DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
REPUBLIC OF THE PHILIPPINES

JAPAN INTERNATIONAL COOPERATION AGENCY

THE DETAILED DESIGN OF PASIG-MARIKINA RIVER CHANNEL IMPROVEMENT PROJECT (PHASE III)

FINAL REPORT

VOLUME-IV-2

QUANTITY CALCULATION OF LOWER MARIKINA RIVER

FEBRUARY 2013

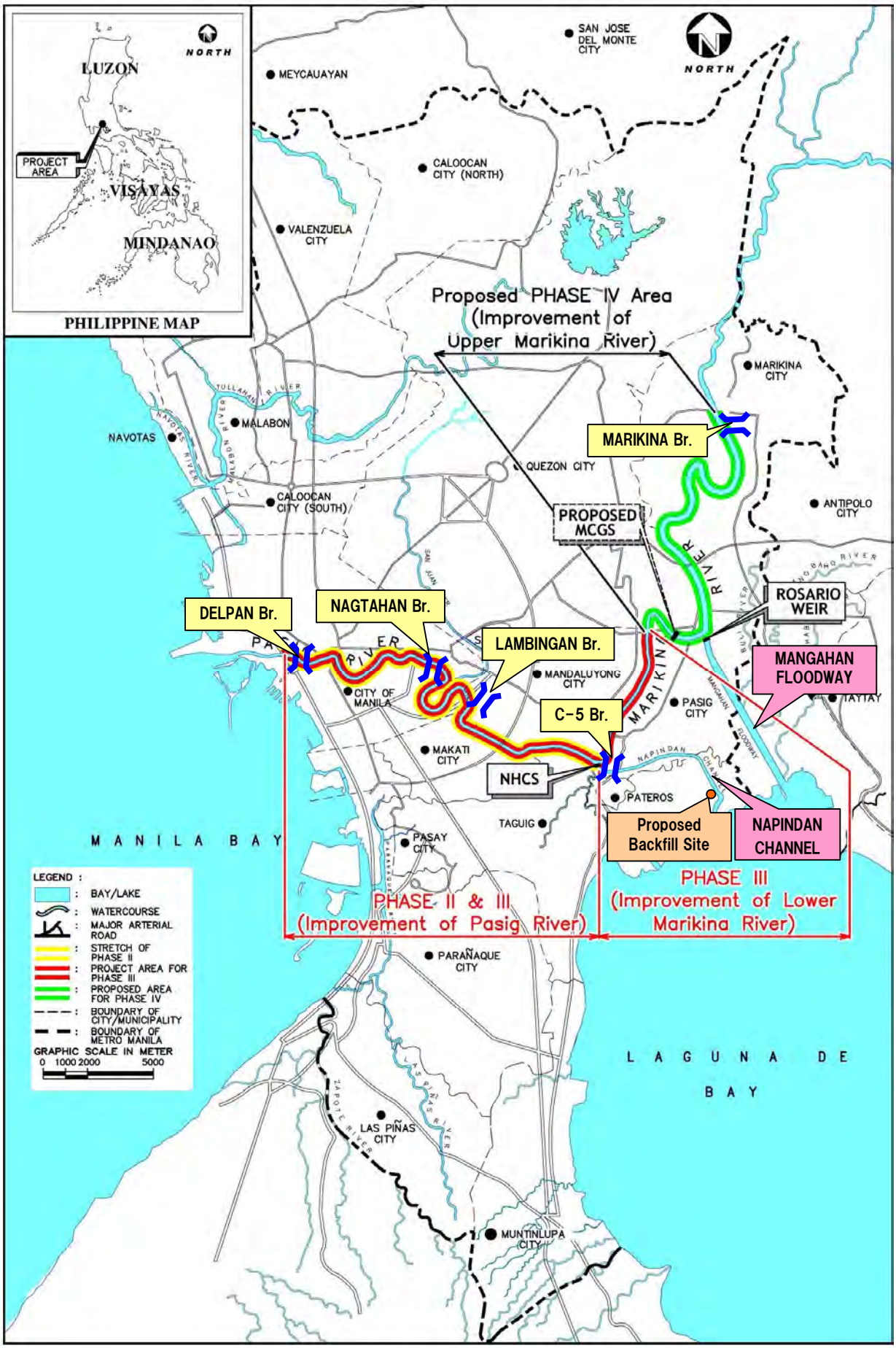
CTI Engineering International Co., Ltd.
Consulting Engineers

COMPOSITION OF FINAL REPORT

VOLUME-I	**:**	**SUMMARY**
VOLUME-II	**:**	**MAIN REPORT**
VOLUME-III-1	**:**	**STRUCTURAL CALCULATION OF PASIG RIVER**
VOLUME-III-2	**:**	**STRUCTURAL CALCULATION OF LOWER MARIKINA RIVER**
VOLUME-IV-1	**:**	**QUANTITY CALCULATION OF PASIG RIVER**
VOLUME-IV-2	**:**	**QUANTITY CALCULATION OF LOWER MARIKINA RIVER**
VOLUME-V	**:**	**COST ESTIMATE**

EXCHANGE RATES USED IN THE REPORT:
PHP 1.00 = JPY 1.968
USD 1.00 = JPY 80.940 = PHP 41.123

(Monthly Average in November 2012 of Central Bank of the Philippines)



PROJECT LOCATION MAP

THE DETAILED DESIGN
OF
PASIG-MARIKINA RIVER CHANNEL
IMPROVEMENT PROJECT (PHASE III)

FINAL REPORT
Vol.-IV-2 QUANTITY CALCULATION OF
LOWER MARIKINA RIVER

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ABBREVIATIONS AND ACRONYMS

Units of Measurement

mm	:	millimeter
cm	:	centimeter
m	:	meter
km	:	kilometer
g, gr	:	gram
kg	:	kilogram
t, ton	:	metric ton
m^2	:	square meter
ha, has	:	hectare, hectares
km^2	:	square kilometer
m^3	:	cubic meter
s, sec	:	second
m, min.	:	minute
h, hr	:	hour
y, yr	:	year
MW	:	megawatt
mm/hr	:	millimeter per hour
m/s	:	meter per second
km/hr	:	kilometer per hour
mg/l	:	milligram per liter
m^3/s	:	cubic meter per second
$m^3/s/km^2$	:	cubic meter per second per square kilometer
%	:	percent
ppm	:	parts per million
x x	:	symbol of multiplication (times)
≤ , ≥	:	Inequality sign (e.g. A≤B means that value A is less than or equal to value B.)
< , >	:	Inequality sign (e.g. A<B means that value A is less than value B.)
Y, Y, JPY	:	Japanese Yen
P, P, PHP	:	Philippine Peso

CHAPTER 1 BILL OF QUANTITY

Bill of quantity of lower Marikina River is indicated from the following page.

BILL No. 1 - PRELIMINARY AND GENERAL

Item No.	Description	Unit	Quantity	Unit Rates				Amounts			
				Peso	Yen	VAT	Total (Peso)	Peso	Yen	VAT	Total (Peso)
1.10/1	Mobilization and demobilization	LS	1								
1.11/1	Survey of ground profiles	LS	1								
1.13/1	Foundation investigation	m	400								
1.15/1	Traffic Management Plan	LS	1								
1.15/2	Implementation and operation of traffic management plan	mo	36								
1.16/1	Quality Management Plan	LS	1								
1.16/2	Implementation and operation of quality management plan	mo	36								
1.16/3	Provisional of laboratory equipment for Employer	LS	1								
1.17/1	Programming and reporting	LS	1								
1.18/1	Health and Safety Plan	LS	1								
1.18/2	Implementation and operation of health and safety plan	mo	36								
1.20/1	Progress photographs	mo	36								
1.22/1	Provision of office for Employer's Personnel	LS	1								
1.22/2	Maintenance of office for Employer's Personnel	mo	36								
1.23/4	Maintain Type A transportation item	mo	180								
1.23/5	Maintain Type B transportation item	mo	108								
1.23/6	Maintain Type C transportation item	mo	36								
1.24/1	Commemorative panels	no	6								
1.25/1	Site clean up	LS	1								
							SUB-TOTALS CARRIED TO SUMMARY				

BILL No. 2 - ENVIRONMENTAL

Item No.	Description	Unit	Quantity	Unit Rates				Amounts			
				Peso	Yen	VAT	Total (Peso)	Peso	Yen	VAT	Total (Peso)
2.1/1	Contractor's environmental management	LS	1								
2.14/1	Testing of dredged materials	LS	1								
							SUB-TOTALS CARRIED TO SUMMARY				

BILL No. 4 - EXCAVATION AND EARTHWORKS

Item No.	Description	Unit	Quantity	Unit Rates				Amounts			
				Peso	Yen	VAT	Total (Peso)	Peso	Yen	VAT	Total (Peso)
4.5/1-B	Demolition and removal of existing concrete wall and structure between Sta. 0+921 and 1+338L	LS	1								
4.5/2-B	Demolition and removal of existing net fence between Sta. 0+921 and 1+338L	LS	1								
4.5/3-B	Demolition and removal of existing concrete road between Sta. 0+921 and 1+338L	LS	1								
4.5/4-B	Demolition and removal of existing guard rail between Sta. 0+921 and 1+338L	LS	1								
4.5/5-B	Temporary relocation and re-installation of lighting post between Sta. 0+921 and 1+338L	LS	1								
4.5/6-B	Demolition and removal of existing concrete wall and structure between Sta. 3+033 and 3+621R	LS	1								
4.5/7-B	Demolition and removal of existing net fence between Sta. 3+033 and 3+621R	LS	1								
4.5/8-B	Demolition & removal of existing concrete road between Sta. 3+033 and 3+621R	LS	1								
4.5/9-B	Temporary relocation and re-installation of lighting post between Sta. 3+033 and 3+621R	LS	1								
4.5/10-B	Demolition and removal of existing steel structure, gate, plate and speaker post between Sta. 3+033 and 3+621R	LS	1								
4.5/11-B	Demolition and removal of existing concrete wall and structure between Sta. 3+898 and 4+670L	LS	1								
4.5/12-B	Demolition and removal of existing net fence between Sta. 3+898 and 4+670L	LS	1								
4.5/13-B	Demolition & removal of existing concrete road between Sta. 3+898 and 4+670L	LS	1								
4.5/14-B	Temporary relocation and re-installation of lighting post between Sta. 3+898 and 4+670L	LS	1								
4.5/15-B	Demolition and removal of existing sluice structure and steel post between Sta. 3+898 and 4+670L	LS	1								
4.8/1	Excavation for manholes and junction manholes	m^3	2,400								
4.8/2	Excavation for pipe culverts	m^3	6,800								
4.8/3	Excavation for other structures	m^3	12,400								
4.11/1	Dike embankment	m^3	11,100								
4.16/1	Random backfill	m^3	11,200								
4.17/1	Zone B pipe backfill	m^3	2,300								
4.17/2	Zone C pipe backfill	m^3	1,100								
4.18/1	Dredging	m^3	889,100								
4.19/1	Disposal of dredged material Type A	m^3	267,500								
4.19/2	Disposal of dredged material Type B	m^3	309,300								
4.19/3	Disposal of dredged material Type C	m^3	312,300								
							SUB-TOTALS CARRIED TO SUMMARY				

BILL No. 5 - CONCRETE

Item No.	Description	Unit	Quantity	Unit Rates				Amounts			
				Peso	Yen	VAT	Total (Peso)	Peso	Yen	VAT	Total (Peso)
5.11/1	Reinforcement Grade 275	t	228								
5.16/1	Precast concrete manhole and junction box covers	m^3	11								
5.16/2	Precast concrete U-ditch covers	m^3	22								
5.22/1	Concrete in manholes, junction boxes and outlets	m^3	230								
5.22/2	Concrete for pipe bedding	m^3	12								
5.22/3	Concrete in box culverts	m^3	354								
5.22/4	Concrete in sheet pile copings	m^3	1,031								
5.22/6	Concrete in parapet walls PW Type 1	m^3	360								
5.22/15	Filler concrete (Class B)	m^3	734								
5.22/16	Concrete in U-ditches	m^3	317								
5.22/18	Concrete in gravity wall	m^3	219								
5.22/19	Concrete revetment	m^3	12								
5.22/20	Concrete in base type A for concrete block retaining wall	m^3	153								
5.22/21	Concrete in base type B for concrete block retaining wall	m^3	101								
5.22/22	Concrete in partition for concrete block retaining wall	m^3	30								
5.22/23	Backfill concrete for concrete block retaining wall	m^3	361								
5.22/24	Top concrete for concrete block retaining wall	m^3	111								
5.22/25	Concrete in stair block	m^3	63								
5.22/26	Concrete in boundary wall	m^3	528								
5.22/27	Concrete in sluice structures	m^3	586								
5.22/28	Concrete in drainage outlet structure at Laguna backfill area	m^3	117								
5.23/1	Levelling concrete	m^3	300								
							SUB-TOTALS CARRIED TO SUMMARY				

BILL No. 6 - PILING

Item No.	Description	Unit	Quantity	Unit Rates				Amounts			
				Peso	Yen	VAT	Total (Peso)	Peso	Yen	VAT	Total (Peso)
6.4/1	Type IIIw U-shape	m	113								
6.4/5	Type10H Hat-shape	m	2,194								
6.4/6	Type 10H Hat-shape with flexible joint	m	254								
6.4/19	Type 25H Hat-shape	m	19,808								
6.4/20	Type 25H Hat-shape with flexible joint	m	184								
6.4/25	Extra-over cost of installing sheet piles beneath bridges and HV cables	m	788								
							SUB-TOTALS CARRIED TO SUMMARY				

BILL No. 7 - PROTECTION WORKS

Item No.	Description	Unit	Quantity	Unit Rates				Amounts			
				Peso	Yen	VAT	Total (Peso)	Peso	Yen	VAT	Total (Peso)
7.5/1	Gravel bedding and backfill	m^3	2,924								
7.8/1	Gabion matresses	m^3	1,130								
7.10/1	Precast concrete block retaining wall	m^2	2,865								
7.11/1	Grass sodding	m^2	5,980								
7.15/1	Protection of existing bridge foundations	m^3	4,329								
							SUB-TOTALS CARRIED TO SUMMARY				

BILL No. 8 - DRAINAGE

Item No.	Description	Unit	Quantity	Unit Rates				Amounts			
				Peso	Yen	VAT	Total (Peso)	Peso	Yen	VAT	Total (Peso)
8.4/6	Reinforced concrete pipe - 910 mm dia.	lm	739								
8.4/7	Reinforced concrete pipe – 1070 mm dia.	lm	8								
8.6/3	Rectangular aluminium flap gate 1000 x 1000	no	1								
8.6/4	Rectangular aluminium flap gate 1200 x 1200	no	3								
8.6/5	Rectangular aluminium flap gate 1400 x 1400	no	2								
8.6/6	Rectangular aluminium flap gate 1500 x 1500	no	2								
8.6/7	Rectangular aluminium flap gate 1600 x 1600	no	1								
8.6/8	Rectangular aluminium flap gate 2000 x 1600	no	1								
							SUB-TOTALS CARRIED TO SUMMARY				

BILL No. 9 - ROADWORKS

Item No.	Description	Unit	Quantity	Unit Rates				Amounts			
				Peso	Yen	VAT	Total (Peso)	Peso	Yen	VAT	Total (Peso)
9.6/1	Base course	m^3	1,173								
9.8/1	Bituminous concrete surface course	m^2	5,870								
							SUB-TOTALS CARRIED TO SUMMARY				

BILL No. 11 - STRUCTURAL AND MISCELLANEOUS METALWORK

Item No.	Description	Unit	Quantity	Unit Rates				Amounts			
				Peso	Yen	VAT	Total (Peso)	Peso	Yen	VAT	Total (Peso)
11.10/1	Trash screen 1400 x 1400	no	1								
11.10/2	Trash screen 1600 x 1600	no	1								
11.10/3	Trash screen 1800 x 1800	no	2								
11.10/4	Trash screen 1900 x 1900	no	2								
11.10/5	Trash screen 2000 x 2000	no	1								
11.10/6	Trash screen 2400 x 2000	no	1								
11.10/7	Trash screen 3100 x 1600	no	1								
							SUB-TOTALS CARRIED TO SUMMARY				

BILL No. 15 - MISCELLANEOUS WORKS

Item No.	Description	Unit	Quantity	Unit Rates				Amounts			
				Peso	Yen	VAT	Total (Peso)	Peso	Yen	VAT	Total (Peso)
15.3/4	Concrete railing – Type 4	no	328								
15.8/1	Boundary markers	no	71								
							SUB-TOTALS CARRIED TO SUMMARY				

CHAPTER 2 RIVER STRUCTURE

Quantity calculation of river structure is indicated from the following page.

Bill of Quantities

No.	Description	Standatd	Using Portion or Description	Unit	Revetment with Sheet Pile			Boundary Marker	Foot Protection Around Piers	Dredging	Backfill Site	Temporary Backfill Site	Total
					Section 1	Section 2	Section 3						
1	Steel Sheet Pile	SP-25H	In all	nos	467	675	897						2,039
			Under Bridge	(nos)	29	14	25						68
			6.4/19 In all	m	4,099	6,609	8,645						19,353
			Under Bridge	(m)	218	140.0	263						620
				t	463.1	746.8	976.8						2,187
				m2	3,689	5,948	7,780						17,417
			Corrosion Protecti	m2	1,678	2,413	3,225						7,316
		SP-10H		nos		123	167						290
			6.4/5	m		245	334						578
				t		21.0	28.8						49.8
				m2		220	300						520
2	Concrete Block	More than 350kg/m2	7.10/1	m2	539	1,014	1,363						2,916
				nos	3,995	7,510	10,095						21,600
		Filling Concrete	5.22/15	m3	115	212	381						708
3	Concrete	A (RC,t≧20cm)	Parapet Wall Type- 5.22/6	m3	81	116	155						351
			Coping 5.22/4	m3	235	338	451						1,024
			Concrete Base Typ 5.22/21	m3		41	55						96
			Step	m3	5	16	39						60
			Outlet 5.22/28	m3							102	9	111
		B (Plain Concrete)	Gravity Wall 5.22/18	m3	93	64	54						211
			Concrete Base Typ 5.22/20	m3	35	43	64						142
			Top Concrete 5.22/24	m3	17	52	39						108
			Partion for Block 5.22/22	m3	3	3	6						12
			Backfill Concrete 5.22/23	m3	60	110	179						349
			Boundary wall 5.22/16	m3	122	164	217						503
			Concrete Revetmer 5.22/19	m3	3	6	3						12
			Boundary Marker	m3				14					14
		C (RC,t<20cm)	Concrete Railing Type-4	m3		6	13						19
		F (Leveling)	5.23/1	m3		8.8	12.0				14.0	48.0	83
4	Form	F2 (Small Structure)	Parapet Wall Type- 5.22/6	m2	673	968	1,293						2,934
			Coping 5.22/4	m2	671	965	1,290						2,926
			Concrete Base Typ 5.22/21	m2		155	234						389
			Step	m2	30	95	249						374
			Outlet 5.22/28	m2							527	95	622
			Gravity Wall 5.22/18	m2	250	155	6						411
			Concrete Base Typ 5.22/20	m2	128	130	177						434
			Top Concrete 5.22/24	m2	67	105	154						326
			Partition for Block 5.22/22	m2	21	25	6						52
			Backfill Concrete 5.22/23	m2	599	1,101	1,760						3,460
			Boundary wall 5.22/16	m2	245	328	434						1,006
			Concrete Revetmer 5.22/19	m2	11	22	11						45
			Boundary Marker	m2				117					117
			Concrete Railing Type-4	m2		209	442						651
		(Leveling Concrete)		m2		22	30				5	15	72
5	Deformed Bar	Grade 275	5.11/1	t	18.4	29.1	40.4	0.3			8.8	0.2	97.2
6	Backfill Gravel	C-40	7.5/1	m3	295	565	908						1,768
7	Foundation Grav	C-40	7.5/1	m3				58			27		85
8	Scaffolding	Frame Scaffolding		m2		278	406						684
9	Embankment	Including extra-embankment	4.11/1	m3	2,026	3,588	4,804					62	10,480
		Temporary Road		m3								7125	7,125
		Gravel	7.5/1	m3							960	1,800	2,760
		Safety Railing		m								2,800	2,800
10	Pavement	Bituminous Concrete Surface Couse	t=5cm 9.8/1	m2	1,331	1,870	2,384						5,585
		Base Course	9.6/1	m3	266	374	477						1,117

Bill of Quantities

No.	Description	Standatd	Using Portion or Description	Unit	Revetment with Sheet Pile Section 1	Revetment with Sheet Pile Section 2	Revetment with Sheet Pile Section 3	Boundary Marker	Foot Protection Around Piers	Dredging	Backfill Site	Temporary Backfill Site	Total
11	Concrete Railing	Type 4		m		100	212						312
		Painting		m2		209	442						650
12	Grass Sodding		7.11/1	m2	845	2,380	2,466						5,692
13	Expansion Joint Part-1	Block Wall	t=10mm	m	36	69	111						216
		Gravity Wall	t=10mm	m	8	5	3						16
14	Drainage Pipe	φ50, With Bag of gravel	Concrete Block Retaining Wall, L=0.60	nos	216	406	546						1,168
		0.06m3 20mm gravel	Gravity Wall L=1.10m	nos	59	33	24						116
15	Expansion Joint Part-2	Cork Filler	Coping t=10mm	m2	18	25	33						76
			Parapet Wall	m2	3	5	6						14
		Joint Sealant	Coping 10*12.5mm	m	52	74	97						223
			Parapet Wall	m	65	98	122						285
		Water Stop	Parapet Wall	m	17	25	31						73
16	Construction Joi	Joint Sealant V-Cut Length	Parapet Wall	m	99	141	192						432
17	Earth Work (Structure)	Excavation For Other Structure	4.8/3	m3	807	1,264	1,450	215			409	460	4,605
		Excavation for Pipe Culvert	4.8/2	m3								168	168
		Random Backfill	4.16/1	m3	388	1,228	1,052	197			174	138	3,177
		Surplus Soil		m3	419	36	397	18			235	30	1,135
		Cleaning of Formation Surface		m2							184		184
		Stripping of Top Soil	t=30cm	ha							9		9
18	RC Pipe	φ910	8.4/6	m							24	32	56
19	Crushed Stone	C-40	7.5/1	m3							960		960
20	Bottle Unit	Installation Area		m2					10,307				10,307
		Weight		t					6,650				6,650
		Bag		nos					6.650				6.650
		Filling Stone	7.15/1	m3					4,123				4,123
21	Dredging Sedime	Dredging	4.18/1	m3						871,552			871,552
		A	4/19.1	m3						262,249			262,249
		B	4.19/2	m3						303,189			303,189
		C	4.19/3	m3						306,114			306,114
22	Dredging Sedime Treatment Area	Reclamation		m3							967,061		967,061
		Gate		nos								2	2
		Observation well		nos							3		3
23	Boundary Marke	Number	15.6/1	nos				71					71
		Form		m2				117					117
		Foundation Gravel		m3				58					58
		Paint (Red)		m2				8					8
24	Temporay Bridg	Handrail L-75*75*9		m								673	673
		H-shaped Steel H-400*400*13*21		m								2,799	2,799
				nos								174	174
		Deck Plate 1000*2000*208		m2								1,440	1,440
				nos								720	720
			Plate 990*1996*6	nos								720	720
			H-shaped Steel H-194*150*6*9	m								5,760	5,760
			Horizontal Brace ∟-125*65*6*8	m								1,184	1,184
			Plate 94*176*8	nos								8,640	8,640
			Flange Angle L-75*75*9	m								1,426	1,426
		Temporary Jetty and Bridge	Main beam H=488*300*11*18	m								738	738
			Cross Beam ∟-300*90:9*13	m								720	720
			Beam Seat ∟-280*100*13*20	m								692	692
			Vertical Booth L-100*100*10	m								1,325	1,325
			Horizontal Brace ∟-200*90*8*13.5	m								653	653
			Bolt M-22:70(F107)	nos								6,198	6,198
			Plate 300*500*12	nos								348	348
			Flange Angle L-75*75*9	m								24	24

Bill of Quantities

No.	Description	Standatd	Using Portion or Description	Unit	Revetment with Sheet Pile Section 1	Revetment with Sheet Pile Section 2	Revetment with Sheet Pile Section 3	Boundary Marker	Foot Protection Around Piers	Dredging	Backfill Site	Temporary Backfill Site	Total
25	Removal	Concrete Structure	Concrete Wall and Structure	m3	93 4.5/1-B	147 4.5/6-B	255 4.5/11-B						495
			Concrete Road	m3	536 5.5/3-B	500 4.5/8-B	807 4.5/13-B						1,842
			Flowerbed and bench	m3		6 4.5/10-B	11 4.5/15-B						17
		Net		m2	691 4.5/2-B	1,192 4.5/7-B	1,316 4.5/12-B						3,199
		Guard Rail		m	121 4.5/4-B								121
		Electric Pole	normal	nos	13 4.5/5-B	10 4.5/10-B	41 4.5/14-B						64
		Electric Pole Concrete	0.30m*0.30m*3.10m	nos			1 4.5/14-B						1
		Steel Post		nos			1						1
		Steel Gate	1.75m*2.05m	nos		1							1
		Steel Plate		nos		1							1
		Organic Materials Miller		nos		2							2
		Fertilizer (Steel Conservatory)	4.50*10.00	nos		1							1
		Sperker Post		nos		1							1
		Steel Handrail φ150		m			8.0						8
		Crane		nos			1						1
		Gate 2.50*2.50		nos			1						1
		Concrete Hume Pipe φ910		m							16.0		16
		φ610		m							28.0		28
		Steel Pipe φ800		m							10.0		10
		House		nos							18.0		18
		Concrete Block 0.60*2.00		m3							494.4		494

Bill of Quantities

1. Revetment SECTION-1 STA 0+921~STA 1+338							
	Description	Standard	B/Q	Unit	Calculation		
1	Steel Sheet Pile	SP-25H W=900	467	nos	L=9.00m 284.10/0.90+1	=	316.7
					L=9.50m 54.1/0.90	=	60.1
					L=7.50m 81.2/0.90	=	90.2
						Sub	467.0
					Under Vargas Bridge W=26.1m 26.1/0.90	nos =	29
		Length	4098.5	m	L=9.00m (284.10/0.90+1)*9.00	=	2850.0
					L=9.50m 54.1/0.90*9.50	=	571.5
					L=7.50m 81.2/0.90*7.50	=	677.0
						Sub	4098.5
					Under Vargas Bridge W=26.1m 29*7.50	=	217.5
		Weight	463.1	t	0.113*4098.5	=	463.13
		Area	3689	m^2	4098.5*0.90	=	3688.7
		Corrosion Protection	1678	m^2	419.4*4.00	=	1677.6
2	Concrete Block Retaining Wall	More than 350kg/2	539	m^2	H=1.75m 1.845*(8.1+40.0+50.0+50.0)	=	273.2
					H=1.50m 1.565*(50.0+50.0+50.0+20.0)	=	266.1
						Sub	539.3
		Block	3995	nos	539.3/(0.30*0.45)	=	3994.81
		Concrete per 1 Block	0.021	m^3			
		Form Area per 1 Block	0.73	m^2	(0.42+0.45)*0.25*1/2*2+(0.24+0.30)*0.25*1/2*2	=	0.35
					(0.45+0.30)*0.05*2	=	0.08
					((0.45+0.25)*0.07+(0.30+0.20)*0.11)*1/2*2	=	0.10
					((0.25+0.15)*0.16+(0.20+0.15)*0.16)*1/2*2	=	0.12
					((0.15+0.20)*0.05+(0.14+0.15)*0.06)*1/2*2	=	0.03
					(0.20+0.13)*0.03*2	=	0.02
					0.20*0.13	=	0.03
						Sub	0.73
		Filling Concrete Type B	115	m^3	(1.845*0.35+0.35*0.175*1/2)*148.1-3995*0.021	=	16.3
					(1.565*0.35+0.35*0.175*1/2)*170.0	=	98.3
						Sub	114.60

Bill of Quantities

1. Revetment SECTION-1 STA 0+921~STA 1+338							
	Description	Standard	B/Q	Unit	Calculation		
3	Concrete	A			Parapet Wall Type-1		
		(RC,t≧20cm)	320	m^3	0.192*419.40	=	80.52
					Coping		
					0.70*0.80*419.40	=	234.86
					Step		
					5.02	=	5.02
						Sub	320.41
		B			Base Concrete Type A		
		(Plain Concrete	330	m^3	0.11*(318.1+0.30*5)	=	35.16
					Top Concrete		
					(0.50+0.55)*0.10*1/2*318.1	=	16.70
					Backfill Concrete		
					(1.875+0.175)*0.10*148.1+(1.565+0.175)*0.10*170.0		59.94
					Partition		
					(1.91*2+1.64*3)*0.30		2.62
					Gravity Wall		
					1.31*58.70+0.55*30.00		93.40
					Boudary Wall		
					0.30*1.00*408.0		122.40
					Concrete Revetment		
					((0.50+1.38+0.80)*0.30+0.424*1.50+0.50*1.00)*1.50	=	2.91
						Sub	330.22
4	Form	F2			Parapet Wall Type-1		
		(RC,t≧20cm)	2696	m^2	1.604*419.40	=	672.72
					Coping		
					1.60*419.40	=	671.04
					Step		
					30.46	=	30.46
					Base Concrete		
					(0.10+0.30)*(318.1+0.30*5)	=	127.84
					Top Concrete		
					(0.112+0.10)*318.1	=	67.44
					Backfill Concrete		
					2.05*148.1+1.74*170.0	=	599.41
					Partition		
					(1.91*2+1.957*0.30+0.25*0.30)*2	=	8.96
					(1.64*2+1.677*0.30+0.25*0.30)*3	=	11.57
					Partition Sub= 20.54		
					Gravity Wall H=1.50m		
					3.18*58.70	=	186.67
					Gravity Wall H=1.00m		
					2.12*30.0	=	63.60
					Gravity Wall Sub= 250.27		
					Boundary Wall		
					0.30*1.00*2*408.0	=	244.80
					Concrete Revetment		
					(0.80*2+0.80+0.50+2.546+1.00*2)*1.50	=	11.17
						Sub	2695.67
5	Deformed Bar	Grade 275			Coping with Parapet Wall Type-1		
			18.37	t	37.69*419.40*0.001	=	15.81
					Step		
					232.02*0.001	=	0.23

Bill of Quantities

1. Revetment SECTION-1 STA 0+921~STA 1+338							
Description		Standard	B/Q	Unit	Calculation		
					Concrete Revetment (4*1.50+1.35*3)*0.888*0.001	=	0.009
					Boundary Wall 5.70*408.0*0.001	=	2.33
						Sub	18.37
6	Backfill Gravel	C-40	295	m^3	0.990*148.1+0.857*170.0	=	292.31
					1.186*0.20*0.30*2+1.162*0.20*0.30*3	=	0.35
					Step 2.6	=	2.60
						Sub	295.26
9	Dike	including extra-embankment	2,026	m^3	From Earth Work Calculation 2025.5	=	2,025.5
10	Pavement	Bituminous t=5cm	1,331	m^2	(284.1+54.1+81.2)*3.00+2.65*4.95+(9.5+5.0)*5.0*1/2+(5.0+4.5)*5.0*1/2	=	1,331.3
		Base Course t=20cm	266	m^2	1331.1*0.20	=	266.2
12	Grass Sodding		845	m^2	From Earth Work Calculation 845.1	=	845
13	Expansion Joint Part-1	Filler Expansion	44.2	m^2	(1.957+2.182)*0.45*1/2*17+(1.677+1.902)*0.45*1/2*20	=	31.94
					(0.502*0.30-0.20*0.402*1/2)*37	=	4.08
					Concrete Block Wall Sub= 36.02		
					1.31*5+0.55*3	=	8.20
						Sub	44.22
14	Drainage Pipe	With Bag of Gravel VPφ50	216	nos	Concrete Block Retaining Wall, L=0.60m 539.3 / 2.5	=	215.7
			59	nos	Gravity Wall, L=1.10m 1.677*86.8/2.50	=	58.2
15	Joint Coping+Wall	Coping Expansinon	43	nos	413.1/10.0+1	=	42.3
	Part-2	Parapet Expansion	22	nos	413.1/20.0+1	=	21.7
		Parapet Construction	62	nos	413.1/20.0*3	=	62.0
	Expansion Joint	Cork Filler 10mm	18	m^2	0.41*43	=	17.6
					Coping 0.70*0.80-1.20*0.125	=	0.41

Bill of Quantities

1. Revetment SECTION-1 STA 0+921~STA 1+338							
	Description	Standard	B/Q	Unit	Calculation		
			3	m^2	0.15*22		3.3
					Parapet Wall (0.20+0.28)*0.80*1/2-0.0125*(0.80+0.20+0.804)-0.020*(0.80-0.0125)	=	0.15
		Joint Sealant 10*12.5	52	m	1.20*43		52
					Coping 0.05+0.80+0.35	=	1.20
			65	m	2.97*22		65
					Parapet Wall 0.80+0.20+0.804+0.370+0.800	=	2.97
		Water Stop	17	m	Parapet Wall (0.80-0.05)*22	=	17
16	Construction Join	Joint Sealant V-Cut Length	99	m	Parapet Wall (0.80+0.804)*62	=	99
17	Earth Work Excavation		807	m^3	From Earth Work Calculation 803.6		803.60
					Concrete revetment (1.50+2.50)*1.00*1/2*1.50	=	3.00
						Sub	806.60
	Surplus Soil		419	m^3	From Earth Work Calculation 803.6-385.8	=	417.80
					Concrete revetment 0.50*1.00*1.50	=	0.75
						Sub	418.55
	Backfill		388	m^3	From Earth Work Calculation 385.8	=	385.80
					3.00-0.75	=	2.25
						Sub	388.05
25	Removal	Concrete Structure	Total 629	m^3	0.20*0.48*250.00	=	24.0
					0.20*0.45*13.20	=	1.2
					0.20*0.80*150.00*0.90	=	21.6
					0.20*0.50*85.00	=	8.5
					Bench (2.11*0.63*0.09+0.18*0.42*0.60*3)*3	=	0.8
					Flower Bed (2.14*1.20*0.10+2.04*1.04*0.51)*4	=	5.4
					Existing House (8.20*3+11.00*2+14.6)*3.30*0.16	=	32.3
					Concrete Road t=0.23m 6.30*0.23*369.7	=	535.7
						Sub	629.4

Bill of Quantities

1. Revetment SECTION-1 STA 0+921~STA 1+338							
Description		Standard	B/Q	Unit	Calculation		
		Net	Total 691	m^2	h=2.00m 2.00*250.0	= =	 500
					h=2.25m 2.25*85.00	= Sub	 191 691
		Guard Rail	121	m	41.30+38.30+14.20+27.40		121
		Electric Pole	13	nos	392.0/30.0		13

Bill of Quantities

2. Revetment SECTION-2 STA 3+033~STA 3+621

	Description	Standard	B/Q	Unit	Calculation		
1	Steel Sheet Pile	SP-25H W=900	675	nos	L=9.00m 119.10/0.9+2	=	134.3
					L=10.00m 97.2/0.90	=	108.0
					L=10.50m 387.0/0.90+2	=	432.0
						Sub	674.3
					Under Sandoval Bridge W=12.6m 12.6/0.90	nos =	14.0
		Length	6609.0	m	L=9.00m (119.10/0.9+2)*9.00	=	1209.0
					L=10.00m 97.2/0.90*10.00	=	1080.0
					L=10.50m (387.0/0.90+2)*10.00	=	4320.0
						Sub	6609.0
					Under Sandoval Bridge W=26.1m 14*10.0	=	140.0
		Weight	746.8	t	0.113*6609.0		746.82
		Area	5948	m^2	6609.0*0.90	=	5948.1
		SP-10H W=900	123	nos	L=2.00m (50.0+50.0+10.0)/0.90	=	122.2
		Length	244.5	m	L=2.00m (50.0+50.0+10.0)/0.90*2.00	=	244.5
		Weight	21.0	t	0.086.4*244.5	=	21.03
		Area	220	m^2	244.5*0.90	=	220.1
		Corrosion Protection	2413	m^2	603.3*4.00	=	2413.2
2	Concrete Block Retaining Wall	More than 350kg/2	1014	m^2	H=1.75m 1.845*(50.0*5+18.0)	=	494.5
					H=2.00m 2.124*(50.0+30.0+40.0)	=	254.9
					H=2.25m 2.404*(50.0+50.0+10.0)	=	264.4
						Sub	1013.8
		Block	7510	nos	1013.8/(0.30*0.45)	=	7509.63
		Concrete per 1 Block	0.021	m^3			
		Form Area per 1 Block	0.73	m^2	(0.42+0.45)*0.25*1/2*2+(0.24+0.30)*0.25*1/2*2	=	0.35
					(0.45+0.30)*0.05*2	=	0.08
					((0.45+0.25)*0.07+(0.30+0.20)*0.11)*1/2*2	=	0.10
					((0.25+0.15)*0.16+(0.20+0.15)*0.16)*1/2*2	=	0.12
					((0.15+0.20)*0.05+(0.14+0.15)*0.06)*1/2*2	=	0.03
					(0.20+0.13)*0.03*2	=	0.02

Bill of Quantities

2. Revetment SECTION-2 STA 3+033~STA 3+621

	Description	Standard	B/Q	Unit	Calculation		
					0.20*0.13	=	0.03
						Sub	0.73
		Filling Concrete Type B	212	m^3	(1.845*0.35+0.35*0.175*1/2)*268.0-7510*0.021	=	23.6
					(2.124*0.35+0.35*0.175*1/2)*120.0	=	92.9
					(2.404*0.35+0.35*0.175*1/2)*110.0	=	95.9
						Sub	212.36
3	Concrete	A (RC,t≧20cm)	510	m^3	Parapet Wall Type-1 0.192*603.3	=	115.83
					Coping 0.70*0.80*603.3	=	337.85
					Base Concrete 0.369*(110.00+0.30)	=	40.70
					Step 15.91	=	15.91
						Sub	510.29
		B (Plain Concre	95	m^3	Base Concrete 0.11*(388.0+0.30*5)	=	42.85
					Top Concrete (0.50+0.55)*0.10*(110.0+388.0)	=	52.29
					Backfill Concrete (1.845+0.175)*268.0*0.10	=	54.14
					(2.124+0.175)*120.0*0.10	=	27.59
					(2.404+0.175)*110.0*0.10	=	28.37
					Back fill Sub = 110.09		
					Levelling Concrete 0.10*0.80*110.0	=	8.80
					Partition 1.91*0.30*3	=	1.72
					2.20*0.30*1	=	0.66
					2.72*0.30*1	=	0.82
					Partition Sub= 3.20		
					Gravity Wall H=1.50m 1.31*48.6	=	63.67
					Boundary Wall 0.30*1.00*546.0	=	163.80
					Concrete Revetment ((0.50+1.38+0.80)*0.30+0.424*1.50+0.50*1.00)*1.50*2	=	5.82
						Sub	95.14
		C (RC,t<20cm)	6.2		0.621*100.0/10.0	=	6.21
		F (Levelling Concrete)	8.8	m^3	0.10*0.80*110.3	=	8.82

Bill of Quantities

2. Revetment SECTION-2 STA 3+033~STA 3+621

	Description	Standard	B/Q	Unit	Calculation		
4	Form	F2 (Small)			Parapet Wall Type-1		
			4256	m^2	1.604*603.3	=	967.69
					Coping		
					1.60*603.3	=	965.28
					Base Concrete Type A		
					1.175*110.3	=	129.60
					Step		
					95.3	=	95.30
					Base Concrete Type-B		
					0.40*388.0	=	155.20
					Top Concrete		
					(0.11+0.10)*(388.0+110.0)	=	104.58
					Backfill Concrete		
					(1.845+0.175)*268.0+(2.124+0.175)*120.0+(2.404+0.175)*110.0	=	1100.93
					Partition		
					(1.91*2+1.957*0.30+0.25*0.30)*3	=	13.45
					(2.20*2+2.236*0.30+0.25*0.30)*1	=	5.15
					(2.72*2+2.516*0.30+0.25*0.30)*1	=	6.27
					Partition Sub= 24.86		
					Gravity Wall H=1.50m		
					3.18*48.60	=	154.55
					Boundary Wall		
					0.30*1.00*2*546.0	=	327.60
					Concrete Revetment		
					(0.80*2+0.80+0.50+2.546+1.00*2)*1.50*2	=	22.34
					Concrete Railing Type-4		
					20.85*100.0/10.0	=	208.50
						Sub	4256.43
		F (Levelling Concrete)	22.1	m^3	0.10*2*110.3	=	22.06
5	Deformed Bar	Grade 275			Coping with Parapet Wall Type-1		
			29.14	t	37.69*603.30*0.001	=	22.74
					Base Concrete		
					16.0*110.30*0.001	=	1.76
					Step		
					768.59*0.001	=	0.77
					Concrete Revetment		
					(4*1.50+1.35*3)*0.888*0.001*2	=	0.018
					Boundary Wall		
					5.70*546.0*0.001	=	3.11
					Concrete Railing Type-4		
					73.92*100.0/10.0*0.001	=	0.74
						Sub	29.14
6	Backfill Gravel	C-40					
			565	m^3	0.990*268.0+1.128*120.0+1.411*110.0	=	555.89
					1.186*0.20*0.30*3+1.210*0.220*0.30*2+(1.133*0.30-0.10*0.80)*0.30	=	0.45
					Step		
					8.22	=	8.22
						Sub	564.56

Bill of Quantities

2. Revetment SECTION-2 STA 3+033~STA 3+621

	Description	Standard	B/Q	Unit	Calculation		
8	Frame		278	m^2	2.516*110.3	=	277.51
9	Dike	including extra-embankment	3,588	m^3	From Earth Work Calculation 3588.077	=	3,588.1
10	Pavement	Bituminous t=5cm	1,870	m^2	593.0*3.0+(5.65+8.5)*2.5*1/2+41.0+2.65*7.5+5.0*5.0*1/2	=	1,870.1
		Base Course t=20cm	374	m^2	1870.1*0.20	=	374.0
11	Concrete Railing	Type 4 Length	100.0	m	3+370.6~3+479.8 100.0	=	100.0
		Paint	208.5	m	3+370.6~3+479.8 20.85*100.0/10.0	=	208.5
12	Grass Sodding		2,380	m^2	From Earth Work Calculation 2380.4	=	2,380
13	Expansion Joint Part-1	Filler Expansion	74.2	m^2	(2.516+2.741)*0.45*1/2*13+(2.236+2.461)*0.45*1/2*15	=	31.23
					(1.957+2.182)*0.45*1/2*30	=	27.94
					(0.502*0.30-0.20*0.402*1/2)*45+(0.60*0.70-0.45*0.225*1/2)*13	=	9.77
					Concrete Block Wall Sub = 68.94		
					1.31*4	=	5.24
						Sub	74.18
14	Drainage Pipe	With Bag of gravel VPφ50	406	nos	Concrete Block Retaining Wall, L=0.60m 1014/2.50	=	406
			33	nos	Gravity Wall, L=1.10m 1.677*48.6/2.50	=	32.6
15	Joint Part-2	Coping Expansinon	62	nos	576.7/10.0+4	=	61.7
		Parapet Expansion	33	nos	576.7/20.0+4	=	32.8
		Parapet Construction	88	nos	576.7/20.0*3+1	=	87.5
	Expansion Joint	Cork Filler 10mm	25	m^2	0.41*62	=	25.4
					Coping 0.70*0.80-1.20*0.125	=	0.41
			5	m^2	0.15*33		5.0

Bill of Quantities

2. Revetment SECTION-2 STA 3+033~STA 3+621

	Description	Standard	B/Q	Unit	Calculation		
					Parapet Wall (0.20+0.28)*0.80*1/2-0.0125*(0.80+0.20+0.804)-0.020*(0.80-0.0125)	=	0.15
		Joint Sealant 10*12.5	74	m	1.20*62	=	74
					Coping 0.05+0.80+0.35	=	1.20
			98	m	2.97*33		98
					Parapet Wall 0.80+0.20+0.804+0.370+0.800	=	2.97
		Water Stop	25	m	Parapet Wall (0.80-0.05)*33	=	25
16	Construction Join	Joint Sealant V-Cut Length	141	m	Parapet Wall (0.80+0.804)*88	=	141
17	Earth Work Excavation		1,264	m^3	From Earth Work Calculation 1257.8	=	1257.80
					Concrete revetment (1.50+2.50)*1.00*1/2*1.50*2	=	6.00
						Sub	1263.80
	Surplus Soil		36	m^3	From Earth Work Calculation 1257.8-1223.5	=	34.30
					Concrete revetment 0.50*1.00*1.50*2	=	1.50
						Sub	35.80
	Backfill		1,228	m^3	From Earth Work Calculation 1223.5	=	1223.50
					6.00-1.50	=	4.50
						Sub	1228.00
25	Removal	Concrete Structure	Total 652	m^3	0.20*1.50*15.80	=	4.7
					0.15*0.90*180.40*0.80	=	19.5
					0.20*1.00*182.0	=	36.4
					0.20*1.00*414.0	=	82.8
					Bench (1.70*0.40*0.10+0.10*0.30*0.40*2)*10	=	0.9
					Flower Bed (1.05*2.10-0.79*1.84)*0.62*10	=	4.7
					Step 5.40*1.50*0.20+0.15*0.40*10*1.50+1.50*0.20*4.00	=	3.7
					Concrete Road t=0.20m 6.10*0.20*409.5	=	499.6
						Sub	652.3
		Net	1,192	m^2	h=2.00m 2.00*(182.0+414.0)	=	1192
		Electric Pole	10	nos	10	=	10

Bill of Quantities

2. Revetment SECTION-2 STA 3+033~STA 3+621							
Description		Standard	B/Q	Unit	Calculation		
		Steel Gate	1	nos	1.70*2.05 1	=	1
		Steel Plate	1	nos	4.50*7.15 (Drainage System) 1	=	1
		Organic Materials Miller	2	nos	2	=	2
		Fertilizer (Steel Conservatory)	1	nos	4.50*10.00 1	=	1
		Sperker Post	1	nos	1	=	1

Bill of Quantities

3. Revetment SECTION-3 STA 3+898~STA 4+670							
Description		Standard	B/Q	Unit	Calculation		
1	Steel Sheet Pile	SP-25H W=900	897	nos	L=9.50m 332.1/0.90+1	=	370.0
					L=10.50m (60.2+289.20)/0.90	=	388.2
					L=9.00m 124.7/0.90	=	138.6
						Sub	896.8
					Under Rosario Bridge W=22.5m 22.5/0.90	nos =	25
		Length	8645.0	m	L=9.50m (332.1/0.90+1)*9.50	=	3515.0
					L=10.50m (60.2+289.20)/0.90*10.0	=	3882.5
					L=9.00m 124.7/0.90*9.00	=	1247.0
						Sub	8644.5
					Under Rosario Bridge W=22.5m 25*10.5	m =	262.5
		Weight	976.8	t	0.113*8644.5	=	976.83
		Area	7780	m^2	8644.5*0.90	=	7780.1
		SP-10H W=900	167	nos	L=2.00m (50.0+50.0+50.0)/0.90	=	166.7
		Length	333.5		L=2.00m (50.0+50.0+50.0)/0.90*2.00	=	333.5
		Weight	28.8	t	0.0864*333.5	=	28.8
		Area	300.2	m^2	333.5*0.90	=	300.2
		Corrosion Protection	3225	m^2	806.23*4.00	=	3224.9
2	Concrete Block Retaining Wall	More than 350kg/2	1363	m^2	H=2.00m 2.124*(50.0*9+40.0*2+25.0+30.0)	=	1242.5
					H=2.25m 2.404*50.0	=	120.2
					H=2.50m 2.683*50.0*2	=	268.3
						Sub	1362.7
		Block	10095	nos	1362.7/(0.30*0.45)	=	10094.07
		Concrete per 1 Block	0.021	m^3			
		Form Area per 1 Block	0.73	m^2	(0.42+0.45)*0.25*1/2*2+(0.24+0.30)*0.25*1/2*2	=	0.35
					(0.45+0.30)*0.05*2	=	0.08
					((0.45+0.25)*0.07+(0.30+0.20)*0.11)*1/2*2	=	0.10
					((0.25+0.15)*0.16+(0.20+0.15)*0.16)*1/2*2	=	0.12
					((0.15+0.20)*0.05+(0.14+0.15)*0.06)*1/2*2	=	0.03
					(0.20+0.13)*0.03*2	=	0.02

Bill of Quantities

3. Revetment SECTION-3 STA 3+898~STA 4+670							
Description		Standard	B/Q	Unit	Calculation		
					0.20*0.13	=	0.03
						Sub	0.73
		Filling Concrete Type B	381	m^3	(2.124*0.35+0.35*0.175*1/2)*585.0-10095*0.021	=	240.8
					(2.404*0.35+0.35*0.175*1/2)*50.0	=	43.6
					(2.683*0.35+0.35*0.175*1/2)*100.0	=	97.0
						Sub	381.38
3	Concrete	A (RC,t≧20cm)	701	m^3	Parapet Wall Type-1 0.192*806.23	=	154.80
					Coping 0.70*0.80*806.23	=	451.49
					Base Concrete 0.369*(150.00+0.30)	=	55.46
					Step 39.4	=	39.40
						Sub	701.15
		B (Plain Concre	571	m^3	Base Concrete 0.11*585.0	=	64.35
					Top Concrete (0.50+0.55)*0.10*1/2*735.0	=	38.59
					Backfill Concrete (2.124+0.175)*0.10*585.0	=	134.49
					(2.683+0.175)*0.10*110.0	=	31.44
					(2.404+0.175)*0.10*50.0	=	12.90
					Back fill Sub = 178.82		
					Levelling Concrete 0.10*0.80*150.0	=	12.00
					Partition 2.72*2+2.516*0.30+0.25*0.30	=	6.27
					Gravity Wall H=1.80m 1.71*30.0+0.90*1.80*1/2*0.50*2	=	52.11
					Gravity Wall H=1.00m 0.55*3.00	=	1.65
					Gravity Wall Sub= 53.76		
					Boundary Wall 0.30*1.00*723.0	=	216.90
					Concrete Revetment ((0.50+1.38+0.80)*0.30+0.424*1.50+0.50*1.00)*1.50	=	2.91
						Sub	570.69
		C (RC,t<20cm)	13.2	m^3	0.621*212.0/10.0	=	13.17
		F (Levelling Concrete)	12.0	m^3	0.10*0.80*150.3	=	12.02

Bill of Quantities

3. Revetment SECTION-3 STA 3+898~STA 4+670							
	Description	Standard	B/Q	Unit	Calculation		
4	Form	F2 (Small)	6173	m^2	Parapet Wall Type-1 1.604*806.23	=	1293.19
					Coping 1.60*806.23	=	1289.97
					Base Concrete Type A 1.175*(150.00+0.30)	=	176.60
					Step 248.5	=	248.50
					Base Concrete Type B 0.40*585.0	=	234.00
					Top Concrete (0.11+0.10)*735.0	=	154.35
					Backfill Concrete (2.124+0.175)*585.0	=	1344.92
					(2.683+0.175)*100.0	=	285.80
					(2.404+0.175)*50.0	=	128.95
					Back fill Sub = 1759.67		
					Partition 2.72*2+2.516*0.30+0.25*0.30	=	6.27
					Gravity Wall H=1.80m 3.81*29.00+0.90*1.80*1/2*4+2.012+0.50*2	=	116.74
					Gravity Wall H=1.00m 2.12*3.00	=	6.36
					Boundary Wall 0.30*1.00*2*723.0	=	433.80
					Concrete Revetment (0.80*2+0.80+0.50+2.546+1.00*2)*1.50	=	11.17
					Concrete Railing Type-4 20.85*212.0/10.0	=	442.02
						Sub	6172.64
		F (Levelling Concrete)	30.1	m^3	0.10*2*150.3	=	30.06
5	Deformed Bar	Grade 275	40.37	t	Coping with Parapet Wall Type-1 37.69*806.23*0.001	=	30.387
					Base Concrete 16.0*150.30*0.001	=	2.405
					Step 1879.30*0.001	=	1.879
					Concrete Revetment (4*1.50+1.35*3)*0.888*0.001	=	0.009
					Boundary Wall 5.70*723.0*0.001	=	4.121
					Concrete Railing Type 4 73.90*212.0/10.0*0.001	=	1.567
						Sub	40.368
6	Backfill Gravel	C-40	908	m^3	1.128*585.0+1.575*100.0+1.411*50.0	=	887.93
					(1.133*0.30-0.10*0.80)*0.30	=	0.08
					Step 20.11	=	20.11

Bill of Quantities

3. Revetment SECTION-3 STA 3+898~STA 4+670							
Description		Standard	B/Q	Unit	Calculation		
						=	908.12
8	Frame		406	m^2	2.795*100.0+2.516*50.3	=	406.05
9	Dike	including extra-embankment	0	m^3	From Earth Work Calculation	=	0.0
10	Pavement	Bituminous t=5cm	2,384	m^2	794.7*3.00	=	2,384.1
		Base Course t=20cm	477	m^2	2384.1*0.20	=	476.8
11	Concrete Railing	Type 4 Length	211.9	m	3+898~4+105 211.9	=	211.9
		Painting	441.8	m	3+898~4+105 20.85*211.9/10.0	=	441.8
12	Grass Sodding		2,466	m^2	From Earth Work Calculation 2466	=	2,466
13	Joint Part-1	Filler Expansion	113.9	m^2	(2.236+2.471)*0.45*1/2*70+(2.795+3.02)*0.45*1/2*12	=	89.84
					(2.516+2.741)*0.45*1/2*6	=	7.10
					(0.502*0.30-0.20*0.402*1/2)*70+(0.60*0.70-0.45*0.225*1/2)*18	=	14.38
					Concrete Block Wall Sub= 111.31		
					1.31*2	=	2.62
						Sub	113.93
14	Drainage Pipe	With Bag of Gravel VPφ50	546	nos	Concrete Block Retaining Wall, L=0.60m 1363/2.50	=	545
			24	nos	Gravity Wall, L=1.10m (1.80*30.0+1.677*3.0)/2.50	=	23.6
15	Joint Coping+Wall	Coping Expansinon	81	nos	794.7/10.0+1	=	80.5
	Part-2	Parapet Expansion	41	nos	794.7/20.0+1	=	40.7
		Parapet Construction	120	nos	794.7/20.0*3	=	119.2
	Expansion Joint	Cork Filler 10mm	33	m^2	0.41*81	=	33.2
					Coping 0.70*0.80-1.20*0.125	=	0.41
			6	m^2	0.15*41	=	6.2

Bill of Quantities

3. Revetment SECTION-3 STA 3+898~STA 4+670							
Description		Standard	B/Q	Unit	Calculation		
					Parapet Wall (0.20+0.28)*0.80*1/2-0.0125*(0.80+0.20+0.804)-0.020*(0.80-0.0125)	=	0.15
		Joint Sealant 10*12.5	97	m	1.20*81	=	97
					Coping 0.05+0.80+0.35	=	1.20
			122	m	2.97*41	=	122
					Parapet Wall 0.80+0.20+0.804+0.370+0.800	=	2.97
		Water Stop	31	m	Parapet Wall (0.80-0.05)*41	=	31
16	Construction Join	Joint Sealant V-Cut Length	192	m	Parapet Wall (0.80+0.804)*120	=	192
17	Earth Work Excavation		1,450	m^3	From Earth Work Calculation 1446.5	=	1446.50
					Concrete revetment (1.50+2.50)*1.00*1/2*1.50	=	3.00
						Sub	1449.50
	Surplus Soil		397	m^3	From Earth Work Calculation 1446.5-1050.1	=	396.40
					Concrete revetment 0.50*1.00*1.50	=	0.75
						Sub	397.15
	Backfill		1,052	m^3	From Earth Work Calculation 1050.1	=	1050.10
					3.00-0.75	=	2.25
						Sub	1052.35
25	Removal	Concrete Structure	Total 1,073	m^3	0.18*0.72*(180.0+95.6)	=	35.7
					0.20*1.55*48.0	=	14.9
					0.20*0.73*401.0	=	58.5
					0.18*0.92*(180.7+20.0)	=	33.2
					0.20*1.24*12.00	=	3.0
					0.18*0.85*(116.0+189.8)	=	46.8
					Bench (2.11*0.63*0.09+0.18*0.42*0.60*3)*39	=	10.0
					Bench (1.20*0.40*0.10+0.16*0.30*0.45*2)*17	=	1.6
					Flower Bed (0.60^2*π/4*2+0.85*0.60-0.38^2*π/4-0.38*0.85)*0.60*25	=	9.6
					(1.50*0.60-1.28*0.38)*0.38*4	=	0.6

Bill of Quantities

3. Revetment SECTION-3 STA 3+898~STA 4+670							
Description		Standard	B/Q	Unit	Calculation		
					Sluisway		
					0.30*0.30*2.60*4	=	0.9
					2.43*2.50*0.40	=	2.4
					0.30*0.30*(1.05*2+1.75*2+1.83)	=	0.7
					(2.50*2.50-1.90*1.80)*7.50	=	21.2
					Concrete Road		
					5.30*761.0*0.20	=	806.7
					Concrete Wall		
					(0.45*2.25+2.75*5.51+1.30*2.25+1.30*1.00)*0.30	=	6.1
					Concrete Slab Structure		
					(6.40*2.85-5.40*2.35)*6.85*1/2+0.40*0.40*2.35*3	=	20.1
					(1.70*1.57-1.36*1.23)*1.27	=	1.3
						Sub	1073.3
		Net	Total 1,316	m^2	h=1.06m		
					1.06*48.0	=	50.9
					h=1.90m		
					1.90*(180.0+95.6)	=	523.6
					h=1.85m		
					1.85*401.0	=	741.9
						Sub	1316.4
		Electric Pole	41	nos	13+28	=	41
		Steel Handrail φ150	8.0	m	2.00*4	=	8.0
		Crane	1	nos	1	=	1
		Gate 2.50*2.50	1	nos	1	=	1
		Electric Pole Concrete	1	nos	0.30m*0.30m*3.10m 1	=	1
		Steel Post	1	nos	1	=	1

Step Volume

	Section	1			2								3													
	STA	0+933	1+075	Sub	3+048	3+144	3+250	3+272	3+449	3+540	3+595	Sub	3+920	3+967	4+016	4+065	4+166	4+218	4+270	4+322	4+374	4+486	4+538	4+590	4+642	Sub
Properties	H	1.50	1.50		0.90	1.35	1.50	1.20	1.75	1.60	1.35		2.10	2.30	2.30	2.10	1.50	1.35	1.50	1.50	1.20	1.50	1.60	1.75	1.60	
	Hr	1.12	1.12		0.48	0.96	1.12	0.80	1.44	1.28	0.95		1.76	1.92	1.92	1.76	1.12	0.96	1.12	1.12	0.80	1.12	1.28	1.44	1.28	
	hf	0.38	0.38		0.42	0.39	0.38	0.40	0.31	0.32	0.39		0.34	0.38	0.38	0.34	0.38	0.39	0.38	0.38	0.40	0.38	0.32	0.31	0.32	
	h	0.02	0.12		0.14	0.11	0.00	0.15	0.15	0.04	0.13		0.06	0.13	0.06	0.11	0.10	0.04	0.02	0.07	0.04	0.06	0.06	0.04	0.05	
	L	2.46	2.46		1.34	2.18	2.46	1.90	3.02	2.74	2.18		3.58	3.86	3.86	3.30	2.45	2.18	2.46	2.46	1.90	2.46	2.74	3.02	2.74	
	Ls	1.96	1.96		0.84	1.68	1.96	1.40	2.52	2.24	1.68		3.08	3.36	3.36	2.80	1.96	1.68	1.96	1.96	1.40	1.96	2.24	2.52	2.24	
	n	7.00	7.00		3.00	6.00	7.00	5.00	9.00	8.00	6.00		11.00	12.00	12.00	11.00	7.00	6.00	7.00	7.00	5.00	7.00	8.00	9.00	8.00	
Form	1	5.185	5.185		2.009	4.273	5.185	3.440	6.941	5.901	4.246		9.615	11.305	11.305	8.932	5.155	4.273	5.185	5.185	3.440	5.185	5.901	6.941	5.901	
	2	2.759	2.759		0.573	2.095	2.759	1.509	4.071	3.278	2.095		6.199	7.592	7.592	5.694	2.759	2.095	2.759	2.759	1.509	2.759	3.278	4.071	3.278	
	3	3.732	3.732		1.857	3.263	3.732	2.794	4.595	4.126	3.263		5.607	6.151	6.151	5.123	3.732	3.263	3.732	3.732	2.794	3.732	4.126	4.595	4.126	
	4	1.695	1.695		0.955	1.510	1.695	1.325	2.025	1.840	1.510		2.435	2.660	2.660	2.306	1.695	1.510	1.695	1.695	1.325	1.695	1.840	2.025	1.840	
	5	0.750	0.750		0.346	0.649	0.750	0.548	0.951	0.850	0.649		1.153	1.254	1.254	1.007	0.750	0.649	0.750	0.750	0.548	0.750	0.850	0.951	0.850	
	6	1.110	1.110		1.170	1.125	1.110	1.140	1.005	1.020	1.125		1.050	1.110	1.110	1.050	1.110	1.125	1.110	1.110	1.140	1.110	1.020	1.005	1.020	
	Total	15.231	15.231	30.46	6.910	12.915	15.231	10.757	19.588	17.015	12.888	95.30	26.060	30.071	30.071	24.113	15.201	12.915	15.231	15.231	10.757	15.231	17.015	19.588	17.015	248.50
Concrete	1	1.037	1.037		0.402	0.855	1.037	0.688	1.388	1.180	0.858		1.923	2.261	2.261	1.786	1.031	0.855	1.037	1.037	0.688	1.037	1.180	1.388	1.180	
Volume	2	1.068	1.068		0.762	0.992	1.068	0.915	1.184	1.107	0.992		1.374	1.488	1.488	1.290	1.068	0.992	1.068	1.068	0.915	1.068	1.107	1.184	1.107	
	3	0.403	0.403		0.134	0.336	0.403	0.269	0.538	0.470	0.336		0.672	0.739	0.739	0.672	0.403	0.336	0.403	0.403	0.269	0.403	0.470	0.538	0.470	
	Total	2.508	2.508	5.02	1.298	2.182	2.508	1.872	3.109	2.758	2.186	15.91	3.969	4.488	4.488	3.748	2.502	2.182	2.508	2.508	1.872	2.508	2.758	3.109	2.758	39.40
Foundation	1	0.588	0.588		0.252	0.504	0.588	0.420	0.756	0.672	0.504		0.924	1.008	1.008	0.840	0.588	0.504	0.588	0.588	0.420	0.588	0.672	0.756	0.672	
Gravel	2	0.162	0.162		0.126	0.153	0.162	0.144	0.177	0.168	0.153		0.198	0.210	0.210	0.198	0.162	0.153	0.162	0.162	0.144	0.162	0.168	0.177	0.168	
	3	0.550	0.550		0.206	0.464	0.550	0.378	0.733	0.647	0.464		0.895	0.970	0.970	0.777	0.546	0.464	0.550	0.550	0.378	0.550	0.647	0.733	0.647	
	Total	1.300	1.300	2.60	0.584	1.121	1.300	0.942	1.666	1.487	1.121	8.22	2.017	2.188	2.188	1.815	1.296	1.121	1.300	1.300	0.942	1.300	1.487	1.666	1.487	20.11

Section 1 Dike Embankment

STA			Distance (m)	Area (m^2)	Average Area(m^2)	Volume(m^3)
0	+	921.2		7.44		
0	+	922.7	1.50	7.44	7.44	11.2
0	+	950	27.30	9.47	8.46	230.8
1	+	000	50.00	5.26	7.37	368.3
1	+	050	50.00	7.02	6.14	307.0
1	+	100	50.00	4.56	5.79	289.5
1	+	150	50.00	4.31	4.44	221.8
1	+	200	50.00	4.56	4.44	221.8
1	+	250	50.00	2.45	3.51	175.3
1	+	266	50.00	1.99	2.22	111.0
1	+	300	50.00	0.99	1.49	74.5
1	+	351.8	51.80	0.00	0.50	25.6
					Total	2,025.5

Section 1 Excavation

STA			Distance (m)	Area (m^2)	Average Area(m^2)	Volume(m^3)
0	+	921.2		1.90		
0	+	922.7	1.50	1.90	1.90	2.9
0	+	950	27.30	1.11	1.51	41.1
1	+	000	50.00	1.76	1.44	71.8
1	+	050	50.00	1.13	1.45	72.3
1	+	100	50.00	1.53	1.33	66.5
1	+	150	50.00	1.47	1.50	75.0
1	+	200	50.00	1.46	1.47	73.3
1	+	250	50.00	2.30	1.88	94.0
1	+	266	50.00	2.50	2.40	120.0
1	+	300	50.00	1.31	1.91	95.3
1	+	351.8	51.80	3.11	2.21	114.5
					Total	823.6

Section 1 Backfill

STA			Distance (m)	Area (m^2)	Average Area(m^2)	Volume(m^3)
0	+	921.2		1.00		
0	+	922.7	1.50	1.00	1.00	1.5
0	+	950	27.30	1.17	1.09	29.6
1	+	000	50.00	1.05	1.11	55.5
1	+	050	50.00	0.92	0.99	49.3
1	+	100	50.00	0.70	0.81	40.5
1	+	150	50.00	0.72	0.71	35.5
1	+	200	50.00	0.64	0.68	34.0
1	+	250	50.00	0.91	0.78	38.8
1	+	266	50.00	0.15	0.53	26.5
1	+	300	50.00	0.63	0.39	19.5
1	+	351.8	51.80	1.56	1.10	56.7
					Total	385.8

Section 1 Grass Sodding

STA			Distance (m)	Length(m)	Average Length(m)	Area(m2)
0	+	921.2		0.00		
0	+	922.7	1.50	0.00	0.00	0.0
0	+	950	27.30	2.45	1.23	33.4
1	+	000	50.00	2.33	2.39	119.5
1	+	050	50.00	2.30	2.32	115.8
1	+	100	50.00	2.45	2.38	118.8
1	+	150	50.00	2.69	2.57	128.5
1	+	200	50.00	2.43	2.56	128.0
1	+	250	50.00	1.29	1.86	93.0
1	+	266	50.00	0.45	0.87	43.5
1	+	300	50.00	1.05	0.75	37.5
1	+	351.8	51.80	0.00	0.53	27.2
					Total	845.1

Section 2 Dike Embankment

STA			Distance (m)	Area (m^2)	Average Area(m^2)	Volume(m^3)
3	+	033.6		1.63		
3	+	035.1	1.50	1.63	1.63	2.4
3	+	050	20.50	5.35	3.49	71.5
3	+	100	50.00	5.90	5.63	281.3
3	+	150	50.00	5.48	5.69	284.5
3	+	200	50.00	5.74	5.61	280.5
3	+	250	50.00	5.30	5.52	276.0
3	+	262	12.00	5.74	5.52	66.2
3	+	300	38.00	5.30	5.52	209.8
3	+	350	50.00	5.74	5.52	276.0
3	+	400	50.00	6.25	6.00	299.8
3	+	450	50.00	6.27	6.26	313.0
3	+	500	50.00	7.15	6.71	335.5
3	+	550	50.00	6.45	6.80	340.0
3	+	600	50.00	5.89	6.17	308.5
3	+	620.2	29.60	10.70	8.30	245.5
					Total	3,588.1

Section 2 Excavation

STA			Distance (m)	Area (m^2)	Average Area(m^2)	Volume(m^3)
3	+	033.6		1.38		
3	+	035.1	1.50	1.38	1.38	2.1
3	+	050	20.50	1.45	1.42	29.0
3	+	100	50.00	1.71	1.58	79.0
3	+	150	50.00	1.94	1.83	91.3
3	+	200	50.00	1.62	1.78	89.0
3	+	250	50.00	1.81	1.72	85.8
3	+	262	12.00	1.95	1.88	22.6
3	+	300	38.00	2.17	2.06	78.3
3	+	350	50.00	1.67	1.92	96.0
3	+	400	50.00	1.86	1.77	88.3
3	+	450	50.00	2.05	1.96	97.8
3	+	500	50.00	2.47	2.26	113.0
3	+	550	50.00	3.18	2.83	141.3
3	+	600	50.00	4.20	3.69	184.5
3	+	620.2	29.60	0.00	2.10	62.2
					Total	1,257.8

Section 2 Backfill

STA			Distance (m)	Area (m^2)	Average Area(m^2)	Volume(m^3)
3	+	033.6		0.68		
3	+	035.1	1.50	0.68	0.68	1.0
3	+	050	20.50	1.49	1.09	22.2
3	+	100	50.00	1.96	1.73	86.3
3	+	150	50.00	1.18	1.57	78.5
3	+	200	50.00	1.97	1.58	78.8
3	+	250	50.00	1.05	1.51	75.5
3	+	262	12.00	1.37	1.21	14.5
3	+	300	38.00	1.02	1.20	45.4
3	+	350	50.00	0.63	0.83	41.3
3	+	400	50.00	0.77	0.70	35.0
3	+	450	50.00	0.75	0.76	38.0
3	+	500	50.00	5.07	2.91	145.5
3	+	550	50.00	6.32	5.70	284.8
3	+	600	50.00	3.01	4.67	233.3
3	+	620.2	29.60	0.00	1.51	44.5
					Total	1,223.5

Section 2 Grass Sodding

STA			Distance (m)	Length(m)	Average Length(m)	Area(m2)
3	+	033.6		0.00		
3	+	035.1	1.50	0.00	0.00	0.0
3	+	050	20.50	3.02	1.51	31.0
3	+	100	50.00	2.86	2.94	147.0
3	+	150	50.00	2.58	2.72	136.0
3	+	200	50.00	3.03	2.81	140.3
3	+	250	50.00	3.00	3.02	150.8
3	+	262	12.00	3.97	3.49	41.8
3	+	300	38.00	2.47	3.22	122.4
3	+	350	50.00	1.95	2.21	110.5
3	+	400	50.00	1.67	1.81	90.5
3	+	450	50.00	1.57	1.62	81.0
3	+	500	50.00	11.29	6.43	321.5
3	+	550	50.00	11.68	11.49	574.3
3	+	600	50.00	2.73	7.21	360.3
3	+	620.2	29.60	2.22	2.48	73.3
					Total	2,380.4

Section 3 Dike Embankment

STA			Distance (m)	Area (m^2)	Average Area(m^2)	Volume(m^3)
3	+	898.9		2.52		
3	+	900.4	1.50	2.52	2.52	3.8
3	+	950	60.00	8.61	5.57	333.9
4	+	000	50.00	8.04	8.33	416.3
4	+	050	50.00	6.21	7.13	356.3
4	+	100	50.00	6.30	6.26	312.8
4	+	150	50.00	6.65	6.48	323.8
4	+	200	50.00	6.48	6.57	328.3
4	+	250	50.00	4.14	5.31	265.5
4	+	300	50.00	5.95	5.05	252.3
4	+	350	50.00	5.57	5.76	288.0
4	+	400	50.00	6.13	5.85	292.5
4	+	450	50.00	6.17	6.15	307.5
4	+	500	50.00	6.27	6.22	311.0
4	+	550	50.00	6.11	6.19	309.5
4	+	600	50.00	5.83	5.97	298.5
4	+	650	50.00	6.17	6.00	300.0
4	+	678.5	35.00	0.00	3.09	108.0
					Total	4,803.9

Section 3 Excavation

STA			Distance (m)	Area (m^2)	Average Area(m^2)	Volume(m^3)
3	+	898.9		1.55		
3	+	900.4	1.50	1.55	1.55	2.3
3	+	950	60.00	0.85	1.20	72.0
4	+	000	50.00	2.75	1.80	90.0
4	+	050	50.00	3.30	3.03	151.3
4	+	100	50.00	3.40	3.35	167.5
4	+	150	50.00	1.86	2.63	131.5
4	+	200	50.00	1.99	1.93	96.3
4	+	250	50.00	0.00	1.00	49.8
4	+	300	50.00	1.87	0.94	46.8
4	+	350	50.00	2.02	1.95	97.3
4	+	400	50.00	1.61	1.82	90.8
4	+	450	50.00	1.56	1.59	79.3
4	+	500	50.00	1.75	1.66	82.8
4	+	550	50.00	1.43	1.59	79.5
4	+	600	50.00	1.68	1.56	77.8
4	+	650	50.00	1.56	1.62	81.0
4	+	678.5	35.00	1.48	1.52	53.2
					Total	1,446.5

Section 3 Backfill

STA			Distance (m)	Area (m^2)	Average Area(m^2)	Volume(m^3)
3	+	898.9		0.73		
3	+	900.4	1.50	0.73	0.73	1.1
3	+	950	60.00	0.43	0.58	34.8
4	+	000	50.00	1.59	1.01	50.5
4	+	050	50.00	2.01	1.80	90.0
4	+	100	50.00	1.90	1.96	97.8
4	+	150	50.00	1.54	1.72	86.0
4	+	200	50.00	1.98	1.76	88.0
4	+	250	50.00	1.22	1.60	80.0
4	+	300	50.00	1.38	1.30	65.0
4	+	350	50.00	1.78	1.58	79.0
4	+	400	50.00	1.21	1.50	74.8
4	+	450	50.00	1.10	1.16	57.8
4	+	500	50.00	0.91	1.01	50.3
4	+	550	50.00	1.17	1.04	52.0
4	+	600	50.00	0.97	1.07	53.5
4	+	650	50.00	1.38	1.18	58.8
4	+	678.5	35.00	0.45	0.92	32.0
					Total	1,050.1

Section 3 Grass Sodding

STA			Distance (m)	Length(m)	Average Length(m)	Area(m2)
3	+	898.9		1.79		
3	+	900.4	1.50	1.79	1.79	2.7
3	+	950	60.00	3.11	2.45	147.0
4	+	000	50.00	2.89	3.00	150.0
4	+	050	50.00	2.86	2.88	143.8
4	+	100	50.00	2.95	2.91	145.3
4	+	150	50.00	3.46	3.21	160.3
4	+	200	50.00	3.43	3.45	172.3
4	+	250	50.00	3.75	3.59	179.5
4	+	300	50.00	2.60	3.18	158.8
4	+	350	50.00	2.99	2.80	139.8
4	+	400	50.00	4.76	3.88	193.8
4	+	450	50.00	4.06	4.41	220.5
4	+	500	50.00	3.42	3.74	187.0
4	+	550	50.00	3.23	3.33	166.3
4	+	600	50.00	2.30	2.77	138.3
4	+	650	50.00	2.50	2.40	120.0
4	+	678.5	35.00	0.00	1.25	43.8
					Total	2,466.0

Bill of Quantities

4. Boundary Marker

	Description	Standard	B/Q	Unit	Calculation		
	Boundary Marker						
1	Number		71	nos	71	=	71
2	Concrete	Class B	14	m^3	0.204*71	=	14.48
3	Form		117	m2	(0.15*0.15+0.30*0.60+0.70*0.30)*4*71	=	117.15
4	Foundatin Gravel		58	m3	0.81*71	=	57.51
5	Re-bar	φ12	0.3	kg	4.218*71*0.001	=	0.30
6	Paint (Red)		8	m2	0.113*71	=	8.02
7	Excavation		215	m3	(2.40*2.40+1.70*1.70)*0.70*1/2*71	=	214.95
8	Surplus Soil		18	m3	(0.30*0.30*0.30+0.70*0.70*0.30+0.90*0.90*0.10)*71	=	18.11
9	Backfill		7-8 197	m3	214.95-18.11	=	196.84

Bill of Quantities

5. Foot Protection around Piers

	Description	Standard	B/Q	Unit	Calculation		
1	Bottle Unit	Installation Area			Sta. Rosa Bridge		
		SBU-10	10,307	m^2	((14.30+16.00)*17.20*1/2 - 1.50^2* π /4*2)*2	=	514.09
		1600*480(320)	(1 layer)				
		2 layers			((23.80+16.00)*17.20*1/2 - 1.50^2*π/4*2)*2	=	677.49
					Vargas Bridge		
					((27.10+30.00)*36.60*1/2 - 2.00^2*π/4*2 - 3.40*7.00)*2	=	2029.69
					((23.90+25.20)*36.60*1/2 - 2.00^2*π/4*2 - 3.40*7.00)*2	=	1736.89
					Sandoval Bridge		
					(19.00+21.10)*22.20*1/2*2+(16.00+18.10)*19.20*1/2-9.40*3.80*3	=	1110.42
					((25.40+24.20)*22.20*1/2-10.40*4.80)*2	=	1001.28
					Rosario Bridge		
					(46.20*38.50-4.00*10.00*4)*2	=	3237.40
						Sub	10307.27
		Weight			Average height = 0.40m, 0.62m^3/bag		
		1t	6,650	t	10307*0.40 / 0.62	=	6649.68
		Bag					
		1t / piece	6,650	nos	10307*0.40 / 0.62	=	6649.68
		Volume of					
		Filling Stone	4,123	m^3	10307*0.40	=	4122.80

STA			Distance (m)	Area (m^2)	Average Area(m^2)	Volume(m^3)	Dredge Material Type (m^3)		
							A	B	C
0	+	000		30.26					
0	+	050	50.00	103.64	66.95	3,347.5	3,347.5		
0	+	100	50.00	183.13	143.39	7,169.3	7,169.3		
0	+	150	50.00	237.57	210.35	10,517.5	10,517.5		
0	+	200	50.00	257.61	247.59	12,379.5	12,379.5		
0	+	250	50.00	235.34	246.48	12,323.8	12,323.8		
0	+	300	50.00	100.52	167.93	8,396.5	8,396.5		
0	+	350	50.00	80.36	90.44	4,522.0	4,522.0		
0	+	400	50.00	221.84	151.10	7,555.0	7,555.0		
0	+	450	50.00	183.68	202.76	10,138.0	10,138.0		
0	+	500	50.00	175.99	179.84	8,991.8	8,991.8		
0	+	545	45.00	56.15	116.07	5,223.2	5,223.2		
0	+	562	17.00	56.15	56.15	954.6	954.6		
0	+	575	13.00	99.95	78.05	1,014.7	1,014.7		
0	+	600	25.00	184.17	142.06	3,551.5	1,775.7	1,775.8	
0	+	625	25.00	182.81	183.49	4,587.3	2,293.6	2,293.7	
0	+	650	25.00	181.45	182.13	4,553.3	4,553.3		
0	+	700	50.00	176.75	179.10	8,955.0	8,955.0		
0	+	750	50.00	164.96	170.86	8,542.8	8,542.8		
0	+	800	50.00	152.14	158.55	7,927.5	7,927.5		
0	+	850	50.00	145.98	149.06	7,453.0	7,453.0		
0	+	900	50.00	144.73	145.36	7,267.8	7,267.8		
0	+	950	50.00	143.11	143.92	7,196.0	7,196.0		
0	+	975	25.00	144.53	143.82	3,595.5	3,595.5		
1	+	000	25.00	145.94	145.24	3,630.9		3,630.9	
1	+	025	25.00	142.55	144.25	3,606.1		3,606.1	
1	+	050	25.00	139.16	140.86	3,521.4	3,521.4		
1	+	100	50.00	136.58	137.87	6,893.5	6,893.5		
1	+	150	50.00	139.45	138.02	6,900.8	6,900.8		
1	+	200	50.00	141.65	140.55	7,027.5	7,027.5		
1	+	210	10.00	141.65	141.65	1,416.5	1,416.5		
1	+	245	35.00	60.46	101.06	3,536.9	3,536.9		
1	+	275	30.00	55.90	58.18	1,745.4	1,745.4		
1	+	280	5.00	55.14	55.52	277.6		277.6	
1	+	315	35.00	144.60	99.87	3,495.5		3,495.5	
1	+	350	35.00	149.69	147.15	5,150.1		5,150.1	
1	+	400	50.00	150.79	150.24	7,512.0		7,512.0	
1	+	450	50.00	147.85	149.32	7,466.0		7,466.0	
1	+	500	50.00	148.85	148.35	7,417.5		7,417.5	
1	+	550	50.00	148.84	148.85	7,442.3		7,442.3	
1	+	600	50.00	146.30	147.57	7,378.5		7,378.5	
1	+	650	50.00	141.93	144.12	7,205.8		7,205.8	
1	+	675	25.00	146.77	144.35	3,608.8		3,608.8	
1	+	700	25.00	151.60	149.19	3,729.6	3,729.6		
1	+	750	50.00	158.20	154.90	7,745.0	7,745.0		
1	+	775	25.00	150.53	154.37	3,859.1	3,859.1		
1	+	800	25.00	142.85	146.69	3,667.3			3,667.3
1	+	850	50.00	160.25	151.55	7,577.5			7,577.5
1	+	875	25.00	171.61	165.93	4,148.3			4,148.3
1	+	900	25.00	182.96	177.29	4,432.1		2,216.1	2,216.0
1	+	950	50.00	182.32	182.64	9,132.0		4,566.0	4,566.0
2	+	000	50.00	184.57	183.45	9,172.3		4,586.2	4,586.1
2	+	050	50.00	177.74	181.16	9,057.8		4,528.9	4,528.9
2	+	100	50.00	181.02	179.38	8,969.0		4,484.5	4,484.5
2	+	150	50.00	194.62	187.82	9,391.0		4,695.5	4,695.5
2	+	200	50.00	214.48	204.55	10,227.5		5,113.8	5,113.7
2	+	225	25.00	209.33	211.91	5,297.6		2,648.8	2,648.8
2	+	250	25.00	204.18	206.76	5,168.9	5,168.9		
2	+	300	50.00	152.24	178.21	8,910.5	8,910.5		
2	+	350	50.00	166.58	159.41	7,970.5	7,970.5		
2	+	400	50.00	156.09	161.34	8,066.8	8,066.8		
2	+	425	25.00	161.21	158.65	3,966.3	3,966.3		
2	+	450	25.00	166.33	163.77	4,094.3		4,094.3	
2	+	500	50.00	175.75	171.04	8,552.0		8,552.0	
2	+	550	50.00	167.11	171.43	8,571.5		8,571.5	
2	+	600	50.00	179.12	173.12	8,655.8		8,655.8	
2	+	650	50.00	185.00	182.06	9,103.0		9,103.0	
2	+	700	50.00	184.89	184.95	9,247.3		9,247.3	
2	+	750	50.00	140.51	162.70	8,135.0		8,135.0	
2	+	775	25.00	134.53	137.52	3,438.0		3,438.0	
2	+	800	25.00	128.54	131.54	3,288.4			3,288.4
2	+	850	50.00	159.19	143.87	7,193.3			7,193.3
2	+	900	50.00	162.92	161.06	8,052.8			8,052.8
2	+	925	25.00	162.57	162.75	4,068.6			4,068.6
2	+	950	25.00	162.22	162.40	4,059.9		4,059.9	
3	+	000	50.00	157.55	159.89	7,994.3		7,994.3	
3	+	050	50.00	164.95	161.25	8,062.5		8,062.5	
3	+	100	50.00	153.65	159.30	7,965.0		7,965.0	
3	+	150	50.00	189.58	171.62	8,580.8		8,580.8	

STA			Distance (m)	Area (m^2)	Average Area(m^2)	Volume(m^3)	Dredge Material Type (m^3)		
							A	B	C
3	+	200	50.00	160.96	175.27	8,763.5		8,763.5	
3	+	215	15.00	160.96	160.96	2,414.4		2,414.4	
3	+	251	36.00	58.52	109.74	3,950.6		3,950.6	
3	+	274	23.00	58.52	58.52	1,346.0		1,346.0	
3	+	310	36.00	159.87	109.20	3,931.0		3,931.0	
3	+	350	40.00	126.29	143.08	5,723.2		5,723.2	
3	+	375	25.00	134.57	130.43	3,260.8		3,260.8	
3	+	400	25.00	142.84	138.71	3,467.6	3,467.6		
3	+	450	50.00	171.90	157.37	7,868.5	7,868.5		
3	+	500	50.00	115.30	143.60	7,180.0	7,180.0		
3	+	550	50.00	166.08	140.69	7,034.5	7,034.5		
3	+	575	25.00	165.66	165.87	4,146.8	4,146.8		
3	+	600	25.00	165.24	165.45	4,136.3		4,136.3	
3	+	650	50.00	155.86	160.55	8,027.5		8,027.5	
3	+	700	50.00	165.02	160.44	8,022.0		8,022.0	
3	+	750	50.00	177.04	171.03	8,551.5		8,551.5	
3	+	800	50.00	194.09	185.57	9,278.3		9,278.3	
3	+	825	25.00	191.22	192.66	4,816.4		4,816.4	
3	+	850	25.00	188.34	189.78	4,744.5			4,744.5
3	+	900	50.00	177.13	182.74	9,136.8			9,136.8
3	+	950	50.00	164.41	170.77	8,538.5			8,538.5
4	+	000	50.00	162.17	163.29	8,164.5			8,164.5
4	+	050	50.00	168.72	165.45	8,272.3			8,272.3
4	+	100	50.00	163.86	166.29	8,314.5			8,314.5
4	+	150	50.00	161.99	162.93	8,146.3			8,146.3
4	+	200	50.00	164.77	163.38	8,169.0			8,169.0
4	+	225	25.00	44.16	104.47	2,611.6			2,611.6
4	+	227	2.00	34.51	39.34	78.7		78.7	
4	+	266	39.00	34.51	34.51	1,345.9		1,345.9	
4	+	300	34.00	169.61	102.06	3,470.0		3,470.0	
4	+	350	50.00	167.52	168.57	8,428.3		8,428.3	
4	+	400	50.00	144.12	155.82	7,791.0		7,791.0	
4	+	450	50.00	174.32	159.22	7,961.0		7,961.0	
4	+	475	25.00	172.37	173.35	4,333.6		4,333.6	
4	+	500	25.00	170.41	171.39	4,284.8			4,284.8
4	+	550	50.00	166.33	168.37	8,418.5			8,418.5
4	+	600	50.00	159.08	162.71	8,135.3			8,135.3
4	+	650	50.00	165.17	162.13	8,106.3			8,106.3
4	+	700	50.00	169.11	167.14	8,357.0			8,357.0
4	+	750	50.00	165.73	167.42	8,371.0			8,371.0
4	+	800	50.00	172.72	169.23	8,461.3			8,461.3
4	+	850	50.00	186.94	179.83	8,991.5			8,991.5
4	+	900	50.00	175.93	181.44	9,071.8			9,071.8
4	+	950	50.00	172.04	173.99	8,699.3			8,699.3
5	+	000	50.00	175.59	173.82	8,690.8			8,690.8
5	+	050	50.00	187.54	181.57	9,078.3			9,078.3
5	+	100	50.00	198.14	192.84	9,642.0			9,642.0
5	+	150	50.00	196.57	197.36	9,867.8			9,867.8
5	+	200	50.00	182.57	189.57	9,478.5			9,478.5
5	+	250	50.00	193.10	187.84	9,391.8			9,391.8
5	+	300	50.00	202.79	197.95	9,897.3			9,897.3
5	+	350	50.00	225.30	214.05	10,702.3			10,702.3
5	+	400	50.00	236.14	230.72	11,536.0			11,536.0
					Total	871,552.5	262,249.1	303,189.1	306,114.4

Bill of Quantities

3. Revetment SECTION-3 STA 3+898~STA 4+670							
Description		Standard	B/Q	Unit	Calculation		
1	Steel Sheet Pile	SP-25H W=900	897	nos	L=9.50m 332.1/0.90+1	=	370.0
					L=10.50m (60.2+289.20)/0.90	=	388.2
					L=9.00m 124.7/0.90	=	138.6
						Sub	896.8
					Under Rosario Bridge W=22.5m 22.5/0.90	nos =	25
		Length	8645.0	m	L=9.50m (332.1/0.90+1)*9.50	=	3515.0
					L=10.50m (60.2+289.20)/0.90*10.0	=	3882.5
					L=9.00m 124.7/0.90*9.00	=	1247.0
						Sub	8644.5
					Under Rosario Bridge W=22.5m 25*10.5	m =	262.5
		Weight	976.8	t	0.113*8644.5	=	976.83
		Area	7780	m^2	8644.5*0.90	=	7780.1
		SP-10H W=900	167	nos	L=2.00m (50.0+50.0+50.0)/0.90	=	166.7
		Length	333.5		L=2.00m (50.0+50.0+50.0)/0.90*2.00	=	333.5
		Weight	28.8	t	0.0864*333.5	=	28.8
		Area	300.2	m^2	333.5*0.90	=	300.2
		Corrosion Protection	3225	m^2	806.23*4.00	=	3224.9
2	Concrete Block Retaining Wall	More than 350kg/2	1363	m^2	H=2.00m 2.124*(50.0*9+40.0*2+25.0+30.0)	=	1242.5
					H=2.25m 2.404*50.0	=	120.2
					H=2.50m 2.683*50.0*2	=	268.3
						Sub	1362.7
		Block	10095	nos	1362.7/(0.30*0.45)	=	10094.07
		Concrete per 1 Block	0.021	m^3			
		Form Area per 1 Block	0.73	m^2	(0.42+0.45)*0.25*1/2*2+(0.24+0.30)*0.25*1/2*2	=	0.35
					(0.45+0.30)*0.05*2	=	0.08
					((0.45+0.25)*0.07+(0.30+0.20)*0.11)*1/2*2	=	0.10
					((0.25+0.15)*0.16+(0.20+0.15)*0.16)*1/2*2	=	0.12
					((0.15+0.20)*0.05+(0.14+0.15)*0.06)*1/2*2	=	0.03
					(0.20+0.13)*0.03*2	=	0.02

Bill of Quantities

3. Revetment SECTION-3 STA 3+898~STA 4+670							
Description		Standard	B/Q	Unit	Calculation		
					0.20*0.13	=	0.03
						Sub	0.73
		Filling Concrete Type B	381	m^3	(2.124*0.35+0.35*0.175*1/2)*585.0-10095*0.021	=	240.8
					(2.404*0.35+0.35*0.175*1/2)*50.0	=	43.6
					(2.683*0.35+0.35*0.175*1/2)*100.0	=	97.0
						Sub	381.38
3	Concrete	A (RC,t≧20cm)	701	m^3	Parapet Wall Type-1 0.192*806.23	=	154.80
					Coping 0.70*0.80*806.23	=	451.49
					Base Concrete 0.369*(150.00+0.30)	=	55.46
					Step 39.4	=	39.40
						Sub	701.15
		B (Plain Concre	571	m^3	Base Concrete 0.11*585.0	=	64.35
					Top Concrete (0.50+0.55)*0.10*1/2*735.0	=	38.59
					Backfill Concrete (2.124+0.175)*0.10*585.0	=	134.49
					(2.683+0.175)*0.10*110.0	=	31.44
					(2.404+0.175)*0.10*50.0	=	12.90
					Back fill Sub = 178.82		
					Levelling Concrete 0.10*0.80*150.0	=	12.00
					Partition 2.72*2+2.516*0.30+0.25*0.30	=	6.27
					Gravity Wall H=1.80m 1.71*30.0+0.90*1.80*1/2*0.50*2	=	52.11
					Gravity Wall H=1.00m 0.55*3.00	=	1.65
					Gravity Wall Sub= 53.76		
					Boundary Wall 0.30*1.00*723.0	=	216.90
					Concrete Revetment ((0.50+1.38+0.80)*0.30+0.424*1.50+0.50*1.00)*1.50	=	2.91
						Sub	570.69
		C (RC,t<20cm)	13.2	m^3	0.621*212.0/10.0	=	13.17
		F (Levelling Concrete)	12.0	m^3	0.10*0.80*150.3	=	12.02

Bill of Quantities

3. Revetment SECTION-3 STA 3+898~STA 4+670							
	Description	Standard	B/Q	Unit	Calculation		
4	Form	F2 (Small)	6173	m^2	Parapet Wall Type-1 1.604*806.23	=	1293.19
					Coping 1.60*806.23	=	1289.97
					Base Concrete Type A 1.175*(150.00+0.30)	=	176.60
					Step 248.5	=	248.50
					Base Concrete Type B 0.40*585.0	=	234.00
					Top Concrete (0.11+0.10)*735.0	=	154.35
					Backfill Concrete (2.124+0.175)*585.0	=	1344.92
					(2.683+0.175)*100.0	=	285.80
					(2.404+0.175)*50.0	=	128.95
					Back fill Sub = 1759.67		
					Partition 2.72*2+2.516*0.30+0.25*0.30	=	6.27
					Gravity Wall H=1.80m 3.81*29.00+0.90*1.80*1/2*4+2.012+0.50*2	=	116.74
					Gravity Wall H=1.00m 2.12*3.00	=	6.36
					Boundary Wall 0.30*1.00*2*723.0	=	433.80
					Concrete Revetment (0.80*2+0.80+0.50+2.546+1.00*2)*1.50	=	11.17
					Concrete Railing Type-4 20.85*212.0/10.0	=	442.02
						Sub	6172.64
		F (Levelling Concrete)	30.1	m^3	0.10*2*150.3	=	30.06
5	Deformed Bar	Grade 275	40.37	t	Coping with Parapet Wall Type-1 37.69*806.23*0.001	=	30.387
					Base Concrete 16.0*150.30*0.001	=	2.405
					Step 1879.30*0.001	=	1.879
					Concrete Revetment (4*1.50+1.35*3)*0.888*0.001	=	0.009
					Boundary Wall 5.70*723.0*0.001	=	4.121
					Concrete Railing Type 4 73.90*212.0/10.0*0.001	=	1.567
						Sub	40.368
6	Backfill Gravel	C-40	908	m^3	1.128*585.0+1.575*100.0+1.411*50.0	=	887.93
					(1.133*0.30-0.10*0.80)*0.30	=	0.08
					Step 20.11	=	20.11

Bill of Quantities

3. Revetment SECTION-3 STA 3+898~STA 4+670							
Description		Standard	B/Q	Unit	Calculation		
						=	908.12
8	Frame		406	m^2	2.795*100.0+2.516*50.3	=	406.05
9	Dike	including extra-embankment	0	m^3	From Earth Work Calculation	=	0.0
10	Pavement	Bituminous t=5cm	2,384	m^2	794.7*3.00	=	2,384.1
		Base Course t=20cm	477	m^2	2384.1*0.20	=	476.8
11	Concrete Railing	Type 4 Length	211.9	m	3+898~4+105 211.9	=	211.9
		Painting	441.8	m	3+898~4+105 20.85*211.9/10.0	=	441.8
12	Grass Sodding		2,466	m^2	From Earth Work Calculation 2466	=	2,466
13	Joint Part-1	Filler Expansion	113.9	m^2	(2.236+2.471)*0.45*1/2*70+(2.795+3.02)*0.45*1/2*12	=	89.84
					(2.516+2.741)*0.45*1/2*6	=	7.10
					(0.502*0.30-0.20*0.402*1/2)*70+(0.60*0.70-0.45*0.225*1/2)*18	=	14.38
					Concrete Block Wall Sub= 111.31		
					1.31*2	=	2.62
						Sub	113.93
14	Drainage Pipe	With Bag of Gravel VPφ50	546	nos	Concrete Block Retaining Wall, L=0.60m 1363/2.50	=	545
			24	nos	Gravity Wall, L=1.10m (1.80*30.0+1.677*3.0)/2.50	=	23.6
15	Joint Coping+Wall	Coping Expansinon	81	nos	794.7/10.0+1	=	80.5
	Part-2	Parapet Expansion	41	nos	794.7/20.0+1	=	40.7
		Parapet Construction	120	nos	794.7/20.0*3	=	119.2
	Expansion Joint	Cork Filler 10mm	33	m^2	0.41*81	=	33.2
					Coping 0.70*0.80-1.20*0.125	=	0.41
			6	m^2	0.15*41	=	6.2

Bill of Quantities

3. Revetment SECTION-3 STA 3+898~STA 4+670							
Description		Standard	B/Q	Unit	Calculation		
					Parapet Wall (0.20+0.28)*0.80*1/2-0.0125*(0.80+0.20+0.804)-0.020*(0.80-0.0125)	=	0.15
		Joint Sealant 10*12.5	97	m	1.20*81	=	97
					Coping 0.05+0.80+0.35	=	1.20
			122	m	2.97*41	=	122
					Parapet Wall 0.80+0.20+0.804+0.370+0.800	=	2.97
		Water Stop	31	m	Parapet Wall (0.80-0.05)*41	=	31
16	Construction Join	Joint Sealant V-Cut Length	192	m	Parapet Wall (0.80+0.804)*120	=	192
17	Earth Work Excavation		1,450	m^3	From Earth Work Calculation 1446.5	=	1446.50
					Concrete revetment (1.50+2.50)*1.00*1/2*1.50	=	3.00
						Sub	1449.50
	Surplus Soil		397	m^3	From Earth Work Calculation 1446.5-1050.1	=	396.40
					Concrete revetment 0.50*1.00*1.50	=	0.75
						Sub	397.15
	Backfill		1,052	m^3	From Earth Work Calculation 1050.1	=	1050.10
					3.00-0.75	=	2.25
						Sub	1052.35
25	Removal	Concrete Structure	Total 1,073	m^3	0.18*0.72*(180.0+95.6)	=	35.7
					0.20*1.55*48.0	=	14.9
					0.20*0.73*401.0	=	58.5
					0.18*0.92*(180.7+20.0)	=	33.2
					0.20*1.24*12.00	=	3.0
					0.18*0.85*(116.0+189.8)	=	46.8
					Bench (2.11*0.63*0.09+0.18*0.42*0.60*3)*39	=	10.0
					Bench (1.20*0.40*0.10+0.16*0.30*0.45*2)*17	=	1.6
					Flower Bed (0.60^2*π/4*2+0.85*0.60-0.38^2*π/4-0.38*0.85)*0.60*25	=	9.6
					(1.50*0.60-1.28*0.38)*0.38*4	=	0.6

Bill of Quantities

3. Revetment SECTION-3 STA 3+898~STA 4+670							
Description		Standard	B/Q	Unit	Calculation		
					Sluisway		
					0.30*0.30*2.60*4	=	0.9
					2.43*2.50*0.40	=	2.4
					0.30*0.30*(1.05*2+1.75*2+1.83)	=	0.7
					(2.50*2.50-1.90*1.80)*7.50	=	21.2
					Concrete Road		
					5.30*761.0*0.20	=	806.7
					Concrete Wall		
					(0.45*2.25+2.75*5.51+1.30*2.25+1.30*1.00)*0.30	=	6.1
					Concrete Slab Structure		
					(6.40*2.85-5.40*2.35)*6.85*1/2+0.40*0.40*2.35*3	=	20.1
					(1.70*1.57-1.36*1.23)*1.27	=	1.3
						Sub	1073.3
		Net	Total 1,316	m^2	h=1.06m		
					1.06*48.0	=	50.9
					h=1.90m		
					1.90*(180.0+95.6)	=	523.6
					h=1.85m		
					1.85*401.0	=	741.9
						Sub	1316.4
		Electric Pole	41	nos	13+28	=	41
		Steel Handrail φ150	8.0	m	2.00*4	=	8.0
		Crane	1	nos	1	=	1
		Gate 2.50*2.50	1	nos	1	=	1
		Electric Pole Concrete	1	nos	0.30m*0.30m*3.10m 1	=	1
		Steel Post	1	nos	1	=	1

Bill of Quantities

7. Temporary Backfill Site

	Description	Standard	B/Q	Unit	Calculation		
1	RC Pipe	ϕ 910	Total 32.0	m	East Side to West Side 2*8.00	=	16.00
					West Side to Drainage Channel 2*8.00	=	16.00
						Sub	32.00
2	Concrete	Grade 275	9.0	m^3	Collar (1.51*1.51-1.11^2*π/4)*0.25*7*4	=	9.19
3	Form		95.0	m^2	Collar ((1.51*1.51-1.11^2*π/4)*2*7+1.51*0.25*2*7)*4	=	94.64
4	Re-bar		0.2	kg	(30.85+22.38)*4/1000	=	0.21
5	Excavation	Excavation For Pipe	Total 168	m^3	RC Pipe φ910 (2.51+4.51)*2.00*1/2*6.00*4	=	168.48
		Excavation for Structure	460	m^3	Sand Basin (6.00*32.00+9.00*35.00)*1.50*1/2	=	380.25
					Pit (8.00*8.00+4.00*4.00)*2.00:1/2	=	80.00
						Sub	460.25
		Surplus	30	m^3	Pipe + Collar (1.11^2*π/4*6.00+(1.51*1.51-1.11^2*π/4)*0.25*5)*4	=	29.79
		Backfill	Exca-Surp 138	m^3	Only for Pipe	=	
6	Embankment	Sand Basin Embankment	Total 62	m^3	Around Sand Basin (1.00+2.00)*0.50*1/2*(36.00*2+11.00)	=	62
7	Road	Road Embankment	Total 7125				
		Carry-in Road Embankment	475		(4.00+5.50)*0.50*1/2*200.0	=	475
		Site Road Embankment	6,650		(4.00+5.50)*0.50*1/2*2800.0	=	6,650
					(Temporary Bridge Approach) 3.00*8.50*1/2*2+(6.00+10.00)*15.0*1/2	=	146
		Road Pavement C-40	1,800	m^3	3.00*0.20*(200.00+2800.0)	=	1,800
		Safety Railing	2,800	m	2800	=	2,800

Bill of Quantities

7. Temporary Backfill Site							
Description		Standard	B/Q	Unit	Calculation		
8	Facilities	Gate	2	nos	2	=	2
9	Temporary Bridge	Handrail L-75*75*9	673	m			
		H-shaped Steel H-400*400*13*21	2,799	m			
		(Install+Pull out)	174	nos			
		Deck Plate 1000*2000*208	1,440	m^2			
		(Install+removal)	720	nos			
		Plate 990*1996*6	720	nos			
		H-shaped Steel H-194*150*6*9	5,760.0	m			
		Horizontal Brace [-125*65*6*8	1,183.7	m			
		Plate 94*176*8	8,640	nos			
		Flange Angle L-75*75*9	1,425.6	m			
		Main beam H-488*300*11*18	738	m			
		Cross Beam [-300*90:9*13	720	m			
		Beam Seat [-380*100*13*20	692	m			
		Vertical Booth L-100*100*10	1,325	m			
		Horizontal Brace [-200*90*8*13.5	653	m			
		Bolt M-22:70(F107)	6,198	nos			
		Plate 300*500*12	348	nos			
		Flange Angle L-75*75*9	24	m			
		Total Concrete	48	m^3			
		Concrete Base	2	m^3			
		Slope Concrete	46	m^3			
		Form	15	m^2			
	Temporary Jetty	Handrail L-75*75*9	607	m	228.0*2+(228.0 / 2.0+1)*1.31	=	606.65
		H-shaped Steel H-400*400*13*21	2,641	m	Material, 172kg/m 3*54*16.30	=	2640.60
			162	nos	Driving 3*54	=	162

Bill of Quantities

7. Temporary Backfill Site							
Description		Standard	B/Q	Unit	Calculation		
		Deck Plate 1000*2000*208	1,368	m^2	Material 12.0*108.0+12.00*6.00	=	1368.00
			684	nos	Installing and Removal 1368.0 / 2.00	=	684
		Plate 990*1996*6	684.0	nos	684	=	684
		H-shaped Steel H-194*150*6*9	5,472.0	m	Material, 29.9kg/m 2.00*4*684	=	5472.0
		Horizontal Brace [-125*65*6*8	1,124.5	m	13.4kg/m 0.274*3*2*684	=	1124.5
		Plate 94*176*8	8,208	nos	12*684	=	8208.0
		Flange Angle L-75*75*9	1,354.3	m	0.99*2*684	=	1354.3
		Main beam H-488*300*11*18	690.0	m	125kg/m 12.00*54+6.0*7	=	690.00
		Cross Beam [-300*90*9*13	684.00	m	48.6kg/m 108.0*6+12.0*3	=	684.00
		Beam Seat [-380*100*13*20	654.00	m	67.3kg/m 109.0*6	=	654.00
		Vertical Booth L-100*100*10	1,325.20	m	14.9kg/m 5.50*4*19+2.80*108*3	=	1325.20
		Horizontal Brace [-200*90*8*13.5	652.80	m	30.3kg/m 108.80*6	=	652.80
		Bolt M-22:70(F107)	6,000	nos	6000	=	6,000
		Plate 300*500*12	324	nos	3*54*2	=	324
		H Beam for Base H-350*350*12*19			Material, 135kg/m 12.00*1	=	12.00
		Flange Angle L-75*75*9	12.00	m	12	=	12.00
		Concrete Base	2	m^3	0.70*0.20*12.00	=	1.68
		Slope Concrete	32	m^3	7.32*0.73*1/2*12.00	=	32.06
		Form	5	m^2	7.32*0.73*1/2*2	=	5.34
	Temporary Bridge (12.00m)	Handrail L-75*75*9	66.34	m	12.0*2*2+(12.0 / 2.0+1)*2*1.31	=	66.34
		H-shaped Steel H-400*400*13*21	158	m	Material, 172kg/m 4*3*13.20	=	158.40
			12	nos	Driving 4*3	=	12
			12	nos	Pulling out 12	=	12
		Deck Plate 1000*2000*208	72	m^2	Material 6.00*12.00	=	72.00
			36	nos	Installing and Removal 72.00 / 2.00	=	36

Bill of Quantities

7. Temporary Backfill Site

Description		Standard	B/Q	Unit	Calculation		
		Plate 990*1996*6	36.0	nos	36	=	36
		H-shaped Steel H-194*150*6*9	288.0	m	Material, 29.9kg/m 2.00*4*36	=	288.0
		Horizontal Brace [-125*65*6*8	59.2	m	13.4kg/m 0.274*3*2*36	=	59.2
		Plate 94*176*8	432	nos	12*36	=	432.0
		Flange Angle L-75*75*9	71.3	m	9.96kg/m 0.99*2*36	=	71.3
		Main beam H-488*300*11*18	48.0	m	125kg/m 12.00*4	=	48.00
		Cross Beam [-300*90:9*13	36.00	m	48.6kg/m 6.00*6	=	36.00
		Beam Seat [-380*100*13*20	38.40	m	67.3kg/m 6.40*6	=	38.40
		Vertical Booth L-100*100*10	0.00	m	14.9kg/m	=	0.00
		Horizontal Brace [-200*90*8*13.5	0.00	m	30.3kg/m	=	0.00
		Bolt M-22:70(F107)	198	nos	6*3*3+12*3*4	=	198
		Plate 300*500*12	24	nos	3*4*2	=	24
		Flange Angle L-75*75*9	12.00	m	6.00*2	=	12.00
		Concrete Base	0	m^3	0	=	0.00
		Slope Concrete	14	m^3	2.80*6.00*0.85	=	14.28
		Form	10	m^2	(2.80*2+6.00)*0.85	=	9.86

Laguna Disposal Site
Reclamation Volume (m^3)

	Distance (m)	Area (m^2)	Average Area(m^2)	Volume(m^3)
0.0		0.00		
1.2	1.20	466.74	233.37	280.0
50.0	50.00	1,306.46	653.23	32,661.5
100.0	50.00	1,639.26	1,472.86	73,643.0
150.0	50.00	1,762.20	1,700.73	85,036.5
200.0	50.00	1,763.24	1,762.72	88,136.0
250.0	50.00	1,939.70	1,851.47	92,573.5
300.0	50.00	1,676.76	1,808.23	90,411.5
350.0	50.00	1,625.73	1,651.25	82,562.3
400.0	50.00	1,654.44	1,640.09	82,004.3
450.0	50.00	1,621.16	1,637.80	81,890.0
500.0	50.00	1,570.12	1,595.64	79,782.0
550.0	50.00	1,496.59	1,533.36	76,667.8
600.0	50.00	1,014.93	1,255.76	62,788.0
650.0	50.00	328.82	671.88	33,593.8
680.6	30.60	0.00	164.41	5,030.9
			Total	967,061.0

Bill of Materials

Laguna Disposal Site

Outlet - 1

No	D (mm)	Shape Pattern	Length(m) a	b	c	d	Hook	Sub (m)	Nos	Length (m)	Unit Weight (kg/m)	Weight (kg)	Remarks
1	D12	A	4.050					4.050	8	32.40	0.888	28.77	
2	〃	A	0.880					0.880	20	17.60	0.888	15.63	Average
3	〃	A	0.570					0.570	10	5.70	0.888	5.06	Average
4	〃	C	4.050	1.975	1.975			8.000	2	16.00	0.888	14.21	
5	〃	A	1.975					1.975	16	31.60	0.888	28.06	
6	〃	A	0.970					0.970	16	15.52	0.888	13.78	Average
7	〃	A	0.220					0.220	8	1.76	0.888	1.56	
8	〃	A	1.550					1.550	16	24.80	0.888	22.02	
9	〃	A	1.320					1.320	16	21.12	0.888	18.75	
10	〃	L	3.860	0.350				4.210	4	16.84	0.888	14.95	
11	〃	C	0.150	0.100	0.100			0.350	14	4.90	0.888	4.35	
12		C	0.150	0.180	0.180			0.510	18	9.18	0.888	8.15	
13	〃	A	4.270					4.270	4	17.08	0.888	15.17	
14	〃	C	2.450	1.150	1.150			4.750	9	42.75	0.888	37.96	Average
15	〃	A	2.250					2.250	18	40.50	0.888	35.96	Average
16	〃	C	0.150	0.100	0.100			0.350	35	12.25	0.888	10.88	
17	〃	C	0.150	0.100	0.100			0.350	8	2.80	0.880	2.46	
18		A	2.700					2.700	8	21.60	0.880	19.01	
19		A	4.050					4.050	8	32.40	0.880	28.51	
20		C	0.150	0.180	0.180			0.510	18	9.18	0.880	8.08	
21	〃	A	2.450					2.450	24	58.80	0.888	52.21	
22	〃	E	1.360	1.360	1.360	1.710		5.790	12	69.48	0.888	61.70	
23	〃	C	0.100	0.100	0.100			0.300	168	50.40	0.888	44.76	
24	D16	B	3.475	1.940				5.415	147	796.01	1.578	1256.10	Average
25	〃	B	0.880	1.940				2.820	19	53.58	1.578	84.55	Average
26	〃	A	1.540					1.540	19	29.26	1.578	46.17	Average
27	〃	B	1.520	2.200				3.720	43	159.96	1.578	252.42	Average
28	〃	B	3.470	1.500				4.970	43	213.71	1.578	337.23	Average
29	D12	A	2.550					2.550	166	423.30	0.880	372.50	Average
30	〃	A	8.370					8.370	43	359.91	0.880	316.72	Average
31	〃	A	3.470					3.470	77	267.19	0.880	235.13	
32	〃	A	0.790					0.790	9	7.11	0.880	6.26	Average
33	〃	A	1.510					1.510	9	13.59	0.880	11.96	Average
34	〃	A	3.470					3.470	22	76.34	0.880	67.18	
35	〃	B	1.670	0.570				2.240	80	179.20	0.880	157.70	Average
36	〃	C	4.050	1.500	1.500			7.050	9	63.45	0.880	55.84	Average
37	〃	C	4.050	0.750	0.750			5.550	4	22.20	0.880	19.54	
38	〃	A	0.550					0.550	8	4.40	0.880	3.87	Average
39	〃	A	7.580					7.580	18	136.44	0.880	120.07	Average
40	〃	A	5.290					5.290	8	42.32	0.880	37.24	Average
41	〃	A	7.050					7.050	8	56.40	0.880	49.63	Average
42	〃	A	0.440					0.440	8	3.52	0.880	3.10	
43	〃	C	5.450	2.040				7.490	13	97.37	0.880	85.69	Average
44	〃	A	1.500					1.500	30	45.00	0.880	39.60	Average
45	〃	A	5.450					5.450	14	76.30	0.880	67.14	
46	〃	D	0.570	2.030	1.450	2.030	0.570	6.650	2	13.30	0.880	11.70	
47	〃	D	1.000	2.030	1.450	2.030	1.000	7.510	2	15.02	0.880	13.22	
48	〃	A	1.500					1.500	32	48.00	0.880	42.24	
49	〃	L	3.860	0.350				4.210	4	16.84	0.880	14.82	
50	〃	C	0.150	0.180	1.800			2.130	148	315.24	0.880	277.41	
51	〃	C	0.150	0.100	0.100			0.350	306	107.10	0.880	94.25	
52	〃	C	0.250	0.100	0.100			0.450	180	81.00	0.880	71.28	
								Sub				4642.55	

Outlet - 2

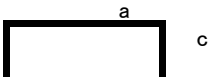
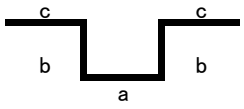
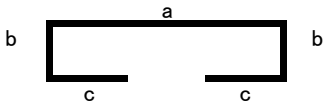
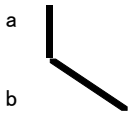
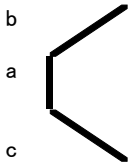
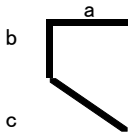
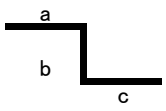
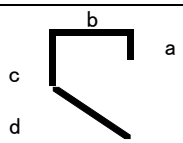
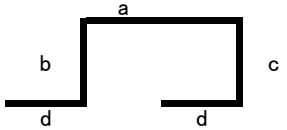
No	D (mm)	Shape Pattern	Length(m) a	b	c	d	Hook	Sub (m)	Nos	Length (m)	Unit Weight (kg/m)	Weight (kg)	Remarks
1	D12	A	2.450					2.450	8	19.60	0.888	17.40	
2	〃	A	0.880					0.880	20	17.60	0.888	15.63	Average
3	〃	C	2.450	1.975	1.975			6.400	2	12.80	0.888	11.37	
4	〃	A	1.975					1.975	12	23.70	0.888	21.05	
5	〃	A	0.970					0.970	8	7.76	0.888	6.89	Average
6	〃	A	0.220					0.220	4	0.88	0.888	0.78	
7	〃	A	1.550					1.550	8	12.40	0.888	11.01	
8	〃	A	1.320					1.320	8	10.56	0.888	9.38	
9	〃	L	3.860	0.350				4.210	2	8.42	0.888	7.48	
10	〃	C	0.150	0.100	0.100			0.350	8	2.80	0.888	2.49	
11	〃	C	0.150	0.100	0.100			0.350	8	2.80	0.888	2.49	
12	〃	A	4.270					4.270	4	17.08	0.888	15.17	
13	〃	C	2.450	1.150	1.150			4.750	4	19.00	0.888	16.87	Average
14	〃	A	2.250					2.250	16	36.00	0.888	31.97	Average
15	〃	C	0.150	0.180	0.180			0.510	18	9.18	0.888	8.15	
16	〃	A	2.700					2.700	8	21.60	0.880	19.01	
17	〃	A	2.450					2.450	14	34.30	0.880	30.18	
18	〃	C	0.150	0.100	0.100			0.350	18	6.30	0.880	5.54	
19	〃	C	0.150	0.100	0.100			0.350	8	2.80	0.880	2.46	
20	〃	E	1.360	1.360	1.360	1.710		5.790	6	34.74	0.888	30.85	
21	〃	C	0.100	0.100	0.100			0.300	84	25.20	0.888	22.38	
22	D16	B	3.475	1.940				5.415	69	373.64	1.578	589.60	Average
23		B	3.475	1.400				4.875	61	297.38	1.578	469.26	Average
24		B	2.110	1.400				3.510	4	14.04	1.578	22.16	Average
25	〃	B	0.880	1.400				2.280	10	22.80	1.578	35.98	Average
26	〃	A	1.540					1.540	10	15.40	1.578	24.30	Average
27	D12	A	2.550					2.550	43	109.65	0.880	96.49	Average
28	〃	A	3.880					3.880	43	166.84	0.880	146.82	Average
29	〃	A	5.650					5.650	43	242.95	0.880	213.80	
30	〃	A	5.450					5.450	43	234.35	0.880	206.23	
31		C	0.250	0.100	0.100			0.450	95	42.75	0.880	37.62	
32	〃	A	5.450					5.450	47	256.15	0.880	225.41	
33	〃	A	1.590					1.590	32	50.88	0.880	44.77	
34	〃	A	5.750					5.750	48	276.00	0.880	242.88	
35	〃	A	3.920					3.920	10	39.20	0.880	34.50	Average
36	〃	A	0.660					0.660	10	6.60	0.880	5.81	Average
37	〃	A	1.550					1.550	16	24.80	0.880	21.82	
38	〃	D	0.880	1.700	1.280	2.030	0.570	6.460	4	25.84	0.880	22.74	
39	〃	D	1.000	2.030	1.450	2.030	1.000	7.510	2	15.02	0.880	13.22	
40	〃	A	0.150	0.100	0.100			0.350	230	80.50	0.880	70.84	
41	〃	L	3.860	0.350				4.210	2	8.42	0.880	7.41	
42	〃	C	0.150	0.180	0.180			0.510	98	49.98	0.880	43.98	
								Sub				2864.19	

Outlet-3,4

No	D (mm)	Shape Pattern	Length(m) a	b	c	d	Hook	Sub (m)	Nos	Length (m)	Unit Weight (kg/m)	Weight (kg)	Remarks
1	D12	A	2.000					2.000	24	48.00	0.888	42.62	Average
2	〃	A	0.330					0.330	8	2.64	0.888	2.34	Average
3	〃	A	0.970					0.970	8	7.76	0.888	6.89	Average
4	〃	A	1.550					1.550	8	12.40	0.888	11.01	
5	〃	A	1.320					1.320	8	10.56	0.888	9.38	
6	〃	A	3.650					3.650	8	29.20	0.888	25.93	
7	〃	A	1.850					1.850	6	11.10	0.888	9.86	Average
8	〃	B	0.830	0.150				0.980	16	15.68	0.888	13.92	Average
9	〃	C	0.150	0.100	0.100			0.350	10	3.50	0.888	3.11	
10	〃	C	0.150	0.180	0.180			0.510	16	8.16	0.888	7.25	
11	〃	D	1.230	2.380	1.500	2.380	1.230	8.720	2	17.44	0.888	15.49	
12	〃	L	3.860	0.350				4.210	2	8.42	0.888	7.48	
13	〃	C	0.150	0.100	0.100			0.350	16	5.60	0.888	4.97	
14	〃	E	1.360	1.360	1.360	1.710		5.790	6	34.74	0.888	30.85	
15	〃	C	0.100	0.100	0.100			0.300	84	25.20	0.888	22.38	
16	D12	A	2.450					2.450	8	19.60	0.888	17.40	
17	〃	A	0.880					0.880	20	17.60	0.888	15.63	Average
18	〃	C	2.450	1.975	1.975			6.400	2	12.80	0.888	11.37	
19	〃	A	1.975					1.975	12	23.70	0.888	21.05	
20	〃	A	0.970					0.970	8	7.76	0.888	6.89	Average
21	〃	A	0.220					0.220	4	0.88	0.888	0.78	
22	〃	A	1.550					1.550	8	12.40	0.888	11.01	
23	〃	A	1.320					1.320	8	10.56	0.888	9.38	
24	〃	L	3.860	0.350				4.210	2	8.42	0.888	7.48	
25	〃	C	0.150	0.100	0.100			0.350	8	2.80	0.888	2.49	
26	〃	C	0.150	0.100	0.100			0.350	8	2.80	0.888	2.49	
27	〃	A	4.270					4.270	4	17.08	0.888	15.17	
28	〃	C	2.450	1.150	1.150			4.750	4	19.00	0.888	16.87	Average
29	〃	A	2.250					2.250	16	36.00	0.888	31.97	Average
30	〃	C	0.150	0.180	0.180			0.510	18	9.18	0.888	8.15	
31	〃	A	2.700					2.700	8	21.60	0.880	19.01	
32	〃	A	2.450					2.450	14	34.30	0.880	30.18	
33	〃	C	0.150	0.100	0.100			0.350	18	6.30	0.880	5.54	
34	〃	C	0.150	0.100	0.100			0.350	8	2.80	0.880	2.46	
								Sub				448.80	

Single Barrel

No	D (mm)	Shape Pattern	Length(m) a	b	c	d	Hook	Sub (m)	Nos	Length (m)	Unit Weight (kg/m)	Weight (kg)	Remarks
1	D12	A	2.000					2.000	48	96.00	0.888	85.25	Average
2	〃	A	0.330					0.330	16	5.28	0.888	4.69	Average
3	〃	A	0.970					0.970	16	15.52	0.888	13.78	Average
4	〃	A	1.550					1.550	16	24.80	0.888	22.02	
5	〃	A	1.320					1.320	16	21.12	0.888	18.75	
6	〃	A	3.650					3.650	16	58.40	0.888	51.86	
7	〃	A	1.850					1.850	12	22.20	0.888	19.71	Average
8	〃	B	0.830	0.150				0.980	32	31.36	0.888	27.85	Average
9	〃	C	0.150	0.100	0.100			0.350	20	7.00	0.888	6.22	
10	〃	C	0.150	0.180	0.180			0.510	32	16.32	0.888	14.49	
11	〃	D	1.230	2.380	1.500	2.380	1.230	8.720	4	34.88	0.888	30.97	
12	〃	L	3.860	0.350				4.210	4	16.84	0.888	14.95	
13	〃	C	0.150	0.100	0.100			0.350	16	5.60	0.888	4.97	
14	〃	E	1.360	1.360	1.360	1.710		5.790	6	34.74	0.888	30.85	
15	〃	C	0.100	0.100	0.100			0.300	84	25.20	0.888	22.38	
								Sub				368.74	

Shape Pattern	Schedule
A	
B	
C	
D	
E	
F	
G	
H	
I	
J	
K	
L	

Diameter	Hook Length
D10	139
D13	162
D16	190
D19	226
D22	261
D25	296
D29	343
D32	379

Lapping	
D12	350
D16	465

Lapping at Edge	15D
D10	150
D13	195
D16	240
D19	285
D22	330
D25	375
D29	435
D32	480

CHAPTER 3 DRAINAGE FACILITIES

Quantity calculation of drainage facilities is indicated from the following page.

Lower Marikina River Drainage Facilities

3.1 Summary of Quantity

BQ No.	Description	Unit	Drainage Pipes and Manholes			Sluice way	Total
			Section I	Section II	Section III		
			0+921.2	3+33.6	3+898.9		
			~	~	~		
			1+337.8	3+621.2	4+674.5		
			Left Bank	Right Bank	Left Bank		
BILL No. 4 - EXCAVATION AND EARTHWORKS							
4.8/1	**Excavation for manholes and junction manholes**	m^3	671.0	536.6	1062.6		2,270.2
4.8/2	**Excavation for pipe culverts**	**m^3**	**1835.1**	**1472.2**	**3095.3**		**6402.6**
	RCP	m^3	1781.6	25.8	2059.1		3866.5
	Box Culvert	m^3	53.5	1446.4	1036.2		2536.1
4.8/3	**Excavation for other structures**	**m^3**	**730.6**	**1754.4**	**1195.4**	**3939.5**	**7619.9**
	U-ditch	m^3	373.9	1058.1	696.6		2128.6
	Demolish Existing Drainage	m^3	356.7	696.3	498.8		1551.8
	Sluiceway	m^3				3939.5	3939.5
4.16/1	**Random backfill**	**m^3**	**819.7**	**2816.9**	**2022.8**	**1960.7**	**7620.2**
	Manhole	m^3	71.0	67.6	115.3		253.9
	Box Culvert	m^3	37.6	1027.8	758.8		1824.2
	U-ditch	m^3	341.2	1013.4	631.2		1985.8
	Demolish Existing Drainage	m^3	369.9	708.1	517.5		1595.5
	Sluiceway	m^3				1960.7	1960.7
4.17/1	**Zone B pipe backfill**						
	RCP	m^3	868.9	11.1	1283.1		2163.1
4.17/2	**Zone C pipe backfill**						
	RCP	m^3	617.5	10.7	337.7		965.9
	Disposal Material	**m^3**	**2417.0**	**946.3**	**3330.5**	**1978.8**	**8672.5**
	Manhole	m^3	600.1	469.0	947.3		2016.3
	RCP	m^3	1781.6	25.8	2059.1		3866.5
	Box Culvert	m^3	15.9	418.6	277.4		711.9
	U-ditch	m^3	32.7	44.7	65.4		142.8
	Demolish Existing Drainage	m^3	-13.2	-11.8	-18.7		-43.7
	Sluiceway	m^3				1978.8	1978.8
BILL No. 5 - CONCRETE							
5.11/1	**Reinforcement Grade 275**	t	10.000	35.102	20.353	54.771	120.226
5.16/1	**Precast concrete manhole and junction box covers**						
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla	m^3	7.533	9.913	14.958		32.4
	Formwork	m^2	46.924	61.820	93.259		202.0
5.22/1	**Concrete in manholes, junction boxes and outlets**						
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla	m^3	61.911	56.300	100.365		218.6
	Formwork	m^2	381.700	323.850	594.840		1,300.4
	Scaffolding Work	m^2	462.6	298.5	641.4		1402.5
	Supporting Work	m^2	45.7	32.1	51.5		129.3
	Demolition of Existing Draina RCP, Box Culvert	m^3	5.869	6.388	9.746		22.0
	Demolition of House	no	1				1
	Temporary earth retaining wall	lm	46.4	234.9	207.2		488.5
5.22/2	**Concrete for pipe bedding**						
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla	m^3	4.236	0.379	6.822		11.4
	Formwork	m^2	107.115	1.400	161.440		270.0
5.22/3	**Concrete in box culverts**						
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla	m^3	6.363	198.159	132.616		337.1
	Formwork	m^2	19.680	425.460	279.760		724.9
	Expansiton Joint Water Stop	m	4.0	91.9	60.2		156.1
	Cork Filler	m^2	0.6	19.8	13.2		33.6
	Joint Sealant	m	3.6	82.8	54.4		140.8
5.22/4	**Concrete in sheet pile copings**						
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla	m^3				42.161	42.2
	Formwork	m^2				147.680	147.7
5.22/6	**Concrete in parapet walls PW Type 1**						
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla	m^3				8.458	8.5
	Formwork	m^2				73.472	73.5
5.22/15	**Filler concrete (Class B)**	m^3				8.889	8.9
	Concrete Work for Reinforced Concrete, Class-A, Manpower Placing						
5.22/16	**Concrete in U-ditches**						
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla	m^3	41.522	165.379	94.893		301.8
	Formwork	m^2	238.623	701.287	598.376		1,538.3
	Expansiton Joint Water Stop	m		62.7			62.7
	Cork Filler	m^2		36.9			36.9
	Joint Sealant	m		55.5			55.5
5.22/18	**Concrete in Gravity Wall**						
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla	m^3				2.129	2.1

BQ No.	Description		Unit	Drainage Pipes and Manholes			Sluice way	Total
				Section I	Section II	Section III		
				0+921.2	3+33.6	3+898.9		
				~	~	~		
				1+337.8	3+621.2	4+674.5		
				Left Bank	Right Bank	Left Bank		
	Formwork		m^2				4.074	4.1
	Joint Filler	Elastite, t=10mm	m^2				0.9	0.9
5.22/20	**Concrete in base type A for concrete block retaining wall**							
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla		m^3				4.048	4.0
	Formwork		m^2				15.600	15.6
5.22/22	**Concrete in partition for concrete block wall**							
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla		m^3				16.460	16.5
	Formwork		m^2				82.611	82.6
	Joint Filler	Elastite, t=10mm	m^2				65.8	65.8
5.22/23	**Backfill concrete for concrete block retaining wall**							
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla		m^3				5.291	5.3
	Formwork		m^2				53.610	53.6
5.22/24	**Top concrete for concrete block retaining wall**							
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla		m^3				1.942	1.9
	Formwork		m^2				8.247	8.2
5.22/27	**Concrete in sluice structures**							
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla		m^3				557.938	557.9
	Formwork		m^2				1617.928	1,617.9
	Scaffolding Work		m^2				696.1	696.1
	Supporting Work		m^2				114.5	114.5
	Grout Pipe	h=500mm	no				6	6
		h=800mm	no				6	6
		h=450mm	no				3	3
		h=750mm	no				3	3
	Flexible Joint	1.0 x 1.0	no				1	1
		1.2 x 1.2	no				3	3
		1.4 x 1.4	no				2	2
		1.5 x 1.5	no				2	2
		1.6 x 1.6	no				1	1
		1.8 x 1.1	no				1	1
		1.8 x 1.3	no				1	1
		1.8 x 1.5	no				1	1
		2.0 x 1.1	no				1	1
		2.0 x 1.6	no				1	1
		2.1 x 1.0	no				1	1
		2.1 x 1.2	no				1	1
		2.2 x 1.3	no				1	1
		2.6 x 0.5	no				1	1
		3.5 x 1.0	no				1	1
	Expansiton Joint	Water Stop	m				48.5	
		Cork Filler	m^2				93.3	
		Joint Sealant	m				247.5	
5.23/1	**Leveling concrete**							
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla		m^3	32.850	97.049	86.056	41.247	257.2
	Formwork		m^2	86.480	159.992	199.446	30.667	476.6
BILL No. 6 - PILING								
6.4/1	**Type IIIw U-shape U-shape**	W=600 136.0kg/m						
	L=6.0~9.0m		m				110.5	110.5
6.4/5	**Type 10H Hat-shape**	W=900 96.0kg/m						
	L=2.0~4.0m		m				184.0	184.0
	L=4.0~6.0m		m				405.0	405.0
	L=6.0~9.0m		m				575.5	575.5
	L=9.0~12.0m		m				409.0	409.0
6.4/6	**Type 10H Hat-shape with flexible joint**							
	L=2.0~4.0m		m				28.0	28.0
	L=4.0~6.0m		m				54.0	54.0
	L=6.0~9.0m		m				75.0	75.0
	L=9.0~12.0m		m				97.0	97.0
6.4/19	**Type 25H Hat-shape**	W=900 126.0kg/m						
	L=2.0~4.0m		m				14.2	14.2
	L=4.0~6.0m		m				22.2	22.2
	L=6.0~9.0m		m				296.4	296.4
	L=9.0~12.0m		m				993.0	993.0
6.4/20	**Type 25H Hat-shape with flexible joint**							
	L=2.0~4.0m		m					

BQ No.	Description	Unit	Drainage Pipes and Manholes			Sluice way	Total
			Section I	Section II	Section III		
			0+921.2	3+33.6	3+898.9		
			~	~	~		
			1+337.8	3+621.2	4+674.5		
			Left Bank	Right Bank	Left Bank		
	L=4.0~6.0m	m					
	L=6.0~9.0m	m				15.0	15.0
	L=9.0~12.0m	m				169.0	169.0
6.4/25	**Extra-over cost of installing sheet pilesbeneath bridges and HV cables**						
	Type 10H Hat-shape	m				152.5	152.5
	Type 25H Hat-shape	m				129.0	129.0
BILL No. 7 - PROTECTION WORKS							
7.5/1	**Gravel bedding and backfill**	m^3				27.971	28.0
7.8/1	**Gabion mattresses**						
	Gabion mattresses t=500mm	m^2				2152.9	2,152.9
	Filter Fabric t=10mm	m^2				2678.7	2,678.7
7.10/1	**Precast concrete block retaining wall**						
	Concrete Work for Reinforced Concrete, Class-A, Manpower Pla	m^3				8.001	8.0
	Formwork	m^2				278.130	278.1
BILL No. 8 - DRAINAGE							
8.4/6	**Reinforced concrete pipe - 910 mm dia.**						
	Installation of RC Pipe Culvert	lm	263.0	4.0	413.0		680.0
	Cement Mortar (1:2) for Joint Collar of RC Pipe Culvert	m^3	14.6	0.2	22.8		
8.4/7	**Reinforced concrete pipe – 1070 mm dia.**						
	Installation of RC Pipe Culvert	lm	8.0				8.0
	Cement Mortar (1:2) for Joint Collar of RC Pipe Culvert	m^3	0.5				
8.6/3	**Rectangular aluminum flap gate 1000 x 1000**	no				1	1
8.6/4	**Rectangular aluminum flap gate 1200 x 1200**	no				3	3
8.6/5	**Rectangular aluminum flap gate 1400 x 1400**	no				2	2
8.6/6	**Rectangular aluminum flap gate 1500 x 1500**	no				2	2
8.6/7	**Rectangular aluminum flap gate 1600 x 1600**	no				1	1
8.6/8	**Rectangular aluminum flap gate 2000 x 1600**	no				1	1
BILL No. 11 - STRUCTURAL AND MISCELLANEOUS METALWORK							
11.10/1	**Trash screen 1400 x 1400**	no				1	1
11.10/2	**Trash screen 1600 x 1600**	no				1	1
11.10/3	**Trash screen 1800 x 1800**	no				2	2
11.10/4	**Trash screen 1900 x 1900**	no				2	2
11.10/5	**Trash screen 2000 x 2000**	no				1	1
11.10/6	**Trash screen 2400 x 2000**	no				1	1
11.10/7	**Trash screen 3100 x 1600**	no				1	1

Lower Marikina River Drainage Facilities

3.2 Drainage Pipes and Manholes

Quantity of Drainage Pipes and Manholes					
BQ No.	Description	Unit	Quantity	Calculation	
No. 4 - EXCAVATION AND EARTHWORKS					
4.8/1	Excavation for manholes and junction manholes				
4.8/	Section I	m3	671.0	671.0	*From Quantity Calculation of Manhole
	Section II	m3	536.6	536.6	"
	Section III	m3	1062.6	1062.6	"
4.8/2	Excavation for pipe culverts				
	Section I	**m3**	**1835.1**		
	RCP	m3	1781.6	1781.6	*From Quantity Calculation of Collector Pipe
	Box Culvert	m3	53.5	53.5	
	Section II	**m3**	**1472.2**		
	RCP	m3	25.8	25.8	*From Quantity Calculation of Collector Pipe
	Box Culvert	m3	1446.4	1446.4	*From Quantity Calculation of Box Culvert
	Section III	**m3**	**3095.3**		
	RCP	m3	2059.1	2059.1	*From Quantity Calculation of Collector Pipe
	Box Culvert	m3	1036.2	1036.2	*From Quantity Calculation of Box Culvert
4.8/3	Excavation for other structures				
	Section I	**m3**	**730.6**		
	U-ditch	m3	373.9	373.9	*From Quantity Calculation of U-ditch
	Demolishing Existing Drainage	m3	356.7	356.7	*From Quantity Calculation of Demolishing Existing Drainage
	Section II	**m3**	**1754.4**		
	U-ditch	m3	1058.1	1058.1	*From Quantity Calculation of U-ditch
	Demolishing Existing Drainage	m3	696.3	696.3	*From Quantity Calculation of Demolishing Existing Drainage
	Section III	**m3**	**1195.4**		
	U-ditch	m3	696.6	696.6	*From Quantity Calculation of U-ditch
	Demolishing Existing Drainage	m3	498.8	498.8	*From Quantity Calculation of Demolishing Existing Drainage
					Quantity of Drainage Pipes and Manholes

Quantity of Drainage Pipes and Manholes					
BQ No.	Description	Unit	Quantity	Calculation	
4.16/1	Random Backfill Excavated Material				
	Section I	**m3**	**819.7**		
	Manhole	m3	71.0	71.0	
	Box Culvert	m3	37.6	37.6	
	U-ditch	m3	341.2	341.2	*From Quantity Calculation of U-ditch
	Demolish Existing Drainage	m3	369.9	369.9	*From Quantity Calculation of Demolishing Existing Drainage
	Section II	**m3**	**2816.9**		
	Manhole	m3	67.6	67.6	
	Box Culvert	m3	1027.8	1027.8	*From Quantity Calculation of Box Culvert
	U-ditch	m3	1013.4	1013.4	*From Quantity Calculation of U-ditch
	Demolish Existing Drainage	m3	708.1	708.1	*From Quantity Calculation of Demolishing Existing Drainage
	Section III	**m3**	**2022.8**		
	Manhole	m3	115.3	115.3	
	Box Culvert	m3	758.8	758.8	*From Quantity Calculation of Box Culvert
	U-ditch	m3	631.2	631.2	*From Quantity Calculation of U-ditch
	Demolish Existing Drainage	m3	517.5	517.5	*From Quantity Calculation of Demolishing Existing Drainage
4.17/1	Zone B pipe backfill				
	Section I RCP	m3	868.9	868.9	*From Quantity Calculation of Collector Pipe
	Section II	m3	11.1	11.1	"
	Section III	m3	1283.1	1283.1	"
4.17/2	Zone C pipe backfill				
	Section I RCP	m3	617.5	617.5	*From Quantity Calculation of Collector Pipe
	Section II	m3	10.7	10.7	"
	Section III	m3	337.7	337.7	"
	Disposal Material				
	Section I	**m3**	2417.0	671.0 + 1,835.1 + 730.6 -(819.7)	
	Section II	**m3**	946.3	536.6 + 1,472.2 + 1,754.4 -(2,816.9)	
	Section IIII	**m3**	3330.5	1,062.6 + 3,095.3 + 1,195.4 -(2,022.8)	
					Quantity of Drainage Pipes and Manholes

Quantity of Drainage Pipes and Manholes					
BQ No.	Description	Unit	Quantity	Calculation	
5.11/1	**Reinforcement Grade 275**				
	Section I	**t**	**10.000**		
	Manhole	t	5.673	0.103 + 5.570	
	Manhole Cover	t	0.353	0.353	*From Quantity Calculation of Manhole
	Box Culvert	t	0.573	0.573	*From Quantity Calculation of Box Culvert
	U-ditch	t	2.699	2.699 + 5.200	*From Quantity Calculation of U-ditch
	U-ditch cover **n=135pc**	t	0.702	5.2 × 135.0 / 1000	
				*Weight of Reinforcing bar in 1 pc	
	Section II	**t**	**35.102**		
	Manhole	t	5.133	0.093 + 5.040	
	Manhole Cover	t	0.475	0.475	*From Quantity Calculation of Manhole
	Box Culvert	t	17.834	17.834	*From Quantity Calculation of Box Culvert
	U-ditch	t	10.750	10.750	*From Quantity Calculation of U-ditch
	U-ditch cover **n=175pc**	t	0.910	5.2 × 175.0 / 1000	
				*Weight of Reinforcing bar in 1 pc	
	Section III	**t**	**20.353**		
	Manhole	t	0.178	0.178 + 9.097	
	Manhole Cover	t	0.694	0.694	*From Quantity Calculation of Manhole
	Box Culvert	t	11.935	11.935	*From Quantity Calculation of Box Culvert
	U-ditch	t	6.168	6.168	*From Quantity Calculation of U-ditch
	U-ditch cover **n=265pc**	t	1.378	5.2 × 265.0 / 1000	
				*Weight of Reinforcing bar in 1 pc	
5.16/1	Precast concrete manhole and junction box covers				
	Section I	**m3**	**7.533**		
	Manhole	m3	2.470	2.470	*From Quantity Calculation of Manhole
	U-ditch L=135.0m	m3	5.063	0.038 × 135.0	
	Section II	**m3**	**9.913**	*Concrete Volume of 1 piece	
	Manhole	m3	3.350	3.350	*From Quantity Calculation of Manhole
	U-ditch L=175.0m	m3	6.563	0.038 × 175.0	
	Section III	**m3**	**14.958**	*Concrete Volume of 1 piece	
	Manhole	m3	5.020	5.020	*From Quantity Calculation of Manhole
	U-ditch L=265.0m	m3	9.938	0.038 × 265.0	
				*Concrete Volume of 1 piece	
5.22/1	Concrete in manholes, junction boxes and outlets				
	Section I	**m3**	61.911	61.911	*From Quantity Calculation of Manhole
	Section II	**m3**	56.300	56.300	"
	Section III	**m3**	100.365	100.365	"
					Quantity of Drainage Pipes and Manholes

Quantity of Drainage Pipes and Manholes					
BQ No.	Description	Unit	Quantity	Calculation	
	Demolishing Existing Drainage				
	Section I	**m3**	5.869	5.869	*From Quantity Calculation of Demolishing Existing Drainage
	Section II	**m3**	6.388	6.388	"
	Section III	**m3**	9.746	9.746	"
5.22/2	Concrete for pipe bedding				
	Section I	**m3**	4.236	4.236	*From Quantity Calculation of Collector Pipe
	Section II	**m3**	0.379	0.379	"
	Section III	**m3**	6.822	6.822	"
	Concrete Collar mortar 1:2				
	Section I RCP φ910	**m3**	14.594	14.594	*From Quantity Calculation of Collector Pipe
	RCP φ1070	**m3**	0.466	0.466	*From Quantity Calculation of Collector Pipe
	Section II	**m3**	0.173	0.173	"
	Section III	**m3**	22.782	22.782	"
5.22/3	Concrete in box culverts				
	Section I	**m3**	6.363	6.363	
	Section II	**m3**	198.159	198.159	*From Quantity Calculation of Box Culvert
	Section III	**m3**	132.616	132.616	"
5.22/16	Concrete in U-ditches				
	Section I	**m3**	41.522	41.522	*From Quantity Calculation of U-ditch
	Section II	**m3**	165.379	165.379	"
	Section III	**m3**	94.893	94.893	"
5.23/1	Leveling concrete				
	Section I	**m3**	**32.850**		
	Manhole	m3	6.047	6.047	*From Quantity Calculation of Manhole
	Box Culvert	m3	1.414	1.414	
	U-ditch	m3	25.389	25.389	*From Quantity Calculation of U-ditch
	Section II	**m3**	**97.049**		
	Manhole	m3	7.939	7.939	*From Quantity Calculation of Manhole
	Box Culvert	m3	34.311	34.311	*From Quantity Calculation of Box Culvert
	U-ditch	m3	54.799	54.799	*From Quantity Calculation of U-ditch
	Section III	**m3**	**86.056**		
	Manhole	m3	12.351	12.351	*From Quantity Calculation of Manhole
	Box Culvert	m3	22.605	22.605	*From Quantity Calculation of Box Culvert
	U-ditch	m3	51.100	51.100	*From Quantity Calculation of U-ditch

Quantity of Drainage Pipes and Manholes				
BQ No.	Description	Unit	Quantity	Calculation
	Formwork			
	Precast concrete manhole and junction box covers			
	Section I	**m2**	**46.924**	
	Manhole	m2	16.549	16.549 *From Quantity Calculation of Manhole
	U-ditch L=135.000m	m2	30.375	0.225 × 135.0
				*Formwork Area of 1 piece
	Section II	**m2**	**61.820**	
	Manhole	m2	22.445	22.445 *From Quantity Calculation of Manhole
	U-ditch L=175.000m	m2	39.375	0.225 × 175.0
				*Formwork Area of 1 piece
	Section III	**m2**	**93.259**	
	Manhole	m2	33.634	33.634 *From Quantity Calculation of Manhole
	U-ditch L=265.000m	m2	59.625	0.225 × 265.0
				*Formwork Area of 1 piece
	Concrete in manholes, junction boxes and outlets			
	Section I	m2	381.700	381.700 *From Quantity Calculation of Manhole
	Section II	m2	323.850	323.850 *From Quantity Calculation of Manhole
	Section III	m2	594.840	594.840 *From Quantity Calculation of Manhole
				*Formwork Area of 1 piece
	Concrete for pipe bedding			
	Section I	m2	107.115	107.115 *From Quantity Calculation of Collector Pipe
	Section II	m2	1.400	1.400 "
	Section III	m2	161.440	161.440 "
	Concrete in box culverts			
	Section I	m2	19.680	19.680
	Section II	m2	425.460	425.460 *From Quantity Calculation of Box Culvert
	Section III	m2	279.760	279.760 "
	Concrete in U-ditches			
	Section I	m2	238.623	238.623 *From Quantity Calculation of U-ditch
	Section II	m2	701.287	701.287 "
	Section III	m2	598.376	598.376 "
	Scaffolding Work manhole			
	Section I	m2	462.6	462.6 *From Quantity Calculation of Manhole
	Section II	m2	298.5	298.5 "
	Section III	m2	641.4	641.4 "
	Supporting Work			
	Section I	m2	45.7	45.7 *From Quantity Calculation of Manhole
	Section II	m2	32.1	32.1 "
	Section III	m2	51.5	51.5 "
				Quantity of Drainage Pipes and Manholes

Quantity of Drainage Pipes and Manholes					
BQ No.	Description	Unit	Quantity	Calculation	
	Leveling concrete				
	Section I	**m2**	**86.480**		
	Manhole	m2	11.920	11.920	*From Quantity Calculation of Manhole
	Box Culvert	m2	2.020	2.020	
	U-ditch	m2	72.540	72.540	*From Quantity Calculation of U-ditch
	Section II	**m2**	**159.992**		
	Manhole	m2	14.692	14.692	*From Quantity Calculation of Manhole
	Box Culvert	m2	45.960	45.960	*From Quantity Calculation of Box Culvert
	U-ditch	m2	99.340	99.340	*From Quantity Calculation of U-ditch
	Section III	**m2**	**199.446**		
	Manhole	m2	23.306	23.306	*From Quantity Calculation of Manhole
	Box Culvert	m2	30.140	30.140	*From Quantity Calculation of Box Culvert
	U-ditch	m2	146.000	146.000	*From Quantity Calculation of U-ditch
	Expansion Joint				
	Water Stop				
	Box Culvert	**m**	**156.1**		
	SectionI	m	4.0	4.00	*From Quantity Calculation of Box Culvert
	SectionII	m	91.9	91.90	"
	SectionIII	m	60.2	60.20	"
	U-ditch	**m**	**62.7**		
	SectionII	m	62.7	62.70	*From Quantity Calculation of U-ditch
	SectionIII	m		0.00	"
	Cork Filler				
	Box Culvert	**m2**	**33.6**		
	SectionI	m	0.6	0.60	*From Quantity Calculation of Box Culvert
	SectionII	m2	19.8	19.80	*From Quantity Calculation of Box Culvert
	SectionIII	m2	13.2	13.20	"
	U-ditch	**m2**	**36.9**		
	SectionII	m2	36.9	36.90	*From Quantity Calculation of U-ditch
	SectionIII	m2		0.00	"
	Joint Sealant				
	Box Culvert	**m**	**140.8**		
	SectionI	m	3.6	3.60	*From Quantity Calculation of Box Culvert
	SectionII	m	82.8	82.80	*From Quantity Calculation of Box Culvert
	SectionIII	m	54.4	54.40	*From Quantity Calculation of Box Culvert
	U-ditch	**m**	**55.5**		
	SectionII	m	55.5	55.50	*From Quantity Calculation of U-ditch
	SectionIII	m		0.00	
					Quantity of Drainage Pipes and Manholes

Quantity of Drainage Pipes and Manholes

BQ No.	Description	Unit	Quantity	Calculation		
No. 8 - DRAINAGE						
8.4/6	Reinforced concrete pipe - 910 mm dia.					
	Section I	lm	263.0	263	1.000	*From Quantity Calculation of Collector Pipe
	Section II	lm	4.0	4	1.000	"
	Section III	lm	413.0	413	1.000	"
8.4/7	Reinforced concrete pipe – 1070 mm dia.					
	Section I	lm	8.0	8	1.000	*From Quantity Calculation of Collector Pipe
	Temporary Works					
	Temporary earth retaining wall					
	Section I	lm	46.4	46.4	*From Length of Temporary Earth Retaining Wall	
	Section II	lm	234.9	234.9	"	
	Section III	lm	207.2	207.2	"	
	Demolition					
	Demolition of House STA 0+950 Left Bank	no	1.0	1.0		

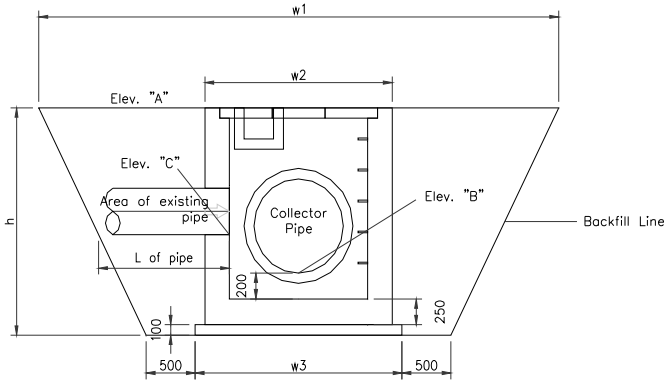
(1) Quantity of Manholes

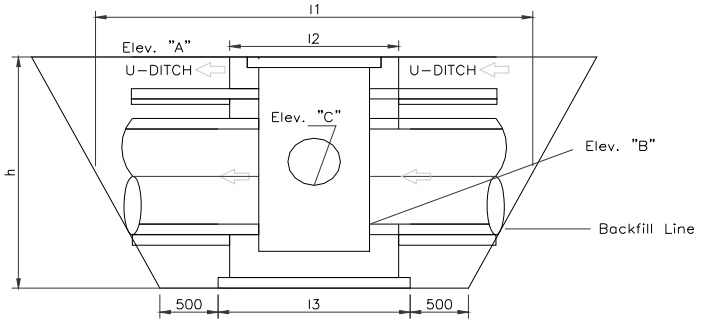
Manhole Serial No.	Excavation	Backfill	Concrete for Manhole		Concrete Cover		Leveling Concrete		Ladder Rung	Reinforcement		Scaffolding	Supporting
			Concrete	Form Work	Concrete	Form Work	Concrete	Form Work		Manhole	Cover		
	(m^3)	(m^3)	(m^3)	(m^2)	(m^3)	(m^2)	(m^3)	(m^2)	(kg)	(kg)	(kg)	(m^2)	(m^3)
Section I													
MML 3.1	28.3	3.2	3.068	20.820	0.180	1.206	0.340	0.744	6.4	276.1	25.7	23.6	
MML 3.2	30.4	3.1	2.889	19.190	0.190	1.273	0.352	0.756	6.4	260.0	27.1	24.4	
MML 3.3	33.8	1.0	3.130	19.190	0.120	0.804	0.352	0.832	6.4	281.7	17.2	24.4	2.7
MML 3.4	31.8	3.3	2.909	19.410	0.190	1.273	0.348	0.752	6.4	261.8	26.7	24.7	
MML 3.5	32.9	3.4	2.935	19.630	0.190	1.273	0.348	0.752	6.4	264.2	26.7	24.9	
MML 3.5.1	27.9	5.3	2.505	17.340	0.190	1.273	0.274	0.682	6.4	225.4	26.7	22.2	
MML 4.0	32.7	3.9	3.282	22.330	0.190	1.273	0.352	0.756	7.5	295.4	27.1	27.6	
MML 4.1	36.2	4.1	3.544	24.320	0.190	1.273	0.359	0.762	7.5	318.9	27.8	29.6	
MML 4.2	75.9	6.3	7.103	39.700	0.180	1.206	0.736	1.100	8.5	638.9	25.9	50.4	10.4
MML 5	47.4	4.3	3.401	23.350	0.190	1.273	0.348	0.752	7.5	306.1	26.7	28.5	
MML 5.1	41.2	3.7	3.156	21.320	0.190	1.273	0.352	0.756	6.6	284.0	27.1	26.7	
MML 5.2	39.4	5.8	3.259	22.140	0.190	1.273	0.352	0.756	6.4	293.3	27.1	25.7	
MML 5.3	102.3	12.0	9.820	52.130	0.140	0.938	0.990	1.260	9.6	883.2	20.7	60.8	15.2
MML 6	111.0	11.7	10.910	60.830	0.140	0.938	0.544	1.260	10.7	981.1	20.7	69.2	17.4
Subtotal	**671.0**	**71.0**	**61.911**	**381.700**	**2.470**	**16.549**	**6.047**	**11.920**	**102.8**	**5570.1**	**353.3**	**462.6**	**45.7**
Section II													
MMR 7.6	29.3	3.1	3.110	20.610	0.290	1.943	0.380	0.752	6.4	280.4	41.7	25.3	
MMR 7.11	23.7	2.7	2.810	18.140	0.210	1.407	0.380	0.790	6.4	252.7	29.8		
MMR 7.16	32.9	2.8	2.610	16.570	0.210	1.407	0.380	0.790	6.4	234.9	29.8	24.7	
MMR 7.17	29.8	2.6	2.510	15.780	0.210	1.407	0.380	0.790	6.4	226.0	29.8	23.9	
MMR 7.18	61.3	4.2	5.550	32.880	0.220	1.474	0.710	1.080	8.5	499.8	31.1	48.0	
MMR 7 .24	26.0	2.7	2.520	15.890	0.210	1.407	0.380	0.790	6.4	227.3	29.8	24.0	
MMR 7.32	24.4	2.0	2.610	16.550	0.210	1.407	0.380	0.790	5.3	234.8	29.8		
MMR 8	104.5	26.6	14.280	78.520	0.190	1.273	1.500	1.800	8.5	1284.9	26.9	86.3	23.2
MMR 8A.1.1	7.5	1.2	1.346	8.340	0.120	0.804	0.254	0.720	2.1	121.1	13.7		
MMR 8A.1.2	23.0	2.7	1.600	9.980	0.140	0.938	0.290	0.700	4.3	144.3	19.6		
MMR 8A.1.3	25.6	2.2	1.926	11.430	0.190	1.273	0.360	0.780	4.3	173.3	27.4		
MMR 8A.1.4	31.5	1.6	2.400	13.920	0.250	1.675	0.440	0.860	5.3	215.6	36.3	22.4	
MMR 8A.2	64.3	5.2	6.521	26.660	0.250	1.675	0.832	1.160	7.5	558.7	36.3	44.1	8.9
MMR 8A.2.1	27.3	1.5	2.270	13.200	0.240	1.608	0.430	0.840	4.3	204.7	34.6		
MMR 8A.2.2	9.4	2.0	1.787	10.540	0.180	1.206	0.345	0.760	4.3	160.9	25.9		
MMR 8A.2.3	6.8	2.2	1.320	7.880	0.130	0.871	0.270	0.680	3.2	118.8	18.4		
MMR 8A.2.4	9.2	2.1	1.130	6.960	0.100	0.670	0.228	0.610	3.2	101.7	14.4		
Subtotal	**536.6**	**67.6**	**56.300**	**323.850**	**3.350**	**22.445**	**7.939**	**14.692**	**92.9**	**5039.9**	**475.3**	**298.5**	**32.1**

Manhole Serial No.	Excavation	Backfill	Concrete for Manhole		Concrete Cover		Leveling Concrete		Ladder Rung	Reinforcement		Scaffolding	Supporting
			Concrete	Form Work	Concrete	Form Work	Concrete	Form Work		Manhole	Cover		
	(m^3)	(m^3)	(m^3)	(m^2)	(m^3)	(m^2)	(m^3)	(m^2)	(kg)	(kg)	(kg)	(m^2)	(m^2)
Section III													
MML 11.41	30.1	3.5	2.827	19.260	0.160	1.072	0.317	0.722	6.4	254.4	23.2	21.7	
MML 12A	31.8	2.7	2.680	17.160	0.190	1.273	0.350	0.752	6.4	241.5	26.7	22.8	
MML 12A.2	59.9	8.4	6.713	34.730	0.180	1.206	0.907	1.282	6.4	651.8	27.8	44.9	9.6
MML 12A.3	26.2	3.3	2.330	16.310	0.160	1.072	0.320	0.722	4.7	223.9		13.3	
MML 12A.3.1	23.4	3.9	2.010	13.380	0.130	0.871	0.274	0.682	5.3	180.9	18.6		
MML 12A.3.2	22.8	4.0	2.040	13.550	0.130	0.871	0.270	0.682	5.3	182.8	18.6		
MML 12A.3.3	24.3	4.1	2.089	14.010	0.130	0.871	0.274	0.682	5.3	188.0	18.6		
MML 12A.4	30.4	2.6	2.760	18.250	0.190	1.273	0.350	0.752	5.3	248.7	26.7		
MML 12A.5	21.9	1.4	2.145	11.430	0.190	1.273	0.359	0.762	4.3	193.1	27.8		
MML 12A.6	21.6	1.6	1.990	12.060	0.190	1.273	0.350	0.752	4.3	179.1	26.7		
MML 12A.6.1	20.6	4.9	1.929	12.740	0.130	0.871	0.274	0.682	5.3	173.6	18.5		
MML 12A.7	41.4	4.2	4.830	26.030	0.160	1.072	0.680	1.062	5.3	434.5	23.2	33.4	6.2
MML 12A.9	34.9	1.6	2.938	18.820	0.230	1.541	0.401	0.802	6.4	264.5	32.5	24.7	
MML 12B	36.4	1.9	3.130	20.370	0.230	1.541	0.400	0.802	6.4	284.9	32.5	26.3	
MML 12B.1	33.1	5.7	2.662	18.600	0.130	0.871	0.274	0.682	7.5	239.6	18.6	23.3	
MML 12B.2	111.0	15.1	11.410	52.160	0.140	0.938	1.120	1.340	9.6	1027.2	20.8	67.6	18.2
MML 12C	112.1	14.2	10.930	49.500	0.170	1.139	1.090	1.320	9.6	983.7	20.7	66.4	17.5
MML 12C.1	52.5	1.1	3.840	23.760	0.180	1.206	0.480	0.880	7.5	345.4	25.9	34.0	
MML 12C.2	30.3	3.4	2.860	18.520	0.210	1.407	0.380	0.790	7.5	257.4	29.8	26.7	
MML 12C.5	28.9	4.5	2.850	18.510	0.210	1.407	0.380	0.790	6.4	256.8	29.8	26.8	
MML 12C.8	28.5	3.1	2.740	17.640	0.210	1.407	0.380	0.790	6.4	247.0	29.8	25.7	
MML 12C.12	28.4	2.3	2.680	17.240	0.200	1.340	0.370	0.786	5.3	241.6	29.3	21.9	
MML 13	46.8	0.2	4.010	26.800	0.250	1.675	0.440	0.860	7.5	360.6	36.3	31.9	
MML 13.1	46.5	2.2	4.810	30.810	0.370	2.479	0.591	0.982	7.5	432.9	53.3	38.2	
MML 13.1.1	31.3	5.0	2.420	16.640	0.130	0.871	0.270	0.682	6.4	217.6	18.6	21.5	
MML 13.1.2	27.9	4.8	2.346	16.070	0.130	0.871	0.274	0.682	6.4	211.1	18.6	20.7	
MML 13.1.3	28.5	4.6	2.280	15.490	0.130	0.871	0.270	0.682	6.4	204.6	18.6	20.3	
MML 14	31.1	0.8	4.116	25.000	0.160	1.072	0.506	0.902	6.4	370.5	23.2	29.4	
Subtotal	**1062.6**	**115.3**	**100.365**	**594.840**	**5.020**	**33.634**	**12.351**	**23.306**	**177.7**	**9097.4**	**694.2**	**641.4**	**51.5**

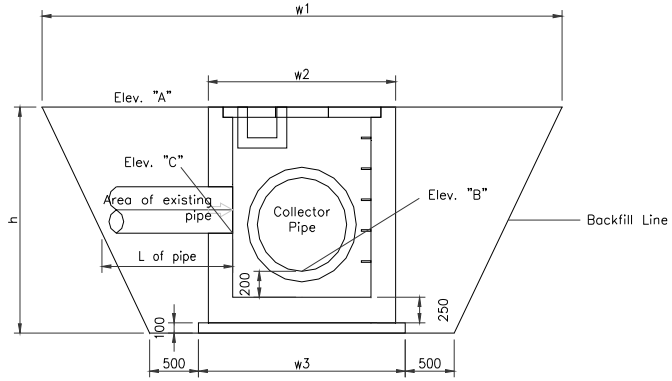
・Calculation Sheet of Backfill for Manholes

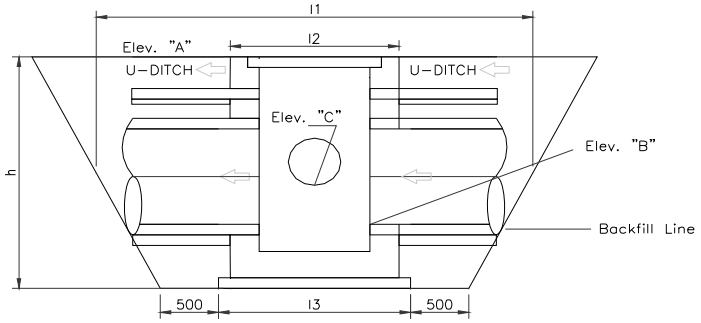
・Manhole Serial No	Elev. "A" m	Elev. "B" m	Elev. "C" m	Area of existing m^2	L of pipe m	w1 m	w2 m	w3 m	l1 m	l2 m	l3 m	h m	Volume of Manhole m^3	Volume of Leveling Concrete m^3	Volume of Pipe m^3	Backfill m^3
Section I																
MML 3.1	13.23	11.49	12.39	0.20	1.33	5.40	1.91	2.11	3.76	1.41	1.61	2.29	5.90	0.34	0.27	3.24
MML 3.2	13.19	11.41	11.97	0.23	1.15	5.43	1.91	2.11	3.83	1.47	1.67	2.32	6.24	0.35	0.27	3.06
MML 3.3	13.14	11.35	12.10	0.55	1.25	5.45	1.91	2.11	4.22	1.85	2.05	2.34	7.91	0.43	0.69	0.97
MML 3.4	13.10	11.29	12.09	0.16	1.28	5.47	1.91	2.11	3.83	1.45	1.65	2.36	6.26	0.35	0.20	3.31
MML 3.5	13.06	11.23	12.08	0.16	1.30	5.49	1.91	2.11	3.84	1.45	1.65	2.38	6.31	0.35	0.21	3.36
MML 3.5.1	13.00	11.14				5.52	1.91	2.11	3.50	1.10	1.30	2.41	4.84	0.27		5.26
MML 4.0	13.10	11.05	12.08	0.17	1.39	5.71	1.91	2.11	3.97	1.47	1.67	2.60	7.02	0.35	0.24	3.85
MML 4.1	13.18	10.98	11.54	0.20	1.15	5.85	1.91	2.11	4.07	1.50	1.70	2.74	7.58	0.36	0.23	4.14
MML 4.2	13.20	10.80	10.80	1.96	0.88	6.25	2.10	2.30	5.68	3.00	3.20	2.95	17.96	0.74	1.72	6.32
MML 5	13.20	11.06	11.84	0.16	1.27	5.81	1.91	2.11	4.00	1.45	1.65	2.70	7.20	0.35	0.20	4.29
MML 5.1	13.17	11.20	11.75	0.17	1.15	5.63	1.91	2.11	3.93	1.47	1.67	2.52	6.80	0.35	0.20	3.67
MML 5.2	13.90	11.26	11.83	0.17	1.16	6.30	1.91	2.11	4.26	1.47	1.67	3.19	8.67	0.35	0.20	5.77
MML 5.3	13.90	11.20	11.30	2.10	0.93	7.25	2.80	3.00	5.93	3.10	3.30	3.25	27.34	0.99	1.95	12.00
MML 6	13.92	11.34	11.34	2.10	0.88	7.14	2.80	3.00	5.87	3.10	3.30	3.14	26.38	0.99	1.84	11.72



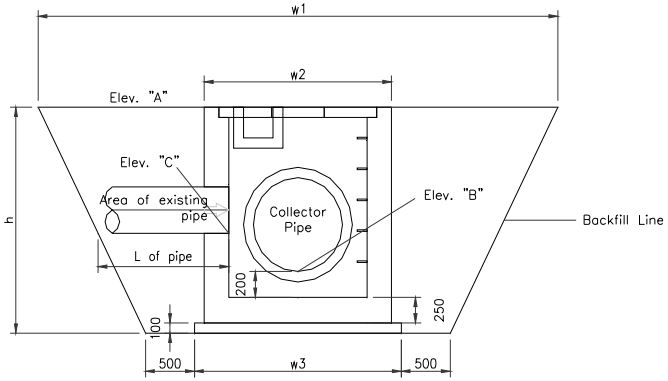


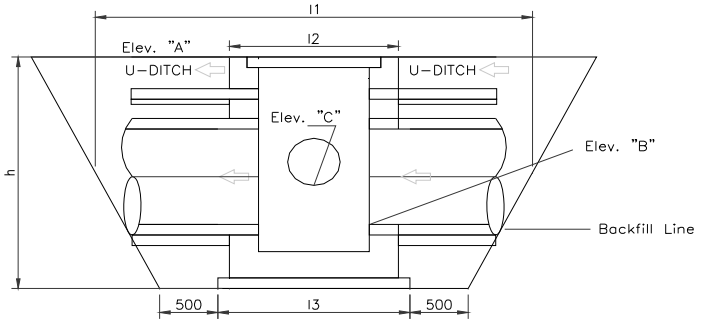
Manhole Serial No	Elev. "A" m	Elev. "B" m	Elev. "C" m	Area of existing m^2	L of pipe m	w1 m	w2 m	w3 m	l1 m	l2 m	l3 m	h m	Volume of Manhole m^3	Volume of Leveling Concrete m3	Volume of Pipe m^3	Backfill m^3
Section II																
MMR 7.6	13.92	12.19	12.61	0.16	1.09	5.39	1.91	2.11	3.79	1.45	1.65	2.28	6.03	0.35	0.17	3.13
MMR 7.11	13.77	12.11	12.84	0.16	1.24	5.50	2.10	2.30	3.75	1.45	1.65	2.20	6.40	0.38	0.20	2.71
MMR 7.16	13.61	11.94	11.95	0.16	0.88	5.53	2.10	2.30	3.76	1.45	1.65	2.23	6.47	0.38	0.14	2.83
MMR 7.17	13.48	11.87	12.29	0.16	1.09	5.46	2.10	2.30	3.73	1.45	1.65	2.16	6.27	0.38	0.17	2.64
MMR 7.18	13.40	11.06	11.72	0.16	1.21	6.19	2.10	2.30	5.55	2.90	3.10	2.89	16.99	0.71	0.19	4.18
MMR 7 .24	13.56	11.94	12.22	0.16	1.01	5.47	2.10	2.30	3.73	1.45	1.65	2.17	6.30	0.38	0.16	2.67
MMR 7.32	13.34	12.01	12.23	0.16	0.98	5.18	2.10	2.30	3.59	1.45	1.65	1.88	5.42	0.38	0.16	2.02
MMR 8	13.30	10.97	10.97	2.01	0.88	6.08	2.00	2.20	9.24	6.60	6.80	2.88	36.70	1.50	1.76	26.59
MMR 8A.1.1	13.70	13.00		-	-	4.20	1.75	1.95	3.27	1.45	1.65	1.25	2.91	0.32		1.22
MMR 8A.1.2	13.43	12.42		-	-	4.75	2.00	2.20	3.08	1.10	1.30	1.55	3.19	0.29		2.69
MMR 8A.1.3	13.19	12.08		-	-	5.05	2.20	2.40	3.33	1.30	1.50	1.65	4.44	0.36		2.18
MMR 8A.1.4	13.08	11.78		-	-	5.45	2.40	2.60	3.63	1.50	1.70	1.85	6.30	0.44		1.63
MMR 8A.2	13.00	11.60	13.02	-	-	5.55	2.40	2.60	5.18	3.00	3.20	1.95	13.32	0.83		5.23
MMR 8A.2.1	13.09	11.89		-	-	5.25	2.30	2.50	3.58	1.50	1.70	1.75	5.69	0.43		1.54
MMR 8A.2.2	13.22	12.22		-	-	4.85	2.10	2.30	3.27	1.30	1.50	1.55	3.96	0.35		2.01
MMR 8A.2.3	13.38	12.58		-	-	4.45	1.90	2.10	2.98	1.10	1.30	1.35	2.61	0.27		2.21
MMR 8A.2.4	13.58	12.83		-	-	4.05	1.55	1.75	2.95	1.10	1.30	1.30	2.05	0.23		2.15





Manhole Serial No	Elev. "A" m	Elev. "B" m	Elev. "C" m	Area of existing m^2	L of pipe m	w1 m	w2 m	w3 m	l1 m	l2 m	l3 m	h m	Volume of Manhole m^3	Volume of Leveling Concrete m3	Volume of Pipe m^3	Backfill m^3
Section III																
MML 11.41	12.96	11.35	12.49	0.07	1.44	5.27	1.91	2.11	3.58	1.30	1.50	2.16	5.11	0.32	0.10	3.51
MML 12A	12.93	11.33	12.63	0.16	1.52	5.26	1.91	2.11	3.72	1.45	1.65	2.15	5.67	0.35	0.24	2.72
MML 12A.2	12.80	11.10	12.08	0.16	1.37	5.36	1.91	2.11	6.43	4.10	4.30	2.25	16.84	0.91	0.22	8.43
MML 12A.3	12.69	11.18	12.13	0.07	1.35	5.18	1.91	2.11	3.53	1.30	1.50	2.07	4.89	0.32	0.10	3.27
MML 12A.3.1	12.69	11.25				5.11	1.91	2.11	3.30	1.10	1.30	2.00	3.99	0.27		3.95
MML 12A.3.2	12.75	11.28				5.12	1.91	2.11	3.31	1.10	1.30	2.01	4.02	0.27		3.99
MML 12A.3.3	12.90	11.39				5.17	1.91	2.11	3.33	1.10	1.30	2.06	4.12	0.27		4.14
MML 12A.4	12.98	11.45	12.09	0.16	1.20	5.19	1.91	2.11	3.69	1.45	1.65	2.08	5.49	0.35	0.19	2.62
MML 12A.5	13.08	12.05	12.22	0.21	0.96	4.69	1.91	2.11	3.49	1.50	1.70	1.58	4.25	0.36	0.20	1.36
MML 12A.6	13.12	12.05	12.03	0.16	0.86	4.73	1.91	2.11	3.46	1.45	1.65	1.62	4.20	0.35	0.14	1.65
MML 12A.6.1	13.25	11.50				5.41	1.91	2.11	3.45	1.10	1.30	2.30	4.63	0.27		4.91
MML 12A.7	13.40	11.85	12.00	0.88	0.95	5.21	1.91	2.11	5.25	3.00	3.20	2.10	11.48	0.68	0.84	4.24
MML 12A.9	13.46	11.85	11.88	0.38	0.89	5.27	1.91	2.11	3.98	1.70	1.90	2.16	6.68	0.40	0.34	1.61
MML 12B	13.53	11.77	11.95	0.38	0.97	5.43	1.91	2.11	4.06	1.70	1.90	2.32	7.20	0.40	0.37	1.92
MML 12B.1	13.65	11.68				5.63	1.91	2.11	3.56	1.10	1.30	2.52	5.09	0.27		5.67
MML 12B.2	13.79	11.19	11.19	2.56	0.88	7.45	3.10	3.30	5.98	3.20	3.40	3.15	30.26	1.12	2.24	15.11
MML 12C	13.79	11.51	12.03	2.70	1.14	7.14	3.10	3.30	5.72	3.10	3.30	2.84	26.28	1.09	3.07	14.23
MML 12C.1	13.66	11.51	11.64	0.64	0.94	6.00	2.10	2.30	4.45	1.90	2.10	2.70	10.39	0.48	0.60	1.10
MML 12C.2	13.55	11.63	12.47	0.16	1.30	5.77	2.10	2.30	3.89	1.45	1.65	2.47	7.22	0.38	0.21	3.40
MML 12C.5	13.98	11.70	11.70	0.16	0.88	6.13	2.10	2.30	4.06	1.45	1.65	2.83	8.30	0.38	0.14	4.50
MML 12C.8	13.55	11.75	11.91	0.16	0.95	5.64	2.10	2.30	3.82	1.45	1.65	2.34	6.83	0.38	0.15	3.12
MML 12C.12	13.35	11.88	12.39	0.26	1.13	5.32	2.10	2.30	3.64	1.43	1.63	2.02	5.75	0.37	0.29	2.26
MML 13	13.23	11.23	11.62	0.64	1.07	5.25	1.50	1.70	4.88	2.40	2.60	2.55	8.82	0.44	0.68	0.19
MML 13.1	13.24	11.37	11.60	0.50	0.99	5.53	1.91	2.11	5.01	2.60	2.80	2.42	11.53	0.59	0.50	2.15
MML 13.1.1	13.24	11.45				5.45	1.91	2.11	3.47	1.10	1.30	2.34	4.70	0.27		5.03
MML 13.1.2	13.24	11.53				5.37	1.91	2.11	3.43	1.10	1.30	2.26	4.54	0.27		4.78
MML 13.1.3	13.24	11.57				5.33	1.91	2.11	3.41	1.10	1.30	2.22	4.45	0.27		4.64
MML 14	13.35	11.70	11.70	0.84	0.88	5.31	1.91	2.11	4.50	2.20	2.40	2.20	8.84	0.51	0.74	0.80



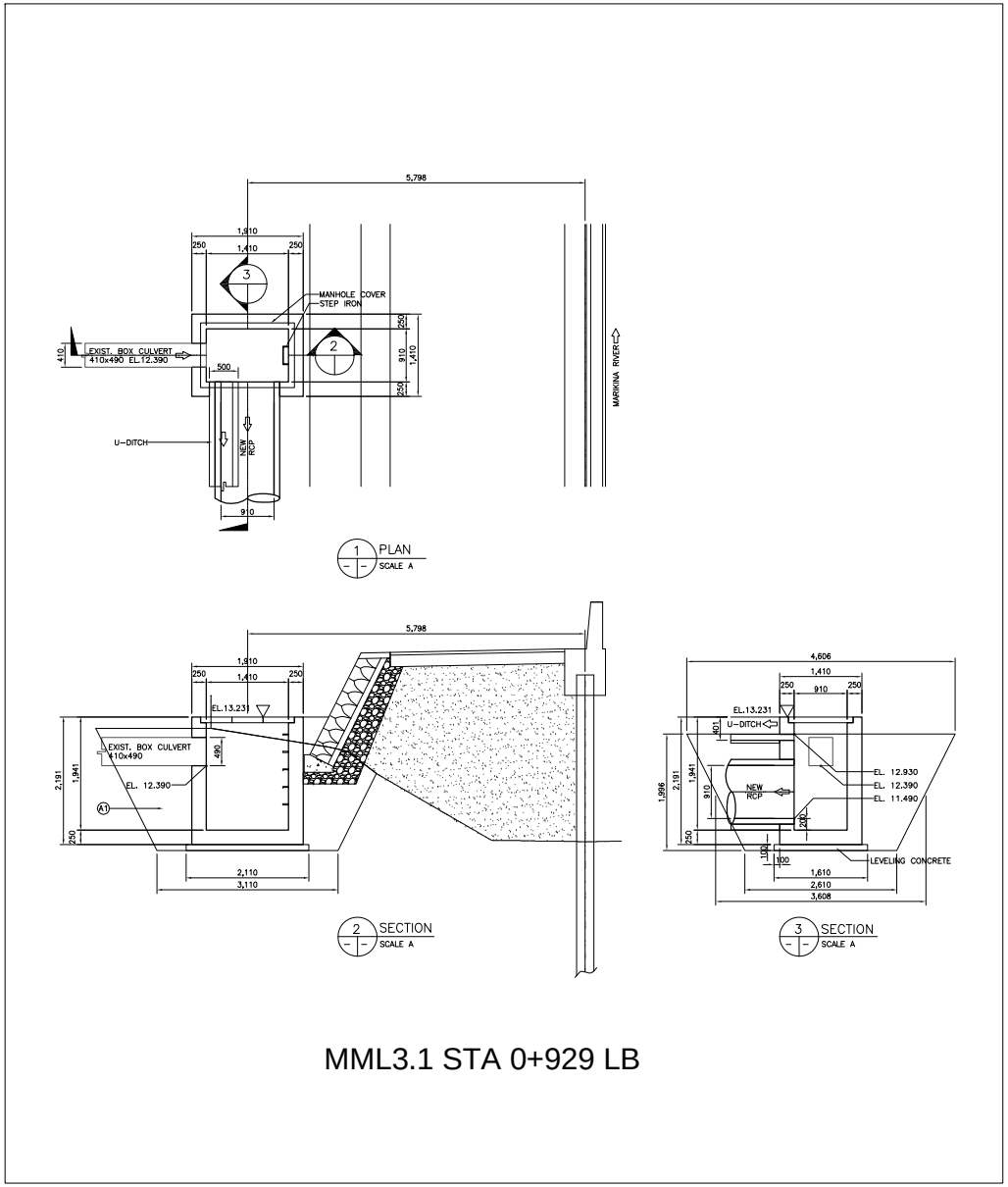


QUANTITIES OF MANHOLE

Manhole No. : **MML3.1**

Location : **STA.0+929**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation					
		A1=7.83	3.61	28.26	
				28.26	m^3
2. Lev. Concrete	W=2.11	3.40	0.1	**0.34**	m^3
	L=1.61				
3. Bottom Slab	W=1.91	2.69	0.25	**0.67**	m^3
	L=1.41				
4. Wall					
Entire Wall	Wout=1.91	Aout=2.69			
	Lout=1.41				
	Win=1.41	Ain=1.28	1.941	2.737	m^3
	Lout=.91				
	.	Anet=1.41			
Minus					
Pipe hole on Wall A	DiaA=0.00	0.00	0.25	0.00	
D=0.49	W=0.41	0.20	0.25	0.05	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.39**	m^3
5. Form Work					
Entire Wall	Wout=1.91	Aout=6.64	2.191	14.548	m^2
	Lout=1.41				
	Win=1.41	Ain=4.64	1.941	9.006	m^2
	Lout=.91				
Minus					
Pipe hole on Wall A	DiaA=0.00	0.00	×2	0.00	m^2
D=0.49	W=0.41	0.20	×2	-0.40	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**20.82**	$\mathbf{m^2}$
6. Conc. Cover	L=1.11	1.7871	0.1	**0.18**	m^3
	W=1.61				
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=6			**6.41**	kg
8. Reinforcement	Manhole	V=3.07		**276.10**	kg
	Conc. Cover	V=0.18		**25.73**	kg
9. Scaffolding			outside	14.55	m^2
			Inside	9.01	m^2
Net Area.				**23.55**	$\mathbf{m^2}$
10. Supporting				**0.00**	m^2



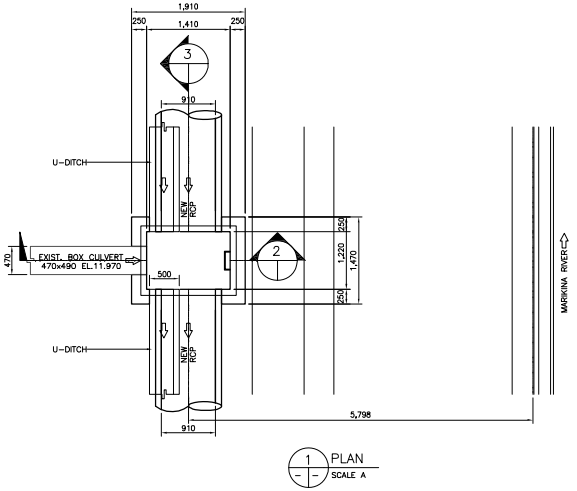
MML3.1 STA 0+929 LB

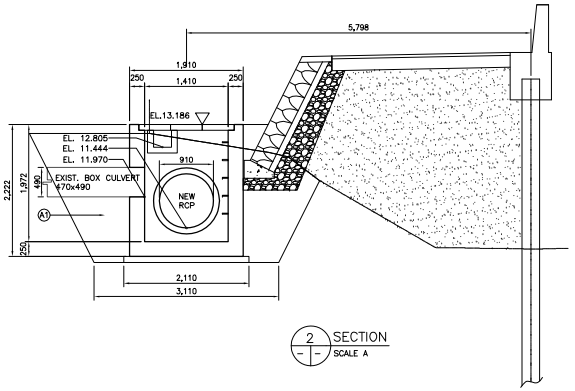
QUANTITIES OF MANHOLE

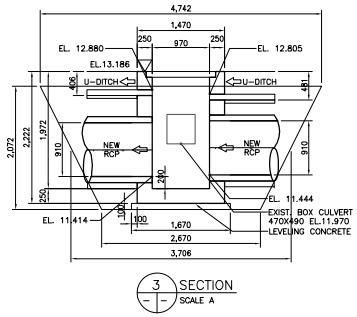
Manhole No. : **MML3.2**

Location : **STA.0+953**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.20	3.71	30.39	
				30.39	m^3
2. Lev. Concrete	W=2.11 L=1.67	3.52	0.1	**0.35**	m^3
3. Bottom Slab	W=1.91 L=1.47	2.81	0.25	**0.70**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.47 Win=1.41 Lout=.97 .	Aout=2.81 Ain=1.37 Anet=1.44	1.972	2.840	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
D=0.49	W=0.47	0.23	0.25	0.06	
Pipe hole on Wall C	DiaC=1.11	1.21	0.25	0.30	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.19**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.47	Aout=6.76	2.222	15.021	m^2
	Win=1.41 Lout=.97	Ain=4.76	1.972	9.387	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.34	m^2
D=0.49	W=0.47	0.23	×2	-0.46	m^2
Pipe hole on Wall C	DiaC=1.11	1.21	×2	-2.42	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**19.19**	$\mathbf{m^2}$
6. Conc. Cover	L=1.17 W=1.61	1.8837	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.89		**260.04**	kg
	Conc. Cover	V=0.19		**27.13**	kg
9. Scaffolding			outside	15.02	m^2
			Inside	9.39	m^2
Net Area.				**24.41**	$\mathbf{m^2}$
10. Supporting				**0.00**	m^2







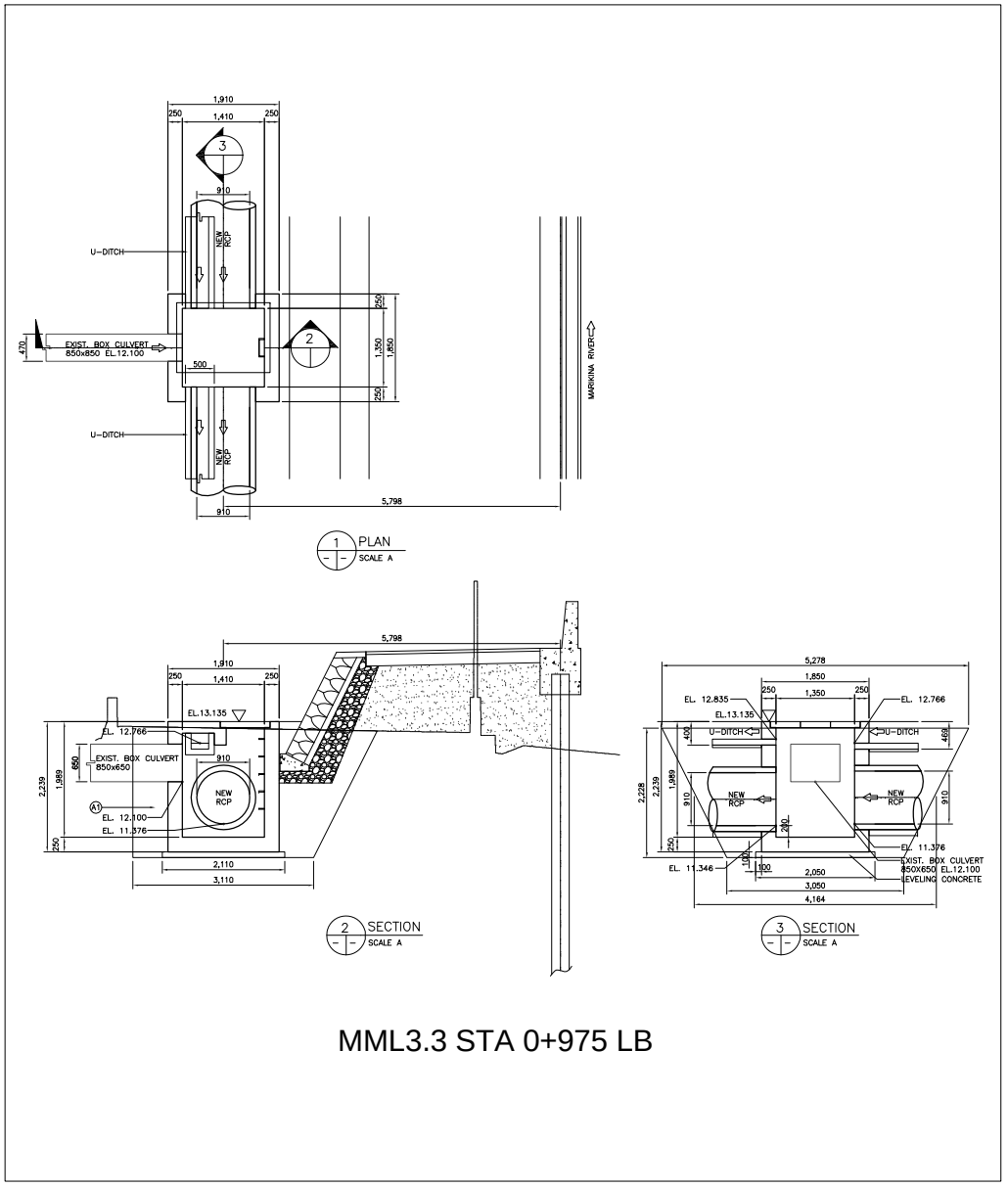
MML3.2 STA 0+953 LB

QUANTITIES OF MANHOLE

Manhole No. : **MML3.3**

Location : **STA.0+975**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.13	4.16	33.84	
				33.84	m^3
2. Lev. Concrete	W=2.11 L=1.67	3.52	0.1	**0.35**	m^3
3. Bottom Slab & Top Slab	W=1.91 L=1.47	2.81	0.25	**0.94**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.47 Win=1.41 Lout=.97 .	Aout=2.81 Ain=1.37 Anet=1.44	1.972	2.840	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
D=0.49	W=0.47	0.23	0.25	0.06	
Pipe hole on Wall C	DiaC=1.11	1.21	0.25	0.30	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.19**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.47	Aout=6.76	2.222	15.021	m^2
	Win=1.41 Lout=.97	Ain=4.76	1.972	9.387	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.34	m^2
D=0.49	W=0.47	0.23	×2	-0.46	m^2
Pipe hole on Wall C	DiaC=1.11	1.21	×2	-2.42	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**19.19**	**m^2**
6. Conc. Cover	L=1.55 W=0.77	1.1935	0.1	**0.12**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=3.13		**281.66**	kg
	Conc. Cover	V=0.12		**17.19**	kg
9. Scaffolding			outside	15.02	m^2
			Inside	9.39	m^2
Net Area.				**24.41**	**m^2**
10. Supporting		Ain=1.37	1.972	**2.70**	m^2



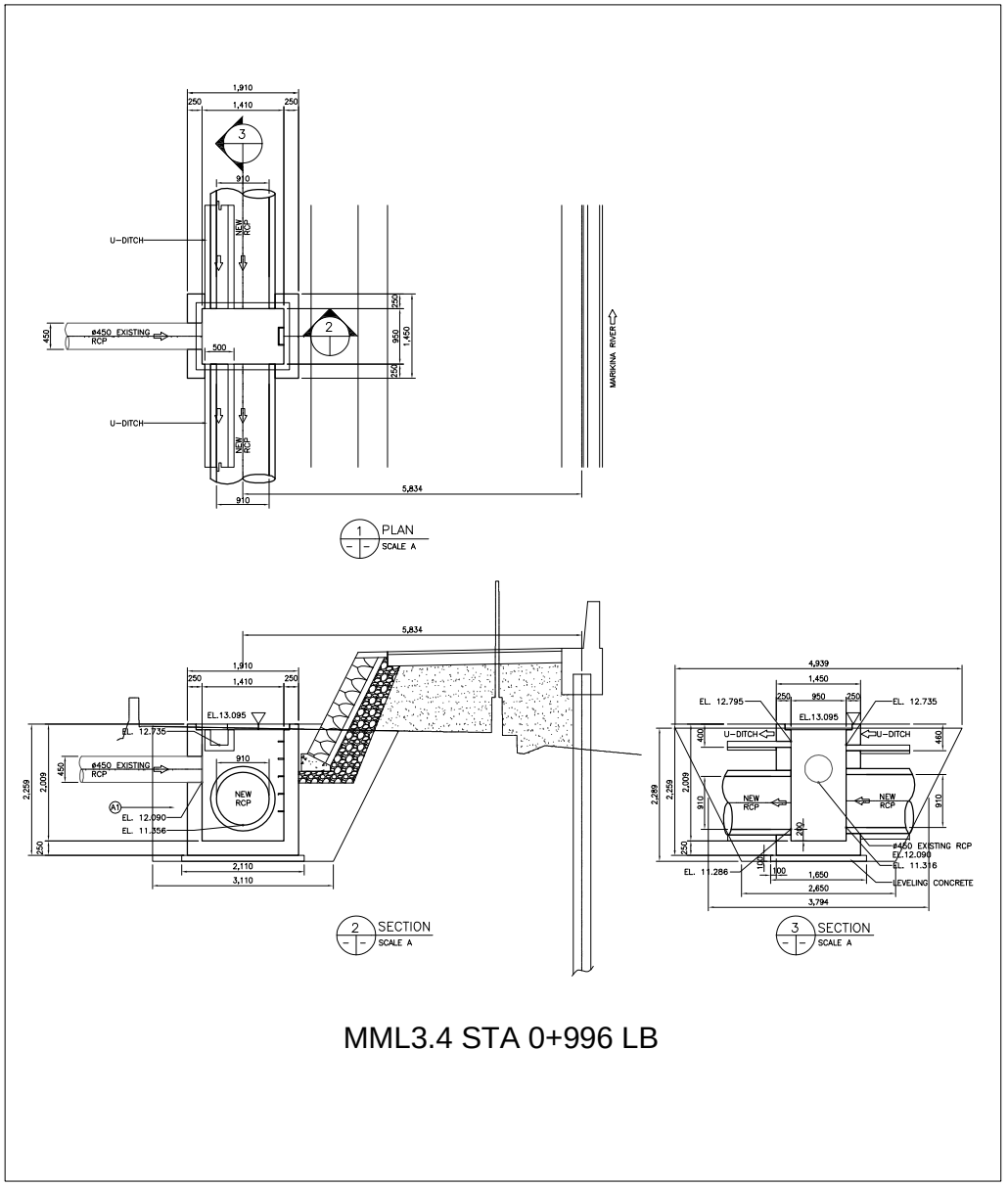
MML3.3 STA 0+975 LB

QUANTITIES OF MANHOLE

Manhole No. : **MML3.4**

Location : **STA.0+996**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.38	3.79	31.81	
				31.81	m^3
2. Lev. Concrete	W=2.11 L=1.65	3.48	0.1	**0.35**	m^3
3. Bottom Slab	W=1.91 L=1.45	2.77	0.25	**0.69**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.45 Win=1.41 Lout=.95 .	Aout=2.77 Ain=1.34 Anet=1.43	2.009	2.873	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.11	1.20	0.25	0.30	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.22**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.45	Aout=6.72	2.259	15.180	m^2
	Win=1.41 Lout=.95	Ain=4.72	2.009	9.482	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.11	1.20	×2	-2.40	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**19.41**	**m^2**
6. Conc. Cover	L=1.15 W=1.61	1.8515	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.91		**261.79**	kg
	Conc. Cover	V=0.19		**26.66**	kg
9. Scaffolding			outside	15.18	m^2
			Inside	9.48	m^2
Net Area.				**24.66**	**m^2**
10. Supporting				**0.00**	m^2



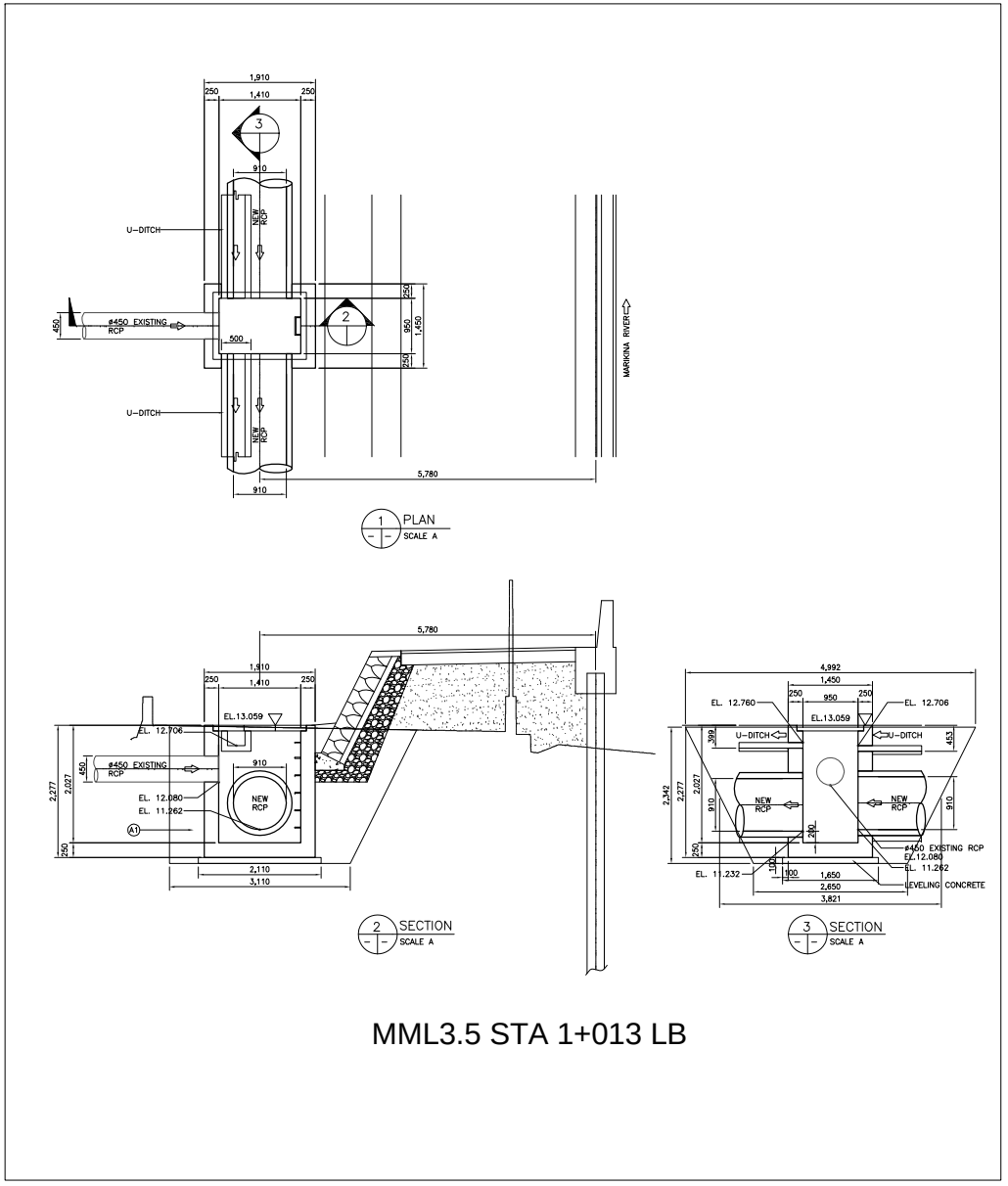
MML3.4 STA 0+996 LB

QUANTITIES OF MANHOLE

Manhole No. : **MML3.5**

Location : **STA.1+013**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.61	3.82	32.89	
				32.89	m^3
2. Lev. Concrete	W=2.11 L=1.65	3.48	0.1	**0.35**	m^3
3. Bottom Slab	W=1.91 L=1.45	2.77	0.25	**0.69**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.45 Win=1.41 Lout=.95 .	Aout=2.77 Ain=1.34 Anet=1.43	2.027	2.899	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.19	0.25	0.30	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.24**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.45	Aout=6.72	2.277	15.301	m^2
	Win=1.41 Lout=.95	Ain=4.72	2.027	9.567	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.19	×2	-2.39	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.33	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**19.63**	$\mathbf{m^2}$
6. Conc. Cover	L=1.15 W=1.61	1.8515	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.94		**264.19**	kg
	Conc. Cover	V=0.19		**26.66**	kg
9. Scaffolding			outside	15.30	m^2
			Inside	9.57	m^2
Net Area.				**24.87**	$\mathbf{m^2}$
10. Supporting				**0.00**	m^2



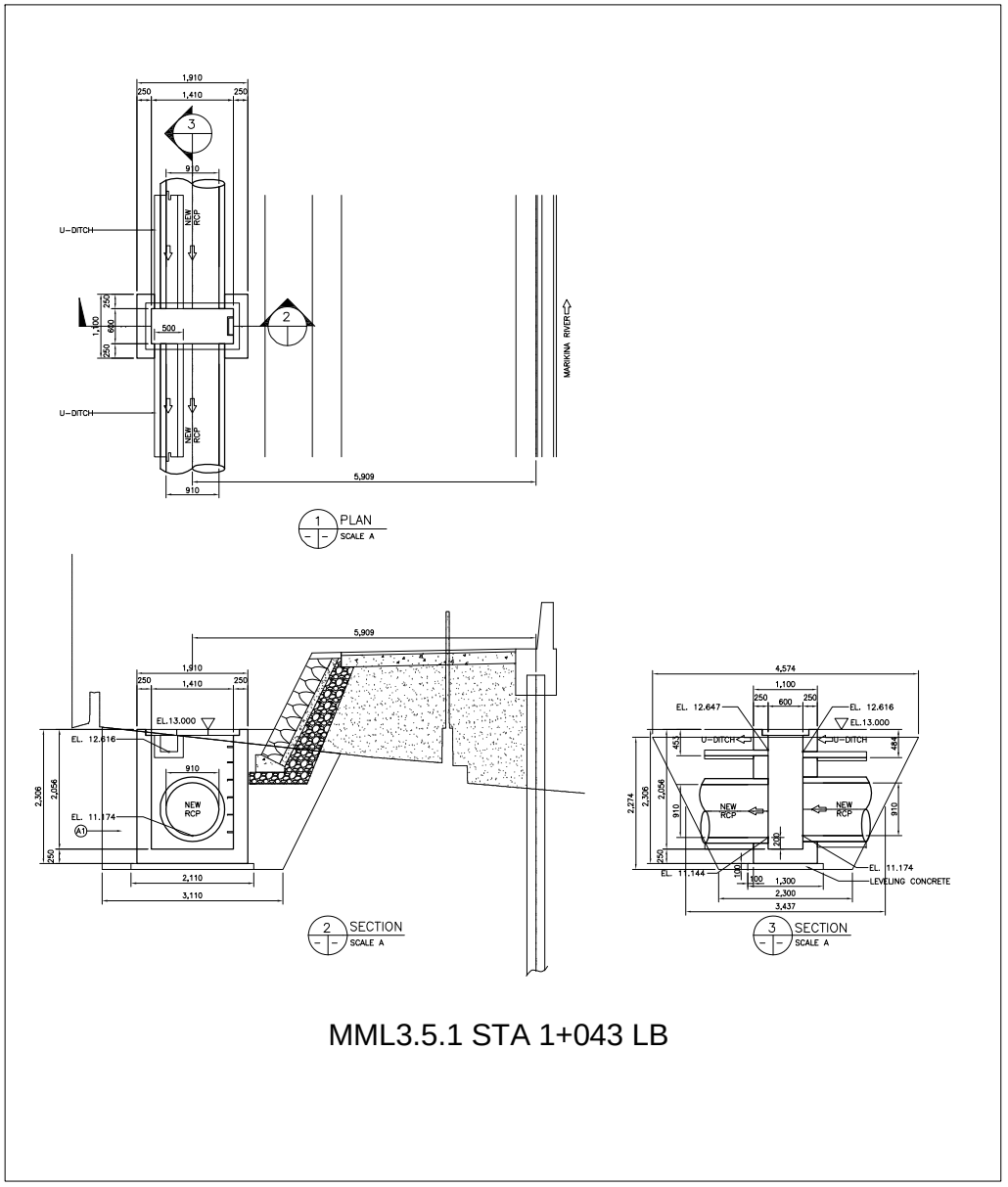
MML3.5 STA 1+013 LB

QUANTITIES OF MANHOLE

Manhole No. : **MML3.5.1**

Location : **STA.1+043**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.12	3.44	27.90	
				27.90	m^3
2. Lev. Concrete	W=2.11 L=1.30	2.74	0.1	**0.27**	m^3
3. Bottom Slab	W=1.91 L=1.10	2.10	0.25	**0.53**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.10 Win=1.41 Lout=.60	Aout=2.10 Ain=0.85 Anet=1.26	2.056	2.580	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.21	0.25	0.30	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.11	1.19	0.25	0.30	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.98**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.10	Aout=6.02	2.306	13.882	m^2
	Win=1.41 Lout=.60	Ain=4.02	2.056	8.265	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.21	×2	-2.42	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=1.11	1.19	×2	-2.39	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**17.34**	m^2
6. Conc. Cover	L=1.15 W=1.61	1.8515	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.50		**225.41**	kg
	Conc. Cover	V=0.19		**26.66**	kg
9. Scaffolding			outside	13.88	m^2
			Inside	8.27	m^2
Net Area.				**22.15**	m^2
10. Supporting				**0.00**	m^2



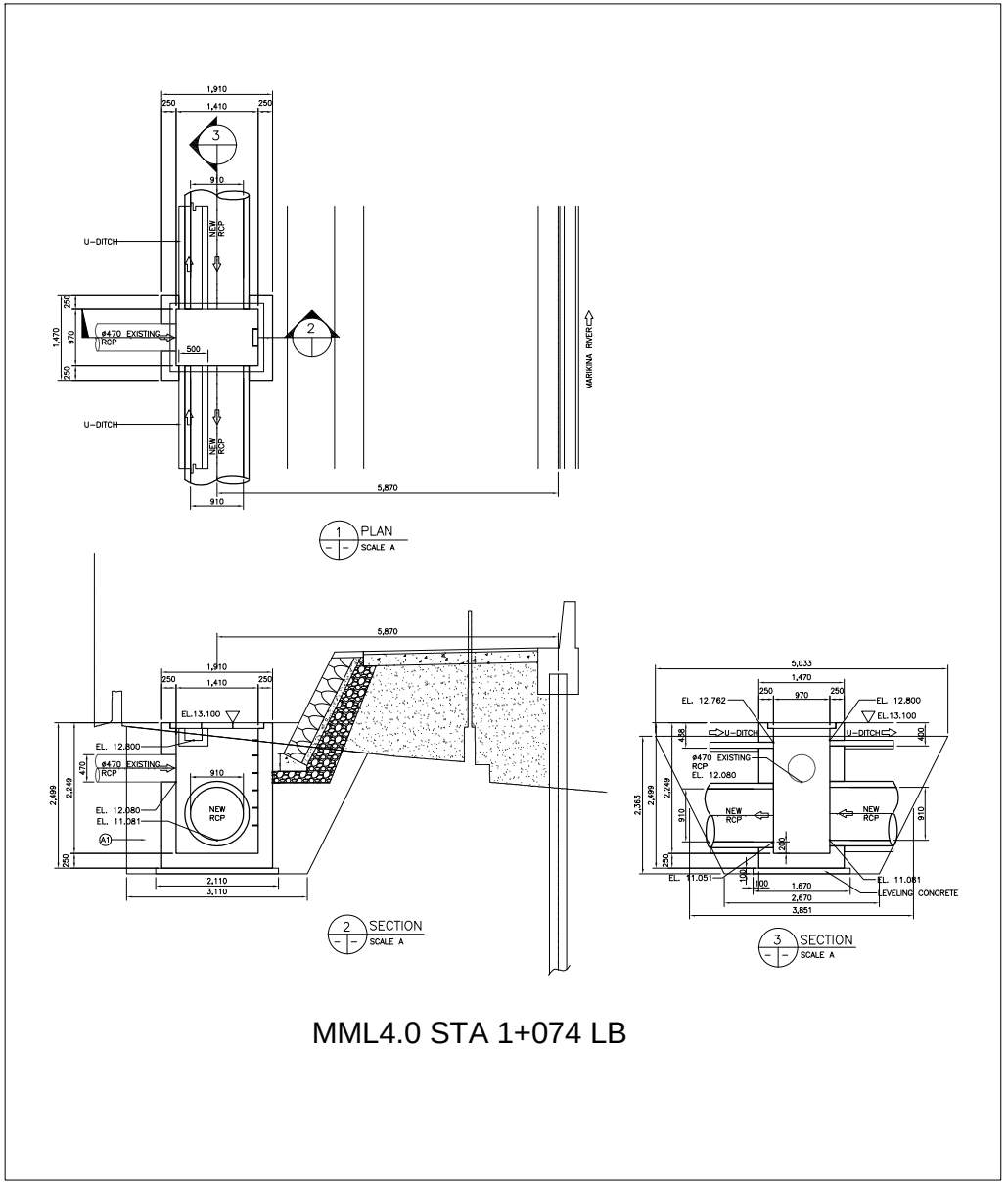
MML3.5.1 STA 1+043 LB

QUANTITIES OF MANHOLE

Manhole No. : **MML4.0**

Location : **STA.1+074**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.48	3.85	32.67	
				32.67	m^3
2. Lev. Concrete	W=2.11 L=1.67	3.52	0.1	**0.35**	m^3
3. Bottom Slab	W=1.91 L=1.47	2.81	0.25	**0.70**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.47 Win=1.41 Lout=.97	Aout=2.81 Ain=1.37 Anet=1.44	2.249	3.239	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
Pipe hole on Wall B	DiaB=0.60	0.28	0.25	0.07	
Pipe hole on Wall C	DiaC=1.11	1.19	0.25	0.30	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.58**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.47	Aout=6.76	2.499	16.893	m^2
	Win=1.41 Lout=.97	Ain=4.76	2.249	10.705	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall B	W=0.60	0.28	×2	-0.56	m^2
Pipe hole on Wall C	DiaC=1.11	1.19	×2	-2.37	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**22.33**	$\mathbf{m^2}$
6. Conc. Cover	L=1.17 W=1.61	1.8837	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=7	1.78kg/m		1.07 **7.48**	kg/pc kg
8. Reinforcement	Manhole	V=3.28		**295.39**	kg
	Conc. Cover	V=0.19		**27.13**	kg
9. Scaffolding			outside	16.89	m^2
			Inside	10.71	m^2
Net Area.				**27.60**	$\mathbf{m^2}$
10. Supporting				**0.00**	m^2



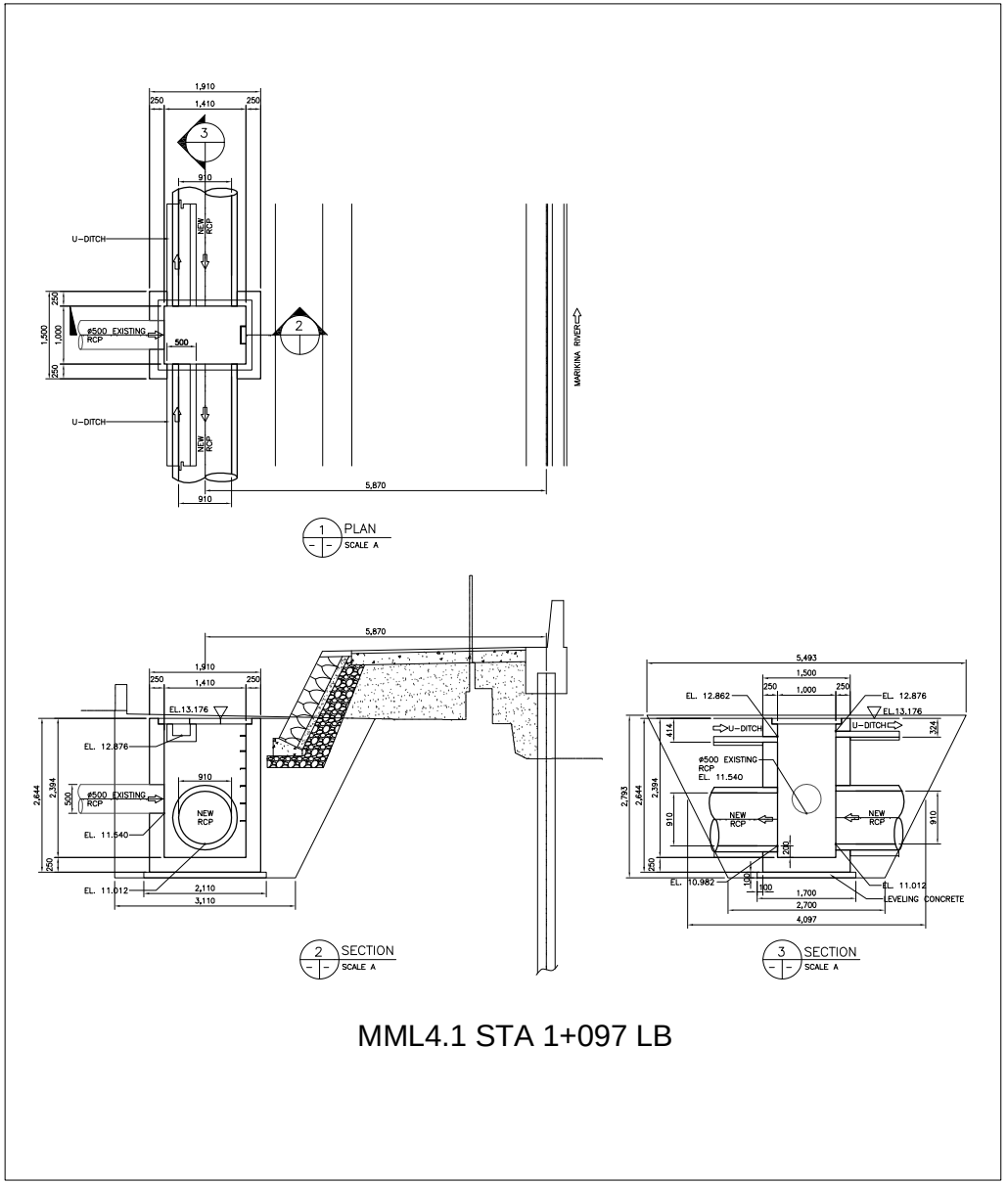
MML4.0 STA 1+074 LB

QUANTITIES OF MANHOLE

Manhole No. : **MML4.1**

Location : **STA.1+097**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.83	4.10	36.19	
				36.19	m^3
2. Lev. Concrete	W=2.11 L=1.70	3.59	0.1	**0.36**	m^3
3. Bottom Slab	W=1.91 L=1.50	2.87	0.25	**0.72**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.50 Win=1.41 Lout=1.00	Aout=2.87 Ain=1.41 Anet=1.46	2.394	3.483	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.13	0.25	0.28	
Pipe hole on Wall B	DiaB=0.64	0.32	0.25	0.08	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.83**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.50	Aout=6.82	2.644	18.032	m^2
	Win=1.41 Lout=1.00	Ain=4.82	2.394	11.539	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.13	×2	-2.26	m^2
Pipe hole on Wall B	W=0.64	0.32	×2	-0.64	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.35	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**24.32**	$\mathbf{m^2}$
6. Conc. Cover	L=1.20 W=1.61	1.932	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=7	1.78kg/m		1.07 **7.48**	kg/pc kg
8. Reinforcement	Manhole	V=3.54		**318.92**	kg
	Conc. Cover	V=0.19		**27.82**	kg
9. Scaffolding			outside	18.03	m^2
			Inside	11.54	m^2
Net Area.				**29.57**	$\mathbf{m^2}$
10. Supporting				**0.00**	m^2



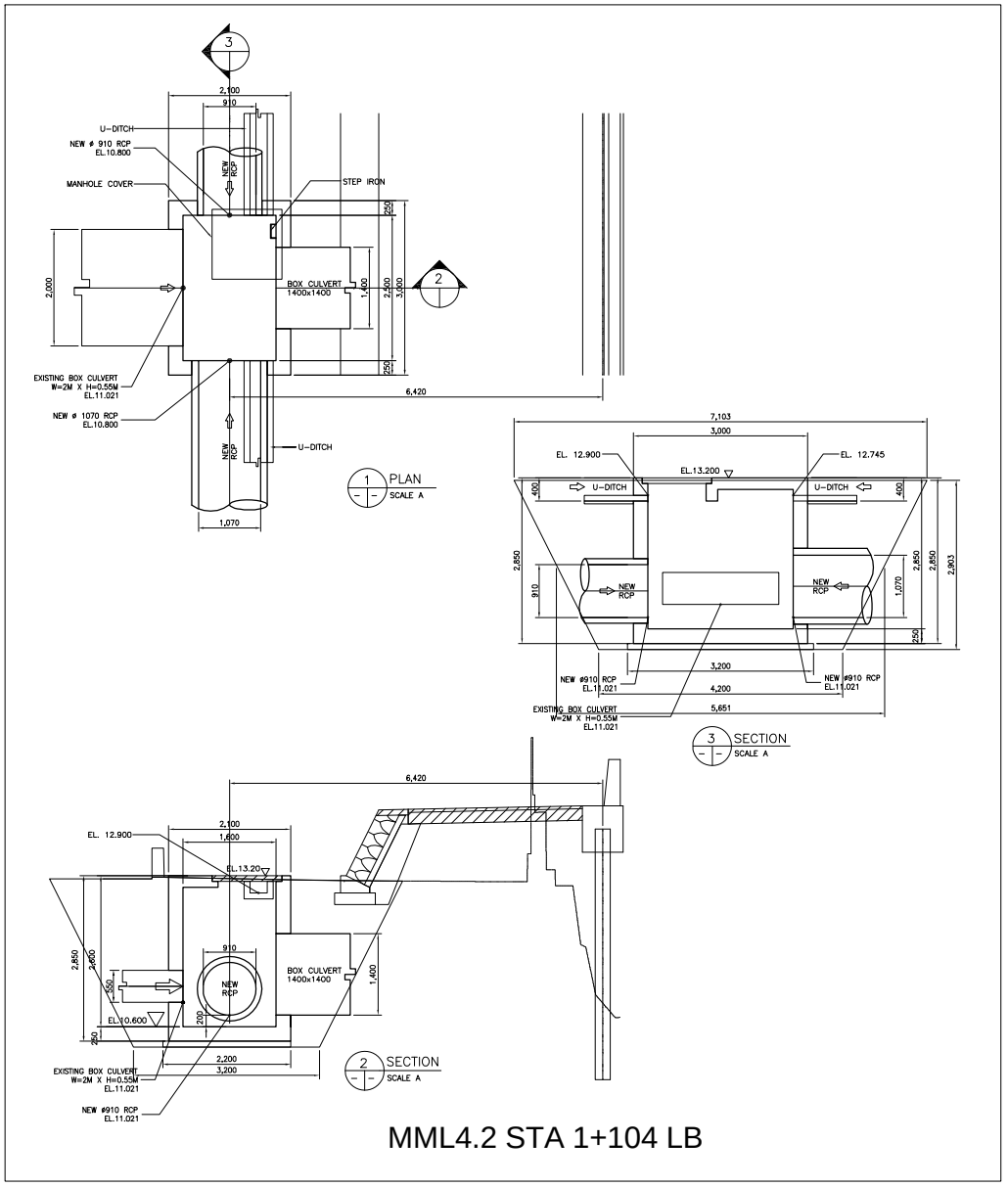
MML4.1 STA 1+097 LB

QUANTITIES OF MANHOLE

Manhole No. : **MML4.2**

Location : **STA.1+104**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation		A1=13.43	5.65	75.87	
				75.87	m^3
2. Lev. Concrete	W=2.30 L=3.20	7.36	0.1	**0.74**	m^3
3. Bottom Slab	W=2.10	8.48	0.25	**2.46**	m^3
& Top Slab	L=3.00	2.24	0.15		
4. Wall					
Entire Wall	Wout=2.10 Lout=3.00	Aout=6.30			
	Win=1.60 Lout=2.50	Ain=4.00	2.600	5.980	m^3
		Anet=2.30			
Minus					
Pipe hole on Wall A	DiaA=1.11	0.97	0.25	0.24	
Pipe hole on Wall B	DiaB=2.00	1.10	0.25	0.28	
Pipe hole on Wall C	DiaC=1.30	1.32	0.25	0.33	
Pipe hole on Wall D	DiaD=1.40	1.96	0.25	0.49	
Net Wall Vol.				**4.64**	m^3
5. Form Work					
Entire Wall	Wout=2.10 Lout=3.00	Aout=10.20	2.850	29.070	m^2
	Win=1.60 Lout=2.50	Ain=8.20	2.600	21.320	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	0.97	×2	-1.94	m^2
Pipe hole on Wall B	W=2.00	1.10	×2	-2.20	m^2
Pipe hole on Wall C	DiaC=1.30	1.32	×2	-2.64	m^2
Pipe hole on Wall D	DiaD=1.40	1.96	×2	-3.92	m^2
Net Area.				**39.70**	$\mathbf{m^2}$
6. Conc. Cover	L=1.00 W=1.80	1.8	0.1	**0.18**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=8	1.78kg/m		1.07 **8.54**	kg/pc kg
8. Reinforcement	Manhole	V=7.10		**638.85**	kg
	Conc. Cover	V=0.18		**25.92**	kg
9. Scaffolding			outside	29.07	m^2
			Inside	21.32	m^2
Net Area.				**50.39**	$\mathbf{m^2}$
10. Supporting		Ain=4.00	2.600	**10.40**	m^2



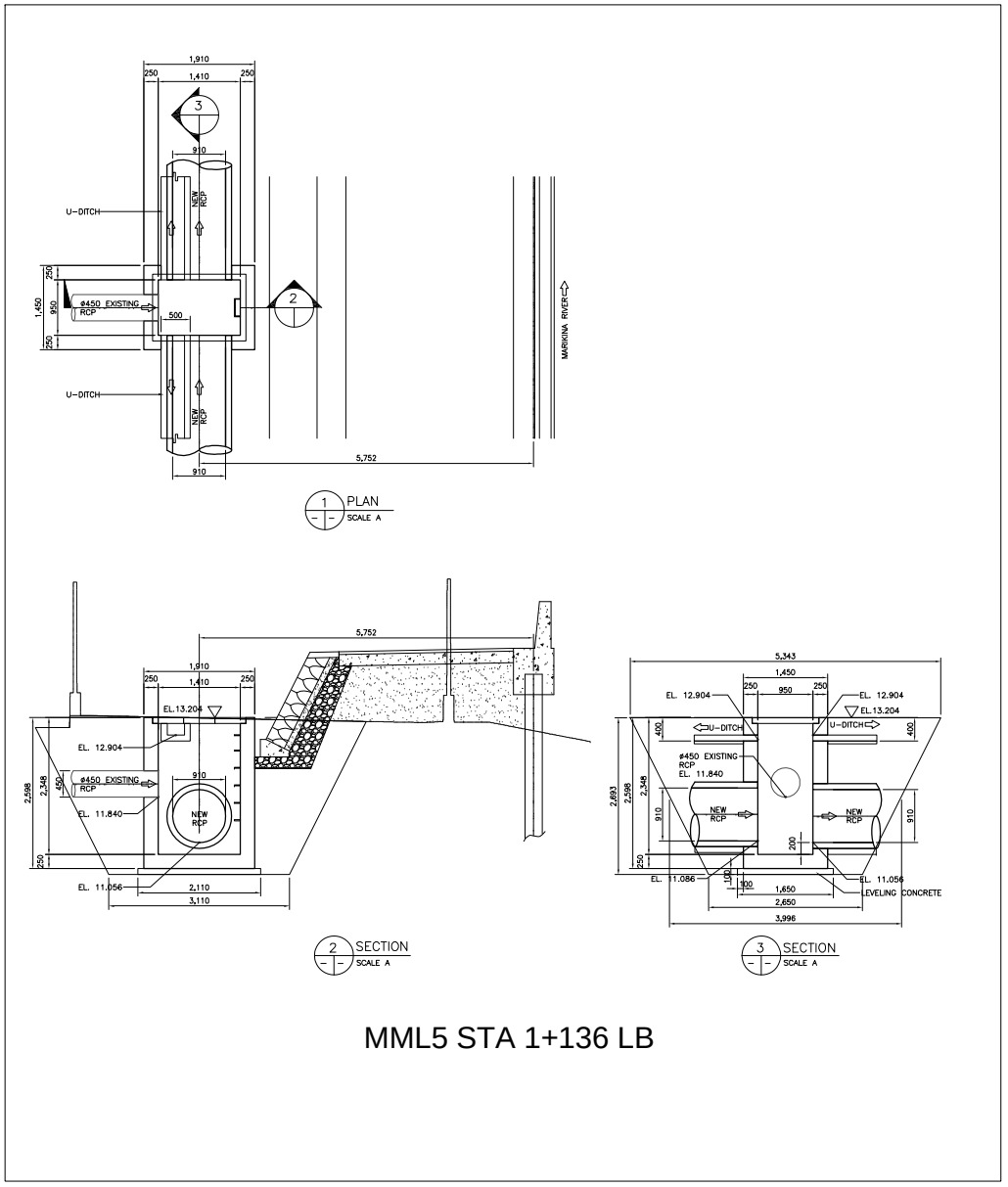
MML4.2 STA 1+104 LB

QUANTITIES OF MANHOLE

Manhole No. : **MML5.0**

Location : **STA.1+136**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation		A1=11.86	4.00	47.39	
				47.39	m^3
2. Lev. Concrete	W=2.11 L=1.65	3.48	0.1	**0.35**	m^3
3. Bottom Slab	W=1.91 L=1.45	2.77	0.25	**0.69**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.45	Aout=2.77			
	Win=1.41 Lout=.95	Ain=1.34	2.348	3.358	m^3
		Anet=1.43			
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.71**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.45	Aout=6.72	2.598	17.459	m^2
	Win=1.41 Lout=.95	Ain=4.72	2.348	11.083	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**23.35**	$\mathbf{m^2}$
6. Conc. Cover	L=1.15 W=1.61	1.8515	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=7			**7.48**	kg
8. Reinforcement	Manhole	V=3.40		**306.09**	kg
	Conc. Cover	V=0.19		**26.66**	kg
9. Scaffolding			outside	17.46	m^2
			Inside	11.08	m^2
Net Area.				**28.54**	$\mathbf{m^2}$
10. Supporting				**0.00**	m^2



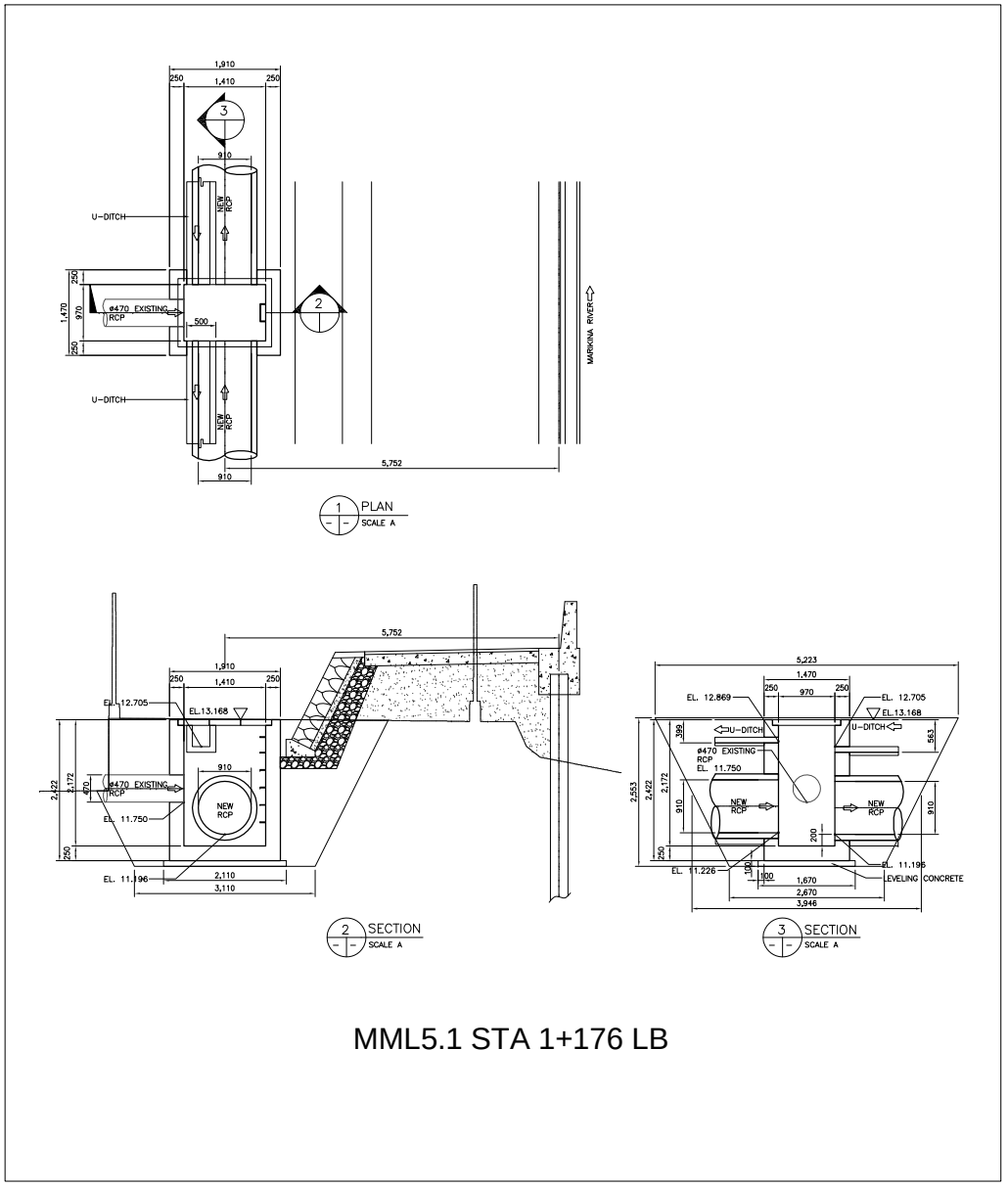
MML5 STA 1+136 LB

QUANTITIES OF MANHOLE

Manhole No. : **MML5.1**

Location : **STA.1+176**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation		A1=10.43	3.95	41.16	
				41.16	m^3
2. Lev. Concrete	W=2.11 L=1.67	3.52	0.1	**0.35**	m^3
3. Bottom Slab	W=1.91 L=1.47	2.81	0.25	**0.70**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.47 Win=1.41 Lout=.97	Aout=2.81 Ain=1.37 Anet=1.44	2.172	3.128	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.25	0.25	0.31	
Pipe hole on Wall B	DiaB=0.60	0.28	0.25	0.07	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.45**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.47	Aout=6.76	2.422	16.373	m^2
	Win=1.41 Lout=.97	Ain=4.76	2.172	10.339	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.25	×2	-2.50	m^2
Pipe hole on Wall B	W=0.60	0.28	×2	-0.56	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.33	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**21.32**	$\mathbf{m^2}$
6. Conc. Cover	L=1.17 W=1.61	1.8837	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=7	0.000201062		0.000120637 0.95 **6.63**	m^3 kg/pc kg
8. Reinforcement	Manhole	V=3.16		**284.02**	kg
	Conc. Cover	V=0.19		**27.13**	kg
9. Scaffolding			outside	16.37	m^2
			Inside	10.34	m^2
Net Area.				**26.71**	$\mathbf{m^2}$
10. Supporting				**0.00**	m^2



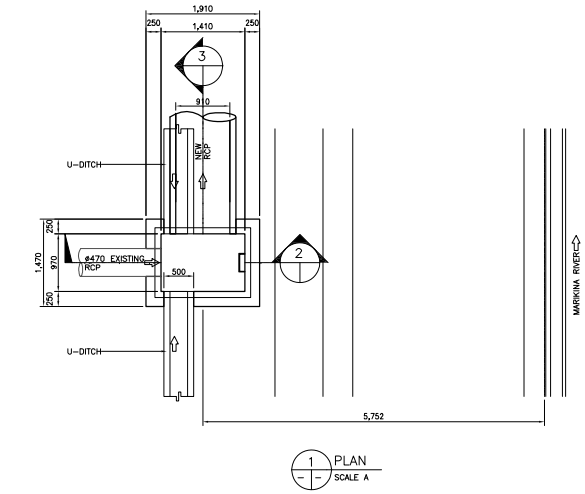
MML5.1 STA 1+176 LB

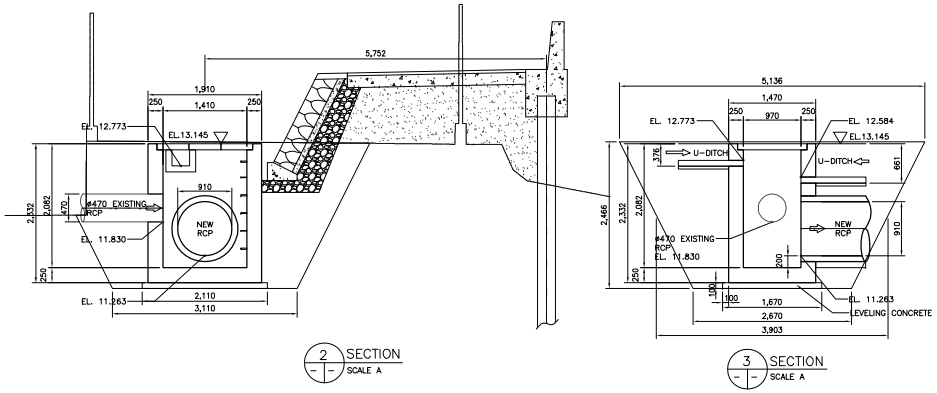
QUANTITIES OF MANHOLE

Manhole No. : **MML5.2**

Location : **STA.1+195**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation		A1=10.10	3.90	39.40	
				39.40	m^3
2. Lev. Concrete	W=2.11 L=1.67	3.52	0.1	**0.35**	m^3
3. Bottom Slab	W=1.91 L=1.47	2.81	0.25	**0.70**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.47 Win=1.41 Lout=.97	Aout=2.81 Ain=1.37 Anet=1.44	2.082	2.998	m^3
Minus					
Pipe hole on Wall A	DiaA=0.50	0.19	0.25	0.05	
Pipe hole on Wall B	DiaB=0.60	0.28	0.25	0.07	
Pipe hole on Wall C	DiaC=1.11	1.30	0.25	0.32	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.56**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.47	Aout=6.76	2.332	15.764	m^2
	Win=1.41 Lout=.97	Ain=4.76	2.082	9.910	m^2
Minus					
Pipe hole on Wall A	DiaA=0.50	0.19	×2	-0.38	m^2
Pipe hole on Wall B	W=0.60	0.28	×2	-0.56	m^2
Pipe hole on Wall C	DiaC=1.11	1.30	×2	-2.60	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**22.14**	$\mathbf{m^2}$
6. Conc. Cover	L=1.17 W=1.61	1.8837	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=3.26		**293.28**	kg
	Conc. Cover	V=0.19		**27.13**	kg
9. Scaffolding			outside	15.76	m^2
			Inside	9.91	m^2
Net Area.				**25.67**	$\mathbf{m^2}$
10. Supporting				**0.00**	m^2





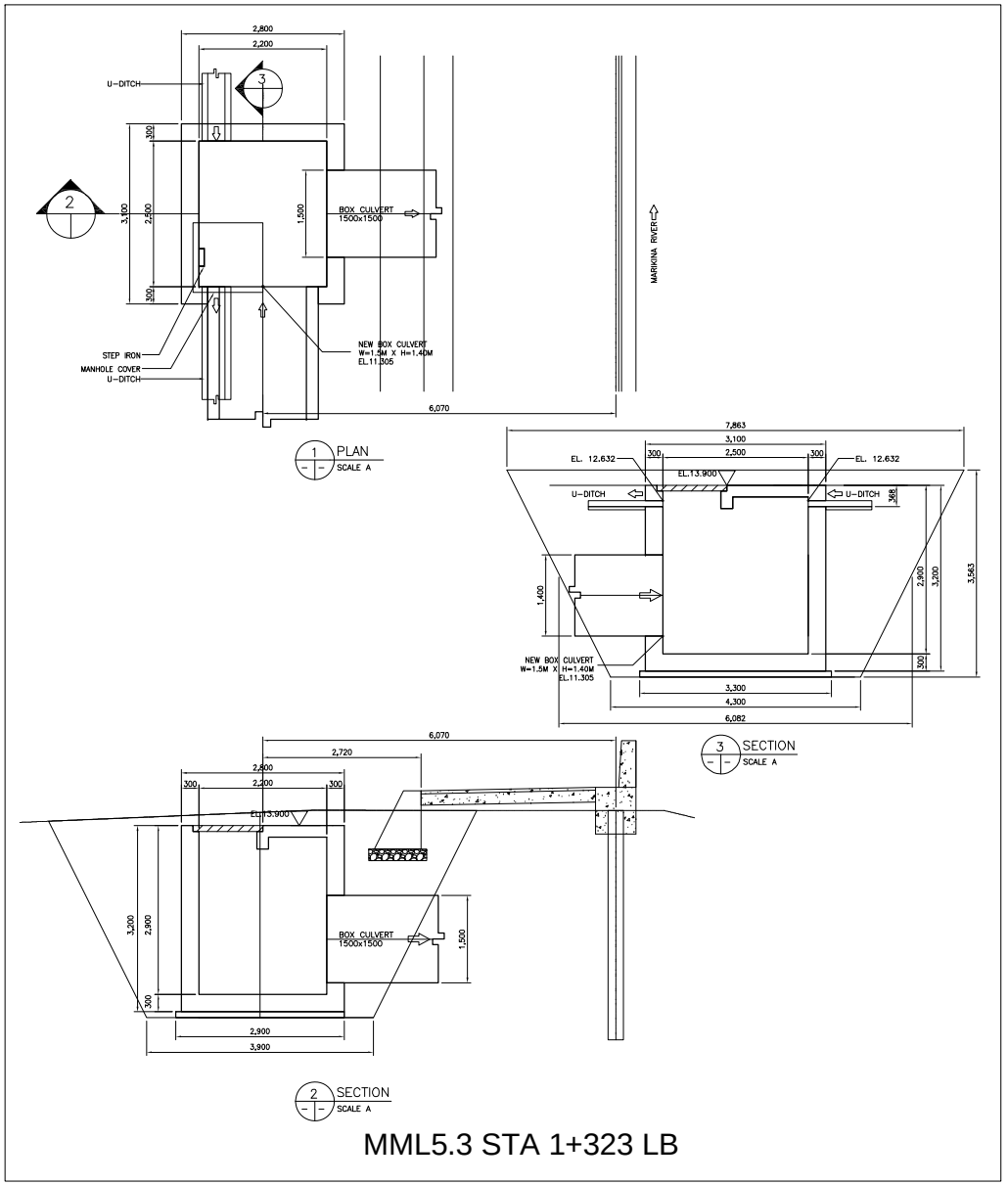
MML5.2 STA 1+195 LB

QUANTITIES OF MANHOLE

Manhole No. : **MML5.3**

Location : **STA.1+323**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation					
		A1=18.80	5.81	109.26	
				109.26	m^3
2. Lev. Concrete	W=3.00	9.90	0.1	**0.99**	m^3
	L=3.30				
3. Bottom Slab &	W=2.80	8.68	0.3	**3.73**	m^3
Top slab	L=3.10	7.47	0.15		
4. Wall					
Entire Wall	Wout=2.70	Aout=8.10			
	Lout=3.00				
	Win=2.20	Ain=5.50	2.760	7.176	m^3
	Lout=2.50				
		Anet=2.60			
Minus					
Pipe hole on Wall A	DiaA=1.50	2.10	0.25	0.53	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=0.00	0.00	0.25	0.00	
Pipe hole on Wall D	DiaB=1.50	2.25	0.25	0.56	
Net Wall Vol.				**6.09**	m^3
5. Form Work					
Entire Wall	Wout=2.70	Aout=11.40	3.060	34.884	m^2
	Lout=3.00				
	Win=2.20	Ain=9.40	2.760	25.944	m^2
	Lout=2.50				
Minus					
Pipe hole on Wall A	DiaA=1.50	2.10	×2	-4.20	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall D	DiaD=1.50	2.25	×2	-4.50	m^2
Net Area.				**52.13**	**m^2**
6. Conc. Cover	L=1.20	1.44	0.1	**0.14**	m^3
	W=1.20				
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=9			**9.61**	kg
8. Reinforcement	Manhole	V=9.81		**883.22**	kg
	Conc. Cover	V=0.14		**20.74**	kg
9. Scaffolding			outside	34.88	m^2
			Inside	25.94	m^2
Net Area.				**60.83**	**m^2**
10. Supporting		Ain=5.50	2.760	**15.180**	**m^2**

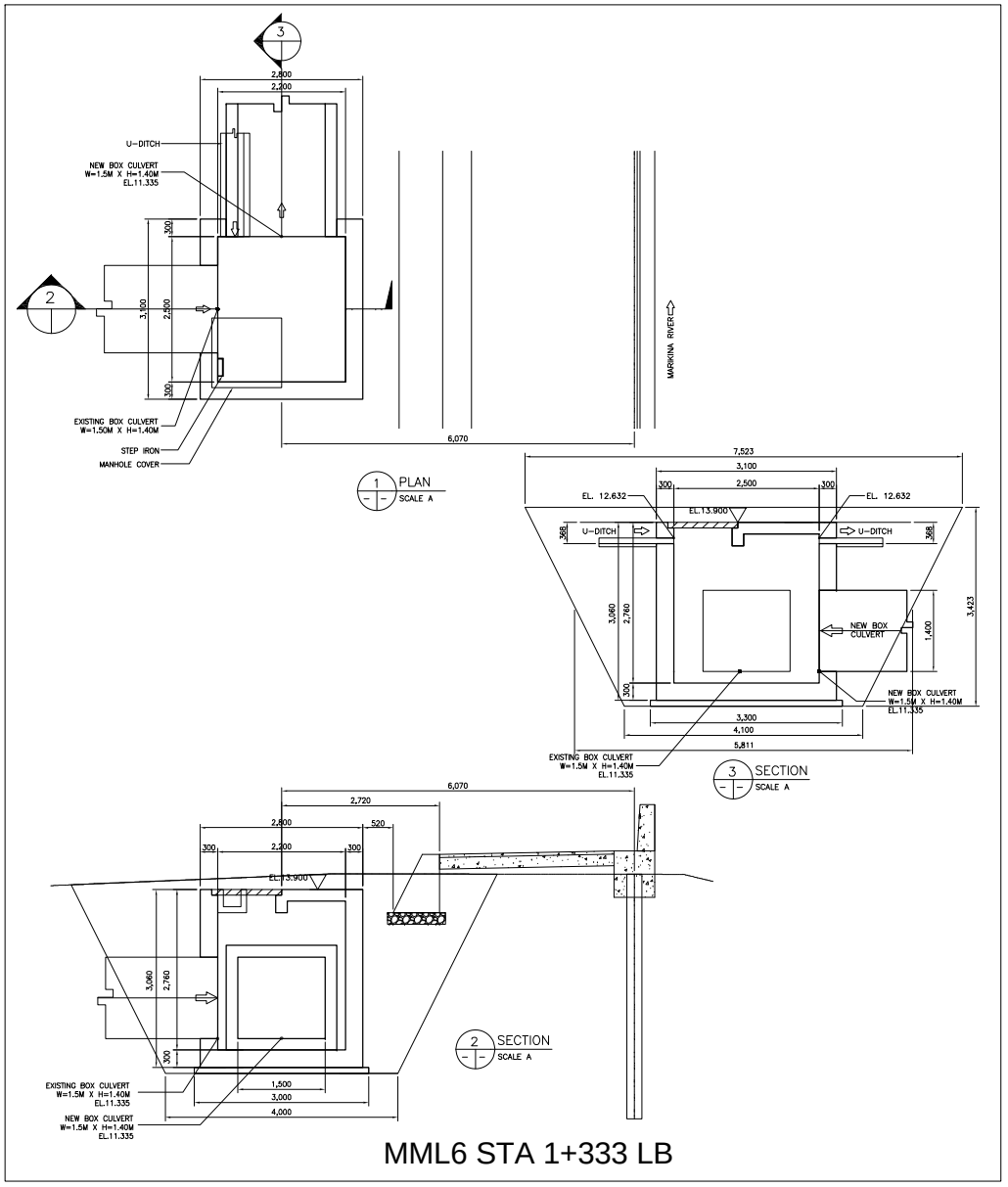


QUANTITIES OF MANHOLE

Manhole No. : **MML6.0**

Location : **STA.1+333**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation					
		A1=19.10	5.81	111.00	
				111.00	m^3
2. Lev. Concrete	W=3.00	9.90	0.1	**0.99**	m^3
	L=3.30				
3. Bottom Slab &	W=2.80	8.68	0.3	**3.73**	m^3
Top slab	L=3.10	7.47	0.15		
4. Wall					
Entire Wall	Wout=2.70	Aout=8.10			
	Lout=3.00				
	Win=2.20	Ain=5.50	3.164	8.226	m^3
	Lout=2.50				
		Anet=2.60			
Minus					
Pipe hole on Wall A	DiaA=1.50	2.10	0.25	0.53	
Pipe hole on Wall B	DiaB=1.50	2.10	0.25	0.53	
Pipe hole on Wall C	DiaC=0.00	0.00	0.25	0.00	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**7.18**	m^3
5. Form Work					
Entire Wall	Wout=2.70	Aout=11.40	3.464	39.490	m^2
	Lout=3.00				
	Win=2.20	Ain=9.40	3.164	29.742	m^2
	Lout=2.50				
Minus					
Pipe hole on Wall A	DiaA=1.50	2.10	×2	-4.20	m^2
Pipe hole on Wall B	W=1.50	2.10	×2	-4.20	m^2
Pipe hole on Wall C	DiaC=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**60.83**	**m^2**
6. Conc. Cover	L=1.20	1.44	0.1	**0.14**	m^3
	W=1.20				
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=10			**10.68**	kg
8. Reinforcement	Manhole	V=10.90		**981.13**	kg
	Conc. Cover	V=0.14		**20.74**	kg
9. Scaffolding			outside	39.49	m^2
			Inside	29.74	m^2
Net Area.				**69.23**	**m^2**
10. Supporting		Ain=5.50	3.164	**17.402**	**m^2**

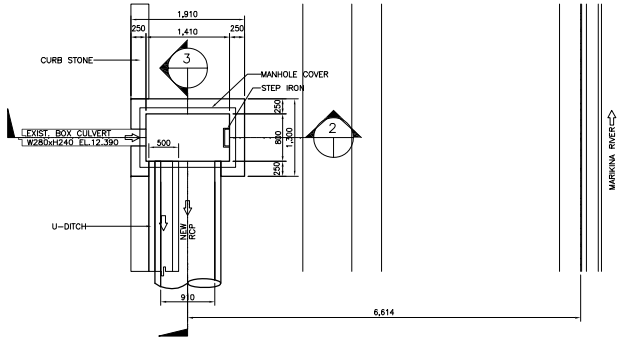


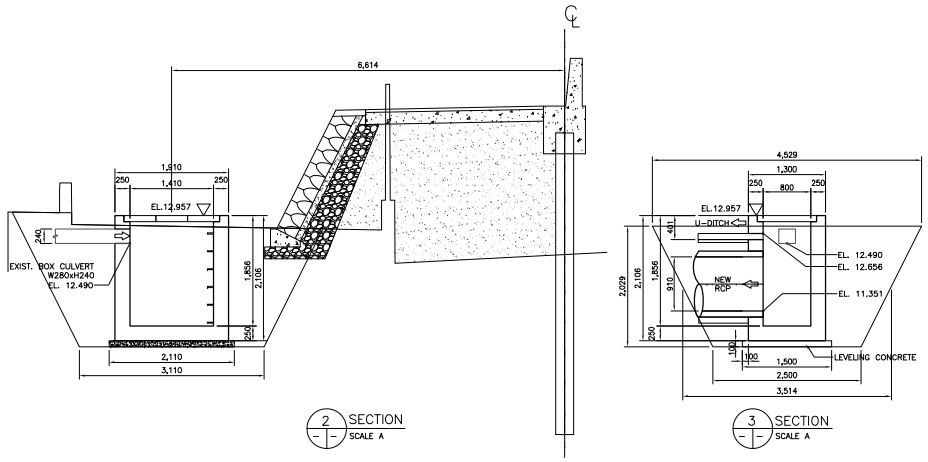
QUANTITIES OF MANHOLE

Manhole No. : **MML11.41**

Location : **STA.3+915**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.55	3.51	30.06	
				30.06	m^3
2. Lev. Concrete	W=2.11 L=1.50	3.17	0.1	**0.32**	m^3
3. Bottom Slab	W=1.91 L=1.30	2.48	0.25	**0.62**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.30 Win=1.41 Lout=.80	Aout=2.48 Ain=1.13 Anet=1.36	1.856	2.515	m^3
Minus					
Pipe hole on Wall A	DiaA=0.00	0.00	0.25	0.00	
Pipe hole on Wall B	DiaB=0.28	0.07	0.25	0.02	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.21**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.30	Aout=6.42	2.106	13.521	m^2
	Win=1.41 Lout=.80	Ain=4.42	1.856	8.204	m^2
Minus					
Pipe hole on Wall A	DiaA=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall B	W=0.28	0.07	×2	-0.13	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**19.26**	m^2
6. Conc. Cover	L=1.00 W=1.61	1.61	0.1	**0.16**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.83		**254.41**	kg
	Conc. Cover	V=0.16		**23.18**	kg
9. Scaffolding			outside	13.52	m^2
			Inside	8.20	m^2
Net Area.				**21.73**	m^2
10. Supporting				**0.00**	m^2





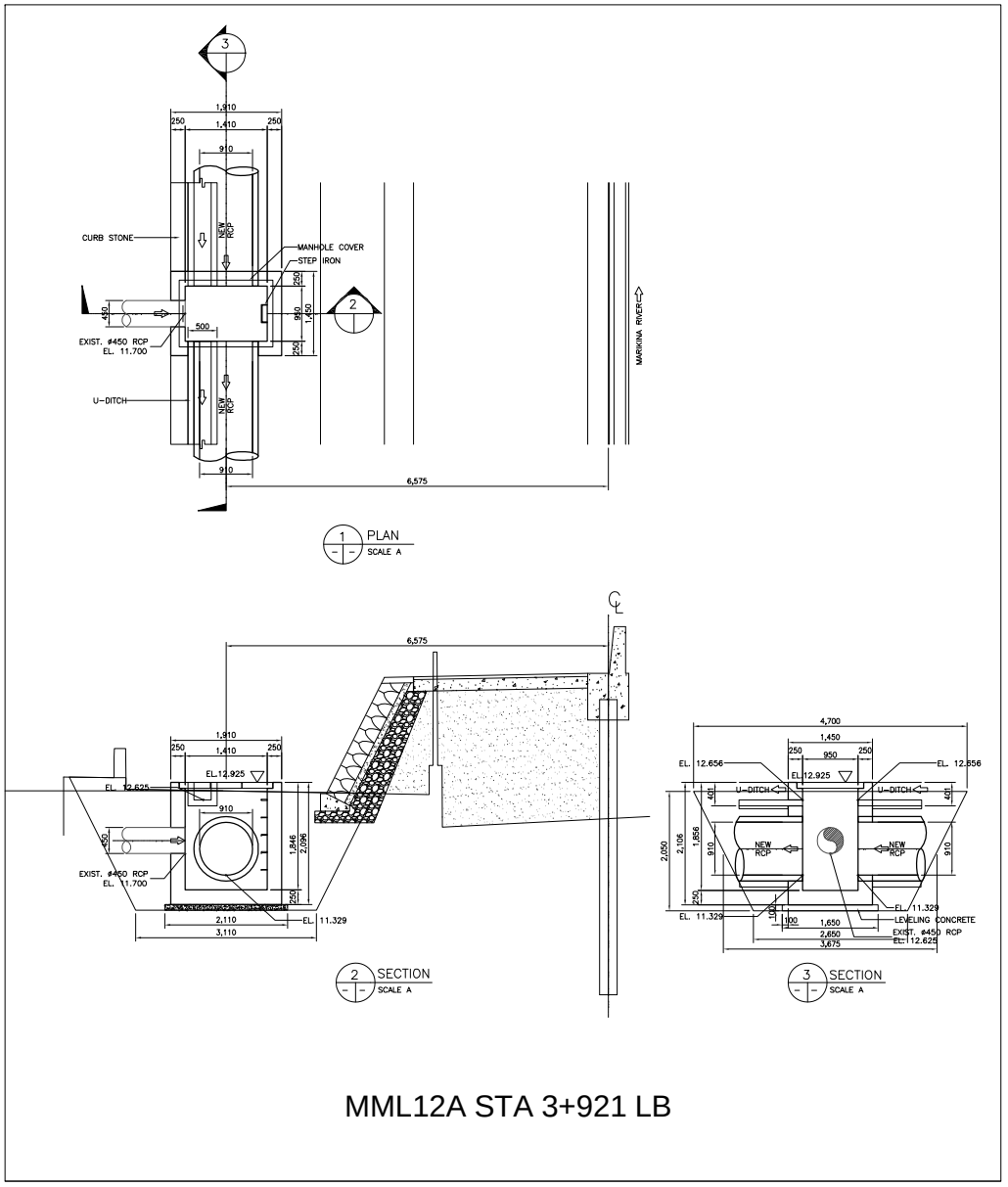
MML11.41 STA 3+915 LB

QUANTITIES OF MANHOLE

Manhole No. : **MML12A**

Location : **STA.3+921**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.66	3.68	31.81	
				31.81	m^3
2. Lev. Concrete	W=2.11 L=1.65	3.48	0.1	**0.35**	m^3
3. Bottom Slab	W=1.91 L=1.45	2.77	0.25	**0.69**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.45 Win=1.41 Lout=.95	Aout=2.77 Ain=1.34 Anet=1.43	1.846	2.640	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.99**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.45	Aout=6.72	2.096	14.085	m^2
	Win=1.41 Lout=.95	Ain=4.72	1.846	8.713	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**17.61**	m^2
6. Conc. Cover	L=1.15 W=1.61	1.8515	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.68		**241.46**	kg
	Conc. Cover	V=0.19		**26.66**	kg
9. Scaffolding			outside	14.09	m^2
			Inside	8.71	m^2
Net Area.				**22.80**	m^2
10. Supporting		Ain=1.34	1.846	**2.47**	m^2



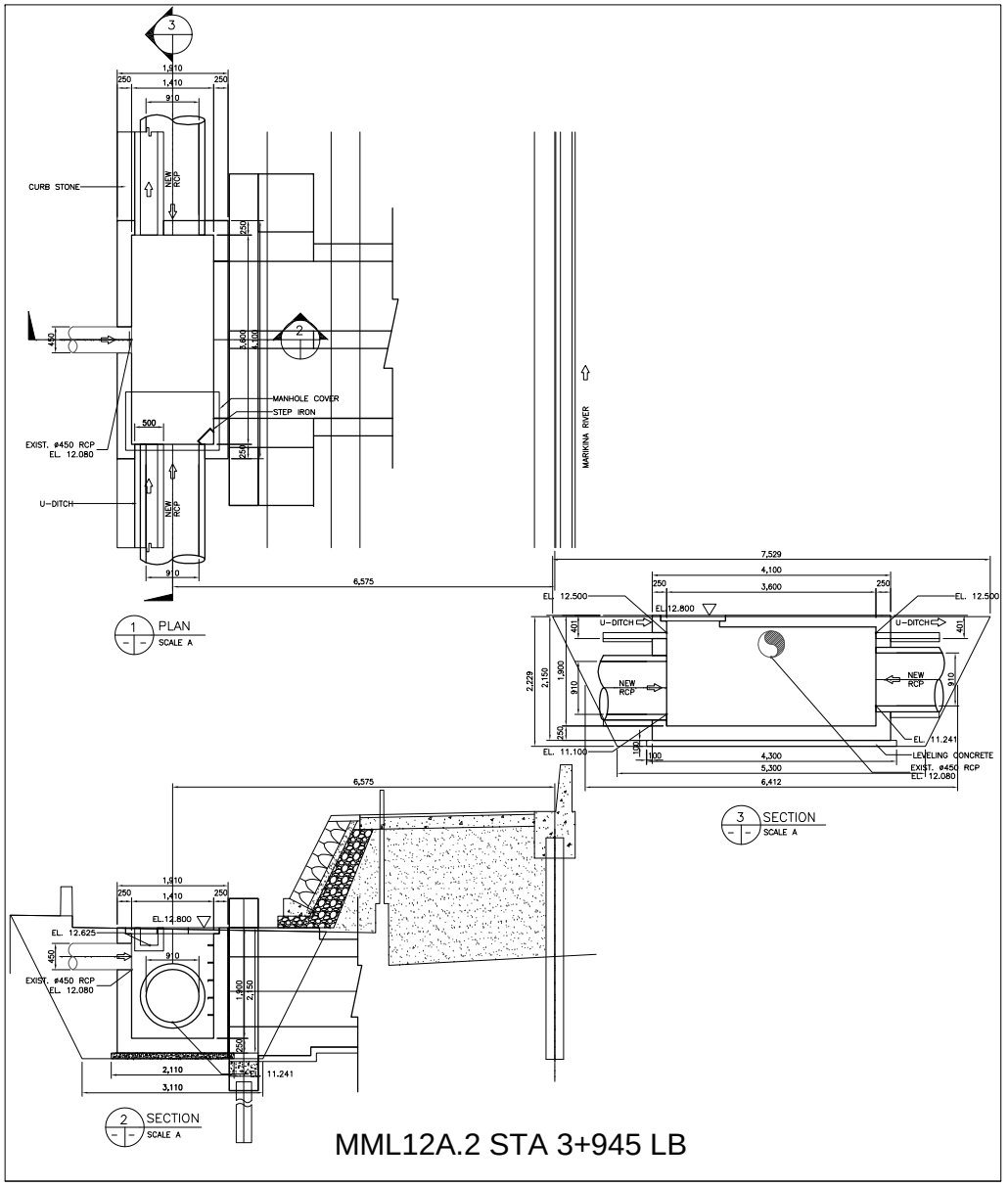
MML12A STA 3+921 LB

QUANTITIES OF MANHOLE

Manhole No. : **MML12A.2**

Location : **STA.3+945**

Item	W or L	Area	Thkness/Ht	Vol./Wt.	Unit
1. Excavation		A1=9.35	6.41	59.94	
				59.94	m^3
2. Lev. Concrete	W=2.11 L=4.30	9.07	0.1	**0.91**	m^3
3. Bottom Slab	W=1.91	10.99	0.25	**3.28**	m^3
& Top Slab	L=4.10	3.53	0.15		
4. Wall					
Entire Wall	Wout=1.91 Lout=4.10	Aout=7.83			
	Win=1.41 Lout=3.60	Ain=5.08	1.900	5.235	m^3
		Anet=2.76			
Minus					
Pipe hole on Wall A	DiaA=1.11	0.97	0.25	0.24	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.11	0.97	0.25	0.24	
Pipe hole on Wall D	DiaD=1.20	2.88	0.25	0.72	
Net Wall Vol.				**3.97**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=4.10	Aout=12.02	2.150	25.843	m^2
	Win=1.41 Lout=3.60	Ain=10.02	1.900	19.038	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	0.97	×2	-1.94	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.11	0.97	×2	-1.94	m^2
Pipe hole on Wall D	DiaD=1.20	2.88	×2	-5.76	m^2
Net Area.				**34.73**	$\mathbf{m^2}$
6. Conc. Cover	L=1.20 W=1.61	1.932	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=7.24		**651.75**	kg
	Conc. Cover	V=0.19		**27.82**	kg
9. Scaffolding			outside	25.84	m^2
			Inside	19.04	m^2
Net Area.				**44.88**	$\mathbf{m^2}$
10. Supporting		Ain=5.08	1.900	**9.64**	m^2

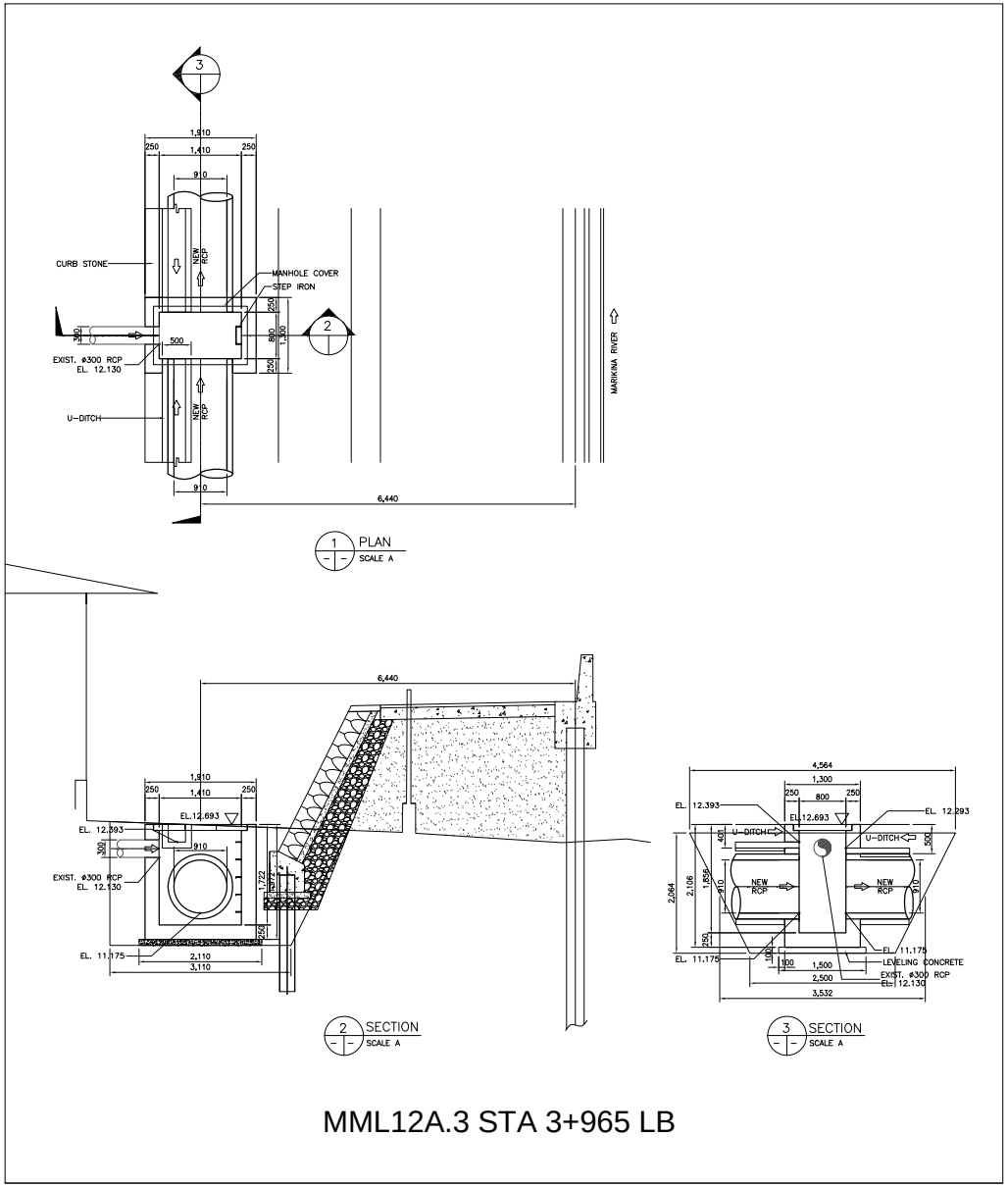


QUANTITIES OF MANHOLE

Manhole No.: **MML 12A.3**

Location: **STA. 3+965**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=7.41	3.53	26.16	
				26.16	m^3
2. Lev. Concrete	W=2.11 L=1.50	3.17	0.1	**0.32**	m^3
3. Bottom Slab	W=1.91 L=1.30	2.48	0.25	**0.62**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.30 Win=1.41 Lout=.80	Aout=2.48 Ain=1.13	1.722	2.333	m^3
		Anet=1.36			
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
Pipe hole on Wall B	DiaB=0.40	0.13	0.25	0.03	
Pipe hole on Wall C	DiaC=1.11	1.22	0.25	0.30	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.71**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.30	Aout=6.42	1.972	12.660	m^2
	Win=1.41 Lout=.80	Ain=4.42	1.722	7.611	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall B	W=0.40	0.13	×2	-0.25	m^2
Pipe hole on Wall C	DiaC=1.11	1.22	×2	-2.44	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**15.25**	**m^2**
6. Conc. Cover	L=1.00 W=1.61	1.61	0.1	**0.16**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=5			**5.34**	kg
8. Reinforcement	Manhole	V=2.33		**209.36**	kg
	Conc. Cover	V=0.16		**23.18**	kg
9. Scaffolding			outside	12.66	m^2
			Inside	7.61	m^2
Net Area.				**20.27**	**m^2**
10. Supporting				**0.00**	m^2



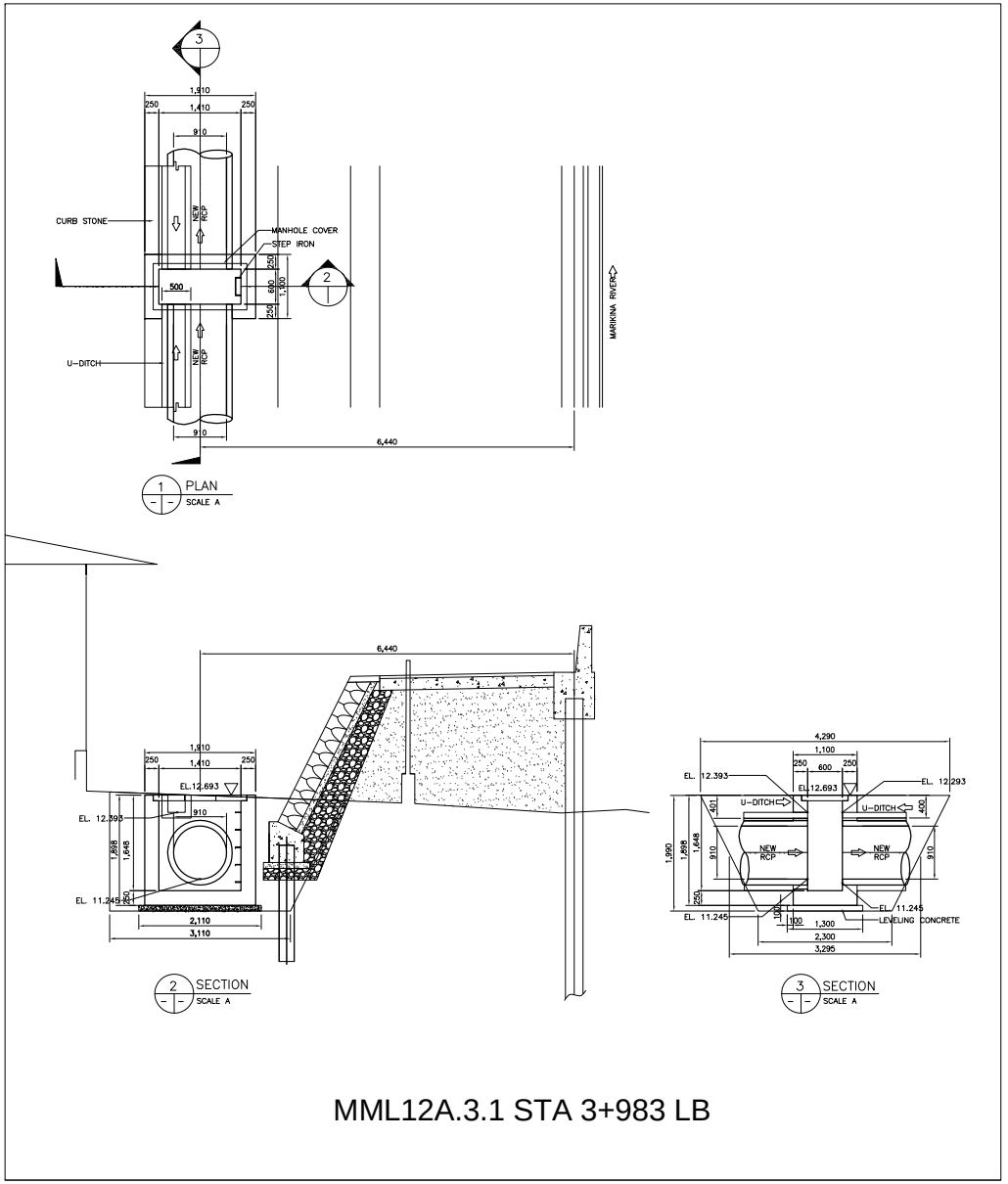
MML12A.3 STA 3+965 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 12A.3.1**

Location: **STA. 3+983**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=7.11	3.30	23.41	
				23.41	m^3
2. Lev. Concrete	W=2.11 L=1.30	2.74	0.1	**0.27**	m^3
3. Bottom Slab	W=1.91 L=1.10	2.10	0.25	**0.53**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.10	Aout=2.10			
	Win=1.41 Lout=.60	Ain=0.85	1.648	2.068	m^3
		Anet=1.26			
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.48**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.10	Aout=6.02	1.898	11.426	m^2
	Win=1.41 Lout=.60	Ain=4.02	1.648	6.625	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**13.38**	**m^2**
6. Conc. Cover	L=0.80 W=1.61	1.288	0.1	**0.13**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=5	1.78kg/m		1.07 **5.34**	kg/pc kg
8. Reinforcement	Manhole	V=2.01		**180.86**	kg
	Conc. Cover	V=0.13		**18.55**	kg
9. Scaffolding			outside	11.43	m^2
			Inside	6.63	m^2
Net Area.				**18.05**	**m^2**
10. Supporting				**0.00**	m^2



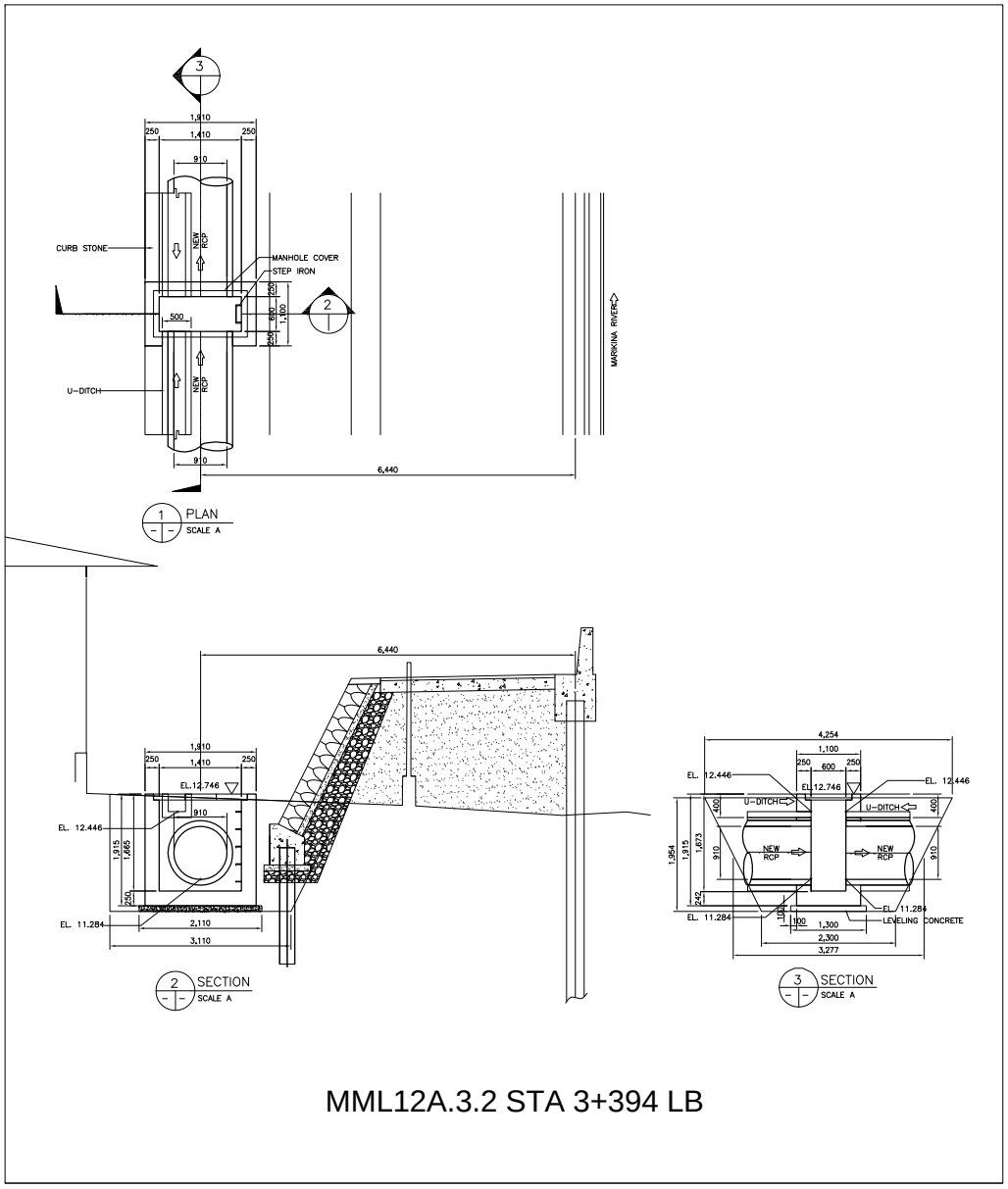
MML12A.3.1 STA 3+983 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 12A.3.2**

Location: **STA. 3+394**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=6.96	3.28	22.81	
				22.81	m^3
2. Lev. Concrete	W=2.11 L=1.30	2.74	0.1	**0.27**	m^3
3. Bottom Slab	W=1.91 L=1.10	2.10	0.25	**0.53**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.10 Win=1.41 Lout=.60	Aout=2.10 Ain=0.85 Anet=1.26	1.665	2.090	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.51**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.10	Aout=6.02	1.915	11.528	m^2
	Win=1.41 Lout=.60	Ain=4.02	1.665	6.693	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17 ×2		-2.34	m^2
Pipe hole on Wall B	W=0.00	0.00 ×2		0.00	m^2
Pipe hole on Wall C	DiaC=1.11	1.17 ×2		-2.34	m^2
Pipe hole on Wall D	DiaD=0.00	0.00 ×2		0.00	m^2
Net Area.				**13.55**	**m^2**
6. Conc. Cover	L=0.80 W=1.61	1.288	0.1	**0.13**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=5	1.78kg/m		1.07 **5.34**	kg/pc kg
8. Reinforcement	Manhole	V=2.03		**182.79**	kg
	Conc. Cover	V=0.13		**18.55**	kg
9. Scaffolding			outside	0.00	m^2
			Inside	0.00	m^2
Net Area.				**0.00**	**m^2**
10. Supporting				**0.00**	m^2



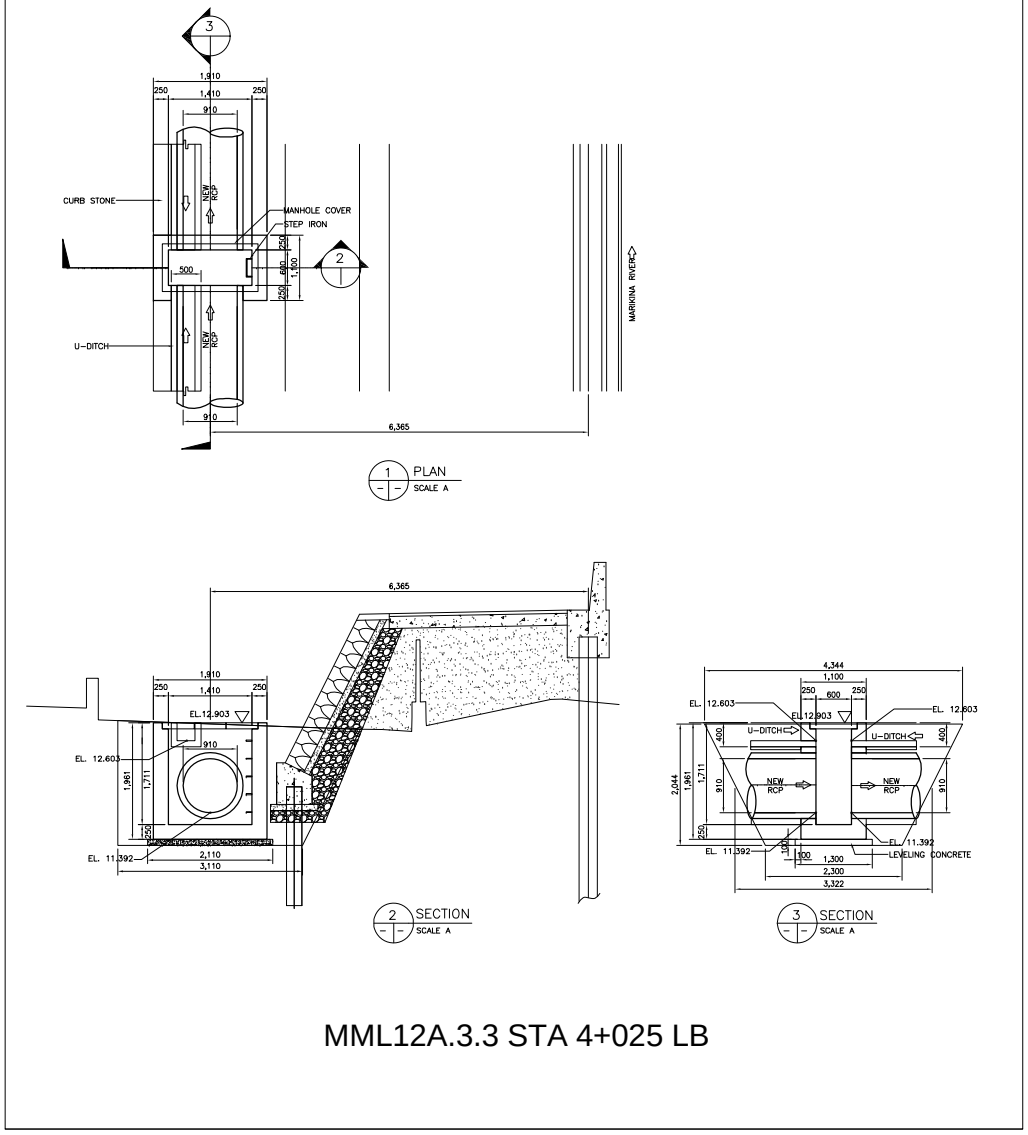
MML12A.3.2 STA 3+394 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 12A.3.3**

Location: **STA. 4+025**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=7.33	3.32	24.34	
				24.34	m^3
2. Lev. Concrete	W=2.11 L=1.30	2.74	0.1	**0.27**	m^3
3. Bottom Slab	W=1.91 L=1.10	2.10	0.25	**0.53**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.10	Aout=2.10			
	Win=1.41 Lout=.60	Ain=0.85	1.711	2.147	m^3
		Anet=1.26			
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.56**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.10	Aout=6.02	1.961	11.805	m^2
	Win=1.41 Lout=.60	Ain=4.02	1.711	6.878	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**14.01**	**m^2**
6. Conc. Cover	L=0.80 W=1.61	1.288	0.1	**0.13**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=5			**5.34**	kg
8. Reinforcement	Manhole	V=2.09		**187.98**	kg
	Conc. Cover	V=0.13		**18.55**	kg
9. Scaffolding			outside	0.00	m^2
			Inside	0.00	m^2
Net Area.				**0.00**	**m^2**
10. Supporting				**0.00**	m^2



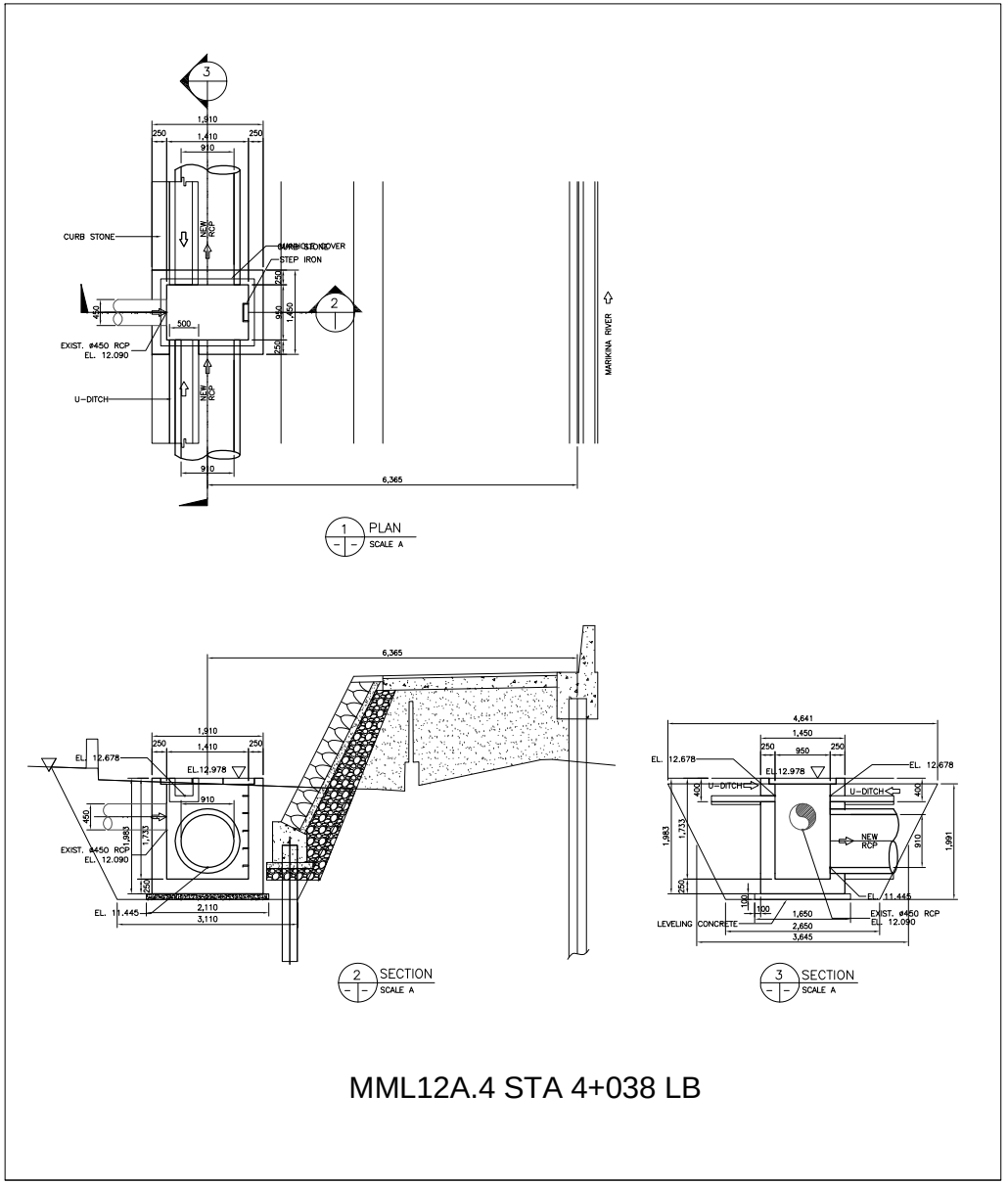
MML12A.3.3 STA 4+025 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 12A.4**

Location: **STA. 4+038**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.33	3.65	30.35	
				30.35	m^3
2. Lev. Concrete	W=2.11 L=1.65	3.48	0.1	**0.35**	m^3
3. Bottom Slab	W=1.91 L=1.45	2.77	0.25	**0.69**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.45 Win=1.41 Lout=.95	Aout=2.77 Ain=1.34 Anet=1.43	1.733	2.478	m^3
Minus					
Pipe hole on Wall A	DiaA=0.40	0.20	0.25	0.05	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.07**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.45	Aout=6.72	1.983	13.326	m^2
	Win=1.41 Lout=.95	Ain=4.72	1.733	8.180	m^2
Minus					
Pipe hole on Wall A	DiaA=0.40	0.20	×2	-0.40	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**18.25**	**m^2**
6. Conc. Cover	L=1.15 W=1.61	1.8515	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=5	1.78kg/m		1.07 **5.34**	kg/pc kg
8. Reinforcement	Manhole	V=2.76		**248.71**	kg
	Conc. Cover	V=0.19		**26.66**	kg
9. Scaffolding			outside	0.00	m^2
			Inside	0.00	m^2
Net Area.				**0.00**	**m^2**
10. Supporting				**0.00**	m^2



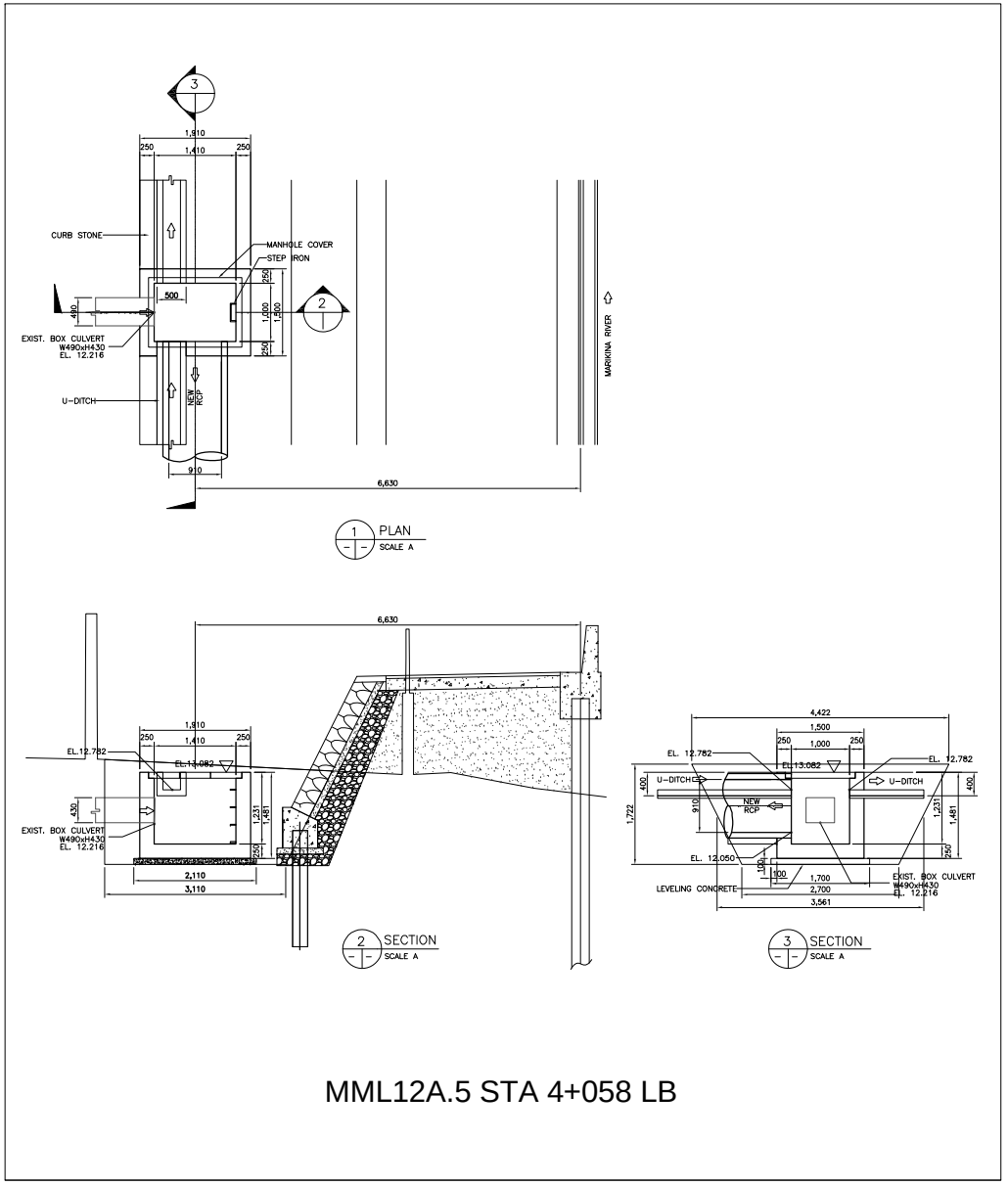
MML12A.4 STA 4+038 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 12A.5**

Location: **STA. 4+058**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=6.16	3.56	21.94	
		\		**21.94**	m^3
2. Lev. Concrete	W=2.11 L=1.70	3.59	0.1	**0.36**	m^3
3. Bottom Slab	W=1.91 L=1.50	2.87	0.25	**0.72**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.50	Aout=2.87			
	Win=1.41 Lout=1.00	Ain=1.41	1.231	1.791	m^3
		Anet=1.46			
Minus					
Pipe hole on Wall A	DiaA=0.54	0.27	0.25	0.07	
Pipe hole on Wall B	DiaB=0.43	0.21	0.25	0.05	
Pipe hole on Wall C	DiaC=1.11	0.97	0.25	0.24	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.43**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.50	Aout=6.82	1.231	8.395	m^2
	Win=1.41 Lout=1.00	Ain=4.82	1.231	5.933	m^2
Minus					
Pipe hole on Wall A	DiaA=0.54	0.27	×2	-0.54	m^2
Pipe hole on Wall B	W=0.43	0.21	×2	-0.42	m^2
Pipe hole on Wall C	DiaC=1.11	0.97	×2	-1.94	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**11.43**	**m^2**
6. Conc. Cover	L=1.20 W=1.61	1.932	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=4			**4.27**	kg
8. Reinforcement	Manhole	V=2.15		**193.06**	kg
	Conc. Cover	V=0.19		**27.82**	kg
9. Scaffolding			outside	0.00	m^2
			Inside	0.00	m^2
Net Area.				**0.00**	**m^2**
10. Supporting				**0.00**	m^2



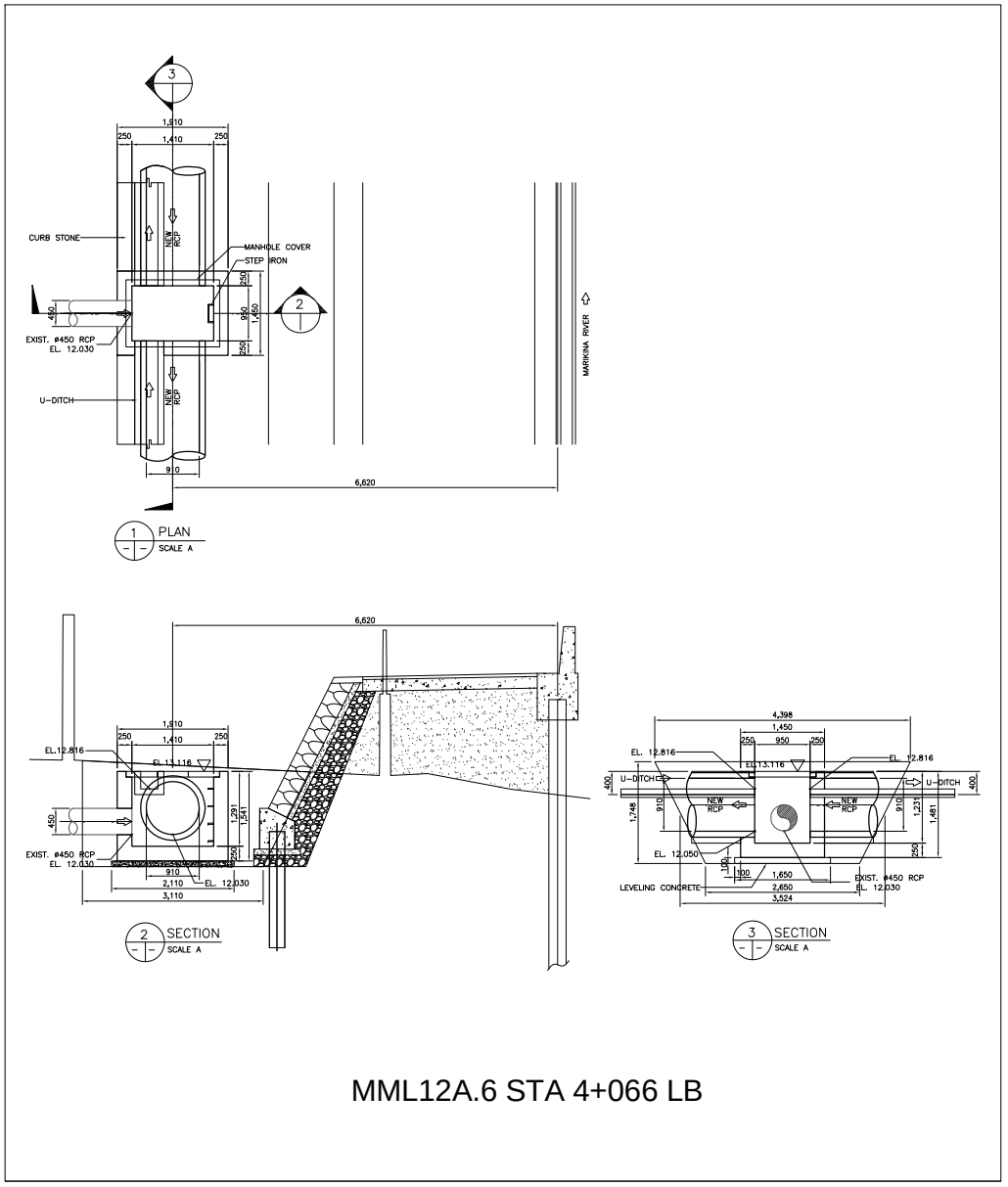
MML12A.5 STA 4+058 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 12A.6**

Location: **STA. 4+066**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=6.12	3.52	21.57	
				21.57	m^3
2. Lev. Concrete	W=2.11 L=1.65	3.48	0.1	**0.35**	m^3
3. Bottom Slab	W=1.91 L=1.45	2.77	0.25	**0.69**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.45 Win=1.41 Lout=.95	Aout=2.77 Ain=1.34 Anet=1.43	1.291	1.846	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	0.97	0.25	0.24	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.11	0.97	0.25	0.24	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.30**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.45	Aout=6.72	1.541	10.356	m^2
	Win=1.41 Lout=.95	Ain=4.72	1.291	6.094	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	0.97	×2	-1.94	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.11	0.97	×2	-1.94	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**12.06**	**m^2**
6. Conc. Cover	L=1.15 W=1.61	1.8515	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=4	1.78kg/m		1.07 **4.27**	kg/pc kg
8. Reinforcement	Manhole	V=1.99		**179.06**	kg
	Conc. Cover	V=0.19		**26.66**	kg
9. Scaffolding			outside	0.00	m^2
			Inside	0.00	m^2
Net Area.				**0.00**	**m^2**
10. Supporting				**0.00**	m^2



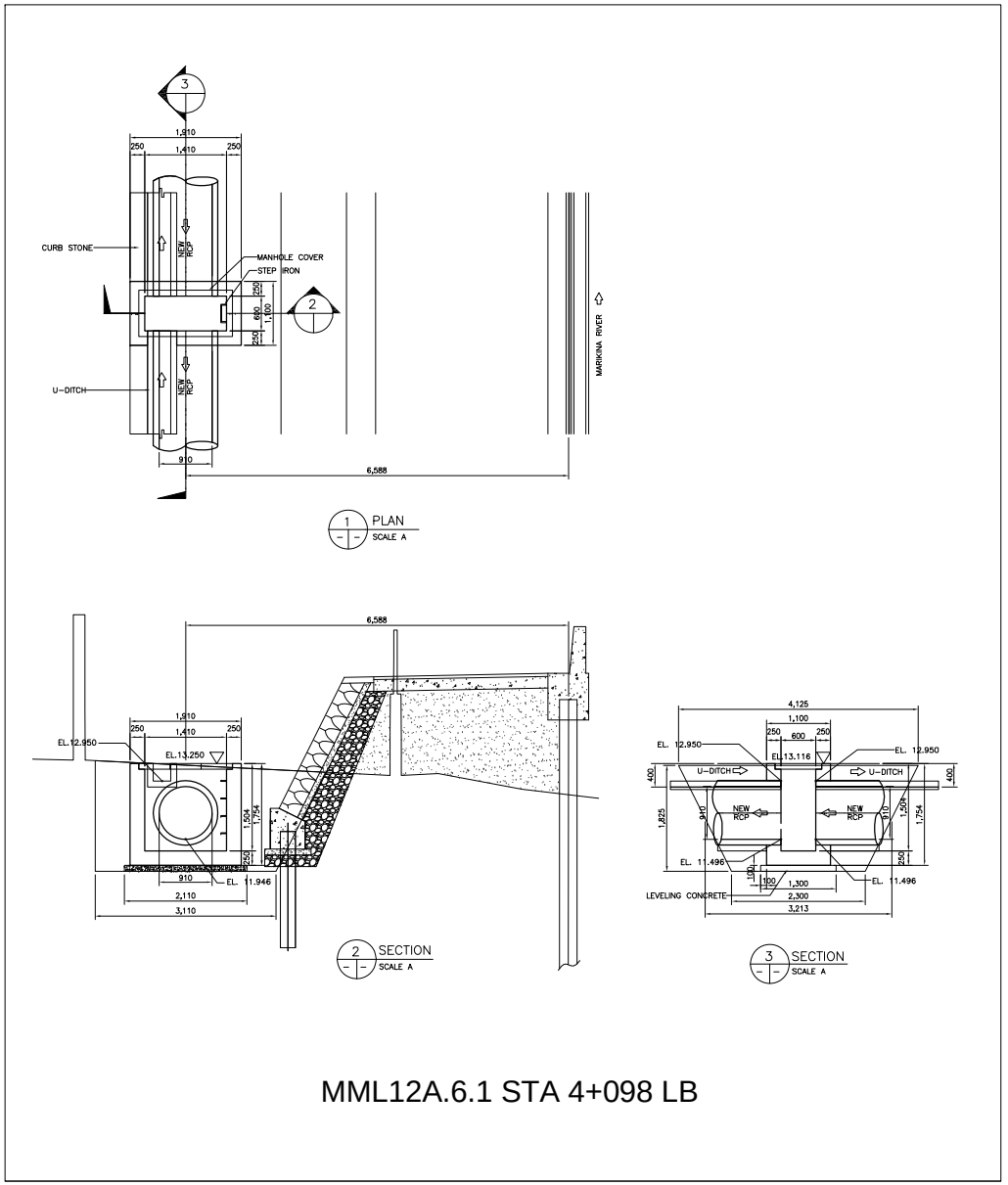
MML12A.6 STA 4+066 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 12A.6.1**

Location: **STA. 4+098**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=6.42	3.21	20.62	
				20.62	m^3
2. Lev. Concrete	W=2.11 L=1.30	2.74	0.1	**0.27**	m^3
3. Bottom Slab	W=1.91 L=1.10	2.10	0.25	**0.53**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.10	Aout=2.10			
	Win=1.41 Lout=.60	Ain=0.85	1.504	1.888	m^3
		Anet=1.26			
Minus					
Pipe hole on Wall A	DiaA=1.11	0.97	0.25	0.24	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.11	0.97	0.25	0.24	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.40**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.10	Aout=6.02	1.754	10.559	m^2
	Win=1.41 Lout=.60	Ain=4.02	1.504	6.046	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	0.97	×2	-1.94	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=1.11	0.97	×2	-1.94	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**12.74**	**m^2**
6. Conc. Cover	L=0.80 W=1.61	1.288	0.1	**0.13**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=5			**5.3**	kg
8. Reinforcement	Manhole	V=1.93		**173.6**	kg
	Conc. Cover	V=0.13		**18.5**	kg
9. Scaffolding			outside	0.00	m^2
			Inside	0.00	m^2
Net Area.				**0.00**	**m^2**
10. Supporting				**0.00**	m^2

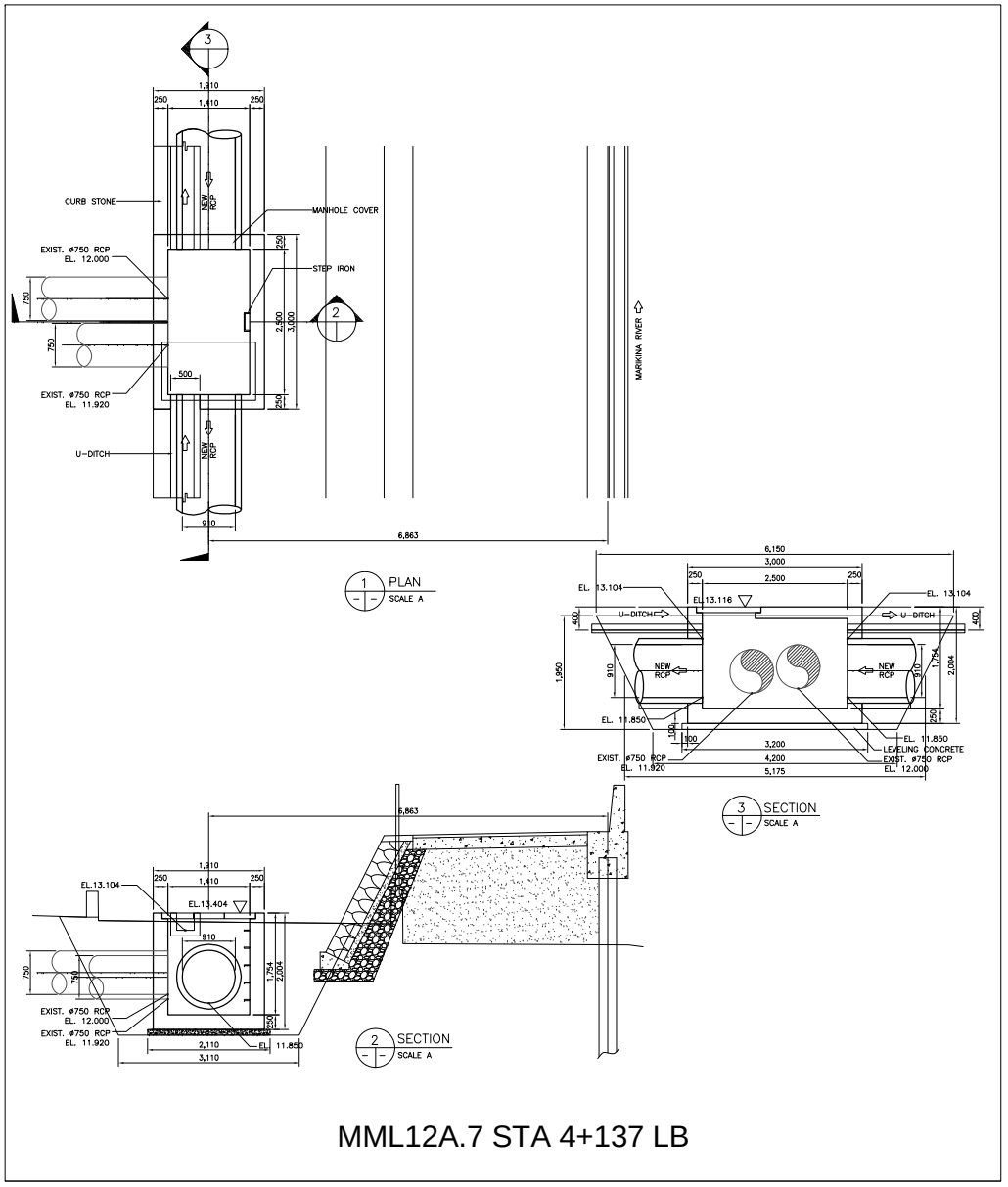


QUANTITIES OF MANHOLE

Manhole No.: **MML 12A.7**

Location: **STA. 4+137**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.01	5.18	41.44	
				41.44	m^3
2. Lev. Concrete	W=2.11 L=3.20	6.75	0.1	**0.68**	m^3
3. Bottom Slab	W=1.91 L=3.00	7.52	0.25	**1.88**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=3.00 Win=1.41 Lout=2.50	Aout=5.73 Ain=3.53 Anet=2.21	1.754	3.868	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
Pipe hole on Wall B	DiaB=0.93	1.35	0.25	0.34	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.95**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=3.00	Aout=9.82	2.004	19.679	m^2
	Win=1.41 Lout=2.50	Ain=7.82	1.754	13.716	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall B	W=0.93	1.35	×2	-2.69	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**26.03**	**m^2**
6. Conc. Cover	L=1.00 W=1.61	1.61	0.1	**0.16**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=5			**5.34**	kg
8. Reinforcement	Manhole	V=4.83		**434.51**	kg
	Conc. Cover	V=0.16		**23.18**	kg
9. Scaffolding			outside	19.68	m^2
			Inside	13.72	m^2
Net Area.				**33.40**	**m^2**
10. Supporting		V=3.53	1.754	**6.18**	m^3

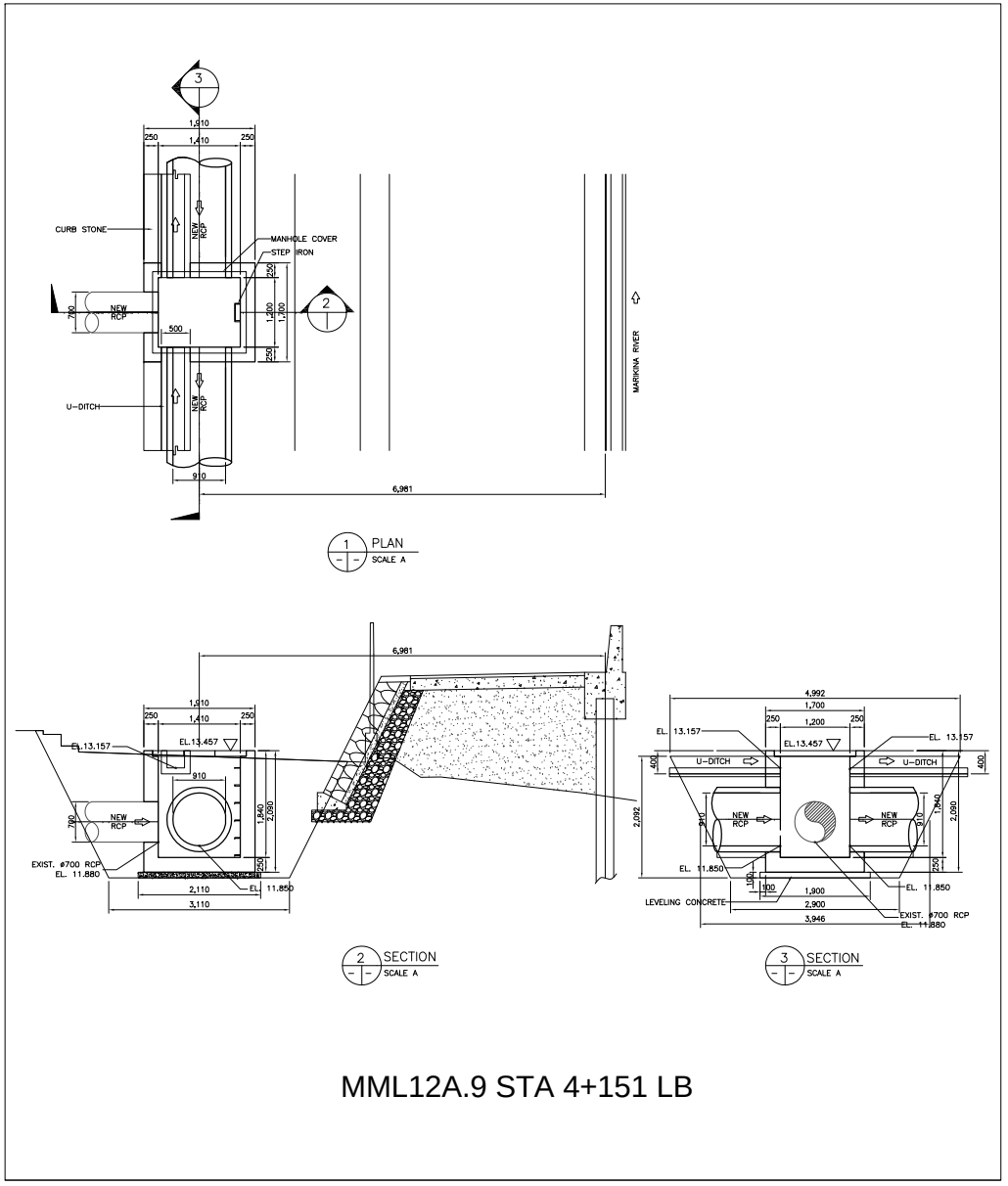


QUANTITIES OF MANHOLE

Manhole No.: **MML 12A.9**

Location: **STA. 4+151**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.83	3.95	34.86	
				34.86	m^3
2. Lev. Concrete	W=2.11 L=1.90	4.01	0.1	**0.40**	m^3
3. Bottom Slab	W=1.91 L=1.70	3.25	0.25	**0.81**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.70 Win=1.41 Lout=1.20	Aout=3.25 Ain=1.69 Anet=1.56	1.840	2.861	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
Pipe hole on Wall B	DiaB=0.88	0.60	0.25	0.15	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.13**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.70	Aout=7.22	2.090	15.090	m^2
	Win=1.41 Lout=1.20	Ain=5.22	1.840	9.605	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall B	W=0.88	0.60	×2	-1.21	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**18.82**	**m^2**
6. Conc. Cover	L=1.40 W=1.61	2.254	0.1	**0.23**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.94		**264.46**	kg
	Conc. Cover	V=0.23		**32.46**	kg
9. Scaffolding			outside	15.09	m^2
			Inside	9.61	m^2
Net Area.				**24.70**	**m^2**
10. Supporting				**0.00**	m^2



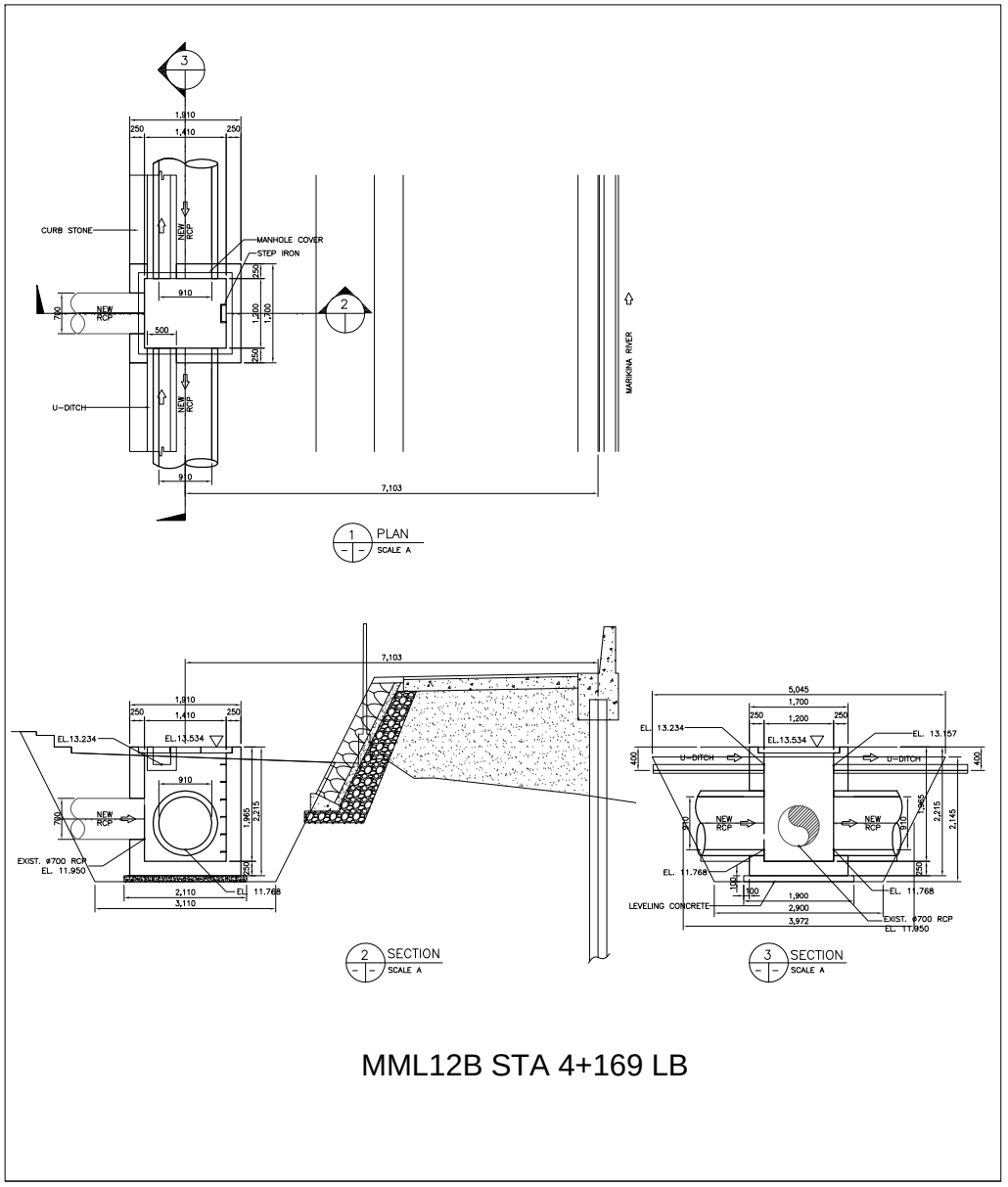
MML12A.9 STA 4+151 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 12B**

Location: **STA. 4+169**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=9.16	3.97	36.38	
				36.38	m^3
2. Lev. Concrete	W=2.11 L=1.90	4.01	0.1	**0.40**	m^3
3. Bottom Slab	W=1.91 L=1.70	3.25	0.25	**0.81**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.70	Aout=3.25			
	Win=1.41 Lout=1.20	Ain=1.69	1.965	3.056	m^3
		Anet=1.56			
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
Pipe hole on Wall B	DiaB=0.88	0.60	0.25	0.15	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.32**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.70	Aout=7.22	2.215	15.992	m^2
	Win=1.41 Lout=1.20	Ain=5.22	1.965	10.257	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall B	W=0.88	0.60	×2	-1.21	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**20.37**	**m^2**
6. Conc. Cover	L=1.40 W=1.61	2.254	0.1	**0.23**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=3.13		**281.95**	kg
	Conc. Cover	V=0.23		**32.46**	kg
9. Scaffolding			outside	15.99	m^2
			Inside	10.26	m^2
Net Area.				**26.25**	**m^2**
10. Supporting				**0.00**	m^2



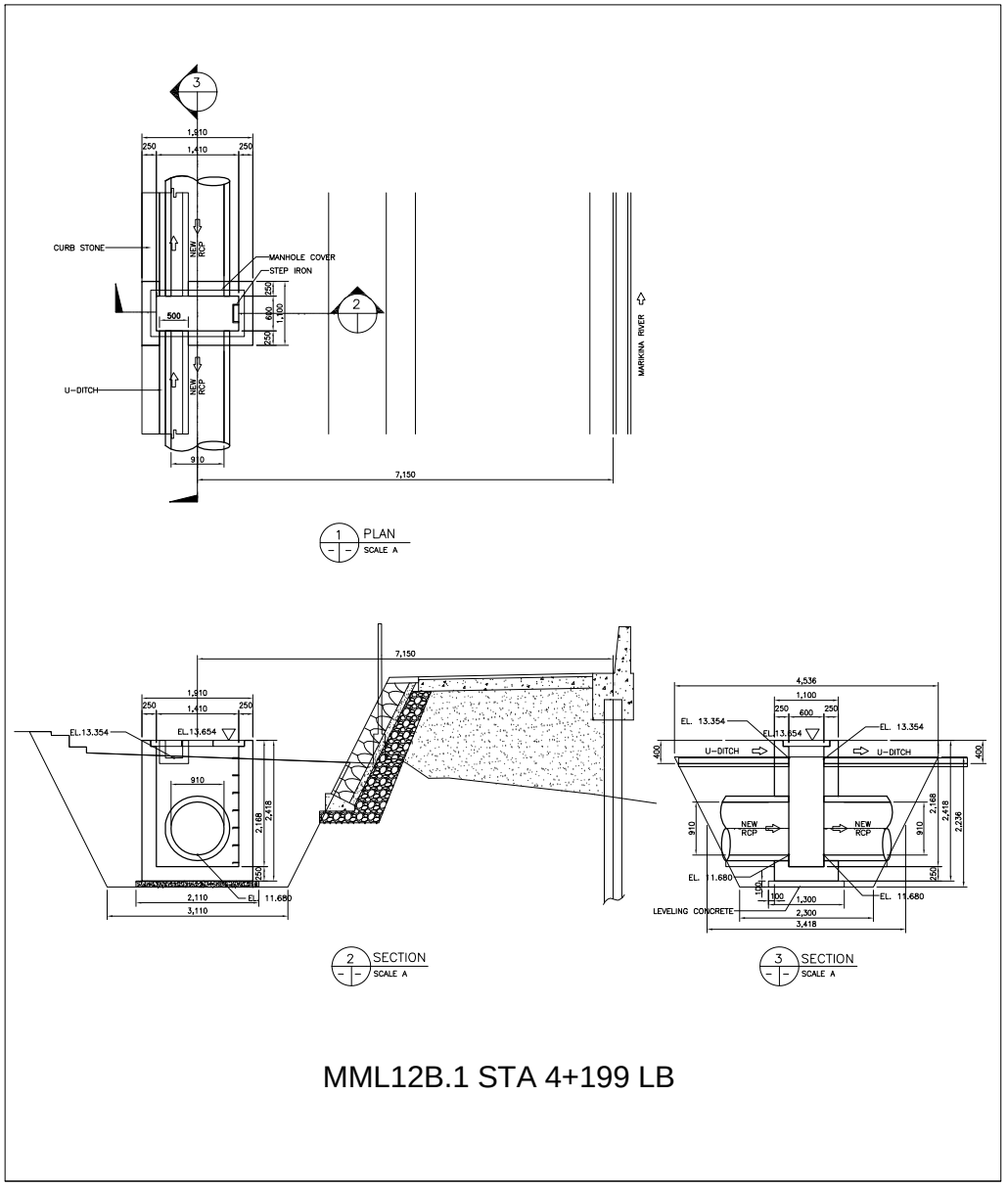
MML12B STA 4+169 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 12B.1**

Location: **STA. 4+199**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=9.67	3.42	33.05	
				33.05	m^3
2. Lev. Concrete	W=2.11 L=1.30	2.74	0.1	**0.27**	m^3
3. Bottom Slab	W=1.91 L=1.10	2.10	0.25	**0.53**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.10 Win=1.41 Lout=.60	Aout=2.10 Ain=0.85 Anet=1.26	2.168	2.721	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.11	1.17	0.25	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.14**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.10	Aout=6.02	2.418	14.556	m^2
	Win=1.41 Lout=.60	Ain=4.02	2.168	8.715	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**18.60**	**m^2**
6. Conc. Cover	L=0.80 W=1.61	1.288	0.1	**0.13**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=7			**7.48**	kg
8. Reinforcement	Manhole	V=2.66		**239.60**	kg
	Conc. Cover	V=0.13		**18.55**	kg
9. Scaffolding			outside	14.56	m^2
			Inside	8.72	m^2
Net Area.				**23.27**	**m^2**
10. Supporting				**0.00**	m^2



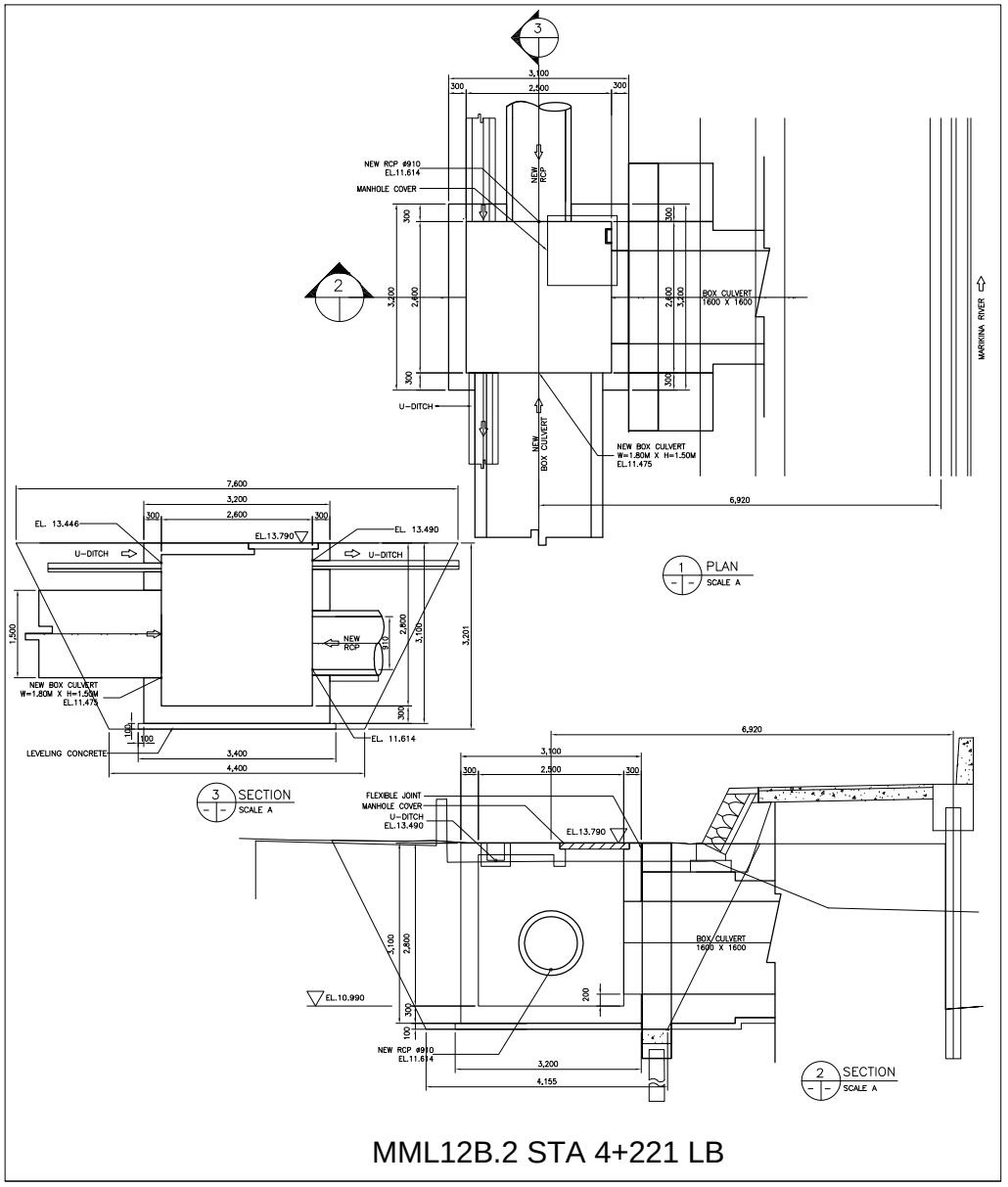
MML12B.1 STA 4+199 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 12B.2**

Location: **STA. 4+221**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=18.50	6.00	111.00	
				111.00	m^3
2. Lev. Concrete	W=3.30 L=3.40	11.22	0.1	**1.12**	m^3
3. Bottom Slab	W=3.10	9.92	0.3	**3.77**	m^3
& Top Slab	L=3.20	5.29	0.15		
4. Wall					
Entire Wall	Wout=3.10 Lout=3.20	Aout=9.92			
	Win=2.50 Lout=2.60	Ain=6.50	2.800	9.576	m^3
		Anet=3.42			
Minus					
Pipe hole on Wall A	DiaA=2.20	4.00	0.30	1.00	
Pipe hole on Wall B	DiaB=0.00	0.00	0.30	0.00	
Pipe hole on Wall C	DiaC=1.11	1.17	0.30	0.29	
Pipe hole on Wall D	DiaB=1.60	2.56	0.30	0.64	
Net Wall Vol.				**7.64**	m^3
5. Form Work					
Entire Wall	Wout=3.10 Lout=3.20	Aout=12.60	3.100	39.060	m^2
	Win=2.50 Lout=2.60	Ain=10.20	2.800	28.560	m^2
Minus					
Pipe hole on Wall A	DiaA=2.20	4.00	×2	-8.00	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall D	DiaD=1.60	2.56	×2	-5.12	m^2
Net Area.				**52.16**	**m^2**
6. Conc. Cover	L=1.20 W=1.20	1.44	0.1	**0.14**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=9			**9.61**	kg
8. Reinforcement	Manhole	V=11.41		**1027.19**	kg
	Conc. Cover	V=0.14		**20.74**	kg
9. Scaffolding			outside	39.06	m^2
			Inside	28.56	m^2
Net Area.				**67.62**	**m^2**
10. Supporting		Ain=6.50	2.800	**18.20**	m^2

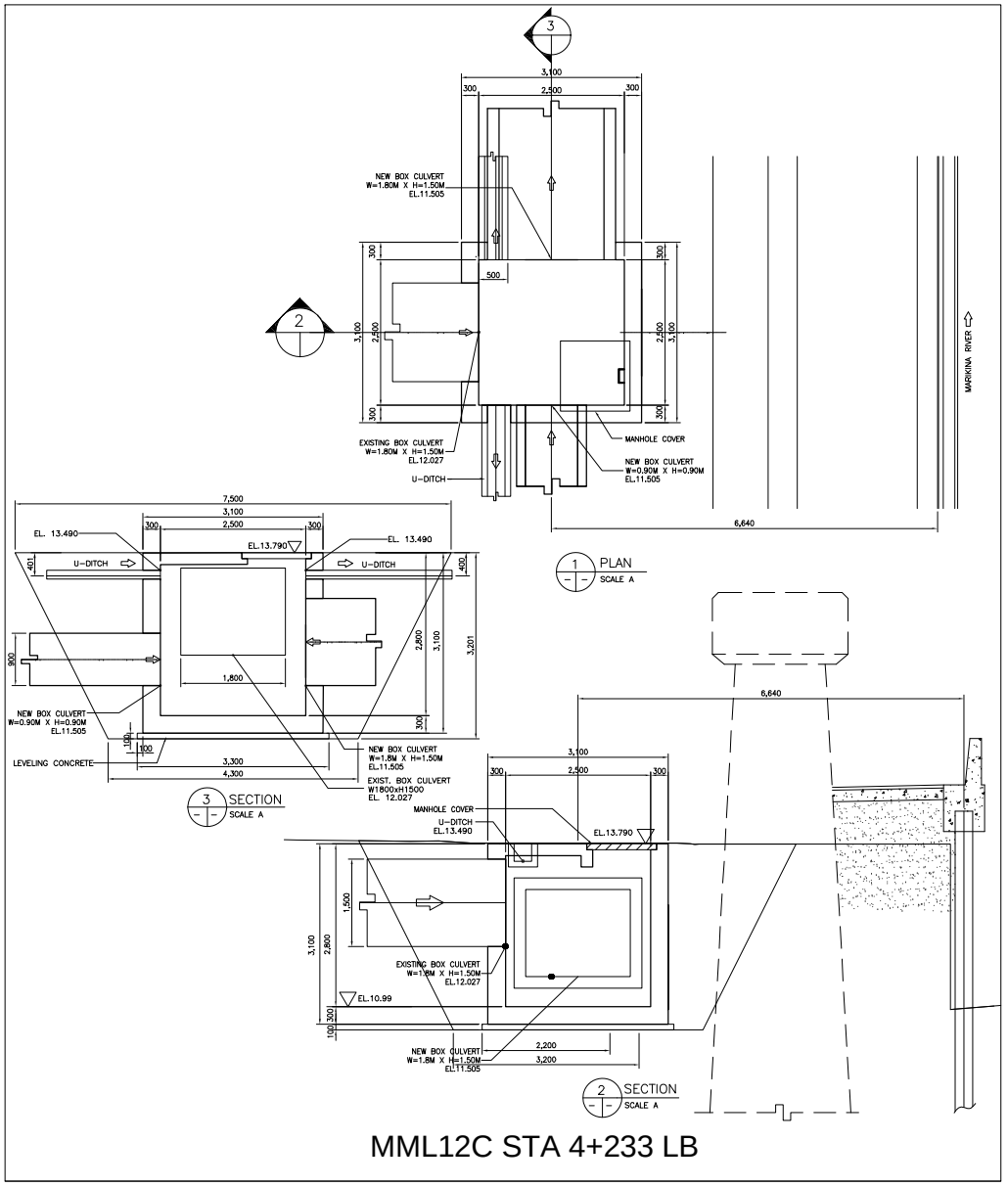


QUANTITIES OF MANHOLE

Manhole No.: **MML 12C**

Location: **STA. 4+233**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=19.00	5.90	112.10	
				112.10	m^3
2. Lev. Concrete	W=3.30 L=3.30	10.89	0.1	**1.09**	m^3
3. Bottom Slab	W=3.10	9.61	0.3	**3.64**	m^3
& Top Slab	L=3.10	5.04	0.15		
4. Wall					
Entire Wall	Wout=3.10 Lout=3.10	Aout=9.61			
	Win=2.50 Lout=2.50	Ain=6.25	2.800	9.408	m^3
		Anet=3.36			
Minus					
Pipe hole on Wall A	DiaA=2.20	4.00	0.30	1.00	
Pipe hole on Wall B	DiaB=2.20	3.30	0.30	0.83	
Pipe hole on Wall C	DiaC=1.11	1.17	0.30	0.29	
Pipe hole on Wall D	DiaD=0.00	0.00	0.30	0.00	
Net Wall Vol.				**7.29**	m^3
5. Form Work					
Entire Wall	Wout=3.10 Lout=3.10	Aout=12.40	3.100	38.440	m^2
	Win=2.50 Lout=2.50	Ain=10.00	2.800	28.000	m^2
Minus					
Pipe hole on Wall A	DiaA=2.20	4.00	×2	-8.00	m^2
Pipe hole on Wall B	W=2.20	3.30	×2	-6.60	m^2
Pipe hole on Wall C	DiaC=1.11	1.17	×2	-2.34	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**49.50**	**m^2**
6. Conc. Cover	L=1.20 W=1.20	1.44	0.1	**0.14**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=9			**9.61**	kg
8. Reinforcement	Manhole	V=10.93		**983.68**	kg
	Conc. Cover	V=0.14		**20.74**	kg
9. Scaffolding			outside	38.44	m^2
			Inside	28.00	m^2
Net Area.				**66.44**	**m^2**
10. Supporting		Ain=6.25	2.800	**17.50**	m^2

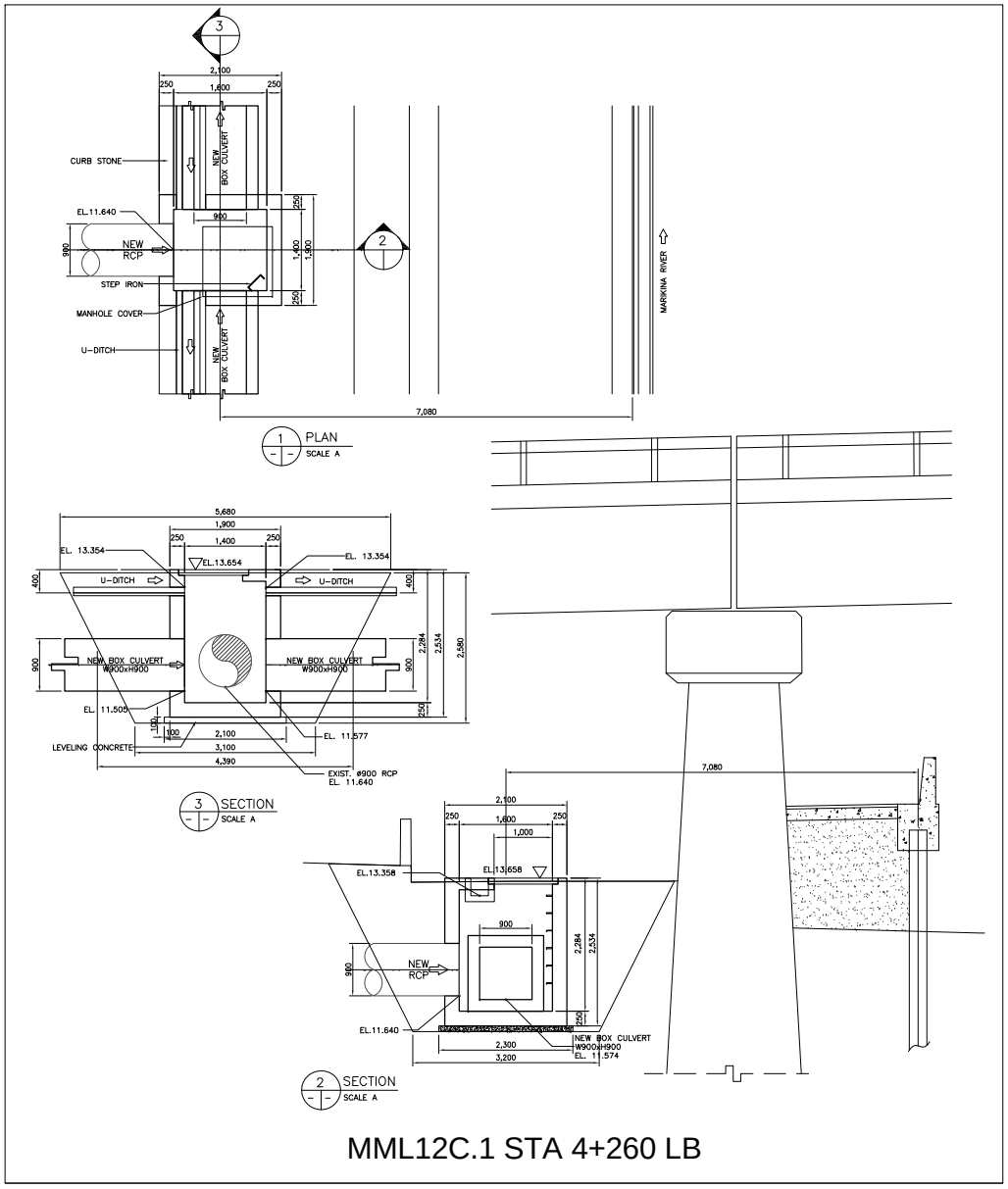


QUANTITIES OF MANHOLE

Manhole No.: **MML 12C.1**

Location: **STA. 4+260**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=11.96	4.39	52.50	
				52.50	m^3
2. Lev. Concrete	W=2.30 L=2.10	4.83	0.1	**0.48**	m^3
3. Bottom Slab	W=2.10 L=1.90	4.47	0.25	**1.12**	m^3
4. Wall					
Entire Wall	Wout=2.10 Lout=1.90	Aout=3.99			
	Win=1.60 Lout=1.40	Ain=2.24	2.284	3.997	m^3
		Anet=1.75			
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	0.25	0.47	
Pipe hole on Wall B	DiaB=1.30	1.33	0.25	0.33	
Pipe hole on Wall C	DiaC=1.30	1.89	0.25	0.47	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.72**	m^3
5. Form Work					
Entire Wall	Wout=2.10 Lout=1.90	Aout=8.00	2.534	20.272	m^2
	Win=1.60 Lout=1.40	Ain=6.00	2.284	13.704	m^2
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall B	W=1.30	1.33	×2	-2.66	m^2
Pipe hole on Wall C	DiaC=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**23.76**	**m^2**
6. Conc. Cover	L=1.00 W=1.80	1.8	0.1	**0.18**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=7			**7.48**	kg
8. Reinforcement	Manhole	V=3.84		**345.39**	kg
	Conc. Cover	V=0.18		**25.92**	kg
9. Scaffolding			outside	20.27	m^2
			Inside	13.70	m^2
Net Area.				**33.98**	**m^2**
10. Supporting				**0.00**	m^2



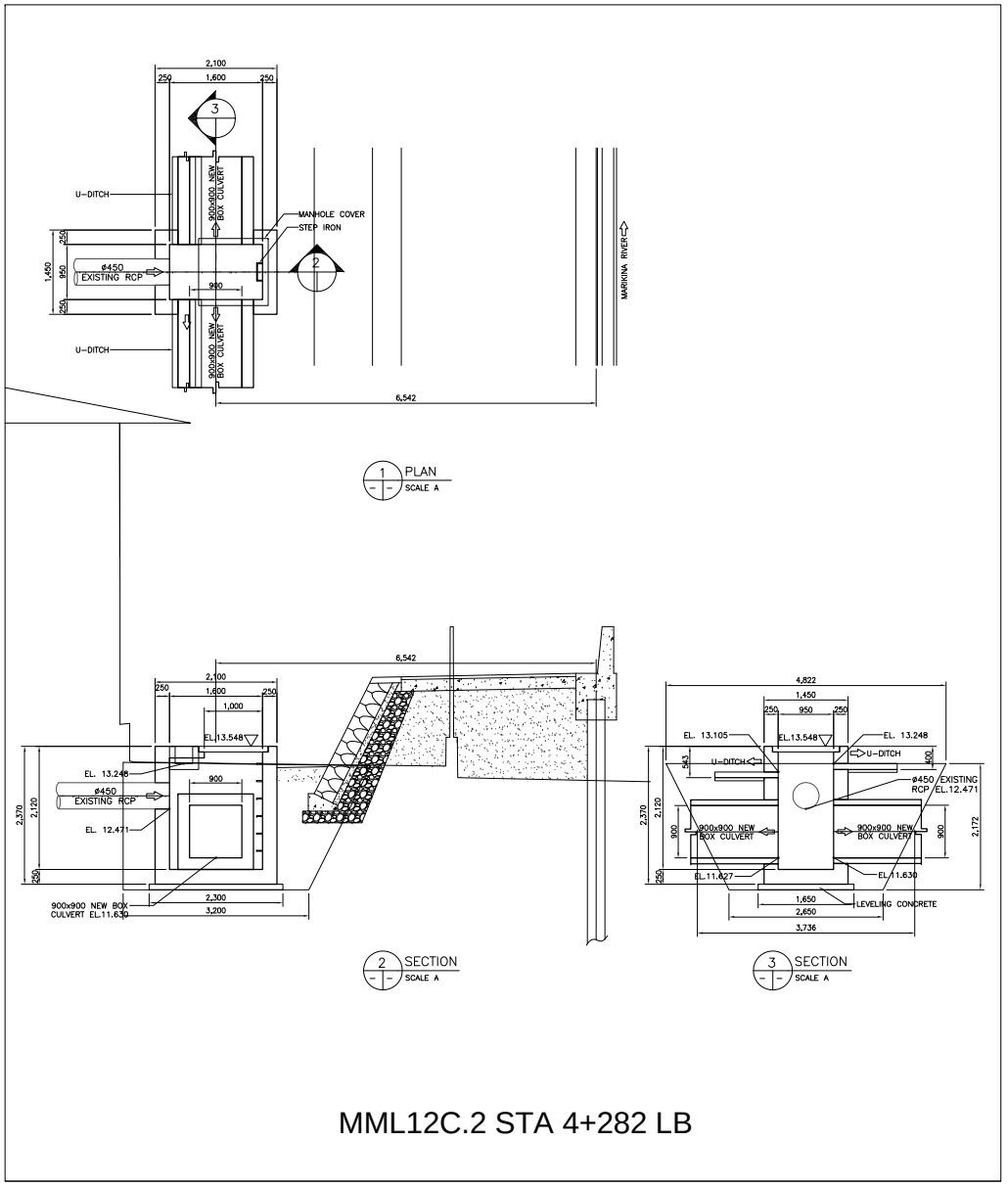
MML12C.1 STA 4+260 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 12C.2**

Location: **STA. 4+282**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.10	3.74	30.26	
				30.26	m^3
2. Lev. Concrete	W=2.30 L=1.65	3.80	0.1	**0.38**	m^3
3. Bottom Slab	W=2.10 L=1.45	3.05	0.25	**0.76**	m^3
4. Wall					
Entire Wall	Wout=2.00 Lout=1.45 Win=1.50 Lout=.95	Aout=2.90 Ain=1.43 Anet=1.48	2.120	3.127	m^3
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	0.25	0.47	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.30	1.96	0.25	0.49	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.10**	m^3
5. Form Work					
Entire Wall	Wout=2.00 Lout=1.45	Aout=6.90	2.370	16.353	m^2
	Win=1.50 Lout=.95	Ain=4.90	2.120	10.388	m^2
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.30	1.96	×2	-3.92	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**18.52**	**m^2**
6. Conc. Cover	L=1.15 W=1.80	2.07	0.1	**0.21**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=7	1.78kg/m		1.07 **7.48**	kg/pc kg
8. Reinforcement	Manhole	V=2.86		**257.42**	kg
	Conc. Cover	V=0.21		**29.81**	kg
9. Scaffolding			outside	16.35	m^2
			Inside	10.39	m^2
Net Area.				**26.74**	**m^2**
10. Supporting				**0.00**	m^2



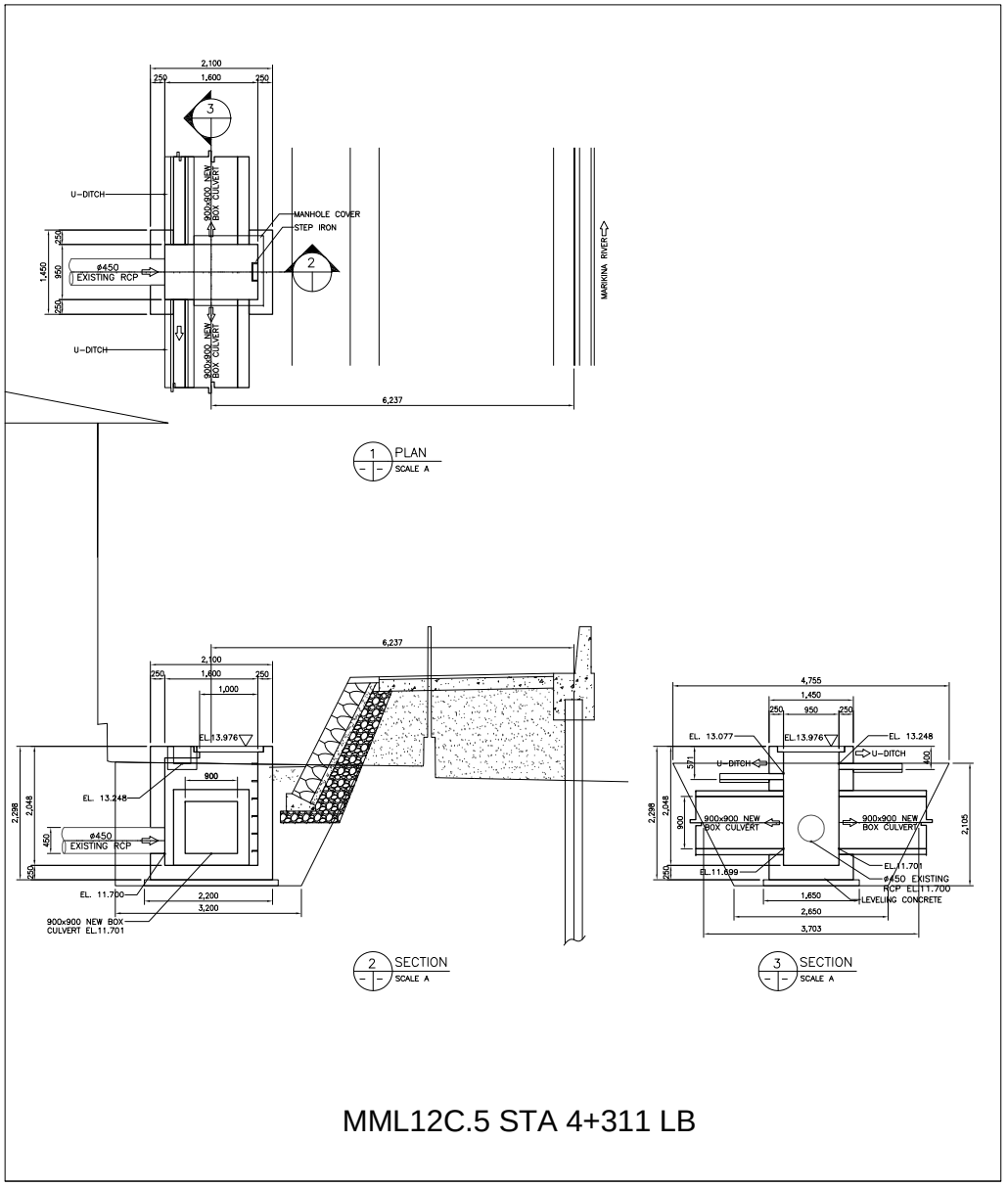
MML12C.2 STA 4+282 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 12C.5**

Location: **STA. 4+311**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=7.81	3.70	28.92	
				28.92	m^3
2. Lev. Concrete	W=2.30 L=1.65	3.80	0.1	**0.38**	m^3
3. Bottom Slab	W=2.10 L=1.45	3.05	0.25	**0.76**	m^3
4. Wall					
Entire Wall	Wout=2.10 Lout=1.45 Win=1.60 Lout=.95	Aout=3.05 Ain=1.52	2.048	3.123	m^3
		Anet=1.53			
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	0.25	0.47	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.30	1.98	0.25	0.49	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.09**	m^3
5. Form Work					
Entire Wall	Wout=2.10 Lout=1.45	Aout=7.10	2.298	16.316	m^2
	Win=1.60 Lout=.95	Ain=5.10	2.048	10.445	m^2
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.30	1.98	×2	-3.95	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**18.51**	**m^2**
6. Conc. Cover	L=1.15 W=1.80	2.07	0.1	**0.21**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.85		**256.76**	kg
	Conc. Cover	V=0.21		**29.81**	kg
9. Scaffolding			outside	16.32	m^2
			Inside	10.45	m^2
Net Area.				**26.76**	**m^2**
10. Supporting				**0.00**	m^2



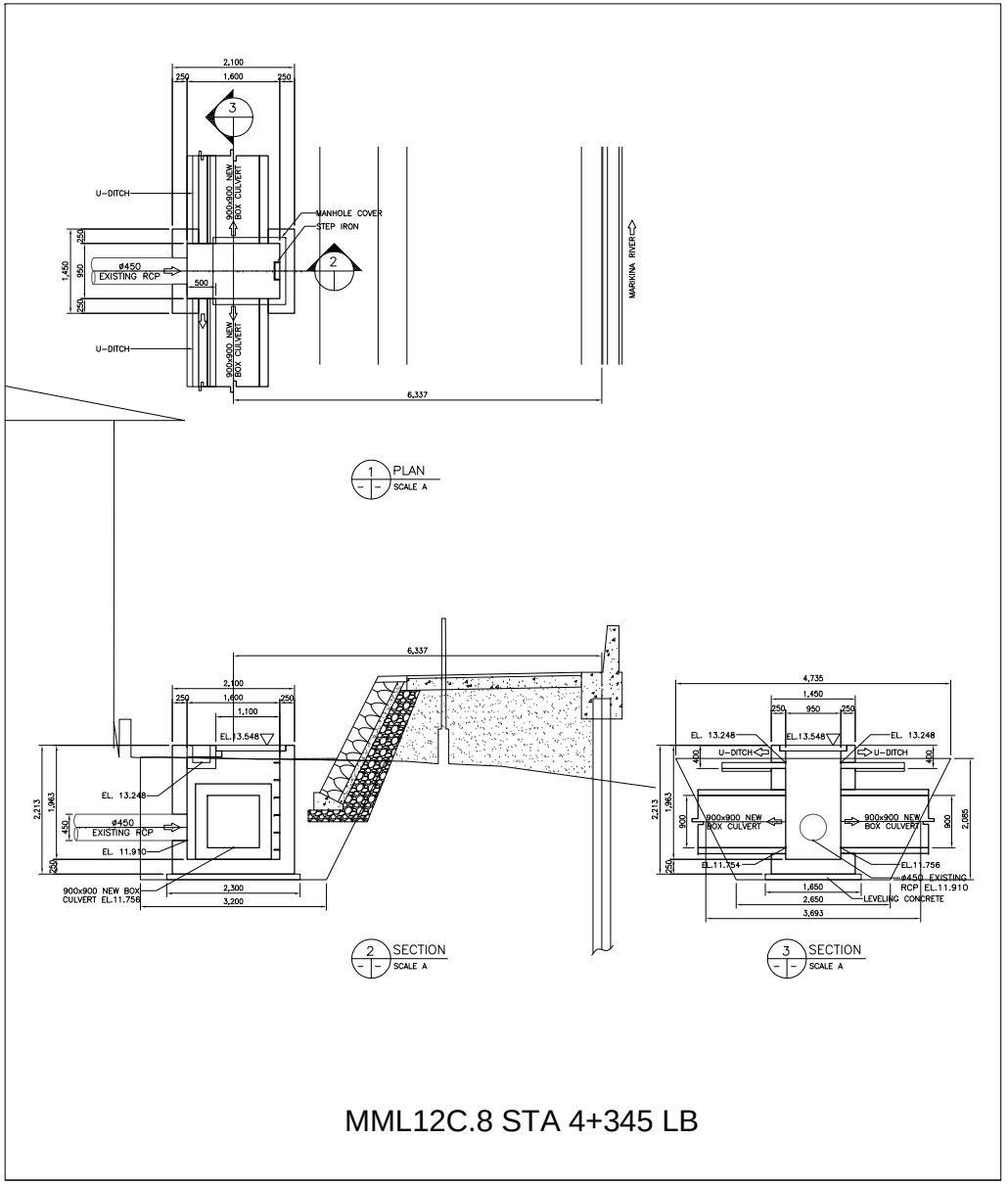
MML12C.5 STA 4+311 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 12C.8**

Location: **STA. 4+345**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=7.73	3.69	28.54	
				28.54	m^3
2. Lev. Concrete	W=2.30 L=1.65	3.80	0.1	**0.38**	m^3
3. Bottom Slab	W=2.10 L=1.45	3.05	0.25	**0.76**	m^3
4. Wall					
Entire Wall	Wout=2.10 Lout=1.45 Win=1.60 Lout=.95	Aout=3.05 Ain=1.52 Anet=1.53	1.963	2.994	m^3
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	0.25	0.47	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.30	1.89	0.25	0.47	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.98**	m^3
5. Form Work					
Entire Wall	Wout=2.10 Lout=1.45	Aout=7.10	2.213	15.712	m^2
	Win=1.60 Lout=.95	Ain=5.10	1.963	10.011	m^2
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**17.64**	**m^2**
5. Conc. Cover	L=1.15 W=1.80	2.07	0.1	**0.21**	m^3
6. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.74		**247.02**	kg
	Conc. Cover	V=0.21		**29.81**	kg
9. Scaffolding			outside	15.71	m^2
			Inside	10.01	m^2
Net Area.				**25.72**	**m^2**
10. Supporting				**0.00**	m^2

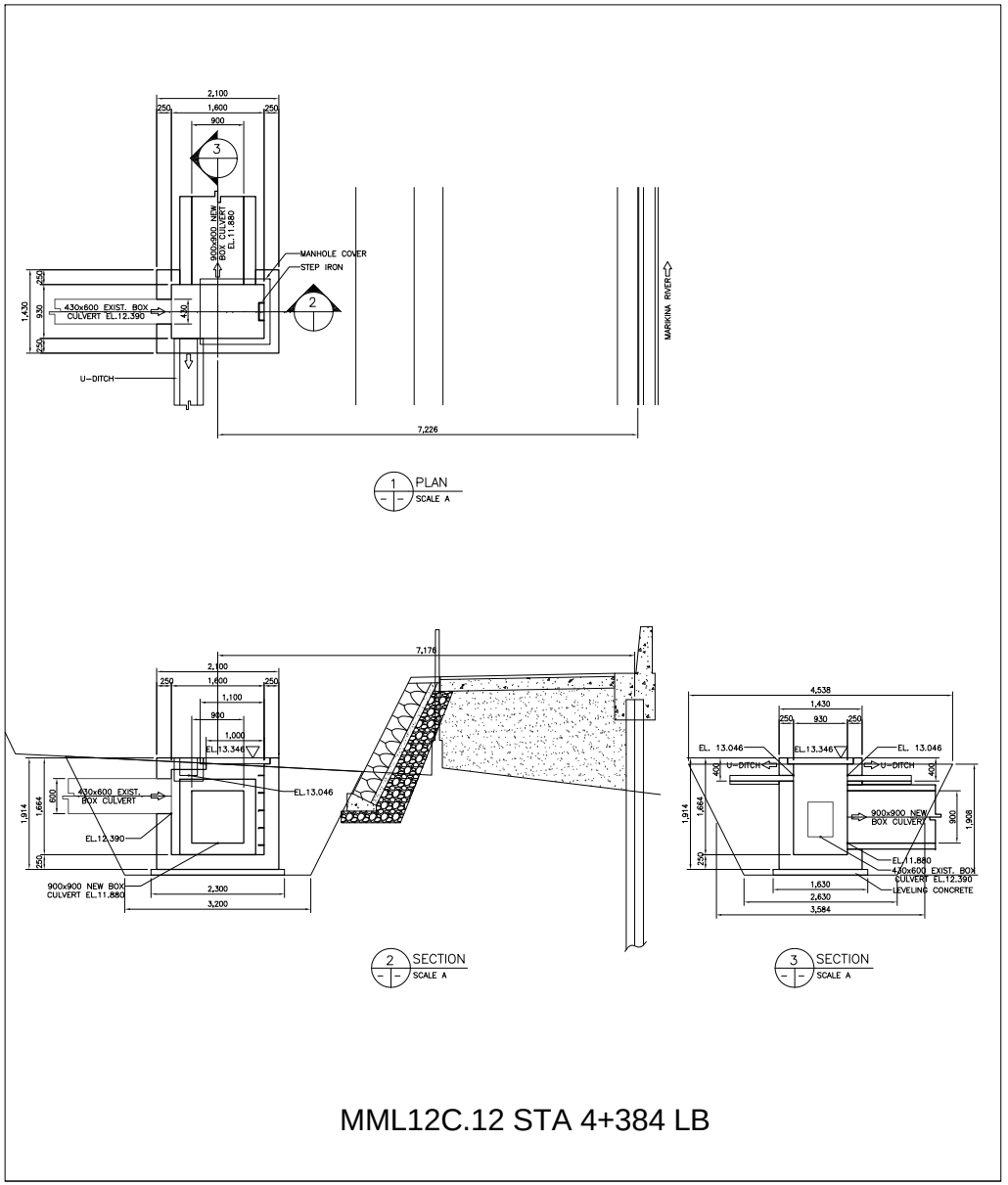


QUANTITIES OF MANHOLE

Manhole No.: **MML 12C.12**

Location: **STA. 4+384**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=7.93	3.58	28.42	
				28.42	m^3
2. Lev. Concrete	W=2.30 L=1.63	3.75	0.1	**0.37**	m^3
3. Bottom Slab	W=2.10 L=1.43	3.00	0.25	**0.75**	m^3
4. Wall					
Entire Wall	Wout=2.10 Lout=1.43 Win=1.60 Lout=.93	Aout=3.00 Ain=1.49 Anet=1.52	1.664	2.521	m^3
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	0.25	0.47	
Pipe hole on Wall B	DiaB=0.43	0.26	0.25	0.06	
Pipe hole on Wall C	DiaC=0.40	0.20	0.25	0.05	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.93**	m^3
5. Form Work					
Entire Wall	Wout=2.10 Lout=1.43	Aout=7.06	1.914	13.513	m^2
	Win=1.60 Lout=.93	Ain=5.06	1.664	8.420	m^2
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall B	W=0.43	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=0.40	0.20	×2	-0.40	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**17.24**	$\mathbf{m^2}$
5. Conc. Cover	L=1.13 W=1.80	2.034	0.1	**0.20**	m^3
6. Ladder Rung	L=0.60 Dia=.016m Qty=5	1.78kg/m		1.07 **5.34**	kg/pc kg
8. Reinforcement	Manhole	V=2.68		**241.62**	kg
	Conc. Cover	V=0.20		**29.29**	kg
9. Scaffolding			outside	0.00	m^2
			Inside	0.00	m^2
Net Area.				**0.00**	$\mathbf{m^2}$
10. Supporting				**0.00**	m^2



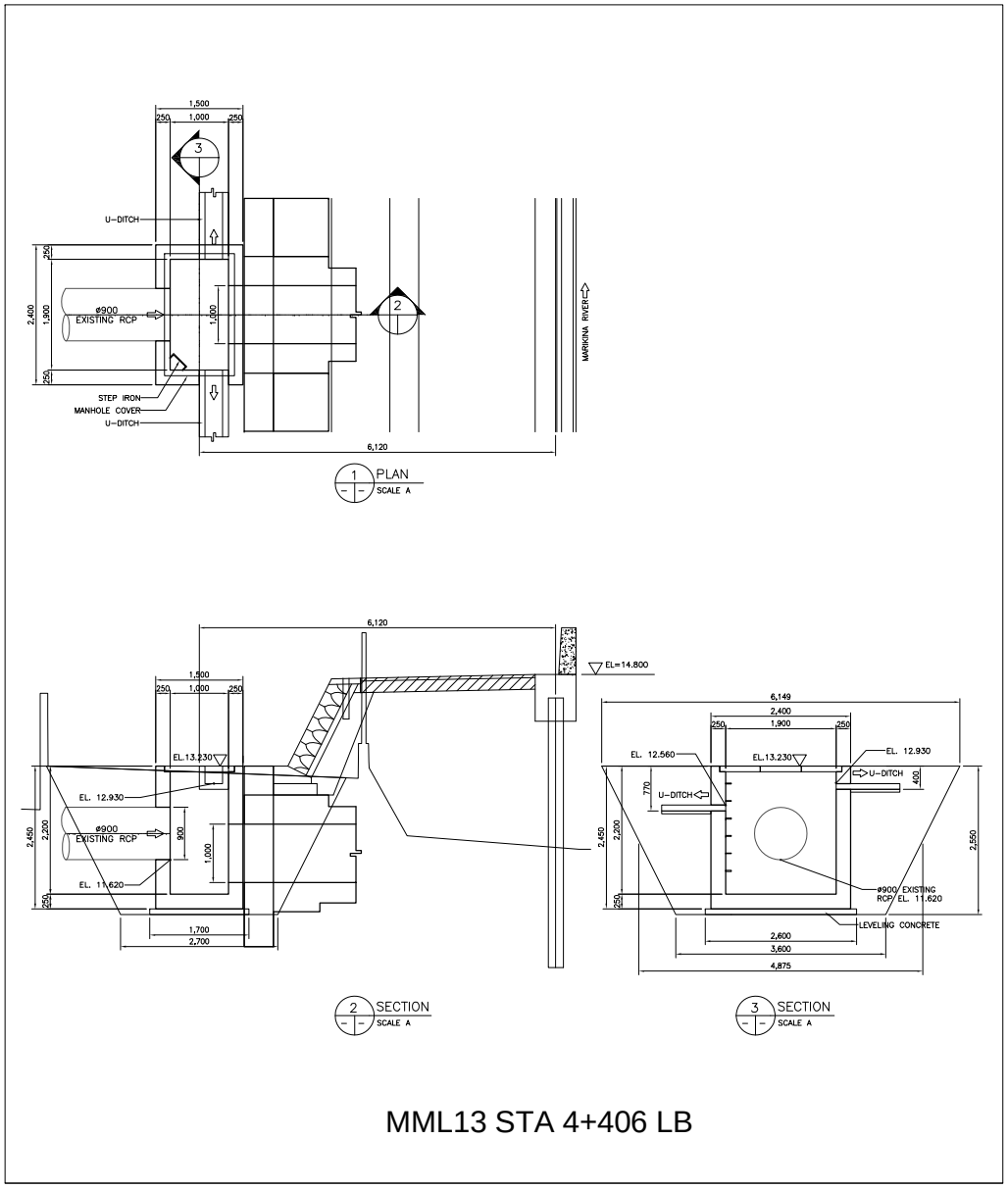
MML12C.12 STA 4+384 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 13**

Location: **STA. 4+406**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=9.59	4.88	46.75	
				46.75	m^3
2. Lev. Concrete	W=1.70 L=2.60	4.42	0.1	**0.44**	m^3
3. Bottom Slab	W=1.50 L=2.40	3.60	0.25	**0.90**	m^3
4. Wall					
Entire Wall	Wout=1.50 Lout=2.40	Aout=3.60			
	Win=1.00 Lout=1.90	Ain=1.90	2.200	3.740	m^3
		Anet=1.70			
Minus					
Pipe hole on Wall A	DiaA=0.40	0.20	0.25	0.05	
Pipe hole on Wall B	DiaB=1.10	0.95	0.25	0.24	
Pipe hole on Wall C	DiaC=0.77	0.39	0.25	0.10	
Pipe hole on Wall D	DiaD=1.00	1.00	0.25	0.25	
Net Wall Vol.				**3.11**	m^3
5. Form Work					
Entire Wall	Wout=1.50 Lout=2.40	Aout=7.80	2.450	19.110	m^2
	Win=1.00 Lout=1.90	Ain=5.80	2.200	12.760	m^2
Minus					
Pipe hole on Wall A	DiaA=0.40	0.20	×2	-0.40	m^2
Pipe hole on Wall B	W=1.10	0.95	×2	-1.90	m^2
Pipe hole on Wall C	DiaC=0.77	0.39	×2	-0.77	m^2
Pipe hole on Wall D	DiaD=1.00	1.00	×2	-2.00	m^2
Net Area.				**26.80**	**m^2**
6. Conc. Cover	L=2.10 W=1.20	2.52	0.1	**0.25**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=7			**7.48**	kg
8. Reinforcement	Manhole	V=4.01		**360.56**	kg
	Conc. Cover	V=0.25		**36.29**	kg
9. Scaffolding			outside	19.11	m^2
			Inside	12.76	m^2
Net Area.				**31.87**	**m^2**
10. Supporting				**0.00**	m^2



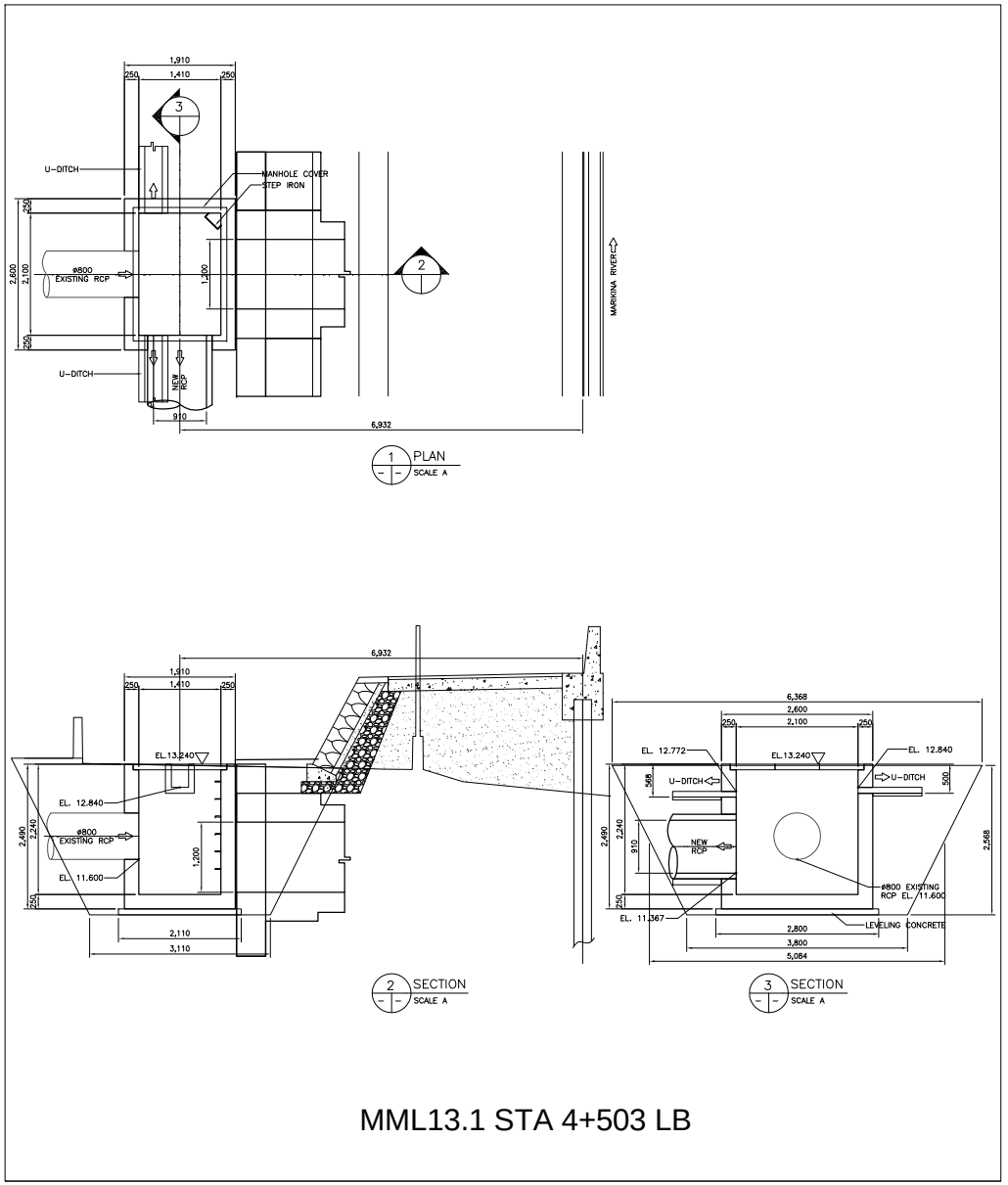
MML13 STA 4+406 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 13.1**

Location: **STA. 4+503**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=11.38	4.08	46.48	
				46.48	m^3
2. Lev. Concrete	W=2.11 L=2.80	5.91	0.1	**0.59**	m^3
3. Bottom Slab	W=1.91 L=2.60	4.97	0.25	**1.24**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=2.60 Win=1.41 Lout=2.10	Aout=4.97 Ain=2.96 Anet=2.01	2.240	4.491	m^3
Minus					
Pipe hole on Wall A	DiaA=0.50	0.25	0.25	0.06	
Pipe hole on Wall B	DiaB=0.98	0.75	0.25	0.19	
Pipe hole on Wall C	DiaC=1.11	1.25	0.25	0.31	
Pipe hole on Wall D	DiaD=1.20	1.44	0.25	0.36	
Net Wall Vol.				**3.57**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=2.60	Aout=9.02	2.490	22.460	m^2
	Win=1.41 Lout=2.10	Ain=7.02	2.240	15.725	m^2
Minus					
Pipe hole on Wall A	DiaA=0.50	0.25	×2	-0.50	m^2
Pipe hole on Wall B	W=0.98	0.75	×2	-1.50	m^2
Pipe hole on Wall C	DiaC=1.11	1.25	×2	-2.50	m^2
Pipe hole on Wall D	DiaD=1.20	1.44	×2	-2.88	m^2
Net Area.				**30.81**	**m^2**
6. Conc. Cover	L=2.30 W=1.61	3.703	0.1	**0.37**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=7	1.78kg/m		1.07 **7.48**	kg/pc kg
8. Reinforcement	Manhole	V=4.81		**432.92**	kg
	Conc. Cover	V=0.37		**53.32**	kg
9. Scaffolding			outside	22.46	m^2
			Inside	15.73	m^2
Net Area.				**38.19**	**m^2**
10. Supporting				**0.00**	m^2



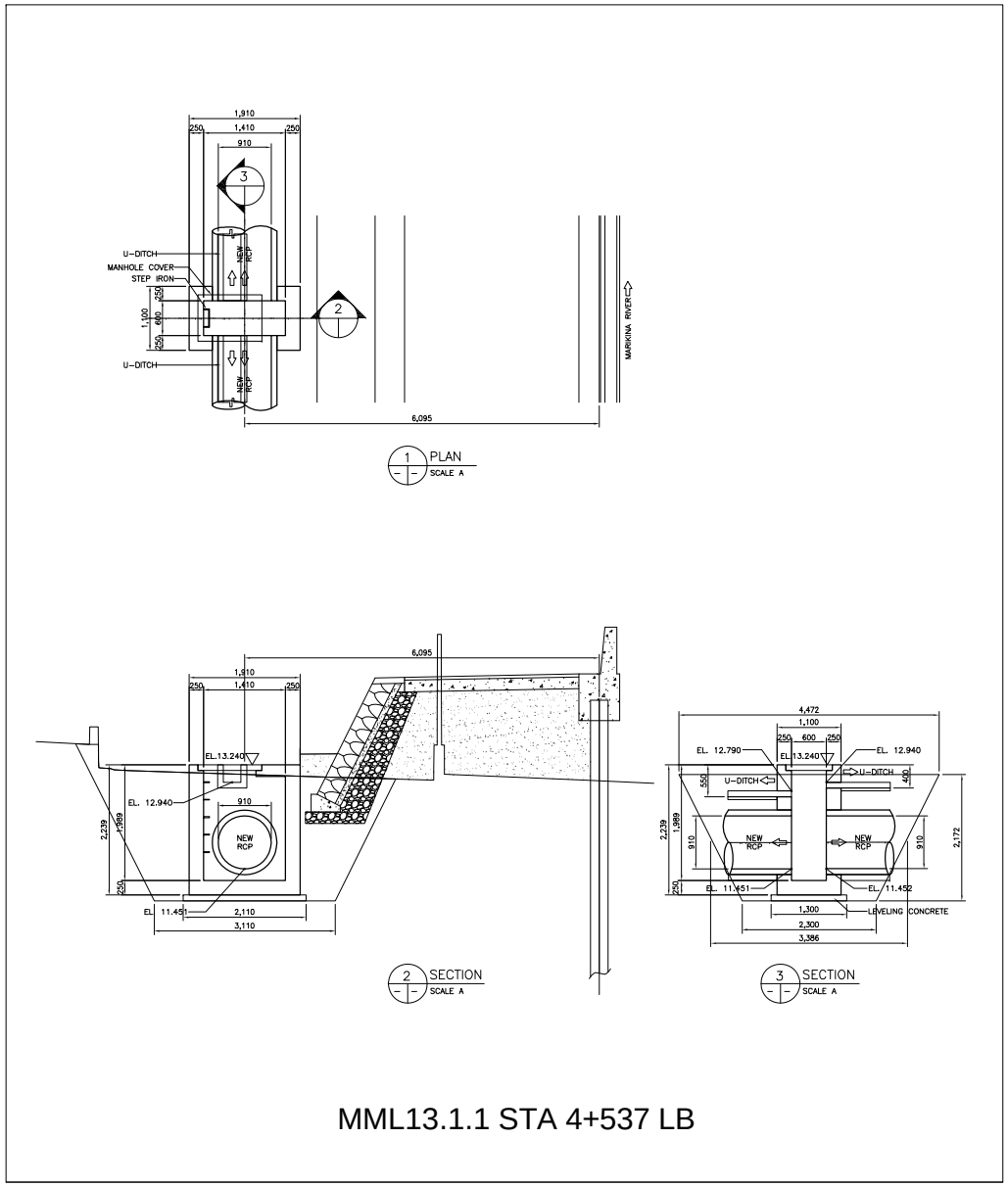
MML13.1 STA 4+503 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 13.1.1**

Location: **STA. 4+537**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=9.25	3.39	31.32	
				31.32	m^3
2. Lev. Concrete	W=2.11 L=1.30	2.74	0.1	**0.27**	m^3
3. Bottom Slab	W=1.91 L=1.10	2.10	0.25	**0.53**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.10 Win=1.41 Lout=.60	Aout=2.10 Ain=0.85 Anet=1.26	1.989	2.496	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.11	1.24	0.25	0.31	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.89**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.10	Aout=6.02	2.239	13.479	m^2
	Win=1.41 Lout=.60	Ain=4.02	1.989	7.996	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.35	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=1.11	1.24	×2	-2.49	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**16.64**	**m^2**
6. Conc. Cover	L=0.80 W=1.61	1.288	0.1	**0.13**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.42		**217.58**	kg
	Conc. Cover	V=0.13		**18.55**	kg
9. Scaffolding			outside	13.48	m^2
			Inside	8.00	m^2
Net Area.				**21.48**	**m^2**
10. Supporting				**0.00**	m^2



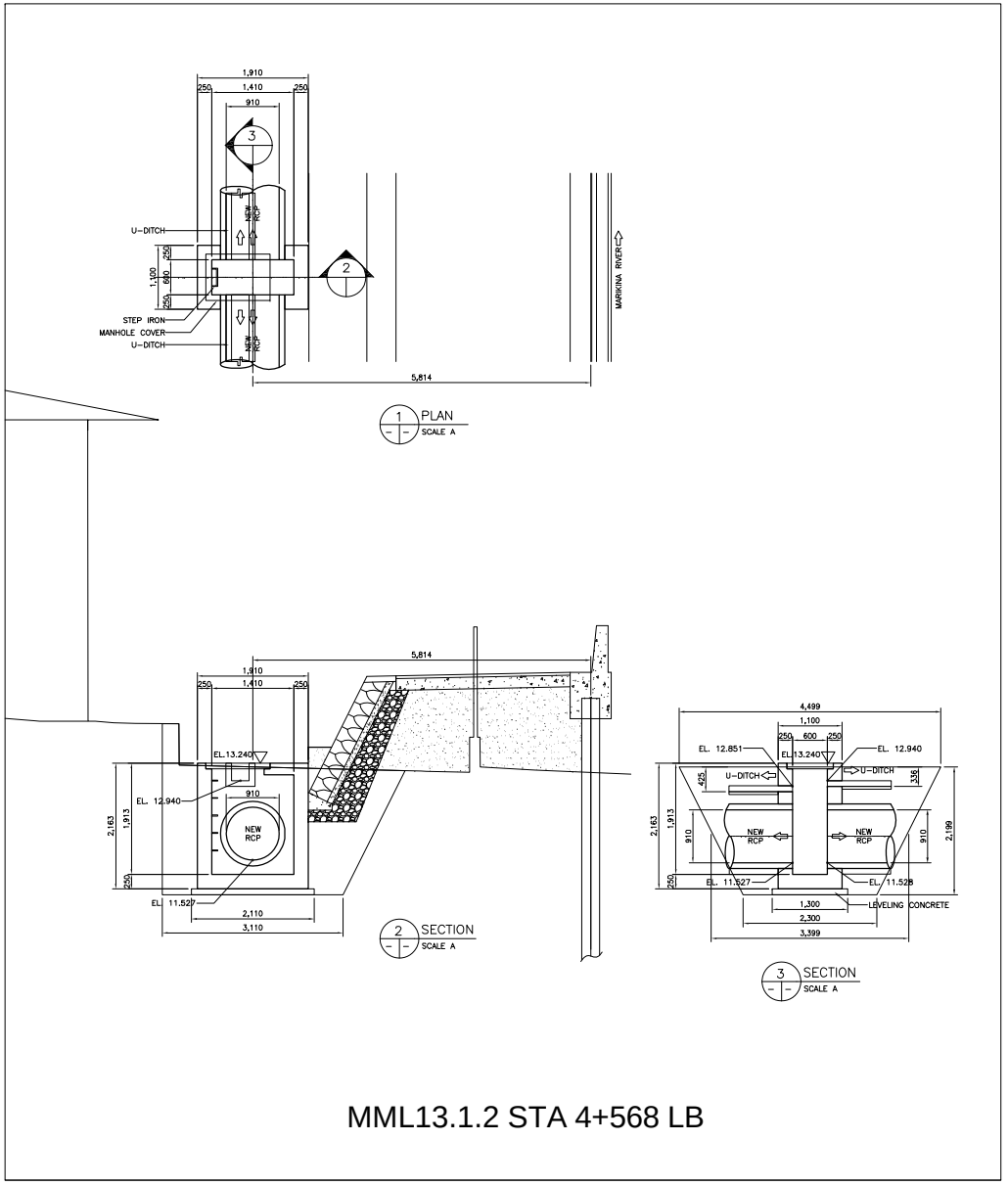
MML13.1.1 STA 4+537 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 13.1.2**

Location: **STA. 4+568**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.19	3.40	27.85	
				27.85	m^3
2. Lev. Concrete	W=2.11 L=1.30	2.74	0.1	**0.27**	m^3
3. Bottom Slab	W=1.91 L=1.10	2.10	0.25	**0.53**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.10 Win=1.41 Lout=.60	Aout=2.10 Ain=0.85 Anet=1.26	1.913	2.401	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.14	0.25	0.29	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.11	1.18	0.25	0.30	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.82**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.10	Aout=6.02	2.163	13.021	m^2
	Win=1.41 Lout=.60	Ain=4.02	1.913	7.690	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.14	×2	-2.28	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=1.11	1.18	×2	-2.36	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**16.07**	**m^2**
6. Conc. Cover	L=0.80 W=1.61	1.288	0.1	**0.13**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.35		**211.12**	kg
	Conc. Cover	V=0.13		**18.55**	kg
9. Scaffolding			outside	13.02	m^2
			Inside	7.69	m^2
Net Area.				**20.71**	**m^2**
10. Supporting				**0.00**	m^2

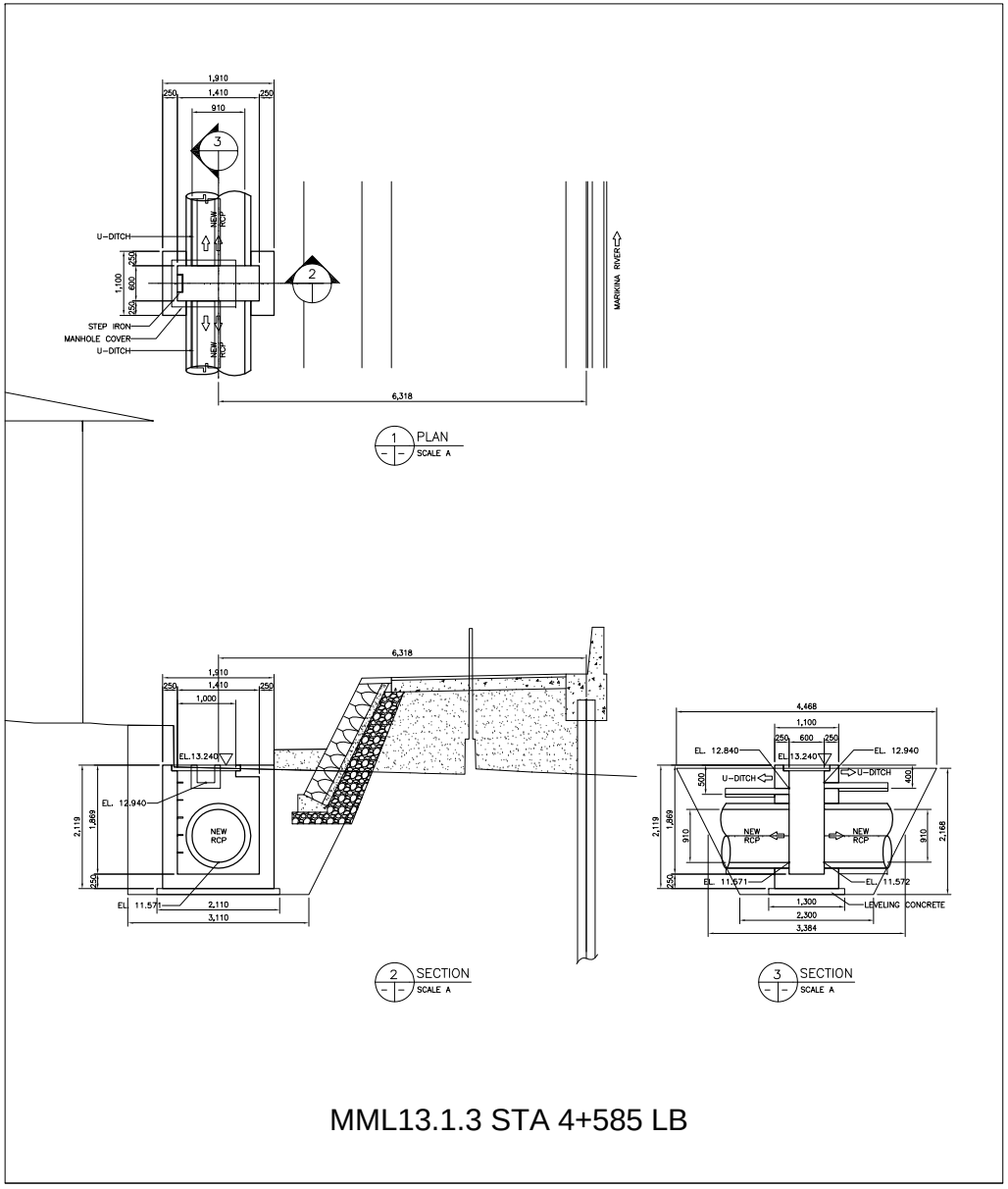


QUANTITIES OF MANHOLE

Manhole No.: **MML 13.1.3**

Location: **STA. 4+585**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.42	3.38	28.48	
				28.48	m^3
2. Lev. Concrete	W=2.11 L=1.30	2.74	0.1	**0.27**	m^3
3. Bottom Slab	W=1.91 L=1.10	2.10	0.25	**0.53**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=1.10 Win=1.41 Lout=.60	Aout=2.10 Ain=0.85 Anet=1.26	1.869	2.346	m^3
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	0.25	0.29	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.11	1.22	0.25	0.30	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.75**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=1.10	Aout=6.02	2.119	12.756	m^2
	Win=1.41 Lout=.60	Ain=4.02	1.869	7.513	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.17	×2	-2.35	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=1.11	1.22	×2	-2.44	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**15.49**	**m^2**
6. Conc. Cover	L=0.80 W=1.61	1.288	0.1	**0.13**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.27		**204.59**	kg
	Conc. Cover	V=0.13		**18.55**	kg
9. Scaffolding			outside	12.76	m^2
			Inside	7.51	m^2
Net Area.				**20.27**	**m^2**
10. Supporting				**0.00**	m^2



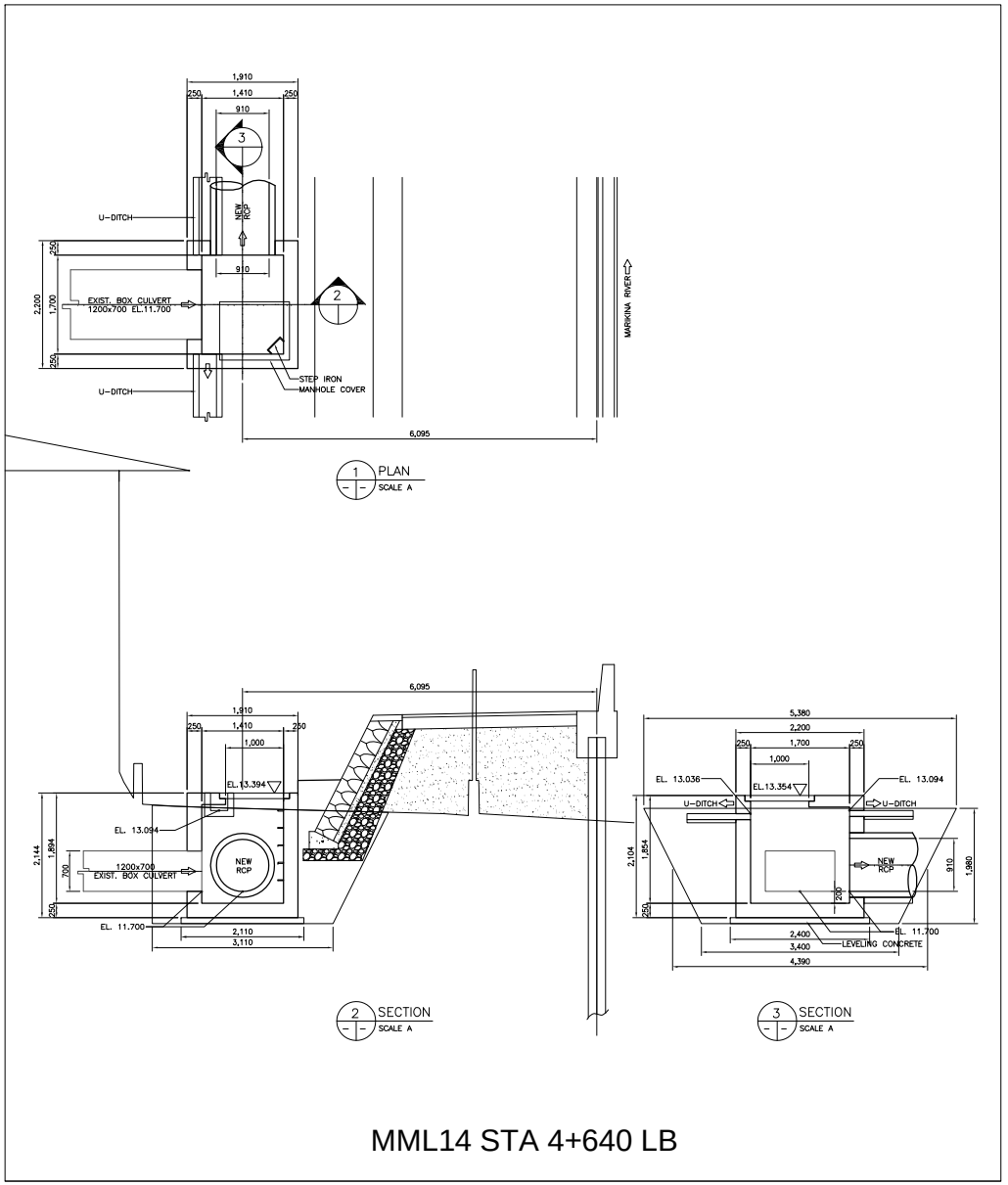
MML13.1.3 STA 4+585 LB

QUANTITIES OF MANHOLE

Manhole No.: **MML 14**

Location: **STA. 4+640**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=7.09	4.39	31.10	
				31.10	m^3
2. Lev. Concrete	W=2.11 L=2.40	5.06	0.1	**0.51**	m^3
3. Bottom Slab	W=1.91 L=2.20	4.99	0.25	**1.25**	m^3
4. Wall					
Entire Wall	Wout=1.91 Lout=2.20	Aout=4.20			
	Win=1.41 Lout=1.70	Ain=2.40	1.894	3.419	m^3
		Anet=1.81			
Minus					
Pipe hole on Wall A	DiaA=1.11	1.15	0.25	0.29	
Pipe hole on Wall B	DiaB=1.20	0.84	0.25	0.21	
Pipe hole on Wall C	DiaC=0.50	0.21	0.25	0.05	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.87**	m^3
5. Form Work					
Entire Wall	Wout=1.91 Lout=2.20	Aout=8.22	2.144	17.624	m^2
	Win=1.41 Lout=1.70	Ain=6.22	1.894	11.781	m^2
Minus					
Pipe hole on Wall A	DiaA=1.11	1.15	×2	-2.31	m^2
Pipe hole on Wall B	W=1.20	0.84	×2	-1.68	m^2
Pipe hole on Wall C	DiaC=0.50	0.21	×2	-0.42	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**25.00**	**m^2**
5. Conc. Cover	L=1.00 W=1.61	1.61	0.1	**0.16**	m^3
6. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=4.12		**370.45**	kg
	Conc. Cover	V=0.16		**23.18**	kg
9. Scaffolding			outside	17.62	m^2
			Inside	11.78	m^2
Net Area.				**29.41**	**m^2**
10. Supporting				**0.00**	m^2



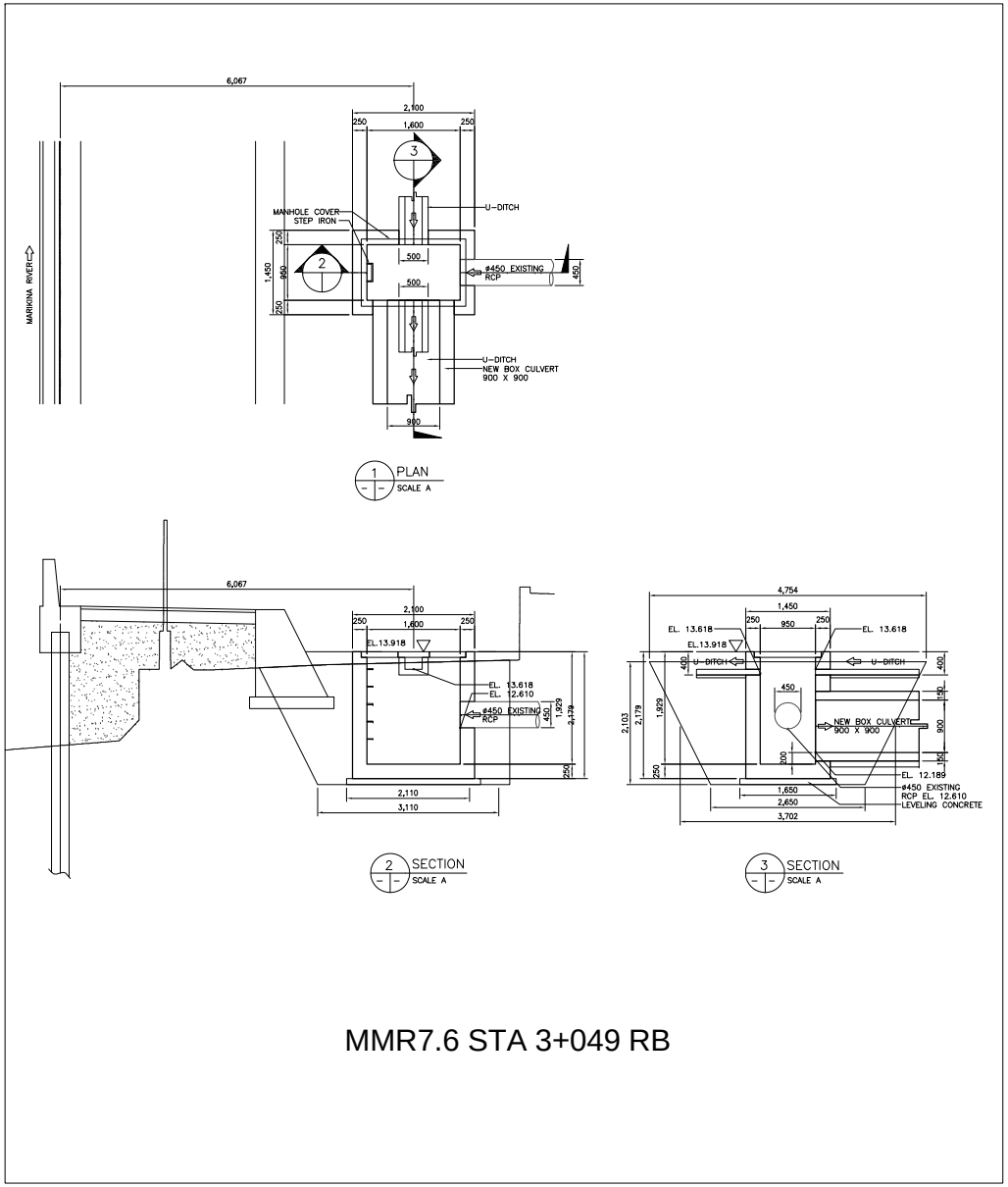
MML14 STA 4+640 LB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 7.6**

Location: **STA. 3+049**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=7.92	3.70	29.32	
				29.32	m^3
2. Lev. Concrete	W=2.30 L=1.65	3.80	0.1	**0.38**	m^3
3. Bottom Slab	W=2.10 L=1.45	3.05	0.25	**0.76**	m^3
4. Wall					
Entire Wall	Wout=2.10 Lout=1.45	Aout=3.05			
	Win=1.60 Lout=.95	Ain=1.52	1.929	2.942	m^3
		Anet=1.53			
Minus					
Pipe hole on Wall A	DiaA=0.40	0.20	0.25	0.05	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.30	1.89	0.25	0.47	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.35**	m^3
5. Form Work					
Entire Wall	Wout=2.10 Lout=1.45	Aout=7.10	2.179	15.471	m^2
	Win=1.60 Lout=.95	Ain=5.10	1.929	9.838	m^2
Minus					
Pipe hole on Wall A	DiaA=0.40	0.20	×2	-0.40	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**20.61**	**m^2**
6. Conc. Cover	L=1.80 W=1.61	2.898	0.1	**0.29**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=3.12		**280.38**	kg
	Conc. Cover	V=0.29		**41.73**	kg
9. Scaffolding			outside	15.47	m^2
			Inside	9.84	m^2
Net Area.				**25.31**	**m^2**
10. Supporting				**0.00**	m^2



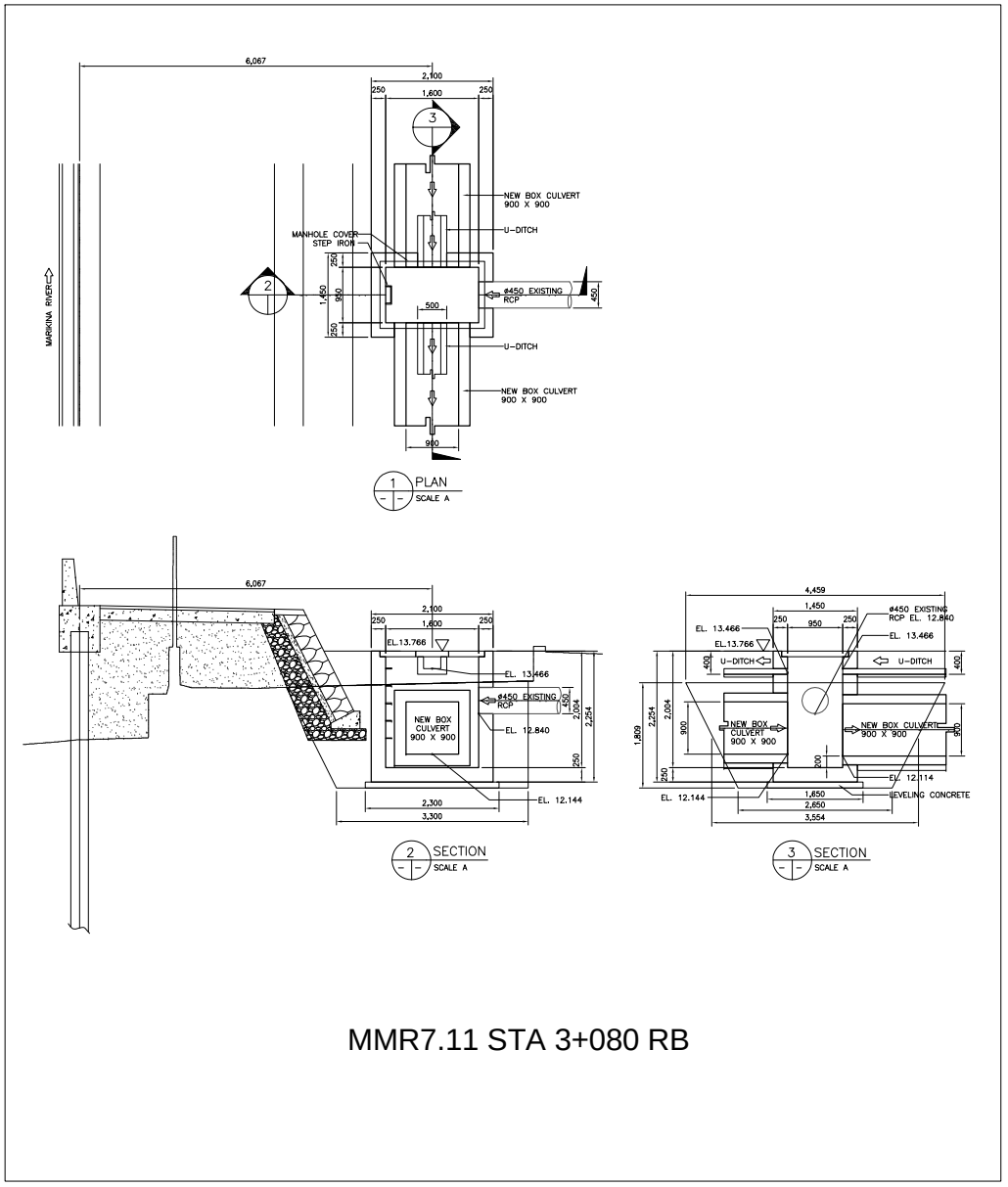
MMR7.6 STA 3+049 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 7.11**

Location: **STA. 3+080**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=6.68	3.55	23.74	
				23.74	m^3
2. Lev. Concrete	W=2.30 L=1.65	3.80	0.1	**0.38**	m^3
3. Bottom Slab	W=2.10 L=1.45	3.05	0.25	**0.76**	m^3
4. Wall					
Entire Wall	Wout=2.10 Lout=1.45 Win=1.60 Lout=.95	Aout=3.05 Ain=1.52 Anet=1.53	2.004	3.056	m^3
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	0.25	0.47	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.30	1.89	0.25	0.47	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**2.05**	m^3
5. Form Work					
Entire Wall	Wout=2.10 Lout=1.45	Aout=7.10	2.254	16.003	m^2
	Win=1.60 Lout=.95	Ain=5.10	2.004	10.220	m^2
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**18.14**	**m^2**
6. Conc. Cover	L=1.15 W=1.80	2.07	0.1	**0.21**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.81		**252.65**	kg
	Conc. Cover	V=0.21		**29.81**	kg
9. Scaffolding			outside	0.00	m^2
			Inside	0.00	m^2
Net Area.				**0.00**	**m^2**
10. Supporting				**0.00**	m^2



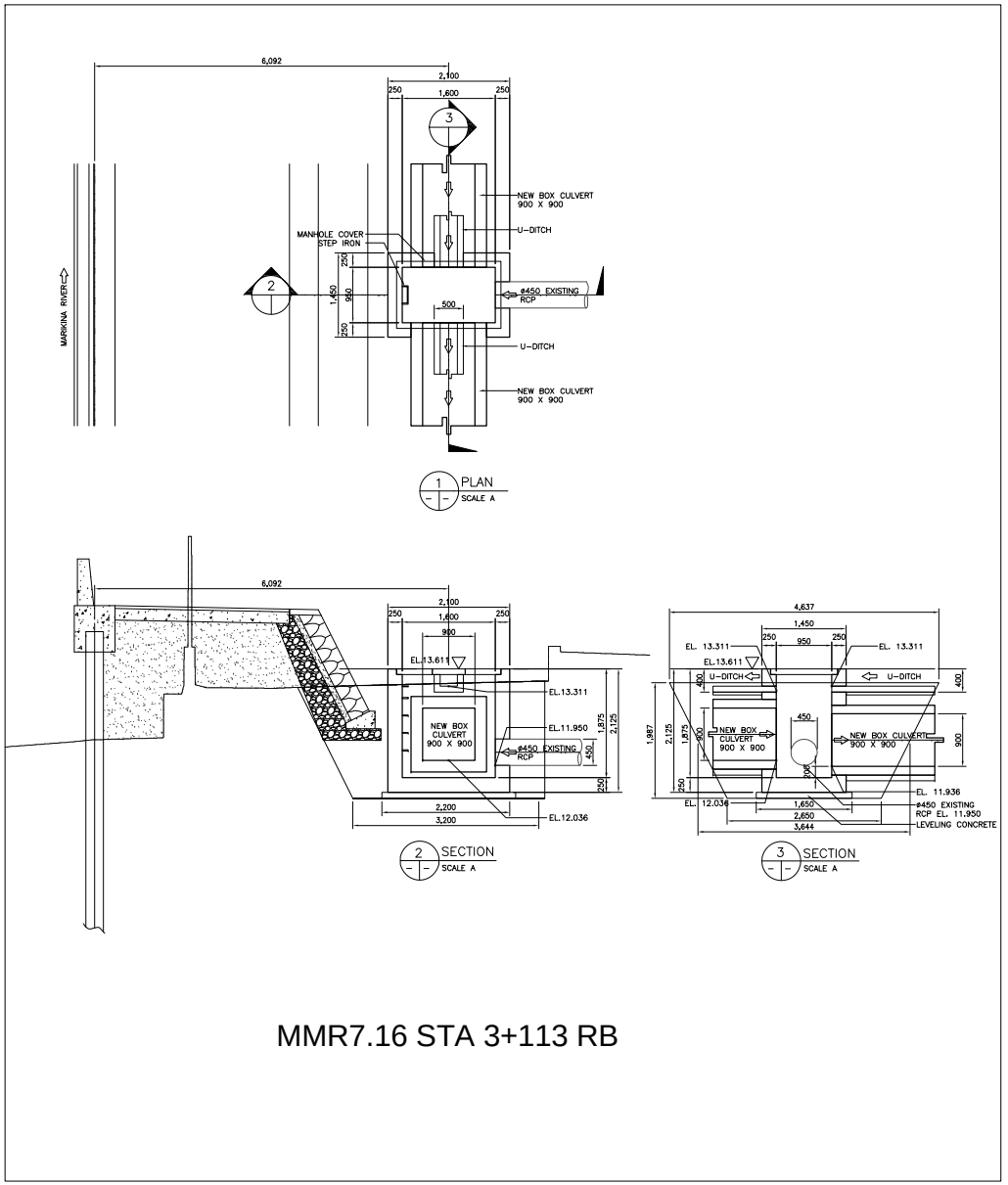
MMR7.11 STA 3+080 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 7.16**

Location: **STA. 3+113**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=7.44	3.64	27.11	
				27.11	m^3
2. Lev. Concrete	W=2.30 L=1.65	3.80	0.1	**0.38**	m^3
3. Bottom Slab	W=2.10 L=1.45	3.05	0.25	**0.76**	m^3
4. Wall					
Entire Wall	Wout=2.10 Lout=1.45	Aout=3.05			
	Win=1.60 Lout=.95	Ain=1.52	1.875	2.859	m^3
		Anet=1.53			
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	0.25	0.47	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.30	1.89	0.25	0.47	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.85**	m^3
5. Form Work					
Entire Wall	Wout=2.10 Lout=1.45	Aout=7.10	2.125	15.088	m^2
	Win=1.60 Lout=.95	Ain=5.10	1.875	9.563	m^2
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**16.57**	**m^2**
6. Conc. Cover	L=1.15 W=1.80	2.07	0.1	**0.21**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=6			**6.41**	kg
8. Reinforcement	Manhole	V=2.61		**234.94**	kg
	Conc. Cover	V=0.21		**29.81**	kg
9. Scaffolding			outside	15.09	m^2
			Inside	9.56	m^2
Net Area.				**24.65**	**m^2**
10. Supporting				**0.00**	m^2



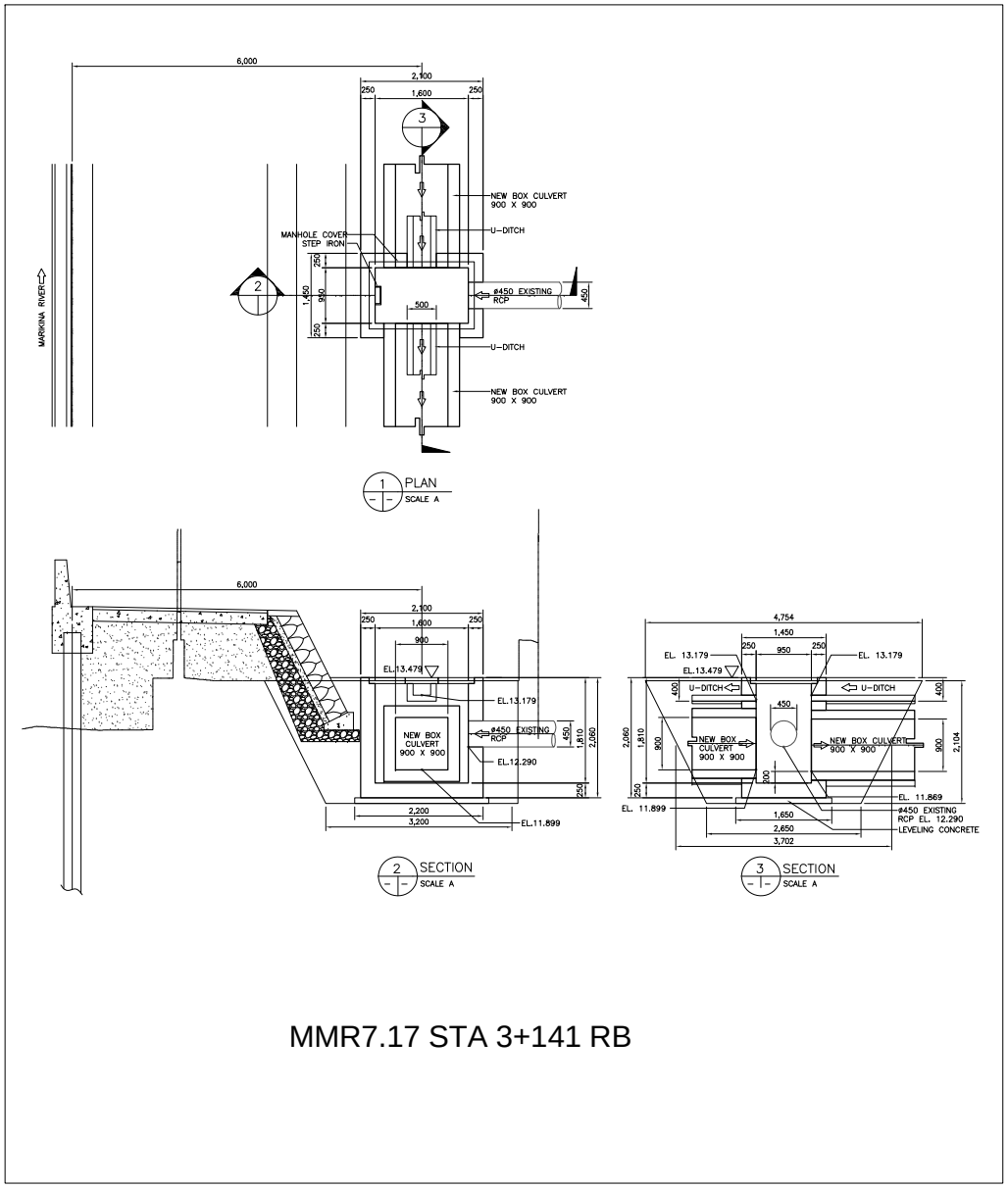
MMR7.16 STA 3+113 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 7.17**

Location: **STA. 3+141**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.05	3.70	29.80	
				29.80	m^3
2. Lev. Concrete	W=2.30 L=1.65	3.80	0.1	**0.38**	m^3
3. Bottom Slab	W=2.10 L=1.45	3.05	0.25	**0.76**	m^3
4. Wall					
Entire Wall	Wout=2.10 Lout=1.45 Win=1.60 Lout=.95	Aout=3.05 Ain=1.52	1.810	2.760	m^3
		Anet=1.53			
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	0.25	0.47	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.30	1.89	0.25	0.47	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.75**	m^3
5. Form Work					
Entire Wall	Wout=2.10 Lout=1.45	Aout=7.10	2.060	14.626	m^2
	Win=1.60 Lout=.95	Ain=5.10	1.810	9.231	m^2
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**15.78**	**m^2**
6. Conc. Cover	L=1.15 W=1.80	2.07	0.1	**0.21**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.51		**226.02**	kg
	Conc. Cover	V=0.21		**29.81**	kg
9. Scaffolding			outside	14.63	m^2
			Inside	9.23	m^2
Net Area.				**23.86**	**m^2**
10. Supporting				**0.00**	m^2



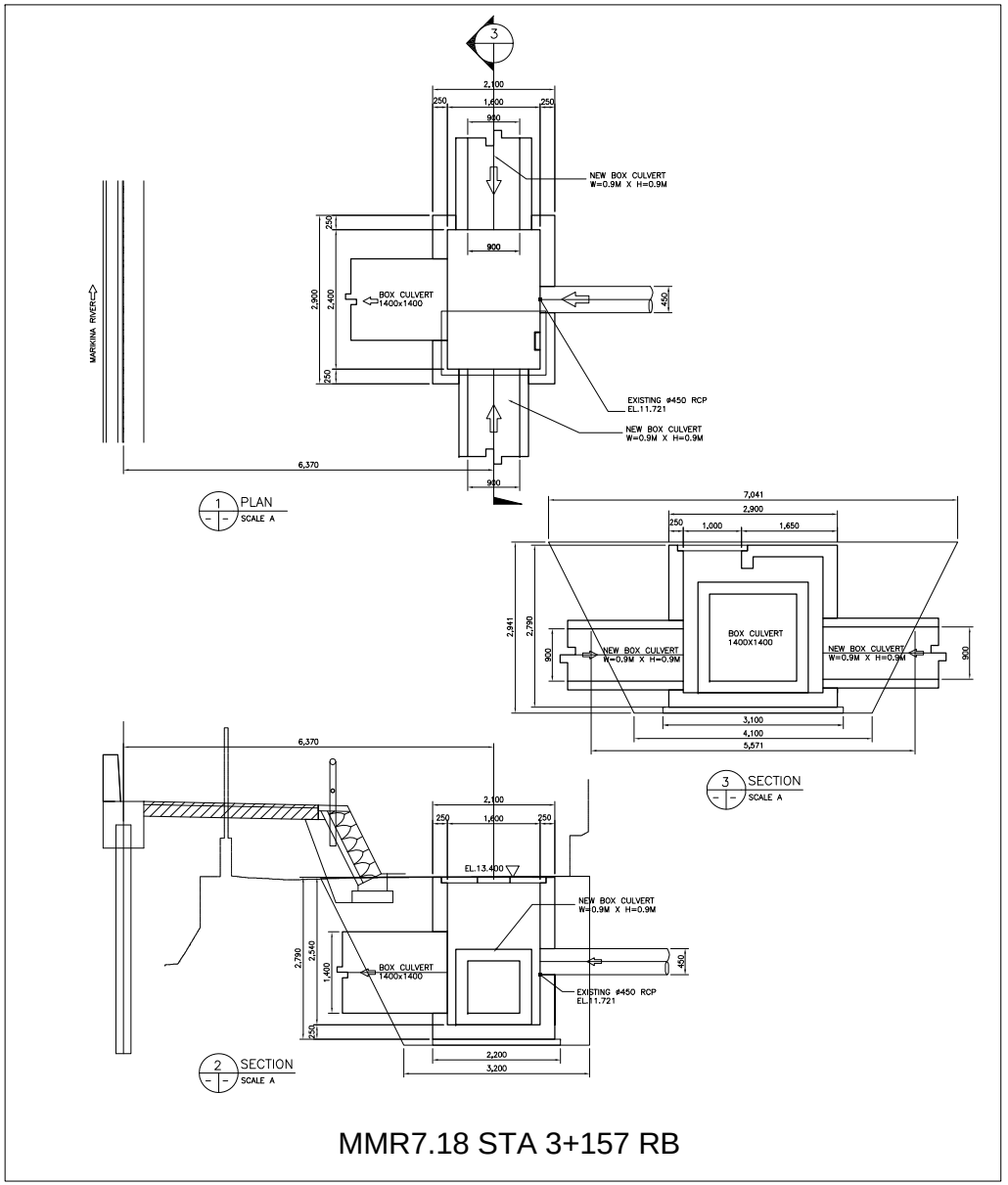
MMR7.17 STA 3+141 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 7.18**

Location: **STA. 3+157**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=11.00	5.57	61.28	
				61.28	m^3
2. Lev. Concrete	W=2.30 L=3.10	7.13	0.1	**0.71**	m^3
3. Bottom Slab	W=2.00	5.80	0.25	**2.02**	m^3
& Top Slab	L=2.90	3.82	0.15		
4. Wall					
Entire Wall	Wout=2.06 Lout=2.90	Aout=5.97			
	Win=1.60 Lout=2.40	Ain=3.84	2.540	5.420	m^3
		Anet=2.13			
Minus					
Pipe hole on Wall A	DiaA=1.30	1.69	0.25	0.42	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.30	1.69	0.25	0.42	
Pipe hole on Wall D	DiaD=1.40	3.92	0.25	0.98	
Net Wall Vol.				**3.53**	m^3
5. Form Work					
Entire Wall	Wout=2.06 Lout=2.90	Aout=9.92	2.790	27.677	m^2
	Win=1.60 Lout=2.40	Ain=8.00	2.540	20.320	m^2
Minus					
Pipe hole on Wall A	DiaA=1.30	1.69	×2	-3.38	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.30	1.69	×2	-3.38	m^2
Pipe hole on Wall D	DiaD=1.40	3.92	×2	-7.84	m^2
Net Area.				**32.88**	**m^2**
6. Conc. Cover	L=1.20 W=1.80	2.16	0.1	**0.22**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=8			**8.54**	kg
8. Reinforcement	Manhole	V=5.55		**499.79**	kg
	Conc. Cover	V=0.22		**31.10**	kg
9. Scaffolding			outside	27.68	m^2
			Inside	20.32	m^2
Net Area.				**48.00**	**m^2**
10. Supporting		V=3.84	2.540	**9.75**	m^3



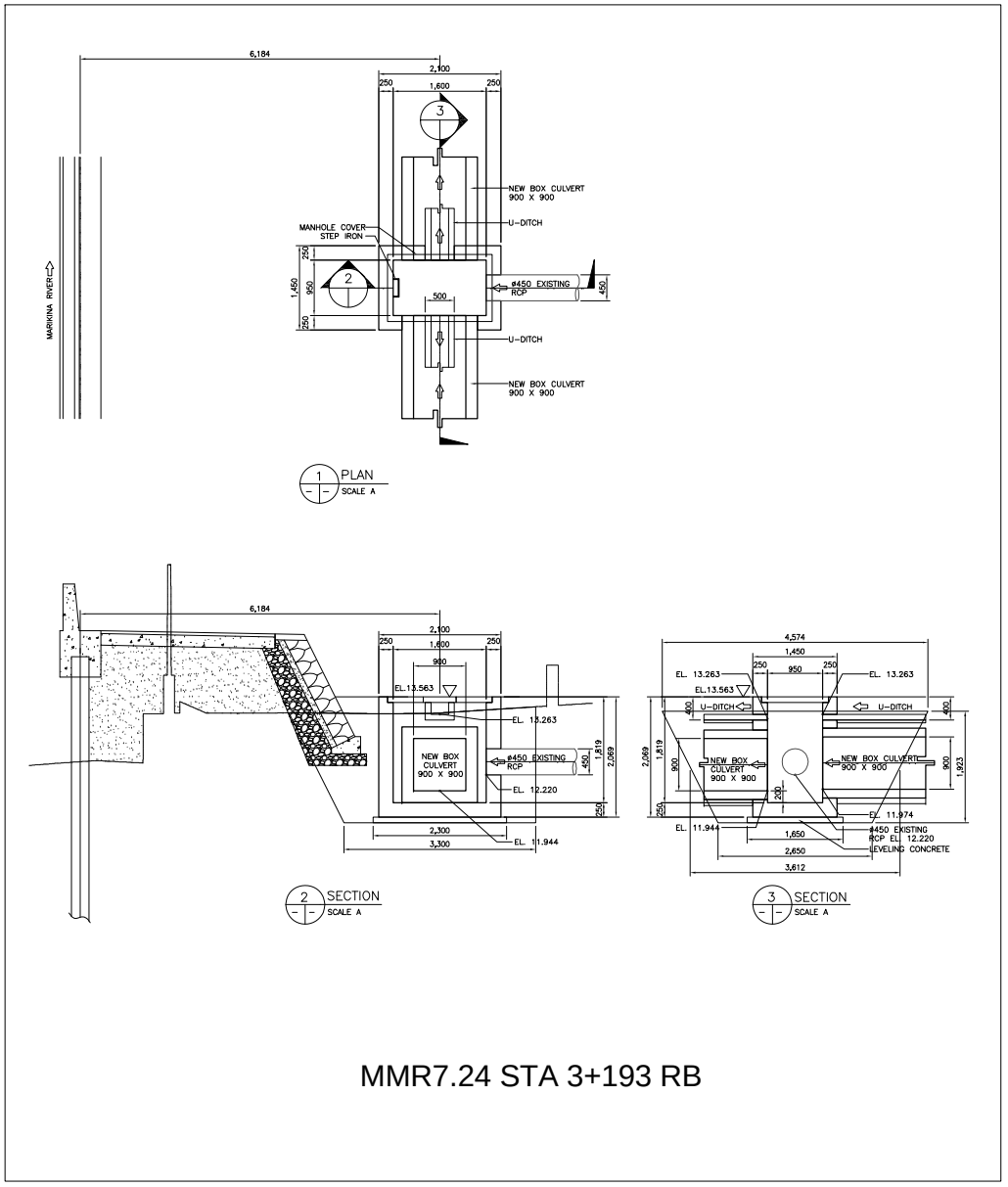
MMR7.18 STA 3+157 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 7.24**

Location: **STA. 3+193**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=7.21	3.61	26.04	
				26.04	m^3
2. Lev. Concrete	W=2.30 L=1.65	3.80	0.1	**0.38**	m^3
3. Bottom Slab	W=2.10 L=1.45	3.05	0.25	**0.76**	m^3
4. Wall					
Entire Wall	Wout=2.10 Lout=1.45 Win=1.60 Lout=.95	Aout=3.05 Ain=1.52	1.819	2.774	m^3
		Anet=1.53			
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	0.25	0.47	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.30	1.89	0.25	0.47	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.76**	m^3
5. Form Work					
Entire Wall	Wout=2.10 Lout=1.45	Aout=7.10	2.069	14.690	m^2
	Win=1.60 Lout=.95	Ain=5.10	1.819	9.277	m^2
Minus					
Pipe hole on Wall A	DiaA=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.30	1.89	×2	-3.78	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**15.89**	**m^2**
6. Conc. Cover	L=1.15 W=1.80	2.07	0.1	**0.21**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=6	1.78kg/m		1.07 **6.41**	kg/pc kg
8. Reinforcement	Manhole	V=2.53		**227.26**	kg
	Conc. Cover	V=0.21		**29.81**	kg
9. Scaffolding			outside	14.69	m^2
			Inside	9.28	m^2
Net Area.				**23.97**	**m^2**
10. Supporting				**0.00**	m^2



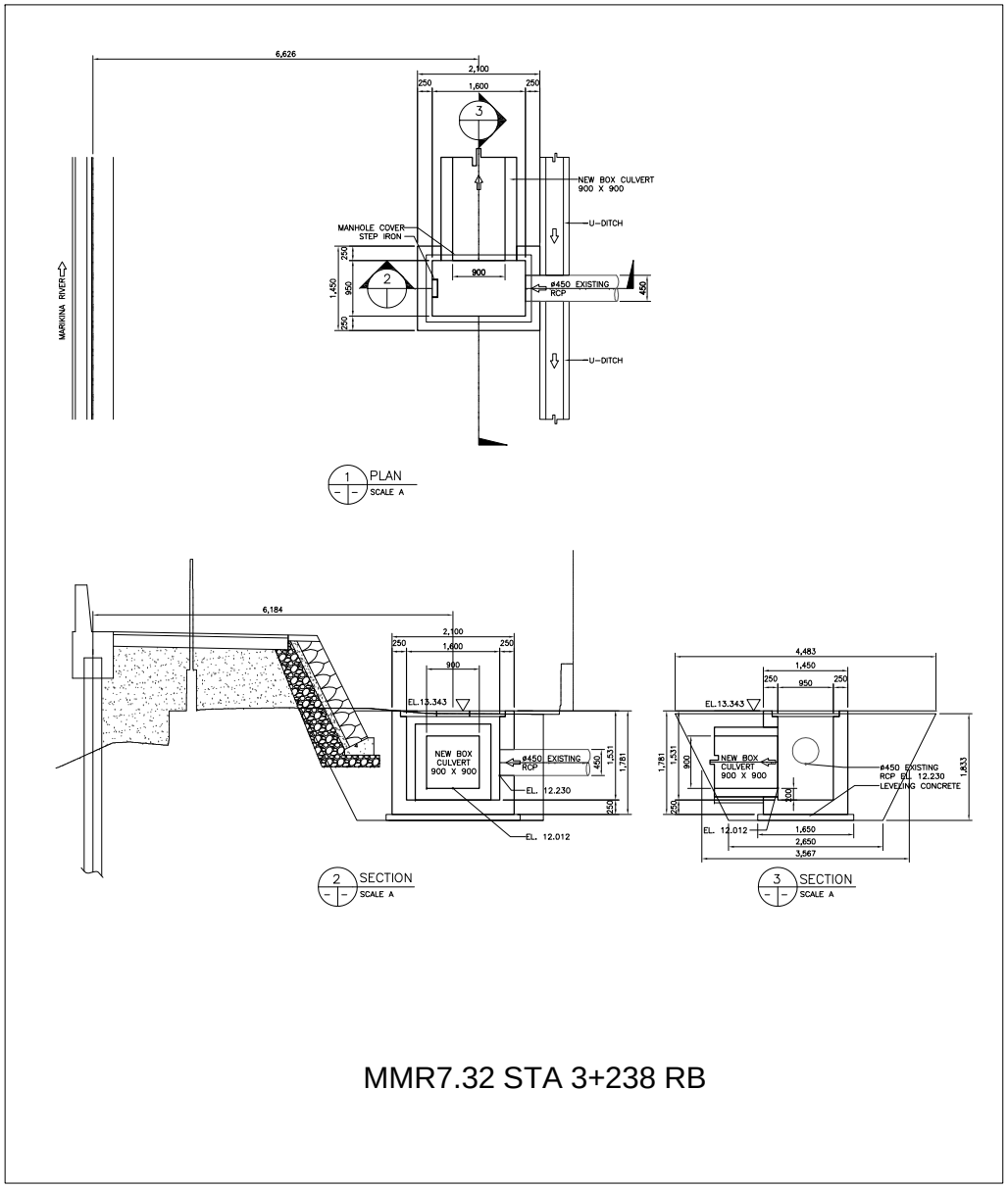
MMR7.24 STA 3+193 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 7.32**

Location: **STA. 3+238**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=6.85	3.57	24.43	
				24.43	m^3
2. Lev. Concrete	W=2.30 L=1.65	3.80	0.1	**0.38**	m^3
3. Bottom Slab	W=2.10 L=1.45	3.05	0.25	**0.76**	m^3
4. Wall					
Entire Wall	Wout=2.10 Lout=1.45	Aout=3.05			
	Win=1.60 Lout=.95	Ain=1.52	1.531	2.335	m^3
		Anet=1.53			
Minus					
Pipe hole on Wall A	DiaA=0.00	0.00	0.25	0.00	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.30	1.69	0.25	0.42	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.85**	m^3
5. Form Work					
Entire Wall	Wout=2.10 Lout=1.45	Aout=7.10	1.781	12.645	m^2
	Win=1.60 Lout=.95	Ain=5.10	1.531	7.808	m^2
Minus					
Pipe hole on Wall A	DiaA=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.30	1.69	×2	-3.38	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**16.55**	**m^2**
6. Conc. Cover	L=1.15 W=1.80	2.07	0.1	**0.21**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=5			**5.34**	kg
8. Reinforcement	Manhole	V=2.61		**234.75**	kg
	Conc. Cover	V=0.21		**29.81**	kg
9. Scaffolding			outside	0.00	m^2
			Inside	0.00	m^2
Net Area.				**0.00**	**m^2**
10. Supporting				**0.00**	m^2



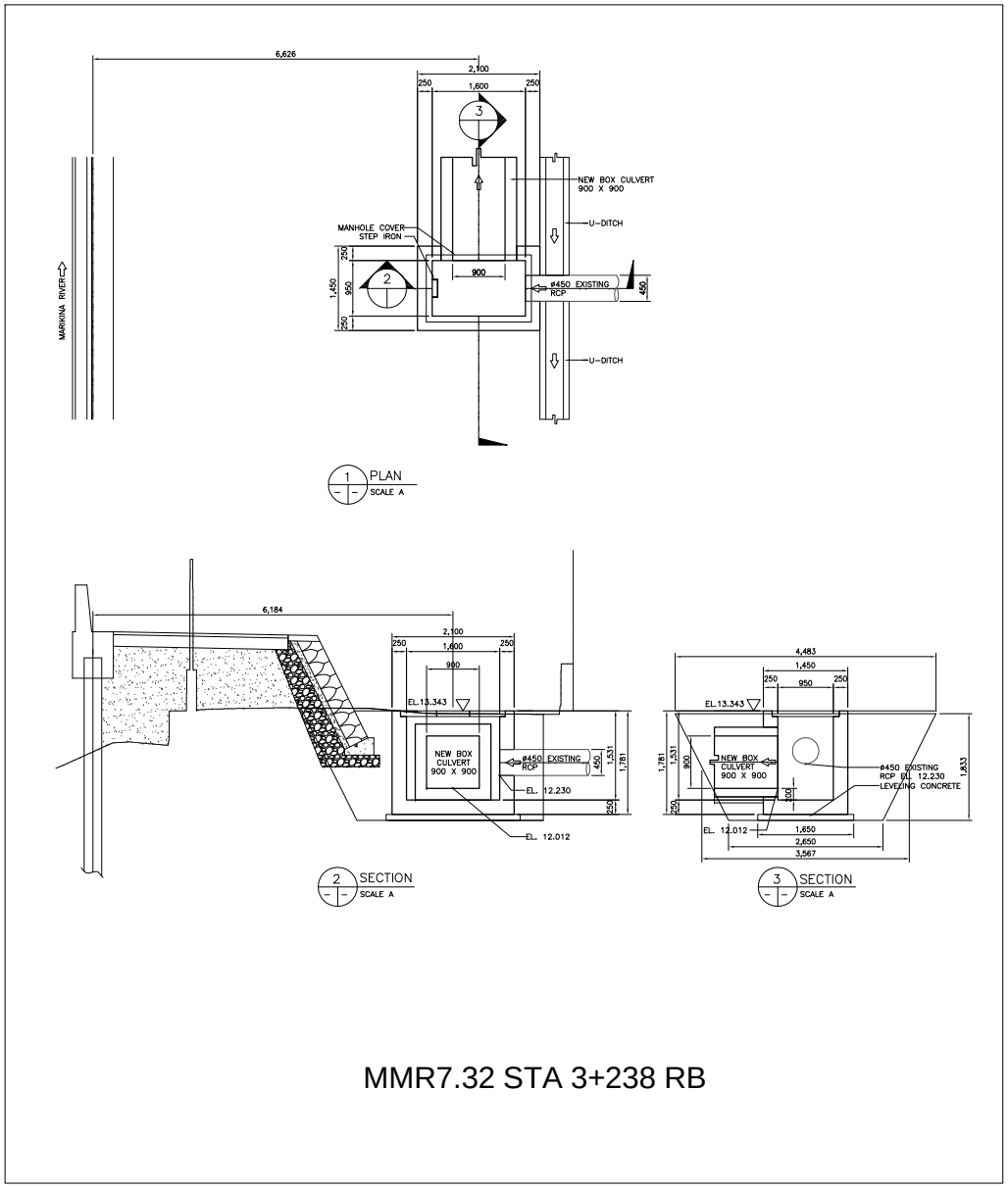
MMR7.32 STA 3+238 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 7.32**

Location: **STA. 3+238**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=6.68	3.57	23.82	
				23.82	m^3
2. Lev. Concrete	W=2.20 L=1.65	3.63	0.1	**0.36**	m^3
3. Bottom Slab	W=2.00 L=1.45	2.90	0.25	**0.73**	m^3
4. Wall					
Entire Wall	Wout=2.00 Lout=1.45 Win=1.50 Lout=.95	Aout=2.90 Ain=1.43 Anet=1.48	1.531	2.258	m^3
Minus					
Pipe hole on Wall A	DiaA=0.00	0.00	0.25	0.00	
Pipe hole on Wall B	DiaB=0.58	0.26	0.25	0.07	
Pipe hole on Wall C	DiaC=1.20	1.44	0.25	0.36	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.83**	m^3
5. Form Work					
Entire Wall	Wout=2.00 Lout=1.45	Aout=6.90	1.781	12.289	m^2
	Win=1.50 Lout=.95	Ain=4.90	1.531	7.502	m^2
Minus					
Pipe hole on Wall A	DiaA=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall B	W=0.58	0.26	×2	-0.52	m^2
Pipe hole on Wall C	DiaC=1.20	1.44	×2	-2.88	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**16.39**	**m^2**
6. Conc. Cover	L=1.15 W=1.61	1.8515	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=5	1.78kg/m		1.07 **5.34**	kg/pc kg
8. Reinforcement	Manhole	V=2.56		**230.23**	kg
	Conc. Cover	V=0.19		**26.66**	kg
9. Scaffolding			outside	12.29	m^2
			Inside	7.50	m^2
Net Area.				**19.79**	**m^2**
10. Supporting				**0.00**	m^2



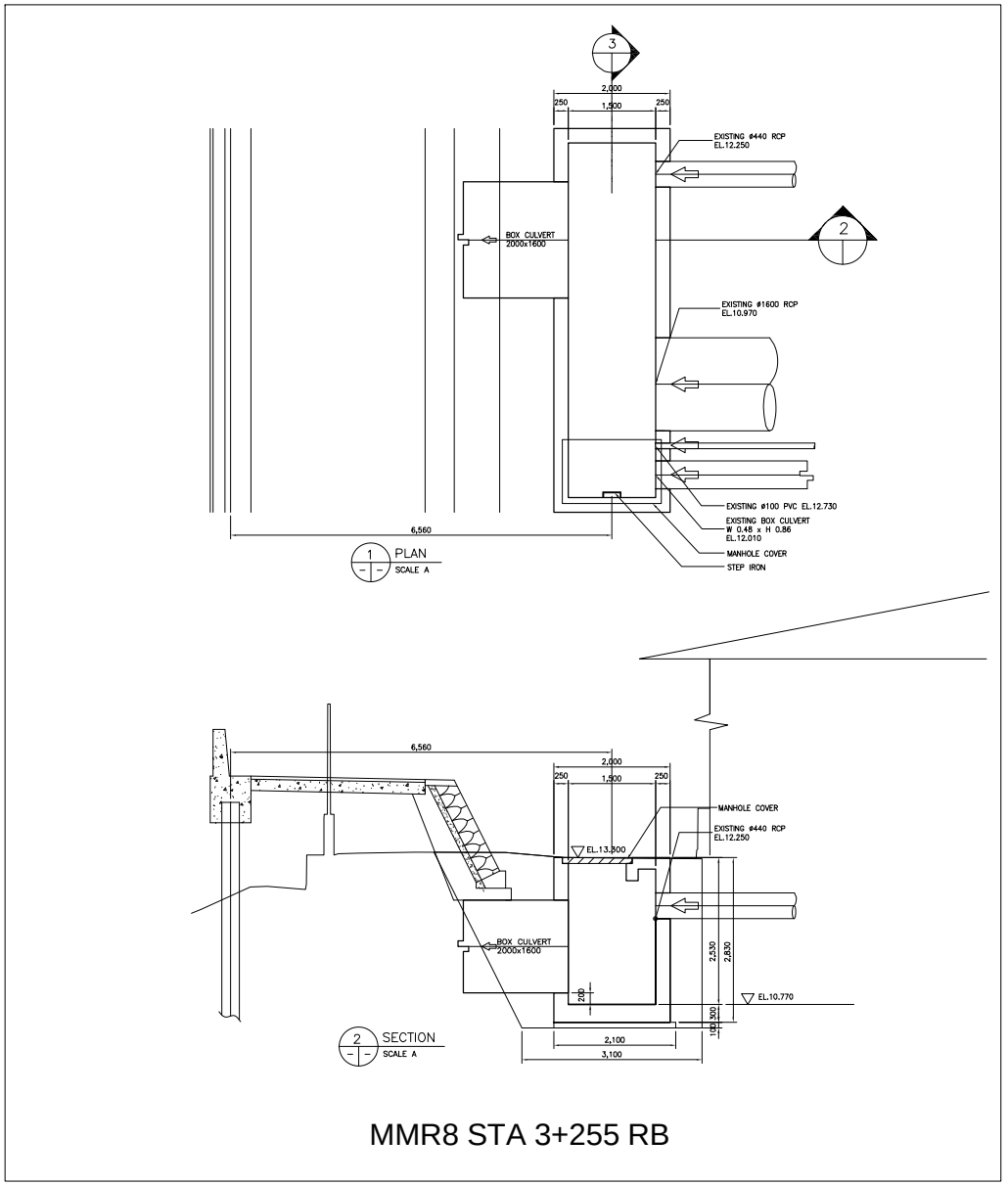
MMR7.32 STA 3+238 RB

QUANTITIES OF MANHOLE

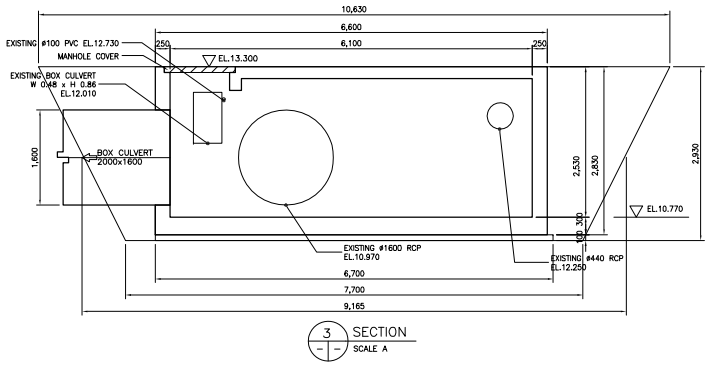
Manhole No.: **MMR 8**

Location: **STA. 3+255**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=11.40	9.17	104.48	
				104.48	m^3
2. Lev. Concrete	W=2.20 L=6.80	14.96	0.1	**1.50**	m^3
3. Bottom Slab	W=2.00	13.20	0.25	**5.00**	m^3
& Top Slab	L=6.60	11.33	0.15		
4. Wall					
Entire Wall	Wout=2.00 Lout=6.60	Aout=13.20			
	Win=1.50 Lout=6.10	Ain=9.15	2.530	10.247	m^3
		Anet=4.05			
Minus					
Pipe hole on Wall A-1	DiaA=0.48	0.72	0.25	0.18	
Pipe hole on Wall A-2	DiaB=1.90	2.84	0.25	0.71	
Pipe hole on Wall A-3	DiaB=0.57	0.32	0.25	0.08	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**9.28**	m^3
5. Form Work					
Entire Wall	Wout=2.00 Lout=6.60	Aout=17.20	2.780	47.816	m^2
	Win=1.50 Lout=6.10	Ain=15.20	2.530	38.456	m^2
Minus					
Pipe hole on Wall A-1	DiaA=0.48	0.72	×2	-1.44	m^2
Pipe hole on Wall A-2	W=1.90	2.84	×2	-5.67	m^2
Pipe hole on Wall A-3	DiaC=0.57	0.32	×2	-0.64	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**78.52**	**m^2**
6. Conc. Cover	L=1.10 W=1.70	1.87	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=8			**8.54**	kg
8. Reinforcement	Manhole	V=14.28		**1284.92**	kg
	Conc. Cover	V=0.19		**26.93**	kg
9. Scaffolding			outside	47.82	m^2
			Inside	38.46	m^2
Net Area.				**86.27**	**m^2**
10. Supporting		Ain=9.15	2.530	**23.15**	m^2



MMR8 STA 3+255 RB



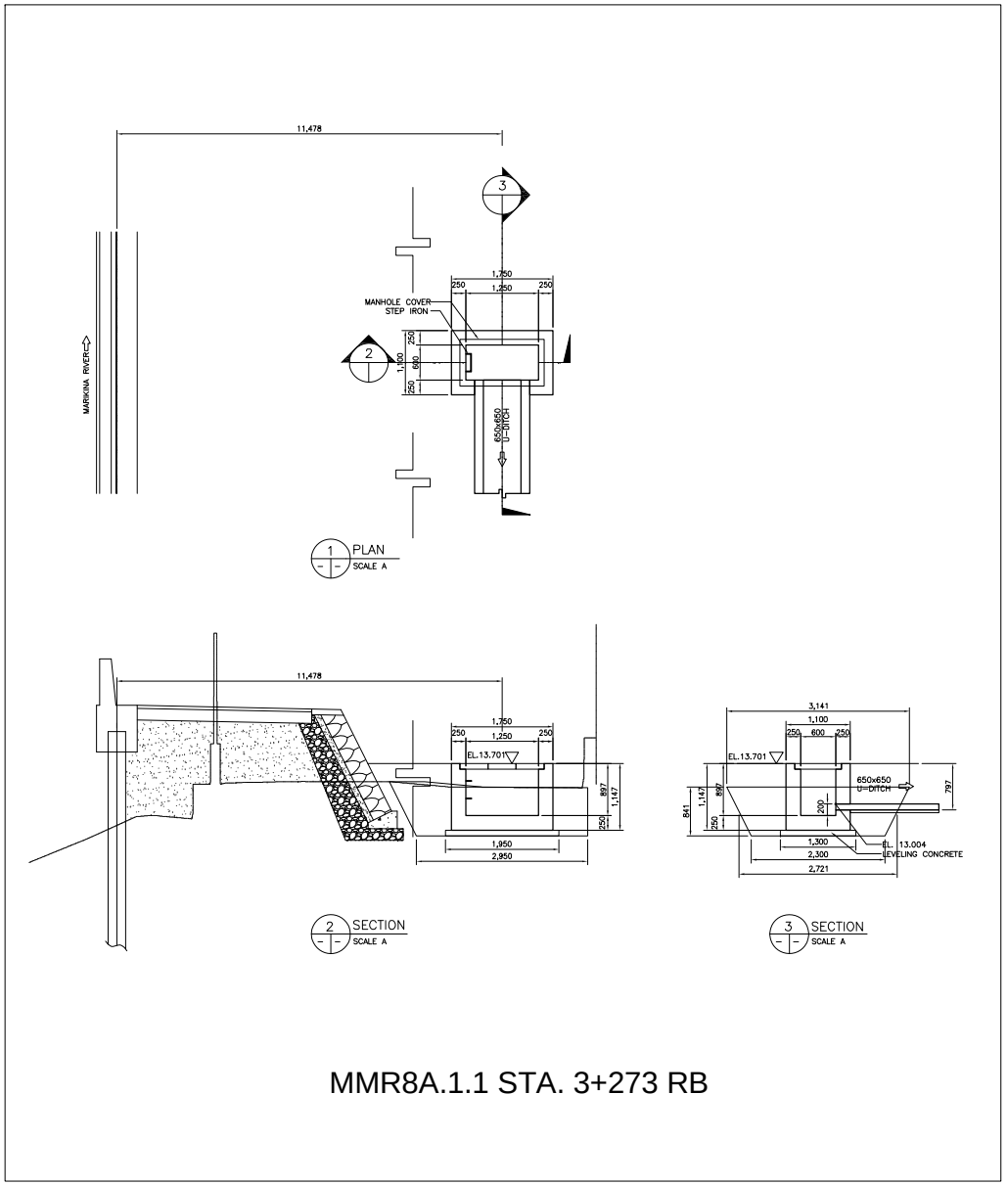
MMR8 STA 3+255 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 8A.1.1**

Location: **STA. 3+273**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=2.75	2.72	7.49	
				7.49	m^3
2. Lev. Concrete	W=1.95 L=1.30	2.54	0.1	**0.25**	m^3
3. Bottom Slab	W=1.75 L=1.10	1.93	0.25	**0.48**	m^3
4. Wall					
Entire Wall	Wout=1.75 Lout=1.10	Aout=1.93			
	Win=1.25 Lout=.60	Ain=0.75	0.897	1.054	m^3
		Anet=1.18			
Minus					
Pipe hole on Wall A	DiaA=0.95	0.76	0.25	0.19	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=0.00	0.00	0.25	0.00	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**0.86**	m^3
5. Form Work					
Entire Wall	Wout=1.75 Lout=1.10	Aout=5.70	1.147	6.538	m^2
	Win=1.25 Lout=.60	Ain=3.70	0.897	3.319	m^2
Minus					
Pipe hole on Wall A	DiaA=0.95	0.76	×2	-1.51	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**8.34**	**m^2**
6. Conc. Cover	L=0.80 W=1.45	1.16	0.1	**0.12**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=2			**2.14**	kg
8. Reinforcement	Manhole	V=1.35		**121.13**	kg
	Conc. Cover	V=0.12		**16.70**	kg
9. Scaffolding			outside	0.00	m^2
			Inside	0.00	m^2
Net Area.				**0.00**	**m^2**
10. Supporting				**0.00**	m^2



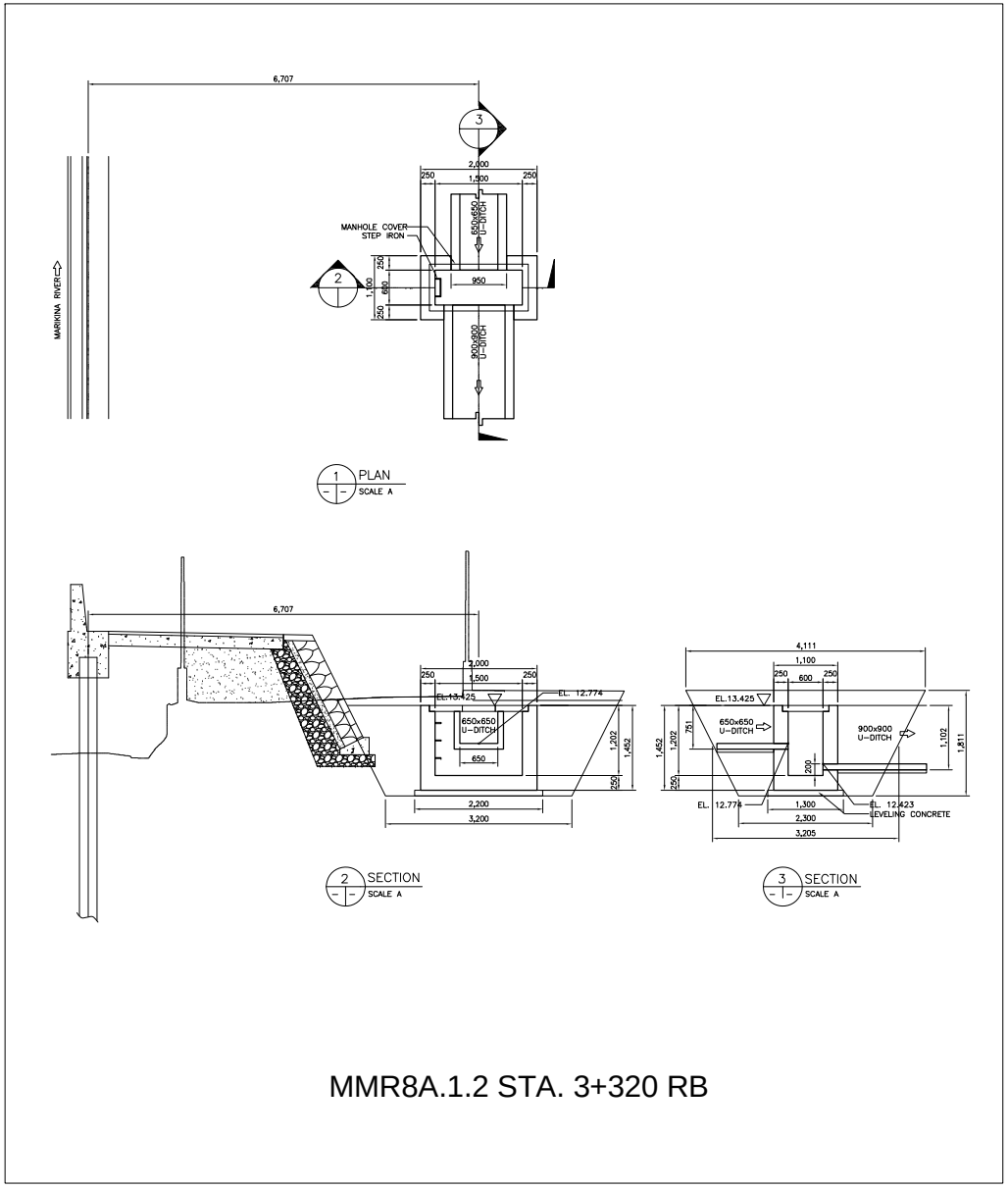
MMR8A.1.1 STA. 3+273 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 8A.1.2**

Location: **STA. 3+320**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=7.16	3.21	22.96	
				22.96	m^3
2. Lev. Concrete	W=2.20 L=1.30	2.86	0.1	**0.29**	m^3
3. Bottom Slab	W=2.00 L=1.10	2.20	0.25	**0.55**	m^3
4. Wall					
Entire Wall	Wout=2.00 Lout=1.10	Aout=2.20			
	Win=1.50 Lout=.60	Ain=0.90	1.202	1.563	m^3
		Anet=1.30			
Minus					
Pipe hole on Wall A	DiaA=0.95	0.71	0.25	0.18	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.20	1.32	0.25	0.33	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.05**	m^3
5. Form Work					
Entire Wall	Wout=2.00 Lout=1.10	Aout=6.20	1.452	9.002	m^2
	Win=1.50 Lout=.60	Ain=4.20	1.202	5.048	m^2
Minus					
Pipe hole on Wall A	DiaA=0.95	0.71	×2	-1.43	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=1.20	1.32	×2	-2.65	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**9.98**	**m^2**
6. Conc. Cover	L=0.80 W=1.70	1.36	0.1	**0.14**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=4			**4.27**	kg
8. Reinforcement	Manhole	V=1.60		**144.33**	kg
	Conc. Cover	V=0.14		**19.58**	kg
9. Scaffolding			outside	9.00	m^2
			Inside	5.05	m^2
Net Area.				**14.05**	**m^2**
10. Supporting				**0.00**	m^2



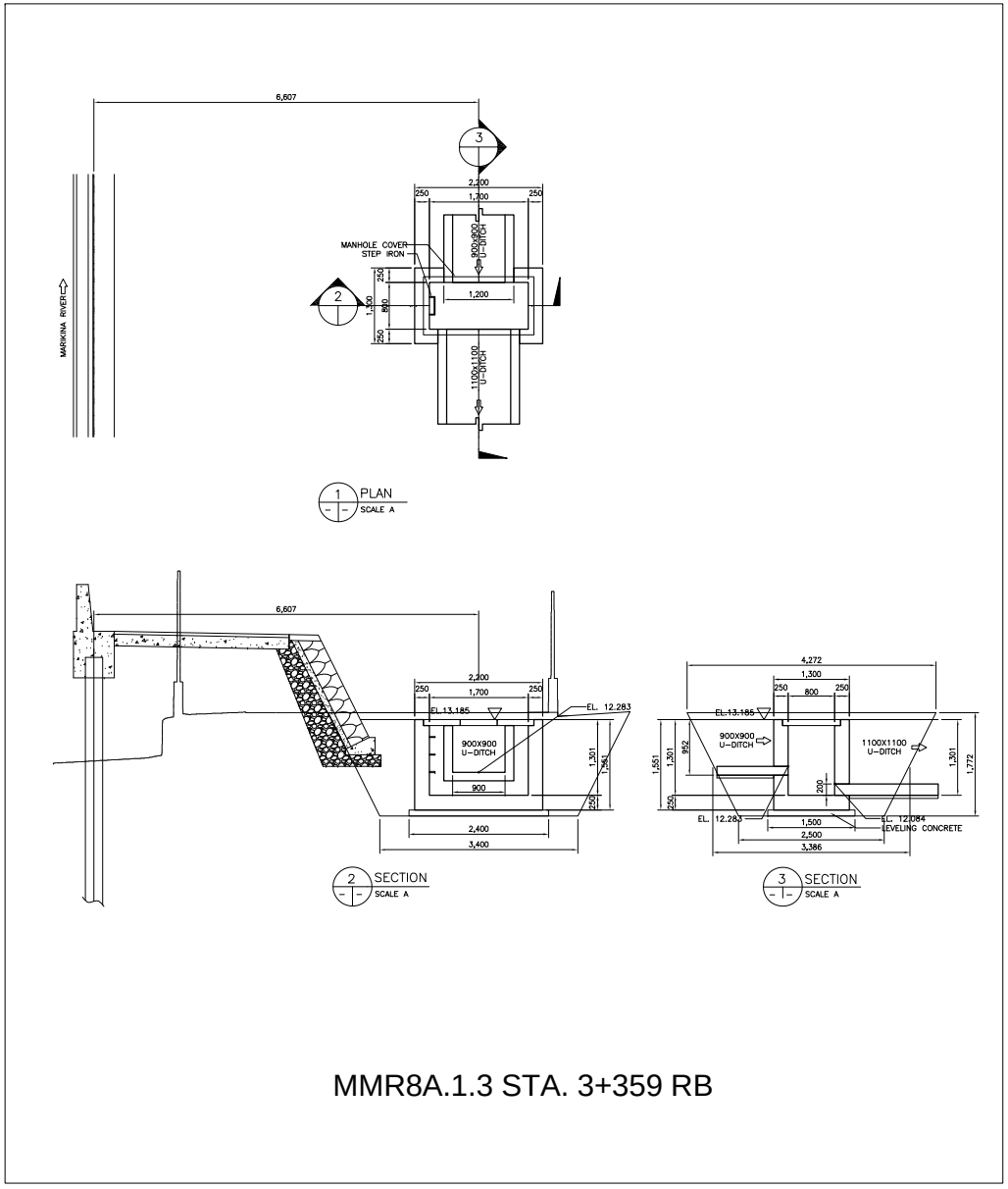
MMR8A.1.2 STA. 3+320 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 8A.1.3**

Location: **STA. 3+359**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=7.56	3.39	25.61	
				25.61	m^3
2. Lev. Concrete	W=2.40 L=1.50	3.60	0.1	**0.36**	m^3
3. Bottom Slab	W=2.20 L=1.30	2.86	0.25	**0.72**	m^3
4. Wall					
Entire Wall	Wout=2.20 Lout=1.30	Aout=2.86			
	Win=1.70 Lout=.80	Ain=1.36	1.301	1.952	m^3
		Anet=1.50			
Minus					
Pipe hole on Wall A	DiaA=1.20	1.14	0.25	0.29	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.40	1.82	0.25	0.46	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.21**	m^3
5. Form Work					
Entire Wall	Wout=2.20 Lout=1.30	Aout=7.00	1.551	10.857	m^2
	Win=1.70 Lout=.80	Ain=5.00	1.301	6.505	m^2
Minus					
Pipe hole on Wall A	DiaA=1.20	1.14	×2	-2.29	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=1.40	1.82	×2	-3.64	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**11.43**	**m^2**
6. Conc. Cover	L=1.00 W=1.90	1.9	0.1	**0.19**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=4	1.78kg/m		1.07 **4.27**	kg/pc kg
8. Reinforcement	Manhole	V=1.93		**173.30**	kg
	Conc. Cover	V=0.19		**27.36**	kg
9. Scaffolding			outside	0.00	m^2
			Inside	0.00	m^2
Net Area.				**0.00**	**m^2**
10. Supporting				**0.00**	m^2



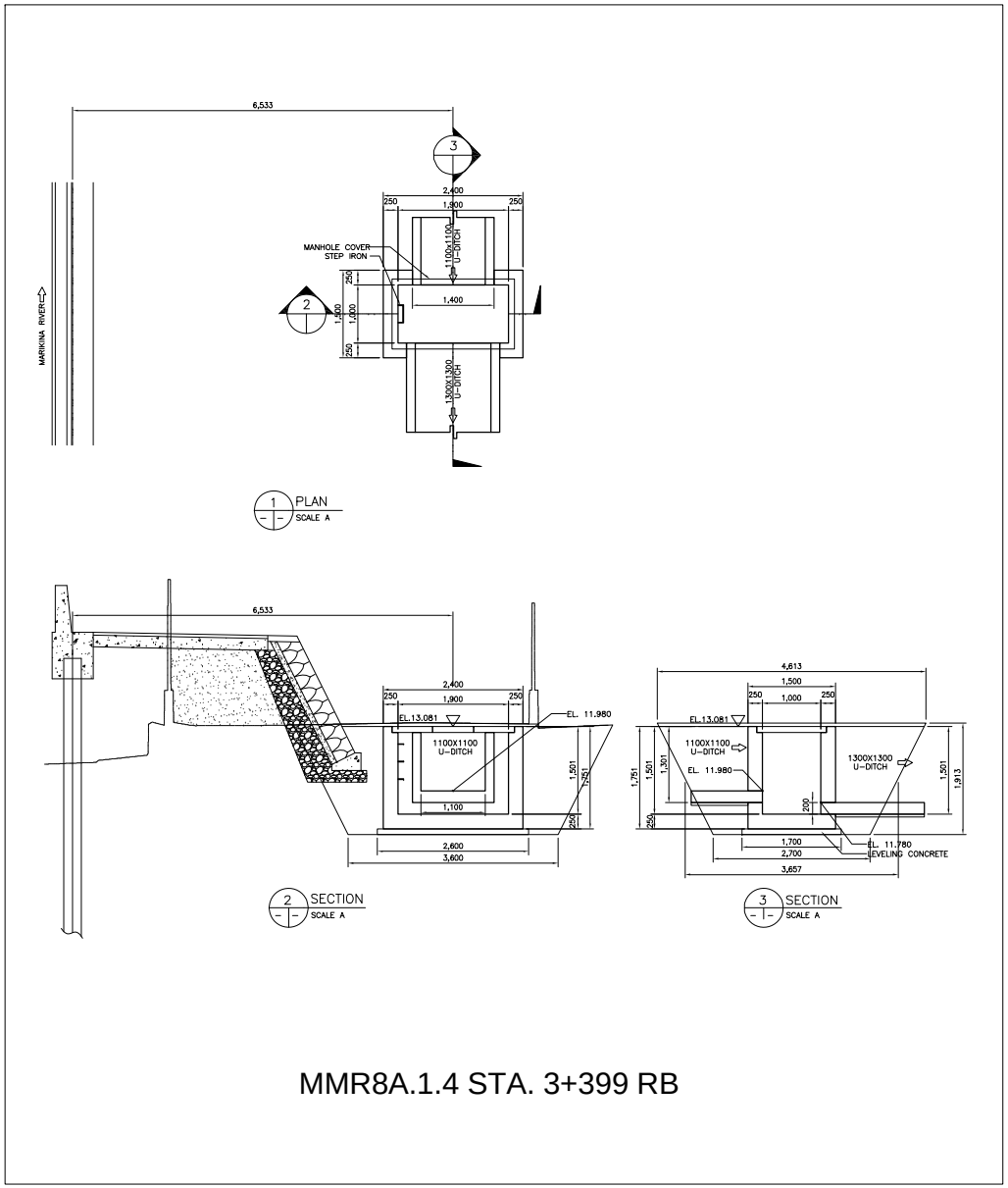
MMR8A.1.3 STA. 3+359 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 8A.1.4**

Location: **STA. 3+399**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=8.60	3.66	31.45	
				31.45	m^3
2. Lev. Concrete	W=2.60 L=1.70	4.42	0.1	**0.44**	m^3
3. Bottom Slab	W=2.40 L=1.50	3.60	0.25	**0.90**	m^3
4. Wall					
Entire Wall	Wout=2.40 Lout=1.50	Aout=3.60			
	Win=1.90 Lout=1.00	Ain=1.90	1.501	2.552	m^3
		Anet=1.70			
Minus					
Pipe hole on Wall A	DiaA=1.40	1.82	0.25	0.46	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.60	2.40	0.25	0.60	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.50**	m^3
5. Form Work					
Entire Wall	Wout=2.40 Lout=1.50	Aout=7.80	1.751	13.658	m^2
	Win=1.90 Lout=1.00	Ain=5.80	1.501	8.706	m^2
Minus					
Pipe hole on Wall A	DiaA=1.40	1.82	×2	-3.64	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=1.60	2.40	×2	-4.80	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**13.92**	**m^2**
6. Conc. Cover	L=1.20 W=2.10	2.52	0.1	**0.25**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=5	1.78kg/m		1.07 **5.34**	kg/pc kg
8. Reinforcement	Manhole	V=2.40		**215.64**	kg
	Conc. Cover	V=0.25		**36.29**	kg
9. Scaffolding			outside	13.66	m^2
			Inside	8.71	m^2
Net Area.				**22.36**	**m^2**
10. Supporting				**0.00**	m^2



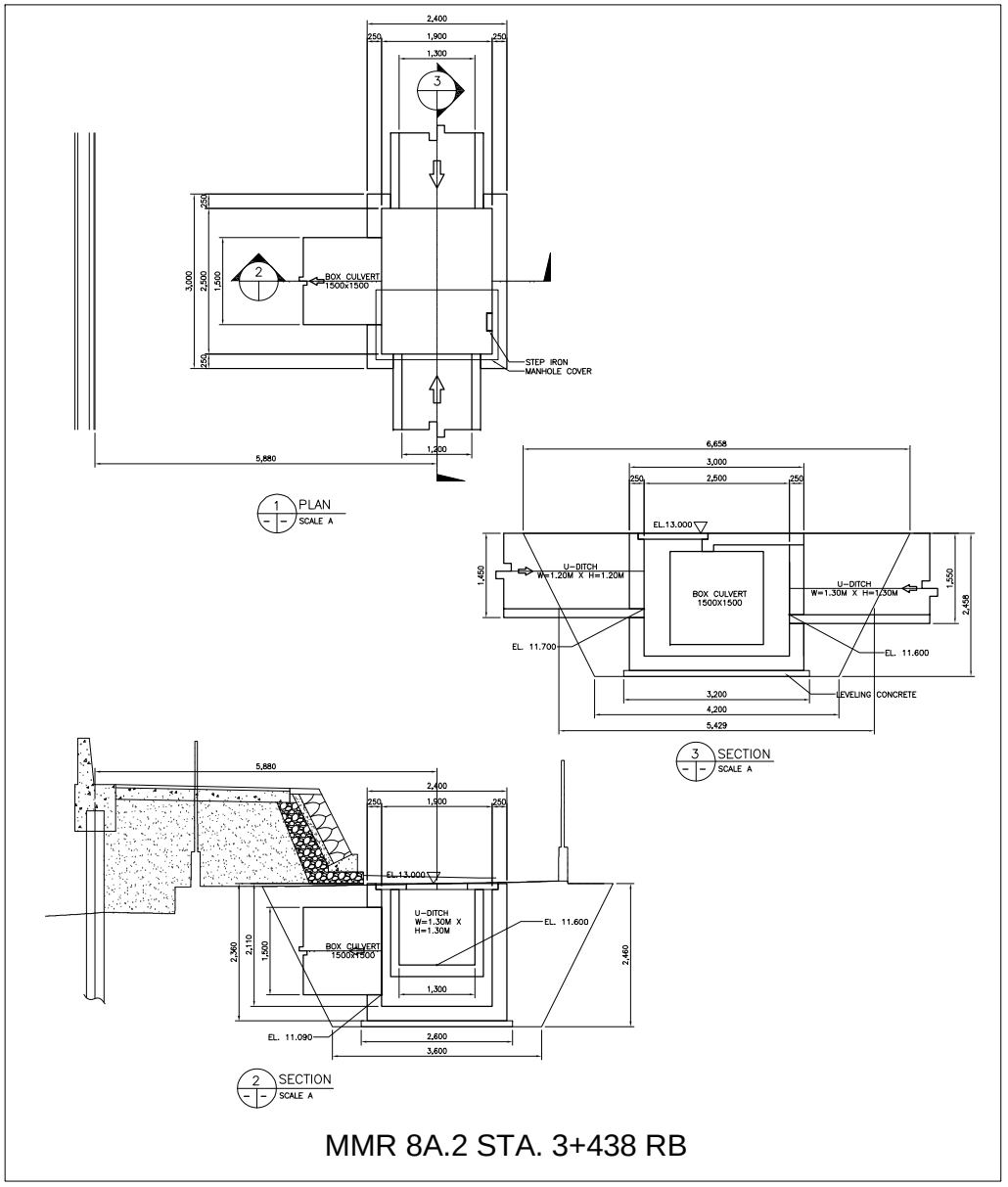
MMR8A.1.4 STA. 3+399 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 8A.2**

Location: **STA. 3+438**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=11.84	5.43	64.28	
				64.28	m^3
2. Lev. Concrete	W=2.60 L=3.20	8.32	0.1	**0.83**	m^3
3. Bottom Slab	W=2.40	7.20	0.25	**2.12**	m^3
& Top Slab	L=3.00	2.14	0.15		
4. Wall					
Entire Wall	Wout=2.40 Lout=3.00	Aout=7.20			
	Win=1.41 Lout=3.00	Ain=4.23	2.110	6.267	m^3
		Anet=2.97			
Minus					
Pipe hole on Wall A	DiaA=1.60	2.48	0.25	0.62	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.20	1.74	0.25	0.44	
Pipe hole on Wall D	DiaD=1.50	4.50	0.25	1.13	
Net Wall Vol.				**4.09**	m^3
5. Form Work					
Entire Wall	Wout=2.40 Lout=3.00	Aout=10.80	2.360	25.488	m^2
	Win=1.41 Lout=3.00	Ain=8.82	2.110	18.610	m^2
Minus					
Pipe hole on Wall A	DiaA=1.60	2.48	×2	-4.96	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=1.20	1.74	×2	-3.48	m^2
Pipe hole on Wall D	DiaD=1.50	4.50	×2	-9.00	m^2
Net Area.				**26.66**	**m^2**
6. Conc. Cover	L=1.20 W=2.10	2.52	0.1	**0.25**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=7			**7.48**	kg
8. Reinforcement	Manhole	V=6.21		**558.69**	kg
	Conc. Cover	V=0.25		**36.29**	kg
9. Scaffolding			outside	25.49	m^2
			Inside	18.61	m^2
Net Area.				**44.10**	**m^2**
10. Supporting		Ain=4.23	2.110	**8.93**	m^2



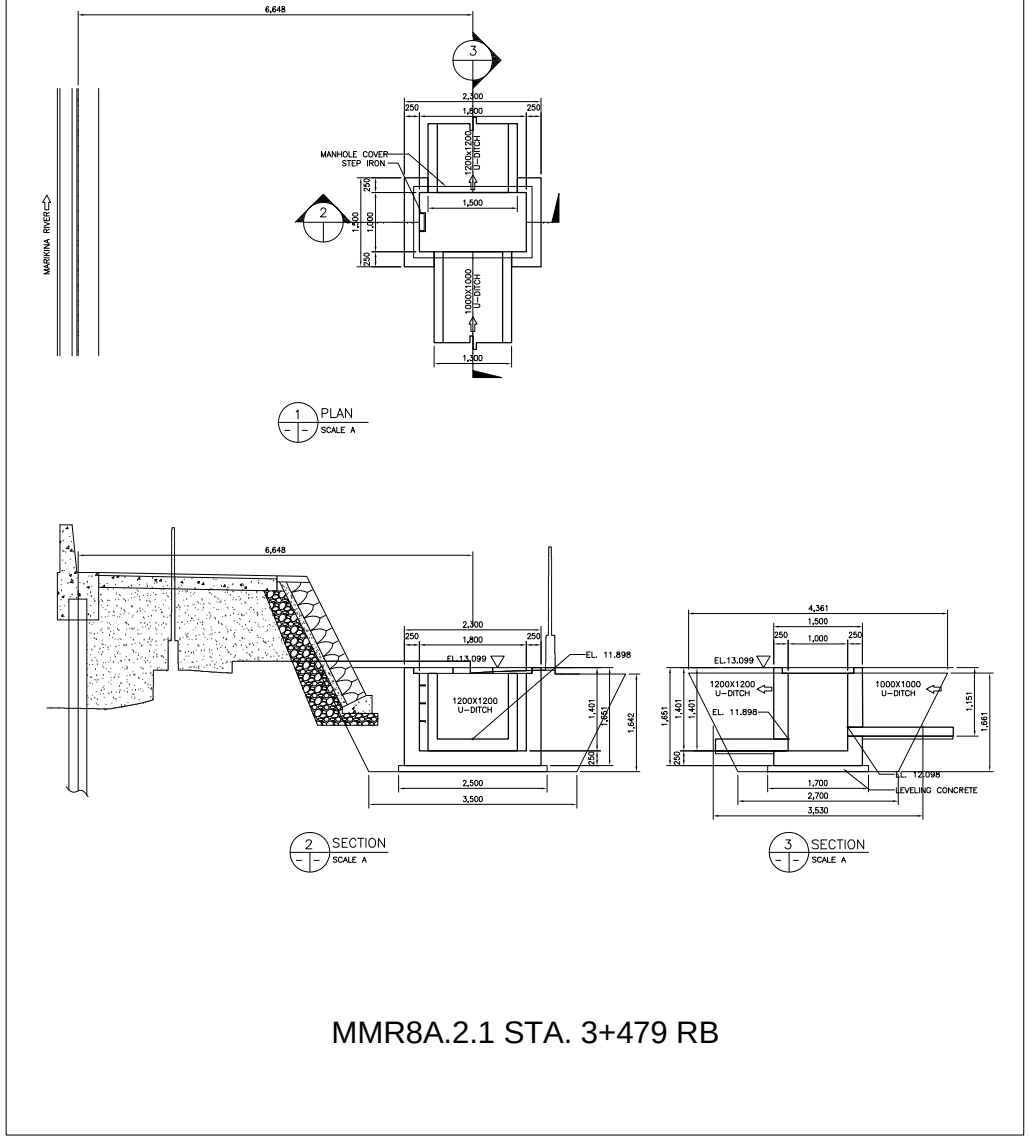
MMR 8A.2 STA. 3+438 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 8A.2.1**

Location: **STA. 3+479**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=7.72	3.53	27.27	
				27.27	m^3
2. Lev. Concrete	W=2.50 L=1.70	4.25	0.1	**0.43**	m^3
3. Bottom Slab	W=2.30 L=1.50	3.45	0.25	**0.86**	m^3
4. Wall					
Entire Wall	Wout=2.30 Lout=1.50	Aout=3.45			
	Win=1.80 Lout=1.00	Ain=1.80	1.401	2.312	m^3
		Anet=1.65			
Minus					
Pipe hole on Wall A	DiaA=1.50	2.10	0.25	0.53	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.30	1.50	0.25	0.37	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.41**	m^3
5. Form Work					
Entire Wall	Wout=2.30 Lout=1.50	Aout=7.60	1.651	12.548	m^2
	Win=1.80 Lout=1.00	Ain=5.60	1.401	7.846	m^2
Minus					
Pipe hole on Wall A	DiaA=1.50	2.10	×2	-4.20	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=1.30	1.50	×2	-2.99	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**13.20**	**m^2**
6. Conc. Cover	L=1.20 W=2.00	2.4	0.1	**0.24**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=4	1.78kg/m		1.07 **4.27**	kg/pc kg
8. Reinforcement	Manhole	V=2.27		**204.72**	kg
	Conc. Cover	V=0.24		**34.56**	kg
9. Scaffolding			outside	12.55	m^2
			Inside	7.85	m^2
Net Area.				**20.39**	**m^2**
10. Supporting				**0.00**	m^2



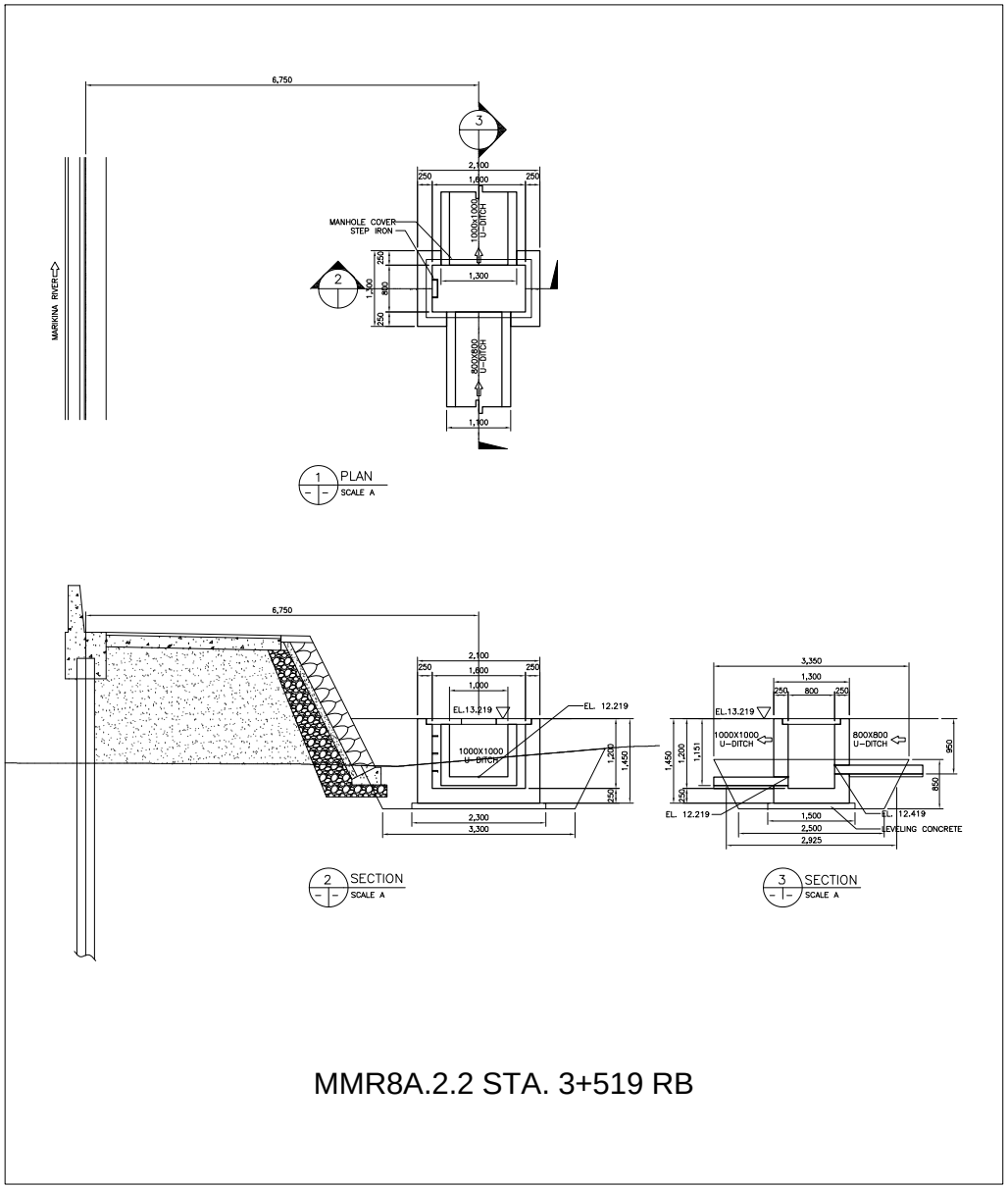
MMR8A.2.1 STA. 3+479 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 8A2.2**

Location: **STA. 3+519**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=3.20	2.93	9.36	
				9.36	m^3
2. Lev. Concrete	W=2.30 L=1.50	3.45	0.1	**0.35**	m^3
3. Bottom Slab	W=2.10 L=1.30	2.73	0.25	**0.68**	m^3
4. Wall					
Entire Wall	Wout=2.10 Lout=1.30 Win=1.60 Lout=.80	Aout=2.73 Ain=1.28	1.200	1.740	m^3
		Anet=1.45			
Minus					
Pipe hole on Wall A	DiaA=1.30	1.50	0.25	0.37	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=1.10	1.05	0.25	0.26	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**1.10**	m^3
5. Form Work					
Entire Wall	Wout=2.10 Lout=1.30	Aout=6.80	1.450	9.860	m^2
	Win=1.60 Lout=.80	Ain=4.80	1.200	5.760	m^2
Minus					
Pipe hole on Wall A	DiaA=1.30	1.50 ×2		-2.99	m^2
Pipe hole on Wall B	W=0.00	0.00 ×2		0.00	m^2
Pipe hole on Wall C	DiaC=1.10	1.05 ×2		-2.09	m^2
Pipe hole on Wall D	DiaD=0.00	0.00 ×2		0.00	m^2
Net Area.				**10.54**	**m^2**
6. Conc. Cover	L=1.00 W=1.80	1.8	0.1	**0.18**	m^3
7. Ladder Rung	L=0.60 Dia=.016m Qty=4	1.78kg/m		1.07 **4.27**	kg/pc kg
8. Reinforcement	Manhole	V=1.79		**160.85**	kg
	Conc. Cover	V=0.18		**25.92**	kg
9. Scaffolding			outside	0.00	m^2
			Inside	0.00	m^2
Net Area.				**0.00**	**m^2**
10. Supporting				**0.00**	m^2



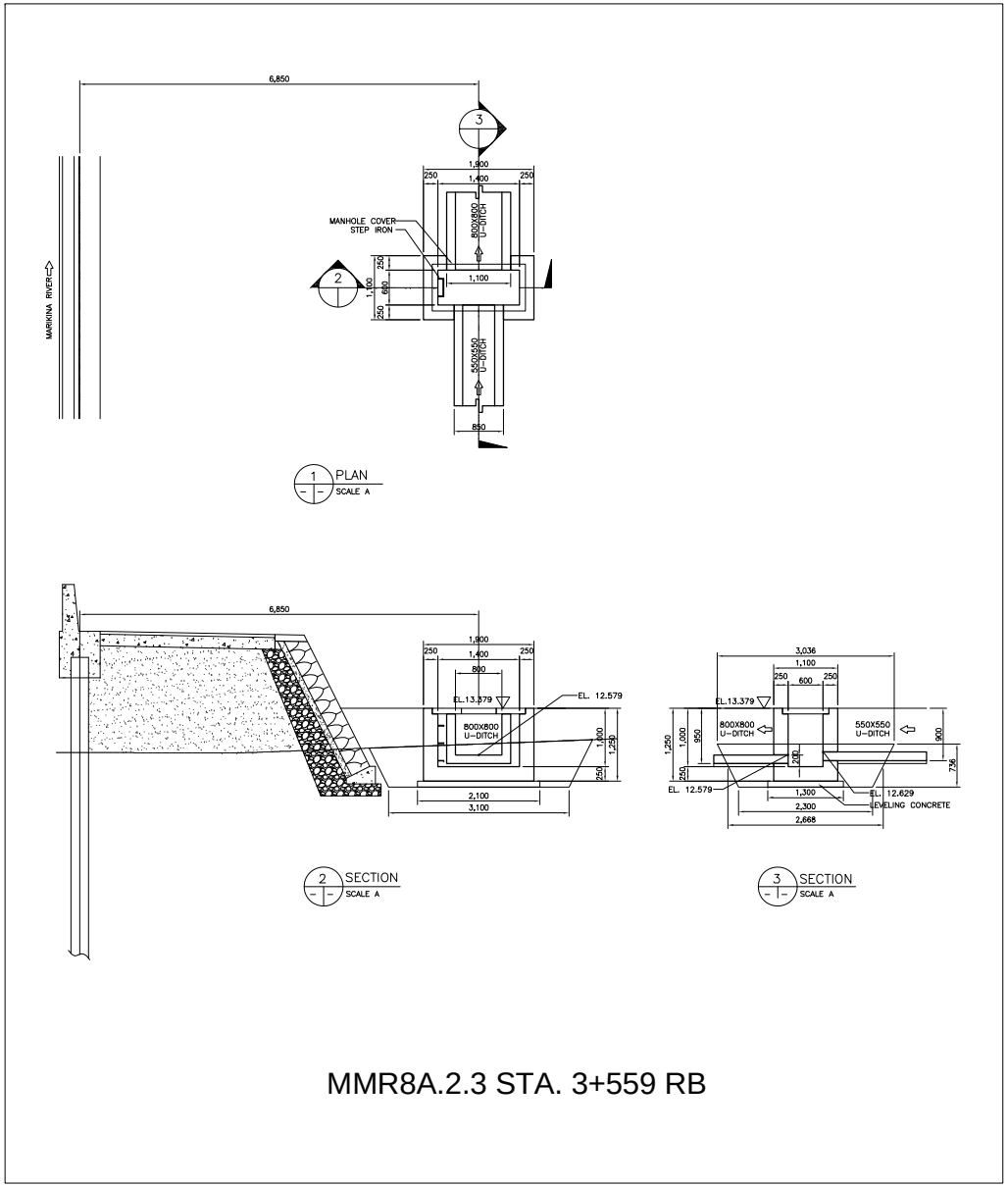
MMR8A.2.2 STA. 3+519 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 8A.2.3**

Location: **STA. 3+559**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=2.56	2.67	6.82	
				6.82	m^3
2. Lev. Concrete	W=2.10 L=1.30	2.73	0.1	**0.27**	m^3
3. Bottom Slab	W=1.90 L=1.10	2.09	0.25	**0.52**	m^3
4. Wall					
Entire Wall	Wout=1.90 Lout=1.10 Win=1.40 Lout=.60	Aout=2.09 Ain=0.84 Anet=1.25	1.000	1.250	m^3
Minus					
Pipe hole on Wall A	DiaA=1.10	1.05	0.25	0.26	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=0.85	0.77	0.25	0.19	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**0.80**	m^3
5. Form Work					
Entire Wall	Wout=1.90 Lout=1.10	Aout=6.00	1.250	7.500	m^2
	Win=1.40 Lout=.60	Ain=4.00	1.000	4.000	m^2
Minus					
Pipe hole on Wall A	DiaA=1.10	1.05	×2	-2.09	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=0.85	0.77	×2	-1.53	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**7.88**	**m^2**
6. Conc. Cover	L=0.80 W=1.60	1.28	0.1	**0.13**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=3			**3.20**	kg
8. Reinforcement	Manhole	V=1.32		**118.80**	kg
	Conc. Cover	V=0.13		**18.43**	kg
9. Scaffolding			outside	7.50	m^2
			Inside	4.00	m^2
Net Area.				**11.50**	**m^2**
10. Supporting				**0.00**	m^2



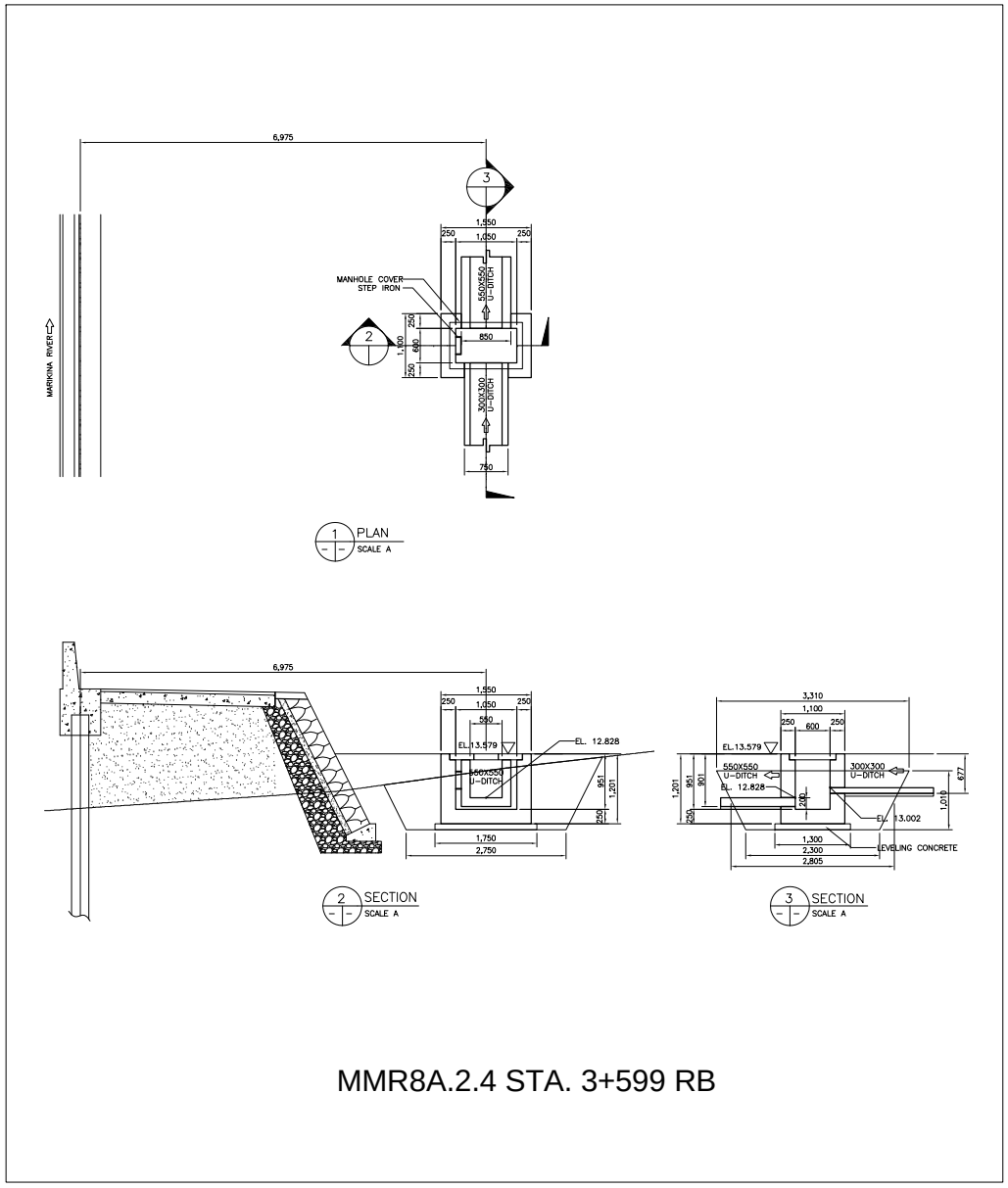
MMR8A.2.3 STA. 3+559 RB

QUANTITIES OF MANHOLE

Manhole No.: **MMR 8A.2.4**

Location: **STA. 3+599**

Item	W or L	Area	Thickness/Ht	Vol./Wt.	Unit
1. Excavation		A1=3.29	2.81	9.23	
				9.23	m^3
2. Lev. Concrete	W=1.75 L=1.30	2.28	0.1	**0.23**	m^3
3. Bottom Slab	W=1.55 L=1.10	1.71	0.25	**0.43**	m^3
4. Wall					
Entire Wall	Wout=1.55 Lout=1.10 Win=1.05 Lout=.60	Aout=1.71 Ain=0.63 Anet=1.08	0.951	1.022	m^3
Minus					
Pipe hole on Wall A	DiaA=0.85	0.77	0.25	0.19	
Pipe hole on Wall B	DiaB=0.00	0.00	0.25	0.00	
Pipe hole on Wall C	DiaC=0.75	0.51	0.25	0.13	
Pipe hole on Wall D	DiaD=0.00	0.00	0.25	0.00	
Net Wall Vol.				**0.70**	m^3
5. Form Work					
Entire Wall	Wout=1.55 Lout=1.10	Aout=5.30	1.201	6.365	m^2
	Win=1.05 Lout=.60	Ain=3.30	0.951	3.138	m^2
Minus					
Pipe hole on Wall A	DiaA=0.85	0.77	×2	-1.53	m^2
Pipe hole on Wall B	W=0.00	0.00	×2	0.00	m^2
Pipe hole on Wall C	DiaC=0.75	0.51	×2	-1.02	m^2
Pipe hole on Wall D	DiaD=0.00	0.00	×2	0.00	m^2
Net Area.				**6.96**	**m^2**
6. Conc. Cover	L=0.80 W=1.25	1	0.1	**0.10**	m^3
7. Ladder Rung	L=0.60				
	Dia=.016m	1.78kg/m		1.07	kg/pc
	Qty=3			**3.20**	kg
8. Reinforcement	Manhole	V=1.13		**101.72**	kg
	Conc. Cover	V=0.10		**14.40**	kg
9. Scaffolding			outside	0.00	m^2
			Inside	0.00	m^2
Net Area.				**0.00**	**m^2**
10. Supporting				**0.00**	m^2



MMR8A.2.4 STA. 3+599 RB

・Quantity Calculation of Collector Pipe

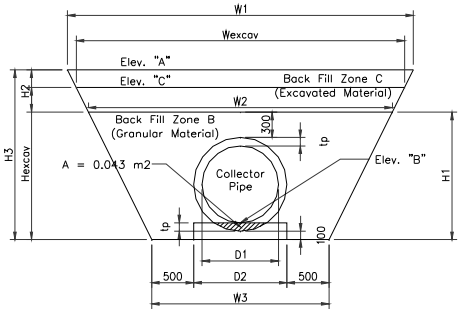
Manhole Serial No.	L	Excavation	Backfill Zone B	Backfill Zone C	Concrete Bedding		Concrete Collar	RCP dia 910	RCP dia 1070
					Concrete	Formwork			
	m	m^3	m^3	m^3	m^3	m^2	m^3	pc	pc
Section I									
MML 3.1 - 3.2	25.3	178.8	94.9	69.3	0.379	10.120	1.442	26	
MML 3.2 - 3.3	22.7	121.7	72.2	23.5	0.379	9.080	1.269	23	
MML 3.3 - 3.4	19.8	114.6	63.0	28.9	0.379	7.920	1.096	20	
MML 3.4 - 3.5	17.9	107.7	56.9	30.3	0.379	7.160	0.981	18	
MML 3.5 - 3.5.1	29.5	176.7	93.8	49.0	0.379	11.800	1.673	30	
MML 3.5.1 - 4	30.8	185.7	97.9	52.5	0.379	12.320	1.730	31	
MML 4 - 4.1	22.9	163.5	72.8	64.4	0.379	9.160	1.269	23	
MML 4.1 - 4.2	7.5	64.1	28.4	24.1	0.446	3.195	0.466		8
MML 4.2 - 5	31.9	249.1	101.4	111.1	0.379	12.760	1.788	32	
MML 5 - 5.1	39.9	290.2	126.9	117.5	0.379	15.960	2.250	40	
MML 5.1 - 5.2	19.1	129.5	60.7	46.9	0.379	7.640	1.096	20	
Subtotal		**1781.6**	**868.9**	**617.5**	**4.236**	**107.115**	**15.060**	**263**	**8**

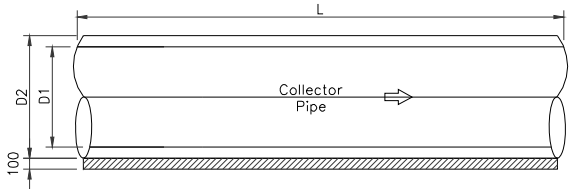
Manhole Serial No.	L m	Excavation m^3	Backfill Zone B m^3	Backfill Zone C m^3	Concrete Bedding Concrete m^3	 Formwork m^2	Concrete Collar m^3	RCP dia 910 pc	RCP dia 1070 pc
Section II									
MMR 7.32 - 7.33	3.5	25.8	11.1	10.7	0.379	1.400	0.173	4	
Subtotal		**25.8**	**11.1**	**10.7**	**0.379**	**1.400**	**0.173**	**4**	

Manhole Serial No.	L m	Excavation m^3	Backfill Zone B m^3	Backfill Zone C m^3	Concrete Bedding Concrete m^3	 Formwork m^2	Concrete Collar m^3	RCP dia 910 pc	RCP dia 1070 pc
Section III									
MML 11.41 - 12A	6.3	28.0	20.0	0.7	0.379	2.520	0.346	7	
MML 12A - 12A.2	25.0	125.3	79.5	17.1	0.379	10.000	1.384	25	
MML 12A.2 - 12A.3	21.3	115.0	67.7	22.9	0.379	8.520	1.211	22	
MML 12A.3 - 12A.3.1	20.2	99.7	64.2	12.4	0.379	8.080	1.154	21	
MML 12A.3.1 - 12A.3.	11.0	52.1	35.0	4.5	0.379	4.400	0.577	11	
MML 12A.3.2 - 12A.3.	31.0	149.9	98.6	15.8	0.379	12.400	1.730	31	
MML 12A.3.3 - 12A.5	15.1	74.1	48.0	8.8	0.379	6.040	0.865	16	
MML 12A.5 - 12A.6	8.4	32.3	26.7	4.1	0.379	3.360	0.461	9	
MML 12A.6 - 12A.6.1	33.7	135.6	107.1	6.3	0.379	13.480	1.903	34	
MML 12A.6.1 - 12A.7	38.5	170.8	122.4	4.2	0.379	15.400	2.192	39	
MML 12A.7 - 12A.9	13.1	64.6	41.7	7.9	0.379	5.240	0.750	14	
MML 12A.9 - 12B	19.2	101.8	61.0	18.7	0.379	7.680	1.096	20	
MML 12B - 12B.1	29.2	162.9	92.8	36.6	0.379	11.680	1.673	30	
MML 12B.1 - 12B.2	22.4	136.8	71.2	39.9	0.379	8.960	1.269	23	
MML 13.1 - 13.1.1	27.4	163.5	87.1	45.0	0.379	10.960	1.557	28	
MML 13.1.1 - 13.1.2	33.6	186.7	106.8	41.4	0.379	13.440	1.903	34	
MML 13.1.2 - 13.1.3	30.4	168.7	96.7	37.1	0.379	12.160	1.730	31	
MML 13.1.3 - 14	17.8	91.3	56.6	14.3	0.379	7.120	0.981	18	
Subtotal		**2059.1**	**1283.1**	**337.7**	**6.822**	**161.440**	**22.782**	**413**	

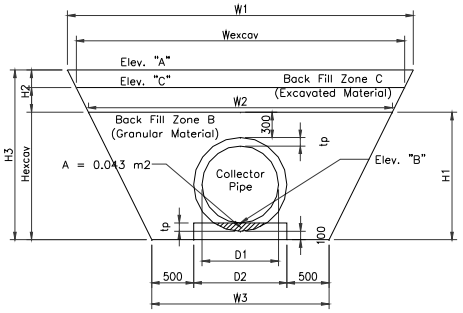
・Calculation Sheet of Collector Pipes

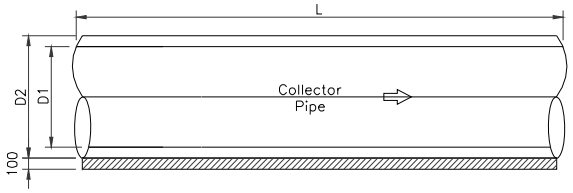
Manhole Serial No.	Elev. "A"	Elev. "B"	Elev. "C"	D1	D2	tp	W1	W2	W3	H1	H2	H3	Hexcav	Wexcav	Slope	L	Area excav	Backfill	
																		Area of Zone B	Area of Zone C
	m	m	m	m	m	m	m	m	m	m	m	m	m	m	%	m	m^2	m^2	m^2
Section I																			
MML 3.1 - 3.2	12.94	11.49	12.94	0.91	1.11	0.10	3.76	3.62	2.11	1.51	0.14	1.65	1.65	3.76	0.30	25.3	4.83	4.33	0.50
	13.94	11.44	13.94	0.91	1.11	0.10	4.80	3.62	2.11	1.51	1.18	2.69	2.69	4.80			9.30	3.18	4.98
MML 3.2 - 3.3	12.94	11.41	12.94	0.91	1.11	0.10	3.83	3.62	2.11	1.51	0.21	1.72	1.72	3.83	0.30	22.7	5.12	3.18	0.79
	13.02	11.38	13.02	0.91	1.11	0.10	3.96	3.62	2.11	1.51	0.34	1.85	1.85	3.96			5.61	3.18	1.28
MML 3.3 - 3.4	13.02	11.35	13.02	0.91	1.11	0.10	3.99	3.62	2.11	1.51	0.37	1.88	1.88	3.99	0.30	19.8	5.73	3.18	1.40
	13.03	11.32	13.03	0.91	1.11	0.10	4.02	3.62	2.11	1.51	0.40	1.91	1.91	4.02			5.85	3.18	1.52
MML 3.4 - 3.5	13.03	11.29	13.03	0.91	1.11	0.10	4.05	3.62	2.11	1.51	0.43	1.94	1.94	4.05	0.30	17.9	5.97	3.18	1.65
	13.02	11.26	13.02	0.91	1.11	0.10	4.07	3.62	2.11	1.51	0.45	1.96	1.96	4.07			6.06	3.18	1.74
MML 3.5 - 3.5.1	13.02	11.23	13.02	0.91	1.11	0.10	4.10	3.62	2.11	1.51	0.48	1.99	1.99	4.10	0.30	29.5	6.19	3.18	1.86
	12.87	11.17	12.87	0.91	1.11	0.10	4.00	3.62	2.11	1.51	0.38	1.89	1.89	4.00			5.79	3.18	1.46
MML 3.5.1 - 4	12.87	11.14	12.87	0.91	1.11	0.10	4.03	3.62	2.11	1.51	0.41	1.92	1.92	4.03	0.30	30.8	5.91	3.18	1.58
	12.86	11.08	12.86	0.91	1.11	0.10	4.09	3.62	2.11	1.51	0.47	1.98	1.98	4.09			6.15	3.18	1.82
MML 4 - 4.1	12.86	11.05	12.86	0.91	1.11	0.10	4.12	3.62	2.11	1.51	0.50	2.01	2.01	4.12	0.30	22.9	6.27	3.18	1.95
	13.23	11.01	13.23	0.91	1.11	0.10	4.52	3.62	2.11	1.51	0.90	2.41	2.41	4.52			8.00	3.18	3.68
MML 4.1 - 4.2	13.23	10.98	13.23	1.07	1.30	0.11	4.75	3.99	2.30	1.70	0.76	2.46	2.46	4.75	0.30	7.5	8.65	3.78	3.32
	13.00	10.80	13.00	1.07	1.30	0.11	4.71	3.99	2.30	1.70	0.71	2.41	2.41	4.71			8.44	3.78	3.11
MML 4.2 - 5	13.00	10.80	13.00	0.91	1.11	0.10	4.51	3.62	2.11	1.51	0.89	2.40	2.40	4.51	0.30	31.9	7.93	3.18	3.60
	13.20	11.06	13.20	0.91	1.11	0.10	4.45	3.62	2.11	1.51	0.83	2.34	2.34	4.45			7.69	3.18	3.36
MML 5 - 5.1	13.20	11.09	13.20	0.91	1.11	0.10	4.42	3.62	2.11	1.51	0.80	2.31	2.31	4.42	0.35	39.9	7.56	3.18	3.23
	13.18	11.20	13.18	0.91	1.11	0.10	4.29	3.62	2.11	1.51	0.67	2.18	2.18	4.29			6.99	3.18	2.66
MML 5.1 - 5.2	13.18	11.23	13.18	0.91	1.11	0.10	4.26	3.62	2.11	1.51	0.64	2.15	2.15	4.26	0.35	19.1	6.86	3.18	2.53
	13.18	11.26	13.18	0.91	1.11	0.10	4.23	3.62	2.11	1.51	0.61	2.12	2.12	4.23			6.70	3.18	2.38



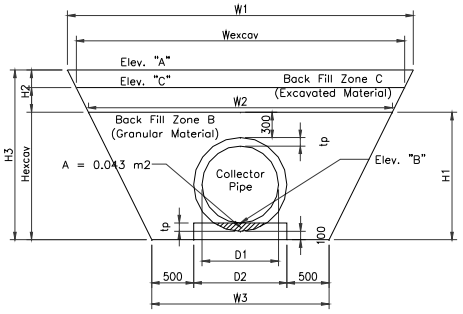


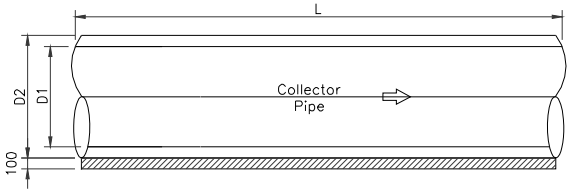
Manhole Serial No.	Elev. "A"	Elev. "B"	Elev. "C"	D1	D2	tp	W1	W2	W3	H1	H2	H3	Hexcav	Wexcav	Slope	L	Area excav	Backfill	
																		Area of Zone B	Area of Zone C
	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m^2	m^2	m^2
Section II																			
MMR 7.32 - 7.33	13.29	11.48	13.29	0.91	1.11	0.10	4.12	3.62	2.11	1.51	0.50	2.01	2.01	4.12		3.50	6.27	3.18	1.94
	13.29	10.97	13.29	0.91	1.11	0.10	4.63	3.62	2.11	1.51	1.01	2.52	2.52	4.63			8.50	3.18	4.18





Manhole Serial No.	Elev. "A"	Elev. "B"	Elev. "C"	D1	D2	tp	W1	W2	W3	H1	H2	H3	Hexcav	Wexcav	Slope	L	Area excav	Backfill	
																		Area of Zone B	Area of Zone C
	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m	m^2	m^2	m^2
Section III																			
MML 11.41 - 12A	12.78	11.55	12.78	0.91	1.11	0.10	3.54	3.62	2.11	1.51	-0.08	1.43	1.43	3.54	0.35	6.3	4.04	3.18	-0.29
	12.78	11.33	12.78	0.91	1.11	0.10	3.76	3.62	2.11	1.51	0.14	1.65	1.65	3.76			4.84	3.18	0.52
MML 12A - 12A.2	12.78	11.33	12.78	0.91	1.11	0.10	3.76	3.62	2.11	1.51	0.14	1.65	1.65	3.76	0.35	25	4.84	3.18	0.52
	12.78	11.24	12.78	0.91	1.11	0.10	3.85	3.62	2.11	1.51	0.23	1.74	1.74	3.85			5.18	3.18	0.85
MML 12A.2 - 12A.3	12.78	11.10	12.78	0.91	1.11	0.10	3.99	3.62	2.11	1.51	0.37	1.88	1.88	3.99	0.35	21.3	5.73	3.18	1.40
	12.69	11.18	12.69	0.91	1.11	0.10	3.82	3.62	2.11	1.51	0.20	1.71	1.71	3.82			5.07	3.18	0.74
MML 12A.3 - 12A.3.1	12.69	11.18	12.69	0.91	1.11	0.10	3.82	3.62	2.11	1.51	0.20	1.71	1.71	3.82	0.35	20.2	5.07	3.18	0.74
	12.69	11.25	12.69	0.91	1.11	0.10	3.75	3.62	2.11	1.51	0.13	1.64	1.64	3.75			4.81	3.18	0.48
MML 12A.3.1 - 12A.3.2	12.69	11.25	12.69	0.91	1.11	0.10	3.75	3.62	2.11	1.51	0.13	1.64	1.64	3.75	0.35	11	4.81	3.18	0.48
	12.69	11.28	12.69	0.91	1.11	0.10	3.71	3.62	2.11	1.51	0.09	1.60	1.60	3.71			4.66	3.18	0.33
MML 12A.3.2 - 12A.3.3	12.69	11.28	12.69	0.91	1.11	0.10	3.71	3.62	2.11	1.51	0.09	1.60	1.60	3.71	0.35	31	4.66	3.18	0.33
	12.89	11.39	12.89	0.91	1.11	0.10	3.80	3.62	2.11	1.51	0.18	1.69	1.69	3.80			5.01	3.18	0.68
MML 12A.3.3 - 12A.5	12.89	11.39	12.89	0.91	1.11	0.10	3.80	3.62	2.11	1.51	0.18	1.69	1.69	3.80	0.35	15.1	5.01	3.18	0.68
	12.89	11.45	12.89	0.91	1.11	0.10	3.75	3.62	2.11	1.51	0.13	1.64	1.64	3.75			4.81	3.18	0.48
MML 12A.5 - 12A.6	13.22	12.05	13.22	0.91	1.11	0.10	3.48	3.62	2.11	1.51	0.14	1.37	1.37	3.48	0.25	8.4	3.84	3.18	0.49
	13.22	12.05	13.22	0.91	1.11	0.10	3.48	3.62	2.11	1.51	0.14	1.37	1.37	3.48			3.84	3.18	0.49
MML 12A.6 - 12A.6.1	13.22	12.05	13.22	0.91	1.11	0.10	3.48	3.62	2.11	1.51	0.14	1.37	1.37	3.48	0.25	33.7	3.84	3.18	0.49
	13.22	11.94	13.22	0.91	1.11	0.10	3.59	3.62	2.11	1.51	-0.03	1.48	1.48	3.59			4.21	3.18	-0.12
MML 12A.6.1 - 12A.7	13.22	11.94	13.22	0.91	1.11	0.10	3.59	3.62	2.11	1.51	-0.03	1.48	1.48	3.59	0.25	38.5	4.21	3.18	-0.12
	13.25	11.85	13.25	0.91	1.11	0.10	3.71	3.62	2.11	1.51	0.09	1.60	1.60	3.71			4.66	3.18	0.33
MML 12A.7 - 12A.9	13.25	11.85	13.25	0.91	1.11	0.10	3.71	3.62	2.11	1.51	0.09	1.60	1.60	3.71	0.25	13.1	4.66	3.18	0.33
	13.36	11.82	13.36	0.91	1.11	0.10	3.85	3.62	2.11	1.51	0.23	1.74	1.74	3.85			5.20	3.18	0.87
MML 12A.9 - 12B	13.36	11.82	13.36	0.91	1.11	0.10	3.85	3.62	2.11	1.51	0.23	1.74	1.74	3.85	0.03	19.2	5.20	3.18	0.87
	13.36	11.77	13.36	0.91	1.11	0.10	3.91	3.62	2.11	1.51	0.29	1.80	1.80	3.91			5.40	3.18	1.08
MML 12B - 12B.1	13.36	11.77	13.36	0.91	1.11	0.10	3.91	3.62	2.11	1.51	0.29	1.80	1.80	3.91	0.30	29.2	5.40	3.18	1.08
	13.37	11.68	13.37	0.91	1.11	0.10	4.00	3.62	2.11	1.51	0.38	1.89	1.89	4.00			5.75	3.18	1.43
MML 12B.1 - 12B.2	13.37	11.68	13.37	0.91	1.11	0.10	4.00	3.62	2.11	1.51	0.38	1.89	1.89	4.00	0.30	22.4	5.75	3.18	1.43
	13.47	11.61	13.47	0.91	1.11	0.10	4.17	3.62	2.11	1.51	0.55	2.06	2.06	4.17			6.46	3.18	2.14
MML 13.1 - 13.1.1	13.22	11.37	13.22	0.91	1.11	0.10	4.16	3.62	2.11	1.51	0.54	2.05	2.05	4.16	0.30	27.40	6.43	3.18	2.10
	13.07	11.45	13.07	0.91	1.11	0.10	3.93	3.62	2.11	1.51	0.31	1.82	1.82	3.93			5.50	3.18	1.18
MML 13.1.1 - 13.1.2	13.07	11.45	13.07	0.91	1.11	0.10	3.93	3.62	2.11	1.51	0.31	1.82	1.82	3.93	0.25	33.60	5.50	3.18	1.18
	13.18	11.53	13.18	0.91	1.11	0.10	3.96	3.62	2.11	1.51	0.34	1.85	1.85	3.96			5.61	3.18	1.28
MML 13.1.2 - 13.1.3	13.18	11.53	13.18	0.91	1.11	0.10	3.96	3.62	2.11	1.51	0.34	1.85	1.85	3.96	0.25	30.40	5.61	3.18	1.28
	13.19	11.57	13.19	0.91	1.11	0.10	3.93	3.62	2.11	1.51	0.31	1.82	1.82	3.93			5.48	3.18	1.16
MML 13.1.3 - 14	13.19	11.57	13.19	0.91	1.11	0.10	3.93	3.62	2.11	1.51	0.31	1.82	1.82	3.93	0.25	17.80	5.48	3.18	1.16
	13.13	11.70	13.13	0.91	1.11	0.10	3.74	3.62	2.11	1.51	0.12	1.63	1.63	3.74			4.78	3.18	0.45



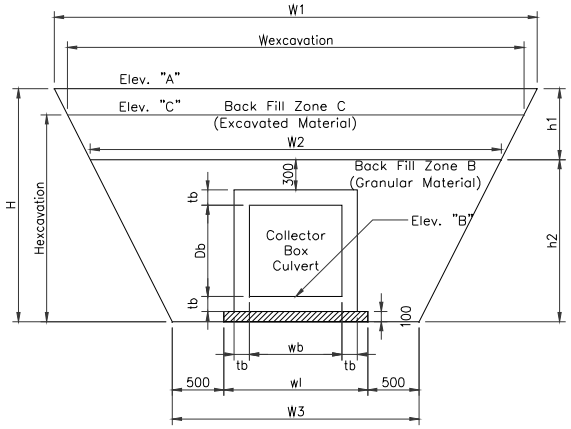


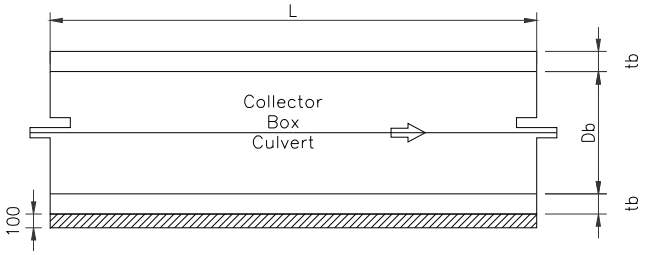
・Quantity Calculation of Box Culvert

Manhole Serial No.	L	Excavation	Backfill	Concrete		Leveling Concrete		Reinforcement	Cork Filler	Joint Sealant	Water Stop
				Concrete	Form work	Concrete	Form work				
	m	m^3	m^3	m^3	m^2	m^3	m^2	kg	m^2	m	m
Section I											
MML5.3 - 6	10.1	53.5	37.6	6.363	19.680	1.414	2.020	572.7	0.6	3.6	4.0
Subtotal		**53.5**	**37.6**	**6.363**	**19.680**	**1.414**	**2.020**	**572.7**	**0.6**	**3.6**	**4.0**
Section II											
MMR7.6 - 7.11	30.1	170.7	115.3	26.488	55.880	4.515	6.020	2383.9	2.6	10.8	12.0
MMR7.11 - 7.16	31.3	164.8	107.2	27.544	58.040	4.695	6.260	2479.0	2.8	11.3	12.5
MMR7.16 - 7.17	26.5	160.0	111.2	23.320	49.400	3.975	5.300	2098.8	2.3	9.5	10.6
MMR7.17 - 7.18	15.7	129.0	100.1	13.816	29.960	2.355	3.140	1243.4	1.4	5.7	6.3
MMR7.18 - 7.24	32.7	205.4	145.3	28.776	60.560	4.905	6.540	2589.8	2.9	11.8	13.1
MMR7.24 - 7.32	53.8	290.3	191.3	47.344	98.540	8.070	10.760	4261.0	4.7	19.4	21.5
MMR8A.2 - 8A.2.1	39.7	326.2	257.4	30.871	73.080	5.796	7.940	2778.4	3.1	14.3	15.9
Subtotal		**1446.4**	**1027.8**	**198.159**	**425.460**	**34.311**	**45.960**	**17834.3**	**19.8**	**82.8**	**91.9**
SectionIII											
MML 12C - 12C.1	27.4	234.4	184.0	24.112	51.020	4.110	5.480	2170.1	2.4	9.9	11.0
MML 12C.1 - 12C.2	22.1	168.0	127.3	19.448	41.480	3.315	4.420	1750.3	1.9	8.0	8.8
MML 12C.2 - 12C.5	28.6	186.6	134.0	25.168	53.180	4.290	5.720	2265.1	2.5	10.3	11.4
MML 12C.5 - 12C.8	34.1	217.6	154.8	30.008	63.080	5.115	6.820	2700.7	3.0	12.3	13.6
MML 12C.8 - 12C	38.5	229.6	158.7	33.880	71.000	5.775	7.700	3049.2	3.4	13.9	15.4
MML 12C - 12B.2	12.0	117.0	63.9	17.760	38.300	2.880	2.400	1598.4	1.8	4.3	4.8
Subtotal		**1036.2**	**758.8**	**132.616**	**279.760**	**22.605**	**30.140**	**11935.4**	**13.2**	**54.4**	**60.2**

・Calculation Sheet of Box Culvert

Manhole Serial No.	Elev. "A"	Elev. "B"	Elev. "C"	wb	Db	tb	wl	W1	W3	H	Wexcavation	Hexcavation	Slope	L	Area of Excavation	Area of Box culvert	Area of Leveling	BackFill
	m	m	m	m	m	m	m	m	m	m	m	m	%	m	m^2	m^2	m^2	m^2
Section I																		
MML5.3 - 6	13.74	12.19	13.74	0.90	0.90	0.15	1.40	4.20	2.40	1.80	4.20	1.80	0.35	10.1	5.95	1.44	0.14	4.37
	13.37	12.14	13.37	0.90	0.90	0.15	1.40	3.88	2.40	1.48	3.88	1.48			4.64	1.44	0.14	3.06
Section II																		
MMR7.6 - 7.11	13.74	12.19	13.74	0.90	0.90	0.20	1.50	4.35	2.50	1.85	4.35	1.85	0.25	30.1	6.35	1.69	0.15	4.51
	13.37	12.14	13.37	0.90	0.90	0.20	1.50	4.03	2.50	1.53	4.03	1.53			4.99	1.69	0.15	3.15
MMR7.11 - 7.16	13.37	12.11	13.37	0.90	0.90	0.20	1.50	4.06	2.50	1.56	4.06	1.56	0.25	31.3	5.10	1.69	0.15	3.26
	13.37	12.04	13.37	0.90	0.90	0.20	1.50	4.14	2.50	1.64	4.14	1.64			5.43	1.69	0.15	3.59
MMR7.16 - 7.17	13.37	11.94	13.37	0.90	0.90	0.20	1.50	4.24	2.50	1.74	4.24	1.74	0.25	26.5	5.85	1.69	0.15	4.01
	13.42	11.90	13.42	0.90	0.90	0.20	1.50	4.32	2.50	1.82	4.32	1.82			6.22	1.69	0.15	4.38
MMR7.17 - 7.18	13.42	11.87	13.42	0.90	0.90	0.20	1.50	4.35	2.50	1.85	4.35	1.85	0.25	15.7	6.34	1.69	0.15	4.50
	13.40	11.06	13.40	0.90	0.90	0.20	1.50	5.14	2.50	2.64	5.14	2.64			10.09	1.69	0.15	8.25
MMR7.18 - 7.24	13.40	11.83	13.40	0.90	0.90	0.20	1.50	4.37	2.50	1.87	4.37	1.87	0.25	32.7	6.42	1.69	0.15	4.58
	13.32	11.81	13.32	0.90	0.90	0.20	1.50	4.31	2.50	1.81	4.31	1.81			6.14	1.69	0.15	4.30
MMR7.24 - 7.32	13.32	11.94	13.32	0.90	0.90	0.20	1.50	4.18	2.50	1.68	4.18	1.68	0.25	53.8	5.59	1.69	0.15	3.75
	13.29	12.01	13.29	0.90	0.90	0.20	1.50	4.08	2.50	1.58	4.08	1.58			5.20	1.69	0.15	3.36
MMR8A.2 - 8A.2.1	13.00	10.90	13.00	0.90	0.90	0.18	1.46	4.84	2.46	2.38	4.84	2.38	0.25	39.7	8.69	1.59	0.15	6.95
	13.09	11.19	13.09	0.90	0.90	0.18	1.46	4.64	2.46	2.18	4.64	2.18			7.75	1.59	0.15	6.01
SectionIII																		
MML 12C - 12C.1	13.47	11.51	13.47	0.90	0.90	0.20	1.50	4.77	2.50	2.27	4.77	2.27	0.25	27.4	8.24	1.69	0.15	6.40
	13.60	11.51	13.60	0.90	0.90	0.20	1.50	4.90	2.50	2.40	4.90	2.40			8.88	1.69	0.15	7.04
MML 12C.1 - 12C.2	13.60	11.58	13.60	0.90	0.90	0.20	1.50	4.82	2.50	2.32	4.82	2.32	0.25	22.1	8.51	1.69	0.15	6.67
	13.26	11.63	13.26	0.90	0.90	0.20	1.50	4.43	2.50	1.93	4.43	1.93			6.70	1.69	0.15	4.86
MML 12C.2 - 12C.5	13.26	11.63	13.26	0.90	0.90	0.20	1.50	4.43	2.50	1.93	4.43	1.93	0.25	28.6	6.69	1.69	0.15	4.85
	13.26	11.70	13.26	0.90	0.90	0.20	1.50	4.36	2.50	1.86	4.36	1.86			6.36	1.69	0.15	4.52
MML 12C.5 - 12C.8	13.26	11.70	13.26	0.90	0.90	0.20	1.50	4.35	2.50	1.85	4.35	1.85	0.25	34.1	6.35	1.69	0.15	4.51
	13.32	11.75	13.32	0.90	0.90	0.20	1.50	4.37	2.50	1.87	4.37	1.87			6.41	1.69	0.15	4.57
MML 12C.8 - 12C	13.32	11.76	13.32	0.90	0.90	0.20	1.50	4.36	2.50	1.86	4.36	1.86	0.30	38.5	6.40	1.69	0.15	4.56
	13.24	11.88	13.24	0.90	0.90	0.20	1.50	4.16	2.50	1.66	4.16	1.66			5.53	1.69	0.15	3.69
MML 12C - 12B.2	13.24	11.50	13.32	1.80	1.50	0.20	2.40	5.44	3.40	2.04	5.44	2.04	0.30	12.0	9.02	4.18	0.24	4.60
	13.47	11.47	13.47	1.80	1.50	0.20	2.40	5.70	3.40	2.30	5.70	2.30			10.47	4.18	0.24	6.05





・Quantity Calculation of U-Ditch

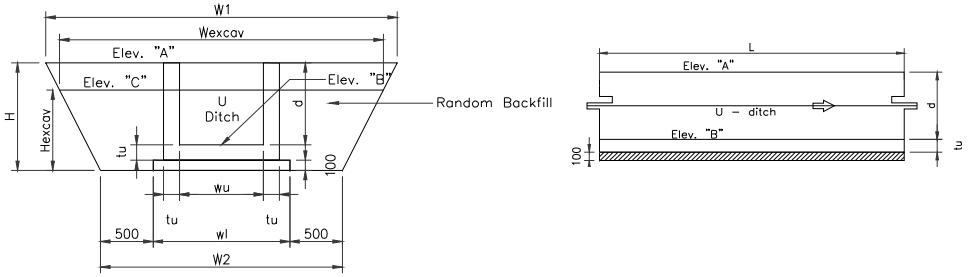
Manhole Serial No.	L	Excavation	Backfill	Concrete		Leveling Concrete		Reinforcement	Cork Filler	Joint Sealant	Water Stop
				Concrete	Form Work	Concrete	Form Work				
	m	m^3	m^3	m^3	m^2	m^3	m^2	kg	m^2	m	m
Section I											
End - MML3.1	10.0	6.2	5.3	0.762	2.951	0.700	2.000	49.5			
MML3.1 - 3.2	25.3	12.5	10.2	1.295	0.510	1.771	5.060	84.2			
MML3.2 - 3.3	22.7	15.3	13.3	1.389	2.798	1.589	4.540	90.3			
MML3.3 - 3.4	19.8	16.7	14.9	1.738	7.873	1.386	3.960	113.0			
MML3.4 - 3.5	17.9	16.5	14.8	1.718	8.664	1.253	3.580	111.7			
MML3.5 - 3.5.1	29.5	26.1	23.4	3.033	16.040	2.065	5.900	197.1			
MML3.5.1 - 4	30.8	21.0	18.2	2.901	14.035	2.156	6.160	188.6			
MML4 - 4.1	22.9	18.3	16.3	1.438	3.195	1.603	4.580	93.5			
MML4.1 - 5	7.5	7.7	7.0	0.899	5.784	0.525	1.500	58.4			
MML5 - 5.1	39.9	46.6	43.0	4.349	24.036	2.793	7.980	282.7			
MML5.1 - 5.2	19.1	24.6	22.9	2.139	12.352	1.337	3.820	139.0			
MML5.2 - 5.3	127.3	168.6	157.2	20.623	143.336	8.911	25.460	1340.5			
MML5.3 - End	24.2	26.0	23.8	2.865	17.095	1.694	4.840	186.2			
Subtotal		**373.9**	**341.2**	**41.522**	**238.623**	**25.389**	**72.540**	**2699.0**			

Manhole Serial No.	L	Excavation	Backfill	Concrete		Leveling Concrete		Reinforcement	Cork Filler	Joint Sealant	Water Stop
				Concrete	Form Work	Concrete	Form Work				
	m	m^3	m^3	m^3	m^2	m^3	m^2	kg	m^2	m	m
Section II											
End - MMR 7.6	6.8	12.2	11.6	0.748	4.580	0.476	1.360	48.6			
MMR 7.6 - 7.11	30.1	49.9	47.2	3.311	18.560	2.107	6.020	215.2			
MMR 7.11 - 7.16	31.3	10.4	7.6	3.443	19.280	2.191	6.260	223.8			
MMR 7.16 - 7.17	26.5	17.7	15.3	2.915	16.400	1.855	5.300	189.5			
MMR 7.17 - 7.24	15.7	10.3	8.9	1.727	9.920	1.099	3.140	112.3			
MMR 7.24 - 7.26	53.8	40.2	35.4	5.918	32.780	3.766	10.760	384.7			
MMR 7.32 - 8	8.8	8.5	7.7	1.102	7.194	0.616	1.760	71.6			
MMR 8 - 8A.1.1	10.5	10.4	9.5	1.155	6.800	0.735	2.100	75.1			
MMR 8A.1.1 - 8A.1.2	40.0	56.0	52.4	8.976	56.657	4.200	8.000	583.4	3.2	5.4	6.0
MMR 8A.1.2 - 8A.1.3	40.0	147.3	143.7	12.416	81.362	5.200	8.000	807.0	4.5	7.6	8.2
MMR 8A.1.3 - 8A.1.4	40.0	205.8	202.2	29.616	89.581	6.800	8.000	1925.0	6.5	8.8	10.0
MMR 8A.1.4 - 8A.2	40.3	244.1	240.4	34.674	106.562	7.657	8.060	2253.8	7.7	10.5	11.7
MMR 8A.2 - 8A.2.1	39.7	53.0	49.4	11.910	32.560	3.573	7.940	774.2	2.1	2.8	4.0
MMR 8A.2.1 - 8A.2.2	40.0	112.4	108.8	27.216	81.481	6.400	8.000	1769.0	5.9	8.0	9.2
MMR 8A.2.2 - 8A.2.3	40.0	43.0	39.4	12.000	81.200	4.800	8.000	780.0	4.1	7.2	7.8
MMR 8A.2.3- 8A.2.4	40.0	49.1	45.5	9.000	60.950	3.800	8.000	585.0	2.9	5.2	5.8
MMR 8A.2.4 - End	21.4	25.0	23.1	3.428	24.334	1.498	4.280	222.8	0.9	1.8	2.1
Subtotal		**1058.1**	**1013.4**	**165.379**	**701.287**	**54.799**	**99.340**	**10749.6**	**36.9**	**55.5**	**62.7**

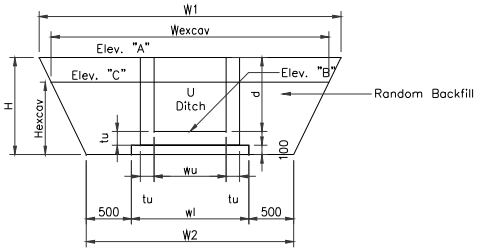
Manhole Serial No.	L	Excavation	Backfill	Concrete		Leveling Concrete		Reinforcement
				Concrete	Form Work	Concrete	Form Work	
	m	m^3	m^3	m^3	m^2	m^3	m^2	kg
Section III								
End - MML 11.4	15.9	9.7	8.3	1.743	9.974	1.113	3.180	113.3
MML 11.41 - 12A	6.3	3.8	3.2	0.694	4.294	0.441	1.260	45.1
MML 12A - 12A.2	25.0	19.1	16.9	2.595	13.919	1.750	5.000	168.7
MML 12A.2 - 12A.3	21.3	20.1	18.2	2.343	13.280	1.491	4.260	152.3
MML 12A.3 - 12A.3.1	20.2	21.6	19.8	2.626	16.760	1.414	4.040	170.7
MML 12A.3.1 - 1A.3.2	11.0	11.1	10.1	1.430	9.400	0.770	2.200	93.0
MML 12A.3.2 - 12A.3.3	31.0	27.6	24.8	3.410	19.100	2.170	6.200	221.7
MML 12A.3.3 - 12A.4	15.1	12.9	11.6	1.661	9.560	1.057	3.020	108.0
MML 12A.4 - 12A.5	20.8	21.5	19.7	2.288	12.980	1.456	4.160	148.7
MML 12A.5 - 12A.6	8.4	10.5	9.8	0.924	5.540	0.588	1.680	60.1
MML 12A.6 - 12A.6.1	33.7	35.9	32.8	3.707	20.720	2.359	6.740	241.0
MML 12A.6.1 - 12A.7	38.5	30.0	26.6	3.203	13.148	2.695	7.700	208.2
MML 12A.7 - 12A.9	13.1	9.3	8.1	0.686	0.526	0.917	2.620	44.6
MML 12A.9 - 12B	19.2	14.8	13.0	2.112	12.020	1.344	3.840	137.3
MML 12B - 12B.1	29.2	16.9	14.3	3.662	22.594	2.044	5.840	238.0
MML 12B.1 - 12C	34.4	12.2	9.1	3.784	21.140	2.408	6.880	246.0
MML 12C - 12C.1	27.4	16.3	13.9	3.014	16.940	1.918	5.480	195.9
MML 12C.1 - 12C.2	22.1	16.9	14.9	2.431	13.760	1.547	4.420	158.0
MML 12C.2 - 12C.5	28.6	19.7	17.1	3.964	25.983	2.002	5.720	257.7
MML 12C.5 - 12C.8	34.1	20.7	17.6	7.836	62.411	2.387	6.820	509.3
MML 12C.8 - 12C.12	38.5	24.0	20.5	4.235	23.600	2.695	7.700	275.3
MML 12C.12 - 13	22.0	32.5	30.6	2.420	13.700	1.540	4.400	157.3
MML 13 - 13.1	96.9	170.4	161.7	17.830	130.716	6.783	19.380	1159.0
MML 13.1 - 13.1.1	33.6	37.7	34.7	4.825	32.118	2.352	6.720	313.6
MML 13.1.1 - 13.1.2	30.4	29.9	27.2	4.256	28.010	2.128	6.080	276.6
MML 13.1.2 - 13.1.3	17.8	18.8	17.2	2.275	14.437	1.246	3.560	147.9
MML 13.1.3 -MML 14	51.4	42.4	37.8	6.682	41.720	3.598	10.280	434.3
MML 14 - End	35.6	38.1	34.9	4.365	26.409	2.492	7.120	283.7
Subtotal		**696.6**	**631.2**	**94.893**	**598.376**	**51.100**	**146.000**	**6168.3**

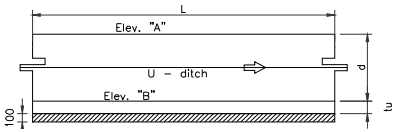
・Calculation Sheet of U-Ditch

Manhole Serial No.	Elev. "A" m	Elev. "B" m	Elev. "C" m	wu m	tu m	d m	wl m	W1 m	W2 m	H m	Wexcav m	Hexcav m	Length m	Area of Excav m^2	Area of Backfill m^2
Section I															
End - MML3.1	12.94	12.81	12.94	0.30	0.10	0.13	0.70	2.03	1.70	0.33	2.03	0.33	10.0	0.62	0.62
	12.94	12.81	12.94	0.30	0.10	0.13	0.70	2.03	1.70	0.33	2.03	0.33		0.62	0.62
MML3.1 - 3.2	12.94	12.93	12.94	0.30	0.10	0.01	0.70	1.91	1.70	0.21	1.91	0.21	25.3	0.37	0.37
	12.94	12.81	12.94	0.30	0.10	0.13	0.70	2.03	1.70	0.33	2.03	0.33		0.62	0.62
MML3.2 - 3.3	12.94	12.88	12.94	0.30	0.10	0.06	0.70	1.96	1.70	0.26	1.96	0.26	22.7	0.47	0.47
	13.02	12.77	13.02	0.30	0.10	0.26	0.70	2.16	1.70	0.46	2.16	0.46		0.88	0.88
MML3.3 - 3.4	13.02	12.84	13.02	0.30	0.10	0.19	0.70	2.09	1.70	0.39	2.09	0.39	19.8	0.74	0.74
	13.03	12.74	13.03	0.30	0.10	0.29	0.70	2.19	1.70	0.49	2.19	0.49		0.95	0.95
MML3.4 - 3.5	13.03	12.80	13.03	0.30	0.10	0.23	0.70	2.13	1.70	0.43	2.13	0.43	17.9	0.82	0.82
	13.02	12.71	13.02	0.30	0.10	0.32	0.70	2.22	1.70	0.52	2.22	0.52		1.01	1.01
MML3.5 - 3.5.1	13.02	12.76	13.02	0.30	0.10	0.26	0.70	2.16	1.70	0.46	2.16	0.46	29.5	0.90	0.90
	12.87	12.62	12.87	0.30	0.10	0.25	0.70	2.15	1.70	0.45	2.15	0.45		0.87	0.87
MML3.5.1 - 4	12.87	12.65	12.87	0.30	0.10	0.22	0.70	2.12	1.70	0.42	2.12	0.42	30.8	0.80	0.80
	12.86	12.76	12.86	0.30	0.10	0.10	0.70	2.00	1.70	0.30	2.00	0.30		0.56	0.56
MML4 - 4.1	12.86	12.80	12.86	0.30	0.10	0.06	0.70	1.96	1.70	0.26	1.96	0.26	22.9	0.48	0.48
	13.23	12.86	13.23	0.30	0.10	0.36	0.70	2.26	1.70	0.56	2.26	0.56		1.12	1.12
MML4.1 - 5	13.23	12.88	13.23	0.30	0.10	0.35	0.70	2.25	1.70	0.55	2.25	0.55	7.5	1.08	1.08
	13.20	12.90	13.20	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.20	0.50		0.96	0.96
MML5 - 5.1	13.20	12.90	13.20	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.20	0.50	39.9	0.96	0.96
	13.18	12.71	13.18	0.30	0.10	0.47	0.70	2.37	1.70	0.67	2.37	0.67		1.37	1.37
MML5.1 - 5.2	13.18	12.87	13.18	0.30	0.10	0.31	0.70	2.21	1.70	0.51	2.21	0.51	19.1	1.00	1.00
	13.15	12.58	13.15	0.30	0.10	0.56	0.70	2.46	1.70	0.76	2.46	0.76		1.58	1.58
MML5.2 - 5.3	13.15	12.59	13.15	0.30	0.10	0.56	0.70	2.46	1.70	0.76	2.46	0.76	127.3	1.58	1.58
	13.94	13.60	13.94	0.30	0.10	0.34	0.70	2.24	1.70	0.54	2.24	0.54		1.07	1.07
MML5.3 - End	13.94	13.60	13.94	0.30	0.10	0.34	0.70	2.24	1.70	0.54	2.24	0.54	24.2	1.07	1.07
	13.90	13.55	13.90	0.30	0.10	0.35	0.70	2.25	1.70	0.55	2.25	0.55		1.08	1.08

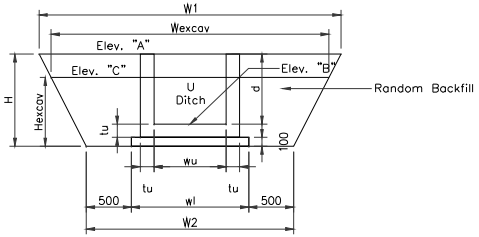


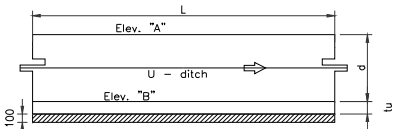
Manhole Serial No.	Elev. "A" m	Elev. "B" m	Elev. "C" m	wu m	tu m	d m	wl m	W1 m	W2 m	H m	Wexcav m	Hexcav m	Length m	Area of Excav m^2	Area of Backfill m^2
Section II															
End - MMR 7.6	13.97	13.68	13.74	0.30	0.10	0.30	0.70	2.19	1.70	0.49	1.96	0.26	6.8	0.47	0.47
	13.92	12.62	13.74	0.30	0.10	1.30	0.70	3.20	1.70	1.50	3.02	1.32		3.13	3.13
MMR 7.6 - 7.11	13.92	12.62	13.74	0.30	0.10	0.30	0.70	3.20	1.70	1.50	3.02	1.32	30.1	3.13	3.13
	13.77	13.47	13.37	0.30	0.10	0.30	0.70	2.20	1.70	0.50	1.81	0.11		0.19	0.19
MMR 7.11 - 7.16	13.77	13.47	13.37	0.30	0.10	0.30	0.70	2.20	1.70	0.50	1.81	0.11	31.3	0.19	0.19
	13.61	13.31	13.37	0.30	0.10	0.30	0.70	2.20	1.70	0.50	1.96	0.26		0.48	0.48
MMR 7.16 - 7.17	13.61	13.31	13.37	0.30	0.10	0.30	0.70	2.20	1.70	0.50	1.96	0.26	26.5	0.48	0.48
	13.48	13.18	13.42	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.14	0.44		0.85	0.85
MMR 7.17 - 7.24	13.48	13.18	13.42	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.14	0.44	15.7	0.85	0.85
	13.56	13.26	13.32	0.30	0.10	0.30	0.70	2.20	1.70	0.50	1.95	0.25		0.46	0.46
MMR 7.24 - 7.26	13.56	13.26	13.32	0.30	0.10	0.30	0.70	2.20	1.70	0.50	1.95	0.25	53.8	0.46	0.46
	13.34	12.97	13.29	0.30	0.10	0.38	0.70	2.28	1.70	0.58	2.23	0.52		1.03	1.03
MMR 7.32 - 8	13.34	12.97	13.29	0.30	0.10	0.38	0.70	2.28	1.70	0.58	2.23	0.52	8.8	1.03	1.03
	13.32	13.02	13.29	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.17	0.47		0.91	0.91
MMR 8 - 8A.1.1	13.32	13.02	13.29	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.17	0.47	10.5	0.91	0.91
	13.30	12.95	13.29	0.30	0.10	0.36	0.70	2.26	1.70	0.56	2.25	0.55		1.08	1.08
MMR 8A.1.1 - 8A.1.2	13.70	13.00	13.00	0.65	0.10	0.70	1.05	2.95	2.05	0.90	2.25	0.20	40.0	0.43	0.43
	13.43	12.77	13.51	0.65	0.10	0.65	1.05	2.90	2.05	0.85	2.99	0.94		2.37	2.37
MMR 8A.1.2 - 8A.1.3	13.43	12.42	13.51	0.90	0.10	1.00	1.30	3.50	2.30	1.20	3.59	1.29	40.0	3.80	3.80
	13.19	12.28	13.31	0.90	0.10	0.90	1.30	3.40	2.30	1.10	3.52	1.22		3.56	3.56
MMR 8A.1.3 - 8A.1.4	13.19	12.08	13.31	1.10	0.20	1.10	1.70	4.10	2.70	1.40	4.22	1.52	40.0	5.27	5.27
	13.08	11.98	13.14	1.10	0.20	1.10	1.70	4.10	2.70	1.40	4.16	1.46		5.02	5.02
MMR 8A.1.4 - 8A.2	13.08	11.78	13.14	1.30	0.20	1.30	1.90	4.50	2.90	1.60	4.56	1.66	40.3	6.21	6.21
	13.00	11.70	13.00	1.30	0.20	1.30	1.90	4.50	2.90	1.60	4.50	1.60		5.91	5.91
MMR 8A.2 - 8A.2.1	13.00	12.60	13.00	0.30	0.20	0.40	0.90	2.60	1.90	0.70	2.60	0.70	39.7	1.57	1.57
	13.10	12.80	13.01	0.30	0.20	0.30	0.90	2.50	1.90	0.60	2.41	0.51		1.10	1.10
MMR 8A.2.1 - 8A.2.2	13.10	12.10	13.01	1.00	0.20	1.00	1.60	3.90	2.60	1.30	3.81	1.21	40.0	3.88	3.88
	13.22	12.22	12.52	1.00	0.20	1.00	1.60	3.90	2.60	1.30	3.20	0.60		1.74	1.74
MMR 8A.2.2 - 8A.2.3	13.22	12.22	12.52	0.80	0.10	1.00	1.20	3.40	2.20	1.20	2.70	0.50	40.0	1.23	1.23
	13.38	12.58	12.77	0.80	0.10	0.80	1.20	3.20	2.20	1.00	2.59	0.39		0.92	0.92
MMR 8A.2.3- 8A.2.4	13.38	12.63	12.77	0.55	0.10	0.75	0.95	2.90	1.95	0.95	2.29	0.34	40.0	0.71	0.71
	13.38	12.83	13.38	0.55	0.10	0.55	0.95	2.70	1.95	0.75	2.70	0.75		1.74	1.74
MMR 8A.2.4 - End	13.38	12.83	13.38	0.30	0.10	0.55	0.70	2.45	1.70	0.75	2.45	0.75	21.4	1.56	1.56
	13.38	13.08	13.29	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.11	0.41		0.78	0.78





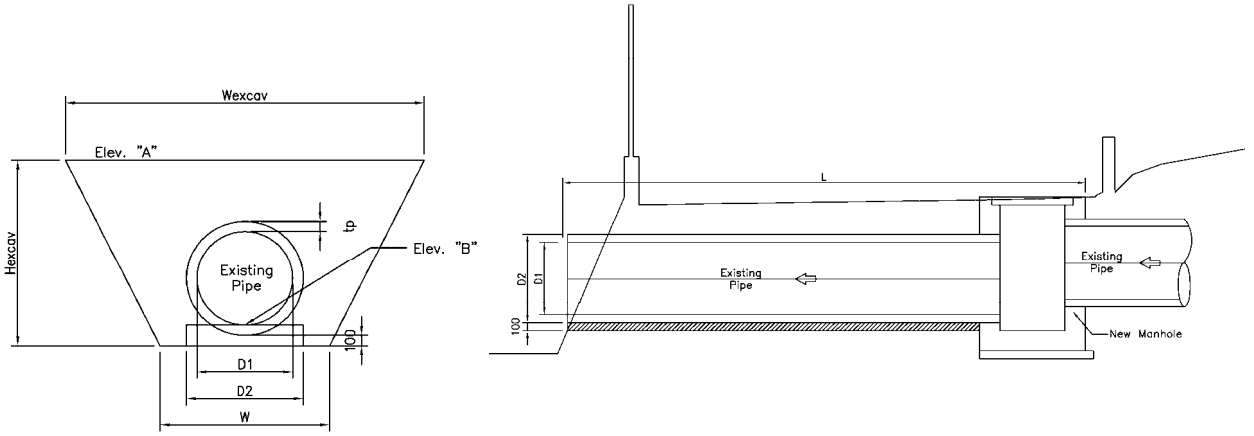
Manhole Serial No.	Elev. "A" m	Elev. "B" m	Elev. "C" m	wu m	tu m	d m	wl m	W1 m	W2 m	H m	Wexcav m	Hexcav m	Length m	Area of Excav m^2	Area of Backfill m^2
Section III															
End - MML 11.4	13.02	12.72	12.85	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.03	0.33	15.9	0.62	0.62
	12.96	12.66	12.78	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.02	0.32		0.60	0.60
MML 11.41 - 12A	12.96	12.66	12.78	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.02	0.32	6.3	0.60	0.60
	12.93	12.66	12.78	0.30	0.10	0.27	0.70	2.17	1.70	0.47	2.02	0.32		0.60	0.60
MML 12A - 12A.2	12.93	12.66	12.78	0.30	0.10	0.27	0.70	2.17	1.70	0.47	2.02	0.32	25.0	0.60	0.60
	12.80	12.50	12.78	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.18	0.48		0.93	0.93
MML 12A.2 - 12A.3	12.80	12.50	12.78	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.18	0.48	21.3	0.93	0.93
	12.69	12.39	12.69	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.19	0.49		0.96	0.96
MML 12A.3 - 12A.3.1	12.69	12.29	12.69	0.30	0.10	0.40	0.70	2.30	1.70	0.60	2.29	0.59	20.2	1.18	1.18
	12.69	12.39	12.69	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.19	0.49		0.96	0.96
MML 12A.3.1 - 1A.3.1	12.69	12.29	12.69	0.30	0.10	0.40	0.70	2.30	1.70	0.60	2.29	0.59	11.0	1.18	1.18
	12.75	12.45	12.69	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.14	0.44		0.84	0.84
MML 12A.3.2 - 12A.3.	12.75	12.45	12.69	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.14	0.44	31.0	0.84	0.84
	12.90	12.60	12.89	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.18	0.48		0.94	0.94
MML 12A.3.3 - 12A.4	12.90	12.60	12.89	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.18	0.48	15.1	0.94	0.94
	12.98	12.68	12.89	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.11	0.41		0.78	0.78
MML 12A.4 - 12A.5	12.98	12.68	12.89	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.11	0.41	20.8	0.78	0.78
	13.08	12.78	13.22	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.34	0.64		1.30	1.30
MML 12A.5 - 12A.6	13.08	12.78	13.22	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.34	0.64	8.4	1.30	1.30
	13.12	12.82	13.22	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.31	0.61		1.22	1.22
MML 12A.6 - 12A.6.1	13.12	12.82	13.22	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.31	0.61	33.7	1.22	1.22
	13.12	12.95	13.22	0.30	0.10	0.17	0.70	2.07	1.70	0.37	2.17	0.47		0.91	0.91
MML 12A.6.1 - 12A.7	13.12	12.95	13.22	0.30	0.10	0.17	0.70	2.07	1.70	0.37	2.17	0.47	38.5	0.91	0.91
	13.12	13.10	13.25	0.30	0.10	0.01	0.70	1.91	1.70	0.21	2.05	0.35		0.65	0.65
MML 12A.7 - 12A.9	13.12	13.10	13.25	0.30	0.10	0.01	0.70	1.91	1.70	0.21	2.05	0.35	13.1	0.65	0.65
	13.46	13.16	13.36	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.10	0.40		0.76	0.76
MML 12A.9 - 12B	13.46	13.16	13.36	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.10	0.40	19.2	0.76	0.76
	13.53	13.16	13.36	0.30	0.10	0.38	0.70	2.28	1.70	0.58	2.11	0.41		0.77	0.77
MML 12B - 12B.1	13.53	13.16	13.36	0.30	0.10	0.38	0.70	2.28	1.70	0.58	2.11	0.41	29.2	0.77	0.77
	13.65	13.35	13.37	0.30	0.10	0.30	0.70	2.20	1.70	0.50	1.91	0.21		0.38	0.38
MML 12B.1 - 12C	13.65	13.35	13.37	0.30	0.10	0.30	0.70	2.20	1.70	0.50	1.91	0.21	34.4	0.38	0.38
	13.79	13.49	13.47	0.30	0.10	0.30	0.70	2.20	1.70	0.50	1.88	0.18		0.33	0.33
MML 12C - 12C.1	13.79	13.49	13.47	0.30	0.10	0.30	0.70	2.20	1.70	0.50	1.88	0.18	27.4	0.33	0.33
	13.65	13.35	13.60	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.15	0.45		0.87	0.87
MML 12C.1 - 12C.2	13.65	13.35	13.60	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.15	0.45	22.1	0.87	0.87
	13.55	13.11	13.26	0.30	0.10	0.44	0.70	2.34	1.70	0.64	2.05	0.35		0.66	0.66
MML 12C.2 - 12C.5	13.55	13.11	13.26	0.30	0.10	0.44	0.70	2.34	1.70	0.64	2.05	0.35	28.6	0.66	0.66
	13.98	13.08	13.26	0.30	0.10	0.90	0.70	2.80	1.70	1.10	2.08	0.38		0.71	0.71
MML 12C.5 - 12C.8	13.98	13.08	13.26	0.30	0.10	0.90	0.70	2.80	1.70	1.10	2.08	0.38	34.1	0.71	0.71
	13.55	13.25	13.32	0.30	0.10	0.30	0.70	2.20	1.70	0.50	1.97	0.27		0.50	0.50
MML 12C.8 - 12C.12	13.55	13.25	13.32	0.30	0.10	0.30	0.70	2.20	1.70	0.50	1.97	0.27	38.5	0.50	0.50
	13.35	13.05	13.24	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.09	0.39		0.75	0.75
MML 12C.12 - 13	13.35	13.05	13.24	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.09	0.39	22.0	0.75	0.75
	13.23	12.56	13.36	0.30	0.10	0.67	0.70	2.57	1.70	0.87	2.70	1.00		2.21	2.21
MML 13 - 13.1	13.23	12.56	13.36	0.30	0.10	0.67	0.70	2.57	1.70	0.87	2.70	1.00	96.9	2.21	2.21
	13.24	12.77	13.22	0.30	0.10	0.47	0.70	2.37	1.70	0.67	2.35	0.65		1.31	1.31
MML 13.1 - 13.1.1	13.24	12.77	13.22	0.30	0.10	0.47	0.70	2.37	1.70	0.67	2.35	0.65	33.6	1.31	1.31
	13.24	12.79	13.07	0.30	0.10	0.45	0.70	2.35	1.70	0.65	2.18	0.48		0.94	0.94
MML 13.1.1 - 13.1.2	13.24	12.79	13.07	0.30	0.10	0.45	0.70	2.35	1.70	0.65	2.18	0.48	30.4	0.94	0.94
	13.24	12.85	13.18	0.30	0.10	0.39	0.70	2.29	1.70	0.59	2.23	0.52		1.03	1.03
MML 13.1.2 - 13.1.3	13.24	12.85	13.18	0.30	0.10	0.39	0.70	2.29	1.70	0.59	2.23	0.52	17.8	1.03	1.03
	13.24	12.84	13.19	0.30	0.10	0.40	0.70	2.30	1.70	0.60	2.25	0.55		1.08	1.08
MML 13.1.3 -MML 14	13.24	12.84	13.19	0.30	0.10	0.40	0.70	2.30	1.70	0.60	2.25	0.55	51.4	1.08	1.08
	13.39	13.09	13.20	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.01	0.31		0.57	0.57
MML 14 - End	13.39	13.03	13.20	0.30	0.10	0.36	0.70	2.26	1.70	0.56	2.07	0.37	35.6	0.70	0.70
	13.48	13.18	13.69	0.30	0.10	0.30	0.70	2.20	1.70	0.50	2.41	0.71		1.45	1.45



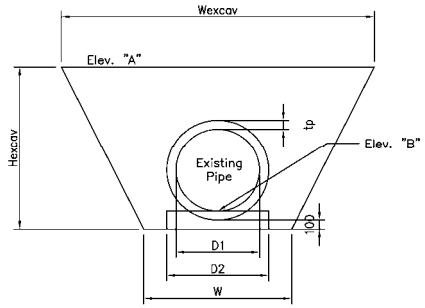


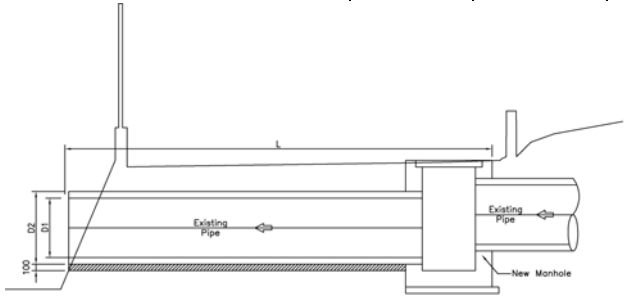
・Demolition of Existing Drainage Pipe

Drainage Serial No.	STA No.	Existing Drainage	Elev. "A" (EL.m)	Elev. "B" (EL.m)	D1 (m)	D2 (m)	tp (m)	W (m)	Hexcav (m)	Wexcav (m)	L (m)	Excavation C (m^3)	Random Backfill B (m^3)	Concrete V(m^3)
Section I														
MEL3.1	0+929	BOX CULVERT	13.23	12.36	0.4	0.7	0.2	1.3	1.1	2.4	2.4	6.0	6.5	0.427
MEL3.2	0+953	BOX CULVERT	12.63	11.97	0.5	0.8	0.2	1.3	0.9	2.2	2.4	4.3	4.9	0.469
MEL3.3	0+975	RCP	12.89	12.10	0.9	1.2	0.2	1.7	1.0	2.7	5.4	14.4	15.4	0.586
MEL3.4	0+996	RCP	13.05	12.09	0.5	0.6	0.1	1.1	1.1	2.2	5.4	13.4	13.7	0.173
MEL3.5	1+013	RCP	13.07	12.08	0.5	0.6	0.1	1.1	1.2	2.3	5.4	13.9	14.2	0.173
MEL4	1+074	RCP	13.18	11.65	0.5	0.6	0.1	1.2	1.7	2.9	5.4	26.3	26.6	0.180
MEL4.1	1+097	RCP	13.21	11.54	0.6	0.7	0.1	1.2	1.8	3.0	5.4	30.0	30.4	0.217
MEL4.2	1+104	BOX CULVERT	13.19	11.02	2.0	2.3	0.2	2.8	2.4	5.2	6.0	70.4	75.7	1.540
MEL5	1+136	RCP	13.20	11.84	0.5	0.6	0.1	1.1	1.5	2.6	5.7	22.7	23.0	0.173
MEL5.1	1+176	RCP	13.17	11.75	0.5	0.6	0.1	1.2	1.6	2.8	5.7	25.1	25.4	0.180
MEL5.2	1+195	RCP	13.13	11.83	0.5	0.6	0.1	1.2	1.5	2.7	5.7	22.0	22.3	0.180
MEL6	1+333	BOX CULVERT	13.92	11.34	1.5	1.9	0.2	2.4	2.9	5.3	7.3	108.2	111.8	1.570
										Sub Total		**356.7**	**369.9**	**5.869**

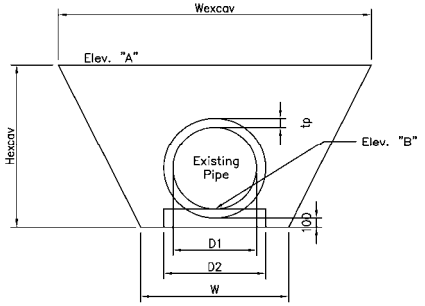


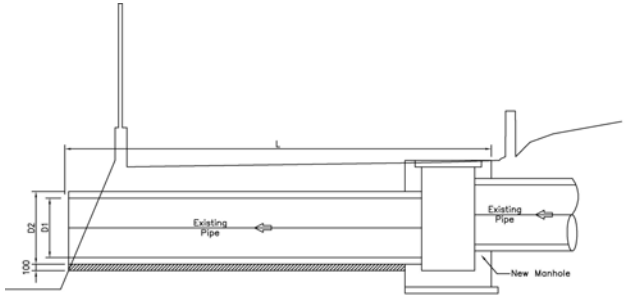
Drainage Serial No.	STA No.	Existing Drainage	Elev. "A" (EL.m)	Elev. "B" (EL.m)	D1 (m)	D2 (m)	tp (m)	W (m)	Hexcav (m)	Wexcav (m)	L (m)	Excavation C (m^3)	Random Backfill B (m^3)	Concrete V(m^3)
Section II														
3	3+049	RCP	13.84	12.61	0.5	0.6	0.1	1.1	1.4	2.5	5.9	20.4	20.7	0.173
MER7.7	3+055	RCP	13.76	12.58	0.5	0.6	0.1	1.1	1.4	2.5	5.9	19.2	19.5	0.173
MER7.8	3+061	RCP	13.67	12.60	0.5	0.6	0.1	1.1	1.2	2.3	6.0	17.2	17.5	0.173
MER7.9	3+068	RCP	13.59	12.66	0.5	0.6	0.1	1.1	1.1	2.2	6.0	14.2	14.5	0.173
MER7.10	3+074	RCP	13.51	12.54	0.5	0.6	0.1	1.1	1.1	2.2	6.1	15.3	15.6	0.173
MER7.11	3+080	RCP	13.47	12.84	0.5	0.6	0.1	1.1	0.8	1.9	6.1	8.9	9.2	0.173
MER7.12	3+086	RCP	13.45	12.40	0.5	0.6	0.1	1.1	1.2	2.3	6.1	16.9	17.2	0.173
MER7.13	3+093	RCP	13.42	12.29	0.5	0.6	0.1	1.1	1.3	2.4	6.1	18.7	19.0	0.173
MER7.14	3+100	RCP	13.40	12.20	0.5	0.6	0.1	1.1	1.4	2.5	6.2	20.6	20.9	0.173
MER7.15	3+107	RCP	13.40	12.19	0.5	0.6	0.1	1.1	1.4	2.5	6.2	20.9	21.2	0.173
MER7.16	3+113	RCP	13.39	11.95	0.5	0.6	0.1	1.1	1.6	2.7	6.2	26.8	27.1	0.173
MER7.17	3+141	RCP	13.40	12.29	0.5	0.6	0.1	1.1	1.3	2.4	6.0	17.9	18.2	0.173
MER7.18	3+157	RCP	13.41	11.72	0.5	0.6	0.1	1.1	1.9	3.0	6.0	32.7	33.0	0.173
MER7.19	3+166	RCP	13.42	12.12	0.5	0.6	0.1	1.1	1.5	2.6	6.1	22.7	23.0	0.173
MER7.20	3+172	RCP	13.42	12.11	0.5	0.6	0.1	1.1	1.5	2.6	6.1	23.0	23.3	0.173
MER7.21	3+179	RCP	13.43	12.03	0.5	0.6	0.1	1.1	1.6	2.7	6.2	25.6	25.9	0.173
MER7.22	3+185	RCP	13.43	12.23	0.5	0.6	0.1	1.1	1.4	2.5	6.2	20.7	21.0	0.173
MER7.23	3+193	RCP	13.42	12.22	0.5	0.6	0.1	1.1	1.4	2.5	6.3	21.0	21.3	0.173
MER7.24	3+197	RCP	13.42	12.23	0.5	0.6	0.1	1.1	1.4	2.5	6.3	20.7	21.0	0.173
MER7.25	3+203	RCP	13.42	12.30	0.5	0.6	0.1	1.1	1.3	2.4	6.2	18.7	19.0	0.173
MER7.26	3+210	RCP	13.41	12.20	0.5	0.6	0.1	1.1	1.4	2.5	6.2	20.8	21.1	0.173
MER7.27	3+216	RCP	13.41	12.23	0.5	0.6	0.1	1.1	1.4	2.5	6.2	20.3	20.6	0.173
MER7.28	3+222	RCP	13.41	12.14	0.5	0.6	0.1	1.1	1.4	2.5	6.2	22.4	22.7	0.173
MER7.29	3+229	RCP	13.42	12.18	0.5	0.6	0.1	1.1	1.4	2.5	6.1	21.2	21.5	0.173
MER7.30	3+235	RCP	13.42	12.17	0.5	0.6	0.1	1.1	1.4	2.5	6.1	21.5	21.8	0.173
MER7.31	3+241	RCP	13.43	12.23	0.5	0.6	0.1	1.1	1.4	2.5	6.1	20.4	20.7	0.173
MER7.32	3+248	RCP	13.41	12.25	0.4	0.6	0.1	1.1	1.3	2.4	6.1	19.4	19.7	0.170
MER7.33	3+254	RCP	13.38	11.68	0.4	0.5	0.1	1.1	1.9	3.0	6.0	33.2	33.4	0.157
MER8	3+258	RCP	13.36	10.97	1.6	1.9	0.2	2.5	2.6	5.1	6.5	85.7	88.6	1.077
MER8A	3+260	BOX CULVERT	13.35	12.01	0.5	0.8	0.2	1.3	1.6	2.9	6.5	29.3	29.9	0.476
											Sub Total	**696.3**	**708.1**	**6.388**





Drainage Serial No.	STA No.	Existing Drainage	Elev. "A" (EL.m)	Elev. "B" (EL.m)	D1 (m)	D2 (m)	tp (m)	W (m)	Hexcav (m)	Wexcav (m)	L (m)	Excavation C (m^3)	Random Backfill B (m^3)	Concrete V(m^3)
Section III														
MEL11.41	3+915	BOX CULVERT	12.94	12.49	0.3	0.6	0.2	1.1	0.7	1.8	4.5	5.4	5.7	0.336
MEL12A	3+921	RCP	12.90	11.70	0.5	0.8	0.2	1.3	1.4	2.7	4.4	17.1	17.5	0.358
MEL12A.2	3+945	RCP	12.82	12.08	0.5	0.6	0.1	1.1	0.9	2.0	4.4	7.7	8.0	0.173
MEL12A.3	3+965	RCP	12.77	12.13	0.3	0.4	0.1	1.0	0.8	1.8	4.4	6.3	6.4	0.110
MEL12A.4	4+038	RCP	12.89	12.09	0.5	0.6	0.1	1.1	1.0	2.1	4.3	8.3	8.6	0.173
MEL12A.5	4+058	BOX CULVERT	12.97	12.22	0.5	0.8	0.2	1.3	1.0	2.3	4.5	9.8	10.4	0.483
MEL12A.6	4+066	RCP	12.98	12.03	0.5	0.6	0.1	1.1	1.1	2.2	4.4	10.6	10.9	0.173
MEL12A.7	4+137	RCP	13.35	11.92	0.8	0.9	0.1	1.5	1.6	3.1	4.0	19.6	20.3	0.331
MEL12A.8	4+137	RCP	13.35	12.00	0.8	0.9	0.1	1.5	1.5	3.0	4.0	18.0	18.7	0.331
MEL12A.9	4+161	RCP	13.28	11.88	0.7	0.9	0.1	1.4	1.6	3.0	3.9	18.0	18.6	0.311
MEL12B	4+180	RCP	13.30	11.95	0.7	0.9	0.1	1.4	1.5	2.9	3.9	17.0	17.6	0.311
MEL12C	4+233	BOX CULVERT	13.45	12.03	1.8	2.2	0.2	2.7	1.7	4.4	5.7	38.6	43.4	1.840
MEL12C.1	4+260	RCP	13.33	11.64	0.9	1.1	0.1	1.6	1.9	3.5	5.7	36.6	37.6	0.424
MEL12C.2	4+282	RCP	13.28	12.47	0.5	0.6	0.1	1.1	1.0	2.1	4.9	9.7	10.0	0.173
MEL12C.3	4+289	RCP	13.30	11.97	0.5	0.6	0.1	1.2	1.5	2.7	4.9	19.5	19.8	0.189
MEL12C.4	4+307	RCP	13.31	11.99	0.2	0.3	0.1	0.9	1.5	2.4	4.6	16.1	16.2	0.081
MEL12C.5	4+311	RCP	13.32	11.70	0.5	0.6	0.1	1.1	1.8	2.9	4.6	23.5	23.8	0.173
MEL12C.6	4+319	RCP	13.37	11.92	0.3	0.4	0.1	1.0	1.6	2.6	4.6	19.2	19.3	0.110
MEL12C.7	4+328	RCP	13.44	12.17	0.3	0.4	0.1	1.0	1.4	2.4	4.5	15.5	15.6	0.110
MEL12C.8	4+345	RCP	13.35	11.91	0.5	0.6	0.1	1.1	1.6	2.7	4.5	19.3	19.6	0.173
MEL12C.9	4+354	RCP	13.34	12.13	0.5	0.6	0.1	1.1	1.4	2.5	4.5	15.1	15.4	0.173
MEL12C.10	4+368	RCP	13.34	12.26	0.5	0.7	0.1	1.2	1.3	2.5	4.5	13.6	13.9	0.200
MEL12C.11	4+374	RCP	13.31	11.99	0.5	0.8	0.2	1.3	1.6	2.9	4.6	20.3	20.7	0.358
MEL12C.12	4+384	BOX CULVERT	13.28	12.39	0.4	0.7	0.2	1.3	1.1	2.4	4.6	12.3	12.8	0.441
MEL13	4+406	RCP	13.30	11.62	0.9	1.1	0.1	1.6	1.9	3.5	6.8	43.5	44.5	0.424
MEL13.1	4+503	RCP	13.25	11.60	0.8	1.0	0.1	1.5	1.9	3.4	4.9	29.6	30.4	0.383
MEL14	4+642	BOX CULVERT	13.21	11.70	1.2	1.5	0.2	2.0	1.8	3.8	4.8	29.6	31.8	0.980
											Sub Total	**498.8**	**517.5**	**9.746**





・Length of Temporary Earth Retaining Wall

Section I

STA	Manhole No.	Length of Wall (m)		
		For Collector Pipe	For Manhole	Total
0+929 - 0+953	MML3.1 - MML3.2	3.2		3.2
0+953 - 0+975	MML3.2 - MML3.3	5.8	5.3	11.0
0+975 - 0+996	MML3.3 - MML3.4		4.9	4.9
0+996 - 1+013	MML3.4 - MML3.5		5.0	5.0
1+013 - 1+043	MML3.5 - MML3.5.1		4.6	4.6
1+043 - 1+074	MML3.5.1 - MML4.0		5.0	5.0
1+074 - 1+097	MML4.0 - MML4.1		5.5	5.5
1+097 - 1+104	MML4.1 - MML4.2		7.1	7.1
1+104 - 1+136	MML4.2 - MML5			
1+136 - 1+176	MML5 - MML5.1			
1+176 - 1+195	MML5.1 - MML5.2			
1+195 - 1+333	MML5.2 - MML6			
			Subtotal	**46.4**

Section II

STA	Manhole No.	Length of Wall (m)		
		For Collector Pipe	For Manhole	Total
3+049 - 3+080	MMR7.6 - MMR7.11	28.7	4.5	33.2
3+080 - 3+113	MMR7.11 - MMR7.16	29.9	4.6	34.5
3+113 - 3+141	MMR7.16 - MMR7.17	25.1	4.8	29.9
3+141 - 3+157	MMR7.17 - MMR7.18	14.0	7.0	21.0
3+157 - 3+193	MMR7.18 - MMR7.24	31.3	7.5	38.8
3+193 - 3+248	MMR7.24 - MMR7.32	52.4	4.5	56.9
3+248 - 3+258	MMR7.32 - MMR8	5.0	4.8	9.8
3+258 - 3+264	MMR8 - MMR8A.1.1		7.6	7.6
3+264 - 3+264	MMR8 - MMR8A.1.1		3.1	3.1
3+264 - 3+310	MMR8A.1.1 - MMR8A.1.2			
3+310 - 3+350	MMR8A.1.2 - MMR8A.1.3			
3+350 - 3+390	MMR8A.1.3 - MMR8A.1.4			
3+390 - 3+438	MMR8A.1.4 - MMR8A2			
3+438 - 3+470	MMR8A2 - MMR8A.2.1			
3+470 - 3+511	MMR8A.2.1 - MMR8A.2.2			
3+511 - 3+550	MMR8A.2.2 - MMR8A.2.3			
3+550 - 3+590	MMR8A.2.3 - MMR8A.2.4			
			Subtotal	**234.9**

Section III

STA	Manhole No.	Length of Wall (m)		
		For Collector Pipe	For Manhole	Total
3+915 - 3+921	MML11.41 - MML12A			
3+921 - 3+945	MML12A - MML12A.2			
3+945 - 3+965	MML12A.2 - MML12A.3		4.6	4.6
3+965 - 3+989	MML12A.3 - MML12A.3.1		4.3	4.3
3+989 - 4+000	MML12A.3.1 - MML12A.3.2		4.3	4.3
4+000 - 4+031	MML12A.3.2 - MML12A.3.3			
4+031 - 4+038	MML12A.3.3 - MML12A.4			
4+038 - 4+058	MML12A.4 - MML12A.5			
4+058 - 4+066	MML12A.5 - MML12A.6		1.5	1.5
4+066 - 4+098	MML12A.6 - MML12A.6.1	32.5	1.5	34.0
4+098 - 4+137	MML12A.6.1 - MML12A.7	36.5	1.1	37.6
4+137 - 4+161	MML12A.7 - MML12A.9			
4+161 - 4+180	MML12A.9 - MML12B			
4+180 - 4+209	MML12B - MML12B.1			
4+209 - 4+233	MML12B.1 - MML12C			
4+233 - 4+260	MML12C - MML12C.1	25.1		25.1
4+260 - 4+282	MML12C.1 - MML12C.2	20.4	1.5	21.9
4+282 - 4+311	MML12C.2 - MML12C.5	27.2	1.5	28.7
4+311 - 4+345	MML12C.5 - MML12C.8	32.7	1.5	34.2
4+345 - 4+384	MML12C.8 - MML12C.12			
4+384 - 4+406	MML12C.12 - MML13			
4+406 - 4+503	MML13 - MML13.1			
4+503 - 4+547	MML13.1 - MML13.1.1			
4+547 - 4+577	MML13.1.1 - MML13.1.2		4.5	4.5
4+577 - 4+595	MML13.1.2 - MML13.1.3		4.5	4.5
4+595 - 4+642	MML13.1.3 - MML14		2.2	2.2
			Subtotal	**207.2**

Lower Marikina River Drainage Facilities

3.3 Sluiceway

Summary of Quantity (Sluiceway)

BQ No.	Description	Unit	Left Bank						Right Bank			Total
			MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSR-2	MSR-3	MSR-4	
			1+104	1+223	3+945	4+221	4+406	4+503	3+157	3+255	3+438	
			1.4 x 1.4	1.5 x 1.5	2@1.2 x 1.2	1.6 x 1.6	1.0*1.0	1.2 x 1.2	1.4 x 1.4	2.0 x 1.6	1.5 x 1.5	
			L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	
BILL No. 4 - EXCAVATION AND EARTHWORKS												
4.8/3	Excavation for other structures	m^3	619.1	425.0	430.2	383.8	378.8	419.1	430.6	484.5	368.4	3,939.5
4.16/1	Random backfill	m^3	320.9	198.3	219.5	136.4	179.7	212.6	234.4	237.8	221.1	1,960.7
	Disposal Material	m^3	298.2	226.7	210.7	247.4	199.1	206.5	196.2	246.7	147.3	1,978.8
BILL No. 5 - CONCRETE												
5.11/1	Reinforcement Grade 275	t	6.252	4.948	8.401	6.201	5.257	5.609	5.736	5.551	6.816	54.771
5.22/4	Concrete in sheet pile copings	m^3	2.160	2.160	2.633	2.295	13.061	2.160	2.160	2.408	13.124	42.161
5.22/6	Concrete in parapet walls PW Type 1	m^3	0.941	0.941	1.162	0.941	0.902	0.845	0.902	0.902	0.922	8.458
5.22/15	Filler concrete (Class B)	m^3	1.011		1.547	0.900	1.203	1.126	1.056	1.090	0.956	8.889
5.22/18	Concrete in Gravity Wall	m^3		2.129								2.129
5.22/20	Concrete in base type A for concrete block retaining wall	m^3	0.484		0.627	0.506	0.440	0.462	0.484	0.550	0.495	4.048
5.22/22	Concrete in partition for concrete block wall	m^3	1.640		2.200	2.200	2.200	2.200	1.910	1.910	2.200	16.460
5.22/23	Backfill concrete for concrete block retaining wall	m^3	0.598		0.969	0.529	0.708	0.664	0.616	0.640	0.567	5.291
5.22/24	Top concrete for concrete block retaining wall	m^3	0.229		0.302	0.244	0.212	0.223	0.233	0.265	0.234	1.942
5.22/27	Concrete in sluice structures	m^3	66.367	51.874	89.546	65.668	44.443	59.314	60.669	58.373	61.684	557.938
5.23/1	Leveling concrete	m^3	5.206	4.465	6.541	4.828	3.643	3.980	4.391	3.888	4.305	41.247
	Form work											
	Concrete in sheet pile copings	m^2	8.900	8.900	10.700	9.350	40.960	8.900	8.900	9.800	41.270	147.680
	Concrete in parapet walls PW Type 1	m^2	7.923	7.923	10.088	8.244	7.923	7.442	7.923	7.923	8.083	73.472
	Concrete in Gravity Wall	m^2		4.074								4.074
	Concrete in base type A for concrete block retaining wall	m^2	1.870		2.390	1.950	1.710	1.790	1.870	2.110	1.910	15.600
	Concrete in partition for concrete block wall	m^2	8.237		11.036	11.036	11.036	11.036	9.597	9.597	11.036	82.611
	Backfill concrete for concrete block retaining wall	m^2	6.006		9.695	5.272	7.165	6.697	6.203	6.663	5.909	53.610
	Top concrete for concrete block retaining wall	m^2	0.977		1.267	1.032	0.905	0.947	0.990	1.118	1.011	8.247
	Concrete in sluice structures	m^2	196.404	164.348	209.518	191.656	150.850	173.629	175.225	166.658	189.640	1,617.928
	Leveling concrete	m^2	3.840	3.500	3.770	3.500	3.230	3.380	3.440	2.860	3.147	30.667
	Supporting Work	m^2	11.580	11.771	17.900	15.140	5.849	8.452	11.580	18.914	13.283	114.469
	Scaffolding Work	m^2	90.460	64.950	75.485	76.099	55.998	54.328	90.246	96.441	92.137	696.144
	Grout Pipe h=500mm	no	1	1		1			1	1	1	6
	h=800mm	no	1	1		1			1	1	1	6
	h=450mm	no			1		1	1				3
	h=750mm	no			1		1	1				3

BQ No.	Description		Unit	Left Bank						Right Bank			Total
				MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSR-2	MSR-3	MSR-4	
				1+104	1+333	3+945	4+233	4+406	4+503	3+157	3+258	3+438	
				1.4 x 1.4	1.5 x 1.5	2@1.2 x 1.2	1.6 x 1.6	1.0*1.0	1.2 x 1.2	1.4 x 1.4	2.0 x 1.6	1.5 x 1.5	
				L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	
	Expansion Joint and Flexible Joint												
	Flexible Joint	1.0 x 1.0	no					1					1
		1.2 x 1.2	no			2			1				3
		1.4 x 1.4	no	1						1			2
		1.5 x 1.5	no		1							1	2
		1.6 x 1.6	no				1						1
		1.8 x 1.3	no	1									1
		1.8 x 1.1	no					1					1
		1.8 x 1.5	no						1				1
		2.0 x 1.1	no							1			1
		2.0 x 1.6	no								1		1
		2.1 x 1.0	no		1								1
		2.1 x 1.2	no									1	1
		2.2 x 1.3	no				1						1
		2.6 x 0.5	no								1		1
		3.5 x 1.0	no			1							1
	Water Stop		m	5.9	5.0	6.4	5.6	4.3	5.6	4.9	5.5	5.3	48.5
	Cork Filler		m^2	11.6	10.4	11.0	9.6	7.6	9.6	10.0	11.2	12.3	93.3
	Joint Sealant		m	28.2	26.7	30.8	29.1	22.7	26.8	26.2	28.8	28.2	247.5
	Joint Filler (Elastite) t=10mm	Partition Wall	m^2	6.6		8.8	8.8	8.8	8.8	7.6	7.6	8.8	65.8
		Gravity Wall			0.9								0.9
BILL No. 6 - PILING													
6.4/1	Type IIIw U-shape	W=600 136.0kg/m											
		L=6.0~9.0m	m									110.5	110.5
6.4/5	Type 10H Hat-shape	W=900 96.0kg/m											
		L=2.0~4.0m	m	12.0	22.0	18.0	14.0	60.0	14.0	14.0	14.0	16.0	184.0
		L=4.0~6.0m	m	22.0	132.0	55.0		55.0	73.0	18.0		50.0	405.0
		L=6.0~9.0m	m	145.0		42.0	90.0	26.0	60.0	60.0	92.5	60.0	575.5
		L=9.0~12.0m	m			80.0	105.0	72.0		72.0	80.0		409.0
6.4/6	Type 10H Hat-shape with flexible joint	**L=2.0~4.0m**	m	17.0	11.0								28.0
		L=4.0~6.0m	m		11.0	11.0		11.0	11.0			10.0	54.0
		L=6.0~9.0m	m	12.0			12.0		15.0	12.0	12.0	12.0	75.0
		L=9.0~12.0m	m			20.0	21.0	18.0		18.0	20.0		97.0

BQ No.	Description		Unit	Left Bank						Right Bank			Total
				MSL-1	MSL-2	MSL-3	MSL-4	MSL-5	MSL-6	MSR-2	MSR-3	MSR-4	
				1+104	1+333	3+945	4+233	4+406	4+503	3+157	3+258	3+438	
				1.4 x 1.4	1.5 x 1.5	2@1.2 x 1.2	1.6 x 1.6	1.0*1.0	1.2 x 1.2	1.4 x 1.4	2.0 x 1.6	1.5 x 1.5	
				L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	L=5.7	
6.4/19	Type 25H Hat-shape	W=900 126.0kg/m											
		L=2.0~4.0m	m		14.2								14.2
		L=4.0~6.0m	m	22.2									22.2
		L=6.0~9.0m	m		90.0	32.3	33.2	31.2	24.6	24.4	30.1	30.7	296.4
		L=9.0~12.0m	m	120.0		132.0	132.0	126.0	126.0	126.0	126.0	105.0	993.0
6.4/20	Type 25H Hat-shape with flexible joint												
		L=2.0~4.0m	m										
		L=4.0~6.0m	m										
		L=6.0~9.0m	m		15.0								15.0
		L=9.0~12.0m	m	20.0		22.0	22.0	21.0	21.0	21.0	21.0	21.0	169.0
6.4/25	Extra-over cost of installing sheet piles beneath bridges and HV cables	Type 10H Hat-shape	m				82.5				70.0		152.5
		Type 25H Hat-shape	m				66.0				63.0		129.0
BILL No. 7 - PROTECTION WORKS													
7.5/1	Gravel bedding and backfill		m^3	2.966	0.855	4.788	2.889	3.516	3.343	3.199	3.395	3.020	27.971
7.8/1	Gabion mattresses	t=500mm	m^3	339.8	223.0	233.5	237.6	260.0	246.4	221.0	221.0	170.6	2152.9
	Filter Fabric	t=10mm	m^2	415.6	287.8	293.8	297.4	308.0	308.4	279.0	279.0	209.7	2678.7
7.10/1	Precast concrete block retaining wall	Concrete	m^3	0.903		1.491	0.756	1.113	1.029	0.924	0.945	0.840	8.001
		Formwork	m^2	31.390		51.830	26.280	38.690	35.770	32.120	32.850	29.200	278.130
BILL No. 8 - DRAINAGE													
8.6/3	Rectangular aluminum flap gate 1000 x 1000		no					1					1
8.6/4	Rectangular aluminum flap gate 1200 x 1200		no			2			1				3
8.6/5	Rectangular aluminum flap gate 1400 x 1400		no	1						1			2
8.6/6	Rectangular aluminum flap gate 1500 x 1500		no		1							1	2
8.6/7	Rectangular aluminum flap gate 1600 x 1600		no				1						1
8.6/8	Rectangular aluminum flap gate 2000 x 1600		no								1		1
BILL No. 11 - STRUCTURAL AND MISCELLANEOUS METALWORK													
11.10/1	Trash screen 1400 x 1400		no					1					1
11.10/2	Trash screen 1600 x 1600		no						1				1
11.10/3	Trash screen 1800 x 1800		no	1						1			2
11.10/4	Trash screen 1900 x 1900		no		1							1	2
11.10/5	Trash screen 2000 x 2000		no				1						1
11.10/6	Trash screen 2400 x 2000		no								1		1
11.10/7	Trash screen 3100 x 1600		no			1							1

Lower Marikina River Drainage Facilities

3.3 Sluiceway

(1) LEFT BANK MSL-1 STA 1+104

Sluiceway STA 1+104 MSL-1 1.4*1.4				(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation
	Excavation for Structures	**m3**	**619.1**	
4.8/	**for Sluiceway Structure**	m3	434.9	From Quantity Calculation of Earth Work
	for Gabion Mattress	m3	184.2	10.50 × 13.600 × 0.50 × 2.00 + 23.65 × 3.50 × 0.50
	Backfill for Structure			
4.8/	Random Backfill Excavated Material	m3	320.9	
4.8/	Disposal Material	m3	298.2	
				Sluiceway STA 1+104 MSL-1 1.4*1.4

Sluiceway STA 1+104 MSL-1 1.4*1.4					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
No.5	**Concrete (Total)**	**Class A**	**m3**	**69.468**	
5.22/4	**Concrete in sheet pile copings**		**m3**	**2.160**	0.600 × 0.250 × 5.4 + 0.500 × 0.250 ×(5.40 + 5.40)
5.22/6	**Concrete in parapet walls PW Type 1**	**L=4.900m**	**m3**	**0.941**	
	Parapet Wall	PC1	m3	0.941	0.192 × 4.900
5.22/27	**Concrete in sluice structures**		**m3**	**66.367**	
	a.Box Culvert		**m3**	**24.445**	
	BC-C1	**L=1.600m**	m3	8.168	5.105 × 1.600
		Deduction	m3	-0.998	-(2.850 × 0.350)
	BC-C2	**L=2.600m**	m3	6.760	2.600 × 2.600
	BC-C3	**L=1.500m**	m3	5.768	3.845 × 1.500
	BC-C4	**L=0.500m**	m3	4.409	8.818 × 0.500
	BC-C4	**L=2.700m**	m3	0.338	0.500 × 0.500 × 0.5 × 2.700
	b.Breast wall (River Side)		**m3**	**9.878**	
	BWR - C1	**L=1.000m**	m3	6.800	3.400 × 1.000 × 2
	BWR - C2	**L=2.700m**	m3	2.754	1.700 × 0.600 × 2.700
	BWR - C3	**L=2.700m**	m3	0.324	0.200 × 0.600 × 2.700
	c.Breast wall (Land Side)		**m3**	**4.810**	
	BWL - C1	**L=1.000m**	m3	4.000	2.000 × 1.000 × 2
	BWL - C2	**L=2.400m**	m3	0.675	0.500 × 0.500 × 2.700
	BWL - C3	**L=2.700m**	m3	0.135	0.100 × 0.500 × 2.700
	d.Wing wall		**m3**	**16.827**	
	WW - C1	**L=4.800m**	m3	13.632	2.840 × 4.800
	WW - C1'	**L=1.100m**	m3	2.915	2.650 × 1.100
	WW - C3	**L=2.800m**	m3	0.280	0.200 × 0.500 × 2.800
	e. U-shaped Channel		**m3**	**10.253**	
	UC- C1	**L=7.000m**	m3	10.253	(2.170 + 1.350)× 0.500 × 7.000
	f. Infilled Concrete	**t=150**	**m3**	**0.154**	1.025 × 0.150
					Sluiceway STA 1+104 MSL-1 1.4*1.4

Sluiceway STA 1+104 MSL-1 1.4*1.4 （Unit: Per Place ）

BQ No.	Description		Unit	Quantity	Calculation
	Formwork (Total)	**Class**	**m2**	**213.227**	
	Concrete in sheet pile copings		**m2**	**8.900**	
	Breast Wall (River Side)	**w=5.400m**	m2	3.000	0.250 ×(5.400 + 0.600)× 2
	Seepage cut off Wall	**w=5.400m**	m2	2.950	0.250 ×(5.400 + 0.500)× 2
	Breast Wall (Land Side)	**w=5.400m**	m2	2.950	0.250 ×(5.400 + 0.500)× 2
	Concrete in parapet walls PW Type 1	**L=4.700m**	**m2**	**7.923**	
	PW-F1		m2	3.779	0.804 × 4.700
	PW-F2		m2	3.760	0.800 × 4.700
	PW-F3 End		m2	0.384	0.192 × 2
	Concrete in sluice structures		**m2**	**196.404**	
	a.Box Culvert	**L=5.700m**	**m2**	**69.640**	
	BC F1	**L=5.350m**	m2	22.390	4.185 × 5.350
	BC F2	**L=2.100m**	m2	9.030	2.150 × 2.100 × 2
	BC F3	**L=0.900m**	m2	3.420	1.900 × 0.900 × 2
	BC F4	**L=1.000m**	m2	3.800	1.900 × 1.000 × 2
	BC F5		m2	2.850	2.850
	BC F6	**L=0.350m**	m2	3.575	2.250 × 0.350 × 2 + 2.000
	BC F7		m2	17.620	8.810 × 2
	BC F8	**L=0.500m**	m2	3.250	3.250 × 0.500 × 2
	BC F9	**L=2.400m**	m2	0.360	0.150 × 2.400
	BC F10	**L=2.400m**	m2	0.240	0.100 × 2.400
	BC F11	**L=2.700m**	m2	1.890	0.700 × 2.700
	BC F12	**L=2.700m**	m2	0.405	0.150 × 2.700
	BC F13	**L=2.700m**	m2	0.810	0.300 × 2.700
	b.Breast Wall (River Side)			**37.580**	
	BWR - F1	**L=1.000m**	m2	9.000	4.500 × 1.000 × 2
	BWR - F2	**L=1.000m**	m2	7.200	3.600 × 1.000 × 2
	BWR - F3	**L=1.000m**	m2	1.400	0.700 × 1.000 × 2
	BWR - F4	**L=4.700m**	m2	0.940	0.200 × 4.700
	BWR - F5	**L=2.700m**	m2	7.650	4.500 × 2.700 − 2.250 × 2.000
	BWR - F6		m2	4.590	4.590
	BWR - F7 End		m2	6.800	3.400 × 2
					Sluiceway STA 1+104 MSL-1 1.4*1.4

Sluiceway STA 1+104 MSL-1 1.4*1.4 (Unit: Per Place)

BQ No.	Description		Unit	Quantity	Calculation
	c.Breast Wall (Land Side)			**22.680**	
	BWL - F1	**L=1.000m**	m2	6.000	3.000 × 1.000 × 2
	BWL - F2	**L=1.000m**	m2	4.800	2.400 × 1.000 × 2
	BWL - F3	**L=1.000m**	m2	1.000	0.500 × 1.000 × 2
	BWL - F4	**L=4.400m**	m2	0.440	0.100 × 4.400
	BWL - F5	**L=2.400m**	m2	5.240	3.000 × 2.400 − 1.400 × 1.400
	BWL - F6		m2	1.200	1.200
	BWL - F7 End		m2	4.000	2.000 × 2
	d. Wing Wall			**50.692**	
	WW- F1	**L=4.800m**	m2	22.080	2.300 × 4.800 × 2
	WW- F1'	**L=1.100m**	m2	4.796	2.180 × 1.100 × 2
	WW- F2	**L=4.800m**	m2	17.280	1.800 × 4.800 × 2
	WW- F2'	**L=1.100m**	m2	3.696	1.680 × 1.100 × 2
	WW- F3 End		m2	2.840	2.840
	e. U-shaped Channel			**15.812**	
	UC- F1	**L=7.000m**	m2	6.846	1.956 × 0.500 × 7.000
	UC- F2	**L=7.000m**	m2	5.446	1.556 × 0.500 × 7.000
	UC- F3 End		m2	2.170	2.170
	UC- F4 End		m2	1.350	1.350
	Supporting Work		**m3**	**11.580**	
		L=5.350m	m3	10.005	(1.400 × 1.400 −(4 × 0.150 × 0.150))× 5.350
		L=0.350m	m3	1.575	2.000 × 2.250 × 0.350
	Scaffolding work				
	Sluiceway		**m2**	90.460	
	Box Culvert	L=2.100m	m2	22.030	2.150 × 2.100 × 2 + 3.250 × 1.000 × 4
	Breast Wall (River Side)	L=4.700m	m2	28.350	4.500 × 4.700 + 3.600 × 1.000 × 2
	Breast Wall (Land Side)	L=4.400m	m2	18.000	3.000 × 4.400 + 2.400 × 1.000 × 2
	Wing Wall	L=4.800m	m2	22.080	2.300 × 4.800 × 2
5.11/1	**Reinforcement Grade 275**		ton	**6.252**	69.468 × 90.000 kg/m3
	Grout Pipe	**h=500mm**	no	1	
		h=800mm	no	1	
					Sluiceway STA 1+104 MSL-1 1.4*1.4

Sluiceway STA 1+104 MSL-1 1.4*1.4 （Unit: Per Place ）

BQ No.	Description		Unit	Quantity	Calculation
5.23/1	**Leveling concrete**	**Class F**	**m3**	**5.206**	
	a. Box Culvert, Breast Wall			**1.433**	
	BC-LC1	**L=1.000m**	m3	0.490	4.900 × 1.000 × 0.100
	BC-LC2	**L=2.100m**	m3	0.483	2.300 × 2.100 × 0.100
	BC-LC3	**L=1.000m**	m3	0.460	4.600 × 1.000 × 0.100
	b. Wing Wall			**1.830**	
	WW-LC1	**L=5.400m**	m3	1.620	3.000 × 5.400 × 0.100
	WW-LC2	**L=0.700m**	m3	0.210	3.000 × 0.700 × 0.100
	c. U-shaped Channel				
	UC-LC1	**L=6.700m**	m3	**1.943**	2.900 × 6.700 × 0.100
	Formwork	**Class**	**m2**	**3.840**	
	a. Box Culvert, Breast Wall			**0.820**	
	BC-LF1	**L=1.000m**	m2	0.200	1.000 × 0.100 × 2
	BC-LF2	**L=2.100m**	m2	0.420	2.100 × 0.100 × 2
	BC-LF3	**L=1.000m**	m2	0.200	1.000 × 0.100 × 2
	b. Wing Wall		m2	**1.680**	4.600 × 0.100
	WW-LF1	**L=5.400m**	m2	1.080	5.400 × 0.100 × 2
	WW-LF2	**L=0.700m**	m2	0.600	0.700 × 0.100 × 2 + 2.300 × 0.100 × 2
	c. U-shaped Channel				
	UC-LF1	**L=6.700m**	m2	**1.340**	6.700 × 0.100 × 2

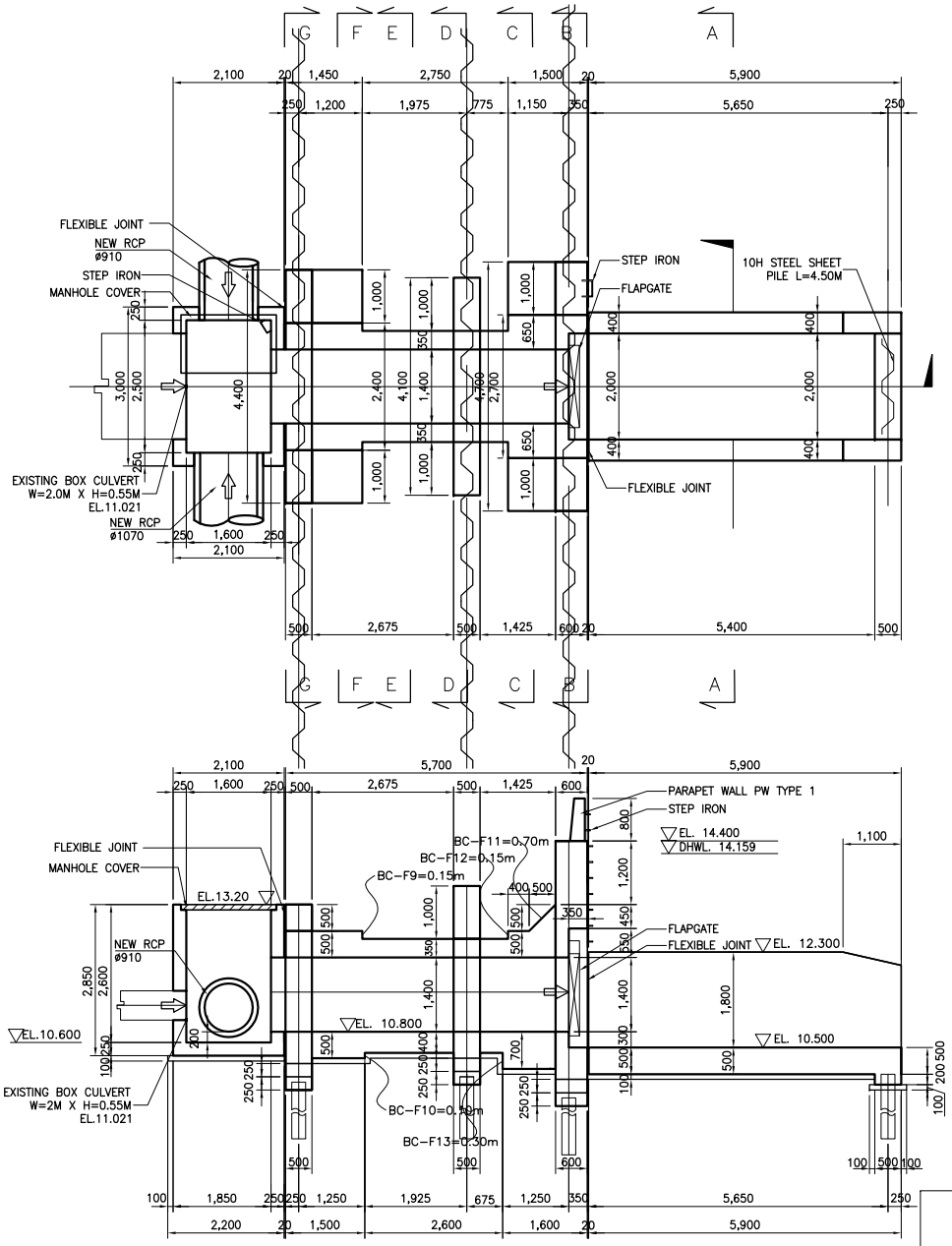
Sluiceway STA 1+104 MSL-1 1.4*1.4					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	Concrete Block Retaining Wall L=4.400m				
	Concrete (Total)	m3	**6.191**		
5.22/15	**Filler concrete (Class B) CB-C1**	m3	1.011	0.435 × 4.400 - 0.903	
5.22/20	**Concrete in base type A for concrete block retaining wall CB-C2**	m3	0.484	0.11 × 4.400	
5.22/23	**Backfill concrete for concrete block retaining wall** CB-C3	m3	0.598	0.136 × 4.400	
5.22/24	**Top concrete for concrete block retaining wall** CB-C4	m3	0.229	0.052 × 4.400	
7.5/1	**Gravel bedding and backfill**	m3	2.966	0.674 × 4.400	
7.10/1	**Precast concrete block retaining wall**	no	43	(1.150 × 4.400)/ 0.3 × 0.4	
		m3	0.903	0.021 × 43	*Surface Area of 1 Concrete Block
				* Volume of 1 Concrete Block	
	Formwork (Total)	**m2**	**40.243**		
	Concrete in base type A for concrete block retaining wall	m2	1.870	(0.300 + 0.100)× 4.400 + 0.11	
	Backfill concrete for concrete block retaining wall	m2	6.006	1.334 × 4.400 + 0.136	
	Top concrete for concrete block retaining wall	m2	0.977	(0.110 + 0.100)× 4.400 +(0.500 + 0.551)/ 2.00 × 0.10	
	Precast concrete block retaining wall	m2	31.390	0.730 × 43	
				* Form Area of 1 Concrete Block	
5.22/22	**Concrete in partition for concrete block wall**				
	Concrete t=500mm	**m3**	1.640	1.640 × 0.500 × 2	
	H=1500mm				
	Form work	**m2**	**8.237**		
	PT- F1 End	m2	6.560	1.640 × 2 × 2	
	PT- F2	m2	1.677	1.677 × 0.500 × 2	
	Joint Filler (Elastite) **t=10mm**	m2	6.6	1.640 × 2 × 2	
					Sluiceway STA 1+104 MSL-1 1.4*1.4

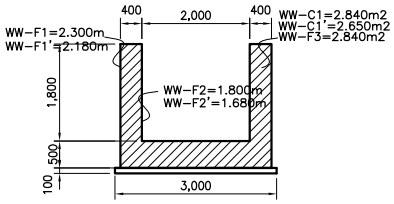
Sluiceway STA 1+104 MSL-1 1.4*1.4					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	Expansion Joint and Flexible Joint				
	Flexible Joint				
	b. Wing Wall	1.8 x 1.3	no	1	
	c. Breast Wall Land Side	1.4 x 1.4	no	1	
	Water Stop				
	a. U-shaped Channel	W=150 t=5	m	5.9	(1.556 + 0.200)× 2 + 2.000 + 0.350
	Cork Filler		**m2**	**11.6**	
	a. U-shaped Channel	t=20	m2	2.169	(1.556 × 0.350)× 2 +(2.000 + 0.700)× 0.400
	b. Wing Wall	"	m2	2.840	(1.800 × 0.400)× 2 +(2.000 + 0.800)× 0.500
	c. Breast Wall Land Side	"	m2	6.590	2.850 × 3.000 - 1.400 × 1.400
	Joint Sealant		**m2**	**28.2**	
	a. U-shaped Channel	w=0.125 t=20	m	9.468	(1.556 + 0.400)× 2 + 2.000 + 0.700 + 1.556 + 1.300
	b. Wing Wall	"	m	7.000	(1.800 + 0.500)× 2 + 2.000 + 0.400
	c. Breast Wall Land Side	"	m	11.700	(2.850 + 3.000)× 2
No. 6 - PILING					
6.4/5	**Type 10H Hat-shape SSP**	**W=900 96.0kg/m**			
		L=2.0~4.0m	**m**	**12.0**	
		L=4.0~6.0m	**m**	**22.0**	
		L=6.0~9.0m	**m**	**145.0**	
		L=9.0~12.0m	**m**	**0.0**	
	Wing Wall	L=2.000m	m	4.000	2 × 2.000
	Seepage cut off Wall	L=2.000m	m	8.000	4 × 2.000
		L=6.000m	m	60.000	10 × 6.000
	Breast Wall (Land Side)	L=5.500m	m	22.000	4 × 5.500
		L=8.500m	m	85.000	10 × 8.500
6.4/19	**Type 25H Hat-shape SSP**	**W=900 126.0kg/m**			
		L=2.0~4.0m	**m**	**0.0**	
		L=4.0~6.0m	**m**	**22.2**	
		L=6.0~9.0m	**m**	**0.0**	
		L=9.0~12.0m	**m**	**120.0**	
	Breast Wall (River Side)	L=5.550m	m	22.200	4 × 5.550
		L=10.000m	m	120.000	12 × 10.000
					Sluiceway STA 1+104 MSL-1 1.4*1.4

Concrete (Total)						(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation	
	SSP with flexisble joint					
6.4/6	**Type 10H Hat-shape**	**L=2.0~4.0m**	**m**	**17.0**		
		L=4.0~6.0m	**m**	**0.0**		
		L=6.0~9.0m	**m**	**12.0**		
		L=9.0~12.0m	**m**	**0.0**		
		L=6.000m	m	12.000	2 × 6.000	
		-L=8.500m	m	17.000	2 × 8.500	
6.4/20	**Type 25H Hat-shape**	**L=2.0~4.0m**	**m**	**0.0**		
		L=4.0~6.0m	**m**	**0.0**		
		L=6.0~9.0m	**m**	**0.0**		
		L=9.0~12.0m	**m**	**20.0**		
		L=10.000m	m	20.000	2 × 10.000	
No. 7 - PROTECTION WORKS						
7.8/1	Gabion mattresses	**t=500mm**	m2	339.8	10.00 × 13.600 × 2.00 + 22.60 × 3.00	
	Filter Fabric	**t=10mm**	m2	415.6	11.00 × 14.600 × 2 + 23.60 × 4.00	
No. 8 - DRAINAGE						
8.6/5	Rectangular aluminum flap gate 1400 x 1400	Aluminum	no	1		
No. 11 - STRUCTURAL AND MISCELLANEOUS METALWORK						
11.10/3	Trash screen 1800 x 1800	for 1.4m*1.4m	no	1		
			Kg	**109**		
		18-FB 75*4.5*1800	Kg	86.000	2.650 × 1.800 × 18	
		5- ϕ 16*1800	Kg	15.000	1.580 × 1.800 × 5	
		Anchor Bar ϕ 16	Kg	8.000	1.580 × 0.500 × 5 × 2	
						Sluiceway STA 1+104 MSL-1 1.4*1.4

Quantity Calculation Of Earth Work

Location	Distance	Excavation			Backfill					
		Area	Average Area	Volume	Area	Average Area	Volume			
0		0								
+11.0	11	16.8	8.4	92.4	10	5	55			
+15.8	4.8	16.8	16.8	80.6	10	10	48			
+15.8		46.2			37.3					
+17.4	1.6	46.2	46.2	73.9	37.3	37.3	59.7			
+17.4		39.4			34.6					
+20.0	2.6	39.4	39.4	102.4	34.6	34.6	90			
+22.0	2	26.4	32.9	65.8	19.2	26.9	53.8			
+23.5	1.5	0	13.2	19.8	0	9.6	14.4			
Total				434.9			320.9			


G F E D C B A
FLEXIBLE JOINT
NEW RCP ø910
STEP IRON
MANHOLE COVER
EXISTING BOX CULVERT W=2.0M X H=0.55M EL.11.021
NEW RCP ø1070
10H STEEL SHEET PILE L=4.50M
FLAPGATE
FLEXIBLE JOINT
PARAPET WALL PW TYPE 1
EL. 14.400
DHWL. 14.159
EL.13.20
BC-F11=0.70m
BC-F12=0.15m
BC-F9=0.15m
EL. 12.300
EL. 10.800
EL. 10.500
EL.10.600
BC-F10=0.30m
BC-F13=0.30m
EXISTING BOX CULVERT W=2M X H=0.55M EL.11.021



SECTION A-A(Wing wall)
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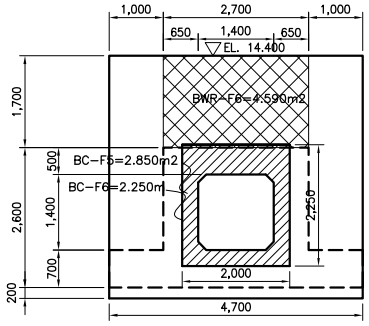

SECTION B-B
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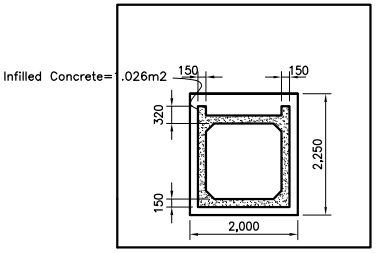
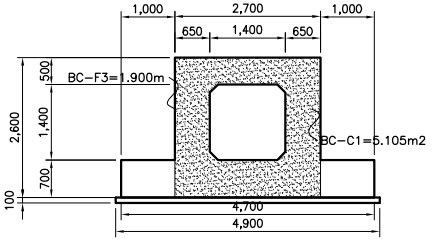
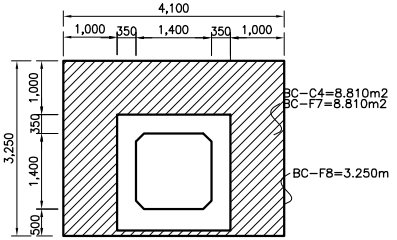


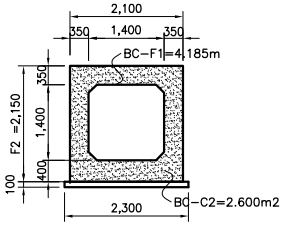
SECTION B-B
SCALE 1:100



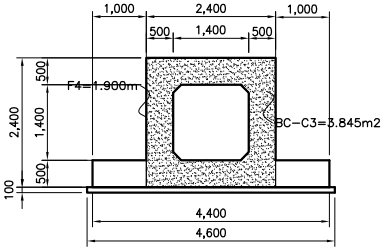
SECTION C-C
SCALE 1:100



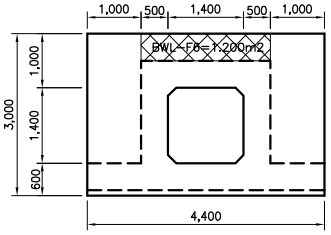
SECTION D-D
SCALE 1:100



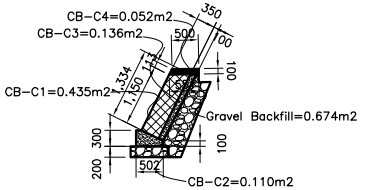
SECTION E-E
SCALE 1:100



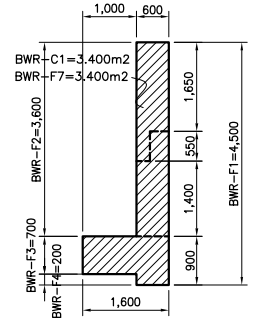
SECTION F-F
1:100



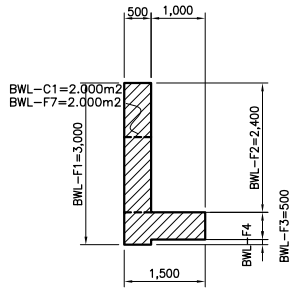
SECTION G-G
SCALE 1:100



Concrete Block Retaining Wall
SCALE 1:100



Breast Wall (River Side)
SCALE 1:100



Breast Wall (Land Side)
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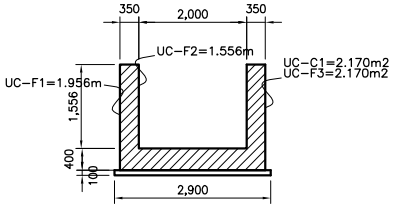
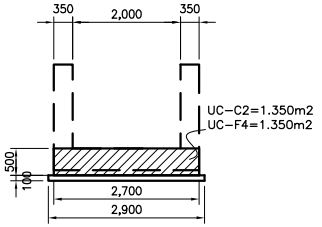
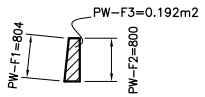


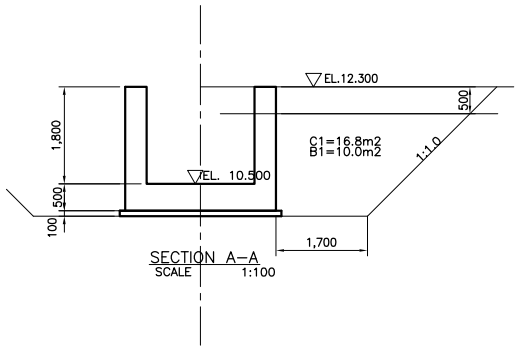
U-shaped Channel(1)
SCALE 1:100

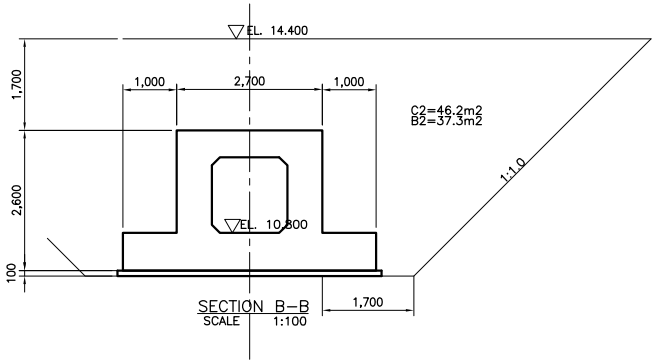


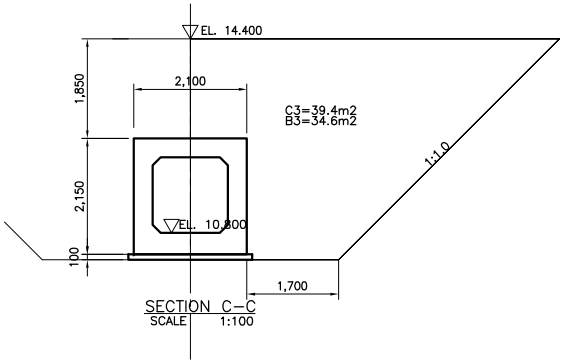
U-shaped Channel(2)
SCALE 1:100

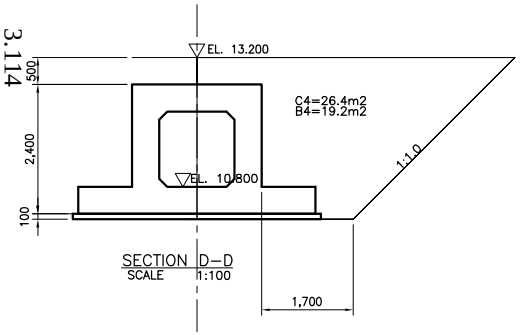


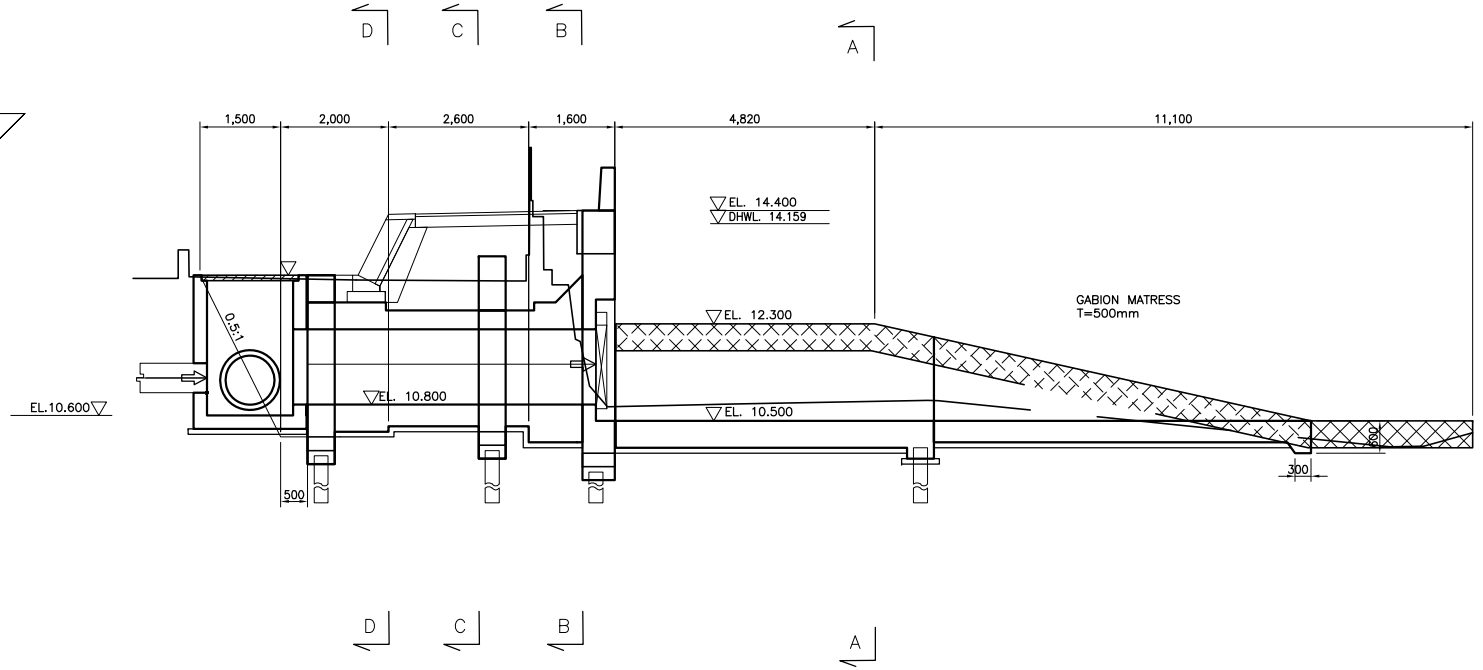
Parapet Wall
SCALE 1:100


EL.12.300
500
1,800
C1=16.8m2
B1=10.0m2
1:1.0
EL. 10.500
500
100
1,700
SECTION A–A
SCALE 1:100


EL. 14.400
1,700
1,000
2,700
1,000
C2=46.2m2
B2=37.3m2
1:1.0
2,600
EL. 10.800
100
1,700
SECTION B–B
SCALE 1:100


EL. 14.400
1,850
2,100
C3=39.4m2
B3=34.6m2
1:1.0
2,150
EL. 10.800
100
1,700
SECTION C–C
SCALE 1:100


EL. 13.200
500
C4=26.4m2
B4=19.2m2
1:1.0
2,400
EL. 10.800
100
1,700
SECTION D–D
SCALE 1:100


D
C
B
A
1,500
2,000
2,600
1,600
4,820
11,100
EL. 14.400
DHWL. 14.159
0.5:1
EL. 12.300
GABION MATRESS
T=500mm
EL.10.600
EL. 10.800
EL. 10.500
500
300
500
D
C
B
A

3.114

Lower Marikina River Drainage Facilities

3.3 Sluiceway

(2) LEFT BANK MSL-2 STA 1+323

Sluiceway STA 1+323 MSL-2 1.5*1.5				(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation
	Excavation for Structures	**m3**	**425.0**	
4.8/	**for Sluiceway Structure**	m3	315.8	From Quantity Calculation of Earth Work
	for Gabion Mattress	m3	109.2	10.50 × 10.400 × 0.50 × 2.00
	Backfill for Structure			
4.8/	Random Backfill Excavated Material	m3	198.3	
4.8/	Disposal Material	m3	226.7	

Sluiceway STA 1+323 MSL-2 1.5*1.5

Sluiceway STA 1+323 MSL-2 1.5*1.5					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
No.5	**Reinforced Concrete (Total)**	**Class A**	**m3**	**54.975**	
5.22/4	**Concrete in sheet pile copings**		**m3**	**2.160**	0.600 × 0.250 × 5.4 + 0.500 × 0.250 ×(5.40 + 5.40)
5.22/6	**Concrete in parapet walls PW Type 1**	**L=4.900m**	**m3**	**0.941**	
	Parapet Wall	PC1	m3	0.941	0.192 × 4.900
5.22/27	**Concrete in sluice structures**		**m3**	**51.874**	
	a.Box Culvert		**m3**	**22.875**	
	BC-C1	**L=1.600m**	m3	8.568	5.355 × 1.600
		Deduction	m3	-0.956	-(2.730 × 0.350)
	BC-C2	**L=1.800m**	m3	4.941	2.745 × 1.800
	BC-C3	**L=1.600m**	m3	6.474	4.046 × 1.600
	BC-C4	**L=0.500m**	m3	3.510	7.020 × 0.500
	BC-C4	**L=2.700m**	m3	0.338	0.500 × 0.500 × 0.5 × 2.700
	b.Breast wall (River Side)		**m3**	**8.306**	
	BWR - C1	**L=1.000m**	m3	6.200	3.100 × 1.000 × 2
	BWR - C2	**L=2.700m**	m3	1.944	1.200 × 0.600 × 2.700
	BWR - C3	**L=2.700m**	m3	0.162	0.100 × 0.600 × 2.700
	d.Breast wall (Land Side)		**m3**	**5.380**	
	BWL - C1	**L=1.000m**	m3	4.300	2.150 × 1.000 × 2
	BWL - C2	**L=2.500m**	m3	0.945	0.700 × 0.500 × 2.700
	BWL - C3	**L=2.500m**	m3	0.135	0.100 × 0.500 × 2.700
	c.Wing wall		**m3**	**9.589**	
	WW - C1	**L=5.800m**	m3	9.309	1.605 × 5.800
	WW - C1'	**L=0.000m**	m3	0.000	0.000 × 0.000
	WW - C3	**L=2.800m**	m3	0.280	0.200 × 0.500 × 2.800
	d. U-shaped Channel		**m3**	**5.561**	
	UC- C1	**L=4.200m**	m3	5.561	(1.605 + 1.650)× 0.500 × 4.200
	e. Infilled Concrete	**t=150**	**m3**	**0.163**	1.084 × 0.150
					Sluiceway STA 1+323 MSL-2 1.5*1.5

Sluiceway STA 1+323 MSL-2 1.5*1.5 (Unit: Per Place)

BQ No.	Description		Unit	Quantity	Calculation
	Formwork (Total)	**Class**	**m2**	**185.245**	
	Concrete in sheet pile copings		**m2**	**8.900**	
	Breast Wall (River Side)	**w=5.400m**	m2	3.000	0.250 × (5.400 + 0.600) × 2
	Seepage cut off Wall	**w=5.400m**	m2	2.950	0.250 × (5.400 + 0.500) × 2
	Breast Wall (Land Side)	**w=5.400m**	m2	2.950	0.250 × (5.400 + 0.500) × 2
	Concrete in parapet walls PW Type 1	**L=4.700m**	**m2**	**7.923**	
	PW-F1		m2	3.779	0.804 × 4.700
	PW-F2		m2	3.760	0.800 × 4.700
	PW-F3 End		m2	0.384	0.192 × 2
	Concrete in sluice structures		**m2**	**164.348**	
	b.Box Culvert	**L=5.000m**	**m2**	**64.235**	
	BC F1	**L=4.650m**	m2	20.925	4.500 × 4.650
	BC F2	**L=1.800m**	m2	8.100	2.250 × 1.800 × 2
	BC F3	**L=0.900m**	m2	3.600	2.000 × 0.900 × 2
	BC F4	**L=1.100m**	m2	4.400	2.000 × 1.100 × 2
	BC F5 End		m2	2.730	2.730
	BC F6	**L=0.350m**	m2	3.745	2.350 × 0.350 × 2 + 2.100
	BC F7		m2	14.040	7.020 × 2
	BC F8	**L=0.500m**	m2	2.850	2.850 × 0.500 × 2
	BC F9	**L=2.500m**	m2	0.375	0.150 × 2.500
	BC F10	**L=2.500m**	m2	0.250	0.100 × 2.500
	BC F11	**L=2.800m**	m2	1.960	0.700 × 2.800
	BC F12	**L=2.800m**	m2	0.420	0.150 × 2.800
	BC F13	**L=2.800m**	m2	0.840	0.300 × 2.800
	c.Breast Wall (River Side)			**32.095**	
	BWR - F1	**L=1.000m**	m2	8.000	4.000 × 1.000 × 2
	BWR - F2	**L=1.000m**	m2	6.400	3.200 × 1.000 × 2
	BWR - F3	**L=1.000m**	m2	1.400	0.700 × 1.000 × 2
	BWR - F4	**L=4.700m**	m2	0.470	0.100 × 4.700
	BWR - F5	**L=2.800m**	m2	6.265	4.000 × 2.800 − 2.100 × 2.350
	BWR - F6		m2	3.360	3.360
	BWR - F7 End		m2	6.200	3.100 × 2
					Sluiceway STA 1+323 MSL-2 1.5*1.5

	Sluiceway STA 1+323 MSL-2 1.5*1.5				(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	d.Breast Wall (Land Side)			**25.500**	
	BWL - F1	**L=1.000m**	m2	6.600	3.300 × 1.000 × 2
	BWL - F2	**L=1.000m**	m2	5.400	2.700 × 1.000 × 2
	BWL - F3	**L=1.000m**	m2	1.000	0.500 × 1.000 × 2
	BWL - F4	**L=4.500m**	m2	0.450	0.100 × 4.500
	BWL - F5	**L=2.500m**	m2	6.000	3.300 × 2.500 − 1.500 × 1.500
	BWL - F6		m2	1.750	1.750
	BWL - F7 End		m2	4.300	2.150 × 2
	e. Wing Wall			**30.615**	
	WW- F1	**L=5.700m**	m2	16.530	1.450 × 5.700 × 2
	WW- F1'	**L=0.000m**	m2	0.000	0.000 × 0.000 × 2
	WW- F2	**L=5.700m**	m2	12.540	1.100 × 5.700 × 2
	WW- F2'	**L=0.000m**	m2	0.000	0.000 × 0.000 × 2
	WW- F3 End		m2	1.545	1.545
	f. U-shaped Channel			**11.903**	
	UC- F1	**L=4.300m**	m2	5.268	(1.450 + 1.000)× 0.500 × 4.300
	UC- F2	**L=4.300m**	m2	3.440	(1.100 + 0.500)× 0.500 × 4.300
	UC- F3 End		m2	1.545	1.545
	UC- F4 End		m2	1.650	1.650
	Supporting Work		**m3**	**11.771**	
		L=4.650m	m3	10.044	(1.500 × 1.500 −(4 × 0.150 × 0.150))× 4.650
		L=0.350m	m3	1.727	2.100 × 2.350 × 0.350
	Scaffolding work				
	Sluiceway		**m2**	64.950	
	Box Culvert	L=1.800m	m2	19.500	2.250 × 1.800 × 2 + 2.850 × 1.000 × 4
	Breast Wall (River Side)	L=4.700m	m2	25.200	4.000 × 4.700 + 3.200 × 1.000 × 2
	Breast Wall (Land Side)	L=4.500m	m2	20.250	3.300 × 4.500 + 2.700 × 1.000 × 2
	Wing Wall	L=5.700m	m2	0.000	0.000 × 5.700 × 2
5.11/1	**Reinforcement Bar**	**Grade 275**	ton	**4.948**	54.975 × 90.000 kg/m3
	Grout Pipe	**h=500mm**	no	1	
		h=800mm	no	1	
					Sluiceway STA 1+323 MSL-2 1.5*1.5

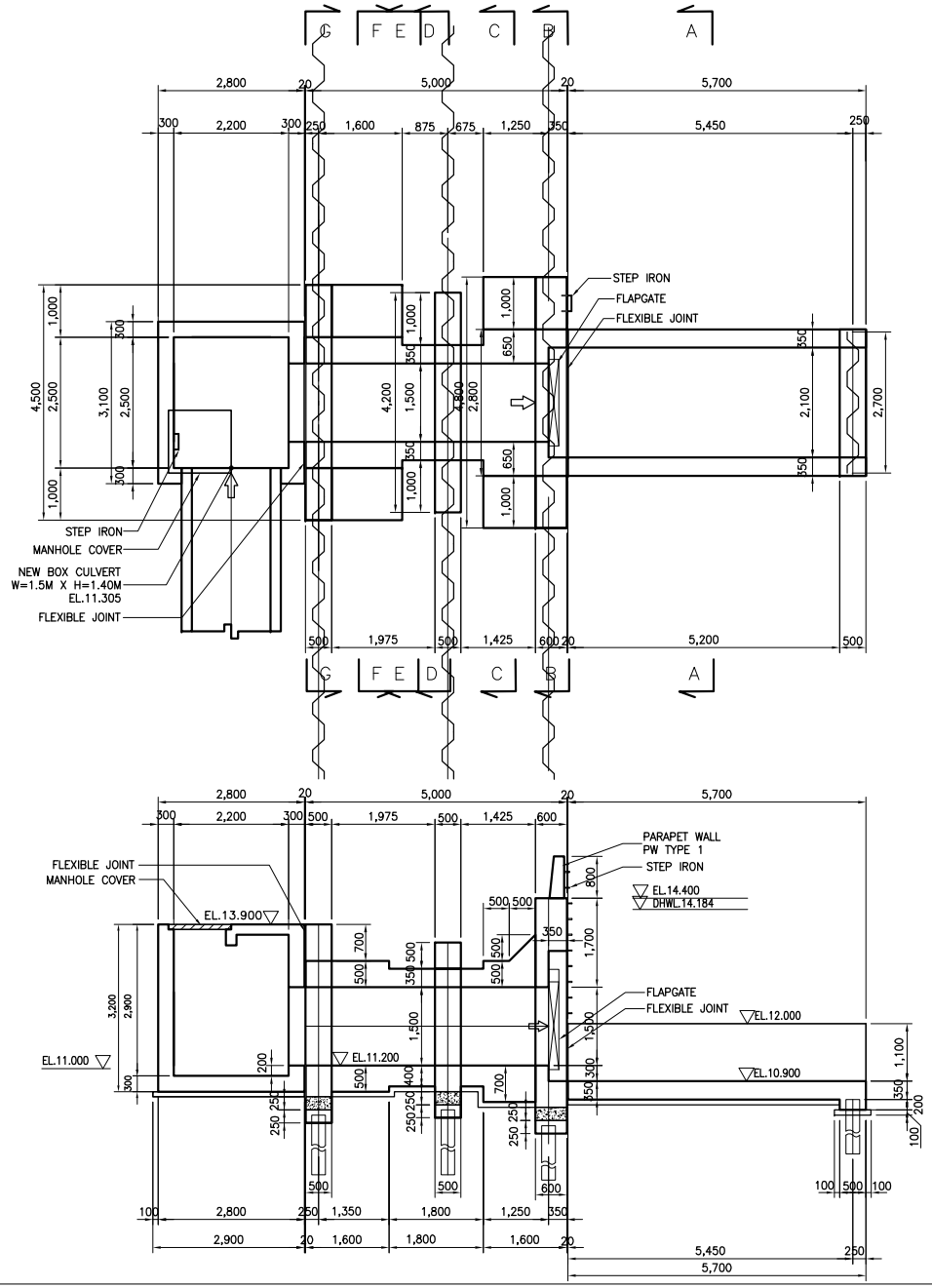
Sluiceway STA 1+323 MSL-2 1.5*1.5					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
5.23/1	**Leveling concrete**	**Class F**	**m3**	**4.465**	
	a. Box Culvert, Breast Wall			**1.449**	
	BC-LC1	**L=1.000m**	m3	0.500	5.000 × 1.000 × 0.100
	BC-LC2	**L=1.800m**	m3	0.432	2.400 × 1.800 × 0.100
	BC-LC3	**L=1.100m**	m3	0.517	4.700 × 1.100 × 0.100
	b. Wing Wall			**1.769**	
	WW-LC1	**L=5.400m**	m3	1.566	2.900 × 5.400 × 0.100
	WW-LC2	**L=0.700m**	m3	0.203	2.900 × 0.700 × 0.100
	c. U-shaped Channel				
	UC-LC1	**L=4.300m**	m3	**1.247**	2.900 × 4.300 × 0.100
	Formwork	**Class**	**m2**	**3.500**	
	a. Box Culvert, Breast Wall			**0.780**	
	BC-LF1	**L=1.000m**	m2	0.200	1.000 × 0.100 × 2
	BC-LF2	**L=1.800m**	m2	0.360	1.800 × 0.100 × 2
	BC-LF3	**L=1.100m**	m2	0.220	1.100 × 0.100 × 2
	b. Wing Wall		m2	**1.860**	4.600 × 0.100
	WW-LF1	**L=5.700m**	m2	1.140	5.700 × 0.100 × 2
	WW-LF2	**L=0.700m**	m2	0.720	0.700 × 0.100 × 2 + 2.900 × 0.100 × 2
	c. U-shaped Channel				
	UC-LF1	**L=4.300m**	m2	**0.860**	4.300 × 0.100 × 2
5.22/18	**Concrete in Gravity Wall**	**L=4.500m**			
	Concrete		**m3**	2.129	0.473 × 4.500
	Form work		m2	4.074	(0.900 + 1.006)× 4.500
7.5/1	Gravel Bedding		m3	0.855	0.200 × 0.950 × 4.500
	Joint Filler (Elastite)	**t=10mm**	m2	0.9	0.473 × 2
					Sluiceway STA 1+323 MSL-2 1.5*1.5

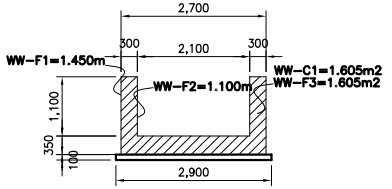
Sluiceway STA 1+323 MSL-2 1.5*1.5					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	Expansion Joint and Flexible Joint				
	Flexible Joint				
	b. Wing Wall	2.1 x 1.0	no	1	
	c. Breast Wall Land Side	1.5 x 1.5	no	1	
	Water Stop				
	a. U-shaped Channel	W=150 t=5	m	5.0	(1.100 + 0.175)× 2 + 2.100 + 0.300
	Cork Filler		**m2**	**10.4**	
	a. U-shaped Channel	t=20	m2	1.605	(1.100 × 0.300)× 2 +(2.100 + 0.600)× 0.350
	b. Wing Wall	"	m2	1.470	(1.100 × 0.300)× 2 +(2.100 + 0.600)× 0.300
	c. Breast Wall Land Side	"	m2	7.360	3.100 × 3.100 - 1.500 × 1.500
	Joint Sealant		**m2**	**26.7**	
	a. U-shaped Channel	w=0.125 t=20	m	8.700	(1.100 + 0.350)× 2 + 2.100 + 0.600 + 1.000 + 2.100
	b. Wing Wall	"	m	5.600	(1.100 + 0.350)× 2 + 2.100 + 0.600
	c. Breast Wall Land Side	"	m	12.400	(3.100 + 3.100)× 2
No. 6 - PILING					
6.4/5	**Type 10H Hat-shape SSP**	W=900 96.0kg/m			
		L=2.0~4.0m	**m**	**22.0**	
		L=4.0~6.0m	**m**	**132.0**	
		L=6.0~9.0m	**m**	**0.0**	
		L=9.0~12.0m	**m**	**0.0**	
	Wing Wall	L=2.000m	m	6.000	3 × 2.000
	Seepage cut off Wall	L=2.000m	m	8.000	4 × 2.000
		L=5.500m	m	66.000	12 × 5.500
	Breast Wall (Land Side)	L=2.000m	m	8.000	4 × 2.000
		L=5.500m	m	66.000	12 × 5.500
6.4/19	**Type 25H Hat-shape SSP**	W=900 126.0kg/m			
		L=2.0~4.0m	**m**	**14.2**	
		L=4.0~6.0m	**m**	**0.0**	
		L=6.0~9.0m	**m**	**90.0**	
		L=9.0~12.0m	**m**	**0.0**	
	Breast Wall (River Side)	L=3.550m	m	14.200	4 × 3.550
		L=7.500m	m	90.000	12 × 7.500
					Sluiceway STA 1+323 MSL-2 1.5*1.5

	Sluiceway STA 1+323 MSL-2 1.5*1.5				(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	SSP with flexisble joint				
6.4/6	**Type 10H Hat-shape**	**L=2.0~4.0m**	**m**	**11.0**	
		L=4.0~6.0m	**m**	**11.0**	
		L=6.0~9.0m	**m**	**0.0**	
		L=9.0~12.0m	**m**	**0.0**	
		L=5.500m	m	11.000	2 × 5.500
		-L=5.500m	m	11.000	2 × 5.500
6.4/20	**Type 25H Hat-shape**	**L=2.0~4.0m**	**m**	**0.0**	
		L=4.0~6.0m	**m**	**0.0**	
		L=6.0~9.0m	**m**	**15.0**	
		L=9.0~12.0m	**m**	**0.0**	
		L=7.500m	m	15.000	2 × 7.500
No. 7 - PROTECTION WORKS					
7.8/1	**Gabion Mattresses**	**t=500mm**	m2	223.0	10.00 × 10.400 × 2 + 3.00 × 3.00 + 1.00 × 3.00 × 2
	Filter Fabric	**t=10mm**	m2	287.8	11.00 × 11.400 × 2 + 4.00 × 4.00 + 1.50 × 3.50 × 4
No. 8 - DRAINAGE					
8.6/6	Rectangular aluminum flap gate 1500 x 1500	Aluminum	no	1	
No. 11 - STRUCTURAL AND MISCELLANEOUS METALWORK					
11.10/3	Trash screen 1900 x 1900	for 1.5m*1.5m	no	1	
			Kg	**122**	
		19-FB 75*4.5*1900	Kg	96.000	2.650 × 1.900 × 19
		5-ϕ 16*1900	Kg	16.000	1.580 × 1.900 × 5
		Anchor Bar ϕ 16	Kg	10.000	1.580 × 0.500 × 6 × 2
					Sluiceway STA 1+323 MSL-2 1.5*1.5

Quantity Calculation of Earth Work

Location	Distance	Excavation			Backfill					
		Area	Average Area	Volume	Area	Average Area	Volume			
0		1.3								
+11.3	11.3	1.3	1.3	14.7	0.0	0.0	0.0			
+11.3		1.3								
+11.8	0.5	5.8	3.6	1.8	1.6	0.8	0.4			
+25.3	13.5	5.8	5.8	78.3	1.6	1.6	21.6			
+25.3		40.8			31.3					
+26.9	1.6	40.8	40.8	65.3	31.3	31.3	50.1			
+26.9		34.4			29.2					
+28.7	1.8	34.4	34.4	61.9	29.2	29.2	52.6			
+30.8	2.1	30.4	32.4	68.0	22.6	25.9	54.4			
+32.5	1.7	0.0	15.2	25.8	0.0	11.3	19.2			
Total				315.8			198.3			


STEP IRON
FLAPGATE
FLEXIBLE JOINT
STEP IRON
MANHOLE COVER
NEW BOX CULVERT
W=1.5M X H=1.40M
EL.11.305
FLEXIBLE JOINT
PARAPET WALL
PW TYPE 1
STEP IRON
EL.14.400
DHWL.14.184
FLEXIBLE JOINT
MANHOLE COVER
EL.13.900
FLAPGATE
FLEXIBLE JOINT
EL.12.000
EL.11.000
EL.11.200
EL.10.900



SECTION A-A(Wing wall)
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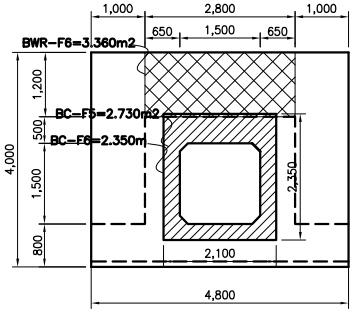

SECTION B-B
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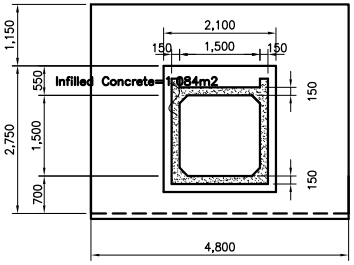

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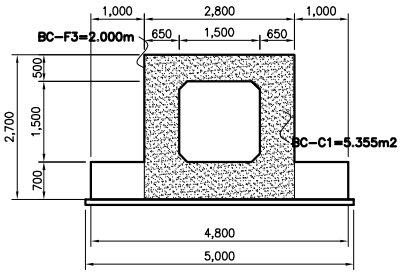
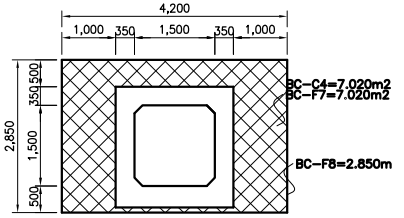
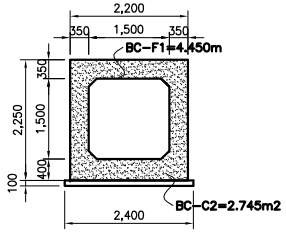


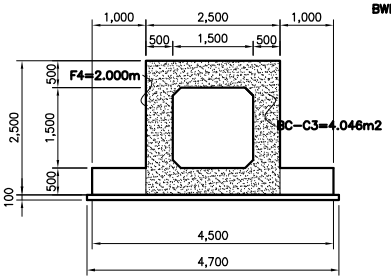
SECTION C-C
SCALE 1:100



SECTION D-D
SCALE 1:100



SECTION E-E
SCALE 1:100



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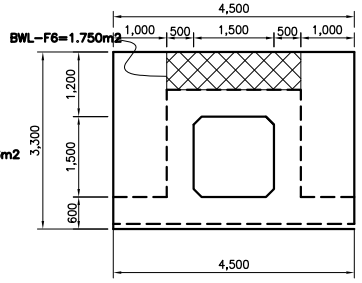

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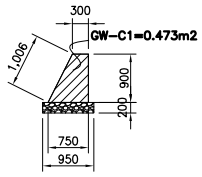
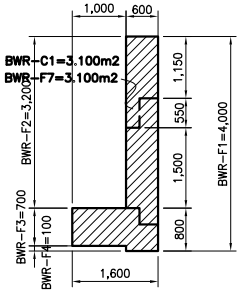
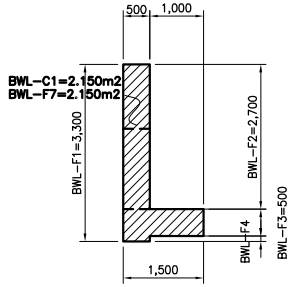


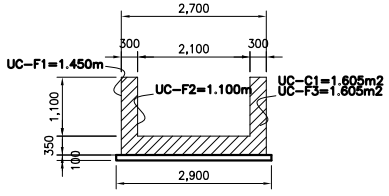
Gravity Wall
SCALE 1:100



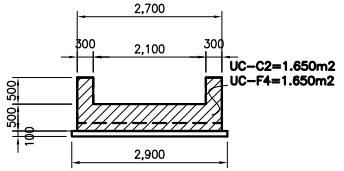
Breast Wall (River Side)
SCALE 1:100



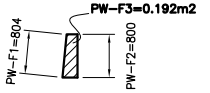
Breast Wall (Land Side)
SCALE 1:100



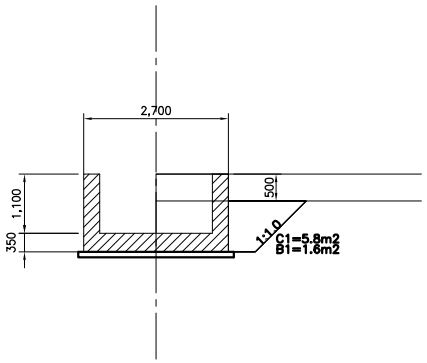
U-shaped Channel(1)
SCALE 1:100



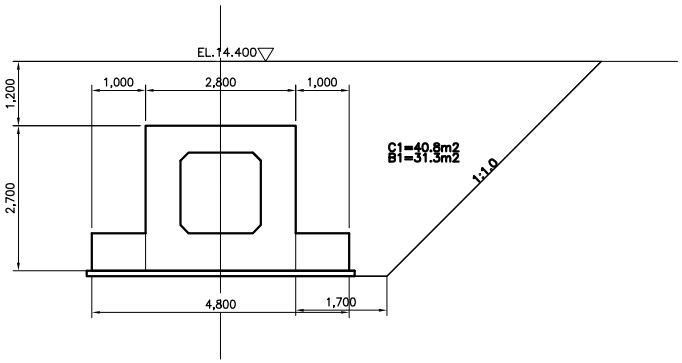
U-shaped Channel(2)
SCALE 1:100



Parapet Wall
SCALE 1:100



Section A



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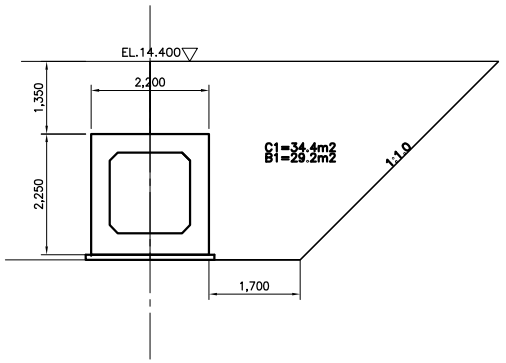
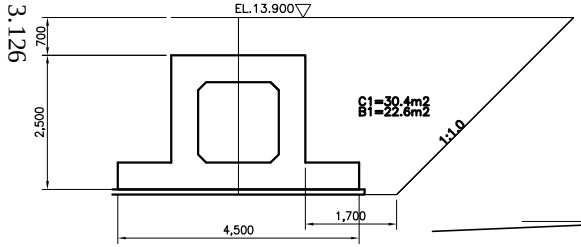


Section C

D C B A E



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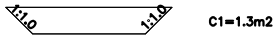

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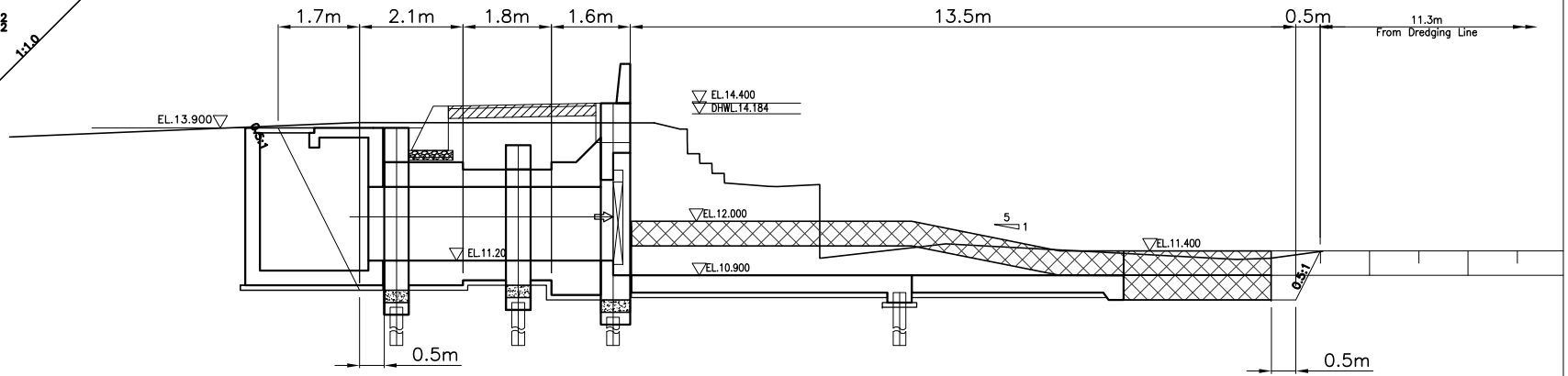


D C B A E

3.126

Lower Marikina River Drainage Facilities

3.3 Sluiceway

(3) LEFT BANK MSL-3 STA 3+945

Sluiceway STA 3+945 MSL-3 2@1.2*1.2				（Unit: Per Place ）
BQ No.	Description	Unit	Quantity	Calculation
	Excavation for Structures	**m3**	**430.2**	
4.8/	**for Sluiceway Structure**	m3	325.2	From Quantity Calculation of Earth Work
	for Gabion Mattress	m3	105.0	10.50 × 10.000 × 0.50 × 2.00
	Backfill for Structure			
4.8/	Random Backfill Excavated Material	m3	219.5	
4.8/	Disposal Material	m3	210.7	

Sluiceway STA 3+945 MSL-3 2@1.2*1.2

Sluiceway STA 3+945 MSL-3 2@1.2*1.2					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
No.5	**Concrete (Total)**	**Class A**	**m3**	**93.341**	
5.22/4	**Concrete in sheet pile copings**		**m3**	**2.633**	0.600 × 0.250 × 6.3 + 0.500 × 0.250 ×(6.30 + 7.20)
5.22/6	**Concrete in parapet walls PW Type 1**				
	Parapet Wall	**L=6.050m**	**m3**	**1.162**	
		PC1	m3	1.162	0.192 × 6.050
5.22/27	**Concrete in sluice structures**		**m3**	**89.546**	
	a.Box Culvert		**m3**	**30.764**	
	BC-C1	**L=1.500m**	m3	10.094	6.729 × 1.500
		Deduction	m3	-1.379	-(3.940 × 0.350)
	BC-C2	**L=2.800m**	m3	9.288	3.317 × 2.800
	BC-C3	**L=1.400m**	m3	7.490	5.350 × 1.400
	BC-C4	**L=0.500m**	m3	4.765	9.530 × 0.500
	BC-C4	**L=4.050m**	m3	0.506	0.500 × 0.500 × 0.5 × 4.050
	b.Breast wall (River Side)		**m3**	**12.036**	
	BWR - C1	**L=1.000m**	m3	6.690	3.345 × 1.000 × 2
	BWR - C2	**L=4.050m**	m3	4.860	2.000 × 0.600 × 4.050
	BWR - C3	**L=4.050m**	m3	0.486	0.200 × 0.600 × 4.050
	d.Breast wall (Land Side)		**m3**	**4.810**	
	BWL - C1	**L=1.000m**	m3	3.700	1.850 × 1.000 × 2
	BWL - C2	**L=3.700m**	m3	0.925	0.500 × 0.500 × 3.700
	BWL - C3	**L=3.700m**	m3	0.185	0.100 × 0.500 × 3.700
	c.Wing wall		**m3**	**15.760**	
	WW - C1	**L=5.400m**	m3	15.340	2.950 × 5.200
	WW - C1'	**L=0.000m**	m3	0.000	0.000 × 0.000
	WW - C3	**L=4.200m**	m3	0.420	0.200 × 0.500 × 4.200
	d. U-shaped Channel		**m3**	**25.851**	
	UC- C1	**L=4.600m**	m3	25.851	(2.950 + 3.810)× 0.500 × 4.600
	e. Infiled Concrete	**t=150**	**m3**	**0.325**	1.084 × 0.150 × 2
					Sluiceway STA 3+945 MSL-3 2@1.2*1.2

Sluiceway STA 3+945 MSL-3 2@1.2*1.2 (Unit: Per Place)

BQ No.	Description		Unit	Quantity	Calculation
	Formwork (Total)	**Class**	**m2**	**230.306**	
	Concrete in sheet pile copings		**m2**	**10.700**	
	Breast Wall (River Side)	**w=6.300m**	m2	3.450	0.250 ×(6.300 + 0.600)× 2
	Seepage cut off Wall	**w=6.300m**	m2	3.400	0.250 ×(6.300 + 0.500)× 2
	Breast Wall (Land Side)	**w=7.200m**	m2	3.850	0.250 ×(7.200 + 0.500)× 2
	Concrete in parapet walls PW Type 1	**L=6.050m**	**m2**	**10.088**	
	PW-F1		m2	4.864	0.804 × 6.050
	PW-F2		m2	4.840	0.800 × 6.050
	PW-F3 End		m2	0.384	0.192 × 2
	Concrete in sluice structures		**m2**	**209.518**	
	b.Box Culvert	**L=5.700m**	**m2**	**88.428**	
	BC F1	**L=5.350m**	m2	37.450	3.500 × 5.350 × 2
	BC F2	**L=2.300m**	m2	8.510	1.850 × 2.300 × 2
	BC F3	**L=0.900m**	m2	3.060	1.700 × 0.900 × 2
	BC F4	**L=0.900m**	m2	3.060	1.700 × 0.900 × 2
	BC F5 End		m2	3.940	3.940
	BC F6	**L=0.350m**	m2	4.815	1.950 × 0.350 × 2 + 3.450
	BC F7		m2	19.060	9.530 × 2
	BC F8	**L=0.500m**	m2	2.950	2.950 × 0.500 × 2
	BC F9	**L=3.700m**	m2	0.555	0.150 × 3.700
	BC F10	**L=3.700m**	m2	0.370	0.100 × 3.700
	BC F11	**L=4.050m**	m2	2.835	0.700 × 4.050
	BC F12	**L=4.050m**	m2	0.608	0.150 × 4.050
	BC F13	**L=4.050m**	m2	1.215	0.300 × 4.050
	c.Breast Wall (River Side)			**46.100**	
	BWR - F1	**L=1.000m**	m2	9.200	4.600 × 1.000 × 2
	BWR - F2	**L=1.000m**	m2	7.400	3.700 × 1.000 × 2
	BWR - F3	**L=1.000m**	m2	1.300	0.650 × 1.000 × 2
	BWR - F4	**L=6.050m**	m2	1.513	0.250 × 6.050
	BWR - F5	**L=4.050m**	m2	11.903	4.600 × 4.050 − 1.950 × 3.450
	BWR - F6		m2	8.095	8.095
	BWR - F7 End		m2	6.689	3.345 × 2
					Sluiceway STA 3+945 MSL-3 2@1.2*1.2

Sluiceway STA 3+945 MSL-3 2@1.2*1.2 (Unit: Per Place)

BQ No.	Description		Unit	Quantity	Calculation
	d.Breast Wall (Land Side)			**29.280**	
	BWL - F1	**L=1.000m**	m2	5.600	2.800 × 1.000 × 2
	BWL - F2	**L=1.000m**	m2	4.400	2.200 × 1.000 × 2
	BWL - F3	**L=1.000m**	m2	1.000	0.500 × 1.000 × 2
	BWL - F4	**L=5.700m**	m2	0.450	0.100 × 4.500
	BWL - F5	**L=3.700m**	m2	7.480	2.800 × 3.700 − 1.200 × 1.200 × 2
	BWL - F6		m2	6.250	6.250
	BWL - F7 End		m2	4.100	2.050 × 2
	e. Wing Wall			**27.450**	
	WW- F1	**L=4.900m**	m2	14.700	1.500 × 4.900 × 2
	WW- F1'	**L=0.000m**	m2	0.000	0.000 × 0.000 × 2
	WW- F2	**L=4.900m**	m2	9.800	1.000 × 4.900 × 2
	WW- F2'	**L=0.000m**	m2	0.000	0.000 × 0.000 × 2
	WW- F3 End		m2	2.950	2.950
	f. U-shaped Channel			**18.260**	
	UC- F1	**L=4.600m**	m2	6.900	(1.500 + 1.500)× 0.500 × 4.600
	UC- F2	**L=4.600m**	m2	4.600	(1.000 + 1.000)× 0.500 × 4.600
	UC- F3 End		m2	2.950	2.950
	UC- F4 End		m2	3.810	3.810
	Supporting Work		**m3**	**17.900**	
		L=5.350m	m3	14.445	(1.200 × 1.200 −(4 × 0.150 × 0.150))× 5.350 × 2
		L=0.350m	m3	3.455	2.100 × 2.350 × 0.350 × 2
	Scaffolding work				
	Sluiceway		**m2**	75.485	
	Box Culvert	L=2.300m	m2	11.800	0.000 × 2.300 × 2 + 2.950 × 1.000 × 4
	Breast Wall (River Side)	L=6.050m	m2	43.325	4.600 × 6.050 + 3.700 × 1.000 × 2 + 8.095
	Breast Wall (Land Side)	L=5.700m	m2	20.360	2.800 × 5.700 + 2.200 × 1.000 × 2
	Wing Wall	L=4.900m	m2	0.000	0.000 × 4.900 × 2
5.11/1	**Reinforcement Bar**	**Grade 275**	ton	**8.401**	93.341 × 90.000 kg/m3
	Grout Pipe	**h=450mm**	no	1	
		h=750mm	no	1	
					Sluiceway STA 3+945 MSL-3 2@1.2*1.2

Sluiceway STA 3+945 MSL-3 2@1.2*1.2 （Unit: Per Place ）

BQ No.	Description		Unit	Quantity	Calculation
5.23/1	**Leveling Concrete**	**Class F**	**m3**	**6.541**	
	a. Box Culvert, Breast Wall			**1.899**	
	BC-LC1	**L=0.900m**	m3	0.563	6.250 × 0.900 × 0.100
	BC-LC2	**L=2.300m**	m3	0.805	3.500 × 2.300 × 0.100
	BC-LC3	**L=0.900m**	m3	0.531	5.900 × 0.900 × 0.100
	b. Wing Wall			**2.458**	
	WW-LC1	**L=4.700m**	m3	2.139	4.550 × 4.700 × 0.100
	WW-LC2	**L=0.700m**	m3	0.319	4.550 × 0.700 × 0.100
	c. U-shaped Channel				
	UC-LC1	**L=4.800m**	m3	**2.184**	4.550 × 4.800 × 0.100
	Formwork	**Class**	**m2**	**3.770**	
	a. Box Culvert, Breast Wall			**0.820**	
	BC-LF1	**L=0.900m**	m2	0.180	0.900 × 0.100 × 2
	BC-LF2	**L=2.300m**	m2	0.460	2.300 × 0.100 × 2
	BC-LF3	**L=0.900m**	m2	0.180	0.900 × 0.100 × 2
	b. Wing Wall		m2	**2.030**	4.600 × 0.100
	WW-LF1	**L=4.900m**	m2	0.980	4.900 × 0.100 × 2
	WW-LF2	**L=0.700m**	m2	1.050	0.700 × 0.100 × 2 + 4.550 × 0.100 × 2
	c. U-shaped Channel				
	UC-LF1	**L=4.600m**	m2	**0.920**	4.600 × 0.100 × 2

Sluiceway STA 3+945 MSL-3 2@1.2*1.2 (Unit: Per Place)

BQ No.	Description		Unit	Quantity	Calculation
	Concrete Block Retaining Wall	**L=5.700m**			
	Concrete (Total)		m3	**9.724**	
5.22/15	**Filler concrete (Class B)**	**CB-C1**	m3	1.547	0.533 × 5.700 - 1.491
5.22/20	**Concrete in base type A for concrete block retaining wall**	**CB-C2**	m3	0.627	0.11 × 5.700
5.22/23	**Backfill concrete for concrete block retaining wall**	CB-C3	m3	0.969	0.170 × 5.700
5.22/24	**Top concrete for concrete block retaining wall**	CB-C4	m3	0.302	0.053 × 5.700
7.5/1	**Gravel bedding and backfill**		m3	4.788	0.840 × 5.700
7.10/1	**Precast concrete block retaining wall**		no	71	(1.487 × 5.700)/ 0.3 × 0.4
			m3	1.491	0.021 × 71 *Surface Area of 1 Concrete Block
					* Volume of 1 Concrete Block
	Formwork (Total)		**m2**	**65.182**	
	Concrete in base type A for concrete block retaining wall		m2	2.390	(0.300 + 0.100)× 5.700 + 0.11
	Backfill concrete for concrete block retaining wall		m2	9.695	1.671 × 5.700 + 0.170
	Top concrete for concrete block retaining wall		m2	1.267	(0.113 + 0.100)× 5.700 +(0.500 + 0.551)/ 2.00 × 0.10
	Precast concrete block retaining wall		m2	51.830	0.730 × 71
					* Form Area of 1 Concrete Block
5.22/22	**Concrete in partition for concrete block wall**				
	Concrete	**t=500mm**	**m3**	**2.200**	2.200 × 0.500 × 2
		H=1500mm			
	Form work		**m2**	**11.036**	
	PT- F1 End		m2	8.800	2.200 × 2 × 2
	PT- F2		m2	2.236	2.236 × 0.500 × 2
	Joint Filler (Elastite)	**t=10mm**	m2	8.8	2.200 × 2 × 2

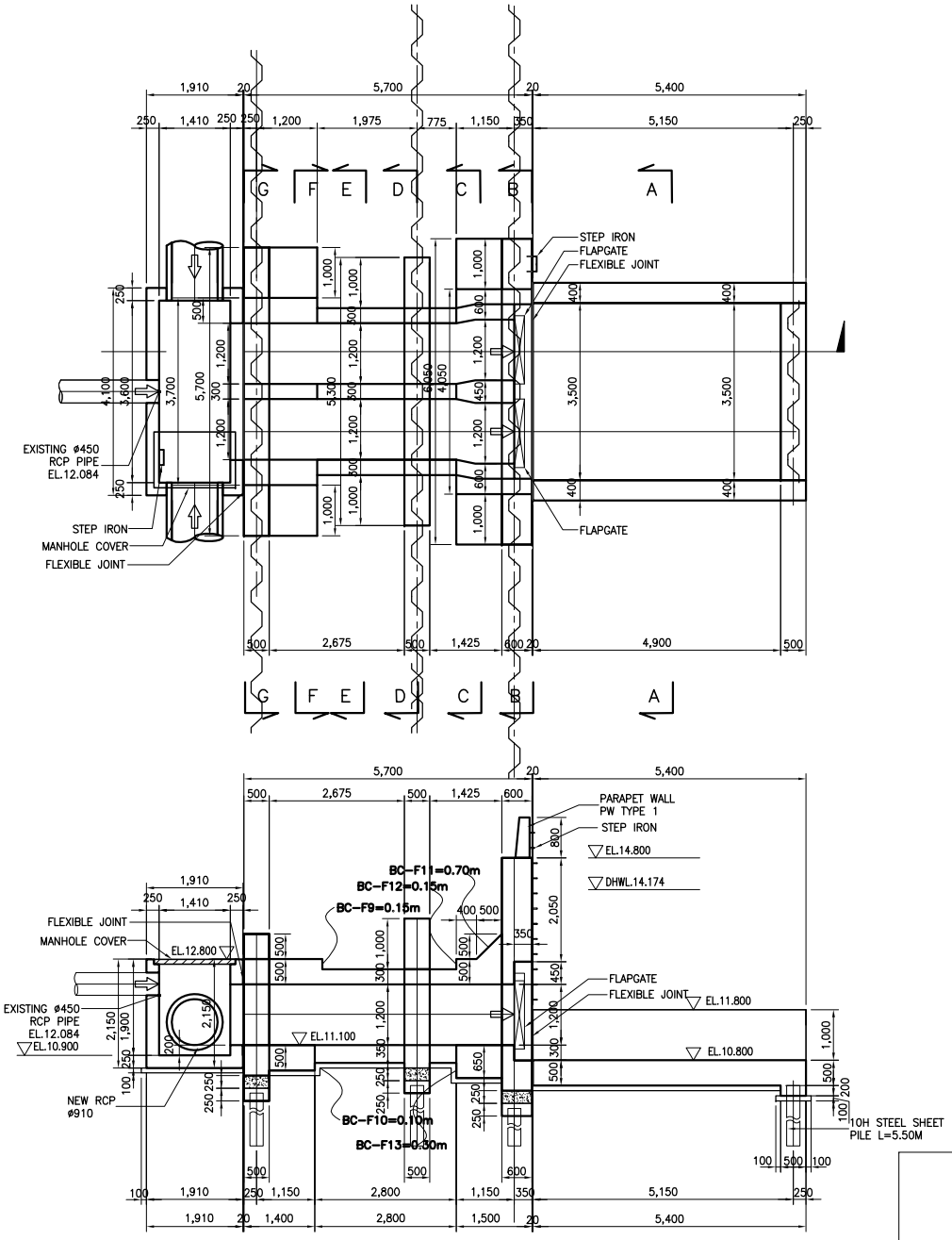
Sluiceway STA 3+945 MSL-3 2@1.2*1.2

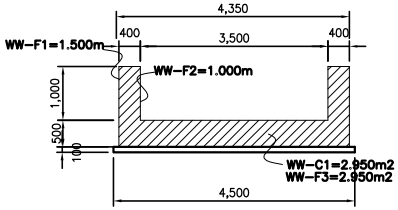
Sluiceway STA 3+945 MSL-3 2@1.2*1.2					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	Expansion Joint and Flexible Joint				
	Flexible Joint				
	b. Wing Wall	3.5 x 1.0	no	1	
	c. Breast Wall Land Side	1.2 x 1.2	no	2	
	Water Stop				
	a. U-shaped Channel	W=150 t=5	m	6.4	(1.000 + 0.250)× 2 + 3.500 + 0.400
	Cork Filler		**m2**	**11.0**	
	a. U-shaped Channel	t=20	m2	2.950	(1.000 × 0.400)× 2 +(3.500 + 0.800)× 0.500
	b. Wing Wall	"	m2	2.950	(1.000 × 0.400)× 2 +(3.500 + 0.800)× 0.500
	c. Breast Wall Land Side	"	m2	5.075	3.700 × 2.150 - 1.200 × 1.200 × 2
	Joint Sealant		**m2**	**30.8**	
	a. U-shaped Channel	w=0.125 t=20	m	11.800	(1.000 + 0.500)× 2 + 3.500 + 0.800 + 1.000 + 3.500
	b. Wing Wall	"	m	7.300	(1.000 + 0.500)× 2 + 3.500 + 0.800
	c. Breast Wall Land Side	"	m	11.700	(3.700 + 2.150)× 2
No. 6 - PILING					
6.4/5	**Type 10H Hat-shape SSP**	W=900 96.0kg/m			
		L=2.0~4.0m	**m**	**18.0**	
		L=4.0~6.0m	**m**	**55.0**	
		L=6.0~9.0m	**m**	**42.0**	
		L=9.0~12.0m	**m**	**80.0**	
	Wing Wall	L=2.000m	m	8.000	4 × 2.000
	Seepage cut off Wall	L=2.000m	m	10.000	5 × 2.000
		L=5.500m	m	55.000	10 × 5.500
	Breast Wall (Land Side)	L=7.000m	m	42.000	6 × 7.000
		L=10.000m	m	80.000	8 × 10.000
6.4/19	**Type 25H Hat-shape SSP**	W=900 126.0kg/m			
		L=2.0~4.0m	**m**	**0.0**	
		L=4.0~6.0m	**m**	**0.0**	
		L=6.0~9.0m	**m**	**32.3**	
		L=9.0~12.0m	**m**	**132.0**	
	Breast Wall (River Side)	L=6.450m	m	32.250	5 × 6.450
		L=11.000m	m	132.000	12 × 11.000
					Sluiceway STA 3+945 MSL-3 2@1.2*1.2

	Sluiceway STA 3+945 MSL-3 2@1.2*1.2				(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	SSP with flexisble joint				
6.4/6	**Type 10H Hat-shape**	**L=2.0~4.0m**	**m**	**0.0**	
		L=4.0~6.0m	**m**	**11.0**	
		L=6.0~9.0m	**m**	**0.0**	
		L=9.0~12.0m	**m**	**20.0**	
		L=5.500m	m	11.000	2 × 5.500
		-L=10.000m	m	20.000	2 × 10.000
6.4/20	**Type 25H Hat-shape**	**L=2.0~4.0m**	**m**	**0.0**	
		L=4.0~6.0m	**m**	**0.0**	
		L=6.0~9.0m	**m**	**0.0**	
		L=9.0~12.0m	**m**	**22.0**	
		L=11.000m	m	22.000	2 × 11.000
No. 7 - PROTECTION WORKS					
7.8/1	**Gabion Mattresses**	**t=500mm**	m2	233.5	10.00 × 10.400 × 2 + 3.00 × 4.50 + 1.00 × 3.00 × 4
	Filter Fabric	**t=10mm**	m2	293.8	11.00 × 11.400 × 2 + 4.00 × 5.50 + 1.50 × 3.50 × 4
No. 8 - DRAINAGE					
8.6/4	Rectangular aluminum flap gate 1200 x 1200	Aluminum	no	2	
No. 11 - STRUCTURAL AND MISCELLANEOUS METALWORK					
11.10/7	Trash screen 3100 x 1600	for 2@1.2m*1.2m	no	1	
			Kg	**121**	
		30-FB 75*4.5*1600	Kg	81.000	2.650 × 1.600 × 19
		4- ϕ 16*3100	Kg	25.000	1.580 × 3.100 × 5
		Anchor Bar ϕ 16	Kg	15.000	1.580 × 0.500 × 9 × 2

Quantity Calculation Of Earth Work

Location	Distance	Excavation			Backfill					
		Area	Average Area	Volume	Area	Average Area	Volume			
0		4.0								
+14.8	14.8	4.0	4.0	59.2	0.0	0.0	0.0			
+14.8		4.0			0.0					
+16.0	1.2	8.4	6.2	7.4	2.0	1.0	1.2			
+29.5	13.5	8.4	8.4	113.4	2.0	2.0	27.0			
+29.5		51.2			39.8					
+31.0	1.5	51.2	51.2	76.8	39.8	39.8	59.7			
+31.0		35.0			28.6					
+33.8	2.8	35.0	35.0	98.0	28.6	28.6	80.1			
+35.7	1.9	26.6	30.8	58.5	16.8	22.7	43.1			
+36.7	1.0	0.0	13.3	13.3	0.0	8.4	8.4			
Total				426.6			219.5			


STEP IRON
FLAPGATE
FLEXIBLE JOINT
EXISTING ø450
RCP PIPE
EL.12.084
STEP IRON
MANHOLE COVER
FLEXIBLE JOINT
FLAPGATE
PARAPET WALL
PW TYPE 1
STEP IRON
EL.14.800
DHWL.14.174
BC-F11=0.70m
BC-F12=0.15m
BC-F9=0.15m
FLEXIBLE JOINT
MANHOLE COVER
EL.12.800
FLAPGATE
FLEXIBLE JOINT
EL.11.800
EXISTING ø450
RCP PIPE
EL.12.084
EL.10.900
EL.11.100
EL.10.800
NEW RCP
ø910
BC-F10=0.10m
BC-F13=0.30m
10H STEEL SHEET
PILE L=5.50M



SECTION A-A(Wing wall)
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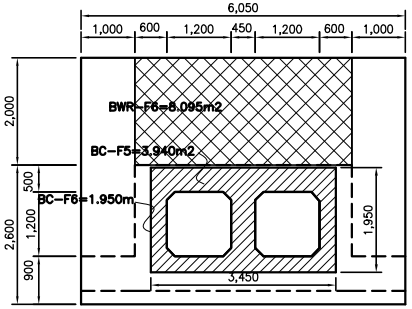
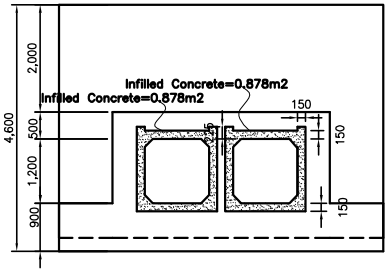


SECTION B-B
SCALE 1:100



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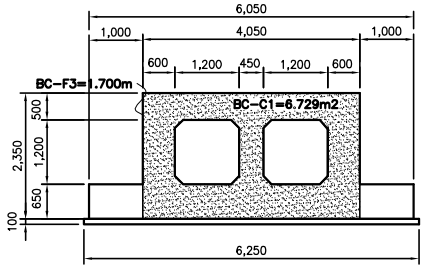
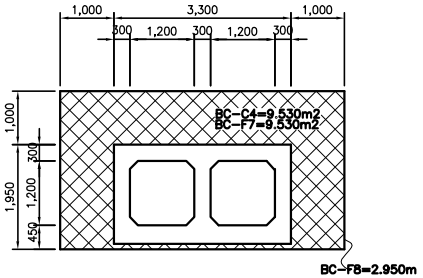
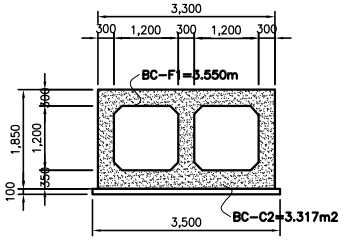


SECTION C-C
SCALE 1:100



SECTION D-D
SCALE 1:100



SECTION E-E
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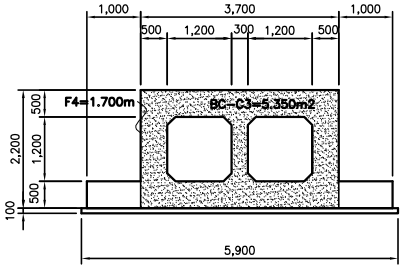

SECTION F-F
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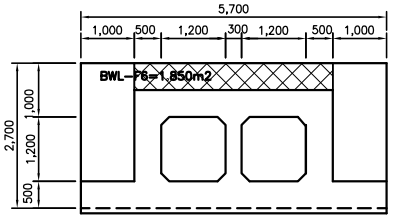

SECTION G-G
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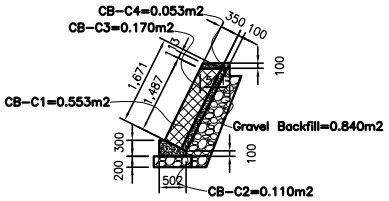
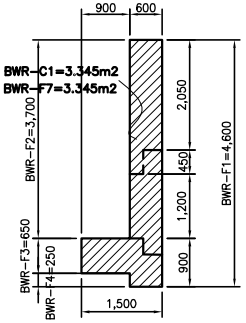
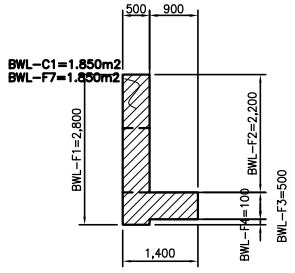
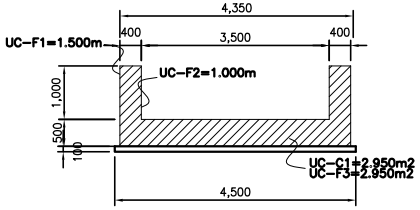




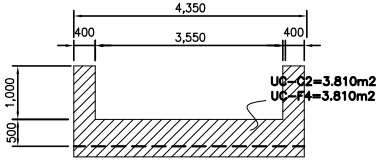
Breast Wall (River Side)
SCALE 1:100



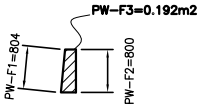
Breast Wall (Land Side)
SCALE 1:100



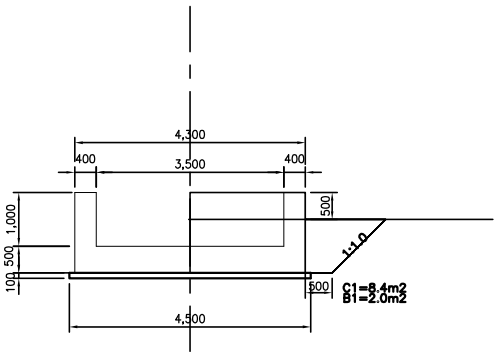
U-shaped Channel(1)
SCALE 1:100



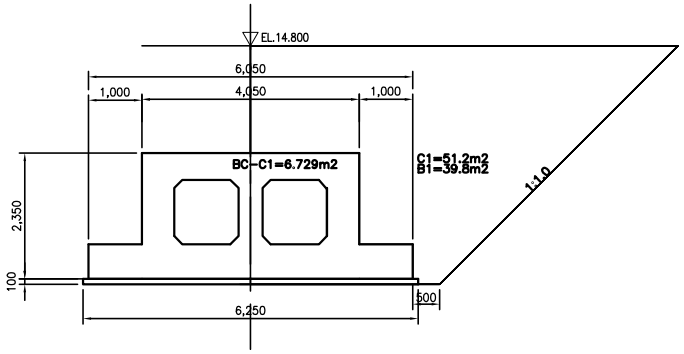
U-shaped Channel(2)
SCALE 1:100



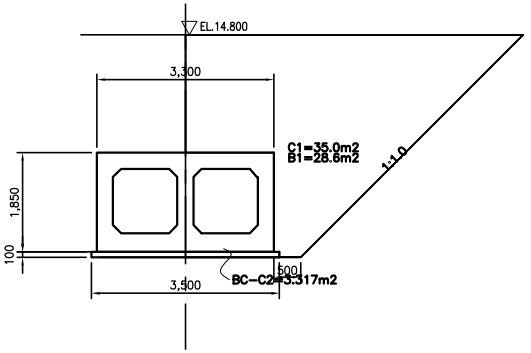
Parapet Wall
SCALE 1:100



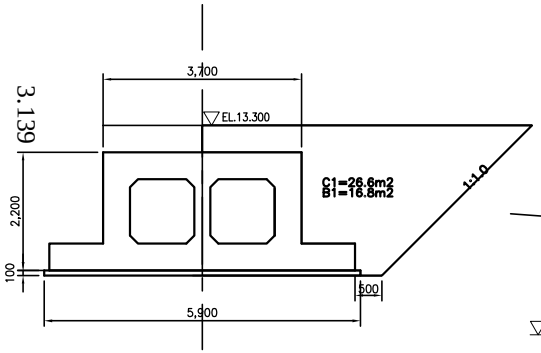
Section A



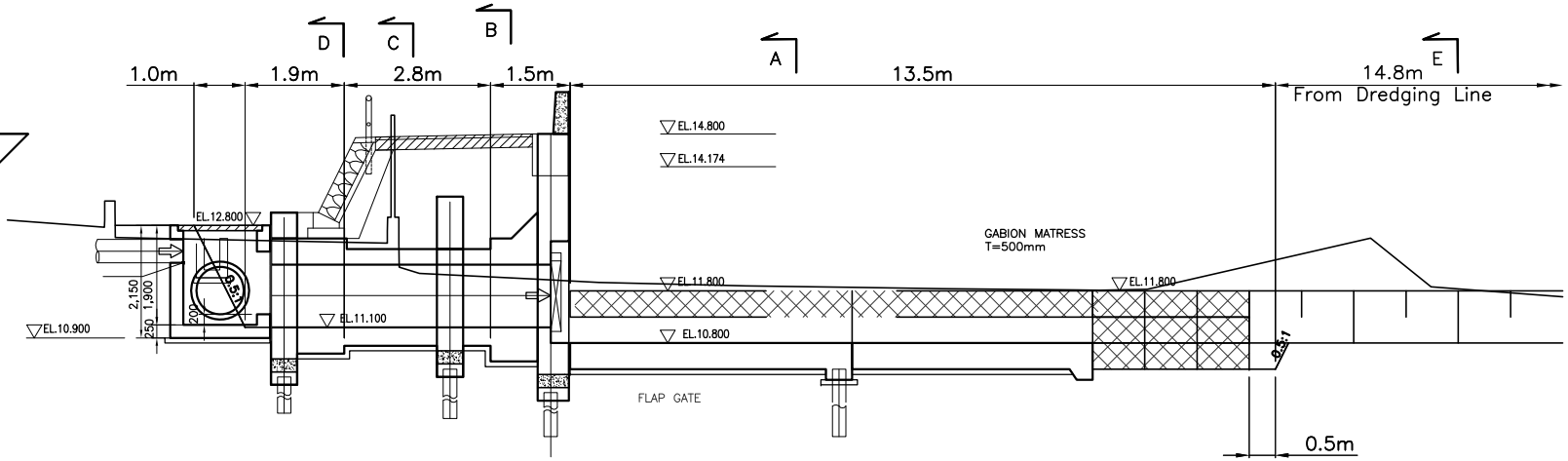
Section B

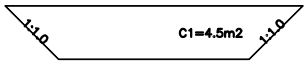


Section C



Section D





Section E

D C B A E

Lower Marikina River Drainage Facilities

3.3 Sluiceway

(4) LEFT BANK MSL-4 STA 4+221

Sluiceway STA 4+221 MSL-4 1.6*1.6				(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation
	Excavation for Structures	**m3**	**383.8**	
4.8/	**for Sluiceway Structure**	m3	278.8	From Quantity Calculation of Earth Work
	for Gabion Mattress	m3	105.0	10.50 × 10.000 × 0.50 × 2.0
	Backfill for Structure			
4.8/	Random Backfill Excavated Material	m3	136.4	
4.8/	Disposal Material	m3	247.4	

Sluiceway STA 4+221 MSL-4 1.6*1.6

Sluiceway STA 4+221 MSL-4 1.6*1.6					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
No.5	**Concrete (Total)**	**Class A**	**m3**	**68.904**	
5.22/4	**Concrete in sheet pile copings**		**m3**	**2.295**	0.600 × 0.250 × 6.3 + 0.500 × 0.250 ×(5.40 + 5.40)
5.22/6	**Concrete in parapet walls PW Type 1**	**w=4.900m**	**m3**	**0.941**	
	Parapet Wall	PC1	m3	0.941	0.192 × 4.900
5.22/27	**Concrete in sluice structures**		**m3**	**65.668**	
	a.Box Culvert		**m3**	**26.448**	
	BC-C1	**L=1.700m**	m3	9.529	5.605 × 1.700
		Deduction	m3	-1.045	-(2.985 × 0.350)
	BC-C2	**L=2.400m**	m3	6.936	2.890 × 2.400
	BC-C3	**L=1.400m**	m3	5.950	4.250 × 1.400
	BC-C4	**L=0.500m**	m3	4.715	9.430 × 0.500
	BC-C4	**w=2.900m**	m3	0.363	0.500 × 0.500 × 0.5 × 2.900
	b.Breast wall (River Side)	**L=5.700m**	**m3**	**9.805**	
	BWR - C1	**L=1.000m**	m3	6.830	3.415 × 1.000 × 2
	BWR - C2	**w=2.900m**	m3	2.627	0.600 × 1.510 × 2.900
	BWR - C3	**w=2.900m**	m3	0.348	0.600 × 0.200 × 2.900
	d.Breast wall (Land Side)		**m3**	**5.080**	
	BWL - C1	**L=1.000m**	m3	4.300	2.150 × 1.000 × 2
	BWL - C2	**w=2.600m**	m3	0.650	0.500 × 0.500 × 2.600
	BWL - C3	**w=2.600m**	m3	0.130	0.500 × 0.100 × 2.600
	c.Wing wall		**m3**	**13.740**	
	WW - C1	**L=6.000m**	m3	13.440	2.240 × 6.000
	WW - C1'	**L=0.000m**	m3	0.000	0.000 × 0.000
	WW - C3	**w=3.000m**	m3	0.300	0.200 × 0.500 × 3.000
	d. U-shaped Channel		**m3**	**10.125**	
	UC- C1	**L=4.000m**	m3	10.125	(2.240 + 2.260)× 0.500 × 4.000
					.
	e. Infiled Concrete	**t=150**	**m3**	**0.5**	1.565 × 0.150 × 2
					.
					.
					.
					.

Sluiceway STA 4+221 MSL-4 1.6*1.6					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	Formwork (Total)	**Class**	**m2**	**209.250**	
	Concrete in sheet pile copings		**m2**	**9.350**	
	Breast Wall (River Side)	**w=6.300m**	m2	3.450	0.250 ×(6.300 + 0.600)× 2
	Seepage cut off Wall	**w=5.400m**	m2	2.950	0.250 ×(5.400 + 0.500)× 2
	Breast Wall (Land Side)	**w=5.400m**	m2	2.950	0.250 ×(5.400 + 0.500)× 2
	Concrete in parapet walls PW Type 1	**w=4.900m**	**m2**	**8.244**	
	PW-F1		m2	3.940	0.804 × 4.900
	PW-F2		m2	3.920	0.800 × 4.900
	PW-F3 End		m2	0.384	0.192 × 2
	Concrete in sluice structures			**191.656**	
	b.Box Culvert	**L=5.700m**	**m2**	**76.807**	
	BC F1	**L=5.350m**	m2	25.407	4.749 × 5.350
	BC F2	**L=1.900m**	m2	8.930	2.350 × 1.900 × 2
	BC F3	**L=1.100m**	m2	4.620	2.100 × 1.100 × 2
	BC F4	**L=1.100m**	m2	4.620	2.100 × 1.100 × 2
	BC F5 End		m2	2.985	2.985
	BC F6	**L=0.350m**	m2	3.950	2.500 × 0.350 × 2 + 2.200
	BC F7		m2	18.860	9.430 × 2
	BC F8	**L=0.500m**	m2	3.450	3.450 × 0.500 × 2
	BC F9	**w=2.600m**	m2	0.390	0.150 × 2.600
	BC F10	**w=2.600m**	m2	0.260	0.100 × 2.600
	BC F11	**w=2.900m**	m2	2.030	0.700 × 2.900
	BC F12	**w=2.900m**	m2	0.435	0.150 × 2.900
	BC F13	**w=2.900m**	m2	0.870	0.300 × 2.900
	c.Breast Wall (River Side)			**35.529**	
	BWR - F1	**L=1.000m**	m2	8.820	4.410 × 1.000 × 2
	BWR - F2	**L=1.000m**	m2	7.220	3.610 × 1.000 × 2
	BWR - F3	**L=1.000m**	m2	1.400	0.700 × 1.000 × 2
	BWR - F4	**L=4.900m**	m2	0.490	0.100 × 4.900
	BWR - F5	**L=2.900m**	m2	7.289	4.410 × 2.900 − 2.200 × 2.500
	BWR - F6		m2	3.480	3.480
	BWR - F7 End		m2	6.830	3.415 × 2
					Sluiceway STA 4+221 MSL-4 1.6*1.6

Sluiceway STA 4+221 MSL-4 1.6*1.6					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	d.Breast Wall (Land Side)			**25.380**	
	BWL - F1	**L=1.000m**	m2	6.400	3.200 × 1.000 × 2
	BWL - F2	**L=1.000m**	m2	5.200	2.600 × 1.000 × 2
	BWL - F3	**L=1.000m**	m2	1.000	0.500 × 1.000 × 2
	BWL - F4	**L=4.600m**	m2	0.460	0.100 × 4.600
	BWL - F5	**L=2.900m**	m2	6.720	3.200 × 2.900 − 1.600 × 1.600
	BWL - F6		m2	1.300	1.300
	BWL - F7 End		m2	4.300	2.150 × 2
	e. Wing Wall			**38.240**	
	WW- F1	**L=6.000m**	m2	20.400	1.700 × 6.000 × 2
	WW- F1'	**L=0.000m**	m2	0.000	0.000 × 0.000 × 2
	WW- F2	**L=6.000m**	m2	15.600	1.300 × 6.000 × 2
	WW- F2'	**L=0.000m**	m2	0.000	0.000 × 0.000 × 2
	WW- F3 End		m2	2.240	2.240
	f. U-shaped Channel			**15.700**	
	UC- F1	**L=4.000m**	m2	6.600	(1.700 + 1.600)× 0.5 × 4.000
	UC- F2	**L=4.000m**	m2	4.600	(1.300 + 1.000)× 0.5 × 4.000
	UC- F3 End		m2	2.240	2.240
	UC- F4 End		m2	2.260	2.260
	Supporting Work		**m3**	**15.140**	
		L=5.350m	m3	13.215	(1.600 × 1.600 −(4 × 0.150 × 0.150))× 5.350
		L=0.350m	m3	1.925	2.200 × 2.500 × 0.350
	Scaffolding work				
	Sluiceway		**m2**	76.099	
	Box Culvert	L=1.900m	m2	22.730	2.350 × 1.900 × 2 + 3.450 × 1.000 × 4
			m2	4.620	2.100 × 1.100 + 2 × 1.100
	Breast Wall (River Side)	L=4.900m	m2	28.829	4.410 × 4.900 + 3.610 × 1.000 × 2
	Breast Wall (Land Side)	L=4.600m	m2	19.920	3.200 × 4.600 + 2.600 × 1.000 × 2
	Wing Wall	L=6.000m	m2	0.000	0.000 × 6.000 × 2
5.11/1	**Reinforcement Bar**	**Grade 275**	ton	**6.201**	68.904 × 90.000 kg/m3
	Grount Hole	**h=500mm**	no	1	
		h=800mm	no	1	
					Sluiceway STA 4+221 MSL-4 1.6*1.6

Sluiceway STA 4+221 MSL-4 1.6*1.6 （Unit: Per Place ）

BQ No.	Description		Unit	Quantity	Calculation
5.23/1	**Leveling Concrete**	**Class F**	**m3**	**4.828**	
	a. Box Culvert, Breast Wall			**1.564**	
	BC-LC1	**L=1.100m**	m3	0.561	5.100 × 1.100 × 0.100
	BC-LC2	**L=1.900m**	m3	0.475	2.500 × 1.900 × 0.100
	BC-LC3	**L=1.100m**	m3	0.528	4.800 × 1.100 × 0.100
	b. Wing Wall			**1.984**	
	WW-LC1	**L=5.500m**	m3	1.760	3.200 × 5.500 × 0.100
	WW-LC2	**L=0.700m**	m3	0.224	3.200 × 0.700 × 0.100
	c. U-shaped Channel				
	UC-LC1	**L=4.000m**	m3	**1.280**	3.200 × 4.000 × 0.100
	Formwork	**Class**	**m2**	**3.500**	
	a. Box Culvert, Breast Wall			**0.820**	
	BC-LF1	**L=1.100m**	m2	0.220	1.100 × 0.100 × 2
	BC-LF2	**L=1.900m**	m2	0.380	1.900 × 0.100 × 2
	BC-LF3	**L=1.100m**	m2	0.220	1.100 × 0.100 × 2
	b. Wing Wall		m2	**1.880**	4.600 × 0.100
	WW-LF1	**L=5.500m**	m2	1.100	5.500 × 0.100 × 2
	WW-LF2	**L=0.700m**	m2	0.780	0.700 × 0.100 × 2 + 3.200 × 0.100 × 2
	c. U-shaped Channel				
	UC-LF1	**L=4.000m**	m2	**0.800**	4.000 × 0.100 × 2

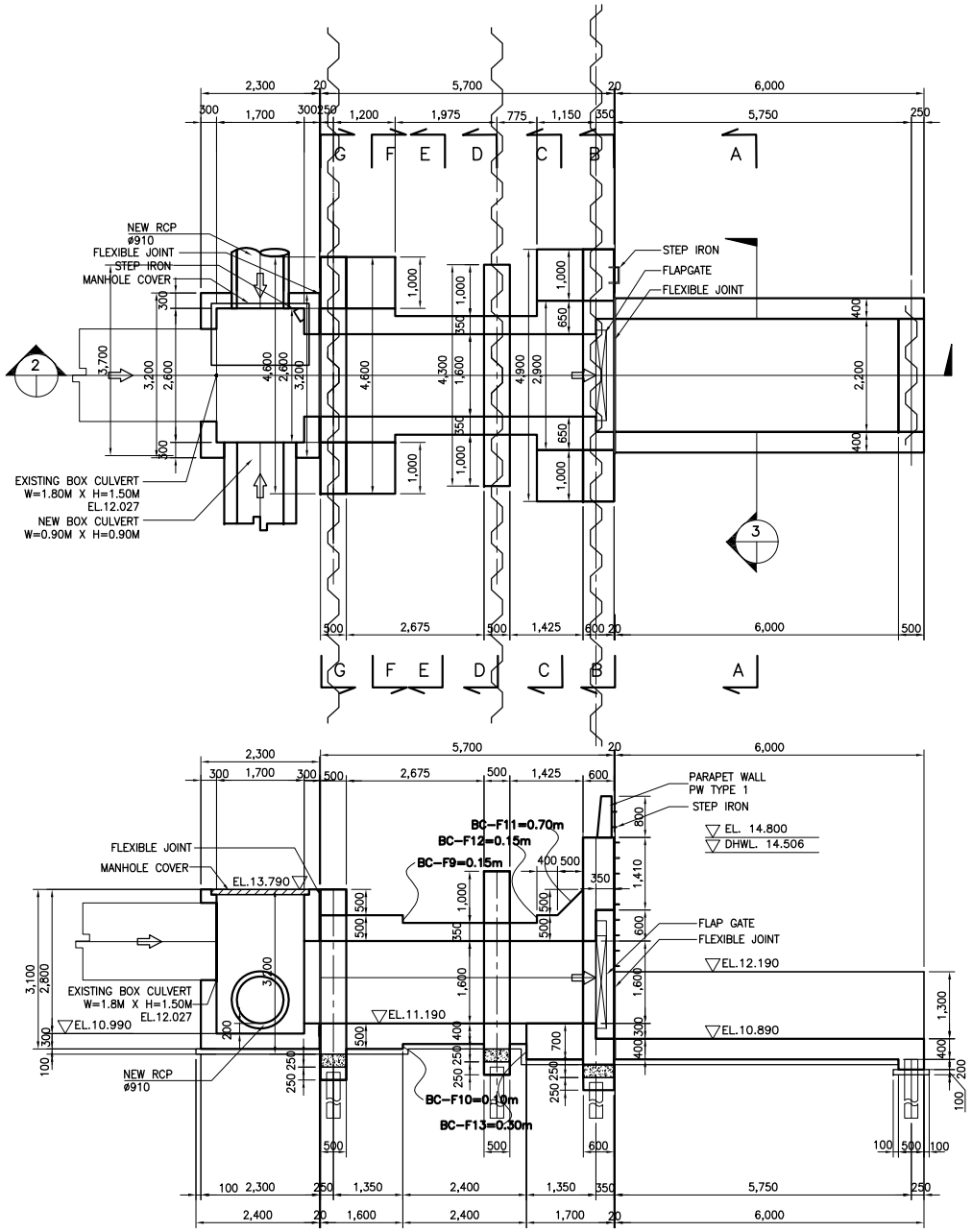
Sluiceway STA 4+221 MSL-4 1.6*1.6					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	Concrete Block Retaining Wall L=4.600m				
	Concrete (Total)	m3	**5.824**		
5.22/15	**Filler concrete (Class B) CB-C1**	m3	0.900	0.360 × 4.600 - 0.756	
5.22/20	**Concrete in base type A for concrete block retaining wall CB-C2**	m3	0.506	0.11 × 4.600	
5.22/23	**Backfill concrete for concrete block retaining wall** CB-C3	m3	0.529	0.115 × 4.600	
5.22/24	**Top concrete for concrete block retaining wall** CB-C4	m3	0.244	0.053 × 4.600	
7.5/1	**Gravel bedding and backfill**	m3	2.889	0.628 × 4.600	
7.10/1	**Precast concrete block retaining wall**	no	36	(0.937 × 4.600)/ 0.3 × 0.4	
		m3	0.756	0.021 × 36	*Surface Area of 1 Concrete Block
				* Volume of 1 Concrete Block	
	Formwork (Total)	**m2**	**34.534**		
	Concrete in base type A for concrete block retaining wall	m2	1.950	(0.300 + 0.100)× 4.600 + 0.11	
	Backfill concrete for concrete block retaining wall	m2	5.272	1.121 × 4.600 + 0.115	
	Top concrete for concrete block retaining wall	m2	1.032	(0.113 + 0.100)× 4.600 +(0.500 + 0.551)/ 2.00 × 0.10	
	Precast concrete block retaining wall	m2	26.280	0.730 × 36	
				* Form Area of 1 Concrete Block	
5.22/22	**Concrete in partition for concrete block wall**				
	Concrete t=500mm	**m3**	**2.200**	2.200 × 0.500 × 2	
	H=1500mm				
	Form work	**m2**	**11.036**		
	PT- F1 End	m2	8.800	2.200 × 2 × 2	
	PT- F2	m2	2.236	2.236 × 0.500 × 2	
	Joint Filler (Elastite) **t=10mm**	m2	8.8	2.200 × 2 × 2	
					Sluiceway STA 4+221 MSL-4 1.6*1.6

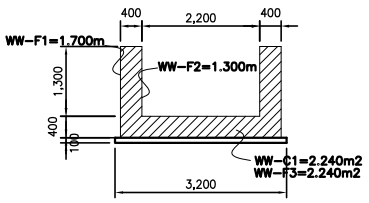
Sluiceway STA 4+221 MSL-4 1.6*1.6					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	Expansion Joint and Flexible Joint				
	Flexible Joint				
	b. Wing Wall	2.2 x 1.3	no	1	
	c. Breast Wall Land Side	1.6 x 1.6	no	1	
	Water Stop				
	a. U-shaped Channel	W=150 t=5	m	5.6	(1.300 + 0.200)× 2 + 2.200 + 0.400
	Cork Filler		**m2**	**9.6**	
	a. U-shaped Channel	t=20	m2	2.240	(1.300 × 0.400)× 2 +(2.200 + 0.800)× 0.400
	b. Wing Wall	"	m2	2.240	(1.300 × 0.400)× 2 +(2.200 + 0.800)× 0.400
	c. Breast Wall Land Side	"	m2	5.120	3.200 × 3.200 - 1.600 × 1.600 × 2
	Joint Sealant		**m2**	**29.1**	
	a. U-shaped Channel	w=0.125 t=20	m	9.900	(1.300 + 0.400)× 2 + 2.200 + 0.800 + 1.300 + 2.200
	b. Wing Wall	"	m	6.400	(1.300 + 0.400)× 2 + 2.200 + 0.800
	c. Breast Wall Land Side	"	m	12.800	(3.200 + 3.200)× 2
No. 6 - PILING					
6.4/5	**Type 10H Hat-shape SSP**	W=900 96.0kg/m			
		L=2.0~4.0m	**m**	**14.0**	
		L=4.0~6.0m	**m**	**0.0**	
		L=6.0~9.0m	**m**	**90.0**	
		L=9.0~12.0m	**m**	**105.0**	
	Wing Wall	L=2.000m	m	6.000	3 × 2.000
	Seepage cut off Wall	L=2.000m	m	8.000	4 × 2.000
		L=6.000m	m	60.000	10 × 6.000
	Breast Wall (Land Side)	L=7.500m	m	30.000	4 × 7.500
		L=10.500m	m	105.000	10 × 10.500
6.4/19	**Type 25H Hat-shape SSP**	W=900 126.0kg/m			
		L=2.0~4.0m	**m**	**0.0**	
		L=4.0~6.0m	**m**	**0.0**	
		L=6.0~9.0m	**m**	**33.2**	
		L=9.0~12.0m	**m**	**132.0**	
	Breast Wall (River Side)	L=6.640m	m	33.200	5 × 6.640
		L=11.000m	m	132.000	12 × 11.000
6.4/25	Extra-over cost of installing sheet piles beneath bridges and HV cables	**Type 10H Hat-shape**	m	82.5	5 × 6.000 + 5 × 10.500
		Type 25H Hat-shape	m	66.0	6 × 11.000
					Sluiceway STA 4+221 MSL-4 1.6*1.6

Sluiceway STA 4+221 MSL-4 1.6*1.6					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	SSP with flexisble joint				
6.4/6	**Type 10H Hat-shape**	**L=2.0~4.0m**	**m**	**0.0**	
		L=4.0~6.0m	**m**	**0.0**	
		L=6.0~9.0m	**m**	**12.0**	
		L=9.0~12.0m	**m**	**21.0**	
		L=6.000m	m	12.000	2 × 6.000
		-L=10.500m	m	21.000	2 × 10.500
6.4/20	**Type 25H Hat-shape**	**L=2.0~4.0m**	**m**	**0.0**	
		L=4.0~6.0m	**m**	**0.0**	
		L=6.0~9.0m	**m**	**0.0**	
		L=9.0~12.0m	**m**	**22.0**	
		L=11.000m	m	22.000	2 × 11.000
No. 7 - PROTECTION WORKS					
7.8/1	**Gabion Mattresses**	**t=500mm**	m2	237.6	10.00 × 10.800 × 2 + 3.00 × 3.20 + 1.00 × 3.00 × 4
	Filter Fabric	**t=10mm**	m2	297.4	11.00 × 11.800 × 2 + 4.00 × 4.20 + 1.50 × 3.50 × 4
No. 8 - DRAINAGE					
8.6/7	Rectangular aluminum flap gate 1600 x 1600	Aluminum	no	1	
No. 11 - STRUCTURAL AND MISCELLANEOUS METALWORK					
11.10/5	Trash screen 2000 x 2000	for 1.6m*1.6m	no	1	
			Kg	**132**	
		20-FB 75*4.5*2000	Kg	106.000	2.650 × 2.000 × 20
		5- ϕ 16*2000	Kg	16.000	1.580 × 2.000 × 5
		Anchor Bar ϕ 16	Kg	10.000	1.580 × 0.500 × 6 × 2

Quantity Calculation of Earth Work

Location	Distance	Excavation			Backfill					
		Area	Average Area	Volume	Area	Average Area	Volume			
+0.0		0.0			0.0					
+0.4	0.4	7.7	3.9	1.5	1.3	0.7	0.3			
+13.9	13.5	7.7	7.7	104.0	1.3	1.3	17.6			
+13.9		23.1			18.4					
+15.6	1.7	23.1	23.1	39.3	18.4	18.4	31.3			
+15.6		20.0			17.3					
+18.0	2.4	20.0	20.0	48.0	17.3	17.3	41.5			
+20.1	2.1	10.3	15.2	31.8	14.1	15.7	33.0			
+21.9	1.8	0.0	5.2	9.3	0.0	7.1	12.7			
Total				233.9			136.4			


NEW RCP
ø910
FLEXIBLE JOINT
STEP IRON
MANHOLE COVER
EXISTING BOX CULVERT
W=1.80M X H=1.50M
EL.12.027
NEW BOX CULVERT
W=0.90M X H=0.90M
STEP IRON
FLAPGATE
FLEXIBLE JOINT
PARAPET WALL
PW TYPE 1
STEP IRON
EL. 14.800
DHWL. 14.506
BC-F11=0.70m
BC-F12=0.15m
BC-F9=0.15m
FLEXIBLE JOINT
MANHOLE COVER
EL.13.790
EXISTING BOX CULVERT
W=1.8M X H=1.50M
EL.12.027
EL.10.990
NEW RCP
ø910
EL.11.190
BC-F10=0.10m
BC-F13=0.30m
FLAP GATE
FLEXIBLE JOINT
EL.12.190
EL.10.890



SECTION A-A(Wing wall)
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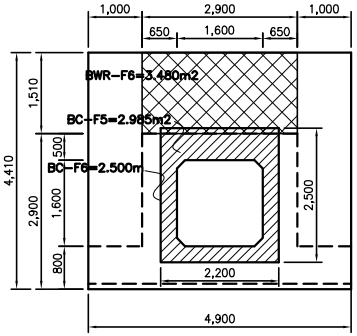

SECTION B-B
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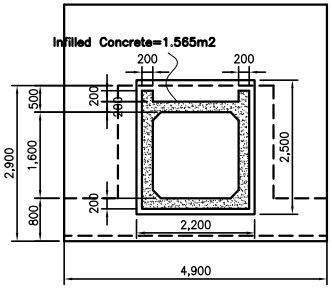

SECTION B-B
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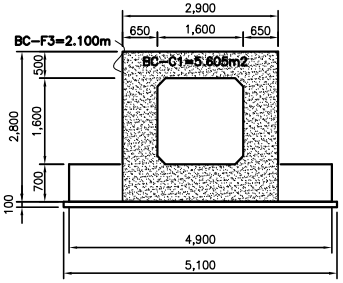

SECTION C-C
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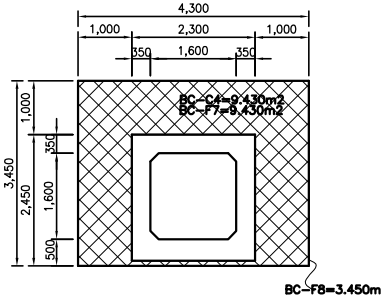

SECTION D-D
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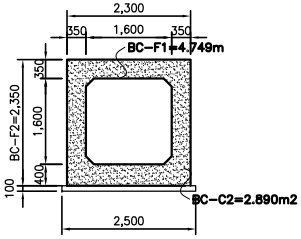

SECTION E-E
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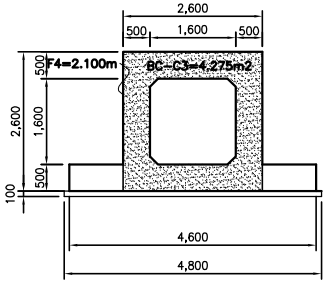

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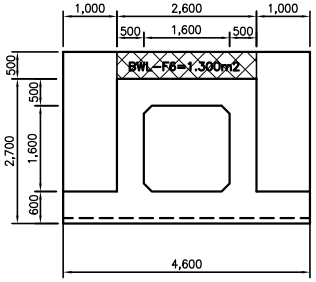

SECTION G-G
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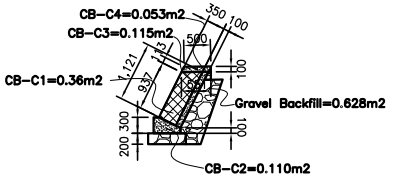

Concrete Block Retaining Wall
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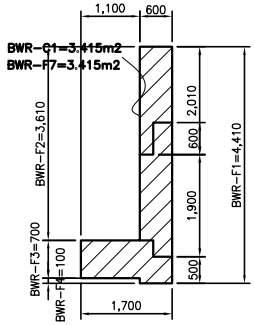
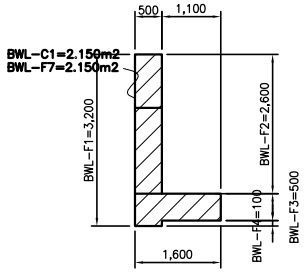
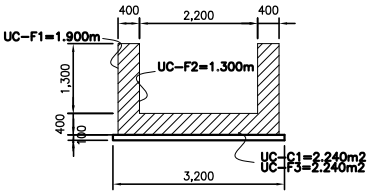


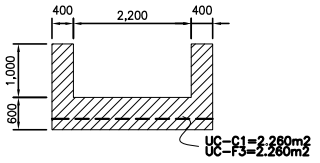
Breast Wall (River Side)
SCALE 1:100



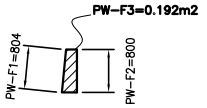
Breast Wall (Land Side)
SCALE 1:100



U-shaped Channel(1)
SCALE 1:100

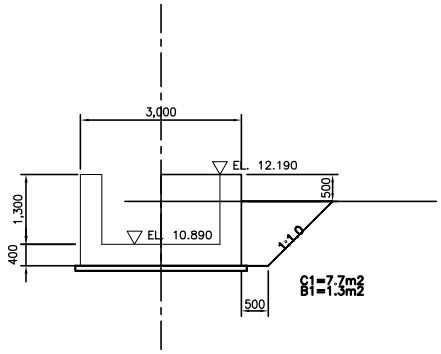


U-shaped Channel(2)
SCALE 1:100

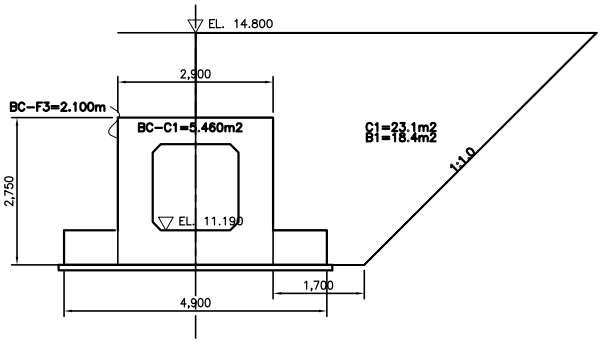


Parapet Wall
SCALE 1:100

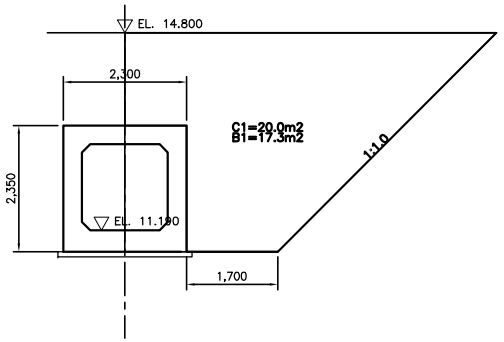
3.151



Section A



Section B



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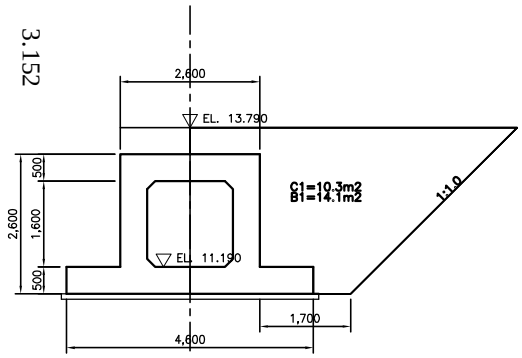
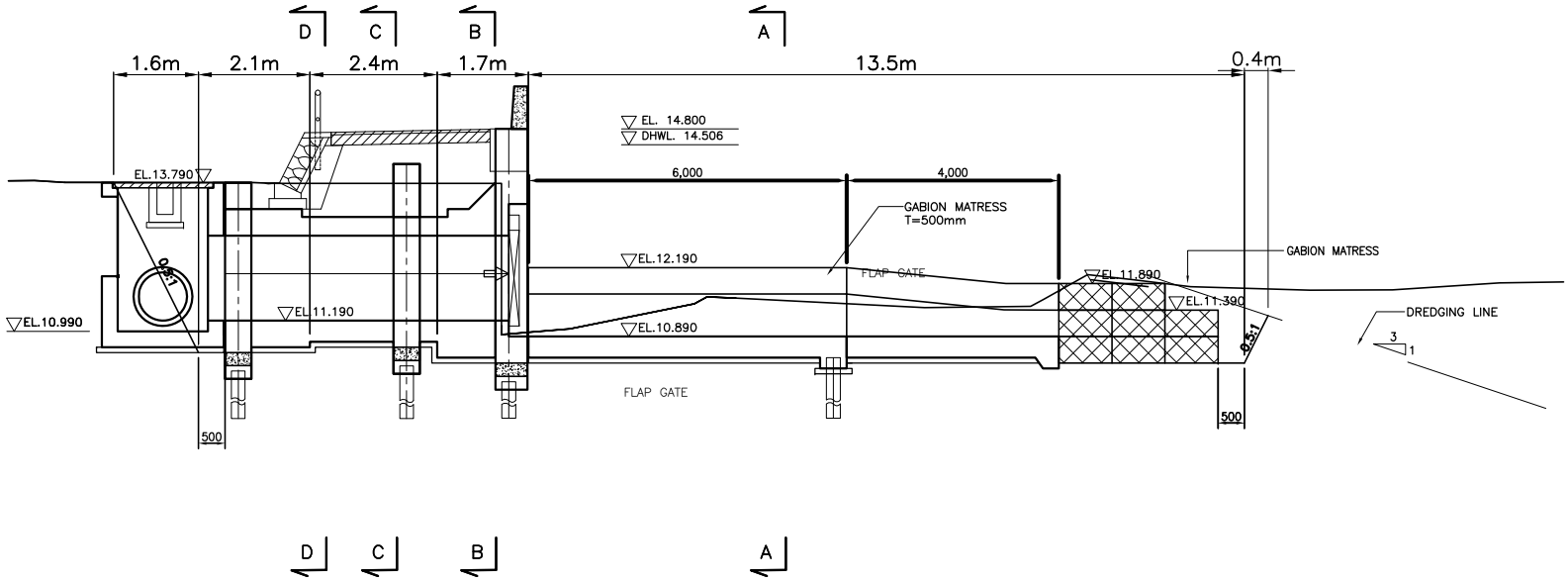


Section D



Lower Marikina River Drainage Facilities

3.3 Sluiceway

(5) LEFT BANK MSL-5 STA 4+406

Sluiceway STA 4+406 MSL-5 1.0*1.0				(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation
	Excavation for Structures	**m3**	**378.8**	
4.8/	**for Sluiceway Structure**	m3	242.3	From Quantity Calculation of Earth Work
	for Gabion Mattress	m3	136.5	10.50 × 13.000 × 0.50 × 2
	Backfill for Structure			
4.8/	Random Backfill Excavated Material	m3	179.7	
4.8/	Disposal Material	m3	199.1	

Sluiceway STA 4+406 MSL-5 1.0*1.0

Sluiceway STA 4+406 MSL-5 1.0*1.0 (Unit: Per Place)

BQ No.	Description		Unit	Quantity	Calculation
No.5	**Concrete (Total)**	**Class A**	**m3**	**58.406**	
5.22/4	**Concrete in sheet pile copings**		**m3**	**13.061**	
	Sluiceway		m3	2.183	0.600 × 0.250 × 6.3 + 0.500 × 0.250 ×(4.50 + 5.40)
	U-shaped Channel	**L=22.200m**	m3	10.878	0.700 × 0.700 × 22.200
5.22/6	**Concrete in parapet walls PW Type 1**	**w=4.700m**	**m3**	**0.902**	
	Parapet Wall	PC1	m3	0.902	0.192 × 4.700
5.22/27	**Concrete in sluice structures**		**m3**	**44.443**	
	b.Box Culvert		**m3**	**17.558**	
	BC-C1	**L=1.400m**	m3	5.285	3.775 × 1.400
		Deduction	m3	-0.646	-(1.845 × 0.350)
	BC-C2	**L=3.000m**	m3	5.055	1.685 × 3.000
	BC-C3	**L=1.300m**	m3	3.959	3.045 × 1.300
	BC-C4	**L=0.500m**	m3	3.630	7.260 × 0.500
	BC-C5	**w=2.200m**	m3	0.275	0.500 × 0.500 × 0.5 × 2.200
	c.Breast wall (River Side)		**m3**	**9.088**	
	BWR - C1	**L=1.000m**	m3	6.224	3.112 × 1.000 × 2
	BWR - C2	**w=2.200m**	m3	2.732	0.600 × 2.070 × 2.200
	BWR - C3	**w=2.200m**	m3	0.132	0.600 × 0.100 × 2.200
	d.Breast wall (Land Side)		**m3**	**4.000**	
	BWL - C1	**L=1.000m**	m3	3.400	1.700 × 1.000 × 2
	BWL - C2	**w=2.000m**	m3	0.500	0.500 × 0.500 × 2.000
	BWL - C3	**w=2.000m**	m3	0.100	0.500 × 0.100 × 2.000
	e.Wing wall		**m3**	**6.679**	
	WW - C1	**L=4.700m**	m3	6.439	1.370 × 4.700
	WW - C1'	**L=0.000m**	m3	0.000	0.000 × 0.000
	WW - C3	**w=2.400m**	m3	0.240	0.200 × 0.500 × 2.400
	f. U-shaped Channel		**m3**	**6.890**	
	UC- C1	**L=5.150m**	m3	4.833	(1.370 + 1.370)× 0.500 × 5.150
	UC- C2	**L=3.900m**	m3	2.057	(1.370 + 0.770)× 0.500 × 3.900
	g. Infiled Concrete	**t=150**	**m3**	**0.228**	0.759 × 0.150 × 2

Sluiceway STA 4+406 MSL-5 1.0*1.0 (Unit: Per Place)

BQ No.	Description		Unit	Quantity	Calculation
	Formwork (Total)	**Class**	**m2**	**199.733**	
	Concrete in sheet pile copings		**m2**	**40.960**	
	Breast Wall (River Side)	**w=6.300m**	m2	3.450	0.250 ×(6.300 + 0.600)× 2
	Seepage cut off Wall	**w=4.500m**	m2	2.500	0.250 ×(4.500 + 0.500)× 2
	Breast Wall (Land Side)	**w=5.400m**	m2	2.950	0.250 ×(5.400 + 0.500)× 2
	U-shaped Channel				
	UC- F1	**L=22.200m**	m2	31.080	0.700 × 22.2 × 2
	UC- F2 End		m2	0.980	0.700 × 0.700 × 2
	Concrete in parapet walls PW Type 1	**w=4.700m**	**m2**	**7.923**	
	PW-F1		m2	3.779	0.804 × 4.700
	PW-F2		m2	3.760	0.800 × 4.700
	PW-F3 End		m2	0.384	0.192 × 2
	Concrete in sluice structures		**m2**	**150.850**	
	b.Box Culvert	**L=5.700m**	**m2**	**52.127**	
	BC F1	**L=5.350m**	m2	15.777	2.949 × 5.350
	BC F2	**L=1.900m**	m2	6.270	1.650 × 1.900 × 2
	BC F3	**L=0.800m**	m2	2.400	1.500 × 0.800 × 2
	BC F4	**L=0.800m**	m2	2.400	1.500 × 0.800 × 2
	BC F5 End		m2	1.845	1.845
	BC F6	**L=0.350m**	m2	2.825	1.750 × 0.350 × 2 + 1.600
	BC F7		m2	14.520	7.260 × 2
	BC F8	**L=0.500m**	m2	2.750	2.750 × 0.500 × 2
	BC F9	**w=2.000m**	m2	0.400	0.200 × 2.000
	BC F10	**w=2.000m**	m2	0.300	0.150 × 2.000
	BC F11	**w=2.200m**	m2	1.540	0.700 × 2.200
	BC F12	**w=2.200m**	m2	0.440	0.200 × 2.200
	BC F13	**w=2.200m**	m2	0.660	0.300 × 2.200
	c.Breast Wall (River Side)		**m2**	**35.342**	
	BWR - F1	**L=1.000m**	m2	8.640	4.320 × 1.000 × 2
	BWR - F2	**L=1.000m**	m2	7.500	3.750 × 1.000 × 2
	BWR - F3	**L=1.000m**	m2	1.300	0.650 × 1.000 × 2
	BWR - F4	**L=4.200m**	m2	0.420	0.100 × 4.200
	BWR - F5	**L=2.200m**	m2	6.704	4.320 × 2.200 − 1.600 × 1.750
	BWR - F6		m2	4.554	4.554
	BWR - F7 End		m2	6.224	3.112 × 2
					Sluiceway STA 4+406 MSL-5 1.0*1.0

Sluiceway STA 4+406 MSL-5 1.0*1.0					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	d.Breast Wall (Land Side)		**m2**	**20.120**	
	BWL - F1	**L=1.000m**	m2	5.200	2.600 × 1.000 × 2
	BWL - F2	**L=1.000m**	m2	4.400	2.200 × 1.000 × 2
	BWL - F3	**L=1.000m**	m2	1.000	0.500 × 1.000 × 2
	BWL - F4	**L=4.000m**	m2	0.400	0.100 × 4.000
	BWL - F5	**L=2.200m**	m2	4.720	2.600 × 2.200 − 1.000 × 1.000
	BWL - F6		m2	1.000	1.000
	BWL - F7 End		m2	3.400	1.700 × 2
	e. Wing Wall		**m2**	**23.460**	
	WW- F1	**L=4.700m**	m2	12.690	1.350 × 4.700 × 2
	WW- F1'	**L=0.000m**	m2	0.000	0.000 × 0.000 × 2
	WW- F2	**L=4.700m**	m2	9.400	1.000 × 4.700 × 2
	WW- F2'	**L=0.000m**	m2	0.000	0.000 × 0.000 × 2
	WW- F3 End		m2	1.370	1.370
	f. U-shaped Channel		**m2**	**19.801**	
	UC- F1	**L=5.150m**	m2	6.953	(1.350 + 1.350)× 0.5 × 5.150
	UC- F1'	**L=3.900m**	m2	3.608	(1.350 + 0.500)× 0.5 × 3.900
	UC- F2	**L=5.150m**	m2	5.150	(1.000 + 1.000)× 0.5 × 5.150
	UC- F2'	**L=3.900m**	m2	1.950	(1.000 + 0.000)× 0.5 × 3.900
	UC- F3 End		m2	1.370	1.370
	UC- F4 End		m2	0.770	0.770
	Supporting Work		**m3**	**5.849**	
		L=5.350m	m3	4.869	(1.000 × 1.000 −(4 × 0.150 × 0.150))× 5.350
		L=0.350m	m3	0.980	1.600 × 1.750 × 0.350
	Scaffolding work				
	Sluiceway		**m2**	55.998	
	Box Culvert	L=1.900m	m2	11.000	0.000 × 1.900 × 2 + 2.750 × 1.000 × 4
	Breast Wall (River Side)	L=4.200m	m2	30.198	4.320 × 4.200 + 3.750 × 1.000 × 2 + 4.554
	Breast Wall (Land Side)	L=4.000m	m2	14.800	2.600 × 4.000 + 2.200 × 1.000 × 2
	Wing Wall	L=4.700m	m2	0.000	0.000 × 4.700 × 2
5.11/1	**Reinforcement Bar**	**Grade 275**	ton	**5.257**	58.406 × 90.000 kg/m3
	Grout Pipe	**h=450mm**	no	1	
		h=750mm	no	1	
					Sluiceway STA 4+406 MSL-5 1.0*1.0

Sluiceway STA 4+406 MSL-5 1.0*1.0 （Unit: Per Place ）

BQ No.	Description		Unit	Quantity	Calculation
5.23/1	**Leveling Concrete**	**Class F**	**m3**	**3.643**	
	a. Box Culvert, Breast Wall		**m3**	**1.030**	
	BC-LC1	**L=0.800m**	m3	0.352	4.400 × 0.800 × 0.100
	BC-LC2	**L=1.900m**	m3	0.342	1.800 × 1.900 × 0.100
	BC-LC3	**L=0.800m**	m3	0.336	4.200 × 0.800 × 0.100
	b. Wing Wall		**m3**	**1.274**	
	WW-LC1	**L=4.200m**	m3	1.092	2.600 × 4.200 × 0.100
	WW-LC2	**L=0.700m**	m3	0.182	2.600 × 0.700 × 0.100
	c. U-shaped Channel		**m3**	**2.353**	
	UC-LC1	**L=5.150m**	m3	1.339	2.600 × 5.150 × 0.100
	UC-LC1	**L=3.900m**	m3	1.014	2.600 × 3.900 × 0.100
	Formwork	**Class**	**m2**	**3.230**	
	a. Box Culvert, Breast Wall		**m2**	**0.700**	
	BC-LF1	**L=0.800m**	m2	0.160	0.800 × 0.100 × 2
	BC-LF2	**L=1.900m**	m2	0.380	1.900 × 0.100 × 2
	BC-LF3	**L=0.800m**	m2	0.160	0.800 × 0.100 × 2
	b. Wing Wall		**m2**	**1.500**	4.600 × 0.100
	WW-LF1	**L=4.200m**	m2	0.840	4.200 × 0.100 × 2
	WW-LF2	**L=0.700m**	m2	0.660	0.700 × 0.100 × 2 + 2.600 × 0.100 × 2
	c. U-shaped Channel		**m2**	**1.810**	
	UC-LF1	**L=5.150m**	m2	1.030	5.150 × 0.100 × 2
	UC-LF1	**L=3.900m**	m2	0.780	3.900 × 0.100 × 2

Sluiceway STA 4+406 MSL-5 1.0*1.0

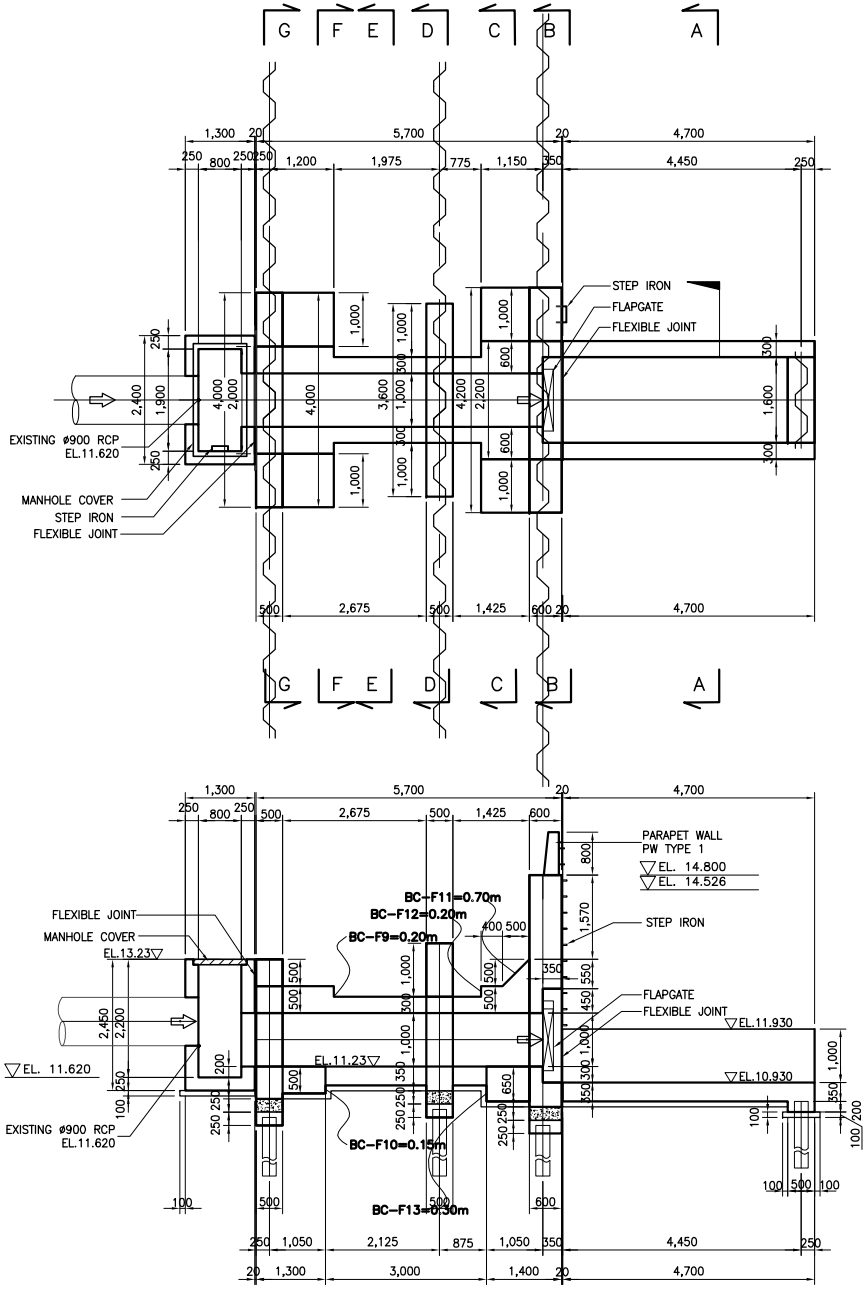
Sluiceway STA 4+406 MSL-5 1.0*1.0					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	Concrete Block Retaining Wall L=4.000m				
	Concrete (Total)	m3	**7.192**		
5.22/15	**Filler concrete (Class B) CB-C1**	m3	1.203	0.579 × 4.000 - 1.113	
5.22/20	**Concrete in base type A for concrete block retaining wall CB-C2**	m3	0.440	0.11 × 4.000	
5.22/23	**Backfill concrete for concrete block retaining wall** CB-C3	m3	0.708	0.177 × 4.000	
5.22/24	**Top concrete for concrete block retaining wall** CB-C4	m3	0.212	0.053 × 4.000	
7.5/1	**Gravel bedding and backfill**	m3	3.516	0.879 × 4.000	
7.10/1	**Precast concrete block retaining wall**	no	53	(1.563 × 4.000)/ 0.3 × 0.4	
		m3	1.113	0.021 × 53	*Surface Area of 1 Concrete Block
				* Volume of 1 Concrete Block	
	Formwork (Total)	**m2**	**48.470**		
	Concrete in base type A for concrete block retaining wall	m2	1.710	(0.300 + 0.100)× 4.000 + 0.11	
	Backfill concrete for concrete block retaining wall	m2	7.165	1.747 × 4.000 + 0.177	
	Top concrete for concrete block retaining wall	m2	0.905	(0.113 + 0.100)× 4.000 +(0.500 + 0.551)/ 2.00 × 0.10	
	Precast concrete block retaining wall	m2	38.690	0.730 × 53	
				* Form Area of 1 Concrete Block	
5.22/22	**Concrete in partition for concrete block wall**				
	Concrete t=500mm	**m3**	**2.200**	2.200 × 0.500 × 2	
	H=1500mm				
	Form work	**m2**	**11.036**		
	PT- F1 End	m2	8.800	2.200 × 2 × 2	
	PT- F2	m2	2.236	2.236 × 0.500 × 2	
	Joint Filler (Elastite) **t=10mm**	m2	8.8	2.200 × 2 × 2	
					Sluiceway STA 4+406 MSL-5 1.0*1.0

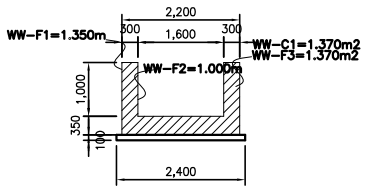
Sluiceway STA 4+406 MSL-5 1.0*1.0					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	Expansion Joint and Flexible Joint				
	Flexible Joint				
	b. Wing Wall 1.8 x 1.1	no	1		
	c. Breast Wall Land Side 1.0 x 1.0	no	1		
	Water Stop				
	a. U-shaped Channel W=150 t=5	m	4.3	(1.000 + 0.175)× 2 + 1.600 + 0.300	
	Cork Filler	**m2**	**7.6**		
	a. U-shaped Channel t=20	m2	1.370	(1.000 × 0.300)× 2 +(1.600 + 0.600)× 0.350	
	b. Wing Wall "	m2	1.370	(1.000 × 0.300)× 2 +(1.600 + 0.600)× 0.350	
	c. Breast Wall Land Side "	m2	4.880	2.400 × 2.450 - 1.000 × 1.000	
	Joint Sealant	**m2**	**22.7**		
	a. U-shaped Channel w=0.125 t=20	m	7.500	(1.000 + 0.350)× 2 + 1.600 + 0.600 + 1.000 + 1.600	
	b. Wing Wall "	m	5.500	(1.000 + 0.350)× 2 + 2.200 + 0.600	
	c. Breast Wall Land Side "	m	9.700	(2.400 + 2.450)× 2	
No. 6 - PILING					
6.4/5	**Type 10H Hat-shape SSP** W=900 96.0kg/m				
	L=2.0~4.0m	**m**	**60.0**		
	L=4.0~6.0m	**m**	**55.0**		
	L=6.0~9.0m	**m**	**26.0**		
	L=9.0~12.0m	**m**	**72.0**		
	Wing Wall L=2.000m	m	6.000	3 × 2.000	
	Seepage cut off Wall L=2.000m	m	6.000	3 × 2.000	
	L=5.500m	m	55.000	10 × 5.500	
	Breast Wall (Land Side) L=6.500m	m	26.000	4 × 6.500	
	L=9.000m	m	72.000	8 × 9.000	
	U-shaped Channel L=2.000m	m	48.000	(10.000 + 10.000 + 1.600 + 0.000)/ 0.900 × 2.000	
6.4/19	**Type 25H Hat-shape SSP** W=900 126.0kg/m				
	L=2.0~4.0m	**m**	**0.0**		
	L=4.0~6.0m	**m**	**0.0**		
	L=6.0~9.0m	**m**	**31.2**		
	L=9.0~12.0m	**m**	**126.0**		
	Breast Wall (River Side) L=6.230m	m	31.150	5 × 6.230	
	L=10.500m	m	126.000	12 × 10.500	
					Sluiceway STA 4+406 MSL-5 1.0*1.0

Sluiceway STA 4+406 MSL-5 1.0*1.0					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	SSP with flexisble joint				
6.4/6	**Type 10H Hat-shape** **L=2.0~4.0m**	**m**	**0.0**		
	L=4.0~6.0m	**m**	**11.0**		
	L=6.0~9.0m	**m**	**0.0**		
	L=9.0~12.0m	**m**	**18.0**		
	L=5.500m	m	11.000	2 × 5.500	
	L=9.000m	m	18.000	2 × 9.000	
6.4/20	**Type 25H Hat-shape** **L=2.0~4.0m**	**m**	**0.0**		
	L=4.0~6.0m	**m**	**0.0**		
	L=6.0~9.0m	**m**	**0.0**		
	L=9.0~12.0m	**m**	**21.0**		
	L=10.500m	m	21.000	2 × 10.500	
No. 7 - PROTECTION WORKS					
7.8/1	**Gabion Mattresses** **t=500mm**	m2	260.0	10.00 × 13.000 × 2	
	Filter Fabric **t=10mm**	m2	308.0	11.00 × 14.000 × 2	
No. 8 - DRAINAGE					
8.6/3	Rectangular aluminum flap gate 1000 x 1000	no	1		
No. 11 - STRUCTURAL AND MISCELLANEOUS METALWORK					
11.10/1	Trash screen 1400 x 1400 **for 1.0m*1.0m**	no	1		
		Kg	**72**		
	15-FB 75*4.5*1400	Kg	56.000	2.650 × 1.400 × 15	
	4-φ16*1400	Kg	9.000	1.580 × 1.400 × 4	
	Anchor Barφ16	Kg	7.000	1.580 × 0.500 × 4 × 2	
					Sluiceway STA 4+406 MSL-5 1.0*1.0

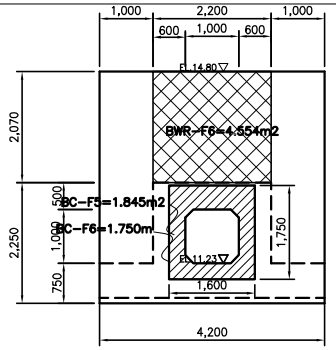
Quantity Calculation of Earth Work

Location	Distance	Excavation			Backfill					
		Area	Average Area	Volume	Area	Average Area	Volume			
+0.0		0.0			0.0					
+3.0	3.0	5.0	2.5	7.5	1.8	0.9	2.7			
+12.0	9.0	5.0	5.0	45.0	1.8	1.8	16.2			
+12.0		41.2			35.4					
+13.4	1.4	41.2	41.2	57.7	35.4	35.4	49.6			
+13.4		25.6			22.4					
+16.4	3.0	25.6	25.6	76.8	22.4	22.4	67.2			
+18.2	1.8	20.8	23.2	41.8	15.4	18.9	34.0			
+19.5	1.3	0.0	10.4	13.5	0.0	7.7	10.0			
Total				242.3			179.7			

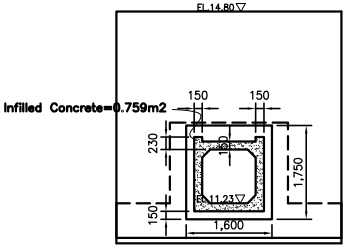

G F E D C B A
STEP IRON
FLAPGATE
FLEXIBLE JOINT
EXISTING ø900 RCP
EL.11.620
MANHOLE COVER
STEP IRON
FLEXIBLE JOINT
PARAPET WALL
PW TYPE 1
EL. 14.800
EL. 14.526
BC-F11=0.70m
BC-F12=0.20m
BC-F9=0.20m
FLEXIBLE JOINT
MANHOLE COVER
EL.13.23
STEP IRON
FLAPGATE
FLEXIBLE JOINT
EL.11.930
EL. 11.620
EL.11.23
EL.10.930
EXISTING ø900 RCP
EL.11.620
BC-F10=0.15m
BC-F13=0.30m



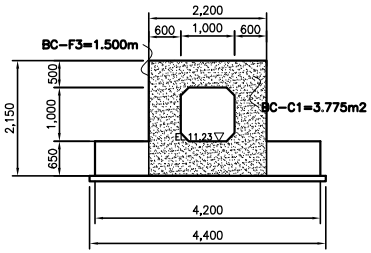
SECTION A-A(Wing wall)
SCALE 1:100



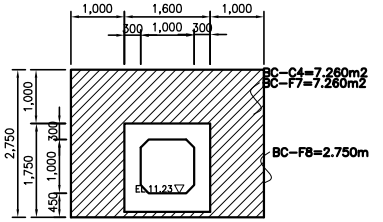
SECTION B-B
SCALE 1:100



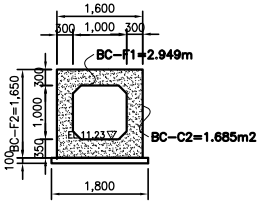
SECTION B-B
SCALE 1:100



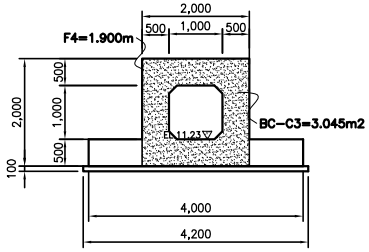
SECTION C-C
SCALE 1:100



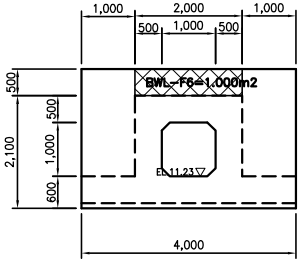
SECTION D-D
SCALE 1:100



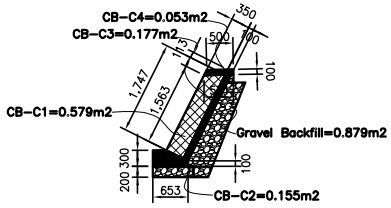
SECTION E-E
SCALE 1:100



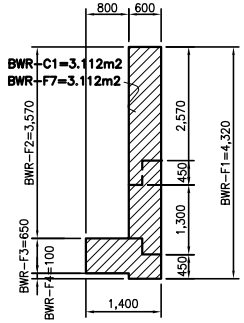
SECTION F-F
1:100



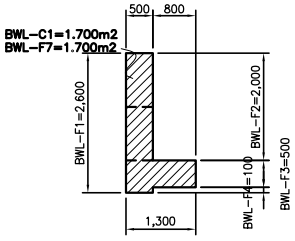
SECTION G-G
SCALE 1:100



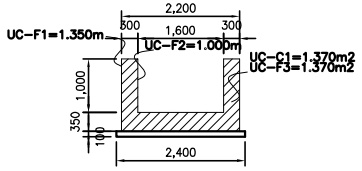
Concrete Block Retaining Wall
SCALE 1:100



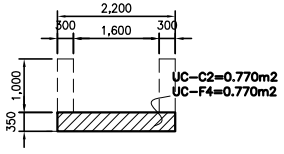
Breast Wall (River Side)
SCALE 1:100



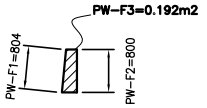
Breast Wall (Land Side)
SCALE 1:100



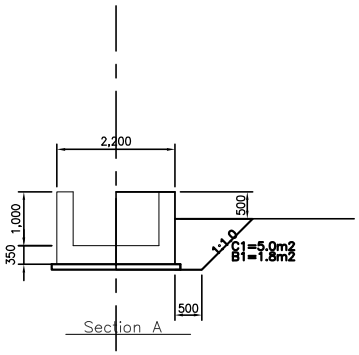
U-shaped Channel(1)
SCALE 1:100

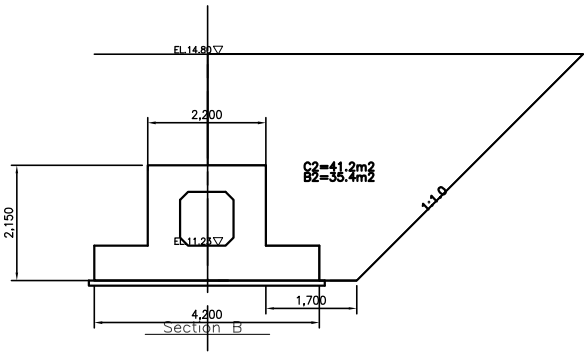


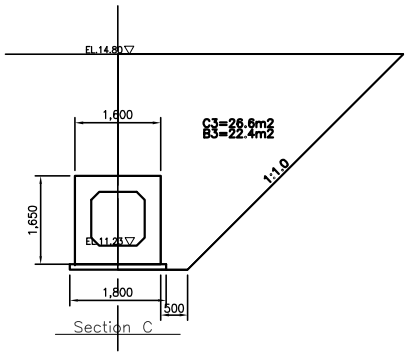
U-shaped Channel(2)
SCALE 1:100

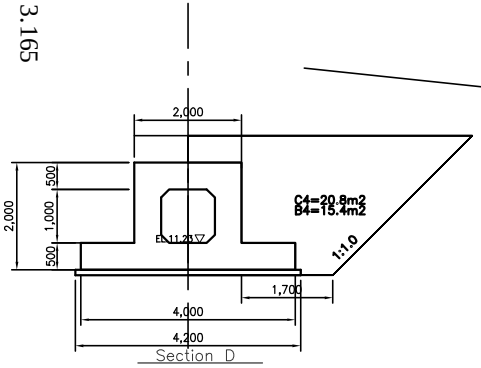


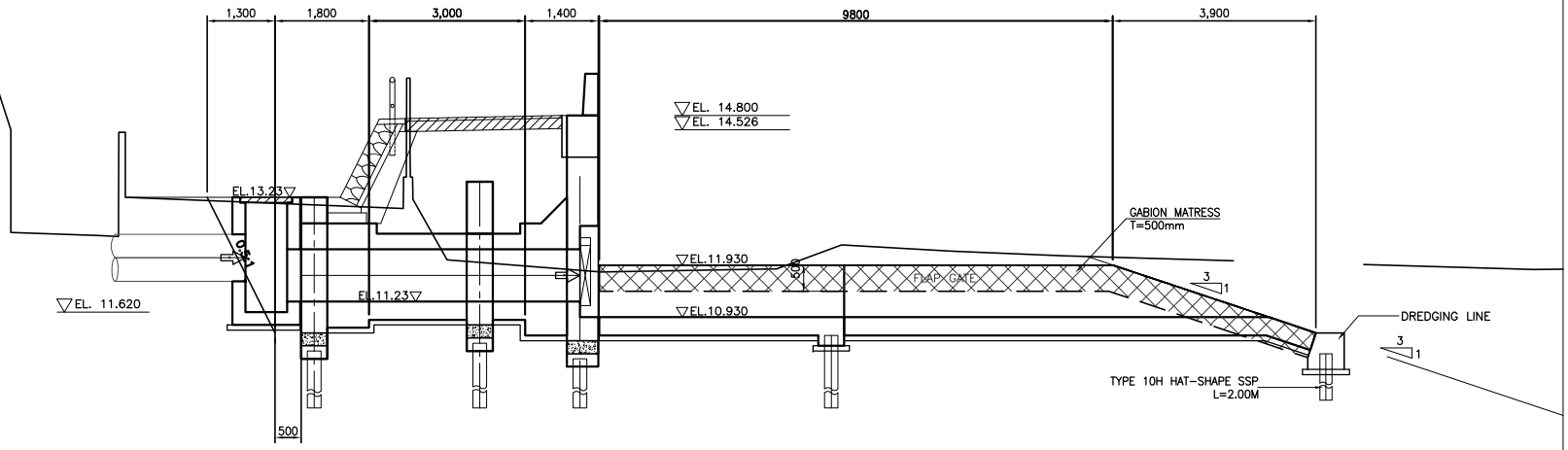
Parapet Wall
SCALE 1:100


2,200
500
1,000
350
1:1.0
C1=5.0m2
B1=1.8m2
500
Section A


EL.14.80
2,200
C2=41.2m2
B2=35.4m2
1:1.0
2,150
EL.11.23
1,700
4,200
Section B


EL.14.80
1,600
C3=26.6m2
B3=22.4m2
1:1.0
1,650
EL.11.23
1,800
500
Section C


2,000
500
2,000
1,000
500
C4=20.8m2
B4=15.4m2
EL.11.23
1:1.0
1,700
4,000
4,200
Section D


D
C
B
A
1,300
1,800
3,000
1,400
9800
3,900
EL. 14.800
EL. 14.526
EL.13.23
1:1.0
EL. 11.620
EL.11.23
EL.11.930
EL.10.930
500
FLAP GATE
GABION MATRESS
T=500mm
3
1
DREDGING LINE
3
1
TYPE 10H HAT-SHAPE SSP
L=2.00M
500
D
C
B
A

3.165

Lower Marikina River Drainage Facilities

3.3 Sluiceway

(6) LEFT BANK MSL-6 STA 4+503

Sluiceway STA 4+503 MSL-6 1.2*1.2 （Unit: Per Place ）

BQ No.	Description	Unit	Quantity	Calculation
	Excavation for Structures	**m3**	**419.1**	
4.8/	**for Sluiceway Structure**	m3	313.0	From Quantity Calculation of Earth Work
	for Gabion Mattress	m3	106.1	10.50 × 10.100 × 0.50 × 2
	Backfill for Structure			
4.8/	Random Backfill Excavated Material	m3	212.6	
4.8/	Disposal Material	m3	206.5	

Sluiceway STA 4+503 MSL-6 1.2*1.2

Sluiceway STA 4+503 MSL-6 1.2*1.2 (Unit: Per Place)

BQ No.	Description		Unit	Quantity	Calculation
No.5	**Concrete (Total)**	**Class A**	**m3**	**62.319**	
5.22/4	**Concrete in sheet pile copings**		**m3**	**2.160**	0.600 × 0.250 × 5.4 + 0.500 × 0.250 ×(5.40 + 5.40)
5.22/6	**Concrete in parapet walls PW Type 1**	**w=4.400m**	**m3**	**0.845**	
	Parapet Wall	PC1	m3	0.845	0.192 × 4.400
5.22/27	**Concrete in sluice structures**		**m3**	**59.314**	
	a.Box Culvert		**m3**	**23.554**	
	BC-C1	**L=1.500m**	m3	6.368	4.245 × 1.500
		Deduction	m3	-0.740	-(2.115 × 0.350)
	BC-C2	**L=2.800m**	m3	5.418	1.935 × 2.800
	BC-C3	**L=2.400m**	m3	8.268	3.445 × 2.400
	BC-C4	**L=0.500m**	m3	3.940	7.880 × 0.500
	BC-C4	**w=2.400m**	m3	0.300	0.500 × 0.500 × 0.5 × 2.400
	b.Breast wall (River Side)		**m3**	**9.402**	
	BWR - C1	**L=1.000m**	m3	6.450	3.225 × 1.000 × 2
	BWR - C2	**w=2.400m**	m3	2.736	0.600 × 1.900 × 2.400
	BWR - C3	**w=2.400m**	m3	0.216	0.600 × 0.150 × 2.400
	d.Breast wall (Land Side)		**m3**	**4.360**	
	BWL - C1	**L=1.000m**	m3	3.700	1.850 × 1.000 × 2
	BWL - C2	**w=2.200m**	m3	0.550	0.500 × 0.500 × 2.200
	BWL - C3	**w=2.200m**	m3	0.110	0.500 × 0.100 × 2.200
	c.Wing wall		**m3**	**10.910**	
	WW - C1	**L=5.200m**	m3	10.660	2.050 × 5.200
	WW - C1'	**L=0.000m**	m3	0.000	0.000 × 0.000
	WW - C3	**w=2.500m**	m3	0.250	0.200 × 0.500 × 2.500
	d. U-shaped Channel		**m3**	**10.824**	
	UC- C1	**L=4.800m**	m3	10.824	(2.050 + 2.200)× 0.500 × 4.800
	UC- C2	**L=0.000m**	m3	0.000	(0.000 + 0.000)× 0.000 × 0.000
	e. Infiled Concrete	**t=150**	**m3**	**0.264**	0.879 × 0.150 × 2

Sluiceway STA 4+503 MSL-6 1.2*1.2

Sluiceway STA 4+503 MSL-6 1.2*1.2 (Unit: Per Place)

BQ No.	Description		Unit	Quantity	Calculation
	Formwork (Total)	**Class**	**m2**	**189.971**	
	Concrete in sheet pile copings		**m2**	**8.900**	
	Breast Wall (River Side)	**w=5.400m**	m2	3.000	0.250 ×(5.400 + 0.600)× 2
	Seepage cut off Wall	**w=5.400m**	m2	2.950	0.250 ×(5.400 + 0.500)× 2
	Breast Wall (Land Side)	**w=5.400m**	m2	2.950	0.250 ×(5.400 + 0.500)× 2
	Concrete in parapet walls PW Type 1	**w=4.400m**	**m2**	**7.442**	
	PW-F1		m2	3.538	0.804 × 4.400
	PW-F2		m2	3.520	0.800 × 4.400
	PW-F3 End		m2	0.384	0.192 × 2
	Concrete in sluice structures		**m2**	**173.629**	
	b.Box Culvert	**L=5.700m**	**m2**	**60.436**	
	BC F1	**L=5.350m**	m2	18.506	3.459 × 5.350
	BC F2	**L=2.300m**	m2	8.510	1.850 × 2.300 × 2
	BC F3	**L=0.900m**	m2	3.060	1.700 × 0.900 × 2
	BC F4	**L=0.800m**	m2	2.720	1.700 × 0.800 × 2
	BC F5 End		m2	2.115	2.115
	BC F6	**L=0.350m**	m2	3.165	1.950 × 0.350 × 2 + 1.800
	BC F7		m2	15.760	7.880 × 2
	BC F8	**L=0.500m**	m2	2.950	2.950 × 0.500 × 2
	BC F9	**w=2.200m**	m2	0.440	0.200 × 2.200
	BC F10	**w=2.200m**	m2	0.330	0.150 × 2.200
	BC F11	**w=2.400m**	m2	1.680	0.700 × 2.400
	BC F12	**w=2.400m**	m2	0.480	0.200 × 2.400
	BC F13	**w=2.400m**	m2	0.720	0.300 × 2.400
	c.Breast Wall (River Side)		**m2**	**35.633**	
	BWR - F1	**L=1.000m**	m2	8.740	4.370 × 1.000 × 2
	BWR - F2	**L=1.000m**	m2	7.140	3.570 × 1.000 × 2
	BWR - F3	**L=1.000m**	m2	1.300	0.650 × 1.000 × 2
	BWR - F4	**L=4.400m**	m2	0.660	0.150 × 4.400
	BWR - F5	**L=2.400m**	m2	6.783	4.370 × 2.400 − 1.900 × 1.950
	BWR - F6		m2	4.560	4.560
	BWR - F7 End		m2	6.450	3.225 × 2
					Sluiceway STA 4+503 MSL-6 1.2*1.2

Sluiceway STA 4+503 MSL-6 1.2*1.2 (Unit: Per Place)

BQ No.	Description		Unit	Quantity	Calculation
	d.Breast Wall (Land Side)		**m2**	**21.500**	
	BWL - F1	**L=1.000m**	m2	5.600	2.800 × 1.000 × 2
	BWL - F2	**L=1.000m**	m2	4.400	2.200 × 1.000 × 2
	BWL - F3	**L=1.000m**	m2	1.000	0.500 × 1.000 × 2
	BWL - F4	**L=4.200m**	m2	0.420	0.100 × 4.200
	BWL - F5	**L=2.400m**	m2	5.280	2.800 × 2.400 − 1.200 × 1.200
	BWL - F6		m2	1.100	1.100
	BWL - F7 End		m2	3.700	1.850 × 2
	e. Wing Wall		**m2**	**37.410**	
	WW- F1	**L=5.200m**	m2	19.760	1.900 × 5.200 × 2
	WW- F1'	L=0.000m	m2	0.000	0.000 × 0.000 × 2
	WW- F2	**L=5.200m**	m2	15.600	1.500 × 5.200 × 2
	WW- F2'	L=0.000m	m2	0.000	0.000 × 0.000 × 2
	WW- F3 End		m2	2.050	2.050
	f. U-shaped Channel		**m2**	**18.650**	
	UC- F1	**L=4.800m**	m2	8.400	(1.900 + 1.600)× 0.5 × 4.800
	UC- F1'	L=0.000m	m2	0.000	(0.000 + 0.000)× 0.5 × 0.000
	UC- F2	**L=4.800m**	m2	6.000	(1.500 + 1.000)× 0.5 × 4.800
	UC- F2'	L=0.000m	m2	0.000	(1.000 + 0.000)× 0.5 × 0.000
	UC- F3 End		m2	2.050	2.050
	UC- F4 End		m2	2.200	2.200
	Supporting Work		**m3**	**8.452**	
		L=5.350m	m3	7.223	(1.200 × 1.200 −(4 × 0.150 × 0.150))× 5.350
		L=0.350m	m3	1.229	1.800 × 1.950 × 0.350
	Scaffolding work				
	Sluiceway		**m2**	**54.328**	
	Box Culvert	L=2.300m	m2	11.800	0.000 × 2.300 × 2 + 2.950 × 1.000 × 4
	Breast Wall (River Side)	L=4.400m	m2	26.368	4.370 × 4.400 + 3.570 × 1.000 × 2
	Breast Wall (Land Side)	L=4.200m	m2	16.160	2.800 × 4.200 + 2.200 × 1.000 × 2
	Wing Wall	L=5.200m	m2	0.000	0.000 × 5.200 × 2
5.11/1	**Reinforcement Bar**	**Grade 275**	ton	**5.609**	62.319 × 90.000 kg/m3
	Grout Pipe	**h=450mm**	no	1	
		h=750mm	no	1	
					Sluiceway STA 4+503 MSL-6 1.2*1.2

Sluiceway STA 4+503 MSL-6 1.2*1.2 （Unit: Per Place）

BQ No.	Description		Unit	Quantity	Calculation
5.23/1	**Leveling Concrete**	**Class F**	**m3**	**3.980**	
	a. Box Culvert, Breast Wall		**m3**	**1.226**	
	BC-LC1	**L=0.900m**	m3	0.414	4.600 × 0.900 × 0.100
	BC-LC2	**L=2.300m**	m3	0.460	2.000 × 2.300 × 0.100
	BC-LC3	**L=0.800m**	m3	0.352	4.400 × 0.800 × 0.100
	b. Wing Wall		**m3**	**1.458**	
	WW-LC1	**L=4.700m**	m3	1.269	2.700 × 4.700 × 0.100
	WW-LC2	**L=0.700m**	m3	0.189	2.700 × 0.700 × 0.100
	c. U-shaped Channel		**m3**	**1.296**	
	UC-LC1	**L=4.800m**	m3	**1.296**	2.700 × 4.800 × 0.100
	UC-LC1	**L=0.000m**	m3	**0.000**	0.000 × 0.000 × 0.100
	Formwork	**Class**	**m2**	**3.380**	
	a. Box Culvert, Breast Wall		**m2**	**0.800**	
	BC-LF1	**L=0.900m**	m2	0.180	0.900 × 0.100 × 2
	BC-LF2	**L=2.300m**	m2	0.460	2.300 × 0.100 × 2
	BC-LF3	**L=0.800m**	m2	0.160	0.800 × 0.100 × 2
	b. Wing Wall		**m2**	**1.620**	4.600 × 0.100
	WW-LF1	**L=4.700m**	m2	0.940	4.700 × 0.100 × 2
	WW-LF2	**L=0.700m**	m2	0.680	0.700 × 0.100 × 2 + 2.700 × 0.100 × 2
	c. U-shaped Channel		**m2**	**0.960**	
	UC-LF1	**L=4.800m**	m2	**0.960**	4.800 × 0.100 × 2
	UC-LF1	**L=0.000m**	m2	**0.000**	0.000 × 0.100 × 2

Sluiceway STA 4+503 MSL-6 1.2*1.2

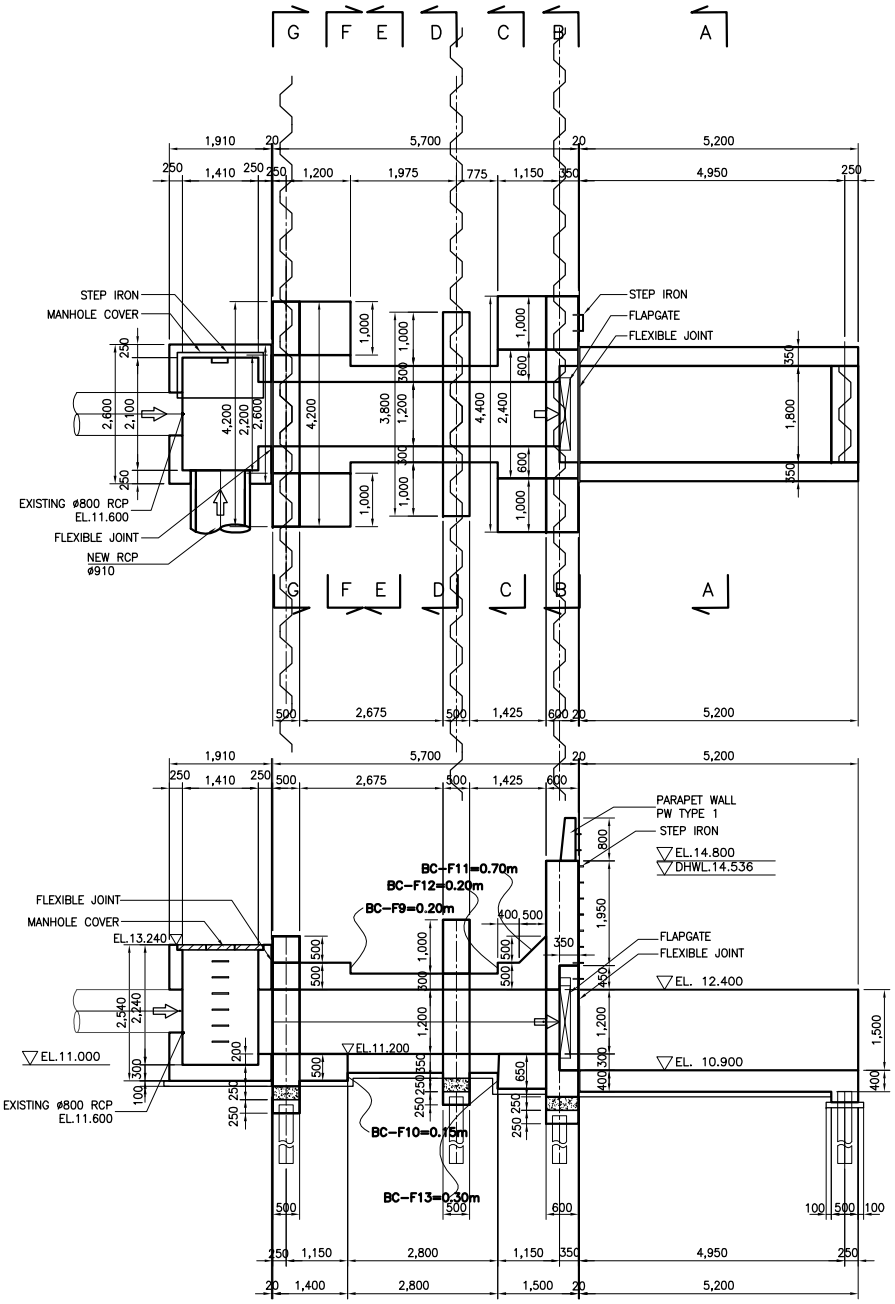
Sluiceway STA 4+503 MSL-6 1.2*1.2					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	Concrete Block Retaining Wall L=4.200m				
	Concrete (Total)	m3	**6.847**		
5.22/15	**Filler concrete (Class B) CB-C1**	m3	1.126	0.513 × 4.200 - 1.029	
5.22/20	**Concrete in base type A for concrete block retaining wall CB-C2**	m3	0.462	0.11 × 4.200	
5.22/23	**Backfill concrete for concrete block retaining wall** CB-C3	m3	0.664	0.158 × 4.200	
5.22/24	**Top concrete for concrete block retaining wall** CB-C4	m3	0.223	0.053 × 4.200	
7.5/1	**Gravel bedding and backfill**	m3	3.343	0.796 × 4.200	
7.10/1	**Precast concrete block retaining wall**	no	49	(1.373 × 4.200)/ 0.3 × 0.4	
		m3	1.029	0.021 × 49	*Surface Area of 1 Concrete Block
				* Volume of 1 Concrete Block	
	Formwork (Total)	**m2**	**45.204**		
	Concrete in base type A for concrete block retaining wall	m2	1.790	(0.300 + 0.100)× 4.200 + 0.11	
	Backfill concrete for concrete block retaining wall	m2	6.697	1.557 × 4.200 + 0.158	
	Top concrete for concrete block retaining wall	m2	0.947	(0.113 + 0.100)× 4.200 +(0.500 + 0.551)/ 2.00 × 0.10	
	Precast concrete block retaining wall	m2	35.770	0.730 × 49	
				* Form Area of 1 Concrete Block	
5.22/22	**Concrete in partition for concrete block wall**				
	Concrete t=500mm	**m3**	**2.200**	2.200 × 0.500 × 2	
	H=1500mm				
	Form work	**m2**	**11.036**		
	PT- F1 End	m2	8.800	2.200 × 2 × 2	
	PT- F2	m2	2.236	2.236 × 0.500 × 2	
	Joint Filler (Elastite) **t=10mm**	m2	8.8	2.200 × 2 × 2	
					Sluiceway STA 4+503 MSL-6 1.2*1.2

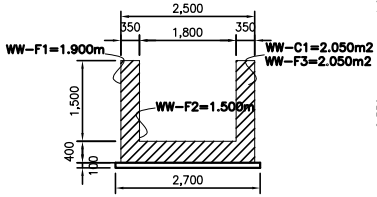
Sluiceway STA 4+503 MSL-6 1.2*1.2					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	Expansion Joint and Flexible Joint				
	Flexible Joint				
	b. Wing Wall 1.8 x 1.5	no	1		
	c. Breast Wall Land Side 1.2 x 1.2	no	1		
	Water Stop				
	a. U-shaped Channel W=150 t=5	m	5.6	(1.500 + 0.200)× 2 + 1.800 + 0.350	
	Cork Filler	**m2**	**9.6**		
	a. U-shaped Channel t=20	m2	2.200	(1.500 × 0.400)× 2 +(1.800 + 0.700)× 0.400	
	b. Wing Wall "	m2	2.200	(1.500 × 0.400)× 2 +(1.800 + 0.700)× 0.400	
	c. Breast Wall Land Side "	m2	5.164	2.600 × 2.540 - 1.200 × 1.200	
	Joint Sealant	**m2**	**26.8**		
	a. U-shaped Channel w=0.125 t=20	m	9.700	(1.500 + 0.400)× 2 + 1.800 + 0.800 + 1.500 + 1.800	
	b. Wing Wall "	m	6.800	(1.500 + 0.400)× 2 + 2.200 + 0.800	
	c. Breast Wall Land Side "	m	10.280	(2.600 + 2.540)× 2	
No. 6 - PILING					
6.4/1	**Type 10H Hat-shape SSP** W=900 96.0kg/m				
	L=2.0~4.0m	**m**	**14.0**		
	L=4.0~6.0m	**m**	**73.0**		
	L=6.0~9.0m	**m**	**60.0**		
	L=9.0~12.0m	**m**	**0.0**		
	Wing Wall L=2.000m	m	6.000	3 × 2.000	
	Seepage cut off Wall L=2.000m	m	8.000	4 × 2.000	
	L=5.500m	m	55.000	10 × 5.500	
	Breast Wall (Land Side) L=4.500m	m	18.000	4 × 4.500	
	L=7.500m	m	60.000	8 × 7.500	
6.4/19	**Type 25H Hat-shape SSP** W=900 126.0kg/m				
	L=2.0~4.0m	**m**	**0.0**		
	L=4.0~6.0m	**m**	**0.0**		
	L=6.0~9.0m	**m**	**24.6**		
	L=9.0~12.0m	**m**	**126.0**		
	Breast Wall (River Side) L=6.150m	m	24.600	4 × 6.150	
	L=10.500m	m	126.000	12 × 10.500	
					Sluiceway STA 4+503 MSL-6 1.2*1.2

Sluiceway STA 4+503 MSL-6 1.2*1.2					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	SSP with flexisble joint				
6.4/6	**Type 10H Hat-shape** **L=2.0~4.0m**	**m**	**0.0**		
	L=4.0~6.0m	**m**	**11.0**		
	L=6.0~9.0m	**m**	**15.0**		
	L=9.0~12.0m	**m**	**0.0**		
	L=5.500m	m	11.000	2 × 5.500	
	L=7.500m	m	15.000	2 × 7.500	
6.4/20	**Type 25H Hat-shape** **L=2.0~4.0m**	**m**	**0.0**		
	L=4.0~6.0m	**m**	**0.0**		
	L=6.0~9.0m	**m**	**0.0**		
	L=9.0~12.0m	**m**	**21.0**		
	L=10.500m	m	21.000	2 × 10.500	
No. 7 - PROTECTION WORKS					
7.8/1	Gabion Mattresses **t=500mm**	m2	246.4	10.00 × 10.100 × 2 + 3.00 × 2.80 + 3.00 × 3.00 × 4	
	Filter Fabric **t=10mm**	m2	308.4	11.00 × 11.100 × 2 + 4.00 × 3.80 + 3.50 × 3.50 × 4	
No. 8 - DRAINAGE					
8.6/4	Rectangular aluminum flap gate 1200 x 1200	no	1		
No. 11 - STRUCTURAL AND MISCELLANEOUS METALWORK					
11.10/2	Trash screen 1600 x 1600 for 1.2m*1.2m	no	1		
		Kg	**177**		
	16-FB 75*4.5*1600	Kg	68.000	2.650 × 1.600 × 16	
	4- ϕ 16*1600	Kg	102.000	1.580 × 16.000 × 4	
	Anchor Bar ϕ 16	Kg	7.000	1.580 × 0.500 × 4 × 2	

Quantity Calculation of Earth Work

Location	Distance	Excavation			Backfill					
		Area	Average Area	Volume	Area	Average Area	Volume			
+0.0		0.0			0.0					
+2.2	2.2	8.1	4.1	8.9	3.4	1.7	3.7			
+15.7	13.5	8.1	8.1	109.4	3.4	3.4	45.9			
+15.7		42.7			35.8					
+17.2	1.5	42.7	42.7	64.1	35.8	35.8	53.7			
+17.2		26.7			23.3					
+19.8	2.6	26.7	26.7	69.4	23.3	23.3	60.6			
+21.7	1.9	22.4	24.6	46.6	16.6	20.0	37.9			
+23.0	1.3	0.0	11.2	14.6	0.0	8.3	10.8			
Total				313.0			212.6			


G F E D C B A
STEP IRON
MANHOLE COVER
EXISTING ø800 RCP
EL.11.600
FLEXIBLE JOINT
NEW RCP
ø910
STEP IRON
FLAPGATE
FLEXIBLE JOINT
PARAPET WALL
PW TYPE 1
STEP IRON
EL.14.800
DHWL.14.536
BC-F11=0.70m
BC-F12=0.20m
BC-F9=0.20m
FLEXIBLE JOINT
MANHOLE COVER
EL.13.240
FLAPGATE
FLEXIBLE JOINT
EL. 12.400
EL.11.000
EL.11.200
EL. 10.900
EXISTING ø800 RCP
EL.11.600
BC-F10=0.15m
BC-F13=0.30m



SECTION A-A(Wing wall)
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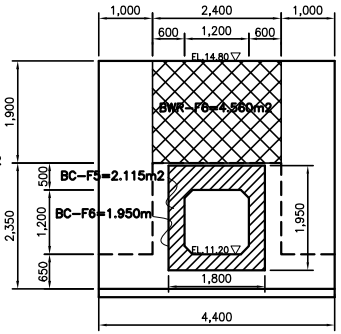
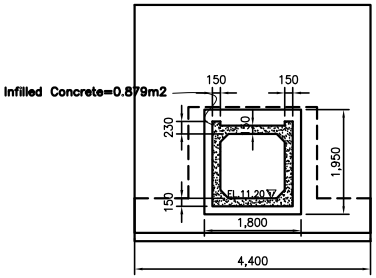


SECTION B-B
SCALE 1:100



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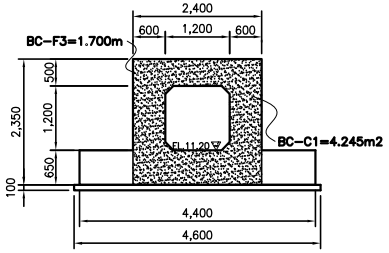
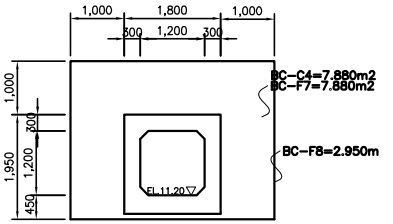
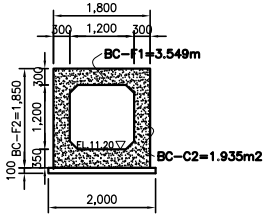


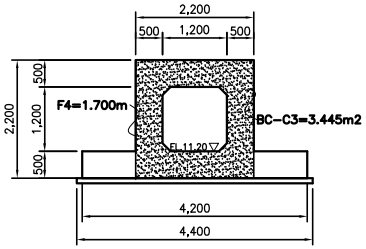
SECTION C-C
SCALE 1:100



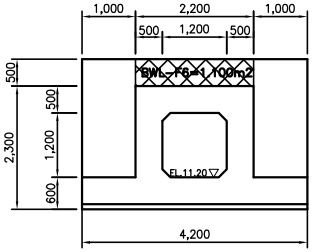
SECTION D-D
SCALE 1:100



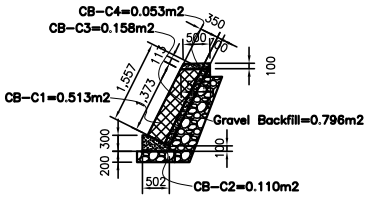
SECTION E-E
SCALE 1:100



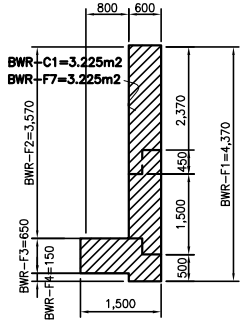
SECTION F-F
1:100



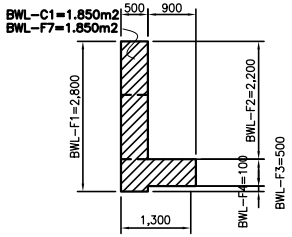
SECTION G-G
SCALE 1:100



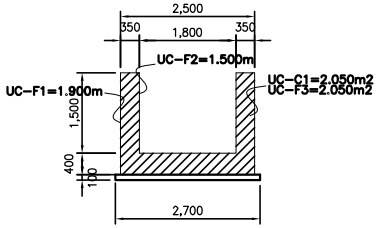
Concrete Block Retaining Wall
SCALE 1:100



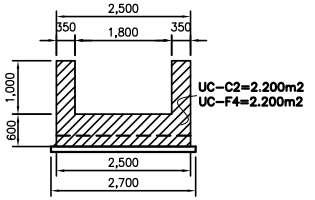
Breast Wall (River Side)
SCALE 1:100



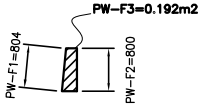
Breast Wall (Land Side)
SCALE 1:100



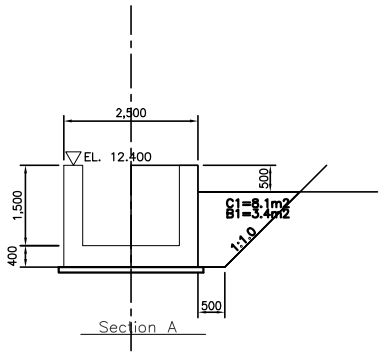
U-shaped Channel(1)
SCALE 1:100



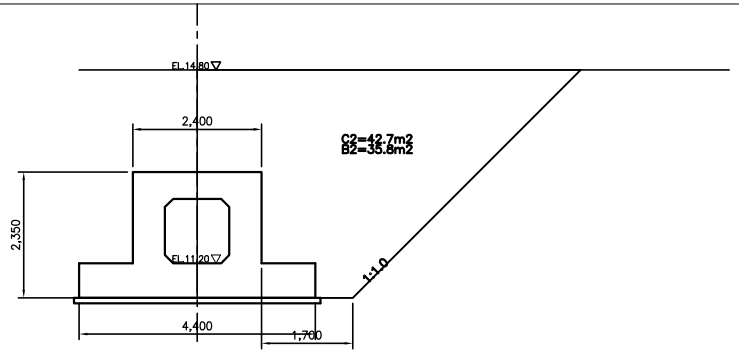
U-shaped Channel(2)
SCALE 1:100



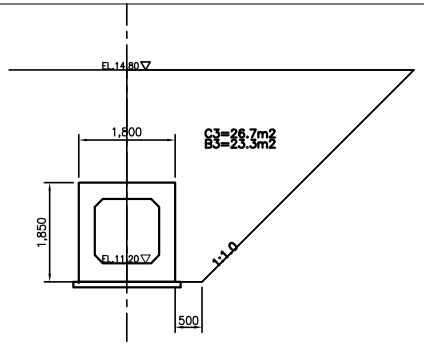
Parapet Wall
SCALE 1:100



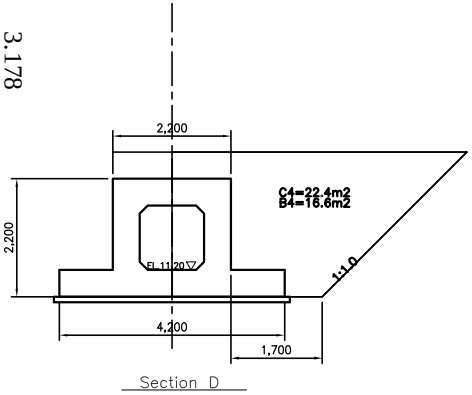
Section A



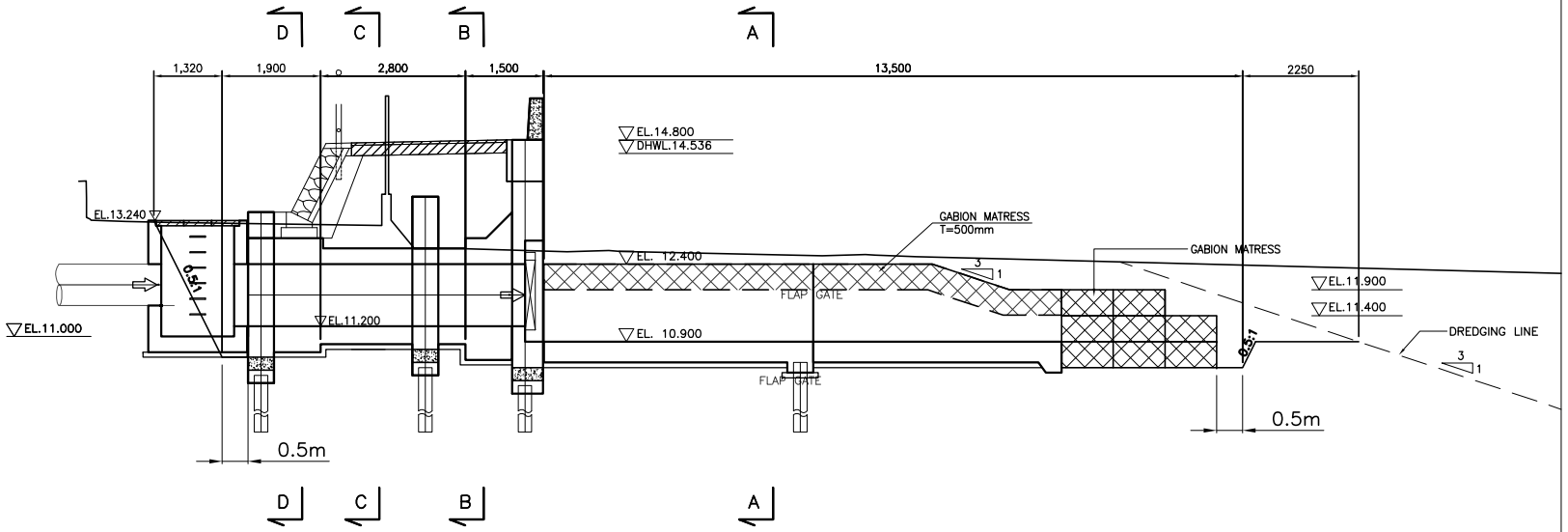
Section B



Section C



Section D



3.178

Lower Marikina River Drainage Facilities

3.3 Sluiceway

(7) RIGHT BANK MSR-2 STA3+157

Sluiceway STA 3+157 MSR-2 1.4*1.4				(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation
	Excavation for Structures	**m3**	**430.6**	
4.8/	**for Sluiceway Structure**	m3	324.5	From Quantity Calculation of Earth Work
	for Gabion Mattress	m3	106.1	10.50 × 10.100 × 0.50 × 2
	Backfill for Structure			
4.8/	Random Backfill Excavated Material	m3	234.4	
4.8/	Disposal Material	m3	196.2	

Sluiceway STA 3+157 MSR-2 1.4*1.4 (Unit: Per Place)

BQ No.	Description		Unit	Quantity	Calculation
No.5	**Concrete (Total)**	**Class A**	**m3**	**63.731**	
5.22/4	**Concrete in sheet pile copings**		**m3**	**2.160**	0.600 × 0.250 × 5.4 + 0.500 × 0.250 ×(5.40 + 5.40)
5.22/6	**Concrete in parapet walls PW Type 1**	**w=4.700m**	**m3**	**0.902**	
	Parapet Wall	PC1	m3	0.902	0.192 × 4.700
5.22/27	**Concrete in sluice structures**		**m3**	**60.669**	
	a.Box Culvert		**m3**	**27.594**	
	BC-C1	**L=1.600m**	m3	11.232	7.020 × 1.600
		Deduction	m3	-0.905	-(2.585 × 0.350)
	BC-C2	**L=2.600m**	m3	6.760	2.600 × 2.600
	BC-C3	**L=1.500m**	m3	5.768	3.845 × 1.500
	BC-C4	**L=0.500m**	m3	4.401	8.802 × 0.500
	BC-C4	**w=2.700m**	m3	0.338	0.500 × 0.500 × 0.5 × 2.700
	b.Breast wall (River Side)		**m3**	**9.709**	
	BWR - C1	**L=1.000m**	m3	6.728	3.364 × 1.000 × 2
	BWR - C2	**w=2.700m**	m3	2.819	0.600 × 1.740 × 2.700
	BWR - C3	**w=2.700m**	m3	0.162	0.600 × 0.100 × 2.700
	d.Breast wall (Land Side)		**m3**	**4.720**	
	BWL - C1	**L=1.000m**	m3	4.000	2.000 × 1.000 × 2
	BWL - C2	**w=2.400m**	m3	0.600	0.500 × 0.500 × 2.400
	BWL - C3	**w=2.400m**	m3	0.120	0.500 × 0.100 × 2.400
	c.Wing wall		**m3**	**10.217**	
	WW - C1	**L=5.800m**	m3	9.947	1.715 × 5.800
	WW - C1'	**L=0.000m**	m3	0.000	0.000 × 0.000
	WW - C3	**w=2.700m**	m3	0.270	0.200 × 0.500 × 2.700
	d. U-shaped Channel		**m3**	**8.121**	
	UC- C1	**L=4.200m**	m3	8.121	(1.715 + 2.255)× 0.500 × 4.200
	UC- C2	**L=0.000m**	m3	0.000	(0.000 + 0.000)× 0.000 × 0.000
	e. Infiled Concrete	**t=150**	**m3**	**0.308**	1.026 × 0.150 × 2
					Sluiceway STA 3+157 MSR-2 1.4*1.4

Sluiceway STA 3+157 MSR-2 1.4*1.4					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	Formwork (Total)	**Class**	**m2**	**418.525**	
	Concrete in sheet pile copings		**m2**	**8.900**	
	Breast Wall (River Side)	**w=5.400m**	m2	3.000	0.250 ×(5.400 + 0.600)× 2
	Seepage cut off Wall	**w=5.400m**	m2	2.950	0.250 ×(5.400 + 0.500)× 2
	Breast Wall (Land Side)	**w=5.400m**	m2	2.950	0.250 ×(5.400 + 0.500)× 2
	Concrete in parapet walls PW Type 1	**w=4.700m**	**m2**	**7.923**	
	PW-F1		m2	3.779	0.804 × 4.700
	PW-F2		m2	3.760	0.800 × 4.700
	PW-F3 End		m2	0.384	0.192 × 2
	Concrete in sluice structures		**m2**	**175.225**	
	b.Box Culvert	**L=5.700m**	**m2**	**68.446**	
	BC F1	**L=5.350m**	m2	22.197	4.149 × 5.350
	BC F2	**L=2.100m**	m2	9.030	2.150 × 2.100 × 2
	BC F3	**L=1.000m**	m2	3.800	1.900 × 1.000 × 2
	BC F4	**L=1.000m**	m2	3.800	1.900 × 1.000 × 2
	BC F5 End		m2	2.585	2.585
	BC F6	**L=0.350m**	m2	3.575	2.250 × 0.350 × 2 + 2.000
	BC F7		m2	17.604	8.802 × 2
	BC F8	**L=0.500m**	m2	2.150	2.150 × 0.500 × 2
	BC F9	**w=2.400m**	m2	0.360	0.150 × 2.400
	BC F10	**w=2.400m**	m2	0.240	0.100 × 2.400
	BC F11	**w=2.700m**	m2	1.890	0.700 × 2.700
	BC F12	**w=2.700m**	m2	0.405	0.150 × 2.700
	BC F13	**w=2.700m**	m2	0.810	0.300 × 2.700
	c.Breast Wall (River Side)		**m2**	**36.804**	
	BWR - F1	**L=1.000m**	m2	8.880	4.440 × 1.000 × 2
	BWR - F2	**L=1.000m**	m2	7.140	3.570 × 1.000 × 2
	BWR - F3	**L=1.000m**	m2	1.400	0.700 × 1.000 × 2
	BWR - F4	**L=4.700m**	m2	0.470	0.100 × 4.700
	BWR - F5	**L=2.700m**	m2	7.488	4.440 × 2.700 − 2.000 × 2.250
	BWR - F6		m2	4.698	4.698
	BWR - F7 End		m2	6.728	3.364 × 2
					Sluiceway STA 3+157 MSR-2 1.4*1.4

Sluiceway STA 3+157 MSR-2 1.4*1.4					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	d.Breast Wall (Land Side)		**m2**	**23.580**	
	BWL - F1	**L=1.000m**	m2	6.000	3.000 × 1.000 × 2
	BWL - F2	**L=1.000m**	m2	4.800	2.400 × 1.000 × 2
	BWL - F3	**L=1.000m**	m2	1.000	0.500 × 1.000 × 2
	BWL - F4	**L=4.400m**	m2	0.440	0.100 × 4.400
	BWL - F5	**L=2.700m**	m2	6.140	3.000 × 2.700 − 1.400 × 1.400
	BWL - F6		m2	1.200	1.200
	BWL - F7 End		m2	4.000	2.000 × 2
	e. Wing Wall		**m2**	**31.295**	
	WW- F1	**L=5.800m**	m2	16.820	1.450 × 5.800 × 2
	WW- F1'	L=0.000m	m2	0.000	0.000 × 0.000 × 2
	WW- F2	**L=5.800m**	m2	12.760	1.100 × 5.800 × 2
	WW- F2'	L=0.000m	m2	0.000	0.000 × 0.000 × 2
	WW- F3 End		m2	1.715	1.715
	f. U-shaped Channel		**m2**	**15.100**	
	UC- F1	**L=4.200m**	m2	6.510	(1.450 + 1.650)× 0.5 × 4.200
	UC- F1'	L=0.000m	m2	0.000	(0.000 + 0.000)× 0.5 × 0.000
	UC- F2	**L=4.200m**	m2	4.620	(1.100 + 1.100)× 0.5 × 4.200
	UC- F2'	L=0.000m	m2	0.000	(1.000 + 0.000)× 0.5 × 0.000
	UC- F3 End		m2	1.715	1.715
	UC- F4 End		m2	2.255	2.255
	Supporting Work		**m3**	**11.580**	
		L=5.350m	m3	10.005	(1.400 × 1.400 −(4 × 0.150 × 0.150))× 5.350
		L=0.350m	m3	1.575	2.000 × 2.250 × 0.350
	Scaffolding work				
	Sluiceway		**m2**	**90.246**	
	Box Culvert	L=2.100m	m2	44.238	2.150 × 2.100 × 2 + 8.802 × 1.000 × 4
	Breast Wall (River Side)	L=4.700m	m2	28.008	4.440 × 4.700 + 3.570 × 1.000 × 2
	Breast Wall (Land Side)	L=4.400m	m2	18.000	3.000 × 4.400 + 2.400 × 1.000 × 2
	Wing Wall	L=5.800m	m2	0.000	0.000 × 5.800 × 2
5.11/1	**Reinforcement Bar**	**Grade 275**	ton	**5.736**	63.731 × 90.000 kg/m3
	Grout Pipe	**h=500mm**	no	1	
		h=800mm	no	1	
					Sluiceway STA 3+157 MSR-2 1.4*1.4

Sluiceway STA 3+157 MSR-2 1.4*1.4 （Unit: Per Place ）

BQ No.	Description		Unit	Quantity	Calculation
5.23/1	**Leveling Concrete**	**Class F**	**m3**	**4.391**	
	a. Box Culvert, Breast Wall		**m3**	**1.433**	
	BC-LC1	**L=1.000m**	m3	0.490	4.900 × 1.000 × 0.100
	BC-LC2	**L=2.100m**	m3	0.483	2.300 × 2.100 × 0.100
	BC-LC3	**L=1.000m**	m3	0.460	4.600 × 1.000 × 0.100
	b. Wing Wall		**m3**	**1.740**	
	WW-LC1	**L=5.300m**	m3	1.537	2.900 × 5.300 × 0.100
	WW-LC2	**L=0.700m**	m3	0.203	2.900 × 0.700 × 0.100
	c. U-shaped Channel		**m3**	**1.218**	
	UC-LC1	**L=4.200m**	m3	1.218	2.900 × 4.200 × 0.100
	UC-LC1	**L=0.000m**	m3	**0.000**	0.000 × 0.000 × 0.100
	Formwork	**Class**	**m2**	**3.440**	
	a. Box Culvert, Breast Wall		**m2**	**0.820**	
	BC-LF1	**L=1.000m**	m2	0.200	1.000 × 0.100 × 2
	BC-LF2	**L=2.100m**	m2	0.420	2.100 × 0.100 × 2
	BC-LF3	**L=1.000m**	m2	0.200	1.000 × 0.100 × 2
	b. Wing Wall		**m2**	**1.780**	4.600 × 0.100
	WW-LF1	**L=5.300m**	m2	1.060	5.300 × 0.100 × 2
	WW-LF2	**L=0.700m**	m2	0.720	0.700 × 0.100 × 2 + 2.900 × 0.100 × 2
	c. U-shaped Channel		**m2**	**0.840**	
	UC-LF1	**L=4.200m**	m2	0.840	4.200 × 0.100 × 2
	UC-LF1	**L=0.000m**	m2	0.000	0.000 × 0.100 × 2

Sluiceway STA 3+157 MSR-2 1.4*1.4

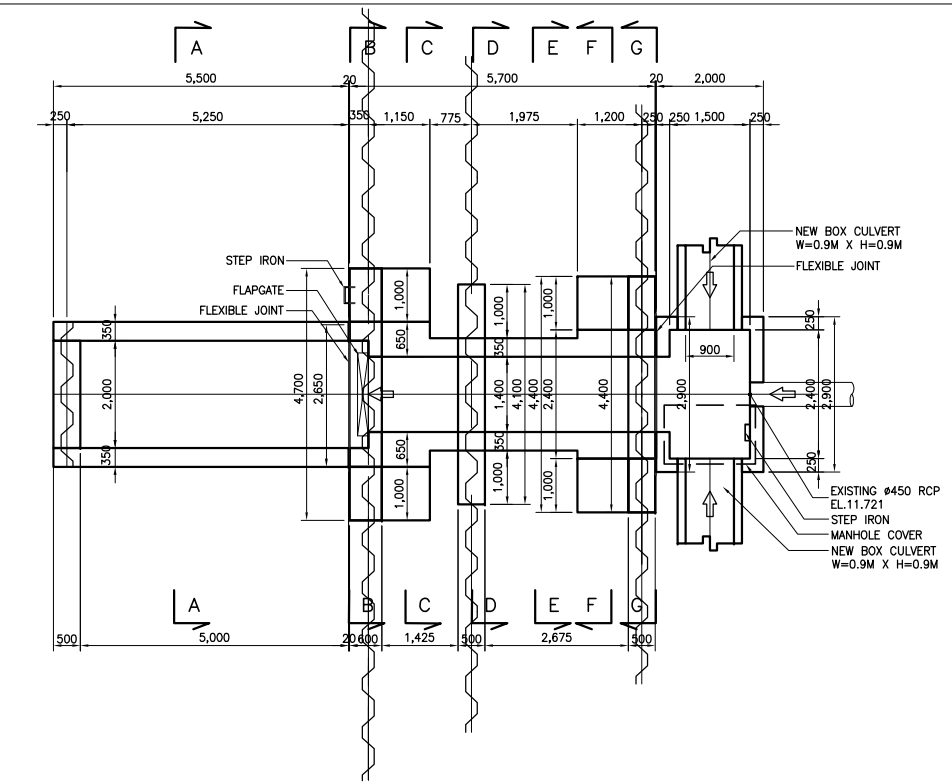
Sluiceway STA 3+157 MSR-2 1.4*1.4					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	Concrete Block Retaining Wall L=4.400m				
	Concrete (Total)	m3	**6.512**		
5.22/15	**Filler concrete (Class B) CB-C1**	m3	1.056	0.450 × 4.400 - 0.924	
5.22/20	**Concrete in base type A for concrete block retaining wall CB-C2**	m3	0.484	0.11 × 4.400	
5.22/23	**Backfill concrete for concrete block retaining wall** CB-C3	m3	0.616	0.140 × 4.400	
5.22/24	**Top concrete for concrete block retaining wall** CB-C4	m3	0.233	0.053 × 4.400	
7.5/1	**Gravel bedding and backfill**	m3	3.199	0.727 × 4.400	
7.10/1	**Precast concrete block retaining wall**	no	44	(1.194 × 4.400)/ 0.3 × 0.4	
		m3	0.924	0.021 × 44	*Surface Area of 1 Concrete Block
				* Volume of 1 Concrete Block	
	Formwork (Total)	**m2**	**41.183**		
	Concrete in base type A for concrete block retaining wall	m2	1.870	(0.300 + 0.100)× 4.400 + 0.11	
	Backfill concrete for concrete block retaining wall	m2	6.203	1.378 × 4.400 + 0.140	
	Top concrete for concrete block retaining wall	m2	0.990	(0.113 + 0.100)× 4.400 +(0.500 + 0.551)/ 2.00 × 0.10	
	Precast concrete block retaining wall	m2	32.120	0.730 × 44	
				* Form Area of 1 Concrete Block	
5.22/22	**Concrete in partition for concrete block wall**				
	Concrete t=500mm	**m3**	**1.910**	1.910 × 0.500 × 2	
	H=1500mm				
	Form work	**m2**	**9.597**		
	PT- F1 End	m2	7.640	1.910 × 2 × 2	
	PT- F2	m2	1.957	1.957 × 0.500 × 2	
	Joint Filler (Elastite) **t=10mm**	m2	7.6	1.910 × 2 × 2	
					Sluiceway STA 3+157 MSR-2 1.4*1.4

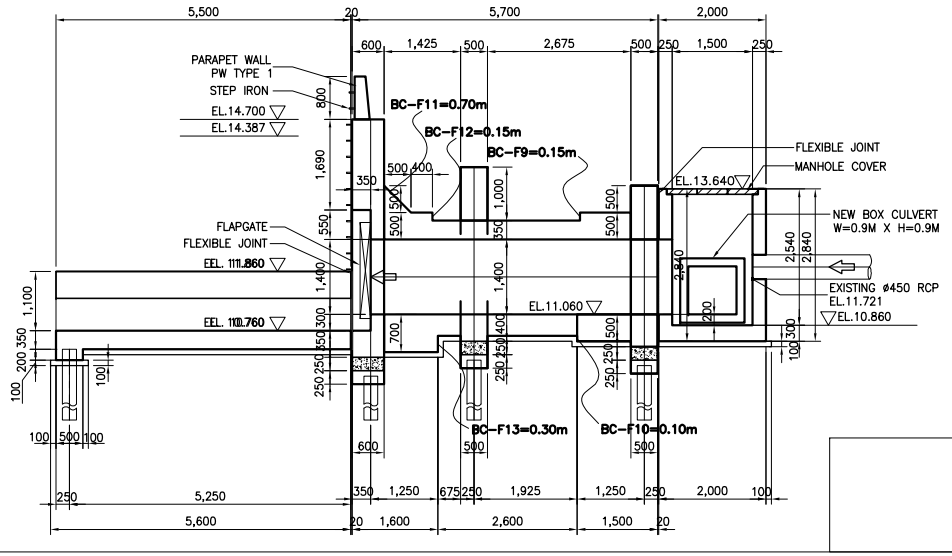
Sluiceway STA 3+157 MSR-2 1.4*1.4					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	Expansion Joint and Flexible Joint				
	Flexible Joint				
	b. Wing Wall 2.0 x 1.1	no	1		
	c. Breast Wall Land Side 1.4 x 1.4	no	1		
	Water Stop				
	a. U-shaped Channel W=150 t=5	m	4.9	(1.100 + 0.175)× 2 + 2.000 + 0.350	
	Cork Filler	**m2**	**10.0**		
	a. U-shaped Channel t=20	m2	1.715	(1.100 × 0.350)× 2 +(2.000 + 0.700)× 0.350	
	b. Wing Wall "	m2	1.715	(1.100 × 0.350)× 2 +(2.000 + 0.700)× 0.350	
	c. Breast Wall Land Side "	m2	6.566	2.900 × 2.940 - 1.400 × 1.400	
	Joint Sealant	**m2**	**26.2**		
	a. U-shaped Channel w=0.125 t=20	m	8.700	(1.100 + 0.350)× 2 + 2.000 + 0.700 + 1.100 + 2.000	
	b. Wing Wall "	m	5.800	(1.100 + 0.350)× 2 + 2.200 + 0.700	
	c. Breast Wall Land Side "	m	11.680	(2.900 + 2.940)× 2	
No. 6 - PILING					
6.4/1	**Type 10H Hat-shape SSP** W=900 96.0kg/m				
	L=2.0~4.0m	**m**	**14.0**		
	L=4.0~6.0m	**m**	**18.0**		
	L=6.0~9.0m	**m**	**60.0**		
	L=9.0~12.0m	**m**	**72.0**		
	Wing Wall L=2.000m	m	6.000	3 × 2.000	
	Seepage cut off Wall L=2.000m	m	8.000	4 × 2.000	
	L=6.000m	m	60.000	10 × 6.000	
	Breast Wall (Land Side) L=4.500m	m	18.000	4 × 4.500	
	L=9.000m	m	72.000	8 × 9.000	
6.4/19	**Type 25H Hat-shape SSP** W=900 126.0kg/m				
	L=2.0~4.0m	**m**	**0.0**		
	L=4.0~6.0m	**m**	**0.0**		
	L=6.0~9.0m	**m**	**24.4**		
	L=9.0~12.0m	**m**	**126.0**		
	Breast Wall (River Side) L=6.110m	m	24.440	4 × 6.110	
	L=10.500m	m	126.000	12 × 10.500	
					Sluiceway STA 3+157 MSR-2 1.4*1.4

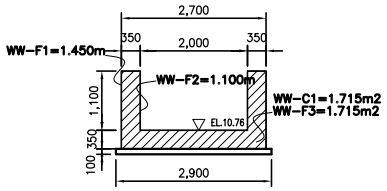
Sluiceway STA 3+157 MSR-2 1.4*1.4						(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation	
	SSP with flexisble joint					
6.4/6	**Type 10H Hat-shape**	**L=2.0~4.0m**	**m**	**0.0**		
		L=4.0~6.0m	**m**	**0.0**		
		L=6.0~9.0m	**m**	**12.0**		
		L=9.0~12.0m	**m**	**18.0**		
		L=6.000m	m	12.000	2 × 6.000	
		L=9.000m	m	18.000	2 × 9.000	
6.4/20	**Type 25H Hat-shape**	**L=2.0~4.0m**	**m**	**0.0**		
		L=4.0~6.0m	**m**	**0.0**		
		L=6.0~9.0m	**m**	**0.0**		
		L=9.0~12.0m	**m**	**21.0**		
		L=10.500m	m	21.000	2 × 10.500	
No. 7 - PROTECTION WORKS						
7.8/1	**Gabion Mattresses**	**t=500mm**	m2	221.0	10.00 × 10.000 × 2 + 3.00 × 3.00 + 1.00 × 3.00 × 4	
	Filter Fabric	**t=10mm**	m2	279.0	11.00 × 11.000 × 2 + 4.00 × 4.00 + 1.50 × 3.50 × 4	
No. 8 - DRAINAGE						
8.6/5	**Rectangular aluminum flap gate 1400 x 1400**		no	1		
No. 11 - STRUCTURAL AND MISCELLANEOUS METALWORK						
11.10/3	**Trash screen 1800 x 1800**	for 1.4m*1.4m	no	1		
			Kg	**109**		
		18-FB 75*4.5*1800	Kg	86.000	2.650 × 1.800 × 18	
		5- ϕ 16*1800	Kg	15.000	1.580 × 1.800 × 5	
		Anchor Bar ϕ 16	Kg	8.000	1.580 × 0.500 × 5 × 2	
						Sluiceway STA 3+157 MSR-2 1.4*1.4

Quantity Calculation Of Earth Work

Location	Distance	Excavation			Backfill					
		Area	Average Area	Volume	Area	Average Area	Volume			
+0.0		0.0			0.0					
+0.9	0.9	5.8	2.9	2.6	1.9	1.0	0.9			
+13.9	13.0	5.8	5.8	75.4	1.9	1.9	24.7			
+13.9		45.3			36.9					
+15.5	1.6	45.3	45.3	72.5	36.9	36.9	59.0			
+15.5		38.5			34.0					
+18.1	2.6	38.5	38.5	100.1	34.0	34.0	88.4			
+20.2	2.1	19.7	29.1	61.1	15.1	24.6	51.6			
+21.5	1.3	0.0	9.9	12.8	0.0	7.6	9.8			
Total				324.5			234.4			


A
B
C
D
E
F
G
NEW BOX CULVERT
W=0.9M X H=0.9M
FLEXIBLE JOINT
STEP IRON
FLAPGATE
FLEXIBLE JOINT
EXISTING ø450 RCP
EL.11.721
STEP IRON
MANHOLE COVER
NEW BOX CULVERT
W=0.9M X H=0.9M


PARAPET WALL
PW TYPE 1
STEP IRON
EL.14.700
EL.14.387
BC-F11=0.70m
BC-F12=0.15m
BC-F9=0.15m
FLEXIBLE JOINT
MANHOLE COVER
EL.13.640
NEW BOX CULVERT
W=0.9M X H=0.9M
FLAPGATE
FLEXIBLE JOINT
EL.11.060
EXISTING ø450 RCP
EL.11.721
EL.10.860
BC-F13=0.30m
BC-F10=0.10m



SECTION A-A(Wing wall)
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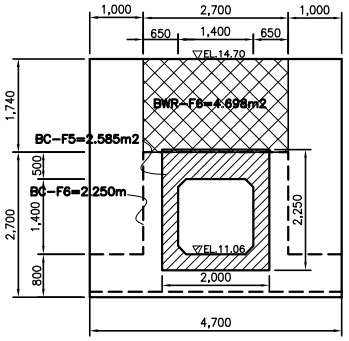
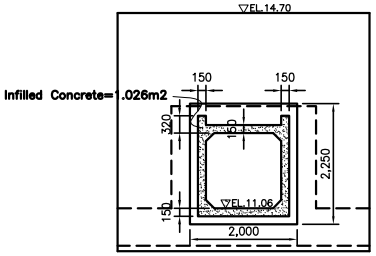


SECTION B-B
SCALE 1:100



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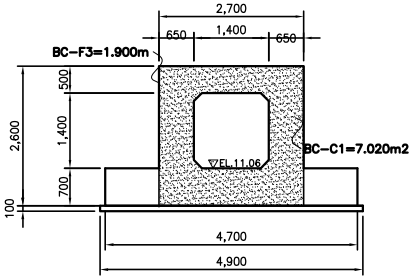
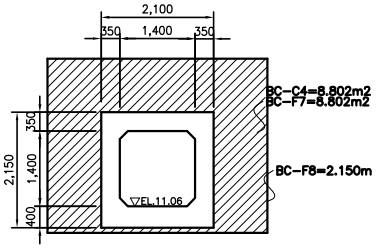
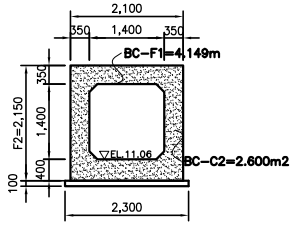


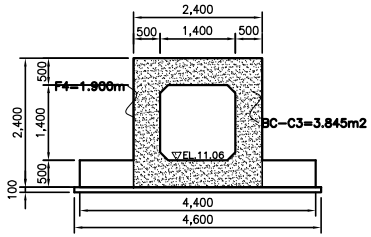
SECTION C-C
SCALE 1:100



SECTION D-D
SCALE 1:100



SECTION E-E
SCALE 1:100



SECTION F-F
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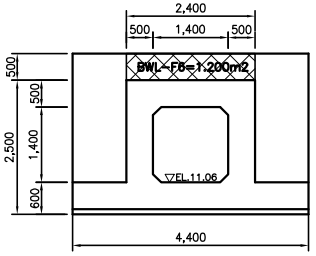
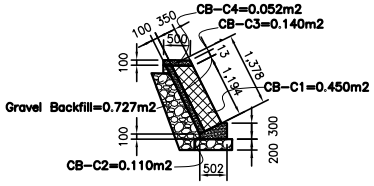
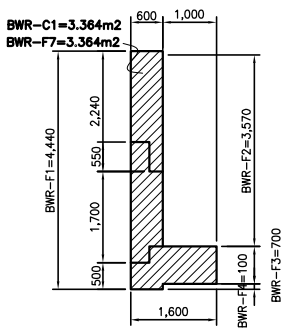


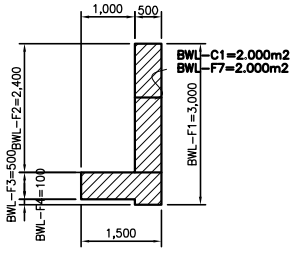
SECTION G-G
SCALE 1:100



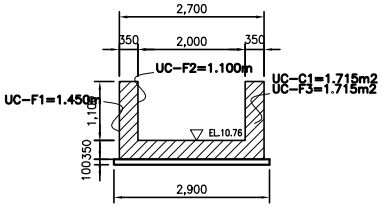
Concrete Block Retaining Wall
SCALE 1:100



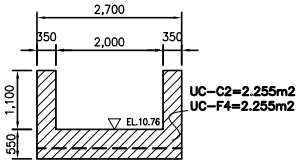
Breast Wall (River Side)
SCALE 1:100



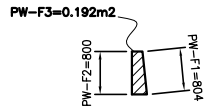
Breast Wall (Land Side)
SCALE 1:100



U-shaped Channel(1)
SCALE 1:100

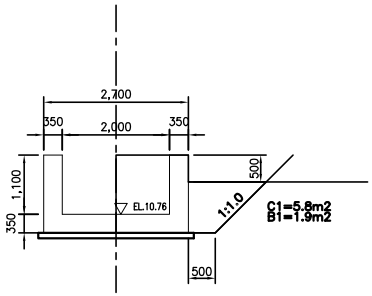


U-shaped Channel(2)
SCALE 1:100

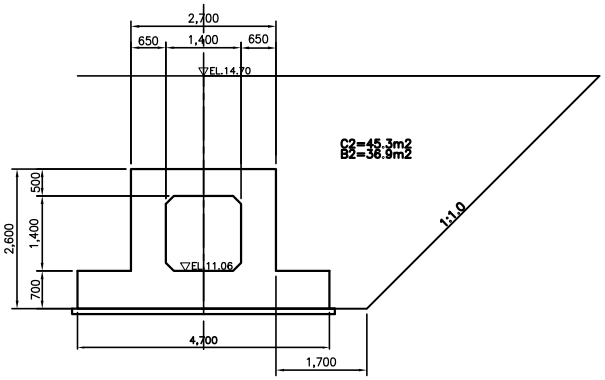


Parapet Wall
SCALE 1:100

3.190



Section A



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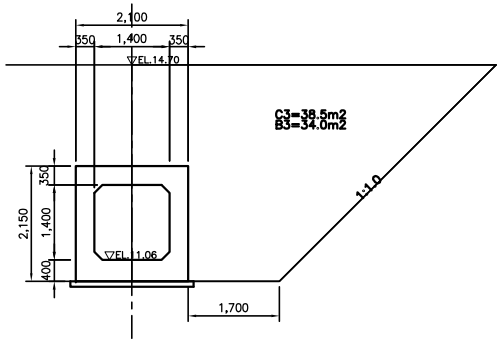

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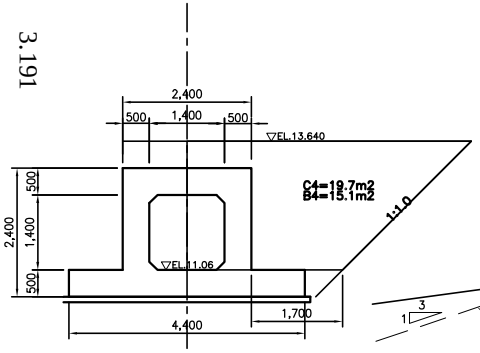
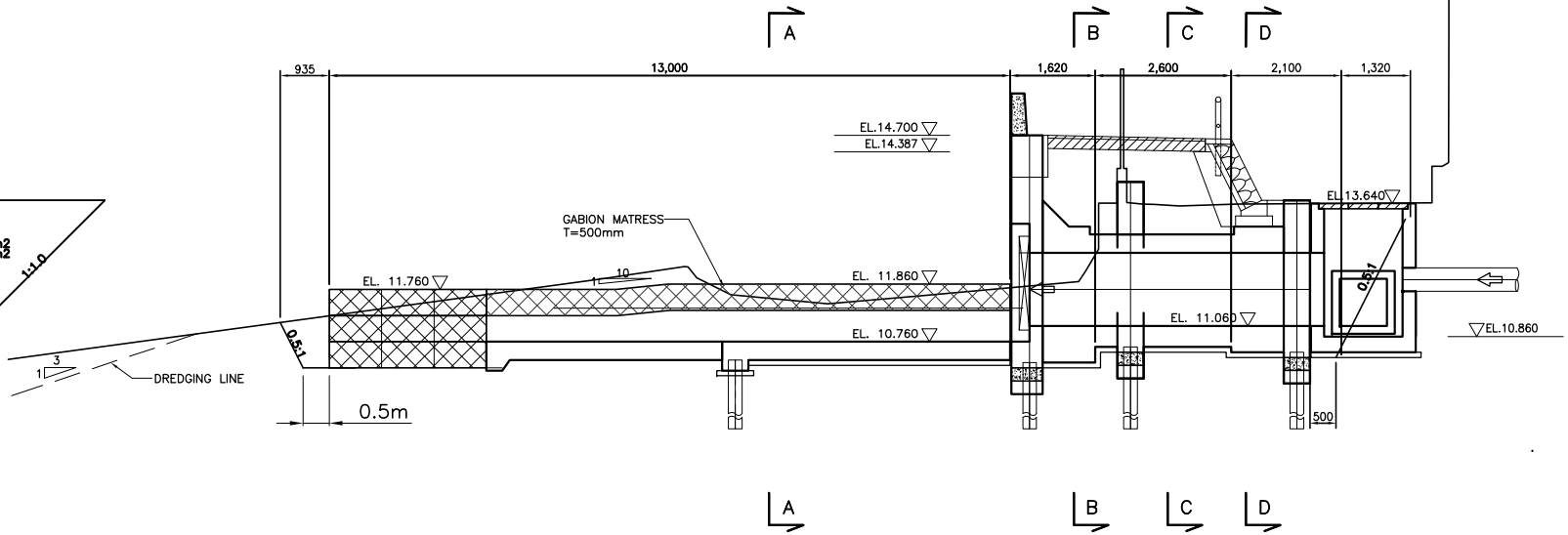


Section D

3.191



Lower Marikina River Drainage Facilities

3.3 Sluiceway

(8) RIGHT BANK MSR-3 STA3+255

Sluiceway STA 3+255 MSR-3 2.0*1.6				(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation
	Excavation for Structures	**m3**	**484.5**	
4.8/	**for Sluiceway Structure**	m3	325.2	From Quantity Calculation of Earth Work
	for Gabion Mattress	m3	159.3	10.50 × 13.500 × 0.50 × 2 + 2.60 × 13.500 × 0.50
	Backfill for Structure			
4.8/	Random Backfill Excavated Material	m3	237.8	
4.8/	Disposal Material	m3	246.7	

Sluiceway STA 3+255 MSR-3 2.0*1.6					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
No.5	**Concrete (Total)**	**Class A**	**m3**	**61.683**	
5.22/4	**Concrete in sheet pile copings**		**m3**	**2.408**	0.600 × 0.250 × 6.30 + 0.500 × 0.250 ×(5.40 + 6.30)
5.22/6	**Concrete in parapet walls PW Type 1**	**w=4.700m**	**m3**	**0.902**	
	Parapet Wall	PC1	m3	0.902	0.192 × 4.700
5.22/27	**Concrete in sluice structures**		**m3**	**58.373**	
	a.Box Culvert		**m3**	**29.596**	
	BC-C1	**L=1.700m**	m3	10.331	6.077 × 1.700
		Deduction	m3	-1.171	-(3.345 × 0.350)
	BC-C2	**L=2.400m**	m3	7.656	3.190 × 2.400
	BC-C3	**L=1.600m**	m3	7.432	4.645 × 1.600
	BC-C4	**L=0.500m**	m3	4.935	9.870 × 0.500
	BC-C4	**w=3.300m**	m3	0.413	0.500 × 0.500 × 0.5 × 3.300
	b.Breast wall (River Side)		**m3**	**9.779**	
	BWR - C1	**L=1.000m**	m3	6.976	3.488 × 1.000 × 2
	BWR - C2	**w=2.700m**	m3	2.641	0.600 × 1.630 × 2.700
	BWR - C3	**w=2.700m**	m3	0.162	0.600 × 0.100 × 2.700
	d.Breast wall (Land Side)		**m3**	**5.020**	
	BWL - C1	**L=1.000m**	m3	4.300	2.150 × 1.000 × 2
	BWL - C2	**w=2.400m**	m3	0.600	0.500 × 0.500 × 2.400
	BWL - C3	**L=2.400m**	m3	0.120	0.500 × 0.100 × 2
	c.Wing wall		**m3**	**8.942**	
	WW - C1	**L=6.100m**	m3	8.662	1.420 × 6.100
	WW - C1'	**L=0.000m**	m3	0.000	0.000 × 0.000
	WW - C3	**w=2.800m**	m3	0.280	0.200 × 0.500 × 2.800
	d. U-shaped Channel		**m3**	**4.656**	
	UC- C1	**L=0.900m**	m3	0.907	(1.420 + 1.420)× 0.500 × 0.900
	UC- C2	**L=3.000m**	m3	3.749	(1.420 + 1.760)× 0.500 × 3.000
	e. Infiled Concrete	**t=150**	**m3**	**0.380**	1.266 × 0.150 × 2
					Sluiceway STA 3+255 MSR-3 2.0*1.6

Sluiceway STA 3+255 MSR-3 2.0*1.6					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	Formwork (Total)	**Class**	**m2**	**184.381**	
	Concrete in sheet pile copings		**m2**	**9.800**	
	Breast Wall (River Side)	**w=6.300m**	m2	3.450	0.250 ×(6.300 + 0.600)× 2
	Seepage cut off Wall	**w=5.400m**	m2	2.950	0.250 ×(5.400 + 0.500)× 2
	Breast Wall (Land Side)	**w=6.300m**	m2	3.400	0.250 ×(6.300 + 0.500)× 2
	Concrete in parapet walls PW Type 1	**w=4.700m**	**m2**	**7.923**	
	PW-F1		m2	3.779	0.804 × 4.700
	PW-F2		m2	3.760	0.800 × 4.700
	PW-F3 End		m2	0.384	0.192 × 2
	Concrete in sluice structures		**m2**	**166.658**	
	b.Box Culvert	**L=5.700m**	**m2**	**80.307**	
	BC F1	**L=5.350m**	m2	27.547	5.149 × 5.350
	BC F2	**L=1.900m**	m2	8.930	2.350 × 1.900 × 2
	BC F3	**L=1.100m**	m2	4.620	2.100 × 1.100 × 2
	BC F4	**L=1.100m**	m2	4.620	2.100 × 1.100 × 2
	BC F5 End		m2	3.345	3.345
	BC F6	**L=0.350m**	m2	4.350	2.500 × 0.350 × 2 + 2.600
	BC F7		m2	19.740	9.870 × 2
	BC F8	**L=0.500m**	m2	3.450	3.450 × 0.500 × 2
	BC F9	**w=2.400m**	m2	0.360	0.150 × 2.400
	BC F10	**w=2.400m**	m2	0.240	0.100 × 2.400
	BC F11	**w=2.700m**	m2	1.890	0.700 × 2.700
	BC F12	**w=2.700m**	m2	0.405	0.150 × 2.700
	BC F13	**w=2.700m**	m2	0.810	0.300 × 2.700
	c.Breast Wall (River Side)			**36.476**	
	BWR - F1	**L=1.000m**	m2	9.060	4.530 × 1.000 × 2
	BWR - F2	**L=1.000m**	m2	7.460	3.730 × 1.000 × 2
	BWR - F3	**L=1.000m**	m2	1.400	0.700 × 1.000 × 2
	BWR - F4	**L=4.700m**	m2	0.470	0.100 × 4.700
	BWR - F5	**L=2.700m**	m2	5.731	4.530 × 2.700 − 2.600 × 2.500
	BWR - F6		m2	5.379	5.379
	BWR - F7 End		m2	6.976	3.488 × 2
					Sluiceway STA 3+255 MSR-3 2.0*1.6

Sluiceway STA 3+255 MSR-3 2.0*1.6 (Unit: Per Place)

BQ No.	Description		Unit	Quantity	Calculation
	d.Breast Wall (Land Side)			**24.280**	
	BWL - F1	**L=1.000m**	m2	6.400	3.200 × 1.000 × 2
	BWL - F2	**L=1.000m**	m2	5.200	2.600 × 1.000 × 2
	BWL - F3	**L=1.000m**	m2	1.000	0.500 × 1.000 × 2
	BWL - F4	**L=4.400m**	m2	0.440	0.100 × 4.400
	BWL - F5	**L=2.700m**	m2	5.440	3.200 × 2.700 − 2.000 × 1.600
	BWL - F6		m2	1.500	1.500
	BWL - F7 End		m2	4.300	2.150 × 2
	e. Wing Wall			**17.750**	
	WW- F1	**L=6.100m**	m2	10.370	0.850 × 6.100 × 2
	WW- F1'	**L=0.000m**	m2	0.000	0.000 × 0.000 × 2
	WW- F2	**L=6.100m**	m2	6.100	0.500 × 6.100 × 2
	WW- F2'	**L=0.000m**	m2	0.000	0.000 × 0.000 × 2
	WW- F3 End		m2	1.280	1.280
	f. U-shaped Channel			**7.845**	
	UC- F1	**L=0.900m**	m2	0.765	(0.850 + 0.850)× 0.5 × 0.900
	UC- F1'	**L=3.000m**	m2	2.700	(0.850 + 0.950)× 0.5 × 3.000
	UC- F2	**L=0.900m**	m2	0.450	(0.500 + 0.500)× 0.5 × 0.900
	UC- F2'	**L=3.000m**	m2	0.750	(0.500 + 0.000)× 0.5 × 3.000
	UC- F3 End		m2	1.420	1.420
	UC- F4 End		m2	1.760	1.760
	Supporting Work		**m3**	**18.914**	
		L=5.350m	m3	16.639	(2.000 × 1.600 −(4 × 0.150 × 0.150))× 5.350
		L=0.350m	m3	2.275	2.600 × 2.500 × 0.350
	Scaffolding work				
	Sluiceway		**m2**	**96.441**	
	Box Culvert	L=1.900m	m2	48.410	2.350 × 1.900 × 2 + 9.870 × 1.000 × 4
	Breast Wall (River Side)	L=4.700m	m2	28.751	4.530 × 4.700 + 3.730 × 1.000 × 2
	Breast Wall (Land Side)	L=4.400m	m2	19.280	3.200 × 4.400 + 2.600 × 1.000 × 2
	Wing Wall	L=6.100m	m2	0.000	0.000 × 6.100 × 2
5.11/1	**Reinforcement Bar**	**Grade 275**	ton	**5.551**	61.683 × 90.000 kg/m3
					Sluiceway STA 3+255 MSR-3 2.0*1.6

Sluiceway STA 3+255 MSR-3 2.0*1.6					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	Grout Pipe	**h=500mm**	no	1	
		h=800mm	no	1	
5.23/1	**Leveling Concrete**	**Class F**	**m3**	**3.888**	
	a. Box Culvert, Breast Wall		**m3**	**1.728**	
	BC-LC1	**L=1.100m**	m3	0.605	5.500 × 1.100 × 0.100
	BC-LC2	**L=1.900m**	m3	0.551	2.900 × 1.900 × 0.100
	BC-LC3	**L=1.100m**	m3	0.572	5.200 × 1.100 × 0.100
	b. Wing Wall		**m3**	**1.890**	
	WW-LC1	**L=5.600m**	m3	1.680	3.000 × 5.600 × 0.100
	WW-LC2	**L=0.700m**	m3	0.210	3.000 × 0.700 × 0.100
	c. U-shaped Channel		**m3**	**0.270**	
	UC-LC1	**L=0.900m**	m3	0.270	3.000 × 0.900 × 0.100
	UC-LC1	**L=3.000m**	m3	**0.000**	0.000 × 3.000 × 0.100
	Formwork	**Class**	**m2**	**2.860**	
	a. Box Culvert, Breast Wall		**m2**	**0.820**	
	BC-LF1	**L=1.100m**	m2	0.220	1.100 × 0.100 × 2
	BC-LF2	**L=1.900m**	m2	0.380	1.900 × 0.100 × 2
	BC-LF3	**L=1.100m**	m2	0.220	1.100 × 0.100 × 2
	b. Wing Wall		**m2**	**1.860**	4.600 × 0.100
	WW-LF1	**L=5.600m**	m2	1.120	5.600 × 0.100 × 2
	WW-LF2	**L=0.700m**	m2	0.740	0.700 × 0.100 × 2 + 3.000 × 0.100 × 2
	c. U-shaped Channel		**m2**	**0.780**	
	UC-LF1	**L=0.900m**	m2	0.180	0.900 × 0.100 × 2
	UC-LF1	**L=3.000m**	m2	0.600	3.000 × 0.100 × 2
					Sluiceway STA 3+255 MSR-3 2.0*1.6

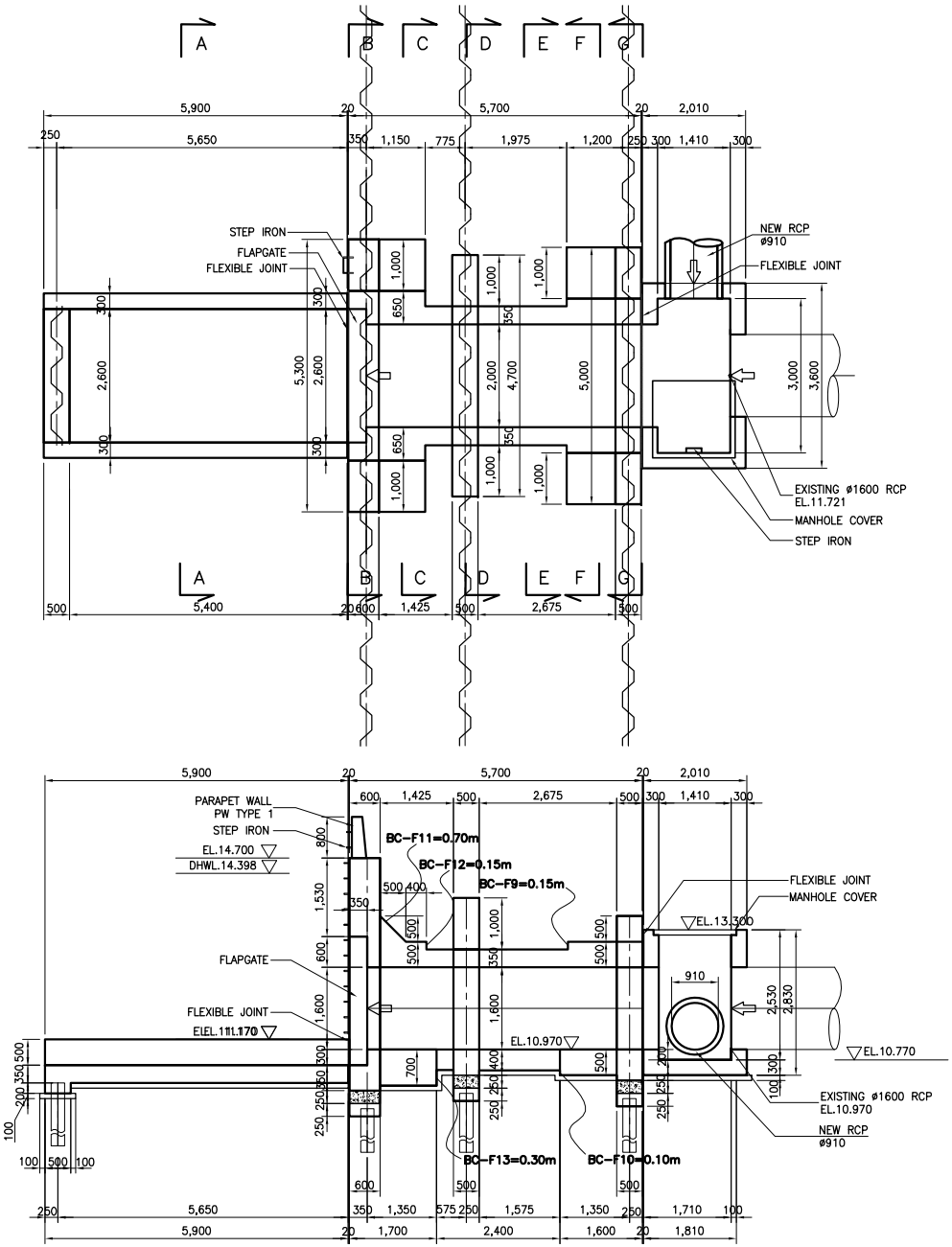
Sluiceway STA 3+255 MSR-3 2.0*1.6					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	Concrete Block Retaining Wall L=5.000m				
	Concrete (Total)	m3	**6.885**		
5.22/15	**Filler concrete (Class B) CB-C1**	m3	1.090	0.407 × 5.000 - 0.945	
5.22/20	**Concrete in base type A for concrete block retaining wall CB-C2**	m3	0.550	0.11 × 5.000	
5.22/23	**Backfill concrete for concrete block retaining wall** CB-C3	m3	0.640	0.128 × 5.000	
5.22/24	**Top concrete for concrete block retaining wall** CB-C4	m3	0.265	0.053 × 5.000	
7.5/1	**Gravel bedding and backfill**	m3	3.395	0.679 × 5.000	
7.10/1	**Precast concrete block retaining wall**	no	45	(1.071 × 5.000)/ 0.3 × 0.4	
		m3	0.945	0.021 × 45	*Surface Area of 1 Concrete Block
				* Volume of 1 Concrete Block	
	Formwork (Total)	**m2**	**42.741**		
	Concrete in base type A for concrete block retaining wall	m2	2.110	(0.300 + 0.100)× 5.000 + 0.11	
	Backfill concrete for concrete block retaining wall	m2	6.663	1.307 × 5.000 + 0.128	
	Top concrete for concrete block retaining wall	m2	1.118	(0.113 + 0.100)× 5.000 +(0.500 + 0.551)/ 2.00 × 0.10	
	Precast concrete block retaining wall	m2	32.850	0.730 × 45	
				* Form Area of 1 Concrete Block	
5.22/22	**Concrete in partition for concrete block wall**				
	Concrete t=500mm	**m3**	**1.910**	1.910 × 0.500 × 2	
	H=1500mm				
	Form work	**m2**	**9.597**		
	PT- F1 End	m2	7.640	1.910 × 2 × 2	
	PT- F2	m2	1.957	1.957 × 0.500 × 2	
	Joint Filler (Elastite) **t=10mm**	m2	7.6	1.910 × 2 × 2	
					Sluiceway STA 3+255 MSR-3 2.0*1.6

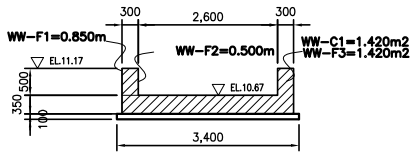
Sluiceway STA 3+255 MSR-3 2.0*1.6					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	Expansion Joint and Flexible Joint				
	Flexible Joint				
	b. Wing Wall 2.6 x 0.5	no	1		
	c. Breast Wall Land Side 2.0 x 1.6	no	1		
	Water Stop				
	a. U-shaped Channel W=150 t=5	m	5.5	(1.100 + 0.175)× 2 + 2.600 + 0.350	
	Cork Filler	**m2**	**11.2**		
	a. U-shaped Channel t=20	m2	1.925	(1.100 × 0.350)× 2 +(2.600 + 0.700)× 0.350	
	b. Wing Wall "	m2	1.925	(1.100 × 0.350)× 2 +(2.600 + 0.700)× 0.350	
	c. Breast Wall Land Side "	m2	7.348	3.600 × 2.930 - 2.000 × 1.600	
	Joint Sealant	**m2**	**28.8**		
	a. U-shaped Channel w=0.125 t=20	m	9.900	(1.100 + 0.350)× 2 + 2.600 + 0.700 + 1.100 + 2.600	
	b. Wing Wall "	m	5.800	(1.100 + 0.350)× 2 + 2.200 + 0.700	
	c. Breast Wall Land Side "	m	13.060	(3.600 + 2.930)× 2	
No. 6 - PILING					
6.4/1	**Type 10H Hat-shape SSP** W=900 96.0kg/m				
	L=2.0~4.0m	**m**	**14.0**		
	L=4.0~6.0m	**m**	**0.0**		
	L=6.0~9.0m	**m**	**92.5**		
	L=9.0~12.0m	**m**	**80.0**		
	Wing Wall L=2.000m	m	6.000	3 × 2.000	
	Seepage cut off Wall L=2.000m	m	8.000	4 × 2.000	
	L=6.000m	m	60.000	10 × 6.000	
	Breast Wall (Land Side) L=6.500m	m	32.500	5 × 6.500	
	L=10.000m	m	80.000	8 × 10.000	
6.4/19	**Type 25H Hat-shape SSP** W=900 126.0kg/m				
	L=2.0~4.0m	**m**	**0.0**		
	L=4.0~6.0m	**m**	**0.0**		
	L=6.0~9.0m	**m**	**30.1**		
	L=9.0~12.0m	**m**	**126.0**		
	Breast Wall (River Side) L=6.020m	m	30.100	5 × 6.020	
	L=10.500m	m	126.000	12 × 10.500	
6.4/25	Extra-over cost of installing sheet piles beneath bridges and HV cables **Type 10H Hat-shape**	m	70.000	5 × 6.000 + 4 × 10.000	
	Type 25H Hat-shape	m	63.000	6 × 10.500	
					Sluiceway STA 3+255 MSR-3 2.0*1.6

Sluiceway STA 3+255 MSR-3 2.0*1.6					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	SSP with flexisble joint				
6.4/6	**Type 10H Hat-shape** **L=2.0~4.0m**	**m**	**0.0**		
	L=4.0~6.0m	**m**	**0.0**		
	L=6.0~9.0m	**m**	**12.0**		
	L=9.0~12.0m	**m**	**20.0**		
	L=6.000m	m	12.000	2 × 6.000	
	L=10.000m	m	20.000	2 × 10.000	
6.4/20	**Type 25H Hat-shape** **L=2.0~4.0m**	**m**	**0.000**		
	L=4.0~6.0m	**m**	**0.0**		
	L=6.0~9.0m	**m**	**0.0**		
	L=9.0~12.0m	**m**	**21.0**		
	L=10.500m	m	21.000	2 × 10.500	
No. 7 - PROTECTION WORKS					
7.8/1	**Gabion Mattresses** **t=500mm**	m2	221.0	10.00 × 10.000 × 2 + 3.00 × 3.00 + 1.00 × 3.00 × 4	
	Filter Fabric **t=10mm**	m2	279.0	11.00 × 11.000 × 2 + 4.00 × 4.00 + 1.50 × 3.50 × 4	
No. 8 - DRAINAGE					
11.10/5	**Rectangular aluminum flap gate 2000 x 1600**	no	1		
No. 11 - STRUCTURAL AND MISCELLANEOUS METALWORK					
11.10/6	**Trash screen 2400 x 2000** for 2.0m*1.6m	no	1		
		Kg	**159**		
	24-FB 75*4.5*2000	Kg	128.000	2.650 × 2.000 × 24	
	5- ϕ 16*2400	Kg	19.000	1.580 × 2.400 × 5	
	Anchor Bar ϕ 16	Kg	12.000	1.580 × 0.500 × 7 × 2	
					Sluiceway STA 3+255 MSR-3 2.0*1.6

Quantity Calculation of Earth Work

Location	Distance	Excavation			Backfill					
		Area	Average Area	Volume	Area	Average Area	Volume			
+0.0		0.0			0.0					
+0.3	0.3	2.8	1.4	0.4	0.5	0.3	0.1			
+13.8	13.5	2.8	2.8	37.8	0.5	0.5	6.8			
+13.8		49.2			38.6					
+15.5	1.7	49.2	49.2	83.6	38.6	38.6	65.6			
+15.5		42.2			35.9					
+18.1	2.6	42.2	42.2	109.7	35.9	35.9	93.3			
+20.1	2.0	29.4	35.8	71.6	20.6	28.3	56.5			
+21.6	1.5	0.0	14.7	22.1	0.0	10.3	15.5			
Total				325.2			237.8			


A
B
C
D
E
F
G
5,900
20
5,700
20
2,010
250
5,650
350
1,150
775
1,975
1,200
250
300
1,410
300
STEP IRON
FLAPGATE
FLEXIBLE JOINT
NEW RCP
ø910
FLEXIBLE JOINT
EXISTING ø1600 RCP
EL.11.721
MANHOLE COVER
STEP IRON
5,400
1,425
2,675
PARAPET WALL
PW TYPE 1
EL.14.700
DHWL.14.398
BC-F11=0.70m
BC-F12=0.15m
BC-F9=0.15m
FLEXIBLE JOINT
MANHOLE COVER
EL.13.300
910
EL.10.970
EL.10.770
EXISTING ø1600 RCP
EL.10.970
NEW RCP
ø910
BC-F13=0.30m
BC-F10=0.10m
5,650
1,350
1,575
1,710
1,700
2,400
1,600
1,810



SECTION A-A(Wing wall)
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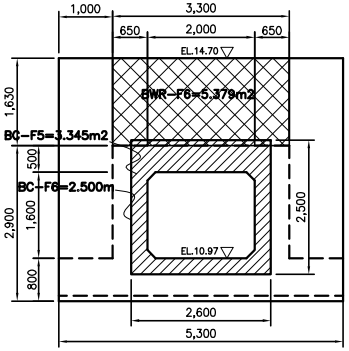
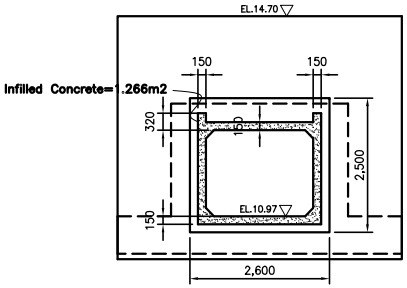


SECTION B-B
SCALE 1:100



SECTION B-B
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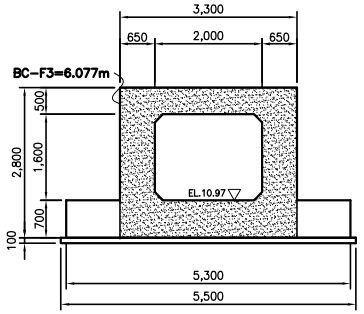
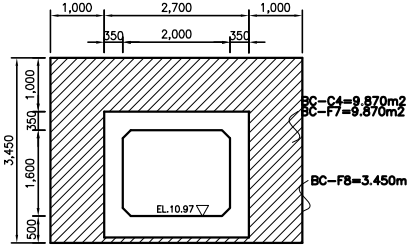
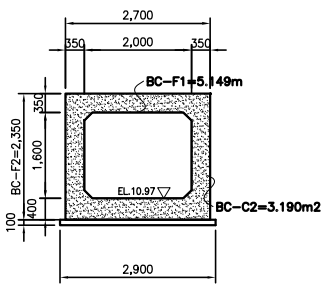


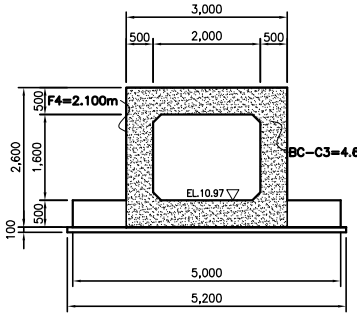
SECTION C-C
SCALE 1:100



SECTION D-D
SCALE 1:100



SECTION E-E
SCALE 1:100



SECTION F-F
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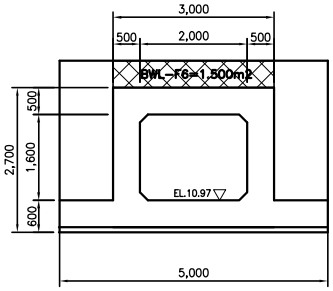
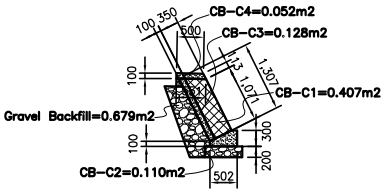
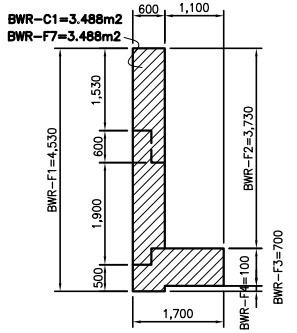


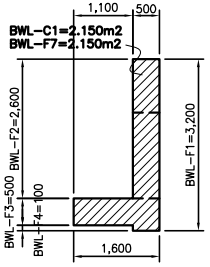
SECTION G-G
SCALE 1:100



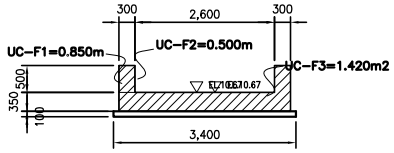
Concrete Block Retaining Wall
SCALE 1:100



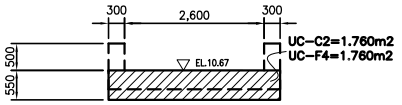
Breast Wall (River Side)
SCALE 1:100



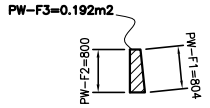
Breast Wall (Land Side)
SCALE 1:100



U-shaped Channel(1)
SCALE 1:100

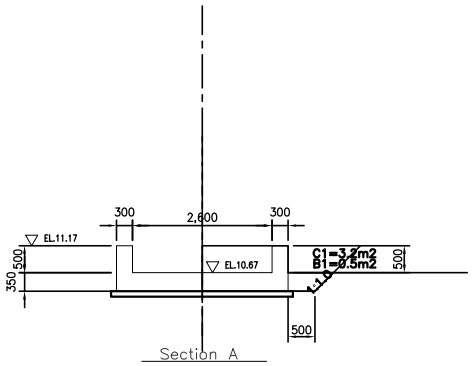


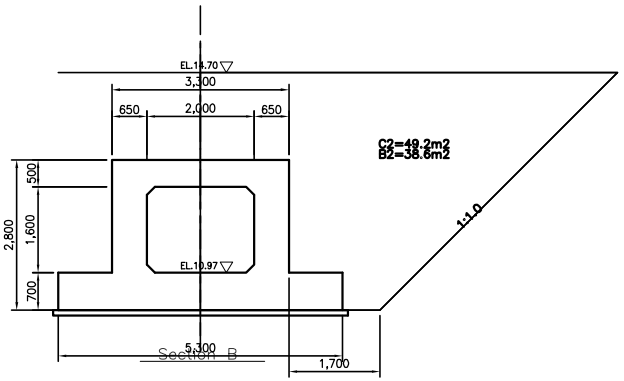
U-shaped Channel(2)
SCALE 1:100

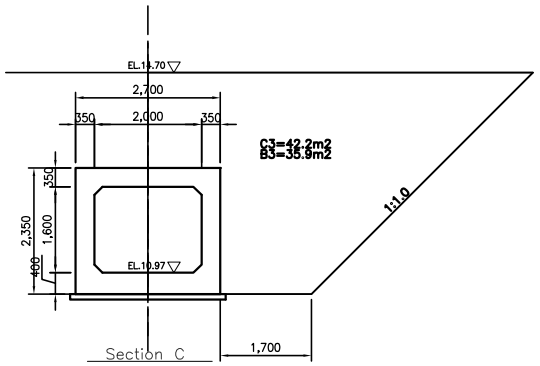


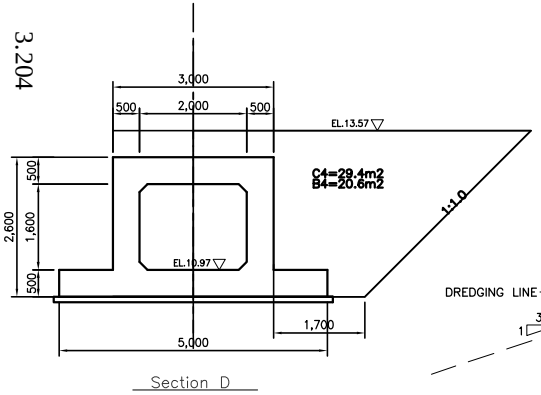
Parapet Wall
SCALE 1:100

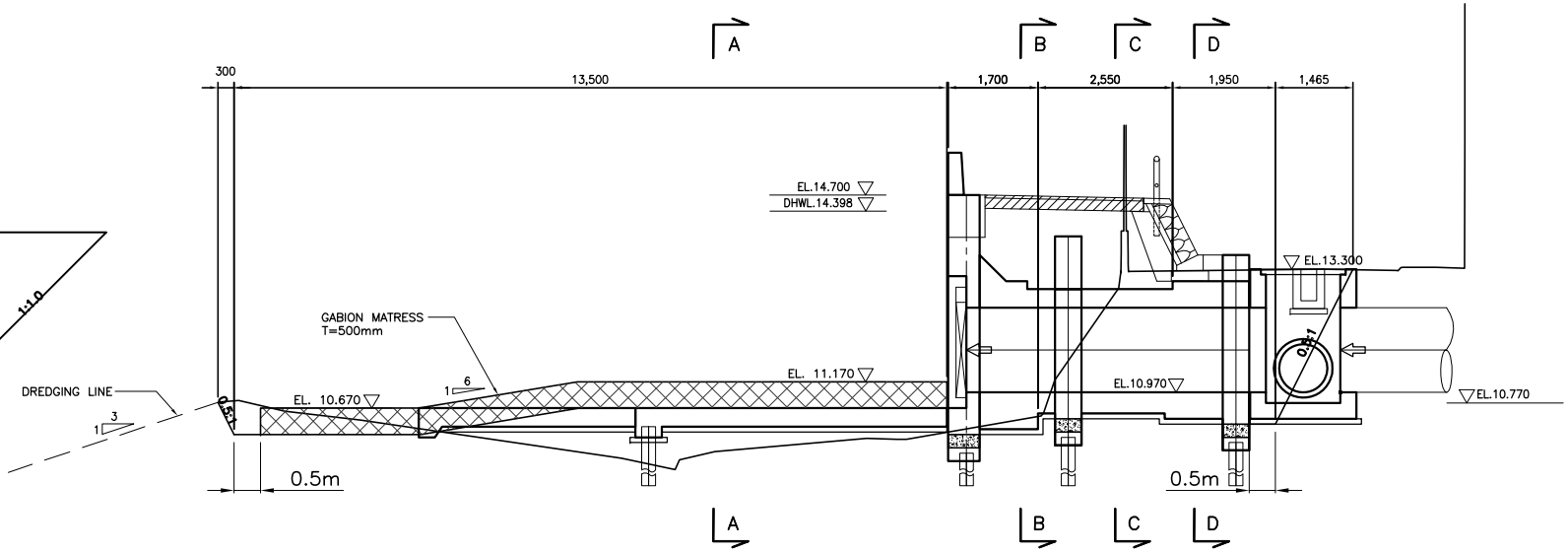
3.203


300
2,600
300
EL.11.17
EL.10.67
C1=3.2m2
B1=0.5m2
500
350
500
1:1.0
500
Section A


EL.14.70
3,300
650
2,000
650
C2=49.2m2
B2=38.6m2
500
2,800
1,600
700
EL.10.97
1:1.0
5,300
1,700
Section B


EL.14.70
2,700
350
2,000
350
C3=42.2m2
B3=35.9m2
350
2,350
1,600
400
EL.10.97
1:1.0
1,700
Section C


3,000
500
2,000
500
EL.13.57
C1=29.4m2
B4=20.6m2
500
2,600
1,600
500
EL.10.97
1:1.0
1,700
5,000
Section D


A
B
C
D
300
13,500
1,700
2,550
1,950
1,465
EL.14.700
DHWL.14.398
EL.13.300
GABION MATRESS
T=500mm
EL. 11.170
EL.10.970
EL.10.770
DREDGING LINE
3
1
6
1
0.5m
EL. 10.670
0.5m
A
B
C
D

3.204

Lower Marikina River Drainage Facilities

3.3 Sluiceway

(9) RIGHT BANK MSR-4 STA3+438

Sluiceway STA 3+438 MSR-4 1.5*1.5				(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation
	Excavation for Structures	**m3**	**368.4**	
4.8/	**for Sluiceway Structure**	m3	278.8	From Quantity Calculation of Earth Work
	for Gabion Mattress	m3	89.6	10.50 × 8.530 × 0.50 × 2
	Backfill for Structure			
4.8/	Random Backfill Excavated Material	m3	221.1	
4.8/	Disposal Material	m3	147.3	

Sluiceway STA 3+438 MSR-4 1.5*1.5

Sluiceway STA 3+438 MSR-4 1.5*1.5 (Unit: Per Place)

BQ No.	Description		Unit	Quantity	Calculation
No.5	**Concrete (Total)**	**Class A**	**m3**	**75.730**	
5.22/4	**Concrete in sheet pile copings**		**m3**	**13.124**	
	Sluiceway		m3	2.295	0.600 × 0.250 × 6.3 + 0.500 × 0.250 ×(5.40 + 5.40)
	U-shaped Channel	**L=22.100m**	m3	10.829	0.700 × 0.700 × 22.100
5.22/6	**Concrete in parapet walls PW Type 1**	**w=4.800m**	**m3**	**0.922**	
	Parapet Wall	PC1	m3	0.922	0.192 × 4.800
5.22/27	**Concrete in sluice structures**		**m3**	**61.684**	
	a.Box Culvert		**m3**	**25.727**	
	BC-C1	**L=1.600m**	m3	8.568	5.355 × 1.600
		Deduction	m3	-0.956	-(2.730 × 0.350)
	BC-C2	**L=2.600m**	m3	7.137	2.745 × 2.600
	BC-C3	**L=1.500m**	m3	6.068	4.045 × 1.500
	BC-C4	**L=0.500m**	m3	4.560	9.120 × 0.500
	BC-C5	**w=2.800m**	m3	0.350	0.500 × 0.500 × 0.5 × 2.800
	b.Breast wall (River Side)		**m3**	**9.462**	
	BWR - C1	**L=1.000m**	m3	6.692	3.346 × 1.000 × 2
	BWR - C2	**w=2.700m**	m3	2.608	0.600 × 1.610 × 2.700
	BWR - C3	**w=2.700m**	m3	0.162	0.600 × 0.100 × 2.700
	c.Breast wall (Land Side)		**m3**	**4.760**	
	BWL - C1	**L=1.000m**	m3	4.100	2.050 × 1.000 × 2
	BWL - C2	**w=2.200m**	m3	0.550	0.500 × 0.500 × 2.200
	BWL - C3	**w=2.200m**	m3	0.110	0.500 × 0.100 × 2.200
	d.Wing wall		**m3**	**18.352**	
	WW - C1	**L=2.650m**	m3	6.874	1.297 × 2.650 × 2
	WW - C2	**L=4.375m**	m3	8.575	1.960 × 4.375
	WW - C2'	**L=1.265m**	m3	2.093	(1.960 + 1.688)× 0.500 × 1.265
	WW - C3	**w=8.100m**	m3	0.810	0.200 × 0.500 × 8.100
	e U-shaped Channel		**m3**	**3.058**	
	UC- C1	**L=3.235m**	m3	3.058	(1.688 + 1.120)× 0.500 × 3.235
	UC- C2	**L=0.000m**	m3	0.000	(0.000 + 0.000)× 0.500 × 0.000
	f. Infiled Concrete	**t=150**	**m3**	**0.325**	1.084 × 0.150 × 2
					Sluiceway STA 3+438 MSR-4 1.5*1.5

Sluiceway STA 3+438 MSR-4 1.5*1.5 (Unit: Per Place)

BQ No.	Description		Unit	Quantity	Calculation
	Formwork (Total)	**Class**	**m2**	**238.993**	
	Concrete in sheet pile copings		**m2**	**41.270**	
	Breast Wall (River Side)	**w=6.300m**	m2	3.450	0.250 × (6.300 + 0.600) × 2
	Seepage cut off Wall	**w=5.400m**	m2	2.950	0.250 × (5.400 + 0.500) × 2
	Breast Wall (Land Side)	**w=5.400m**	m2	2.950	0.250 × (5.400 + 0.500) × 2
	U-shaped Channel				
	UC- F1	**L=22.100m**	m2	30.940	0.700 × 22.1 × 2
	UC- F2 End		m2	0.980	0.700 × 0.700 × 2
	Concrete in parapet walls PW Type 1	**w=4.800m**	**m2**	**8.083**	
	PW-F1		m2	3.859	0.804 × 4.800
	PW-F2		m2	3.840	0.800 × 4.800
	PW-F3 End		m2	0.384	0.192 × 2
	Concrete in sluice structures		**m2**	**189.640**	
	b.Box Culvert	**L=5.700m**	**m2**	**72.972**	
	BC F1	**L=5.350m**	m2	23.802	4.449 × 5.350
	BC F2	**L=2.100m**	m2	9.450	2.250 × 2.100 × 2
	BC F3	**L=1.000m**	m2	4.000	2.000 × 1.000 × 2
	BC F4	**L=1.000m**	m2	4.000	2.000 × 1.000 × 2
	BC F5 End		m2	2.730	2.730
	BC F6	**L=0.350m**	m2	3.745	2.350 × 0.350 × 2 + 2.100
	BC F7		m2	18.240	9.120 × 2
	BC F8	**L=0.500m**	m2	3.350	3.350 × 0.500 × 2
	BC F9	**w=2.200m**	m2	0.330	0.150 × 2.200
	BC F10	**w=2.200m**	m2	0.220	0.100 × 2.200
	BC F11	**w=2.700m**	m2	1.890	0.700 × 2.700
	BC F12	**w=2.700m**	m2	0.405	0.150 × 2.700
	BC F13	**w=2.700m**	m2	0.810	0.300 × 2.700
	c.Breast Wall (River Side)			**36.322**	
	BWR - F1	**L=1.000m**	m2	8.820	4.410 × 1.000 × 2
	BWR - F2	**L=1.000m**	m2	7.460	3.730 × 1.000 × 2
	BWR - F3	**L=1.000m**	m2	1.400	0.700 × 1.000 × 2
	BWR - F4	**L=4.700m**	m2	0.470	0.100 × 4.700
	BWR - F5	**L=2.700m**	m2	6.972	4.410 × 2.700 − 2.100 × 2.350
	BWR - F6		m2	4.508	4.508
	BWR - F7 End		m2	6.692	3.346 × 2
					Sluiceway STA 3+438 MSR-4 1.5*1.5

Sluiceway STA 3+438 MSR-4 1.5*1.5					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	d.Breast Wall (Land Side)		**24.090**		
	BWL - F1 **L=1.000m**	m2	6.200	3.100 × 1.000 × 2	
	BWL - F2 **L=1.000m**	m2	5.000	2.500 × 1.000 × 2	
	BWL - F3 **L=1.000m**	m2	1.000	0.500 × 1.000 × 2	
	BWL - F4 **L=4.200m**	m2	0.420	0.100 × 4.200	
	BWL - F5 **L=2.700m**	m2	6.120	3.100 × 2.700 − 1.500 × 1.500	
	BWL - F6	m2	1.250	1.250	
	BWL - F7 End	m2	4.100	2.050 × 2	
	e. Wing Wall		**49.530**		
	WW - F1 **L=2.650m**	m2	8.008	1.511 × 2.650 × 2	
	WW - F2 **L=2.650m**	m2	5.183	0.978 × 2.650 × 2	
	WW - F3 **L=2.650m**	m2	3.710	0.700 × 2.650 × 2	
	WW - F4 **L=2.650m**	m2	1.060	0.200 × 2.650 × 2	
	WW- F5 End	m2	1.297	1.297	
	WW- F6 **L=4.735m**	m2	15.152	1.600 × 4.735 × 2	
	WW- F6' **L=1.265m**	m2	1.209	(1.600 + 1.511)× 0.5 × 1.265	
	WW- F7 **L=4.735m**	m2	11.364	1.200 × 4.735 × 2	
	WW- F7' **L=1.265m**	m2	0.587	(1.200 + 0.978)× 0.5 × 1.265	
	WW- F8 End	m2	1.960	1.960	
	f. U-shaped Channel		**6.726**		
	UC- F1 **L=3.235m**	m2	2.606	(1.211 + 0.400)× 0.5 × 3.235	
	UC- F1' **L=0.000m**	m2	0.000	(0.000 + 0.000)× 0.5 × 0.000	
	UC- F2 **L=3.235m**	m2	1.312	(0.811 + 0.000)× 0.5 × 3.235	
	UC- F2' **L=0.000m**	m2	0.000	(0.000 + 0.000)× 0.5 × 0.000	
	UC- F3 End	m2	1.688	1.688	
	UC- F4 End	m2	1.120	1.120	
	Scaffolding work				
	Sluiceway	**m2**	**92.137**		
	Box Culvert L=2.100m	m2	45.930	2.250 × 2.100 × 2 + 9.120 × 1.000 × 4	
	Breast Wall (River Side) L=4.700m	m2	28.187	4.410 × 4.700 + 3.730 × 1.000 × 2	
	Breast Wall (Land Side) L=4.200m	m2	18.020	3.100 × 4.200 + 2.500 × 1.000 × 2	
	Wing Wall L=4.735m	m2	0.000	0.000 × 4.735 × 2	
	Supporting Work	**m3**	**13.283**		
	L=5.350m	m3	11.556	(1.500 × 1.500 −(4.0 × 0.150 × 0))× 5.35	
	L=0.350m	m3	1.727	2.100 × 2.350 × 0.350	
					Sluiceway STA 3+438 MSR-4 1.5*1.5

Sluiceway STA 3+438 MSR-4 1.5*1.5 （Unit: Per Place ）

BQ No.	Description		Unit	Quantity	Calculation
5.11/1	**Reinforcement Bar**	**Grade 275**	ton	**6.816**	75.730 × 90.000 kg/m3
	Grout Pipe	**h=500mm**	no	1	
		h=800mm	no	1	
5.24/1	**Leveling Concrete**	**Class F**	**m3**	**4.305**	
	a. Box Culvert, Breast Wall		**m3**	**1.474**	
	BC-LC1	**L=1.000m**	m3	0.500	5.000 × 1.000 × 0.100
	BC-LC2	**L=2.100m**	m3	0.504	2.400 × 2.100 × 0.100
	BC-LC3	**L=1.000m**	m3	0.470	4.700 × 1.000 × 0.100
	b. Wing Wall		**m3**	**1.860**	
	WW-LC1	**L=5.500m**	m3	1.650	3.000 × 5.500 × 0.100
	WW-LC2	**L=0.700m**	m3	0.210	3.000 × 0.700 × 0.100
	c. U-shaped Channel		**m3**	**0.971**	
	UC-LC1	**L=3.235m**	m3	0.971	3.000 × 3.235 × 0.100
	UC-LC1	**L=0.000m**	m3	**0.000**	0.000 × 0.000 × 0.100
	Formwork	**Class**	**m2**	**3.147**	
	a. Box Culvert, Breast Wall		**m2**	**0.820**	
	BC-LF1	**L=1.000m**	m2	0.200	1.000 × 0.100 × 2
	BC-LF2	**L=2.100m**	m2	0.420	2.100 × 0.100 × 2
	BC-LF3	**L=1.000m**	m2	0.200	1.000 × 0.100 × 2
	b. Wing Wall		**m2**	**1.680**	4.600 × 0.100
	WW-LF1	**L=4.700m**	m2	0.940	4.700 × 0.100 × 2
	WW-LF2	**L=0.700m**	m2	0.740	0.700 × 0.100 × 2 + 3.000 × 0.100 × 2
	c. U-shaped Channel		**m2**	**0.647**	
	UC-LF1	**L=3.235m**	m2	0.647	3.235 × 0.100 × 2
	UC-LF1	**L=0.000m**	m2	0.000	0.000 × 0.100 × 2
					Sluiceway STA 3+438 MSR-4 1.5*1.5

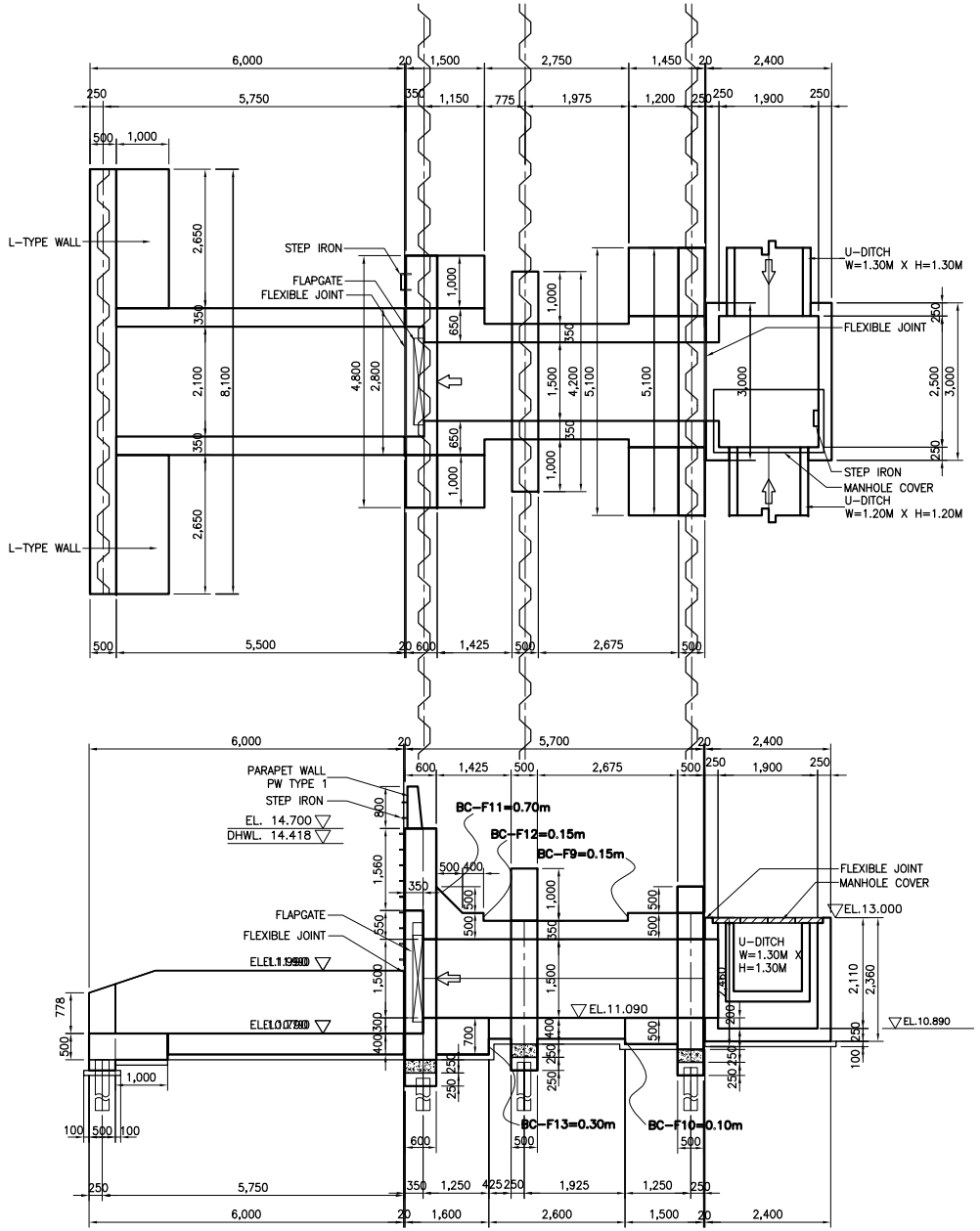
Sluiceway STA 3+438 MSR-4 1.5*1.5					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	Concrete Block Retaining Wall L=4.500m				
	Concrete (Total)	m3	**6.112**		
5.22/15	**Filler concrete (Class B) CB-C1**	m3	0.956	0.399 × 4.500 - 0.840	
5.22/20	**Concrete in base type A for concrete block retaining wall CB-C2**	m3	0.495	0.11 × 4.500	
5.22/23	**Backfill concrete for concrete block retaining wall** CB-C3	m3	0.567	0.126 × 4.500	
5.22/24	**Top concrete for concrete block retaining wall** CB-C4	m3	0.234	0.052 × 4.500	
7.5/1	**Gravel bedding and backfill**	m3	3.020	0.671 × 4.500	
7.10/1	**Precast concrete block retaining wall**	no	40	(1.049 × 4.500)/ 0.3 × 0.4	
		m3	0.840	0.021 × 40	*Surface Area of 1 Concrete Block
				* Volume of 1 Concrete Block	
	Formwork (Total)	**m2**	**38.030**		
	Concrete in base type A for concrete block retaining wall	m2	1.910	(0.300 + 0.100)× 4.500 + 0.11	
	Backfill concrete for concrete block retaining wall	m2	5.909	1.285 × 4.500 + 0.126	
	Top concrete for concrete block retaining wall	m2	1.011	(0.113 + 0.100)× 4.500 +(0.500 + 0.551)/ 2.00 × 0.10	
	Precast concrete block retaining wall	m2	29.200	0.730 × 40	
				* Form Area of 1 Concrete Block	
5.22/22	**Concrete in partition for concrete block wall**				
	Concrete t=500mm	**m3**	**2.200**	2.200 × 0.500 × 2	
	H=1500mm				
	Form work	**m2**	**11.036**		
	PT- F1 End	m2	8.800	2.200 × 2 × 2	
	PT- F2	m2	2.236	2.236 × 0.500 × 2	
	Joint Filler (Elastite) **t=10mm**	m2	8.8	2.200 × 2 × 2	
					Sluiceway STA 3+438 MSR-4 1.5*1.5

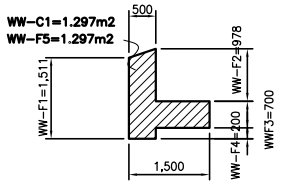
Sluiceway STA 3+438 MSR-4 1.5*1.5					(Unit: Per Place)
BQ No.	Description		Unit	Quantity	Calculation
	Expansion Joint and Flexible Joint				
	Flexible Joint				
	b. Wing Wall	2.1 x 1.2	no	1	
	c. Breast Wall Land Side	1.5 x 1.5	no	1	
	Water Stop				
	a. U-shaped Channel	W=150 t=5	m	5.3	(1.200 + 0.200)× 2 + 2.100 + 0.350
	Cork Filler		**m2**	**12.3**	
	a. U-shaped Channel	t=20	m2	2.000	(1.100 × 0.400)× 2 +(2.100 + 0.700)× 0.400
	b. Wing Wall	"	m2	2.000	(1.100 × 0.400)× 2 +(2.100 + 0.700)× 0.400
	c. Breast Wall Land Side	"	m2	8.298	3.600 × 2.930 - 1.500 × 1.500
	Joint Sealant		**m2**	**28.2**	
	a. U-shaped Channel	w=0.125 t=20	m	9.100	(1.100 + 0.400)× 2 + 2.100 + 0.800 + 1.100 + 2.100
	b. Wing Wall	"	m	6.000	(1.100 + 0.400)× 2 + 2.200 + 0.800
	c. Breast Wall Land Side	"	m	13.060	(3.600 + 2.930)× 2
No. 6 - PILING					
6.4/1	**Steel Sheet Pile Type IIIw U-shape**	W=600 136.0kg/m			
		L=6.0~9.0m	**m**	**110.5**	
	Wing Wall	L=8.500m	m	110.500	13 × 8.500
6.4/5	**Type 10H Hat-shape SSP**	W=900 96.0kg/m			
		L=2.0~4.0m	**m**	**16.0**	
		L=4.0~6.0m	**m**	**50.0**	
		L=6.0~9.0m	**m**	**60.0**	
		L=9.0~12.0m	**m**	**0.0**	
	Seepage cut off Wall	L=2.000m	m	8.000	4 × 2.000
		L=6.000m	m	60.000	10 × 6.000
	Breast Wall (Land Side)	L=2.000m	m	8.000	4 × 2.000
		L=5.000m	m	50.000	10 × 5.000
	U-shaped Channel	L=2.000m	m	50.000	(10.000 + 10.000 + 2.100 + 0.000)/ 0.900 × 2.000
6.4/19	**Type 25H Hat-shape SSP**	W=900 126.0kg/m			
		L=2.0~4.0m	**m**	**0.0**	
		L=4.0~6.0m	**m**	**0.0**	
		L=6.0~9.0m	**m**	**30.7**	
		L=9.0~12.0m	**m**	**105.0**	
	Breast Wall (River Side)	L=6.140m	m	30.700	5 × 6.140
		L=10.500m	m	105.000	10 × 10.500
					Sluiceway STA 3+438 MSR-4 1.5*1.5

Sluiceway STA 3+438 MSR-4 1.5*1.5					(Unit: Per Place)
BQ No.	Description	Unit	Quantity	Calculation	
	SSP with flexisble joint				
6.4/6	**Type 10H Hat-shape** **L=2.0~4.0m**	**m**	**0.0**		
	L=4.0~6.0m	**m**	**10.0**		
	L=6.0~9.0m	**m**	**12.0**		
	L=9.0~12.0m	**m**	**0.0**		
	L=6.000m	m	12.000	2 × 6.000	
	L=5.000m	m	10.000	2 × 5.000	
6.4/20	**Type 25H Hat-shape** **L=2.0~4.0m**	**m**	**0.0**		
	L=4.0~6.0m	**m**	**0.0**		
	L=6.0~9.0m	**m**	**0.0**		
	L=9.0~12.0m	**m**	**21.0**		
	L=10.500m	m	21.000	2 × 10.500	
No. 7 - PROTECTION WORKS					
7.8/1	**Gabion Mattresses** **t=500mm**	m2	170.6	10.00 × 8.530 × 2	
	Filter Fabric **t=10mm**	m2	209.7	11.00 × 9.530 × 2	
No. 8 - DRAINAGE					
8.6/6	**Rectangular aluminum flap gate 1500 x 1500**	no	1		
No. 11 - STRUCTURAL AND MISCELLANEOUS METALWORK					
11.10/4	**Trash screen 1900 x 1900** for 1.5m*1.5m	no	1		
		Kg	**122**		
	19-FB 75*4.5*1900	Kg	96.000	2.650 × 1.900 × 19	
	5- ϕ 16*1900	Kg	16.000	1.580 × 1.900 × 5	
	Anchor Bar ϕ 16	Kg	10.000	1.580 × 0.500 × 6 × 2	
					Sluiceway STA 3+438 MSR-4 1.5*1.5

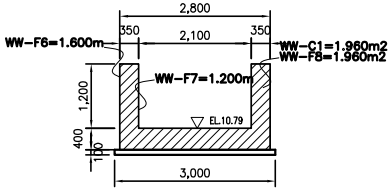
Quantity Calculation of Earth Work

Location	Distance	Excavation			Backfill					
		Area	Average Area	Volume	Area	Average Area	Volume			
+0.0		0.0			0.0					
+3.6	3.6	6.8	3.4	12.2	2.3	1.2	4.1			
+8.3	4.7	6.8	6.8	32.0	2.3	2.3	10.8			
+8.3		45.3			36.4					
+9.9	1.6	45.3	45.3	72.5	36.4	36.4	58.2			
+9.9		36.5			31.6					
+12.5	2.6	36.5	36.5	94.9	31.6	31.6	82.2			
+14.5	2.0	26.7	31.6	63.2	29.7	30.7	61.3			
+14.8	0.3	0.0	13.4	4.0	0.0	14.9	4.5			
Total				278.8			221.1			

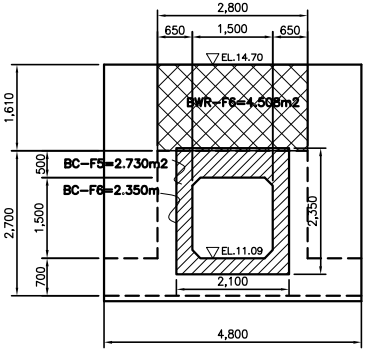

L-TYPE WALL
STEP IRON
FLAPGATE
FLEXIBLE JOINT
U-DITCH
W=1.30M X H=1.30M
FLEXIBLE JOINT
STEP IRON
MANHOLE COVER
U-DITCH
W=1.20M X H=1.20M
L-TYPE WALL
PARAPET WALL
PW TYPE 1
STEP IRON
EL. 14.700
DHWL. 14.418
BC-F11=0.70m
BC-F12=0.15m
BC-F9=0.15m
FLEXIBLE JOINT
MANHOLE COVER
EL.13.000
FLAPGATE
FLEXIBLE JOINT
U-DITCH
W=1.30M X
H=1.30M
EL.11.090
EL.10.890
BC-F13=0.30m
BC-F10=0.10m



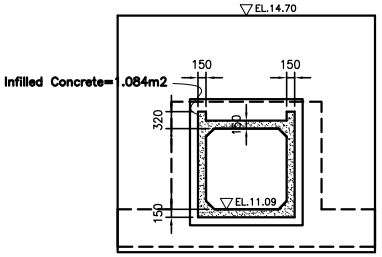
Wing Wall (L-shaped)
SCALE 1:100



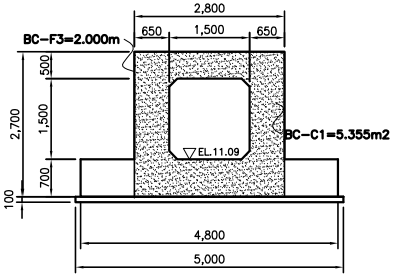
SECTION A-A(Wing wall)
SCALE 1:100



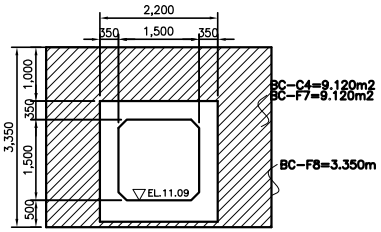
SECTION B-B
SCALE 1:100



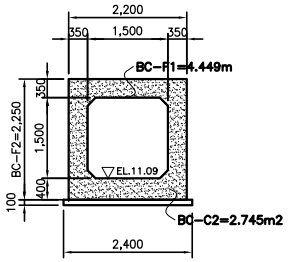
SECTION B-B
SCALE 1:100



SECTION C-C
SCALE 1:100



SECTION D-D
SCALE 1:100



SECTION E-E
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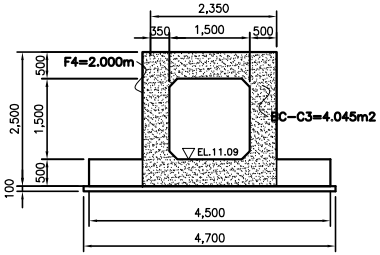

SECTION F-F
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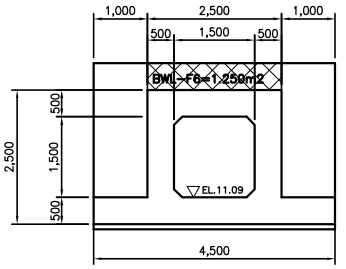

SECTION G-G
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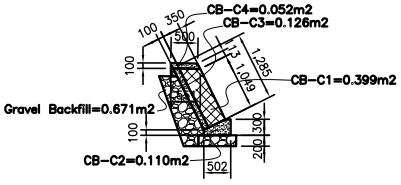

Concrete Block Retaining Wall
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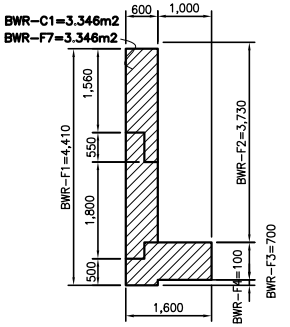

Breast Wall (River Side)
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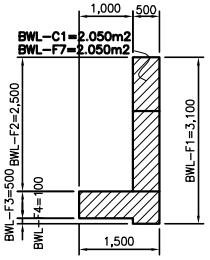
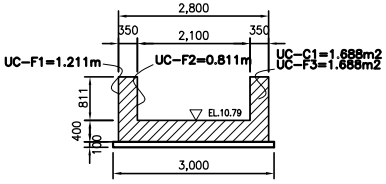
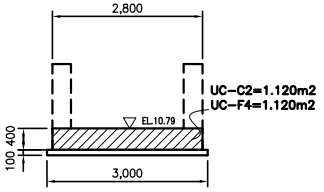


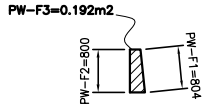
Breast Wall (Land Side)
SCALE 1:100



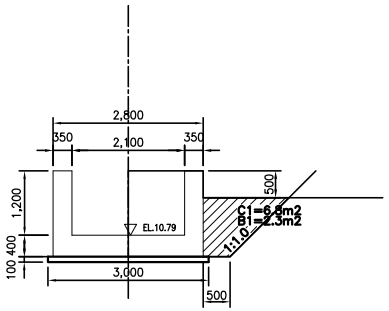
U-shaped Channel(1)
SCALE 1:100



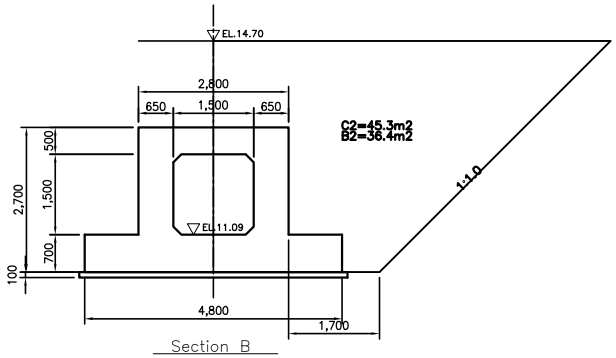
U-shaped Channel(2)
SCALE 1:100



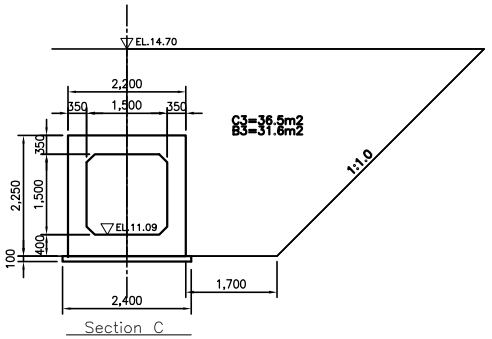
Parapet Wall
SCALE 1:100



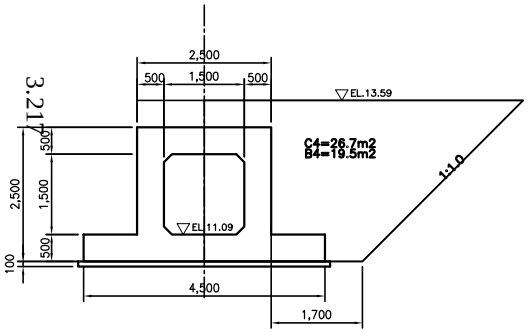
Section A



Section B



Section C



Section D