APPENDIX B-8

Cost and BOQ as of 23 April, 2017

Integrated Water Management System

As of 23 April, 2017

No.	Item	Grade	Unit	Quantity	Rate			Amount		
					Foreign		Local	Foreign		Local
					JPY	US$	L.E.	JPY	US$	L.E.
	WM-1. Gauging station (Type-A (4 nos))									
WM-1-1	WATER LEVEL SENSOR	including Cables	set	4		1,900			7,600	
WM-1-2	SOLAR CELLS PANEL	including Mount Bracket, Cables	set	4		500			2,000	
WM-1-3	GROUNDING RODS	including Cables	set	40		200			8,000	
WM-1-4	ENCLOSURE	including Mount Bracket	set	4		1,400			5,600	
WM-1-5	SURGE PROTECTIVE DEVICE	including Cables for water level sensor	set	4		400			1,600	
WM-1-6	SURGE PROTECTIVE DEVICE	including Cables for solar cells panel	set	4		600			2,400	
WM-1-7	GPRS MODEM	including Antenna, Mount Bracket, Cables	set	4		1,300			5,200	
WM-1-8	RTU	including Mount Bracket, Cables	set	4		2,400			9,600	
WM-1-9	DATA LOGGER	including Mount Bracket, Cables	set	4		2,500			10,000	
WM-1-10	POWER CHARGE CONTROLLER	including Mount Bracket, Cables	set	4		400			1,600	
WM-1-11	STORAGE BATTERY	including Mount Bracket, Cables	set	4		500			2,000	
WM-1-12	GROUNDING TERMINAL	including Mount Bracket	set	4		100			400	
WM-1-13	Program software for RTU		set	4		2,200			8,800	
	Total								64,800	

No.	Item	Grade	Unit	Quantity	Rate			Amount		
					Foreign		Local	Foreign		Local
					JPY	US$	L.E.	JPY	US$	L.E.
	WM-2. Gauging station (Type-B (34 nos))									
WM-2-1	WATER LEVEL SENSOR	including Cables	set	68		1,900			129,200	
WM-2-2	SOLAR CELLS PANEL	including Mount Bracket, Cables	set	34		500			17,000	
WM-2-3	GROUNDING RODS	including Cables	set	340		200			68,000	
WM-2-4	ENCLOSURE	including Mount Bracket	set	34		1,400			47,600	
WM-2-5	SURGE PROTECTIVE DEVICE	including Cables for water level sensor	set	68		400			27,200	
WM-2-6	SURGE PROTECTIVE DEVICE	including Cables for solar cells panel	set	34		600			20,400	
WM-2-7	GPRS MODEM	including Antenna, Mount Bracket, Cables	set	34		1,300			44,200	
WM-2-8	RTU	including Mount Bracket, Cables	set	34		2,400			81,600	
WM-2-9	DATA LOGGER	including Mount Bracket, Cables	set	34		2,500			85,000	
WM-2-10	POWER CHARGE CONTROLLER	including Mount Bracket, Cables	set	34		400			13,600	
WM-2-11	STORAGE BATTERY	including Mount Bracket, Cables	set	34		500			17,000	
WM-2-12	GROUNDING TERMINAL	including Mount Bracket	set	34		100			3,400	
WM-2-13	Program software for RTU		set	34		2,200			74,800	
	Total								629,000	

No.	Item	Grade	Unit	Quantity	Rate			Amount		
					Foreign		Local	Foreign		Local
					JPY	US$	L.E.	JPY	US$	L.E.
	WM-3. Master station									
WM-3 1	LCD MONITOR	including Wall mount bracket	set	1		4,600			4,600	
WM-3 2	LASER PRINTER	including Table, Cables	set	1		2,500			2,500	
WM-3 3	SERVER	including Monitor, Keyboard, Mouse, Cables	sets	3		11,400			34,200	
WM-3 4	COMPUTER RACK	including Power duct, Power Unit, Brank panel	set	1		2,900			2,900	
WM-3 5	GPRS MODEM	including Antenna. Rack mount plate, Cables	set	1		1,300			1,300	
WM-3 6	PERSONAL COMPUTER	including Monitor, Keyboard, Mouse, Cables	set	1		2,700			2,700	
WM-3 7	LCD KVM SWITCH	including Rack mount bracket, Cables	set	1		3,200			3,200	
WM-3 8	L2-SW	including Rack mount bracket, Cables	set	1		1,700			1,700	
WM-3 9	ROUTER	including Rack mount plate, Cables	set	2		2,700			5,400	
WM-3 10	UPS	including Rack mount plate, Cables (1KVA)	set	1		3,400			3,400	
WM-3 11	UPS	including Rack mount plate, Cables (3KVA)	set	1		3,400			3,400	
WM-3 12	Software	including Rack mount plate, Cables	set	1		13,500			13,500	
WM-3 13	Application software for Telemetry system		LS	1		121,000			121,000	
	Total								199,800	

No.	Item	Grade	Unit	Quantity	Rate			Amount		
					Foreign		Local	Foreign		Local
					JPY	US$	L.E.	JPY	US$	L.E.
	WM-4. Monitoring station									
WM-4 1	LCD MONITOR	including WALL MOUNT XETTING OPTION	set	1		4,600			4,600	
WM-4 2	PERSONAL COMPUTER	including 22"Monitor, Keyboard, Mouse, Cables	set	1		2,700			2,700	
WM-4 3	ROUTER	including Cables	set	1		2,700			2,700	
WM-4 4	UPS	including Rack mount plate, Cables (1KVA)	set	1		3,400			3,400	
WM-4 5	Application software for Telemetry system		LS	1		55,000			55,000	
	Total								68,400	

No.	Item	Grade	Unit	Quantity	Rate			Amount		
					Foreign		Local	Foreign		Local
					JPY	US$	L.E.	JPY	US$	L.E.
	WM-5. Installation Cost									
WM-5- 1	Gauging station (38 stations)	including site acquision, cost of fence and pole with foundation works, fixing equipments, adjustment and others	LS	1		602,000			602,000	
WM-5- 2	Master and Monitoring station	including cables, installation and adjustment	LS	1		24,000			24,000	
	Total								626,000	

No.	Item	Grade	Unit	Quantity	Rate			Amount		
					Foreign		Local	Foreign		Local
					JPY	US$	L.E.	JPY	US$	L.E.
	WM-6. Spare parts and training									
WM-6- 1	Supply of Spare parets as per requrements in Particular		LS	1		138,000			138,000	
WM-6- 2	On-Site Training		LS	1		16,500			16,500	
	Total								154,500	

WM-1. Gauging station (Type-A (4 nos))	64,800	
WM-2. Gauging station (Type-B (34 nos))	629,000	
WM-3. Master station	199,800	
WM-4. Monitoring station	68,400	
	962,000	USD
WM-5. Installation Cost		
Gauging station (38 stations)	602,000	
Master and Monitoring station	24,000	
	626,000	USD
WM-6. Spare parts and training		
Supply of Spare parets as per requrements in Particular Technical Specification	138,000	
On-Site Training	16,500	
	154,500	USD
Total	1,742,500	USD

Quotation of equipment for gauging station (Unit : US$)

Item	Quotation as of March and April 2017			Average
	A	B	C	
WATER LEVEL SENSOR	1,500	1,300	2,845	1,900
SOLAR CELLS PANEL	300	500	635	500
ENCLOSURE	1,100	1,250	1,729	1,400
SURGE PROTECTIVE DEVICE	100	500	500	400
SURGE PROTECTIVE DEVICE	100	500	1,100	600
GPRS MODEM	1,300	2,050	450	1,300
RTU	1,600	2,700	2,970	2,400
Program software for RTU	1,400	3,050	2,113	2,200
DATA LOGGER	3,800	2,250	1,500	2,500
POWER CHARGE CONTROLLER	400	250	585	400
STORAGE BATTERY	300	750	375	500
GROUNDING TERMINAL	100	150	100	100
GROUNDING RODS	100	100	420	200
Total	12,100	15,350	15,320	14,400

Quotation of equipment for Master station (Unit : US$)

Item	Quotation as of March and April 2017			Average
	A	B	C	
LCD MONITOR	5,500	4,200	4,000	4,600
LASER PRINTER	2,200	3,250	1,900	2,500
SERVER	11,600	9,400	13,200	11,400
COMPUTER RACK	2,100	4,580	2,000	2,900
GPRS MODEM	1,300	2,050	450	1,300
PERSONAL COMPUTER	5,100	1,850	1,200	2,700
LCD KVM SWITCH	2,400	4,200	2,950	3,200
L2-SW	1,200	2,300	1,650	1,700
ROUTER	3,100	3,000	1,950	2,700
UPS	1,100	7,925	1,200	3,400
Software	12,200	12,000	16,250	13,500
Total	47,800	54,755	46,750	49,900

Quotation of equipment for Monitoring station (Unit : US$)

Item	Quotation as of March and April 2017			Average
	A	B	C	
LCD MONITOR	5,500	4,200	4,000	4,600
PERSONAL COMPUTER	5,100	1,850	1,200	2,700
ROUTER	3,100	3,000	1,950	2,700
UPS	1,100	7,925	1,200	3,400
Total	14,800	16,975	8,350	13,400

DETAILED DESIGN STUDY ON THE PROJECT FOR CONSTRUCTION OF

THE NEW DIROUT GROUP OF REGULATORS

WATER MANEGEMENT SYSTEM

QUANTITY CALCULATION SHEET

(As of 23 April, 2017)

TOTAL AMOUNT FOR EQUIPMENT

FACILITY	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION (PTS-ME)	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	MASTER STATION	LCD MONITOR	Cp.3 Sec.3.7	Wall mount bracket	1	set	
		LASER PRINTER	Cp.3 Sec.3.10	Table, Cables	1	set	
		SERVER	Cp.3 Sec.3.5	Monitor, Keyboard, Mouse, Cables	3	set	
		COMPUTER RACK	Cp.3 Sec.3.12	Power duct, Power Unit, Brank panel	1	set	
		GPRS MODEM	Cp.3 Sec.3.1	Antenna, Rack mount plate, Cables	1	set	
		PERSONAL COMPUTER	Cp.3 Sec.3.6	Monitor, Keyboard, Mouse, Cables	1	set	
		LCD KVM SWITCH	Cp.3 Sec.3.13	Rack mount bracket, Cables	1	set	
		L2-SW	Cp.3 Sec.3.8	Rack mount bracket, Cables	1	set	
		ROUTER	Cp.3 Sec.3.9	Rack mount plate, Cables	2	set	
		UPS	Cp.3 Sec.5.6	Rack mount plate, Cables	1	set	
	MONITORING STATION	LCD MONITOR	Cp.3 Sec.3.7	WALL MOUNT XETTING OPTION	1	set	
		PERSONAL COMPUTER	Cp.3 Sec.3.6	22"Monitor, Keyboard, Mouse, Cables	1	set	
		ROUTER	Cp.3 Sec.3.9	Cables	1	set	
	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	72	set	
		SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	38	set	
		GROUNDING RODS	Cp.3 Sec.5.8	Cables	380	set	
		ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	38	set	
		SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	72	set	
		SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	38	set	
		GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	38	set	
		RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	38	set	
		DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	38	set	
		POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	38	set	
		STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	38	set	
		GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	38	set	

SUMMARY OF QUANTITY FOR EQUIPMENT

FACILITY	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	MASTER STATION	LCD MONITOR	Cp.3 Sec.3.7	Wall mount bracket	1	set	
		LASER PRINTER	Cp.3 Sec.3.10	Table, Cables	1	set	
		SERVER	Cp.3 Sec.3.5	Monitor, Keyboard, Mouse, Cables	3	set	
		COMPUTER RACK	Cp.3 Sec.3.12	Power duct, Power Unit, Brank panel	1	set	
		GPRS MODEM	Cp.3 Sec.3.1	Antenna, Rack mount plate, Cables	1	set	
		PERSONAL COMPUTER	Cp.3 Sec.3.6	Monitor, Keyboard, Mouse, Cables	1	set	
		LCD KVM SWITCH	Cp.3 Sec.3.13	Rack mount bracket, Cables	1	set	
		L2-SW	Cp.3 Sec.3.8	Rack mount bracket, Cables	1	set	
		ROUTER	Cp.3 Sec.3.9	Rack mount plate, Cables	2	set	
		UPS	Cp.3 Sec.5.6	Rack mount plate, Cables	1	set	
	MONITORING STATION	LCD MONITOR	Cp.3 Sec.3.7	WALL MOUNT XETTING OPTION	1	set	
		PERSONAL COMPUTER	Cp.3 Sec.3.6	22"Monitor, Keyboard, Mouse, Cables	1	set	
		ROUTER	Cp.3 Sec.3.9	Cables	1	set	

SUMMARY OF QUANTITY FOR EQUIPMENT

FACILITY	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	GAUGING STATION TYPE-A (WATER LEVEL:1)	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	4	set	Pressure type
		SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	4	set	
		GROUNDING RODS	Cp.3 Sec.5.8	Cables	40	set	
		ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	4	set	IP65, KEY LOCK, Duct
		SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	4	set	FOR WATER LEVEL SENSOR
		SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	4	set	FOR SOLAR CELLS PANEL
		GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	4	set	
		RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	4	set	
		DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	4	set	LCD Monitor, Memory card
		POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	4	set	
		STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	4	set	
		GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	4	set	8 terminals
	GAUGING STATION TYPE-B (WATER LEVEL:2)	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	68	set	Pressure type
		SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	34	set	
		GROUNDING RODS	Cp.3 Sec.5.8	Cables	340	set	
		ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	34	set	IP65, KEY LOCK, Duct
		SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	68	set	FOR WATER LEVEL SENSOR
		SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	34	set	FOR SOLAR CELLS PANEL
		GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	34	set	
		RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	34	set	
		DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	34	set	LCD Monitor, Memory card
		POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	34	set	
		STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	34	set	
		GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	34	set	8 terminals

COUNT QUANTITY OF EQUIPMENT

FACILITY	SITE NAME	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	DIROUT	MASTER STATION	LCD MONITOR	Cp.3 Sec.3.7	Wall mount bracket	1	set	
			LASER PRINTER	Cp.3 Sec.3.10	Table, Cables	1	set	
			SERVER	Cp.3 Sec.3.5	Monitor, Keyboard, Mouse, Cables	3	set	
			COMPUTER RACK	Cp.3 Sec.3.12	Power duct, Power Unit, Brank panel	1	set	
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Rack mount plate, Cables	1	set	
			PERSONAL COMPUTER	Cp.3 Sec.3.6	Monitor, Keyboard, Mouse, Cables	1	set	
			LCD KVM SWITCH	Cp.3 Sec.3.13	Rack mount bracket, Cables	1	set	
			L2-SW	Cp.3 Sec.3.8	Rack mount bracket, Cables	1	set	
			ROUTER	Cp.3 Sec.3.9	Rack mount plate, Cables	2	set	
			UPS	Cp.3 Sec.5.6	Rack mount plate, Cables	1	set	
	MINIA	MONITORING STATION	LCD MONITOR	Cp.3 Sec.3.7	WALL MOUNT XETTING OPTION	1	set	
			PERSONAL COMPUTER	Cp.3 Sec.3.6	22"Monitor, Keyboard, Mouse, Cables	1	set	
			ROUTER	Cp.3 Sec.3.9	Cables	1	set	

COUNT QUANTITY OF EQUIPMENT

FACILITY	SITE NAME	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	Manshat El Dahab Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	El Hareka Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	El Sabaa Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals

COUNT QUANTITY OF EQUIPMENT

FACILITY	SITE NAME	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	Quftan Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Wesh El Bab Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Giza Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals

COUNT QUANTITY OF EQUIPMENT

FACILITY	SITE NAME	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	Hassan Wasef Weir	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	1	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Irad El Maharak Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	El Kosia Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals

COUNT QUANTITY OF EQUIPMENT

FACILITY	SITE NAME	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	East Hafze Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	West Hafze Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Adkak Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals

COUNT QUANTITY OF EQUIPMENT

FACILITY	SITE NAME	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	Gendia Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Abo Shosha Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	El Soultany Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals

COUNT QUANTITY OF EQUIPMENT

FACILITY	SITE NAME	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	Tansa Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	El Mansour Intake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Serry Weir	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	1	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals

COUNT QUANTITY OF EQUIPMENT

FACILITY	SITE NAME	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	Maghagha Weir	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	1	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Ibrahimia Head Regulator	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Dahab Regulator	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals

COUNT QUANTITY OF EQUIPMENT

FACILITY	SITE NAME	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	Sakoula Regulator	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Mazoura Regulator	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Lahoun Regulator	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals

COUNT QUANTITY OF EQUIPMENT

FACILITY	SITE NAME	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	Abo EL Shekok Regulator	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	km39 Regulator	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	New Hafze Regulator	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals

COUNT QUANTITY OF EQUIPMENT

FACILITY	SITE NAME	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	Matay Regulator	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Maghagha Regulator	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Sharahna Regulator	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals

COUNT QUANTITY OF EQUIPMENT

FACILITY	SITE NAME	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	El Gandy Regulator	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Ashmont Regulator	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Quarun Lake	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	1	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals

COUNT QUANTITY OF EQUIPMENT

FACILITY	SITE NAME	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	New Kamdeer PS	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	New Terfa PS	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Old Terfa PS	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals

COUNT QUANTITY OF EQUIPMENT

FACILITY	SITE NAME	CATEGORY	NAME OF EQUIPMENT	SPECIFICATION	ACCESSARY	QTY	UNIT	REMARKS
WATER MANAGEMENT	Old Sakola PS	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals
	Mazoura PS	GAUGING STATION	WATER LEVEL SENSOR	Cp.3 Sec.3.4	Cables	2	set	Pressure type
			SOLAR CELLS PANEL	Cp.3 Sec.5.3	Mount Bracket, Cables	1	set	
			GROUNDING RODS	Cp.3 Sec.5.8	Cables	10	set	
			ENCLOSURE	Cp.3 Sec.3.11	Mount Bracket	1	set	IP65, KEY LOCK, Duct
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	2	set	FOR WATER LEVEL SENSOR
			SURGE PROTECTIVE DEVICE	Cp.3 Sec.5.9	Cables	1	set	FOR SOLAR CELLS PANEL
			GPRS MODEM	Cp.3 Sec.3.1	Antenna, Mount Bracket, Cables	1	set	
			RTU	Cp.3 Sec.3.2	Mount Bracket, Cables	1	set	
			DATA LOGGER	Cp.3 Sec.3.3	Mount Bracket, Cables	1	set	LCD Monitor, Memory card
			POWER CHARGE CONTROLLER	Cp.3 Sec.5.4	Mount Bracket, Cables	1	set	
			STORAGE BATTERY	Cp.3 Sec.5.5	Mount Bracket, Cables	1	set	
			GROUNDING TERMINAL	Cp.3 Sec.5.8	Mount Bracket	1	set	8 terminals

APPENDIX C

Quantity Calculation Sheet

C-1. Quantity Calculation Sheet of Civil Works ---------- C- 1

C-2. Quantity Calculation Sheet of Building Works ---------- C-287

C-3. Quantity Calculation Sheet of Gate Facility---------- C-323

C-4. Quantity Calculation Sheet of Water Management---------- C-562

C-5. Quantity Calculation Sheet of Temporary Works---------- C-585

APPENDIX C-1

Quantity Calculation Sheet of Civil Works

C-1-1. Quantity summary table of civil works ---------- C- 2

C-1-2. Quantity calculation of earth works ---------- C- 5

C-1-3. Quantity calculation of foundation works ---------- C-12

C-1-4. Quantity calculation of cutoff sheet pile works ---------- C-23

C-1-5. Quantity calculation of weir works ---------- C-25

C-1-6. Quantity calculation of ancillary bridge works ---------- C-215

C-1-7. Quantity calculation of bank protection works ---------- C-225

C-1-8. Quantity calculation of bed protection works ---------- C-265

C-1-9. Quantity calculation of hydraulic pipe pit works ---------- C-268

C-1-10. Quantity calculation of ancillary road works ---------- C-272

C-1-1. Quantity summary table of civil works

(1/3)

Works	Description	Dimension		Unit	Bahr Yusef	Ibrahimia	Badraman		Abo Gabal	Sahelyia	Total
							Badraman	Diroutiah			
Earth works	Exacavation		C1 : cohesive soil	m^3	1,500	0	1,000	1,100	1,200	800	5,600
			C1 : sandy soil	m^3	3,600	13,700	0	0	290	200	17,790
			C2 : cohesive soil	m^3	30	0	30	40	20	10	130
			C2 : sandy soil	m^3	60	140	0	0	0	0	200
	Backfilling		R : sandy soil	m^3	1,400	3,700	710	600	550	510	7,470
	Embankment		B0 : sandy soil	m^3	1,100	0	0	0	0	0	1,100
			BL: sandy soil	m^3	38,000	1,200	160	100	840	490	40,790
			BR : sandy soil	m^3	7,200	25,400	180	230	1,200	390	34,600
	Earth finishing foundation		L1	m^2	1,810	1,810	210	290	370	150	4,640
	Rough finishing		L2	m^2	250	170	420	370	210	190	1,610
Foundation works	Cast-in place RC pile	Φ1,000×L13.50m		nos	72						72
		Φ1,000×L7.50m		nos	32						32
		Φ1,000×L15.00m		nos		56					56
		Φ1,000×L7.00m		nos		32					32
Cutoff sheet pileworks		Sheet pile (S270GP)	PU12	ton	89.632	91.152	4.759	7.271	4.429	3.305	200.548
			PU18	ton	5.229	2.576	1.538				9.343
		Cutting	PU12	m	12.0	12.0					24.0
		Welding	PU12	m	12.0	12.0					24.0
		Painting on steel sheet pile		m^2	42.5	39.7	43.2	40.8	12.5	15.0	193.7
Weir body works	Demolition works	Concrete demolition	PC structure	m^3					3.6	2.1	5.8
			RC structure	m^3					123.6	71.8	195.4
	Main body	Concrete	Leveling con. ,σck=20kN/mm^2	m^3	153.3	154.6	17.5	24.3	37.9	15.6	403.1
			Reinforced con. ,σck=25kN/mm^2	m^3	6,503.8	6,460.9	770.9	987.6	1,441.4	752.4	16,917.0
			Second stage con. ,σck=25kN/mm^2	m^3	143.2	142.7	10.3	14.5	23.7	13.4	347.7
		Formwork	Leveling con.	m^2	15.4	15.4	4.9	4.8	6.7	4.8	51.9
			Reinforced con.	m^2	4,586.1	4,498.1	1,146.5	1,350.1	1,660.8	1,060.3	14,302.0
			Second stage con.	m^2	468.2	464.6	51.7	70.9	121.3	72.0	1,248.8
		Circular formwork	RC structure Φ2,500-1/2 Circle	m^2	176.7	173.2					349.9
			RC structure Φ1,000-1/2 Circle	m^2			11.2	20.4	29.9	9.4	70.8
			RC structure Φ1,000-1/4 Circle	m^2	17.3	16.8	11.2	10.2	5.3	9.4	70.1
		Rebar	Steel 360/520 D12	ton	21.103	20.947	2.069	2.686	3.968	1.831	52.604
			Steel 360/520 D16	ton	143.639	142.678	31.552	40.722	53.777	31.097	443.465
			Steel 360/520 D18	ton	26.059	26.059					52.118
			Steel 360/520 D22	ton	16.528	16.490	2.400	2.424			37.842
		Concrete curing	PC structure	m^3	153.3	154.6	17.5	24.3	37.9	15.6	403.1
			RC structure	m^3	6,647.0	6,603.5	781.2	1,002.1	1,465.1	765.8	17,264.7
		Scaffolding	Prefabricated scaffold H≦30m	m^2	3,665.3	3,625.5	848.6	933.3	975.4	707.0	10,755.1
		Falsework	Pipe support falsework	m^3			45.8	61.5	60.6		167.9
			Wedge linked falsework	m^3	1,680.7	1,666.3	56.9	77.0	417.1	294.8	4,192.8
		Expansion joint	Elastic filler , t=20mm	m^2	160.1	159.2			96.4	73.1	488.7
		Water stop	B=300mm	m	95.5	94.9			34.0	26.6	251.0
		Water-swelling water stop	Paste type , 9mm×30mm	m					36.7	29.4	66.1
		Resin capsule anchor	D20×200 , Drilling dia.Φ25	nos					121	96	217
		Slip bar	D20×1.00m , VPΦ25×0.50m	nos	321	319			111	86	837
			D20×0.70m	nos					121	96	217
	Other miscellaneous	Joint bar	D16×300	nos	1,472	1,472					2,944
			D16×200	nos	1,152	1,120	464	464	1,120	636	4,956
		Grating	5,200×2,400	set	4	4					8
			6,000×1,000	set	8	8					16
			2,000×1,000	set			4	6	4	2	16
		Crane facility	Rail (15kg/m)	m	35.5	35.5					71.0
			Manual chain block (5t)	set	1	1					2
		Steps	B=300mm,Resin coated	pcs	212	208	54	75	136	80	765
		Staff gauge	H=7.50m	pcs	1	1					2
			H=7.00m	pcs	1						1
			H=6.70m	pcs		1					1
			H=5.95m	pcs						1	1
			H=4.75m	pcs					2		2
			H=4.50m	pcs						1	1
			H=3.90m	pcs					1		1
			H=3.60m	pcs			1				1
			H=3.30m	pcs				1			1
			H=3.00m	pcs			1				1
			H=2.70m	pcs				1			1
	Safty facillities work	Guard fense	H=1.10m	m	201.6	201.6	41.2	59.2	29.8	29.8	563.2
	Approach cushion slab	Concrete	Reinforced con.σck=25kN/mm^2	m^3	40.0	40.0	40.0	40.0			160.0
		Formwork	RC structure	m^2	24.0	24.0	24.0	24.0			96.0
		Rebar	Steel 360/520 D12	ton	0.150	0.150	0.150	0.150			0.600
			Steel 360/520 ,D16	ton	2.370	2.370	2.370	2.370			9.480
			Steel 360/520 ,D18	ton	1.040	1.040	1.040	1.040			4.160
		Concrete curing	RC structure	m^3	40.0	40.0	40.0	40.0			160.0
		Anchor cap	SGPΦ40×180	nos	50	50	50	50			200
		Anchor bar	D22×500 (including D10 spiral reinforcement)	nos	50	50	50	50			200
		Rubber shoe	t=30mm	m^2	6.0	6.0	6.0	6.0			24.0
		Expansion joint	Elastic filler , t=20mm	m^2	8.6	8.6	8.6	8.6			34.4

Works	Description	Dimension		Unit	Bahr Yusef	Ibrahimia	Badraman		Abo Gabal	Sahelyia	Total
							Badraman	Diroutiah			
Ancilary bridge works	Concrete works	Concrete	Reinforced con.σck=25kN/mm^2	m^3	231.8	231.8	34.1	51.2			548.9
		Formwork	RC structure	m^2	759.4	759.4	71.4	106.0			1,696.2
		Styroform	t=150	m^2	19.2	19.2					38.4
			t=100	m^2	11.6	11.6					23.2
			t=50	m^2	36.8	36.8	11.4	11.4			96.4
			t=20cm	m^2			22.0	33.0			55.0
		Concrete curing	RC structure	m^3	231.8	231.8	34.1	51.2			548.9
		Rebar	Steel 360/520	kg	46,332	46,332	5,003	7,420			105,087
		Falsework		m^3	2,700	2,700	298	424			6,122
	Shoe	Rubber bearing	330×150×40	nos	10	10					20
			330×300×40	nos	20	20					40
			150×10,000×20	nos			1	1			2
			300×10,000×20	nos			2	3			5
		ST formula corrosionproof anchor	F25D×710	set	4	4					8
			M25D×710	set	8	8					16
			F25D×580	set			2	2			4
			M25D×580	set			2	2			4
		PD-Packing	150^t×65×65	nos	4	4					8
			150^t×65×165	nos	8	8					16
			20^t×65×65	nos			2	2			4
			20^t×65×165	nos			2	2			4
	Expansion joint	Brof joint	Type NⅡ-20 (Carrige way)	m	20.2	20.2	20.2	20.2			80.8
			Type NⅡ-20 (Side way)	m	4.0	4.0	4.0	4.0			16.0
			Type NⅡ-35 (Carrige way)	m	10.1	10.1					20.2
			Type NⅡ-35 (Side way)	m	2.0	2.0					4.0
		Anchor bar		kg	205	205	102	102			614
	Aspahlt pavement	Wearing course		m^3	30.4	30.4	5.4	8.1			74.3
	Bulstrade	Bulstrade		m	67.6	67.6	12.0	18.0			165.2
		Anchor bar		kg	625	625	108	159			1,517
Bank protection works	Steel sheet pile	Steel sheet pile (S270GP)	TYPE A	m	66.6						66.6
	protection		TYPE BL-1	m	6.6						6.6
			TYPE BL-2	m	6.6						6.6
			TYPE BR-1	m	4.8						4.8
			TYPE BR-2	m	9.0						9.0
			TYPE C-1	m	3.6						3.6
			TYPE C-2	m	9.0						9.0
			TYPE D-1	m		3.6					3.6
			TYPE D-2	m		5.4					5.4
			TYPE E-1	m		3.0					3.0
			TYPE E-2	m		1.8					1.8
			TYPE F	m		72.6					72.6
			TYPE G-1	m		6.6					6.6
			TYPE G-2	m		6.0					6.0
			TYPE H	m						19.2	19.2
			TYPE I	m				6.6			6.6
			TYPE J	m				4.2			4.2
			TYPE K	m			6.6				6.6
			TYPE L	m			3.6				3.6
			TYPE M	m					45.0		45.0
	Wet stone piching	Wet stone piching	1:2.0 t=35cm	m^2	1,202.0						1,202.0
	protection		1:1.5 t=35cm	m^2		806.8					806.8
		Backfilling concrete	t=20cm, σck=20kN/mm^2	m^3		161.4					161.4
		Crown works	Type A	m	47.3						47.3
			Type B	m		54.7					54.7
		Foundation works	Type A	m	55.9						55.9
			Type B	m		50.6					50.6
	Gabion protection	Gabion	0.5^H×1.0^B×2.0^L	nos	598	586					1,184
			1.0^H×1.0^B×2.0^L	nos	162	508					670
		Stone		m^3	882.7	1,587.0					2,469.7
		Geotextiles sheet		m^2	1,441.3	2,157.9					3,599.2
Bed protection works	Riprap	Stone	D_{50}=40cm	m^3	850.5	850.5					1,701.0
			D_{50}=20cm	m^3	438.0	440.5	30.0	48.0			956.5
		Gravel	crushed stone	m^3	94.5	94.5	7.5	12.0			208.5
		Geotextiles sheet		m^2	945.0	945.0	75.0	120.0			2,085.0
Hydraulic pipe rel. works	Concrete works	Concrete	Leveling con. ,σck=20kN/mm^2	m^3	3.0	7.6					10.5
			Reinforced con. ,σck=25kN/mm^2	m^3	8.9	76.9					85.8
		Formwork	Leveling con.	m^2	3.0	6.1					9.1
			Reinforced con.	m^2	53.3	321.4					374.7
		Rebar	Steel 360/520 D12	kg	448	2,923					3,371
			Steel 360/520 D16	kg		4,820					4,820
			Steel 360/520 D25	kg		328					328
		Concrete curing	PC structure	m^3	3.0	7.6					10.5
			RC structure	m^3	8.9	76.9					85.8
		Scaffolding		m^2		160.1					160.1
		Falsework		m^3		92.0					92.0
	Other miscellaneous	Expansion joint	Elastic filler, t=20mm	m^2		5.1					5.1
		Constraction joint	Oil paint	m^2	0.6						0.6

Works	Description	Dimension		Unit	Bahr Yusef Ibrahimia	Badraman		Abo Gabal	Sahelyia	Total
						Badraman	Diroutiah			
Hydraulic pipe pit works	Other miscellaneous	Water stop	B=300mm	m	16.8					16.8
		Slip bar	D20×1.00m, VPΦ25×0.50m	pcs	32.0					32.0
		Checker plate	t=3.2mm	m^2	1.0					1.0
			t=4.5mm	m^2	18.8					18.8
		Anchor bar	D16, L=0.20m	pcs	16					16
Ancillary road works	Earth works	Ebankment	sandysoil	m^3						10,225
	Asphalt pavement	Roadwalk		m^2						4,075.1
		Sidewalk		m^2						623.7
	Curb concrete	Type-1		m						643.5
		Type-2		m						629.8
	Bulstrade	Bulstrade		m						629.8
	Slope protection	Wet stone piching	1:1.5 t=35cm	m^2						1,987.0
			1:1.0 t=35cm	m^2						158.4
		Backfilling concrete	t=10cm, σck=20kN/mm^2	m^3						15.8
		Crown works	Type A	m						421.0
			Type B	m						57.6
		Foundation works		m						536.8
	Steps	Type-A	H=3.57m 1:1.5	places						2
		Type-B	H=2.57m 1:1.5	places						4
		Type-C	H=3.67m 1:1.0	places						2
		Type-D	H=2.57m 1:1.0	places						2
		Type-E	H=3.87m 1:1.5	places						2

C-1-2. Quantity calculation of earth works

(1) Quantity summary table of earth works

Item		Soil	Unit	Bahr Yusef	Ibrahimia	Badraman		Abo Gabal	Sahelyia
						Badraman	Diroutiah		
Exacavation	C1	cohesive soil	m^3	1,500	0	1,000	1,100	1,200	800
		sandy soil	m^3	3,600	13,700	0	0	290	200
	C2	cohesive soil	m^3	30	0	30	40	20	10
		sandy soil	m^3	60	140	0	0	0	0
Backfilling	R	sandy soil	m^3	1,400	3,700	710	600	550	510
Embankment	B0	sandy soil	m^3	1,100	0	0	0	0	0
	BL	sandy soil	m^3	38,000	1,200	160	100	840	490
	BR	sandy soil	m^3	7,200	25,400	180	230	1,200	390
Earth finishing foundation	L1		m^2	1,810	1,810	210	290	370	150
Rough finishing	L2		m^2	250	170	420	370	210	190

(2) Bahr Yusef Reg.

Station	Distance	Excavation (C1)			Excavation (C2)			Backfilling (R)			Embankment (B0)		
	(m)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)
252.2		0.23						0.00					
249.6	2.6	0.73	0.48	1.25				0.00	0.00	0.00			
245.2	4.4	3.21	1.97	8.67				0.00	0.00	0.00			
209.8	35.4	40.09	21.65	766.41				1.98	0.99	35.05			
(+) 204.8	5.0	93.80	66.95	334.75				1.58	1.78	8.90			
(−) 204.8	0.0	104.82	99.31	0.00				1.58	1.58	0.00	0.00		
(+) 179.8	25.0	36.09	70.46	1,761.50				1.58	1.58	39.50	7.50	3.75	93.75
(−) 179.8	0.0	36.09	36.09	0.00				1.58	1.58	0.00	7.50	7.50	0.00
(+) 174.8	5.0	26.37	31.23	156.15	−			1.49	1.54	7.70	15.60	11.55	57.75
(−) 174.8	0.0	22.99	24.68	0.00	12.96	12.96	0.00	18.47	9.98	0.00	2.74	9.17	0.00
173.8	1.0	22.99	22.99	22.99	12.96	12.96	12.96	18.47	18.47	18.47	2.74	2.74	2.74
172.8	1.0	23.18	23.09	23.09	0.00	6.48	6.48	18.47	18.47	18.47	13.87	8.31	8.31
154.7	18.1	0.86	12.02	217.56				19.41	18.94	342.81	49.79	31.83	576.12
(+) 151.8	2.9	0.38	0.62	1.80	−			4.64	12.03	34.89	40.76	45.28	131.31
(−) 151.8	0.0	3.84	2.11	0.00	12.12	12.96	0.00	8.10	6.37	0.00	10.12	25.44	0.00
150.8	1.0	3.84	3.84	3.84	12.12	12.12	12.12	7.63	7.87	7.87	10.12	10.12	10.12
149.8	1.0	2.54	3.19	3.19	0.00	6.06	6.06	7.26	7.45	7.45	31.75	20.94	20.94
(+) 140.0	9.8	62.64	32.59	319.38				10.62	8.94	87.61	0.00	15.88	155.62
(−) 140.0	0.0	62.64	62.64	0.00				10.62	10.62	0.00			
125.4	14.6	78.66	70.65	1,031.49	0.00	0.00	0.00	30.29	20.46	298.72			
124.4	1.0	78.66	78.66	78.66	33.66	16.83	16.83	31.23	30.76	30.76			
(+) 123.4	1.0	78.66	78.66	78.66	33.66	33.66	33.66	30.49	30.86	30.86			
(−) 123.4	0.0	4.28	41.47	0.00	−			11.54	21.02	0.00			
121.2	2.2	5.39	4.84	10.65				11.53	11.54	25.39			
97.7	23.5	9.78	7.59	178.37				6.29	8.91	209.39			
82.3	15.4	4.71	7.25	111.65				10.27	8.28	127.51			
68.8	13.5	0.00	2.36	31.86				0.00	5.14	69.39			
				5,141.92			88.11			1,400.74			1,056.66

Station	Distance	Embankment (BL)			Embankment (BR)			Earth Finishing Foundation (L1)			Rough Finising (L2)		
	(m)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Line (m)	Ave. (m)	Area (m^2)	Line (m)	Ave. (m)	Area (m^2)
252.2	0.0	0.00											
249.6	2.6	11.46	5.73	14.90									
245.2	4.4	21.03	16.25	71.50									
209.8	35.4	127.55	74.29	2,629.87									
(+) 204.8	5.0	133.93	130.74	653.70									
(−) 204.8	0.0	133.93	133.93	0.00									
(+) 179.8	25.0	184.00	158.97	3,974.25									
(−) 179.8	0.0	184.00	184.00	0.00	0.00								
(+) 174.8	5.0	217.88	200.94	1,004.70	39.61	19.81	99.05	−			−		
(−) 174.8	0.0	277.71	247.80	0.00	76.41	58.01	0.00	34.50			6.99		
173.8	1.0	277.71	277.71	277.71	76.13	76.27	76.27	34.50	34.50	34.50	6.99	6.99	6.99
172.8	1.0	277.71	277.71	277.71	76.58	76.36	76.36	34.70	34.60	34.60	6.91	6.95	6.95
154.7	18.1	308.16	292.94	5,302.21	115.25	95.92	1,736.15	34.70	34.70	628.07	1.37	4.14	74.93
(+) 151.8	2.9	327.86	318.01	922.23	124.50	119.88	347.65	34.70	34.70	100.63	1.10	1.24	3.60
(−) 151.8	0.0	323.30	325.58	0.00	124.50	124.50	0.00	35.50	35.10	0.00	4.97	3.04	0.00
150.8	1.0	323.30	323.30	323.30	118.09	121.30	121.30	35.50	35.50	35.50	4.97	4.97	4.97
149.8	1.0	322.81	323.06	323.06	118.93	118.51	118.51	35.70	35.60	35.60	2.72	3.85	3.85
(+) 140.0	9.8	308.83	315.82	3,095.04	113.29	116.11	1,137.88	35.70	35.70	349.86	5.58	4.15	40.67
(−) 140.0	0.0	373.19	341.01	0.00	140.58	126.94	0.00	35.70	35.70	0.00	5.58	5.58	0.00
125.4	14.6	367.45	370.32	5,406.67	119.11	129.85	1,895.81	35.70	35.70	521.22	6.56	6.07	88.62
124.4	1.0	367.45	367.45	367.45	118.90	119.01	119.01	35.50	35.60	35.60	9.11	7.84	7.84
(+) 123.4	1.0	367.45	367.45	367.45	118.57	118.74	118.74	35.50	35.50	35.50	9.11	9.11	9.11
(−) 123.4	0.0	378.04	372.75	0.00	60.56	89.57	0.00	−			−		
121.2	2.2	376.08	377.06	829.53	56.63	58.60	128.92						
97.7	23.5	294.85	335.47	7,883.55	18.42	37.53	881.96						
82.3	15.4	135.84	215.35	3,316.39	14.41	16.42	252.87						
68.8	13.5	8.67	72.26	975.51	0.00	7.21	97.34						
				38,016.73			7,207.82			1,811.08			247.53

(3) Ibrahimia Reg.

Station	Distance	Excavation (C1)			Excavation (C2)			Backfilling (R)			Embankment (B0)		
	(m)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)
255.7		0.00						0.00					
250.7	5.0	0.65	0.33	1.65				0.00	0.00	0.00			
245.7	5.0	5.09	2.87	14.35				0.19	0.10	0.50			
209.8	35.9	31.55	18.32	657.69				10.54	5.37	192.78			
(+) 204.8	5.0	90.25	60.90	304.50				10.09	10.32	51.60			
(−) 204.8	0.0	110.51	100.38	0.00				10.88	10.49	0.00			
(+) 179.8	25.0	95.58	103.05	2,576.25				14.69	12.79	319.75			
(−) 179.8	0.0	95.58	95.58	0.00				14.69	14.69	0.00			
(+) 174.8	5.0	90.92	93.25	466.25	−			15.85	15.27	76.35			
(−) 174.8	0.0	107.56	99.24	0.00	24.09	24.09	0.00	37.11	26.48	0.00			
173.8	1.0	107.71	107.64	107.64	24.09	24.09	24.09	37.48	37.30	37.30			
172.8	1.0	109.13	108.42	108.42	0.00	12.05	12.05	37.78	37.63	37.63			
154.7	18.1	119.84	114.49	2,072.27				46.85	42.32	765.99			
(+) 151.8	2.9	116.31	118.08	342.43	−			48.33	47.59	138.01			
(−) 151.8	0.0	126.20	121.26	0.00	33.06	33.06	0.00	49.02	48.68	0.00			
150.8	1.0	126.69	126.45	126.45	33.66	33.36	33.36	49.52	49.27	49.27			
149.8	1.0	126.89	126.79	126.79	0.00	16.83	16.83	48.27	48.90	48.90			
(+) 140.0	9.8	114.83	120.86	1,184.43				44.48	46.38	454.52			
(−) 140.0	0.0	114.83	114.83	0.00				49.74	47.11	0.00			
125.4	14.6	106.20	110.52	1,613.59	0.00	0.00	0.00	54.81	52.28	763.29			
124.4	1.0	106.20	106.20	106.20	33.66	16.83	16.83	56.01	55.41	55.41			
(+) 123.4	1.0	106.64	106.42	106.42	33.66	33.66	33.66	57.18	56.60	56.60			
(−) 123.4	0.0	25.13	65.89	0.00	−			16.68	36.93	0.00			
121.2	2.2	24.75	24.94	54.87				17.00	16.84	37.05			
97.7	23.5	89.42	57.09	1,341.62				20.14	18.57	436.40			
84.7	13.0	125.78	107.60	1,398.80				0.00	10.07	130.91			
69.5	15.2	2.76	64.27	976.90									
62.4	7.1	0.00	1.38	9.80									
				13,697.32			136.82			3,652.26			0.00

Station	Distance	Embankment (BL)			Embankment (BR)			Earth Finishing Foundation (L1)			Rough Finising (L2)		
	(m)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Line (m)	Ave. (m)	Area (m^2)	Line (m)	Ave. (m)	Area (m^2)
255.7					0.00								
250.7	5.0				7.35	3.68	18.40						
245.7	5.0	−			10.01	8.68	43.40						
209.8	35.9	10.77			95.00	52.51	1,885.11						
(+) 204.8	5.0	0.47	5.62	28.10	101.64	98.32	491.60						
(−) 204.8	0.0	0.47	0.47	0.00	101.64	101.64	0.00						
(+) 179.8	25.0	1.54	1.01	25.25	110.76	106.20	2,655.00						
(−) 179.8	0.0	1.54	1.54	0.00	110.76	110.76	0.00						
(+) 174.8	5.0	1.54	1.54	7.70	111.57	111.17	555.85	−			−		
(−) 174.8	0.0	24.06	12.80	0.00	166.33	138.95	0.00	34.50			2.84		
173.8	1.0	24.06	24.06	24.06	166.33	166.33	166.33	34.50	34.50	34.50	2.90	2.87	2.87
172.8	1.0	24.06	24.06	24.06	166.33	166.33	166.33	34.70	34.60	34.60	2.53	2.72	2.72
154.7	18.1	21.78	22.92	414.85	170.60	168.47	3,049.31	34.70	34.70	628.07	3.26	2.90	52.49
(+) 151.8	2.9	21.77	21.78	63.16	169.77	170.19	493.55	34.70	34.70	100.63	3.89	3.58	10.38
(−) 151.8	0.0	18.73	20.25	0.00	165.05	167.41	0.00	35.50	35.10	0.00	5.02	4.46	0.00
150.8	1.0	18.74	18.74	18.74	165.06	165.06	165.06	35.50	35.50	35.50	5.09	5.06	5.06
149.8	1.0	18.74	18.74	18.74	165.06	165.06	165.06	35.70	35.60	35.60	2.60	3.85	3.85
(+) 140.0	9.8	13.44	16.09	157.68	174.56	169.81	1,664.14	35.70	35.70	349.86	3.22	2.91	28.52
(−) 140.0	0.0	24.15	18.80	0.00	224.72	199.64	0.00	35.70	35.70	0.00	3.22	3.22	0.00
125.4	14.6	22.01	23.08	336.97	235.13	229.93	3,356.98	35.70	35.70	521.22	4.17	3.70	54.02
124.4	1.0	22.01	22.01	22.01	235.13	235.13	235.13	35.50	35.60	35.60	6.79	5.48	5.48
(+) 123.4	1.0	22.01	22.01	22.01	235.13	235.13	235.13	35.50	35.50	35.50	6.85	6.82	6.82
(−) 123.4	0.0	−			246.15	240.64	0.00	−			−		
121.2	2.2				252.98	249.57	549.05						
97.7	23.5				232.78	242.88	5,707.68						
84.7	13.0				134.33	183.56	2,386.28						
69.5	15.2				33.47	83.90	1,275.28						
62.4	7.1				8.01	20.74	147.25						
				1,163.33			25,411.92			1,811.08			172.21

(4) Badraman Reg. (Badraman)

Station	Distance	Excavation (C1)			Excavation (C2)			Backfilling (R)			Embankment (B0)		
	(m)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)
169.3		1.00											
(+) 154.3	15.0	1.00	1.00	15.00	–			–					
(–) 154.3	0.0	36.10	18.55	0.00	9.41			21.63					
(+) 153.3	1.0	36.10	36.10	36.10	9.41	9.41	9.41	21.63	21.63	21.63			
(–) 153.3	0.0	36.10	36.10	0.00	9.41	9.41	0.00	25.62	23.63	0.00			
152.3	1.0	36.10	36.10	36.10	0.00	4.71	4.71	25.62	25.62	25.62			
(+) 140.0	12.3	36.00	36.05	443.42				25.43	25.53	314.02			
(–) 140.0	0.0	36.00	36.00	0.00				25.43	25.43	0.00			
128.1	11.9	35.91	35.96	427.92	0.00			25.23	25.33	301.43			
(+) 127.1	1.0	35.91	35.91	35.91	9.41	4.71	4.71	23.23	24.23	24.23			
(–) 127.1	0.0	35.91	35.91	0.00	9.41	9.41	0.00	21.33	22.28	0.00			
126.1	1.0	35.91	35.91	35.91	9.41	9.41	9.41	21.33	21.33	21.33			
				1,030.36			28.24			708.26			0.00

Station	Distance	Embankment (BL)			Embankment (BR)			Earth Finishing Foundation (L1)			Rough Finising (L2)		
	(m)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Line (m)	Ave. (m)	Area (m^2)	Line (m)	Ave. (m)	Area (m^2)
169.3													
(+) 154.3	15.0	–			–			–			–		
(–) 154.3	0.0	2.05			1.85			9.00			16.41		
(+) 153.3	1.0	2.05	2.05	2.05	1.85	1.85	1.85	9.00	9.00	9.00	16.41	16.41	16.41
(–) 153.3	0.0	3.77	2.91	0.00	4.01	2.93	0.00	7.20	8.10	0.00	14.40	15.41	0.00
152.3	1.0	3.77	3.77	3.77	4.01	4.01	4.01	7.20	7.20	7.20	14.40	14.40	14.40
(+) 140.0	12.3	3.45	3.61	44.40	4.43	4.22	51.91	7.20	7.20	88.56	14.76	14.58	179.33
(–) 140.0	0.0	8.36	5.91	0.00	8.44	6.44	0.00	7.20	7.20	0.00	14.76	14.76	0.00
128.1	11.9	7.96	8.16	97.10	8.95	8.70	103.53	7.20	7.20	85.68	14.77	14.77	175.76
(+) 127.1	1.0	7.96	7.96	7.96	8.95	8.95	8.95	7.20	7.20	7.20	14.77	14.77	14.77
(–) 127.1	0.0	5.26	6.61	0.00	5.47	7.21	0.00	9.00	8.10	0.00	16.78	15.78	0.00
126.1	1.0	5.26	5.26	5.26	5.47	5.47	5.47	9.00	9.00	9.00	16.78	16.78	16.78
				160.54			175.72			206.64			417.45

(5) Badraman Reg. (Diroutiah)

Station	Distance (m)	Excavation (C1)			Excavation (C2)			Backfilling (R)			Embankment (B0)		
		Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)
168.8		3.49											
(+) 153.8	15.0	3.49	3.49	52.35	-			-					
(-) 153.8	0.0	39.07	21.28	0.00	12.11			19.60					
(+) 152.8	1.0	39.07	39.07	39.07	12.11	12.11	12.11	19.60	19.60	19.60			
(-) 152.8	0.0	39.07	39.07	0.00	12.11	12.11	0.00	23.12	21.36	0.00			
151.8	1.0	39.07	39.07	39.07	0.00	6.06	6.06	23.12	23.12	23.12			
(+) 140.0	11.8	37.43	38.25	451.35				21.22	22.17	261.61			
(-) 140.0	0.0	37.43	37.43	0.00				21.22	21.22	0.00			
128.1	11.9	38.09	37.76	449.34	0.00			21.51	21.37	254.30			
(+) 127.1	1.0	38.09	38.09	38.09	12.11	6.06	6.06	21.51	21.51	21.51			
(-) 127.1	0.0	38.09	38.09	0.00	12.11	12.11	0.00	17.93	19.72	0.00			
126.1	1.0	38.09	38.09	38.09	12.11	12.11	12.11	17.93	17.93	17.93			
				1,107.36			36.34			598.07			0.00

Station	Distance (m)	Embankment (BL)			Embankment (BR)			Earth Finishing Foundation (L1)			Rough Finising (L2)		
		Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Line (m)	Ave. (m)	Area (m^2)	Line (m)	Ave. (m)	Area (m^2)
168.8													
(+) 153.8	15.0	-			-			-			-		
(-) 153.8	0.0	1.02			3.10			12.00			17.60		
(+) 152.8	1.0	1.02	1.02	1.02	3.10	3.10	3.10	12.00	12.00	12.00	17.60	17.60	17.60
(-) 152.8	0.0	2.52	1.77	0.00	5.35	4.23	0.00	10.20	11.10	0.00	15.59	16.60	0.00
151.8	1.0	2.52	2.52	2.52	5.35	5.35	5.35	10.20	10.20	10.20	15.59	15.59	15.59
(+) 140.0	11.8	2.01	2.27	26.79	6.12	5.74	67.73	10.20	10.20	120.36	12.91	14.25	168.15
(-) 140.0	0.0	5.60	3.81	0.00	10.97	8.55	0.00	10.20	10.20	0.00	12.91	12.91	0.00
128.1	11.9	4.82	5.21	62.00	12.13	11.55	137.45	10.20	10.20	121.38	11.86	12.39	147.44
(+) 127.1	1.0	4.82	4.82	4.82	12.13	12.13	12.13	10.20	10.20	10.20	11.86	11.86	11.86
(-) 127.1	0.0	2.61	3.72	0.00	8.43	10.28	0.00	12.00	11.10	0.00	13.87	12.87	0.00
126.1	1.0	2.61	2.61	2.61	8.43	8.43	8.43	12.00	12.00	12.00	13.87	13.87	13.87
				99.76			234.19			286.14			374.51

(6) Abo Gabal Reg.

Station	Distance	Excavation (C1)			Excavation (C2)			Backfilling (R)			Embankment (B0)		
	(m)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)
(-) 4.2		104.05						33.99					
5.2	1.0	104.05	104.05	104.05				33.99	33.99	33.99			
14.8	9.6	41.41	72.73	698.21				19.48	26.74	256.70			
(+) 21.0	6.2	41.47	41.44	256.93				17.00	18.24	113.09			
(-) 21.0	0.0	43.57	42.52	0.00				19.10	18.05	0.00			
29.0	8.0	35.09	39.33	314.64	0.00			11.02	15.06	120.48			
30.0	1.0	34.95	35.02	35.02	13.41	6.71	6.71	12.59	11.81	11.81			
31.0	1.0	34.95	34.95	34.95	13.41	13.41	13.41	12.59	12.59	12.59			
				1,443.80			20.12			548.66			0.00

Station	Distance	Embankment (BL)			Embankment (BR)			Earth Finishing Foundation (L1)			Rough Finising (L2)		
	(m)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Line (m)	Ave. (m)	Area (m^2)	Line (m)	Ave. (m)	Area (m^2)
(-) 4.2		13.80			8.40			16.30			9.26		
5.2	1.0	13.80	13.80	13.80	8.40	8.40	8.40	16.30	16.30	16.30	9.26	9.26	9.26
14.8	9.6	34.73	24.27	232.99	9.21	8.81	84.58	13.20	14.75	141.60	6.55	7.91	75.94
(+) 21.0	6.2	34.95	34.84	216.01	13.27	11.24	69.69	13.20	13.20	81.84	6.93	6.74	41.79
(-) 21.0	0.0	34.95	34.95	0.00	89.28	51.28	0.00	13.20	13.20	0.00	9.83	8.38	0.00
29.0	8.0	38.35	36.65	293.20	116.83	103.06	824.48	13.20	13.20	105.60	6.29	8.06	64.48
30.0	1.0	44.25	41.30	41.30	115.38	116.11	116.11	13.00	13.10	13.10	7.97	7.13	7.13
31.0	1.0	45.05	44.65	44.65	115.38	115.38	115.38	13.00	13.00	13.00	7.97	7.97	7.97
				841.95			1,218.64			371.44			206.57

(7) Sahelyia Reg.

Station	Distance	Excavation (C1)			Excavation (C2)			Backfilling (R)			Embankment (B0)		
	(m)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)
(-) 4.6		21.00											
5.6	1.0	21.00	21.00	21.00				0.00					
8.8	3.2	38.87	29.94	95.81				12.98	6.49	20.77			
(+) 10.0	1.2	38.87	38.87	46.64				12.98	12.98	15.58			
(-) 10.0	0.0	54.39	46.63	0.00				28.53	20.76	0.00			
17.7	7.7	60.68	57.54	443.06				35.79	32.16	247.63			
22.0	4.3	63.05	61.87	266.04	0.00			34.68	35.24	151.53			
23.0	1.0	63.86	63.46	63.46	8.01	4.01	4.01	37.20	35.94	35.94			
24.0	1.0	65.15	64.51	64.51	8.01	8.01	8.01	38.37	37.79	37.79			
				1,000.52			12.02			509.24			0.00

Station	Distance	Embankment (BL)			Embankment (BR)			Earth Finishing Foundation (L1)			Rough Finising (L2)		
	(m)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Area (m^2)	Ave. (m^2)	Vol. (m^3)	Line (m)	Ave. (m)	Area (m^2)	Line (m)	Ave. (m)	Area (m^2)
(-) 4.6								10.50					
5.6	1.0	0.00			0.00			10.50	10.50	10.50			
8.8	3.2	6.72	3.36	10.75	6.70	3.35	10.72	7.20	8.85	28.32			
(+) 10.0	1.2	6.72	6.72	8.06	6.70	6.70	8.04	7.20	7.20	8.64	0.00		
(-) 10.0	0.0	41.16	23.94	0.00	28.73	17.72	0.00	7.20	7.20	0.00	10.50	5.25	0.00
17.7	7.7	29.10	35.13	270.50	24.29	26.51	204.13	7.20	7.20	55.44	15.70	13.10	100.87
22.0	4.3	32.31	30.71	132.05	28.25	26.27	112.96	7.20	7.20	30.96	13.58	14.64	62.95
23.0	1.0	32.30	32.31	32.31	28.96	28.61	28.61	7.00	7.10	7.10	16.12	14.85	14.85
24.0	1.0	31.28	31.79	31.79	28.79	28.88	28.88	7.00	7.00	7.00	16.12	16.12	16.12
				485.46			393.34			147.96			194.79

C-1-3. Quantity calculation of foundation works

(1) Quantity summary table of foundation

Discription	Dimension	Unit	Bahr Yusef Reg.		Ibrahimia Reg.		Total
			Main body	L type wall	Main body	L type wall	
Cast-in place RC pile	Φ1,000×^{L}13.50m	nos	72				72
	Φ1,000×^{L}7.50m	〃		32			32
	Φ1,000×^{L}15.00m	〃			56		56
	Φ1,000×^{L}7.00m	〃				32	32

● Unit quantity								
① Reinforceing bar	Dimension	Unit	D12	D16	D22	D25	D32	Total
(Steel 360/520)	Φ1,000×^{L}13.50m	ton/nos	0.013	0.523	0.040	0.922		1.498
	Φ1,000×^{L}7.50m	〃	0.010	0.314	0.029		1.481	1.834
	Φ1,000×^{L}15.00m	〃	0.014	0.553	0.050	0.790		1.407
	Φ1,000×^{L}7.00m	〃	0.010	0.296	0.029		1.405	1.740
② Reinforced concrete	Dimension	Unit						Total
(σ ck=25N/mm^2(cube))	Φ1,000×^{L}13.50m	m^3/nos						10.60
	Φ1,000×^{L}7.50m	〃						5.89
	Φ1,000×^{L}15.00m	〃						11.78
	Φ1,000×^{L}7.00m	〃						5.50

(1) Bahr Yusef reg. (Main body)

Cast-in place RC pile Quantity calculation

Description	Classification	Calculation			Quantity	Unit	Remarks
Cast-in place RC pile							
Cast-in place RC pile φ 1000, L=13.50m							
Reinforced con.	σ ck=25N/mm^2(cube)						
		π /4 × 1.00^2 × 13.50	=	10.60	10.60	m^3/nos	
Rebar	Steel 360/520	refer to rebar weight caluculation sheet					
		D12	=	0.013	0.013	t nos	
		D16	=	0.523	0.523	t nos	
		D22	=	0.040	0.040	t nos	
		D25	=	0.922	0.922	t/nos	
【Total quantity】							
Nos of pile		9 ×8	=	72.00	72	nos	
Reinforced con.	σ ck=25N/mm^2(cube)						
		10.60×72	=	763.20	763.20	m^3	
Rebar	Steel 360/520	D12 0.013 × 72	=	0.936	0.936	t	
		D16 0.523 × 72	=	37.656	37.656	t	
		D22 0.040×72	=	2.880	2.880	t	

(2) Bahr Yusef reg. (L type wall)

Cast-in place RC pile Quantity calculation

Description	Classification	Calculation		Quantity	Unit	Remarks
Cast-in place RC pile						
Cast-in place RC pile φ1000, L=7.50m						
Reinforced con.	σck=25N/mm²(cube)					
		π /4 × 1.00^2 × 7.50	= 5.89	5.89	m³/nos	
Rebar	Steel 360/520	refer to rebar weight caluculation sheet				
		D12	= 0.010	0.010	t nos	
		D16	= 0.314	0.314	t nos	
		D22	= 0.029	0.029	t nos	
		D32	= 1.481	1.481	t/nos	
【Total quantity】						
Nos of pile		8 × 2 × 2	= 32.00	32	nos	
Reinforced con.	σck=25N/mm²(cube)					
		5.89×32	= 188.48	188.48	m³	
Rebar	Steel 360/520	D12 0.010 × 32	= 0.320	0.320	t	
		D16 0.314 × 32	= 10.048	10.048	t	
		D22 0.029×32	= 0.928	0.928	t	
		D32 1.481×32	= 47.392	47.392	t	

Bahr Yusef Reg. (Main body) Rebar weight [1/1]

per a pile

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
P1	D 25	A		15.175 ×1						1.375 ×1	16.55	14	231.70	
P2	D 22	C		2.051 ×1	1.210 ×1				φ653		3.27	4	13.08	
P3	D 16	D		2.328 ×1	1.164 ×1	0.113 ×2	0.160 ×2		φ741		4.04	83	335.32	
P4	D 12	E		0.558 ×1 ～0.697	0.180 ×2						0.99	8	7.92	
P5	D 12	F		0.188 ×1	0.050 ×2				φ120		0.29	16	4.64	

D12	12.56×0.995	=	12.50 kg	= 0.013 t
D16	335.32×1.56	=	523.10 kg	= 0.523 t
D22	13.08×3.04	=	39.76 kg	= 0.040 t
D25	231.70×3.98	=	922.17 kg	= 0.922 t

Type

A B C D E F

Dia.	kg m	R	L	J
D12	0.995	130	204	1000
D14	1.56	150	236	1000
D16	1.56	170	267	1000
D18	2.25	190	298	1000
D20	2.25	210	330	1100
D22	3.04	240	377	1210
D25	3.98	270	424	1375
D28	5.04	300	471	1540
D32	6.23	340	534	1760

Bahr Yusef Reg. (L type wall)　　Rebar weight 〔1/1〕

per a pile

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
P1	D 32	B		8.750 ×1	0.550 ×1	0.480 ×1					9.78	24	234.72	
P2	D 22	C		2.029 ×1	1.210 ×1				φ646		3.24	3	9.72	
P3	D 16	D		2.350 ×1	1.077 ×1	0.113 ×2	0.160 ×2		φ748		3.98	50	199.00	
P4	D 12	E		0.562 ×1 ～0.704	0.180 ×2						1.00	8	8.00	
P5	D 12	F		0.188 ×1	0.050 ×2				φ120		0.29	12	3.48	

D12	11.48×0.888	=	10.19 kg	= 0.010 t
D16	199.00×1.58	=	314.42 kg	= 0.314 t
D22	9.72×2.98	=	28.97 kg	= 0.029 t
D32	234.72×6.31	=	1481.08 kg	= 1.481 t

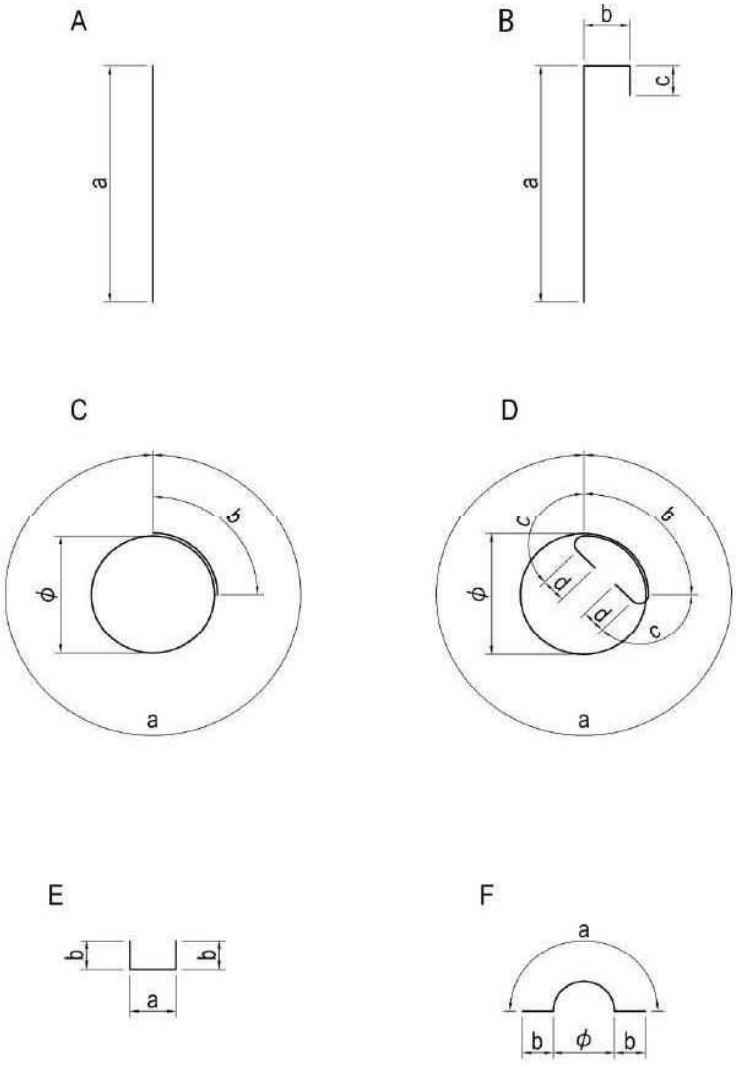
タイプ

A　B　C　D　E　F

Dia.	kg m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Schematic design of rebar

(Bahr Yusef reg.)



(3) Ibrahimia reg. (Main body)

Cast-in place RC pile Quantity calculation

Description	Classification	Calculation		Quantity	Unit	Remarks
Cast-in place RC pile						
Cast-in place RC pile φ 1000, L=15.00m						
Reinforced con.	σ ck=21N/mm^2(cube)					
		π /4 × 1.00^2 × 15.00	= 11.78	11.78	m^3/nos	
Rebar	Steel 360/520	refer to rebar weight caluculation sheet				
		D12	= 0.014	0.014	t nos	
		D16	= 0.553	0.553	t nos	
		D22	= 0.050	0.050	t nos	
		D25	= 0.790	0.790	t/nos	
【Total quantity】						
Nos of pile		8 ×7	= 56.00	56	nos	
Reinforced con.	σ ck=21N/mm^2(cube)					
		11.78×56	= 659.68	659.68	m^3	
Rebar	Steel 360/520	D12 0.014 × 56	= 0.784	0.784	t	
		D16 0.553 × 56	= 30.968	30.968	t	
		D22 0.050×56	= 2.800	2.800	t	

(4) Ibrahimia reg. (Ltype wall)

Cast-in place RC pile Quantity calculation

Description	Classification	Calculation		Quantity	Unit	Remarks
Cast-in place RC pile						
Cast-in place RC pile ϕ 1000, L=7.00m						
Reinforced con.	σ ck=21N/mm^2(cube)					
		π /4 × 1.00^2 × 7.00	= 5.50	5.50	m^3/nos	
Rebar	Steel 360/520	refer to rebar weight caluculation sheet				
		D12	= 0.010	0.010	t nos	
		D16	= 0.296	0.296	t nos	
		D22	= 0.029	0.029	t nos	
		D32	= 1.405	1.405	t/nos	
【Total quantity】						
Nos of pile		8 × 2 × 2	= 32.00	32	nos	
Reinforced con.	σ ck=21N/mm^2(cube)					
		5.50×32	= 176.00	176.00	m^3	
Rebar	Steel 360/520	D12 0.010 × 32	= 0.320	0.320	t	
		D16 0.296 × 32	= 9.472	9.472	t	
		D22 0.029×32	= 0.928	0.928	t	
		D32 1.405 × 32	= 44.960	44.960	t	

Ibrahimia Reg. (Main body) Rebar weight [1/1]

per a pile

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
P1	D 25	A		16.675 ×1						1.375 ×1	18.05	11	198.55	
P2	D 22	C		2.051 ×1	1.210 ×1				φ653		3.27	5	16.35	
P3	D 16	D		2.328 ×1	1.058 ×1	0.113 ×2	0.160 ×2		φ741		3.94	90	354.60	
P4	D 12	E		0.558 ×1 ～0.697	0.180 ×2						0.99	8	7.92	
P5	D 12	F		0.188 ×1	0.050 ×2				φ120		0.29	20	5.80	

D12	13.72×0.995	=	13.65 kg	=	0.014 t
D16	354.60×1.56	=	553.18 kg	=	0.553 t
D22	16.35×3.04	=	49.70 kg	=	0.050 t
D25	198.55×3.98	=	790.23 kg	=	0.790 t

Type

A B C D E F

Dia.	kg m	R	L	J
D12	0.995	130	204	1000
D14	1.56	150	236	1000
D16	1.56	170	267	1000
D18	2.25	190	298	1000
D20	2.25	210	330	1100
D22	3.04	240	377	1210
D25	3.98	270	424	1375
D28	5.04	300	471	1540
D32	6.23	340	534	1760

Ibrahimia Reg. (L type wall)　　Rebar weight 〔1/1〕

per a pile

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
P1	D 32	B		8.250 ×1	0.550 ×1	0.480 ×1					9.28	24	222.72	
P2	D 22	C		2.029 ×1	1.210 ×1				φ648		3.24	3	9.72	
P3	D 16	D		2.350 ×1	1.077 ×1	0.113 ×2	0.160 ×2		φ748		3.98	47	187.06	
P4	D 12	E		0.562 ×1 ～0.704	0.180 ×2						1.00	8	8.00	
P5	D 12	F		0.188 ×1	0.050 ×2				φ120		0.29	12	3.48	

D12	11.48×0.888	=	10.19 kg	= 0.010 t
D16	187.06×1.58	=	295.55 kg	= 0.296 t
D22	9.72×2.98	=	28.97 kg	= 0.029 t
D32	222.72×6.31	=	1405.36 kg	= 1.405 t

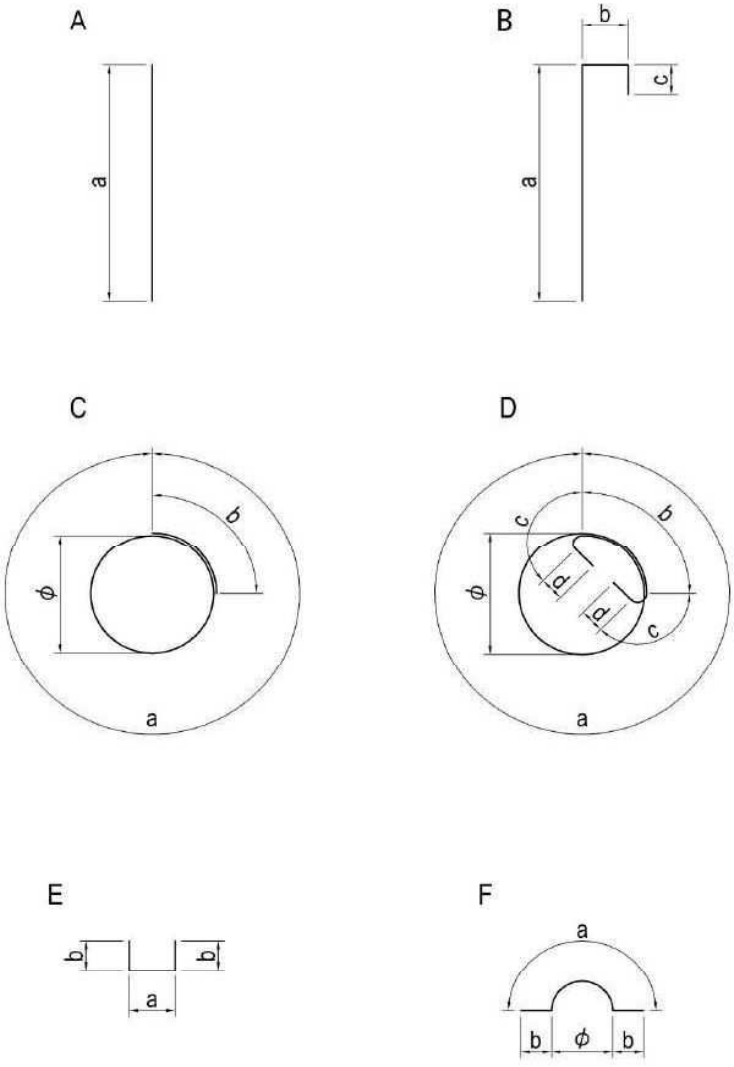
Type

A　B　C　D　E　F

Dia.	kg m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Schematic design of rebar

(Ibrahimia reg.)



C-1-4 Quantity calculation cutoff sheet pile works

Description	Dimension		Unit	Bahr Yusef			Bahr Yusef			Badraman (Badraman)		Badraman (Diroutiah)		Sahe -lyia	Abo Gabal	Total
				Up	Mid	Down	Up	Mid	Down	Up	Down	Up	Down	Up	Up	
Sheet pile	PU12 L=12.0 m		piece	60			60									120
(S270GP)	L=6.0 m		〃		59			59								118
	L=4.5 m		〃			60			60							120
	L=2.0 m		〃							14	14	19	19	14	24	104
	PU12 L=13.5 m	L-1	〃						1							1
	L=11.0 m	I,I	〃											2		2
	L=9.5 m	G,M	〃						1						2	3
	L=9.0 m	I	〃									2				2
	L=8.0 m	J,L	〃								2		2			4
	PU18 L=21.5 m	A	〃	1												1
	L=19.0 m	C-1	〃	1												1
	L=17.5 m	F	〃				1									1
	L=16.5 m	BR-1	〃			1										1
	L=16.0 m	D-1	〃				1									1
	L=11.0 m	BL	〃			1										1
	L=10.0 m	K	〃							2						2
	PU12		m	732.0	354.0	270.0	732.0	354.0	293.0	28.0	44.0	56.0	54.0	50.0	67.0	
		Σ	m			1,356.0			1,379.0		72.0		110.0	50.0	67.0	3,034.0
		Σ	t			89.632			91.152		4.759		7.271	3.305	4.429	200.548
	PU18		m	40.5	0.0	27.5	33.5	0.0	0.0	20.0	0.0	0.0	0.0	0.0	0.0	
		Σ	m			68.0			33.5		20.0		0.0	0.0	0.0	121.5
		Σ	t			5.229			2.576		1.538		0.000	0.000	0.000	9.343
Cutting	PU12		m	12.0			12.0									24.0
Welding	PU12		m	12.0			12.0									24.0
Painting on steel sheet pile			m^2	19.9		22.6	19.9		19.8	24.0	19.2	21.6	19.2	15.0	12.5	
		Σ	m^2			42.5			39.7		43.2		40.8	15.0	12.5	193.7

Description	Dimension			Penetaration depth		Painting on steel sheet pile	
Sheet pile	PU12	L=12.0 m		11.50	m/piece	0.00	m^2/piece
(S270GP)		L=6.0 m		5.50	〃	0.00	〃
		L=4.5 m		4.00	〃	0.00	〃
		L=2.0 m		1.50	〃	0.00	〃
	PU12	L=13.5 m	E-1	5.50	〃	8.40	〃
		L=11.0 m	H	3.25	〃	7.50	〃
		L=9.5 m	G	1.10	〃	11.10	〃
		L=9.5 m	M	2.95	〃	6.24	〃
		L=9.0 m	I	3.00	〃	10.80	〃
		L=8.0 m	J	3.10	〃	9.60	〃
		L=8.0 m	L	2.80	〃	9.60	〃
	PU18	L=21.5 m	A	11.20	〃	9.96	〃
		L=19.0 m	C-1	8.30	〃	9.96	〃
		L=17.5 m	F	7.20	〃	9.96	〃
		L=16.5 m	BR-1	7.70	〃	9.36	〃
		L=16.0 m	D-1	5.70	〃	9.96	〃
		L=11.0 m	BL	2.30	〃	13.20	〃
		L=10.0 m	K	3.70	〃	12.00	〃

C-1-5. Quantity calculation of weir works

Description	Dimension		Unit	Bahr Yusef	Ibrahimia	Badraman		Abo Gabal	Sahelyia	Total
						Badraman	Diroutiah			
Demolition works	Concrete demolition	PC structure	m^3					3.6	2.1	5.8
		RC structure	m^3					123.6	71.8	195.4
Main body	Concrete	Leveling con. ,σck=20kN/mm^2	m^3	153.3	154.6	17.5	24.3	37.9	15.6	403.1
		Reinforced con. ,σck=25kN/mm^2	m^3	6,503.8	6,460.9	770.9	987.6	1,441.4	752.4	16,917.0
		Second stage con. ,σck=25kN/mm^2	m^3	143.2	142.7	10.3	14.5	23.7	13.4	347.7
	Formwork	Leveling con.	m^2	15.4	15.4	4.9	4.8	6.7	4.8	51.9
		Reinforced con.	m^2	4,586.1	4,498.1	1,146.5	1,350.1	1,660.8	1,060.3	14,302.0
		Second stage con.	m^2	468.2	464.6	51.7	70.9	121.3	72.0	1,248.8
	Circular formwork	RC structure Φ2,500-1/2 Circle	m^2	176.7	173.2					349.9
		RC structure Φ1,000-1/2 Circle	m^2			11.2	20.4	29.9	9.4	70.8
		RC structure Φ1,000-1/4 Circle	m^2	17.3	16.8	11.2	10.2	5.3	9.4	70.1
	Rebar	Steel 360/520 D12	ton	21.103	20.947	2.069	2.686	3.968	1.831	52.604
		Steel 360/520 D16	ton	143.639	142.678	31.552	40.722	53.777	31.097	443.465
		Steel 360/520 D18	ton	26.059	26.059					52.118
		Steel 360/520 D22	ton	16.528	16.490	2.400	2.424			37.842
	Concrete curing	PC structure	m^3	153.3	154.6	17.5	24.3	37.9	15.6	403.1
		RC structure	m^3	6,647.0	6,603.5	781.2	1,002.1	1,465.1	765.8	17,264.7
	Scaffolding	Prefabricated scaffold H≤30m	m^2	3,665.3	3,625.5	848.6	933.3	975.4	707.0	10,755.1
	Falsework	Pipe support falsework	m^3			45.8	61.5	60.6		167.9
		Wedge linked falsework	m^3	1,680.7	1,666.3	56.9	77.0	417.1	294.8	4,192.8
	Expansion joint	Elastic filler , t=20mm	m^2	160.1	159.2			96.4	73.1	488.7
	Water stop	B=300mm	m	95.5	94.9			34.0	26.6	251.0
	Water-swelling water stop	Paste type , 9mm×30mm	m					36.7	29.4	66.1
	Resin capsule anchor	D20×200 , Drilling dia. Φ25	nos					121	96	217
	Slip bar	D20×1.00m , VPΦ25×0.50m	nos	321	319			111	86	837
		D20×0.70m	nos					121	96	217
Other miscellaneous	Joint bar	D16×300	nos	1,472	1,472					2,944
		D16×200	nos	1,152	1,120	464	464	1,120	636	4,956
	Grating	5,200×2,400	set	4	4					8
		6,000×1,000	set	8	8					16
		2,000×1,000	set			4	6	4	2	16
	Crane facility	Rail (15kg/m)	m	35.5	35.5					71.0
		Manual chain block (5t)	set	1	1					2
	Steps	B=300mm,Resin coated	pcs	212	208	54	75	136	80	765
	Staff gauge	H=7.50m	pcs	1	1					2
		H=7.00m	pcs	1						1
		H=6.70m	pcs		1					1
		H=5.95m	pcs						1	1
		H=4.75m	pcs					2		2
		H=4.50m	pcs						1	1
		H=3.90m	pcs					1		1
		H=3.60m	pcs			1				1
		H=3.30m	pcs				1			1
		H=3.00m	pcs			1				1
		H=2.70m	pcs				1			1
Safty facillities work	Guard fense	H=1.10m	m	201.6	201.6	41.2	59.2	29.8	29.8	563.2
Approach cushion slab	Concrete	Reinforced con.σck=25kN/mm^2	m^3	40.0	40.0	40.0	40.0			160.0
	Formwork	RC structure	m^2	24.0	24.0	24.0	24.0			96.0
	Rebar	Steel 360/520 D12	ton	0.150	0.150	0.150	0.150			0.600
		Steel 360/520 ,D16	ton	2.370	2.370	2.370	2.370			9.480
		Steel 360/520 ,D18	ton	1.040	1.040	1.040	1.040			4.160
	Concrete curing	RC structure	m^3	40.0	40.0	40.0	40.0			160.0
	Anchor cap	SGPΦ40×180	nos	50	50	50	50			200
	Anchor bar	D22×500 (including D10 spiral reinforcement)	nos	50	50	50	50			200
	Rubber shoe	t=30mm	m^2	6.0	6.0	6.0	6.0			24.0
	Expansion joint	Elastic filler , t=20mm	m^2	8.6	8.6	8.6	8.6			34.4

(1) Bahr Yusef regulator

Bahr Yusef Weir body Quantity Summary Sheet

Type of works	Class	Subdivision	Dimensions	Unit	Quantity	Up stream	Down stream
Weir body	Main body	Leveling con.	σck=20N/mm^2	m^3	153.30	81.82	71.48
		Formwork	Leveling con.	m^2	15.40	4.90	10.50
		Reinforced con.	σck=25N/mm^2	m^3	6,503.79	4,810.04	1,693.75
		Formwork	RC structure	m^2	4,586.12	3,686.25	899.87
		Circular formwork	RC structure φ2500-1/2Circle	m^2	176.71	176.71	−
		〃	RC structure φ1000-1/4Circle	m^2	17.28	6.28	11.00
		Second stage con.	σck=25N/mm^2	m^3	143.19	143.19	−
		Formwork	RC structure	m^2	468.24	468.24	−
		Rebar (Steel 360/520)	D12	t	21.103	13.637	7.466
		〃	D16	t	143.639	103.030	40.609
		〃	D18	t	26.059	26.059	−
		〃	D22	t	16.528	3.230	13.298
		Concrete curing	PC structure	m^3	153.30	81.82	71.48
		〃	RC structure	m^3	6,646.98	4,953.23	1,693.75
		Scaffolding	Prefabricated scaffold H≦ 30m	m^2	3,665.33	2,812.56	852.77
		Falsework	Wedge linked falsework, H≦ 30m, Support bearing force 40KN/m^2 and less	m^3	1,680.69	1,680.69	−
		Expansion joint	Elastic filler,t=20mm	m^2	160.06	−	160.06
		Water stop	B=300mm	m	95.50	48.50	47.00
		Slip bar	D20×1.00m, VPφ25×0.50m	nos	321	165	156
	Other miscellaneous	Joint bar	D16×300	nos	1,472	1,472	−
		〃	D16×200	nos	1,152	1,152	−
		Grating	5200×2400	Set	4	4	−
		〃	6000×1000	Set	8	8	−
	Safty facilities work	Guard fense	H=1.10m	m	201.60	201.60	−

Type of works	Class	Subdivision	Dimensions	Unit	Quantity	Up stream	Down stream
Approach cushion slab	Approach cushion slab	Reinforced con.	σck=25N/mm^2	m^3	40.00	40.00	−
		Formwork	RC structure	m^2	24.00	24.00	−
		Rebar (Steel 360/520)	D12	t	0.150	0.150	−
		〃	D16	t	2.370	2.370	−
		〃	D18	t	1.040	1.040	−
		Concrete curing	RC structure	m^3	40.00	40.00	−
		Anchor cap	SGPφ40×180	nos	50	50	−
		Anchor bar	D22×500 (including D10 spiral reinforcement)	nos	50	50	−
		Rubber shoe	t=30mm	m^2	6.00	6.00	−
		Expansion joint	Elastic filler,t=20mm	m^2	8.60	8.60	−

Bahr Yusef Weir body Quantity calculation

【Upstream】

Description	Classification	Calculation			Quantity	Unit	Remarks
Main body Leveling con.	σck=20N/mm^2						
		35.70×(24.40+24.60)/2×0.10	−	87.47			
		-π/4×1.00^2×0.10×72	−	-5.65			(-)Piles part
		Total	−	81.82	81.82	m^3	
Formwork	Leveling con.						
		(24.40+24.60)/2×0.10×2	−	4.90			
		Total	−	4.90	4.90	m^2	
Reinforced con.	σck=25N/mm^2						
	Cut-off	1/2×(1.00 2.00)×1.00×36.50	=	54.75			Upstream
	〃	1/2×(1.00 2.00)×1.00×8.00×2	=	24.00			Downstream
	〃	0.50×0.50×8.00×2	=	4.00			〃
	〃	1/2×(0.50+1.50)×1.00×19.50	=	19.50			〃
	〃	1/2×(1.00+1.023)×0.50×19.50	−	9.86			〃
	Invert	1.00×3.00×1.00	−	3.00			Upstream-left
	〃	2.00×2.00×1.00	−	4.00			Upstream-right
	〃	27.9×2.00×35.50	=	1980.90			
	〃	1/2×(9.00+11.00)×0.50×6.00×4	=	120.00			
	〃	-2.40×1.05×0.40×8	=	-8.06			(-)Blockout part
	〃	-0.60×5.60×0.40×4	−	-5.38			〃
	〃	-1.00×6.70×0.30×4×2	−	-16.08			〃
	〃	-π/4×1.00^2×0.10×72	−	-5.65			(-)Piles part
	Wall A	1.00×8.00×1.00	=	8.00			
	〃	2.00×8.00×11.15	=	178.40			
	〃	2.00×7.00×16.75	=	234.50			
	〃	-(1.00×0.35 2.40×0.85)×7.50	=	-17.93			(-)Blockout part
	〃	-1.00×0.35×7.00	=	-2.45			〃

Description	Classification	Calculation			Quantity	Unit	Remarks
	Wall B	2.50×8.00×10.65×3	=	639.00			
	〃	2.50×7.00×16.25×3	=	853.13			
	〃	-(1−π/4)×1.25^2×2×(8.00 7.00)×3	=	-30.18			
	〃	-(1.00×0.35 2.40×0.85)×7.50×2×3	=	-107.55			(-)Blockout part
	〃	-1.00×0.35×7.00×2×3	=	-14.70			〃
	Wall C	1.00×8.00×1.00	=	8.00			
	〃	2.00×8.00×11.15	−	178.40			
	〃	2.00×7.00×16.75	=	234.50			
	〃	-(1−π/4)×1.00^2×8.00	=	-1.72			
	〃	-(1.00×0.35−2.40×0.85)×7.50	=	-17.93			(-)Blockout part
	〃	-1.00×0.35×7.00	=	-2.45			〃
	Corridor	1.00×0.50×6.00×4×4	−	48.00			
	〃	0.15×0.15×6.00×4×4	−	2.16			(-)Second stage con.
	Bridge seat	11.00×2.07×2.00×2	−	91.08			Abut pier
	〃	11.00×2.07×(2.50+1.00×2)	−	102.47			Middle pier
	Earth pressure wall	0.75×33.83×2	−	50.75			
	Pedestal	1/2×(0.30 0.70)×0.40×10.00×2	=	4.00			
	Gate pier	(2.00×4.40−2.40×0.85)×4.50×2	=	60.84			
	〃	0.85×1.00×4.00×4×3	=	40.80			
	〃	2.50×1.00×0.50×2×3	−	7.50			
	Top slab	6.40×0.50×35.50	−	113.60			
	〃	1/2×1.00×0.50×(2.00×2−2.50×3)	−	2.88			
	〃	-2.40×0.50×7.70×4	−	-36.96			(-)Opening
	〃	-0.15×0.15×5.20×2×4	−	-0.94			(-)Second stage con.
			Total −	4810.04	4810.04	m^3	
Formwork	RC structure						
	Cut-off	1/2×(1.00+2.00)×1.00×2×2	−	6.00			Side
	〃	1.00×35.50	−	35.50			Upstream end
	〃	1.50×8.00×2 1.00×19.50	=	43.50			Downstream end

Description	Classification	Calculation			Quantity	Unit	Remarks
	Invert	1.00×3.00×3	=	9.00			Upstream left
	〃	1.00×2.00	=	2.00			Upstream right
	〃	35.50×2.00	=	71.00			Upstream end
	〃	27.90×2.00×2	=	111.60			Side
	〃	1.50×8.00×2+2.00×19.50	=	63.00			Downstream end
	〃	0.50×0.50×2	=	0.50			〃
	〃	1.118×6.00×2×4	=	53.66			Raising part
	〃	(2.40−7.70)×2×0.40×4	=	32.32			Blockout part
	〃	(0.812+0.988)×0.40×2×4	=	5.76			〃
	〃	(1.00−6.70)×2×0.30×4×2	=	36.96			〃
	Wall A	1.00×8.00×3	=	24.00			
	〃	8.00×(1.00+11.15×2)	=	186.40			
	〃	7.00×(2.00+16.75×2)	=	248.50			
	〃	7.50×(0.35+0.85)×2	=	18.00			Blockout part
	〃	7.00×0.35×2	=	4.90			〃
	〃	-1/2×(9.00+11.00)×0.50	=	-5.00			(-)Raising part
	〃	-(1.00×0.50−0.15×0.15)×4	=	-1.91			(-)Corridor
	Wall B	8.00×9.40×2×3	=	451.20			
	〃	2.50×1.00×2	=	5.00			
	〃	7.00×15.00×2×3	=	630.00			
	〃	7.50×(0.35+0.85)×4×3	=	108.00			Blockout part
	〃	7.00×0.35×4×3	=	29.40			〃
	〃	-1/2×(9.00+11.00)×0.50×2×3	=	-30.00			(-)Raising part
	〃	-(1.00×0.50−0.15×0.15)×4×2×3	=	-11.46			(-)Corridor
	Wall C	8.00×(2.00+1.00+11.15+10.15)	=	194.40			
	〃	7.00×(2.00+16.75×2)	=	248.50			
	〃	7.50×(0.35+0.85)×2	=	18.00			Blockout part
	〃	7.00×0.35×2	=	4.90			〃
	〃	-1/2×(9.00+11.00)×0.50	=	-5.00			(-)Raising part
	〃	-(1.00×0.50−0.15×0.15)×4	=	-1.91			(-)Corridor

Description	Classification	Calculation			Quantity	Unit	Remarks
	Corridor	(1.00 0.50×2)×6.00×4×4	=	192.00			
	Bridge seat	(11.00×2 + 1.25)×2.07×2	=	96.26			Abut pier
	〃	1.25×1.07×2	=	2.68			〃
	〃	(11.00×2 + 2.50)×2.07	=	50.72			Middle pier
	〃	2.50×1.07	=	2.68			〃
	〃	(11.00×2+1.00)×2.07×2	=	95.22			〃
	〃	1.00×1.07×2	−	2.14			〃
	Earth pressure wall	33.83×2×2	=	135.32			
	〃	(0.601+0.20×4+0.15×2+4.633−1.00)×0.75×2					
			=	11.00			
	〃	-0.70×10.00×2	=	-14.00			(-)Pedestal
	Gate pier	(2.00−4.40+0.85)×2×4.00×2	−	116.00			Abut pier
	〃	{2.00−(4.40+0.85)×2}×0.50×2	−	12.50			〃
	〃	-0.75×2.237×2	−	-3.36			(-)Earth pressure wall
	〃	(0.85−1.00)×2×4.00×4×3	−	177.60			Middle pier
	〃	(1.00×4+2.50×3)×0.50×3	−	17.25			〃
	Top slab	(6.40 35.50)×2×0.50	=	41.90			Side
	〃	(2.40−7.70)×2×0.50×4	=	40.40			Opening
	〃	0.15×0.15×4×4	=	0.36			Second stage con.
	〃	1.00×35.50	−	35.50			Underside
	〃	(2.00−1.00)×6.00×4	−	72.00			〃
	〃	1/2×1.00×0.50×2×5	−	2.50			Haunch
	〃	1.118×(2.00×2−2.50×3)	−	12.86			〃
			Total −	3686.25	3686.25	m^2	
Circular formwork	RC structure						
	φ2500-1/2Circle	π/2×2.50×(8.00+7.00)×3	−	176.71	176.71	m^2	
	φ1000-1/4Circle	π/4×1.00×8.00	−	6.28	6.28	m^2	

Description	Classification	Calculation			Quantity	Unit	Remarks
Second stage con.	σck=25N/mm^2						
		2.40×1.05×0.40×8	=	8.06			Invert part
		0.60×5.60×0.40×4	=	5.38			〃
		1.00×6.70×0.30×4×2	=	16.08			〃
		2.40×0.85×7.50×8	=	122.40			Gate part
		-0.54×(0.705+0.455)×7.50×8	=	-37.58			〃
		1.00×0.35×(7.50+7.00)×8	−	40.60			Stop log part
		-0.50×0.25×(7.50+7.00)×8	=	-14.50			〃
		(0.15^2−0.05^2)×6.00×4×4	=	1.92			Corridor part
		(0.15^2−0.05^2)×5.20×2×4	=	0.83			Top slab part
		Total	=	143.19	143.19	m^3	
Formwork	RC structure						
		(2.40−0.54×4)×7.50×8	−	273.60			Gate part
		(1.00−0.25×2)×(7.50+7.00)×8	−	174.00			Stop log part
		0.15×6.00×4×4	−	14.40			Corridor part
		0.15×5.20×2×4	=	6.24			Top slab part
		Total	=	468.24	468.24	m^2	
Rebar	Steel 360/520	refer to rebar weight caluculation sheet					
		D12	−	13.637	13.637	t	
		D16	−	103.030	103.030	t	
		D18	−	26.059	26.059	t	
		D22	−	3.230	3.230	t	
Concrete curing	PC structure	Leveling concrete	−	81.82	81.82	m^3	
	RC structure	4810.04+143.19	−	4953.23	4953.23	m^3	

Description	Classification	Calculation		Quantity	Unit	Remarks
Scaffolding	Prefabricated scaffold, H≦30m					
	Outer perimeter	10.00×(38.90＋1.00　13.20＋12.20　1.20＋0.40×2)				
			＝ 673.00			
	〃	12.57×16.80×2	＝ 422.35			
	Inside	8.00×2.00×8	＝ 128.00			
	〃	7.50×1.70×8	＝ 102.00			
	〃	9.07×11.80×8	－ 856.21			
	〃	7.00×(1.00＋2.00)×8	＝ 168.00			
	Gate pier part	5.00×(8.60＋37.70)×2	＝ 463.00			
			Total ＝ 2812.56	2812.56	m^2	
Falsework	Wedge linked falsework, H≦30m, Support bearing force 40KN/m^2 and less					
	①	1.00×(7.325＋7.00)/2×6.00×4	－ 171.90			Corridor part
	②	1.00×7.00×6.00×4	－ 168.00			〃
	③	1.00×6.50×6.00×2×4	－ 312.00			〃
	④	2.00×4.50×6.00×4	－ 216.00			Gate pier part
	⑤	1.00×12.00×6.00×2×4	＝ 576.00			〃
	⑥	1.00×4.50×(2.00×2＋2.50×3)	＝ 51.75			〃
	⑦	1.00×(4.50＋4.00)/2×(2.00×2－2.50×3)	＝ 48.88			〃
	⑧	1.00×4.00×0.80×3×2	－ 19.20			〃
	⑨	2.40×4.50×0.80×3	－ 25.92			〃
	⑩	1/2×(11.58＋11.18)×0.40×10.00×2	－ 91.04			Pedestal part
			Tota－ 1680.69	1680.69	m^3	
Water stop	B=300mm	33.50＋7.50×2	－ 48.50	48.50	m^2	
Slip bar	D20×1.00m, VPφ25×0.50m		－ 165.0	165	nos	

Description	Classification	Calculation			Quantity	Unit	Remarks
Other miscellaneous							
Joint bar	D16@300	368×4	=	1472.0	1472	nos	Gate part
	D16@200	(148 + 140)×4	=	1152.0	1152	nos	Stop log part
Grating	5200×2400		=	4.0	4	Set	
	6000×1000		=	8.0	8	Set	
Safety facilities work							
Guard fense	H=1.10m	35.20×2−6.10−5.10	=	81.60			Top slab part
		7.50×4@2@2	−	120.00			Pedestal part
			Tota −	201.60	201.60	m	
Approach cushion slab							
Reinforced con.	σck=25N/mm^2						
		10.00×5.00×0.40×2	=	40.00	40.00	m^3	
Formwork	RC structure						
		(10.00+5.00)×0.40×2×2	−	24.00	24.00	m^2	
Rebar	Steel 360/520	refer to rebar weight caluculation sheet					
		D12 0.075 × 2	−	0.150	0.150	t	
		D16 1.185 × 2	−	2.370	2.370	t	
		D18 0.520 × 2	−	1.040	1.040	t	
Concrete curing	RC structure	Reinforced con.	−	40.00	40.00	m^3	

Description	Classification	Calculation			Quantity	Unit	Remarks
Anchor cap	SGP φ40× 180						
		25×2	=	50.0	50	nos	
Anchor bar	D22~500 (including D10 spiral reinforcement)						
		25×2	=	50.0	50	nos	
Rubber shoe	t=30mm						
		10.00×0.30×2	=	6.00	6.00	m^2	
Expansion joint	Elastic filler, t=20mm						
		0.43×10.00×2	=	8.60	8.60	m^2	

Grating (5200×2400)　Quantity calculation

per a piece

Description	Classification	Calculation	Quantity	Unit	Remarks
Grating	I-44、855×2460				
		— 6.0	6	pieces	
Equal-leg angle	L-50、50×6、5200				
		5.20×0.00443、2 — 0.05	0.05	t	
Anchor bar	D12、105	10×2 — 20.0	20	nos	

Grating（6000×1000） Quantity calculation

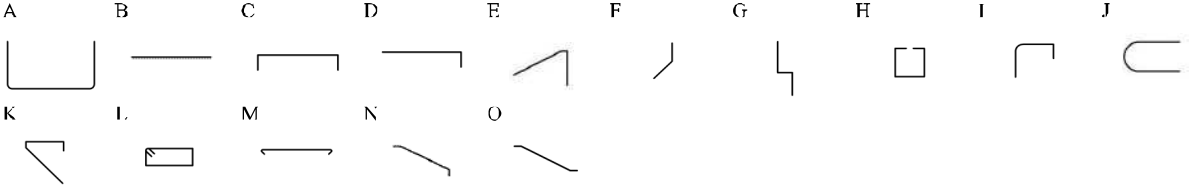
per a piece

Description	Classification	Calculation	Quantity	Unit	Remarks
Grating	I-44、985×1060				
		－ 6.0	6	pieces	
Equal-leg angle	L-50、50×6、6000				
		6.00×0.00443、2 － 0.05	0.05	t	
Anchor bar	D12、105	12×2 － 24.0	24	nos	

Bahr Yusef Reg. (Upstream) Rebar weight (1/10)

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length nos	nos	total length	Remarks
F1	D 18	A		34.920 ×1	2.660 ×1	4.110 ×1	0.298 ×2		φ170	1.000 ×1	46.29	140	6480.60	
F2	D 18	B		35.300 ×1						1.000 3	38.30	141	5400.30	
F3	D 18	B		3.100 ×1							3.10	14	43.40	
F4	D 18	C		5.400 ×1	1.300 ×1	1.300 ×1					8.00	36	288.00	
F5	D 18	B		5.900 ×1							5.90	21	123.90	
F6	D 16	B		27.700 ×1						1.000 ×2	29.70	179	5316.30	
F7	D 16	D		23.683 ×1	1.183 ×1					1.000 ×2	26.87	8	214.96	
F8	D 16	B		2.550 ×1							2.55	157	400.35	
F9	D 16	E		1.856 ×1	0.205 1	1.183 ×1					3.25	120	390.00	
F10	D 16	B		3.000 ×1							3.00	152	456.00	
F11	D 16	C		1.766 ×1	1.183 ×1	1.283 ×1					4.24	8	33.92	
F12	D 16	C		2.578 ×1	1.183 1	1.283 ×1					5.05	112	565.60	
F13	D 16	B		4.400 ×1							4.40	64	281.60	
F14	D 16	B		2.600 ×1							2.60	112	291.20	
F15	D 16	E		1.856 ×1	3.105 1	1.283 ×1					6.25	8	50.00	
F16	D 16	E		1.856 ×1	4.093 ×1	1.283 ×1					7.24	112	810.88	
F17	D 16	D		12.133 ×1	1.183 ×1					1.000 ×1	14.32	60	859.20	
F18	D 16	D		12.133 ×1	1.183 1					1.000 1	14.32	60	859.20	

Type

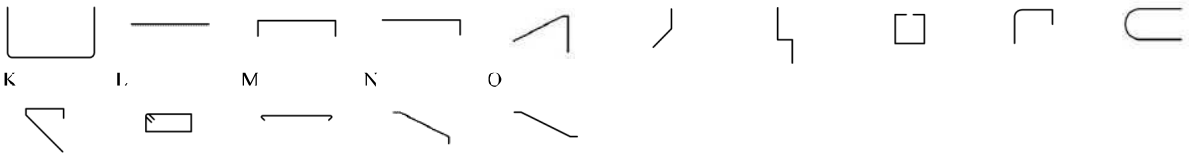


Dia.	kg m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Bahr Yusef Reg. (Upstream) Rebar weight 〔2/4〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length nos	nos	total length	Remarks
F19	D 16	B		3.000 ×1							3.00	152	456.00	
F20	D 16	D		2.783 ×1	1.183 1						3.97	161	639.17	
F21	D 16	C		1.716 ×1	0.240 2						2.20	323	710.60	
F22	D 18	C		35.266 ×1	0.270 ×1	0.270 ×1				1.000 ×3	38.81	16	620.96	
F23	D 16	B		27.664 ×1						1.000 2	29.67	16	474.72	
F24	D 18	B		1.900 ×1							1.90	30	57.00	
F25	D 18	C		1.750 ×1	0.270 ×1	0.270 ×1					2.29	5	11.45	
F26	D 16	B		1.800 ×1							1.80	6	10.80	
F27	D 16	B		1.000 ×1							1.00	4	4.00	
F28	D 16	C		1.716 ×1	0.240 ×1	0.240 ×1					2.20	4	8.80	
F29	D 16	B		1.900 ×1							1.90	189	359.10	
F30	D 16	B		2.273 ×1							2.28	184	419.52	
F31	D 16	F		1.000 ×1	1.331 ×1						2.34	5	11.70	
F32	D 16	B		36.300 ×1						1.000 ×3	39.30	12	471.60	
F33	D 16	G		1.100 ×1	0.500 1	1.300 ×1					2.90	80	232.00	
F34	D 16	G		1.100 ×1	0.500 ×1	0.800 ×1					2.40	99	237.60	
F35	D 16	B		2.273 ×1							2.28	179	408.12	
F36	D 16	B		35.300 ×1						1.000 3	38.30	11	421.30	

Type

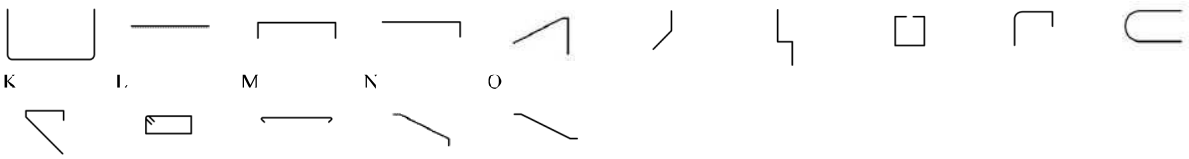


Dia.	kg m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Bahr Yusef Reg. (Upstream)　　Rebar weight 〔3/10〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length nos	nos	total length	Remarks
F37	D 16	B		21.500 ×1						1.000 ˇ1	22.50	3	67.50	
F38	D 16	B		7.800 ×1							7.80	12	93.60	
F39	D 12	H		0.430 ×1	1.780 1	1.780 ›1	0.100 2				4.19	1084	4541.96	
F40	D 12	H		0.430 ×1	1.788 ×1 ～2.063	2.003 ×1 ～2.278	0.100 ×2				4.70	120	564.00	
F41	D 12	II		0.430 ×1	1.980 1	1.980 ›1	0.100 2				4.59	88	403.92	
F42	D 12	H		0.430 ×1	2.280 ^1	2.280 ›1	0.100 ^2				5.19	412	2138.28	
F43	D 12	H		0.430 ×1	1.880 ˇ1	1.880 ›1	0.100 ˇ2				4.39	68	298.52	
F44	D 12	II		0.430 ×1	1.480 1	1.480 ›1	0.100 2				3.59	88	315.92	
F45	D 18	C		0.800 ×1	0.270 1	0.270 ›1					1.34	3	4.02	
W 1	D 16	B		7.900 ×1							7.90	56	442.40	
W 2	D 16	B		6.450 ×1							6.45	56	361.20	
W 3	D 16	B		8.970 ×1							8.97	55	493.35	
W 4	D 16	B		7.520 ×1							7.52	55	413.60	
W 5	D 16	B		6.900 ×1							6.90	29	200.10	
W 6	D 16	B		5.450 ×1							5.45	29	158.05	
W 7	D 16	D		9.750 ×1	0.240 ^1						9.99	582	5814.18	
W 8	D 16	D		10.820 ×1	0.240 ˇ1						11.06	220	2433.20	
W 9	D 16	D		8.750 ×1	0.240 1						8.99	506	4548.94	

Type

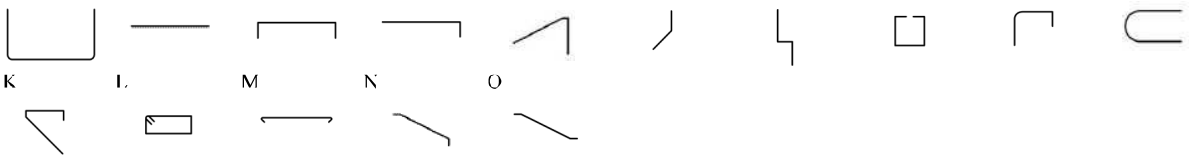


Dia.	kg m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Bahr Yusef Reg. (Upstream) Rebar weight [4/10]

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length nos	nos	total length	Remarks
W10	D 16	B		10.800 ×1							10.80	10	108.00	
W11	D 16	B		1.970 ×1							1.97	29	57.13	
W12	D 16	B		2.970 ×1							2.97	243	721.71	
W13	D 16	D		9.733 ×1	0.240 ×1						9.98	10	99.80	
W14	D 16	C		1.800 ×1	1.000 1	1.000 ×1					3.80	202	767.60	
W15	D 16	C		1.450 ×1	1.000 ×1	1.000 ×1					3.45	20	69.00	
W16	D 16	C		0.800 ×1	0.240 ×1	0.240 ×1					1.28	10	12.80	
W17	D 16	C		1.794 ~1.466 ×1	1.000 1	1.000 ×1					3.63	4	14.52	
W18	D 16	C		2.300 ×1	1.000 1	1.000 ×1					4.30	279	1199.70	
W19	D 16	C		1.600 ×1	1.000 ×1	1.000 ×1					3.60	30	108.00	
W20	D 16	C		0.600 ×1	1.000 ×1	1.000 ×1					2.60	36	93.60	
W21	D 16	C		2.265 ~1.136 ×1	1.000 1	1.000 ×1					3.71	30	111.30	
W22	D 16	C		0.800 ×1	1.000 ×1	1.000 ×1					2.80	106	296.80	
W23	D 16	B		27.700 ×1						1.000 -2	29.70	72	2138.40	
W24	D 16	C		2.768 ×1	1.768 1	1.234 ×1					5.77	42	242.34	
W25	D 16	B		3.000 ×1							3.00	84	252.00	
W26	D 16	C		1.768 ×1	1.234 ×1	1.768 ×1					4.77	84	400.68	
W27	D 16	B		4.400 ×1							4.40	84	369.60	

Type

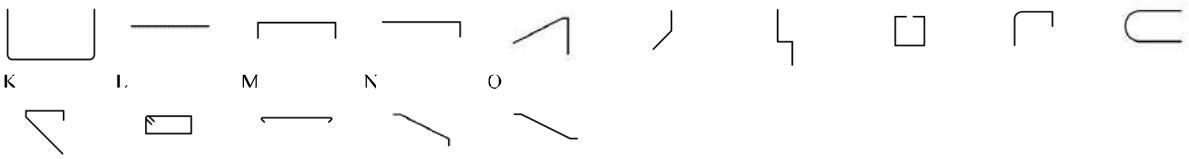


Dia.	kg m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Bahr Yusef Reg. (Upstream) Rebar weight 〔5/10〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length nos	nos	total length	Remarks
W28	D 16	C		15.268 ×1	1.768 ˇ1	1.768 ›1				1.000 ˇ1	19.81	72	1426.32	
W29	D 16	B		3.000 ×1							3.00	72	216.00	
W30	D 16	C		2.768 ×1	1.234 1	1.768 ›1					5.77	72	415.44	
W31	D 16	B		10.950 ×1							10.95	12	131.40	
W32	D 16	C		2.518 ×1	1.768 1	1.768 ›1					6.06	12	72.72	
W33	D 16	B		10.800 ×1							10.80	56	604.80	
W34	D 16	C		1.768 ×1	0.240 ˇ1	0.240 ›1					2.25	44	99.00	
W35	D 16	I		0.884 ×1	1.388 1	1.884 ›1	1.234 1		φ884		5.39	42	226.38	
W36	D 16	B		1.200 ×1							1.20	6	7.20	
W37	D 16	B		1.900 ×1							1.90	194	368.60	
W38	D 16	J		3.562 ×1	1.150 ˇ2				φ1.134		5.87	126	739.62	
W39	D 16	B		3.000 ×1							3.00	252	756.00	
W40	D 16	B		1.800 ×1							1.80	252	453.60	
W41	D 16	B		3.400 ×1							3.40	252	856.80	
W42	D 16	B		15.300 ×1						1.000 1	16.30	216	3520.80	
W43	D 16	B		3.000 ×1							3.00	216	648.00	
W44	D 16	J		3.562 ×1	1.150 ˇ2				φ1.134		5.87	216	1267.92	
W45	D 16	B		2.550 ×1							2.55	36	91.80	

Type

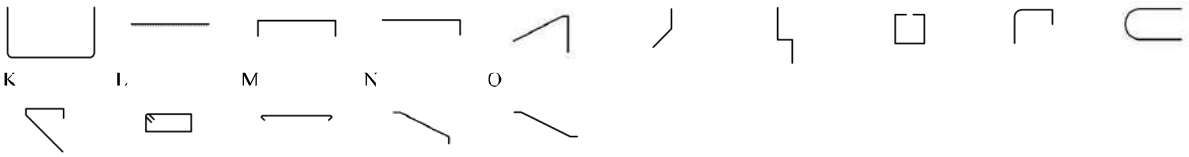


Dia.	kg m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Bahr Yusef Reg. (Upstream) Rebar weight 〔6/10〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length nos	nos	total length	Remarks
W46	D 16	B		10.800 ×1							10.80	83	896.40	
W47	D 16	C		2.268 ×1	0.240 1	0.240 ×1					2.75	760	2090.00	
W48	D 16	C		0.768 ×1	0.240 1	0.240 ×1					1.25	44	55.00	
W49	D 16	B		1.900 ×1							1.90	12	22.80	
W50	D 16	B		5.800 ×1							5.80	11	63.80	
W51	D 16	B		2.800 ×1							2.80	1	2.80	
W52	D 16	B		1.800 ×1							1.80	2	3.60	
W53	D 16	B		3.650 ×1							3.65	12	43.80	
W54	D 16	B		6.650 ×1							6.65	10	66.50	
W55	D 16	B		2.650 ×1							2.65	2	5.30	
W56	D 16	B		2.800 ×1							2.80	2	5.60	
W57	D 16	B		5.794 ×1 ～5.648							5.73	3	17.19	
W58	D 16	B		2.466 ×1							2.47	1	2.47	
W59	D 16	B		11.550 ×1 ～11.532							11.55	9	103.95	
W60	D 16	B		5.228 ×1 ～5.131							5.18	12	62.16	
W61	D 16	B		1.976 ×1 ～1.718							1.85	12	22.20	
W62	D 16	B		1.800 ×1							1.80	12	21.60	
W63	D 16	B		2.250 ×1							2.25	8	18.00	

Type

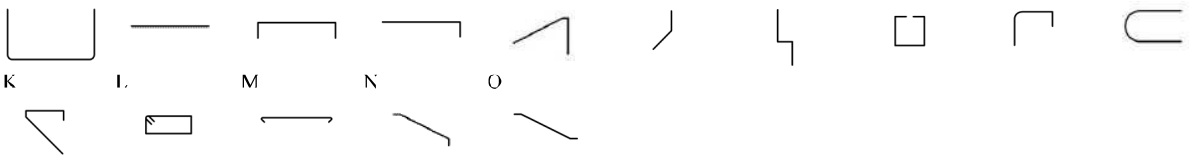


Dia.	kg m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Bahr Yusef Reg. (Upstream) Rebar weight 〔7/10〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length nos	nos	total length	Remarks
W64	D 16	B		3.650 ×1							3.65	12	43.80	
W65	D 16	B		13.650 ×1						1.000 1	14.65	8	117.20	
W66	D 16	B		16.981 ×1						1.000 1	17.99	4	71.96	
W67	D 16	B		6.150 ×1 ～5.961							6.06	17	103.02	
W68	D 16	B		1.976 ×1 ～1.718							1.85	12	22.20	
W69	D 16	B		2.650 ×1							2.65	4	10.60	
W70	D 12	C		1.829 ×1	0.100 ˇ1	0.100 ›1					2.03	982	1993.46	
W71	D 12	C		1.479 ×1	0.100 1	0.100 ›1					1.68	110	184.80	
W72	D 12	C		0.979 ×1	0.100 1	0.100 ›1					1.18	120	141.60	
W73	D 12	C		0.828 ×1	0.100 ^1	0.100 ›1					1.03	53	54.59	
W74	D 12	C		2.328 ×1	0.100 ˇ1	0.100 ›1					2.53	1351	3418.03	
W75	D 12	C		1.628 ×1	0.100 1	0.100 ›1					1.83	165	301.95	
W76	D 12	C		0.628 ×1	0.100 ^1	0.100 ›1					0.83	180	149.40	
W77	D 12	C		0.828 ×1	0.100 ˇ1	0.100 ›1					1.03	130	133.90	
P 1	D 22	B		2.460 ×1							2.46	204	501.84	
P 2	D 22	B		2.610 ×1							2.61	16	41.76	
P 3	D 22	B		3.680 ×1							3.68	24	88.32	
P 4	D 22	B		3.660 ×1 ～3.393							3.53	12	42.36	

Type

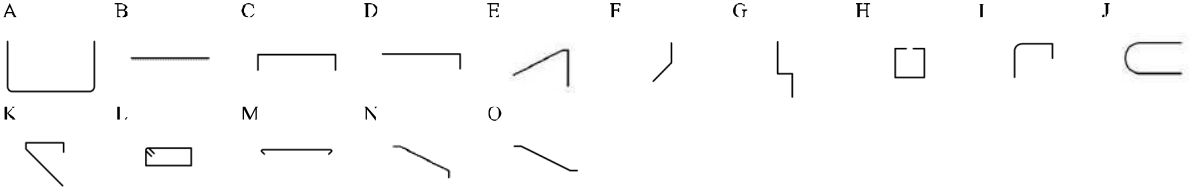


Dia.	kg m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Bahr Yusef Reg. (Upstream) Rebar weight 〔8/10〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length nos	nos	total length	Remarks
P 5	D 22	B		4.680 ×1							4.68	24	112.32	
P 6	D 22	B		4.660 ×1 ～2.126							3.40	80	272.00	
P 7	D 22	B		2.110 ×1							2.11	12	25.32	
P 8	D 12	C		0.550 ×1	0.180 ×1	0.180 ×1					0.91	186	169.26	
P 9	D 16	B		15.820 ×1 ～13.890						1.000 1	15.86	28	444.08	
P 10	D 16	B		2.650 ×1							2.65	24	63.60	
P 11	D 16	B		5.775 ×1 ～4.470							5.13	24	123.12	
P 12	D 16	B		6.650 ×1							6.65	20	133.00	
P 13	D 16	E		0.517 ×1	1.620 1	1.050 ×1					3.19	4	12.76	
P 14	D 16	E		5.325 ×1	1.620 ×1	1.050 ×1					8.00	4	32.00	
P 15	D 16	C		0.512 ×1	0.240 ×1	0.240 ×1					1.00	30	30.00	
P 16	D 12	C		0.584 ×1	0.100 1	0.100 ×1					0.79	186	146.94	
S 1	D 16	B		8.000 ×1							8.00	176	1408.00	
S 2	D 16	B		0.800 ×1							0.80	960	768.00	
S 3	D 16	C		0.618 ×1	0.268 1	0.268 ×1					1.16	480	556.80	
C 1	D 16	K		0.950 ×1	0.159 ×1	1.344 ×1	0.240 ×1				2.70	102	275.40	
C 2	D 16	B		9.800 ×1							9.80	8	78.40	
G 1	D 16	A		34.960 ×1	5.730 1	5.730 ×1	0.267 2		φ170	1.000 6	52.96	8	423.68	

Type

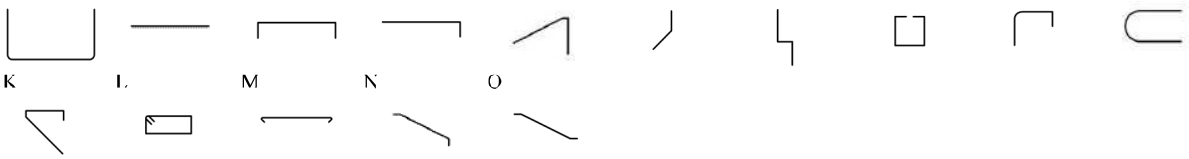


Dia.	kg/m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Bahr Yusef Reg. (Upstream) Rebar weight (9/10)

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length nos	nos	total length	Remarks
G 2	D 16	I		5.730 ×1	0.267 ~1	2.030 >1	0.300 ~1		φ170		8.33	4	33.32	
G 3	D 16	I		5.730 ×1	0.267 1	0.950 >1	0.300 1		φ170		7.25	24	174.00	
G 4	D 16	B		5.900 ×1							5.90	292	1722.80	
G 5	D 16	L		1.832 ×2	0.832 ×2	0.225 ×2					5.78	92	531.76	
G 6	D 16	L		0.982 ×2	4.232 2	0.225 >2					10.88	46	500.48	
G 7	D 16	L		0.682 ×2	0.832 ^2	0.225 >2					3.48	276	960.48	
G 8	D 16	M		2.236 ×1	0.160 ~2	0.113 >2			φ48		2.79	18	50.22	
G 9	D 12	C		0.978 ×1	0.100 1	0.100 >1					1.18	72	84.96	
G10	D 12	C		0.678 ×1	0.100 1	0.100 >1					0.88	132	116.16	
T 1	D 16	C		35.300 ×1	0.300 ^1	0.300 >1				1.000 ^3	38.90	10	389.00	
T 2	D 16	B		7.200 ×1							7.20	8	57.60	
T 3	D 16	C		3.100 ×1	0.300 1	0.300 >1					3.70	6	22.20	
T 4	D 16	C		0.600 ×1	0.300 ^1	0.300 >1					1.20	36	43.20	
T 5	D 16	C		35.300 ×1	0.240 ~1	0.240 >1				1.000 ~3	38.78	19	736.82	
T 6	D 16	C		0.950 ×1	0.240 1	0.240 >1					1.43	24	34.32	
T 7	D 16	C		0.600 ×1	0.240 ^1	0.240 >1					1.08	36	38.88	
T 8	D 16	C		6.232 ×1	0.332 ~1	0.332 >1					6.90	24	165.60	
T 9	D 16	C		2.832 ×1	0.332 1	0.332 >1					3.50	56	196.00	

Type



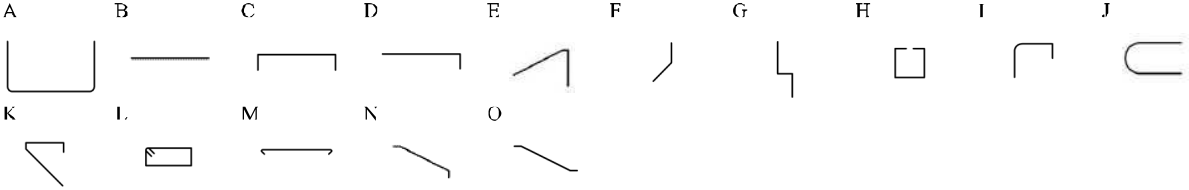
Dia.	kg m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Bahr Yusef Reg. (Upstream)　　Rebar weight 〔10/10〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length nos	nos	total length	Remarks
T10	D 16	C		0.832 ×1	0.332 ˇ1	0.332 ›1					1.50	56	84.00	
T11	D 16	C		2.682 ×1	0.332 1	0.332 ›1					3.35	104	348.40	
T12	D 16	D		0.832 ×1	0.182 1						1.02	208	212.16	
T13	D 16	C		0.682 ×1	0.332 ×1	0.332 ×1					1.35	104	140.40	
T14	D 16	C		6.232 ×1	0.240 1	0.240 ›1					6.72	24	161.28	
T15	D 16	C		2.832 ×1	0.240 ^1	0.240 ›1					3.32	56	185.92	
T16	D 16	C		0.832 ×1	0.240 ˇ1	0.240 ›1					1.32	56	73.92	
T17	D 16	C		2.832 ×1	0.240 1	0.182 ›1					3.26	104	339.04	
T18	D 16	C		0.832 ×1	0.182 1	0.240 ›1					1.26	104	131.04	
T19	D 16	N		2.804 ×1	0.100 ^2						3.01	34	102.34	
T20	D 16	O		1.860 ×1	0.100 ˇ1	0.240 ›1					2.20	30	66.00	
T21	D 16	C		0.832 ×1	0.832 1	0.832 ›1					2.50	24	60.00	
T22	D 16	B		2.300 ×1							2.30	18	41.40	
T23	D 12	C		0.328 ×1	0.100 ˇ1	0.100 ›1					0.53	377	199.81	

D12	15357.46×0.888	=	13637.42 kg	= 13.637 t
D16	65209.11×1.58	=	103030.39 kg	= 103.030 t
D18	13029.63×2.00	=	26059.26 kg	= 26.059 t
D22	1083.92×2.98	=	3230.08 kg	= 3.230 t

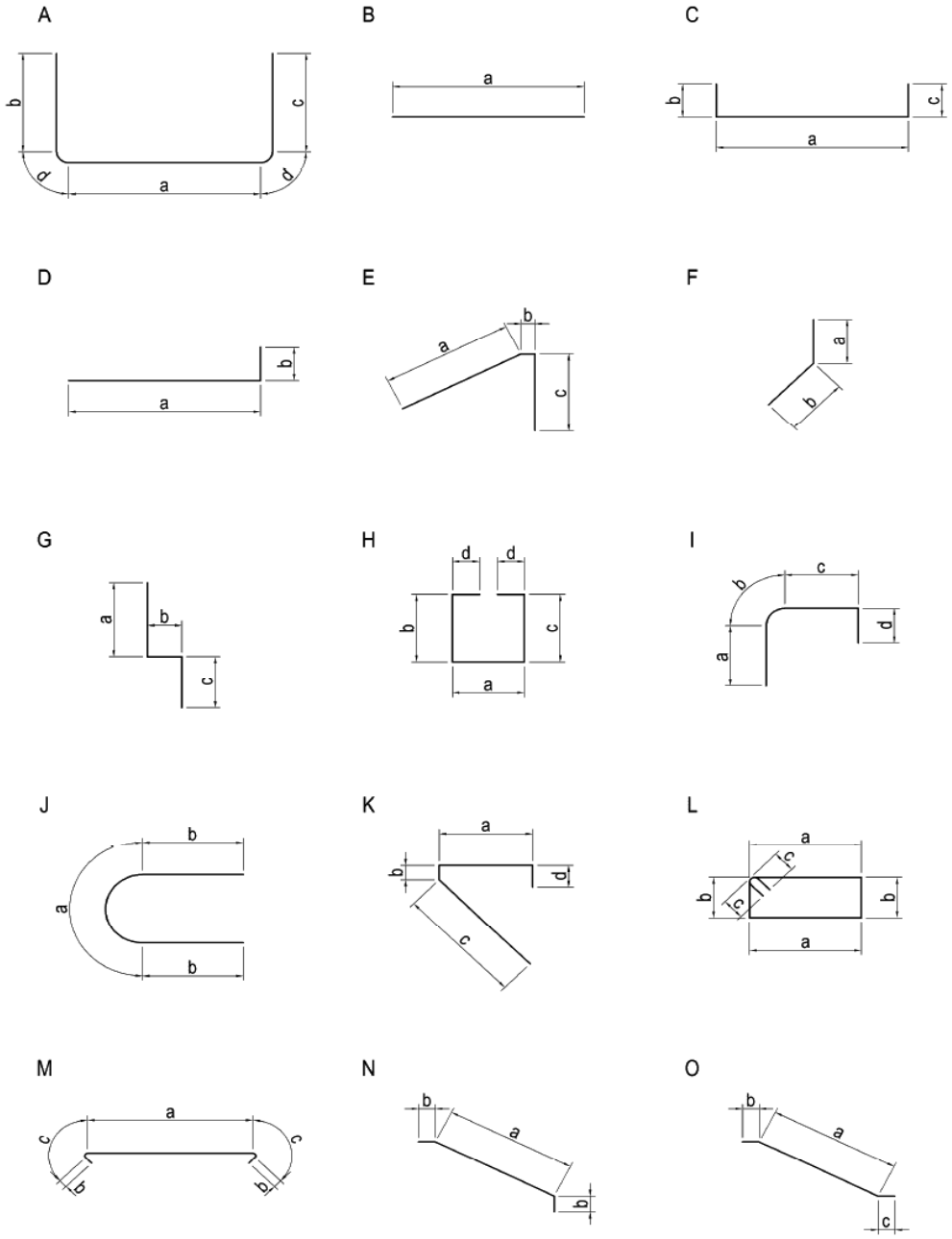
Type



Dia.	kg m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Schematic design of rebar

(Upstream)



Bahr Yusef Reg. (Approach cushion slab)　　Rebar weight 〔1/1〕

per a place

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F1	D 18	B		4.800 ^1	0.200 ^2						5.20	50	260.00	
F2	D 16	B		4.800 ^1	0.200 ^2						5.20	50	260.00	
F3	D 16	A		9.800 ^1							9.80	25	245.00	
F4	D 16	A		9.800 ^1							9.80	25	245.00	
F5	D 12	B		0.229 ^1	0.180 ^2						0.59	144	84.96	

D12	84.96×0.888	=	75.44 kg	=	0.075 t
D16	750.00×1.58	=	1185.00 kg	=	1.185 t
D18	260.00×2.00	=	520.00 kg	=	0.520 t

Type

A　　B

Dia.	kg/m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Schematic design of rebar

(Approach cushion slab)

Bahr Yusef Weir body Quantity calculation

【Downstream】

Description	Classification	Calculation			Quantity	Unit	Remarks
Main body Leveling con.	σck=20N/mm2						
		7.60×(21.50+21.60)/2×0.10×2	=	32.76			L type wall part
		0.50×1.50×0.10×2	=	0.15			〃
		1/2×0.50×0.50×0.10×2	=	0.03			〃
		-π/4×1.00^2×0.10×16×2	=	-2.51			(-) Piles part
		19.50×(21.00+21.10)/2×0.10	=	41.05			Apron part
		Total	=	71.48	71.48	m^3	
Formwork	Leveling con.						
		(21.50+21.60)/2×0.10×2×2	=	8.62			L type wall part
		-0.50×0.10×2	=	-0.10			〃
		0.50×√(2)×0.10×2	=	0.14			〃
		(8.10 10.25)/2×0.10×2	=	1.84			Apron part
		Total	=	10.50	10.50	m^2	
Reinforced con.	σck=25N/mm2						
	Cut-off	1/2×(1.00+1.50)×0.50×8.50×2	=	10.63			L type wall part
	〃	1/2×(1.00+2.00)×1.00×19.50	=	29.25			Apron part
	Invert	8.00×1.50×2.00×2	=	48.00			L type wall part
	〃	1/2×(8.00+7.50)×1.50×0.50×2	=	11.63			〃
	〃	7.50×1.50×19.50×2	=	438.75			〃
	〃	8.50×1.50×1.50×2	=	38.25			〃
	〃	-π/4×1.00^2×0.10×16×2	=	-2.51			(-) Piles part
	〃	1/2×(2.00+1.00)×21.50×19.50	=	628.88			Apron part
	〃	1.00×2.00×19.50	=	39.00			〃
	Wall A	2.00×7.00×2.00	=	28.00			
	〃	1/2×(2.00+1.00)×7.00×1.00	=	10.50			
	〃	1.00×7.00×(20.50+1.50)	=	154.00			

Description	Classification	Calculation			Quantity	Unit	Remarks
	Wall A	1/2×0.50×7.00×(19.50 ｜ 20.00)/2	=	34.56			
	〃	-(1−π/4)×1.00^2×7.00	=	-1.50			
	Wall C	2.00×7.00×2.00	=	28.00			
	〃	1/2×(2.00 ｜ 1.00)×7.00×1.00	=	10.50			
	〃	1.00×7.00×(20.50＋1.50)	=	154.00			
	〃	1/2×0.50×7.00×(19.50＋20.00)/2	=	34.56			
	〃	-(1−π/4)×1.00^2×7.00	−	-1.50			
	Earth pressure wall	1.00×0.75×1.00	=	0.75			
			Total =	1693.75	1693.75	m^3	
Formwork	RC structure						
	Cut-off	1/2×(1.00＋1.50)×0.50×2×2	−	2.50			L type wall part
	〃	0.50×8.50×2	−	8.50			〃
	〃	1.00×19.50	−	19.50			Apron part
	Invert	1.50×(23.50−0.50＋1.00)×2	−	72.00			L type wall part
	〃	1.50×0.50×√(2)×2	−	2.12			〃
	〃	1.50×(23.50 ｜ 8.50)×2	=	96.00			〃
	〃	1/2×8.60×0.40×2	=	3.44			Apron part
	〃	1.00×19.50	=	19.50			〃
	Wall A	7.00×(22.50＋2.00)	−	171.50			L type wall part
	〃	7.00×(0.50＋1.00)/2×√(2)	−	7.42			〃
	〃	7.018×(19.50＋20.00)/2	−	138.61			〃
	〃	7.00×{1.50−1/2×(1.00−1.50)}	−	19.25			〃
	Wall C	7.00×(22.50＋2.00)	−	171.50			L type wall part
	〃	7.00×(0.50＋1.00)/2×√(2)	−	7.42			〃
	〃	7.018×(19.50＋20.00)/2	−	138.61			〃
	〃	7.00×{1.50−1/2×(1.00−1.50)}	−	19.25			〃
	Earth pressure wall	(1.00×2＋0.75)×1.00	−	2.75			
			Total −	899.87	899.87	m^2	

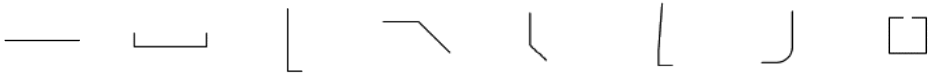
Description	Classification	Calculation							Quantity	Unit	Remarks
Circular formwork	RC structure										
	φ1000-1/4Circle	π/4×1.00×7.00×2					=	11.00	11.00	m^2	
Rebar		refer to rebar weight calculation sheet									
			Ltype wall part			Apron part					
		D12	1.794 ×	2	+	3.878	=	7.466	7.466	t	
		D16	11.185 ×	2	+	18.239	−	40.609	40.609	t	
		D22	6.649 ×	2			=	13.298	13.298	t	
Concrete curing	PC structure	Leveling con.					=	71.48	71.48	m^3	
	RC structure	Reinforced con.					=	1693.75	1693.75	m^3	
Scaffolding	Prefabricated scaffold, H≦30m										
	Outer perimeter	8.50×(2.46+0.71+17.94+1.70−3.70−4.30)×2									
							−	523.77			
	Inside	7.00×23.50×2					−	329.00			
							Total =	852.77	852.77	m^2	
Expansion joint	Elastic filler,t=20mm										
		2.00×(19.50+7.00×2)+(1.50×8.00−0.50×1.00)×2									
							−	92.00			
		1/2×(2.00+1.00)×21.50×2					−	64.50			
		2.00×1.00×2					−	4.00			
		1/2×(1.00+2.00)×1.00×2					−	3.00			
		-1/2×8.60×0.40×2					−	-3.44			
							Total −	160.06	160.06	m^2	
Water stop	B=300mm	23.50×2					−	47.00	47.00	m^2	
Slip bar	D20×1.00m, VPφ25×0.50m	78×2					=	156.0	156	nos	

Bahr Yusef Reg. (Downstream-L type wall) Rebar weight 〔1/4〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length nos	nos	total length	Remarks
F1	D 22	B		7.800 ×1	1.250 ~2						10.30	10	103.00	
F2	D 22	B		7.459 ~7.659 ×1	1.250 2						10.06	2	20.12	
F3	D 22	B		7.300 ×1	1.250 2						9.80	98	960.40	
F4	D 22	B		8.300 ×1	1.250 ×2						10.80	8	86.40	
F5	D 16	B		7.800 ×1	0.240 2						8.28	10	82.80	
F6	D 16	B		7.459 ~7.659 ×1	0.240 ~2						8.04	2	16.08	
F7	D 16	B		7.300 ×1	0.240 ~2						7.78	98	762.44	
F8	D 16	B		8.300 ×1	0.240 2						8.78	8	70.24	
F9	D 16	A		23.300 ×1						1.000 2	25.30	70	1771.00	
F10	D 16	D		1.851 ×1	2.519 ~1						4.37	2	8.74	
F11	D 16	A		2.009 ~2.159 ×1							2.09	2	4.18	
F12	D 16	B		1.300 ×1	1.250 2						3.80	5	19.00	
F13	D 16	B		1.300 ×1	0.240 ~2						1.78	5	8.90	
F14	D 16	B		7.765 ×1	0.240 ~2						8.25	6	49.50	
F15	D 16	C		8.284 ×1	0.240 1						8.53	6	51.18	
F16	D 16	A		8.300 ×1							8.30	6	49.80	
F17	D 16	A		23.284 ×1						1.000 ~2	25.29	12	303.48	
F18	D 16	D		1.851 ×1	2.519 1						4.37	6	26.22	

Type

A B C D E F G H



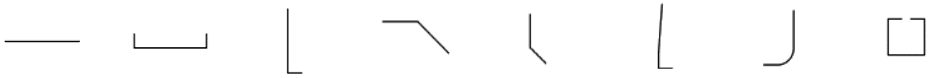
Dia.	kg m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Bahr Yusef Reg. (Downstream-L type wall) Rebar weight 〔2/4〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length nos	nos	total length	Remarks
F19	D 16	B		1.218 ×1	0.240 ~2						1.70	29	49.30	
F20	D 16	A		1.800 ×1							1.80	43	77.40	
F21	D 16	A		1.566 ×1							1.57	35	54.95	
F22	D 16	E		1.000 ×1	0.554 ×1						1.56	8	12.48	
F23	D 16	A		8.300 ×1							8.30	6	49.80	
F24	D 12	H		0.434 ×1	1.281 ~2	0.100 ×2					3.20	420	1344.00	
W1	D 22	C		8.250 ×1	0.330 ~1						8.58	13	111.54	
W2	D 22	F		6.904 ×1	1.349 1	0.330 ×1					8.59	1	8.59	
W3	D 22	F		6.914 ×1	1.347 1	0.330 ×1					8.60	1	8.60	
W4	D 22	F		6.918 ×1	1.350 ~1	0.330 ×1					8.60	98	842.80	
W5	D 22	C		8.250 ×1	0.330 ~1						8.58	8	68.64	
W6	D 16	C		8.250 ×1	0.240 1						8.49	135	1146.15	
W7	D 16	A		23.300 ×1						1.000 ~2	25.30	35	885.50	
W8	D 16	D		1.851 ×1	2.519 ~1						4.37	35	152.95	
W9	D 16	A		2.292 ×1							2.30	35	80.50	
W10	D 16	A		22.400 ×1						1.000 ~2	24.40	35	854.00	
W11	D 16	G		1.400 ×1	1.389 ~1	1.000 ×1			φ884		3.79	35	132.65	
W12	D 16	A		22.966 ×1 ~23.249						1.000 2	25.11	3	75.33	

Type

A B C D E F G H



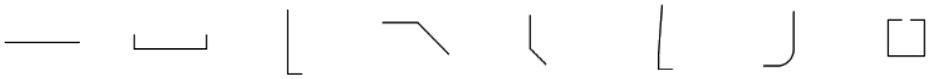
Dia.	kg/m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Bahr Yusef Reg. (Downstream-L type wall) Rebar weight 〔3/4〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length nos	nos	total length	Remarks
W13	D 16	A	——	2.009 ×1 ～2.659							2.34	5	11.70	
W14	D 16	A	——	1.966 ×1 ～2.249							2.11	3	6.33	
W15	D 22	A	——	2.110 ×1							2.11	10	21.10	
W16	D 16	A	——	0.800 ×1							0.80	11	8.80	
W17	D 16	B	⌐¬	1.800 ×1	0.240 ^2						2.28	10	22.80	
W18	D 16	B	⌐¬	0.859 ×1 ～1.659	0.240 ^2						1.74	5	8.70	
W19	D 16	B	⌐¬	0.807 ×1	0.240 ˇ2						1.29	98	126.42	
W20	D 16	B	⌐¬	0.800 ×1	0.240 ^2						1.28	8	10.24	
W21	D 16	B	⌐¬	1.765 ×1	0.240 ^2						2.25	34	76.50	
W22	D 16	B	⌐¬	0.550 ×1	0.240 ^2						1.03	5	5.15	
W23	D 16	B	⌐¬	0.512 ×1	0.240 ˇ2						1.00	8	8.00	
W24	D 12	B	⌐¬	1.831 ×1	0.100 ^2						2.04	43	87.72	
W25	D 12	B	⌐¬	1.145 ×1 ～1.328	0.100 ^2						1.44	17	24.48	
W26	D 12	B	⌐¬	0.867 ×1 ～1.324	0.100 ^2						1.30	416	540.80	
W27	D 12	B	⌐¬	0.831 ×1	0.100 ^2						1.04	21	21.84	
W28	D 12	B	⌐¬	0.584 ×1	0.100 ^2						0.79	2	1.58	

Type

A B C D E F G H



Dia.	kg/m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Bahr Yusef Reg. (Downstream-L type wall) Rebar weight [4/4]

No.	Dia.	Type	Shape	L a	b	c	d	e	φ	Joint	length nos	nos	total length	Remarks
			D12	2020.42×0.888	=	1794.13 kg	=	1.794 t						
			D16	7079.21×1.58	=	11185.15 kg	=	11.185 t						
			D22	2231.19×2.98	=	6648.95 kg	=	6.649 t						

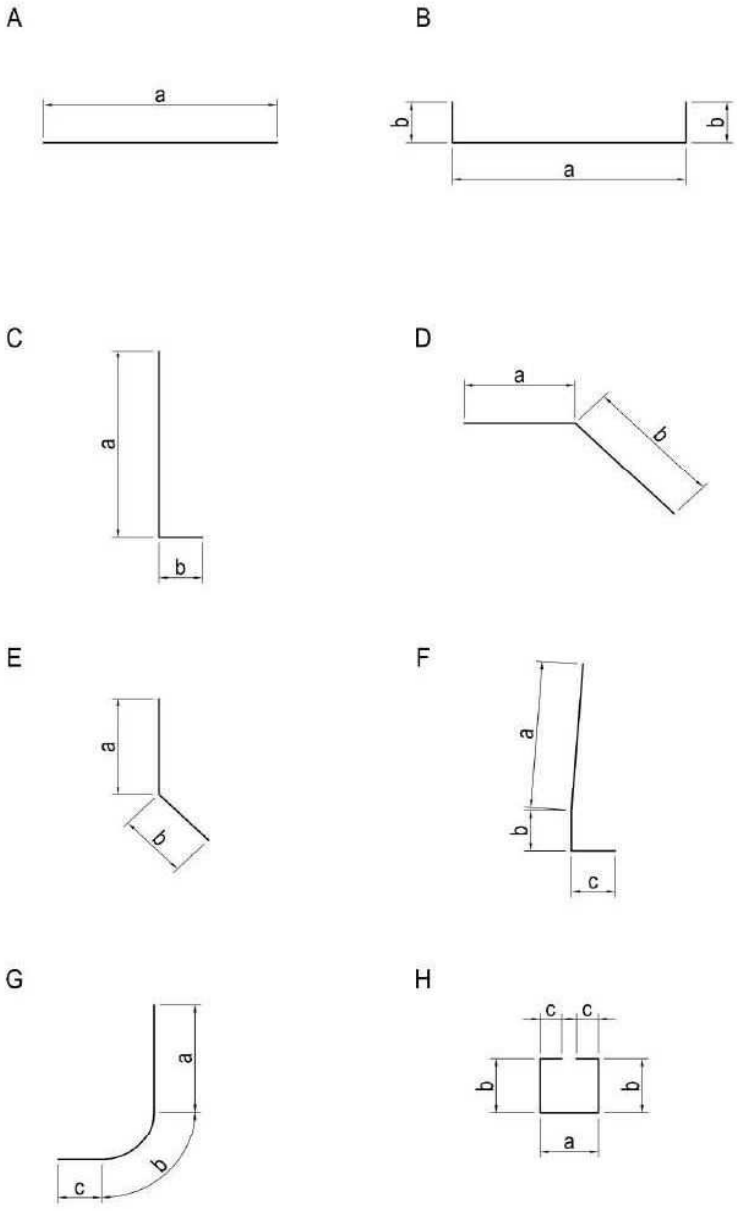
Type

A B C D E F G H

Dia.	kg m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Schematic design of rebar

(Downstream-L type wall)



Bahr Yusef Reg. (Downstream-Apron)　　Rebar weight 〔1/1〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length nos	nos	total length	Remarks
A1	D 16	A		19.300 ×1						1.000 -1	20.30	236	4790.80	
A2	D 16	B		21.420 ×1	1.903 1					1.000 2	25.33	50	1266.50	
A3	D 16	B		21.420 ×1	1.903 1					1.000 2	25.33	49	1241.17	
A4	D 16	A		23.300 ×1						1.000 ×2	25.30	99	2504.70	
A5	D 16	A		23.300 ×1						1.000 2	25.30	6	151.80	
A6	D 16	A		12.798 ×1 ～21.398						1.000 -1	18.10	6	108.60	
A7	D 16	A		4.198 ×1 ～8.498							6.35	4	25.40	
A8	D 16	C		19.268 ×1	0.240 2					1.000 1	20.75	11	228.25	
A9	D 16	C		1.763 ×1	0.240 2						2.25	99	222.75	
A10	D 16	C		0.770 ×1 ～1.756	0.240 -2						1.75	214	374.50	
A11	D 16	C		0.768 ×1	0.240 -2						1.25	18	22.50	
A12	D 16	A		1.800 ×1							1.80	99	178.20	
A13	D 16	A		2.273 ×1							2.28	99	225.72	
A14	D 16	A		19.300 ×1						1.000 -1	20.30	10	203.00	
A15	D 12	D		0.428 ×1	0.840 1 ～1.807	0.828 ×1 ～1.788	0.100 2				3.26	1272	4146.72	
A16	D 12	D		0.428 ×1	0.828 -1	0.828 ×1	0.100 -2				2.29	96	219.84	

D12	4366.56×0.888	= 3877.51 kg	= 3.878 t
D16	11543.89×1.58	= 18239.35 kg	= 18.239 t

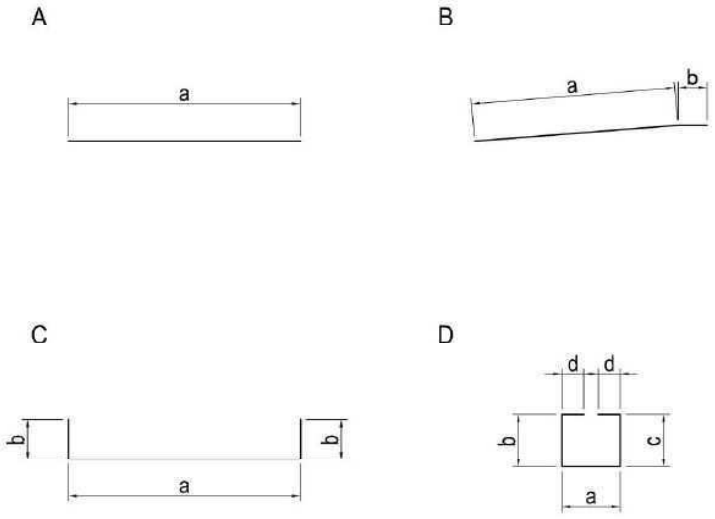
Type

A　B　C　D

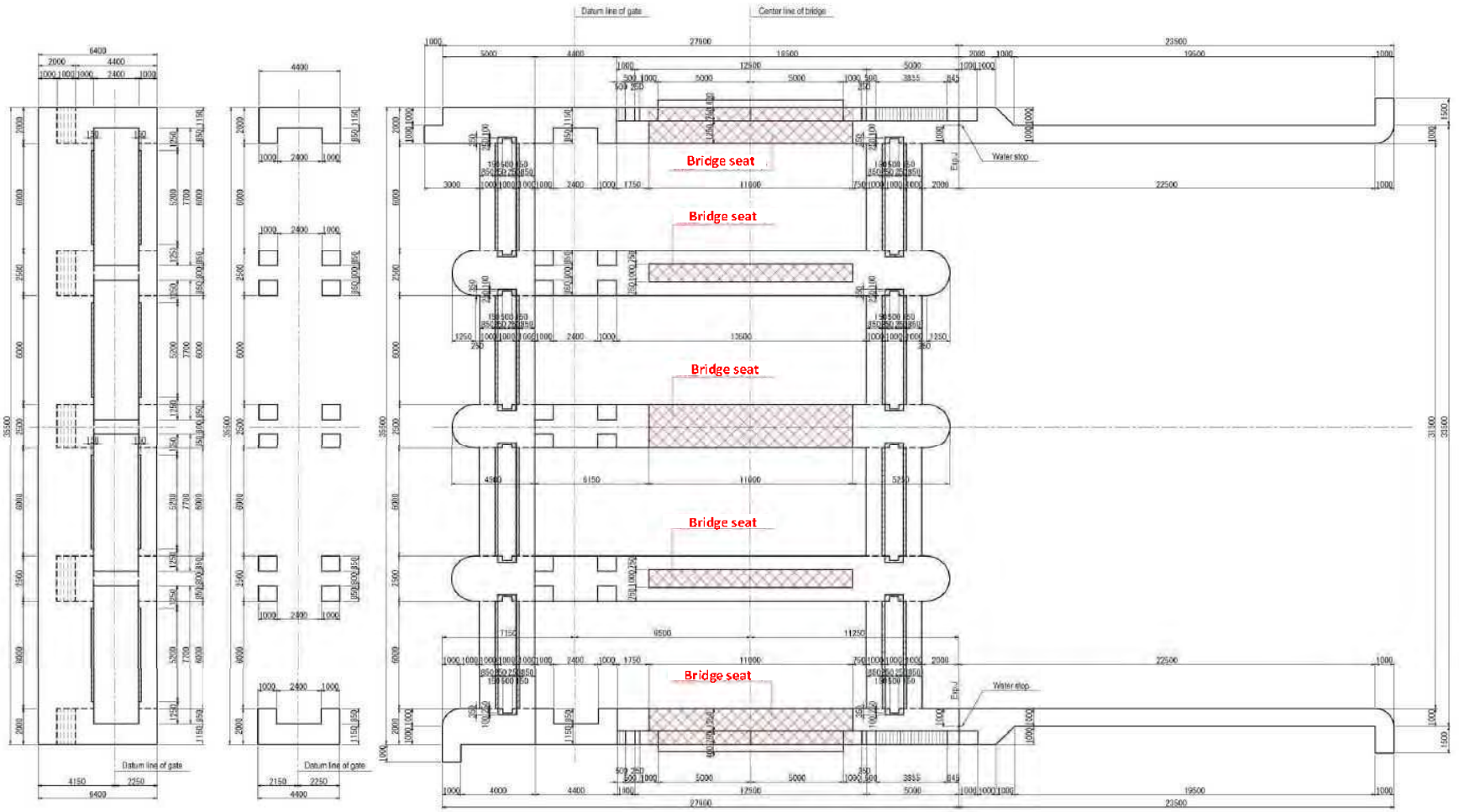
Dia.	kg m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Schematic design of rebar

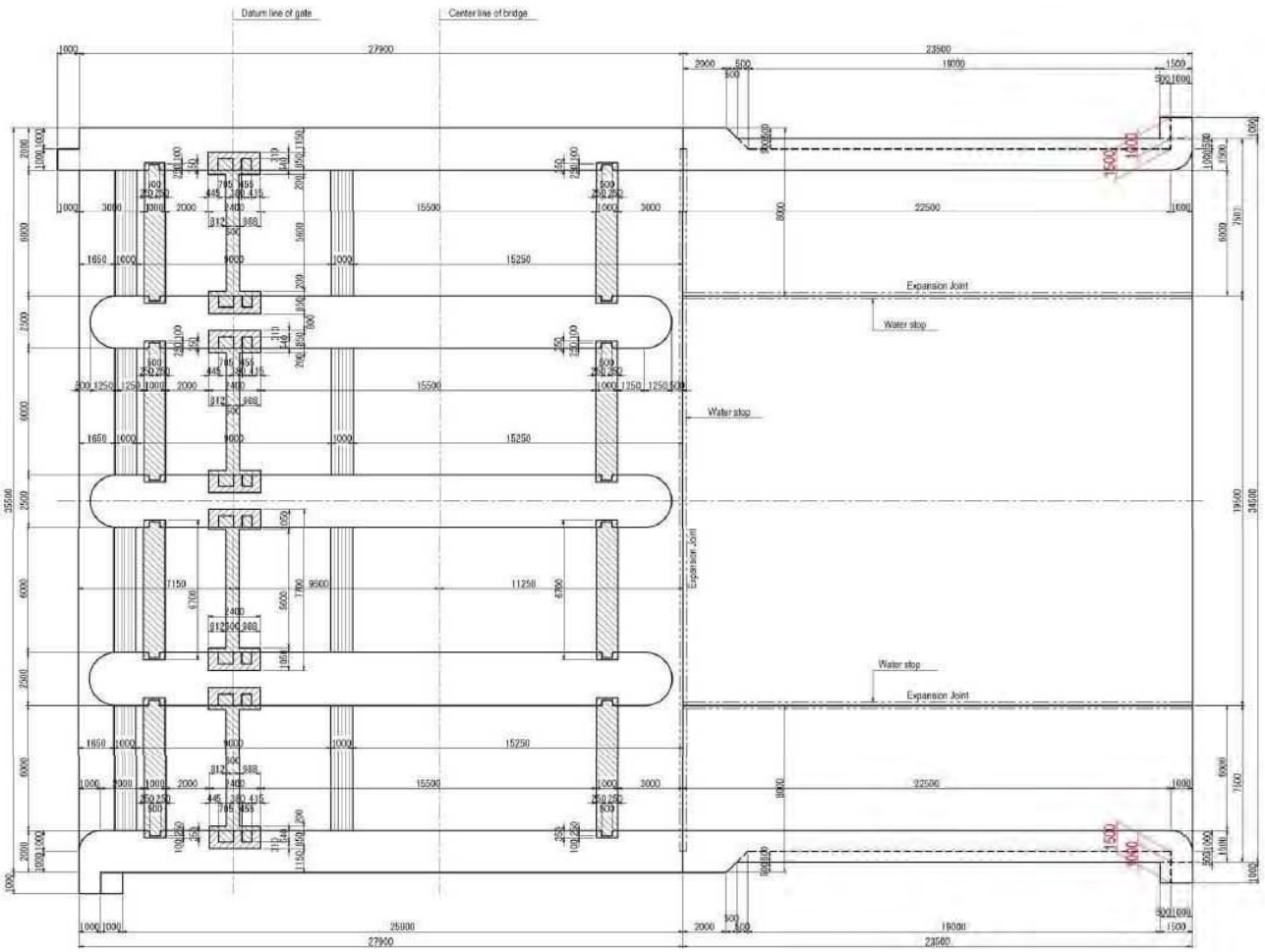
(Downstream-Apron)



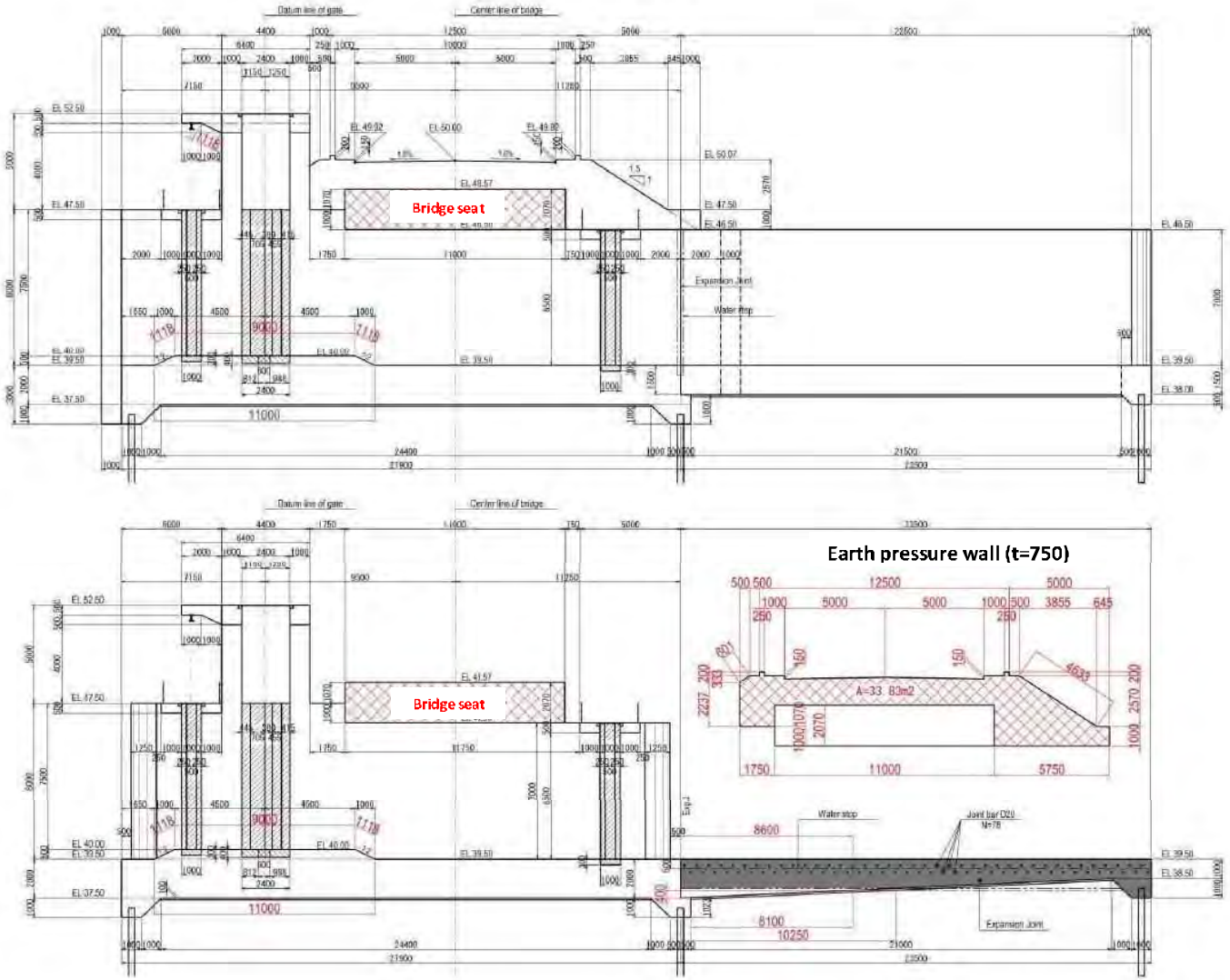
Concrete / Formwork (1/5)



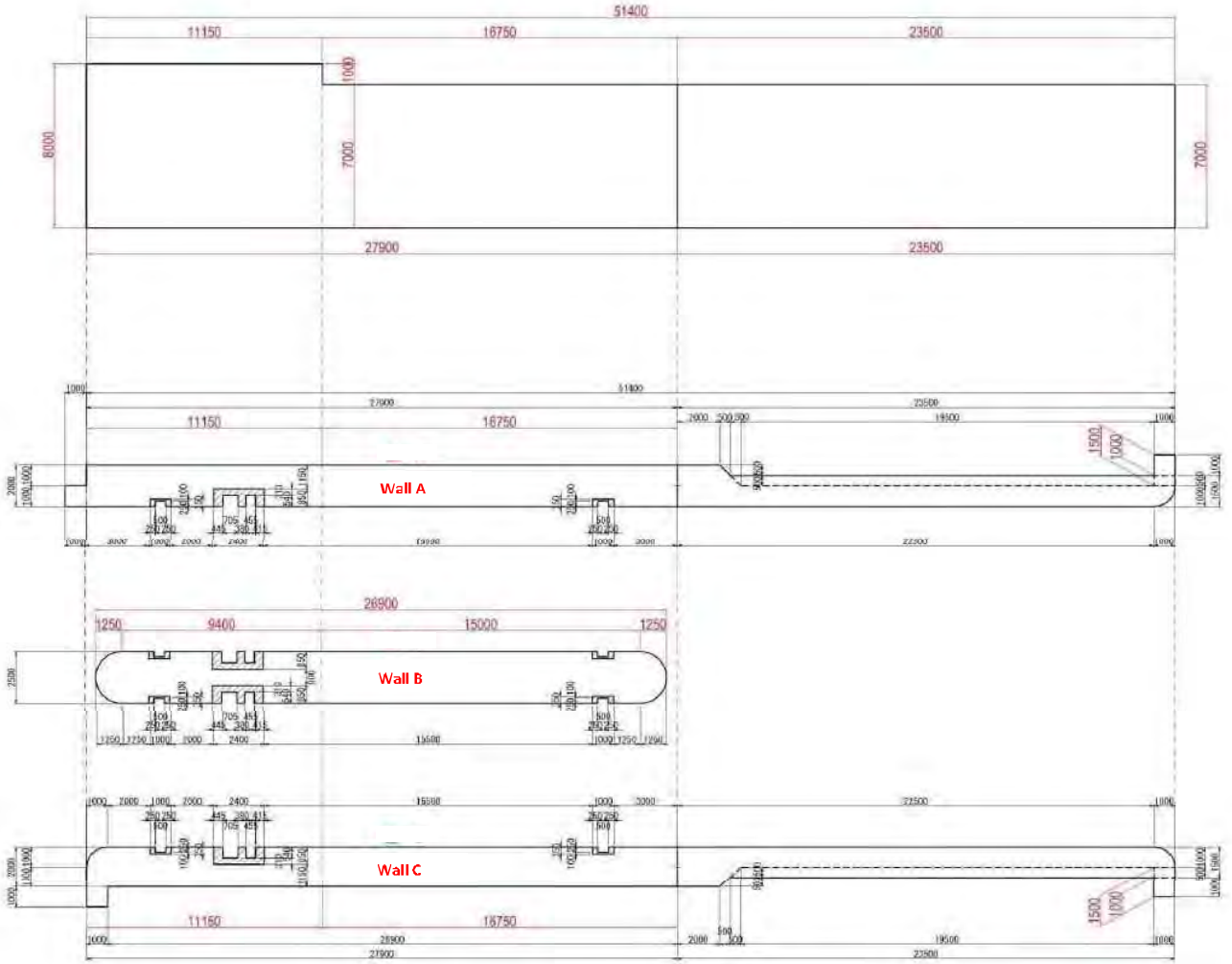
Concrete / Formwork (2/5)



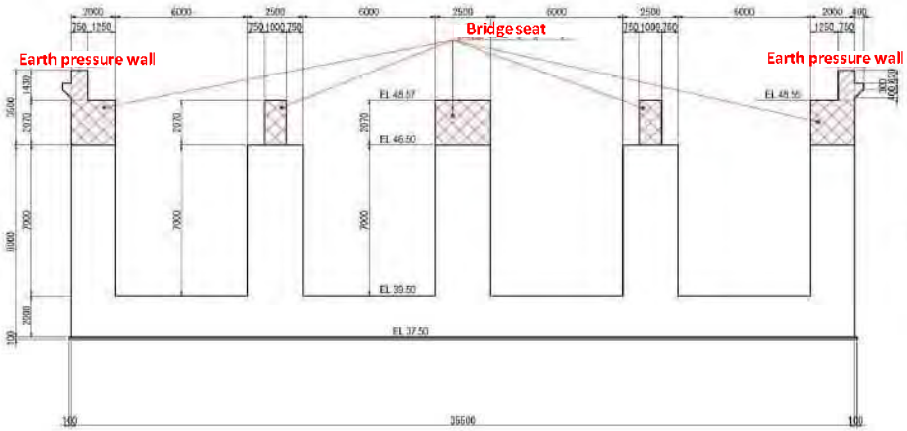
Concrete / Formwork (3/5)

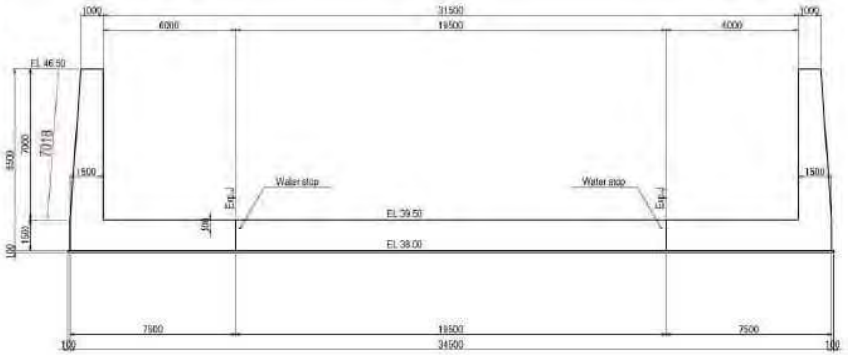


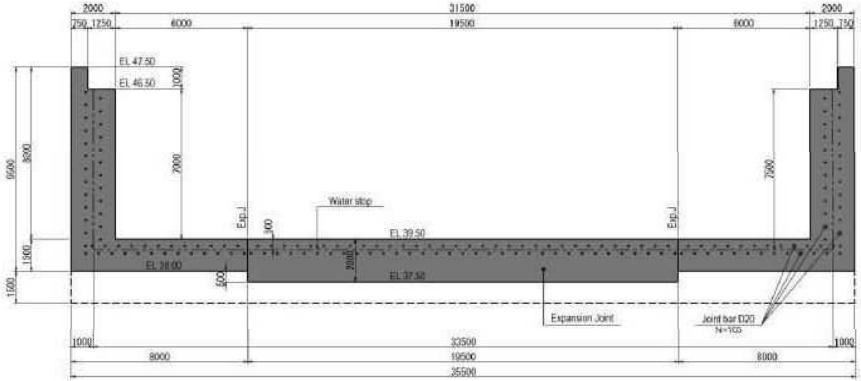
Concrete / Formwork (4/5)

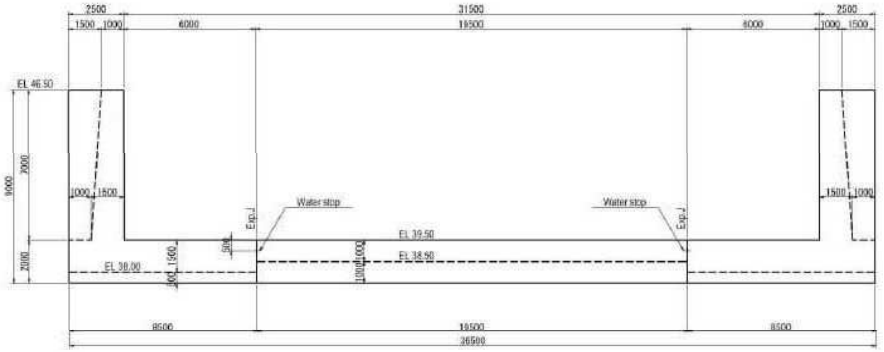


Concrete / Formwork (5/5)

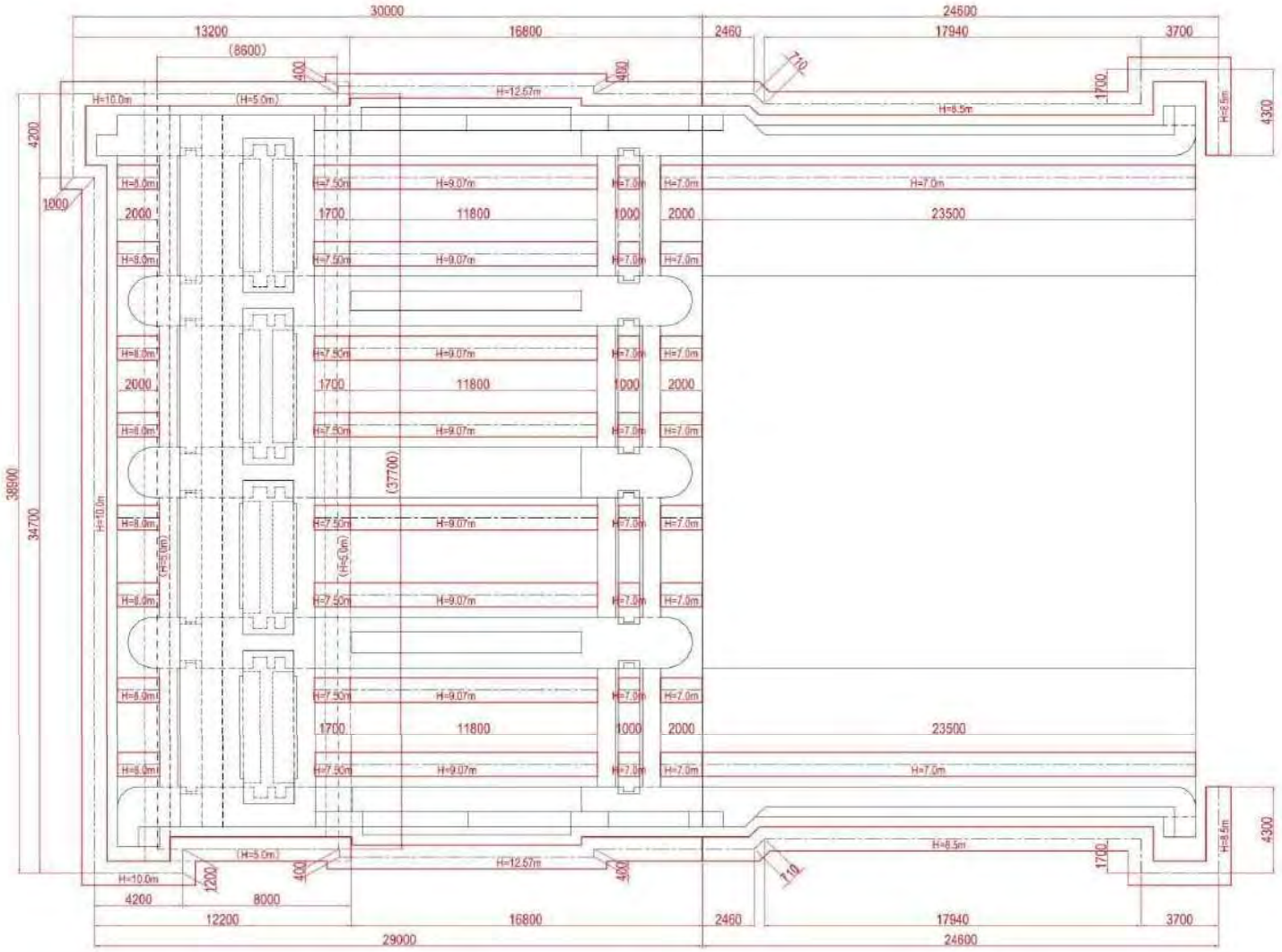






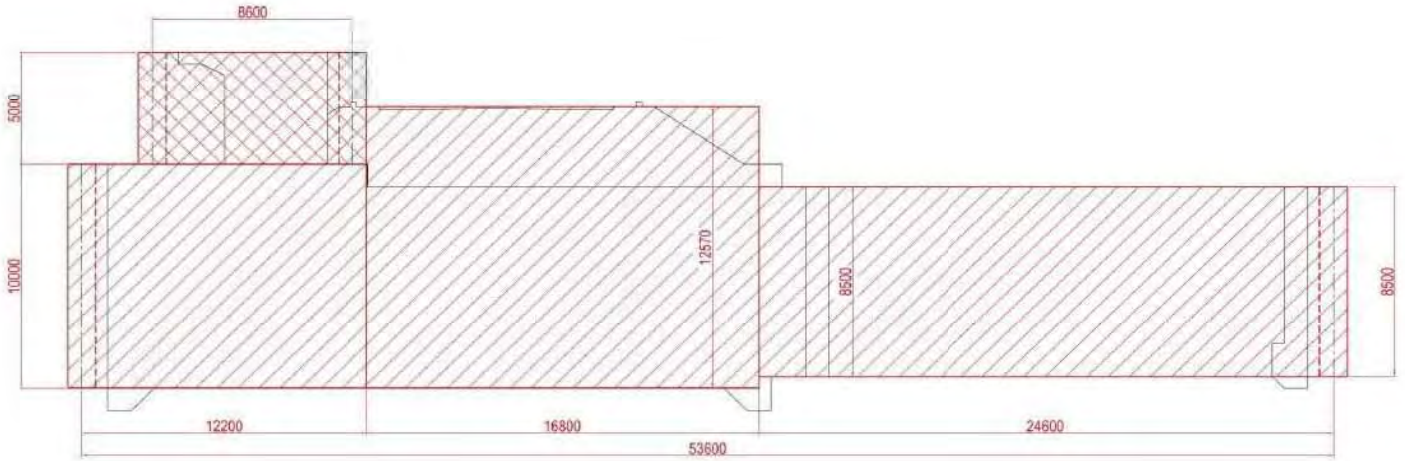


Scaffolding (1/2)

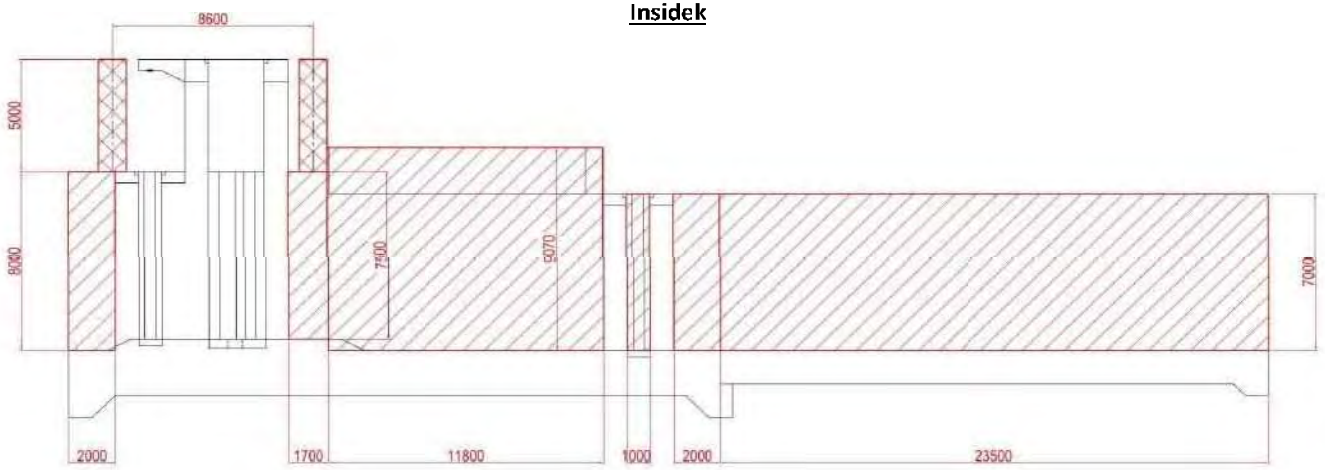


Scaffolding (2/2)

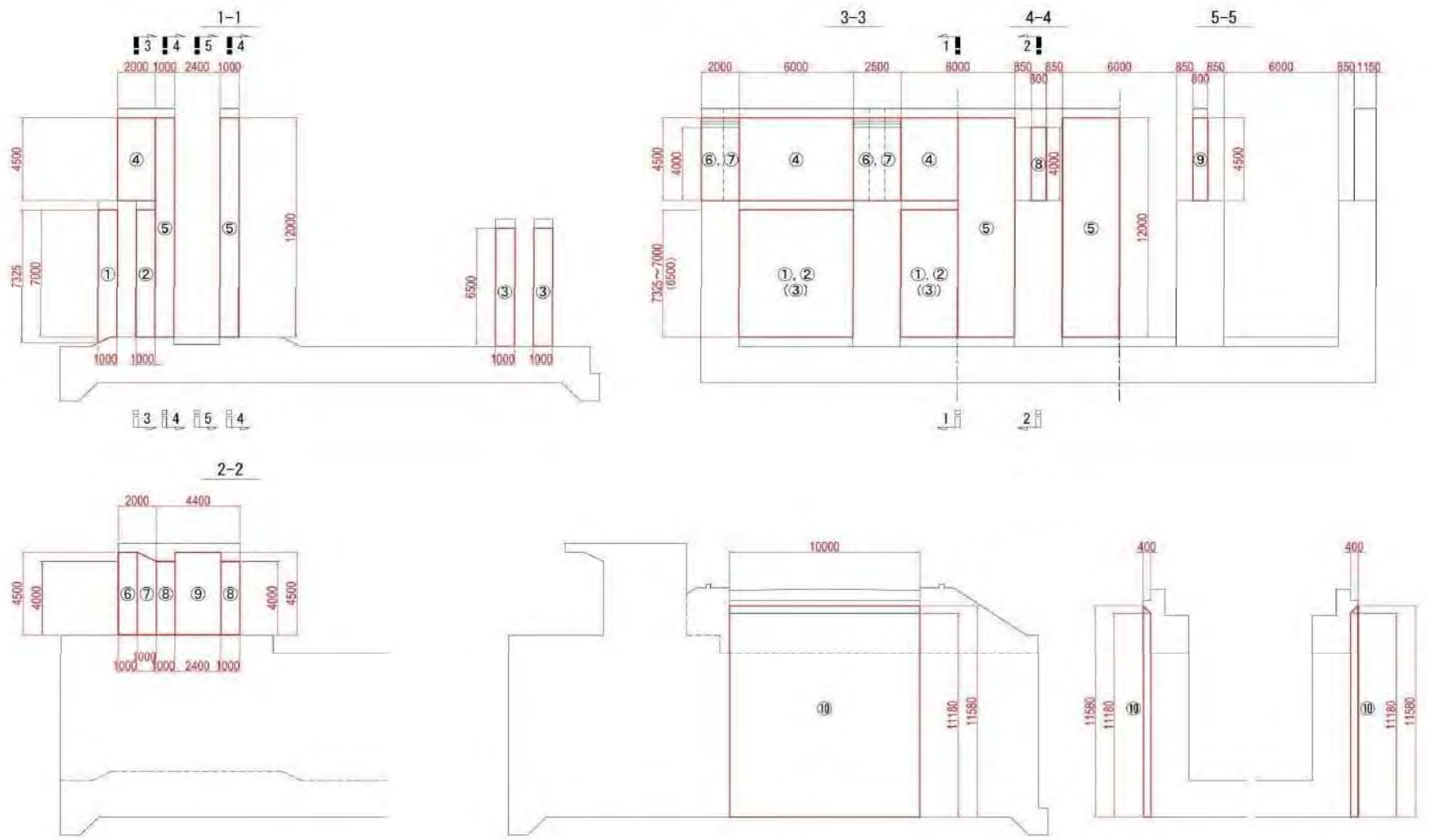
Outer perimeter



Insidek



Falsework



(2) Ibrahimia regulator

Ibrahimia Weir body Quantity Summary Sheet							
Type of works	Class	Subdivision	Dimensions	Unit	Quantity	Up stream	Down stream
Weir body	Main body	leveling con.	σck=20N/mm^2	m^3	154.55	83.07	71.48
		Formwork	Leveling con.	m^2	15.40	4.90	10.50
		Reinforced con.	σck=25N/mm^2	m^3	6,460.87	4,786.70	1,674.17
		Formwork	RC structure	m^2	4,498.09	3,625.98	872.11
		Circular formwork	RC structure φ2500-1/2Circle	m^2	173.18	173.18	−
		〃	RC structure φ1000-1/4Circle	m^2	16.80	6.28	10.52
		Second stage con.	σck=25N/mm^2	m^3	142.65	142.65	−
		Formwork	RC structure	m^2	464.64	464.64	−
		Rebar (Steel 360/520)	D12	t	20.947	13.555	7.392
		〃	D16	t	142.678	102.351	40.327
		〃	D18	t	26.059	26.059	−
		〃	D22	t	16.490	3.334	13.156
		Concrete curing	PC structure	m^3	154.55	83.07	71.48
		〃	RC structure	m^3	6,603.52	4,929.35	1,674.17
		Scaffolding	Prefabricated scaffold H≦30m	m^2	3,625.54	2,805.36	820.18
		Falsework	Wedge linked falsework, H<30m, Support bearing force 40KN/m^2 and less	m^3	1,666.29	1,666.29	−
		Expansion joint	Elastic filler,t=20mm	m^2	159.16	−	159.16
		Water stop	B=300mm	m	94.90	47.90	47.00
		Slip bar	D20×1.00m, VPφ25×0.50m	nos	319	163	156
	Other miscellaneous	Joint bar	D16×300	Set	1,472	1,472	−
		〃	D16×200	Set	1,120	1,120	−
		Grating	5200×2400	Set	4	4	−
		〃	6000×1000	Set	8	8	−
	Safty facilities work	Guard fense	H=1.10m	m	201.60	201.60	−

Type of works	Class	Subdivision	Dimensions	Unit	Quantity	Upstream	Downstream
Approach cushion slab	Approach cushion slab	Reinforced con.	σck=25N/mm2	m^3	40.00	40.00	−
		Formwork	RC structre	m^2	24.00	24.00	−
		Rebar (Steel 360/520)	D12	t	0.150	0.150	−
		〃	D16	t	2.370	2.370	−
		〃	D18	t	1.040	1.040	−
		Concrete curing	RC structre	m^3	40.00	40.00	−
		Anchor cap	SGPφ40×180	nos	50	50	−
		Anchor bar	D22×500 (including D10 spiral reinforcement	nos	50	50	−
		Rubber shoe	t=30mm	m^2	6.00	6.00	−
		Expansion joint	Elastic filler,t=20mm	m^2	8.60	8.60	−

Ibrahimia Weir body Quantity calculation

【Upstream】

Discription	Classification	Calculation			Quantity	Unit	Remarks
Main body Leveling con.	σck=20N/mm²						
		35.70×(24.40+24.60)/2×0.10	=	87.47			
		-π/4×1.00^2×0.10×56	=	-4.40			(-)Piles part
		Total	=	83.07	83.07	m³	
Formwork							
		(24.40+24.60)/2×0.10×2	=	4.90			
		Total	=	4.90	4.90	m²	
Formwork							
Reinforced con.	σck=25N/mm²						
	Cut-off	1/2×(1.00+2.00)×1.00×36.50	=	54.75			Upstream
	〃	1/2×(1.00+2.00)×1.00×8.00×2	=	24.00			Downstream
	〃	0.50×0.50×8.00×2	=	4.00			〃
	〃	1/2×(0.50+1.50)×1.00×19.50	=	19.50			〃
	〃	1/2×(1.00+1.023)×0.50×19.50	=	9.86			〃
	Invert	1.00×3.00×1.00	=	3.00			Upstream-right
	〃	2.00×2.00×1.00	=	4.00			Upstream-left
	〃	27.9×2.00×35.50	=	1980.90			
	〃	1/2×(9.00+11.00)×0.50×6.00×4	=	120.00			
	〃	-2.40×1.05×0.40×8	=	-8.06			(-)Blockout part
	〃	-0.60×5.60×0.40×1	=	-5.38			〃
	〃	-1.00×6.70×0.30×1×2	=	-16.08			〃
	〃	-π/4×1.00^2×0.10×56	=	-4.40			(-)Piles part
	Wall C	1.00×8.00×1.00	=	8.00			
	〃	2.00×8.00×11.15	=	178.40			
	〃	2.00×6.70×16.75	=	224.15			
	〃	-(1.00×0.35+2.40×0.85)×7.50	=	-17.93			(-)Blockout part
	〃	-1.00×0.35×6.70	=	-2.35			〃

Discription	Classification	Calculation			Quantity	Unit	Remarks
	Wall B	2.50×8.00×10.65×3	=	639.00			
	〃	2.50×6.70×16.25×3	=	816.56			
	〃	-(1-π/4)×1.25^2×2×(8.00+6.70)×3	=	-29.57			
	〃	-(1.00×0.35+2.40×0.85)×7.50×2×3	=	-107.55			(-)Blockout part
	〃	-1.00×0.35×6.70×2×3	=	-14.07			〃
	Wall A	1.00×8.00×1.00	=	8.00			
	〃	2.00×8.00×11.15	=	178.40			
	〃	2.00×6.70×16.75	=	224.45			
	〃	-(1-π/4)×1.00^2×8.00	=	-1.72			
	〃	-(1.00×0.35+2.40×0.85)×7.50	=	-17.93			(-)Blockout part
	〃	-1.00×0.35×6.70	=	-2.35			〃
	Corridor	1.00×0.50×6.00×4×4	=	48.00			
	〃	0.15×0.15×6.00×4×4	=	2.16			(-)Second stage con.
	Bridge seat	11.00×2.37×2.00×2	=	104.28			Abut pier
	〃	11.00×2.37×(2.50+1.00×2)	=	117.32			Middle pier
	Earth pressure wall	0.75×35.56×2	=	53.34			
	Pedestal	1/2×(0.30+0.70)×0.40×10.00×2	=	4.00			
	Gate pier	(2.00×1.40-2.10×0.85)×4.50×2	=	60.84			
	〃	0.85×1.00×1.00×4×3	=	10.80			
	〃	2.50×1.00×0.50×2×3	=	7.50			
	Top slab	6.40×0.50×35.50	=	113.60			
	〃	1/2×1.00×0.50×(2.00×2+2.50×3)	=	2.88			
	〃	-2.40×0.50×7.70×4	=	-36.96			(-)Opening
	〃	-0.15×0.15×5.20×2×1	=	-0.94			(-)Second stage con.
		Total	=	4786.70	4786.70	m^3	
Formwork	RC structure						
	Cut-off	1 2×(1.00+2.00)×1.00×2×2	=	6.00			Side
	〃	1.00×35.50	=	35.50			Upstream end
	〃	1.50×8.00×2+1.00×19.50	=	43.50			Downstream end
	Invert	1.00×3.00×3	=	9.00			Upstream-right

Discription	Classification	Calculation			Quantity	Unit	Remarks
	Invert	1.00×2.00	=	2.00			Upstream-left
	〃	35.50×2.00	=	71.00			Upstream end
	〃	27.90×2.00×2	=	111.60			Side
	〃	1.50×8.00×2+2.00×19.50	=	63.00			Downstream end
	〃	0.50×0.50×2	=	0.50			〃
	〃	1.118×6.00×2×4	=	53.66			Raising part
	〃	(2.40+7.70)×2×0.40×4	=	32.32			Blockout part
	〃	(0.812−0.988)×0.40×2×4	=	5.76			〃
	〃	(1.00+6.70)×2×0.30×4×2	=	36.96			〃
	Wall C	1.00×8.00×3	=	24.00			
	〃	8.00×(1.00+11.15×2)	=	186.40			
	〃	6.70×(2.00+16.75×2)	=	237.85			
	〃	7.50×(0.35+0.85)×2	=	18.00			Blockout part
	〃	6.70×0.35×2	=	4.69			〃
	〃	-1/2×(9.00−11.00)×0.50	=	-5.00			(-)Raising part
	〃	-(1.00×0.50−0.15×0.15)×4	=	-1.91			(-)Corridor
	Wall B	8.00×9.40×2×3	=	451.20			
	〃	2.50×1.35×2	=	6.75			
	〃	6.70×15.00×2×3	=	603.00			
	〃	7.50×(0.35+0.85)×4×3	=	108.00			Blockout part
	〃	6.70×0.35×4×3	=	28.14			〃
	〃	-1/2×(9.00 11.00)×0.50×2×3	=	-30.00			(-)Raising part
	〃	-(1.00×0.50−0.15×0.15)×4×2×3	=	-11.46			(-)Corridor
	Wall A	8.00×(2.00+1.00+11.15−10.15)	=	194.10			
	〃	6.70×(2.00+16.75×2)	=	237.85			
	〃	7.50×(0.35+0.85)×2	=	18.00			Blockout part
	〃	6.70×0.35×2	=	4.69			〃
	〃	-1/2×(9.00 11.00)×0.50	=	-5.00			(-)Raising part
	〃	-(1.00×0.50−0.15×0.15)×4	=	-1.91			(-)Corridor
	Corridor	(1.00+0.50×2)×6.00×4×4	=	192.00			

Discription	Classification	Calculation			Quantity	Unit	Remarks
	Bridge seat	(11.00×2−1.25)×2.37×2	−	110.21			Abut pier
	〃	1.25×1.07×2	=	2.68			〃
	〃	(11.00×2−2.50)×2.37	=	58.07			Middle pier
	〃	2.50×1.07	−	2.68			〃
	〃	(11.00×2 1.00)×2.37	=	54.51			〃
	〃	1.00×1.07×2	=	2.14			〃
	Earth pressure wall	35.56×2×2	=	142.24			
	〃	(0.601−0.20×4+0.15×2−4.633+1.30)×0.75×2					
			−	11.45			
	〃	−0.70×10.00×2	−	−14.00			(−)Pedestal
	Gate pier	(2.00 4.40 0.85)×2×4.00×2	=	116.00			Abut pier
	〃	{2.00+(4.10−0.85)×2}×0.50×2	−	12.50			〃
	〃	−0.75×2.237×2	=	−3.36			(−)Earth pressure wall
	〃	(0.85+1.00)×2×1.00×4×3	=	177.60			Middle pier
	〃	(1.00×4+2.50×3)×0.50×3	−	17.25			〃
	Top slab	(6.40 35.50)×2×0.50	=	41.90			Side
	〃	(2.40+7.70)×2×0.50×4	−	10.10			Opening
	〃	0.15×0.15×1×4	−	0.36			Second stage con.
	〃	1.00×35.50	=	35.50			Underside
	〃	(2.00+1.00)×6.00×4	=	72.00			〃
	〃	1 2×1.00×0.50×2×5	−	2.50			Haunch
	〃	1.118×(2.00×2 2.50×3)	=	12.86			〃
			Total =	3625.98	3625.98	m^2	
Circular formwork	RC structure						
	φ2500−1/2Circle	π/2×2.50×(8.00+6.70)×3	=	173.18	173.18	m^2	
	φ1000−1/4Circle	π/4×1.00×8.00	−	6.28	6.28	m^2	
Second stage con.	σck−25N/mm^2						
		2.40×1.05×0.40×8	=	8.06			Invert part
		0.60×5.60×0.40×4	−	5.38			〃
		1.00×6.70×0.30×4×2	=	16.08			〃

Discription	Classification	Calculation			Quantity	Unit	Remarks
		2.40×0.85×7.50×8	−	122.10			Gate part
		−0.51×(0.705+0.155)×7.50×8	=	-37.58			〃
		1.00×0.35×(7.50+6.70)×8	=	39.76			Stop log part
		−0.50×0.25×(7.50+6.70)×8	−	-14.20			〃
		(0.15^2−0.05^2)×6.00×4×4	=	1.92			Corridor part
		(0.15^2−0.05^2)×5.20×2×4	=	0.83			Top slab part
			Total =	142.65	142.65	m^3	
Formwork	RC structure						
		(2.40+0.54×4)×7.50×8	−	273.60			Gate part
		(1.00+0.25×2)×(7.50−6.70)×8	=	170.40			Stop log part
		0.15×6.00×1×4	−	14.10			Corridor part
		0.15×5.20×2×4	=	6.24			Top slab part
			Total =	464.64	464.64	m^2	
Rebar	Steel 360/520	refer to rebar weight calculation sheet					
		D12	−	13.555	13.555	t	
		D16	−	102.351	102.351	t	
		D18	=	26.059	26.059	t	
		D22	=	3.334	3.334	t	
Concrete curing	PC structure	Leveling con.	=	83.07	83.07	m^3	
	RC structure	4786.70+142.65	=	4929.35	4929.35	m^3	
Scaffolding	Prefabricated scaffold, H≤30m						
	Outer perimeter	10.00×(38.90+1.00−13.20+12.20+1.20+0.40×2)					
			−	673.00			
	〃	12.57×16.80×2	=	422.35			
	Inside	8.00×2.00×8	=	128.00			
	〃	7.50×1.70×8	−	102.00			
	〃	9.07×11.80×8	=	856.21			

Discription	Classification	Calculation			Quantity	Unit	Remarks
	〃	6.70×(1.00+2.00)×8	=	160.80			
	Gate pier part	5.00×(8.60+37.70)×2	=	463.00			
		Total	=	2805.36	2805.36	㎡	
Falsework	Wedge linked falsework, H≦30m, Support bearing force 40KN/㎡ and less						
	①	1.00×(7.325+7.00)/2×6.00×4	=	171.90			Corridor part
	②	1.00×7.00×6.00×4	=	168.00			〃
	③	1.00×6.20×6.00×2×4	=	297.60			〃
	④	2.00×4.50×6.00×4	=	216.00			Gate pier part
	⑤	1.00×12.00×6.00×2×4	=	576.00			〃
	⑥	1.00×4.50×(2.00×2+2.50×3)	=	51.75			〃
	⑦	1.00×(1.50+4.00)/2×(2.00×2−2.50×3)	=	18.88			〃
	⑧	1.00×1.00×0.80×3×2	=	19.20			〃
	⑨	2.40×1.50×0.80×3	=	25.92			〃
	⑩	1.2×(11.58−11.18)×0.40×10.00×2	=	91.04			Pedestal part
		Total	=	1666.29	1666.29	㎥	
Water stop	B-300mm	33.50+7.20×2	=	47.90	47.90	㎡	
Slip bar	D20×1.00m, VP φ25×0.50m		−	163.0	163	nos	
Other miscellaneous							
Joint bar	D16×300	368×4	−	1172.0	1172	Set	Gate part
	D16×200	(148+132)×1	−	1120.0	1120	Set	Stop log part
Grating	5200×2400		−	4.0	4	Set	
	6000×1000		=	8.0	8	Set	

Discription	Classification	Calculation			Quantity	Unit	Remarks
Safty facilities work							
Guard fense	H=1.10m	35.20×2+6.10−5.10	=	81.60			Top slab
		7.50×4×2×2	=	120.00			Corridor
		計	−	201.60	201.60	m	
Approach cushion slab							
Reinforced con.	σ ck-25N/mm^2						
		10.00×5.00×0.40×2	=	40.00	40.00	m^3	
Formwork	RC structure						
		(10.00 5.00)×0.40×2 ×2	=	24.00	24.00	m^2	
Rebar	Steel 360/520	refer to rebar weight calculation sheet					
		D12 0.075 × 2	=	0.150	0.150	t	
		D16 1.185 × 2	−	2.370	2.370	t	
		D18 0.520 × 2	=	1.040	1.040	t	
Concrete caring	RC structure	reinforced con.	−	40.00	40.00	m^3	
Anchor cap	SGP φ 40×180						
		25×2	−	50.0	50	nos	
Anchor bar	D22×500 (including D10 spiral reinforcement)						
		25×2	−	50.0	50	nos	
Rubber shoe	t=30mm						
		10.00×0.30×2	=	6.00	6.00	m^2	
Expansion joint	Elastic filler,t=20mm						
		0.43×10.00×2	=	8.60	8.60	m^2	

Grating(5200×2400) Quantity calculation

per a piece

Description	Classification	Calculation	Quantity	Unit	Remarks
Grating	I-44×855×2460				
		= 6.0	6	pieces	
Equal-leg angle	L-50×50×6×5200				
		5.20×0.00443×2 — #NAME?	#NAME?	t	
Anchor bar	D12×105	10×2 — #NAME?	#NAME?	nos	

Grating(6000×1000) Quantity calculation

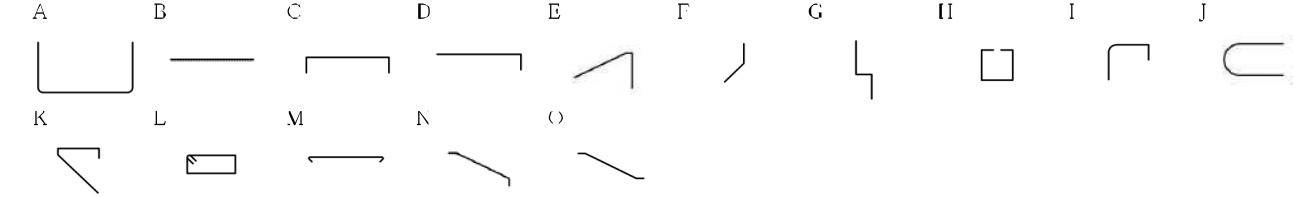
per a piece

Description	Classification	Calculation	Quantity	Unit	Remarks
Grating	I-44×985×1060				
		= 6.0	6	pieces	
Equal-leg angle	L-50 ~ 50×6×6000				
		6.00×0.00443×2 — #NAME?	#NAME?	t	
Anchor bar	D12×105	12×2 — #NAME?	#NAME?	nos	

Ibrahimia Reg. (Upstream)　　Rebar weight 〔1/10〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L ϕ	Joint	length/nos	nos	total length	Remarks
F1	D 18	A		34.920 ×1	2.660 ×1	4.110 ×1	0.298 ×2		ϕ 190	1.000 ×4	46.29	140	6480.60	
F2	D 18	B		35.300 ×1						1.000 ×3	38.30	141	5400.30	
F3	D 18	B		3.100 ×1							3.10	14	43.40	
F4	D 18	C		5.400 ×1	1.300 ×1	1.300 ×1					8.00	36	288.00	
F5	D 18	B		5.900 ×1							5.90	21	123.90	
F6	D 16	B		27.700 ×1						1.000 ×2	29.70	179	5316.30	
F7	D 16	D		23.683 ×1	1.183 ×1					1.000 ×2	26.87	8	214.96	
F8	D 16	B		2.550 ×1							2.55	157	400.35	
F9	D 16	E		1.856 ×1	0.205 ×1	1.183 ×1					3.25	120	390.00	
F10	D 16	B		3.000 ×1							3.00	152	456.00	
F11	D 16	C		1.766 ×1	1.183 ×1	1.283 ×1					4.21	8	33.92	
F12	D 16	C		2.578 ×1	1.183 ×1	1.283 ×1					5.05	112	565.60	
F13	D 16	B		4.400 ×1							4.40	64	281.60	
F14	D 16	B		2.600 ×1							2.60	112	291.20	
F15	D 16	E		1.856 ×1	3.105 ×1	1.283 ×1					6.25	8	50.00	
F16	D 16	E		1.856 ×1	4.093 ×1	1.283 ×1					7.21	112	810.88	
F17	D 16	D		12.133 ×1	1.183 ×1					1.000 ×1	14.32	60	859.20	
F18	D 16	D		12.133 ×1	1.183 ×1					1.000 ×1	14.32	60	859.20	

Type

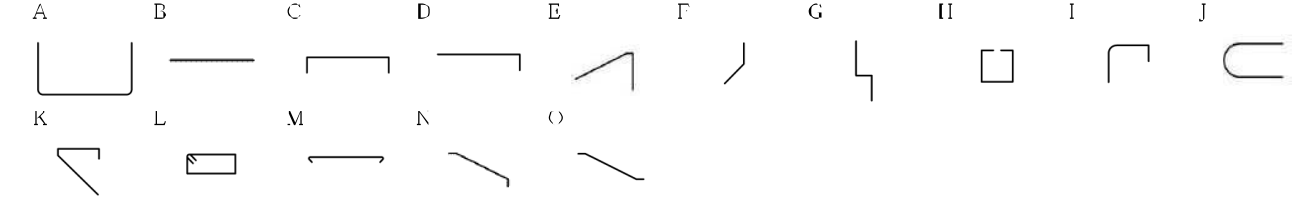


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Ibrahimia Reg. (Upstream)　　Rebar weight 〔2/10〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F19	D 16	B		3.000 ×1							3.00	152	456.00	
F20	D 16	D		2.783 ×1	1.183 ×1						3.97	161	639.17	
F21	D 16	C		1.716 ×1	0.240 ×2						2.20	323	710.60	
F22	D 18	C		35.266 ×1	0.270 ×1	0.270 ×2				1.000 ×3	38.81	16	620.96	
F23	D 16	B		27.664 ×1						1.000 ×3	29.67	16	474.72	
F24	D 18	B		1.900 ×1							1.90	30	57.00	
F25	D 18	C		1.750 ×1	0.270 ×1	0.270 ×2					2.29	5	11.45	
F26	D 16	B		1.800 ×1							1.80	6	10.80	
F27	D 16	B		1.000 ×1							1.00	4	4.00	
F28	D 16	C		1.716 ×1	0.240 ×1	0.240 ×2					2.20	1	8.80	
F29	D 16	B		1.900 ×1							1.90	189	359.10	
F30	D 16	B		2.273 ×1							2.28	184	419.52	
F31	D 16	F		1.000 ×1	1.331 ×1						2.34	5	11.70	
F32	D 16	B		36.300 ×1						1.000 ×3	39.30	12	471.60	
F33	D 16	G		1.100 ×1	0.500 ×1	1.300 ×2					2.90	80	232.00	
F34	D 16	G		1.100 ×1	0.500 ×1	0.800 ×2					2.40	99	237.60	
F35	D 16	B		2.273 ×1							2.28	179	408.12	
F36	D 16	B		35.300 ×1						1.000 ×3	38.30	11	421.30	

Type

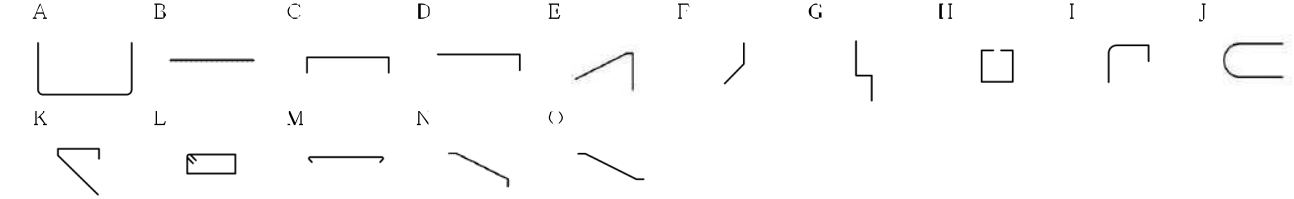


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Ibrahimia Reg. (Upstream)　　Rebar weight 〔3/10〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F37	D 16	B		21.500 ×1						1.000 ×1	22.50	3	67.50	
F38	D 16	B		7.800 ×1							7.80	12	93.60	
F39	D 12	H		0.430 ×1	1.780 ×1	1.780 ×1	0.100 ×2				4.19	1084	4541.96	
F40	D 12	H		0.430 ×1	1.788 ×1 ～2.063	2.003 ×1 ～2.278	0.100 ×2				4.70	120	564.00	
F41	D 12	H		0.430 ×1	1.980 ×1	1.980 ×1	0.100 ×2				4.59	88	403.92	
F42	D 12	H		0.430 ×1	2.280 ×1	2.280 ×1	0.100 ×2				5.19	412	2138.28	
F43	D 12	H		0.430 ×1	1.880 ×1	1.880 ×1	0.100 ×2				4.39	68	298.52	
F44	D 12	H		0.430 ×1	1.480 ×1	1.480 ×1	0.100 ×2				3.59	88	315.92	
F45	D 18	C		0.800 ×1	0.270 ×1	0.270 ×1					1.34	3	4.02	
W 1	D 16	B		7.900 ×1							7.90	56	442.40	
W 2	D 16	B		6.450 ×1							6.45	56	361.20	
W 3	D 16	B		8.970 ×1							8.97	55	493.35	
W 4	D 16	B		7.520 ×1							7.52	55	413.60	
W 5	D 16	B		6.600 ×1							6.60	29	191.40	
W 6	D 16	B		5.150 ×1							5.15	29	149.35	
W 7	D 16	D		9.750 ×1	0.240 ×1						9.99	582	5814.18	
W 8	D 16	D		10.820 ×1	0.240 ×1						11.06	220	2433.20	
W 9	D 16	D		8.450 ×1	0.240 ×1						8.69	506	4397.14	

Type

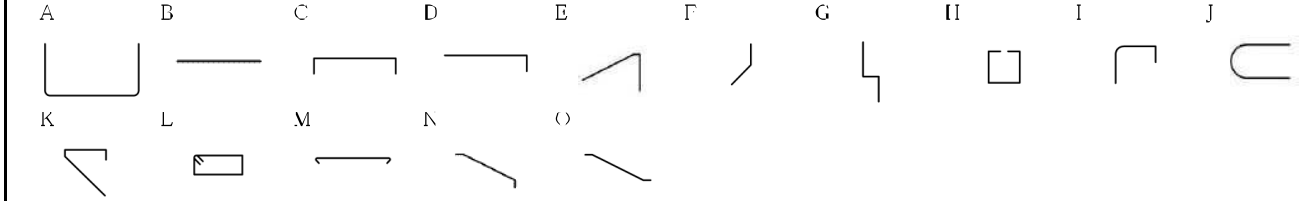


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Ibrahimia Reg. (Upstream)　　Rebar weight 〔4/10〕

No.	Dia.	Type	Shape	L a	b	c	d	e	ϕ	Joint	length/nos	nos	total length	Remarks
W10	D 16	B		10.800 ×1							10.80	10	108.00	
W11	D 16	B		1.970 ×1							1.97	29	57.13	
W12	D 16	B		3.270 ×1							3.27	243	794.61	
W13	D 16	D		9.733 ×1	0.240 ×1						9.98	10	99.80	
W14	D 16	C		1.800 ×1	1.000 ×1	1.000 ×1					3.80	202	767.60	
W15	D 16	C		1.450 ×1	1.000 ×1	1.000 ×1					3.45	20	69.00	
W16	D 16	C		0.800 ×1	0.240 ×1	0.240 ×1					1.28	10	12.80	
W17	D 16	C		1.794 ×1 ～1.466	1.000 ×1	1.000 ×1					3.63	4	14.52	
W18	D 16	C		2.300 ×1	1.000 ×1	1.000 ×1					4.30	279	1199.70	
W19	D 16	C		1.600 ×1	1.000 ×1	1.000 ×1					3.60	30	108.00	
W20	D 16	C		0.600 ×1	1.000 ×1	1.000 ×1					2.60	36	93.60	
W21	D 16	C		2.265 ×1 ～1.136	1.000 ×1	1.000 ×1					3.71	30	111.30	
W22	D 16	C		0.800 ×1	1.000 ×1	1.000 ×1					2.80	106	296.80	
W23	D 16	B		27.700 ×1						1.000 ×2	29.70	68	2019.60	
W24	D 16	C		2.768 ×1	1.768 ×1	1.231 ×1					5.77	41	236.57	
W25	D 16	B		3.000 ×1							3.00	82	246.00	
W26	D 16	C		1.768 ×1	1.234 ×1	1.768 ×1					4.77	82	391.14	
W27	D 16	B		4.400 ×1							4.40	82	360.80	

Type

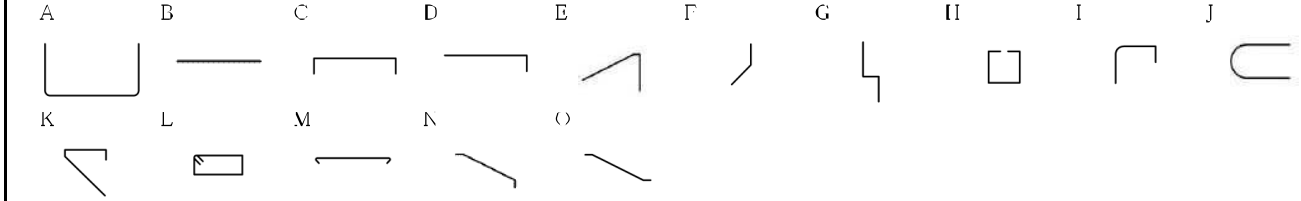


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Ibrahimia Reg. (Upstream)　　Rebar weight 〔5/10〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L ϕ	Joint	length/nos	nos	total length	Remarks
W28	D 16	C		15.268 ×1	1.768 ×1	1.768 ×1				1.000 ×1	19.81	68	1347.08	
W29	D 16	B		3.000 ×1							3.00	68	204.00	
W30	D 16	C		2.768 ×1	1.234 ×1	1.768 ×1					5.77	68	392.36	
W31	D 16	B		10.950 ×1							10.95	14	153.30	
W32	D 16	C		2.518 ×1	1.768 ×1	1.768 ×1					6.06	11	84.84	
W33	D 16	B		10.800 ×1							10.80	64	691.20	
W34	D 16	C		1.768 ×1	0.240 ×1	0.240 ×1					2.25	52	117.00	
W35	D 16	I		0.884 ×1	1.388 ×1	1.884 ×1	1.234 ×1		ϕ 884		5.39	41	220.99	
W36	D 16	B		1.200 ×1							1.20	6	7.20	
W37	D 16	B		1.900 ×1							1.90	192	364.80	
W38	D 16	J		3.562 ×1	1.150 ×2				ϕ 1134		5.87	123	722.01	
W39	D 16	B		3.000 ×1							3.00	246	738.00	
W40	D 16	B		1.800 ×1							1.80	246	442.80	
W41	D 16	B		3.400 ×1							3.40	246	836.40	
W42	D 16	B		15.300 ×1						1.000 ×1	16.30	204	3325.20	
W43	D 16	B		3.000 ×1							3.00	204	612.00	
W44	D 16	J		3.562 ×1	1.150 ×2				ϕ 1134		5.87	204	1197.48	
W45	D 16	B		2.550 ×1							2.55	42	107.10	

Type

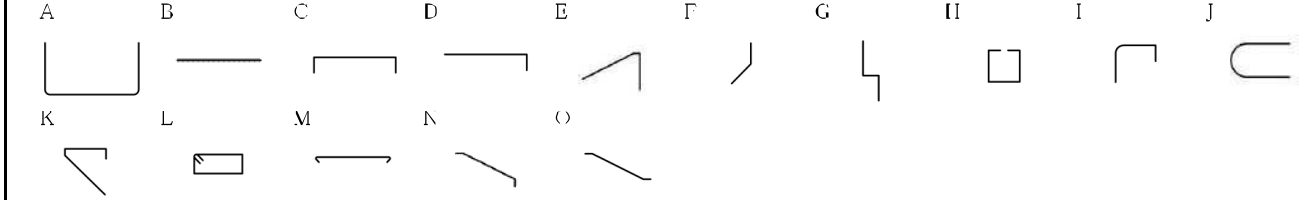


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Ibrahimia Reg. (Upstream)　　Rebar weight 〔6/10〕

No.	Dia.	Type	Shape	L a	b	c	d	e	ϕ	Joint	length/nos	nos	total length	Remarks
W46	D 16	B		10.800 ×1							10.80	95	1026.00	
W47	D 16	C		2.268 ×1	0.240 ×1	0.240 ^					2.75	743	2043.25	
W48	D 16	C		0.768 ×1	0.240 ×1	0.240 ^					1.25	52	65.00	
W49	D 16	B		2.200 ×1							2.20	12	26.40	
W50	D 16	B		5.800 ×1							5.80	11	63.80	
W51	D 16	B		2.800 ×1							2.80	1	2.80	
W52	D 16	B		1.800 ×1							1.80	2	3.60	
W53	D 16	B		3.650 ×1							3.65	12	43.80	
W54	D 16	B		6.650 ×1							6.65	10	66.50	
W55	D 16	B		2.650 ×1							2.65	2	5.30	
W56	D 16	B		2.800 ×1							2.80	2	5.60	
W57	D 16	B		5.794 ×1 ～5.648							5.73	3	17.19	
W58	D 16	B		2.466 ×1							2.47	1	2.47	
W59	D 16	B		11.550 ×1 ～11.532							11.55	9	103.95	
W60	D 16	B		5.228 ×1 ～5.131							5.18	12	62.16	
W61	D 16	B		1.976 ×1 ～1.718							1.85	12	22.20	
W62	D 16	B		1.800 ×1							1.80	12	21.60	
W63	D 16	B		2.250 ×1							2.25	8	18.00	

Type

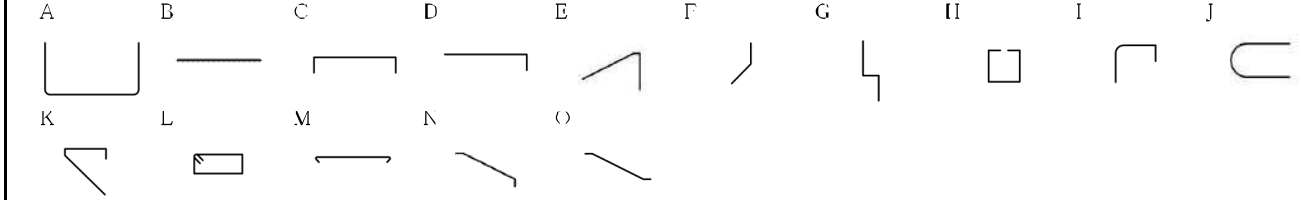


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Ibrahimia Reg. (Upstream)　　Rebar weight 〔7/10〕

No.	Dia.	Type	Shape	L a	b	c	d	e	ϕ	Joint	length/nos	nos	total length	Remarks
W64	D 16	B		3.650 ×1							3.65	12	43.80	
W65	D 16	B		13.650 ×1						1.000 ×1	14.65	8	117.20	
W66	D 16	B		16.981 ×1						1.000 ×1	17.99	4	71.96	
W67	D 16	B		6.250 ×1 ～5.961							6.06	17	103.02	
W68	D 16	B		1.976 ×1 ～1.718							1.85	12	22.20	
W69	D 16	B		2.650 ×1							2.65	4	10.60	
W70	D 12	C		1.829 ×1	0.100 ×1	0.100 ×					2.03	942	1912.26	
W71	D 12	C		1.479 ×1	0.100 ×1	0.100 ×					1.68	108	181.44	
W72	D 12	C		0.979 ×1	0.100 ×1	0.100 ×					1.18	120	141.60	
W73	D 12	C		0.828 ×1	0.100 ×1	0.100 ×					1.03	53	54.59	
W74	D 12	C		2.328 ×1	0.100 ×1	0.100 ×					2.53	1335	3377.55	
W75	D 12	C		1.628 ×1	0.100 ×1	0.100 ×					1.83	162	296.46	
W76	D 12	C		0.628 ×1	0.100 ×1	0.100 ×					0.83	180	149.40	
W77	D 12	C		0.828 ×1	0.100 ×1	0.100 ×					1.03	156	160.68	
P 1	D 22	B		2.460 ×1							2.46	204	501.84	
P 2	D 22	B		2.610 ×1							2.61	16	41.76	
P 3	D 22	B		3.680 ×1							3.68	24	88.32	
P 4	D 22	B		3.660 ×1 ～3.393							3.53	12	42.36	

Type

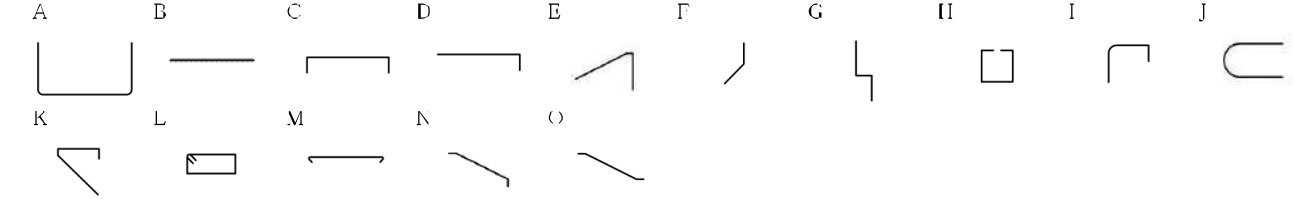


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Ibrahimia Reg. (Upstream)　　Rebar weight 〔8/10〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
P 5	D 22	B		4.980 ×1							4.98	24	119.52	
P 6	D 22	B		4.960 ×1 ～2.426							3.70	80	296.00	
P 7	D 22	B		2.410 ×1							2.41	12	28.92	
P 8	D 12	C		0.550 ×1	0.180 ×1	0.180 ×2					0.91	186	169.26	
P 9	D 16	B		15.820 ×1 ～13.890						1.000 ×1	15.86	28	444.08	
P 10	D 16	B		2.650 ×1							2.65	24	63.60	
P 11	D 16	B		5.775 ×1 ～4.470							5.13	24	123.12	
P 12	D 16	B		6.650 ×1							6.65	28	186.20	
P 13	D 16	E		0.517 ×1	1.620 ×1	1.050 ×2					3.19	4	12.76	
P 14	D 16	E		5.325 ×1	1.620 ×1	1.050 ×2					8.00	1	32.00	
P 15	D 16	C		0.512 ×1	0.240 ×1	0.240 ×1					1.00	31	31.00	
P 16	D 12	C		0.584 ×1	0.100 ×1	0.100 ×1					0.79	200	158.00	
S 1	D 16	B		8.000 ×1							8.00	176	1408.00	
S 2	D 16	B		0.800 ×1							0.80	960	768.00	
S 3	D 16	C		0.618 ×1	0.268 ×1	0.268 ×1					1.16	480	556.80	
C 1	D 16	K		0.950 ×1	0.159 ×1	1.344 ×1	0.240 ×1				2.70	102	275.10	
C 2	D 16	B		9.800 ×1							9.80	8	78.40	
G 1	D 16	A		34.960 ×1	5.730 ×1	5.730 ×1	0.267 ×2		φ170	1.000 ×6	52.96	8	423.68	

Type

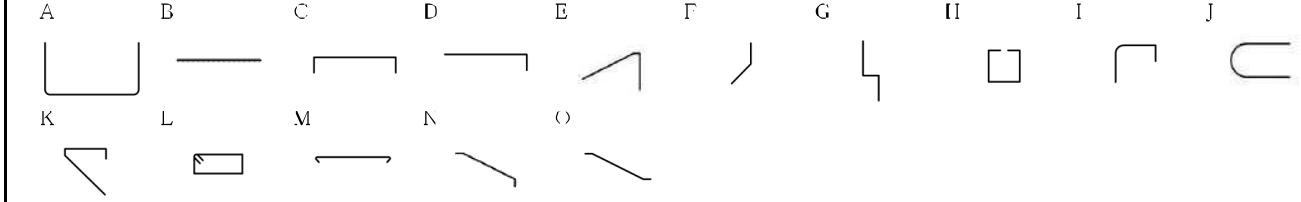


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Ibrahimia Reg. (Upstream)　　Rebar weight 〔9/10〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
G 2	D 16	I		5.730 ×1	0.267 ×1	2.030 ×1	0.300 ×1		φ 170		8.33	1	33.32	
G 3	D 16	I		5.730 ×1	0.267 ×1	0.950 ×1	0.300 ×1		φ 170		7.25	24	174.00	
G 4	D 16	B		5.900 ×1							5.90	292	1722.80	
G 5	D 16	L		1.832 ×2	0.832 ×2	0.225 ×2					5.78	92	531.76	
G 6	D 16	L		0.982 ×2	4.232 ×2	0.225 ×2					10.88	46	500.48	
G 7	D 16	L		0.682 ×2	0.832 ×2	0.225 ×2					3.48	276	960.48	
G 8	D 16	M		2.236 ×1	0.160 ×2	0.113 ×2			φ 48		2.79	18	50.22	
G 9	D 12	C		0.978 ×1	0.100 ×1	0.100 ×1					1.18	72	84.96	
G10	D 12	C		0.678 ×1	0.100 ×1	0.100 ×1					0.88	132	116.16	
T 1	D 16	C		35.300 ×1	0.300 ×1	0.300 ×1				1.000 ×3	38.90	10	389.00	
T 2	D 16	B		7.200 ×1							7.20	8	57.60	
T 3	D 16	C		3.100 ×1	0.300 ×1	0.300 ×1					3.70	6	22.20	
T 4	D 16	C		0.600 ×1	0.300 ×1	0.300 ×1					1.20	36	43.20	
T 5	D 16	C		35.300 ×1	0.240 ×1	0.240 ×1				1.000 ×3	38.78	19	736.82	
T 6	D 16	C		0.950 ×1	0.240 ×1	0.240 ×1					1.43	24	34.32	
T 7	D 16	C		0.600 ×1	0.240 ×1	0.240 ×1					1.08	36	38.88	
T 8	D 16	C		6.232 ×1	0.332 ×1	0.332 ×1					6.90	24	165.60	
T 9	D 16	C		2.832 ×1	0.332 ×1	0.332 ×1					3.50	56	196.00	

Type



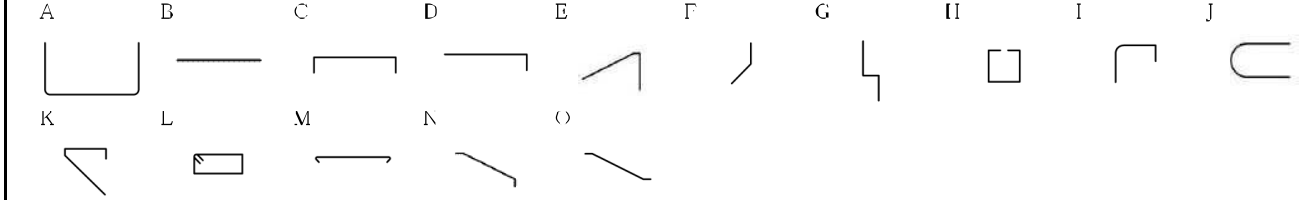
Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Ibrahimia Reg. (Upstream)　　Rebar weight 〔10/10〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
T10	D 16	C		0.832 ×1	0.332 ×1	0.332 ×1					1.50	56	84.00	
T11	D 16	C		2.682 ×1	0.332 ×1	0.332 ×1					3.35	104	348.40	
T12	D 16	D		0.832 ×1	0.182 ×1						1.02	208	212.16	
T13	D 16	C		0.682 ×1	0.332 ×1	0.332 ×1					1.35	104	140.40	
T14	D 16	C		6.232 ×1	0.240 ×1	0.240 ×1					6.72	24	161.28	
T15	D 16	C		2.832 ×1	0.240 ×1	0.240 ×1					3.32	56	185.92	
T16	D 16	C		0.832 ×1	0.240 ×1	0.240 ×1					1.32	56	73.92	
T17	D 16	C		2.832 ×1	0.240 ×1	0.182 ×1					3.26	104	339.04	
T18	D 16	C		0.832 ×1	0.182 ×1	0.240 ×1					1.26	104	131.04	
T19	D 16	N		2.804 ×1	0.100 ×2						3.01	31	102.34	
T20	D 16	O		1.860 ×1	0.100 ×1	0.240 ×1					2.20	30	66.00	
T21	D 16	C		0.832 ×1	0.832 ×1	0.832 ×1					2.50	24	60.00	
T22	D 16	B		2.300 ×1							2.30	18	41.40	
T23	D 12	C		0.328 ×1	0.100 ×1	0.100 ×1					0.53	377	199.81	

D12	15264.77×0.888	=	13555.12 kg	= 13.555 t
D16	64778.91×1.58	=	102350.68 kg	= 102.351 t
D18	13029.63×2.00	=	26059.26 kg	= 26.059 t
D22	1118.72×2.98	=	3333.79 kg	= 3.334 t

Type

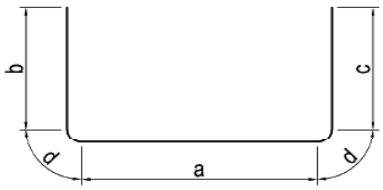


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

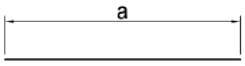
Schematic design of rebar

(Upstream)

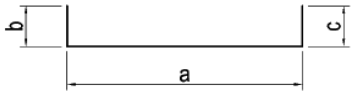
A



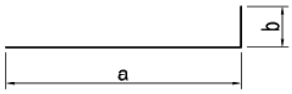
B



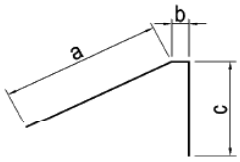
C



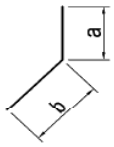
D



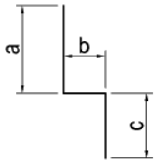
E



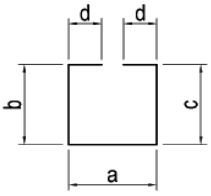
F



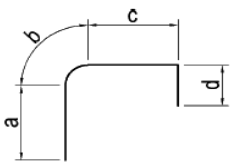
G



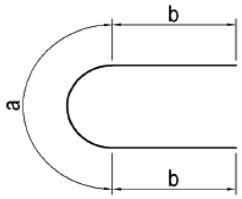
H



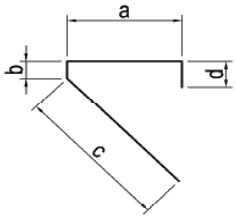
I



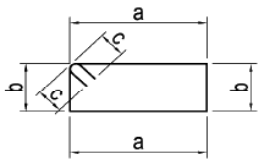
J



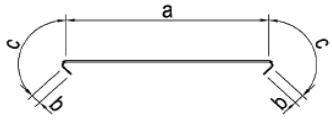
K



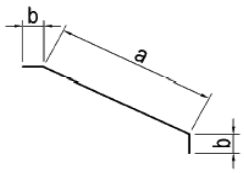
L



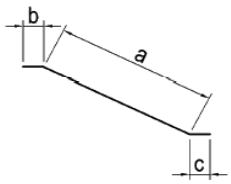
M



N



O



Ibrahimiaf Reg. (Approach cushion slab)　　Rebar weight 〔1/1〕

per a place

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F1	D 18	B	⌊	4.800 ×1	0.200 ×2						5.20	50	260.00	
F2	D 16	B	⌈	4.800 ×1	0.200 ×2						5.20	50	260.00	
F3	D 16	A	—	9.800 ×1							9.80	25	245.00	
F4	D 16	A	—	9.800 ×1							9.80	25	245.00	
F5	D 12	B	]	0.229 ×1	0.180 ×9						0.59	141	84.96	

D12	84.96×0.888	=	75.44 kg	=	0.075 t
D16	750.00×1.58	=	1185.00 kg	=	1.185 t
D18	260.00×2.00	=	520.00 kg	=	0.520 t

Type

A　　B

Dia.	kg/m	R	L	J
D12	0.888	130	204	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Schematic design of rebar
(Approach cushion slab)

Ibrahimia Weir body Quantity calculation

【Downstream】

Discription	Classification	Calculation			Quantity	Unit	Remarks
Main body Leveling con.	σ ck=20N/mm^2						
		7.60×(21.50+21.60)/2×0.10×2	=	32.76			L type wall part
		0.50×1.50×0.10×2	=	0.15			〃
		1/2×0.50×0.50×0.10×2	=	0.03			〃
		-π 4×1.00^2×0.10×16×2	=	-2.51			(-)Piles part
		19.50×(21.00+21.10)/2×0.10	=	41.05			Apron part
		Total	=	71.48	71.48	m^3	
Formwork	Leveling con.						
		(21.50-21.60)/2×0.10×2×2	=	8.62			L type wall part
		-0.50×0.10×2	=	-0.10			〃
		0.50×√(2)×0.10×2	=	0.14			〃
		(8.10+10.25)/2×0.10×2	=	1.84			Apron part
		Total	=	10.50	10.50	m^2	
Reinforced con.	σ ck=25N/mm^2						
	Cut-off	1/2×(1.00+1.50)×0.50×8.50×2	=	10.63			L type wall part
	〃	1/2×(1.00+2.00)×1.00×19.50	=	29.25			Apron part
	Invert	8.00×1.50×2.00×2	=	48.00			L type wall part
	〃	1/2×(8.00+7.50)×1.50×0.50×2	=	11.63			〃
	〃	7.50×1.50×19.50×2	=	438.75			〃
	〃	8.50×1.50×1.50×2	=	38.25			〃
	〃	-π 4×1.00^2×0.10×16×2	=	-2.51			(-)Piles part
	〃	1/2×(2.00+1.00)×21.50×19.50	=	628.88			Apron part
	〃	1.00×2.00×19.50	=	39.00			〃
	Wall A	2.00×6.70×2.00	=	26.80			
	Wall A	1/2×(2.00+1.00)×6.70×1.00	=	10.05			
	〃	1.00×6.70×(20.50+1.50)	=	147.40			

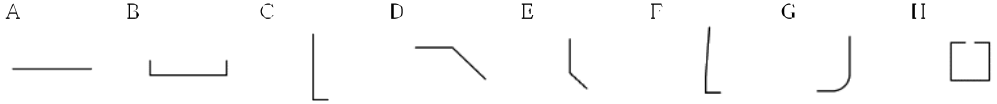
Discription	Classification	Calculation			Quantity	Unit	Remarks
	〃	1/2×0.50×6.70×(19.50+20.00)/2	=	33.08			
	〃	-(1-π/4)×1.00^2×6.70	=	-1.14			
	Wall B	2.00×6.70×2.00	=	26.80			
	〃	1/2×(2.00+1.00)×6.70×1.00	=	10.05			
	〃	1.00×6.70×(20.50+1.50)	=	147.40			
	〃	1/2×0.50×6.70×(19.50+20.00)/2	=	33.08			
	〃	-(1-π/4)×1.00^2×6.70	=	-1.14			
	Earth pressure wall	1.30×0.30×1.30	=	0.51			
			Total =	1674.17	1674.17	m^3	
Formwork	RC structure						
	Cut-off	1/2×(1.00+1.50)×0.50×2×2	=	2.50			L type wall part
	〃	0.50×8.50×2	=	8.50			〃
	〃	1.00×19.50	=	19.50			Apron part
	Invert	1.50×(23.50-0.50+1.00)×2	=	72.00			L type wall part
	〃	1.50×0.50×√(2)×2	=	2.12			〃
	〃	1.50×(23.50+8.50)×2	=	96.00			〃
	〃	1/2×8.60×0.40×2	=	3.44			Apron part
	〃	1.00×19.50	=	19.50			〃
	Wall A	6.70×(22.50+2.00)	=	164.15			L type wall part
	〃	6.70×(0.50+1.00)/2×√(2)	=	7.11			〃
	〃	6.719×(19.50+20.00)/2	=	132.70			〃
	〃	6.70×{1.50+1/2×(1.00+1.50)}	=	18.43			〃
	Wall C	6.70×(22.50+2.00)	=	164.15			L type wall part
	〃	6.70×(0.50+1.00)/2×√(2)	=	7.11			〃
	〃	6.719×(19.50+20.00)/2	=	132.70			〃
	〃	6.70×{1.50+1/2×(1.00+1.50)}	=	18.43			〃
	Earth pressure wall	(1.30×2+0.30)×1.30	=	3.77			
			Total =	872.11	872.11	m^2	

Discription	Classification	Calculation			Quantity	Unit	Remarks
Circular formwork	RC structure						
	φ 1000-1/1Circle	π/4×1.00×6.70×2	=	10.52	10.52	m^2	
Rebar	Steel 360/520	refer to rebar weight calculation sheet					
		L type wall part Apron part					
		D12 1.757 × 2 + 3.878	=	7.392	7.392	t	
		D16 11.041 × 2 + 18.239	=	40.327	40.327	t	
		D22 6.578 × 2	=	13.156	13.156	t	
Concrete curing	PC structure	Leveling con.	−	71.48	71.48	m^3	
	RC structure	Reinforced con.	=	1674.17	1674.17	m^3	
Scaffolding	Prefabricated scaffold, H≦30m						
	Outer perimeter	8.20×(2.46+0.71+17.94−1.70+3.70+1.30)×2					
			−	505.28			
	Inside	6.70 × 23.50 × 2	=	314.90			
			Total −	820.18	820.18	m^2	
Expansion joint	Elastic filler,t=20mm						
		2.00×(19.50+6.70×2)−(1.50×8.00−0.50×1.30)×2					
			−	91.10			
		1/2 ×(2.00 + 1.00)× 21.50 × 2	=	64.50			
		2.00 × 1.00×2	=	4.00			
		1/2×(1.00+2.00)×1.00×2	−	3.00			
		-1/2×8.60×0.40×2	=	-3.44			
			Total −	159.16	159.16	m^2	
Water stop	B=300mm	23.50×2	=	47.00	47.00	m^2	
Slip bar	D20×1.00m, VPφ25×0.50m	78×2	=	156.0	156	nos	

Ibrahimia Reg. (Downstream-L type wall) Rebar weight 〔1/4〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F1	D 22	B		7.800 ×1	1.250 ×2						10.30	10	103.00	
F2	D 22	B		7.459 ×1 ～7.659	1.250 ×2						10.06	2	20.12	
F3	D 22	B		7.300 ×1	1.250 ×2						9.80	98	960.40	
F4	D 22	B		8.300 ×1	1.250 ×2						10.80	8	86.40	
F5	D 16	B		7.800 ×1	0.240 ×2						8.28	10	82.80	
F6	D 16	B		7.459 ×1 ～7.659	0.240 ×2						8.01	2	16.08	
F7	D 16	B		7.300 ×1	0.240 ×2						7.78	98	762.44	
F8	D 16	B		8.300 ×1	0.240 ×2						8.78	8	70.24	
F9	D 16	A		23.300 ×1						1.000 ×2	25.30	70	1771.00	
F10	D 16	D		1.851 ×1	2.519 ×1						1.37	2	8.74	
F11	D 16	A		2.009 ×1 ～2.159							2.09	2	4.18	
F12	D 16	B		1.300 ×1	1.250 ×2						3.80	5	19.00	
F13	D 16	B		1.300 ×1	0.240 ×2						1.78	5	8.90	
F14	D 16	B		7.765 ×1	0.240 ×2						8.25	6	49.50	
F15	D 16	C		8.284 ×1	0.240 ×1						8.53	6	51.18	
F16	D 16	A		8.300 ×1							8.30	6	49.80	
F17	D 16	A		23.284 ×1						1.000 ×3	25.29	12	303.48	
F18	D 16	D		1.851 ×1	2.519 ×1						4.37	6	26.22	

Type

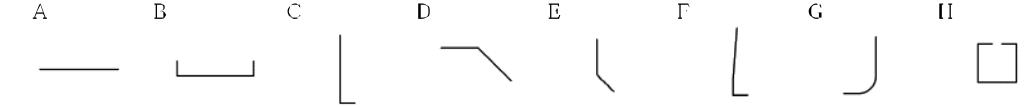


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Ibrahimia Reg. (Downstream-L type wall) Rebar weight 〔2/4〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F19	D 16	B		1.218 ×1	0.240 ×2						1.70	29	49.30	
F20	D 16	A		1.800 ×1							1.80	43	77.40	
F21	D 16	A		1.566 ×1							1.57	35	54.95	
F22	D 16	E		1.000 ×1	0.554 ×1						1.56	8	12.48	
F23	D 16	A		8.300 ×1							8.30	6	49.80	
F24	D 12	H		0.434 ×1	1.281 ×2	0.100 ×2					3.20	420	1344.00	
W1	D 22	C		7.950 ×1	0.330 ×1						8.28	13	107.64	
W2	D 22	F		6.604 ×1	1.349 ×1	0.330 ×1					8.29	1	8.29	
W3	D 22	F		6.615 ×1	1.347 ×1	0.330 ×1					8.30	1	8.30	
W4	D 22	F		6.622 ×1	1.346 ×1	0.330 ×1					8.30	98	813.40	
W5	D 22	C		7.950 ×1	0.330 ×1						8.28	8	66.24	
W6	D 16	C		7.950 ×1	0.240 ×1						8.19	135	1105.65	
W7	D 16	A		23.300 ×1						1.000 ×2	25.30	34	860.20	
W8	D 16	D		1.851 ×1	2.519 ×1						1.37	31	148.58	
W9	D 16	A		2.292 ×1							2.30	31	78.20	
W10	D 16	A		22.100 ×1						1.000 ×2	24.40	31	829.60	
W11	D 16	G		1.400 ×1	1.389 ×1	1.000 ×1			φ 884		3.79	34	128.86	
W12	D 16	A		22.966 ～23.249 ×1						1.000 ×2	25.11	3	75.33	

Type

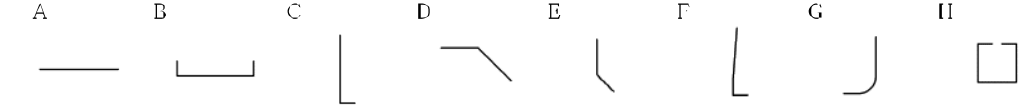


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Ibrahimia Reg. (Downstream-L type wall) Rebar weight 〔3/4〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W13	D 16	A	——	2.009 ×1 ～2.659							2.31	5	11.70	
W14	D 16	A	——	1.966 ×1 ～2.249							2.11	3	6.33	
W15	D 22	A	——	2.410 ×1							2.41	14	33.74	
W16	D 16	A	——	1.100 ×1							1.10	15	16.50	
W17	D 16	B	⌐¬	1.800 ×1	0.240 ×2						2.28	10	22.80	
W18	D 16	B	⌐¬	0.859 ×1 ～1.659	0.240 ×2						1.71	5	8.70	
W19	D 16	B	⌐¬	0.807 ×1	0.240 ×2						1.29	98	126.42	
W20	D 16	B	⌐¬	0.800 ×1	0.240 ×2						1.28	8	10.24	
W21	D 16	B	⌐¬	1.765 ×1	0.240 ×2						2.25	33	74.25	
W22	D 16	B	⌐¬	0.550 ×1	0.240 ×2						1.03	7	7.21	
W23	D 16	B	⌐¬	0.512 ×1	0.240 ×2						1.00	12	12.00	
W24	D 12	B	⌐¬	1.831 ×1	0.100 ×2						2.04	40	81.60	
W25	D 12	B	⌐¬	1.143 ×1 ～1.322	0.100 ×2						1.44	16	23.04	
W26	D 12	B	⌐¬	0.861 ×1 ～1.308	0.100 ×2						1.29	392	505.68	
W27	D 12	B	⌐¬	0.831 ×1	0.100 ×2						1.01	20	20.80	
W28	D 12	B	⌐¬	0.584 ×1	0.100 ×2						0.79	5	3.95	

Type



Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Ibrahimia Reg. (Downstream-L type wall) Rebar weight 〔3/4〕

No.	Dia.	Type	Shape	L a	b	c	d	e	φ	Joint	length/nos	nos	total length	Remarks
			D12	1979.07×0.888		=	1757.41 kg	=	1.757 t					
			D16	6990.06×1.58		=	11044.29 kg	=	11.044 t					
			D22	2207.53×2.98		=	6578.44 kg	=	6.578 t					

Type

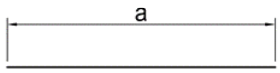
A B C D E Γ G H

Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

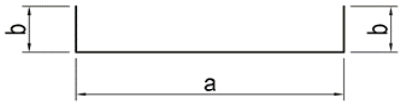
Schematic design of rebar

(Downstream-L type wall)

A

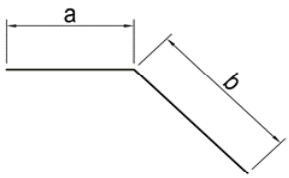


B

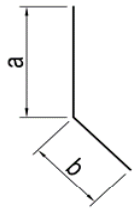


C

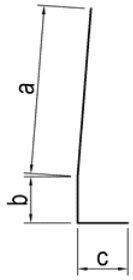
D



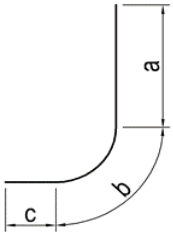
E



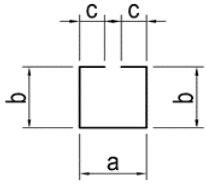
F



G



H



C-101

Ibrahimia Reg. (Downstream-Apron)　　Rebar weight 〔1/1〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
A1	D 16	A		19.300 ×1						1.000 ×1	20.30	236	1790.80	
A2	D 16	B		21.420 ×1	1.903 ×1					1.000 ×2	25.33	50	1266.50	
A3	D 16	B		21.420 ×1	1.903 ×1					1.000 ×2	25.33	49	1241.17	
A4	D 16	A		23.300 ×1						1.000 ×2	25.30	99	2504.70	
A5	D 16	A		23.300 ×1						1.000 ×2	25.30	6	151.80	
A6	D 16	A		12.798 ×1 ～21.398						1.000 ×1	18.10	6	108.60	
A7	D 16	A		4.198 ×1 ～8.498							6.35	4	25.40	
A8	D 16	C		19.268 ×1	0.240 ×2					1.000 ×1	20.75	11	228.25	
A9	D 16	C		1.763 ×1	0.240 ×2						2.25	99	222.75	
A10	D 16	C		0.770 ×1 ～1.756	0.240 ×2						1.75	211	374.50	
A11	D 16	C		0.768 ×1	0.240 ×2						1.25	18	22.50	
A12	D 16	A		1.800 ×1							1.80	99	178.20	
A13	D 16	A		2.273 ×1							2.28	99	225.72	
A14	D 16	A		19.300 ×1						1.000 ×1	20.30	10	203.00	
A15	D 12	D		0.428 ×1	0.840 ×1 ～1.807	0.828 ×1 ～1.788	0.100 ×2				3.26	1272	4146.72	
A16	D 12	D		0.428 ×1	0.828 ×1	0.828 ×1	0.100 ×2				2.29	96	219.84	

D12	4366.56 × 0.888	=	3877.51 kg	= 3.878 t
D16	11543.89 × 1.58	=	18239.35 kg	= 18.239 t

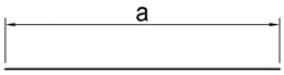
Type

A　B　C　D

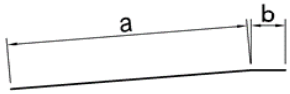
Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Schematic design of rebar
(Downstream-Apron)

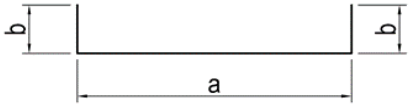
A



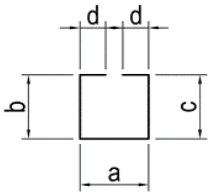
B



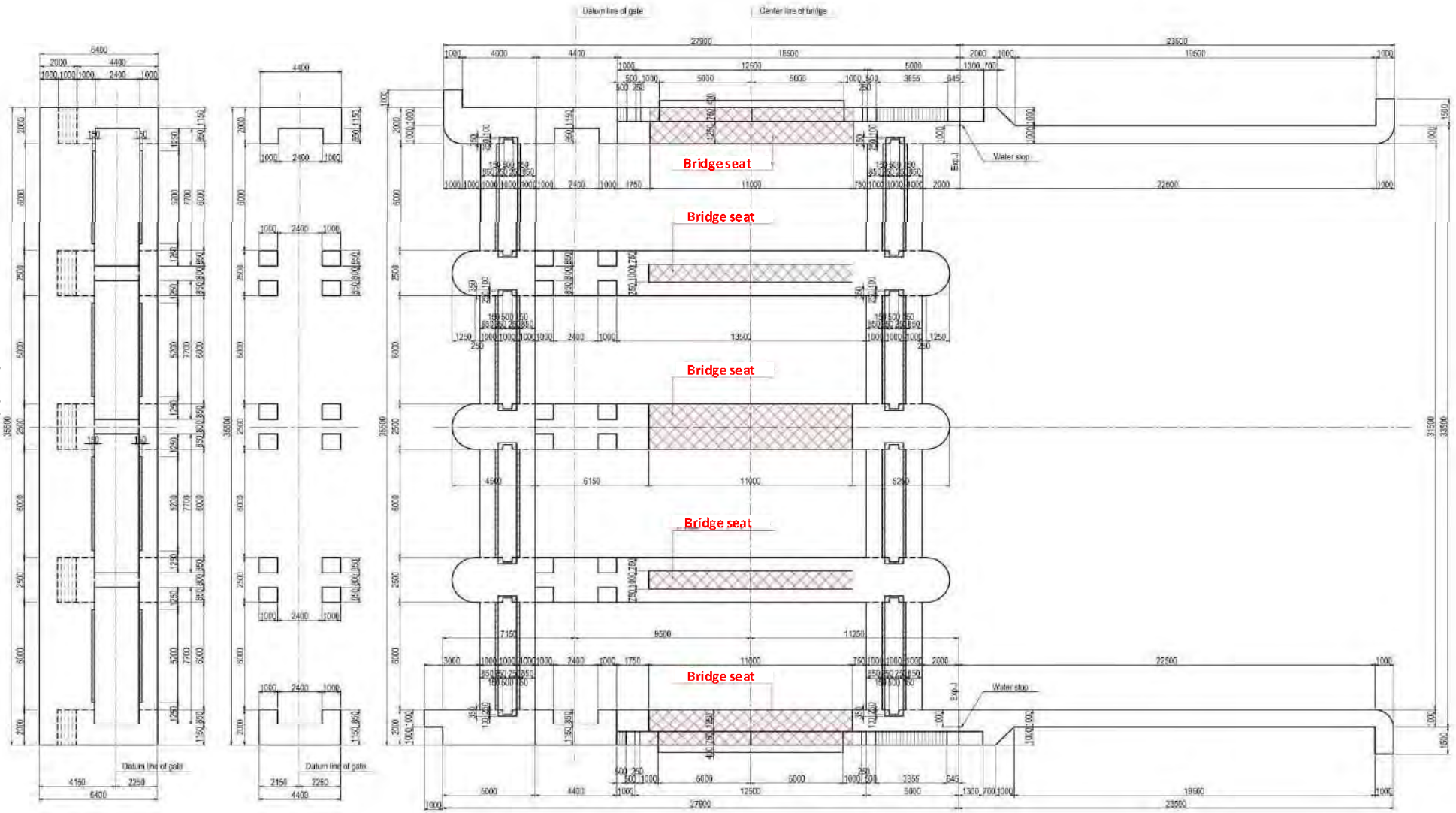
C



D

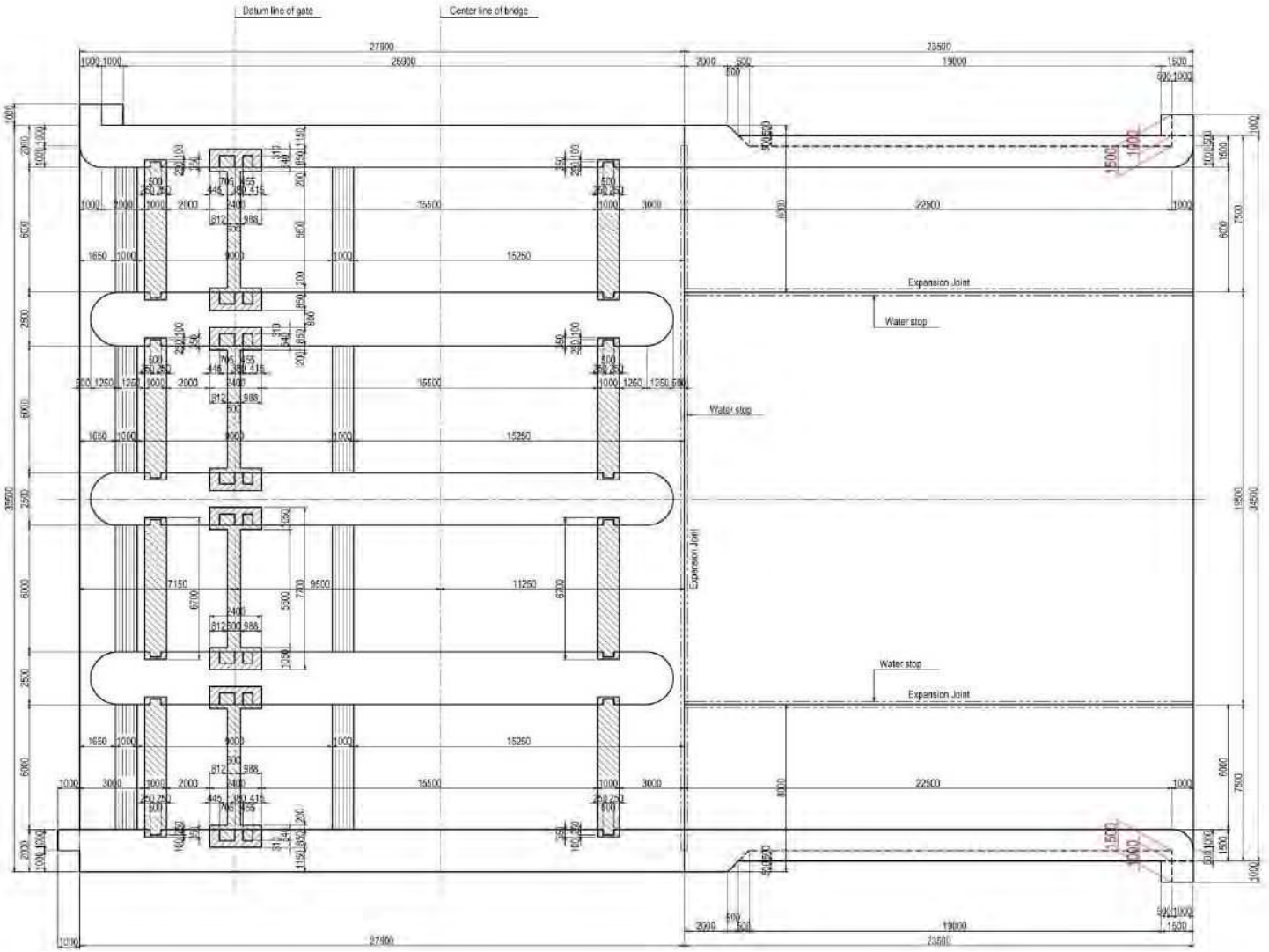


Concrete / Formwork (1/5)

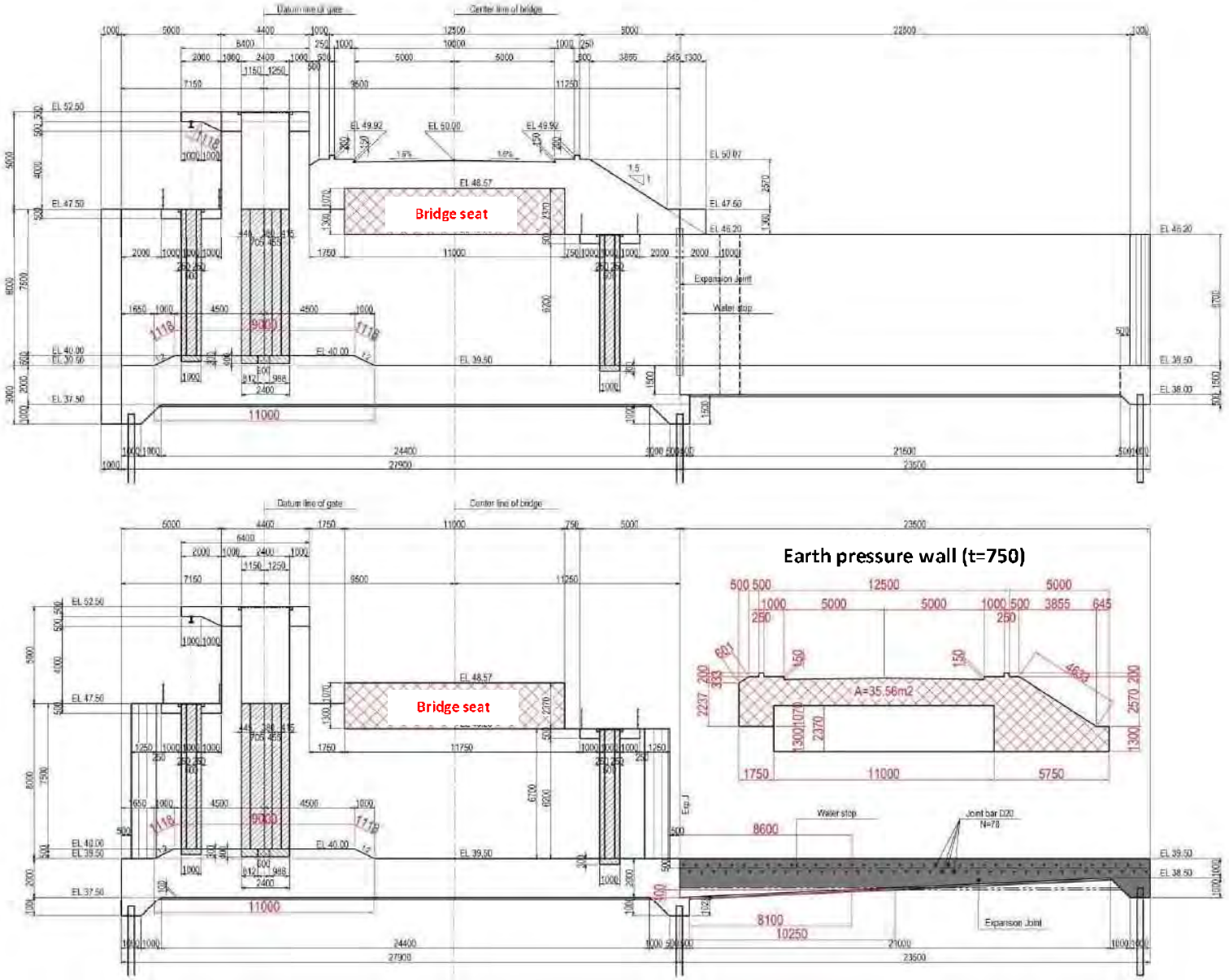


C-103

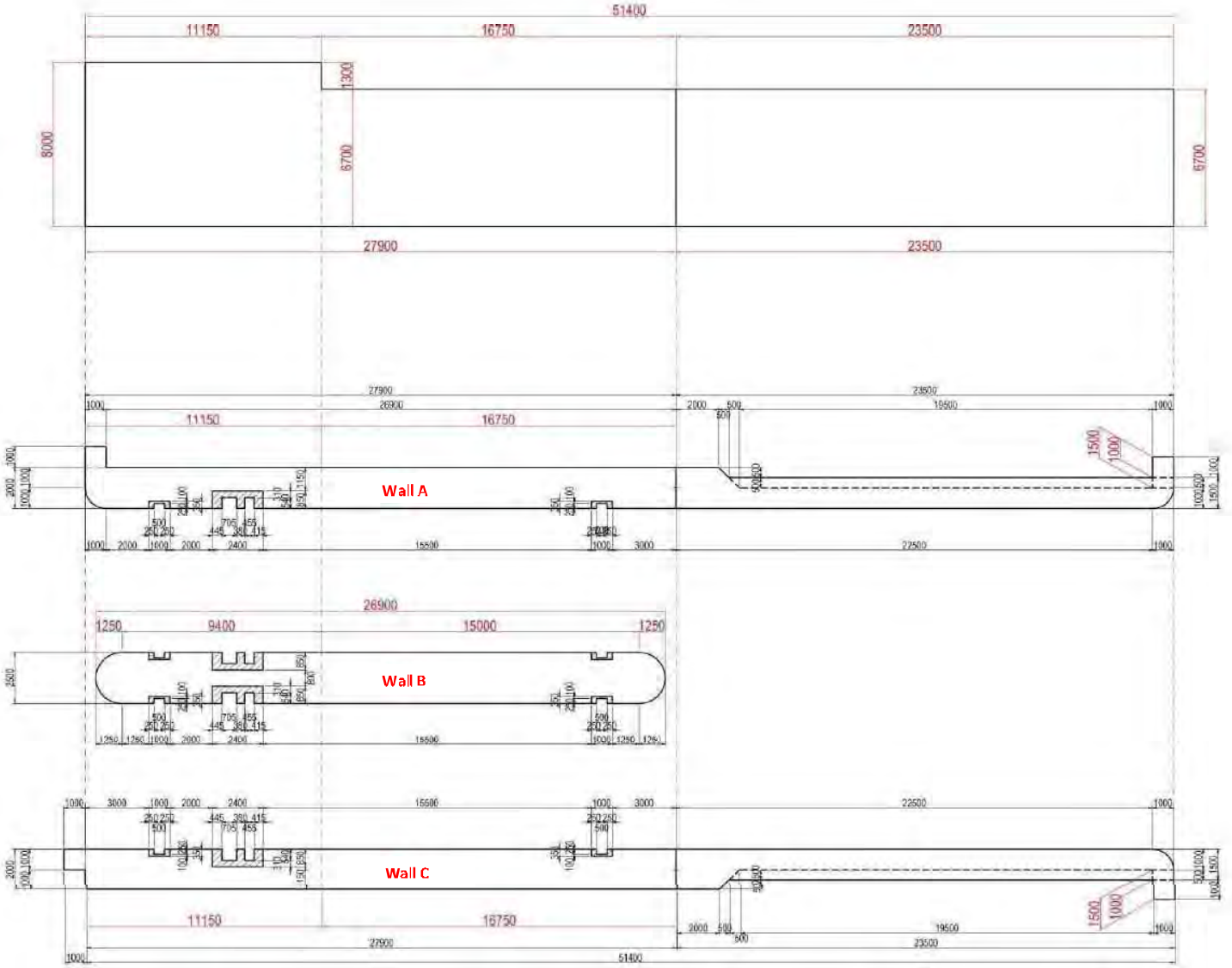
Concrete / Formwork (2/5)



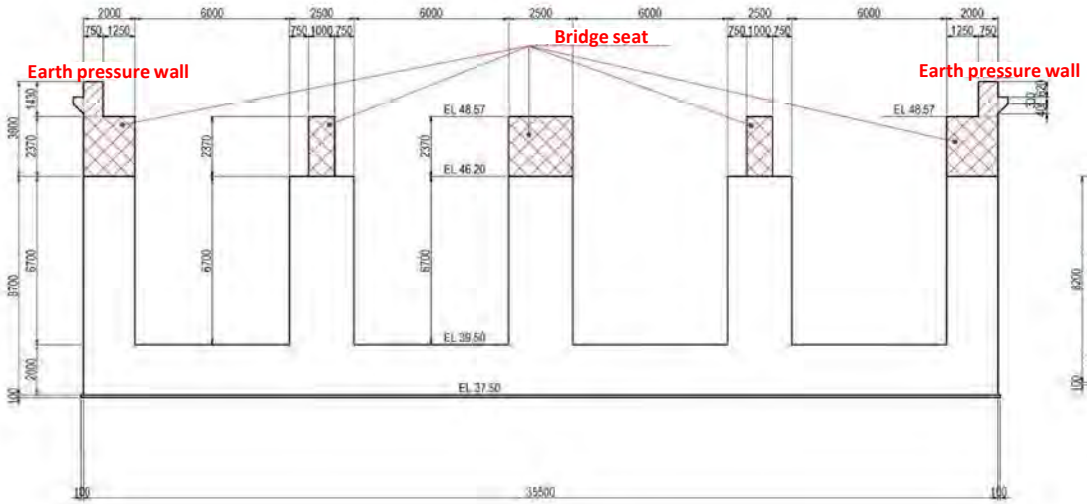
Concrete / Formwork (3/5)

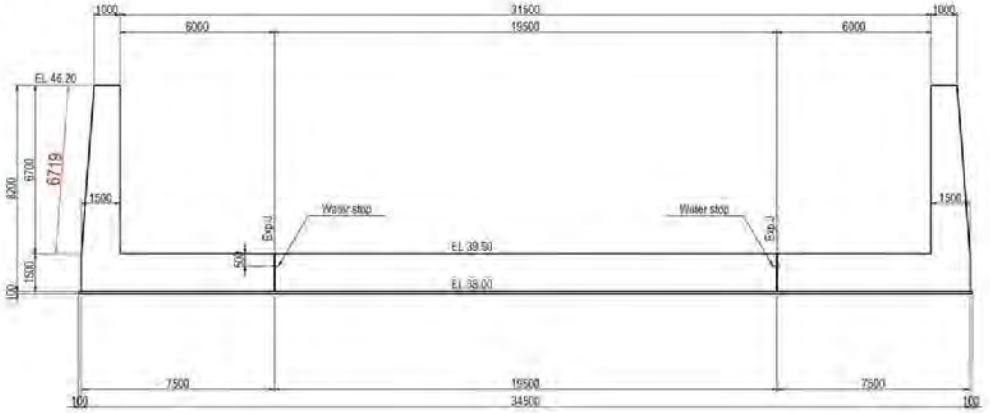


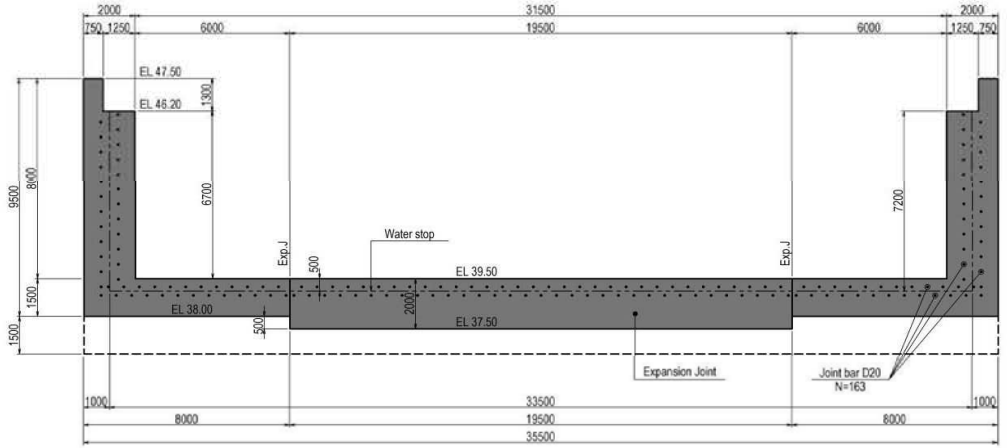
Concrete / Formwork (4/5)

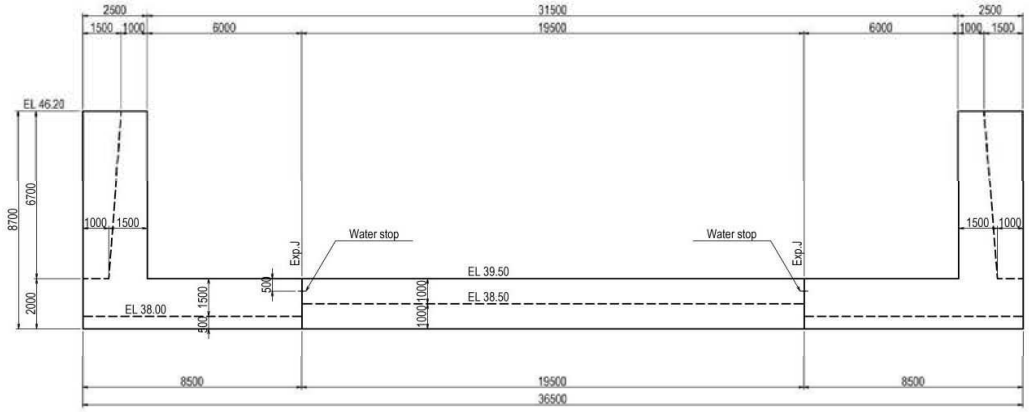


Concrete / Formwork (5/5)

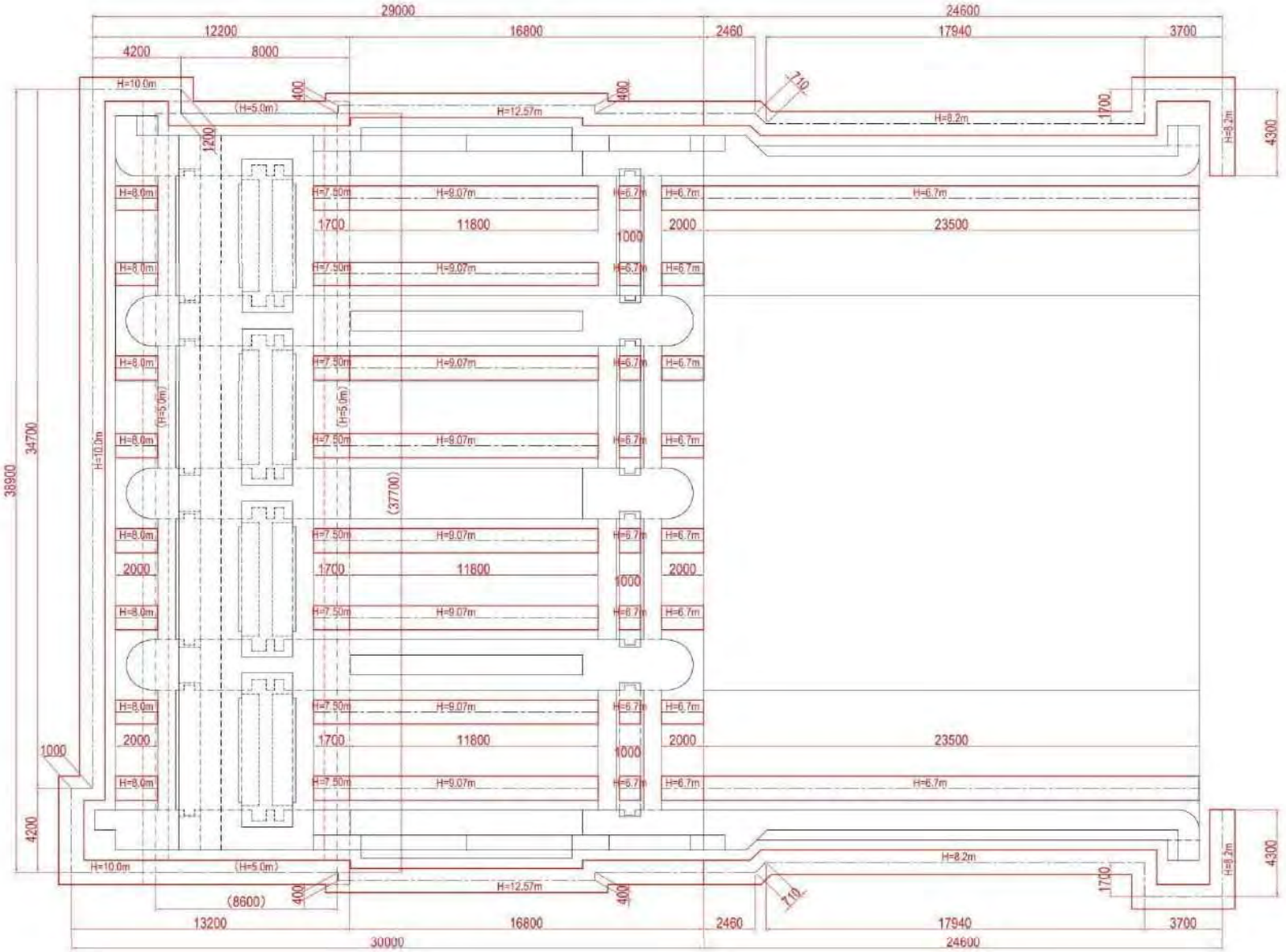






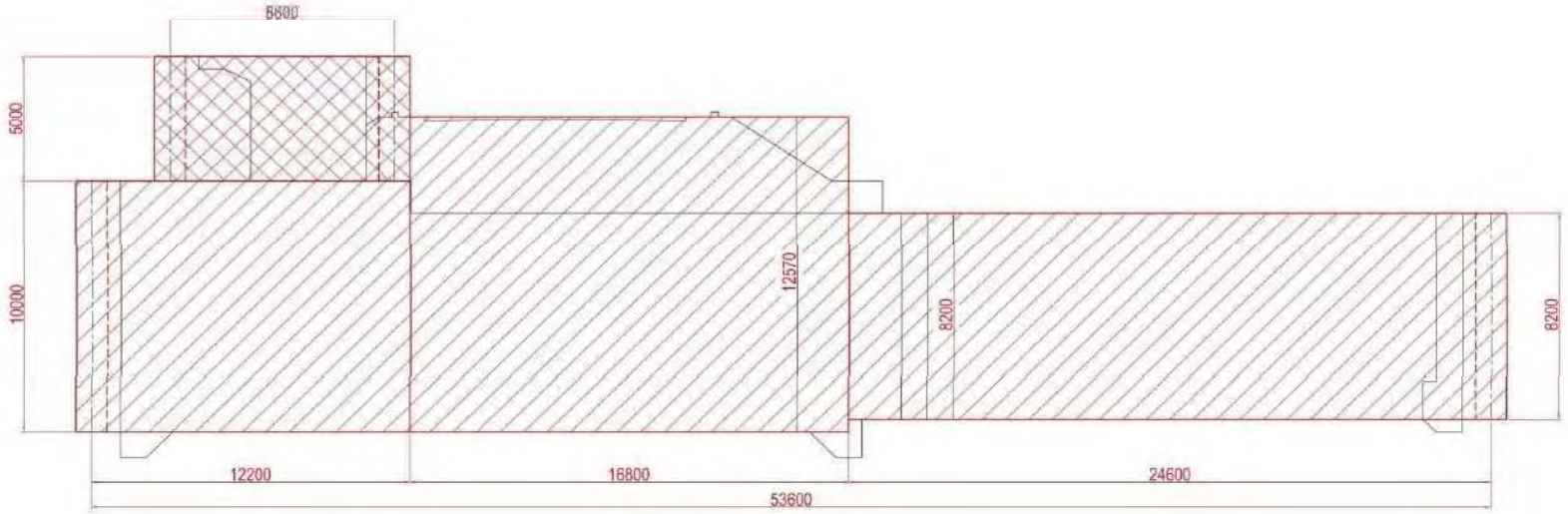


Scaffolding (1/2)

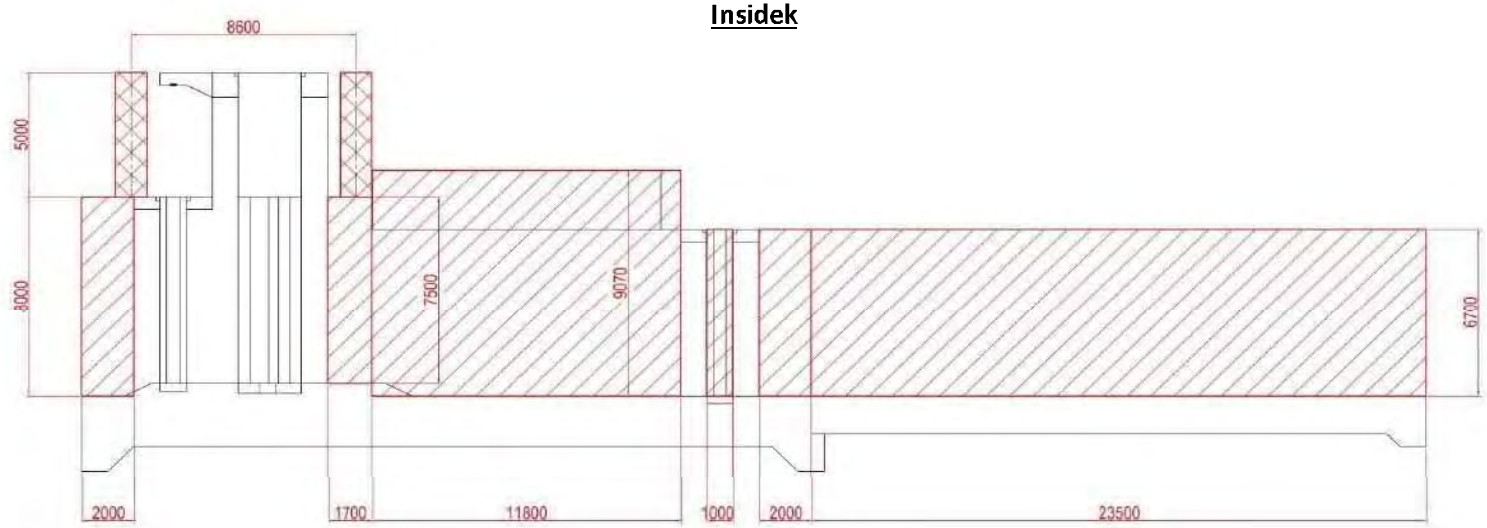


Scaffolding (2/2)

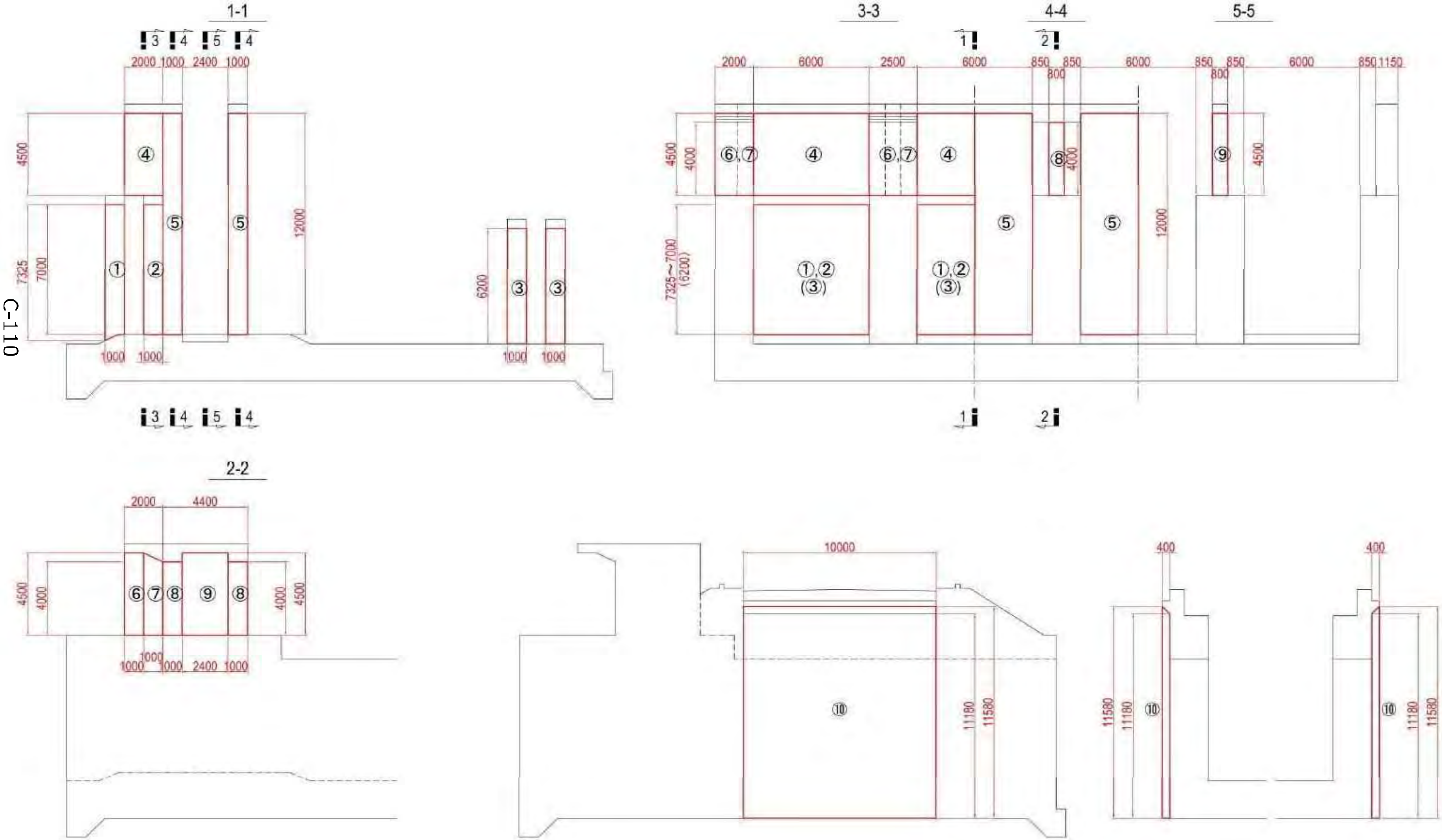
Outer perimeter



Insidek



Falsework



1-1
2000 1000 2400 1000
4500
7325
7000
12000
6200
1000 1000
1000 1000
3-3
4-4
5-5
2000 6000 2500 6000 850 850 6000 850 850 6000 850 1150
800
800
4500
4000
7325~7000
(6200)
2-2
2000 4400
1000 1000 1000 2400 1000
10000
11180
11580
400
400

(3) Badraman regulator

Badraman Weir body Quantity Summary Sheet

Type of works	Class	Subdivision	Dimensions	Unit	Quantity	Remarks
Weir body	Main body	Leveling con.	σck=20N/mm^2	m^3	17.50	
		formwork	Leveling con.	m^2	4.86	
		Reinforced con.	σck=25N/mm^2	m^3	770.91	
		Formwork	RC structure	m^2	1,146.49	
		Circular formwork	RC structure φ1000-1/2Circle	m^2	11.15	
		〃	RC structure φ1000-1/4Circle	m^2	11.15	
		Second stage con.	σck=21N/mm2	m^3	10.31	
		Formwork	RC structure	m^2	51.74	
		Rebar	D12	t	2.069	
		〃	D16	t	31.552	
		〃	D22	t	2.400	
		Concrete curing	PC structure	m^3	17.50	
		〃	RC structure	m^3	781.22	
		Scaffolding	Prefabricated scaffold H≦30m	m^2	848.56	
		Falsework	Pipe support falsework H< 4.0m Support bearing force 40KN/m2 and less	m^3	45.80	
		〃	Wedge linked falsework, H≦30m, Support bearing force 40KN/m^2 and less	m^3	56.93	
	Other miscellaneous	Joint bar	D16~200	nos	464	
		Gration	2000×1000	set	4	
	Safty facillities work	Guard fense	H=1.10m	m	41.20	

Type of works	Class	Subdivision	Dimensions	Unit	Quantity	Remarks
Approach cushion slab	Approach cushion slab	Reinforced con.	$\sigma ck=25N/mm^2$	m^3	40.00	
		Formwork	RC structure	m^2	24.00	
		Rebar	D12	t	0.150	
		〃	D16	t	2.370	
		〃	D18	t	1.040	
		Concrete curing	RC structure	m^3	40.00	
		Anchor cap	SGPφ40×180	nos	50	
		Anchor bar	D22×500 (including D10 spiral reinforcement)	nos	50	
		Rubber shoe	t=30mm	m^2	6.00	
		Expansion joint	Elastic filler,t=20mm	m^2	8.60	

Badraman Weir body Quantity calculation

Description	Classification	Calculation			Quantity	Unit	Remarks
Main body							
Leveling con.	σck=20N/mm^2						
		7.20×(24.20+ 24.40)/2×0.10	−	17.50	17.50	m^3	
Formwork	Leveling con.	(24.20+24.40)/2×0.10×2	−	4.86	4.86	m^2	
Reinforced con.	σck=25N/mm^2						
	Cut-off	1/2×(1.00+ 2.00)×1.00×9.00×2	−	27.00			
	Invert	1.00×1.50×2.00×2×2	=	12.00			
	〃	7.00×1.50×28.20	=	296.10			
	〃	1/2×(5.35+ 7.35)×0.50×2.00×2	−	12.70			
	〃	-0.25×0.70×2.50×3×2	=	-2.63			(-)Blockout
	Wall A	1.00×4.10×1.00	−	4.10			
	〃	1.00×4.10×8.45	=	34.65			
	〃	1.00×3.00×19.75	−	59.25			
	〃	1.00×3.00×1.00	=	3.00			
	〃	-(1−π/4)×0.50^2×(4.10 ｜ 3.00)	=	-0.38			
	〃	-0.25×0.70×(3.60×2+3.00)	−	-1.79			(-)Blockout
	Wall B	1.00×4.10×7.95	=	32.60			
	〃	1.00×3.00×15.25	=	45.75			
	〃	-(1−π/4)×0.50^2×2×(4.10+3.00)	−	-0.76			
	〃	-0.25×0.70×(3.60×2 ｜ 3.00)×2	=	-3.57			(-)Blockout
	Wall C	1.00×4.10×1.00	−	4.10			
	〃	1.00×4.10×8.45	=	34.65			
	〃	1.00×3.00×19.75	−	59.25			
	〃	1.00×3.00×1.00	−	3.00			
	〃	-(1−π/4)×0.50^2×(4.10 ｜ 3.00)	=	-0.38			
	〃	-0.25×0.70×(3.60×2+3.00)	−	-1.79			(-)Blockout

Description	Classification	Calculation			Quantity	Unit	Remarks
	Corridor	1.00×0.50×2.00×4×2	=	8.00			
	〃	-0.15×0.15×2.00×4×2	=	-0.36			(-)Second stage con.
	Bridge seat	1.00×2.95×11.00×3	=	97.35			
	Earth pressure wall	0.45×24.18×2	=	21.76			
	Pedestal	1/2×(0.30 + 0.70)×0.40×10.00×2	=	4.00			
	Gate pier	1.00×3.15×1.70×3	=	16.07			
	〃	-0.25×0.70×3.15×4	=	-2.21			(-)Blockout
	Top slab	2.70×0.50×7.00	=	9.45			
		Total	=	770.91	770.91	m^3	
Formwork	RC structure						
	Cut-off	1/2×(1.00+ 2.00)×1.00×2×2	=	6.00			Side
	〃	1.00×9.00×2	=	18.00			End
	Invert	(9.00− 1.00×2)×1.50×2	=	33.00			End
	〃	28.20×1.50×2	=	84.60			Side
	〃	1.118×2.00×2×2	=	8.94			Raising part
	〃	(0.70− 2.50)×2×0.25×3×2	=	9.60			Blockout part
	Wall A	1.00×4.10×2	=	8.20			
	〃	4.10×(0.50+ 8.45− 7.95)	=	69.29			
	〃	3.00×(0.50 + 19.75 + 19.25)	=	118.50			
	〃	1.00×3.00×3	=	9.00			
	〃	3.60×0.25×2×2	=	3.60			Blockout part
	〃	3.00×0.25×2	=	1.50			〃
	〃	-1/2×(5.35+ 7.35)×0.50	=	-3.18			(-)Raising part
	〃	-(1.00×0.50− 0.15×0.15)×4	=	-1.91			(-)Corridor
	Wall B	4.10×7.45×2	=	61.09			
	〃	3.00×14.75×2	=	88.50			
	〃	3.60×0.25×2×4	=	7.20			Blockout part
	〃	3.00×0.25×4	=	3.00			〃
	〃	-1/2×(5.35 + 7.35)×0.50×2	=	-6.35			(-)Raising part

Description	Classification	Calculation			Quantity	Unit	Remarks
	〃	-(1.00×0.50−0.15×0.15)×4×2	−	-3.82			(-)Corridor
	Wall C	1.00×4.10×2	=	8.20			
	〃	4.10×(0.50+8.45−7.95)	=	69.29			
	〃	3.00×(0.50+19.75+19.25)	−	118.50			
	〃	1.00×3.00×3	=	9.00			
	〃	3.60×0.25×2×2	=	3.60			Blockout part
	〃	3.00×0.25×2	=	1.50			〃
	〃	-1/2×(5.35+7.35)×0.50	−	-3.18			(-)Raising part
	〃	-(1.00×0.50−0.15×0.15)×4	−	-1.91			(-)Corridor
	Corridor	(1.00 0.50×2)×2.00×4×2	=	32.00			
	Bridge seat	(11.00×2+0.55)×2.95×2	−	133.05			Abut pier
	〃	0.55×1.85×2	=	2.04			〃
	〃	-0.70×10.00×2	=	-14.00			(-)Pedestal
	〃	(11.00×2+1.00)×2.95	−	67.85			Middle pier
	〃	1.00×1.85	−	1.85			〃
	Earth pressure wall	24.18×2×2	−	96.72			
	〃	(2.121+0.20×4+0.15×2+5.19)×0.45×2	=	7.57			
	Pedestal	(0.30−0.566)×10.00×2	−	17.32			
	〃	1/2×(0.30+0.70)×0.40×2×2	−	0.80			
	Gate pier	(1.70 1.00)×2×3.15×3	=	51.03			
	〃	0.25×3.15×2×4	−	6.30			
	Top slab	(2.70−7.00)×2×0.50	−	9.70			Side
	〃	2.70×7.00	=	18.90			Underside
	〃	-(1.00×1.70−0.25×0.70)×2	−	-3.05			(-)Pier
	〃	-(1.00×1.70−0.25×0.70×2)	=	-1.35			〃
		Total	−	1146.49	1146.49	m^2	

Description	Classification	Calculation			Quantity	Unit	Remarks
Circular formwork	RC structure						
	φ1000-1/2Circle						
		π/2×1.00×(4.10+3.00)	=	11.15	11.15	m^2	
	φ1000-1/4Circle						
		π/4×1.00×(4.10+3.00)×2	=	11.15	11.15	m^2	
Second stage con.	σck=25N/mm^2						
		0.70×2.50×0.25×3×2	−	2.63			Invert part
		0.70×0.25×(3.60+3.00)×4	−	4.62			Stop log part
		-0.22×0.13×(3.60 3.00)×4	=	-0.76			〃
		(0.70×0.25−0.185×0.13)×3.60×4	−	2.17			Gate part
		{1/2×(0.315+0.435)×0.12+0.265×0.25}×2.70×4					Gate pier part
			=	1.20			
		(0.15^2−0.05^2)×2.00×4×2	−	0.32			Corridor part
		0.05/6×{(2×0.81+0.71)×1.72+(2×0.71+0.81)×1.62}×2					Top slab part
			−	0.13			
			Total =	10.31	10.31	m^3	
Formwork	RC structure						
		(0.70 0.13×2)×3.60×2×2	=	13.82			Stop log part
		(0.70−0.13×2)×3.00×2×2	−	11.52			〃
		(0.70−0.13×2)×3.60×2×2	−	13.82			Gate part
		(0.265+0.13+0.315+0.12×√(2))×2.70×4	=	9.50			Gate pier part
		0.15×2.00×4×2	−	2.40			Corridor part
		1/2×(0.71+0.81)×0.05×√(2)×2×2	=	0.21			Top slab part
		1/2×(1.62+1.72)×0.05×√(2)×2×2	−	0.47			〃
			Total =	51.74	51.74	m^2	

Description	Classification	Calculation			Quantity	Unit	Remarks
Rebar	Steel 360/520	refer to rebar weight caluculation sheet					
		D12	=	2.069	2.069	t	
		D16	=	31.552	31.552	t	
		D22	−	2.400	2.400	t	
Concrete curing	PC structure	Leveling concrete	−	17.50	17.50	m^3	
	RC structure	770.91 ｜ 10.31	−	781.22	781.22	m^3	
Scaffolding	Prefabricated scaffold, H≦30m						
	外周	5.60×{11.20+(9.00+1.00+0.40)×2}	−	179.20			
	〃	8.17×(16.47｜0.40)×2	−	275.66			
	〃	4.50×(4.93+1.00−3.10)×2	−	81.27			
	内部	4.10×(1.00+1.10)×2	=	17.22			
	〃	3.60×(1.00+1.15)×2	−	15.48			
	〃	5.95×11.00×2	−	130.90			
	〃	3.00×{(0.75｜1.00｜5.00)×2｜1.80}	=	45.90			
	門柱部	3.65×(4.90+9.20)×2	−	102.93			
			Total −	848.56	848.56	m^2	
Falsework	Pipe support falsework, H< 4.0m, Support bearing force 40KN/m2 and less						
	①	1.00×(3.60+3.10)/2×2.00×2	=	13.40			Corridor part
	②	1.00×3.10×2.00×2	−	12.40			〃
	③	1.00×2.50×2.00×2×2	=	20.00			〃
			Total =	45.80	45.80	m^3	

Description	Classification	Calculation			Quantity	Unit	Remarks
	Wedge linked falsework, H≤ 30m, Support bearing force 40KN/m^2 and less						
	①	0.50×3.15×7.00	=	11.03			Gate pier part
	⑤	1.70×6.75×2.00×2	=	45.90			〃
	⑥	0.50×(7.00×3.15+2.00×3.60×2)	−	18.23			〃
	⑦	0.40×(7.18 + 6.78)/2×10.00×2	=	55.84			Pedestal part
		Total	=	56.93	56.93	m^3	
Other miscellaneous							
Joint bar	D16×200	104×2	−	208.0			Gate part
	〃	(68 + 60)×2	=	256.0			Stop log part
		Total	−	464.0	464	nos	
Grating	2000×1000		=	4.0	4	set	
Safety facilities work							
Guard fense	H=1.10m	6.70×2+2.40+1.40	=	17.20			Top slab
		6.00×4	−	24.00			Corridor
		Total	−	41.20	41.20	m	

Description	Classification	Calculation			Quantity	Unit	Remarks
Approach cushion slab							
Reinforced con.	σck=25N/mm^2						
		10.00×5.00×0.40×2	=	40.00	40.00	m^3	
Formwork	RC structure						
		(10.00 + 5.00)×0.40×2×2	=	24.00	24.00	m^2	
Rebar	Steel 360/520	refer to rebar weight caluculation sheet					
		D12 0.075 × 2	=	0.150	0.150	t	
		D16 1.185 × 2	=	2.370	2.370	t	
		D18 0.520 × 2	=	1.040	1.040	t	
Concrete curing	RC structure	Reinforced con.	=	40.00	40.00	m^3	
Anchor cap	SGPφ40×180						
		25×2	=	50.0	50	nos	
Anchor bar	D22×500(including D10 spiral reinforcement)						
		25×2	=	50.0	50	nos	
Rubber shoe	t=30mm						
		10.00×0.30×2	=	6.00	6.00	m^2	
Expansion joint	Elastic filler,t=20mm						
		0.43×10.00×2	=	8.60	8.60	m^2	

Grating (2000×1000)　Quantity calculation

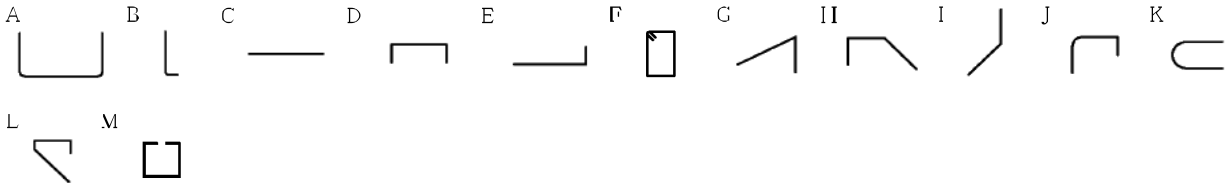
per a piece

Description	Classification	Calculation	Quantity	Unit	Remarks
Grating	t=44 × 985 × 1060				
		= 2.0	2	pieces	
Equal-leg angle	L-50 × 50 × 6 × 2000				
		2.00×0.00413×2 — #NAME?	#NAME?	t	
Anchor bar	D12×105	4×2 — #NAME?	#NAME?	nos	

Badraman Reg. Rebar weight 〔1/8〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F1	D 16	A		6.460 ×1	5.230 ×1	5.230 ×1	0.267 ×2		φ 170	1.000 ×1	18.46	43	793.78	
F2	D 16	A		6.460 ×1	7.080 ×1	7.080 ×1	0.267 ×2		φ 170	1.000 ×1	22.16	55	1218.80	
F3	D 16	A		6.460 ×1	4.130 ×1	4.130 ×1	0.267 ×2		φ 170	1.000 ×1	16.26	44	715.44	
F4	D 16	C		6.800 ×1							6.80	148	1006.40	
F5	D 16	C		28.000 ×1						1.000 ×2	30.00	35	1050.00	
F6	D 16	C		21.150 ×1						1.000 ×1	22.15	4	88.60	
F7	D 16	C		5.950 ×1							5.95	7	41.65	
F8	D 16	C		1.900 ×1							1.90	23	43.70	
F9	D 16	G		1.866 ×1	1.137 ×1						3.01	20	60.20	
F10	D 16	D		1.418 ×1	1.134 ×2						3.69	20	73.80	
F11	D 16	H		1.134 ×1	2.007 ×1	1.859 ×1					5.00	20	100.00	
F12	D 16	E		13.884 ×1	1.134 ×1					1.000 ×1	16.02	20	320.40	
F13	D 16	E		5.934 ×1	1.134 ×1						7.07	20	141.40	
F14	D 16	C		5.050 ×1							5.05	12	60.60	
F15	D 16	C		4.726 ×1							4.73	20	94.60	
F16	D 16	C		2.700 ×1							2.70	32	86.40	
F17	D 16	D		1.268 ×1	0.240 ×2						1.75	58	101.50	
F18	D 16	D		6.800 ×1	0.240 ×2						7.28	12	87.36	

Type

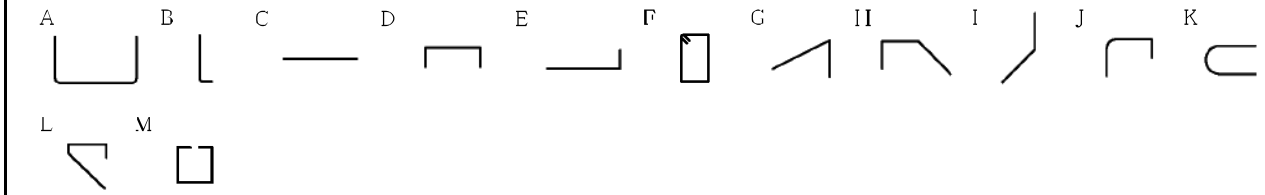


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Badraman Reg. Rebar weight 〔2/8〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F19	D 16	C		28.000 ×1						1.000 ×2	30.00	12	360.00	
F20	D 16	C		1.900 ×1							1.90	104	197.60	
F21	D 16	D		1.268 ×1	0.240 ×2						1.75	16	28.00	
F22	D 16	C		1.800 ×1							1.80	24	43.20	
F23	D 16	C		1.000 ×1							1.00	16	16.00	
F24	D 16	D		1.268 ×1	0.240 ×2						1.75	20	35.00	
F25	D 16	C		1.900 ×1							1.90	90	171.00	
F26	D 16	C		2.273 ×1							2.28	70	159.60	
F27	D 16	I		1.331 ×1	1.000 ×1						2.34	20	46.80	
F28	D 16	C		8.800 ×1							8.80	20	176.00	
F29	D 12	M		0.428 ×1	1.328 ×1	1.328 ×1	0.100 ×2				3.29	6	19.74	
F30	D 12	M		0.428 ×1	1.468 ×1 ～1.575	1.561 ×1 ～1.668	0.100 ×2				3.77	20	75.40	
F31	D 12	M		0.428 ×1	1.578 ×1	1.578 ×1	0.100 ×2				3.79	10	37.90	
F32	D 12	M		0.428 ×1	1.828 ×1	1.828 ×1	0.100 ×2				4.29	30	128.70	
F33	D 12	M		0.428 ×1	1.328 ×1	1.328 ×1	0.100 ×2				3.29	239	786.31	
F34	D 12	M		0.428 ×1	1.078 ×1	1.078 ×1	0.100 ×2				2.79	6	16.74	
W1	D 16	C		5.400 ×1							5.40	108	583.20	
W2	D 16	C		7.250 ×1							7.25	110	797.50	

Type

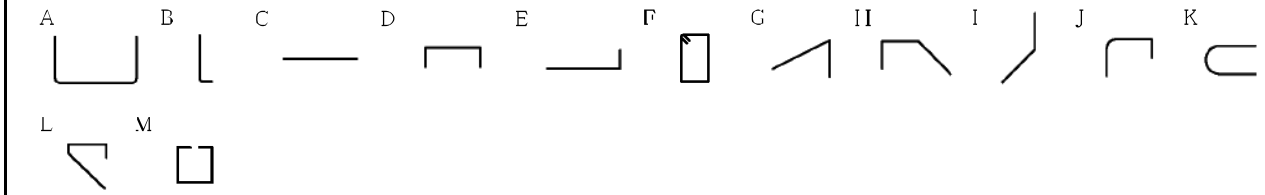


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Badraman Reg. Rebar weight [3/8]

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W3	D 16	C		4.300 ×1							4.30	102	438.60	
W4	D 16	E		5.400 ×1	0.240 ×1						5.64	100	564.00	
W5	D 16	E		7.250 ×1	0.240 ×1						7.49	110	823.90	
W6	D 16	E		4.300 ×1	0.240 ×1						4.54	54	245.16	
W7	D 16	C		3.850 ×1							3.85	18	69.30	
W8	D 16	C		5.400 ×1							5.40	20	108.00	
W9	D 16	C		4.300 ×1							4.30	20	86.00	
W10	D 16	D		0.800 ×1	1.000 ×2						2.80	220	616.00	
W11	D 16	D		0.550 ×1	1.000 ×2						2.55	20	51.00	
W12	D 16	D		0.800 ×1	0.240 ×2						1.28	20	25.60	
W13	D 16	D		0.747 ×1	1.000 ×2						2.75	4	11.00	
W14	D 16	D		0.800 ×1	1.000 ×2						2.80	92	257.60	
W15	D 16	D		0.300 ×1	1.000 ×2						2.30	10	23.00	
W16	D 16	D		0.693 ×1	1.000 ×2						2.70	2	5.40	
W17	D 16	C		28.000 ×1						1.000 ×2	30.00	30	900.00	
W18	D 16	C		8.250 ×1							8.25	12	99.00	
W19	D 16	J		1.400 ×1	1.534 ×1	0.768 ×1	0.603 ×1		φ 384		4.31	42	181.02	
W20	D 16	D		1.418 ×1	0.768 ×2						2.96	42	124.32	

Type

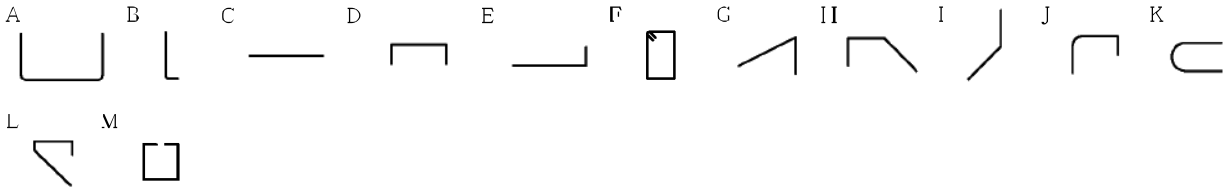


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Badraman Reg. Rebar weight 〔4/8〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W21	D 16	D		13.600 ×1	0.768 ×2					1.000 ×1	16.11	30	484.20	
W22	D 16	D		3.018 ×1	0.768 ×2						4.56	12	54.72	
W23	D 16	J		1.400 ×1	5.534 ×1	0.768 ×1	0.603 ×1		φ 384		8.31	30	249.30	
W24	D 16	C		5.050 ×1							5.05	40	202.00	
W25	D 16	C		2.700 ×1							2.70	34	91.80	
W26	D 16	C		10.800 ×1							10.80	60	648.00	
W27	D 16	D		0.768 ×1	0.240 ×2						1.25	60	75.00	
W28	D 16	C		1.800 ×1							1.80	80	144.00	
W29	D 16	C		1.746 ×1							1.75	4	7.00	
W30	D 16	K		1.050 ×2	1.206 ×1				φ 381		3.31	21	69.51	
W31	D 16	C		1.450 ×1							1.45	42	60.90	
W32	D 16	C		15.950 ×1						1.000 ×1	16.95	30	508.50	
W33	D 16	C		3.050 ×1							3.05	12	36.60	
W34	D 16	K		1.050 ×2	1.206 ×1				φ 381		3.31	15	49.65	
W35	D 16	C		5.050 ×1							5.05	40	202.00	
W36	D 16	C		2.700 ×1							2.70	34	91.80	
W37	D 16	C		10.800 ×1							10.80	30	324.00	
W38	D 16	D		0.768 ×1	0.240 ×2						1.25	150	187.50	

Type

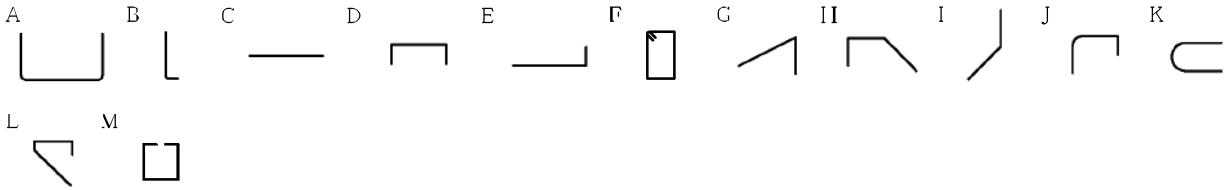


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Badraman Reg. Rebar weight 〔5/8〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W39	D 16	C	—	1.896 ×1							1.90	2	3.80	
W40	D 16	C	—	4.300 ×1							4.30	4	17.20	
W41	D 16	C	—	1.450 ×1							1.45	2	2.90	
W42	D 16	C	—	4.150 ×1							4.15	6	24.90	
W43	D 16	C	—	10.800 ×1							10.80	6	64.80	
W44	D 16	C	—	2.800 ×1							2.80	2	5.60	
W45	D 16	C	—	5.896 ×1							5.90	2	11.80	
W46	D 16	C	—	9.650 ×1							9.65	4	38.60	
W47	D 16	C	—	1.396 ×1							1.40	2	2.80	
W48	D 16	C	—	3.800 ×1							3.80	1	3.80	
W49	D 16	C	—	1.450 ×1							1.45	2	2.90	
W50	D 16	C	—	4.150 ×1							4.15	3	12.45	
W51	D 16	C	—	10.800 ×1							10.80	3	32.40	
W52	D 16	C	—	2.800 ×1							2.80	2	5.60	
W53	D 16	C	—	5.150 ×1							5.15	1	5.15	
W54	D 16	C	—	1.396 ×1							1.40	2	2.80	
W55	D 12	D	⊓	0.828 ×1	0.100 ×2						1.03	652	671.56	
W56	D 12	D	⊓	0.578 ×1	0.100 ×2						0.78	50	39.00	

Type

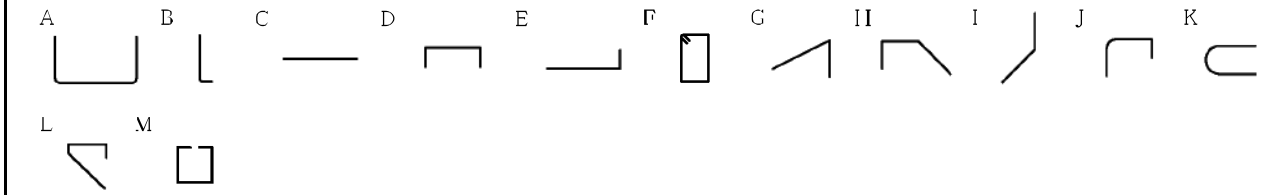


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Badraman Reg. Rebar weight [6/8]

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W57	D 12	D		0.828 ×1	0.100 ×2						1.03	31	35.02	
W58	D 12	D		0.828 ×1	0.100 ×2						1.03	293	301.79	
W59	D 12	D		0.328 ×1	0.100 ×2						0.53	25	13.25	
P1	D 22	C		1.470 ×1							1.47	204	299.88	
P2	D 22	C		1.620 ×1							1.62	16	25.92	
P3	D 22	C		2.029 ×1 ～3.429							2.73	32	87.36	
P4	D 22	C		3.470 ×1							3.47	24	83.28	
P5	D 22	C		4.570 ×1							4.57	24	109.68	
P6	D 22	C		4.529 ×1 ～1.329							2.93	68	199.24	
P7	D 12	D		0.250 ×1	0.180 ×2						0.61	181	112.24	
P8	D 16	C		13.717 ×1 ～14.457						1.000 ×1	15.09	12	181.08	
P9	D 16	C		2.929 ×1 ～3.479							3.21	16	51.36	
P10	D 16	C		3.650 ×1							3.65	20	73.00	
P11	D 16	C		2.929 ×1 ～5.679							1.31	60	258.60	
P12	D 16	H		1.050 ×1	1.609 ×1	2.038 ×1					1.70	1	18.80	
P13	D 16	H		1.050 ×1	1.609 ×1	6.049 ×1					8.71	1	34.84	
P14	D 16	D		0.218 ×1	0.240 ×2						0.70	10	7.00	
P15	D 12	D		0.278 ×1	0.100 ×2						0.48	118	56.64	

Type

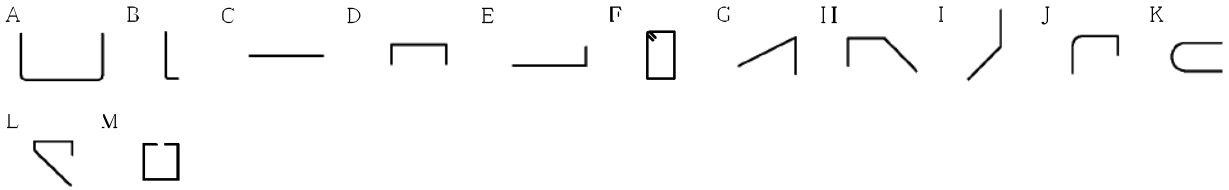


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Badraman Reg. Rebar weight 〔7/8〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
S1	D 16	C		6.800 ×1							6.80	41	299.20	
S2	D 16	C		0.800 ×1							0.80	160	128.00	
S3	D 16	D		0.618 ×1	0.268 ×2						1.16	80	92.80	
C1	D 16	L		0.240 ×1	0.650 ×1	0.159 ×1	0.919 ×1				1.97	102	200.94	
C2	D 16	C		9.800 ×1							9.80	8	78.40	
G1	D 16	A		8.460 ×1	1.230 ×1	1.630 ×1	0.267 ×2		φ 170		11.86	8	94.88	
G2	D 16	B		1.024 ×1	1.230 ×1 ～1.630	0.267 ×1					2.73	2	5.46	
G3	D 16	B		1.053 ×1	1.630 ×1 ～1.230	0.267 ×1					2.75	2	5.50	
G4	D 16	C		0.789 ×1 ～0.845							0.82	4	3.28	
G5	D 16	C		1.589 ×1 ～1.645							1.62	2	3.24	
G6	D 16	C		1.550 ×1							1.55	82	373.10	
G7	D 16	F		0.332 ×2	0.832 ×2	0.225 ×2					2.78	96	266.88	
G8	D 16	F		0.582 ×2	1.532 ×2	0.225 ×2					4.68	32	149.76	
G9	D 16	F		0.332 ×2	1.532 ×2	0.225 ×2					1.18	16	66.88	
G10	D 12	D		0.578 ×1	0.100 ×2						0.78	16	12.48	
G11	D 12	D		0.328 ×1	0.100 ×2						0.53	8	4.24	
T1	D 16	D		6.800 ×1	0.300 ×2						7.40	6	44.40	
T2	D 16	D		6.800 ×1	0.240 ×2						7.28	14	101.92	

Type



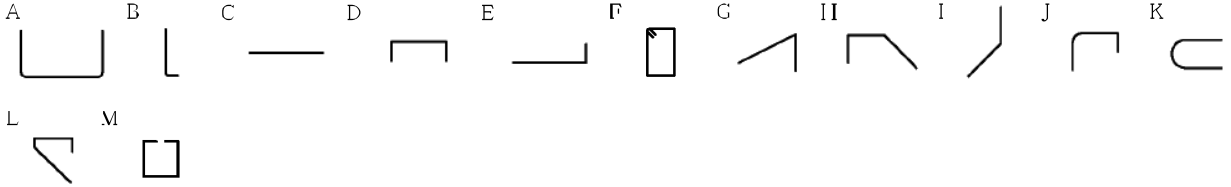
Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Badraman Reg. Rebar weight 〔8/8〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
T3	D 16	E		1.094 ×1 ～1.223	0.240 ×1						1.45	4	5.80	
T4	D 16	C		0.789 ×1 ～0.845							0.82	4	3.28	
T5	D 16	C		1.589 ×1 ～1.645							1.62	2	3.24	
T6	D 16	D		2.532 ×1	0.332 ×2						3.20	31	99.20	
T7	D 16	D		2.532 ×1	0.240 ×2						3.02	31	93.62	
T8	D 16	E		1.078 ×1 ～1.156	0.332 ×1						1.45	8	11.60	
T9	D 16	E		1.096 ×1 ～1.118	0.332 ×1						1.49	8	11.92	
T10	D 16	E		1.078 ×1 ～1.156	0.240 ×1						1.36	8	10.88	
T11	D 16	E		1.096 ×1 ～1.118	0.240 ×1						1.40	8	11.20	
T12	D 12	D		0.328 ×1	0.100 ×2						0.53	36	19.08	
T13	D 16	C		6.250 ×1							6.25	4	25.00	
T14	D 16	C		2.150 ×1							2.15	48	103.20	

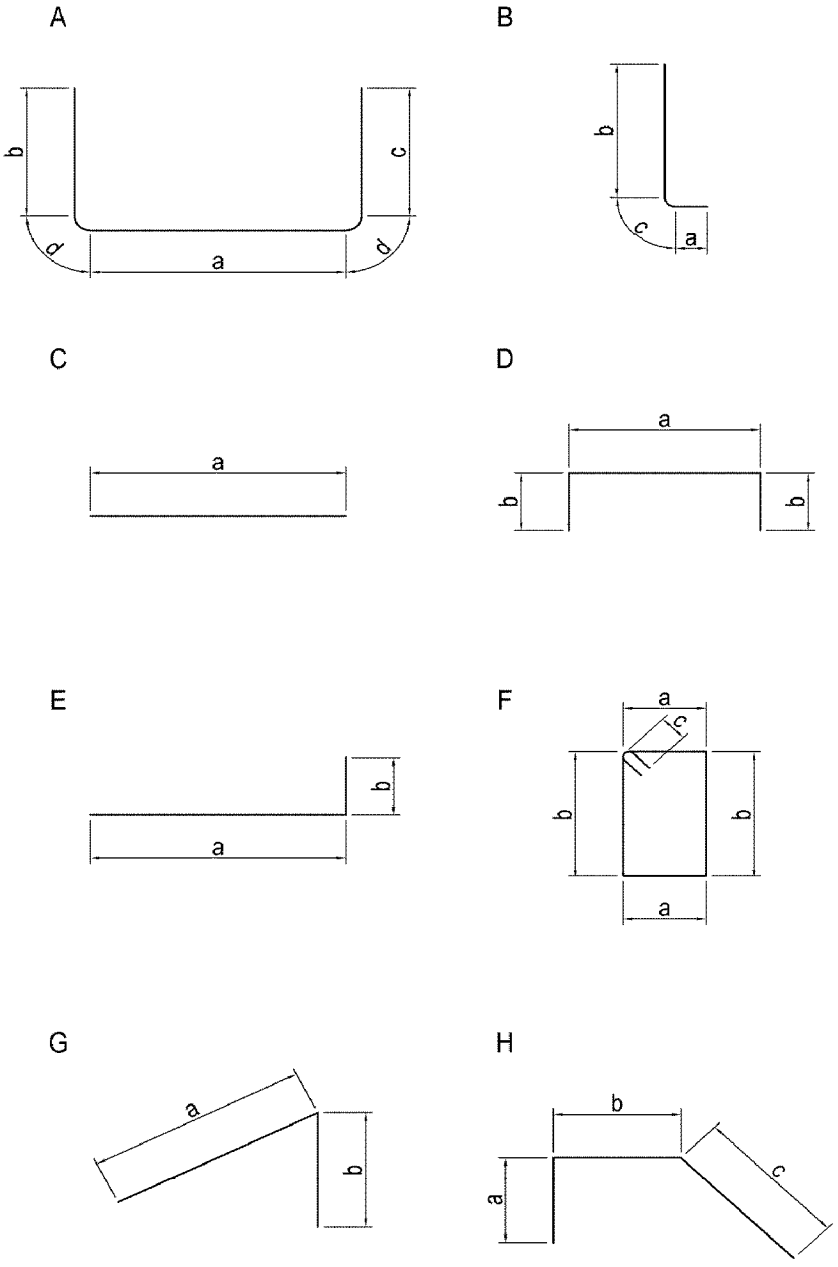
D12	2330.09×0.888	=	2069.12 kg	= 2.069 t
D16	19969.67×1.58	=	31552.08 kg	= 31.552 t
D22	805.36×2.98	=	2399.97 kg	= 2.400 t

Type



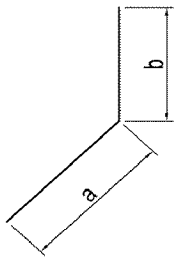
Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Schematic design of rebar (1/2)

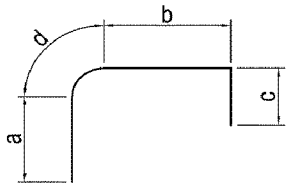


Schematic design of rebar (2/2)

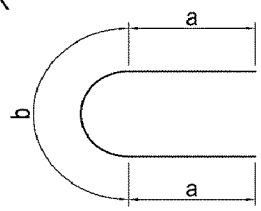
I



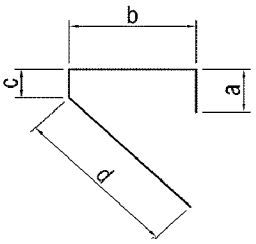
J



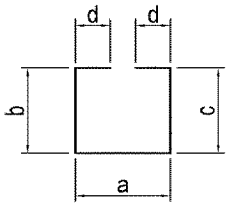
K



L



M



Badraman Reg. (Approach cushion slab)　　Rebar weight 〔1/1〕

per a place

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F1	D 18	B	⌊	4.800 ×1	0.200 ×2						5.20	50	260.00	
F2	D 16	B	⌊	4.800 ×1	0.200 ×2						5.20	50	260.00	
F3	D 16	A	—	9.800 ×1							9.80	25	245.00	
F4	D 16	A	—	9.800 ×1							9.80	25	245.00	
F5	D 12	B	]	0.229 ×1	0.180 ×2						0.59	141	84.96	

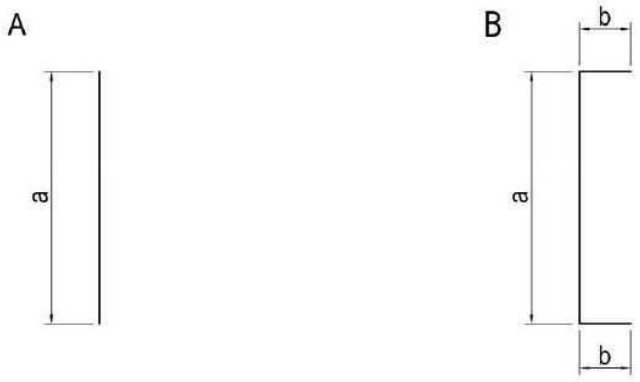
D12	84.96×0.888	=	75.44 kg	= 0.075 t
D16	750.00×1.58	=	1185.00 kg	= 1.185 t
D18	260.00×2.00	=	520.00 kg	= 0.520 t

Type

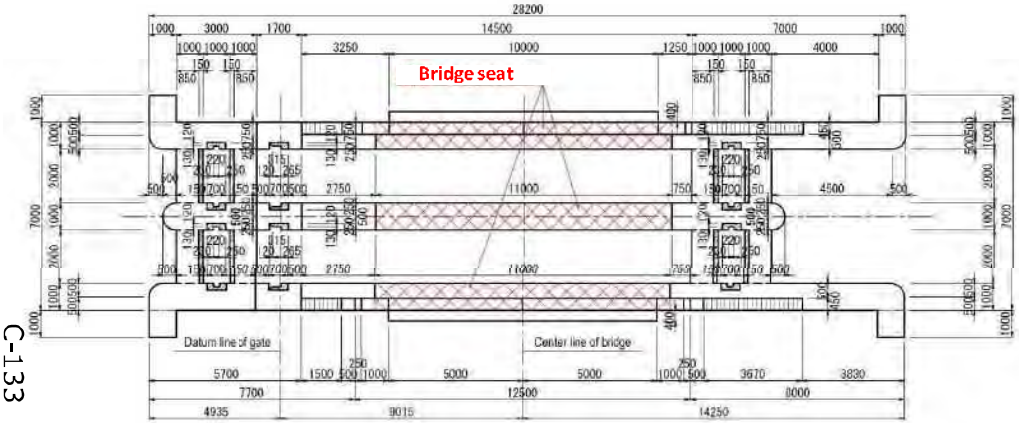
A　　B

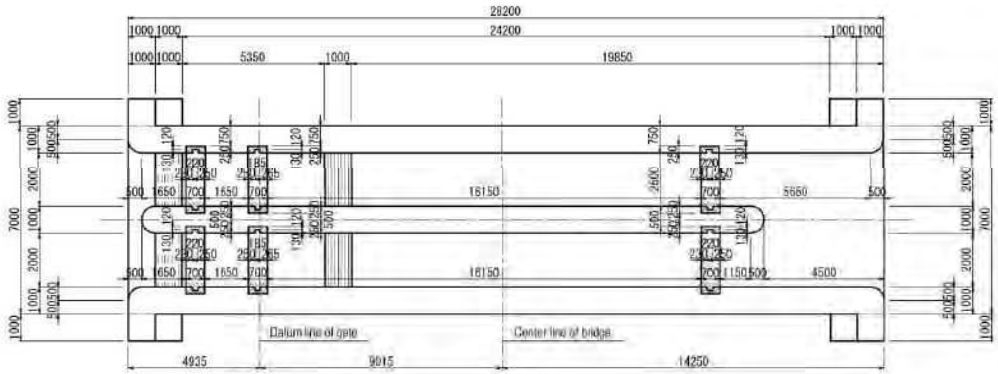
Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

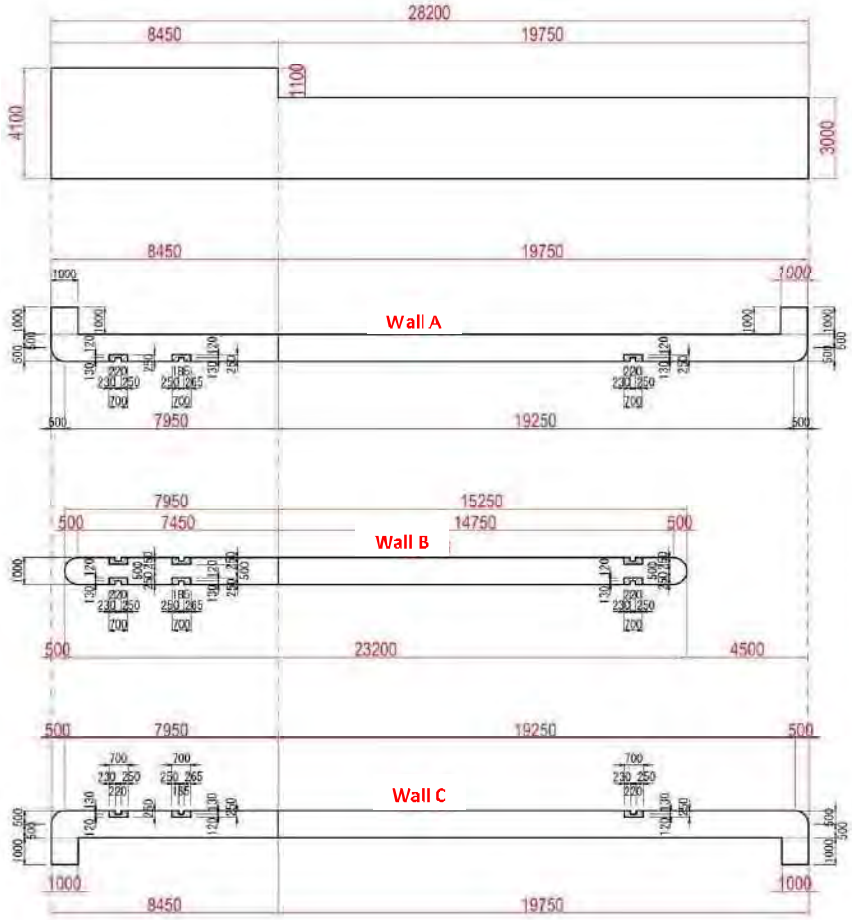
Schematic design of rebar
(Approach cushion slab)



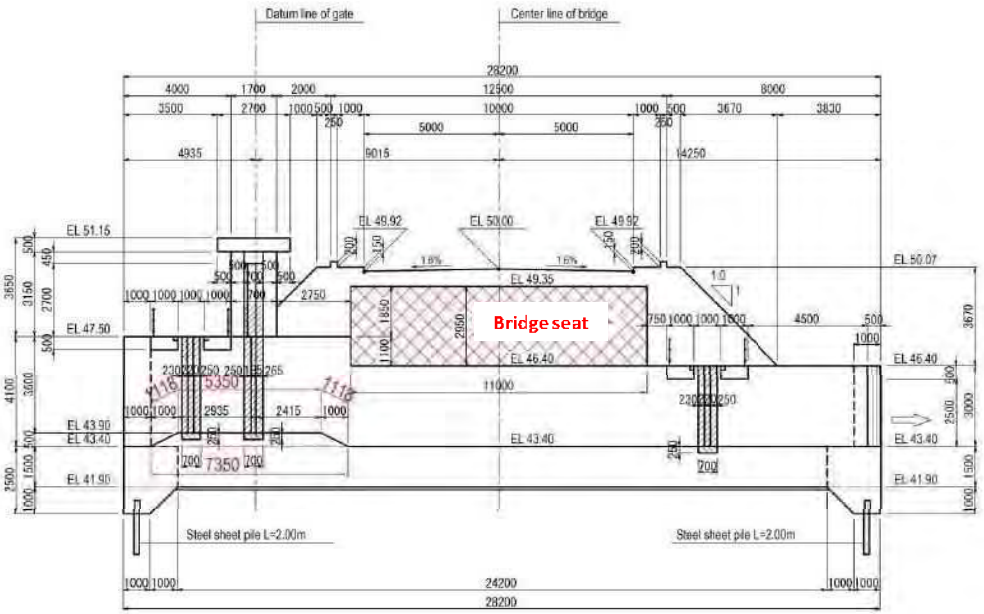
Concrete / Formwork (1/2)



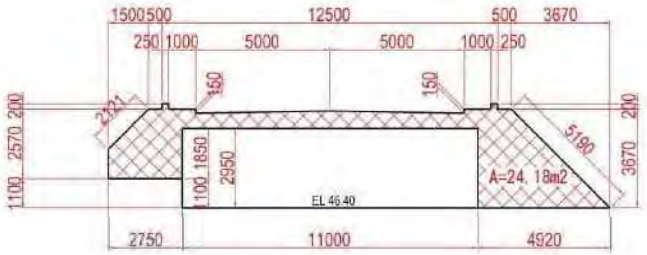


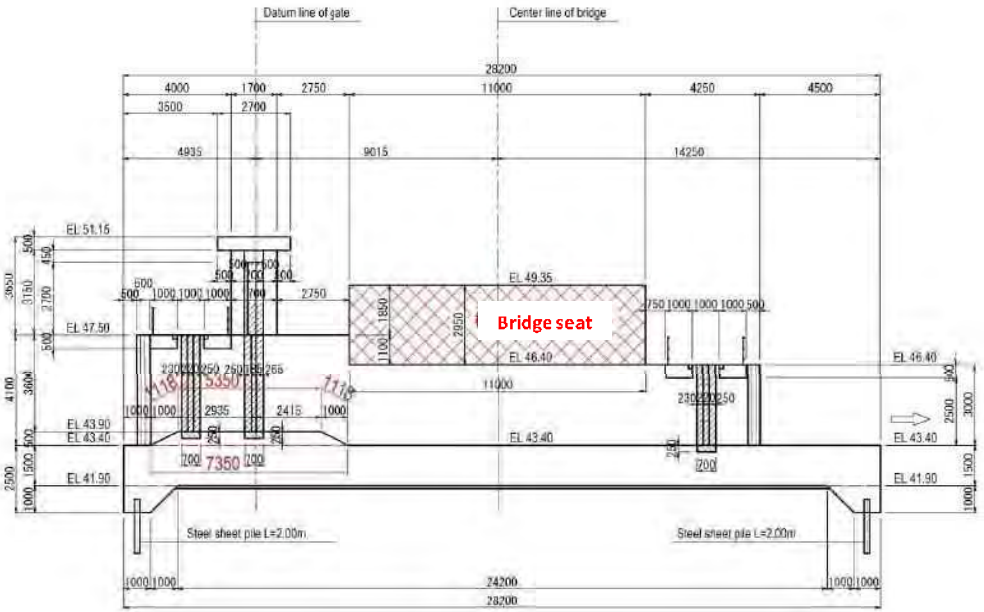


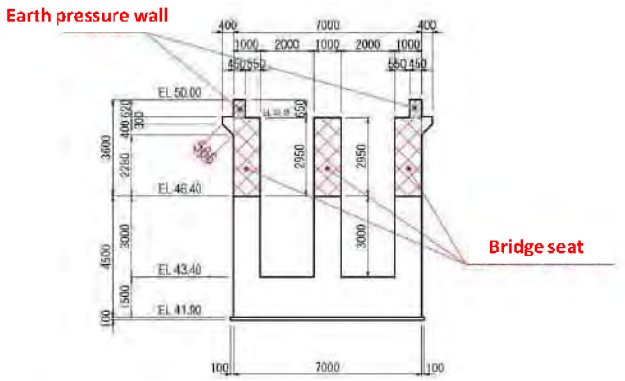
Concrete / Formwork (2/2)



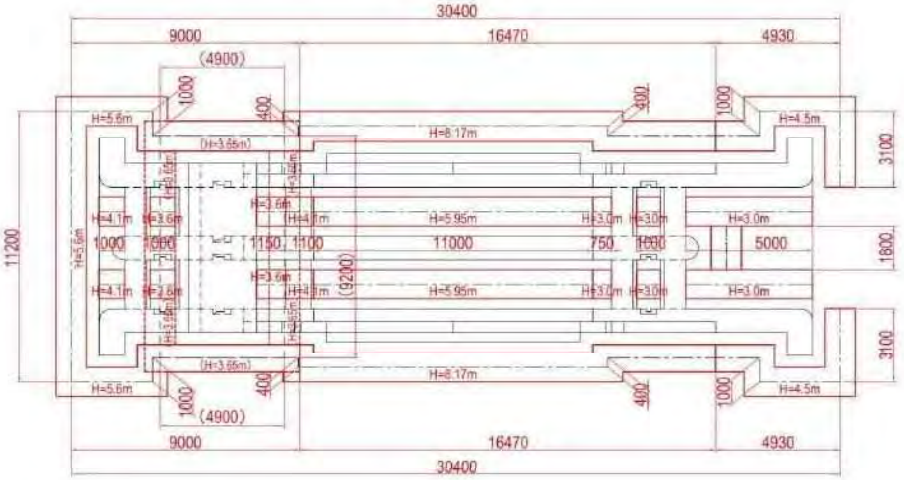
Earth pressure wall (t=450)



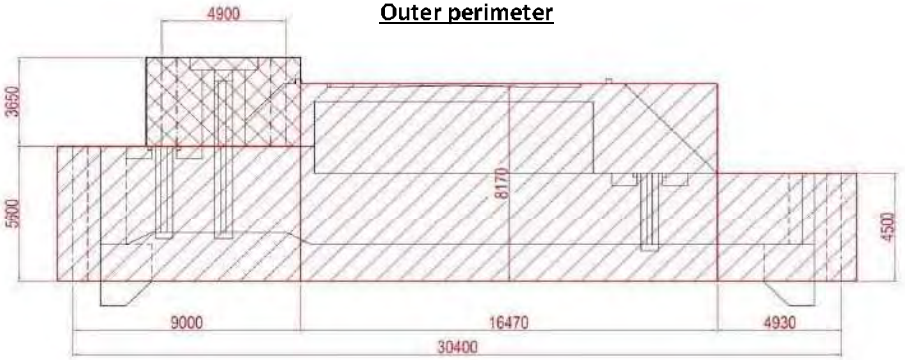




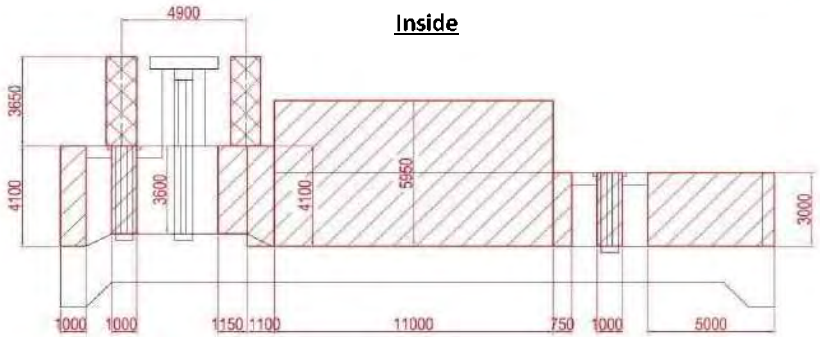
Scaffolding



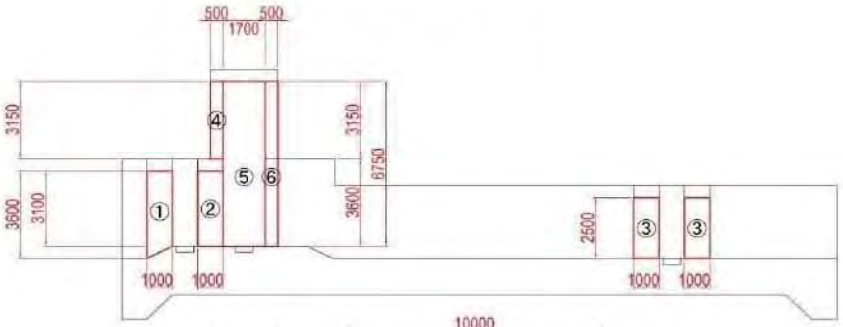
Outer perimeter

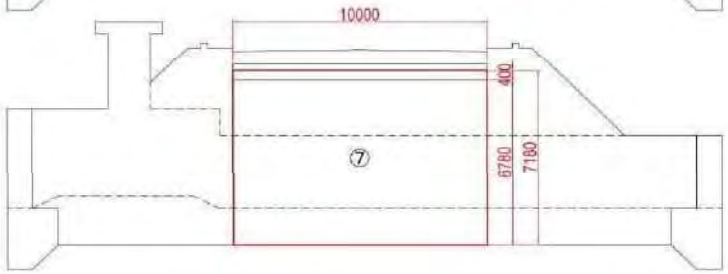


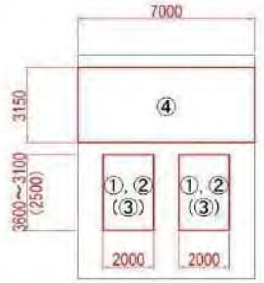
Inside

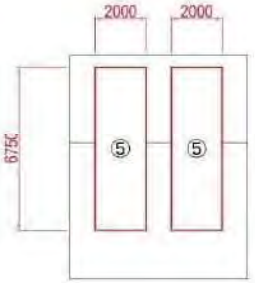


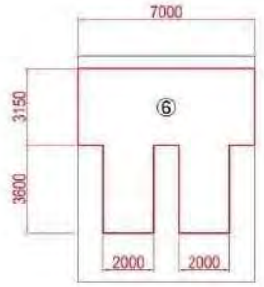
Falsework

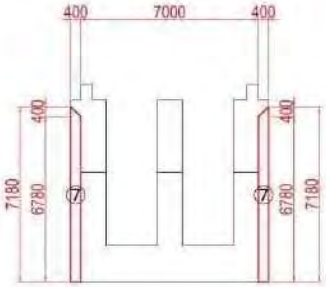












(4) Diroutiah regulator

Diroutiah Weir body Quantity Summary Sheet						
Type of works	Class	Subdivision	Dimensions	Unit	Quantity	Remarks
Weir body	Main body	Leveling con.	σck=20N/mm^2	m^3	24.28	
		formwork	Leveling con.	m^2	4.76	
		Reinforced con.	σck=25N/mm^2	m^3	987.61	
		Formwork	RC structure	m^2	1,350.14	
		Circular formwork	RC structure φ1000-1/2Circle	m^2	20.42	
		〃	RC structure φ1000-1/4Circle	m^2	10.21	
		Second stage con.	σck=25N/mm2	m^3	14.47	
		Formwork	RC structure	m^2	70.87	
		Rebar	D12	t	2.686	
		〃	D16	t	40.722	
		〃	D22	t	2.424	
		Concrete curing	PC structure	m^3	24.28	
		〃	RC structure	m^3	1,002.08	
		Scaffolding	Prefabricated scaffold H≦30m	m^2	933.33	
		Falsework	Pipe support falsework, H< 4.0m Support bearing force 40KN/m2 and less	m^3	61.50	
		〃	Wedge linked falsework, H≦30m, Support bearing force 40KN/m^2 and less	m^3	76.98	
	Other miscellaneous	Joint bar	D16~200	nos	464	
		Gration	2000×1000	set	6	
	Safty facillities work	Guard fense	H=1.10m	m	59.20	

Type of works	Class	Subdivision	Dimensions	Unit	Quantity	Remarks
Approach cushion slab	Approach cushion slab	Reinforced con.	σck=25N/mm^2	m^3	10.00	
		Formwork	RC structure	m^2	24.00	
		Rebar	D12	t	0.150	
		〃	D16	t	2.370	
		〃	D18	t	1.040	
		Concrete curing	RC structure	m^3	10.00	
		Anchor cap	SGPφ40×180	nos	50	
		Anchor bar	D22×500 (including D10 spiral reinforcement)	nos	50	
		Rubber shoe	t=30mm	m^2	6.00	
		Expansion joint	Elastic filler,t=20mm	m^2	8.60	

Diroutiah Weir body Quantity calculation

Description	Classification	Calculation			Quantity	Unit	Remarks
Main body							
Leveling con.	σck=20N/mm^2						
		10.20 × (23.70−23.90)/2 × 0.10	=	21.28	21.28	m^3	
Formwork	Leveling con.	(23.70+23.90) 2×0.10×2	=	4.76	4.76	m^2	
Reinforced con.	σck=25N/mm^2						
	Cut-off	1/2×(1.00−2.00)×1.00×12.00×2	=	36.00			
	Invert	1.00×1.50×2.00×2×2	=	12.00			
	〃	10.00×1.50×27.70	=	415.50			
	〃	1/2×(5.35−7.35)×0.50 × 2.00×3	=	19.05			
	〃	−0.25 × 0.70×2.50 (3) 3	=	-3.94			(-)Blockout
	Wall A	1.00×3.80 × 1.00	=	3.80			
	〃	1.00×3.80×8.45	=	32.11			
	〃	1.00×2.70 × 19.25	=	51.98			
	〃	1.00×2.70 × 1.00	=	2.70			
	〃	−(1− π /4) × 0.50^2 × (3.80 I 2.70)	=	-0.35			
	〃	−0.25 × 0.70×(3.30 × 2+2.70)	=	-1.63			(-)Blockout
	Wall B	1.00×3.80×7.95×2	=	60.42			
	〃	1.00×2.70×15.25×2	=	82.35			
	〃	−(1− π 4) × 0.50^2 × 2×(3.80−2.70)×2	=	-1.39			
	〃	−0.25 × 0.70×(3.30 × 2 I 2.70) × 2 × 2	=	-6.51			(-)Blockout
	Wall C	1.00×3.80×1.00	=	3.80			
	〃	1.00×3.80×8.45	=	32.11			
	〃	1.00×2.70 × 19.25	=	51.98			
	〃	1.00×2.70 × 1.00	=	2.70			
	〃	−(1− π /4) × 0.50^2 × (3.80 I 2.70)	=	-0.35			
	〃	−0.25 × 0.70×(3.30 × 2+2.70)	=	-1.63			(-)Blockout

Description	Classification	Calculation			Quantity	Unit	Remarks
	Corridor	1.00×0.50×2.00×1×3	=	12.00			
	〃	-0.15×0.15×2.00×4×3	=	-0.51			(-)Second stage con.
	Bridge seat	1.00×2.95×11.00×4	=	129.80			
	Earth pressure wall	0.45×24.18×2	=	21.76			
	Pedestal	1/2×(0.30 0.70)×0.40×10.00×2	=	4.00			
	Gate pier	1.00×2.85×1.70×1	=	19.38			
	〃	-0.25×0.70×2.85×6	=	-2.99			(-)Blockout
	Top slab	2.70×0.50×10.00	=	13.50			
		Total	=	987.61	987.61	m^3	
Formwork	RC structure						
	Cut-off	1/2×(1.00-2.00)×1.00×2×2	=	6.00			Side
	〃	1.00×12.00×2	=	24.00			End
	Invert	(12.00 1.00×2)×1.50×2	=	42.00			End
	〃	27.700×1.50×2	=	83.10			Side
	〃	1.118×2.00×2×3	=	13.42			Raising part
	〃	(0.70-2.50)×2×0.25×3×3	=	11.40			Blockout part
	Wall A	1.00×3.80×2	=	7.60			
	〃	3.80×(0.50 8.45 7.95)	=	64.22			
	〃	2.70×(0.50 19.25 18.75)	=	103.95			
	〃	1.00×2.70×2	=	5.40			
	〃	3.30×0.25×2×2	=	3.30			Blockout part
	〃	2.70×0.25×2	=	1.35			〃
	〃	-1 2×(5.35+7.35)×0.50	=	-3.18			(-)Raising part
	〃	-(1.00×0.50-0.15×0.15)×4	=	-1.91			(-)Corridor part
	Wall B	3.80×7.15×2×2	=	113.21			
	〃	2.70×14.75×2×2	=	159.30			
	〃	3.30×0.25×2×4×2	=	13.20			Blockout part
	〃	2.70×0.25×4×2	=	5.40			〃
	〃	-1/2×(5.35 7.35)×0.50×2×2	=	-12.70			(-)Raising part

Description	Classification	Calculation			Quantity	Unit	Remarks
	〃	-(1.00×0.50-0.15×0.15)×4×2×2	=	-7.61			(-)Corridor part
	Wall C	1.00×3.80×2	=	7.60			
	〃	3.80×(0.50+8.45+7.95)	=	64.22			
	〃	2.70×(0.50+19.25+18.75)	=	103.95			
	〃	1.00×2.70×2	=	5.40			
	〃	3.30×0.25×2×2	=	3.30			Blockout part
	〃	2.70×0.25×2	=	1.35			〃
	〃	-1 2×(5.35+7.35)×0.50	=	-3.18			(-)Raising part
	〃	-(1.00×0.50-0.15×0.15)×4	=	-1.91			(-)Corridor part
	Corridor	(1.00-0.50×2)×2.00×1×3	=	18.00			
	Bridge seat	(11.00×2+0.55)×2.95×2	=	133.05			Abut pier
	〃	0.55×1.85×2	=	2.01			〃
	〃	-0.70×10.00×2	=	-14.00			(-)Bridge seat
	〃	(11.00×2+1.00)×2.95×2	=	135.70			Middle pier
	〃	1.00×1.85×2	=	3.70			〃
	Earth pressure wall	24.18×2×2	=	96.72			
	〃	(2.121+0.20×4-0.15×2+5.19)×0.45×2	=	7.57			
	Pedestal	(0.30-0.566)×10.00×2	=	17.32			
	〃	1/2×(0.30 0.70)×0.40×2×2	=	0.80			
	Gate pier	(1.70 1.00)×2×2.85×4	=	61.56			
	〃	0.25×2.85×2×6	=	8.55			
	Top slab	(2.70-10.00)×2×0.50	=	12.70			Side
	〃	2.70×10.00	=	27.00			Underside
	〃	-(1.00×1.70-0.25×0.70)×2	=	-3.05			(-)Gate pier part
	〃	-(1.00×1.70-0.25×0.70×2)×2	=	-2.70			〃
		Total	=	1350.11	1350.14	m²	
Circular formwork	RC structure						
φ1000-1/2Circle		π 2×1.00×(3.80-2.70)×2	=	20.42	20.42	m²	
φ1000-1/4Circle		π 4×1.00×(3.80-2.70)×2	=	10.21	10.21	m²	

Description	Classification	Calculation			Quantity	Unit	Remarks
Second stage con.	σck=25N/mm^2						
		0.70×2.50×0.25×3×3	=	3.91			Invert part
		0.70×0.25×(3.30+2.70)×6	=	6.30			Stop log part
		-0.22×0.13×(3.30+2.70)×6	=	-1.03			〃
		(0.70×0.25-0.185×0.13)×3.30×6	=	2.99			Gate part
		{1/2×(0.315+0.135)×0.12+0.265×0.25}×2.40×6					Gate pier part
			=	1.60			
		(0.15^2-0.05^2)×2.00×4×3	=	0.48			Corridor part
		0.05/6×{(2×0.81+0.71)×1.72+(2×0.71+0.81)×1.62}×3					Top slab part
			=	0.19			
			Total =	11.47	14.17	m^3	
Formwork	RC structure						
		(0.70 0.13×2)×3.30×2×3	=	19.01			Stop log part
		(0.70 0.13×2)×2.70×2×3	=	15.55			〃
		(0.70-0.13×2)×3.30×2×3	=	19.01			Gate part
		(0.265+0.13+0.315+0.12×√(2))×2.10×6	=	12.67			Gate pier part
		0.15×2.00×4×3	=	3.60			Corridor part
		1/2×(0.71 0.81)×0.05×√(2)×2×3	=	0.32			Top slab part
		1/2×(1.62 1.72)×0.05×√(2)×2×3	=	0.71			〃
			Total =	70.87	70.87	m^2	
Rebar	Steel 360/520	refer to rebar weight caluculation sheet					
		D12	=	2.686	2.686	t	
		D16	=	40.722	40.722	t	
		D22	=	2.121	2.121	t	
Concrete curing	PC structure	Leveling concrete	=	21.28	21.28	m^3	
	RC structure	987.61+14.47	=	1002.08	1002.08	m^3	

Description	Classification	Calculation			Quantity	Unit	Remarks
Scaffolding	Prefabricated scaffold, H≤ 30m						
	Outer perimeter	5.30×{11.20+(9.00+1.00+0.10)×2}	=	185.50			
	〃	7.87×(16.47+0.40)×2	=	265.53			
	〃	4.20×(4.43+1.00+3.10)×2	=	71.65			
	Inside	3.80×(1.00+1.10)×3	=	23.94			
	〃	3.30×(1.00+1.15)×3	=	21.29			
	〃	5.65×11.00×3	=	186.45			
	〃	2.70×{(0.75+1.00−5.00)×3+1.80×2}	=	64.40			
	Gate pier part	3.35×(4.90+12.20)×2	=	114.57			
		Total	=	933.33	933.33	m^2	
Falsework	Pipe support falsework, H< 4.0m, Support bearing force 40KN/m2 and less						
	①	1.00×(3.30+2.80)/2×2.00×3	=	18.30			Corridor part
	②	1.00×2.80×2.00×3	=	16.80			〃
	③	1.00×2.20×2.00×3×2	=	26.40			〃
		Total	=	61.50	61.50	m^3	
	Wedge linked falsework, H≤ 30m, Support bearing force 40KN/m^2 and less						
	④	0.50×2.85×10.00	=	14.25			Gate pier part
	⑤	1.70×6.15×2.00×3	=	62.73			〃
	⑥	0.50×(10.00×2.85+2.00×3.30×3)	=	21.15			〃
	⑦	0.40×(6.88+6.48)/2×10.00×2	=	53.41			Pedestal part
		Total	=	76.98	76.98	m^3	
Other miscellaneous							
Joint bar	D16×200	104×2	=	208.0			Gate part
	〃	(68+60)×2	=	256.0			Stop log part
		Total	=	464.0	464	nos	
Grating	2000×1000		=	6.0	6	set	

Description	Classification	Calculation			Quantity	Unit	Remarks
Safety facilities work							
Guard fense	H-1.10m	9.70×2−2.10+1.40	=	23.20			Top slab part
		9.00×4	=	36.00			Corridor part
		Total	=	59.20	59.20	m	
Approach cushion slab							
Reinforced con.	σck=25N/mm^2						
		10.00×5.00×0.40×2	=	40.00	40.00	m^3	
Formwork	RC structure						
		(10.00+5.00)×0.10×2×2	=	21.00	24.00	m^2	
Rebar	Steel 360/520	refer to rebar weight caluculation sheet					
		D12 0.075 × 2	=	0.150	0.150	t	
		D16 1.185 × 2	=	2.370	2.370	t	
		D18 0.520 × 2	=	1.040	1.040	t	
Concrete curing	RC structure	Reinforced con.	=	40.00	40.00	m^3	
Anchor cap	SGPφ40×180						
		25×2	=	50.0	50	nos	
Anchor bar	D22×500(including D10 spiral reinforcement)						
		25×2	=	50.0	50	nos	
Rubber shoe	t=30mm						
		10.00×0.30×2	=	6.00	6.00	m^2	
Expansion joint	Elastic filler,t=20mm						
		0.43×10.00×2	=	8.60	8.60	m^2	

Grating (2000×1000)　Quantity calculation

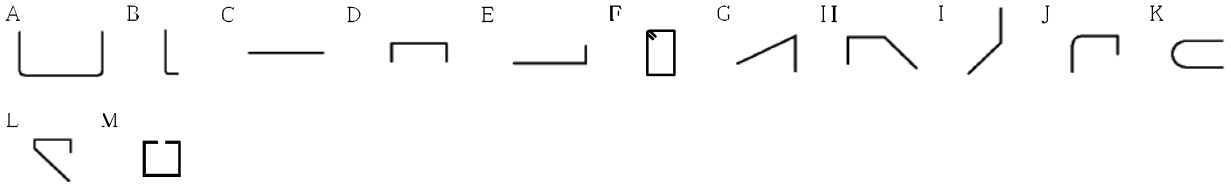
per a piece

Description	Classification	Calculation	Quantity	Unit	Remarks
Grating	t-44 × 985 × 1060				
		= 2.0	2	pieces	
Equal-leg angle	L-50 × 50 × 6 × 2000				
		2.00×0.00413×2 — 0.02	0.02	t	
Anchor bar	D12×105	4×2 — 8.0	8	nos	

Diroutiah Reg. Rebar weight [1/8]

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F1	D 16	A		9.460 ×1	4.930 ×1	4.930 ×1	0.267 ×2		φ 170	1.000 ×1	20.86	43	896.98	
F2	D 16	A		9.460 ×1	6.780 ×1	6.780 ×1	0.267 ×2		φ 170	1.000 ×1	24.56	55	1350.80	
F3	D 16	A		9.460 ×1	3.830 ×1	3.830 ×1	0.267 ×2		φ 170	1.000 ×1	18.66	42	783.72	
F4	D 16	C		9.800 ×1							9.80	146	1430.80	
F5	D 16	C		27.500 ×1						1.000 ×2	29.50	50	1475.00	
F6	D 16	C		21.150 ×1						1.000 ×1	22.15	6	132.90	
F7	D 16	C		5.450 ×1							5.45	12	65.40	
F8	D 16	C		1.900 ×1							1.90	36	68.40	
F9	D 16	G		1.866 ×1	1.137 ×1						3.01	30	90.30	
F10	D 16	D		1.418 ×1	1.134 ×2						3.69	30	110.70	
F11	D 16	H		1.134 ×1	2.007 ×1	1.859 ×1					5.00	30	150.00	
F12	D 16	E		13.884 ×1	1.134 ×1					1.000 ×1	16.02	30	480.60	
F13	D 16	E		5.434 ×1	1.134 ×1						6.57	30	197.10	
F14	D 16	C		5.050 ×1							5.05	18	90.90	
F15	D 16	C		4.726 ×1							4.73	30	141.90	
F16	D 16	C		2.700 ×1							2.70	48	129.60	
F17	D 16	D		1.268 ×1	0.240 ×2						1.75	88	154.00	
F18	D 16	D		9.800 ×1	0.240 ×2						10.28	12	123.36	

Type

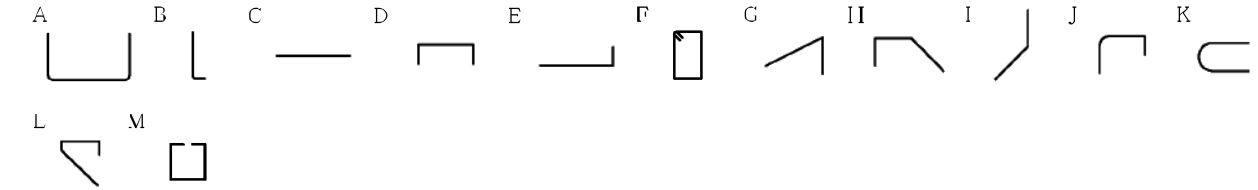


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Diroutiah Reg. Rebar weight [2/8]

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F19	D 16	C		27.500 ×1						1.000 ×2	29.50	12	354.00	
F20	D 16	C		1.900 ×1							1.90	104	197.60	
F21	D 16	D		1.268 ×1	0.240 ×2						1.75	16	28.00	
F22	D 16	C		1.800 ×1							1.80	24	43.20	
F23	D 16	C		1.000 ×1							1.00	16	16.00	
F24	D 16	D		1.268 ×1	0.240 ×2						1.75	20	35.00	
F25	D 16	C		1.900 ×1							1.90	120	228.00	
F26	D 16	C		2.273 ×1							2.28	100	228.00	
F27	D 16	I		1.331 ×1	1.000 ×1						2.34	20	46.80	
F28	D 16	C		11.800 ×1							11.80	20	236.00	
F29	D 12	M		0.428 ×1	1.328 ×1	1.328 ×1	0.100 ×2				3.29	8	26.32	
F30	D 12	M		0.428 ×1	1.468 ×1 ～1.575	1.561 ×1 ～1.668	0.100 ×2				3.77	30	113.10	
F31	D 12	M		0.428 ×1	1.578 ×1	1.578 ×1	0.100 ×2				3.79	15	56.85	
F32	D 12	M		0.428 ×1	1.828 ×1	1.828 ×1	0.100 ×2				4.29	45	193.05	
F33	D 12	M		0.428 ×1	1.328 ×1	1.328 ×1	0.100 ×2				3.29	341	1131.76	
F34	D 12	M		0.428 ×1	1.078 ×1	1.078 ×1	0.100 ×2				2.79	8	22.32	
W1	D 16	C		5.100 ×1							5.10	108	550.80	
W2	D 16	C		6.950 ×1							6.95	110	764.50	

Type

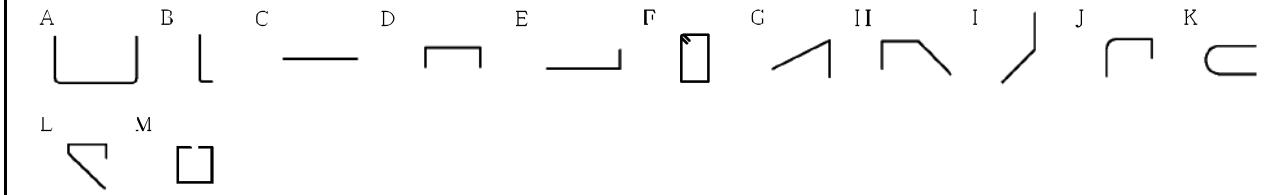


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Diroutiah Reg. Rebar weight 〔3/8〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W3	D 16	C		4.000 ×1							4.00	98	392.00	
W4	D 16	E		5.100 ×1	0.240 ×1						5.34	200	1068.00	
W5	D 16	E		6.950 ×1	0.240 ×1						7.19	220	1581.80	
W6	D 16	E		4.000 ×1	0.240 ×1						4.24	108	457.92	
W7	D 16	C		3.850 ×1							3.85	24	92.40	
W8	D 16	C		5.100 ×1							5.10	20	102.00	
W9	D 16	C		4.000 ×1							4.00	20	80.00	
W10	D 16	D		0.800 ×1	1.000 ×2						2.80	228	638.40	
W11	D 16	D		0.550 ×1	1.000 ×2						2.55	20	51.00	
W12	D 16	D		0.800 ×1	0.240 ×2						1.28	20	25.60	
W13	D 16	D		0.747 ×1	1.000 ×2						2.75	4	11.00	
W14	D 16	D		0.800 ×1	1.000 ×2						2.80	184	515.20	
W15	D 16	D		0.300 ×1	1.000 ×2						2.30	20	46.00	
W16	D 16	D		0.693 ×1	1.000 ×2						2.70	4	10.80	
W17	D 16	C		27.500 ×1						1.000 ×2	29.50	30	885.00	
W18	D 16	C		8.250 ×1							8.25	12	99.00	
W19	D 16	J		1.400 ×1	1.534 ×1	0.768 ×1	0.603 ×1		φ 384		4.31	40	172.40	
W20	D 16	D		1.418 ×1	0.768 ×2						2.96	40	118.40	

Type

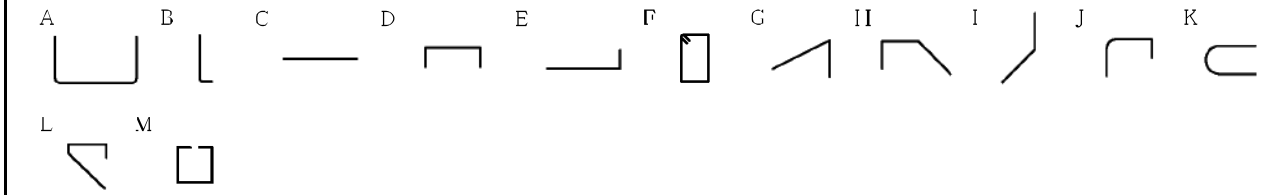


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Diroutiah Reg. Rebar weight 〔4/8〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W21	D 16	D		15.918 ×1	0.768 ×2					1.000 ×1	18.46	28	516.88	
W22	D 16	D		3.018 ×1	0.768 ×2						4.56	12	54.72	
W23	D 16	J		1.400 ×1	5.034 ×1	0.768 ×1	0.603 ×1		φ 384		7.81	28	218.68	
W24	D 16	C		5.050 ×1							5.05	38	191.90	
W25	D 16	C		2.700 ×1							2.70	32	86.40	
W26	D 16	C		10.800 ×1							10.80	60	648.00	
W27	D 16	D		0.768 ×1	0.240 ×2						1.25	60	75.00	
W28	D 16	C		1.800 ×1							1.80	76	136.80	
W29	D 16	C		1.746 ×1							1.75	4	7.00	
W30	D 16	K		1.050 ×2	1.206 ×1				φ 381		3.31	40	132.40	
W31	D 16	C		1.450 ×1							1.45	80	116.00	
W32	D 16	C		15.950 ×1						1.000 ×1	16.95	56	949.20	
W33	D 16	C		3.050 ×1							3.05	24	73.20	
W34	D 16	K		1.050 ×2	1.206 ×1				φ 381		3.31	28	92.68	
W35	D 16	C		5.050 ×1							5.05	76	383.80	
W36	D 16	C		2.700 ×1							2.70	64	172.80	
W37	D 16	C		10.800 ×1							10.80	60	648.00	
W38	D 16	D		0.768 ×1	0.240 ×2						1.25	208	260.00	

Type

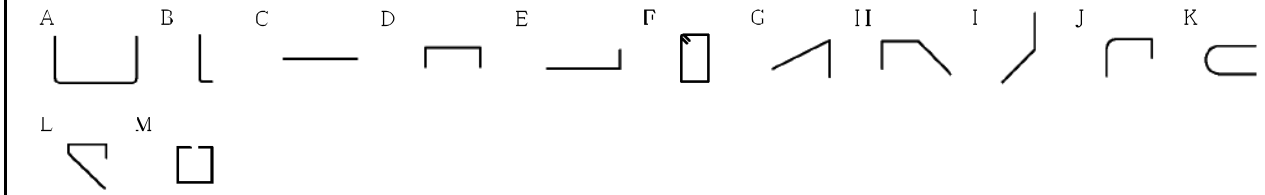


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Diroutiah Reg. Rebar weight 〔5/8〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W39	D 16	C	—	1.896 ×1							1.90	2	3.80	
W40	D 16	C	—	4.300 ×1							4.30	4	17.20	
W41	D 16	C	—	1.450 ×1							1.45	2	2.90	
W42	D 16	C	—	4.150 ×1							4.15	6	24.90	
W43	D 16	C	—	10.800 ×1							10.80	6	64.80	
W44	D 16	C	—	2.800 ×1							2.80	2	5.60	
W45	D 16	C	—	5.896 ×1							5.90	2	11.80	
W46	D 16	C	—	9.650 ×1							9.65	4	38.60	
W47	D 16	C	—	1.396 ×1							1.40	4	5.60	
W48	D 16	C	—	3.800 ×1							3.80	2	7.60	
W49	D 16	C	—	1.450 ×1							1.45	1	5.80	
W50	D 16	C	—	4.150 ×1							4.15	6	24.90	
W51	D 16	C	—	10.800 ×1							10.80	6	64.80	
W52	D 16	C	—	2.800 ×1							2.80	1	11.20	
W53	D 16	C	—	5.150 ×1							5.15	2	10.30	
W54	D 16	C	—	1.396 ×1							1.40	1	5.60	
W55	D 12	D	⊓	0.828 ×1	0.100 ×2						1.03	596	613.88	
W56	D 12	D	⊓	0.578 ×1	0.100 ×2						0.78	44	34.32	

Type

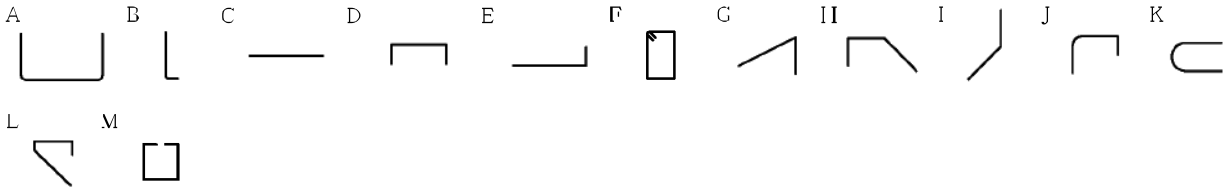


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Diroutiah Reg. Rebar weight [6/8]

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W57	D 12	D	⌐¬	0.828 ×1	0.100 ×2						1.03	30	30.90	
W58	D 12	D	⌐¬	0.828 ×1	0.100 ×2						1.03	540	556.20	
W59	D 12	D	⌐¬	0.328 ×1	0.100 ×2						0.53	44	23.32	
P1	D 22	C	|	1.470 ×1							1.47	204	299.88	
P2	D 22	C	|	1.620 ×1							1.62	16	25.92	
P3	D 22	C	|	2.029 ×1 ～3.429							2.73	32	87.36	
P4	D 22	C	|	3.470 ×1							3.47	24	83.28	
P5	D 22	C	|	4.570 ×1							4.57	24	109.68	
P6	D 22	C	|	4.529 ×1 ～1.229							2.88	72	207.36	
P7	D 12	D	⌐¬	0.250 ×1	0.180 ×2						0.61	186	113.46	
P8	D 16	C	—	13.717 ×1 ～14.457						1.000 ×1	15.09	12	181.08	
P9	D 16	C	—	2.929 ×1 ～3.479							3.21	16	51.36	
P10	D 16	C	—	3.650 ×1							3.65	20	73.00	
P11	D 16	C	—	2.929 ×1 ～5.679							1.31	60	258.60	
P12	D 16	H	⌐	1.050 ×1	1.609 ×1	2.038 ×1					1.70	1	18.80	
P13	D 16	H	¬	1.050 ×1	1.609 ×1	6.049 ×1					8.71	1	34.84	
P14	D 16	D	[	0.218 ×1	0.240 ×2						0.70	10	7.00	
P15	D 12	D	⌐¬	0.278 ×1	0.100 ×2						0.48	126	60.48	

Type

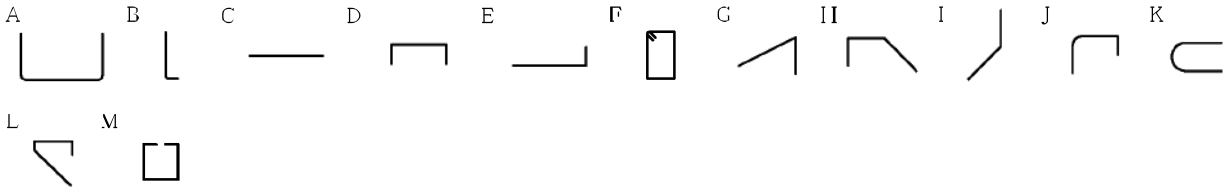


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Diroutiah Reg. Rebar weight 〔7/8〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
S1	D 16	C	—	9.800 ×1							9.80	44	431.20	
S2	D 16	C	—	0.800 ×1							0.80	240	192.00	
S3	D 16	D	⌐¬	0.618 ×1	0.268 ×2						1.16	120	139.20	
C1	D 16	L	◺	0.240 ×1	0.650 ×1	0.159 ×1	0.919 ×1				1.97	102	200.94	
C2	D 16	C	—	9.800 ×1							9.80	8	78.40	
G1	D 16	A	⊓	9.460 ×1	1.230 ×1	1.630 ×1	0.267 ×2		φ 170	1.000 ×1	13.86	8	110.88	
G2	D 16	B	⌐	1.024 ×1	1.230 ×1 ～1.630	0.267 ×1					2.73	2	5.46	
G3	D 16	B	⌐	1.053 ×1	1.630 ×1 ～1.230	0.267 ×1					2.75	2	5.50	
G4	D 16	C	—	0.789 ×1 ～0.845							0.82	6	4.92	
G5	D 16	C	—	1.589 ×1 ～1.645							1.62	1	6.18	
G6	D 16	C	|	1.250 ×1							1.25	140	595.00	
G7	D 16	F	▯	0.332 ×3	0.832 ×2	0.225 ×3					2.78	120	333.60	
G8	D 16	F	▭	0.582 ×2	1.532 ×2	0.225 ×2					4.68	30	140.40	
G9	D 16	F	▭	0.332 ×2	1.532 ×2	0.225 ×2					1.18	30	125.10	
G10	D 12	D	⌐¬	0.578 ×1	0.100 ×2						0.78	16	12.48	
G11	D 12	D	⌐¬	0.328 ×1	0.100 ×2						0.53	16	8.48	
T1	D 16	D	⌐¬	9.800 ×1	0.300 ×2						10.40	6	62.40	
T2	D 16	D	⌐¬	9.800 ×1	0.240 ×2						10.28	14	143.92	

Type



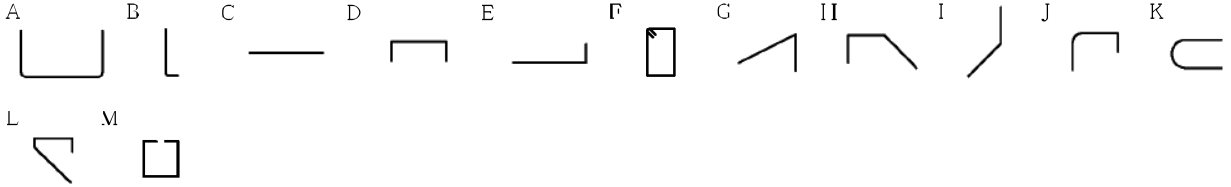
Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Diroutiah Reg. Rebar weight [8/8]

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
T3	D 16	E		1.094 ×1 ～1.223	0.240 ×1						1.45	4	5.80	
T4	D 16	C		0.789 ×1 ～0.845							0.82	6	4.92	
T5	D 16	C		1.589 ×1 ～1.645							1.62	4	6.48	
T6	D 16	D		2.532 ×1	0.332 ×2						3.20	45	144.00	
T7	D 16	D		2.532 ×1	0.240 ×2						3.02	45	135.90	
T8	D 16	E		1.078 ×1 ～1.156	0.332 ×1						1.45	12	17.40	
T9	D 16	E		1.196 ×1 ～1.118	0.332 ×1						1.49	12	17.88	
T10	D 16	E		1.078 ×1 ～1.156	0.240 ×1						1.36	12	16.32	
T11	D 16	E		1.196 ×1 ～1.118	0.240 ×1						1.40	12	16.80	
T12	D 12	D		0.328 ×1	0.100 ×2						0.53	53	28.09	
T13	D 16	C		9.150 ×1							9.15	1	36.60	
T14	D 16	C		2.150 ×1							2.15	72	154.80	

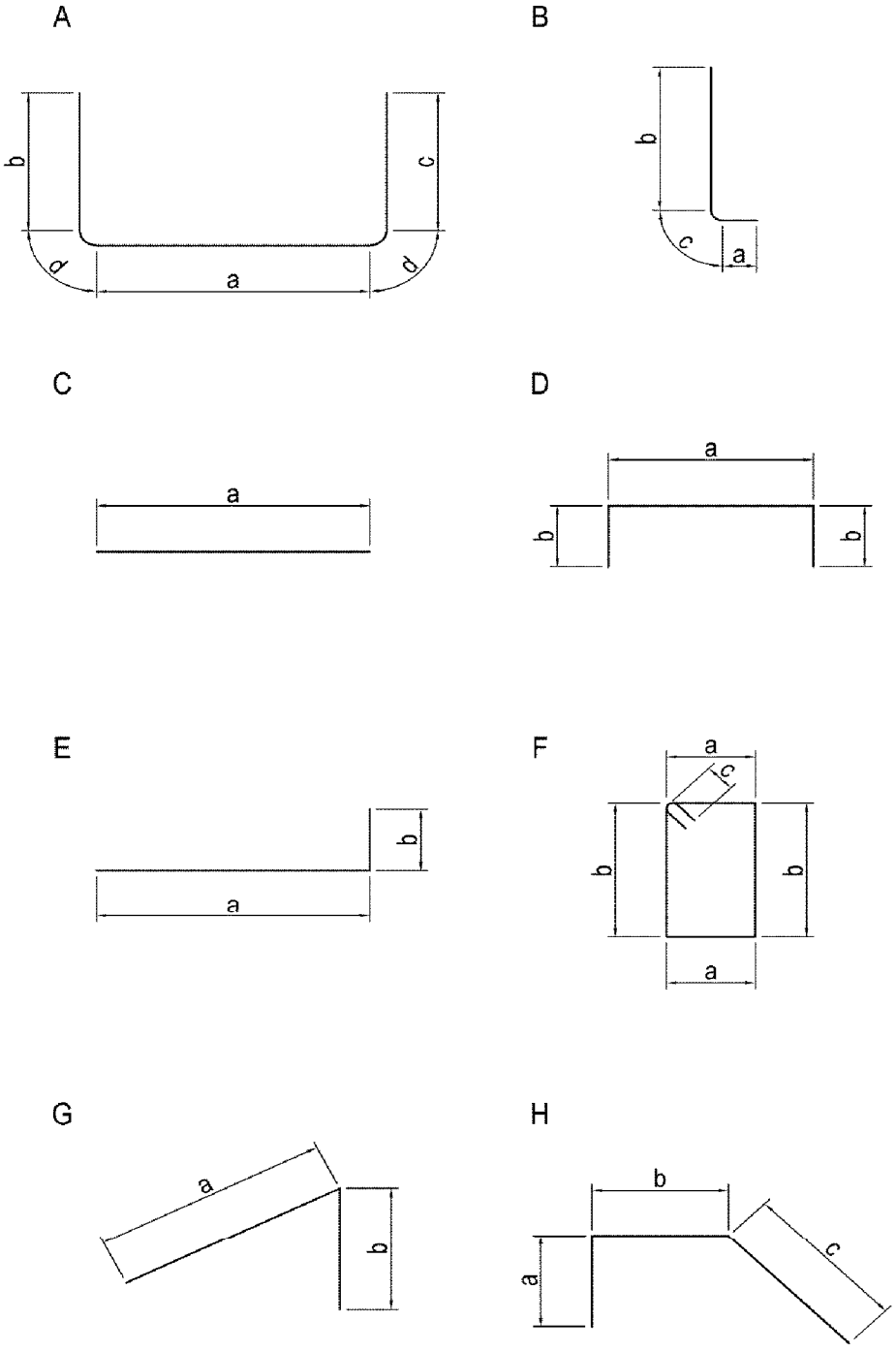
D12	3025.01 × 0.888	= 2686.21 kg	= 2.686 t
D16	25773.42 × 1.58	= 40722.00 kg	= 40.722 t
D22	813.48 × 2.98	= 2424.17 kg	= 2.424 t

Type



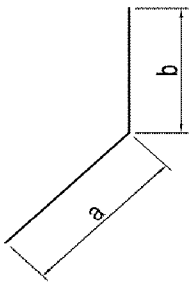
Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Schematic design of rebar (1/2)

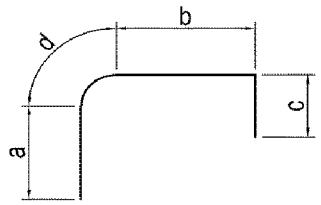


Schematic design of rebar (2/2)

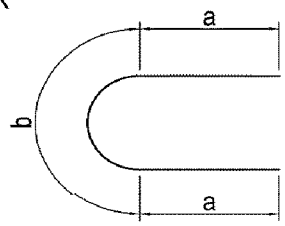
I



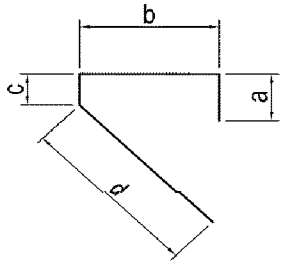
J



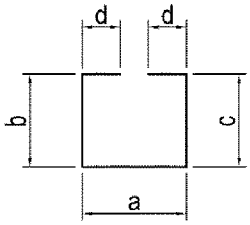
K



L



M



Diroutiah Reg. (Approach cushion slab)　　Rebar weight 〔1/1〕

per a place

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F1	D 18	B	⌊	4.800 ×1	0.200 ×2						5.20	50	260.00	
F2	D 16	B	⌈	4.800 ×1	0.200 ×2						5.20	50	260.00	
F3	D 16	A	—	9.800 ×1							9.80	25	245.00	
F4	D 16	A	—	9.800 ×1							9.80	25	245.00	
F5	D 12	B	]	0.229 ×1	0.180 ×2						0.59	141	84.96	

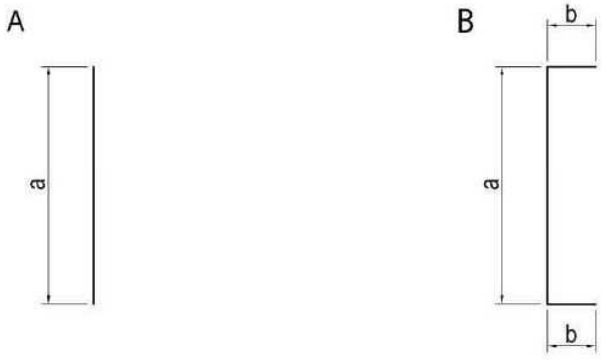
D12	84.96×0.888	=	75.41 kg	= 0.075 t
D16	750.00×1.58	=	1185.00 kg	= 1.185 t
D18	260.00×2.00	=	520.00 kg	= 0.520 t

Type

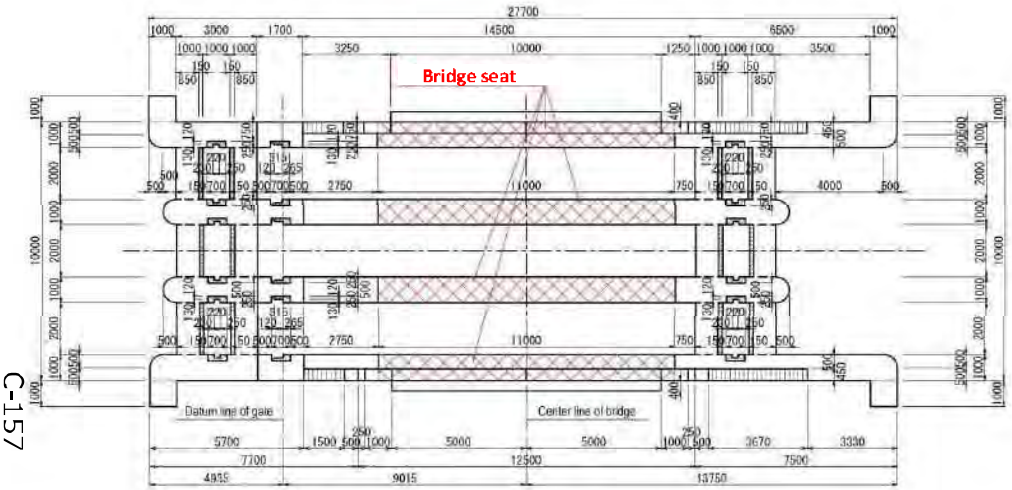
A　　B

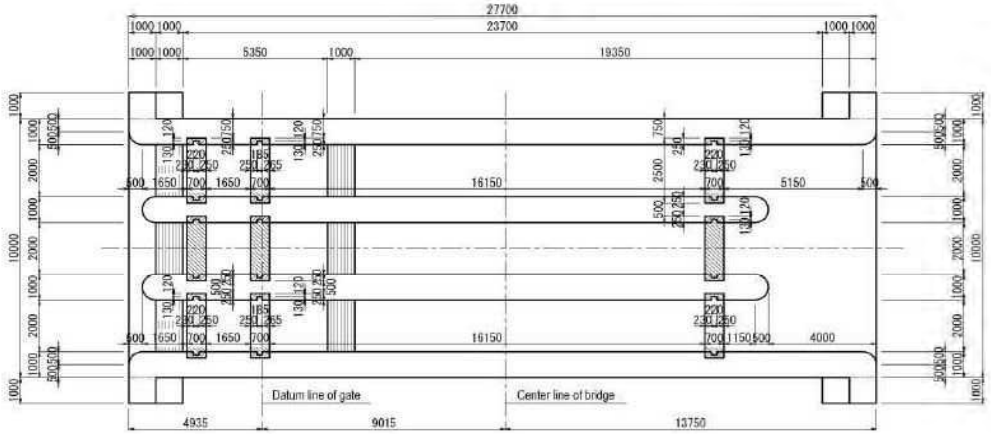
Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

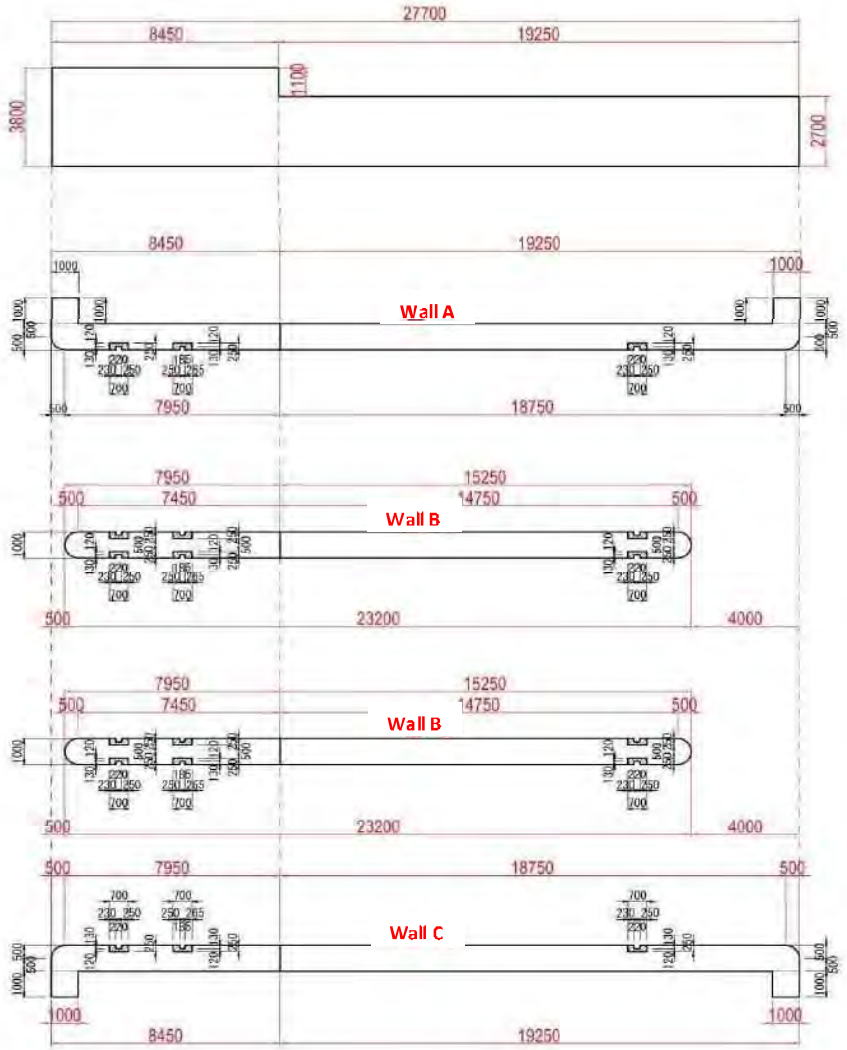
Schematic design of rebar
(Approach cushion slab)



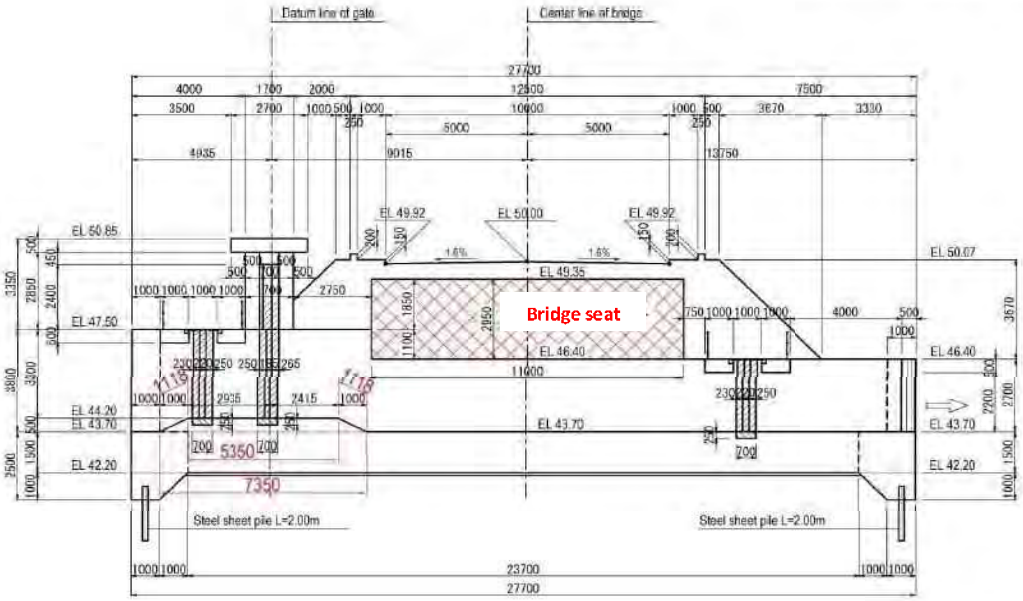
Concrete / Formwork (1/2)



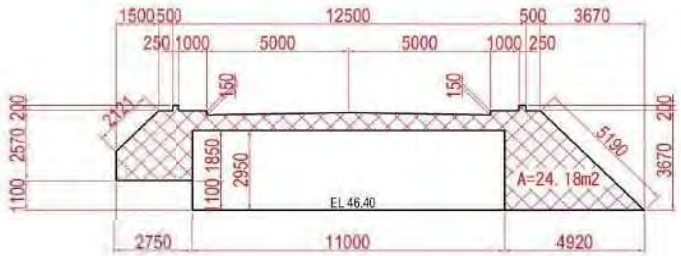


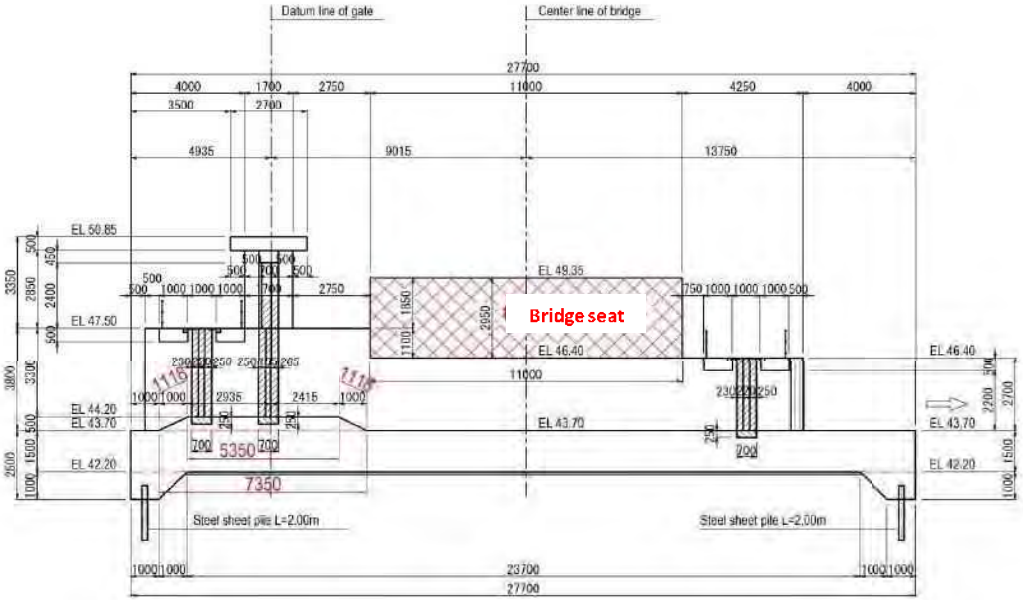


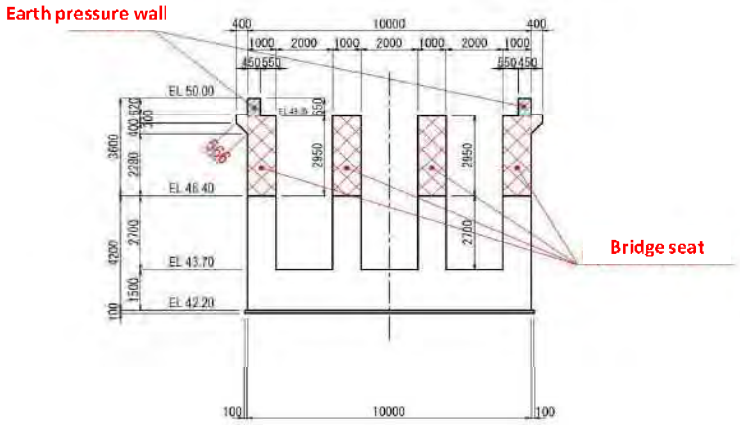
Concrete / Formwork (2/2)



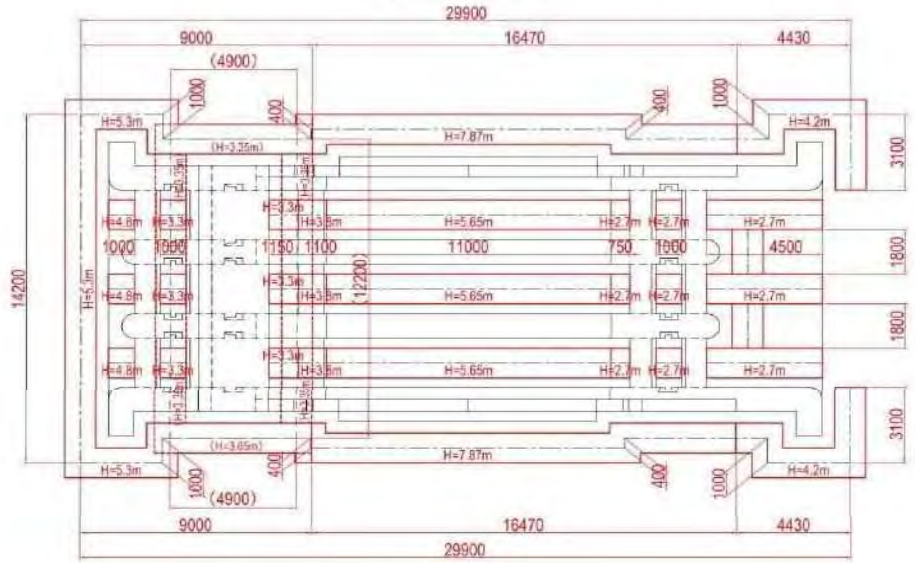
Earth pressure wall (t=450)



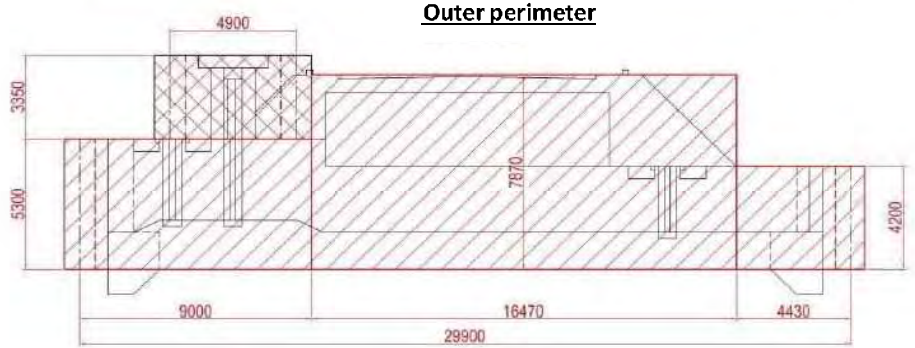




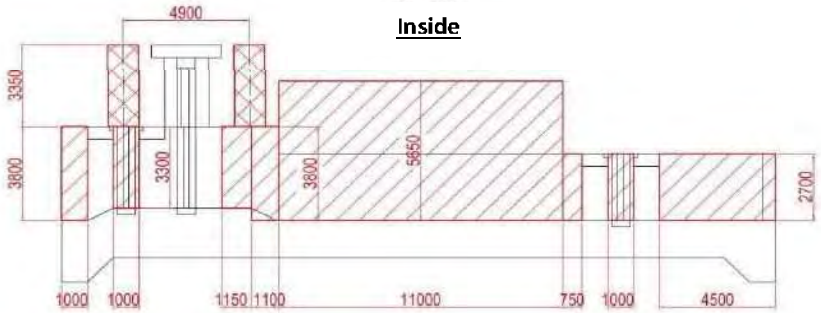
Scaffolding



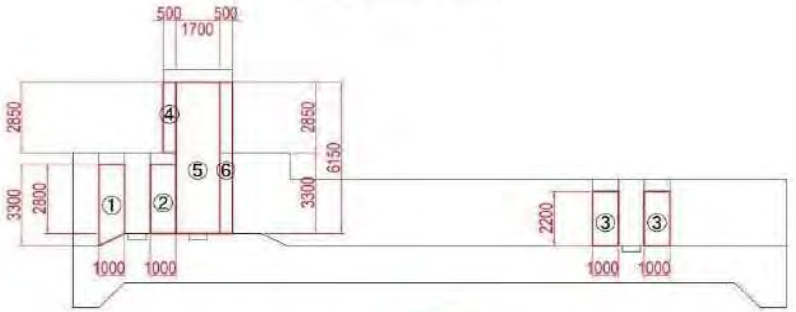
Outer perimeter

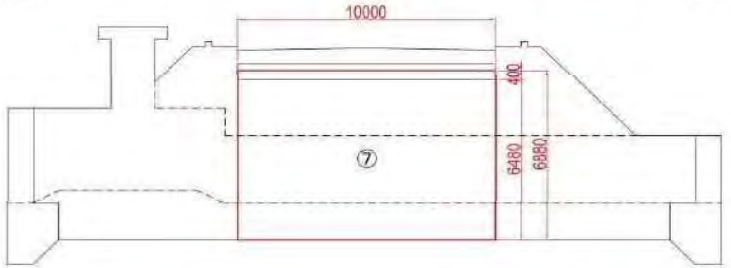


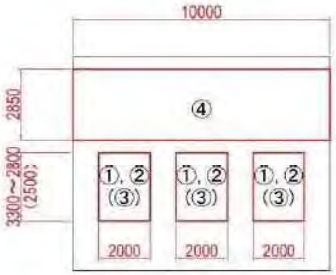
Inside

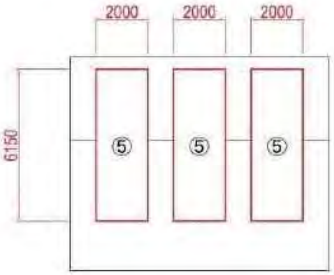


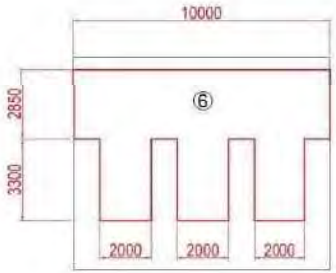
Falsework

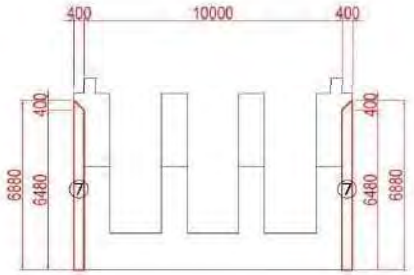












(5) Abo Gabal regulator

Abo Gabal Weir body　　Quantity Summary Sheet

Type of works	Class	Subdivision	Dimensions	Unit	Quantity	Up stream	Down stream
Weir body	Demolition works	Concrete demolition	PC structure	m^3	3.64	—	3.64
			RC structure	m^3	123.61	—	123.64
	Main body	Leveling con.	σ ck=20N/mm²	m^3	37.86	18.81	19.05
		Formwork	Leveling con.	m^2	6.74	4.17	2.57
		Reinforced con.	σ ck=25N/mm²	m^3	1,441.42	805.18	636.24
		Formwork	RC structure	m^2	1,660.83	1,137.03	523.80
		Circular formwork	RC structure φ 1000-1/2Circle	m^2	29.85	29.85	—
		〃	RC structure φ 1000-1/4Circle	m^2	5.26	5.26	—
		Second stage con.	σ ck=25N/mm²	m^3	23.72	23.72	—
		Formwork	RC structure	m^2	121.32	121.32	—
		Rebar	D12	t	3.968	2.049	1.919
		〃	D16	t	53.777	35.871	17.906
		Concrete curing	PC structure	m^3	37.86	18.81	19.05
		〃	RC structure	m^3	1,465.14	828.90	636.24
		Scaffolding	Prefabricated Scaffold, H≦30m	m^2	975.38	593.54	381.84
		Falsework	Pipe support falsework,H≦3.1m Support bearing force40KN/m² and less	m^3	60.58	60.58	—
		〃	Wedge linked falsework,H≦30m Support bearing force40KN/m² and less	m^3	117.09	117.09	—
		Expansion joint	Elastic filler,t=20mm	m^2	96.38	—	96.38
		Water stop	B=300mm	m	34.00	34.00	—
		Water-swelling water stop	Paste type, 9mm×30mm	m	36.65	—	36.65
		Resin capsule anchor	D20×200, Drilling dia. φ25	nos	121	—	121
		Slip bar	D20×1.00m, VP φ25×0.50m	nos	111	111	—
		〃	D20×0.70m	nos	121	—	121

Type of works	Class	Subdivision	Dimensions	Unit	Quantity	Up stream	Down stream
	Other miscellaneous	Joint bar	D16×200	nos	1,120	1,120	—
		Grating	2000×1000	set	1	1	—
	Safty facilities work	Guard fense	H=1.10m	m	29.80	29.80	—

Abo Gabal Weir body Quantity calculation

【Upstream】

Discription	Classification	Calculation			Quantity	Unit	Remarks
Main body							
Leveling con.	σ ck=20N/mm^2						
		13.20×(11.20+11.30)/2×0.10	−	18.81			
		Total	=	18.81	18.81	m^3	
Formwork	Leveling con.	(14.20 14.30)/2 0.10×2	=	2.85			
		13.20×0.10	−	1.32			
		Total	−	4.17	4.17	m^2	
Reinforced con.	σ ck=25N/mm^2						
	Cut-off	1 2×(1.00+2.00)×1.00×15.00	−	22.50			
	Invert	1.00×1.50×2.00×2	=	6.00			
	〃	13.00×1.50×16.20	−	315.90			
	〃	1 2×(3.75+3.96)×0.85×2.00×4	=	26.21			Raising part
	〃	−0.70×0.25×2.50×4×3	−	−5.25			(−)Blockout
	Wall A	1.00×4.75×1.00	=	4.75			
	〃	1.00×4.75×16.20	=	76.95			
	〃	−(1−π/4)×0.50^2×4.75	−	−0.25			
	〃	−0.70×3.90×0.25×2	=	−1.37			(−)Blockout
	〃	−0.70×4.75×0.25	=	−0.83			〃
	Wall B	1.00×4.75×15.70	−	74.58			
	〃	−(1−π/4)×0.50^2×4.75×2	=	−0.51			
	〃	−0.70×3.90×0.25×2×2	−	−2.73			(−)Blockout
	〃	−0.70×4.75×0.25×2	=	−1.66			〃
	Wall C	1.00×4.75×15.70	−	74.58			
	〃	−(1−π/4)×0.50^2×4.75×2	−	−0.51			
	〃	−0.70×3.90×0.25×2×2	=	−2.73			(−)Blockout
	〃	−0.70×4.75×0.25×2	−	−1.66			〃

Discription	Classification	Calculation			Quantity	Unit	Remarks
	Wall D	1.00×1.75×15.20	=	72.20			
	〃	-(1-π/4)×0.50^2×4.75×2×2	=	-1.02			
	〃	-0.70×3.90×0.25×2×2	=	-2.73			(-)Blockout
	〃	-0.70×4.75×0.25×2	=	-1.66			〃
	Wall E	1.00×4.75×1.00	=	4.75			
	〃	1.00×1.75×16.20	=	76.95			
	〃	-(1-π/4)×0.50^2×4.75	=	-0.25			
	〃	-0.70×3.90×0.25×2	=	-1.37			(-)Blockout
	〃	-0.70×4.75×0.25	=	-0.83			〃
	Corrdor	1.00×0.50×2.00×1×2	=	8.00			
	〃	-0.15×0.15×2.00×2×4	=	-0.36			(-)Second stage cor.
	Bridge	6.50×0.50×2.00×1	=	26.00			
	〃	0.25×0.15×13.00×2	=	0.98			
	Gate pier	(0.75×1.20 1.00×0.50)×3.45×2	=	9.66			
	〃	(0.50×1.20 1.00×0.50)×3.45×3	=	11.39			
	Top slab	3.00×0.50×13.00	=	19.50			
			Total =	805.18	805.18	m^3	
Formwork	RC strucure						
	Cut-off	1/2×(1.00+2.00)×1.00×2	=	3.00			Side
	〃	1.00×15.00	=	15.00			Edge
	Invert	(15.00-13.00)×1.50	=	12.00			Edge
	〃	1.00×1.50×2	=	3.00			Overhanging par.
	〃	1.50×16.20×2	=	48.60			Side
	〃	(0.85+0.876)×2.00×4	=	13.81			Raising part
	〃	(0.70+2.50)×0.25×3×4	=	9.60			Blockout part
	Wall A	(1.50+1.00)×4.75	=	11.88			
	〃	4.75×(16.20+15.70+1.00)	=	156.28			
	〃	3.90×0.25×2×2+4.75×0.25×2	=	6.28			Blockout part
	〃	-1/2×(3.75+3.96)×0.85	=	-3.28			(-)Raising part

Discription	Classification	Calculation			Quantity	Unit	Remarks
	〃	-(1.00×0.50-0.15×0.15)×2	=	-0.96			(-)Corridor
	〃	-6.50×0.50	=	-3.25			(-)Bridge
	Wall B	4.75×(15.20×2-1.00)	-	149.15			
	〃	3.90×0.25×4×2+4.75×0.25×4	-	12.55			Blockout part
	〃	-1/2×(3.75+3.96)×0.85×2	=	-6.55			(-)Raising part
	〃	-(1.00×0.50-0.15×0.15)×1	-	-1.91			(-)Corridor
	〃	-6.50×0.50×2	=	-6.50			(-)Bridge
	Wall C	4.75×(15.20×2-1.00)	-	149.15			
	〃	3.90×0.25×4×2+4.75×0.25×4	=	12.55			Blockout part
	〃	-1/2×(3.75+3.96)×0.85×2	-	-6.55			(-)Raising part
	〃	-(1.00×0.50-0.15×0.15)×1	-	-1.91			(-)Corridor
	〃	-6.50×0.50×2	=	-6.50			(-)Bridge
	Wall D	4.75×14.20×2	-	134.90			
	〃	3.90×0.25×4×2+4.75×0.25×4	-	12.55			Blockout part
	〃	-1/2×(3.75+3.96)×0.85×2	=	-6.55			(-)Raising part
	〃	-(1.00×0.50-0.15×0.15)×1	=	-1.91			(-)Corridor
	〃	-6.50×0.50×2	=	-6.50			(-)Bridge
	Wall E	(1.50+1.00)×4.75	-	11.88			
	〃	4.75×(16.20+15.70+1.00)	=	156.28			
	〃	3.90×0.25×2×2+4.75×0.25×2	=	6.28			Blockout part
	〃	-1/2×(3.75+3.96)×0.85	-	-3.28			(-)Raising part
	〃	-(1.00×0.50-0.15×0.15)×2	=	-0.96			(-)Corridor
	〃	-6.50×0.50	=	-3.25			(-)Bridge
	Corridor	(1.00+0.50×2)×2.00×2×4	-	32.00			
	Bridge	(6.50+0.50×2)×2.00×4	-	60.00			
	〃	(0.25+13.00)×2×0.15×2	-	7.95			
	〃	0.25×0.15×4	=	0.15			
	Gate pier	(1.00+1.70)×2×3.45×5	-	93.15			
	Top slab	(3.00+13.00)×2×0.50	-	16.00			
	〃	3.00×13.00	=	39.00			

Discription	Classification	Calculation			Quantity	Unit	Remarks
	〃	-(0.75×1.20+1.00×0.50)×2	=	-2.80			
	〃	-(0.50×1.20+1.00×0.50)×3	=	-3.30			
		Total	=	1137.03	1137.03	m^2	
Circular formwork	RC structure						
φ1000-1/2Circle		π/2×1.00×4.75×1	=	29.85	29.85	m^2	
φ1000-1/4Circle		π/4×1.00×3.35×2	=	5.26	5.26	m^2	
Second stage con.	σck=25N/mm^2						
		0.70×0.25×2.50×1×3	=	5.25			Invert part
		(0.70×0.25-0.185×0.13)×3.90×8	=	4.71			Gate part
		{0.70×0.25-(0.315×0.13+1/2×0.12^2)}×3.00×8					〃
			=	3.04			
		(0.70×0.25-0.22×0.13)×(3.90+4.75)×8	=	10.13			Stop log part
		(0.15^2-0.05^2)×2.00×2×4	=	0.32			Corridor part
		0.05 6×{(2×0.81+0.71)×1.82+(2×0.71-0.81)×1.72}×1					Top slab part
			=	0.27			
		Total	=	23.72	23.72	m^3	
Formwork	RC structure						
		(0.70+0.13×2)×3.90×8	=	29.95			Gate part
		{0.265-0.315+0.13+0.12×√(2)}×3.00×8	=	21.11			〃
		(0.70+0.13×2)×(3.90+4.75)×8	=	66.43			Stop log part
		0.15×2.00×2×4	=	2.40			Corridor part
		1/2×(0.71+0.81)×0.05×√(2)×2×1	=	0.43			Top slab part
		1/2×(1.72+1.82)×0.05×√(2)×2×1	=	1.00			〃
		Total	=	121.32	121.32	m2	

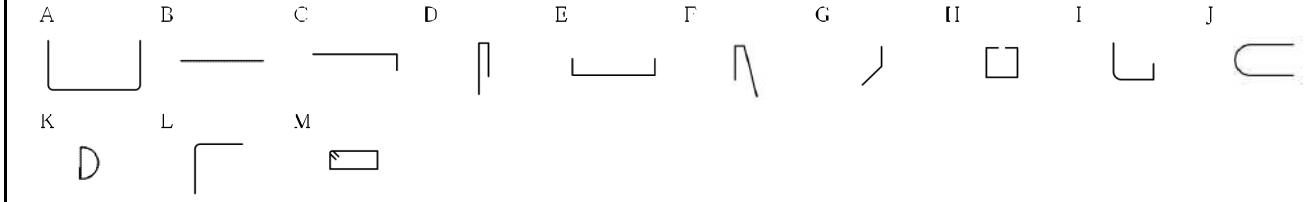
Discription	Classification	Calculation			Quantity	Unit	Remarks
Rebar	Steel 360/520	refer to rebar weight calculation sheet					
		D12	=	2.049	2.049	t	
		D16	=	35.871	35.871	t	
Concrete curing	PC structure	Leveling con.	=	18.81	18.81	m^3	
	RC structure	805.18+23.72	=	828.90	828.90	m^3	
Scaffolding	Prefabricated Scaffold, H≦30m						
	Outer perimeter	6.25×{17.20+(17.13+1.00)×2}	=	334.13			
	Inside	4.75×(1.00−1.35+2.00)×4	=	82.65			
	〃	3.90×1.00×4	=	15.60			
	Gater pier part	3.95×(5.20−15.20)×2	=	161.16			
		Total	=	593.54	593.54	m^2	
Falsework	Pipe support falsework, H<4.0m, Support bearing force40KN/m^2 and less						
	②	2.00×3.40×1.00×1	=	27.20			Corridor part
	④	13.00×3.95×0.65	=	33.38			Gate pier part
		Total	=	60.58	60.58	m^3	
	Wedge linked falsework, H≦30m, Support bearing force40KN/m^2 and less						
	①	2.00×1.25×1.00×1	=	34.00			Corridor part
	③	2.00×1.25×6.50×1	=	221.00			Bridge part
	⑤	(2.00×3.90−2.50×3.45)×1.20×1	=	78.84			Gate pier part
	⑥	2.00×7.35×0.50×4	=	29.40			〃
	⑦	(2.00×4.75×4+13.00×3.45)×0.65	=	53.85			〃
		Total	=	417.09	417.09	m^3	
Water stop	B=300mm	12.00+5.50×4	=	34.00	34.00	m^2	
Slip bar	D20×1.00m, VP φ25×0.50m		=	111.0	111	nos	

Discription	Classification	Calculation		Quantity	Unit	Remarks
Other miscellaneous						
Joint bar	D16×200	(112+76−92)×4	= 1120.0	1120	nos	Gate,Stop log part
Grating	2000×1000		− 4.0	4	nos	
Safty facillities work						
Guard fense	H=1.10m	12.70×2−2.70+1.70	= 29.80			Top slab
		12.00×2	− 24.00			Corridor
			Total = 53.80	29.80	m	

Abo Gabal Reg. (Upstream)　　Rebar weight 〔1/6〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F1	D 16	A		12.460 ×1	5.880 ×2	0.267 ×2			φ 170	1.000 ×3	27.76	82	2276.32	
F2	D 16	B		12.800 ×1						1.000 ×1	13.80	96	1324.80	
F3	D 16	B		16.000 ×1						1.000 ×1	17.00	65	1105.00	
F4	D 16	C		14.134 ×1	1.134 ×1					1.000 ×1	16.27	8	130.16	
F5	D 16	B		2.750 ×1							2.75	49	134.75	
F6	D 16	D		0.068 ×1	1.734 ×1	1.134 ×1					2.94	40	117.60	
F7	D 16	E		1.418 ×1	1.134 ×2						3.69	40	147.60	
F8	D 16	F		0.193 ×1	1.134 ×1	1.756 ×1					3.09	40	123.60	
F9	D 16	C		9.424 ×1	1.134 ×1						10.56	40	422.40	
F10	D 16	C		0.934 ×1	1.134 ×1						2.07	51	105.57	
F11	D 16	B		5.050 ×1							5.05	16	80.80	
F12	D 16	B		3.637 ×1							3.64	40	145.60	
F13	D 16	B		2.700 ×1							2.70	56	151.20	
F14	D 16	E		1.268 ×1	0.240 ×2						1.75	102	178.50	
F15	D 16	E		12.768 ×1	0.240 ×2					1.000 ×1	11.25	12	171.00	
F16	D 16	E		16.168 ×1						1.000 ×1	17.17	12	206.04	
F17	D 16	B		1.900 ×1							1.90	75	142.50	
F18	D 16	B		2.273 ×1							2.28	65	148.20	

Type

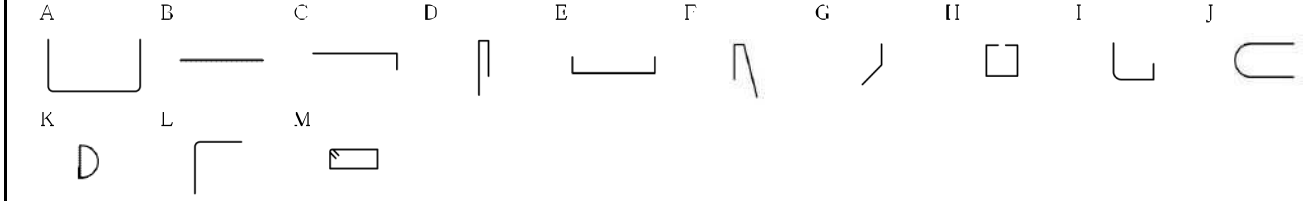


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Abo Gabal Reg. (Upstream)　　Rebar weight 〔2/6〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F19	D 16	G		1.000 ×1	1.331 ×1						2.31	10	23.10	
F20	D 16	B		14.800 ×1						1.000 ×1	15.80	10	158.00	
F21	D 16	B		1.900 ×1							1.90	26	49.40	
F22	D 16	B		1.800 ×1							1.80	12	21.60	
F23	D 16	B		1.000 ×1							1.00	8	8.00	
F24	D 16	E		1.300 ×1	0.240 ×2						1.78	8	14.24	
F25	D 16	E		1.268 ×1	0.240 ×2						1.75	10	17.50	
F26	D 12	H		0.428 ×1	1.328 ×2	0.100 ×2					3.29	240	789.60	
F27	D 12	H		0.428 ×1	1.928 ×2	0.100 ×2					4.49	40	179.60	
F28	D 12	H		0.428 ×1	2.178 ×2	0.100 ×2					1.99	32	159.68	
F29	D 12	H		0.428 ×1	1.078 ×2	0.100 ×2					2.79	20	55.80	
W 1	D 16	C		6.050 ×1	0.240 ×1						6.29	732	4604.28	
W 2	D 16	E		0.800 ×1	0.240 ×2						1.28	72	92.16	
W 3	D 16	E		0.550 ×1	0.240 ×2						1.03	20	20.60	
W 4	D 16	E		0.300 ×1	0.240 ×2						0.78	30	23.40	
W 5	D 16	E		0.800 ×1	0.240 ×2						1.28	10	12.80	
W 6	D 16	B		16.000 ×1						1.000 ×1	17.00	50	850.00	
W 7	D 16	I		1.400 ×1	0.603 ×1	1.534 ×-	0.768 ×1		φ 384		4.31	46	198.26	

Type

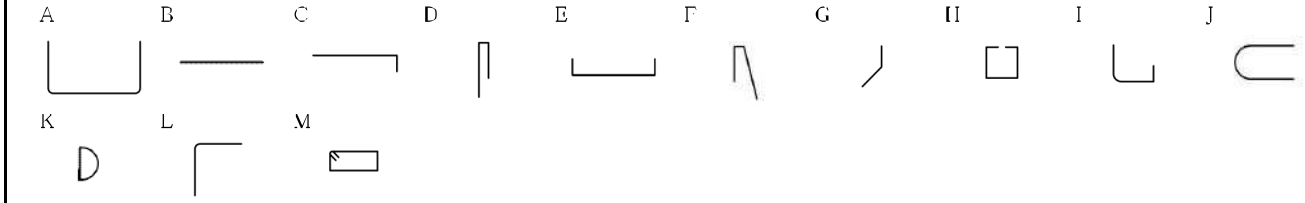


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Abo Gabal Reg. (Upstream)　　Rebar weight 〔3/6〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W 8	D 16	E		1.418 ×1	0.768 ×2						2.96	46	136.16	
W 9	D 16	E		8.918 ×1	0.768 ×2						10.46	46	481.16	
W10	D 16	E		0.918 ×1	0.768 ×2						2.46	50	123.00	
W11	D 16	I		1.400 ×1	0.603 ×1	13.734 ×1	0.768 ×1		φ 384	1.000 ×1	17.51	2	35.02	
W12	D 16	I		1.400 ×1	0.603 ×1	13.731 ×1	0.768 ×1		φ 381	1.000 ×1	17.51	2	35.02	
W13	D 16	J		1.206 ×1	1.050 ×2				φ 381		3.31	69	228.39	
W14	D 16	B		1.450 ×1							1.45	138	200.10	
W15	D 16	B		8.950 ×1							8.95	138	1235.10	
W16	D 16	E		0.918 ×1	0.768 ×2						2.46	100	246.00	
W17	D 16	K		1.206 ×1	0.034 ×2	0.768 ×1	0.240 ×1		φ 381		2.29	25	57.25	
W18	D 16	J		1.206 ×1	1.000 ×2				φ 381		3.21	6	19.26	
W19	D 16	B		13.250 ×1						1.000 ×1	14.25	12	171.00	
W20	D 16	B		1.800 ×1							1.80	50	90.00	
W21	D 16	E		0.768 ×1	0.240 ×2						1.25	327	408.75	
W22	D 16	B		5.050 ×1							5.05	176	888.80	
W23	D 16	B		2.700 ×1							2.70	156	421.20	
W24	D 16	B		2.230 ×1							2.23	26	57.98	
W25	D 16	B		4.300 ×1							4.30	4	17.20	

Type

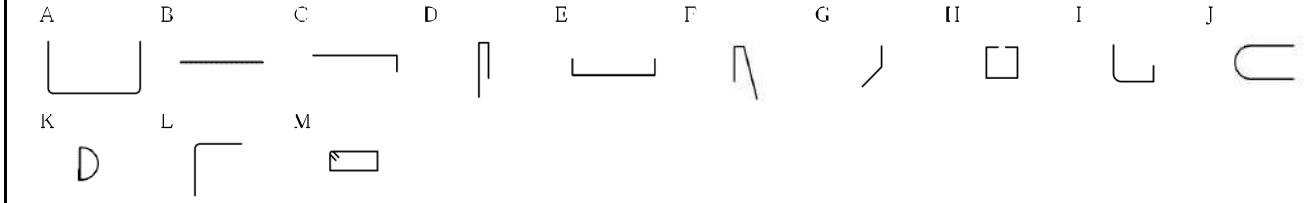


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Abo Gabal Reg. (Upstream)　　Rebar weight 〔4/6〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W26	D 16	B		1.896 ×1							1.90	2	3.80	
W27	D 16	B		10.800 ×1							10.80	6	64.80	
W28	D 16	B		8.950 ×1							8.95	8	71.60	
W29	D 16	B		10.300 ×1							10.30	1	10.30	
W30	D 16	B		1.396 ×1							1.40	6	8.40	
W31	D 16	B		1.450 ×1							1.45	6	8.70	
W32	D 16	B		3.800 ×1							3.80	3	11.40	
W33	D 16	B		0.950 ×1							0.95	6	5.70	
W34	D 16	B		1.746 ×1 ～1.800							1.78	6	10.68	
W35	D 12	E		0.828 ×1	0.100 ×2						1.03	863	888.89	
W36	D 12	E		0.578 ×1	0.100 ×2						0.78	64	49.92	
W37	D 12	E		0.328 ×1	0.100 ×2						0.53	96	50.88	
W38	D 12	E		0.828 ×1	0.100 ×2						1.03	24	24.72	
S 1	D 16	B		12.800 ×1						1.000 ×1	13.80	22	303.60	
S 2	D 16	B		0.800 ×1							0.80	160	128.00	
S 3	D 16	E		0.618 ×1	0.268 ×2						1.16	80	92.80	
S 4	D 16	B		12.800 ×1						1.000 ×1	13.80	66	910.80	
S 5	D 16	E		6.300 ×1	0.268 ×2						6.84	40	273.60	

Type

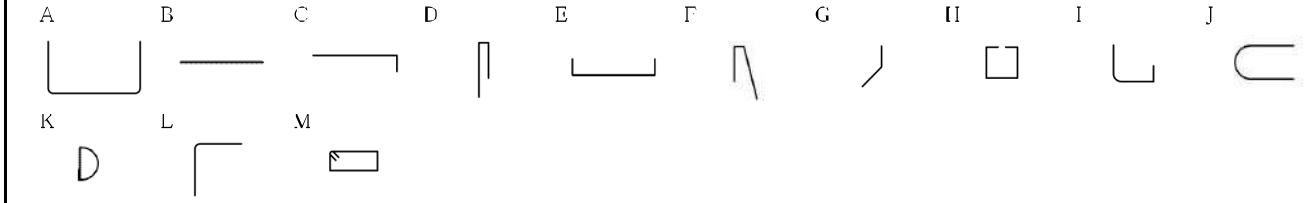


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Abo Gabal Reg. (Upstream)　　Rebar weight 〔5/6〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
S 6	D 16	E		6.300 ×1	0.240 ×2						6.78	40	271.20	
G 1	D 16	A		12.460 ×1	4.680 ×2	0.267 ×2			φ 170	1.000 ×3	25.36	7	177.52	
G 2	D 16	L		0.978 ×1	4.680 ×1	0.267 ×1			φ 170	1.000 ×1	6.93	1	6.93	
G 3	D 16	L		0.978 ×1	4.680 ×1	0.267 ×1			φ 170	1.000 ×1	6.93	1	6.93	
G 4	D 16	L		0.943 ×1	4.680 ×1	0.267 ×1			φ 170	1.000 ×1	6.89	1	6.89	
G 5	D 16	L		0.943 ×1	4.680 ×1	0.267 ×1			φ 170	1.000 ×1	6.89	1	6.89	
G 6	D 16	B		0.825 ×1 ～0.896							0.87	8	6.96	
G 7	D 16	B		1.425 ×1 ～1.496							1.47	6	8.82	
G 8	D 16	B		4.850 ×1							4.85	118	572.30	
G 9	D 16	M		0.832 ×2	0.332 ×2	0.225 ×2					2.78	90	250.20	
G10	D 16	M		1.532 ×2	0.582 ×2	0.225 ×2					4.68	36	168.48	
G11	D 16	M		1.532 ×2	0.332 ×2	0.225 ×2					4.18	54	225.72	
G12	D 12	E		0.578 ×1	0.100 ×2						0.78	28	21.84	
G13	D 12	E		0.328 ×1	0.100 ×2						0.53	42	22.26	
T 1	D 16	E		12.800 ×1	0.300 ×2					1.000 ×1	11.40	8	115.20	
T 2	D 16	E		12.800 ×1	0.240 ×2					1.000 ×1	11.28	15	214.20	
T 3	D 16	C		1.013 ×1 ～1.148	0.240 ×1						1.38	4	5.52	
T 4	D 16	B		0.825 ×1 ～0.896							0.87	8	6.96	

Type



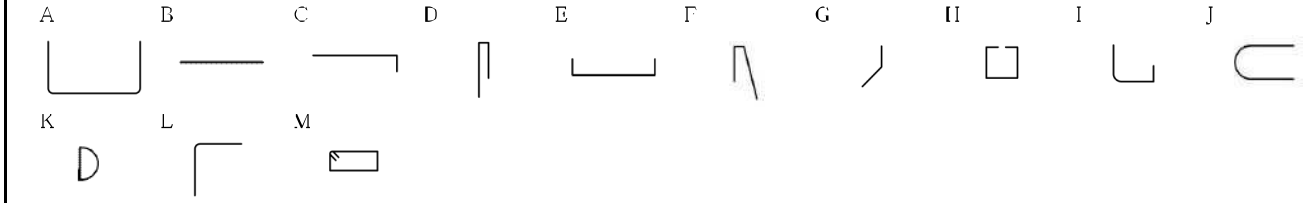
Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Abo Gabal Reg. (Upstream)　　Rebar weight 〔6/6〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
T 5	D 16	B		1.425 ×1 ～1.496							1.47	6	8.82	
T 6	D 16	E		2.832 ×1	0.332 ×2						3.50	57	199.50	
T 7	D 16	E		2.832 ×1	0.240 ×2						3.32	57	189.24	
T 8	D 16	C		1.223 ×1	0.332 ×1						1.56	16	24.96	
T 9	D 16	C		1.263 ×1	0.332 ×1						1.60	16	25.60	
T10	D 16	C		1.223 ×1	0.240 ×1						1.47	16	23.52	
T11	D 16	C		1.263 ×1	0.240 ×1						1.51	16	24.16	
T12	D 16	B		12.800 ×1						1.000 ×1	13.80	4	55.20	
T13	D 16	B		2.200 ×1							2.20	64	140.80	
T14	D 12	E		0.328 ×1	0.100 ×2						0.53	122	64.66	

D12	2307.85 × 0.888	=	2049.37 kg	= 2.049 t
D16	22703.37 × 1.58	=	35871.32 kg	= 35.871 t

Type

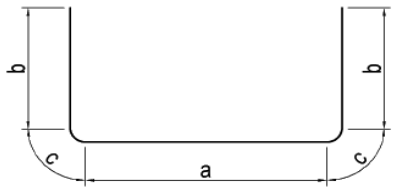


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

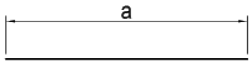
Schematic design of rebar

(Upstream)

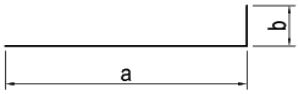
A



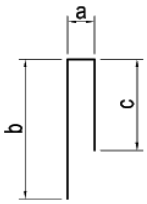
B



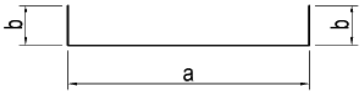
C



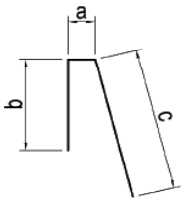
D



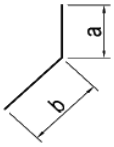
E



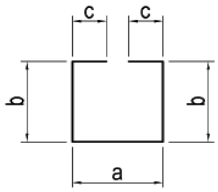
F



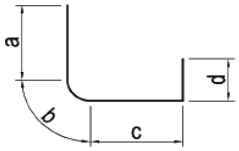
G



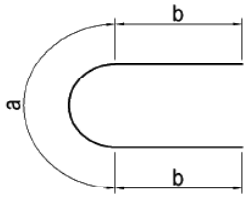
H



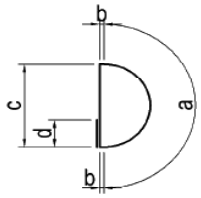
I



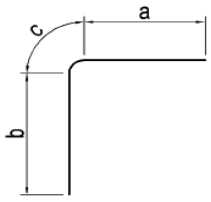
J



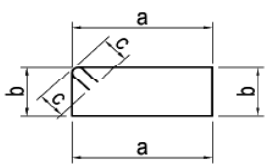
K



L



M



Grating(2000×1000) Quantity calculation

per a piece

Description	Classification	Calculation	Quantity	Unit	Remarks
Grating	I-44×985×1060				
		= 2.0	2	Pieces	
Equal-leg angle	L-50×50×6×2000				
		2.00×0.00413×2 = 0.02	0.02	t	
Anchor bar	D12×105	4×2 = 8.0	8	nos	

Abo Gabal Weir body Quantity calculation

【Downstream】

Discription	Classification	Calculation			Quantity	Unit	Remarks
Demolition works							
Concrete demolition	PC structure	2.00×0.10×18.20	=	3.64	3.64	m^3	
	RC structure	2.00×1.50×18.00	=	54.00			
		(4.24+3.09)×4.75×2	−	69.64			
			Total =	123.64	123.64	m^3	
Main body							
Leveling con.	σ ck=20N/mm^2						
		(13.20−16.30) 2×9.60×0.10	=	14.16			
		16.30×3.00×0.10	−	4.89			
			Total =	19.05	19.05	m3	
Formwork	Leveling con.						
		(10.088+3.00+12.60)×0.10	−	2.57			
			Total =	2.57	2.57	m^2	
Reinforced con.	σ ck=25N/mm^2						
	Invert	(13.00−16.10) 2×1.50×9.60	=	209.52			
	〃	16.10×1.50×3.00	=	72.45			
	Wall A	1.00×4.75×12.60	−	59.85			
	Wall B	1/2×(1.00+2.10)×4.75×9.60	=	70.68			
	〃	2.10×1.75×3.00	−	29.93			
	Wall C	1 2×(1.00+2.10)×1.75×9.60	=	70.68			
	〃	2.10×4.75×3.00	−	29.93			
	Wall E	1 2×(1.00+1.90)×4.75×9.60	−	66.12			
	〃	1.90×4.75×3.00	=	27.08			
			Total −	636.24	636.24	m^3	

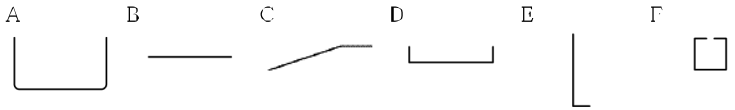
Discription	Classification	Calculation			Quantity	Unit	Remarks
Formwork	RC structure						
	Invert	1.50×(10.088+3.00+12.60)	=	38.53			
	Wall A	4.75×(10.088+3.00)×2	=	124.34			
	Wall B	4.75×(9.827+9.652+3.00×2)	=	121.03			
	Wall C	4.75×(12.60+9.663+3.00)	=	120.00			
	Wall E	4.75×(9.642+3.00−12.60)	=	119.90			
		Total	=	523.80	523.80	m^2	
Rebar	Steel 360/520	refer to reber weight calculation sheet					
		D12	=	1.919	1.919	t	
		D16	=	17.906	17.906	t	
Concrete curing	PC structure	Leveling con.	=	19.05	19.05	m^3	
	RC structure	Reinforced con.	=	636.24	636.24	m^3	
Scaffolding	Prefabricated scaffold, H≦30m						
	Outer Perimeter	6.25×(10.09+3.17−12.60)	=	161.63			
	Inside	4.75×(10.11+3.00−12.60+9.81−3.00+7.84)					
	〃	4.75×14.60	=	220.21			
		Total	=	381.84	381.84	m^2	
Expansion joint	Elastic filler,t=20mm						
		13.00×1.50	=	19.50			Upstream
		1.00×4.75×4	=	19.00			〃
		16.10×1.50	=	24.15			Downstream
		(1.00+2.10×2+1.90)×4.75	=	33.73			〃
		Total	=	96.38	96.38	m^2	
Water-swelling water stop	'Paste type, 9mm×30mm						
		14.65+5.50×4	=	36.65	36.65	m^2	

Discription	Classification	Calculation	Quantity	Unit	Remarks
Resin capsule anchor	D20×200, Drilling dia. ϕ25	= 121.0	121	nos	
Slip bar	D20×0.70m	= 121.0	121	nos	

Abo Gabal Reg. (Downstream)　　Rebar weight 〔1/5〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L ϕ	Joint	length/nos	nos	total length	Remarks
F1	D 16	A		12.487 ×1 ～15.458	5.880 ×2	0.267 ×2			ϕ 170	1.000 ×4	30.27	24	726.48	
F2	D 16	A		15.560 ×1	5.880 ×2	0.267 ×2			ϕ 170	1.000 ×1	31.86	8	254.88	
F3	D 16	A		12.552 ×1 ～15.523	5.880 ×2	0.267 ×2			ϕ 170	1.000 ×1	30.34	24	728.16	
F4	D 16	A		15.560 ×1	5.880 ×2	0.267 ×2			ϕ 170	1.000 ×1	31.86	7	223.02	
F5	D 16	B		12.827 ×1 ～15.863						1.000 ×1	15.35	48	736.80	
F6	D 16	B		15.900 ×1						1.000 ×1	16.90	15	253.50	
F7	D 16	B		12.400 ×1						1.000 ×1	13.40	27	361.80	
F8	D 16	B		2.038 ×1 ～9.505							5.78	5	28.90	
F9	D 16	B		1.214 ×1 ～9.506							5.36	6	32.16	
F10	D 16	B		4.825 ×1 ～10.585							7.71	1	30.84	
F11	D 16	B		0.825 ×1 ～9.511							5.17	11	56.87	
F12	D 16	B		12.206 ×1						1.000 ×1	13.21	1	13.21	
F13	D 16	B		3.535 ×1 ～11.587							7.57	14	105.98	
F14	D 16	C		9.547 ×1	2.895 ×1					1.000 ×1	13.45	1	13.45	
F15	D 16	C		9.569 ×1	2.893 ×1					1.000 ×1	13.47	1	13.47	
F16	D 16	C		9.545 ×1	2.906 ×1					1.000 ×1	13.46	1	13.46	
F17	D 16	C		9.737 ×1	2.887 ×1					1.000 ×1	13.63	1	13.63	
F18	D 16	C		9.964 ×1	2.918 ×1					1.000 ×1	13.89	1	13.89	

Type

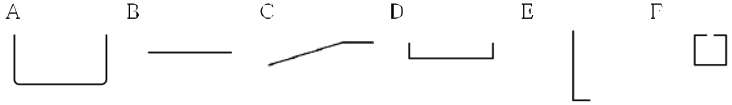


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Abo Gabal Reg. (Downstream)　　Rebar weight 〔2/5〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F19	D 16	C		10.002 ×1	2.882 ×1					1.000 ×1	13.89	1	13.89	
F20	D 16	B		12.400 ×1						1.000 ×1	13.40	65	871.00	
F21	D 16	B		12.175 ×1						1.000 ×1	13.18	1	13.18	
F22	D 16	B		3.504 ×1 ～11.555							7.53	14	105.42	
F23	D 16	D		12.794 ×1	0.240 ×2					1.000 ×1	11.28	6	85.68	
F24	D 16	D		15.868 ×1	0.240 ×2					1.000 ×1	17.35	6	104.10	
F25	D 16	C		10.002 ×1	2.884 ×1					1.000 ×1	13.89	3	41.67	
F26	D 16	C		10.002 ×1	2.884 ×1					1.000 ×1	13.89	3	41.67	
F27	D 16	B		12.400 ×1						1.000 ×1	13.40	6	80.40	
F28	D 16	B		1.268 ×1	0.240 ×2						1.75	92	161.00	
F29	D 12	F		0.528 ×1	1.328 ×2	0.100 ×2					3.39	333	1128.87	
W 1	D 16	E		6.050 ×1	0.240 ×1						6.29	421	2648.09	
W 2	D 16	C		10.002 ×1	2.882 ×1					1.000 ×1	13.89	12	166.68	
W 3	D 16	C		10.002 ×1	2.882 ×1					1.000 ×1	13.89	12	166.68	
W 4	D 16	C		9.964 ×1	2.918 ×1					1.000 ×1	13.89	12	166.68	
W 5	D 16	C		9.964 ×1	2.918 ×1					1.000 ×1	13.89	12	166.68	
W 6	D 16	C		9.737 ×1	2.887 ×1					1.000 ×1	13.63	12	163.56	
W 7	D 16	C		9.737 ×1	2.887 ×1					1.000 ×1	13.63	12	163.56	

Type

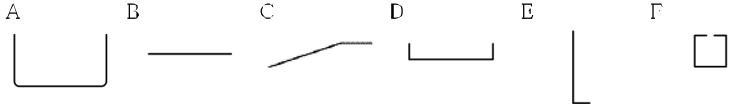


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Abo Gabal Reg. (Downstream)　　Rebar weight 〔3/5〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W 8	D 16	C		9.545 ×1	2.906 ×1					1.000 ×1	13.46	12	161.52	
W 9	D 16	C		9.545 ×1	2.906 ×1					1.000 ×1	13.46	12	161.52	
W10	D 16	B		12.400 ×1						1.000 ×1	13.40	12	160.80	
W11	D 16	C		9.569 ×1	2.893 ×1					1.000 ×1	13.47	12	161.64	
W12	D 16	C		9.569 ×1	2.893 ×1					1.000 ×1	13.47	12	161.64	
W13	D 16	C		9.547 ×1	2.895 ×1					1.000 ×1	13.45	12	161.40	
W14	D 16	C		9.547 ×1	2.895 ×1					1.000 ×1	13.45	12	161.40	
W15	D 16	D		0.800 ×1	1.000 ×2						2.80	14	39.20	
W16	D 16	D		0.790 ×1	1.000 ×2						2.79	47	131.13	
W17	D 16	D		1.900 ×1	1.000 ×2						3.90	11	54.60	
W18	D 16	D		0.831 ×1 ～1.886	1.000 ×2						3.36	47	157.92	
W19	D 16	D		1.900 ×1	1.000 ×2						3.90	14	54.60	
W20	D 16	D		0.834 ×1 ～1.888	1.000 ×2						3.37	47	158.39	
W21	D 16	D		1.700 ×1	1.000 ×2						3.70	11	51.80	
W22	D 16	D		0.828 ×1 ～1.690	1.000 ×2						3.26	47	153.22	
W23	D 16	C		9.983 ×1	2.900 ×1					1.000 ×1	13.89	2	27.78	
W24	D 16	C		9.983 ×1	2.900 ×1					1.000 ×1	13.89	1	13.89	
W25	D 16	B		3.575 ×1 ～10.889							7.24	9	65.16	

Type



Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Abo Gabal Reg. (Downstream)　　Rebar weight 〔4/5〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W26	D 16	B	——	7.575 ×1 ～8.670							8.13	2	16.26	
W27	D 16	B	——	1.815 ×1 ～5.655							3.74	2	7.48	
W28	D 16	B	——	12.400 ×1						1.000 ×1	13.40	4	53.60	
W29	D 16	B	——	4.203 ×1 ～11.185							7.70	5	38.50	
W30	D 16	B	——	4.495 ×1 ～10.895							7.70	4	30.80	
W31	D 16	B	——	12.400 ×1						1.000 ×1	13.40	4	53.60	
W32	D 16	D	⌊	0.756 ×1	0.240 ×2						1.24	24	29.76	
W33	D 16	D	⌊	0.776 ×1	0.240 ×2						1.26	24	30.24	
W34	D 16	D	⌊	0.779 ×1	0.240 ×2						1.26	24	30.24	
W35	D 16	D	⌊	0.777 ×1	0.240 ×2						1.26	24	30.24	
W36	D 16	D	⌋	0.768 ×1	0.240 ×2						1.25	24	30.00	
W37	D 16	D	⌋	1.868 ×1	0.240 ×2						2.35	48	112.80	
W38	D 16	D	⌋	1.668 ×1	0.240 ×2						2.15	24	51.60	
W39	D 12	D	⌐¬	0.818 ×1	0.100 ×2						1.02	132	134.64	
W40	D 12	D	⌐¬	0.828 ×1	0.100 ×2						1.03	39	40.17	
W41	D 12	D	⌐¬	0.859 ×1 ～1.911	0.100 ×2						1.59	132	209.88	
W42	D 12	D	⌐¬	1.928 ×1	0.100 ×2						2.13	78	166.14	
W43	D 12	D	⌐¬	0.862 ×1 ～1.916	0.100 ×2						1.59	132	209.88	

Type

A　B　C　D　E　Γ

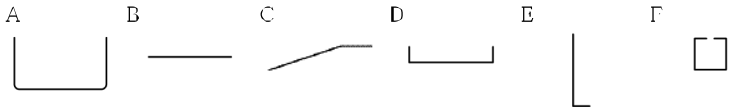
Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Abo Gabal Reg. (Downstream)　　Rebar weight 〔5/5〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W44	D 12	D	⌐¬	0.856 ×1 ～1.718	0.100 ×2						1.49	132	196.68	
W45	D 12	D	⌐¬	1.728 ×1	0.100 ×2						1.93	39	75.27	

D12	2161.53 × 0.888	=	1919.41 kg	=	1.919 t
D16	11333.17 × 1.58	=	17906.41 kg	=	17.906 t

Type

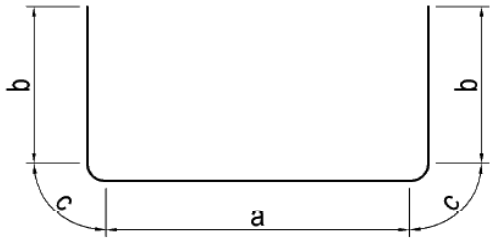


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

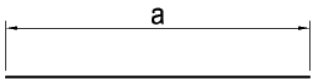
Schematic design of rebar

(Downstream)

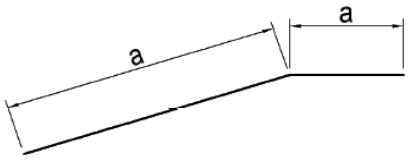
A



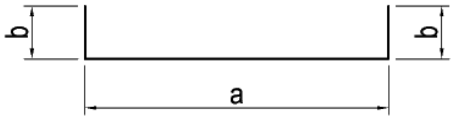
B



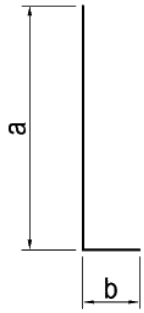
C



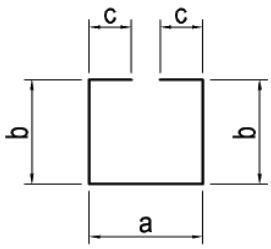
D



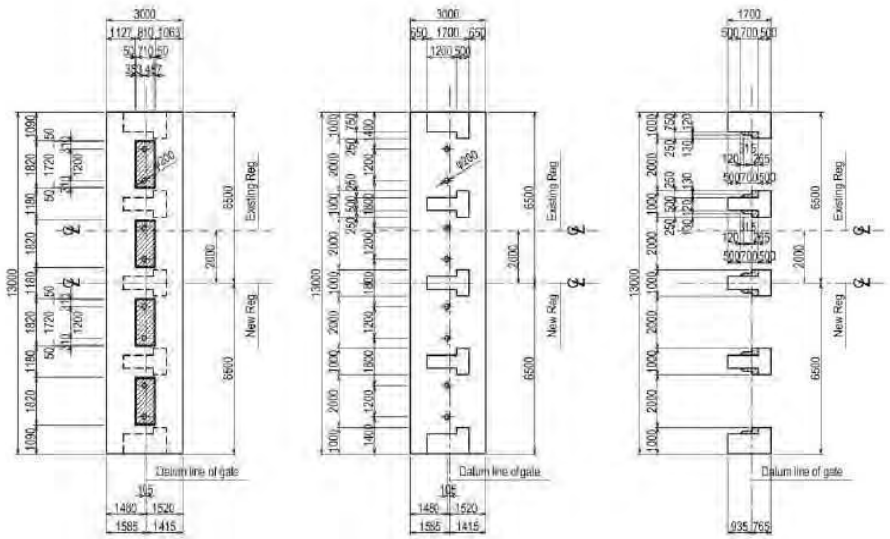
E

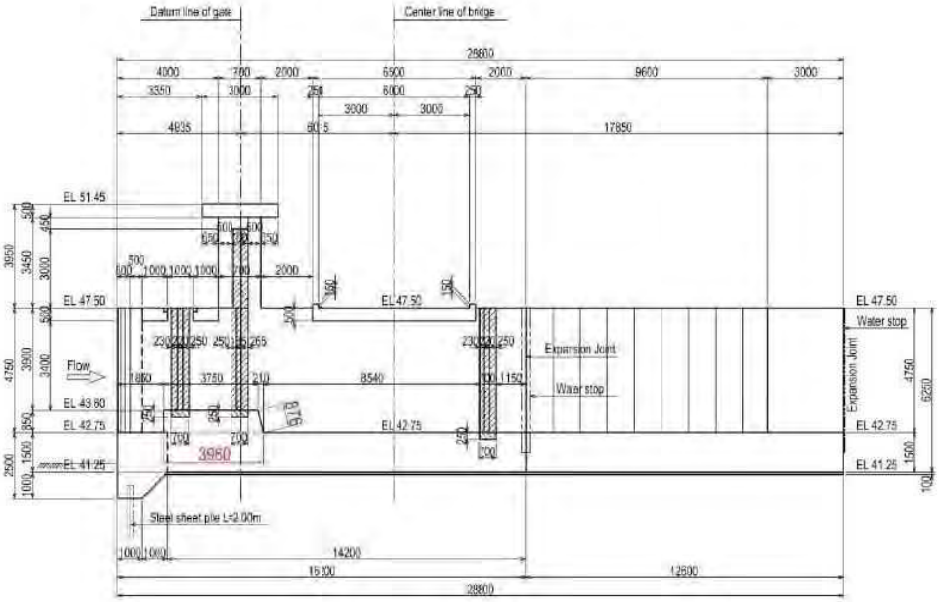


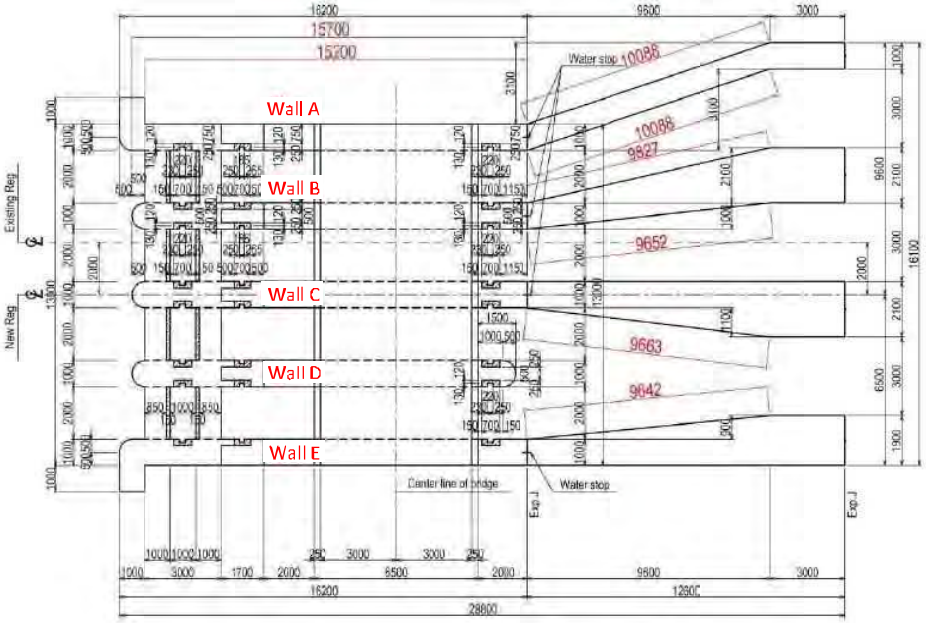
F

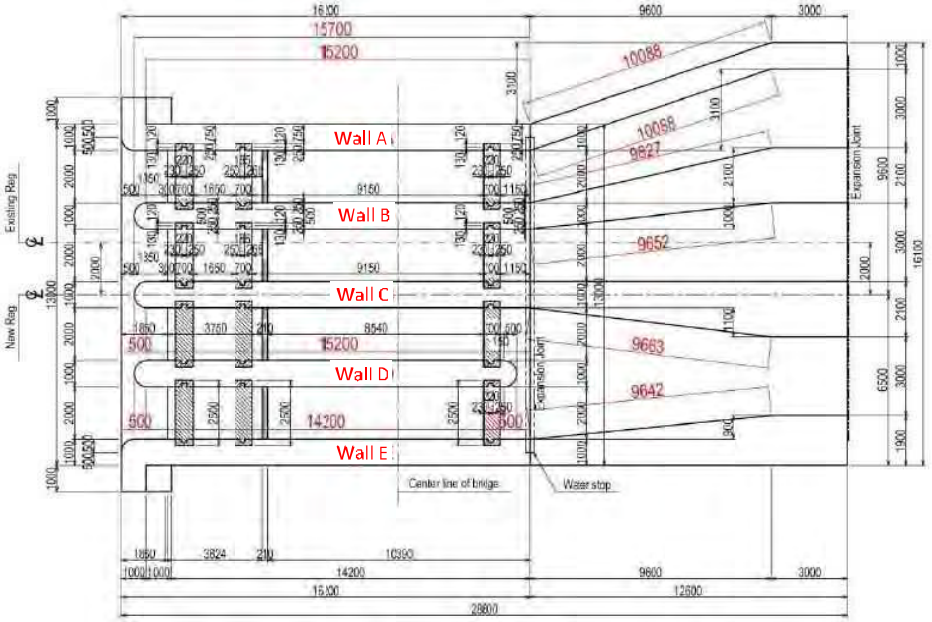


Concrete / Formwork

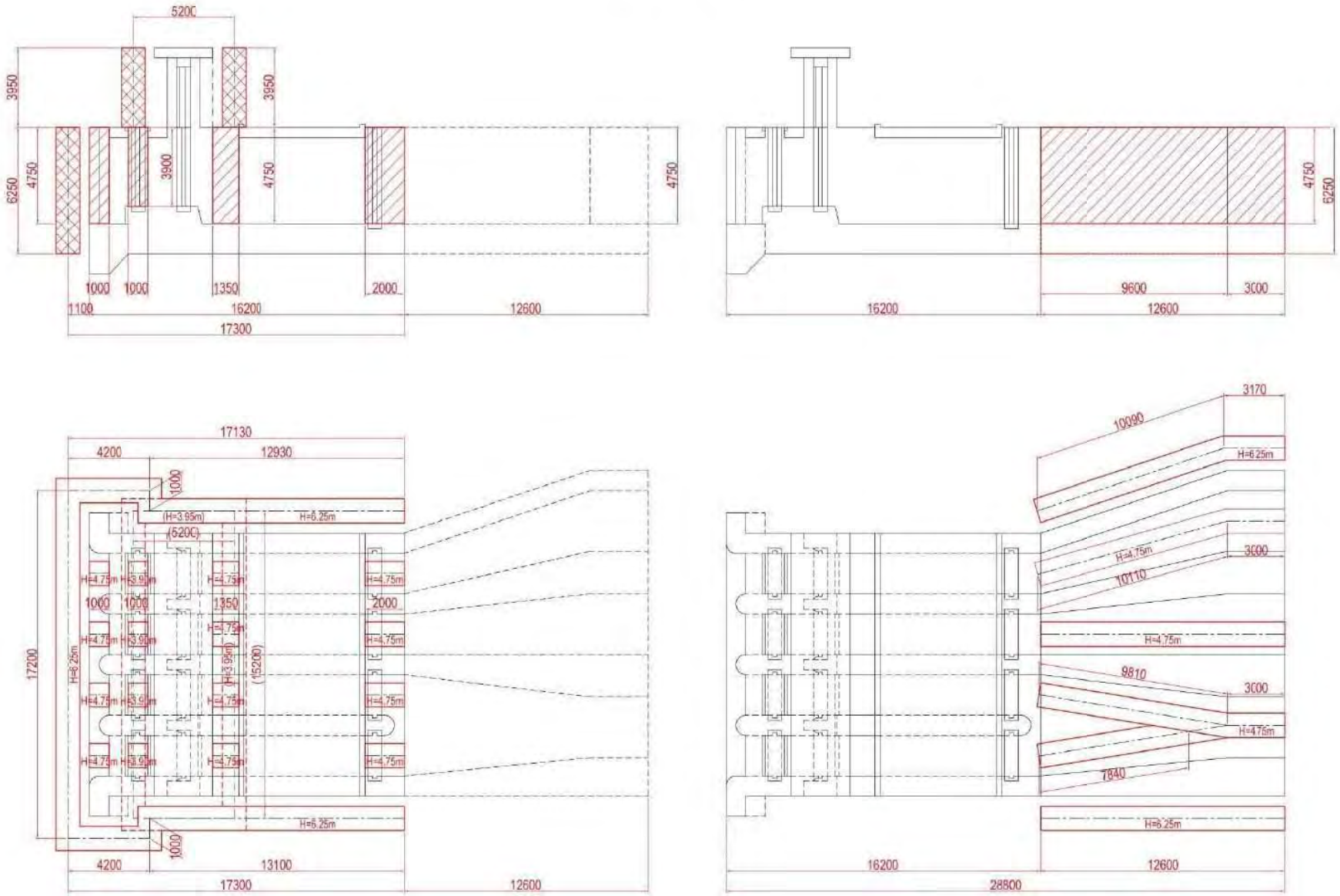




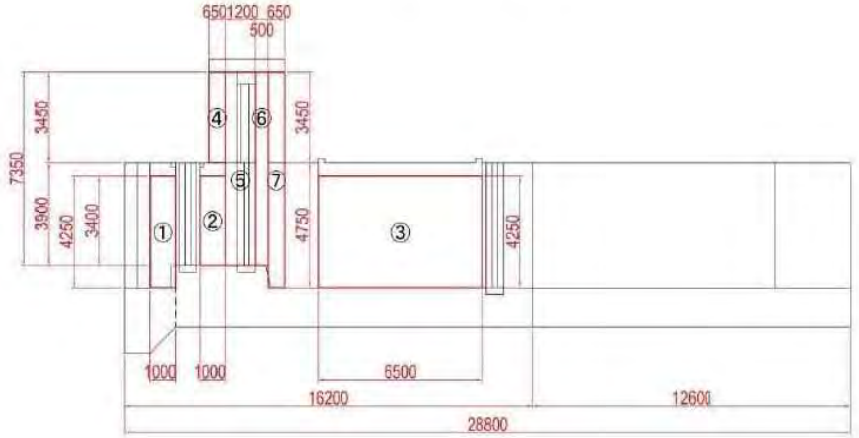


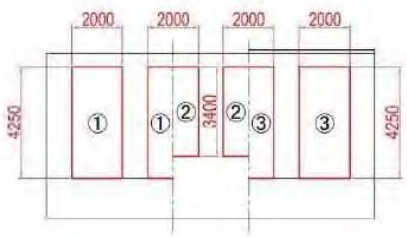


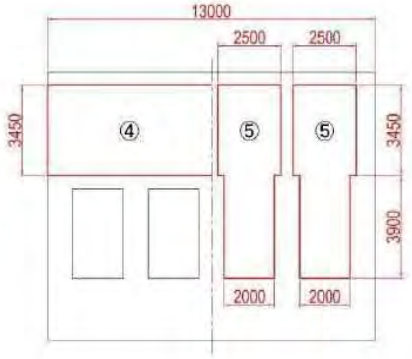
Scaffolding

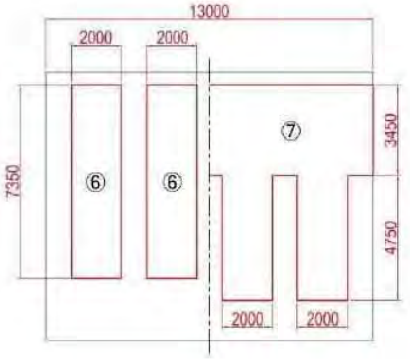


Falsework

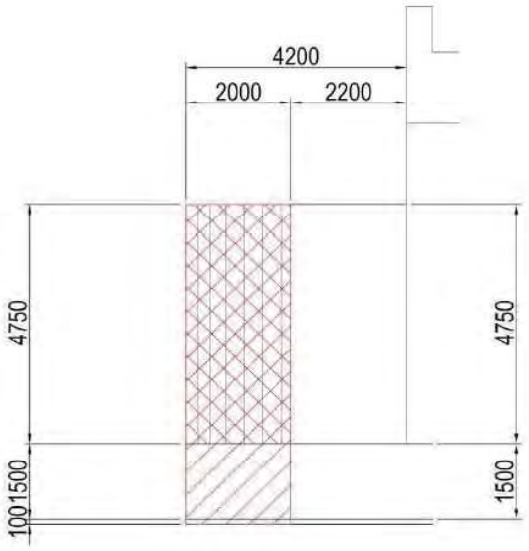

650 1200 650
500
3450
3450
7350
3900
4250
3400
4750
4250
①
②
③
④
⑤
⑥
⑦
1000
1000
6500
16200
12600
28800

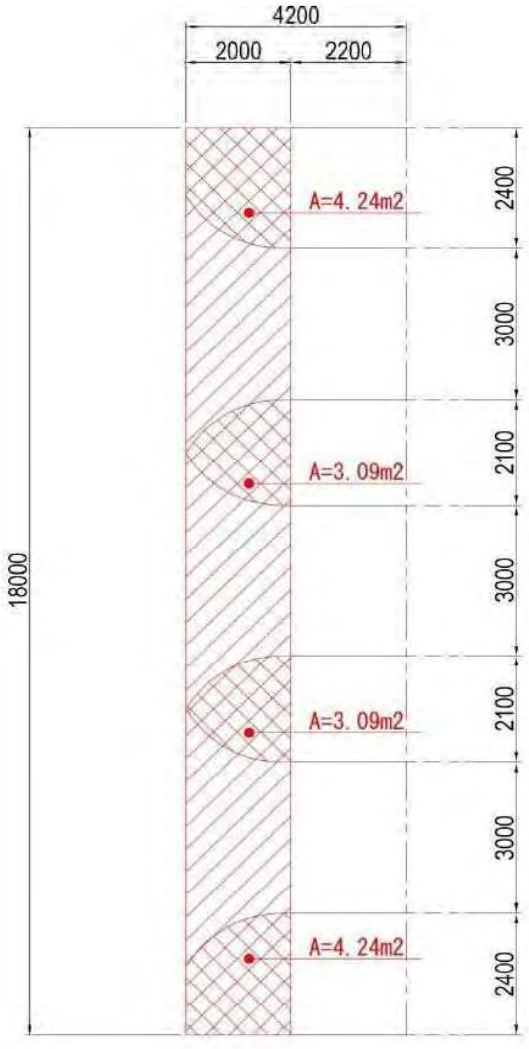

2000
2000
2000
2000
4250
3400
4250
①
①
②
②
③
③


13000
2500
2500
3450
3450
3900
2000
2000
④
⑤
⑤


13000
2000
2000
7350
3450
4750
2000
2000
⑥
⑥
⑦

Concrete demolition





(6) Sahelyia regulator

Sahelyia Weir body　　Quantity Summary Sheet

Type of works	Class	Subdivision	Dimensions	Unit	Quantity	Up stream	Down stream
Weir body	Demolition works	Concrete demolition	PC structure	m^3	2.14	—	2.14
			RC structure	m^3	71.78	—	71.78
	Main body	Leveling con.	σ ck=20N/mm^2	m^3	15.61	9.91	5.70
		Formwork	Leveling con.	m^2	4.76	3.54	1.22
		Reinforced con.	σ ck=25N/mm^2	m^3	752.37	526.13	226.24
		Formwork	RC structure	m^2	1,060.31	830.05	230.26
		Circular formwork	RC structure ϕ 1000-1/2Circle	m^2	9.35	9.35	—
		〃	RC structure ϕ 1000-1/4Circle	m^2	9.35	9.35	—
		Second stage con.	σ ck=25N/mm^2	m^3	13.38	13.38	—
		Formwork	RC structure	m^2	72.00	72.00	—
		Rebar	D12	t	1.831	1.201	0.630
		〃	D16	t	31.097	23.904	7.193
		Concrete curing	PC structure	m^3	15.61	9.91	5.70
		〃	RC structure	m^3	765.75	539.51	226.24
		Scaffolding	Prefabricated Scaffold, H≦30m	m^2	707.00	536.16	170.84
		Falsework	Wedge linked falsework, H=30.0 Support bearing force40KN/m^2 and less	m^3	294.83	294.83	—
		Expansion joint	Elastic filler,t=20mm	m^2	73.09	—	73.09
		Water stop	B-300mm	m	26.62	26.62	—
		Water-swelling water stop	Paste type, 9mm×30mm	m	29.40	—	29.40
		Resin capsule anchor	D20×200, Drilling dia. ϕ 25	nos	96	—	96
		Slip bar	D20×1.00m, VP ϕ 25×0.50m	nos	86	86	—
		〃	D20×0.70m	nos	96	—	96
	Other miscellaneous	Joint bar	D16×200	nos	636	636	—
		Grating	2000×1000	set	2	2	—
	Safty facilities work	Guard fense	H=1.10m	m	29.80	29.80	—

Sahelyia Weir body　　Quantity calculation

【Upstream】

Discription	Classification	Calculation			Quantity	Unit	Remarks
Main body							
Leveling con.	σck=20N/mm^2						
		7.20×(13.20+13.30)/2×0.10	−	9.54			
		(7.20−7.746)/2×0.50×0.10	=	0.37			
		Total	−	9.91	9.91	m^3	
Formwork	Leveling con.	(13.20+13.30)/2×0.10×2	−	2.65			
		(0.57×2+7.746)×0.10	−	0.89			
		Total	=	3.54	3.54	m^2	
Reinforced con.	σck=25N/mm^2						
	Cut-off	1/2×(1.00　2.00)×1.00×9.00	=	13.50			
	Invert	1.00×1.50×2.00×2	−	6.00			
	〃	7.00×1.50×15.20	=	159.60			
	〃	(7.00−7.546)/2×1.50×0.50	−	5.45			
	〃	1/2×(3.75　4.11)×1.45×2.00×2	=	22.79			Raising part
	〃	−0.70×0.25×2.50×2×3	=	-2.63			(−)Blockout
	Wall A	1.00×5.95×1.00	−	5.95			
	〃	1.00×5.95×15.20	=	90.41			
	〃	−(1−π/4)×0.50^2×5.95	=	−0.32			
	〃	1/2×(1.00−1.031)×5.95×0.50	−	3.02			
	〃	−0.70　4.50×0.25×2	=	-1.58			(−)Blockout
	〃	−0.70×5.95×0.25	−	-1.01			〃
	Wall B	1.00×5.95×11.70	=	87.47			
	〃	−(1−π/4)×0.50^2×5.95×2	−	−0.64			
	〃	1/2×(1.00　1.172)×5.95×0.50	−	3.23			
	〃	−0.70×4.50×0.25×2×2	=	-3.15			(−)Blockout
	〃	−0.70×5.95×0.25×2	−	-2.08			〃

Discription	Classification	Calculation			Quantity	Unit	Remarks
	Wall C	1.00×5.95×1.00	=	5.95			
	〃	1.00×5.95×15.20	=	90.41			
	〃	-(1-π/4)×0.50^2×5.95	-	-0.32			
	〃	1/2×(1.00 1.031)×5.95×0.50	-	3.02			
	〃	-0.70×4.50×0.25×2	=	-1.58			(-)Blockout
	〃	-0.70×5.95×0.25	-	-1.04			〃
	Corridor	1.00×0.50×2.00×2×2	=	4.00			
	〃	-0.15×0.15×2.00×2×2	-	-0.18			(-)Second stage con.
	Bridge	6.50×0.50×2.00×2	=	13.00			
	〃	0.25×0.15×7.00×2	-	0.53			
	Gate pier	(0.75×1.20+1.00×0.50)×1.05×2	-	11.31			
	〃	(0.50×1.20+1.00×0.50)×1.05	=	4.46			
	Top slab	3.00×0.50×7.00	-	10.50			
		Total	-	526.13	526.13	m^3	
Formwork	RC structure						
	Cut-off	1/2×(1.00-2.00)×1.00×2	=	3.00			Side
	〃	1.00×9.00	-	9.00			Edge
	Invert	(9.00 7.546)×1.50	=	24.82			Edge
	〃	1.00×1.50×2	=	3.00			Overhanging part
	〃	1.50×(15.20+0.57)×2	-	47.31			Side
	〃	(1.15-1.491)×2.00×2	=	11.78			Raising part
	〃	(0.70-2.50)×0.25×3×2	=	4.80			Blockout part
	Wall A	(1.50-1.00)×5.95	-	14.88			
	〃	5.95×(15.20++0.57-1.00+14.70-0.556)	-	190.55			
	〃	1.50×0.25×2×2+5.95×0.25×2	-	7.48			Blockout part
	〃	-1 2×(3.75+1.11)×1.45	=	-5.70			(-)Raising part
	〃	-(1.00×0.50-0.15×0.15)×2	-	-0.96			(-)Corridor
	〃	-6.50×0.50	-	-3.25			(-)Bridge
	Wall B	5.95×{(14.20 0.507)×2 1.172}	=	181.99			

Discription	Classification	Calculation			Quantity	Unit	Remarks
	Wall B	1.50×0.25×4×2+5.95×0.25×1	=	14.95			Blockout part
	〃	-1 2×(3.75+1.11)×1.45×2	=	-11.40			(-)Raising part
	〃	-(1.00×0.50-0.15×0.15)×4	-	-1.91			(-)Corridor
	〃	-6.50×0.50×2	-	-6.50			(-)Bridge
	Wall C	(1.50 1.00)×5.95	=	14.88			
	〃	5.95×(15.20++0.57-1.00+14.70-0.556)	-	190.55			
	〃	4.50×0.25×2×2+5.95×0.25×2	=	7.48			Blockout part
	〃	-1 2×(3.75+4.11)×1.45	-	-5.70			(-)Raising part
	〃	-(1.00×0.50-0.15×0.15)×2	=	-0.96			(-)Corridor
	〃	-6.50×0.50	-	-3.25			(-)Bridge
	Corridor	(1.00-0.50×2)×2.00×2×2	-	16.00			
	Bridge	(6.50-0.50×2)×2.00×2	=	30.00			
	〃	(0.25-7.00)×2×0.15×2	-	4.35			
	〃	0.25×0.15×4	-	0.15			
	Gate pier	(1.00 1.70)×2×4.05×3	=	65.61			
	Top slab	(3.00-7.00)×2×0.50	=	10.00			
	〃	3.00×7.00	=	21.00			
	〃	-(0.75×1.20+1.00×0.50)×2	-	-2.80			
	〃	-(0.50×1.20 1.00×0.50)	=	-1.10			
		Total	=	830.05	830.05	m^2	
Circular formwork	RC structure						
φ1000-1 2Circle		π 2×1.00×5.95	-	9.35	9.35	m^2	
φ1000-1/1Circle		π/1×1.00×5.95×2	-	9.35	9.35	m^2	

Discription	Classification	Calculation			Quantity	Unit	Remarks
Second stage con.	σck-25N/mm^2						
		0.70×0.25×2.50×2×3	=	2.63			Invert part
		(0.70×0.25−0.235×0.13)×4.50×4	−	2.60			Gate part
		{0.70×0.25−(0.365×0.13+1/2×0.12^2)}×3.60×4					〃
			=	1.73			
		(0.70×0.25−0.22×0.13)×(1.50−5.95)×1	−	6.12			Stop log part
		(0.15^2−0.05^2)×2.00×2×2	=	0.16			Corridor part
		0.05/6×{(2×0.83+0.73)×1.82+(2×0.73+0.83)×1.72}×2					Top slab part
			=	0.14			
		Total	−	13.38	13.38	m^3	
Formwork	RC structure						
		(0.70−0.13×2)×4.50×4	−	17.28			Gate part
		{0.365+0.215−0.13+0.12×√(2)}×3.60×4	−	12.67			〃
		(0.70−0.13×2)×(4.50+5.95)×4	=	40.13			Stop log part
		0.15×2.00×2×2	=	1.20			Corridor part
		1/2×(0.73−0.83)×0.05×√(2)×2×2	=	0.22			Top slab part
		1/2×(1.72−1.82)×0.05×√(2)×2×2	−	0.50			〃
		Total	=	72.00	72.00	m^2	
Rebar	Steel 360/520	refer to rebar weight calculation sheet					
		D12	=	1.201	1.201	t	
		D16	=	23.904	23.904	t	
Concrete caring	PC structure	Leveling con.	−	9.91	9.91	m^3	
	RC structure	526.13+13.38	−	539.51	539.51	m^3	

Discription	Classification	Calculation			Quantity	Unit	Remarks
Scaffolding	Prefabricated Scaffold, H≦30m						
	Outer perimeter	7.45×{11.20+(16.02+1.00−0.89)×2}	=	350.30			
	Inside	5.95×(1.00+1.35+1.50)×2	−	45.82			
	〃	4.50×1.00×2	−	9.00			
	Gate pier part	4.55×(5.20+9.20)×2	=	131.04			
		Total	−	536.16	536.16	m^2	
Falsework	Wedge linked Falsework, H≦30m, Support bearing force40KN/m^2 and less						
	①	2.00×5.45×1.00×2	−	21.80			Corridor part
	②	2.00×4.00×1.00×2	=	16.00			〃
	③	2.00×5.15×6.50×2	−	141.70			Bridge part
	①	7.00×4.05×0.65	=	18.43			Gate pier part
	⑤	(2.00×4.50+2.50×4.05)×1.20×2	=	45.90			〃
	⑥	2.00×8.55×0.50×2	−	17.10			〃
	⑦	(2.00×5.95×2+7.00×4.05)×0.65	−	33.90			〃
		Total	−	294.83	294.83	m^3	
Water stop	B=300mm	6.515−6.70×3	−	26.62	26.62	m^2	
Slip bar	D20×1.00m, VPϕ25×0.50m		=	86.0	86	nos	
Other miscellaneous							
Joint bar	D16×200	(126+84+108)×2	=	636.0	636	nos	Gate,Stop log part
Grating	2000×1000		=	2.0	2	Set	
Safty facillities work							
Guard fense	H=1.10m	6.70×2−2.70+1.70	=	17.80			Top slab
		6.00×2	−	12.00			Corridor
		Total	=	29.80	29.80	m	

Grating (2000×1000)　Quantity calculation

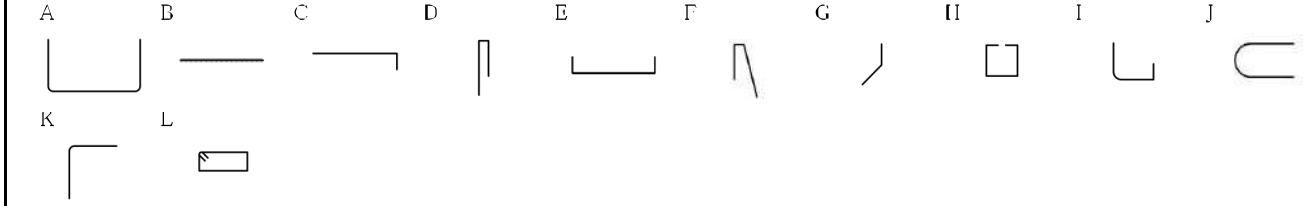
per a piece

Description	Classification	Calculation	Quantity	Unit	Remarks
Grating	I-44×985×1060				
		= 2.0	2	pieces	
Equal-leg angle	L-50×50×6×2000				
		2.00×0.00413×2 = 0.02	0.02	t	
Anchor bar	D12×105	4×2 = 8.0	8	nos	

Sahelyia Reg. (Upstream)　　Rebar weight 〔1/7〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F1	D 16	A		6.460 ×1	7.080 ×2	0.267 ×2			φ 170	1.000 ×3	24.16	77	1860.32	
F2	D 16	A		6.542 ×1 ～6.870	7.080 ×2	0.267 ×2			φ 170	1.000 ×3	24.40	3	73.20	
F3	D 16	B		6.800 ×1							6.80	100	680.00	
F4	D 16	B		6.881 ×1 ～7.210							7.05	3	21.15	
F5	D 16	C		15.500 ×1						1.000 ×1	16.50	35	577.50	
F6	D 16	B		1.400 ×1							1.40	2	2.80	
F7	D 16	G		1.000 ×1	0.422 ×1						1.43	2	2.86	
F8	D 16	C		14.134 ×1	1.134 ×1					1.000 ×1	16.27	4	65.08	
F9	D 16	C		0.500 ×1	1.134 ×1						1.64	2	3.28	
F10	D 16	C		0.457 ×1	1.134 ×1						1.60	2	3.20	
F11	D 16	B		2.750 ×1							2.75	23	63.25	
F12	D 16	D		0.068 ×1	2.334 ×1	1.134 ×1					3.54	20	70.80	
F13	D 16	E		1.418 ×1	1.134 ×2						3.69	20	73.80	
F14	D 16	F		0.193 ×1	1.134 ×1	2.371 ×1					3.71	20	74.20	
F15	D 16	C		9.274 ×1	1.134 ×1						10.41	20	208.20	
F16	D 16	C		0.434 ×1	1.134 ×1						1.57	20	31.10	
F17	D 16	B		0.423 ×1							0.43	2	0.86	
F18	D 16	B		5.050 ×1							5.05	8	40.40	

Type

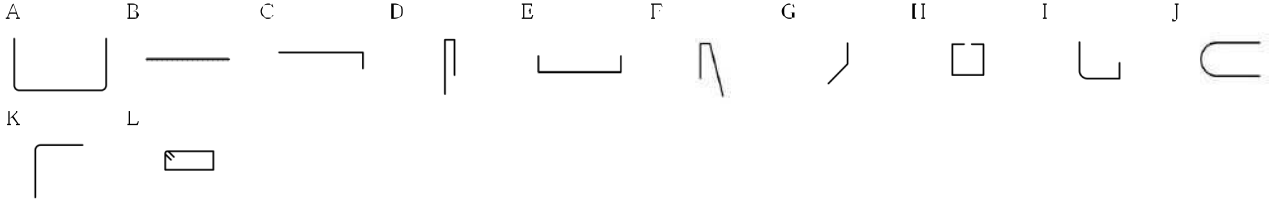


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Sahelyia Reg. (Upstream)　　Rebar weight 〔2/7〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F19	D 16	B		3.634 ×1							3.61	20	72.80	
F20	D 16	B		2.250 ×1							2.25	28	63.00	
F21	D 16	E		1.268 ×1	0.240 ×2						1.75	47	82.25	
F22	D 16	E		6.768 ×1	0.240 ×2						7.25	6	43.50	
F23	D 16	E		7.178 ×1	0.240 ×2						7.66	6	45.96	
F24	D 16	B		15.168 ×1						1.000 ×1	16.17	12	197.64	
F25	D 16	G		1.000 ×1	0.422 ×1						1.43	12	17.16	
F26	D 16	B		1.900 ×1							1.90	45	85.50	
F27	D 16	B		2.273 ×1							2.28	35	79.80	
F28	D 16	G		1.000 ×1	1.331 ×1						2.31	10	23.10	
F29	D 16	B		8.800 ×1							8.80	10	88.00	
F30	D 16	B		1.900 ×1							1.90	26	49.40	
F31	D 16	B		1.800 ×1							1.80	12	21.60	
F32	D 16	B		1.000 ×1							1.00	8	8.00	
F33	D 16	E		1.300 ×1	0.240 ×2						1.78	8	14.24	
F34	D 16	E		1.268 ×1	0.240 ×2						1.75	10	17.50	
F35	D 12	H		0.428 ×1	1.328 ×2	0.100 ×2					3.29	110	361.90	
F36	D 12	H		0.428 ×1	1.928 ×2	0.100 ×2					4.49	20	89.80	

Type



Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Sahelyia Reg. (Upstream)　　Rebar weight 〔3/7〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F37	D 12	H	□	0.428 ×1	2.178 ×2	0.100 ×2					1.99	10	19.90	
F38	D 12	H	□	0.428 ×1	1.078 ×2	0.100 ×2					2.79	10	27.90	
W 1	D 16	C	⌊	7.250 ×1	0.240 ×1						7.49	383	2868.67	
W 2	D 16	E	⌐	0.800 ×1	0.240 ×2						1.28	42	53.76	
W 3	D 16	E	⌐	0.550 ×1	0.240 ×2						1.03	20	20.60	
W 4	D 16	E	⌐	0.781 ×1 ～0.791							0.79	4	3.16	
W 5	D 16	E	⌐	0.300 ×1	0.240 ×2						0.78	10	7.80	
W 6	D 16	E	⌐	0.831 ×1 ～0.883	0.240 ×2						1.34	2	2.68	
W 7	D 16	E	⌐	0.800 ×1	0.240 ×2						1.28	10	12.80	
W 8	D 16	B	–	15.500 ×1						1.000 ×1	16.50	66	1089.00	
W 9	D 16	G	／	1.000 ×1	0.422 ×1						1.43	62	88.66	
W10	D 16	I	⌊	1.400 ×1	0.603 ×1	1.534 ×1	0.768 ×1		φ 384		4.31	52	224.12	
W11	D 16	E	⌐	1.418 ×1	0.768 ×2						2.96	52	153.92	
W12	D 16	E	⌐	8.918 ×1	0.768 ×2						10.46	52	543.92	
W13	D 16	E	⌐	0.464 ×1	0.768 ×1	0.763 ×1					2.00	62	124.00	
W14	D 16	I	⌊	1.400 ×1	0.603 ×1	13.731 ×1	0.768 ×1		φ 384	1.000 ×1	17.51	3	52.53	
W15	D 16	I	⌊	1.400 ×1	0.603 ×1	13.734 ×1	0.768 ×1		φ 384	1.000 ×1	17.51	2	35.02	
W16	D 16	J	⊂	1.206 ×1	1.050 ×2				φ 384		3.31	26	86.06	

Type

A　B　C　D　E　Γ　G　H　I　J

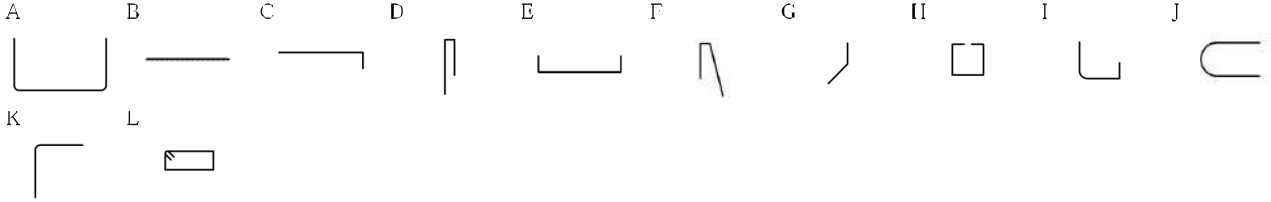
K　L

Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Sahelyia Reg. (Upstream)　　Rebar weight 〔4/7〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L ϕ	Joint	length/nos	nos	total length	Remarks
W17	D 16	B		1.450 ×1							1.45	52	75.10	
W18	D 16	B		8.950 ×1							8.95	52	465.40	
W19	D 16	E		0.424 ×1	0.753 ×1	0.897 ×1					2.08	62	128.96	
W20	D 16	J		1.206 ×1	1.000 ×2				ϕ 384		3.21	5	16.05	
W21	D 16	B		13.250 ×1						1.000 ×1	11.25	10	142.50	
W22	D 16	B		1.800 ×1							1.80	62	111.60	
W23	D 16	E		0.768 ×1	0.240 ×2						1.25	127	158.75	
W24	D 16	B		5.050 ×1							5.05	100	505.00	
W25	D 16	B		2.250 ×1							2.25	128	288.00	
W26	D 16	B		1.300 ×1							1.30	1	17.20	
W27	D 16	B		1.896 ×1							1.90	2	3.80	
W28	D 16	B		1.450 ×1							1.45	4	5.80	
W29	D 16	B		10.300 ×1							10.30	5	51.50	
W30	D 16	B		8.950 ×1							8.95	1	35.80	
W31	D 16	B		0.440 ×1							0.41	2	0.88	
W32	D 16	B		1.396 ×1							1.40	2	2.80	
W33	D 16	B		3.800 ×1							3.80	1	3.80	
W34	D 16	B		0.450 ×1							0.45	2	0.90	

Type

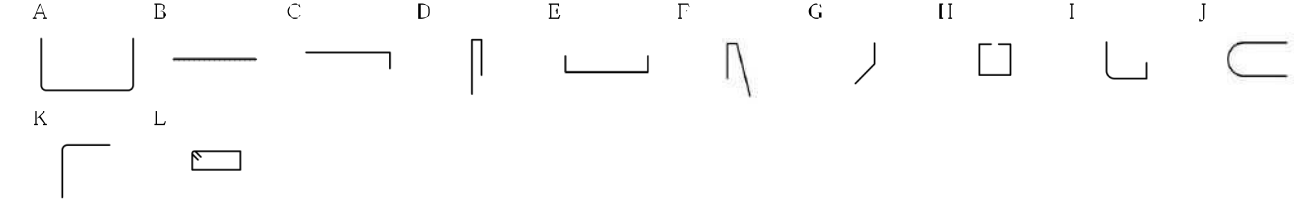


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Sahelyia Reg. (Upstream)　　Rebar weight 〔5/7〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W35	D 16	B		1.746 ×1 ～1.800							1.78	6	10.68	
W36	D 12	E		0.828 ×1	0.100 ×2						1.03	603	621.09	
W37	D 12	E		0.578 ×1	0.100 ×2						0.78	78	60.84	
W38	D 12	E		0.328 ×1	0.100 ×2						0.53	39	20.67	
W39	D 12	E		0.809 ×1	0.100 ×2						1.01	16	16.16	
W40	D 12	E		0.859 ×1	0.100 ×2						1.06	8	8.48	
W41	D 12	E		0.828 ×1	0.100 ×2						1.03	30	30.90	
S 1	D 16	B		6.800 ×1							6.80	22	149.60	
S 2	D 16	B		0.800 ×1							0.80	80	64.00	
S 3	D 16	E		0.618 ×1	0.268 ×2						1.16	40	46.40	
S 4	D 16	B		12.800 ×1						1.000 ×1	13.80	66	910.80	
S 5	D 16	E		6.300 ×1	0.268 ×2						6.84	20	136.80	
S 6	D 16	E		6.300 ×1	0.240 ×2						6.78	20	135.60	
G 1	D 16	A		6.460 ×1	5.280 ×2	0.267 ×2			φ 170	1.000 ×2	19.56	7	136.92	
G 2	D 16	K		1.010 ×1	5.280 ×1	0.267 ×1			φ 170	1.000 ×1	7.56	1	7.56	
G 3	D 16	K		1.010 ×1	5.280 ×1	0.267 ×1			φ 170	1.000 ×1	7.56	1	7.56	
G 4	D 16	K		0.934 ×1	5.280 ×1	0.267 ×1			φ 170	1.000 ×1	7.49	1	7.49	
G 5	D 16	K		0.934 ×1	5.280 ×1	0.267 ×1			φ 170	1.000 ×1	7.49	1	7.49	

Type

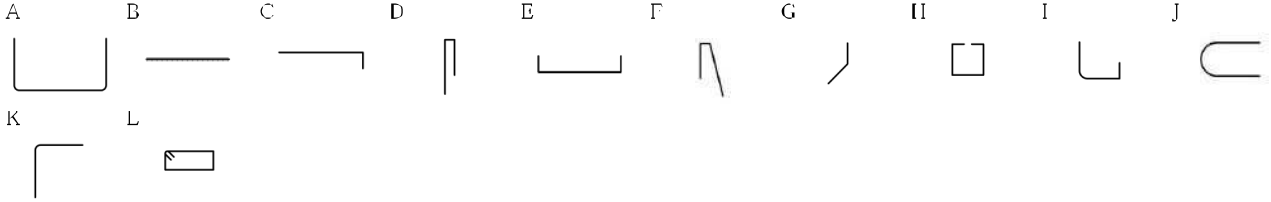


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Sahelyia Reg. (Upstream)　　Rebar weight 〔6/7〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
G 6	D 16	B		0.808 ×1 ～0.960							0.89	4	3.56	
G 7	D 16	B		1.408 ×1 ～1.560							1.49	2	2.98	
G 8	D 16	B		5.450 ×1							5.45	62	337.90	
G 9	D 16	L		0.832 ×2	0.332 ×2	0.225 ×2					2.78	63	175.14	
G10	D 16	L		1.532 ×2	0.582 ×2	0.225 ×2					1.68	42	196.56	
G11	D 16	L		1.532 ×2	0.332 ×2	0.225 ×2					1.18	21	87.78	
G12	D 12	E		0.578 ×1	0.100 ×2						0.78	30	23.40	
G13	D 12	E		0.328 ×1	0.100 ×2						0.53	15	7.95	
T 1	D 16	E		6.800 ×1	0.300 ×2						7.40	8	59.20	
T 2	D 16	E		6.800 ×1	0.240 ×2						7.28	15	109.20	
T 3	D 16	C		1.114 ×1 ～1.180	0.240 ×1						1.39	4	5.56	
T 4	D 16	B		0.809 ×1 ～0.960							0.89	4	3.56	
T 5	D 16	B		1.408 ×1 ～1.560							1.49	2	2.98	
T 6	D 16	E		2.832 ×1	0.332 ×2						3.50	31	108.50	
T 7	D 16	E		2.832 ×1	0.240 ×2						3.32	31	102.92	
T 8	D 16	C		1.253 ×1	0.332 ×1						1.59	12	19.08	
T 9	D 16	C		1.233 ×1	0.332 ×1						1.57	12	18.84	
T10	D 16	C		1.253 ×1	0.240 ×1						1.50	12	18.00	

Type



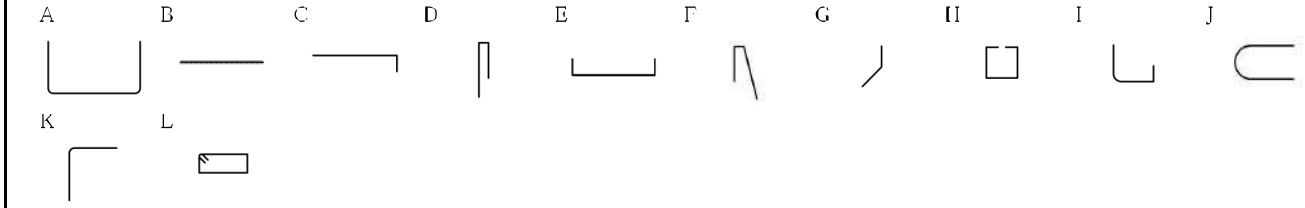
Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Sahelyia Reg. (Upstream)　　Rebar weight 〔7/7〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
T11	D 16	C		1.233 ×1	0.240 ×1						1.48	12	17.76	
T12	D 16	B		6.400 ×1							6.40	4	25.60	
T13	D 16	B		2.200 ×1							2.20	32	70.40	
T14	D 12	E		0.328 ×1	0.100 ×2						0.53	64	33.92	

D12	1352.91×0.888	=	1201.38 kg	= 1.201 t
D16	15129.31×1.58	=	23904.31 kg	= 23.904 t

Type

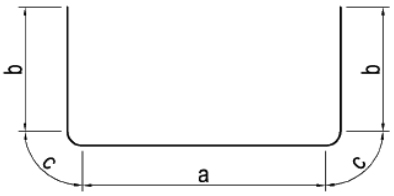


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

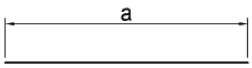
Schematic design of rebar

(Upstream)

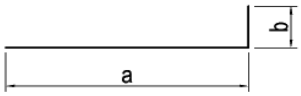
A



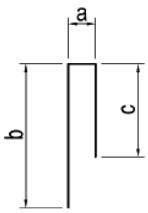
B



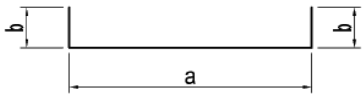
C



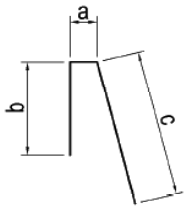
D



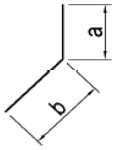
E



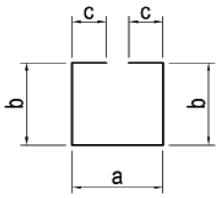
F



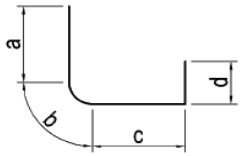
G



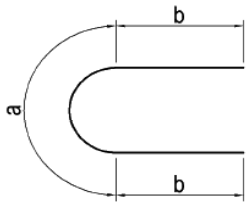
H



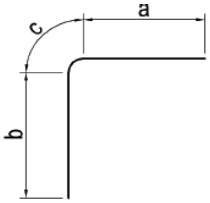
I



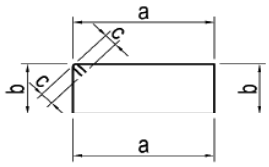
J



K



L



Sahelyia Weir body Quantity calculation

【Downstream】

Discription	Classification	Calculation			Quantity	Unit	Remarks
Demolition works							
Concrete demolition	PC structure	2.00×0.10×10.70	=	2.14	2.14	m^3	
	RC structure	2.00×1.50×10.50	=	31.50			
		(1.84×2+3.09)×5.95	−	40.28			
		Total	=	71.78	71.78	m^3	
Main body							
Leveling con.	σck=20N/mm^2						
		(7.746+10.70)/2×2.70×0.10	=	2.49			
		10.70×3.00×0.10	−	3.21			
		Total	=	5.70	5.70	m^3	
Formwork	Leveling con.	(3.077+3.00)×2×0.10	=	1.22			
		Total	−	1.22	1.22	m^2	
Reinforced con.	σck=25N/mm^2						
	Invert	(7.546+10.50)/2×1.50×2.70	−	36.51			
	〃	10.50×1.50×3.00	=	47.25			
	Wall A	1/2×(1.031+1.20)×5.95×2.70	=	17.92			
	〃	1.20×5.95×3.00	−	21.42			
	Wall B	1/2×(1.172+2.10)×5.95×2.70	=	26.28			
	〃	2.10×5.95×3.00	−	37.49			
	Wall C	1/2×(1.031+1.20)×5.95×2.70	=	17.92			
	〃	1.20×5.95×3.00	−	21.42			
		Total	−	226.24	226.24	m^3	

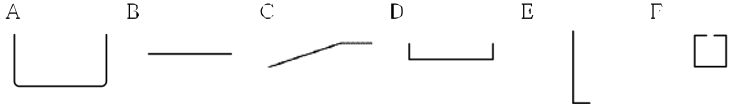
Discription	Classification	Calculation			Quantity	Unit	Remarks
Formwork	RC structure						
	Invert	1.50×(3.077+3.00)×2	=	18.23			
	Wall A	5.95×(3.077+3.00+3.00×2)	=	71.86			
	Wall B	5.95×(2.74+3.00)×2	=	68.31			
	Wall C	5.95×(3.077+3.00+3.00×2)	=	71.86			
		Total	=	230.26	230.26	m^2	
Rebar	Steel 360/520	refer to rebar weight calculation sheet					
		D12	=	0.630	0.630	t	
		D16	=	7.193	7.193	t	
Concrete curing	PC structure	Leveling con.	=	5.70	5.70	m^3	
	RC structure	Reinforced con.	=	226.24	226.24	m^3	
Scaffolding	Prefabricated scaffold, H≦30m						
	Outer perimeter	7.45×(3.36+3.17)×2	=	97.30			
	Inside	5.95×(3.18+3.00)×2	=	73.54			
		Total	=	170.84	170.84	m^2	
Expansion joint	Elastic filler,t=20mm						
		7.516×1.50	=	11.32			Upstream
		(1.031×2+1.172)×5.95	=	19.21			〃
		10.50×1.50	=	15.75			Downstream
		(1.20×2+2.10)×5.95	=	26.78			〃
		Total	=	73.09	73.09	m^2	
Water-swelling water stop	Paste type, 9mm×30mm						
		9.30+6.70×3	=	29.40	29.40	m^2	

Discription	Classification	Calculation	Quantity	Unit	Remarks
Resin capsule anchor	D20×200, Drilling dia. ϕ25	= 96.0	96	nos	
Slip bar	D20×0.70m	= 96.0	96	nos	

Sahelyia Reg. (Downstream)　　Rebar weight 〔1/3〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
F1	D 16	A		7.088 ×1 ～9.879	7.080 ×2	0.267 ×2			φ 170	1.000 ×3	26.18	11	366.52	
F2	D 16	A		9.960 ×1	7.080 ×2	0.267 ×2			φ 170	1.000 ×3	27.66	15	414.90	
F3	D 16	B		7.428 ×1 ～10.217							8.83	14	123.62	
F4	D 16	B		10.300 ×1							10.30	15	154.50	
F5	D 16	B		5.500 ×1							5.50	18	99.00	
F6	D 16	B		0.572 ×1 ～2.609							1.60	6	9.60	
F7	D 16	B		3.336 ×1 ～5.400							4.37	12	52.44	
F8	D 16	C		2.997 ×1	2.870 ×1						5.87	2	11.74	
F9	D 16	C		2.859 ×1	2.927 ×1						5.79	2	11.58	
F10	D 16	C		2.648 ×1	2.890 ×1						5.51	2	11.08	
F11	D 16	B		5.500 ×1							5.50	37	203.50	
F12	D 16	B		3.240 ×1 ～5.434							4.34	14	60.76	
F13	D 16	D		7.392 ×1	0.240 ×2						7.88	6	47.28	
F14	D 16	D		10.268 ×1	0.240 ×2						10.75	6	64.50	
F15	D 16	C		2.997 ×1	2.870 ×1						5.87	12	70.44	
F16	D 16	D		1.268 ×1	0.240 ×2						1.75	56	98.00	
F17	D 12	F		0.528 ×1	1.328 ×2	0.100 ×2					3.39	94	318.66	
W 1	D 16	E		7.250 ×1	0.240 ×1						7.49	146	1093.54	

Type

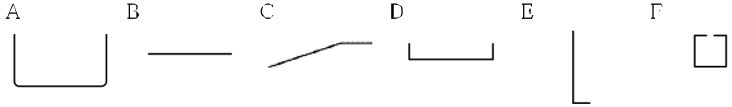


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Sahelyia Reg. (Downstream)　　Rebar weight 〔2/3〕

No.	Dia.	Type	Shape	L a	L b	L c	L d	L e	L φ	Joint	length/nos	nos	total length	Remarks
W 2	D 16	C		2.997 ×1	2.870 ×1						5.87	60	352.20	
W 3	D 16	C		2.859 ×1	2.927 ×1						5.79	60	347.40	
W 4	D 16	C		2.648 ×1	2.890 ×1						5.54	60	332.40	
W 5	D 16	D		0.822 ×1 ～0.972	1.000 ×2						2.90	26	75.40	
W 6	D 16	D		1.000 ×1	1.000 ×2						3.00	28	84.00	
W 7	D 16	D		1.055 ×1 ～1.880	1.000 ×2						3.47	13	45.11	
W 8	D 16	D		1.900 ×1	1.000 ×2						3.90	14	54.60	
W 9	D 16	C		2.925 ×1	2.900 ×1						5.83	8	46.64	
W10	D 16	B		5.500 ×1							5.50	5	27.50	
W11	D 16	B		3.764 ×1 ～4.928							1.35	1	17.10	
W12	D 16	D		0.776 ×1	0.240 ×2						1.26	60	75.60	
W13	D 16	D		0.971 ×1	0.240 ×2						1.46	30	43.80	
W14	D 16	D		0.968 ×1	0.240 ×2						1.45	60	87.00	
W15	D 16	D		1.868 ×1	0.240 ×2						2.35	30	70.50	
W16	D 12	D		0.862 ×1 ～0.987	0.100 ×2						1.13	84	94.92	
W17	D 12	D		1.028 ×1	0.100 ×2						1.23	98	120.54	
W18	D 12	D		1.752 ×1 ～1.839	0.100 ×2						1.70	42	71.40	
W19	D 12	D		1.928 ×1	0.100 ×2						2.13	49	104.37	

Type

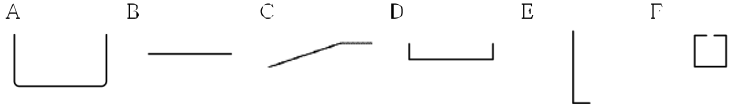


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

Sahelyia Reg. (Downstream)　　Rebar weight 〔3/3〕

No.	Dia.	Type	Shape	L						Joint	length/nos	nos	total length	Remarks
				a	b	c	d	e	ϕ					
			D12	709.89×0.888		=	630.38 kg	=	0.630 t					
			D16	4552.55×1.58		=	7193.03 kg	=	7.193 t					

Type

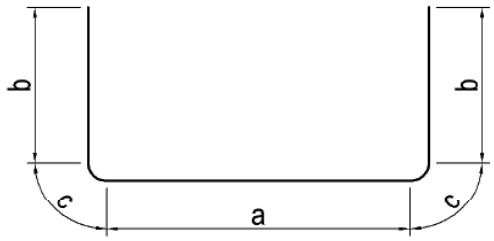


Dia.	kg/m	R	L	J
D12	0.888	130	201	1000
D14	1.21	150	236	1000
D16	1.58	170	267	1000
D18	2.00	190	298	1000
D20	2.47	210	330	1100
D22	2.98	240	377	1210
D25	3.85	270	424	1375
D28	4.83	300	471	1540
D32	6.31	340	534	1760

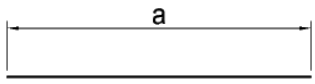
Schematic design of rebar

(Downstream)

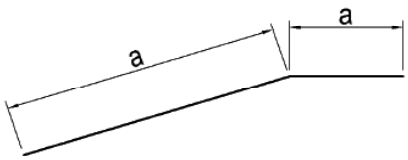
A



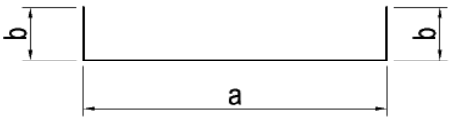
B



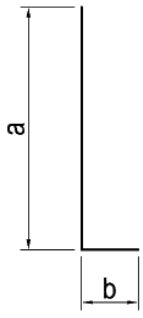
C



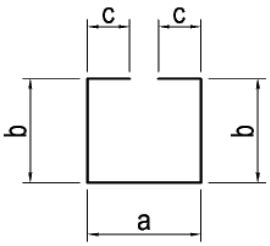
D



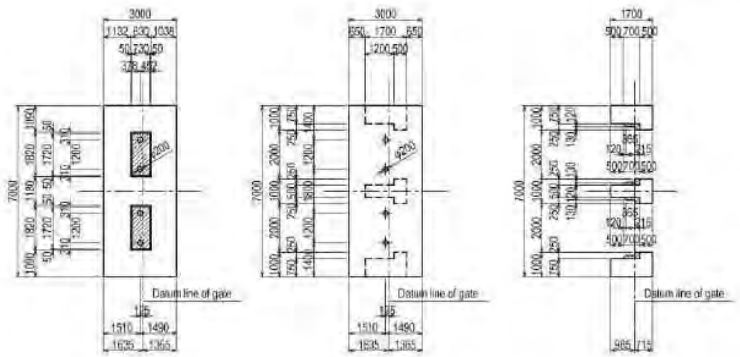
E

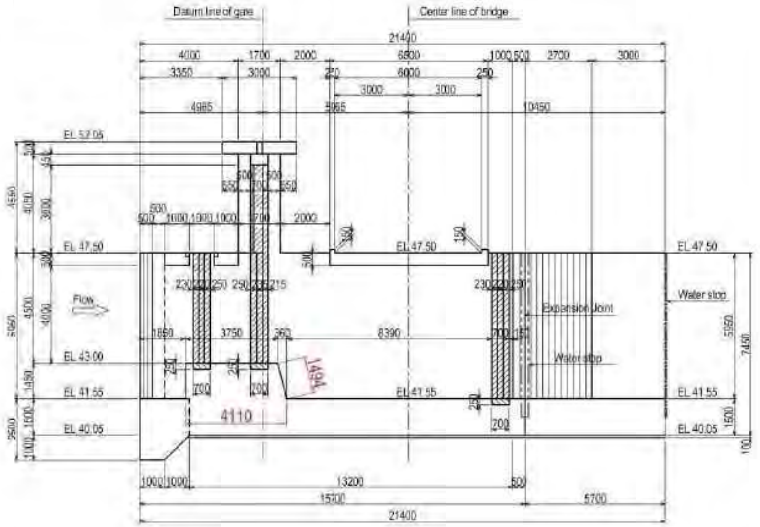


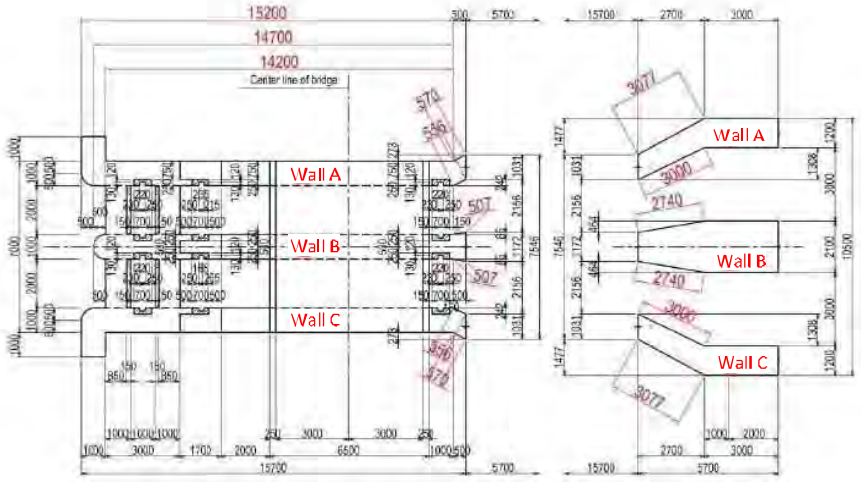
F

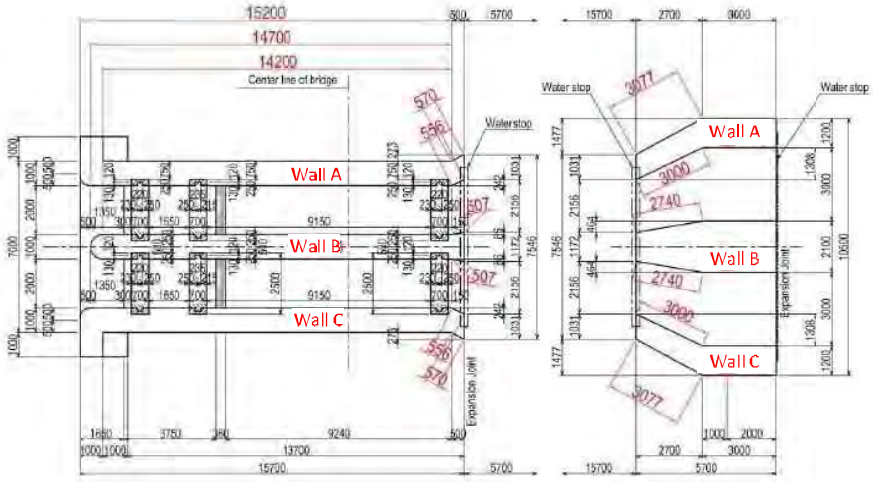


Concrete / Formwork

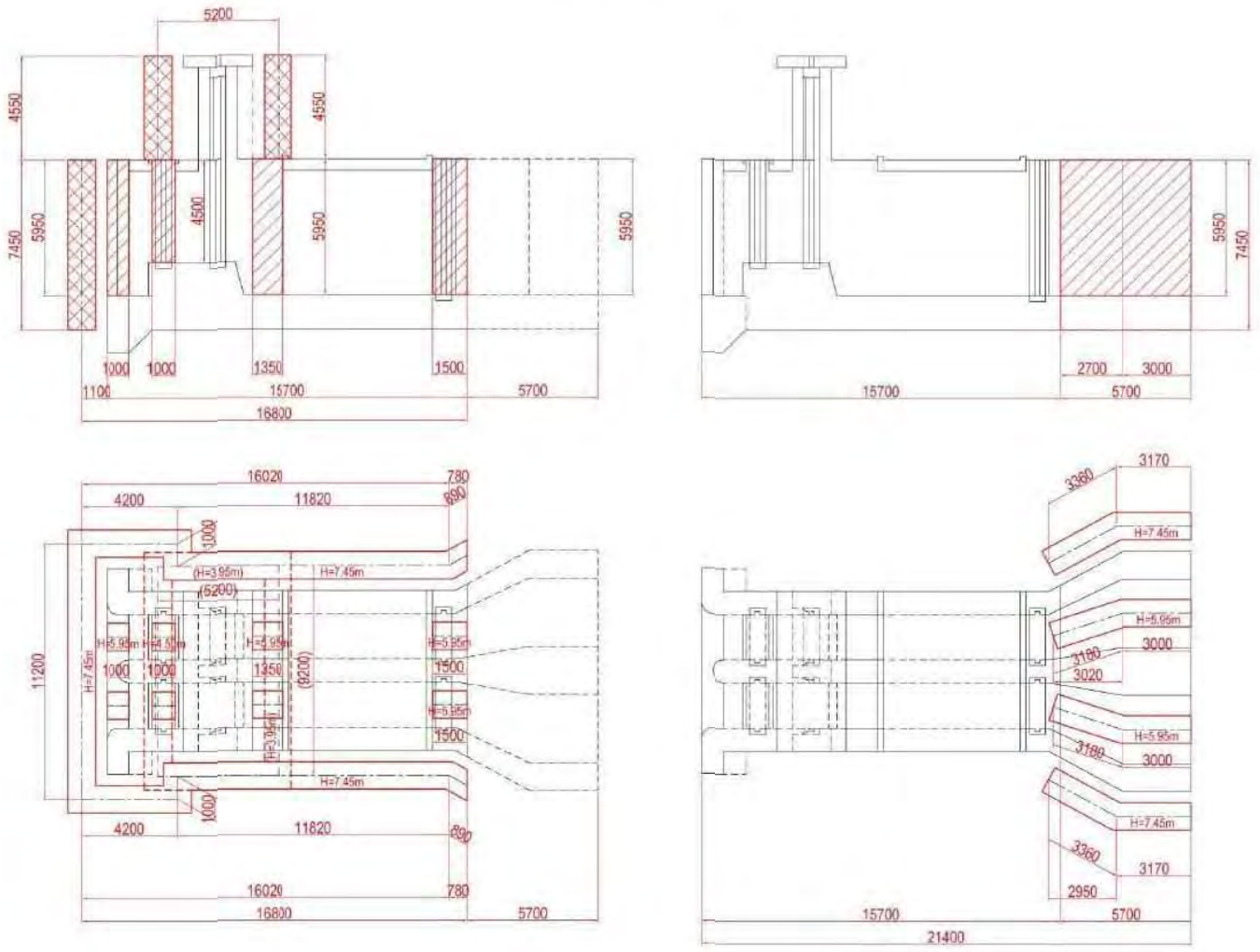




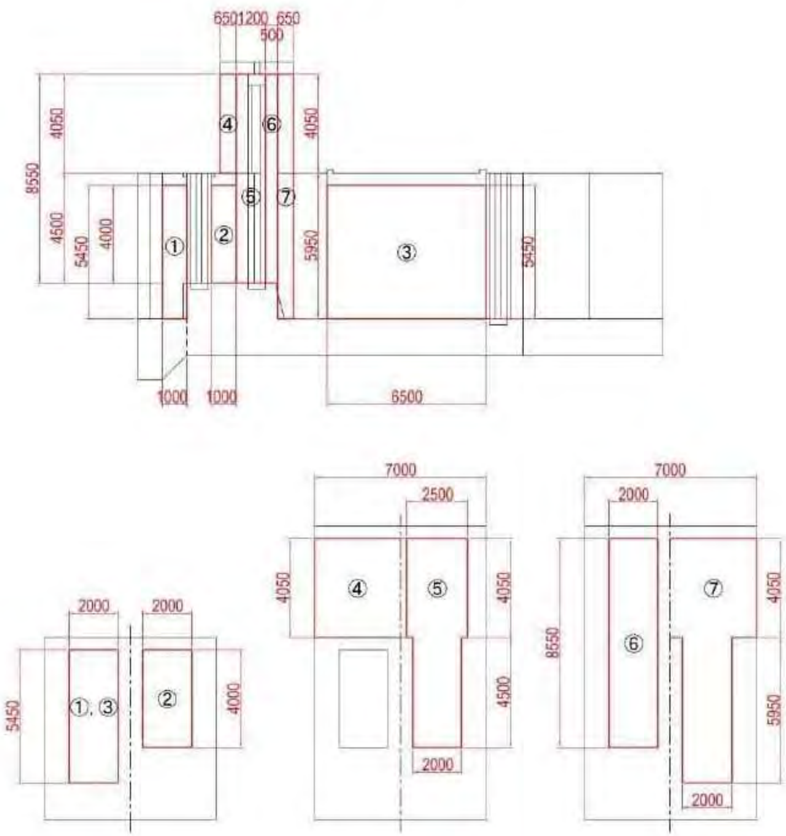




Scaffolding

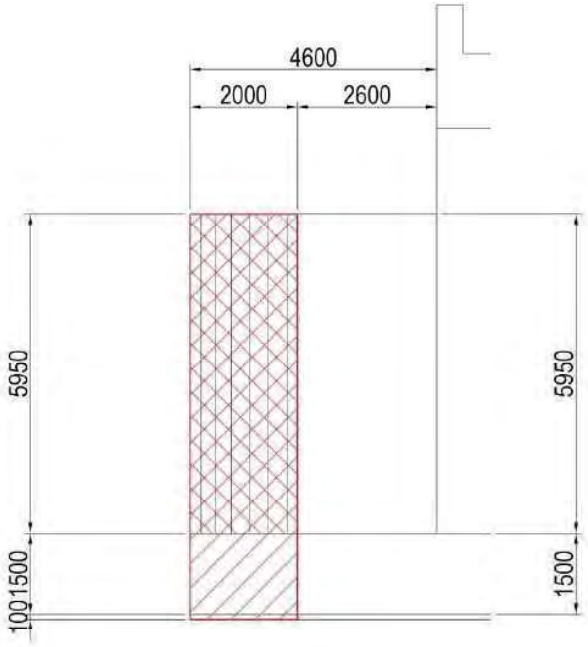


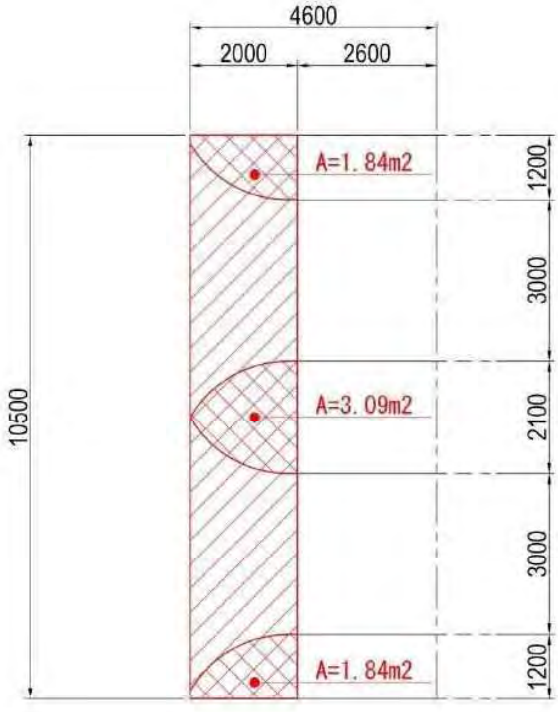
Falsework



650 1200 650
500
4050
8550
4500
5450
4000
5950
5450
4050
1000
1000
6500
7000
2500
2000
2000
2000
7000
2000
5450
4000
4050
4050
4500
2000
8550
4050
5950
2000

Concrete demolition





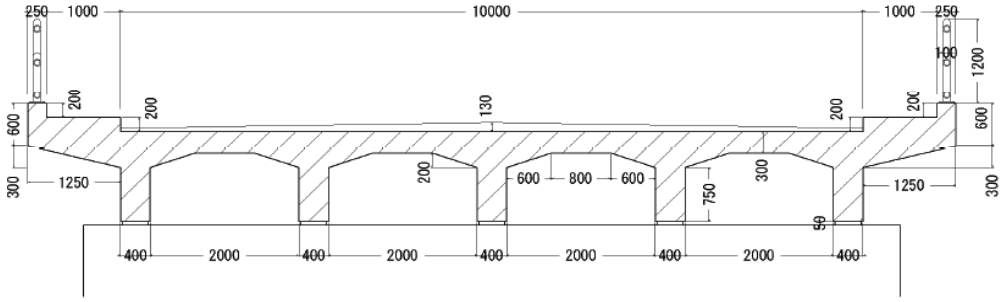
C-1-6. Quantity calculation of ancillary bridge works

(1) Quantity summary table

Description	Classification	Unit	Bahr Yusef	Ibrahimia	Badraman		Quantity	Remarks
					Badraman	Dinoutiah		
1. Concrete works								
(1)Reinforced concrete	σck=25N/mm^2(cube)	m^3	231.8	231.8	34.1	51.2	548.9	
(2) Form	RC stucture	m^2	759.4	759.4	71.4	106.0	1696.3	
(3)Styrofoam	t=150	m^2	19.2	19.2			38.4	
	t=100	m^2	11.6	11.6			23.2	
	t=50	m^2	36.8	36.8	11.4	11.4	96.3	
	t=20				22.0	33.0	55.0	
(4)Curing		m^3	231.8	231.8	34.1	51.2	548.9	
(5)Reinforcing bar	Steel 360/520	kg	46,332	46,332	5,003	7,420	105,087	
(6)Falsework		m^3	2,700	2,700	298	424	6,121	
2.Shoe								
(1)Rubber bearing	330×150×40	nos	10	10			20	
	330×300×40	nos	20	20			40	
	150×10,000×20	nos			1	1	2	
	300×10,000×20	nos			2	3	5	
(2)ST formula corrosion	F25D×710	set	4	4			8	
-proof anchor	M25D×710	set	8	8			16	
	F25D×580	set			2	2	4	
	M25D×580	set			2	2	4	
(3)PD-Packings	150^t×65×65	nos	4	4			8	
	150^t×65×165	nos	8	8			16	
	20^t×65×65	nos			2	2	4	
	20^t×65×165	nos			2	2	4	
3.Expansion joint								
(1)Brof joint	Type NⅡ-20(Carrige way)	m	20.2	20.2	20.2	20.2	80.8	
	Type NⅡ-20(Side walk)	m	4.0	4.0	4.0	4.0	16.0	
	Type NⅡ-35(Carrige way)	m	10.1	10.1			20.2	
	Type NⅡ-35(Side walk)	m	2.0	2.0			4.0	
(2)Anchor bar		kg	205	205	102	102	614	
4.Asphalt pavement	Wearing course	m^3	30.4	30.4	5.4	8.1	74.3	
5.Bulstrade								
(1)Bulstrade		m	67.6	67.6	12.0	18.0	165.2	
(2)Anchor bar		kg	625	625	108	159	1,517	

(2) Bahr Yusef and Ibrahimia reg.

Ancillary bridge (Bahr Yusef , Ibrahimia) Quantity calculation

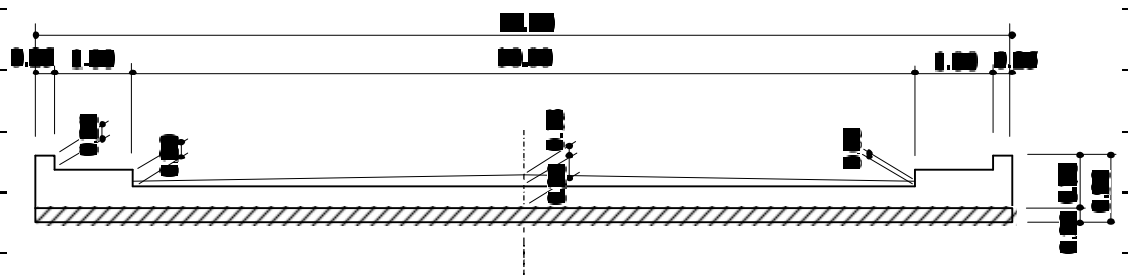
Description	Classification	Calculation			Quantity	Unit	Remarks
							
	Area	a1 = 0.20×0.25×2	=	0.10			
		a2 = 1/2×(0.40+0.70)×1.25×2	=	1.38			
		a3 = 0.30×10.00	=	3.00			
		a4 = 1/2×0.20×0.60×8	=	0.48			
		a5 = 0.75×0.40×5	=	1.50			
				A1 =	6.46	m^2	
		a7 = 1/2×(0.80+2.00)×0.20×4	=	1.12			
		a8 = 0.65×2.00×4	=	5.20			
				A2 =	6.32	m^2	
1. Concrete works							
(1) Reinforced concrete σck=25N/mm^2(cube)							
		A1×16.90×2	=	218.18			
		A2×0.40×3×2	=	15.17			
		-) (0.10×10.10+0.08×2.00)×0.33×2×2	=	-1.54			
				Total	231.80	m^3	
(2) Form	RC structure	$(0.60+(0.30^2+1.25^2)^{1/2})\times 2\times 16.90\times 2$	=	127.46			
		(0.75×2+0.40)×5×16.90×2	=	321.10			
		$((0.20^2+0.60^2)^{1/2}\times 2+0.80)\times 4\times 16.90\times 2$	=	279.18			

Description	Classification	Calculation	Quantity	Unit	Remarks
		-) $((0.65+(0.20^2+0.60^2)^{1/2})\times 2+0.80)\times 0.40\times 12\times 2$ = -32.30			
		$(0.20+0.20)\times 16.90\times 2\times 2$ = 27.04			
		-) $0.40\times(1.20+1.00+1.20)\times 5\times 2$ = -13.60			
		$A2\times 4\times 2$ = 50.56			
		Total	759.43	m^2	
(3) Styrofoam	t=150	$2.00\times 0.40\times 4\times 3\times 2$	19.20	m^2	
	t=100	$A1+A2-0.10\times 10.10-0.08\times 2.00$	11.61	m^2	
	t=50	$(A1+A2-0.10\times 10.10-0.08\times 2.00)\times 2$ = 23.21			
		$0.40\times(1.20+1.00+1.20)\times 5\times 2$ = 13.60			
		Total	36.81	m^3	
(4) Curing			231.80	m^3	
(5) Reinforcing bar (Steel 360/520)	D10	= 3,773			
	D12	= 5,763			
	D16	= 23,248			
	D25	= 13,548			
		Total	46,332	kg	
(6) Falsework		$(8.57\times 12.50+1/2\times(11.25+10.25)\times 0.50)\times 6.00\times 4$	2,700	m^3	
2. Shoe					
①Rubber bearing	330× 150× 40		10	nos	Fix.
	330× 300× 40		20	nos	Mov.
②ST formula corrosion-proof anchor					
	F25D× 710		4	set	Fix.

Description	Classification	Calculation	Quantity	Unit	Remarks
	M25D×710		8	set	Mov.
③PD-Packings	150^{t}×65×65		4	nos	Fix.
	150^{t}×65×165		8	nos	Mov.
3. Expansion joint					
①Brof joint	Type NⅡ-20 (Carrige way)		20.20	m	
	〃 (Side walk)		4.00	m	
	Type NⅢ-35 (Carrige way)		10.10	m	
	〃 (Side walk)		2.00	m	
②Anchor bar	D12	(1.00×4+10.10×2)×4×0.888kg/m = 86			
	D16	0.40×47×4×1.58kg/m = 119			
		Total	205	kg	
4. Asphalt pavement	Wearing course	1/2×(0.05+0.13)×5.00×2×16.90×2	30.42	m^3	
5. Bulstrade					
①Bulstrade	H=1.20m	16.90×2×2	67.6	m	
②Anchor bar	D20	1.15×220×2.47kg/m	625	kg	

(3)Badraman (Badraman) reg.

Ancillary bridge (Badraman) Quantity calculation

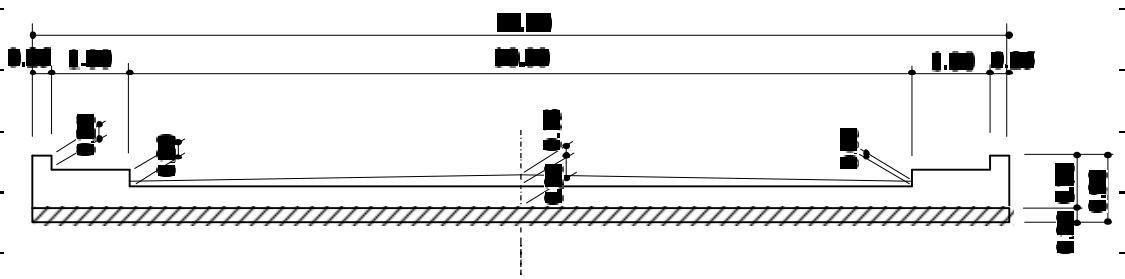
Description	Classification	Calculation		Quantity	Unit	Remarks
						
	Area	a1 = 0.20×(0.25+1.25)×2	= 0.60			
		a2 = 0.30×12.50	= 3.75			
			A1 =	4.35	m^2	
		a3 = A1	= 4.35			
		a4 = 0.20×12.50	= 2.50			
			A2 =	6.85	m^2	
1. Concrete works						
(1) Reinforced concrete σck=25N/mm^2(cube)						
		A2×(0.50+1.00+0.50)	= 13.70			
		1/2×(A1+A2)×0.60×4	= 13.44			
		A1×0.80×2	= 6.96			
			Total	34.10	m^3	
(2) Form	RC structure					
		0.90×(0.50+1.00+0.50)×2	= 3.60			
		1/2×(0.90+0.70)×0.60×4×2	= 3.84			
		0.70×0.80×2×2	= 2.24			
		0.20×4×6.00	= 4.80			
		$(0.50\times2+(0.20^2+0.60^2)^{1/2}\times4+0.80\times2+1.00)\times12.50$	= 76.62			

Description	Classification	Calculation	Quantity	Unit	Remarks
		-) 11.00×(0.50+1.00+0.50) = -22.00			
		(0.10× 10.10+0.08× 2.00)× 2 = 2.34			
		Total	71.44	m^2	
(3) Styrofoam	t=50	(A2-0.10 × 10.10-0.08× 2) × 2	11.36	m^2	
	t=20	11.00×(0.50+1.00+0.50)	22.00	m^2	
(4) Curing			34.10	m^3	
(5) Reinforcing bar	D10	=			
(Steel 360/520)	D12	= 497			
	D16	= 4,506			
	D25	=			
		Total	5,003	kg	
(6) Falsework		5.95× 12.50× 2.00× 2	298	m^3	
2. Shoe					
①Rubber bearing	150× 10,000× 20		1	nos	Fix.
	300× 10,000× 20		2	nos	Mov.
②ST formula corrosion-proof anchor					
	F25D× 580		2	set	Fix.
	M25D× 580		2	set	Mov.
③PD-Packings	20^t× 65× 65		2	nos	Fix.
	20^t× 65× 165		2	nos	Mov.

Description	Classification	Calculation	Quantity	Unit	Remarks
3. Expansion joint					
①Brof joint	Type NII -20 (Carrige way)		20.20	m	
	〃 (Sidc walk)		4.00	m	
②Anchor bar	D12	(1.00× 4+10.10× 2) × 2× 0.888kg/m = 43			
	D16	0.40× 47 × 2× 1.58kg/m = 59			
		Total	102	kg	
4. Asphalt pavement	Wearing course	1/2 × (0.05+0.13)× 5.00× 2× 6.00	5.40	m^3	
5. Bulstrade					
①Bulstrade	H=1.20m	6.00× 2	12.0	m	
②Anchor bar	D20	1.15× 38 × 2.47kg/m	108	kg	

(4) Badraman (Diroutiah) reg.

Ancillary bridge (Diroutiah) Quantity calculation

Description	Classification	Calculation			Quantity	Unit	Remarks
							
	Area	a1 = 0.20×(0.25+1.25)×2	=	0.60			
		a2 = 0.30×12.50	=	3.75			
				A1 =	4.35	m^2	
		a3 = A1	=	4.35			
		a4 = 0.20×12.50	=	2.50			
				A2 =	6.85	m^2	
1. Concrete works							
(1) Reinforced concrete σck=25N/mm^2(cube)							
		A2×(0.50+1.00+1.00+0.50)	=	20.55			
		1/2×(A1+A2)×0.60×6	=	20.16			
		A1×0.80×3	=	10.44			
				Total	51.15	m^3	
(2) Form	RC structure						
		0.90×(0.50+1.00+1.00+0.50)×2	=	5.40			
		1/2×(0.90+0.70)×0.60×6×2	=	5.76			
		0.70×0.80×3×2	=	3.36			
		0.20×4×9.00	=	7.20			
		$(0.50\times2+(0.20^2+0.60^2)^{1/2}\times6+0.80\times3+1.00\times2)\times12.50$	=	114.93			

Description	Classification	Calculation	Quantity	Unit	Remarks
		-) 11.00×(0.50+1.00+1.00+0.50) = -33.00			
		(0.10× 10.10+0.08× 2.00)× 2 = 2.34			
		Total	105.99	m^2	
(3) Styrofoam	t=50	(A2-0.10 × 10.10-0.08× 2) × 2	11.36	m^2	
	t=20	11.00×(0.50+1.00+1.00+0.50)	33.00	m^2	
(4) Curing			51.15	m^3	
(5) Reinforcing bar	D10	=			
(Steel 360/520)	D12	= 757			
	D16	= 6,663			
	D25	=			
		Total	7,420	kg	
(6) Falsework		5.65× 12.50× 2.00× 3	424	m^3	
2. Shoe					
①Rubber bearing	150× 10,000× 20		1	nos	Fix.
	300× 10,000× 20		3	nos	Mov.
②ST formula corrosion-proof anchor					
	F25D× 580		2	set	Fix.
	M25D× 580		2	set	Mov.
③PD-Packings	20^t× 65× 65		2	nos	Fix.
	20^t× 65× 165		2	nos	Mov.

Description	Classification	Calculation	Quantity	Unit	Remarks
3. Expansion joint					
①Brof joint	Type NII -20 (Carrige way)		20.20	m	
	〃 (Sidc walk)		4.00	m	
②Anchor bar	D12	(1.00× 4+10.10× 2) × 2× 0.888kg/m = 43			
	D16	0.40× 47 × 2× 1.58kg/m = 59			
		Total	102	kg	
4. Asphalt pavement	Wearing course	1/2 × (0.05+0.13)× 5.00× 2× 9.00	8.10	m^3	
5. Bulstrade					
①Bulstrade	H=1.20m	9.00× 2	18.0	m	
②Anchor bar	D20	1.15× 56 × 2.47kg/m	159	kg	

C-1-7. Quantity calculation of bank protection works

(1) Quantity summary table

Description	Classification	Unit	Quantity	Remarks
Steel sheet pile	TYPE A	m	66.60	
	TYPE BL-1	m	6.60	
	TYPE BL-2	m	6.60	
	TYPE BR-1	m	4.80	
	TYPE BR-2	m	9.00	
	TYPE C-1	m	3.60	
	TYPE C-2	m	9.00	
	TYPE D-1	m	3.60	
	TYPE D-2	m	5.40	
	TYPE E-1	m	3.00	
	TYPE E-2	m	1.80	
	TYPE F	m	72.60	
	TYPE G-1	m	6.60	
	TYPE G-2	m	6.00	
	TYPE H	m	19.20	
	TYPE I	m	6.60	
	TYPE J	m	4.20	
	TYPE K	m	6.60	
	TYPE L	m	3.60	
	TYPE M	m	45.00	
Wet stone piching	1:2.0 t=35cm	m^2	1202.0	
	1:1.5 t=35cm	m^2	806.8	
	Backfilling concrete(t=20cm)	m^3	161.4	
	Crown works (Type A)	m	47.3	
	Crown works (Type B)	m	54.7	
	Fowndation works (type A)	m	55.9	
	Fowndation works (type B)	m	50.6	
Gabion	$0.5^{H} \times 1.0^{B} \times 2.0^{L}$	nos	1,184	
	$1.0^{H} \times 1.0^{B} \times 2.0^{L}$	nos	670	
	Stone	m^3	2,469.6	
	Geotextiles sheet	m^2	3,599.2	

(2) Steel sheet pile

Steel sheet pile revetment

Name of Reg.			Bahr-Yusef							Ibrahimia							Sahelyia	Diroutiah		Badraman		Abo Gabal	Total
TYPE			A	BL-1	BL-2	BR-1	BR-2	C-1	C-2	D-1	D-2	E-1	E-2	F	G-1	G-2	H	I	J	K	L	M	
Construction length			66.60m	6.60m	6.60m	4.80m	9.00m	3.60m	9.00m	3.60m	5.40m	3.00m	1.80m	72.60m	6.60m	6.00m	19.20m	6.60m	4.20m	6.60m	3.60m	45.00m	
Front sheet pile	type		PU18	PU18	PU18	PU18	PU18	PU18	PU18	PU18	PU12	PU12	PU12	PU18	PU12	PU12	PU12	PU12	PU12	PU18	PU12	PU12	
	length	m	21.5	16.5	11.0	16.5	11.5	19.0	17.0	16.0	9.5	13.5	8.0	17.5	15.0	9.5	11.0	9.0	8.0	10.0	8.0	9.5	
	piece	piece	111	11	11	8	15	6	15	6	9	5	3	121	11	10	32	11	7	11	6	75	
	weight	t	183.52	13.96	9.31	10.15	13.27	8.77	19.61	7.38	5.65	5.29	1.59	162.84	10.91	6.28	23.27	6.54	3.70	8.46	3.17	47.10	
	Penetration depth	m	14.20	9.70	7.80	9.70	7.20	11.70	12.20	8.70	6.70	7.50	6.50	10.20	7.50	6.60	5.75	7.10	6.65	7.95	6.50	4.60	
	painting	m^2	1,105.56	102.96	145.20	74.88	95.40	59.76	104.40	59.76	102.60	42.00	28.80	1,205.16	92.40	114.00	240.00	118.80	67.20	132.00	57.60	468.00	4,416.48
Bracing sheet pile	type		PU12	PU12		PU12	PU12	PU12	PU12	PU12		PU12		PU12	PU12		PU12					PU12	
	length	m	6.0	6.0		6.0	6.0	6.0	6.0	6.0		6.0		6.0	6.0		6.0					6.0	
	piece	piece	94	11		8	15	6	15	6		5		104	11		32					72	
	weight	t	37.28	4.36		3.17	5.95	2.38	5.95	2.38		1.98		41.25	4.36		12.69					28.56	
	Penetration depth	m	5.00	5.00		5.00	5.00	5.00	5.00	5.00		5.00		5.00	5.00		5.00					5.00	
	painting	m^2	676.80	79.20		57.60	108.00	43.20	108.00	43.20		36.00		748.80	79.20		230.40					518.40	2,728.80
Tie-Rod	diameter	mm	46	42		42	25	46	32	46		42		46	42		42					32	
	length	m	12.0 ～14.0	12.0		12.0	7.5	11.0	7.5	10.0		9.0		11.5 ～13.5	10.0		8.5					7.5 ～9.0	
	number	nos.	28	3		2	4	2	4	2		2		31	3		9					20	
	total length	m	351.00	36.00		24.00	30.00	22.00	30.00	20.00		18.00		371.50	30.00		76.50					152.00	
Waling	材料		UPN 220×80	UPN 200×75		UPN 200×75	UPN 180×70	UPN 220×80	UPN 180×70	UPN 220×80		UPN 200×75		UPN 220×80	UPN 200×75		UPN 180×70					UPN 160×65	
	延長	m	246.00	26.40		19.20	36.00	14.40	36.00	14.40		12.00		540.00	26.40		76.80					177.40	
	Weight	t	7.23	0.67		0.49	0.79	0.42	0.79	0.42		0.30		15.88	0.67		1.69					3.34	
Coping concrete																							
Concrete	σ ck=25N/mm2	m3	128.43	9.90	4.90	7.31	13.18	7.81	18.97	7.81	7.15	6.65	2.47	140.81	13.92	8.06	40.11	2.66	1.80	2.66	1.58	91.71	517.89
Form	RC structure	m2	401.53	36.51	17.72	27.53	47.91	26.28	59.94	24.98	20.16	21.47	8.14	440.15	43.42	23.62	128.50	14.04	9.72	14.04	8.64	289.60	1,663.90
Re-bar	D12	t	3.387	0.310	0.154	0.158	0.289	0.207	0.506	0.207	0.172	0.176	0.059	3.716	0.367	0.138	1.065	0.084	0.057	0.084	0.049	2.432	13.62
Curing	RC structure	m3	128.43	9.90	4.90	7.31	13.18	7.81	18.97	7.81	7.15	6.65	2.47	140.81	13.92	8.06	40.11	2.66	1.80	2.66	1.58	91.71	517.89
Expantion joint	Elastic filler,t=20mm	m2	12.70	0.00	0.72	0.72	0.72	1.30	1.30	1.30	0.00	1.30	0.00	14.00	0.00	1.30	4.62	0.72	0.72	0.72	0.72	10.68	53.54

Steel sheet pile revetment（TYPE A） Quantity calculation

Bahr Yusef Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE A	L ＝ 14.30+19.125+33.80-0.25-0.375	＝	66.60	66.60	m	
Front sheet pile	PU18(S270GP), L=21.5m						
		N ＝ 66.60/0.60	＝	111.0	111	piece	
		W ＝ 111×21.50×0.0769	＝	183.522	183.52	t	
Bracing sheet pile	PU12(S270GP), L=6.0m						
		N ＝ (13.20+10.20+33.00)/0.6	＝	94.0	94	piece	
		W ＝ 94×6.0×0.0661	＝	37.280	37.28	t	
Penetration depth	PU18	L ＝ 22.20-8.00	＝	14.20	14.20	m/piece	
	PU12	L ＝ 6.00-1.00	＝	5.00	5.00	m/piece	
Painting on steel sheet pile	GL-1.00m both sides	A ＝ (8.00-0.70+1.00)×0.60×2×111	＝	1105.56			PU18
	entire length both sides	A ＝ 6.00×0.60×2×94	＝	676.80			PU12
		Total	＝	1782.36	1782.36	m^2	
Tie-Rod	Φ46	L ＝ 12.00×20+13.50×2+14.00×6	＝	351.00	351.00	m	
Waling	UPN 220×80	L ＝ (111+94)×0.6×2	＝	246.00	246.00	m	
		W ＝ 246.00×0.0294	＝	7.232	7.23	t	
Coping concrete	σck=25N/mm^2	1.30×1.00×(14.30+19.125+33.80)	＝	87.39			
		0.80×0.90×(13.40+10.40+33.20)	＝	41.04			
		Total	＝	128.43	128.43	m^3	
Form	RC structure	(1.00＋1.30×2)×(14.30+19.125+33.80)	＝	242.01			
		1.30×1.00×7	＝	9.10			
		(0.90+0.80×2)×(13.40+10.40+33.20)	＝	142.50			

Description	Classification	Calculation			Quantity	Unit	Remarks
		0.80×0.90×11	=	7.92			
		Total	=	401.53	401.53	m^2	
Re-bar	D12						
		① (6×50+36)×3.25×0.888/1000	=	0.970			
		② (34×2+26×2+3×50+16)×2.15×0.888/1000	=	0.546			
		③ (19×(9.90×6+7.10))×0.888/1000	=	1.122			
		④ 15×(6.60×2+5.10×2+9.90×3+3.10)×0.888/1000	=	0.749			
		Total	=	3.387	3.387	t	
Curing	RC structure		=	128.43	128.43	m^3	
Expansion joint	elastic filler,t=20mm						
		1.30×1.00×7	=	9.10			
		0.80×0.9×5	=	3.60			
		Total	=	12.70	12.70	m^2	

Steel sheet pile revetment（TYPE BL-1） Quantity calculation

Bahr Yusef Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE BL-1	L ＝ 6.60	＝	6.60	6.60	m	
Front sheet pile	PU18(S270GP), L=16.5m						
		N ＝ 6.60/0.60	＝	11.0	11	piece	
		W ＝ 11×16.50×0.0769	＝	13.957	13.96	t	
Bracing sheet pile	PU12(S270GP), L=6.0m						
		N ＝ 6.60/0.6	＝	11.0	11	piece	
		W ＝ 11×6.0×0.0661	＝	4.363	4.36	t	
Penetration depth	PU18	L ＝ 16.70-7.00	＝	9.70	9.70	m/piece	
	PU12	L ＝ 6.00-1.00	＝	5.00	5.00	m/piece	
Painting on steel sheet pile	GL-1.00m both sides	A ＝ (7.00-0.20+1.00)×0.60×2×11	＝	102.96			PU18
	entire length both sides	A ＝ 6.00×0.60×2×11	＝	79.20			PU12
		Total	＝	182.16	182.16	m^2	
Tie-Rod	Φ42	L ＝ 12.00×3	＝	36.00	36.00	m	
Waling	UPN 200×75	L ＝ (11+11)×0.6×2	＝	26.40	26.40	m	
		W ＝ 26.40×0.0253	＝	0.668	0.67	t	
Coping concrete	σck=25N/mm^2	0.80×0.90×6.94	＝	5.00			
		0.80×0.90×6.80	＝	4.90			
		Total	＝	9.90	9.90	m^3	
Form	RC structure	(0.90＋0.80×2)×6.94	＝	17.35			
		0.80×0.90×1	＝	0.72			
		(0.90+0.80×2)×6.80	＝	17.00			

Description	Classification	Calculation			Quantity	Unit	Remarks
		0.80×0.90×2	=	1.44			
		Total	=	36.51	36.51	m^2	
Re-bar	D12						
		① 34×2.15×0.888/1000	=	0.065			
		② 34×2.15×0.888/1000	=	0.065			
		③ 15×6.84×0.888/1000	=	0.091			
		④ 15×6.70×0.888/1000	=	0.089			
		Total	=	0.310	0.310	t	
Curing	RC structure		=	9.90	9.90	m^3	
Expansion joint	elastic filler,t=20mm						
		0.80×0.90×0	=	0.00			
		0.80×0.9×0	=	0.00			
		Total	=	0.00	0.00	m^2	

Steel sheet pile revetment（TYPE BL-2） Quantity calculation

Bahr Yusef Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE BL-2	L ＝ 6.60	＝	6.60	6.60	m	
Steel sheet pile	PU18(S270GP), L=11.0m						
		N ＝ 6.60/0.60	＝	11.0	11	piece	
		W ＝ 11×11.00×0.0769	＝	9.305	9.31	t	
Penetration depth	PU18	L ＝ 11.30-3.50	＝	7.80	7.80	m/piece	
Painting on steel sheet pile	entire length both sides	A ＝ 11.00×0.60×2×11	＝	145.20	145.20	m^2	
Coping concrete	σck=25N/mm^2						
		0.80×0.90×6.80	＝	4.90	4.90	m^3	
Form	RC structure						
		(0.90＋0.80×2)×6.80	＝	17.00			
		0.80×0.90×1	＝	0.72			
			Total ＝	17.72	17.72	m^3	
Re-bar	D12						
		① 34×2.15×0.888/1000	＝	0.065			
		② 15×6.70×0.888/1000	＝	0.089			
			Total ＝	0.154	0.154	t	
Curing	RC structure		＝	4.90	4.90	m^3	
Expansion joint	elastic filler,t=20mm						
		0.80×0.90×1	＝	0.72	0.72	m^2	

Steel sheet pile revetment（TYPE BR-1） Quantity calculation

Bahr Yusef Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE BR-1	L ＝ 4.80	＝	4.80	4.80	m	
Front sheet pile	PU18(S270GP), L=16.5m						
		N ＝ 4.80/0.60	＝	8.0	8	piece	
		W ＝ 8×16.50×0.0769	＝	10.151	10.15	t	
Bracing sheet pile	PU12(S270GP), L=6.0m						
		N ＝ 4.80/0.60	＝	8.0	8	piece	
		W ＝ 8×6.0×0.0661	＝	3.173	3.17	t	
Penetration depth	PU18	L ＝ 16.70-7.00	＝	9.70	9.70	m/piece	
	PU12	L ＝ 6.00-1.00	＝	5.00	5.00	m/piece	
Painting on steel sheet pile	GL-1.00m both sides	A ＝ (7.00-0.20+1.00)×0.60×2×8	＝	74.88			PU18
	entire length both sides	A ＝ 6.00×0.60×2×8	＝	57.60			PU12
		Total	＝	132.48	132.48	m^2	
Tie-Rod	Φ42	L ＝ 12.00×2	＝	24.00	24.00	m	
Waling	UPN 200×75	L ＝ 4.80×2×2	＝	19.20	19.20	m	
		W ＝ 19.20×0.0253	＝	0.486	0.49	t	
Coping concrete	σck=25N/mm^2						
		0.80×0.90×(5.148+5.00)	＝	7.31	7.31	m^3	
Form	RC structure						
		(0.90＋0.80×2)×(5.148+5.00)	＝	25.37			
		0.80×0.90×3	＝	2.16			
			Total ＝	27.53	27.53	m^3	

Description	Classification	Calculation	Quantity	Unit	Remarks
Re-bar	D12				
		① (26+25)×2.15×0.888/1000 = 0.097			
		② 7×5.05×0.888/1000 = 0.031			
		③ 7×4.90×0.888/1000 = 0.030			
		Total = 0.158	0.158	t	
Curing	RC structure	= 7.31	7.31	m^3	
Expansion joint	elastic filler,t=20mm				
		0.80×0.90×1 = 0.72	0.72	m^2	

Steel sheet pile revetment（TYPE BR-2） Quantity calculation

Bahr Yusef Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE BR-2	L ＝ 9.00	＝	9.00	9.00	m	
Front sheet pile	PU18(S270GP), L=11.5m						
		N ＝ 9.00/0.60	＝	15.0	15	piece	
		W ＝ 15×11.50×0.0769	＝	13.265	13.27	t	
Bracing sheet pile	PU12(S270GP), L=6.0m						
		N ＝ 9.00/0.60	＝	15.0	15	piece	
		W ＝ 15×6.0×0.0661	＝	5.949	5.95	t	
Penetration depth	PU18	L ＝ 11.70-4.50	＝	7.20	7.20	m/piece	
	PU12	L ＝ 6.00-1.00	＝	5.00	5.00	m/piece	
Painting on steel sheet pile	GL-1.00m both sides	A ＝ (4.50-0.20+1.00)×0.60×2×15	＝	95.40			PU18
	entire length both sides	A ＝ 6.00×0.60×2×15	＝	108.00			PU12
		Total	＝	203.40	203.40	m^2	
Tie-Rod	Φ25	L ＝ 7.50×4	＝	30.00	30.00	m	
Waling	UPN 180×70	L ＝ 9.00×2×2	＝	36.00	36.00	m	
		W ＝ 36.00×0.022	＝	0.792	0.79	t	
Coping concrete	σck=25N/mm^2						
		0.80×0.90×(9.10+9.20)	＝	13.18	13.18	m^3	
Form	RC structure						
		(0.90＋0.80×2)×(9.10+9.20)	＝	45.75			
		0.80×0.90×3	＝	2.16			
			Total ＝	47.91	47.91	m^3	

Description	Classification	Calculation	Quantity	Unit	Remarks
Re-bar	D12				
		① (46+46)×2.15×0.888/1000 = 0.176			
		② 7×9.00×0.888/1000 = 0.056			
		③ 7×9.10×0.888/1000 = 0.057			
		Total = 0.289	0.289	t	
Curing	RC structure	= 13.18	13.18	m^3	
Expansion joint	elastic filler,t=20mm				
		0.80×0.90×1 = 0.72	0.72	m^2	

Steel sheet pile revetment（TYPE C-1） Quantity calculation

Bahr Yusef Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE C-1	L ＝ 3.60	＝	3.60	3.60	m	
Front sheet pile	PU18(S270GP), L=19.0m						
		N ＝ 3.60/0.60	＝	6.0	6	piece	
		W ＝ 6×19.00×0.0769	＝	8.767	8.77	t	
Bracing sheet pile	PU12(S270GP), L=6.0m						
		N ＝ 3.60/0.60	＝	6.0	6	piece	
		W ＝ 6×6.0×0.0661	＝	2.380	2.38	t	
Penetration depth	PU18	L ＝ 19.70-8.00	＝	11.70	11.70	m/piece	
	PU12	L ＝ 6.00-1.00	＝	5.00	5.00	m/piece	
Painting on steel sheet pile	GL-1.00m both sides	A ＝ (8.00-0.70+1.00)×0.60×2×6	＝	59.76			PU18
	entire length both sides	A ＝ 6.00×0.60×2×6	＝	43.20			PU12
		Total	＝	102.96	102.96	m^2	
Tie-Rod	Φ46	L ＝ 11.00×2	＝	22.00	22.00	m	
Waling	UPN 220×80	L ＝ 3.60×2×2	＝	14.40	14.40	m	
		W ＝ 14.40×0.0294	＝	0.423	0.42	t	
Coping concrete	σck=25N/mm^2						
		1.30×1.00×3.90+0.80×0.90×3.80	＝	7.81	7.81	m^3	
Form	RC structure						
		(1.00＋1.30×2)×3.90+(0.90+0.80×2)×3.80	＝	23.54			
		1.30×1.00×1+0.80×0.90×2	＝	2.74			
			Total ＝	26.28	26.28	m^3	

Description	Classification	Calculation	Quantity	Unit	Remarks
Re-bar	D12				
		① (20×3.25+19×2.15)×0.888/1000 = 0.094			
		② 19×3.80×0.888/1000 = 0.064			
		③ 15×3.70×0.888/1000 = 0.049			
		Total = 0.207	0.207	t	
Curing	RC structure	= 7.81	7.81	m^3	
Expansion joint	elastic filler,t=20mm				
		1.30×1.00×1 = 1.30	1.30	m^2	

Steel sheet pile revetment（TYPE C-2） Quantity calculation

Bahr Yusef Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE C-2	L ＝ 9.00	＝	9.00	9.00	m	
Front sheet pile	PU18(S270GP), L=17.0m						
		N ＝ 9.00/0.60	＝	15.0	15	piece	
		W ＝ 15×17.00×0.0769	＝	19.610	19.61	t	
Bracing sheet pile	PU12(S270GP), L=6.0m						
		N ＝ 9.00/0.60	＝	15.0	15	piece	
		W ＝ 15×6.0×0.0661	＝	5.949	5.95	t	
Penetration depth	PU18	L ＝ 17.70-5.50	＝	12.20	12.20	m/piece	
	PU12	L ＝ 6.00-1.00	＝	5.00	5.00	m/piece	
Painting on steel sheet pile	GL-1.00m both sides	A ＝ (5.50-0.70+1.00)×0.60×2×15	＝	104.40			PU18
	entire length both sides	A ＝ 6.00×0.60×2×15	＝	108.00			PU12
		Total	＝	212.40	212.40	m^2	
Tie-Rod	Φ32	L ＝ 7.50×4	＝	30.00	30.00	m	
Waling	UPN 180×70	L ＝ 9.00×2×2	＝	36.00	36.00	m	
		W ＝ 36.00×0.022	＝	0.792	0.79	t	
Coping concrete	σck=25N/mm^2						
		1.30×1.00×9.50+0.80×0.90×9.20	＝	18.97	18.97	m^3	
Form	RC structure						
		(1.00＋1.30×2)×9.50+(0.90+0.80×2)×9.20	＝	57.20			
		1.30×1.00×1+0.80×0.90×2	＝	2.74			
		Total	＝	59.94	59.94	m^3	

Description	Classification	Calculation	Quantity	Unit	Remarks
Re-bar	D12				
		① (48×3.25+46×2.15)×0.888/1000 = 0.226			
		② 19×9.40×0.888/1000 = 0.159			
		③ 15×9.10×0.888/1000 = 0.121			
		Total = 0.506	0.506	t	
Curing	RC structure	= 18.97	18.97	m^3	
Expansion joint	elastic filler,t=20mm				
		1.30×1.00×1 = 1.30	1.30	m^2	

Steel sheet pile revetment（TYPE D-1） Quantity calculation

Ibrahimia Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE D-1	L ＝ 3.60	＝	3.60	3.60	m	
Front sheet pile	PU18(S270GP), L=16.0m						
		N ＝ 3.60/0.60	＝	6.0	6	piece	
		W ＝ 6×16.00×0.0769	＝	7.382	7.38	t	
Bracing sheet pile	PU12(S270GP), L=6.0m						
		N ＝ 3.60/0.60	＝	6.0	6	piece	
		W ＝ 6×6.0×0.0661	＝	2.380	2.38	t	
Penetration depth	PU18	L ＝ 16.70-8.00	＝	8.70	8.70	m/piece	
	PU12	L ＝ 6.00-1.00	＝	5.00	5.00	m/piece	
Painting on steel sheet pile	GL-1.00m both sides	A ＝ (8.00-0.70+1.00)×0.60×2×6	＝	59.76			PU18
	entire length both sides	A ＝ 6.00×0.60×2×6	＝	43.20			PU12
		Total	＝	102.96	102.96	m^2	
Tie-Rod	Φ46	L ＝ 10.00×2	＝	20.00	20.00	m	
Waling	UPN 220×80	L ＝ 3.60×2×2	＝	14.40	14.40	m	
		W ＝ 14.40×0.0294	＝	0.423	0.42	t	
Coping concrete	σck=25N/mm^2						
		1.30×1.00×3.90+0.80×0.90×3.80	＝	7.81	7.81	m^3	
Form	RC structure						
		(1.00＋1.30×2)×3.90+(0.90+0.80×2)×3.80	＝	23.54			
		0.80×0.90×2	＝	1.44			
			Total ＝	24.98	24.98	m^3	

Description	Classification	Calculation	Quantity	Unit	Remarks
Re-bar	D12				
		① (20×3.25+19×2.15)×0.888/1000 = 0.094			
		② 19×3.80×0.888/1000 = 0.064			
		③ 15×3.70×0.888/1000 = 0.049			
		Total = 0.207	0.207	t	
Curing	RC structure	= 7.81	7.81	m^3	
Expansion joint	elastic filler,t=20mm				
		1.30×1.00×1 = 1.30	1.30	m^2	

Steel sheet pile revetment（TYPE D-2） Quantity calculation

Ibrahimia Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE D-2	L ＝ 5.40	＝	5.40	5.40	m	
Steel sheet pile	PU12(S270GP), L=9.5m						
		N ＝ 5.40/0.60	＝	9.0	9	piece	
		W ＝ 9×9.50×0.0661	＝	5.652	5.65	t	
Penetration depth	PU12	L ＝ 10.20-3.50	＝	6.70	6.70	m/piece	
Painting on steel sheet pile	entire length both sides	A ＝ 9.50×0.60×2×9	＝	102.60	102.60	m^2	
Coping concrete	σck=25N/mm^2						
		1.30×1.00×5.50	＝	7.15	7.15	m^3	
Form	RC structure						
		(1.00＋1.30×2)×5.50	＝	19.80			
		0.60×0.60×1	＝	0.36			
		Total	＝	20.16	20.16	m^3	
Re-bar	D12						
		① 28×3.25×0.888/1000	＝	0.081			
		② 19×5.40×0.888/1000	＝	0.091			
		Total	＝	0.172	0.172	t	
Curing	RC structure		＝	7.15	7.15	m^3	
Expansion joint	elastic filler,t=20mm						
		1.30×1.00×0	＝	0.00	0.00	m^2	

Steel sheet pile revetment（TYPE E-1） Quantity calculation

Ibrahimia Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE E-1	L ＝ 3.00	＝	3.00	3.00	m	
Front sheet pile	PU12(S270GP), L=13.5m						
		N ＝ 3.00/0.60	＝	5.0	5	piece	
		W ＝ 5×16.00×0.0661	＝	5.288	5.29	t	
Bracing sheet pile	PU12(S270GP), L=6.0m						
		N ＝ 3.00/0.60	＝	5.0	5	piece	
		W ＝ 5×6.0×0.0661	＝	1.983	1.98	t	
Penetration depth	PU12	L ＝ 14.20-6.70	＝	7.50	7.50	m/piece	
	PU12	L ＝ 6.00-1.00	＝	5.00	5.00	m/piece	
Painting on steel sheet pile	GL-1.00m both sides	A ＝ (6.70-0.70+1.00)×0.60×2×5	＝	42.00			PU12
	entire length both sides	A ＝ 6.00×0.60×2×5	＝	36.00			PU12
		Total	＝	78.00	78.00	m^2	
Tie-Rod	Φ42	L ＝ 9.00×2	＝	18.00	18.00	m	
Waling	UPN 200×75	L ＝ 3.00×2×2	＝	12.00	12.00	m	
		W ＝ 12.00×0.0253	＝	0.304	0.30	t	
Coping concrete	σck=25N/mm^2						
		1.30×1.00×3.343+0.80×0.90×3.20	＝	6.65	6.65	m^3	
Form	RC structure						
		(1.00＋1.30×2)×3.343+(0.90+0.80×2)×3.20	＝	20.03			
		0.80×0.90×2	＝	1.44			
			Total ＝	21.47	21.47	m^3	

Description	Classification	Calculation	Quantity	Unit	Remarks
Re-bar	D12				
		① (17×3.25+16×2.15)×0.888/1000 = 0.080			
		② 19×3.25×0.888/1000 = 0.055			
		③ 15×3.10×0.888/1000 = 0.041			
		Total = 0.176	0.176	t	
Curing	RC structure	= 6.65	6.65	m^3	
Expansion joint	elastic filler,t=20mm				
		1.30×1.00×1 = 1.30	1.30	m^2	

Steel sheet pile revetment（TYPE E-2） Quantity calculation

Ibrahimia Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE E-2	L ＝ 1.80	＝	1.80	1.80	m	
Steel sheet pile	PU12(S270GP), L=8.0m						
		N ＝ 1.80/0.60	＝	3.0	3	piece	
		W ＝ 3×8.00×0.0661	＝	1.586	1.59	t	
Penetration depth	PU12	L ＝ 8.70-2.20	＝	6.50	6.50	m/piece	
Painting on steel sheet pile	entire length both sides	A ＝ 8.00×0.60×2×3	＝	28.80	28.80	m^2	
Coping concrete	σck=25N/mm^2						
		1.30×1.00×1.90	＝	2.47	2.47	m^3	
Form	RC structure						
		(1.00＋1.30×2)×1.90	＝	6.84			
		1.30×1.00×1	＝	1.30			
		Total	＝	8.14	8.14	m^3	
Re-bar	D12						
		① 10×3.25×0.888/1000	＝	0.029			
		② 19×1.80×0.888/1000	＝	0.030			
		Total	＝	0.059	0.059	t	
Curing	RC structure		＝	2.47	2.47	m^3	
Expansion joint	elastic filler,t=20mm						
		1.30×1.00×0	＝	0.00	0.00	m^2	

Steel sheet pile revetment（TYPE F） Quantity calculation

Ibrahimia Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE F	L ＝ 14.30+19.125+40.00-0.25-0.575	＝	72.60	72.60	m	
Front sheet pile	PU18(S270GP), L=17.5m						
		N ＝ 72.60/0.60	＝	121.0	121	piece	
		W ＝ 121×17.50×0.0769	＝	162.836	162.84	t	
Bracing sheet pile	PU12(S270GP), L=6.0m						
		N ＝ (13.20+10.20+39.00)/0.6	＝	104.0	104	piece	
		W ＝ 104×6.0×0.0661	＝	41.246	41.25	t	
Penetration depth	PU18	L ＝ 18.20-8.00	＝	10.20	10.20	m/piece	
	PU12	L ＝ 6.00-1.00	＝	5.00	5.00	m/piece	
Painting on steel sheet pile	GL-1.00m both sides	A ＝ (8.00-0.70+1.00)×0.60×2×121	＝	1205.16			PU18
	entire length both sides	A ＝ 6.00×0.60×2×104	＝	748.80			PU12
		Total	＝	1953.96	1953.96	m^2	
Tie-Rod	Φ46	L ＝ 11.50×23+13.00×2+13.50×6	＝	371.50	371.50	m	
Waling	UPN 220×80	L ＝ (121+104)×0.6×2×2	＝	540.00	540.00	m	
		W ＝ 540.00×0.0294	＝	15.876	15.88	t	
Coping concrete	σck=25N/mm^2	1.30×1.00×(14.30+19.125+40.00)	＝	95.45			
		0.80×0.90×(13.40+10.40+39.20)	＝	45.36			
		Total	＝	140.81	140.81	m^3	
Form	RC structure	(1.00＋1.30×2)×(14.30+19.125+40.00)	＝	264.33			
		1.30×1.00×8	＝	10.40			
		(0.90+0.80×2)×(13.40+10.40+39.20)	＝	157.50			

Description	Classification	Calculation	Quantity	Unit	Remarks
		0.80×0.90×11 = 7.92			
		Total = 440.15	440.15	m^2	
Re-bar	D12				
		① (7×50+17)×3.25×0.888/1000 = 1.059			
		② (34×2+26×2+3×50+46)×2.15×0.888/1000 = 0.603			
		③ (19×(9.90×7+3.30))×0.888/1000 = 1.225			
		④ 15×(6.60×2+5.10×2+9.90×3+9.10)×0.888/1000 = 0.829			
		Total = 3.716	3.716	t	
Curing	RC structure	= 140.81	140.81	m^3	
Expansion joint	elastic filler,t=20mm				
		1.30×1.00×8 = 10.40			
		0.80×0.9×5 = 3.60			
		Total = 14.00	14.00	m^2	

Steel sheet pile revetment（TYPE G-1） Quantity calculation

Ibrahimia Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE G-1	L ＝ 6.60	＝	6.60	6.60	m	
Front sheet pile	PU12(S270GP), L=15.0m						
		N ＝ 6.60/0.60	＝	11.0	11	piece	
		W ＝ 11×15.00×0.0661	＝	10.907	10.91	t	
Bracing sheet pile	PU12(S270GP), L=6.0m						
		N ＝ 6.60/0.60	＝	11.0	11	piece	
		W ＝ 11×6.0×0.0661	＝	4.363	4.36	t	
Penetration depth	PU12	L ＝ 14.20-6.70	＝	7.50	7.50	m/piece	
	PU12	L ＝ 6.00-1.00	＝	5.00	5.00	m/piece	
Painting on steel sheet pile	GL-1.00m both sides	A ＝ (6.70-0.70+1.00)×0.60×2×11	＝	92.40			PU12
	entire length both sides	A ＝ 6.00×0.60×2×11	＝	79.20			PU12
		Total	＝	171.60	171.60	m^2	
Tie-Rod	Φ42	L ＝ 10.00×3	＝	30.00	30.00	m	
Waling	UPN 200×75	L ＝ 6.60×2×2	＝	26.40	26.40	m	
		W ＝ 26.40×0.0253	＝	0.668	0.67	t	
Coping concrete	σck=25N/mm^2						
		1.30×1.00×6.94+0.80×0.90×6.80	＝	13.92	13.92	m^3	
Form	RC structure						
		(1.00＋1.30×2)×6.94+(0.90+0.80×2)×6.80	＝	41.98			
		0.80×0.90×2	＝	1.44			
			Total ＝	43.42	43.42	m^3	

Description	Classification	Calculation	Quantity	Unit	Remarks
Re-bar	D12				
		① (34×3.25+34×2.15)×0.888/1000 = 0.163			
		② 19×6.84×0.888/1000 = 0.115			
		③ 15×6.70×0.888/1000 = 0.089			
		Total = 0.367	0.367	t	
Curing	RC structure	= 13.92	13.92	m^3	
Expansion joint	elastic filler,t=20mm				
		1.30×1.00×0 = 0.00	0.00	m^2	

Steel sheet pile revetment（TYPE G-2） Quantity calculation

Ibrahimia Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE G-2	L ＝ 6.00	＝	6.00	6.00	m	
Steel sheet pile	PU12(S270GP), L=9.5m						
		N ＝ 6.00/0.60	＝	10.0	10	piece	
		W ＝ 10×9.50×0.0661	＝	6.280	6.28	t	
Penetration depth	PU12	L ＝ 9.80-3.20	＝	6.60	6.60	m/piece	
Painting on steel sheet pile	entire length both sides	A ＝ 9.50×0.60×2×10	＝	114.00	114.00	m^2	
Coping concrete	σck=25N/mm^2						
		1.30×1.00×6.20	＝	8.06	8.06	m^3	
Form	RC structure						
		(1.00＋1.30×2)×6.20	＝	22.32			
		1.30×1.00×1	＝	1.30			
		Total	＝	23.62	23.62	m^3	
Re-bar	D12						
		① 31×3.25×0.888/1000	＝	0.089			
		② 9×6.10×0.888/1000	＝	0.049			
		Total	＝	0.138	0.138	t	
Curing	RC structure		＝	8.06	8.06	m^3	
Expansion joint	elastic filler,t=20mm						
		1.30×1.00×1	＝	1.30	1.30	m^2	

Steel sheet pile revetment（TYPE H） Quantity calculation

Shelyia Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE H	L ＝ 12.60+6.60	＝	19.20	19.20	m	
Front sheet pile	PU12(S270GP), L=11.0m						
		N ＝ 19.20/0.60	＝	32.0	32	piece	
		W ＝ 32×11.00×0.0661	＝	23.267	23.27	t	
Bracing sheet pile	PU12(S270GP), L=6.0m						
		N ＝ 19.20/0.60	＝	32.0	32	piece	
		W ＝ 32×6.0×0.0661	＝	12.691	12.69	t	
Penetration depth	PU18	L ＝ 11.70-5.95	＝	5.75	5.75	m/piece	
	PU12	L ＝ 6.00-1.00	＝	5.00	5.00	m/piece	
Painting on steel sheet pile	GL-1.00m both sides	A ＝ (5.95-0.70+1.00)×0.60×2×32	＝	240.00			PU12
	entire length both sides	A ＝ 6.00×0.60×2×32	＝	230.40			PU12
		Total	＝	470.40	470.40	m^2	
Tie-Rod	Φ42	L ＝ 8.50×9	＝	76.50	76.50	m	
Waling	UPN 180×70	L ＝ 19.20×2×2	＝	76.80	76.80	m	
		W ＝ 76.80×0.022	＝	1.690	1.69	t	
Coping concrete	σck=25N/mm^2						
		1.30×1.00×20.00+0.80×0.90×19.60	＝	40.11	40.11	m^3	
Form	RC structure						
		(1.00＋1.30×2)×20.00+(0.90+0.80×2)×19.60	＝	121.00			
		1.30×1.00×3+0.80×0.90×5	＝	7.50			
		Total	＝	128.50	128.50	m^3	

Description	Classification	Calculation	Quantity	Unit	Remarks
Re-bar	D12				
		① (100×3.25+98×2.15)×0.888/1000 = 0.476			
		② 19×19.70×0.888/1000 = 0.332			
		③ 15×19.30×0.888/1000 = 0.257			
		Total = 1.065	1.065	t	
Curing	RC structure	= 40.11	40.11	m^3	
Expansion joint	elastic filler,t=20mm				
		1.30×1.00×3+0.8×0.9×1 = 4.62	4.62	m^2	

Steel sheet pile revetment（TYPE I） Quantity calculation

Badraman Reg. (Diroutiah)

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE I	L ＝ 3.00＋3.60	＝	6.60	6.60	m	
Steel sheet pile	PU12(S270GP), L=9.0m						
		N ＝ 6.60/0.60	＝	11.0	11	piece	
		W ＝ 11×9.00×0.0661	＝	6.544	6.54	t	
Penetration depth	PU12	Average L ＝ (9.30-3.80)＋(3.80-0.6)×0.5	＝	7.10	7.10	m/piece	
Painting on steel sheet pile	entire length both sides	A ＝ 9.00×0.60×2×11	＝	118.80	118.80	m^2	
Coping concrete	σck=25N/mm^2						
		0.60×0.60×(3.40＋4.00)	＝	2.66	2.66	m^3	
Form	RC structure						
		(0.60＋0.60×2)×(3.40＋4.00)	＝	13.32			
		0.60×0.60×2	＝	0.72			
		Total	＝	14.04	14.04	m^3	
Re-bar	D12						
		① (17+20)×1.20×0.888/1000	＝	0.039			
		② 7×3.30×0.888/1000	＝	0.021			
		③ 7×3.90×0.888/1000	＝	0.024			
		Total	＝	0.084	0.084	t	
Curing	RC structure		＝	2.66	2.66	m^3	
Expansion joint	elastic filler,t=20mm						
		0.60×0.60×2	＝	0.72	0.72	m^2	

Steel sheet pile revetment（TYPE J） Quantity calculation

Badraman Reg. (Diroutiah)

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE J	L ＝ 1.80＋2.40	＝	4.20	4.20	m	
Steel sheet pile	PU12(S270GP), L=8.0m						
		N ＝ 4.20/0.60	＝	7.0	7	piece	
		W ＝ 7×8.00×0.0661	＝	3.702	3.70	t	
Penetration depth	PU12	Average L ＝ (8.30-2.70)＋(2.70-0.6)×0.5	＝	6.65	6.65	m/piece	
Painting on steel sheet pile	entire length both sides	A ＝ 8.00×0.60×2×7	＝	67.20	67.20	m^2	
Coping concrete	σck=25N/mm^2						
		0.60×0.60×(2.20＋2.80)	＝	1.80	1.80	m^3	
Form	RC structure						
		(0.60＋0.60×2)×(2.20＋2.80)	＝	9.00			
		0.60×0.60×2	＝	0.72			
		Total	＝	9.72	9.72	m^3	
Re-bar	D12						
		① (11+14)×1.20×0.888/1000	＝	0.027			
		② 7×2.10×0.888/1000	＝	0.013			
		③ 7×2.70×0.888/1000	＝	0.017			
		Total	＝	0.057	0.057	t	
Curing	RC structure		＝	1.80	1.80	m^3	
Expansion joint	elastic filler,t=20mm						
		0.60×0.60×2	＝	0.72	0.72	m^2	

Steel sheet pile revetment（TYPE K） Quantity calculation

Badraman Reg. (Badraman)

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE K	L ＝ 3.60＋3.00	＝	6.60	6.60	m	
Steel sheet pile	PU18(S270GP), L=10.0m						
		N ＝ 6.60/0.60	＝	11.0	11	piece	
		W ＝ 11×10.00×0.0769	＝	8.459	8.46	t	
Penetration depth	PU12	Average L ＝ (10.30-4.10)＋(4.10-0.6)×0.5	＝	7.95	7.95	m/piece	
Painting on steel sheet pile	entire length both sides	A ＝ 10.00×0.60×2×11	＝	132.00	132.00	m^2	
Coping concrete	σck=25N/mm^2						
		0.60×0.60×(4.00＋3.40)	＝	2.66	2.66	m^3	
Form	RC structure						
		(0.60＋0.60×2)×(4.00＋3.40)	＝	13.32			
		0.60×0.60×2	＝	0.72			
		Total	＝	14.04	14.04	m^3	
Re-bar	D12						
		① (20+17)×1.20×0.888/1000	＝	0.039			
		② 7×3.90×0.888/1000	＝	0.024			
		③ 7×3.30×0.888/1000	＝	0.021			
		Total	＝	0.084	0.084	t	
Curing	RC structure		＝	2.66	2.66	m^3	
Expansion joint	elastic filler,t=20mm						
		0.60×0.60×2	＝	0.72	0.72	m^2	

Steel sheet pile revetment（TYPE L） Quantity calculation

Badraman Reg. (Badraman)

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE L	L ＝ 1.80＋1.80	＝	3.60	3.60	m	
Steel sheet pile	PU12(S270GP), L=8.0m						
		N ＝ 3.60/0.60	＝	6.0	6	piece	
		W ＝ 6×8.00×0.0661	＝	3.173	3.17	t	
Penetration depth	PU12	Average L ＝ (8.30-3.00)＋(3.00-0.6)×0.5	＝	6.50	6.50	m/piece	
Painting on steel sheet pile	entire length both sides	A ＝ 8.00×0.60×2×6	＝	57.60	57.60	m^2	
Coping concrete	σck=25N/mm^2						
		0.60×0.60×(2.20＋2.20)	＝	1.58	1.58	m^3	
Form	RC structure						
		(0.60＋0.60×2)×(2.20＋2.20)	＝	7.92			
		0.60×0.60×2	＝	0.72			
		Total	＝	8.64	8.64	m^3	
Re-bar	D12						
		① (11+11)×1.20×0.888/1000	＝	0.023			
		② 7×2.10×0.888/1000	＝	0.013			
		③ 7×2.10×0.888/1000	＝	0.013			
		Total	＝	0.049	0.049	t	
Curing	RC structure		＝	1.58	1.58	m^3	
Expansion joint	elastic filler,t=20mm						
		0.60×0.60×2	＝	0.72	0.72	m^2	

Steel sheet pile revetment（TYPE M） Quantity calculation

Abo Gabal Reg.

Description	Classification	Calculation			Quantity	Unit	Remarks
Construction length	TYPE M	L ＝ 32.40+12.60	＝	45.00	45.00	m	
Front sheet pile	PU12(S270GP), L=9.5m						
		N ＝ 45.00/0.60	＝	75.0	75	piece	
		W ＝ 75×9.50×0.0661	＝	47.096	47.10	t	
Bracing sheet pile	PU12(S270GP), L=6.0m						
		N ＝ (30.60+12.60)/0.60	＝	72.0	72	piece	
		W ＝ 72×6.0×0.0661	＝	28.555	28.56	t	
Penetration depth	PU18	L ＝ 9.50-4.90	＝	4.60	4.60	m/piece	
	PU12	L ＝ 6.00-1.00	＝	5.00	5.00	m/piece	
Painting on steel sheet pile	GL-1.00m both sides	A ＝ (4.90-0.70+1.00)×0.60×2×75	＝	468.00			PU12
	entire length both sides	A ＝ 6.00×0.60×2×72	＝	518.40			PU12
		Total	＝	986.40	986.40	m^2	
Tie-Rod	Φ32	L ＝ 7.50×18+8.00×1+9.00×1	＝	152.00	152.00	m	
Waling	UPN 160×65	L ＝ (45.50+43.20)×2	＝	177.40	177.40	m	
		W ＝ 177.40×0.0188	＝	3.335	3.34	t	
Coping concrete	σck=25N/mm^2						
		1.30×1.00×46.40+0.80×0.90×43.60	＝	91.71	91.71	m^3	
Form	RC structure						
		(1.00＋1.30×2)×46.40+(0.90+0.80×2)×43.60	＝	276.04			
		1.30×1.00×6+0.80×0.90×8	＝	13.56			
			Total ＝	289.60	289.60	m^3	

Description	Classification	Calculation	Quantity	Unit	Remarks
Re-bar	D12				
		① (232×3.25+218×2.15)×0.888/1000 = 1.086			
		② 19×45.80×0.888/1000 = 0.773			
		③ 15×43.00×0.888/1000 = 0.573			
		Total = 2.432	2.432	t	
Curing	RC structure	= 91.71	91.71	m^3	
Expansion joint	elastic filler,t=20mm				
		1.30×1.00×6+0.8×0.9×4 = 10.68	10.68	m^2	

(3) Wet stone pitching

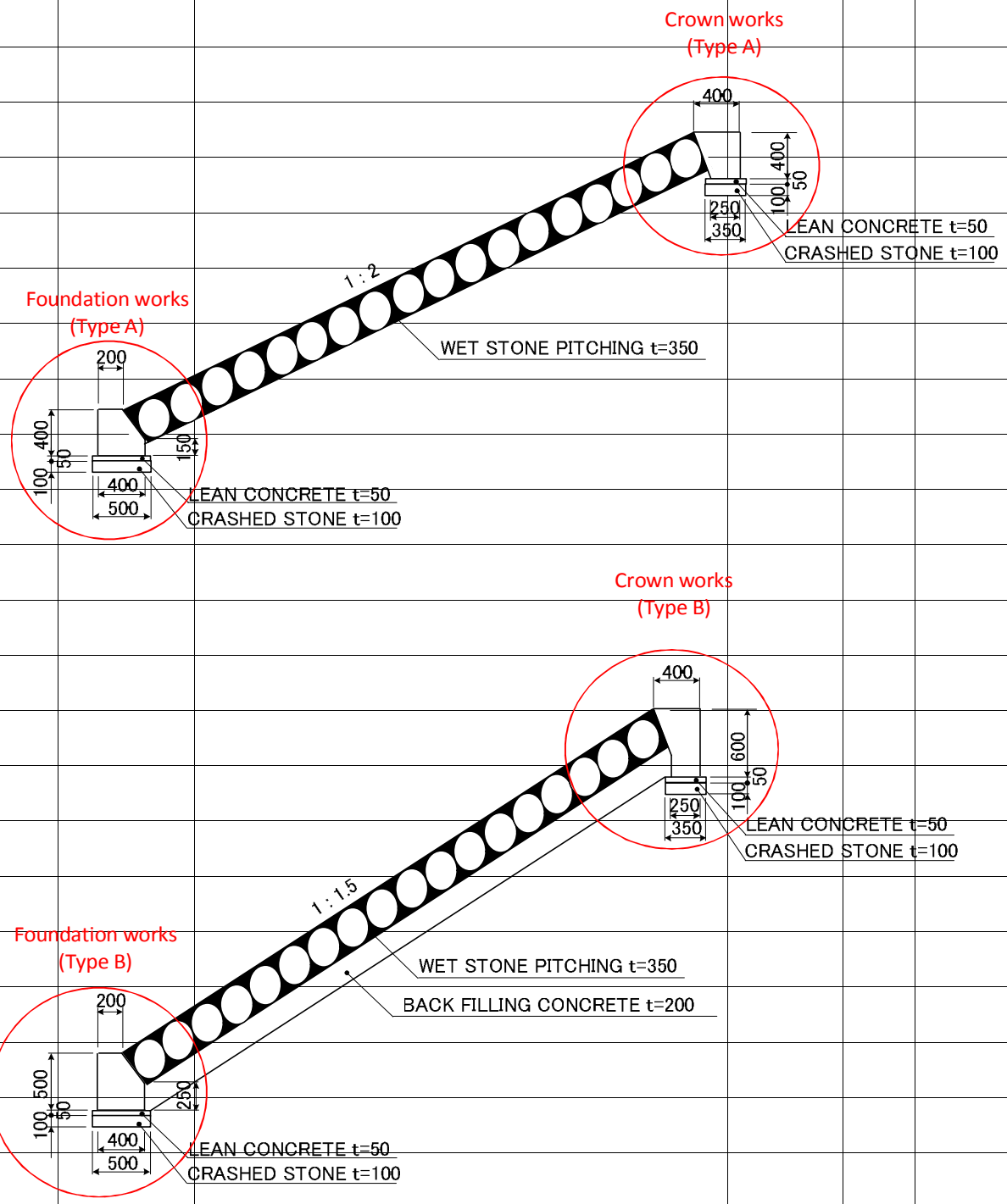
Bank protection (wet stone pitching) Quantity calculation

Description	Classification	Calculation	Quantity	Unit	Remarks
1.Wet stone pitching					
①Slope 1 : 2.0					
Bahr Yusef	(upstream)	A1 = = 1041.97			
	(douwnstream)	A2 = = 160.00			
		Total	1201.97	m^2	
②Slope 1 : 1.5					
Ibrahimia	(upstream)		806.80	m^2	
2.Back filling concrete		0.20×806.80	161.36	m^3	
3.Crown works					
①Type A (Slope 1 : 2.0)					
Bahr Yusef	(upstream)	L1 = = 38.50			
	(downstream)	L2 = = 8.80			
		Total	47.30	m	
②Type B (Slope 1 : 1.5)					
Ibrahimia	(upstream)	L1 = = 54.70			
		Total	54.70	m	
4.Foundation works					
①Type A (Slope 1 : 2.0)					
Bahr Yusef	(upstream)	L1 = = 47.20			
	(downstream)	L2 = = 8.70			
		Total	55.90	m	
②Type B (Slope 1 : 1.5)					
Ibrahimia	(upstream)	L1 = = 50.60			
		Total	50.60	m	

Description	Classification	Calculation	Quantity	Unit	Remarks
(1) Crown concrete (per 10.0m)					
① Type A					
Plain concrete		$1/2\times(0.40+0.25)\times0.40\times10.00$	1.30	m^3	
Leveling concrete		$0.05\times0.35\times10.00$	0.18	m^3	
Form	Plain con.	$(0.40+(0.40^2+0.15^2)^{1/2})\times10.00+1/2\times(0.40+0.25)\times0.40$	8.40	m^2	
Form	Leveling con.	$0.05\times10.00\times2$	1.00	m^2	
Curing			1.30	m^3	
Crushed stone		$0.10\times0.35\times10$	0.35	m^3	
Expansion joint		$1/2\times(0.40+0.25)\times0.40$	0.13	m^2	
② Type B					
Plain concrete		$(1/2\times(0.40+0.25)\times0.40+0.20\times0.25)\times10.00$	1.80	m^3	
Leveling concrete		$0.05\times0.35\times10.00$	0.18	m^3	
Form	Plain con.	$(0.20+(0.40^2+0.15^2)^{1/2}+0.60)\times10.00$ = 12.27			
		$1/2\times(0.40+0.25)\times0.40+0.20\times0.25$ = 0.18			
		Total	12.45	m^2	
Form	Leveling con.	$0.05\times10.00\times2$	1.00	m^2	
Curing			1.80	m^3	
Crushed stone		$0.10\times0.35\times10$	0.35	m^3	
Expansion joint		$1/2\times(0.40+0.25)\times0.40+0.20\times0.25$	0.18	m^2	
(2) Foundation concrete (per 10.0m)					
① Type A					
Plain concrete		$(1/2\times(0.20+0.40)\times0.25+0.15\times0.40)\times10.00$	1.35	m^3	
Leveling concrete		$0.05\times0.50\times10.00$	0.25	m^3	
Form	Plain con.	$(0.15+(0.20^2+0.25^2)^{1/2}+0.40)\times10.00$ = 8.70			
		$1/2\times(0.20+0.40)\times0.25+0.15\times0.40$ = 0.14			
		Total	8.84	m^2	
Form	Leveling con.	$0.05\times10.00\times2$	1.00	m^2	
Curing			1.35	m^3	

Description	Classification	Calculation	Quantity	Unit	Remarks
Crushed stone		0.10×0.50×10.00	0.50	m^3	
Expansion joint		1/2×(0.20+0.40)×0.25+0.15×0.40	0.14	m^2	
② Type B					
Plain concrete		(1/2×(0.20+0.40)×0.25-0.25×0.40)×10.00	1.75	m^3	
Leveling concrete		0.05×0.50×10.00	0.25	m^3	
Form	Plain con.	$(0.25+(0.20^2+0.25^2)^{1/2}+0.50)\times 10.00$ = 10.70			
		1/2×(0.20-0.40)×0.25+0.25×0.40 = 0.18			
		Total	10.88	m^2	
Form	Leveling con.	0.05×10.00×2	1.00	m^2	
Curing			1.75	m^3	
Crushed stone		0.10×0.50×10.00	0.50	m^3	
Expansion joint		1/2×(0.20+0.40)×0.25+0.25×0.40	0.18	m^2	

Description	Classification	Calculation	Quantity	Unit	Remarks



(4) Gabion

Gabion Quantity calculation

Description	Classification	Calculation	Quantity	Unit	Remarks
1. Wire basket					
1.0m×2.0m×0.50m					
Bahr Yusef		9×30+6×43	528	pcs.	
		18+38+14	70	pcs.	
		Total	598	pcs.	
Ibrahimia		8×30+6×43+5×4+4×4+3	537	pcs.	
		16+33	49	pcs.	
		Total	586	pcs.	
1.0m×2.0m×1.0m					
Bahr Yusef		(30+43)×2	146	pcs.	
		10+6	16	pcs.	
		Total	162	pcs.	
Ibrahimia		(30+43)×2	146	pcs.	
		6+12	18	pcs.	
		10×32+21	341	pcs.	left bank
		Total	508	pcs.	
2.Filled stone (Dia.15～20cm)					
Bahr Yusef		A=999.1×1.118=1117.3m^2			
		1117.3×0.5=	558.7		
		1.0×2.0×1.0×162=	324.0		
		Total	882.7	m^3	

Description	Classification	Calculation	Quantity	Unit	Remarks
Ibrahimia		A=1021.4×1.118=1141.9m^2			
		1141.9×0.5=	571.0		
		1.0×2.0×1.0×508=	1016.0		
		Total	1587.0	m^3	
3.Geotextiles sheet					
Bahr Yusef		Slope area	1117.3	m^2	
		1.0×2.0×162=	324.0	m^2	
		Total	1441.3	m^2	
Ibrahimia		Slope area	1141.9	m^2	
		1.0×2.0×508=	1016.0	m^2	
		Total	2157.9	m^2	

C-1-8. Quantity calculation of bed protection works

(1) Quantity summary table

Description	Classification	Unit	Quantity	Remarks
(1) Stone pitching				
	Φ40cm	m^3	850.5	Bahr Yusef
	〃	m^3	850.5	Ibrahimia
	Φ20cm	m^3	438.0	Bahr Yusef
	〃	m^3	440.5	Ibrahimia
	〃	m^3	30.0	Badraman
	〃	m^3	48.0	Diroutiah
(2)Gravel (crushed stone)				
		m^3	94.5	Bahr Yusef
		m^3	94.5	Ibrahimia
		m^3	7.5	Badraman
		m^3	12.0	Diroutiah
(3)Geotextile				
		m^2	945.0	Bahr Yusef
		m^2	945.0	Ibrahimia
		m^2	75.0	Badraman
		m^2	120.0	Diroutiah

(2) Bed protection works

Bed protection works Quantity calculation				
Item	Calculation	Quantity	Unit	Remarks
1.Bahr Yusef regulator				
Downstream	30.00*31.50 =	945.00	m2	
Stone(Dia 40cm)	945.00*0.90 =	850.50	m3	
Gravel	945.0*0.10 =	94.50	m3	
Geotextile sheet		945.00	m2	
	Stone(Dia 20cm)			
Downstream	5.00*42.5*0.5 =	106.25	m3	
Upstream	5.00*132.7*0.5 =	331.75	m3	
	Total	438.00	m3	
2.Ibrahimia regulator				
Downstream	30.00*31.50 =	945.00	m2	
Stone(Dia 40cm)	945.00*0.90 =	850.50	m3	
Gravel	945.0*0.10 =	94.50	m3	
Geotextile sheet		945.00	m2	
	Stone(Dia 20cm)			
Downstream	5.00*32.4*0.5 =	81.00	m3	
Upstream	5.00*143.8*0.5 =	359.50	m3	
	Total	440.50	m3	
3.Badrama regulator(Badraman canal)				
	15.00*5.00 =	75.00	m2	
Stone(Dia 20cm)	75.0*0.40 =	30.00	m3	
Gravel	75.0*0.10 =	7.50	m3	
Geotextile sheet		75.00	m2	

Item	Calculation		Quantity	Unit	Remarks
4.Badrama regulator(Dirouthiah canal)					
	15.00*8.00	=	120.00	m2	
Stone(Dia 20cm)	120.0*0.40	=	48.00	m3	
Gravel	120.0*0.10	=	12.00	m3	
Geotextile sheet			120.00	m2	

C-1-9. Quantity calculation of hydraulic pipe pit works

(1) Quantity summary table

Item	Calculation	Bahr Yusef	Ibrahimia	Unit	Remarks
1.Concrete					
(1)Reinforced concrete					
	Total	8.87	76.94	m^3	
(2)Plain(Leveliling) concrete	Total	2.96	7.56	m^3	
2.Form work (1)Reinforced concrete	Total	53.34	321.39	m^2	
(2)Plain(Leveliling) concrete	=	3.03	6.08	m^2	
3.Concrete curing	Reinforced concrete	8.87	76.94	m^3	
	Plain concrete	2.96	7.56	m^3	
4.Scaffolding	Total		160.14	m^2	
5.Falsework	Total		91.97	m^3	
6.Slip bar	D20 L=1.0m, Vinyl pipe Φ25x0.5m				
	=		32	pcs	
7.Water stop					
B=300	=		16.80	m	
8. Elastic filter	Total		5.13	m^2	
3.Contraction joint	Oil paint =	0.62		m^2	
9.Checker plate					
t=3.2mm	=		0.98	m^2	
t=4.5mm	=	18.79		m^2	
10.Anchor bar	L=0.20m				
D16	=		16	pcs	
11.Re-bar	D25		328	kg	
	D16		4,820	kg	
	D12	448	2,923	kg	

(2) Bahr Yosef reg.

Bahr Yusef hydraulic pipe pit Quantity calculation				
Item	Calculation	Quantity	Unit	Remarks
1.Concrete				
(1)Reinforced concrete				
base slab	0.20*1.90*14.00 =	5.32		
side wall	0.15*0.80*2*13.85 =	3.32		
	0.15*0.80*1.90 =	0.23		
	Total	8.87	m^3	
(2)Plain(Leveliling) concrete				
	2.10*14.10*0.10	2.96	m^3	
2.Form work				
(1)Reinforced concrete				
side wall(0utside)	1.00*(14.00*2+1.90) =	29.90		
side wall(Inside)	0.80*(13.85*2+1.60) =	23.44		
	Total	53.34	m^2	
(2)Plain(Leveliling) concrete				
	(14.10*2+2.10)*0.10 =	3.03	m^2	
3.Contraction joint	Oil paint			
	1.90*0.20+0.15*0.80*2 =	0.62	m^2	
4.Concrete curing	Reinforced concrete	8.87	m^3	
	Plain concrete	2.96	m^3	
5.Checker plate				
t=4.5mm	1.70*11.05 =	18.79	m^2	
6.Rebar				
	D12	448	kg	

(3) Ibrahimia reg.

Ibirahimia hydraulic pipe pit Quantity calculation				
Item	Calculation	Quantity	Unit	Remarks
1.Concrete				
(1)Reinforced concrete				
base slab	0.30*2.40*27.10 =	19.51		
	0.40*1.80*2.50 =	1.80		
side wall	0.30*1.80*(9.10+10.00)*2 =	20.63		
	0.30*1.80*(1.80+8.00+2.20+5.90+0.10) =	9.72		
	0.35*3.50*1.40*2 =	3.43		
	0.30*2.50*1.40 =	1.05		
top slab	0.30*2.40*27.10 =	19.51		
	0.30*2.40*0.10 =	0.07		
	1.80*1.40*0.30 =	0.76		
	-1.40*0.80*0.30*2 =	-0.67		
hatch	-0.60*0.60*0.30*2 =	-0.22		
Hauntch	1/2*0.15*0.15*(26.35+3.825+1.65+24.7+2.175) =	0.66		
	1/2*0.15*0.15*(25.825+2.425+23.375+0.775) =	0.59		
	1/2*0.15*0.15*2.40 =	0.03		
parapet wall	0.15*0.20*2.40 =	0.07		
	Total	76.94	m^3	
(2)Plain(Leveliling) concrete				
	27.30*2.60*0.10	7.10		
	2.70*1.70*0.10	0.46		
	Total	7.56	m^3	
2.Form work				
(1)Reinforced concrete				
side wall(0utside)	2.40*(27.10+2.50+2.40+25.0+0.10) =	137.04		
	3.90*(1.70+0.05)*2 =	13.65		
	2.40*(1.40-0.15) =	3.00		
side wall(Inside)	1.50*(25.825+2.425+23.375+0.775) =	78.60		
	1.95*(0.60*2+0.80+1.40) =	6.63		
	3.35*(0.60*2+0.80+1.40) =	11.39		
	3.05*(0.80+0.40) =	3.66		
	0.30*(0.60*2*2+1.40*2+0.80) =	1.80		
top slab	1.80*(26.50+2.10) =	51.48		
	-1.40*0.80*2 =	-2.24		
	-0.60*0.60*2 =	-0.72		
	-0.15*(25.825+3.225+23.375+0.775) =	-7.98		

Item	Calculation		Quantity	Unit	Remarks
Hauntch	0.212*(26.35+3.825+1.65+24.7+2.175)	=	12.44		
	0.212*(25.825+2.425+23.375+0.775)	=	11.11		
	0.212*2.40	=	0.51		
parapet wall	0.20*(0.15+2.40)*2	=	1.02		
	Total		321.39	m^2	
(2) Plain(Leveliling) concrete					
	(27.30+2.60+24.80+4.30+1.80)*0.10	=	6.08	m^2	
3. Concrete curing	Reinforced concrete		76.94	m^3	
	Plain concrete		7.56	m^3	
4. Scaffolding					
	(29.30+5.30+4.60+24.70+0.70)*2.40	=	155.04		
	1.70*2*(0.10+1.40)	=	5.10		
	Total		160.14	m^2	
5. Falsework					
	(1.80*1.80-1/2*0.15*0.15*4)*(26.50+0.70)	=	86.90		
	(3.20*1.80-1/2*0.15*0.15*2)*1.40	=	8.03		
	-(1.40*0.80+0.60*0.60)*2	=	-2.96		
	Total		91.97	m^3	
6. Slip bar	D20 L=1.0m, Vinyl pipe Φ 25x0.5m				
	16*2	=	32	pcs	
7. Water stop					
B=300	2.10*4*2	=	16.80	m	
8. Elastic filter					
	(2.40+1.80)*0.30*2*2	=	5.04		
	1/2*0.15*0.15*4*2	=	0.09		
	Total		5.13	m^2	
9. Checker plate					
t=3.2mm	0.70*0.70*2	=	0.98	m^2	
10. Anchor bar	L=0.20m				
D16	8*2	=	16	pcs	
11. Rebar					
	D25		328	kg	
	D16		4,820	kg	
	D12		2,923	kg	

C-1-10. Quantity calculation of ancillary road works

(1) Quantity summary table

Description	Classification	Unit	Quantity	Remarks
(1) Earth work				
Embankment	sandy soil	m^3	10,225.3	
(2) Asphalt pavement				
Roadwalk		m^2	4,075.1	
	Wearing course (t=5cm)	m^3	203.8	
	Binder course (t=6cm)	m^3	244.5	
	Base course (t=20cm)	m^3	815.0	
	Sub-base couse (t=20cm)	m^3	815.0	
Sidewalk		m^2	623.7	
	Wearing course (t=5cm)	m^3	31.2	
	Base course (t=15cm)	m^3	93.6	
(3) Cub concrete				
Type-1		m	643.5	
	Plain concrete (σ ck=20N/mm^2)	m^3	38.6	
	Form (Plain concrete)	m^2	390.1	
	Leveling concrete (σck=20N/mm^2)	m^3	9.7	
	Form (Leveling concrete)	m^2	64.4	
	Crushed ston	m^3	19.3	
Type-2		m	629.8	
	Plain concrete (σ ck=20N/mm^2)	m^3	70.9	
	Form (Plain concrete)	m^2	574.0	
	Leveling concrete (σck=20N/mm^2)	m^3	11.0	
	Form (Leveling concrete)	m^2	63.0	
	Crushed ston	m^3	22.0	
(4) Bulstrade		m	629.8	
(5) Slope protection	Wet stone piching (1:15) t=35cm	m^2	1987.0	
	Wet stone piching (1:10) t=35cm	m^2	158.4	
	Backfilling concrete(t=10cm)	m^3	15.8	σck=20N/mm2
	Crown works (Type A)	m	421.0	
	Crown works (Type B)	m	57.6	
	Foundation works	m	536.8	
(6) Step				
Type-A	H=3.57m,1:1.5	places	2	
Type-B	H=2.57m,1:1.5	places	4	
Type-C	H=3.67m,1:1.0	places	2	
Type-D	H=2.57m,1:1.0	places	2	
Type-E	H=3.87m,1:1.5	places	2	

(2) Earth work

	Station	Distance (m)	Embankment (B0)		
			Area (m^2)	Ave. (m^2)	Vol. (m^3)
①Bahr Yusef					
	10.0	0.0	0.00		
	20.0	10.0	202.69	101.35	1,013.50
	40.2	20.2	62.49	132.59	2,678.32
	75.2	35.0	45.38	53.94	1,887.90
	sub-total				5,579.72
	110.7	0.0	45.38		
	137.3	26.6	45.38	45.38	1,207.11
	147.3	10.0	0.00	22.69	226.90
	sub-total				1,434.01
		Total			7,013.73
②Badraman					
(Badraman)	167.3	0.0	0.00		
	174.0	6.7	42.33	21.17	141.84
	sub-total				141.84
	181.0	0.0	42.33		
	189.5	8.5	11.67	27.00	229.50
	sub-total				229.50
		Total			371.34
(Diroutiah)	189.5	0.0	11.67		
	198.0	8.5	42.33	27.00	229.50
	sub-total				229.50
	208.0	0.0	42.33		
	214.0	6.0	4.90	23.62	141.72
	sub-total				141.72
		Total			371.22
③Ibrahimia					
	259.5	0.0	0.00		
	266.1	6.6	48.89	24.45	161.37
	272.3	6.2	48.89	48.89	303.12
	sub-total				464.49
	307.5	0.0	48.89		
	343.5	36.0	48.89	48.89	1,760.04
	353.5	10.0	0.00	24.45	244.50
	sub-total				2,004.54
		Total			2,469.03

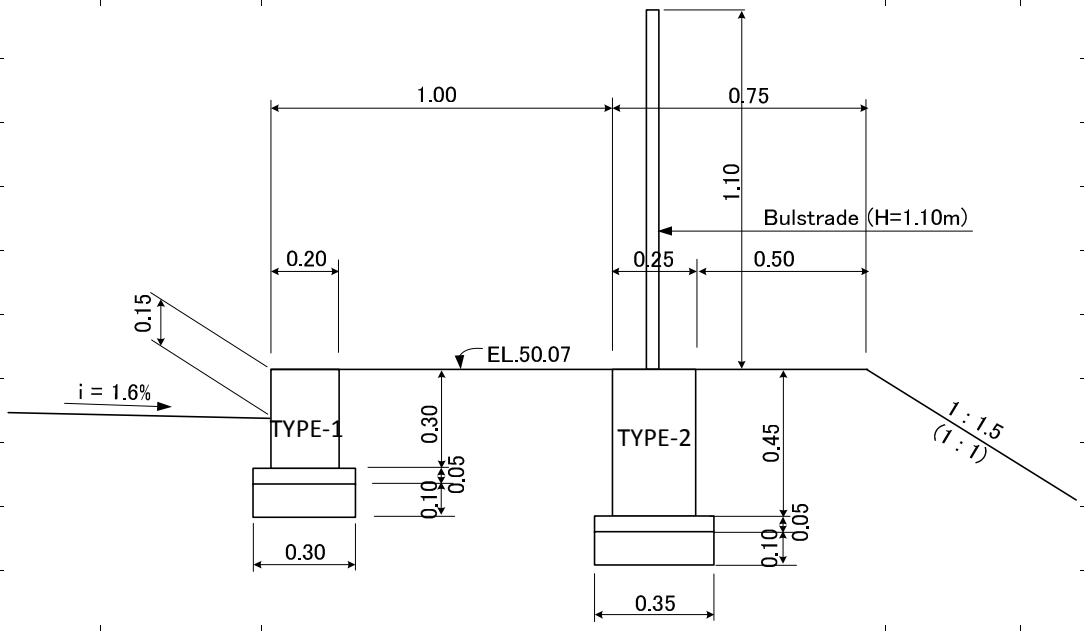
(3) Asphalt pavement

Asphalt pavement Quantity calculation					
Description	Classification	Calculation	Quantity	Unit	Remarks
1.Roadwalk	Area				
	~Bahr Yusef	A1 = 1124.67+641.62 = 1766.29			
	Bahr Ysef~Badraman	A2 = 630.10+37.05+37.23+64.62+84.38 = 853.38			
	Badraman~Diroutiah	A3 = 156.00 = 156.00			
	Diroutiah~Ibrahimia	A4 = 650.29+37.12+53.63+37.28+37.12+56.37			
		= 871.81			
	Ibrahimia~	A5 = 442.03+141.62 = 583.65			
	Abo Gabal	A6 = 148.50 = 148.50			
		Total	4,075.13	m^2	
①Wearing course	t=5cm	4,075.13×0.05	203.76	m^3	
②Binder course	t=6cm	4,075.13×0.06	244.51	〃	
③Base course	t=20cm	4,075.13×0.20	815.03	〃	
④Sub-base course	t=20cm	4,075.13×0.20	815.03	〃	
2.Sidewalk	Area				
	~Bahr Yusef	A1 = 117.83+110.35+13.43+64.83 = 306.44			
	Bahr Ysef~Badraman	A2 = 38.47+4.21+6.21+41.96+6.02+6.16 = 103.03			
	Badraman~Diroutiah	A3 = 16.00+16.00 = 32.00			
	Diroutiah~Ibrahimia	A4 = 6.64+30.91+13.31+6.64+8.09+20.92+13.32			
		= 99.83			
	Ibrahimia~	A5 = 38.36+44.06 = 82.42			
		Total	623.72	m^2	
①Wearing course	t=5cm	623.72×0.05	31.19	m^3	
②Base course	t=15cm	623.72×0.15	93.56	〃	

(4) Curb concrete and Bulstrade

Curb concrete , Bulstrade Quantity calculation					
Description	Classification	Calculation	Quantity	Unit	Remarks
1.Curb concrete	Line				
①TYPE-1	Line				
	~Bahr Yusef	L1 = 113.89+118.45+15.02+65.41 = 312.77			
	Bahr Ysef~ Badraman	L2 = 38.69+4.07+6.16+41.71+5.98+6.16 = 102.77			
	Badraman~ Diroutiah	L3 = 16.00+16.00 = 32.00			
	Diroutiah~ Ibrahimia	L4 = 6.64×2+44.81+8.09+20.75+13.32×2 = 113.57			
	Ibrahimia~	L5 = 38.37+44.05 = 82.42			
		Total	643.53	m	
Plain concrete	σck=20N/mm^2	0.30×0.20×643.53	38.61	m^3	
Form	Plain con.	0.30×2×643.53+0.30×0.20×(643.53/10+1)	390.08	m^2	
Leveling concrete	σck=20N/mm^2	0.05×0.30×643.53	9.65	m^3	
Form	Leveling con.	0.05×2×643.53	64.35	m^2	
Crushed stone		0.10×0.30×643.53	19.31	m^3	
②TYPE-2	Line				
	~Bahr Yusef	L1 = 107.61+116.77+23.74+64.45 = 312.57			
	Bahr Ysef~ Badraman	L2 = 38.69+4.07+6.16+41.71+5.98+6.16 = 102.77			
	Badraman~ Diroutiah	L3 = 16.00+16.00 = 32.00			
	Diroutiah~ Ibrahimia	L4 = 6.64×2+30.94+8.09+21.10+13.32×2 = 100.05			
	Ibrahimia~	L5 = 38.37+44.05 = 82.42			
		Total	629.81	m	
Plain concrete	σck=20N/mm^2	0.45×0.25×629.81	70.85	m^3	
Form	Plain con.	0.45×2×629.81+0.45×0.25×(629.81/10+1)	574.03	m^2	
Leveling concrete	σck=20N/mm^2	0.05×0.35×629.81	11.02	m^3	
Form	Leveling con.	0.05×2×629.81	62.98	m^2	
Crushed stone		0.10×0.35×629.81	22.04	m3	

Description	Classification	Calculation	Quantity	Unit	Remarks
2.Bulstrade	H=1.10m		629.8	m	



(5) Wet stone pitching

Wet stone pitching Quantity calculation

Description	Classification	Calculation		Quantity	Unit	Remarks
1.Wet stone pitching						
①Slope 1 : 1.5						
	～Bahr Yusef	A1 = 106.14+250.10+374.48	= 730.72			
Bahr Ysef～Badraman		A2 = 111.13+21.84+157.00+40.48	= 330.45			
Diroutiahr～Ibrahimia		A3 = 3.06+39.46+4.50+1.62+59.67	= 108.31			
	Ibrahimia～	A4 = 165.04+216.05	= 381.09			
	Abo Gabal	A5 = 102.68	= 102.68			
			Total	1653.25	m^2	
	Area	$1653.25\times(1.0^2+1.5^2)^{1/2}/1.5$		1986.96	m^2	
②Slope 1 : 1.0						
Bahr Ysef～Badraman		A1 = 10.65+14.81	= 25.46			
Badraman～Diroutiah		A2 = 24.89+30.55	= 55.44			
Diroutiahr～Ibrahimia		A3 = 12.45+18.65	= 31.10			
			Total	112.00	m^2	
	Area	$112.00\times(1.0^2+1.0^2)^{1/2}/1.0$		158.39	m^2	
2.Back filling con.	σck=20N/mm²	0.10×158.39		15.84	m^3	
3.Crown works ①Type A (Slope 1 : 1.5)						
	～Bahr Yusef	L1 = 23.74+64.45+87.47	= 175.66			
Bahr Ysef～Badraman		L2 = 38.39+4.02+42.01+6.05	= 90.47			
Diroutiahr～Ibrahimia		L3 = 30.94+8.09+33.42	= 72.45			
	Ibrahimia～	L4 = 38.37+44.05	= 82.42			
			Total	421.00	m	

Description	Classification	Calculation			Quantity	Unit	Remarks
②Type B (Slope 1 : 1.0)							
	Bahr Ysef～Badraman	L1 = 6.16+6.16	=	12.32			
	Badraman～Diroutiah	L2 = 16.00+16.00	=	32.00			
	Diroutiah～Ibrahimia	L3 = 6.64+6.64	=	13.28			
				Total	57.60	m	
4.Foundation works							
	～Bahr Yusef	L1 = 34.08+77.97+67.42	=	179.47			
	Bahr Ysef～Badraman	L2 = 27.04+18.14+3.88+27.07+30.80+3.26	=	110.19			
	Badraman～Diroutiah	L3 = 16.30+17.01	=	33.31			
	Diroutiah～Ibrahimia	L4 = 8.93+4.94×2+17.27×2+10.20×2	=	73.75			
	Ibrahimia～	L5 = 54.74+34.82	=	89.56			
	Abo Gabal	L5 = 50.49	=	50.49			
				Total	536.77	m	

Description	Classification	Calculation	Quantity	Unit	Remarks
(1) Crown concrete (per 10.0m)					
① Type A					
Plain concrete	σck=20N/mm^2	1/2×(0.40+0.25)×0.40×10.00	1.30	m^3	
Leveling concrete	σck=20N/mm^2	0.05×0.35×10.00	0.18	m^3	
Form	Plain con.	(0.40+(0.40^2+0.15^2)$^{1/2}$)×10.00+1/2×(0.40+0.25)×0.40	8.40	m^2	
Form	Leveling con.	0.05×10.00×2	1.00	m^2	
Curing			1.30	m^3	
Crushed stone		0.10×0.35×10	0.35	m^3	
Expansion joint		1/2×(0.40+0.25)×0.40	0.13	m^2	
② Type B					
Plain concrete	σck=20N/mm^2	1/2×(0.40+0.10)×0.30×10.00	0.75	m^3	
Leveling concrete	σck=20N/mm^2	0.05×0.20×10.00	0.10	m^3	
Form	Plain con.	(0.30+(0.30^2+0.30^2)$^{1/2}$)×10.00+1/2×(0.40+0.10)×0.30	7.32	m^2	
Form	Leveling con.	0.05×10.00×2	1.00	m^2	
Curing			0.75	m^3	
Crushed stone		0.10×0.20×10	0.20	m^3	
Expansion joint		1/2×(0.40+0.10)×0.30	0.08	m^2	
(2) Foundation concrete (per 10.0m)					
Plain concrete	σck=20N/mm^2	(1/2×(0.20+0.40)×0.25+0.15×0.40)×10.00	1.35	m^3	
Leveling concrete	σck=20N/mm^2	0.05×0.50×10.00	0.25	m^3	
Form	Plain con.	(0.15+(0.20^2+0.25^2)$^{1/2}$+0.40)×10.00 = 8.70			
		1/2×(0.20+0.40)×0.25+0.15×0.40 = 0.14			
		Total	8.84	m^2	
Form	Leveling con.	0.05×10.00×2	1.00	m^2	
Curing			1.35	m^3	
Crushed stone		0.10×0.35×10	0.35	m^3	
Expansion joint		1/2×(0.20+0.40)×0.25+0.15×0.40	0.14	m^2	

Description	Classification	Calculation	Quantity	Unit	Remarks
		Crown works (Type A)			
		Foundation works			
		Crown works (Type B)			
		Foundation works			

(6) Step

Step Quantity calculation					
Description	Classification	Calculation	Quantity	Unit	Remarks
Type-A	H=3.57m,1:1.5		2	places	
Type-B	H=2.57m,1:1.5		4	places	
Type-C	H=3.67m,1:1.0		2	places	
Type-D	H=2.57m,1:1.0		2	places	
Type-E	H=3.87m,1:1.5		2	places	

Description	Classification	Calculation			Quantity	Unit	Remarks
①Type-A	H=3.57m,1:1.5						
Plain concrete	σck=20N/mm^2	1/2×(0.27+0.586)×0.30×1.20	=	0.15			
		1/2×(6.436+6.417)×0.425×1.20	=	3.28			
		1/2×0.311×0.30×1.20	=	0.06			
		-) 1/2×0.12×0.18×0.80	=	-0.01			
		-) 1/2×0.15×0.225×23×0.80	=	-0.31			
			Total		3.17	m^3	
Form	Plain con.	1/2×(0.27+0.586)×0.30×2	=	0.26			
		1/2×(6.436+6.417)×0.425×2	=	5.46			
		1/2×0.311×0.30×2	=	0.09			
		(3.57+0.30+0.311)×1.20	=	5.02			
		1/2×0.12×0.18×2	=	0.02			
		1/2×0.15×0.225×23×2	=	0.78			
			Total		11.63	m^2	
Leveling concrete	σck=20N/mm^2	(0.586+6.417)×0.10×1.20			0.84	m^3	
Form	Leveling con.	((0.586+6.417)×0.10+0.10×1.20)×2			1.64	m^2	
Curing					11.63	m^2	
Crushed stone		(0.616+6.38)×0.15×1.20			1.26	m^3	
Re-bar	D12	(0.50+6.40)×7×0.888kg/m			42.89	kg	

Description	Classification	Calculation			Quantity	Unit	Remarks
②Type-B	H=2.57m,1:1.5						
Plain concrete	σck=20N/mm^2	1/2×(0.195+0.331)×0.30×1.20	=	0.09			
		1/2×(4.633+4.765)×0.425×1.20	=	2.40			
		1/2×0.311×0.30×1.20	=	0.06			
		-) 1/2×0.17×0.225×0.80	=	-0.02			
		-) 1/2×0.15×0.225×16×0.80	=	-0.22			
			Total		2.32	m^3	
Form	Plain con.	1/2×(0.195+0.331)×0.30×2	=	0.16			
		1/2×(4.633+4.765)×0.425×2	=	3.99			
		1/2×0.311×0.30×2	=	0.09			
		(2.57+0.30+0.311)×1.20	=	3.82			
		1/2×0.17×0.225×2	=	0.04			
		1/2×0.15×0.225×16×2	=	0.54			
			Total		8.64	m^2	
Leveling concrete	σck=20N/mm^2	(0.331+4.765)×0.10×1.20			0.61	m^3	
Form	Leveling con.	((0.331+4.765)×0.10+0.10×1.20)×2			1.26	m^2	
Curing					8.64	m^2	
Crushed stone		(0.361+4.728)×0.15×1.20			0.92	m^3	
Re-bar	D12	(0.20+4.70)×7×0.888kg/m			30.46	kg	

Description	Classification	Calculation			Quantity	Unit	Remarks
③Type-C	H=3.67m,1:1.0						
Plain concrete	σck=20N/mm^2	1/2×(0.38+0.654)×0.30×1.20	=	0.19			
		1/2×(5.190+5.227)×0.406×1.20	=	2.54			
		1/2×0.274×0.30×1.20	=	0.05			
		-) 1/2×0.07×0.07×0.80	=	0.00			
		-) 1/2×0.20×0.20×18×0.80	=	-0.29			
			Total		2.48	m^3	
Form	Plain con.	1/2×(0.38+0.654)×0.30×2	=	0.31			
		1/2×(5.190+5.227)×0.406×2	=	4.23			
		1/2×0.274×0.30×2	=	0.08			
		(3.67+0.30+0.274)×1.20	=	5.09			
		1/2×0.07×0.07×2	=	0.00			
		1/2×0.20×0.20×18×2	=	0.72			
			Total		10.44	m^2	
Leveling concrete	σck=20N/mm^2	(0.654+5.227)×0.10×1.20			0.71	m^3	
Form	Leveling con.	((0.654+5.227)×0.10+0.10×1.20)×2			1.42	m^2	
Curing					10.44	m^2	
Crushed stone		(0.696+5.168)×0.15×1.20			1.06	m^3	
Re-bar	D12	(0.55+5.20)×7×0.888kg/m			35.74	kg	

Description	Classification	Calculation		Quantity	Unit	Remarks
①Type-D	H=2.57m,1:1.0					
Plain concrete	σck=20N/mm^2	1/2×(0.28+0.554)×0.30×1.20	= 0.15			
		1/2×(3.635+3.671)×0.406×1.20	= 1.78			
		1/2×0.274×0.30×1.20	= 0.05			
		-) 1/2×0.17×0.17×0.80	= -0.01			
		-) 1/2×0.20×0.20×12×0.80	= -0.19			
			Total	1.78	m^3	
Form	Plain con.	1/2×(0.28+0.554)×0.30×2	= 0.25			
		1/2×(3.635+3.671)×0.425×2	= 3.11			
		1/2×0.274×0.30×2	= 0.08			
		(2.57+0.30+0.274)×1.20	= 3.77			
		1/2×0.17×0.17×2	= 0.03			
		1/2×0.20×0.20×12×2	= 0.48			
			Total	7.72	m^2	
Leveling concrete	σck=20N/mm^2	(0.554+3.671)×0.10×1.20		0.51	m^3	
Form	Leveling con.	((0.554+3.671)×0.10+0.10×1.20)×2		1.09	m^2	
Curing				7.72	m^2	
Crushed stone		(0.596+3.612)×0.15×1.20		0.76	m^3	
Re-bar	D12	(0.45+3.65)×7×0.888kg/m		25.49	kg	

Description	Classification	Calculation			Quantity	Unit	Remarks
⑤Type-E	H=3.87m,1:1.5						
Plain concrete	σck=20N/mm^2	1/2×(0.27+0.586)×0.30×1.20	=	0.15			
		1/2×(6.977+7.086)×0.425×1.20	=	3.59			
		1/2×0.311×0.30×1.20	=	0.06			
		-) 1/2×0.12×0.18×0.80	=	-0.01			
		-) 1/2×0.15×0.225×25×0.80	=	-0.34			
			Total		3.45	m^3	
Form	Plain con.	1/2×(0.27+0.586)×0.30×2	=	0.26			
		1/2×(6.977+7.086)×0.425×2	=	5.98			
		1/2×0.311×0.30×2	=	0.09			
		(3.57+0.30+0.311)×1.20	=	5.02			
		1/2×0.12×0.18×2	=	0.02			
		1/2×0.15×0.225×25×2	=	0.84			
			Total		12.21	m^2	
Leveling concrete	σck=20N/mm^2	(0.586+7.086)×0.10×1.20			0.92	m^3	
Form	Leveling con.	((0.586+7.086)×0.10+0.10×1.20)×2			1.77	m^2	
Curing					12.21	m^2	
Crushed stone		(0.616+6.921)×0.15×1.20			1.36	m^3	
Re-bar	D12	(0.50+6.95)×7×0.888kg/m			46.31	kg	