APPENDIX C-4

Quantity Calculation Sheet of Water management system

C-4-1. Summary of quantity

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						
WM-1-2	SOLAR CELLS PANEL	including Mount Bracket, Cables	set	4						
WM-1-3	GROUNDING RODS	including Cables	set	40						
WM-1-4	ENCLOSURE	including Mount Bracket	set	4						
WM-1-5	SURGE PROTECTIVE DEVICE	including Cables for water level sensor	set	4						
WM-1-6	SURGE PROTECTIVE DEVICE	including Cables for solar cells panel	set	4						
WM-1-7	GPRS MODEM	including Antenna, Mount Bracket, Cables	set	4						
WM-1-8	RTU	including Mount Bracket, Cables	set	4						
WM-1-9	DATA LOGGER	including Mount Bracket, Cables	set	4						
WM-1-10	POWER CHARGE CONTROLLER	including Mount Bracket, Cables	set	4						
WM-1-11	STORAGE BATTERY	including Mount Bracket, Cables	set	4						
WM-1-12	GROUNDING TERMINAL	including Mount Bracket	set	4						
WM-1-13	Program software for RTU		set	4						
	Total									

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						
WM-2-2	SOLAR CELLS PANEL	including Mount Bracket, Cables	set	34						
WM-2-3	GROUNDING RODS	including Cables	set	340						
WM-2-4	ENCLOSURE	including Mount Bracket	set	34						
WM-2-5	SURGE PROTECTIVE DEVICE	including Cables for water level sensor	set	68						
WM-2-6	SURGE PROTECTIVE DEVICE	including Cables for solar cells panel	set	34						
WM-2-7	GPRS MODEM	including Antenna, Mount Bracket, Cables	set	34						
WM-2-8	RTU	including Mount Bracket, Cables	set	34						
WM-2-9	DATA LOGGER	including Mount Bracket, Cables	set	34						
WM-2-10	POWER CHARGE CONTROLLER	including Mount Bracket, Cables	set	34						
WM-2-11	STORAGE BATTERY	including Mount Bracket, Cables	set	34						
WM-2-12	GROUNDING TERMINAL	including Mount Bracket	set	34						
WM-2-13	Program software for RTU		set	34						
	Total									

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						
WM-3 2	LASER PRINTER	including Table, Cables	set	1						
WM-3 3	SERVER	including Monitor, Keyboard, Mouse, Cables	sets	3						
WM-3 4	COMPUTER RACK	including Power duct, Power Unit, Brank panel	set	1						
WM-3 5	GPRS MODEM	including Antenna. Rack mount plate, Cables	set	1						
WM-3 6	PERSONAL COMPUTER	including Monitor, Keyboard, Mouse, Cables	set	1						
WM-3 7	LCD KVM SWITCH	including Rack mount bracket, Cables	set	1						
WM-3 8	L2-SW	including Rack mount bracket, Cables	set	1						
WM-3 9	ROUTER	including Rack mount plate, Cables	set	2						
WM-3 10	UPS	including Rack mount plate, Cables (1KVA)	set	1						
WM-3 11	UPS	including Rack mount plate, Cables (3KVA)	set	1						
WM-3 12	Software	including Rack mount plate, Cables	set	1						
WM-3 13	Application software for Telemetry system		LS	1						
	Total									

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						
WM-4 2	PERSONAL COMPUTER	including 22"Monitor, Keyboard, Mouse, Cables	set	1						
WM-4 3	ROUTER	including Cables	set	1						
WM-4 4	UPS	including Rack mount plate, Cables (1KVA)	set	1						
WM-4 5	Application software for Telemetry system		LS	1						
	Total									

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						
WM-5- 2	Master and Monitoring station	including cables, installation and adjustment	LS	1						
	Total									

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						
WM-6- 2	On- Site Training		LS	1						
	Total									

C-4-2. Quantity calculation sheet

DETAILED DESIGN STUDY ON THE PROJECT FOR CONSTRUCTION OF

THE NEW DIROUT GROUP OF REGULATORS

WATER MANEGEMENT SYSTEM

C-567

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-5

Quantity Calculation Sheet of Temporary Works

Quantity of Temporary Stage Construction

Plan	Type		Spec・Shape		1.Bahr Yusef Canal River Cross	2.Bahr Yusef Canal Inside River	3.Ibrahimia Canal Inside River	4.Badraman Inside River	5.Abo Gabal Temporary Water Way	6.Sahelyia Temporary Water Way	Total	Unit	Remarks
Temporaly Stage	Dimension	Bridge Length			43.0	210.0	215.0	60.0	18.0	36.0	582.0	m	
		Bridge Width			8.0	6.0	6.0	8.0	3.0	3.0	34.0	m	
	Temporaly Stage , Superstructure	Deck Plate Installation・Removal	1000*2000*208(SM490A)	Area	336.0	1,260.0	1,296.0	480.0	54.0	108.0	3,534.0	m2	
				Weight	71.2	267.1	274.8	101.8	11.4	22.9	749.2	t	
			Slip Stopper [-200*90*8*13(S400)		2.6	12.7	13.0	3.6	1.1	2.2	35.2	t	
			Total Steel Weight		73.8	279.8	287.8	105.4	12.5	25.1	**784.4**	t	
		Superstructure Installation・Removal	Beam	H-250*250*9*14(SS400)	-	-	-	7.1	-	-	7.1	t	
				H-300×300×10×15 SS400	-	-	-	-	2.7	5.3	8.0	t	
				H-350*350*12*19(SS400)	-	34.0	35.0	-	-	-	69.0	t	
				H-400*400*13*21(SS400)	12.4	-	-	-	-	-	12.4	t	
			Girder	H-350*350*12*19(SS400)	-	-	-	40.5	-	-	40.5	t	
				H-400*400*13*21(SS400)	36.1	144.5	148.6	-	-	-	329.2	t	
				[-250*90*9*13 SS400	-	-	-	-	1.2	2.5	3.7	t	
			Steel Plate of Girder		0.3	1.3	1.3	0.4	-	-	3.3	t	
			Total Steel Weight		48.8	179.8	184.9	48.0	3.9	7.8	**473.2**	t	
		Handrail Installation・Removal	Length		86.0	420.0	430.0	120.0	36.0	72.0	1,164.0	m	
			Pole Stanchion		44	212	218	62	20	38	594	pcs	
			Steel Pipe φ48.6 L6000 t2.4		28	140	144	40	12	24	388	pcs	
			Steel Scaffolding Board L4000		21	105	108	30	9	18	291	pcs	
			Safety Nets		84.0	420.0	432.0	120.0	36.0	72.0	1,164.0	m2	
			Clamp(90°)		88	424	436	124	40	76	1,188	pcs	
			Pipe Joint		24	136	140	36	8	20	364	pcs	
		Stage Ends	Steel Plate 5×20 t=25		9.1	14.6	14.6	18.2	-	-	**56.5**	t	
	Temporary Stage , Substructure	Substructure Installation・Removal	Horizontal Piece [-150×75×6.5×10(SS40		2.4	8.0	8.3	3.3	※Refer to the sheet of "Quantity of Temporary Closure".		22.0	t	
			Cross Piece L-100*100*10(S400)		2.7	9.0	9.3	3.7			24.7	t	
			Total Steel Weight		5.1	17.0	17.6	7.0			**46.7**	t	
		Pile Driving	Number		40	144	148	55			387	t	
			H-300*300*10*15(SS400)		-	-	-	59.3			59.3	t	
			H-350*350*12*19(SS400)		49.2	39.4	291.4	-			380.0	t	
			H-400*400*13*21(SS400)		55.7	460.4	-	-			516.1	t	
			Total Steel Weight		104.9	499.8	291.4	59.3			**955.4**	t	
			Pile	Pile Length	21.5(15p) 14.5(25p)	21.5(124p) 14.5(20p)	14.5	11.5			-	m	Steel materials of Bahr Yusef shall be re-used for Ibrahimia.
				Driving	9.3	9.3	7.5	5.3			31.4	m	
				Extraction	9.3	9.3	7.5	5.3			31.4	m	
	Others		Bolt・Nut・Washer M22 F10T L85		0.6	2.2	2.3	0.8	0.05	0.1	**6.05**	t	

1－1. Table of Quantity (BahrYusef River Cross Position W=8m) No.1

Item	Type			Total	Unit	Remarks
	Bridge Length			43.0	m	
	Bridge Width			8.0	m	
Substructure	Support Pile	H-350×350×12×19 SS400		362.5	m	
				25	本	
		重量 ※PLを含む		49.2	t	
		H-400×400×12×19 SS400		322.5	m	
				15	本	
		重量 ※PLを含む		55.7	t	
		1 Per	Pile Length	21.5	m	※Abat Section:14.5m 25pcs
			Driving・Excavation	9.3	m	
	Horizontal Piece	[-150×75×6.5×10 SS400		128.0	m	
				16	pcs	
		Weight		2.4	t	
	Cross Piece	L-100×100×10 SS400		179.2	m	
				64	pcs	
		Weight		2.7	t	
Super Structure	Beam	H-400×400×13×21 SS400		72.0	m	
				8	pcs	
		Weight		12.4	t	
	Girder	H-400×400×13×21 SS400		210.0	m	
				35	pcs	
		Weight		36.1	t	
	Steel Plate of Girder	PL-350×150×12 SS400		60	pcs	
		Weight		0.3	t	
	Deck Plate	1000×2000×208		168	pcs	
		Area		336.0	m2	
		Weight		71.2	t	
	Slip Stopper	[-200×90×8×13 SS400 Weight		2.6	t	
	Steel Plate	5×20 t25 Weight		9.1	t	
Others	Bolt M22	F10t L85 Weight		0.6	t	
Handrail	Pole	Pole Stanchion		44	pcs	
	Side Rail	Steel Pipe φ48.6 L6000 t2.4		28	pcs	
	Base Board	Steel Scaffolding Board L=4000		21	pcs	
	Nets	Safety Nets		84.0	m2	
	Others	Clamp(90°)		88	pcs	
		Pipe Joint		24	pcs	

Type	Calculation Formula	Quantity
1. Dimension	Bridge	
	Length 43.0 m	
	Width 8.0 m	
	Support Span Length 6.0 m	
	Support Span pcs 7 Span	
	Support Point pcs 8 pcs	
2. Substructure		
Support Pile	H-400×400×13×21 SS400 , H-350×350×12×19 SS400	
Plate of Pile Top	PL-350×350×12 SS400 , PL-400×400×12 S400	
Pile Number	5 × 8 ※Total number is 40. (15/River Area 25/Abat Area) =	40 pcs
Pile Length	1 Per ※Length is different (21.5m/River Area 14.5m/Abat A =	21.5 m
	1 Set 14.50 × 25 =	362.5 m
	21.50 × 15 =	322.5 m
Driving・Excavation	Ground Average GL+ 41.000 m Total =	685.0 m
	Pile Bottom GL+ 31.700 m	
	1 Per 41.0 - 31.7 =	9.3 m
	1 Set 9.3 × 40 =	372.0 m
Weight	Support Pile 15 × 21.5 × 172.0 kg/m =	55,470.0 kg
	Plate of Pile Top 15×0.16m2×94.2kg/m2=226.1kg Total =	55.7 t
	Support Pile 25 × 14.5 × 135.0 kg/m =	48,937.5 kg
	Plate of Pile Top 25×0.12m2×94.2kg/m2=282.6kg Total =	49.2 t
Horizontal Piece	[-150×75×6.5×10 SS400	
Number	1 Cross Section × 8 Point =	16 pcs
Length	1 Per =	8.0 m
	1 Set 16 × 8.0 =	128.0 m
Weight	16 × 8.0 × 18.6 kg/m =	2,380.8 kg
	=	2.4 t
Cross Piece	L-100×100×10 SS400	
Number	1 Cross Section × 8 Point =	64 pcs
Length	1 Per =	2.8 m
	1 Set 64 × 2.8 =	179.2 m
Weight	64 × 2.8 × 14.9 kg/m =	2,670.1 kg
	=	2.7 t

Type	Calculation Formula		Quantity
3. Supperstructure			
Beam	H-400×400×13×21 SS400		
Number	1 Cross Section × 8 Point	=	8 pcs
Length	1 Per	=	9.0 m
	1 Set 8 × 9.0	=	72.0 m
Weight	8 × 9.0 × 172.0 kg/m	=	12,384.0 kg
		=	12.4 t
Girder	H-400×400×13×21 SS400		
Number	1 Span 5 × 7 Span	=	35 pcs
Length	1 Per	=	6.0 m
	1 Set 35 × 6.0	=	210.0 m
Weight	35 × 6.0 × 172.0 kg/m	=	36,120.0 kg
		=	36.1 t
eel Plate of Girder	PL-350×150×12 SS400		
Number	1 Cross Section 10 pcs	=	10 pcs
	1 Set 10 × 6 Cross Section	=	60 pcs
Weight	60 × 0.05 m2 × 94.2 kg/m2	=	282.6 kg
		=	0.3 t
Deck Plate	1000×2000×208		
Number	1 Span 24	=	24 pcs
	1 Set 24 × 7 Span	=	168 pcs
Area	168 × 2.0 m2	=	336.0 m 2
Weight	168 × 424.0 kg/pcs	=	71,232.0 kg
		=	71.2 t
Slip Stopper	[-200×90×8×13 SS400		
Length	1 Set 43.0 × 2 Line	=	86.0 m
Weight	86.0 × 30.3 kg/m	=	2,605.8 kg
		=	2.6 t

Type	Calculation Formula		Quantity
1. Stage Ends			
Steel Plate	1524×6096 t=25		
One Side			
Number	Bridge width is 8.0m. That is why, 1524×5=7620	=	5 pcs
Weight	5 × 1823.0 kg/pcs	－	9,115.0 kg
		=	9.1 t
5. Others			
Bolt･Nut･Washer	M22 F10T L85		
Number	1 steel material / 8 volts		
	Add up the number of steel materials.		
	Horizontal Piece	－	16 pcs
	Cross Piece	=	64 pcs
	Beam	－	8 pcs
	Girder	=	35 pcs
	Total Σ	－	123 pcs
	That is		
	8 × 123	－	984 pcs
Weight	984 × 0.6 kg/Set	=	590.4 kg
		－	0.6 t
Hand Rail	Pole Pitch：2.0m		

Bridge Length	43.0	m	Support Span Length	6.0	m
Support Span pcs	7	Span	Support Point pcs	8	Point

1 Span	Pole	Pole Stanchion 4pcs	× 2 Line	=	8 pcs
	Side Rail	Steel Pipe φ48.6 L6000 t2.4 2pcs	× 2 Line	－	4 pcs
	Pipe Joint	4pcs	× 2 Line	－	8 pcs
	Clamp(90°)	8pcs	× 2 Line	=	16 pcs
	Steel Scaffolding Boa	L4000 1.5pcs	× 2 Line	－	3 pcs
	Safety Nets	6m2	× 2 Line	=	12 m 2

											Deduction		
1 Set	Pole	8	×	7	Span	-	6	Point	×	2 Line		－	44 pcs
	Side Rail	4	×	7	Span							=	28 pcs
	Pipe Joint	8	×	7	Span	-	8	Point	×	2 Q	× 2 L	－	24 pcs
	Clamp(90°)	16	×	7	Span	-	6	Point	×	2 Q	× 2 L	－	88 pcs
	Steel Scaffolding Boa	3	×	7	Span							=	21 pcs
	Safety Nets	12	×	7	Span							－	84 m 2

2－1. Table(BahrYusef Inside River W=6m) No.1

Item	Type			Total	Unit	Remarks
	Bridge Length			210.0	m	
	Bridge Width			6.0	m	
Substructure	Support Pile	H-350×350×12×19 SS400		290.0	m	
				20	本	
		重量 ※PLを含む		39.4	t	
		H-400×400×12×19 SS400		2666.0	m	
				124	本	
		重量 ※PLを含む		460.4	t	
		1 Per	Pile Length	21.5	m	・※Abat Section:14.5m 20pcs
			Driving・Excavation	9.3	m	
	Horizontal Piece	[-150×75×6.5×10 SS400		432.0	m	
				72	pcs	
		Weight		8.0	t	
	Cross Piece	L-100×100×10 SS400		604.8	m	
				216	pcs	
		Weight		9.0	t	
Super Structure	Beam	H-350×350×12×19 SS400		252.0	m	
				36	pcs	
		Weight		34.0	t	
	Girder	H-400×400×13×21 SS400		840.0	m	
				140	pcs	
		Weight		144.5	t	
	Steel Plate of Girder	PL-350×150×12 SS400		272	pcs	
		Weight		1.3	t	
	Deck Plate	1000×2000×208		630	pcs	
		Area		1260.0	m2	
		Weight		267.1	t	
	Slip Stopper	[-200×90×8×13 SS400 Weight		12.7	t	
	Steel Plate	5×20 t25 Weight		14.6	t	
Others	Bolt M22	F10t L85 Weight		2.2	t	
Handrail	Pole	Pole Stanchion		212	pcs	
	Side Rail	Steel Pipe φ48.6 L6000 t2.4		140	pcs	
	Base Board	Steel Scaffolding Board L=4000		105	pcs	
	Nets	Safety Nets		420.0	m2	
	Others	Clamp(90°)		424	pcs	
		Pipe Joint		136	pcs	

Type	Calculation Formula	Quantity
1．Dimension	Bridge	
	Length 210.0 m	
	Width 6.0 m	
	Support Span Length 6.0 m	
	Support Span pcs 35 Span	
	Support Point pcs 36 pcs	
2．Substructure		
Support Pile	H-400×400×13×21 SS400 , H-350×350×12×19 SS400	
Plate of Pile Top	PL-350×350×12 SS400 , PL-400×400×12 S400	
Pile Number	4 × 36 ※:Total number is 144. (20/Cross Section213.75 124/(	144 pcs
Pile Length	1 Per ※:Length is different (14.5m/Cross Section 21.5m/C=	21.5 m
	1 Set 21.50 × 124 −	2,666.0 m
	14.50 × 20 =	290.0 m
Driving･Excavation	Ground Average GL+ 41.000 m Total Σ −	2,956.0 m
	Pile Bottom GL+ 31.700 m	
	1 Per 41.0 - 31.7 −	9.3 m
	1 Set 9.3 × 144 =	1,339.2 m
Weight	Support Pile 124 × 21.5 × 172.0 kg/m =	458,552.0 kg
	Plate of Pile Top 124×0.16m2×94.2kg/m2 =1868.9kg Total Σ −	460.4 kg
	Support Pile 20 × 14.5 × 135.0 kg/m =	39,150.0 kg
	Total Σ −	39.4 kg
Horizontal Piece	[-150×75×6.5×10 SS400	
Number	1 Cross Section × 36 Point =	72 pcs
Length	1 Per −	6.0 m
	1 Set 72 × 6.0 =	432.0 m
Weight	72 × 6.0 × 18.6 kg/m =	8,035.2 kg
	=	8.0 t
Cross Piece	L-100×100×10 SS400	
Number	1 Cross Section × 36 Point −	216 pcs
Length	1 Per =	2.8 m
	1 Set 216 × 2.8 −	604.8 m
Weight	216 × 2.8 × 14.9 kg/m =	9,011.5 kg
	=	9.0 t

Type	Calculation Formula		Quantity
3. Supperstructure			
Beam	H-350×350×12×19 SS400		
Number	1 Cross Sect 1 × 36 Point	=	36 pcs
Length	1 Per	–	7.0 m
	1 Set 36 × 7.0	=	252.0 m
Weight	36 › 7.0 × 135.0 kg/m	=	34,020.0 kg
		=	34.0 t
Girder	H-400×400×13×21 SS400		
Number	1 Span 4 × 35 Span	=	140 pcs
Length	1 Per	–	6.0 m
	1 Set 140 × 6.0	=	840.0 m
Weight	140 × 6.0 × 172.0 kg/m	=	144,480.0 kg
		–	144.5 t
eel Plate of Girder	PL-350×150×12 SS400		
Number	1 Cross Section 8 pcs	–	8 pcs
	1 Set 8 × 34 Cross Section	=	272 pcs
Weight	272 × 0.05 m2 › 94.2 kg/m2	=	1,281.1 kg
		–	1.3 t
Deck Plate	1000×2000×208		
Number	1 Span 18	=	18 pcs
	1 Set 18 × 35 Span	–	630 pcs
Area	630 × 2.0 m2	–	1,260.0 m 2
Weight	630 × 424.0 kg/枚	–	267,120.0 kg
		=	267.1 t
Slip Stopper	[-200×90×8×13 SS400		
Length	1 Set 210.0 × 2 Line	–	420.0 m
Weight	420.0 › 30.3 kg/m	–	12,726.0 kg
		–	12.7 t

Type	Calculation Formula		Quantity
4. Stage Ends			
Steel Plate	1524×6096 t=25		
One Side			
Number	Bridge width is 6.0m. That is why, 1524×4=6096	=	4 pcs
	4 × 2 Places	=	8 pcs
Weight	8.0 × 1823.0 kg/pcs	−	14,584.0 kg
		−	14.6 t
5. Others			
Bolt・Nut・Washer	M22 F10T L85		
Number	1 steel material / 8 volts		
	Add up the number of steel materials.		
	Horizontal Piece	−	72 pcs
	Cross Piece	=	216 pcs
	Beam	−	36 pcs
	Girder	=	140 pcs
	Total Σ	−	464 pcs
	That is		
	8 × 464	−	3,712 pcs
Weight	3,712 × 0.6 kg/Set	−	2,227.2 kg
		=	2.2 t
Hand Rail	Pole Pitch : 2.0m		

Bridge Length	210.0	m	Support Span Length	6.0	m
Support Span pcs	35	Span	Support Point pcs	36	Point

1 Span	Pole	Pole Stanchion 4pcs	× 2 Line	−	8 pcs
	Side Rail	Steel Pipe φ48.6 L6000 t2.4 2pcs	× 2 Line	=	4 pcs
	Pipe Joint	4pcs	× 2 Line	−	8 pcs
	Clamp(90°)	8pcs	× 2 Line	=	16 pcs
	Steel Scaffolding Board	L4000 1.5pcs	× 2 Line	−	3 pcs
	Safety Nets	6m2	× 2 Line	=	12 m2
			Deduction		
1 Set	Pole	8 × 35 Span - 34 Point× 2 Line		=	212 pcs
	Side Rail	4 × 35 Span		−	140 pcs
	Pipe Joint	8 × 35 Span - 36 Point× 2 Q × 2 L		=	136 pcs
	Clamp(90°)	16 × 35 Span - 34 Point× 2 Q × 2 L		−	424 pcs
	Steel Scaffolding Board	3 × 35 Span		=	105 pcs
	Safety Nets	12 × 35 Span		−	420 m2

3－1．Table（Ibrahimia Inside River W=6m）　　No.1

Item	Type			Total	Unit	Remarks
	Bridge Length			215.0	m	
	Bridge Width			6.0	m	
Substructure	Support Pile	H-350×350×12×19 SS400		2146.0	m	
				148	pcs	
		Weight：※Including PL		291.4	t	
		1 Per	Pile Length	14.5	m	
			Driving・Excavation	7.5	m	
	Horizontal Piece	[-150×75×6.5×10 SS400		444.0	m	
				74	pcs	
		Weight		8.3	t	
	Cross Piece	L-100×100×10 SS400		621.6	m	
				222	pcs	
		Weight		9.3	t	
Super Structure	Beam	H-350×350×12×19 SS400		259.0	m	
				37	pcs	
		Weight		35.0	t	
	Girder	H-400×400×13×21 SS400		864.0	m	
				144	pcs	
		Weight		148.6	t	
	Steel Plate of Girder	PL-350×150×12　SS400		280	pcs	
		Weight		1.3	t	
	Deck Plate	1000×2000×208		648	pcs	
		Area		1296.0	m2	
		Weight		274.8	t	
	Slip Stopper	[-200×90×8×13 SS400　Weight		13.0	t	
	Steel Plate	5×20 t25　Weight		14.6	t	
Others	Bolt M22	F10t L85　Weight		2.3	t	
Handrail	Pole	Pole Stanchion		218	pcs	
	Side Rail	Steel Pipe φ48.6 L6000 t2.4		144	pcs	
	Base Board	Steel Scaffolding Board L=4000		108	pcs	
	Nets	Safety Nets		432.0	m2	
	Others	Clamp(90°)		436	pcs	
		Pipe Joint		140	pcs	

Type	Calculation Formula		Quantity
1. Dimension	Bridge		
	Length 215.0 m		
	Width 6.0 m		
	Support Span Length 6.0 m		
	Support Span pcs 36 Span		
	Support Point pcs 37 pcs		
2. Substructure			
Support Pile	H-350×350×12×19 SS400		
Plate of Pile Top	PL-350×350×12 SS400		
Pile Number	4 × 37	－	148 pcs
Pile Length	1 Per	＝	14.5 m
	1 Set 14.50 × 148	－	2,146.0 m
Driving・Excavation	Ground Average GL+ 39.000 m		
	Pile Bottom GL+ 31.550 m		
	1 Per 39.0 - 31.6	－	7.5 m
	1 Set 7.5 × 148	＝	1,110.0 m
Weight	Support Pile 148 × 14.50 × 135.0 kg/m	＝	289,710.0 kg
	Plate of Pile Top 148 × 0.12 m2 × 94.2 kg/m2	－	1,707.8 kg
		Total Σ ＝	291,417.8 kg
		＝	291.4 t
Horizontal Piece	[-150×75×6.5×10 SS400		
Number	1 Cross Section × 37 Point	－	74 pcs
Length	1 Per	＝	6.0 m
	1 Set 74 × 6.0	－	444.0 m
Weight	74 × 6.0 × 18.6 kg/m	－	8,258.4 kg
		＝	8.3 t
Cross Piece	L-100×100×10 SS400		
Number	1 Cross Section × 37 Point	＝	222 pcs
Length	1 Per	＝	2.8 m
	1 Set 222 × 2.8	＝	621.6 m
Weight	222 × 2.8 × 14.9 kg/m	－	9,261.8 kg
		＝	9.3 t

Type	Calculation Formula		Quantity
3. Supperstructure			
Beam	H-350×350×12×19 SS400		
Number	1 Cross Sect 1 × 37 Point	－	37 pcs
Length	1 Per	－	7.0 m
	1 Set 37 × 7.0	－	259.0 m
Weight	37 × 7.0 × 135.0 kg/m	－	34,965.0 kg
		－	35.0 t
Girder	H-400×400×13×21 SS400		
Number	1 Span 4 × 36 Span	＝	144 pcs
Length	1 Per	－	6.0 m
	1 Set 144 × 6.0	＝	864.0 m
Weight	144 × 6.0 × 172.0 kg/m	＝	148,608.0 kg
		－	148.6 t
eel Plate of Girder	PL-350×150×12 SS400		
Number	1 Cross Section 8 pcs	－	8 pcs
	1 Set 8 × 35 Cross Section	＝	280 pcs
Weight	280 × 0.05 m2 × 94.2 kg/m2	＝	1,318.8 kg
		－	1.3 t
Deck Plate	1000×2000×208		
Number	1 Span 18	－	18 pcs
	1 Set 18 × 36 Span	＝	648 pcs
Area	648 × 2.0 m2	＝	1,296.0 m 2
Weight	648 × 424.0 kg/pcs	＝	274,752.0 kg
		－	274.8 t
Slip Stopper	[-200×90×8×13 SS400		
Length	1 Set 215.0 × 2 Line	＝	430.0 m
Weight	430.0 × 30.3 kg/m	＝	13,029.0 kg
		－	13.0 t

Type	Calculation Formula		Quantity
4. Stage Ends			
Steel Plate	1524×6096 t=25		
One Side			
Number	Bridge width is 6.0m. That is why , 1524×4=6096	=	4 pcs
	4 × 2 Places	=	8 pcs
Weight	8.0 × 1823.0 kg/pcs	－	14,584.0 kg
		－	14.6 t
5. Others			
Bolt･Nut･Washer	M22 F10T L85		
Number	1 steel material / 8 volts		
	Add up the number of steel materials.		
	Horizontal Piece	－	74 pcs
	Cross Piece	=	222 pcs
	Beam	－	37 pcs
	Girder	=	144 pcs
	Total Σ	－	477 pcs
	That is		
	8 × 477	－	3,816 pcs
Weight	3,816 × 0.6 kg/Set	－	2,289.6 kg
		=	2.3 t
Hand Rail	Pole Pitch : 2.0m		
	Bridge Length 215.0 m / Support Span Length 6.0 m / Support Span pcs 36 Span / Support Point pcs 37 Point		
1 Span	Pole — Pole Stanchion 4pcs × 2 Line	－	8 pcs
	Side Rail — Steel Pipe φ48.6 L6000 t2.4 2pcs × 2 Line	=	4 pcs
	Pipe Joint — 4pcs × 2 Line	－	8 pcs
	Clamp(90°) — 8pcs × 2 Line	=	16 pcs
	Steel Scaffolding Board — L4000 1.5pcs × 2 Line	－	3 pcs
	Safety Nets — 6m2 × 2 Line	=	12 m2
		Deduction	
1 Set	Pole — 8 × 36 Span - 35 Point × 2 Line	=	218 pcs
	Side Rail — 4 × 36 Span	－	144 pcs
	Pipe Joint — 8 × 36 Span - 37 Point × 2 Q × 2 L	=	140 pcs
	Clamp(90°) — 16 × 36 Span - 35 Point × 2 Q × 2 L	－	436 pcs
	Steel Scaffolding Board — 3 × 36 Span	=	108 pcs
	Safety Nets — 12 × 36 Span	－	432 m2

4－1. Table(Badraman Inside River W=8m) No.1

Item	Type			Total	Unit	Remarks
	Bridge Length			60.0	m	
	Bridge Width			8.0	m	
Substructure	Support Pile	H-300×300×10×15 SS400		632.5	m	
				55	pcs	
		Weight ※Including PL		59.3	t	
		1 Per	Pile Length	11.5	m	
			Driving・Excavation	5.3	m	
	Horizontal Piece	[-150×75×6.5×10 SS400		176.0	m	
				22	pcs	
		Weight		3.3	t	
	Cross Piece	L-100×100×10 SS400		246.4	m	
				88	pcs	
		Weight		3.7	t	
Super Structure	Beam	H-250×250×9×14 SS400		99.0	m	
				11	pcs	
		Weight		7.1	t	
	Girder	H-350×350×12×19 SS400		300.0	m	
				50	pcs	
		Weight		40.5	t	
	Steel Plate of Girder	PL-350×150×12 SS400		90	pcs	
		Weight		0.4	t	
	Deck Plate	1000×2000×208		240	pcs	
		Area		480.0	m2	
		Weight		101.8	t	
	Slip Stopper	[-200×90×8×13 SS400 Weight		3.6	t	
	Steel Plate	5×20 t25 Weight		18.2	t	
Others	Bolt M22	F10t L85 Weight		0.8	t	
Handrail	Pole	Pole Stanchion		62	pcs	
	Side Rail	Steel Pipe φ48.6 L6000 t2.4		40	pcs	
	Base Board	Steel Scaffolding Board L=4000		30	pcs	
	Nets	Safety Nets		120.0	m2	
	Others	Clamp(90°)		124	pcs	
		Pipe Joint		36	pcs	

Type	Calculation Formula		Quantity
1．Dimension	Bridge		
	Length 60.0 m ※Total leftbank and Rightbank		
	Width 8.0 m		
	Support Span Length 6.0 m		
	Support Span pcs 10 Span		
	Support Point pcs 11 pcs		
2．Substructure			
Support Pile	H-300×300×10×15 SS400		
Plate of Pile Top	PL-300×300×12 SS400		
Pile Number	5 × 11	－	55 pcs
Pile Length	1 Per	＝	11.5 m
	1 Set 11.50 × 55	－	632.5 m
Driving・Excavation	Ground Average GL+ 43.000 m		
	Pile Bottom GL+ 37.700 m		
	1 Per 43.0 - 37.7	－	5.3 m
	1 Set 5.3 × 55	＝	291.5 m
Weight	Support Pile 55 × 11.50 × 93.0 kg/m	＝	58,822.5 kg
	Plate of Pile Top 55 × 0.09 m2 × 94.2 kg/m2	－	466.3 kg
	Total Σ	＝	59,288.8 kg
		＝	59.3 t
Horizontal Piece	[-150×75×6.5×10 SS400		
Number	1 Cross Section × 11 Point	－	22 pcs
Length	1 Per	＝	8.0 m
	1 Set 22 × 8.0	－	176.0 m
Weight	22 × 8.0 × 18.6 kg/m	－	3,273.6 kg
		＝	3.3 t
Cross Piece	L-100×100×10 SS400		
Number	1 Cross Section × 11 Point	＝	88 pcs
Length	1 Per	＝	2.8 m
	1 Set 88 × 2.8	＝	246.4 m
Weight	88 × 2.8 × 14.9 kg/m	－	3,671.4 kg
		＝	3.7 t

Type	Calculation Formula		Quantity
3．Supperstructure			
Beam	H-250×250×9×14 SS400		
Number	1 Cross Sect 1 × 11 Point	－	11 pcs
Length	1 Per	－	9.0 m
	1 Set 11 × 9.0	－	99.0 m
Weight	11 × 9.0 × 71.8 kg/m	－	7,108.2 kg
		－	7.1 t
Girder	H-350×350×12×19 SS400		
Number	1 Span 5 × 10 Span	＝	50 pcs
Length	1 Per	－	6.0 m
	1 Set 50 × 6.0	＝	300.0 m
Weight	50 × 6.0 × 135.0 kg/m	＝	40,500.0 kg
		－	40.5 t
eel Plate of Girder	PL-350×150×12 SS400		
Number	1 Cross Section 10 pcs	－	10 pcs
	1 Set 10 × 9 Cross Section	＝	90 pcs
Weight	90 × 0.05 m2 × 94.2 kg/m2	＝	423.9 kg
		－	0.4 t
Deck Plate	1000×2000×208		
Number	1 Span 24	－	24 pcs
	1 Set 24 × 10 Span	＝	240 pcs
Area	240 × 2.0 m2	＝	480.0 m 2
Weight	240 × 424.0 kg/枚	＝	101,760.0 kg
		－	101.8 t
Slip Stopper	[-200×90×8×13 SS400		
Length	1 Set 60.0 × 2 Line	＝	120.0 m
Weight	120.0 × 30.3 kg/m	＝	3,636.0 kg
		－	3.6 t

Type	Calculation Formula		Quantity
4. Stage Ends			
Steel Plate	1524×6096 t=25		
One Side			
Number	Bridge width is 8.0m. That is why , 1524×5=7620	=	5 pcs
	5 × 2 Places	=	10 pcs
Weight	10.0 × 1823.0 kg/pcs	=	18,230.0 kg
		=	18.2 t
5. Others			
Bolt・Nut・Washer	M22 F10T L85		
Number	1 steel material / 8 volts		
	Add up the number of steel materials.		
	Horizontal Piece	=	22 pcs
	Cross Piece	=	88 pcs
	Beam	=	11 pcs
	Girder	=	50 pcs
	Total Σ	=	171 pcs
	That is		
	8 × 171	=	1,368 pcs
Weight	1,368 × 0.6 kg/Set	=	820.8 kg
		=	0.8 t
Hand Rail	Pole Pitch : 2.0m		

Bridge Length	60.0	m	Support Span Length	6.0	m
Support Span pcs	10	Span	Support Point pcs	11	Point

1 Span	Pole	Pole Stanchion 4pcs	× 2 Line	=	8 pcs
	Side Rail	Steel Pipe φ48.6 L6000 t2.4 2pcs	× 2 Line	=	4 pcs
	Pipe Joint	4pcs	× 2 Line	=	8 pcs
	Clamp(90°)	8pcs	× 2 Line	=	16 pcs
	Steel Scaffolding Board	L4000 1.5pcs	× 2 Line	=	3 pcs
	Safety Nets	6m2	× 2 Line	=	12 m2
			Deduction		
1 Set	Pole	8 × 10 Span - 9 Point× 2 Line		=	62 pcs
	Side Rail	4 × 10 Span		=	40 pcs
	Pipe Joint	8 × 10 Span - 11 Point× 2 Q × 2 L		=	36 pcs
	Clamp(90°)	16 × 10 Span - 9 Point× 2 Q × 2 L		=	124 pcs
	Steel Scaffolding Board	3 × 10 Span		=	30 pcs
	Safety Nets	12 × 10 Span		=	120 m2

5－1. Table(Abo Gabal Inside River W=3m) No.1

Item	Type		Total	Unit	Remarks
	Bridge Length		18.0	m	
	Bridge Width		3.0	m	
Substructure	※･Refer to the sheet of "Quantity of Temporary Closure".				
Super Structure	Beam	[-250*90*9*13 SS400	36.0	m	
		Weight	1.2	t	
	Girder	H-300×300×10×15 SS400	28.6	m	
			9	pcs	
		Weight	2.7	t	
	Deck Plate	1000×2000×208	27	pcs	
		Area	54.0	m2	
		Weight	11.4	t	
	Slip Stopper	[-200×90×8×13 SS400	36.0	m	
		Weight	1.1	t	
Handrail	Pole	Pole Stanchion	20	pcs	
	Side Rail	Steel Pipe φ48.6 L6000 t2.4	12	pcs	
	Base Board	Steel Scaffolding Board L=4000	9	pcs	
	Nets	Safety Nets	36.0	m2	
	Others	Clamp(90°)	40	pcs	
		Pipe Joint	8	pcs	
Others	Bolt M22	F10t L85 Weight	0.05	t	

Type	Calculation Formula			Quantity
1. Dimension	Bridge			
	Length 18.0 m			
	Width 3.0 m			
	Support Span Length — m			
	Support Span pcs — Span			
	Support Point pcs — pcs			
2. Substructure	※Refer to the sheet of "Quantity of Temporaly Closure".			
3. Supperstructure				
Beam	[-250×90×9×13 SS400			
Length	1 Set 18 × 2 Line		—	36.0 m
Weight	36.0 × 34.6 kg/m		—	1,245.6 kg
			=	1.2 t
Girder	H-300×300×10×15 SS400			
Length	1 Per		—	3.18 m
	1 Set 3.18 × 9 pcs		=	28.6 m
Weight	28.6 × 93.0 kg/m		=	2,661.7 kg
			—	2.7 t
Deck Plate	1000×2000×208			
Number	1 Span		—	3 pcs
	1 Set 3 × 9 Span		—	27 pcs
Area	27 × 2.0 m2		—	54.0 m 2
Weight	27 × 424.0 kg/pcs		—	11,448.0 kg
			=	11.4 t
Slip Stopper	L-200×90×8×13 SS400			
Length	1 Set 18 × 2 Line		—	36.0 m
Weight	36.0 × 30.3 kg/m		—	1,090.8 kg
			=	1.1 t

Type	Calculation Formula			Quantity
5. Others				
Hand Rail	Pole Pitch : 2.0m			
	Bridge Length 18.0 m / Support Span Length 6.0 m			
	Support Span pcs 3 Span / Support Point pcs 4 Point			
1 Span	Pole	Pole Stanchion 4pcs × 2 Line	=	8 pcs
	Side Rail	Steel Pipe φ48.6 L6000 t2.4 2pcs × 2 Line	=	4 pcs
	Pipe Joint	4pcs × 2 Line	=	8 pcs
	Clamp(90°)	8pcs × 2 Line	—	16 pcs
	Steel Scaffolding Board	L4000 1.5pcs × 2 Line	=	3 pcs
	Safety Nets	6m2 × 2 Line	—	12 m2
		Deduction		
1 Set	Pole	8 × 3 Span - 2 Point × 2 Line	=	20 pcs
	Side Rail	4 × 3 Span	—	12 pcs
	Pipe Joint	8 × 3 Span - 4 Point × 2 Q × 2 L	=	8 pcs
	Clamp(90°)	16 × 3 Span - 2 Point × 2 Q × 2 L	—	40 pcs
	Steel Scaffolding Board	3 × 3 Span	=	9 pcs
	Safety Nets	12 × 3 Span	—	36 m2
Bolt・Nut・Washer	M22 F10T L85			
Number	1 steel material / 8 volts			
	Add up the number of steel materials.			
	Girder		—	9 pcs
		Total Σ	=	9 pcs
	That is			
	8 × 9		—	72 pcs
Weight	72 × 0.6 kg/Set		—	43.2 kg
			=	0.05 t

6－1．Table（Sahelyia Inside River W=3m）　　No.1

Item	Type		Total	Unit	Remarks
	Bridge Length		36.0	m	
	Bridge Width		3.0	m	
Substructure	※・Refer to the sheet of "Quantity of Temporary Closure".				
Super Structure	Beam	[-250*90*9*13 SS400	72.0	m	
		Weight	2.5	t	
	Girder	H-300×300×10×15 SS400	57.2	m	
			18	pcs	
		Weight	5.3	t	
	Deck Plate	1000×2000×208	54	pcs	
		Area	108.0	m2	
		Weight	22.9	t	
	Slip Stopper	[-200×90×8×13 SS400	72.0	m	
		Weight	2.2	t	
Handrail	Pole	Pole Stanchion	38	pcs	
	Side Rail	Steel Pipe φ48.6 L6000 t2.4	24	pcs	
	Base Board	Steel Scaffolding Board L=4000	18	pcs	
	Nets	Safety Nets	72.0	m2	
	Others	Clamp(90°)	76	pcs	
		Pipe Joint	20	pcs	
Others	Bolt M22	F10t L85　Weight	0.1	t	

Type	Calculation Formula		Quantity
1．Dimension	Bridge		
	Length 36.0 m		
	Width 3.0 m		
	Support Span Length — m		
	Support Span pcs — Span		
	Support Point pcs — pcs		
2．Substructure	※Refer to the sheet of "Quantity of Temporary Closure".		
3．Supperstructure			
Beam	[-250×90×9×13 SS400		
Length	1 Set 36 × 2 Line	—	72.0 m
Weight	72.0 × 34.6 kg/m	—	2,491.2 kg
		=	2.5 t
Girder	H-300×300×10×15 SS400		
Length	1 Span	—	3.18 m
	1 Set 3.18 × 18 pcs	=	57.2 m
Weight	57.2 × 93.0 kg/m	=	5,323.3 kg
		—	5.3 t
Deck Plate	1000×2000×208		
Number	1 Span	—	3 pcs
	1 Set 3 × 18 Span	—	54 pcs
Area	54 × 2.0 m2	—	108.0 m 2
Weight	54 × 424.0 kg/pcs	—	22,896.0 kg
		=	22.9 t
Slip Stopper	L-200×90×8×13 SS400		
Length	1 Set 36 × 2 Line	—	72.0 m
Weight	72.0 × 30.3 kg/m	—	2,181.6 kg
		=	2.2 t

Type	Calculation Formula			Quantity
5. Others				
Hand Rail	Pole Pitch：2.0m			
	Bridge Length 36.0 m　Support Span Length 6.0 m			
	Support Span pcs 6 Span　Support Point pcs 7 Point			
1 Span	Pole	Pole Stanchion 4pcs × 2 Line	=	8 pcs
	Side Rail	Steel Pipe φ48.6 L6000 t2.4 2pcs × 2 Line	=	4 pcs
	Pipe Joint	4pcs × 2 Line	=	8 pcs
	Clamp(90°)	8pcs × 2 Line	－	16 pcs
	Steel Scaffolding Board	L4000 1.5pcs × 2 Line	=	3 pcs
	Safety Nets	6m2 × 2 Line	－	12 m2
		Deduction		
1 Set	Pole	8 × 6 Span - 5 Point × 2 Line	=	38 pcs
	Side Rail	4 × 6 Span	－	24 pcs
	Pipe Joint	8 × 6 Span - 7 Point × 2 Q × 2 L	=	20 pcs
	Clamp(90°)	16 × 6 Span - 5 Point × 2 Q × 2 L	－	76 pcs
	Steel Scaffolding Board	3 × 6 Span	=	18 pcs
	Safety Nets	12 × 6 Span	－	72 m2
Bolt・Nut・Washer	M22 F10T L85			
Number	1 steel material / 8 volts			
	Add up the number of steel materials.			
	Girder		=	18 pcs
		Total Σ	－	18 pcs
	That is			
	8 × 18		－	144 pcs
Weight	144 × 0.6 kg/Set		=	86.4 kg
			－	0.1 t

Quantity of Temporaly Closure (Steel)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total	Unit	Remarks
		Bahr Yusef		Ibrahimia				Badrashin				Abo Gabal	Sahelyia	Diversion				
		Inside River	Right Bank	Inside River	Left Bank 2 Stage		Right Bank (Railway)	Downstream Side Straight Per	Downstream Side Left Bank	Downstream Side Right Bank	Upstream Side Left & Right	Inside River	Inside River	Left Bank Water Way	Right Bank Water Way			
Coffering Type		Double Sheet Pile	Single Sheet Pile	Double Sheet Pile	Single Sheet Pile Up Side	Single Sheet Pile Bottom Side	Single Sheet Pile	Single Sheet Pile	Single Sheet Pile	Single Sheet Pile	Single Sheet Pile	Double Sheet Pile	Double Sheet Pile	Double Sheet Pile	Double Sheet Pile			
Top Width [m]		8.0	5.0	8.0	5.5	7.0	-	7.0	7.0	7.0	-	6.0	6.0	2.5	2.5	71.5	m	
Top Elevation [GL +]		47.000	47.000	47.000	49~50.000	44~45.000	46.000	48.000	48.000	48.000	50.000	47.000	47.000	48.000	48.000			
Ground Elevation [GL -]	Out	39.000	46.250	39.000	19.000	44.000	46.000	46.000	46.000	46.000	46.000	43.000	43.000	47.000	47.000			
	In	38.000	44.000	38.000	15.000	44.000	-	46.000	46.000	46.000	-	42.000	43.000	47.000	47.000			
Pile Bottom Elevation [GL -]	Out	28.000	43.000	28.000	44.000	39.900	38.000	40.000	40.000	40.000	40.000	38.000	38.000	41.000	41.000			
	In	28.000	40.000	28.000	41.000	31.000	-	42.300	42.300	42.300	-	38.000	38.000	41.000	41.000			
Outer Sheet Pile (S355GP)	Type	PU28+1	-	PU28-1	-	-	PU28-1	PU28-1	PU28-1	PU28+1	PU28-1	PU28-1	PU28+1	PU28-1	PU28+1			
	Total Length [m]	239.7	-	228.5	-	-	116.5	20.4	31.6	31.6	55.0	69.6	68.7	44.5	45.6	951.7	m	
	Length [m]	19.0	-	19.0	-	-	8.0	8.0	8.0	8.0	10.0	9.0	9.0	6.0	6.0	110.0	m	
	Driving Length [m]	11.0	-	11.0	-	-	8.0	6.0	6.0	6.0	6.0	5.0	5.0	6.0	6.0	76.0	m	
	Extraction Length [m]	11.0	-	11.0	-	-	8.0	6.0	6.0	6.0	6.0	5.0	5.0	6.0	6.0	76.0	m	
	Number [pcs]	400	-	381	-	-	195	34	53	53	92	116	115	75	76	1,590	pcs	
	Weight [t]	807.1	-	768.8	-	-	165.7	25.9	45.0	45.0	97.7	110.9	109.9	47.8	48.4	2,272.2	t	
Inner Sheet Pile (S355GP)	Type	PU28+1	PU28-1	PU28-1	PU28+1	PU28-1	-	-	-	-	-	PU28-1	PU28+1	PU28-1	PU28+1			
	Total Length [m]	209.5	116.0	198.6	133.8	119.6	-	-	-	-	-	47.8	45.7	55.2	53.1	1,009.6	m	
	Length [m]	19.0	7.0	19.0	9.0	14.0	-	-	-	-	-	9.0	9.0	6.0	6.0	98.0	m	
	Placing Length [m]	10.0	4.0	10.0	3.0	13.0	-	-	-	-	-	4.0	5.0	6.0	6.0	61.0	m	※3~5.0m
	Out Placing Length [m]	10.0	4.0	10.0	3.0	13.0	-	-	-	-	-	4.0	5.0	6.0	6.0	61.0	m	※3~5.0m
	Number [pcs]	350	242	331	223	200	-	-	-	-	-	80	77	92	89	1,686	pcs	
	Weight [t]	706.2	181.4	667.9	213.1	297.4	-	-	-	-	-	76.5	73.6	58.6	56.7	2,331.4	t	
Bearing Pile H Type (SS400)	Type	-	H-250*250*9*14	-	H-250*250*9*14	H-250*250*9*14	-	H-250*250*9*14	H-250*250*9*14	H-250*250*9*14	-	-	-	-	-			Change Size H-150*250 Pieces 2/3
	Length [m]	-	4.0	-	4.0	4.1	-	5.0	5.0	5.0	-	-	-	-	-	27.1	m	
	Driving Length [m]	-	3.25	-	4.0	4.1	-	3.7	3.7	3.7	-	-	-	-	-	22.45	m	※1.5~3.0m
	Extraction Length [m]	-	3.25	-	4.0	4.1	-	3.7	3.7	3.7	-	-	-	-	-	22.45	m	※1.5~3.0m
	Number [pcs]	-	83	-	76	68	-	13	19	19	-	-	-	-	-	278	pcs	
	Weight [t]	-	23.8	-	21.8	20.0	-	1.7	6.8	6.8	-	-	-	-	-	83.9	t	
Waling Beam (SS400)	Waling	Up: H-150*150*7*10 Down:	H-150*75*6.5*10	Up: H-150*150*7*10 Down:	H-150*75*6.5*10	H-200*80*7.5*11	-	H-200*80*7.5*11	H-200*80*7.5*11	H-200*80*7.5*11	-	H-150*75*6.5*10	H-150*75*6.5*10	H-300*300*8*12	H-300*300*8*12			
	Beam	-	-	-	-	-	-	-	-	-	-	-	-	H-150*150*7*10	H-150*150*7*10			
	Bracket	-	-	-	-	-	-	-	-	-	-	-	-	9	18	27	pcs	
	Weight [t]	72.8	10.3	69.2	12.8	11.8	-	1.0	1.6	1.6	-	4.4	4.3	2.2	4.4	196.4	t	
Vibration Control Steel (SS400)	Vibration Control Steel	H-200*90*8*13.5	-	H-200*90*8*13.5	-	-	-	-	-	-	-	-	-	-	-			
	Weight [t]	27.2	-	25.9	-	-	-	-	-	-	-	-	-	-	-	106.2	t	
Tie Rod (690)	Diameter [mm]	Up: 25 Down: 75	28	Up: 25 Down: 75	28	28	-	28	28	28	-	32	32	-	-			
	Length [m]	8.8~10.0	5.5	8.8~10.0	6.0	7.5	-	7.6	7.6	7.6	-	6.8~8.0	6.8~8.0	-	-			
	Number [pcs]	178	76	182	76	68	-	13	19	19	-	36	35	-	-	702	pcs	
	Weight [t]	39.1	2.0	40.1	2.2	2.5	-	0.5	0.7	0.7	-	1.7	1.6	-	-	91.1	t	

Quantity of Temporary Closure (Earthwork)

			1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total	Unit	Remarks
			Bahr Yusef		Ibrahimia				Badraman				Abo Gabal	Sahelyia	Diversion				
			Inside River	Right Bank	Inside River	Left Bank 2 Stage		Right Bank (Railway)	Downstream Side Straight Per	Downstream Side Left Bank	Downstream Side Right Bank	Upstream Side Left & Right	Inside River	Inside River	Left Bank Water Way	Right Bank Water Way			
Coffering Type			Double Sheet Pile	Single Sheet Pile	Double Sheet Pile	Single Sheet Pile Up Side	Single Sheet Pile Bottom Side	Single Sheet Pile	Single Sheet Pile	Single Sheet Pile	Single Sheet Pile	Single Sheet Pile	Double Sheet Pile	Double Sheet Pile	Double Sheet Pile	Double Sheet Pile			
②Excavation (Slope Sueface)	Volume		-	307.0	-	1,070.4	4,903.6	-	-	-	-	-	-	-	-	-	6,281.0	m	
②Excavation (Inside Water)	Volume		793.0	-	-	-	-	3,703	-	-	-	-	-	-	286.3	307.3	5,089.6	m	
																Total of Excavation	11,370.6	m3	
① Filling Soil	Height		8.5	1.5	8.5	-	-	-	-	-	-	-	4.5	4.5	-	-		m	
	Width		8.0	5.0	8.0	-	-	-	-	6.5	6.5	8.0	6.0	6.0	-	-		m	
	Length		210.0	36.0	215.0	-	-	-	-	24.0	24.0	55.0	58.7	57.2	-	-		m	
	Volume		14,280.0	270.0	14,620.0	-	-	-	-	455.0	455.0	1,760.0	1,584.9	1,544.4	-	-	34,969.3	m3	
②Embankment	Volume		-	393.0	-	-	-	-	-	-	-	-	-	-	-	-	393.0	m3	
③ Embankment (Underside of Railway)	Volume		-	-	-	-	-	1,364.0	-	-	-	-	-	-	-	-	1,364.0	m3	Temporary Yard for Sheet Pile Drive
																Total of Embankment	36,726.3	m3	
⑥ Riprap	Thickness		500	-	-	-	-	500	-	-	-	-	-	-	-	-		mm	
	Area		1,586.7	-	-	-	-	2,600.0	-	-	-	-	-	-	-	-	4,186.7	m2	
	Volume	Stone 90%	714.0	-	-	-	-	1,170.0	-	-	-	-	-	-	-	-	1,884.0	m3	
		Small Stone10%	79.0	-	-	-	-	130.0	-	-	-	-	-	-	-	-	209.0	m3	
⑦ Pavement Removal	Thickness		-	-	-	100	-	-	-	-	-	-	-	-	-	-		mm	
	Area		-	-	-	1,070.4	-	-	-	-	-	-	-	-	-	-	1,070.4	m2	
	Volume		-	-	-	107.0	-	-	-	-	-	-	-	-	-	-	107.0	m3	
⑧ Slope Cover Removal	Length		-	135.0	-	-	119.6	-	-	-	-	-	-	-	-	-		m	
	Width		-	15.0	-	-	10.0	-	-	-	-	-	-	-	-	-		m	
	Area		-	2,025.0	-	-	1,196.0	-	-	-	-	-	-	-	-	-	3,221.0	m2	

Quantity of Temporary Road Construction

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total	Unit	Remarks
		Bahr Yusef		Ibrahimia				Badraman				Abo Gabal	Sahelyia	Diversion				
		Inside River	Right Bank	Inside River	Left Bank 2 Stage		Right Bank (Railway)	Downstream Side Straight Per	Downstream Side Left Bank	Downstream Side Right Bank	Upstream Side Left & Right	Inside River	Inside River	Left Bank Water Way	Right Bank Water Way			
Coffering Type		Double Sheet Pile	Single Sheet Pile	Double Sheet Pile	Single Sheet Pile Up Side	Single Sheet Pile Bottom Side	Single Sheet Pile	Single Sheet Pile	Single Sheet Pile	Single Sheet Pile	Single Sheet Pile	Double Sheet Pile	Double Sheet Pile	Double Sheet Pile	Double Sheet Pile			
① Embankment Access Road Downstream	Height	8.5	-	8.0	-	-	-	-	5.0	5.0	5.0	3.5	3.0	-	-		m	
	Width	8.0	-	8.0	-	-	-	-	18.0	18.0	90.0	8.0	8.0	-	-		m	
	Length	70.8	-	66.7	-	-	-	-	42.0	42.0	90.0	29.2	25.0	-	-		m	
	Slope	12	-	12	-	-	-	-	12	12	12	12	12	-	-		%	
	Volume(100%)	3,691.0	-	3,272.7	-	-	-	-	945.0	945.0	4,125.0	626.8	460.0	-	-	14,065.5	m3	
② Embankment Access Road Upstream	Height	8.5	-	8.0	-	-	-	-	-	-	-	-	-	-	-		m	
	Width	8.0	-	8.0	-	-	-	-	-	-	-	-	-	-	-		m	
	Length	70.8	-	66.7	-	-	-	-	-	-	-	-	-	-	-		m	
	Slope	12	-	12	-	-	-	-	-	-	-	-	-	-	-		%	
	Volume(100%)	3,691.0	-	3,272.7	-	-	-	-	-	-	-	-	-	-	-	6,963.7	m3	
Temporary Road																		
Installation of Steel Plate	Length	294.0	-	259.0	-	-	-	-	-	-	-	-	-	-	-	553.0	m	
	Number	98	-	88	-	-	-	-	-	-	-	-	-	-	-	186	pcs	
Case 1 (For temporary Road)	Embankment	704.8	-	492.3	-	-	-	-	-	-	-	-	-	-	-	1,197.1	m3	
	Soil Improvement	537.0	-	375.0	-	-	-	-	-	-	-	-	-	-	-	912.0	m3	
	Normal Portland Cement	32.2	-	22.5	-	-	-		-	-	-	-	-	-	-	54.7	t	
Case 2 (For Structure Place)	Embankment	739.5	-	739.5	-	-	-	-	-	-	-	-	-	-	-	1,479.0	m3	
	Soil Improvement	1,138.5	-	1,138.5	-	-	-	-	-	-	-	-	-	-	-	2,277.0	m3	
	Normal Portland Cement	85.4	-	85.4	-	-	-		-	-	-	-	-	-	-	170.8	t	

Embankment Total (Temporary Road + Access Road)	23,705.3	m3	
Total of Soil Improvement	3,189.0	m3	
Total of Normal Portland Cement	225.5	t	

1. Bahr Yusef (Inside River)

Type	Calculation Formula	Quantity
1. Bahr Yusef (Inside River)		
	Coffering Type: Double Sheet Pile Work Length: 210.0 m ※: Center Line Out: 239.7 m — 68.5 + 100.23 + 70.943 = 239.7 m In: 209.5 m — 60.5 + 88.5 + 60.5 = 209.5 m Top Width: 8.0 m — Average = 224.6 m Top Elevation: GL+ 47.000 m	
1)Outer Sheet Pile	※: River Side	
Spec	Type: PU28+1 Length: 19.0 m Width: 0.6 m	
Driving・Excavation (1 Per)	Soil State: N<50 Ground: GL+ 39.000 m Pile Bottom: GL+ 28.000 m	
	39.000 - 28.000 =	11.0 m
Number	239.7 / 0.6 =	400 pcs
Weight	Unit Mass: 106.2 kg/m	
	19.0 × 106.2 × 400 =	807.1 t
2)Inner Sheet Pile		
Spec	Type: PU28+1 Length: 19.0 m Width: 0.6 m	
Driving・Excavation (1 Per)	Soil State: N<50 Ground: GL+ 38.000 m Pile Bottom: GL+ 28.000 m	
	38.000 - 28.000 =	10.0 m
Number	209.5 / 0.6 =	350 pcs
Weight	Unit Mass: 106.2 kg/m	
	19.0 × 106.2 × 350 =	706.2 t

1. Bahr Yusef (Inside River)

Type	Calculation Formula	Quantity
3)Sheet Pile of corner(90°)		
Spec	Type: PU28+1 90° / Length: 19.0 m / Width: 0.6 m	
Number	=	2 pcs
Weight	Unit Mass: 106.2 kg/m	
	19.0 × 106.2 × 2 =	4.0 t
4)Sheet Pile of corner(130°)		
Spec	Type: PU28+1 130° ※:Special Order / Length: 19.0 m / Width: 0.6 m	
Number	=	2 pcs
Weight	Unit Mass: 106.2 kg/m	
	19.0 × 106.2 × 2 =	4.0 t
5)Tie Rod		
Spec	Up: High Strength Steel 690, DN 25, Set Span 3.6, Length(1 Per) 8.0+{(0.228+0.15)×2}≒8.8m Down: High Strength Steel 690, DN 75, Set Span 1.8, Length(1 Per) 8.0+{(0.228+0.20)×2}≒8.9m	
Number	上段 (210.0m÷3.6m)+1=60本 下段 (210.0m÷1.8m)+1=118本 From the Drawing, Total Number is 178pcs (Conner Up:14pcs Down14pc)Total =	178 pcs
	For CAD , Max Length is 10.0m	
Length	Up 8.8m×(60-14pcs)=404.8m Up Corner 10.0m×(14pcs)=140.0m Down 8.9m×(118-14pcs)=925.6m Down Corner 10.0m×(14pcs)=140.0m Total =	1610.4 m
Weight	Up φ25 3.85kg/m×404.8m=1,558kg Up Corner φ25 3.85kg/m×140.0m=539kg Down φ75 34.7kg/m×925.6m=32,118kg Down Corner φ75 34.7kg/m×140.0m=4,858kg Total =	39,073 kg 39.1 t

1. Bahr Yusef (Inside River)

Type	Calculation Formula	Quantity
6)Waling Weight		

Type		Length(m)		Unit Mass	Weight
		Out	In	(kg/m)	(kg)
Up	2-H-150×150×7×10	239.7	209.5	31.1	27,940.2
Down	2-H-200×200×8×12	239.7	209.5	49.9	44,830.2
Total					72,770.4

72.8 t

7)Vibration Control Steel
Weight

Type	Length(m)		Unit Mass	Weight
	Out	In	(kg/m)	(kg)
2-[-200×90×8×13.5	239.7	209.5	30.3	27,221.5
Total				27,221.5

27.2 t

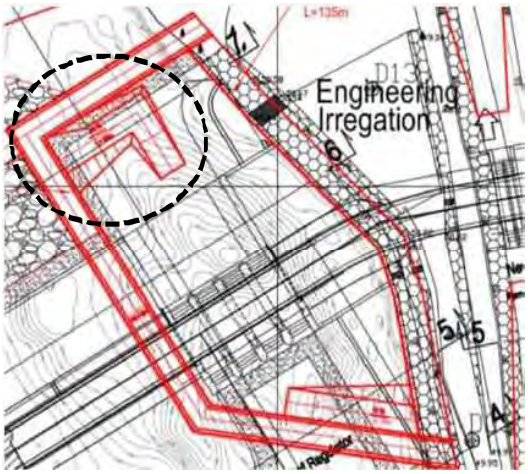
8)Filling Soil

Top EL	GL+ 47.000	m
AVE Ground	GL+ 38.500	m
Height	8.5	m
Length	210.0	m
Width	8.0	m

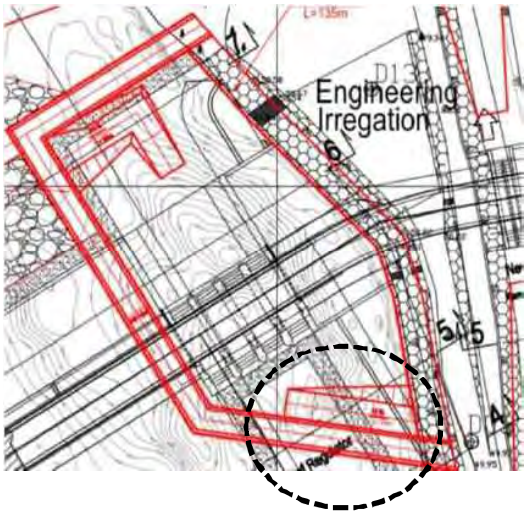
※ Center Line

Volume 8.5 × 8.0 × 210.0 = 14,280.0 m 3

1. Bahr Yusef (Inside River)

Type	Calculation Formula	Quantity
9) Access Road (Downstream)		
Place		
Spec	Length 50.0 m Width 8.0 m Slope 12 % Top EL GL+ 47.000 m Ground GL+ 38.500 m Height 8.5 m	
Confirmation of Length	Slope ; i=12% Height ÷ Slope = Horizontal Length 8.5 ÷ 0.12 = 70.8 m	
Soil Volume	70.8 × 8.0 × 8.5 ÷ 2 =	2,407.2 m 3
	Slope ; 1:0.8 70.8 × (8.0 × 0.8) × 8.5 ÷ 3 =	1,283.8 m 3
	Total Σ =	3,691.0 m 3

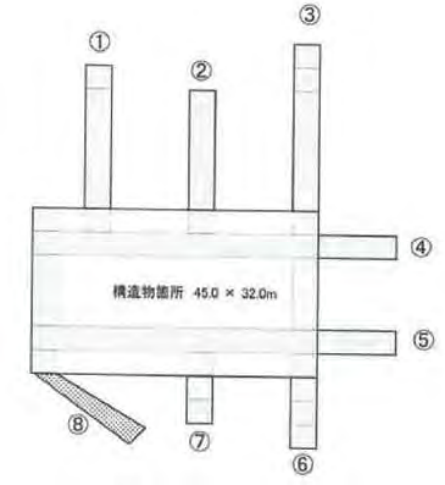
1. Bahr Yusef (Inside River)

Type	Calculation Formula	Quantity
10) Access Road (Upstream)		
Place		

Spec			
	Length	40.0	m
	Width	8.0	m
	Slope	12	%
	Top EL	GL+ 47.000	m
	Ground	GL+ 38.500	m
	Height	8.5	m

Confirmation of Length	Slope ; i=12%					
	Height	÷ Slope	= Horizontal Length			
	8.5	÷ 0.12	= 70.8 m			
Soil Volume	70.8	× 8.0	× 8.5	÷ 2	=	2,407.2 m 3
	Slope ; 1:0.8					
	70.8	× (8.0	× 0.8)	× 8.5 ÷ 3	=	1,283.8 m 3
				Total Σ	=	3,691.0 m 3
11) Excavation(Inside Water)						
Place	Inside River					
Thickness	50cm					
Area	For CAD				=	1586.7 m 2
Volume	1586.7	× 0.5			=	793.0 m 3
12) Riprap						
Place	Excavation(Inside Water) Area					
Thickness	50cm					
Volume	For 10)				=	793.0 m 3
Stone	793.0	× 0.9			=	714.0 m 3
Small Stone	793.0	× 0.1			=	79.0 m 3

1. Bahr Yusef (Inside River)

Type	Calculation Formula		Quantity
13) Temporary Road			
Place			
Spec	Case 1 (For Temporary Road) , Case 2 (For Structure Place)		

	Case 1	Case 2	Unit
The goal improved strength	0.5	1.0	kgf/cm2
Soil Improvement Depth	0.5	0.75	m
Banking Height	0.75	0.5	m
Normal Portland Cement Unit Amount Added	40	50	kg/m3
Cement Material Unit Amount Added	20	25	kg/m3

Case 2 (For Structure Place)			
Embankment			
Area(Up Side)	45.0 × 32.0	=	1440.0 ㎡
Area(Down Side)	46.0 × 33.0	=	1518.0 ㎡
Volume	(1440.0 + 1518.0) ÷ 2 × 0.5	=	739.5 ㎥
Soil Improvement			
Area	46.0 × 33.0	=	1518.0 ㎡
Volume	1518.0 × 0.75	=	1138.5 ㎥
Normal Portland Cement	1138.5 × 50	=	56.9 t
Cement Material	1138.5 × 25	=	28.5 t
	※:Not use cement material. Use Normal Portland Cement. That is.		
	56.9 + 28.5 Total Σ	=	85.4 t

1. Bahr Yusef (Inside River)

Type	Calculation Formula					Quantity
Case 1 (For Temporary Road)						
Spec	Width4.5m					
Embankment Volume						

Place	Length[m]	Area(Up)	Area(Down)	Volume
①	39.0	175.5	234.0	153.6
②	30.0	135.0	180.0	118.1
③	44.0	198.0	264.0	173.3
④	14.0	63.0	84.0	55.1
⑤	14.0	63.0	84.0	55.1
⑥	13.0	58.5	78.0	51.2
⑦	8.0	36.0	48.0	31.5
⑧	17.0	76.5	102.0	66.9
Total	179.0			

		TotalΣ	=	704.8 m 3
Soil Improvement	Each Length× Width(6.0m)× Depth(0.5m)	TotalΣ	=	537.0 m 3
Normal Portland Cement	537.0 × 40		=	21.5 t
Cement Material	537.0 × 20		=	10.7 t
	※Not use cement material. Use Normal Portland Cement. That is.			
	21.5 + 10.7	TotalΣ	=	32.2 t
Installation of Steel Plate				
Spec	2 Line PL-1.5×6.0			
Number	By drawings , L=294.0m			
	294.0 ÷ 6.0 × 2 Line		=	98 pcs

2. Bahr Yusef (Right Bank)

Type	Calculation Formula		Quantity
2. Bahr Yusef (Right Bank)			
	Coffering Type: Single Sheet Pile Work Length: 135.0 m ※ Center Line Out: 130.7 m In: 146.0 m Top Width: 5.0 m Top Elevation: GL+ 47.000 m	Average =	138.4 m
1)Outer Pile (H Type)			
Spec	Type: H-250×250×9×14 Length: 4.0 m Width: 1.8 m		
Driving・Excavation (1 Per)	Soil State: N<50 Ground: GL+ 46.250 m Pile Bottom: GL+ 43.000 m		
	46.250 - 43.000	=	3.25 m
		※	1.5～3.0 m
Number	(146.0 : 1.8) + 1	=	83 pcs
Weight	Unit Mass: 71.8 kg/m		
	4.0 × 71.8 × 83	=	23.8 t
2)Inner Sheet Pile			
Spec	Type: PU28+1 Length: 7.0 m Width: 0.6 m		
Driving・Excavation (1 Per)	Soil State: N<50 Ground: GL+ 44.000 m Pile Bottom: GL+ 40.000 m		
	44.000 - 40.000	=	4.0 m
		※	3～5.0 m
Number	146.0 / 0.6	=	244 pcs
Weight	Unit Mass: 106.2 kg/m		
	7.0 × 106.2 × 244	=	181.4 t

2. Bahr Yusef (Right Bank)

Type	Calculation Formula	Quantity
5)Tie Rod		
Spec	Type: High-Strength Steel 690 Diameter: 1 Step 28 mm	
Length (1 Per)	Sheet Pile Height 0.228 m Waling Height 0.15 m 5.0 + 0.228 + 0.15 + 0.075 =	5.5 m
Number	Set Span 1.8 m (135.0 : 1.8) + 1 =	76 pcs
Length	76 × 5.5 =	418.0 m
Weight		2.0 t
4)Waling		
Weight		10.3 t
5)Filling Soil ※堤ｴﾌﾟﾛﾝ下流端～下流 ※上流側は本設にて計上	Top EL GL+ 47.000 m AVE Ground GL+ 45.500 m Height 1.5 m Length 36.0 m ※ 堤ｴﾌﾟﾛﾝ下流端～下流 Width 5.0 m	
Filled Soil	1.5 × 5.0 × 36.0 =	270.0 m 3

Type		Length (m)	Unit Mass (kg/m)	Number (pcs)	Weight (kg)
1 Step	φ28	5.5	4.83	76	2,018.9
Total				76	2,018.9

Type		Length(m) Out	Length(m) In	Unit Mass (kg/m)	Weight (kg)
Waling	2-[150×75×6.5×10	130.7	146.0	18.6	10,293.2
Total					10,293.2

2. Bahr Yusef (Right Bank)

Type	Calculation Formula		Quantity
6)Slope Cover Removal			
Spec	Length 135.0 m Width 15.0 m		
Removal Area	135.0 × 15.0	=	2,025 m 2
7)Excavation			
Spec	Cross Section: Ba4 Cross Area [m2] ※CAL In - Out 1.0 Length [m] - Ba5 0.5 0.6 20.06 Ba6 4.2 1.8 20.00 Ba7 - 4.0 20.01 Ba8 - 5.7 20.01 Ba9 - 0.8 20.00		
	Distance 20.0m By , Average Cross Section Method		
Excavation Volume (In)	{ (0.5 + 4.2) ÷ 2 } × 20.0	=	47.0 m 3
Excavation Volume (Out)	{ (1.0 + 0.6) ÷ 2 } × 20.0	=	16.0 m 3
	{ (0.6 + 1.8) ÷ 2 } × 20.0	=	24.0 m 3
	{ (1.8 + 4.0) ÷ 2 } × 20.0	=	58.0 m 3
	{ (4.0 + 5.7) ÷ 2 } × 20.0	=	97.0 m 3
	{ (5.7 + 0.8) ÷ 2 } × 20.0	=	65.0 m 3
	Total Σ	=	260.0 m 3
	Ground Total Σ	=	307.0 m 3

2. Bahr Yusef (Right Bank)

Type	Calculation Formula			Quantity
8)Embankment				
Spec				

Cross Section	Cross Area [m2] ※CAL		Length [m]
	In	Out	
Ba4	3.2	1.4	-
Ba5	2.1	2.6	20.06
Ba6	4.5	3.9	20.00
Ba7	-	-	20.01
Ba8	-	-	20.01
Ba9	7.7	0.8	20.00

Distance 20.0m

By , Average Cross Section Method

				Quantity
Excavation Volume (In)	{ (3.2 + 2.1) ÷ 2 } ×	20.0	=	53.0 m 3
	{ (2.1 + 4.5) ÷ 2 } ×	20.0	=	66.0 m 3
	{ (4.5 + -) ÷ 2 } ×	20.0	=	45.0 m 3
	{ (- + 7.7) ÷ 2 } ×	20.0	=	77.0 m 3
		Total Σ	=	241.0 m 3
Excavation Volume (Out)	{ (1.4 + 2.6) ÷ 2 } ×	20.0	=	40.0 m 3
	{ (2.6 + 3.9) ÷ 2 } ×	20.0	=	65.0 m 3
	{ (3.9 + -) ÷ 2 } ×	20.0	=	39.0 m 3
	{ (- + 0.8) ÷ 2 } ×	20.0	=	8.0 m 3
		Total Σ	=	152.0 m 3
		Ground Total Σ	=	393.0 m 3

3. Ibrahimia (Inside River)

Type	Calculation Formula	Quantity
3．Ibrahimia (Inside River)		
	Coffering Type: Double Sheet Pile Work Length: 215.0 m ※ Center Line Out: 228.5 m = 54.4 + 100.765 + 73.366 In: 198.6 m = 46.4 + 88.6 + 63.6 Top Width: 8.0 m Average = Top Elevation: GL+ 47.000 m	228.5 m 198.6 m 213.6 m
1)Outer Sheet Pile	※River Side	
Spec	Type: PU28+1 Length: 19.0 m Width: 0.6 m	
Driving・Excavation (1 Per)	Soil State: N<50 Ground: GL+ 39.000 m Pile Bottom: GL+ 28.000 m	
	39.000 - 28.000 =	11.0 m
Number	228.5 / 0.6 =	381 pcs
Weight	Unit Mass: 106.2 kg/m	
	19.0 × 106.2 × 381 =	768.8 t
2)Inner Sheet Pile		
Spec	Type: PU28+1 Length: 19.0 m Width: 0.6 m	
Driving・Excavation (1 Per)	Soil State: N<50 Ground: GL+ 38.000 m Pile Bottom: GL+ 28.000 m	
	38.000 - 28.000 =	10.0 m
Number	198.6 / 0.6 =	331 pcs
Weight	Unit Mass: 106.2 kg/m	
	19.0 × 106.2 × 331 =	667.9 t

3. Ibrahimia (Inside River)

Type	Calculation Formula			Quantity
3)Sheet Pile of corner(90°)				
Spec	Type: PU28+1 90°			
	Length: 19.0 m			
	Width: 0.6 m			
Number			=	2 pcs
Weight	Unit Mass: 106.2 kg/m			
	19.0 × 106.2 × 2		=	4.0 t
4)Sheet Pile of corner(130°)				
Spec	Type: PU28+1 130° ※Special Order			
	Length: 19.0 m			
	Width: 0.6 m			
Number			=	2 pcs
Weight	Unit Mass: 106.2 kg/m			
	19.0 × 106.2 × 2		=	4.0 t
5)Tie Rod				
Spec	Up: High-Stuength Steel 690, 25, Set Span 3.6, Length(1 Per) 8.0+{(0.228+0.15)×2}≒8.8m			
	Down: High-Stuength Steel 690, 75, Set Span 1.8, Length(1 Per) 8.0+{(0.228+0.20)×2}≒8.9m			
Number	上段 (215.0m÷3.6m)+1=61本			
	下段 (215.0m÷1.8m)+1=121本			
	From the Drawing, Total Number is 178pcs (Conner Up:15pcs Down15pcTotal =			182 pcs
	For CAD , Max Length is 10.0m			
Length	Up	8.8m×(61-15pcs)=404.8m		
	Up Corner	10.0m×(15pcs)=150.0m		
	Down	8.9m×(121-15pcs)=943.4m		
	Down Corner	10.0m×(15pcs)=150.0m	Total =	1648.2 m
Weight	Up	φ25 3.85kg/m×404.8m=1,558kg		
	Up Corner	φ25 3.85kg/m×150.0m=578kg		
	Down	φ75 34.7kg/m×943.4m=32,736kg		
	Down Corner	φ75 34.7kg/m×150.0m=5,205kg	Total =	40,077 kg
				40.1 t

3. Ibrahimia (Inside River)

Type	Calculation Formula	Quantity

6)Waling

Weight

Type		Length(m) Out	Length(m) In	Unit Mass (kg/m)	Weight (kg)
Up	2-H-150×150×7×10	228.5	198.6	31.1	26,565.6
Down	2-H-200×200×8×12	228.5	198.6	49.9	42,624.6
Total					69,190.2

69.2 t

7)ぶれ止め

Weight

Type	Length(m) Out	Length(m) In	Unit Mass (kg/m)	Weight (kg)
2-[-200×90×8×13.5	228.5	198.6	30.3	25,882.3
Total				25,882.3

25.9 t

8)Filling Soil

Top EL	GL+ 47.000	m
AVE Ground	GL+ 38.500	m
Height	8.5	m
Length	215.0	m
Width	8.0	m

※ Center Line

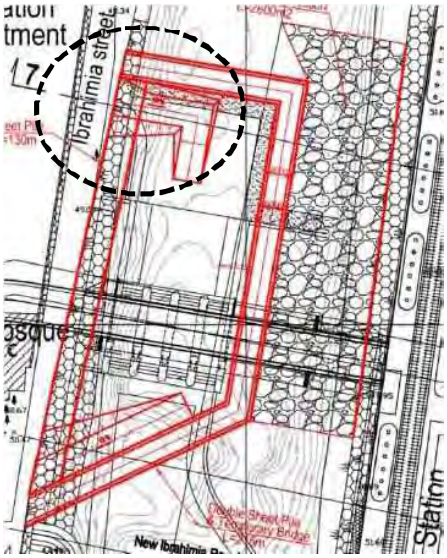
Volume 8.5 × 8.0 × 215.0 = 14,620.0 m 3

3. Ibrahimia (Inside River)

Type	Calculation Formula	Quantity

9) Access Road (Downstream)

Place



Spec

Length	-	m
Width	8.0	m
Slope	12	%
Top EL	GL+ 47.000	m
Ground	GL+ 39.000	m
Height	8.0	m

Confirmation of Length

Slope ; i=1:

Height ÷ Slope = Horizontal Length

8.0 ÷ 0.12 = 66.7 m

66.7 × 8.0 × 8.0 ÷ 2 = 2,134.4 m 3

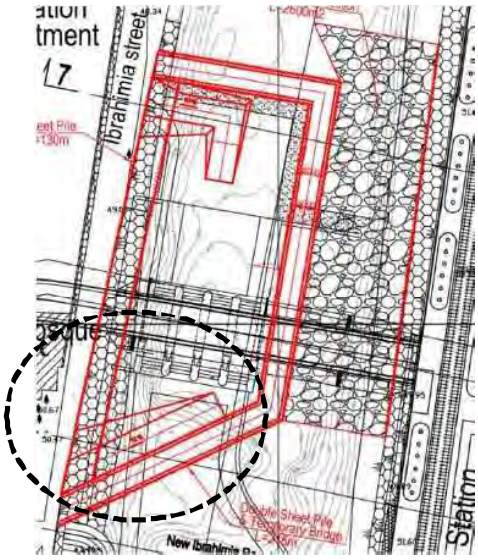
Soil Volume

Slope ; 1:0.8

66.7 × (8.0 × 0.8) × 8.0 ÷ 3 = 1,138.3 m 3

TotalΣ = 3,272.7 m 3

3. Ibrahimia (Inside River)

Type	Calculation Formula	Quantity
10) Access Road (Upstream)		
Place		

Spec			
	Length	-	m
	Width	8.0	m
	Slope	12	%
	Top EL	GL+ 47.000	m
	Ground	GL+ 39.000	m
	Height	8.0	m

Confirmation of Length

Slope ; i=1:

Height : Slope = Horizontal Length

8.0 ÷ 0.12 = 66.7 m

Soil Volume

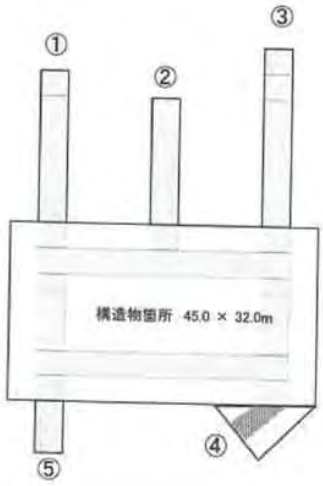
66.7 × 8.0 × 8.0 ÷ 2 = 2,134.4 m3

Slope ; 1:0.8

66.7 × (8.0 × 0.8) × 8.0 ÷ 3 = 1,138.3 m3

TotalΣ = 3,272.7 m3

3. Ibrahimia (Inside River)

Type	Calculation Formula			Quantity
11) Temporary Road				
Place				
Spec	Case 1 (For Temporary Road) , Case 2 (For Structure Place)			

	Case 1	Case 2	Unit
The goal improved strength	0.5	1.0	kgf/cm2
Soil Improvement Depth	0.5	0.75	m
Banking Height	0.75	0.5	m
Normal Portland Cement Unit Amount Added	40	50	kg/m3
Cement Material Unit Amount Added	20	25	kg/m3

Case 2 (For Structure Place)				
Embankment				
Area(Up Side)	45.0 × 32.0		=	1440.0 m 2
Area(Down Side)	46.0 × 33		=	1518.0 m 2
Volume	(1440.0 + 1518.0) ÷ 2 × 0.5		=	739.5 m 3
Soil Improvement				
Area	46.0 × 33		=	1518.0 m 2
Volume	1518.0 × 0.75		=	1138.5 m 3
Normal Portland Cement	1138.5 × 50		=	56.9 t
Cement Material	1138.5 × 25		=	28.5 t
	※Not use cement material. Use Normal Portland Cement. That is.			
	56.9 + 28.5	Total Σ	=	85.4 t

3. Ibrahimia (Inside River)

Type	Calculation Formula				Quantity
Case 1 (For Temporary Road)					
Spec	Width=1.5m				
Embankment Volume					

Place	Length[m]	Area(Up)	Area(Down)	Volume
①	36.0	162.0	216.0	141.8
②	30.0	135.0	180.0	118.1
③	44.0	198.0	264.0	173.3
④	5.0	22.5	30.0	19.7
⑤	10.0	45.0	60.0	39.4
合計	125.0			

		Total Σ	=	492.3 m 3
Soil Improvement	Each Length × Width(6.0m) × Depth(0.5m)	Total Σ	=	375.0 m 3
Normal Portland Cement	375.0 × 40		=	15.0 t
Cement Material	375.0 × 20		=	7.5 t
	※Not use cement material. Use Normal Portland Cement. That is.			
	15.0 + 7.5	Total Σ	=	22.5 t
Installation of Steel Plate				
Spec	2 Line PL-1.5×6.0			
Number	By drawings , L=294.0m			
	259.0 ÷ 6.0 × 2 Line		=	88 pcs

4. Ibrahimia (Left Bank Up Side)

Type	Calculation Formula	Quantity
4. Ibrahimia (Left Bank Up Side)		
	Coffering Type: Single Sheet Pile Work Length: 130.0 m ※ Center Line Out: 133.8 m In: 133.8 m — Average = 133.8 m Top Width: 5.5 m Top Elevation(Out) GL+ 49.000 m Top Elevation(In) GL+ 50.000 m	
1) Outer Pile (H Type)		
Spec	Type: H-250×250×9×14 Length: 4.0 m Width: 1.8 m	
Driving・Excavation (1 Per)	Soil State: N<50 Ground: GL+ 49.000 m ※As Top Pile Bottom: GL+ 45.000 m	
	49.000 - 45.000 =	4.0 m
Number	(133.8 / 1.8) + 1 =	76 pcs
Weight	Unit Mass: 71.8 kg/m	
	4.0 × 71.8 × 76 =	21.8 t
2) Inner Sheet Pile	※River Side	
Spec	Type: PU28+1 Length: 9.0 m Width: 0.6 m	
Driving・Excavation (1 Per)	Soil State: N<50 Ground: GL+ 44.000 m Pile Bottom: GL+ 41.000 m	
	44.000 - 41.000 =	3.0 m
Number	133.8 / 0.6 =	223 pcs
Weight	Unit Mass: 106.2 kg/m	
	9.0 × 106.2 × 223 =	213.1 t

4． Ibrahimia (Left Bank Up Side)

Type	Calculation Formula		Quantity
3)Tie Rod			
Spec	Type: High-Strength Steel 690 Diameter: 1 Step 28 mm		
Length (1 Per)	Sheet Pile Heigh 0.228 m Waling Height 0.15 m 5.5 + 0.228 + 0.15 + 0.075	=	6.0 m
Number	Set Span 1.8 m (133.8 / 1.8) + 1	=	76 pcs
Length	76.0 × 6	=	456.0 m
Weight	Type: 1 Step φ28; Length (m): 6.0; Unit Mass (kg/m): 4.83; Number (pcs): 76; Weight (kg): 2,202.5 Total: Number (pcs): 76; Weight (kg): 2,202.5		2.2 t
4)Waling			
Weight	Type: Waling 2-[-150×75×9×12.5; Length(m) Out: 133.8; Length(m) In: 133.8; Unit Mass (kg/m): 24.0; Weight (kg): 12,844.8 Total: Weight (kg): 12,844.8		12.8 t
5) Pavement Removal			
Spec	Length 133.8 m Width 8.0 m Thickness 100 mm		
Removal Volume	133.8 × 8.0 × 0.1	=	107.0 m 3
6)Excavation			
Spec	Length 133.8 m Width 8.0 m Depth 1.0 m ※Depth for Tie Rod		
Volume	133.8 × 8.0 × 1.0	=	1,070.4 m 3

4. Ibrahimia (Left Bank Up Side)

Type	Calculation Formula	Quantity

５． Ibrahimia (Left Bank Bottom Side)

Type	Calculation Formula	Quantity
５． Ibrahimia (Left Bank Bottom Side)		
	Coffering Type: Single Sheet Pile Work Length: 130.0 m ※ Center Line Out: 119.6 m In: 119.6 m　Average = 119.6 m Top Width: 7.0 m Top Elevation(Out) GL+ 44.000 m　Top Elevation(In) GL+ 45.000 m	
1)Outer Pile (H Type)		
Spec	Type: H-250×250×9×14 Length: 4.1 m Width: 1.8 m	
Driving・Excavation (1 Per)	Soil State: N<50 Ground: GL+ 44.000 m Pile Bottom: GL+ 39.900 m	
	44.000 - 39.900	= 4.1 m
Number	(119.6 / 1.8) + 1	= 68 pcs
Weight	Unit Mass: 71.8 kg/m	
	4.1 × 71.8 × 68	= 20.0 t
2)Inner Sheet Pile	※River Side	
Spec	Type: PU28+1 Length: 14.0 m Width: 0.6 m	
Driving・Excavation (1 Per)	Soil State: N<50 Ground: GL+ 44.000 m Pile Bottom: GL+ 31.000 m	
	44.000 - 31.000	= 13.0 m
Number	119.6 / 0.6	= 200 pcs
Weight	Unit Mass: 106.2 kg/m	
	14.0 × 106.2 × 200	= 297.4 t

5. Ibrahimia (Left Bank Bottom Side)

Type	Calculation Formula	Quantity
3)Tie Rod		
Spec	Type: High-Strength Steel 690 Diameter: 1 Step 28 mm	
Length (1 Per)	Sheet Pile Height 0.228 m Waling Height 0.15 m 7.0 + 0.228 + 0.15 + 0.075 =	7.5 m
Number	Set Span 1.8 m (119.6 / 1.8) + 1 =	68 pcs
Length	68.0 × 7.5 =	510.0 m
Weight	Bottom Side φ28: Length 7.5 m, Unit Mass 4.83 kg/m, Number 68 pcs, Weight 2,463.3 kg Total: 68 pcs, 2,463.3 kg	2.5 t
4)Waling		
Weight	Waling 2-[-200, 80×7.5×11: Length(m) Out 119.6, In 119.6, Unit Mass 24.6 kg/m, Weight 11,768.6 kg Total: 11,768.6 kg	11.8 t
5)Slope Material Removal		
Spec	Length 119.6 m Width 10.0 m	
Removal Area	119.6 × 10.0 =	1,196 m 2
6)Excavation		
Spec	Length 119.6 m Width 10.0 m Height 7.0 m	
Removal Volume	119.6 × 10.0 × 5.0 ÷ 2 = 119.6 × 8.0 × 2.0 = Total Σ =	2,990 m 3 1,914 m 3 4,904 m 3

6. Ibrahimia (Right Bank , Underside of Railway)

Type	Calculation Formula	Quantity

6． Ibrahimia (Right Bank , Underside of Railway)

Coffering Type	Single Sheet Pile		
Work Length	116.5	m	※CAD
Out	—	m	
In	—	m	
Top Width	—	m	
Top Elevation	GL+ 46.000	m	

Average = 116.5 m

1) Sheet Pile

Spec

Type	PU28+1	
Length	8.0	m
Width	0.6	m

Driving・Excavation (1 Per)

Soil State	N<50	
Ground	GL+ 46.000	m
Pile Bottom	GL+ 38.000	m

46.000 - 38.000 = 8.0 m

Number 116.5 / 0.6 = 195 pcs

Weight

Unit Mass	106.2	kg/m

8.0 × 106.2 × 195 = 165.7 t

2) Embankment for Temporary Working Yard

Spec

Cross Section	Cross Area [m2] ※CAD		Length [m]
	In	Out	
Ib5	10.0	-	-
Ib6	9.8	-	20.00
Ib7	12.9	-	19.97
Ib8	13.0	-	21.26
Ib9	7.3	-	18.58
Ib10	15.6	-	20.19
Ib11	9.2	-	19.98

Distance 20.0m

By , Average Cross Section Method

6. Ibrahimia (Right Bank , Underside of Railway)

Type	Calculation Formula		Quantity
Embankment Volume	{ (10.0 + 9.8) ÷ 2 } × 20.0	=	198.0 m 3
	{ (9.8 + 12.9) ÷ 2 } × 20.0	=	227.0 m 3
	{ (12.9 + 13.0) ÷ 2 } × 20.0	=	259.0 m 3
	{ (13.0 + 7.3) ÷ 2 } × 20.0	=	203.0 m 3
	{ (7.3 + 15.6) ÷ 2 } × 20.0	=	229.0 m 3
	{ (15.6 + 9.2) ÷ 2 } × 20.0	=	248.0 m 3
	Total Σ	=	1364.0 m 3

3) Riprap

Place Inside River

Area	For CAD	=	2600 m 2
Thickness		=	0.5 m
Volume	2600 × 0.5	=	1300 m 3
Stone	2600 × 0.5 × 0.9	=	1170 m 3
Small Stone	2600 × 0.5 × 0.1	=	130 m 3

3) Excavation

Spec

Cross Section	Cross Area [m2] ※CAL		Length [m]
	In	Out	
Ib5	14.3	-	-
Ib6	37.2	-	20.00
Ib7	41.1	-	19.97
Ib8	36.5	-	21.26
Ib9	43.1	-	18.58
Ib10	40.2	-	20.19

Distance 20.0m

By , Average Cross Section Method

Excavation Volume (In)	{ (14.3 + 37.2) ÷ 2 } × 20.0	=	515.0 m 3
	{ (37.2 + 41.1) ÷ 2 } × 20.0	=	783.0 m 3
	{ (41.1 + 36.5) ÷ 2 } × 20.0	=	776.0 m 3
	{ (36.5 + 43.1) ÷ 2 } × 20.0	=	796.0 m 3
	{ (43.1 + 40.2) ÷ 2 } × 20.0	=	833.0 m 3
	Total Σ	=	3703.0 m 3

7. Badraman (Downstream Side , Straight Per)

Type	Calculation Formula	Quantity

7． Badraman(Downstream Side , Straight Per)

Coffering Type	Single Sheet Pile	
Work Length	20.4	m
Top Width	7.0	m
Top Elevation	GL+ 48.000	m

1) Outer Sheet Pile

Spec

Type	PU28+1	
Length	8.0	m
Length	6.0	m
Width	0.6	m

Driving・Excavation (1 Per)

Soil State	N<50	
Ground	GL+ 46.000	m
Pile Bottom	GL+ 40.000	m

46.000 - 40.000 = 6.0 m

Number

20.4 : 0.6 = 34 pcs

From Drawing

6.0m:14pcs 8.0m:20pcs

Weight

Unit Mass	106.2	kg/m

6.0 × 106.2 × 14 + 8.0 × 106.2 × 20 = 25.9 t

2) Inner Pile (H Type)

Spec

Type	H-250×250×9×14	
Length	5.0	m
Pitch	1.8	m

Driving・Excavation (1 Per)

Soil State	N<50	
Ground	GL+ 46.000	m
Pile Bottom	GL+ 42.300	m

46.000 - 42.300 = 3.7 m

Number

(20.4 : 1.8) + 1 = 13 pcs

Weight

Unit Mass	71.8	kg/m

5.0 × 71.8 × 13 = 4.7 t

7. Badraman (Downstream Side , Straight Per)

Type	Calculation Formula	Quantity
3)Tie Rod		
Spec	Type: High-Strength Steel 690 Diameter: 1 Step 28 mm	
Length (1 Per)	Sheet Pile Height 0.228 m Waling Height 0.20 m 7.0 + 0.228 + 0.20 + 0.125 =	7.6 m
Number	Set Span 1.8 m (20.4 : 1.8) + 1 =	13 pcs
Length	13 × 7.6 =	98.8 m
Weight		0.5 t

Type		Length (m)	Unit Mass (kg/m)	Number (pcs)	Weight (kg)
1 Step	φ28	7.6	4.83	13	477.2
Total				13	477.2

4)Waling

Weight

Type		Length(m)	Unit Mass (kg/m)	Weight (kg)
Waling	2-[200×80×7.5×11	20.4	24.6	1,003.7
Total				1,003.7

1.0 t

8. Badraman (Downstream Side , Left Bank L Line Per)

Type	Calculation Formula		Quantity
8. Badraman (Downstream Side , Left Bank L Line Per)			
	Coffering Type: Single Sheet Pile		
	Work Length: 31.6 m		
	Top Width: 7.0 m		
	Top Elevation: GL+ 48.000 m		
1)Outer Sheet Pile			
Spec	Type: PU28+1		
	Length: 8.0 m		
	Width: 0.6 m		
Driving・Excavation	Soil State: N<50		
(1 Per)	Ground: GL+ 46.000 m		
	Pile Bottom: GL+ 40.000 m		
	46.000 - 40.000	=	6.0 m
Number	31.6 ÷ 0.6	=	53 pcs
Weight	Unit Mass: 106.2 kg/m		
	8.0 × 106.2 × 53	=	45.0 t
2)Inner Pile (H Type)			
Spec	Type: H-250×250×9×14		
	Length: 5.0 m		
	Pitch: 1.8 m		
Driving・Excavation	Soil State: N<50		
(1 Per)	Ground: GL+ 46.000 m		
	Pile Bottom: GL+ 42.300 m		
	46.000 - 42.300	=	3.7 m
Number	(31.6 : 1.8) + 1	=	19 pcs
Weight	Unit Mass: 71.8 kg/m		
	5.0 × 71.8 × 19	=	6.8 t

8. Badraman (Downstream Side , Left Bank L Line Per)

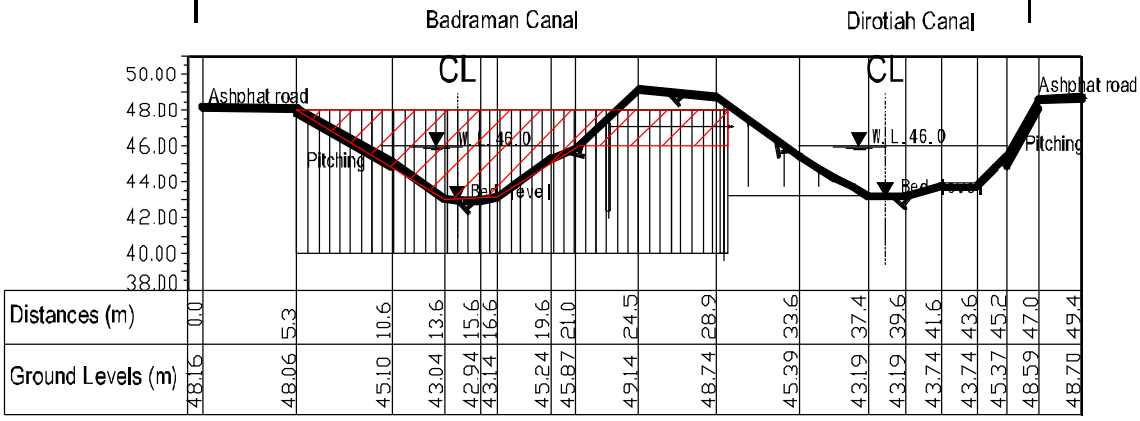
Type	Calculation Formula	Quantity
3)Tie Rod		
Spec	Type: High-Strength Steel 690 Diameter: 1 Step 28 mm	
Length (1 Per)	Sheet Pile Height 0.228 m Waling Height 0.2 m 7.0 + 0.228 + 0.20 + 0.125	= 7.6 m
Number	Set Span 1.8 m (31.6 ÷ 1.8) + 1	= 19 pcs
Length	19 × 7.6	= 144.4 m
Weight	Type: 1 Step φ28; Length (m): 7.6; Unit Mass (kg/m): 4.83; Number (pcs): 19; Weight (kg): 697.5 Total: Number (pcs): 19; Weight (kg): 697.5	0.7 t
4)Waling		
Weight	Type: Waling 2-[200×80×7.5×11; Length(m): 31.6; Unit Mass (kg/m): 24.6; Weight (kg): 1,554.7 Total: Weight (kg): 1,554.7	1.6 t

8. Badraman (Downstream Side , Left Bank L Line Per)

Type	Calculation Formula	Quantity

5)Filling Soil

Top EL	GL+ 48.000	m
AVE Ground	GL+ See drawing	m
Height	See drawing	m
Length	24.0	m
Width	6.5	m



Cross Section of Connection Cannal (Upstream Side at Badraman)

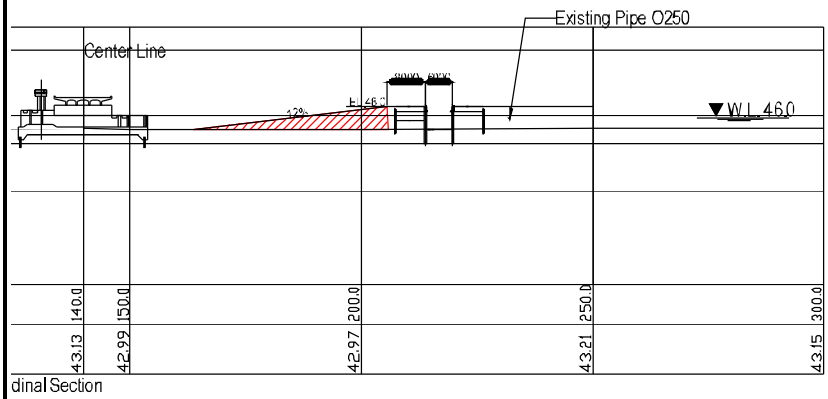
From drawing, Filling Soil is shown red line.

Sectional Area: From CAD, 67.6m2÷70.0m2

Soil Volume: 70.0m2×6.5m = 455.0 m 3

6)Embankment

Height	5.0	m	Slope	12	%
Length	42.0	m	Width	18.0	m



dinal Section

Soil Volume: From drawing, Embankment Soil is shown red line.

42.0m×5.0m×18.0m÷2=1890m3

The section is Corn-Shaped. That is why, To half. = 945.0 m 3

9. Badraman (Downstream Side , Right Bank L Line Per)

Type	Calculation Formula	Quantity
9． Badraman (Downstream Side , Right Bank L Line Per)		
	Coffering Type: Single Sheet Pile Work Length: 31.6 m Top Width: 7.0 m Top Elevation: GL+ 48.000 m	
1)Outer Sheet Pile		
Spec	Type: PU28+1 Length: 8.0 m Width: 0.6 m	
Driving・Excavation (1 Per)	Soil State: N<50 Ground: GL+ 46.000 m Pile Bottom: GL+ 40.000 m	
	46.000 - 40.000	= 6.0 m
Number	31.6 ÷ 0.6	= 53 pcs
Weight	Unit Mass: 106.2 kg/m	
	8.0 × 106.2 × 53	= 45.0 t
2)Inner Pile (H Type)		
Spec	Type: H-250×250×9×14 Length: 5.0 m Pitch: 1.8 m	
Driving・Excavation (1 Per)	Soil State: N<50 Ground: GL+ 46.000 m Pile Bottom: GL+ 42.300 m	
	46.000 - 42.300	= 3.7 m
Number	(31.6 ÷ 1.8) + 1	= 19 pcs
Weight	Unit Mass: 71.8 kg/m	
	5.0 × 71.8 × 19	= 6.8 t

9. Badraman (Downstream Side , Right Bank L Line Per)

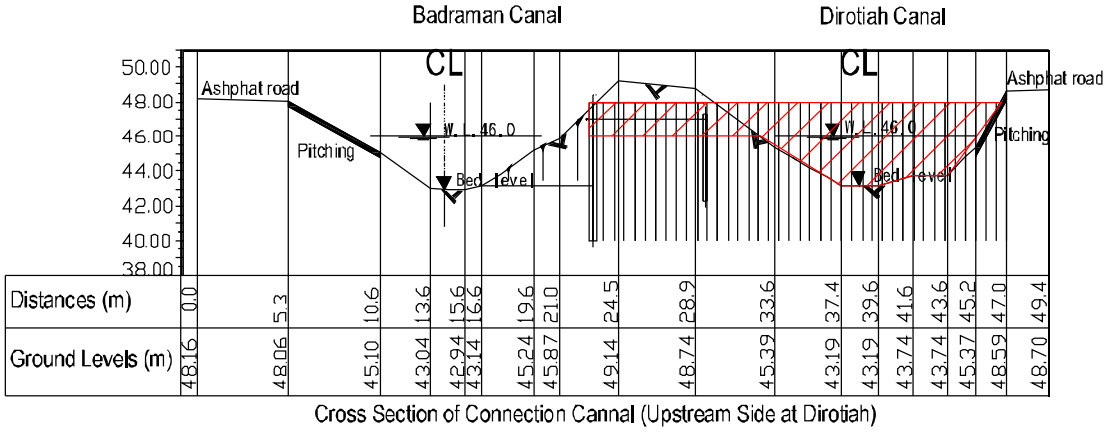
Type	Calculation Formula	Quantity
3)Tie Rod		
Spec	Type: High-Strength Steel 690 Diameter: 1 Step 28 mm	
Length (1 Per)	Sheet Pile Height 0.228 m Waling Height 0.2 m 7.0 + 0.228 + 0.20 + 0.125 =	7.6 m
Number	Set Span 1.8 m (31.6 : 1.8) + 1 =	19 pcs
Length	19 × 7.6 =	144.4 m
Weight	Type: 1 Step φ28; Length (m): 7.6; Unit Mass (kg/m): 4.83; Number (pcs): 19; Weight (kg): 697.5 Total: Number (pcs): 19; Weight (kg): 697.5	0.7 t
4)Waling		
Weight	Type: Waling 2-[200×80×7.5×11; Length(m): 31.6; Unit Mass (kg/m): 24.6; Weight (kg): 1,554.7 Total: Weight (kg): 1,554.7	1.6 t

9. Badraman (Downstream Side , Right Bank L Line Per)

Type	Calculation Formula	Quantity

5)Filling Soil

Top EL	GL+ 48.000	m
AVE Ground	GL+ See drawing	m
Height	See drawing	m
Length	24.0	m
Width	6.5	m



Cross Section of Connection Cannal (Upstream Side at Dirotiah)

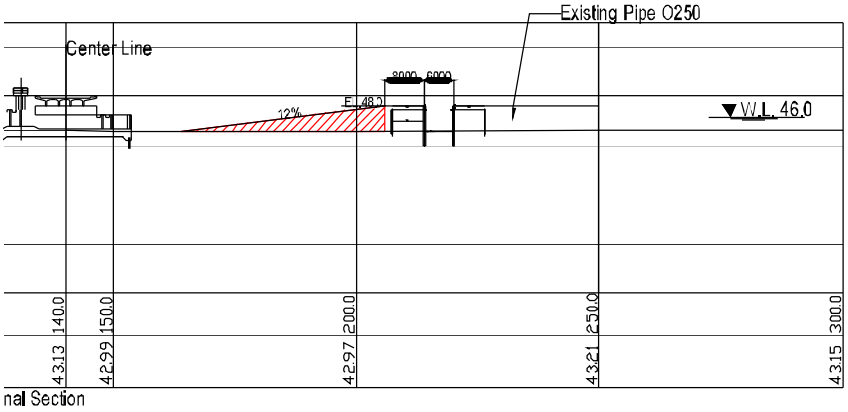
From drawing, Filling Soil is shown red line.

Sectional Area From CAD, 70.4m2゛- 70.0m2

Soil Volume 70.0m2×6.5m = 455.0 m 3

6)Embankment

Height	5.0	m	Slope	12	%
Length	42.0	m	Width	18.0	m



nal Section

Soil Volume From drawing, Embankment Soil is shown red line.

42.0m×5.0m×18.0m÷2=1890m3

The section is Corn-Shaped. That is why, To half. = 945.0 m 3

10. Badraman (Upstream Side)

Type	Calculation Formula	Quantity

10. Badraman (Upstream Side)

Coffering Type	Single Sheet Pile	
Work Length	55.0	m
Top Width	—	m
Top Elevation	GL+ 50.000	m

※Total left bank and Right bank

1)Sheet Pile

Spec

Type	PU28+1	
Length	10.0	m
Width	0.6	m

Driving・Excavation (1 Per)

Soil State	N<50	
Ground	GL+ 46.000	m
Pile Bottom	GL+ 40.000	m

46.000 - 40.000 = 6.0 m

Number

55.0 ÷ 0.6 = 92 pcs

Weight

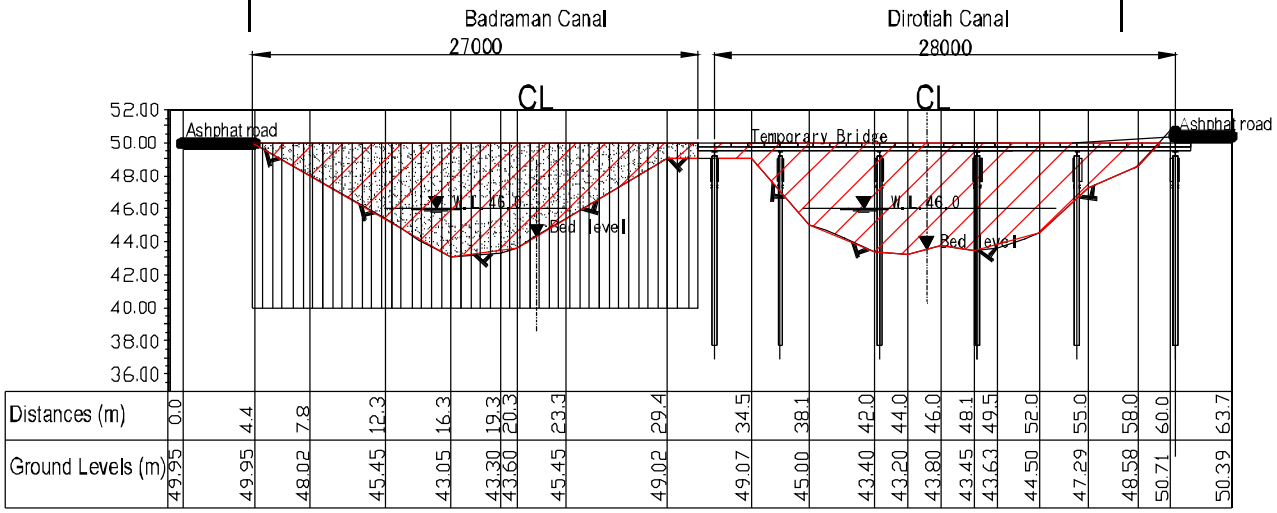
Unit Mass	106.2	kg/m

10.0 × 106.2 × 92 = 97.7 t

10. Badraman (Upstream Side)

Type	Calculation Formula		Quantity
2)Filling Soil			

Top EL	GL+ 46.000	m
AVE Ground	GL+ See drawing	m
Height	See drawing	m
Length	55.0	m
Width	8.0	m

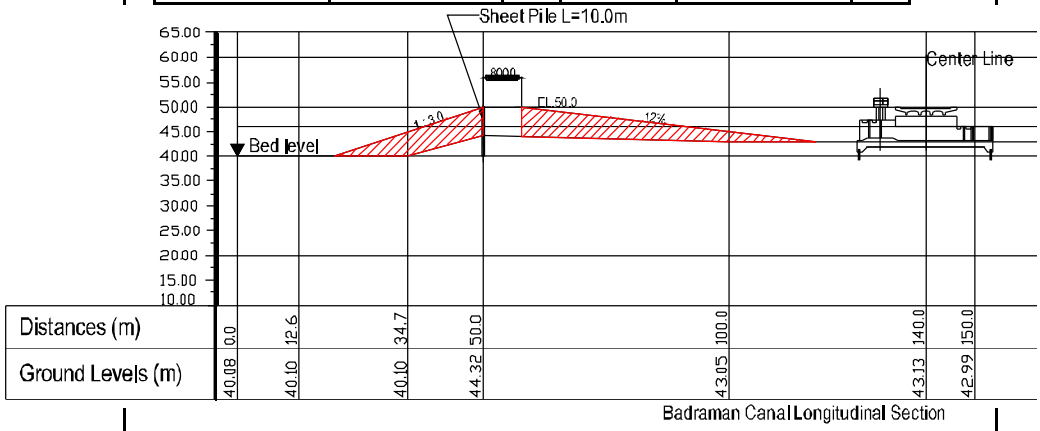


Cross Section No 4

	From drawing, Filling Soil is shown red line.		
Sectional Area	From CAD, 222.1m2≒220.0m2		
Soil Volume	220.0m2×8.0m	=	1,760.0 m 3

3)Embankment

Height	5.0	m	Slope	12	%
Length	90.0	m	Width	55.0	m



Badraman Canal Longitudinal Section

	From drawing, Embankment Soil is shown red line.		
Sectional Area	From CAD, 116.5m2+186.6m2=303.1m2≒300.0m2		
Soil Volume	300.0m2×(Left Wide27.0m+Right Wide28.0m)÷2=8250.0m3		
	The section is Corn-Shaped. That is why, To half.	=	4,125.0 m 3

11. New Abo (Inside River)

Type	Calculation Formula	Quantity
11. New Abo (Inside River)		
	Coffering Type: Double Sheet Pile Work Length: — m ※ Center Line Out: 69.6 m = 25.3 + 26.6 + 17.7 In: 47.8 m = 18.4 + 21.0 + 8.4 Top Width: 6.0 m Average = Top Elevation: GL+ 47.000 m	69.6 m 47.8 m 58.7 m
1)Outer Sheet Pile	※River Side	
Spec	Type: PU28+1 Length: 9.0 m Width: 0.6 m	
Driving・Excavation (1 Per)	Soil State: N<50 Ground: GL+ 43.000 m Pile Bottom: GL+ 38.000 m	
	43.000 - 38.000 =	5.0 m
Number	69.6 / 0.6 =	116 pcs
Weight	Unit Mass: 106.2 kg/m	
	9.0 × 106.2 × 116 =	110.9 t
2)Inner Sheet Pile		
Spec	Type: PU28+1 Length: 9.0 m Width: 0.6 m	
Driving・Excavation (1 Per)	Soil State: N<50 Ground: GL+ 42.000 m Pile Bottom: GL+ 38.000 m	
	42.000 - 38.000 =	4.0 m
Number	47.8 / 0.6 =	80 pcs
Weight	Unit Mass: 106.2 kg/m	
	9.0 × 106.2 × 80 =	76.5 t

11. New Abo (Inside River)

Type	Calculation Formula			Quantity
3)Sheet Pile of corner(120°)				
Spec	Type: PU28+1 120° ※Special Order			
	Length: 9.0 m			
	Width: 0.6 m			
Number			=	2 pcs
Weight	Unit Mass: 106.2 kg/m			
	9.0 × 106.2 × 2		=	1.9 t
4)Sheet Pile of corner(140°)				
Spec	Type: PU28+1 140° ※Special Order			
	Length: 9.0 m			
	Width: 0.6 m			
Number			=	2 pcs
Weight	Unit Mass: 106.2 kg/m			
	9.0 × 106.2 × 2		=	1.9 t
5)Tie Rod				
Spec	Type: High-Strength Steel 690			
	Diameter: 1 Step 32 mm			
Length (1 Per)	Sheet Pile Height: 0.228 m			
	Waling Height: 0.15 m			
	6.0 + { (0.228 + 0.15) × 2 }		=	6.8 m
Number	Set Span: 1.8 m			
	(58.7 ÷ 1.8) + 1		=	34 pcs
	⇓ ※ Consider Corner			
	From the Drawing , Total Number		=	36 pcs
	The number to install in corner section		=	15 pcs
	For CAD , Max Length		=	8.0 m
	That is			
	Length(1 Per): 6.8 — Number: 21			
	Length(1 Per): 8.0 — Number: 15			
Length	(6.8 × 21) + (8.0 × 15)		=	262.8 m

11. New Abo (Inside River)

Type	Calculation Formula	Quantity

Weight

Type		Length (m)	Unit Mass (kg/m)	Number (pcs)	Weight (kg)
1 Step	φ32	6.8	6.31	21	901.1
1 Step(Corner)	φ32	8.0	6.31	15	757.2
Total				36	1,658.3

1.7 t

6)Waling

Weight

Type		Length(m)		Unit Mass (kg/m)	Weight (kg)
		Out	In		
Waling	2-H-150×75×6.5×10	69.6	47.8	18.6	4,367.3
Total					4,367.3

4.4 t

7)Filling Soil

Top EL	GL+ 47.000	m
AVE Ground	GL+ 42.500	m
Height	4.5	m
Length	58.7	m
Width	6.0	m

※ Average Line

Volume 4.5 × 6.0 × 58.7 = 1,584.9 m 3

8) Access Road (Downstream)

Place

Length	30.0	m
Width	8.0	m
Slope	12	%
Top EL	GL+ 50.500	m
Ground	GL+ 47.000	m
Height	3.5	m

Confirmation of Length Slope ; i=1

Height ÷ Slope = Horizontal Length

3.5 : 0.12 = 29.2 m

Soil Volume 29.2 × 8.0 × 3.5 : 2 = 408.8 m 3

Slope ; 1:0.8

29.2 × (8.0 × 0.8) × 3.5 ÷ 3 = 218.0 m 3

TotalΣ = 626.8 m 3

12. New Sahelyia (Inside River)

Type	Calculation Formula	Quantity
12. New Sahelyia (Inside River)		
	Coffering Type: Double Sheet Pile	
	Work Length: — m ※: Center Line	
	Out: 68.7 m — 17.7 + 33.3 + 17.7 =	68.7 m
	In: 45.7 m — 8.4 + 28.9 + 8.4 =	45.7 m
	Top Width: 6.0 m — Average =	57.2 m
	Top Elevation: GL+ 47.000 m	
1) Outer Sheet Pile	※River Side	
Spec	Type: PU28-1	
	Length: 9.0 m	
	Width: 0.6 m	
Driving・Excavation (1 Per)	Soil State: N<50	
	Ground: GL+ 43.000 m	
	Pile Bottom: GL+ 38.000 m	
	43.000 - 38.000 =	5.0 m
Number	68.7 / 0.6 =	115 pcs
Weight	Unit Mass: 106.2 kg/m	
	9.0 × 106.2 × 115 =	109.9 t
2) Inner Sheet Pile		
Spec	Type: PU28-1	
	Length: 9.0 m	
	Width: 0.6 m	
Driving・Excavation (1 Per)	Soil State: N<50	
	Ground: GL+ 43.000 m	
	Pile Bottom: GL+ 38.000 m	
	43.000 - 38.000 =	5.0 m
Number	45.7 / 0.6 =	77 pcs
Weight	Unit Mass: 106.2 kg/m	
	9.0 × 106.2 × 77 =	73.6 t

12. New Sahelyia (Inside River)

Type	Calculation Formula			Quantity
3) Sheet Pile of corner(140°)				
Spec	Type: PU28+1 140° ※Special Order			
	Length: 9.0 m			
	Width: 0.6 m			
Number			=	4 pcs
Weight	Unit Mass: 106.2 kg/m			
	9.0 × 106.2 × 4		=	3.8 t
5) Tie Rod				
Spec	Type: High-Strength Steel 690			
	Diameter: 1 Step 32 mm			
Length (1 Per)	Sheet Pile Height: 0.228 m			
	Waling Height: 0.15 m			
	6.0 + { (0.228 + 0.15) × 2 }		=	6.8 m
Number	Set Span: 1.8 m			
	(57.2 ÷ 1.8) + 1		=	33 pcs
	⇓ ※ Consider Corner			
	From the Drawing , Total Number		=	35 pcs
	The number to install in corner section		=	16 pcs
	For CAD , Max Length		=	8.0 m
	That is			
	Length(1 Per): 6.8 — Number: 19			
	Length(1 Per): 8.0 — Number: 16			
Length	(6.8 × 19) + (8.0 × 16)		=	257.2 m
Weight	Type: 1 Step φ32 — Length: 6.8 m — Unit Mass: 6.31 kg/m — Number: 19 pcs — Weight: 815.3 kg			
	Type: 1 Step(Corner) φ32 — Length: 8.0 m — Unit Mass: 6.31 kg/m — Number: 16 pcs — Weight: 807.7 kg			
	Total: 35 pcs — 1,623.0 kg			1.6 t

12. New Sahelyia (Inside River)

Type	Calculation Formula	Quantity

5) Waling

Weight

Type		Length(m) Out	Length(m) In	Unit Mass (kg/m)	Weight (kg)
Waling	2-H-150×75×6.5×10	68.7	45.7	18.6	4,255.7
Total					4,255.7

4.3 t

7) Filling Soil

Top EL	GL+ 47.000	m
AVE Ground	GL+ 42.500	m
Height	4.5	m
Length	57.2	m
Width	6.0	m

※ Average Line

Volume 4.5 × 6.0 × 57.2 = 1,544.4 m 3

7) Access Road (Downstream)

Place

Length	30.0	m
Width	8.0	m
Slope	12	%
Top EL	GL+ 50.500	m
Ground	GL+ 47.500	m
Height	3.0	m

Confirmation of Length

Slope ; i=1

Height ÷ Slope = Horizontal Length

3.0 ÷ 0.12 = 25.0 m

Soil Volume

25.0 × 8.0 × 3.0 ÷ 2 = 300.0 m 3

Slope ; 1:0.8

25.0 × (8.0 × 0.8) × 3.0 ÷ 3 = 160.0 m 3

TotalΣ = 460.0 m 3

13. Diversion (Left Bank)

Type	Calculation Formula	Quantity
13. Diversion (Left Bank)		
	Coffering Type: Double Sheet Pile	
	Work Length: left-right asymmetry (m) ※: Center Line	
	Out: 44.5 m — 14.4 + 20.4 + 9.7 =	44.5 m
	In: 55.2 m — 13.2 + 18.0 + 24.0 =	55.2 m
	Top Width: 2.5 m — Average =	49.9 m
	Top Elevation: GL+ 48.000 m	
1) Outer Sheet Pile	※River Side	
Spec	Type: PU28+1	
	Length: 6.0 m	
	Width: 0.6 m	
Driving・Excavation (1 Per)	Soil State: N<50	
	Ground: GL+ 47.000 m	
	Pile Bottom: GL+ 41.000 m	
	47.000 - 41.000 =	6.0 m
Number	44.5 / 0.6 =	75 pcs
Weight	Unit Mass: 106.2 kg/m	
	6.0 × 106.2 × 75 =	47.8 t
2) Inner Sheet Pile		
Spec	Type: PU28+1	
	Length: 6.0 m	
	Width: 0.6 m	
Driving・Excavation (1 Per)	Soil State: N<50	
	Ground: GL+ 47.000 m	
	Pile Bottom: GL+ 41.000 m	
	47.000 - 41.000 =	6.0 m
Number	55.2 / 0.6 =	92 pcs
Weight	Unit Mass: 106.2 kg/m	
	6.0 × 106.2 × 92 =	58.6 t

13. Diversion (Left Bank)

Type	Calculation Formula	Quantity

3) Sheet Pile of corner(135°)

Spec

Type	PU28+1 135°	
Length	6.0	m
Width	0.6	m

※:Special Order

Number = 2 pcs

Weight

Unit Mass	106.2	kg/m

6.0 × 106.2 × 2 = 1.3 t

4) Waling

Weight

Type		Length(m)		Unit Mass	Weight	
		Out	In	(kg/m)	(kg)	
Waling	H-200×200×8×12	18.0	18.0	49.9	1,796.4	
Total					1,796.4	1.8 t

5) Beam

Weight

Type		Length(m)			Unit Mass	Weight	
		Pitch	Length	Point	(kg/m, kg/m2)	(kg)	
Beam	H-150×150×7×10	2.0	1.2	9	31.1	335.9	
	Kirin jack H150 L400～500	2	0.4	9	—	—	
	Ends Plate	2	—	18	0.12	0.05	
Total						335.9	0.34 t

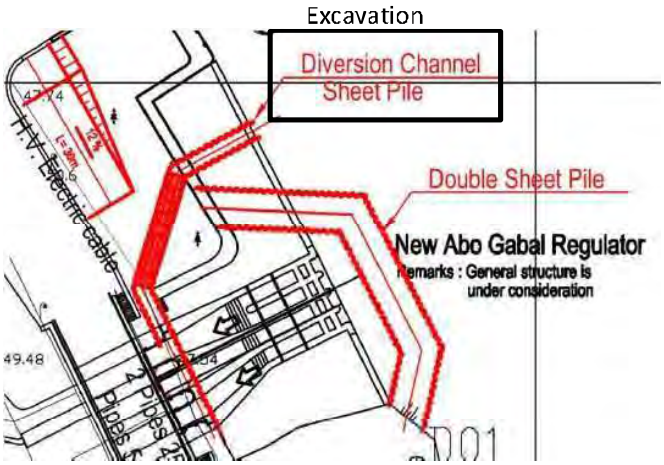
6) Bracket

Weight

Type		Length(m)			Unit Mass	Weight	
		Pitch	Length	Point	(kg/m)	(kg)	
Bracket	L-30×30×5×4	2.0	1.3	18	2.16	50.5	
Total						50.5	0.05 t

Total(Waling+Beam)Σ = 2.2 t

13. Diversion (Left Bank)

Type	Calculation Formula		Quantity
7) Excavation(Water Way)			
Place			
Soil Volume	After Double Sheet Pile , To Excavation.		
	For CAD		
	L=13.1m+19.0m+8.8m=40.9m		
	W=2.0m		
	H=GL+47.500-GL+44.000=3.5m		
	V=40.9m×2.0m×3.5m	=	286.3 m 3

14. Diversion (Right Bank)

Type	Calculation Formula			Quantity
14. Diversion (Right Bank)				
	Coffering Type: Double Sheet Pile			
	Work Length: left-right asymmetry (m) ※: Center Line			
	Out: 45.6 m — 38.4 + 7.2	=		45.6 m
	In: 53.4 m — 37.2 + 16.2	=		53.4 m
	Top Width: 2.5 m	Average =		49.5 m
	Top Elevation: GL+ 48.000 m			
1) Outer Sheet Pile	※River Side			
Spec	Type: PU28+1			
	Length: 6.0 m			
	Width: 0.6 m			
Driving・Excavation	Soil State: N<50			
(1 Per)	Ground: GL+ 47.000 m			
	Pile Bottom: GL+ 41.000 m			
	47.000 - 41.000	=		6.0 m
Number	45.6 / 0.6	=		76 pcs
Weight	Unit Mass: 106.2 kg/m			
	6.0 × 106.2 × 76	=		48.4 t
2) Inner Sheet Pile				
Spec	Type: PU28+1			
	Length: 6.0 m			
	Width: 0.6 m			
Driving・Excavation	Soil State: N<50			
(1 Per)	Ground: GL+ 47.000 m			
	Pile Bottom: GL+ 41.000 m			
	47.000 - 41.000	=		6.0 m
Number	53.4 / 0.6	=		89 pcs
Weight	Unit Mass: 106.2 kg/m			
	6.0 × 106.2 × 89	=		56.7 t

14. Diversion (Right Bank)

Type	Calculation Formula	Quantity

3) Sheet Pile of corner(150°)

Spec

Type	PU28+1 150°	
Length	6.0	m
Width	0.6	m

※:Special Order

Number = 2 pcs

Weight

Unit Mass	106.2	kg/m

6.0 × 106.2 × 2 = 1.3 t

4) Waling

Weight

Type		Length(m)		Unit Mass	Weight	
		Out	In	(kg/m)	(kg)	
Waling	H-200×200×8×12	36.0	36.0	49.9	3,592.8	
Total					3,592.8	3.6 t

5) Beam

Weight

Type		Length(m)			Unit Mass	Weight	
		Pitch	Length	Point	(kg/m, kg/m2)	(kg)	
Beam	H-150×150×7×10	2.0	1.2	18	31.1	671.8	
	Kirin jack H150 L400～500	2	0.4	18	—	—	
	Ends Plate	2	—	36	0.12	0.10	
Total						671.9	0.67 t

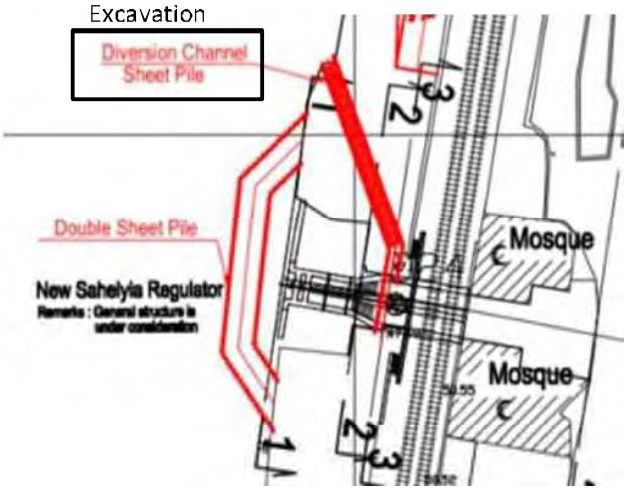
6) Bracket

Weight

Type		Length(m)			Unit Mass	Weight	
		Pitch	Length	Point	(kg/m)	(kg)	
Bracket	L-30×30×5×4	2.0	1.3	36	2.16	101.1	
Total						101.1	0.10 t

Total(Waling+Beam)Σ = 4.4 t

14. Diversion (Right Bank)

Type	Calculation Formula		Quantity
7) Excavation(Water Way)			
Place			
Soil Volume	After Double Sheet Pile , To Excavation.		
	For CAD		
	L=37.3m+6.6m=43.9m		
	W=2.0m		
	H=GL+47.500-GL+44.000=3.5m		
	V=43.9m×2.0m×3.5m	=	307.3 m 3

Quantity of Temporaly Closure (Well Point)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total	Unit	Remarks
	Bahr Yusef		Ibrahimia				Badraman				Abo Gabal	Sahelyia	Diversion				
	Inside River	Right Bank	Inside River	Left Bank 2 Stage		Right Bank (Railway)	Downstream Side Straight Per	Downstream Side Left Bank	Downstream Side Right Bank	Upstream Side Left & Right	Inside River	Inside River	Left Bank Water Way	Right Bank Water Way			
Coffering Type	Double Sheet Pile	Single Sheet Pile	Double Sheet Pile	Single Sheet Pile Up Side	Single Sheet Pile Bottom Side	Single Sheet Pile	Single Sheet Pile	Single Sheet Pile	Single Sheet Pile	Single Sheet Pile	Double Sheet Pile	Double Sheet Pile	Double Sheet Pile	Double Sheet Pile			
Well Point																	
Length	291.2		244.6												535.8	m	
Well Point	96		81												177	pcs	
Pump Out	2		2												4	pcs	
Drilling Length	508.8		429.3												938.1	m	

1. Bahr Yusef (Inside River)

Type	Calculation Formula	Quantity
Drainage Work		
Well Point		
Length	From drawing(TW-35)	
	25.7+13.0+76.1+14.7+22.7+34.6+17.6+68.3+18.5=291.2m	291.2 m
Length of Header Pipe	It is tha same as length	291.2 m
Installation Number of Well Point	From drawing(TW-35), Deep 5.3m Pitch3.0m	96 pcs
Installation Number of Pump Put	From drawing(TW-35), Notch Tank Type	2 pcs
Drilling Length	Deep5.3m×96pcs=508.8m	508.8 m
Equipment(Pump Out)	Notch Tank	2 pcs
	Fugal Pump	2 pcs
	Vacuum Pump	2 pcs
	Check Valve	2 pcs
	Separate Tank	2 pcs
	Gate Valve	2 pcs
	Bend Pipe 90°	2 pcs
	Header Tee	2 pcs
	Distribution Pipe	suitable m
Equipment(Well Point)	Ground Cock(Swing Joint)	96 pcs
	Swing Horse(Swing Joint)	96 pcs
	Riser Pipe L=1.0m 96pcs,96m	
	Riser Pipe L=3.6m 96pcs,345.6m	
	Riser Pipe Total =	441.6 m
	Riser Socket	96 pcs
	Well Point L=0.7m Ver	96 pcs
Equipment(Header Pipe)	Header Pipe OD150	291.2 m
	End Cap	4 pcs
	Bend Pipe 90°	3 pcs
	Bend Pipe 45°	2 pcs
	Coupling	suitable pcs

2. Ibrahimia(Inside River)

Type	Calculation Formula	Quantity
Drainage Work		
Well Point		
Length	From drawing(TW-36)	
	12.5+13.7+87.1+8.1+32.6+81.8+8.8=244.6m	244.6 m
Length of Header Pipe	It is tha same as length	244.6 m
Installation Number of Well Point	From drawing(TW-36), Deep 5.3m Pitch3.0m	81 pcs
Installation Number of Pump Put	From drawing(TW-36), Notch Tank Type	2 pcs
Drilling Length	Deep5.3m×81pcs=429.3m	429.3 m
Equipment(Pump Out)	Notch Tank	2 pcs
	Fugal Pump	2 pcs
	Vacuum Pump	2 pcs
	Check Valve	2 pcs
	Separate Tank	2 pcs
	Gate Valve	2 pcs
	Bend Pipe 90°	2 pcs
	Header Tee	2 pcs
	Distribution Pipe	suitable m
Equipment(Well Point)	Ground Cock(Swing Joint)	81 pcs
	Swing Horse(Swing Joint)	81 pcs
	Riser Pipe L=1.0m 81pcs,81m	
	Riser Pipe L=3.6m 81pcs,291.6m	
	Riser Pipe Total =	372.6 m
	Riser Socket	81 pcs
	Well Point L=0.7m Ver	81 pcs
Equipment(Header Pipe)	Header Pipe OD150	244.6 m
	End Cap	4 pcs
	Bend Pipe 90°	3 pcs
	Bend Pipe 45°	3 pcs
	Coupling	suitable pcs

APPENDIX D

CONSTRUCTION PLANNING

CONSTRUCTION PLANNING

APPENDIX D-1

Hydraulic Calculations

D-1 Hydraulic Calculations

1 Cross Section of Diversion Canal during Construction

Hydraulic condition of the diversion canal on the temporary cross sections of NDGRs (during its construction) is confirmed by hydraulic calculation. The target cross sections for hydraulic consideration are on new Bahr Yusef and Ibrahimia canals. For topographic cross sections, hydraulic calculation is executed under non-uniform flow condition.

Discharge amount is calculated as equation below;

$$Q = A \cdot V$$

Where,

Q: discharge amount (m^3/s)

A: cross section area (m^2)

V: average flow velocity (m/s)

Average flow velocity in open channel is calculated as formula below (Manning formula);

$$V = \frac{1}{n} \cdot R^{2/3} \cdot I^{1/2}$$

Where,

V: average flow velocity (m/s)

n: roughness coefficient

R: hydraulic radius, R = A / P (m)

I: hydraulic gradient

P: wetted perimeter (m)

Fig. 1-1 Plane-View Drawing of NDGRs

Water level of two temporal diversion canals at Bahr Yusef and Ibrahimea are calculated for each when the maximum discharge is applied. Discharge and water level for each diversion canal are followings;

①	Bahr Yusef Canal	Max. Discharge: 185 m^3/s Downstream Water Level: WL. 45.82 m
②	Ibrahimia Canal	Max. Discharge: 162 m^3/s Downstream Water Level: WL. 45.3 m

1-1 Bahr Yusef Canal

The Bahr Yusef Canal is located on the left side of NDGRs, and the existing canal on axis is approx. 85m in width. Considering the cross section of the diversion canal, it becomes approx. 47m in width.

Fig.1-2 Plane-View Drawing of Bahr Yusef Canal

(1) Cross Section of Diversion Canal at Bahr Yusef

The cross section of the Bahr Yusef Canal (CS5) is shown in Fig.1-3. When the maximum discharge (185m^3/s) is applied, highest water level is WL 45.881m (CS2, upstream), and the maximum flow velocity is 1.661 m/s (CS8, downstream).

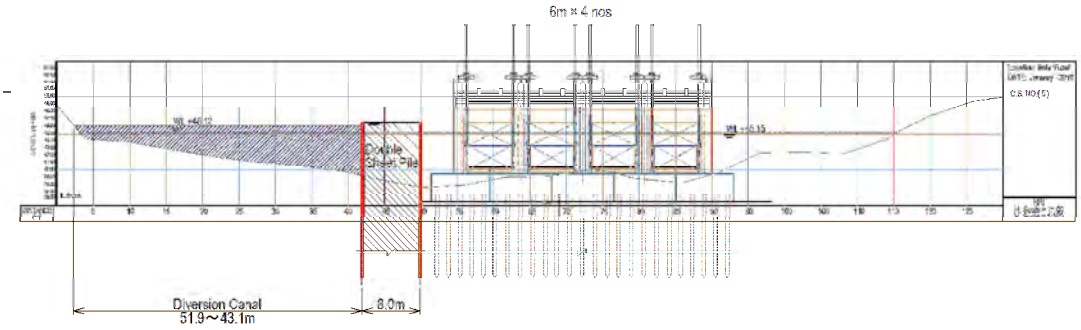


Fig.1-3 Cross Section of Bahr Yusef Canal (CS5)

During the construction, the layout of sheet pile should be linear for the bank protection work and environmental consideration due to the maximum water level WL. 45.82 m. The location of the temporary bridge should be considered depending on the location where mosque on the left bank is transferred.

Table 1-1 Hydraulic Calculation Results (Bahr Yusef)

Discharge (m^3/s)	Maximum Water Level (m)	Maximum Water Velocity (m/s)	Water Level (Downstream) (m)
185	45.881 (Upstream side)	1.661 (CS8)	45.82

1-2 Ibrahimia Canal

The Ibrahimia Canal is located on the right side of NDGRs, and current canal on axis is approx. 85m in width. Considering the cross section of the diversion canal, it becomes approx. 26 m in width.

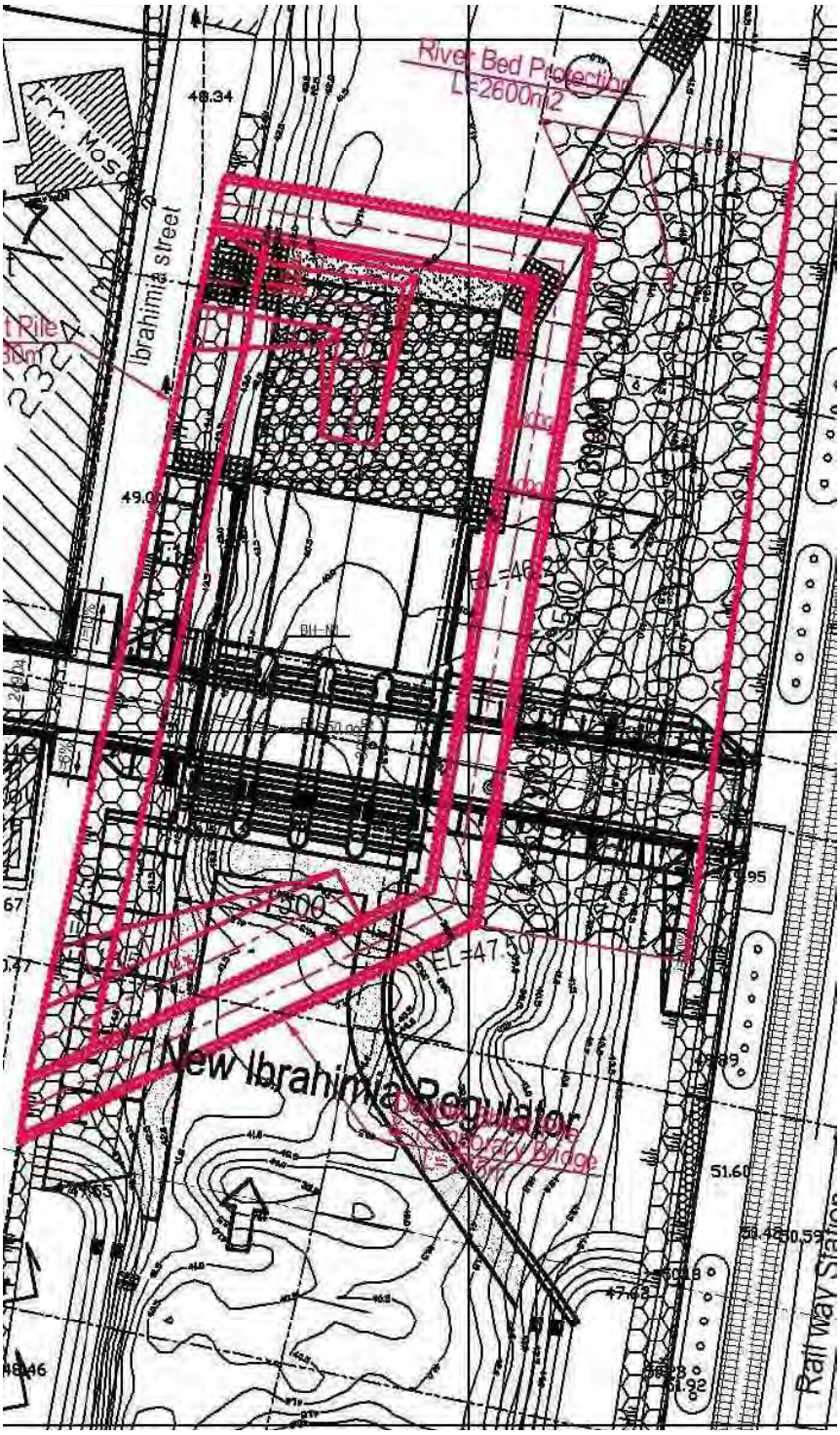


Fig. 1-4 Plane View Drawing of Ibrahimia Canal

(2) Cross Section of Ibrahimia

The current cross section of the Ibrahimia Canal (CS7) is shown in Fig.1-5. When the maximum discharge (162 m^3/s) is applied, highest water level is WL 45.379 m (CS3, upstream), and the maximum flow velocity is 2.307 m/s (CS9, downstream).

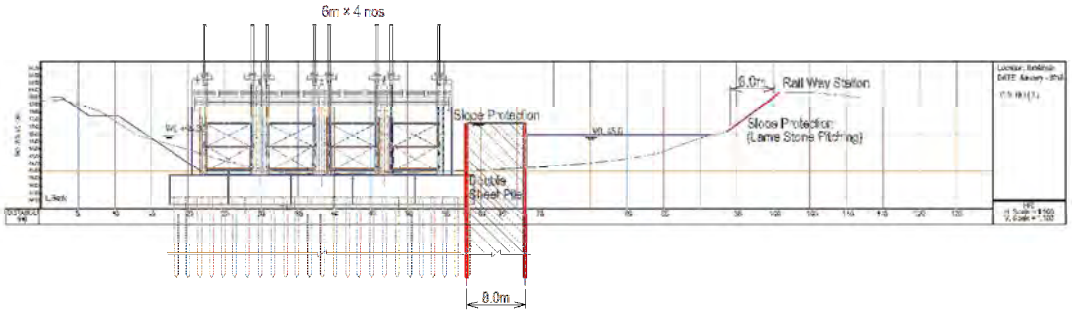


Fig. 1-5 Section of Ibrahimia Canal without Sheet Pile (CS7)

It must be required for the countermeasure against high flow velocity (= 2.307 m/s) in the diversion canal of Ibrahimia regulator, which can be considered.

The other cross section of the Ibrahimia Canal (CS7) is shown in Fig.1-6. When the maximum discharge (162 m^3/s) is applied, highest water level is WL 45.343 m (CS3, upstream), and the maximum flow velocity is 1.672 m/s (CS9, downstream).

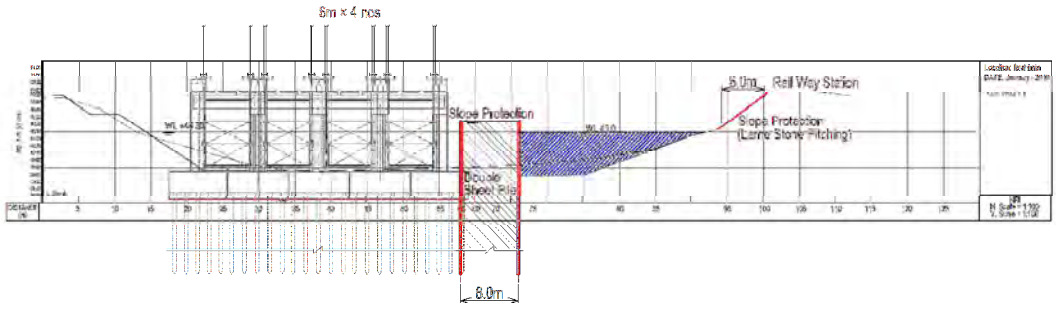


Fig. 1-6 Cross section of the Ibrahimia Canal without Sheet Pile (CS7)

Table 1-1 Hydraulic Calculation Results (Ibrahimia)

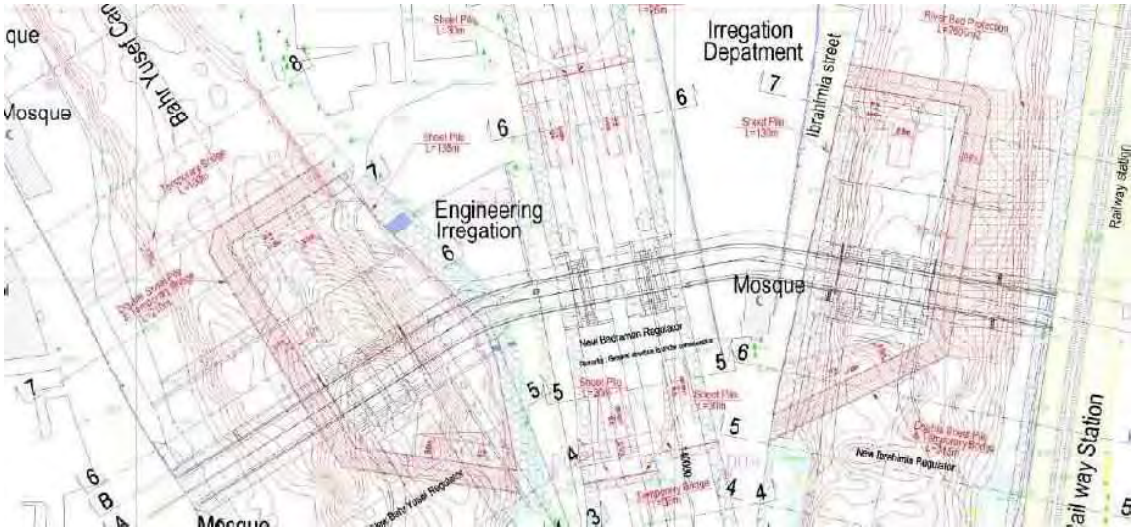
Discharge (m^3/s)	Maximum Water Level (m)	Maximum Water Velocity (m/s)	Water Level (Downstream) (m)	Sheet Pile
162	45.379 (Upstream side)	2.307 (CS9)	45.3	No Sheet Pile
162	45.343 (Upstream side)	1.672 (CS9)	45.3	No Sheet Pile & Excavation

A large scale temporary work must be required because cross section area of the temporary canal is not wide enough. It is significant that more sheet piles with larger size are provided, which specifications will be determined after the final cross section considering the soil condition is available.

2 Results of analysis of flow velocity during temporary works by mathematical model analysis

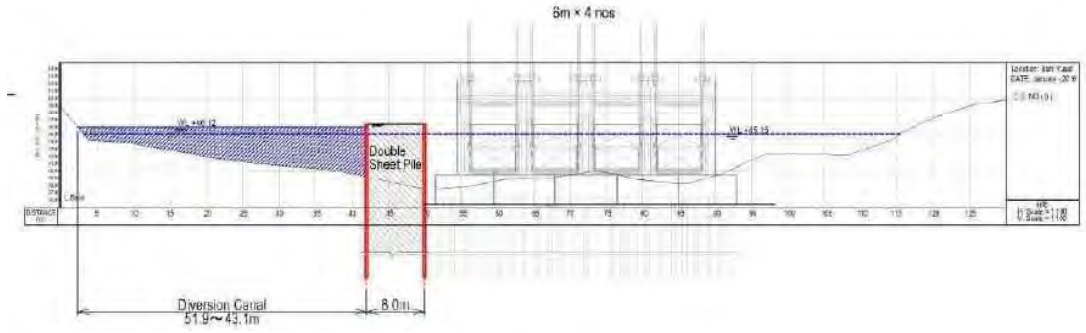
2-1 Condition of Water Level and discharge

Bahr Yusef Regulator: Discharge = 185m³/s, D.S WL = 15.82m
Ibrahimia Regulator: Discharge = 162m³/s, D.S WL = 15.30m



2-2 Bahr Yusef Regulator

The maximum flow velocity of the non-uniform flow analysis is 1.661 m/s on average in



the downstream of the temporary canal (CS 8). The average flow velocity at the same position of the mathematical model analysis is 1.48 m/s, and the flow velocity is smaller than that of the non-uniform flow analysis. The maximum flow velocity is 1.64 m/s in the bottom layer after passing through the temporary canal.

Table2-2.1 Comparison table of analysis results for non-uniform flow analysis and mathematical model analysis

Method of analysis	Max. WL (WL. m)	Average Max Velocity (m/s)	Surface Max. Velocity (m/s)	Middle Max. Velocity (m/s)	Bottom Max. Velocity (m/s)
Non-uniform flow	45.881 (CS2)	1.661(CS8)	-	-	-
Mathematical model analysis	46.001 (CS2)	1.48(CS8) 1.20(Max.) 1.02(CS2)	1.60(CS8) 2.11(Max.) 1.24(CS2)	1.53(CS8) 2.01(Max.) 1.00(CS2)	1.30(CS8) 1.64(Max.) 0.81(CS2)

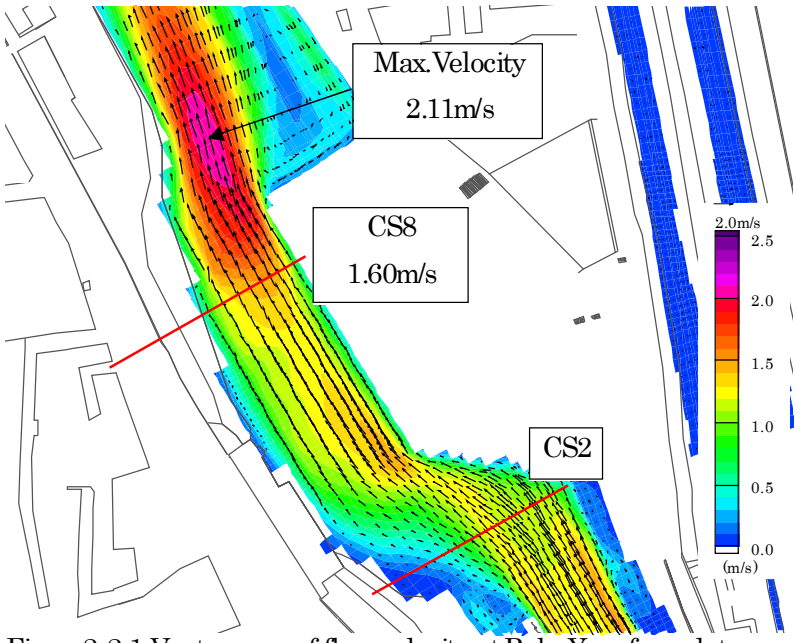


Figure2-2.1 Vector map of flow velocity at Bahr Yusef regulator (Surface layer)

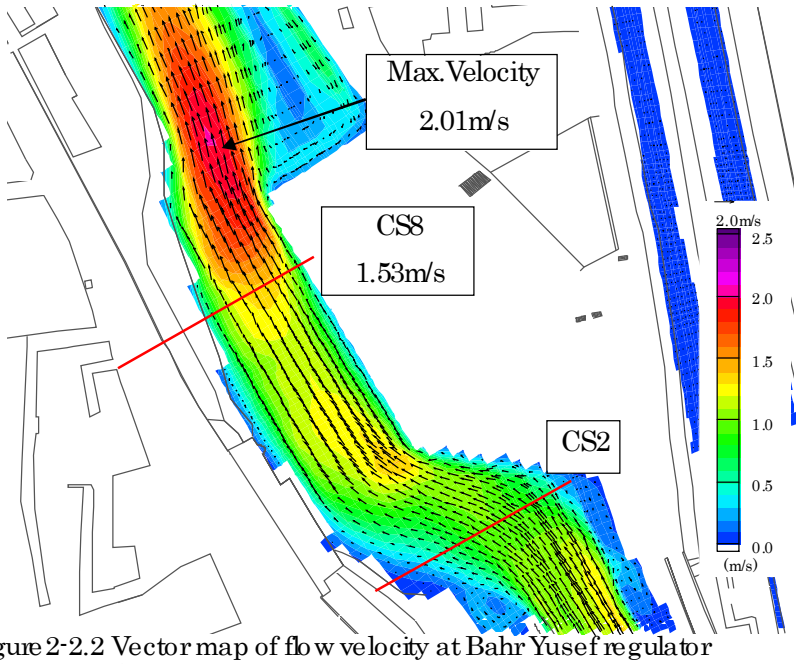


Figure 2-2.2 Vector map of flow velocity at Bahr Yusef regulator (Middle layer)

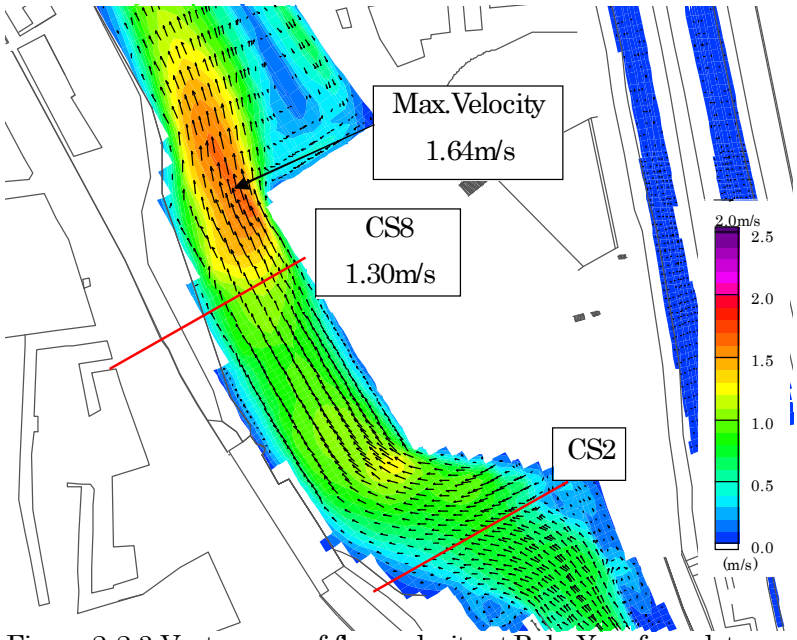
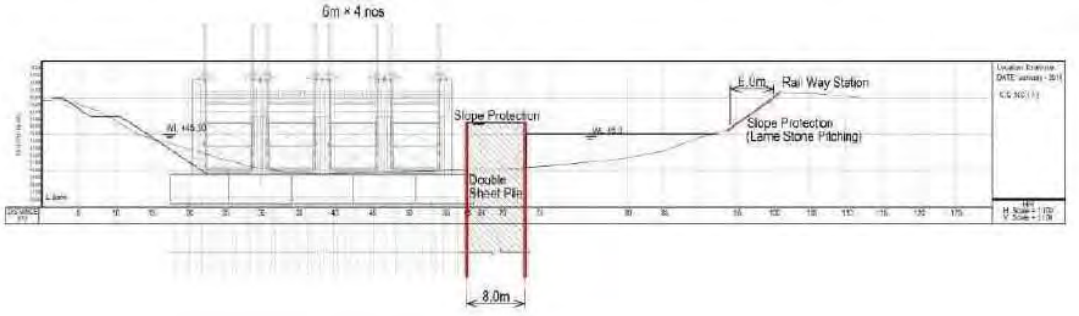


Figure -2-2.3 Vector map of flow velocity at Bahr Yusef regulator (Bottom layer)

2-3 Ibrahimia Regulator

(1) No countermeasures

Table2-3.1 Comparison table of analysis results for non-uniform flow analysis and



mathematical model analysis

Method of analysis	Max. WL (WL. m)	Average Max Velocity (m/s)	Surface Max. Velocity (m/s)	Middle Max. Velocity (m/s)	Bottom Max. Velocity (m/s)
Non-uniform flow	45.379 (CS3)	2.307 (CS9)	-	-	-
Mathematical model analysis	45.568 (Near CS3)	2.16 (CS9,Max.) 0.90(CS3)	2.44 (CS9,Max.) 1.10(CS3)	2.29 (CS9,Max.) 0.94(CS3)	1.75 (CS9,Max.) 0.65(CS3)

The maximum flow velocity of the non-uniform flow analysis is 2.307 m/s on average in the downstream of the temporary canal (CS 9). The average flow velocity at the same position in the mathematical model analysis is 2.16 m/s, and the flow velocity is smaller than that of the non-uniform flow analysis. The maximum flow velocity also occurs at 1.75 m/s in the bottom layer at the same position.

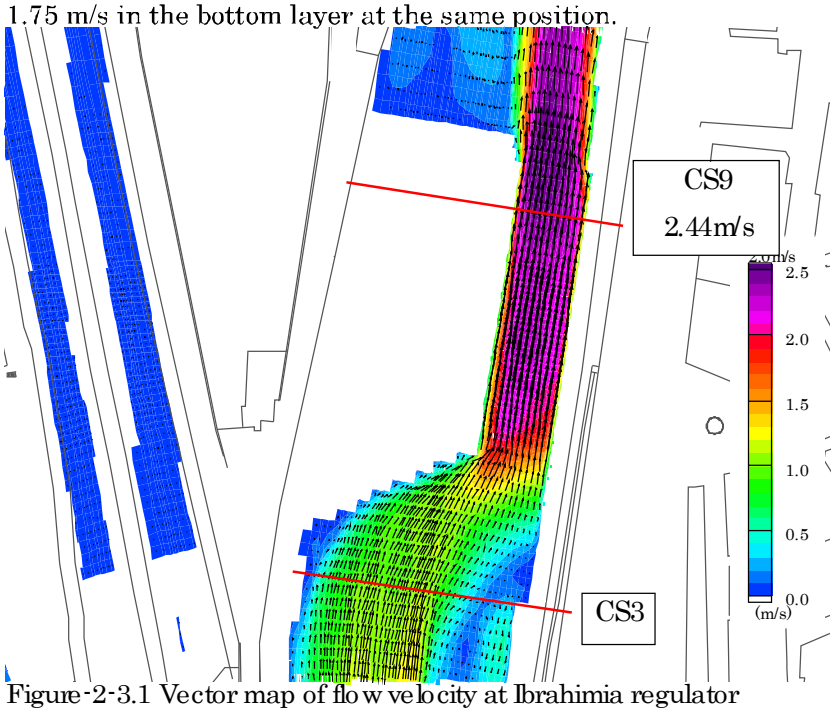


Figure-2-3.1 Vector map of flow velocity at Ibrahimia regulator (Surface layer)

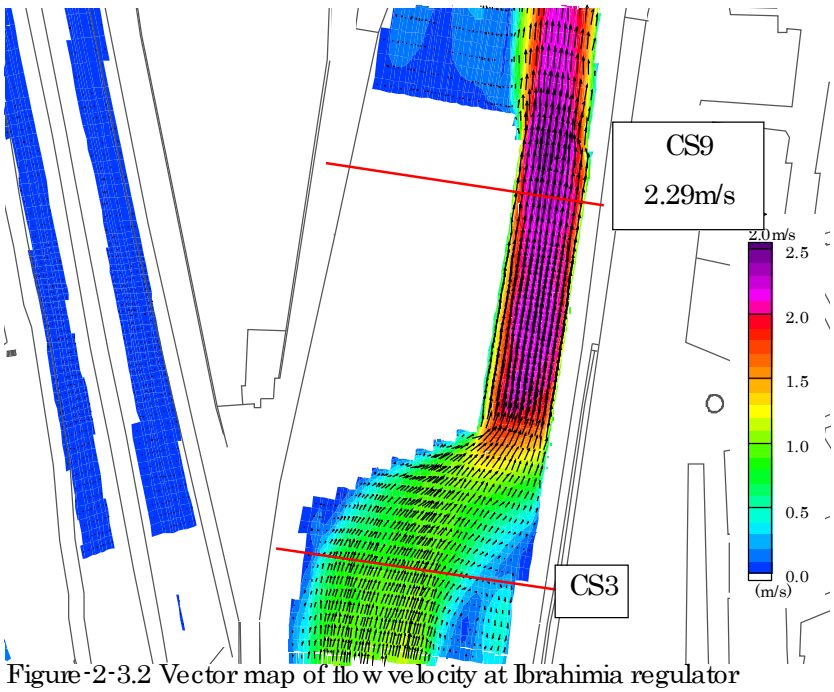


Figure-2-3.2 Vector map of flow velocity at Ibrahimia regulator (Middle layer)

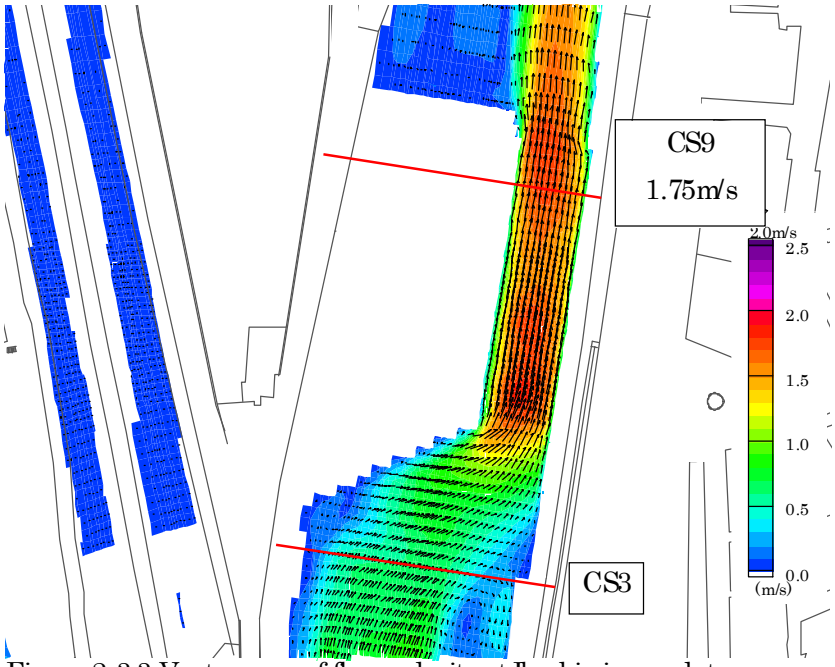
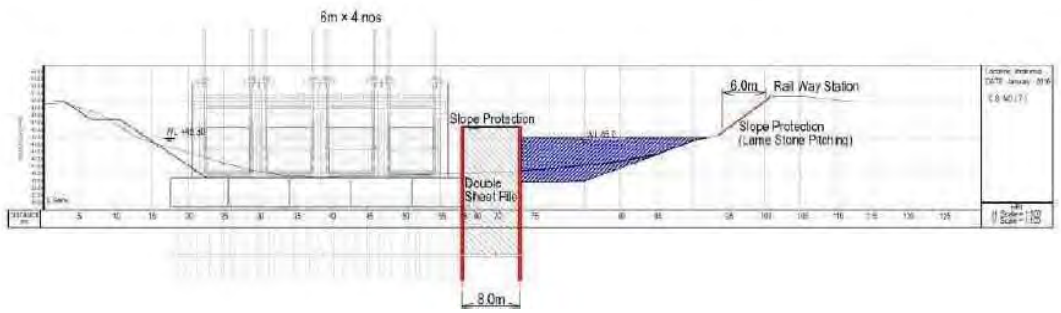


Figure-2-3.3 Vector map of flow velocity at Ibrahimia regulator (Bottom layer)

(2) After countermeasure (riverbed excavation) Drill the riverbed to EL.39 m. Adjust the right bank with the current law gradient.

Table2-3.2 Comparison table of analysis results for non-uniform flow analysis and mathematical model analysis

Method of analysis	Max. WL (WL. m)	Average Max Velocity (m/s)	Surface Max. Velocity (m/s)	Middle Max. Velocity (m/s)	Bottom Max. Velocity (m/s)
Non-uniform flow	45.343 (CS3)	1.672(CS9)	-	-	-
Mathematical model analysis	45.423 (Near CS3)	1.48(CS9) 1.68(Max.)	1.67(CS9) 1.75(Max.)	1.62(CS9) 1.72(Max.)	1.16(CS9) 1.57(Max.)



The maximum flow velocity of the non-uniform flow analysis is 1.672 m/s on average in the downstream of the temporary canal (CS 9). The average flow velocity at the same position of the mathematical model analysis is 1.48 m/s, and the flow velocity is smaller than that of the non-uniform flow analysis. The maximum flow velocity is 1.57 m/s in the bottom layer upstream of the temporary canal. Also, the flow velocity of the bottom layer after passing through the temporary canal is 1.40 m/s.

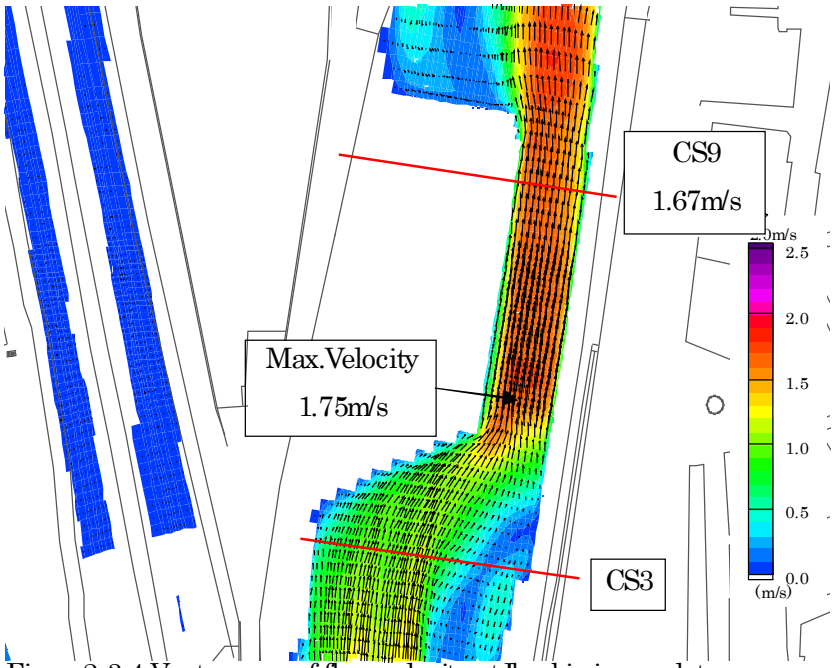


Figure 2-3.4 Vector map of flow velocity at Ibrahimia regulator (Surface layer)

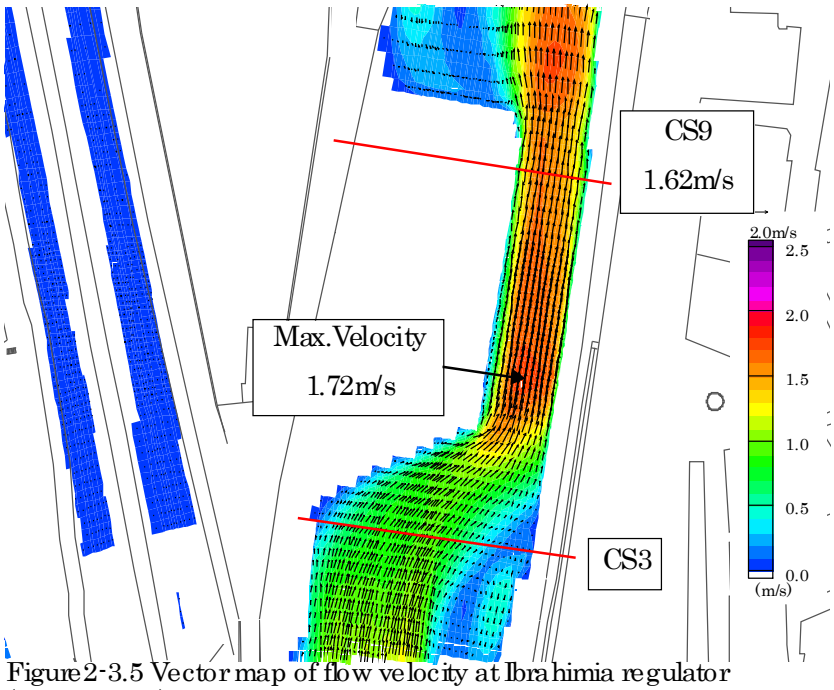


Figure 2-3.5 Vector map of flow velocity at Ibrahimia regulator (Middle layer)

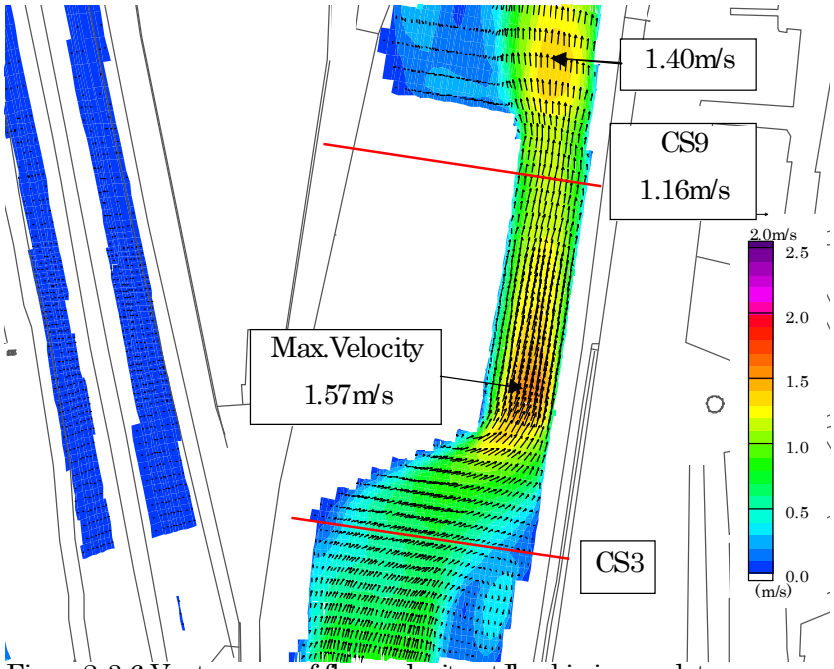


Figure 2-3.6 Vector map of flow velocity at Ibrahimia regulator (Bottom layer)

3 Calculatin results

1) Bahr Yusef Canal (Non Uniform Flow)
2) Ibrahimia Canal (Non Uniform Flow)
3) Ibrahimia Canal with canal bed excavation (Non Uniform Flow)

Calculation table
non-uniform flow (1／1) Part 1 Title [Bahr_Yusef_1Sheet_Pile] Froude number $Fr = U / \{ g \cdot A / (\alpha \cdot B) \}^{1/2}$

Station name	Stage length Δx (m)	Total distance x (m)	Bottom level Zb (m)	non-uniform flow WL Zb+h ① (m)	non-uniform flow Depth h (m)	Discharge Q (m^3/sec)	normal Depth ho (m) Up-Stream	normal Depth ho (m) Down-Stream	Critical depth hc (m)	Froude number Fr	Water surface width B (m)	V Q／A (m/s)	Water flow sectional area A (m^2)	Hydra. Radius R (m)	Velocity formula Level	
CS13		0.000	40.840	45.820	4.980	185.000	1.392		1.741	0.138	58.204	0.839	220.617	3.652	Level1a	
CS12	20.000	20.000	41.170	45.827	4.657	185.000	1.494	1.254	1.574	0.131	67.143	0.776	238.516	3.472	Level1a	
CS11	20.000	40.000	41.320	45.831	4.511	185.000	1.408	1.445	1.509	0.123	69.072	0.734	251.990	3.517	Level1a	
CS10	20.000	60.000	41.490	45.838	4.348	185.000		1.159	1.246	0.111	79.998	0.654	282.796	3.448	Level1a	
CS9	20.000	80.000	41.460	45.789	4.329	185.000			1.871	0.216	48.693	1.201	153.986	2.881	Level1a	
CS8	20.000	100.000	40.660	45.729	5.069	185.000			2.809	0.311	38.947	1.661	111.370	2.562	Level1a	
CS7	20.000	120.000	39.510	45.797	6.287	185.000			2.882	0.210	41.070	1.249	148.100	3.142	Level1a	
CS6	20.000	140.000	39.410	45.815	6.405	185.000			2.871	0.179	40.276	1.129	163.902	3.152	Level1a	
CS5	20.000	160.000	38.710	45.806	7.096	185.000			4.032	0.202	38.920	1.239	149.299	3.158	Level1a	
CS4	20.000	180.000	37.340	45.797	8.457	185.000	3.331		5.673	0.215	35.100	1.336	138.475	3.048	Level1a	
CS3	20.000	200.000	39.370	45.848	6.478	185.000	2.054	1.190	2.493	0.139	44.297	0.926	199.743	3.876	Level1a	
CS2	20.000	220.000	39.610	45.881	6.271	185.000		1.665	1.921	0.077	92.407	0.490	377.378	4.007	Level1a	
CS1	20.000	240.000	39.530	45.860	6.330	185.000			2.045	0.121	50.161	0.820	225.558	4.285	Level1a	

Flow type : Subcritical flow Case of flow 《 CASE1 》 Energy correction Coefficient $\alpha = 1.000$, Gravitational Acceleration $g = 9.800$

Calculation table
non-uniform flow (1／1) Part 2

Case of flow 《 CASE1 》

③is calculated by substituting △x value of under one line
Convergence error = (Φ of one line up) − Ψ

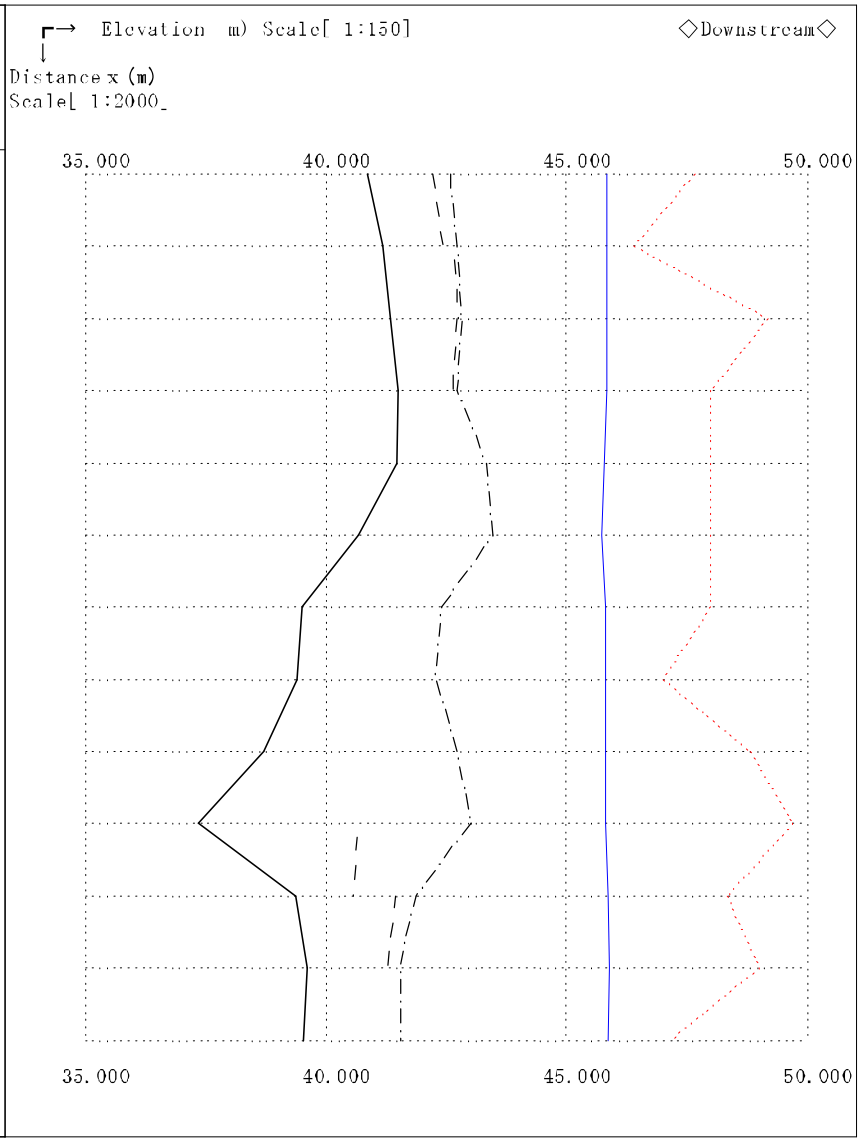
Station name	Velocity head $\frac{\beta \Sigma u_i^2 \cdot A_i}{2g \cdot A}$ ② (m)	Friction head $\frac{\Delta x}{2A}\Sigma\frac{N_i^2 \cdot u_i^2 \cdot Sb_i}{R_i^{1/3}}$ ③ ④ (m)		Side resistance head $\frac{\Delta x}{2A}\Sigma\frac{\tau_i}{\rho \cdot g}S_i$ ③ ④ (m)		Station Total head H_e ①+② (m)	head of △x/2 pos. UpStream Φ ①+②+③ (m)	DownStream Ψ ①+②−④ (m)	Localized Head loss or WL difference Type	Coef. f_{Loss}	Head or WL di. (m)	Specific E h+② (m)	Energy gradient Ie	a note
CS13	0.036	0.001		0.000		45.856	45.857						7.815E-005	
CS12	0.031	0.001	0.001	0.000	0.000	45.857	45.858	45.857					7.151E-005	
CS11	0.027	0.001	0.001	0.000	0.000	45.859	45.859	45.858					6.298E-005	
CS10	0.022	0.001	0.001	0.000	0.000	45.860	45.860	45.859					5.135E-005	
CS9	0.074	0.002	0.002	0.000	0.000	45.862	45.865	45.860					0.00022005	
CS8	0.141	0.005	0.005	0.000	0.000	45.870	45.875	45.865					0.00049206	
CS7	0.080	0.002	0.002	0.000	0.000	45.877	45.879	45.874					0.00021188	
CS6	0.065	0.002	0.002	0.000	0.000	45.880	45.882	45.879					0.00015263	
CS5	0.078	0.002	0.002	0.000	0.000	45.884	45.886	45.882					0.00020708	
CS4	0.091	0.003	0.003	0.000	0.000	45.889	45.891	45.886					0.00025245	
CS3	0.044	0.001	0.001	0.000	0.000	45.892	45.893	45.891					8.807E-005	
CS2	0.012	0.000	0.000	0.000	0.000	45.893	45.893	45.893					2.360E-005	
CS1	0.034		0.001		0.000	45.894		45.893					6.041E-005	

Momentum correction Coefficient $\beta = 1.000$

water surface Profile of
non-uniform flow Bahr_Yusef_1Sheet_Pile

Water level Zb+h ——— Bottom level Zb ——— Critical depth hc —·—·— Normal depth ho — — — bank level ·····

Station name No.	Accumulative distance x (m)	Flow rate Q (m³/sec)	Water rate h (m)	Water level Zb+h (m)	Normal depth ho Up-Stream	Normal depth ho Down-Stream	Critical depth hc (m)	Froude number Fr
CS13	0.000	185.000	1.980	45.820	1.392		1.741	0.138
CS12	20.000	185.000	1.657	45.827	1.491	1.251	1.571	0.131
CS11	40.000	185.000	4.511	45.831	1.408	1.445	1.509	0.123
CS10	60.000	185.000	1.348	45.838		1.159	1.246	0.111
CS9	80.000	185.000	4.329	45.789			1.871	0.216
CS8	100.000	185.000	5.069	45.729			2.809	0.314
CS7	120.000	185.000	6.287	45.797			2.882	0.210
CS6	140.000	185.000	6.405	45.815			2.871	0.179
CS5	160.000	185.000	7.096	45.806			4.032	0.202
CS4	180.000	185.000	8.457	45.797	3.331		5.673	0.215
CS3	200.000	185.000	6.478	45.848	2.054	1.190	2.493	0.139
CS2	220.000	185.000	6.271	45.881		1.665	1.921	0.077
CS1	240.000	185.000	6.330	45.860			2.045	0.124



Flow type : Subcritical flow

Energy regulation factor α = 1.000 , Acceleration of gravity g = 9.80(m/sec²)

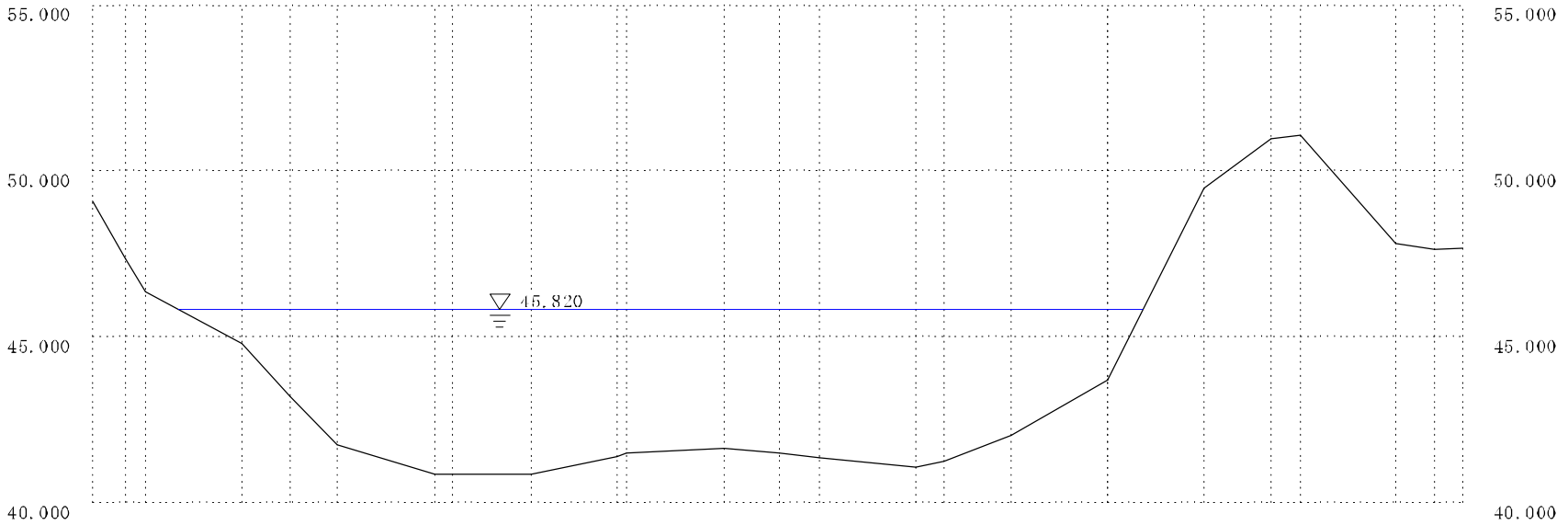
Hydraulic value of cross section (1／1)　　Bahr_Yusef_1Sheet_Pile No. CS13　　Flow rate Q＝ 185.000 (m³ sec) , Water level hi+Zi＝ 45.820 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)		
1	0.000	49.090	0.0250														
2	1.980	47.370	0.0250				0.000	0.000	0.000								
3	3.210	46.340	0.0250				0.000	0.000	0.000								
4	9.010	44.770	0.0250	1.050			3.879	2.036	4.019								
5	11.840	43.180	0.0250	2.640			2.830	5.221	3.216								
6	14.810	41.720	0.0250	4.100			2.970	10.009	3.309								
7	20.610	40.860	0.0250	4.960			5.800	26.274	5.863								
8	21.710	40.840	0.0250	4.980			1.100	5.467	1.100								
9	26.410	40.840	0.0250	4.980			4.700	23.106	4.700								
10	31.580	41.400	0.0250	4.420			5.170	24.299	5.200								
11	32.210	41.480	0.0250	4.340			0.630	2.759	0.635								
12	38.010	41.620	0.0250	4.200			5.800	24.766	5.802								
13	41.450	41.500	0.0250	4.320			3.140	14.651	3.112								
14	43.810	41.350	0.0250	4.470			2.360	10.372	2.365								
15	49.600	41.070	0.0250	4.750			5.790	26.692	5.797								
16	51.320	41.240	0.0250	4.580			1.720	8.024	1.728								
17	55.400	42.000	0.0250	3.820			4.080	17.136	4.150								
18	61.180	43.690	0.0250	2.130			5.780	17.196	6.022								
19	61.200	43.700	0.0250	2.120			0.020	0.043	0.022								
20	67.000	49.160	0.0250				2.135	2.263	3.009								
21	71.050	50.940	0.0250				0.000	0.000	0.000								
22	72.800	51.040	0.0250				0.000	0.000	0.000								
23	78.600	47.780	0.0250				0.000	0.000	0.000								
24	80.920	47.610	0.0250				0.000	0.000	0.000								
25	82.590	47.660	0.0250				0.000	0.000	0.000								
					1		58.201	220.617	60.110	3.652	0.0250						
						Σ＝	58.204	220.617	60.410	3.652							

Type : Level1a , Bottom level Zb＝ 40.840 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.138

Cross section
of stream Bahr_Yusef_1Sheet_Pile No.CS13
→ Distance Y (m) Scale [1:400]
↓
Elevation Z (m)
Scale [1:200]

Streambed Line
Water surface Line



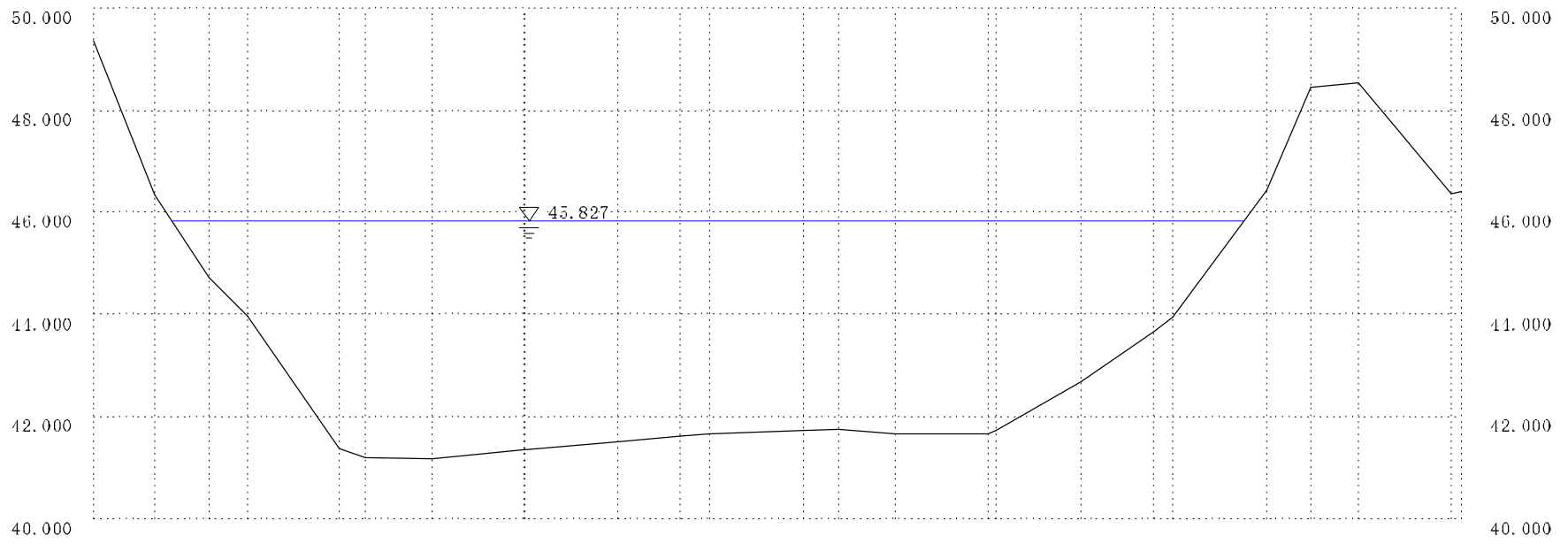
POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m
1	0.000	49.090
2	1.930	47.370
3	3.210	46.340
4	9.010	44.770
5	11.840	43.180
6	14.810	41.720
7	20.610	40.860
8	21.710	40.840
9	26.410	40.840
10	31.580	41.400
11	32.210	41.480
12	38.010	41.620
13	41.450	41.500
14	43.810	41.350
15	49.600	41.070
16	51.320	41.210
17	55.400	42.000
18	61.180	43.690
19	61.200	43.700
20	67.000	49.460
21	71.050	50.940
22	72.800	51.040
23	78.600	47.780
24	80.920	47.610
25	82.590	47.660

Hydraulic value of cross section (1／1)　　Bahr_Yusef_1Sheet_Pile No. CS12　　Flow rate Q＝ 185.000 (m³ sec) , Water level hi+Zi＝ 45.827 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted peri-sbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	0.000	49.360	0.0250														
2	3.810	46.330	0.0250				0.000	0.000	0.000								
3	7.160	44.730	0.0250	1.097			2.296	1.259	2.514								
4	9.610	43.970	0.0250	1.857			2.150	3.618	2.565								
5	15.410	41.380	0.0250	4.447			5.800	18.279	6.352								
6	17.030	41.190	0.0250	4.637			1.620	7.357	1.631								
7	21.210	41.170	0.0250	4.657			4.180	19.423	4.180								
8	26.890	41.350	0.0250	4.477			5.680	25.938	5.683								
9	27.010	41.350	0.0250	4.477			0.120	0.537	0.120								
10	32.810	41.500	0.0250	4.327			5.800	25.529	5.802								
11	36.760	41.610	0.0250	4.217			3.950	16.873	3.952								
12	38.610	41.650	0.0250	4.177			1.850	7.764	1.850								
13	41.410	41.720	0.0250	4.107			5.800	24.021	5.800								
14	46.630	41.750	0.0250	4.077			2.220	9.083	2.220								
15	50.200	41.660	0.0250	4.167			3.570	14.714	3.571								
16	56.000	41.660	0.0250	4.167			5.800	24.166	5.800								
17	56.500	41.710	0.0250	4.117			0.500	2.071	0.502								
18	61.800	42.700	0.0250	3.127			5.300	19.195	5.392								
19	66.370	43.670	0.0250	2.157			4.570	12.072	4.672								
20	67.600	43.950	0.0250	1.877			1.230	2.180	1.261								
21	73.400	46.420	0.0250				4.407	4.135	4.790								
22	76.230	48.460	0.0250				0.000	0.000	0.000								
23	79.200	48.540	0.0250				0.000	0.000	0.000								
24	85.000	46.370	0.0250				0.000	0.000	0.000								
25	85.610	46.100	0.0250				0.000	0.000	0.000								
					1		67.143	238.516	68.688	3.472	0.0250						
						Σ＝	67.143	238.516	68.688	3.472							

Type : Level1a , Bottom level Zb＝ 41.170 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.131

Cross section
of stream Bahr_Yusef_1Sheet_Pile No.CS12
→ Distance Y (m) Scale [1:400]
↓
Elevation Z (m)
Scale [1:125]



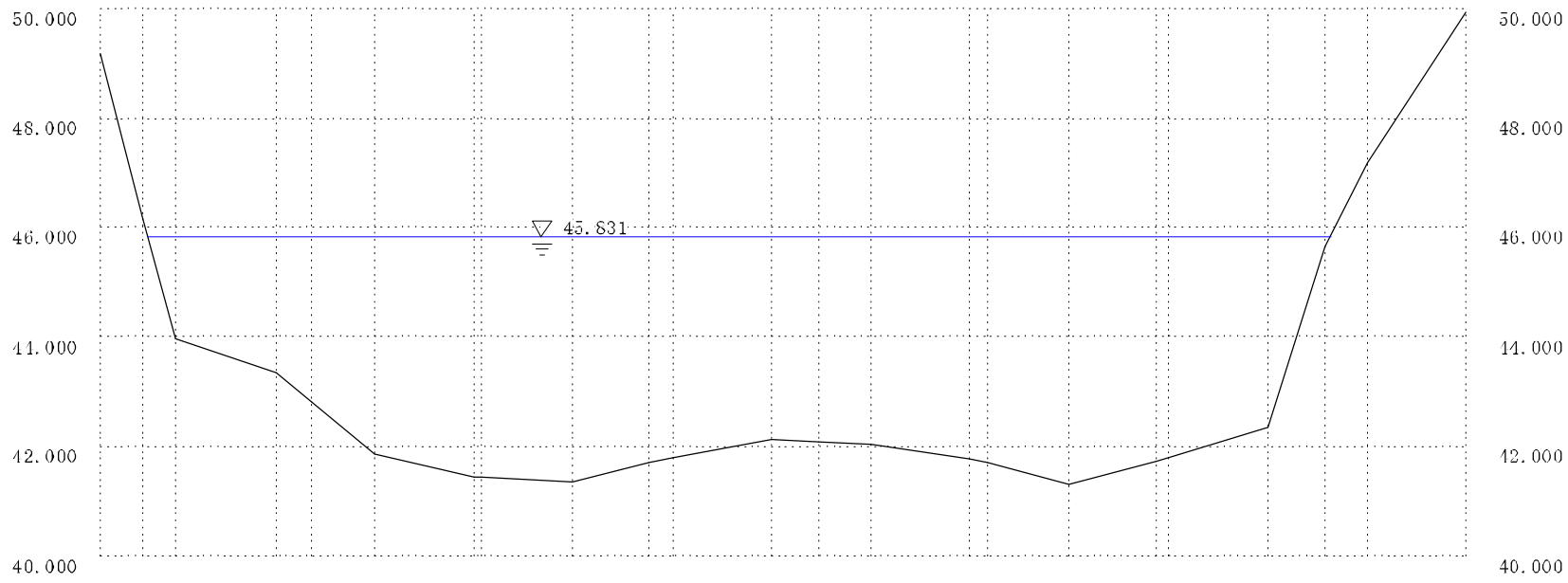
POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m)
1	0.000	49.360
2	3.810	46.330
3	7.160	44.730
4	9.610	43.970
5	15.410	41.380
6	17.030	41.190
7	21.210	41.170
8	26.890	41.350
9	27.010	41.350
10	32.810	41.500
11	36.760	41.610
12	38.610	41.650
13	44.410	41.720
14	46.630	41.750
15	50.200	41.660
16	56.000	41.660
17	56.500	41.710
18	61.800	42.700
19	66.370	43.670
20	67.600	43.950
21	73.400	46.420
22	76.230	48.460
23	79.200	48.540
24	85.000	46.370
25	85.610	46.400

Hydraulic value of cross section (1／1)　　Bahr_Yusef_1Sheet_Pile No. CS11　　Flow rate Q＝ 185.000 (m³ sec) , Water level hi+Zi＝ 45.831 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)	Velocily Ui (m)	Flowrate Qi (m³/sec)
1	0.000	49.180	0.0250														
2	2.470	46.170	0.0250				0.000	0.000	0.000								
3	4.410	43.960	0.0250	1.871			1.642	1.537	2.490								
4	10.210	43.340	0.0250	2.491			5.800	12.650	5.833								
5	12.340	42.810	0.0250	3.021			2.130	5.870	2.195								
6	16.010	41.870	0.0250	3.961			3.670	12.812	3.788								
7	21.810	41.450	0.0250	4.381			5.800	24.192	5.815								
8	22.210	41.440	0.0250	4.391			0.400	1.754	0.400								
9	27.610	41.360	0.0250	4.471			5.400	23.928	5.401								
10	32.070	41.690	0.0250	4.141			4.160	19.205	4.172								
11	33.410	41.810	0.0250	4.021			1.340	5.169	1.315								
12	39.210	42.120	0.0250	3.711			5.800	22.423	5.808								
13	41.940	42.070	0.0250	3.761			2.730	10.200	2.730								
14	45.010	42.040	0.0250	3.791			3.070	11.593	3.070								
15	50.800	41.770	0.0250	4.061			5.790	22.732	5.796								
16	51.810	41.690	0.0250	4.141			1.010	4.142	1.013								
17	56.600	41.320	0.0250	4.511			4.790	20.722	4.804								
18	61.680	41.710	0.0250	4.121			5.080	21.926	5.095								
19	62.400	41.800	0.0250	4.031			0.720	2.935	0.726								
20	68.200	42.360	0.0250	3.471			5.800	21.756	5.827								
21	71.550	45.650	0.0250	0.181			3.350	6.117	4.695								
22	74.000	47.180	0.0250				0.290	0.026	0.342								
23	79.800	49.940	0.0250				0.000	0.000	0.000								
					1		69.072	251.990	71.647	3.517	0.0250						
						Σ＝	69.072	251.990	71.647	3.517							

Type : Level1a , Bottom level Zb＝ 41.320 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.123

Cross section
of stream Bahr_Yusef_1Sheet_Pile No.CS11
→ Distance Y (m) Scale [1:400]
↓
Elevation Z (m)
Scale [1:125]



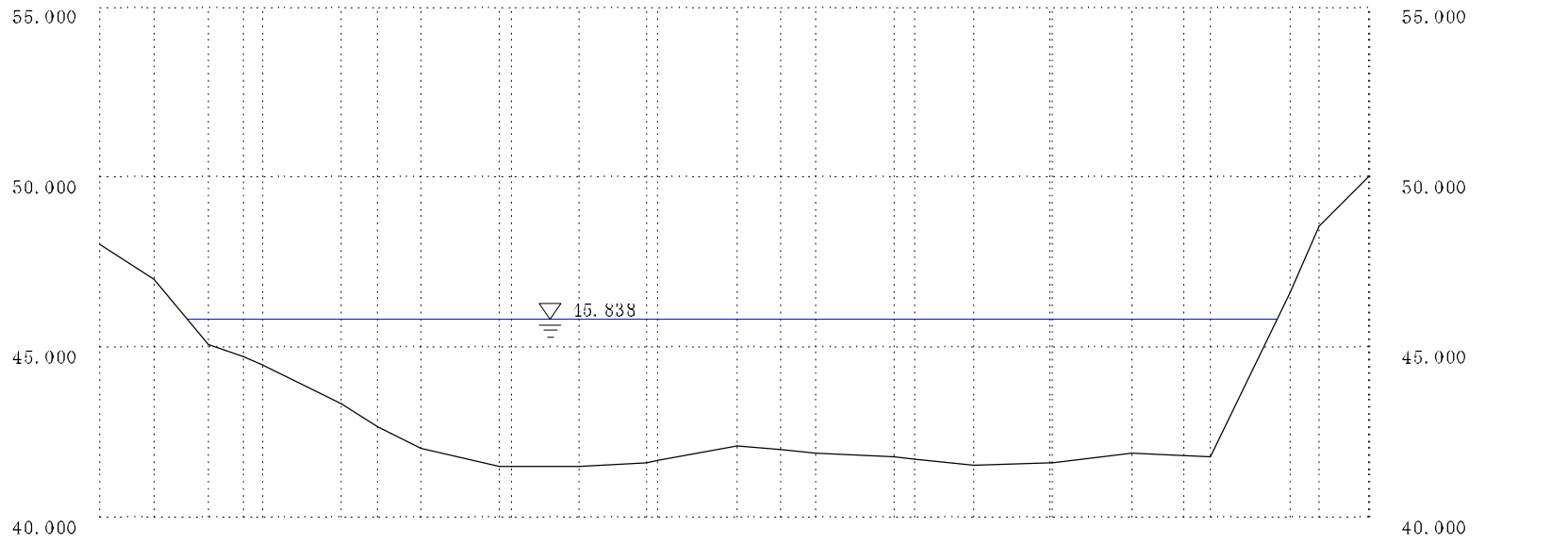
POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m
1	0.000	49.180
2	2.170	46.170
3	4.410	43.960
4	10.210	43.340
5	12.340	42.810
6	16.010	41.870
7	21.810	41.450
8	22.210	41.440
9	27.610	41.360
10	32.070	41.690
11	33.110	41.810
12	39.210	42.120
13	41.940	42.070
14	45.010	42.040
15	50.800	41.770
16	51.810	41.690
17	56.600	41.320
18	61.680	41.710
19	62.400	41.800
20	68.200	42.360
21	71.550	45.650
22	74.000	47.180
23	79.800	49.940

Hydraulic value of cross section (1／1)　　Bahr_Yusef_1Sheet_Pile　No. CS10　　Flow rate Q＝ 185.000 (m³/sec) , Water level hi+Zi＝ 45.838 (m)

POINT No.	Hori-zontal distance Yj (m)	Bottom elevation of stream Zj (m)	Rough-ness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted peri-sbjr Sbi (m)	Hydrulic radius Ri (m)	Rough-ness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	-8.000	48.000	0.0250														
2	-4.000	47.000	0.0250				0.000	0.000	0.000								
3	0.000	45.070	0.0250	0.768			1.591	0.611	1.767								
4	2.520	44.700	0.0250	1.138			2.520	2.401	2.547								
5	3.940	44.480	0.0250	1.358			1.420	1.772	1.437								
6	9.740	43.340	0.0250	2.498			5.800	11.181	5.911								
7	12.390	42.650	0.0250	3.188			2.650	7.534	2.738								
8	15.540	41.990	0.0250	3.848			3.150	11.081	3.218								
9	21.340	41.510	0.0250	4.328			5.800	23.709	5.820								
10	22.260	41.490	0.0250	4.348			0.920	3.991	0.920								
11	27.140	41.510	0.0250	4.328			4.880	21.169	4.880								
12	32.210	41.610	0.0250	4.228			5.070	21.689	5.071								
13	32.940	41.660	0.0250	4.178			0.730	3.068	0.732								
14	38.740	42.110	0.0250	3.728			5.800	22.926	5.817								
15	41.990	41.980	0.0250	3.858			3.250	12.327	3.253								
16	44.540	41.870	0.0250	3.968			2.550	9.978	2.552								
17	50.340	41.760	0.0250	4.078			5.800	23.332	5.801								
18	51.860	41.710	0.0250	4.128			1.520	6.236	1.521								
19	56.140	41.540	0.0250	4.298			4.280	18.031	4.283								
20	61.730	41.610	0.0250	4.228			5.590	23.829	5.590								
21	61.940	41.610	0.0250	4.228			0.210	0.888	0.210								
22	67.740	41.870	0.0250	3.968			5.800	23.767	5.806								
23	71.600	41.790	0.0250	4.048			3.860	15.470	3.861								
24	73.540	41.760	0.0250	4.078			1.940	7.882	1.940								
25	79.340	46.620	0.0250				4.867	9.923	6.349								
26	81.460	48.540	0.0250				0.000	0.000	0.000								
27	85.140	50.020	0.0250				0.000	0.000	0.000								
28	85.260	50.020	0.0250				0.000	0.000	0.000								
					1		79.998	282.796	82.026	3.448	0.0250						
						Σ＝	79.998	282.796	82.026	3.448							

Type : Level1a　　, Bottom level Zb＝ 41.490 (m) , Energy regulation factor α＝ 1.000 ,　Froude number Fr＝ 0.111

Cross section
of stream Bahr_Yusef_1Sheet_Pile No.CS10
→ Distance Y (m) Scale 1:500
↓
Elevation Z (m)
Scale 1:200



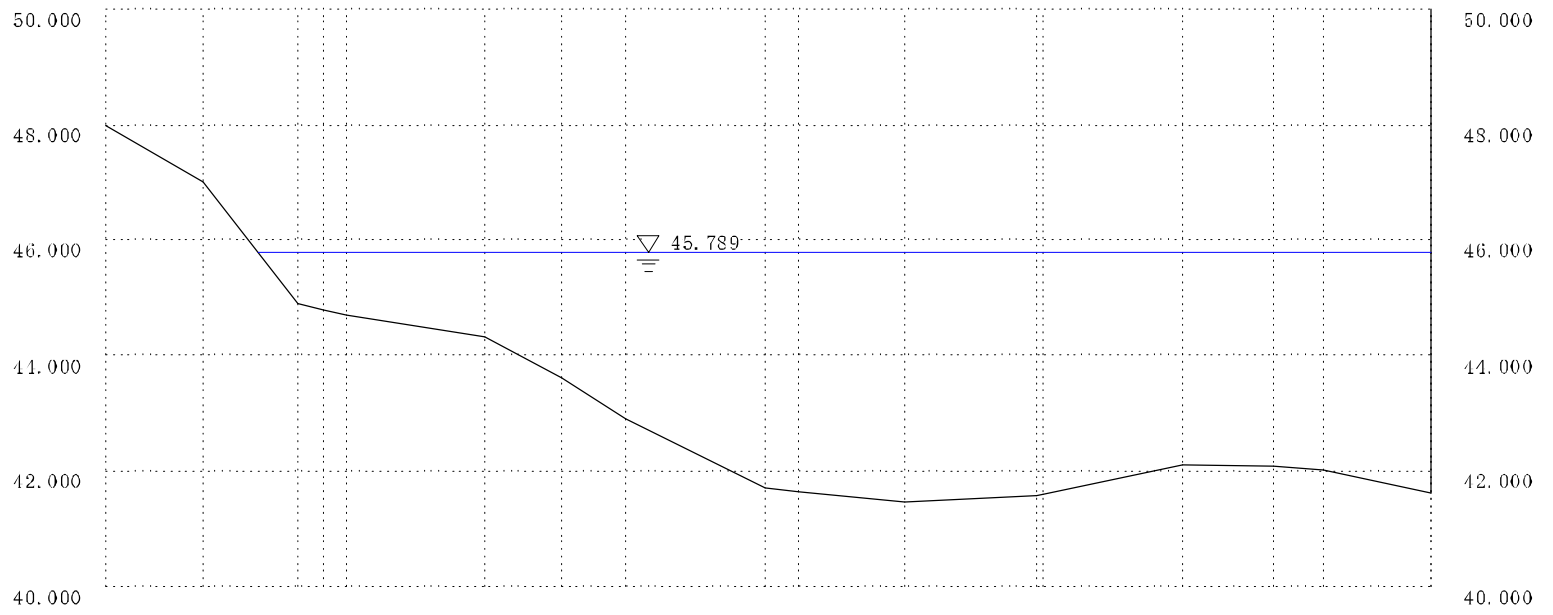
POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m
1	-8.000	48.000
2	-4.000	47.000
3	0.000	45.070
4	2.520	44.700
5	3.940	44.480
6	9.710	43.340
7	12.390	42.650
8	15.510	41.990
9	21.310	41.510
10	22.260	41.490
11	27.110	41.510
12	32.210	41.610
13	32.910	41.660
14	38.740	42.110
15	41.990	41.980
16	44.540	41.870
17	50.310	41.760
18	51.860	41.710
19	56.110	41.540
20	61.730	41.610
21	61.940	41.610
22	67.710	41.870
23	71.600	41.790
24	73.510	41.760
25	79.310	46.620
26	81.160	48.540
27	85.110	50.020
28	85.260	50.020

Hydraulic value of cross section (1／1)　　Bahr_Yusef_1Sheet_Pile　No. CS9　　Flow rate Q＝ 185.000 (m³/sec) , Water level hi+Zi＝ 45.789 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perimeter sbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter: Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)	Velocily Ui (m)	Flowrate Qi (m³/sec)
1	-8.000	48.000	0.0250														
2	-4.000	47.000	0.0250				0.000	0.000	0.000								
3	0.000	44.900	0.0250	0.889			1.693	0.752	1.912								
4	1.050	44.790	0.0250	0.999			1.050	0.991	1.056								
5	1.960	44.700	0.0250	1.089			0.910	0.950	0.914								
6	7.760	44.330	0.0250	1.459			5.800	7.388	5.812								
7	10.920	43.620	0.0250	2.169			3.160	5.732	3.239								
8	13.560	42.900	0.0250	2.889			2.640	6.676	2.736								
9	19.360	41.700	0.0250	4.089			5.800	20.235	5.923								
10	20.790	41.630	0.0250	4.159			1.430	5.897	1.432								
11	25.160	41.460	0.0250	4.329			4.370	18.545	4.373								
12	30.650	41.580	0.0250	4.209			5.490	23.436	5.491								
13	30.960	41.600	0.0250	4.189			0.310	1.302	0.311								
14	36.760	42.090	0.0250	3.699			5.800	22.874	5.821								
15	40.520	42.080	0.0250	3.709			3.760	13.926	3.760								
16	42.560	42.010	0.0250	3.779			2.040	7.637	2.041								
17	47.000	41.620	0.0250	4.169			4.440	17.644	4.457								
18	47.000	50.000	0.0250				0.000	0.000	4.169								
					1		48.693	153.986	53.447	2.881	0.0250						
						Σ＝	48.693	153.986	53.447	2.881							

Type : Level1a　　, Bottom level Zb＝ 41.460 (m) , Energy regulation factor α＝ 1.000 ,　　Froude number Fr＝ 0.216

Cross section
of stream Bahr_Yusef_1Sheet_Pile No.CS9
→ Distance Y (m) Scale [1:300]
↓
Elevation Z (m)
Scale [1:125]



POINT No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Horizontal distance Yi (m)	-8.000	-4.000	0.000	1.050	1.960	7.760	10.920	13.360	19.360	20.790	25.160	30.650	30.960	36.760	40.320	42.360	47.000	47.000
Bottom elevation of stream Zi (m)	48.000	47.000	44.900	44.790	44.700	44.330	43.620	42.900	41.700	41.630	41.460	41.580	41.000	42.090	42.080	42.010	41.620	50.000

Hydraulic value of cross section (1／1)　　Bahr_Yusef_1Sheet_Pile　No. CS8　　Flow rate Q＝ 185.000 (m³/sec) , Water level hi+Zi＝ 45.729 (m)

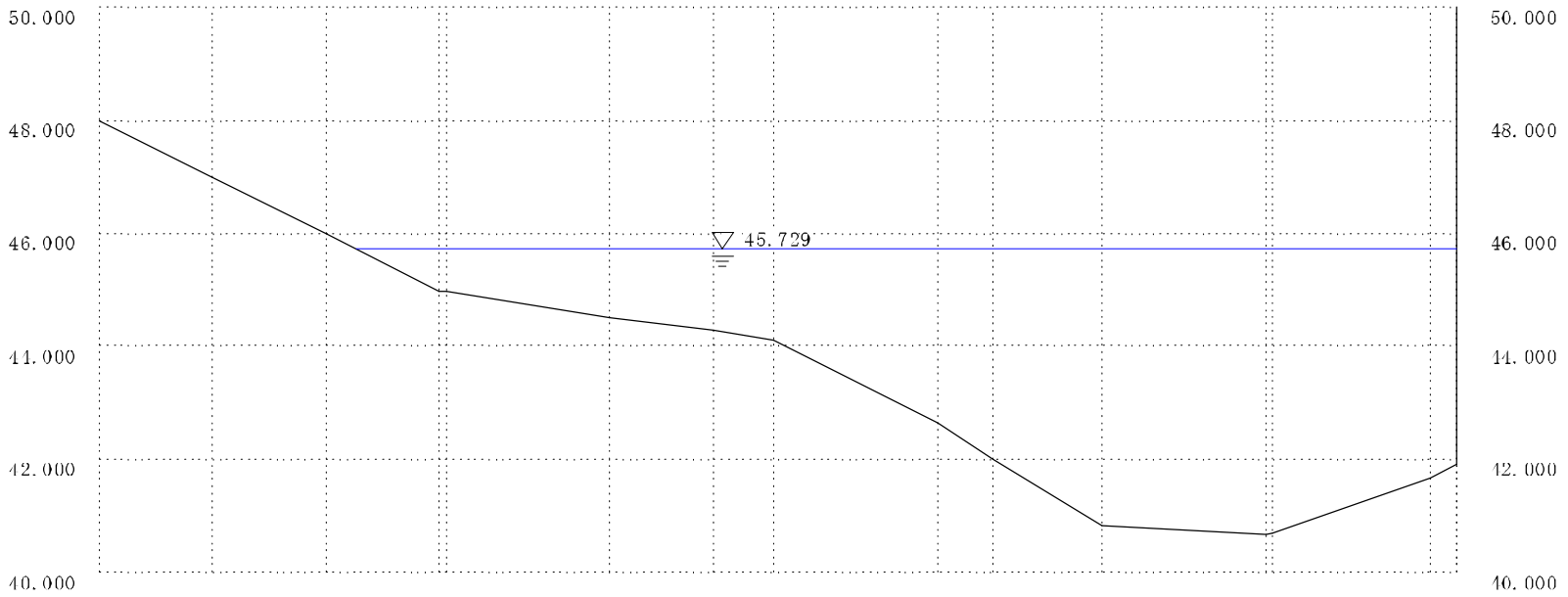
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter: Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)	Velocily Ui (m)	Flowrate Qi (m³/sec)
1	-12.000	48.000	0.0250														
2	-8.000	47.000	0.0250				0.000	0.000	0.000								
3	-4.000	46.000	0.0250				0.000	0.000	0.000								
4	0.000	44.970	0.0250	0.759			2.947	1.118	3.043								
5	0.270	44.950	0.0250	0.779			0.270	0.208	0.271								
6	6.070	44.500	0.0250	1.229			5.800	5.822	5.817								
7	9.740	44.270	0.0250	1.459			3.670	4.932	3.677								
8	11.870	44.100	0.0250	1.629			2.130	3.288	2.137								
9	17.670	42.640	0.0250	3.089			5.800	13.681	5.981								
10	19.600	42.000	0.0250	3.729			1.930	6.579	2.033								
11	23.470	40.840	0.0250	4.889			3.870	16.675	4.040								
12	29.270	40.660	0.0250	5.069			5.800	28.877	5.803								
13	29.470	40.700	0.0250	5.029			0.200	1.010	0.204								
14	35.070	41.650	0.0250	4.079			5.600	25.502	5.680								
15	36.000	41.900	0.0250	3.829			0.930	3.677	0.963								
16	36.000	50.000	0.0250				0.000	0.000	3.829								
					1		38.947	111.370	43.478	2.562	0.0250						
						Σ＝	38.947	111.370	43.478	2.562							

Type : Level1a , Bottom level Zb＝ 40.660 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.314

Cross section
of stream Bahr_Yusef_ISheet_Pile No.CS8
→ Distance Y (m) Scale [1:250]

Elevation Z (m)
Scale [1:125]

Streambed Line
Water surface Line



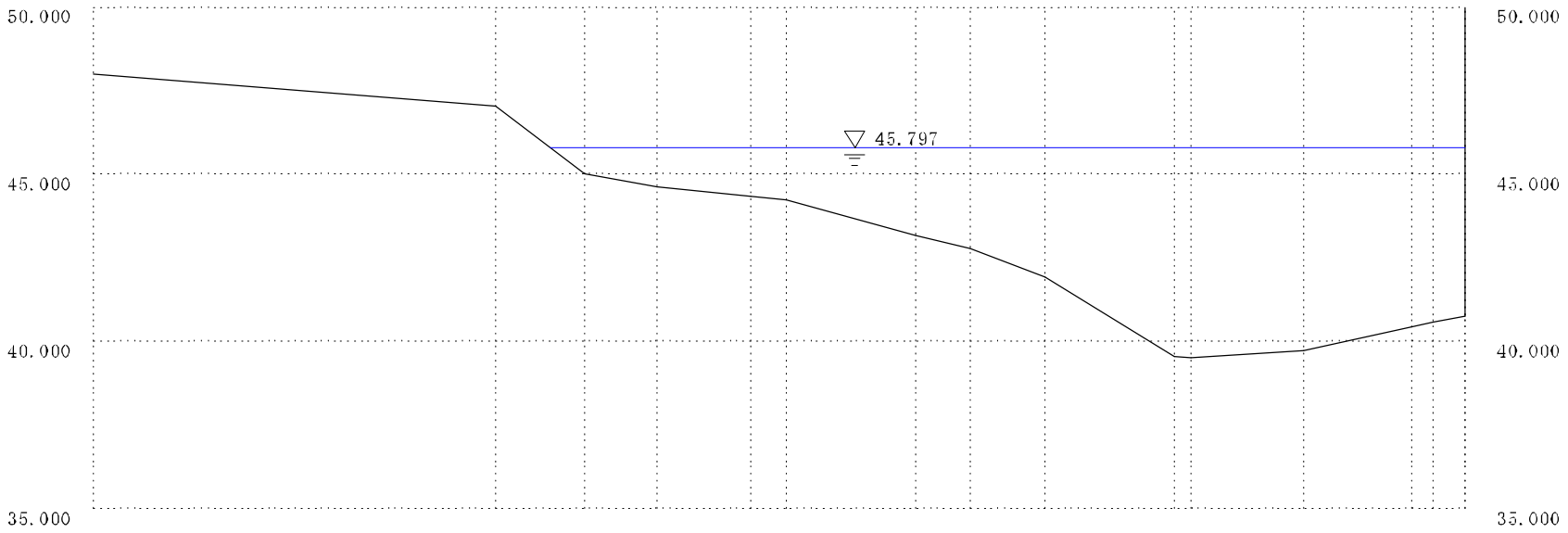
POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m)
1	-12.000	48.000
2	-8.000	47.000
3	-4.000	46.000
4	0.000	44.970
5	0.270	44.950
6	6.070	44.500
7	9.740	44.270
8	11.870	44.100
9	17.670	42.640
10	19.600	42.000
11	23.470	40.840
12	29.270	40.660
13	29.470	40.700
14	35.070	41.650
15	36.000	41.900
16	36.000	50.000

Hydraulic value of cross section (1／1)　　Bahr_Yusef_1Sheet_Pile No. CS7　　Flow rate Q＝ 185.000 (m³ sec) , Water level hi+Zi＝ 45.797 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perimeter Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)	Velocily Ui (m)	Flowrate Qi (m³/sec)
1	-22.000	48.000	0.0250														
2	-1.000	47.000	0.0250				0.000	0.000	0.000								
3	0.000	46.020	0.0250	0.777			1.570	0.610	1.751								
4	3.280	44.590	0.0250	1.207			3.280	3.251	3.308								
5	7.460	44.320	0.0250	1.477			4.180	5.609	1.189								
6	9.080	44.210	0.0250	1.587			1.620	2.482	1.624								
7	14.880	43.150	0.0250	2.647			5.800	12.278	5.896								
8	17.330	42.750	0.0250	3.047			2.450	6.975	2.482								
9	20.680	41.930	0.0250	3.867			3.350	11.581	3.419								
10	26.480	39.560	0.0250	6.237			5.800	29.301	6.266								
11	27.200	39.510	0.0250	6.287			0.720	4.509	0.722								
12	32.280	39.720	0.0250	6.077			5.080	31.404	5.084								
13	37.070	40.120	0.0250	5.377			4.790	27.132	1.811								
14	38.080	40.570	0.0250	5.227			1.010	5.355	1.021								
15	39.500	40.730	0.0250	5.067			1.420	7.309	1.429								
16	39.500	50.000	0.0250				0.000	0.000	5.067								
					1		41.070	148.100	47.129	3.142	0.0250						
						Σ＝	41.070	148.100	47.129	3.142							

Type : Level1a　　, Bottom level Zb＝ 39.510 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.210

Cross section
of stream Bahr_Yusef_1Sheet_Pile No.CS7
→ Distance Y (m) Scale [1:300]
↓
Elevation Z (m)
Scale [1:200]



POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m
1	-22.000	48.000
2	-4.000	47.000
3	0.000	45.020
4	3.230	44.590
5	7.160	44.320
6	9.080	44.210
7	14.830	43.150
8	17.330	42.750
9	20.630	41.930
10	26.430	39.560
11	27.200	39.510
12	32.230	39.720
13	37.070	40.420
14	38.080	40.570
15	39.300	40.730
16	39.300	50.000

Hydraulic value of cross section (1／1)　　Bahr_Yusef_1Sheet_Pile No. CS6　　Flow rate Q＝ 185.000 (m³ sec) , Water level hi+Zi＝ 45.815 (m)

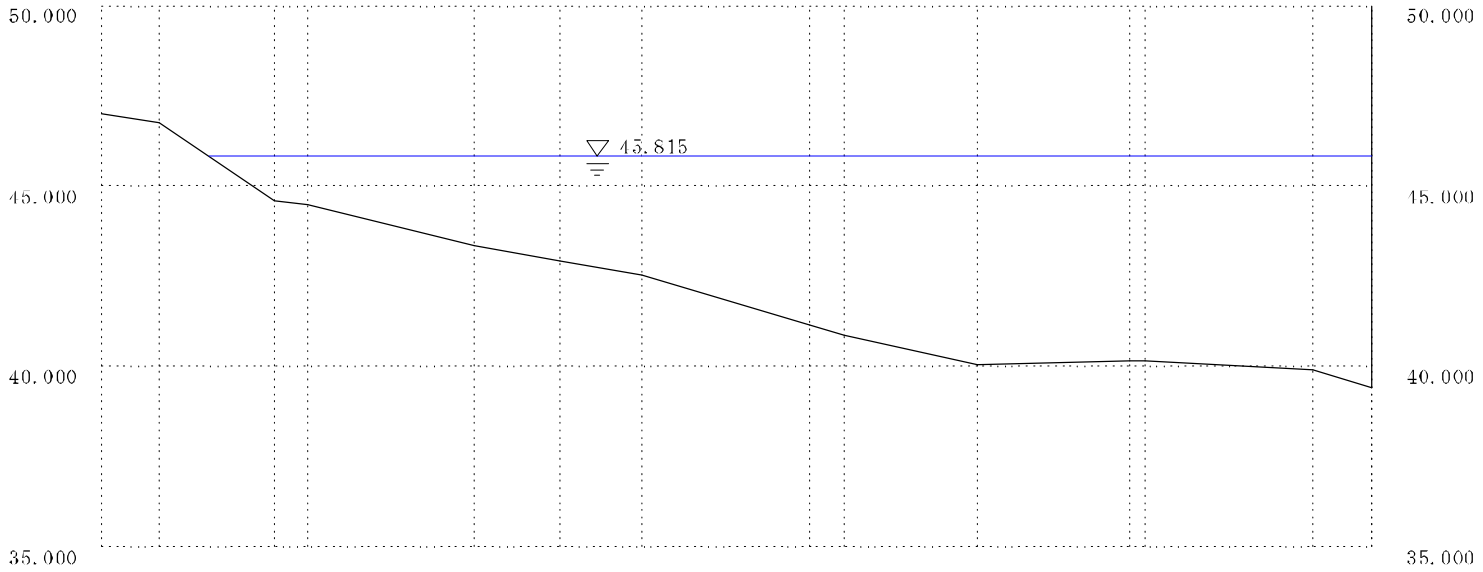
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perimeter Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter: Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)	Velocily Ui (m)	Flowrate Qi (m³/sec)
1	-2.000	47.000	0.0250														
2	0.000	46.740	0.0250				0.000	0.000	0.000								
3	3.990	44.600	0.0250	1.215			2.266	1.377	2.571								
4	5.100	44.460	0.0250	1.355			1.110	1.427	1.119								
5	10.900	43.350	0.0250	2.465			5.800	11.079	5.905								
6	13.860	42.900	0.0250	2.915			2.960	7.963	2.994								
7	16.700	42.520	0.0250	3.295			2.840	8.819	2.865								
8	22.500	41.130	0.0250	4.685			5.800	23.143	5.964								
9	23.730	40.870	0.0250	4.945			1.230	5.923	1.257								
10	28.300	40.060	0.0250	5.755			4.570	24.150	4.641								
11	33.600	40.140	0.0250	5.675			5.300	30.290	5.301								
12	34.100	40.150	0.0250	5.665			0.500	2.835	0.500								
13	39.900	39.880	0.0250	5.935			5.800	33.641	5.806								
14	42.000	39.410	0.0250	6.405			2.100	12.957	2.152								
15	42.000	50.000	0.0250				0.000	0.000	6.405								
					1		40.276	163.902	47.481	3.452	0.0250						
						Σ＝	40.276	163.902	47.481	3.452							

Type : Level1a　　, Bottom level Zb＝ 39.410 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.179

Cross section
of stream Bahr_Yusef_ISheet_Pile No.CS6
→ Distance Y (m) Scale [1:250]

Elevation Z (m)
Scale [1:200]

Streambed Line
Water surface Line



POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m)
1	-2.000	47.000
2	0.000	46.740
3	3.990	44.600
4	5.100	44.460
5	10.900	43.350
6	13.860	42.900
7	16.700	42.520
8	22.500	41.130
9	23.730	40.870
10	28.300	40.060
11	33.600	40.140
12	34.100	40.150
13	39.900	39.880
14	42.000	39.410
15	12.000	50.000

Hydraulic value of cross section (1／1)　　Bahr_Yusef_1Sheet_Pile No. CS5　　Flow rate Q＝ 185.000 (m³ sec) , Water level hi+Zi＝ 45.806 (m)

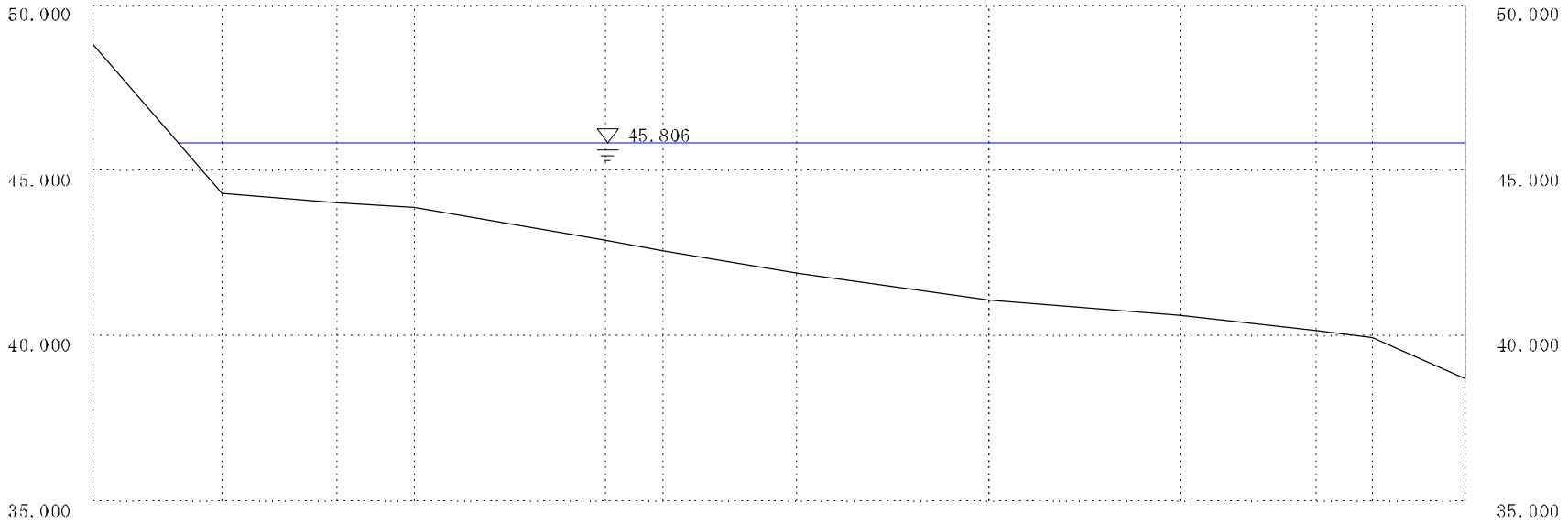
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perimeter Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)		
1	0.000	48.810	0.0250														
2	3.890	44.280	0.0250	1.526			1.310	0.999	2.011								
3	7.360	44.030	0.0250	1.776			3.470	5.727	3.479								
4	9.690	43.890	0.0250	1.916			2.330	4.300	2.334								
5	15.490	42.860	0.0250	2.945			5.800	14.097	5.891								
6	17.230	42.570	0.0250	3.236			1.740	5.377	1.764								
7	21.290	41.870	0.0250	3.936			4.060	14.557	4.120								
8	27.090	41.080	0.0250	4.725			5.800	25.117	5.854								
9	27.100	41.080	0.0250	4.725			0.010	0.047	0.010								
10	32.890	40.600	0.0250	5.206			5.790	28.750	5.810								
11	36.970	40.140	0.0250	5.666			4.080	22.177	4.106								
12	38.690	39.930	0.0250	5.876			1.720	9.925	1.733								
13	41.500	38.710	0.0250	7.096			2.810	18.221	3.063								
14	41.500	50.000	0.0250				0.000	0.000	7.096								
					1		38.920	149.299	47.270	3.158	0.0250						
						Σ＝	38.920	149.299	47.270	3.158							

Type : Level1a , Bottom level Zb＝ 38.710 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.202

Cross section
of stream Bahr_Yusef_ISheet_Pile No.CS5
→ Distance Y (m) Scale [1:200]

Elevation Z (m)
Scale [1:200]

Streambed Line
Water surface Line



POINT No.	Horizontal distance Yi (m	Bottom elevation of stream Zi (m
1	0.000	48.810
2	3.390	44.280
3	7.360	44.030
4	9.690	43.890
5	15.490	42.860
6	17.230	42.570
7	21.290	41.870
8	27.090	41.080
9	27.100	41.080
10	32.890	40.600
11	36.970	40.140
12	38.690	39.930
13	41.500	38.710
14	41.500	50.000

Hydraulic value of cross section (1／1)　　Bahr_Yusef_1Sheet_Pile No. CS4　　Flow rate Q＝ 185.000 (m³ sec) , Water level hi+Zi＝ 45.797 (m)

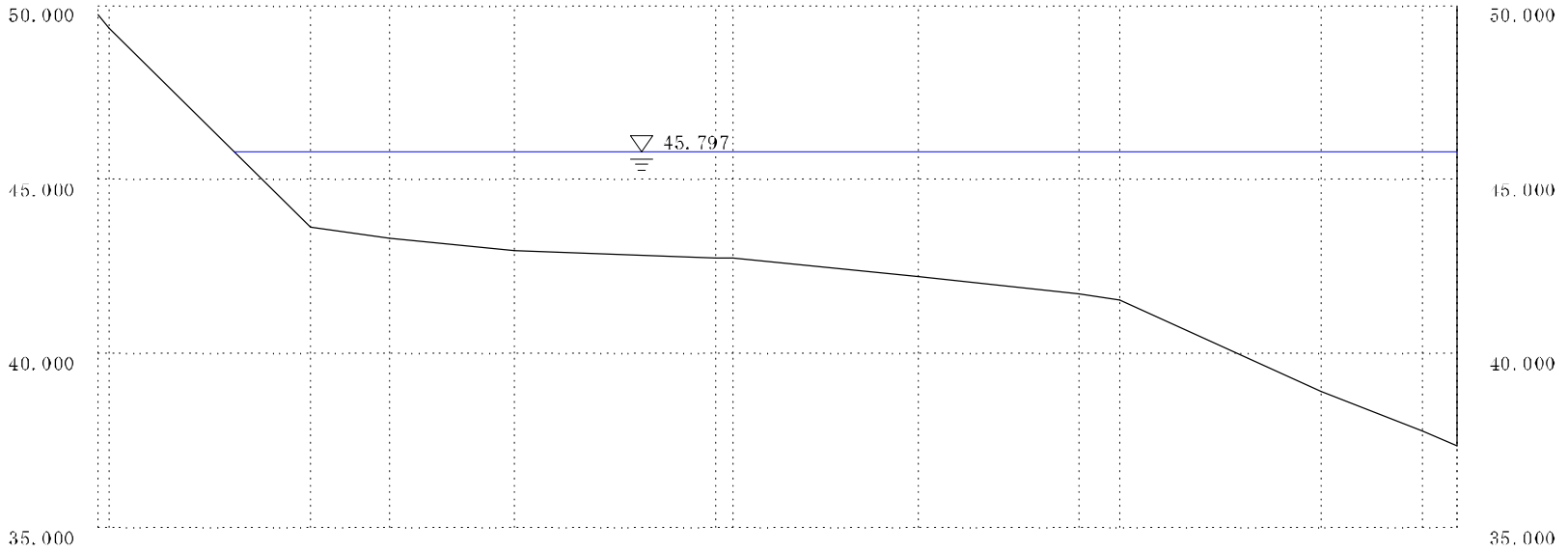
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	0.000	49.710	0.0250														
2	0.320	49.340	0.0250				0.000	0.000	0.000								
3	6.120	43.600	0.0250	2.197			2.220	2.440	3.124								
4	8.380	43.320	0.0250	2.477			2.260	5.283	2.277								
5	11.920	42.940	0.0250	2.857			3.540	9.143	3.560								
6	17.720	42.740	0.0250	3.057			5.800	17.153	5.803								
7	18.250	42.720	0.0250	3.077			0.530	1.626	0.530								
8	23.520	42.190	0.0250	3.607			5.270	17.615	5.297								
9	28.120	41.720	0.0250	4.077			4.600	17.675	4.624								
10	29.320	41.510	0.0250	4.287			1.200	5.019	1.218								
11	35.120	38.890	0.0250	6.907			5.800	32.165	6.364								
12	37.990	37.770	0.0250	8.027			2.870	21.432	3.081								
13	39.000	37.340	0.0250	8.457			1.010	8.325	1.098								
14	39.000	50.000	0.0250				0.000	0.000	8.457								
					1		35.100	138.475	45.434	3.048	0.0250						
						Σ＝	35.100	138.475	45.434	3.048							

Type : Level1a　　, Bottom level Zb＝ 37.340 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.215

Cross section
of stream Bahr_Yusef_ISheet_Pile No.CS4
→ Distance Y (m) Scale [1:200]

Elevation Z (m)
Scale [1:200]

Streambed Line
Water surface Line



POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m
1	0.000	49.710
2	0.320	49.340
3	6.120	43.600
4	8.380	43.320
5	11.920	42.940
6	17.720	42.740
7	18.250	42.720
8	23.520	42.190
9	28.120	41.720
10	29.320	41.510
11	35.120	38.890
12	37.990	37.770
13	39.000	37.340
14	39.000	50.000

Hydraulic value of cross section (1／1)　　Bahr_Yusef_1Sheet_Pile No. CS3　　Flow rate Q＝ 185.000 (m³ sec) , Water level hi+Zi＝ 45.848 (m)

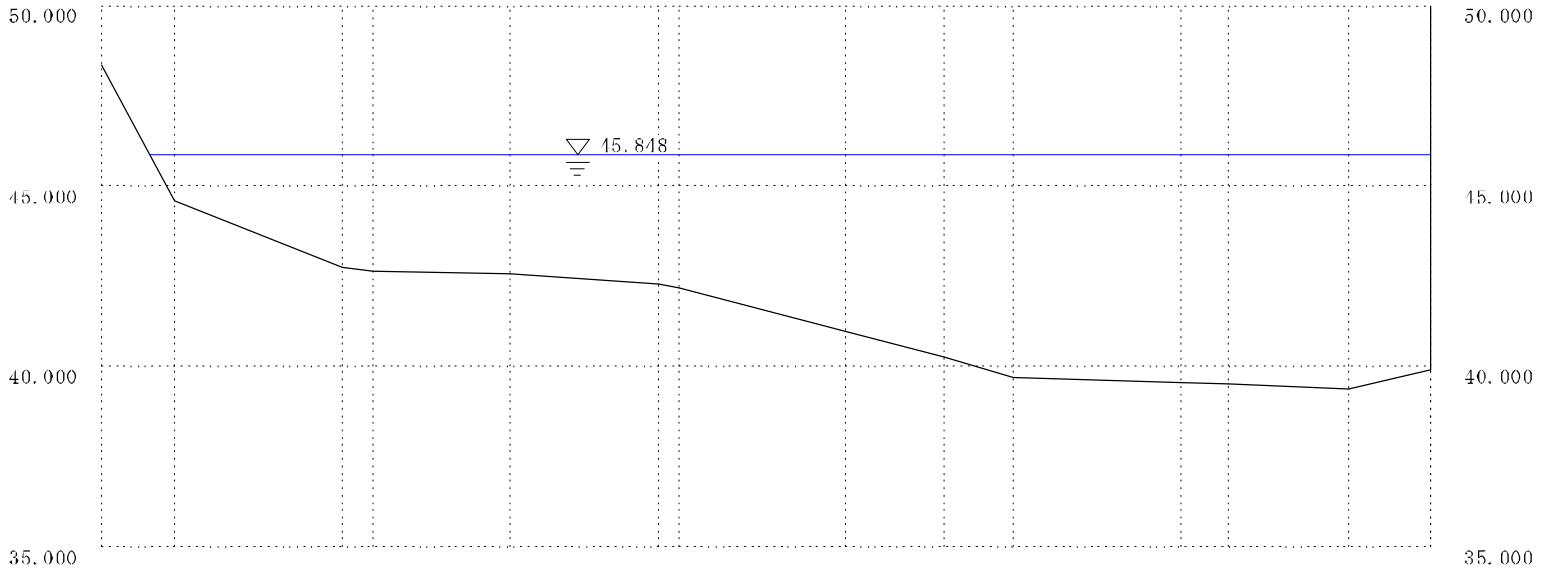
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	0.000	48.330	0.0250														
2	2.560	44.600	0.0250	1.248			0.857	0.535	1.514								
3	8.360	42.740	0.0250	3.108			5.800	12.633	6.091								
4	9.400	42.620	0.0250	3.228			1.040	3.295	1.047								
5	11.160	42.560	0.0250	3.288			4.760	15.509	4.760								
6	19.270	42.250	0.0250	3.598			5.110	17.594	5.119								
7	19.960	42.160	0.0250	3.688			0.690	2.514	0.696								
8	25.760	40.980	0.0250	4.868			5.800	24.813	5.919								
9	29.140	40.240	0.0250	5.608			3.380	17.705	3.160								
10	31.560	39.680	0.0250	6.168			2.420	14.249	2.484								
11	37.360	39.540	0.0250	6.308			5.800	36.181	5.802								
12	39.000	39.500	0.0250	6.348			1.640	10.378	1.640								
13	43.160	39.370	0.0250	6.478			4.160	26.678	4.162								
14	46.000	39.890	0.0250	5.958			2.840	17.659	2.887								
15	46.000	50.000	0.0250				0.000	0.000	5.958								
					1		44.297	199.743	51.540	3.876	0.0250						
						Σ＝	44.297	199.743	51.540	3.876							

Type : Level1a　　, Bottom level Zb＝ 39.370 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.139

Cross section
of stream Bahr_Yusef_ISheet_Pile No.CS3
→ Distance Y (m) Scale [1:250]

Elevation Z (m)
Scale [1:200]

Streambed Line
Water surface Line



POINT No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Horizontal distance Yi (m	0.000	2.560	8.360	9.400	14.160	19.270	19.960	25.760	29.140	31.560	37.360	39.000	43.160	46.000	46.000
Bottom elevation of stream Zi (m	48.330	44.600	42.740	42.620	42.560	42.250	42.160	40.980	40.240	39.680	39.540	39.500	39.370	39.890	50.000

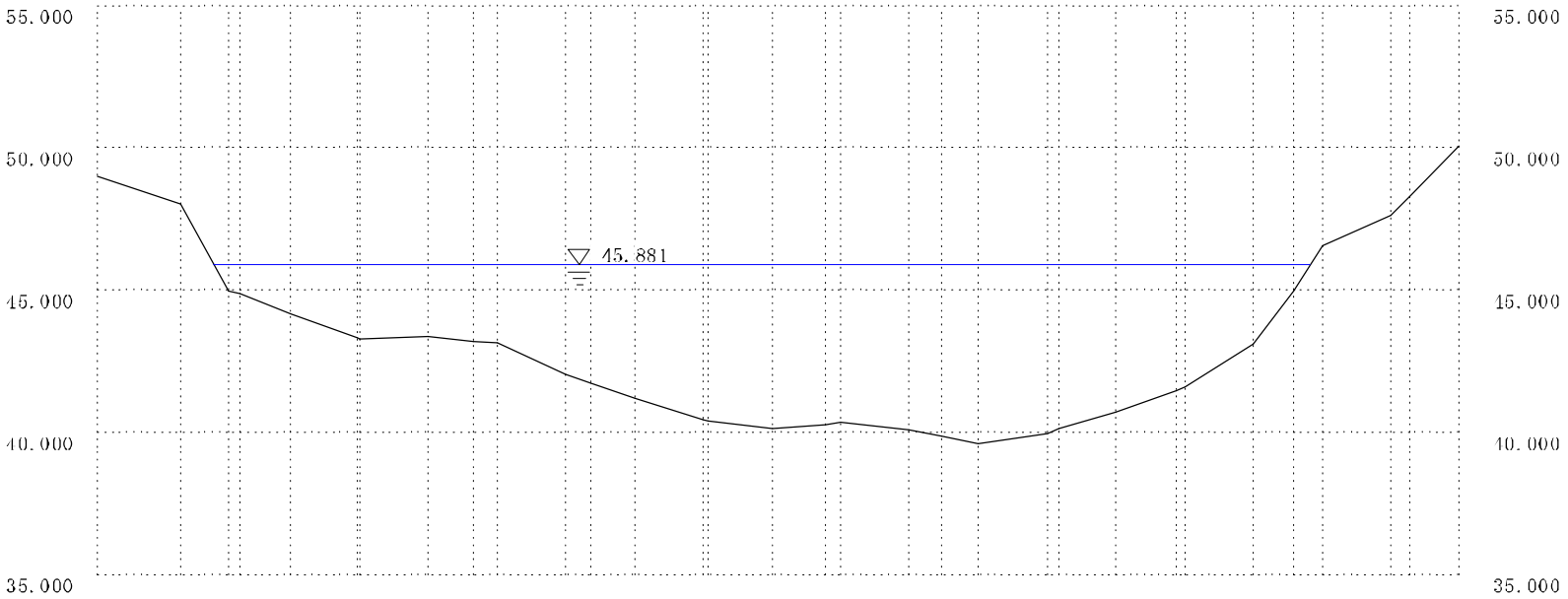
Hydraulic value of cross section (1／1)　　Bahr_Yusef_1Sheet_Pile No. CS2　　Flow rate Q＝ 185.000 (m³ sec) , Water level hi+Zi＝ 45.881 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	-11.000	49.000	0.0250														
2	-1.000	48.000	0.0250				0.000	0.000	0.000								
3	0.000	47.970	0.0250	0.911			1.202	0.547	1.508								
4	0.990	47.870	0.0250	1.011			0.990	0.951	0.995								
5	5.240	47.180	0.0250	1.701			4.250	5.762	1.306								
6	10.860	43.330	0.0250	2.551			5.620	11.946	5.684								
7	11.040	43.310	0.0250	2.571			0.180	0.461	0.181								
8	16.840	43.380	0.0250	2.501			5.800	14.707	5.800								
9	20.730	43.240	0.0250	2.641			3.890	10.000	3.893								
10	22.640	43.130	0.0250	2.751			1.910	5.149	1.913								
11	28.440	42.020	0.0250	3.861			5.800	19.173	5.905								
12	30.600	41.730	0.0250	4.151			2.160	8.652	2.179								
13	31.240	41.200	0.0250	4.681			3.640	16.073	3.678								
14	40.040	40.450	0.0250	5.431			5.800	29.323	5.848								
15	40.460	40.410	0.0250	5.471			0.420	2.289	0.422								
16	45.840	40.140	0.0250	5.741			5.380	30.158	5.387								
17	50.330	40.310	0.0250	5.571			4.190	25.391	4.193								
18	51.640	40.400	0.0250	5.481			1.310	7.239	1.313								
19	57.440	40.090	0.0250	5.791			5.800	32.687	5.808								
20	60.200	39.870	0.0250	6.011			2.760	16.286	2.769								
21	63.240	39.610	0.0250	6.271			3.040	18.668	3.051								
22	69.030	39.970	0.0250	5.911			5.790	35.265	5.801								
23	70.070	40.140	0.0250	5.741			1.040	6.059	1.054								
24	71.830	40.740	0.0250	5.141			4.760	25.898	4.798								
25	79.940	41.480	0.0250	4.401			5.110	24.378	5.163								
26	80.630	41.620	0.0250	4.261			0.690	2.988	0.704								
27	86.430	43.100	0.0250	2.781			5.800	20.120	5.986								
28	89.800	44.950	0.0250	0.931			3.370	6.251	3.844								
29	92.230	46.560	0.0250				1.105	0.651	1.685								
30	98.030	47.630	0.0250				0.000	0.000	0.000								
31	99.670	48.330	0.0250				0.000	0.000	0.000								
32	103.830	50.080	0.0250				0.000	0.000	0.000								
					1		92.407	377.378	94.170	4.007	0.0250						
						Σ＝	92.407	377.378	94.170	4.007							

Type : Level1a　　, Bottom level Zb＝ 39.610 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.077

Cross section
of stream Bahr_Yusef_1Sheet_Pile No.CS2
→ Distance Y (m) Scale [1:600]
↓
Elevation Z (m)
Scale [1:250]

Streambed Line
Water surface Line



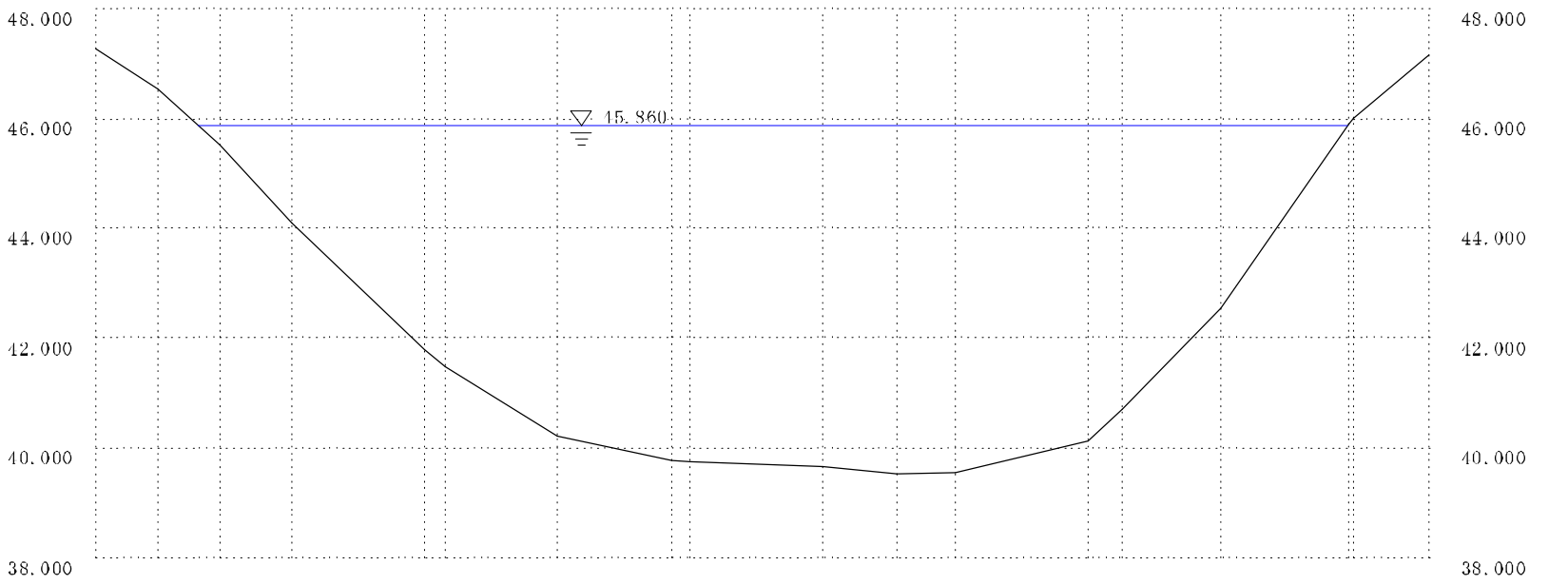
POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m
1	-11.000	49.000
2	-4.000	48.000
3	0.000	44.970
4	0.990	44.870
5	5.240	44.180
6	10.860	43.330
7	11.040	43.310
8	16.840	43.380
9	20.730	43.240
10	22.610	43.130
11	23.440	42.020
12	30.600	41.730
13	34.210	41.200
14	40.040	40.450
15	40.160	40.410
16	45.810	40.140
17	50.330	40.310
18	51.640	40.400
19	57.440	40.090
20	60.200	39.870
21	63.240	39.610
22	69.030	39.970
23	70.070	40.140
24	74.830	40.740
25	79.940	41.480
26	80.630	41.620
27	86.430	43.100
28	89.800	44.950
29	92.230	46.560
30	98.030	47.630
31	99.670	48.330
32	103.830	50.080

Hydraulic value of cross section (1／1)　　Bahr_Yusef_1Sheet_Pile No. CS1　　Flow rate Q＝ 185.000 (m³ sec) , Water level hi+Zi＝ 45.860 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)		
1	0.000	47.270	0.0250														
2	2.720	46.530	0.0250				0.000	0.000	0.000								
3	5.400	45.510	0.0250	0.350			0.918	0.160	0.983								
4	8.520	44.100	0.0250	1.760			3.120	3.290	3.124								
5	11.320	41.800	0.0250	4.060			5.800	16.875	6.239								
6	15.260	41.470	0.0250	4.390			0.940	3.971	0.996								
7	20.120	40.230	0.0250	5.630			4.860	24.346	5.016								
8	25.130	39.770	0.0250	6.090			5.010	29.356	5.031								
9	25.920	39.750	0.0250	6.110			0.790	4.819	0.790								
10	31.720	39.650	0.0250	6.210			5.800	35.725	5.801								
11	35.000	39.530	0.0250	6.330			3.280	20.561	3.282								
12	37.520	39.540	0.0250	6.320			2.520	15.938	2.520								
13	43.320	40.130	0.0250	5.730			5.800	34.942	5.830								
14	44.870	40.720	0.0250	5.140			1.550	8.424	1.658								
15	49.120	42.540	0.0250	3.320			4.250	17.975	4.623								
16	54.730	45.910	0.0250				5.526	9.172	6.446								
17	51.920	46.020	0.0250				0.000	0.000	0.000								
18	58.230	47.150	0.0250				0.000	0.000	0.000								
					1		50.161	225.558	52.640	4.285	0.0250						
						Σ＝	50.164	225.558	52.640	4.285							

Type : Level1a　　, Bottom level Zb＝ 39.530 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.124

Cross section
of stream Bahr_Yusef_1Sheet_Pile No.CS1
→ Distance Y (m) Scale [1:300]
↓
Elevation Z (m)
Scale [1:125]



POINT No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Horizontal distance Yi (m)	0.000	2.720	5.400	8.520	14.320	15.260	20.120	25.130	25.920	31.720	35.000	37.520	13.320	44.870	49.120	54.730	54.920	58.230
Bottom elevation of stream Zi (m	47.270	46.530	45.510	44.100	41.800	41.470	40.230	39.770	39.750	39.650	39.530	39.540	40.130	40.720	42.540	45.910	46.020	47.150

Calculation table
non-uniform flow (1／1) Part 1 Title [Ibrahimia_5] Froude number $Fr = U / \{ g \cdot A / (\alpha \cdot B) \}^{1/2}$

Station name	Stage length Δx (m)	Total distance x (m)	Bottom level Zb (m)	non-uniform flow WL Zb+h ① (m)	non-uniform flow Depth h (m)	Discharge Q (m^3/sec)	normal Depth ho (m) Up-Stream	normal Depth ho (m) Down-Stream	Critical depth hc (m)	Froude number Fr	Water surface width B (m)	V Q／A (m/s)	Water flow sectional area A (m^2)	Hydra. Radius R (m)	Velocity formula Level	
CS12		0.000	40.490	45.300	4.810	162.000	1.285		1.543	0.106	72.314	0.625	259.061	3.516	Levella	
CS11	20.000	20.000	40.780	45.301	4.521	162.000		1.077	1.308	0.105	74.512	0.619	261.886	3.156	Levella	
CS10	20.000	40.000	40.780	45.197	4.417	162.000	2.102		2.069	0.272	29.514	1.584	102.241	2.953	Levella	
CS9	20.000	60.000	40.890	45.067	4.177	162.000		2.671	2.618	0.423	23.171	2.307	70.209	2.510	Levella	
CS8	20.000	80.000	40.450	45.150	4.700	162.000			2.703	0.350	24.220	2.004	80.827	2.728	Levella	
CS7	20.000	100.000	40.340	45.165	4.825	162.000			2.950	0.354	25.109	1.995	81.195	2.654	Levella	
CS6	20.000	120.000	40.170	45.204	5.034	162.000			2.883	0.323	25.875	1.857	87.226	2.762	Levella	
CS5	20.000	140.000	38.830	45.272	6.442	162.000			3.245	0.241	26.690	1.513	107.102	3.142	Levella	
CS4	20.000	160.000	38.810	45.355	6.545	162.000	1.691		2.461	0.130	41.952	0.861	188.100	3.939	Levella	
CS3	20.000	180.000	39.370	45.379	6.009	162.000	1.068	1.143	1.652	0.084	75.632	0.528	307.108	3.981	Levella	
CS2	20.000	200.000	40.120	45.377	5.257	162.000	1.450	1.063	1.532	0.092	67.254	0.583	277.730	3.987	Levella	
CS1	20.000	220.000	40.280	45.360	5.080	162.000		2.544	2.670	0.157	66.708	0.837	193.542	2.794	Levella	

Flow type : Subcritical flow Case of flow 《 CASE1 》 Energy correction Coefficient $\alpha = 1.000$, Gravitational Acceleration $g = 9.800$

Calculation table
non-uniform flow (1／1) Part 2

Case of flow 《 CASE1 》

③is calculated by substituting △x value of under one line
Convergence error = (Φ of one line up) − Ψ

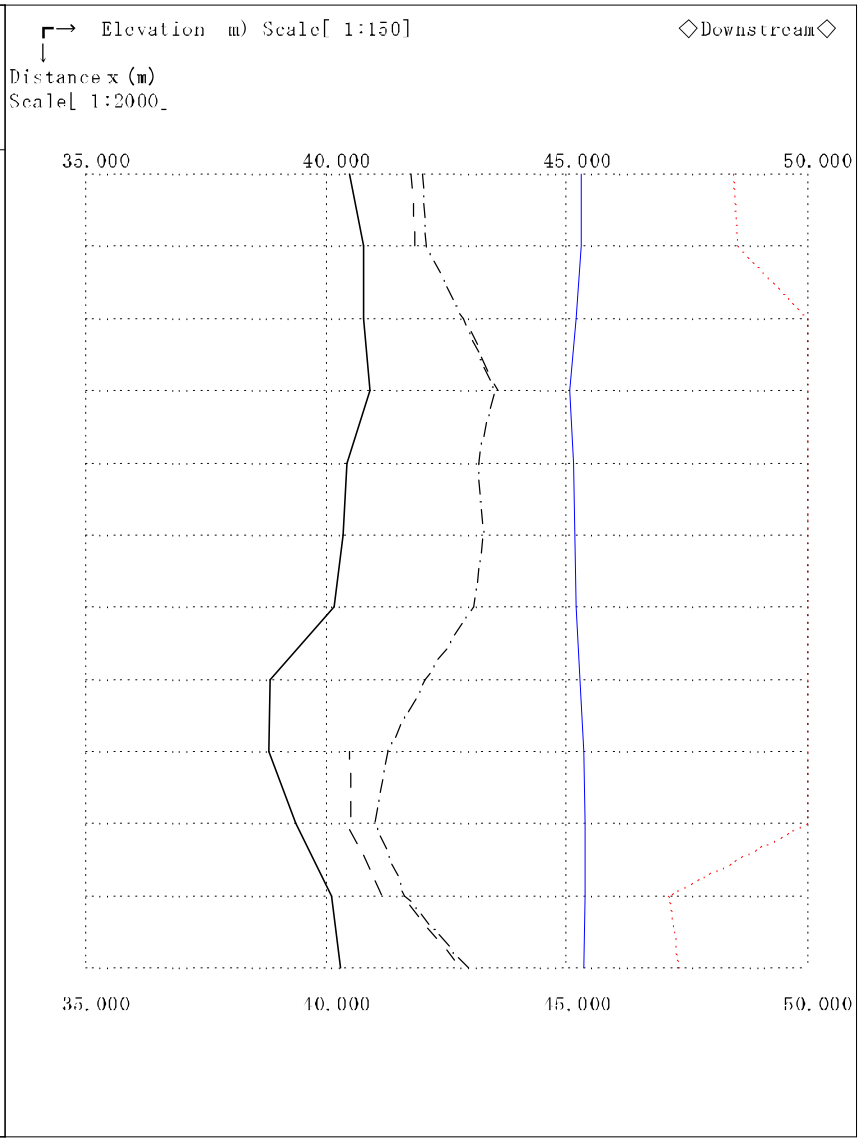
Station name	Velocity head $\frac{\beta \sum u_i^2 \cdot A_i}{2g \cdot A}$ ② (m)	Friction head $\frac{\Delta x}{2A}\sum \frac{N_i^2 \cdot u_i^2 \cdot Sb_i}{R_i^{1/3}}$ ③ (m)	④ (m)	Side resistance head $\frac{\Delta x}{2A}\sum \frac{\tau_i}{\rho \cdot g} S_i$ ③ (m)	④ (m)	Station Total head H_e ①+② (m)	head of △x/2 pos. UpStream Φ ①+②+③ (m)	DownStream Ψ ①+②−④ (m)	Localized Head loss or WL difference Type	Coef. f_{Loss}	Head or WL di. (m)	Specific E h+② (m)	Energy gradient Ie	a note
CS12	0.020	0.000		0.000		45.320	45.320						1.571E−005	
CS11	0.020	0.000	0.000	0.000	0.000	45.321	45.321	45.320					1.578E−005	
CS10	0.128	0.004	0.004	0.000	0.000	45.325	45.329	45.321					0.00037039	
CS9	0.272	0.010	0.010	0.000	0.000	45.339	45.348	45.329					0.00097544	
CS8	0.205	0.007	0.007	0.000	0.000	45.355	45.361	45.348					0.00065884	
CS7	0.203	0.007	0.007	0.000	0.000	45.368	45.375	45.361					0.00067696	
CS6	0.176	0.006	0.006	0.000	0.000	45.380	45.386	45.375					0.00055623	
CS5	0.117	0.003	0.003	0.000	0.000	45.389	45.392	45.386					0.00031072	
CS4	0.038	0.001	0.001	0.000	0.000	45.393	45.393	45.392					7.451E−005	
CS3	0.014	0.000	0.000	0.000	0.000	45.394	45.394	45.393					2.757E−005	
CS2	0.017	0.000	0.000	0.000	0.000	45.394	45.395	45.394					3.364E−005	
CS1	0.036		0.001		0.000	45.396		45.395					0.00011128	

Momentum correction Coefficient $\beta = 1.000$

water surface Profile of
non-uniform flow　Ibrahimia_5

Water level Zb+h ——　Bottom level Zb ——　Critical depth hc —·—·—　Normal depth ho — — —　bank level ·····

Station name No.	Accumulative distance x (m)	Flow rate Q (m³/sec)	Water rate h (m)	Water level Zb+h (m)	Normal depth ho Up-Stream	Normal depth ho Down-Stream	Critical depth hc (m)	Froude number Fr
CS12	0.000	162.000	1.810	15.300	1.285		1.543	0.106
CS11	20.000	162.000	1.521	15.301		1.077	1.308	0.105
CS10	40.000	162.000	4.417	15.197	2.102		2.069	0.272
CS9	60.000	162.000	1.177	15.067		2.671	2.618	0.423
CS8	80.000	162.000	4.700	15.150			2.703	0.350
CS7	100.000	162.000	4.825	15.165			2.950	0.354
CS6	120.000	162.000	5.034	15.204			2.883	0.323
CS5	140.000	162.000	6.442	15.272			3.245	0.241
CS4	160.000	162.000	6.545	15.355	1.691		2.461	0.130
CS3	180.000	162.000	6.009	15.379	1.068	1.143	1.652	0.081
CS2	200.000	162.000	5.257	15.377	1.450	1.063	1.532	0.092
CS1	220.000	162.000	5.080	15.360		2.544	2.670	0.157



Flow type :　Subcritical flow　　Energy regulation factor α = 1.000 , Acceleration of gravity g = 9.80(m/sec²)

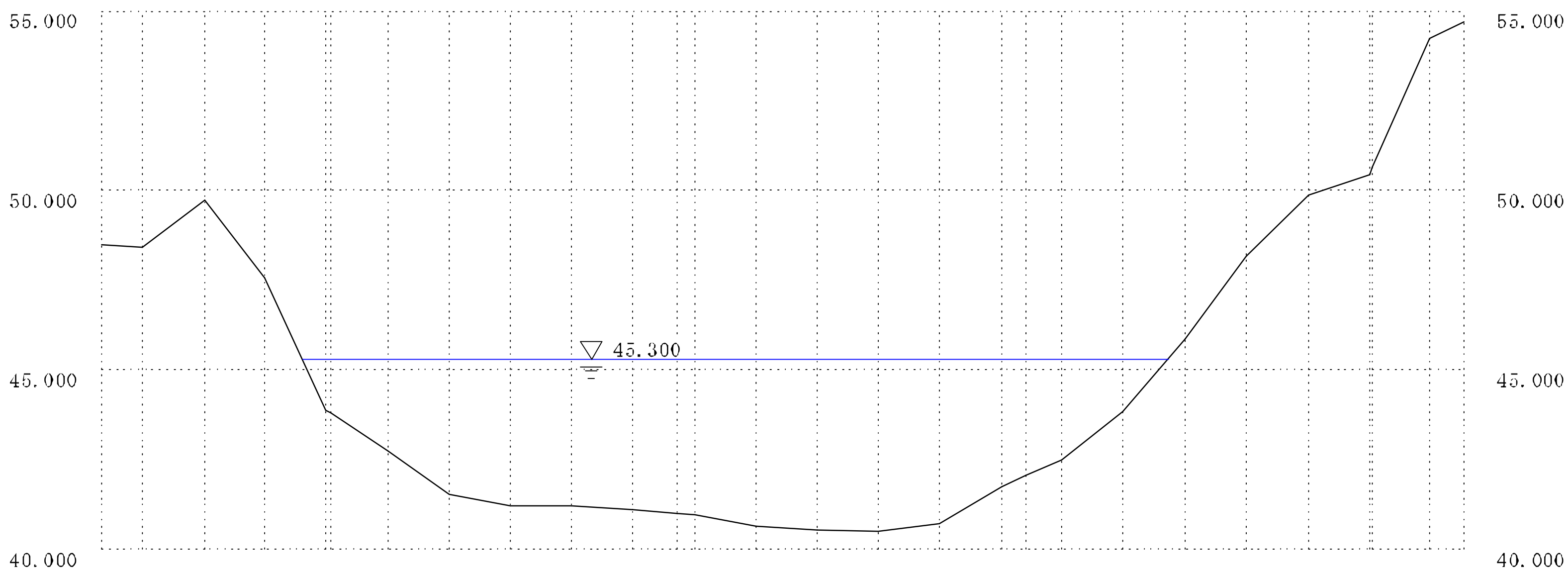
Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS12　　Flow rate Q＝ 162.000 (m³ sec) , Water level hi+Zi＝ 45.300 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	0.000	48.470	0.0250														
2	3.400	48.110	0.0250				0.000	0.000	0.000								
3	8.520	49.730	0.0250				0.000	0.000	0.000								
4	13.640	47.560	0.0250				0.000	0.000	0.000								
5	18.770	43.870	0.0250	1.430			1.988	1.121	2.119								
6	19.110	43.790	0.0250	1.510			0.340	0.500	0.349								
7	23.890	42.710	0.0250	2.590			4.780	9.799	4.900								
8	29.010	41.540	0.0250	3.760			5.120	16.256	5.252								
9	31.140	41.200	0.0250	4.100			5.130	20.161	5.141								
10	39.260	41.200	0.0250	4.100			5.120	20.992	5.120								
11	41.380	41.100	0.0250	4.200			5.120	21.248	5.121								
12	48.130	41.000	0.0250	4.300			3.750	15.938	3.751								
13	49.510	40.950	0.0250	4.350			1.380	5.968	1.381								
14	54.630	40.640	0.0250	4.660			5.120	23.066	5.129								
15	59.750	40.510	0.0250	4.790			5.120	24.192	5.122								
16	64.870	40.490	0.0250	4.810			5.120	24.576	5.120								
17	70.000	40.730	0.0250	4.570			5.130	24.060	5.136								
18	75.120	41.730	0.0250	3.570			5.120	20.838	5.217								
19	77.160	42.050	0.0250	3.250			2.040	6.956	2.065								
20	80.240	42.180	0.0250	2.820			3.080	9.348	3.110								
21	85.370	43.830	0.0250	1.470			5.130	11.004	5.305								
22	90.490	45.850	0.0250				3.726	2.739	4.005								
23	95.610	48.130	0.0250				0.000	0.000	0.000								
24	100.740	49.860	0.0250				0.000	0.000	0.000								
25	105.860	50.100	0.0250				0.000	0.000	0.000								
26	106.190	50.640	0.0250				0.000	0.000	0.000								
27	110.980	51.230	0.0250				0.000	0.000	0.000								
28	113.760	51.670	0.0250				0.000	0.000	0.000								
					1		72.311	259.061	73.673	3.516	0.0250						
						Σ＝	72.314	259.061	73.673	3.516							

Type : Level1a , Bottom level Zb＝ 40.490 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.106

Cross section
of stream Ibrahimia_5 No.CS12
→ Distance Y (m) Scale [1:600]
↓
Elevation Z (m)
Scale [1:200]

Streambed Line
Water surface Line



POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m)
1	0.000	48.470
2	3.400	48.410
3	8.520	49.730
4	13.640	47.560
5	18.770	43.870
6	19.110	43.790
7	23.890	42.710
8	29.010	41.540
9	34.140	41.200
10	39.260	41.200
11	44.380	41.100
12	48.130	41.000
13	49.510	40.950
14	54.630	40.640
15	59.750	40.510
16	64.870	40.490
17	70.000	40.730
18	75.120	41.730
19	77.160	42.050
20	80.240	42.480
21	85.370	43.830
22	90.490	45.850
23	95.610	48.130
24	100.740	49.860
25	105.860	50.400
26	106.190	50.640
27	110.980	54.230
28	113.760	54.670

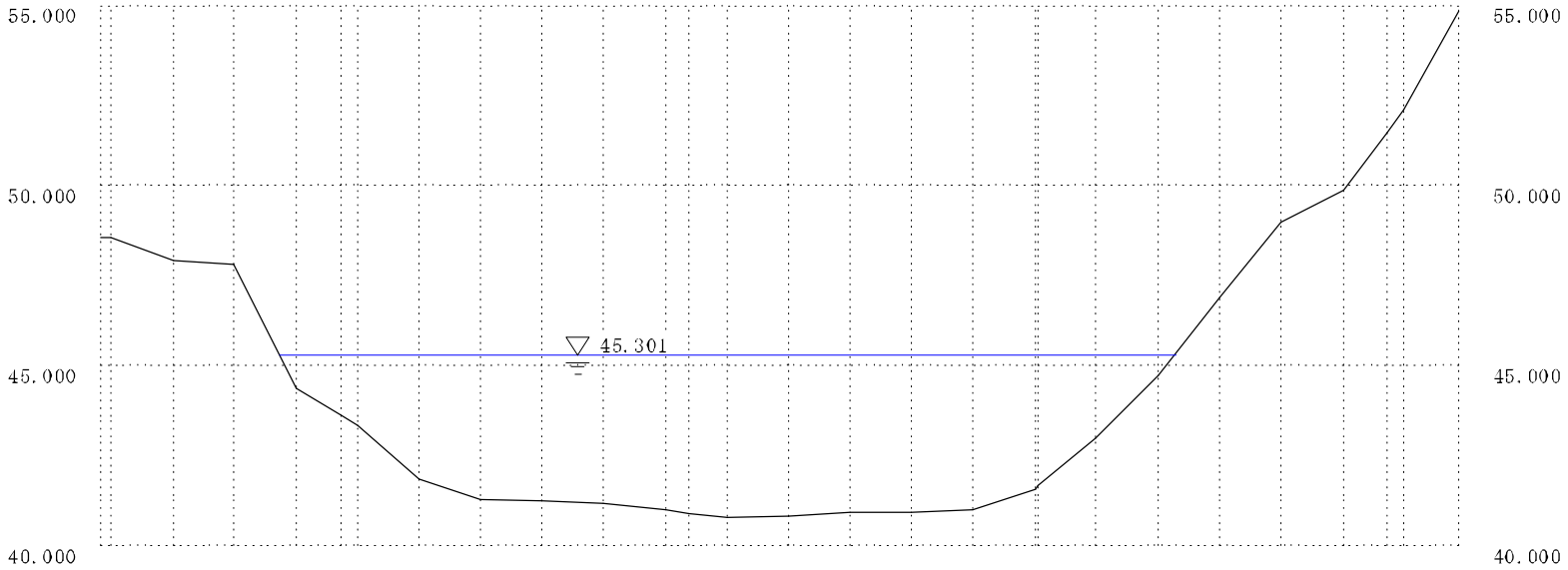
Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS11　　Flow rate Q＝ 162.000 (m³ sec) , Water level hi+Zi＝ 45.301 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	0.000	48.350	0.0250														
2	0.850	48.350	0.0250				0.000	0.000	0.000								
3	5.970	47.900	0.0250				0.000	0.000	0.000								
4	11.090	47.790	0.0250				0.000	0.000	0.000								
5	16.220	11.380	0.0250	0.921			1.386	0.638	1.664								
6	19.920	43.620	0.0250	1.681			3.700	4.815	3.777								
7	21.340	43.340	0.0250	1.961			1.420	2.586	1.447								
8	26.460	41.820	0.0250	3.481			5.120	13.933	5.341								
9	31.580	41.250	0.0250	4.051			5.120	19.283	5.152								
10	36.710	41.230	0.0250	4.071			5.130	20.831	5.130								
11	41.830	41.160	0.0250	4.141			5.120	21.021	5.120								
12	46.950	40.980	0.0250	4.321			5.120	21.664	5.123								
13	48.950	10.900	0.0250	4.401			2.000	8.723	2.002								
14	52.080	40.780	0.0250	4.521			3.130	13.964	3.132								
15	57.200	40.830	0.0250	4.471			5.120	23.021	5.120								
16	62.320	40.920	0.0250	4.381			5.120	22.662	5.121								
17	67.450	10.910	0.0250	4.391			5.130	22.501	5.130								
18	72.570	11.000	0.0250	4.301			5.120	22.253	5.121								
19	77.690	11.570	0.0250	3.731			5.120	20.563	5.152								
20	77.970	11.650	0.0250	3.651			0.280	1.031	0.291								
21	82.820	42.980	0.0250	2.321			4.850	14.483	5.029								
22	87.940	44.700	0.0250	0.601			5.120	7.482	5.401								
23	93.060	46.890	0.0250				1.406	0.423	1.529								
24	98.180	48.970	0.0250				0.000	0.000	0.000								
25	103.310	49.880	0.0250				0.000	0.000	0.000								
26	107.000	51.150	0.0250				0.000	0.000	0.000								
27	108.430	52.090	0.0250				0.000	0.000	0.000								
28	113.010	51.820	0.0250				0.000	0.000	0.000								
					1		74.512	261.886	75.783	3.456	0.0250						
						Σ＝	74.512	261.886	75.783	3.456							

Type : Level1a , Bottom level Zb＝ 40.780 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.105

Cross section
of stream Ibrahimia_5 No.CS11
→ Distance Y (m) Scale [1:600]
↓
Elevation Z (m)
Scale [1:200]

Streambed Line
Water surface Line



POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m
1	0.000	48.550
2	0.850	48.550
3	5.970	47.900
4	11.090	47.790
5	16.220	44.380
6	19.920	43.620
7	21.310	43.340
8	26.160	41.820
9	31.580	41.250
10	36.710	41.230
11	41.830	41.160
12	16.950	40.980
13	48.950	40.900
14	52.080	40.780
15	57.200	40.830
16	62.320	40.920
17	67.450	40.910
18	72.570	41.000
19	77.690	41.570
20	77.970	41.650
21	82.820	42.980
22	87.940	44.700
23	93.060	46.890
24	98.180	48.970
25	103.310	49.880
26	107.000	51.450
27	108.430	52.090
28	113.010	54.820

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS10　　Flow rate Q＝ 162.000 (m³ sec) , Water level hi+Zi＝ 45.197 (m)

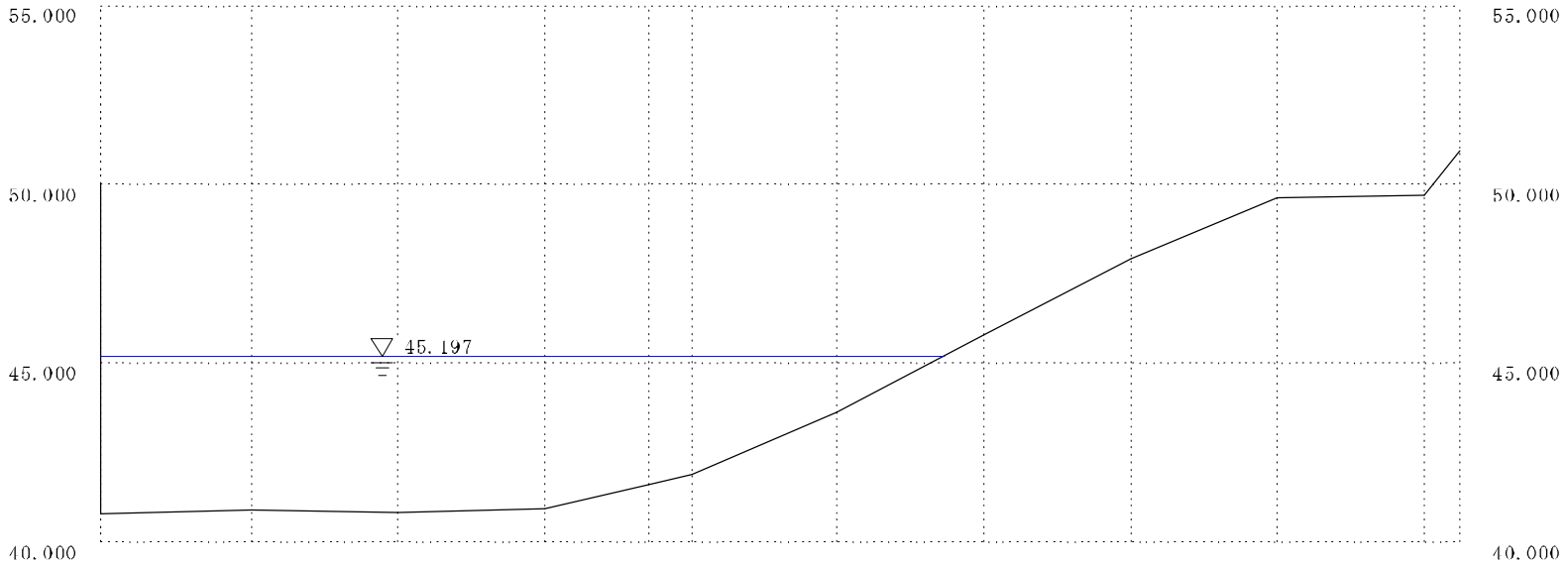
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted peri-sbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	59.000	50.000	0.0250														
2	59.000	10.780	0.0250	4.417			0.000	0.000	4.117								
3	61.250	10.880	0.0250	4.317			5.250	22.926	5.251								
4	69.370	10.820	0.0250	4.377			5.120	22.256	5.120								
5	71.500	10.930	0.0250	4.267			5.130	22.171	5.131								
6	78.140	41.600	0.0250	3.597			3.640	14.312	3.701								
7	79.620	41.880	0.0250	3.317			1.480	5.116	1.506								
8	84.740	43.630	0.0250	1.567			5.120	12.503	5.411								
9	89.870	45.760	0.0250				3.771	2.957	1.086								
10	91.990	47.890	0.0250				0.000	0.000	0.000								
11	100.110	49.610	0.0250				0.000	0.000	0.000								
12	105.230	49.690	0.0250				0.000	0.000	0.000								
13	106.410	50.930	0.0250				0.000	0.000	0.000								
					1		29.514	102.241	34.624	2.953	0.0250						
						Σ＝	29.514	102.241	34.624	2.953							

Type : Level1a　　, Bottom level Zb＝ 40.780 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.272

Cross section
of stream Ibrahimia_5 No.CS10
→ Distance Y (m) Scale [1:250]

Elevation Z (m)
Scale [1:200]

Streambed Line
Water surface Line



POINT No.	Horizontal distance Yi (m	Bottom elevation of stream Zi (m
1	59.000	50.000
2	59.000	40.780
3	64.250	40.880
4	69.370	40.820
5	74.500	40.930
6	78.140	41.600
7	79.620	41.880
8	84.740	43.630
9	89.870	45.760
10	94.990	47.890
11	100.110	49.610
12	105.230	49.690
13	106.440	50.930

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS9　　Flow rate Q＝　162.000 (m³ sec) , Water level hi+Zi＝　45.067 (m)

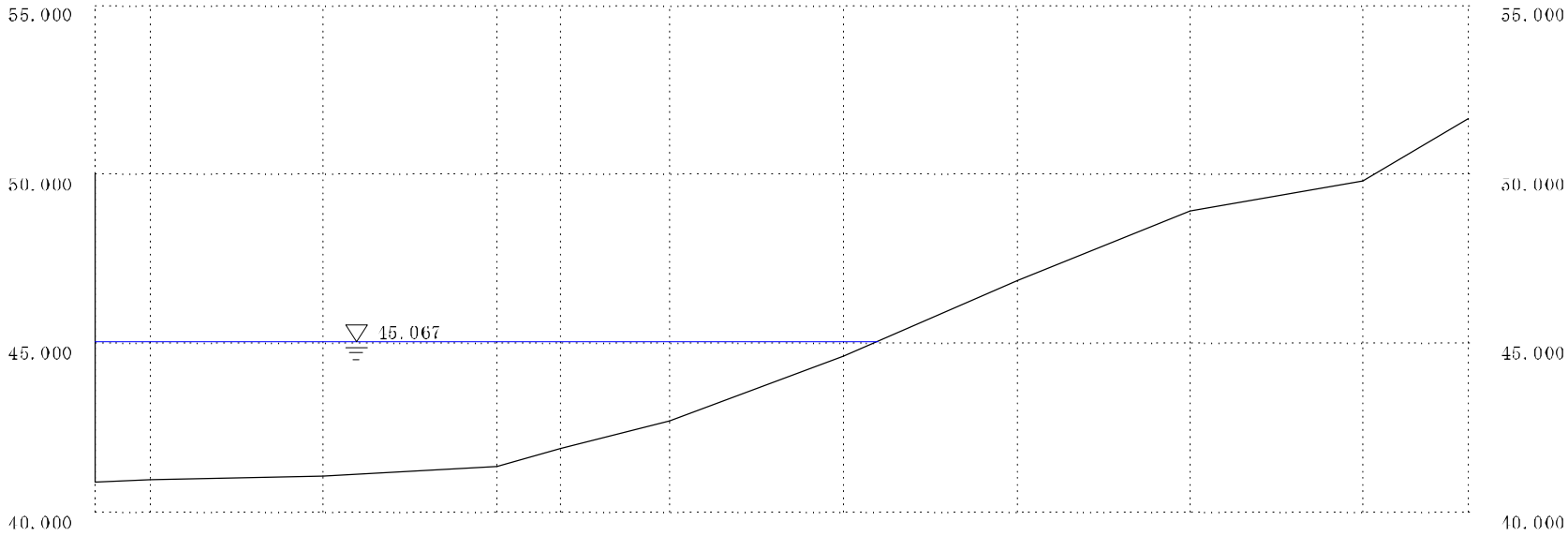
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	66.000	50.000	0.0250														
2	66.000	10.890	0.0250	4.177			0.000	0.000	4.177								
3	67.630	10.960	0.0250	4.107			1.630	6.751	1.631								
4	72.750	11.060	0.0250	4.007			5.120	20.771	5.121								
5	77.880	11.350	0.0250	3.717			5.130	19.812	5.138								
6	79.750	41.860	0.0250	3.207			1.870	6.474	1.938								
7	83.000	42.730	0.0250	2.337			3.250	9.009	3.364								
8	88.120	44.610	0.0250	0.457			5.120	7.152	5.454								
9	93.250	46.840	0.0250				1.051	0.240	1.116								
10	98.370	48.920	0.0250				0.000	0.000	0.000								
11	103.490	49.810	0.0250				0.000	0.000	0.000								
12	106.620	51.640	0.0250				0.000	0.000	0.000								
					1		23.171	70.209	27.971	2.510	0.0250						
						Σ＝	23.171	70.209	27.971	2.510							

Type : Level1a　　, Bottom level Zb＝　40.890 (m) , Energy regulation factor α＝　1.000 ,　　Froude number Fr＝ 0.423

Cross section
of stream Ibrahimia_5 No.CS9
→ Distance Y (m) Scale [1:200]

Elevation Z (m)
Scale [1:200]

Streambed Line
Water surface Line



POINT No.	Horizontal distance Yi (m	Bottom elevation of stream Zi (m
1	66.000	50.000
2	66.000	40.890
3	67.630	40.960
4	72.750	41.060
5	77.980	41.350
6	79.750	41.860
7	83.000	42.730
8	88.120	44.610
9	93.250	46.840
10	98.370	48.920
11	103.490	49.810
12	106.620	51.640

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS8　　Flow rate Q＝　162.000 (m³ sec) , Water level hi+Zi＝　45.150 (m)

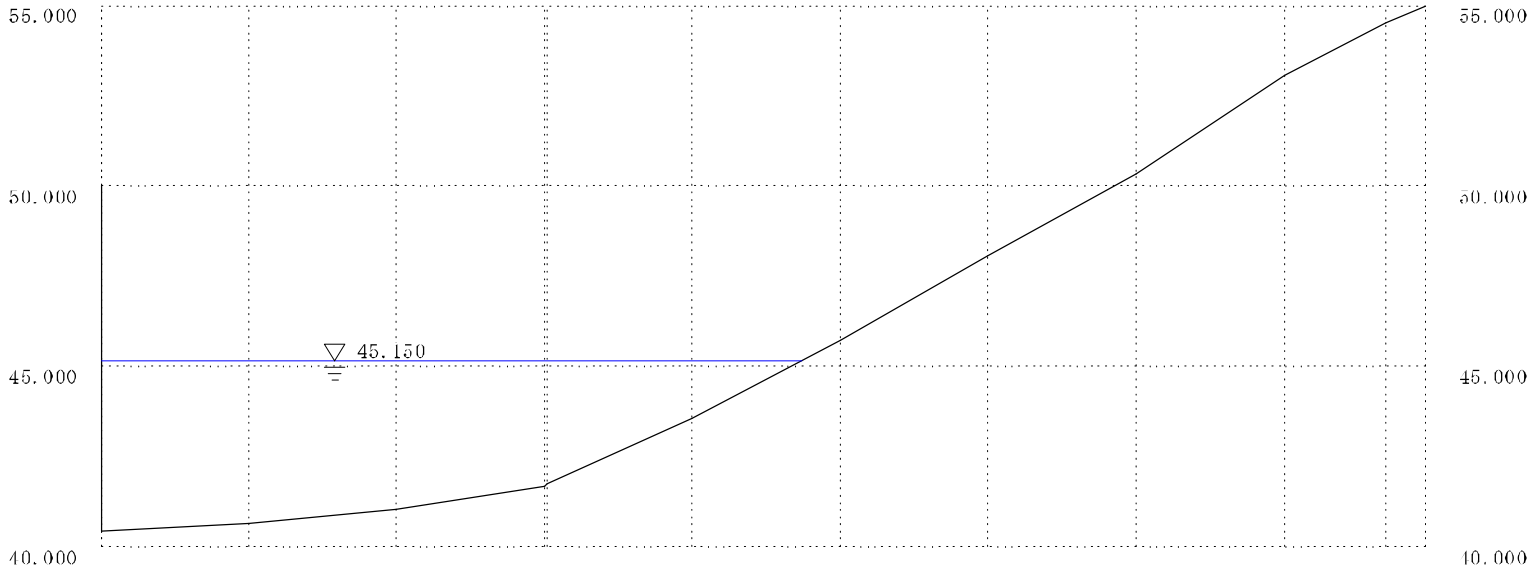
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted peri-sbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)	Velocily Ui (m)	Flowrate Qi (m³/sec)
1	66.000	50.000	0.0250														
2	66.000	10.150	0.0250	4.700			0.000	0.000	1.700								
3	71.070	10.650	0.0250	4.500			5.070	23.321	5.074								
4	76.200	11.020	0.0250	4.130			5.130	22.135	5.143								
5	81.320	11.680	0.0250	3.470			5.120	19.155	5.162								
6	81.430	41.720	0.0250	3.430			0.110	0.379	0.117								
7	86.440	43.570	0.0250	1.580			5.010	12.549	5.341								
8	91.560	45.710	0.0250				3.780	2.986	4.097								
9	96.690	48.060	0.0250				0.000	0.000	0.000								
10	101.810	50.350	0.0250				0.000	0.000	0.000								
11	106.930	53.040	0.0250				0.000	0.000	0.000								
12	110.460	54.520	0.0250				0.000	0.000	0.000								
13	111.800	51.990	0.0250				0.000	0.000	0.000								
					1		24.220	80.827	29.634	2.728	0.0250						
						Σ＝	24.220	80.827	29.634	2.728							

Type : Level1a　　, Bottom level Zb＝　40.450 (m) , Energy regulation factor α＝　1.000 ,　　Froude number Fr＝ 0.350

Cross section
of stream Ibrahimia_5 No.CS8
→ Distance Y (m) Scale [1:250]

Elevation Z (m)
Scale [1:200]

Streambed Line
Water surface Line



POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m)
1	66.000	50.000
2	66.000	40.450
3	71.070	40.650
4	76.200	41.020
5	81.320	41.680
6	81.430	41.720
7	86.440	43.570
8	91.560	45.710
9	96.690	48.060
10	101.810	50.350
11	106.930	53.040
12	110.460	54.520
13	111.800	54.990

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS7　　Flow rate Q＝　162.000 (m³ sec) , Water level hi+Zi＝　45.165 (m)

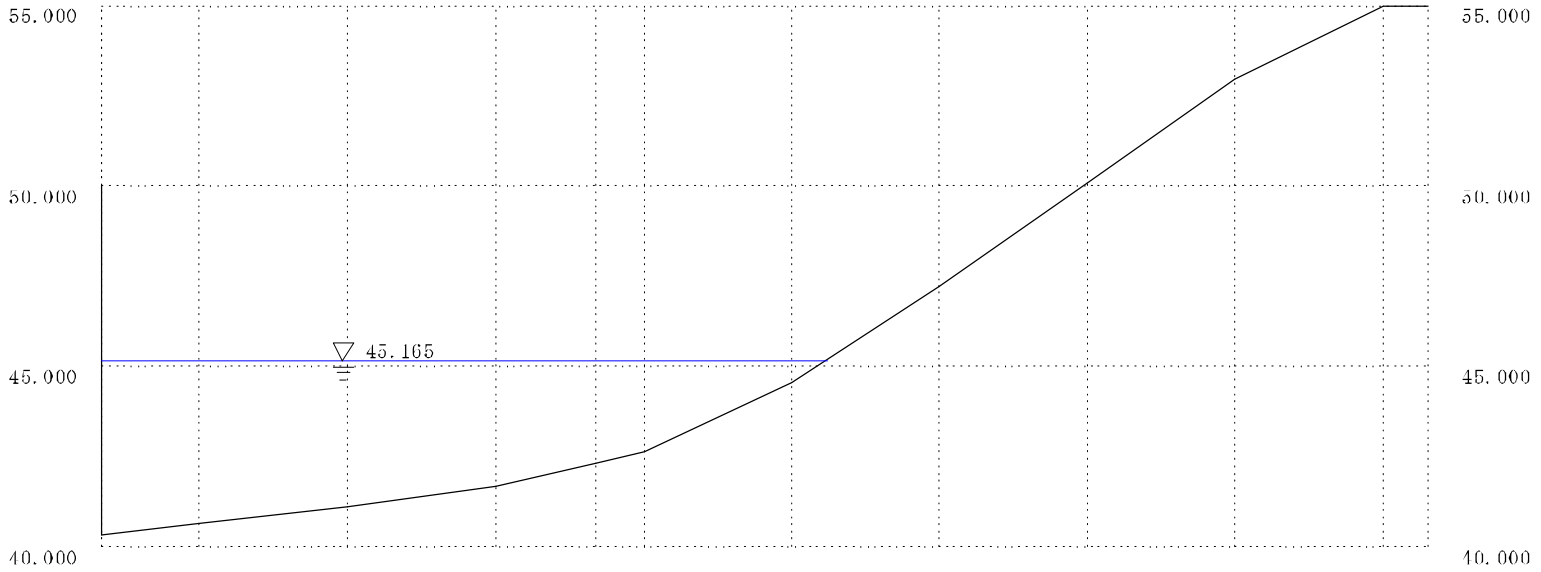
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	66.000	50.000	0.0250														
2	66.000	10.340	0.0250	4.825			0.000	0.000	4.825								
3	69.390	10.650	0.0250	4.515			3.390	15.831	3.404								
4	71.510	11.110	0.0250	4.055			5.120	21.939	5.141								
5	79.640	11.680	0.0250	3.485			5.130	19.340	5.162								
6	83.120	42.300	0.0250	2.865			3.480	11.049	3.535								
7	84.760	42.600	0.0250	2.565			1.640	4.453	1.667								
8	89.880	44.530	0.0250	0.635			5.120	8.192	5.472								
9	95.010	47.180	0.0250				1.229	0.390	1.384								
10	100.130	50.080	0.0250				0.000	0.000	0.000								
11	105.250	52.940	0.0250				0.000	0.000	0.000								
12	110.380	54.940	0.0250				0.000	0.000	0.000								
13	111.920	51.960	0.0250				0.000	0.000	0.000								
					1		25.109	81.195	30.589	2.654	0.0250						
						Σ＝	25.109	81.195	30.589	2.654							

Type : Level1a　　, Bottom level Zb＝　40.340 (m) , Energy regulation factor α＝　1.000 ,　　Froude number Fr＝ 0.354

Cross section
of stream Ibrahimia_5 No.CS7
→ Distance Y (m) Scale [1:250]

Elevation Z (m)
Scale [1:200]

Streambed Line
Water surface Line



POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m)
1	66.000	50.000
2	66.000	40.340
3	69.390	40.650
4	74.510	41.110
5	79.640	41.680
6	83.120	42.300
7	84.760	42.600
8	89.880	44.530
9	95.010	47.180
10	100.130	50.080
11	105.250	52.940
12	110.380	54.940
13	111.920	54.960

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS6　　Flow rate Q＝　162.000 (m³ sec) , Water level hi+Zi＝　45.204 (m)

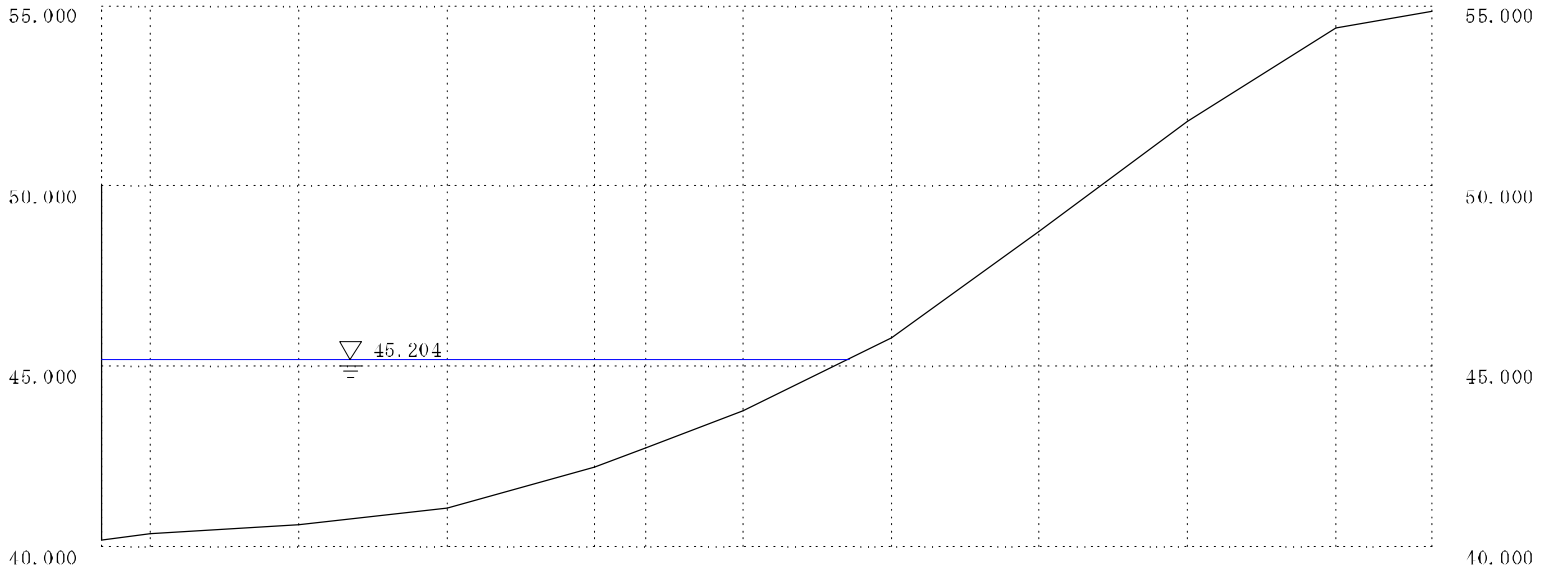
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted peri-sbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)	Velocily Ui (m)	Flowrate Qi (m³/sec)
1	66.000	50.000	0.0250														
2	66.000	40.170	0.0250	5.034			0.000	0.000	5.034								
3	67.710	40.380	0.0250	4.824			1.710	8.429	1.723								
4	72.830	40.600	0.0250	4.604			5.120	24.138	5.125								
5	77.960	41.070	0.0250	4.134			5.130	22.115	5.151								
6	83.080	42.220	0.0250	2.984			5.120	18.224	5.248								
7	84.800	42.740	0.0250	2.464			1.720	4.686	1.797								
8	88.200	43.750	0.0250	1.454			3.400	6.662	3.547								
9	93.330	45.780	0.0250				3.675	2.673	3.953								
10	98.450	48.740	0.0250				0.000	0.000	0.000								
11	103.570	51.780	0.0250				0.000	0.000	0.000								
12	108.700	54.390	0.0250				0.000	0.000	0.000								
13	112.040	51.800	0.0250				0.000	0.000	0.000								
					1		25.875	87.226	31.577	2.762	0.0250						
						Σ＝	25.875	87.226	31.577	2.762							

Type : Level1a　　, Bottom level Zb＝　40.170 (m) , Energy regulation factor α＝　1.000 ,　　Froude number Fr＝ 0.323

Cross section
of stream Ibrahimia_5 No.CS6
→ Distance Y (m) Scale [1:250]

Elevation Z (m)
Scale [1:200]

Streambed Line
Water surface Line



POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m)
1	66.000	50.000
2	66.000	40.170
3	67.710	40.380
4	72.830	40.600
5	77.960	41.070
6	83.080	42.220
7	84.800	42.740
8	88.200	43.750
9	93.330	45.780
10	98.450	48.740
11	103.570	51.780
12	108.700	54.390
13	112.040	54.800

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS5　　Flow rate Q＝　162.000 (m³ sec) , Water level hi+Zi＝　45.272 (m)

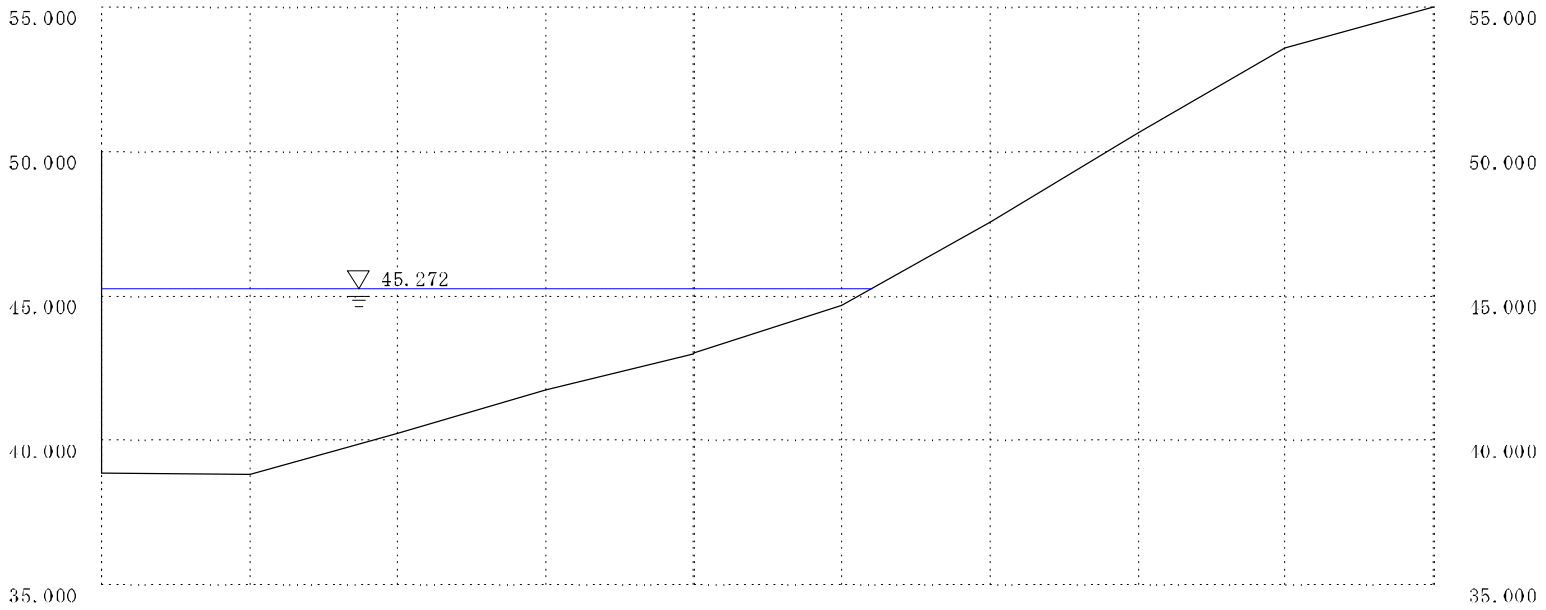
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)		
1	66.000	50.000	0.0250														
2	66.010	38.850	0.0250	6.422			0.006	0.018	6.122								
3	71.140	38.830	0.0250	6.442			5.130	32.997	5.130								
4	76.260	40.220	0.0250	5.052			5.120	29.426	5.305								
5	81.380	41.720	0.0250	3.552			5.120	22.027	5.335								
6	86.460	42.980	0.0250	2.292			5.080	14.845	5.234								
7	86.510	42.990	0.0250	2.282			0.050	0.114	0.051								
8	91.630	44.680	0.0250	0.592			5.120	7.359	5.392								
9	96.750	47.530	0.0250				1.061	0.315	1.218								
10	101.870	50.630	0.0250				0.000	0.000	0.000								
11	107.000	53.560	0.0250				0.000	0.000	0.000								
12	112.120	55.000	0.0250				0.000	0.000	0.000								
13	112.140	55.000	0.0250				0.000	0.000	0.000								
					1		26.690	107.102	34.087	3.142	0.0250						
						Σ＝	26.690	107.102	34.087	3.142							

Type : Level1a　　, Bottom level Zb＝　38.830 (m) , Energy regulation factor α＝　1.000 ,　　Froude number Fr＝ 0.241

Cross section
of stream Ibrahimia_5 No.CS5
→ Distance Y (m) Scale [1:250]

Elevation Z (m)
Scale [1:250]

Streambed Line
Water surface Line



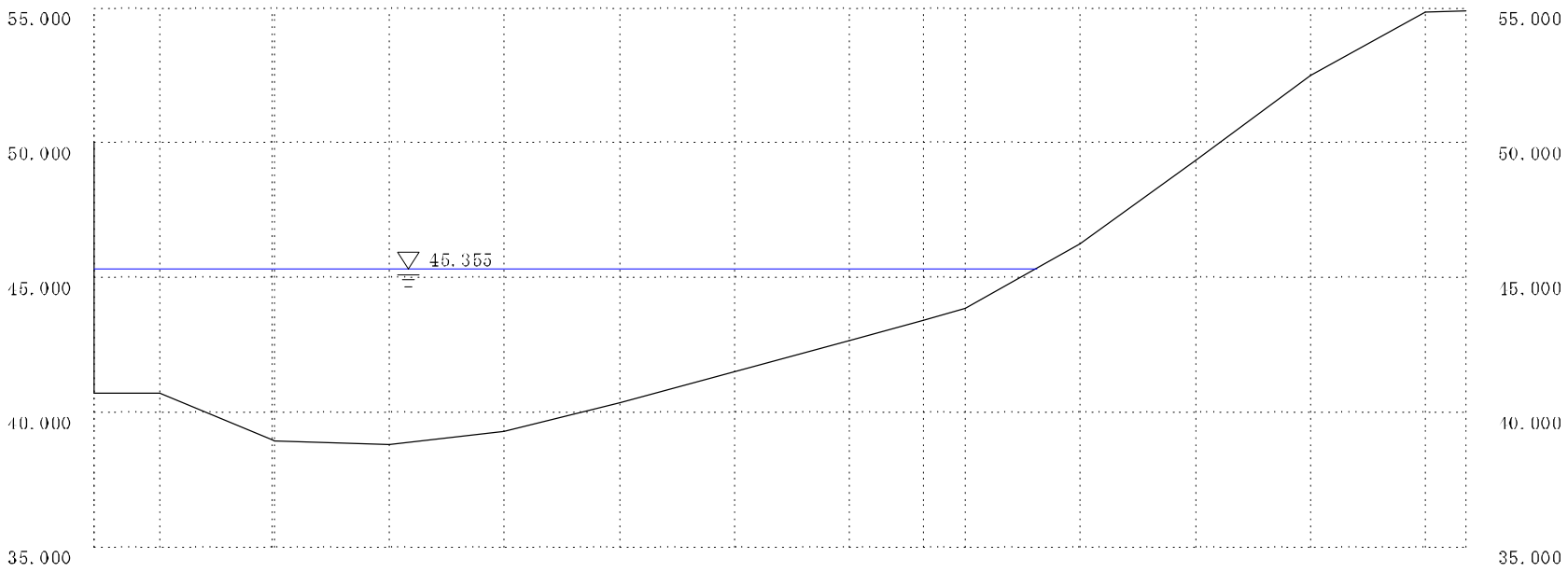
POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m)
1	66.000	50.000
2	66.010	38.830
3	71.140	38.830
4	76.260	40.220
5	81.380	41.720
6	86.460	42.980
7	86.510	42.990
8	91.630	44.680
9	96.750	47.530
10	101.870	50.630
11	107.000	53.560
12	112.120	55.000
13	112.140	55.000

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS4　　Flow rate Q＝　162.000 (m³ sec) , Water level hi+Zi＝　45.355 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perimeter Sbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)	Velocily Ui (m)	Flowrate Qi (m³/sec)
1	51.000	50.000	0.0250														
2	51.000	10.720	0.0250	4.635			0.000	0.000	4.635								
3	53.890	10.720	0.0250	4.635			2.890	13.395	2.890								
4	58.920	38.980	0.0250	6.375			5.030	27.690	5.322								
5	59.010	38.950	0.0250	6.405			0.090	0.575	0.095								
6	64.130	38.810	0.0250	6.545			5.120	33.151	5.122								
7	69.260	39.270	0.0250	6.085			5.130	32.395	5.151								
8	74.380	40.370	0.0250	4.985			5.120	28.339	5.237								
9	79.500	41.510	0.0250	3.845			5.120	22.601	5.215								
10	81.630	42.650	0.0250	2.705			5.130	16.800	5.255								
11	87.940	43.130	0.0250	1.925			3.310	7.662	3.101								
12	89.750	43.860	0.0250	1.495			1.810	3.095	1.860								
13	91.870	16.250	0.0250				3.202	2.391	3.534								
14	100.000	49.380	0.0250				0.000	0.000	0.000								
15	105.120	52.520	0.0250				0.000	0.000	0.000								
16	110.240	54.880	0.0250				0.000	0.000	0.000								
17	112.070	54.930	0.0250				0.000	0.000	0.000								
					1		41.952	188.100	47.747	3.939	0.0250						
						Σ＝	41.952	188.100	47.747	3.939							

Type : Level1a　　, Bottom level Zb＝　38.810 (m) , Energy regulation factor α＝　1.000 ,　　Froude number Fr＝ 0.130

Cross section
of stream Ibrahimia_5 No.CS4
→ Distance Y (m) Scale [1:300]
↓
Elevation Z (m)
Scale [1:250]



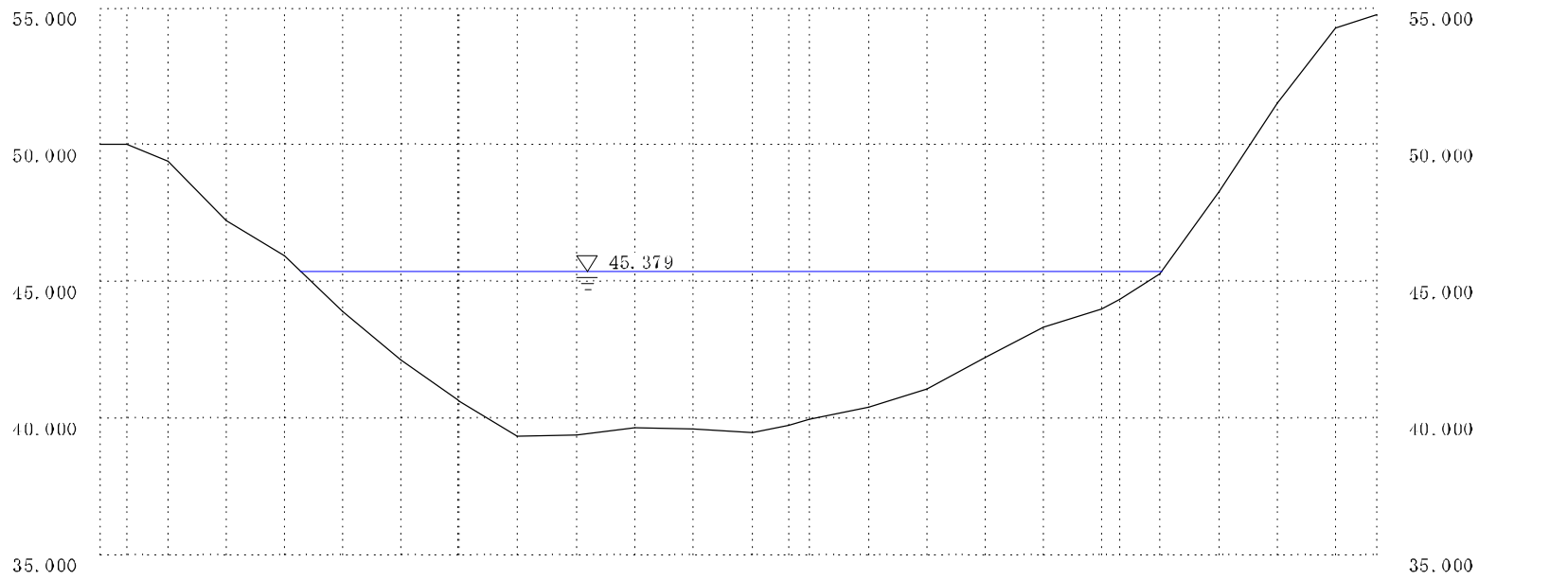
POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m
1	51.000	50.000
2	51.000	40.720
3	53.890	40.720
4	58.920	38.980
5	59.010	38.950
6	64.130	38.810
7	69.260	39.270
8	74.380	40.370
9	79.500	41.510
10	84.630	42.650
11	87.940	43.430
12	89.750	43.860
13	94.870	46.250
14	100.000	49.380
15	105.120	52.520
16	110.240	54.880
17	112.070	54.930

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS3　　Flow rate Q＝ 162.000 (m³ sec) , Water level hi+Zi＝ 45.379 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)		
1	0.000	50.000	0.0250														
2	2.350	50.000	0.0250				0.000	0.000	0.000								
3	5.900	49.400	0.0250				0.000	0.000	0.000								
4	11.020	47.250	0.0250				0.000	0.000	0.000								
5	16.150	45.920	0.0250				0.000	0.000	0.000								
6	21.270	43.910	0.0250	1.469			3.743	2.750	4.021								
7	26.390	42.100	0.0250	3.280			5.120	12.157	5.431								
8	31.370	40.670	0.0250	4.710			4.980	19.893	5.181								
9	31.520	40.630	0.0250	4.749			0.150	0.709	0.155								
10	36.640	39.370	0.0250	6.009			5.120	27.543	5.273								
11	41.760	39.130	0.0250	5.949			5.120	30.615	5.120								
12	46.890	39.650	0.0250	5.729			5.130	29.957	5.135								
13	52.010	39.630	0.0250	5.749			5.120	29.386	5.120								
14	57.130	39.500	0.0250	5.879			5.120	29.770	5.122								
15	60.400	39.760	0.0250	5.620			3.270	18.801	3.280								
16	62.260	39.950	0.0250	5.429			1.860	10.276	1.870								
17	67.380	40.440	0.0250	4.939			5.120	26.545	5.143								
18	72.500	41.060	0.0250	4.319			5.120	23.703	5.157								
19	77.620	42.220	0.0250	3.159			5.120	19.146	5.250								
20	82.750	43.360	0.0250	2.019			5.130	13.281	5.255								
21	87.870	44.000	0.0250	1.379			5.120	8.701	5.160								
22	89.430	44.360	0.0250	1.019			1.560	1.871	1.601								
23	92.990	45.280	0.0250	0.099			3.560	1.992	3.677								
24	98.120	18.300	0.0250				0.169	0.008	0.196								
25	103.240	51.520	0.0250				0.000	0.000	0.000								
26	108.369	51.280	0.0250				0.000	0.000	0.000								
27	111.990	51.800	0.0250				0.000	0.000	0.000								
					1		75.632	307.108	77.147	3.981	0.0250						
						Σ＝	75.632	307.108	77.147	3.981							

Type : Level1a , Bottom level Zb＝ 39.370 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.084

Cross section
of stream Ibrahimia_5 No.CS3
→ Distance Y (m) Scale [1:600]
↓
Elevation Z (m)
Scale [1:250]



POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m
1	0.000	50.000
2	2.350	50.000
3	5.900	49.400
4	11.020	47.250
5	16.150	45.920
6	21.270	43.910
7	26.390	42.100
8	31.370	40.670
9	31.520	40.630
10	36.640	39.370
11	41.760	39.430
12	46.880	39.650
13	52.010	39.630
14	57.130	39.500
15	60.400	39.760
16	62.260	39.950
17	67.380	40.440
18	72.500	41.060
19	77.620	42.220
20	82.750	43.360
21	87.870	44.000
22	89.430	44.360
23	92.990	45.280
24	98.120	48.300
25	103.240	51.520
26	108.369	54.280
27	111.990	54.800

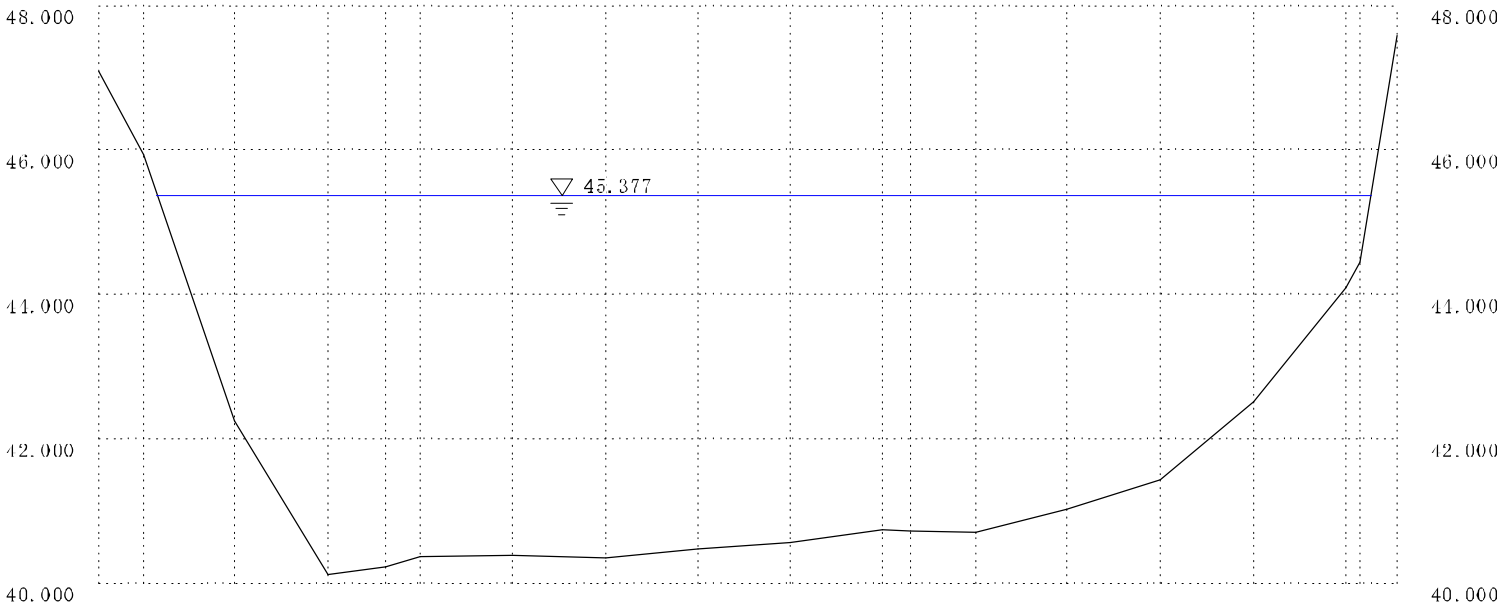
Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS2　　Flow rate Q＝　162.000 (m³ sec) , Water level hi+Zi＝　45.377 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)		
1	0.000	47.100	0.0250														
2	2.430	45.930	0.0250				0.000	0.000	0.000								
3	7.550	42.250	0.0250	3.127			4.351	6.802	5.358								
4	12.680	40.120	0.0250	5.257			5.130	21.505	5.555								
5	15.890	40.220	0.0250	5.157			3.210	16.715	3.212								
6	17.800	40.370	0.0250	5.007			1.910	9.707	1.916								
7	22.920	40.400	0.0250	4.977			5.120	25.559	5.120								
8	28.040	40.360	0.0250	5.017			5.120	25.585	5.120								
9	33.170	40.180	0.0250	4.897			5.130	25.130	5.131								
10	38.290	40.370	0.0250	4.807			5.120	24.842	5.121								
11	43.410	40.740	0.0250	4.637			5.120	24.177	5.123								
12	44.920	40.730	0.0250	4.647			1.510	7.009	1.510								
13	48.540	40.710	0.0250	4.667			3.620	16.858	3.620								
14	53.660	41.020	0.0250	4.357			5.120	23.102	5.129								
15	58.780	41.430	0.0250	3.947			5.120	21.258	5.136								
16	63.910	42.530	0.0250	2.847			5.130	17.427	5.247								
17	69.030	44.100	0.0250	1.277			5.120	10.558	5.355								
18	69.860	44.440	0.0250	0.937			0.830	0.919	0.897								
19	71.860	47.600	0.0250				0.593	0.278	1.109								
					1		67.251	277.730	69.659	3.987	0.0250						
						Σ＝	67.254	277.730	69.659	3.987							

Type : Level1a　　, Bottom level Zb＝　40.120 (m) , Energy regulation factor α＝　1.000 ,　　Froude number Fr＝ 0.092

Cross section
of stream　　Ibrahimia_5 No.CS2
→ Distance Y (m) Scale [1:400]
↓
Elevation Z (m)
Scale [1:100]

Streambed Line
Water surface Line



POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m
1	0.000	47.100
2	2.430	45.930
3	7.550	42.250
4	12.630	40.120
5	15.890	40.220
6	17.800	40.370
7	22.920	40.400
8	28.040	40.360
9	33.170	40.480
10	38.290	40.570
11	43.410	40.740
12	44.920	40.730
13	48.540	40.710
14	53.660	41.020
15	58.780	41.430
16	63.910	42.530
17	69.030	44.100
18	69.860	44.440
19	71.860	47.600

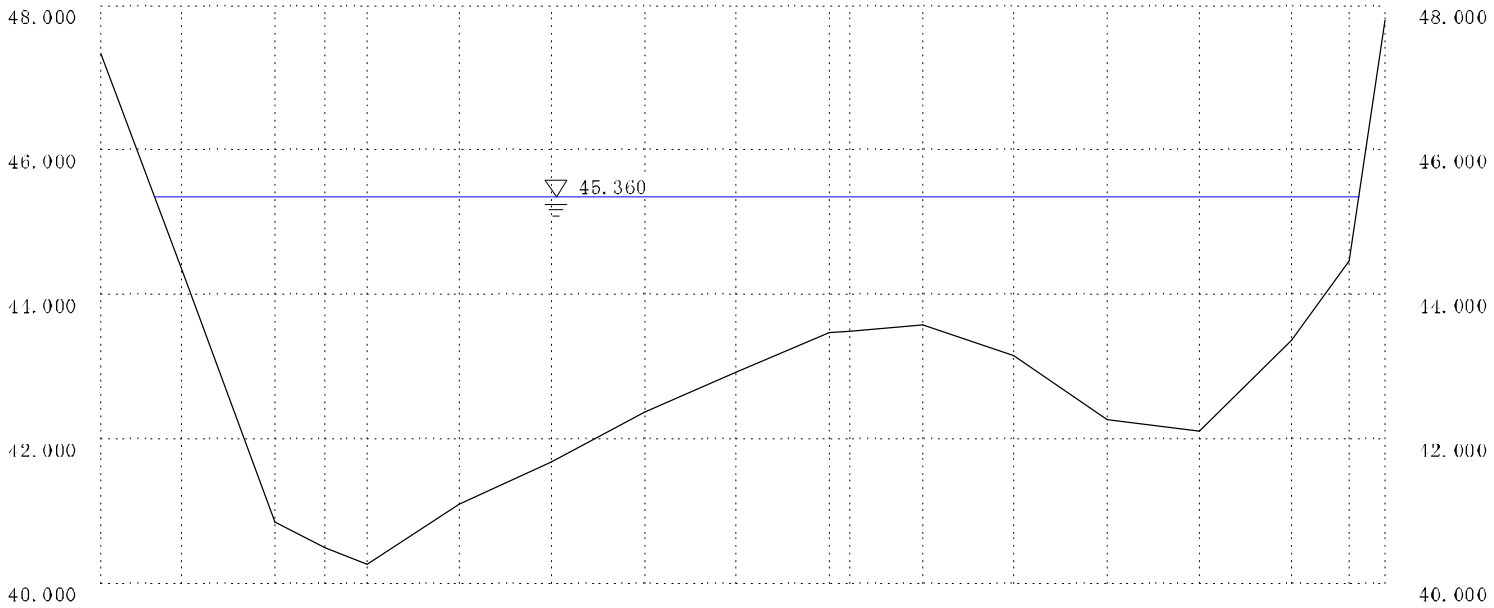
Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS1　　Flow rate Q＝ 162.000 (m³ sec) , Water level hi+Zi＝ 45.360 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	0.000	47.340	0.0250														
2	1.480	44.350	0.0250	1.010			1.514	0.761	1.820								
3	9.600	40.850	0.0250	4.510			5.120	14.132	6.202								
4	12.430	40.490	0.0250	4.870			2.830	13.273	2.853								
5	14.730	40.280	0.0250	5.080			2.300	11.143	2.310								
6	19.850	41.110	0.0250	4.250			5.120	23.886	5.187								
7	24.970	41.680	0.0250	3.680			5.120	20.302	5.152								
8	30.090	42.370	0.0250	2.990			5.120	17.076	5.166								
9	35.220	42.930	0.0250	2.430			5.130	13.903	5.160								
10	40.340	43.470	0.0250	1.890			5.120	11.060	5.118								
11	41.460	43.490	0.0250	1.870			1.120	2.106	1.120								
12	45.460	43.580	0.0250	1.780			4.000	7.301	4.001								
13	50.590	43.150	0.0250	2.210			5.130	10.235	5.118								
14	55.710	42.280	0.0250	3.080			5.120	13.543	5.193								
15	60.830	42.100	0.0250	3.260			5.120	16.231	5.123								
16	65.960	43.370	0.0250	1.990			5.130	13.467	5.285								
17	69.160	44.480	0.0250	0.880			3.200	4.593	3.387								
18	71.100	47.800	0.0250				0.514	0.226	1.019								
					1		66.708	193.542	69.275	2.794	0.0250						
						Σ＝	66.708	193.542	69.275	2.794							

Type : Level1a , Bottom level Zb＝ 40.280 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.157

Cross section
of stream Ibrahimia_5 No.CS1
→ Distance Y (m) Scale 1:400
↓
Elevation Z (m)
Scale 1:100

Streambed Line
Water surface Line



POINT No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Hori-zontal distance Yi (m)	0.000	4.430	9.600	12.430	14.730	19.850	24.970	30.090	35.220	40.340	41.460	45.160	50.590	55.710	60.830	65.960	69.160	71.100
Bottom elevation of stream Zi (m	47.340	44.350	40.850	40.490	40.280	41.110	41.680	42.370	42.930	43.470	43.490	43.580	43.150	42.280	42.100	43.370	44.480	47.800

Calculation table
non-uniform flow (1／1) Part 1 Title [Ibrahimia_5] Froude number $Fr = U / \{ g \cdot A / (\alpha \cdot B) \}^{1/2}$

Station name	Stage length Δx (m)	Total distance x (m)	Bottom level Zb (m)	non-uniform flow WL Zb+h ① (m)	non-uniform flow Depth h (m)	Discharge Q (m^3/sec)	normal Depth ho (m) Up-Stream	normal Depth ho (m) Down-Stream	Critical depth hc (m)	Froude number Fr	Water surface width B (m)	V Q／A (m/s)	Water flow sectional area A (m^2)	Hydra. Radius R (m)	Velocity formula Level	
CS12		0.000	40.490	45.300	4.810	162.000	1.285		1.543	0.106	72.314	0.625	259.061	3.516	Levella	
CS11	20.000	20.000	40.780	45.301	4.521	162.000		1.077	1.308	0.105	74.512	0.619	261.886	3.156	Levella	
CS10	20.000	40.000	39.000	45.234	6.234	162.000			2.937	0.209	29.602	1.328	121.946	3.322	Levella	
CS9	20.000	60.000	39.000	45.187	6.187	162.000			2.975	0.263	23.447	1.672	96.899	3.146	Levella	
CS8	20.000	80.000	39.000	45.201	6.201	162.000			3.071	0.258	24.343	1.630	99.397	3.148	Levella	
CS7	20.000	100.000	39.000	45.213	6.213	162.000			3.218	0.256	25.202	1.603	101.077	3.122	Levella	
CS6	20.000	120.000	39.000	45.246	6.246	162.000			2.717	0.217	25.982	1.424	113.781	3.407	Levella	
CS5	20.000	140.000	38.830	45.271	6.441	162.000			2.507	0.186	26.688	1.273	127.277	3.701	Levella	
CS4	20.000	160.000	38.810	45.322	6.512	162.000	1.375		2.077	0.122	41.881	0.827	196.002	3.995	Levella	
CS3	20.000	180.000	39.370	45.343	5.973	162.000	1.068	1.143	1.652	0.085	75.477	0.532	304.341	3.954	Levella	
CS2	20.000	200.000	40.120	45.340	5.220	162.000	1.450	1.063	1.532	0.093	67.180	0.589	275.266	3.958	Levella	
CS1	20.000	220.000	40.280	45.323	5.043	162.000		2.544	2.670	0.160	66.630	0.848	191.060	2.762	Levella	

Flow type : Subcritical flow Case of flow《 CASE1 》 Energy correction Coefficient $\alpha = 1.000$, Gravitational Acceleration $g = 9.800$

Calculation table
non-uniform flow (1／1) Part 2

Case of flow 《 CASE1 》

③is calculated by substituting △x value of under one line
Convergence error = (Φ of one line up) − Ψ

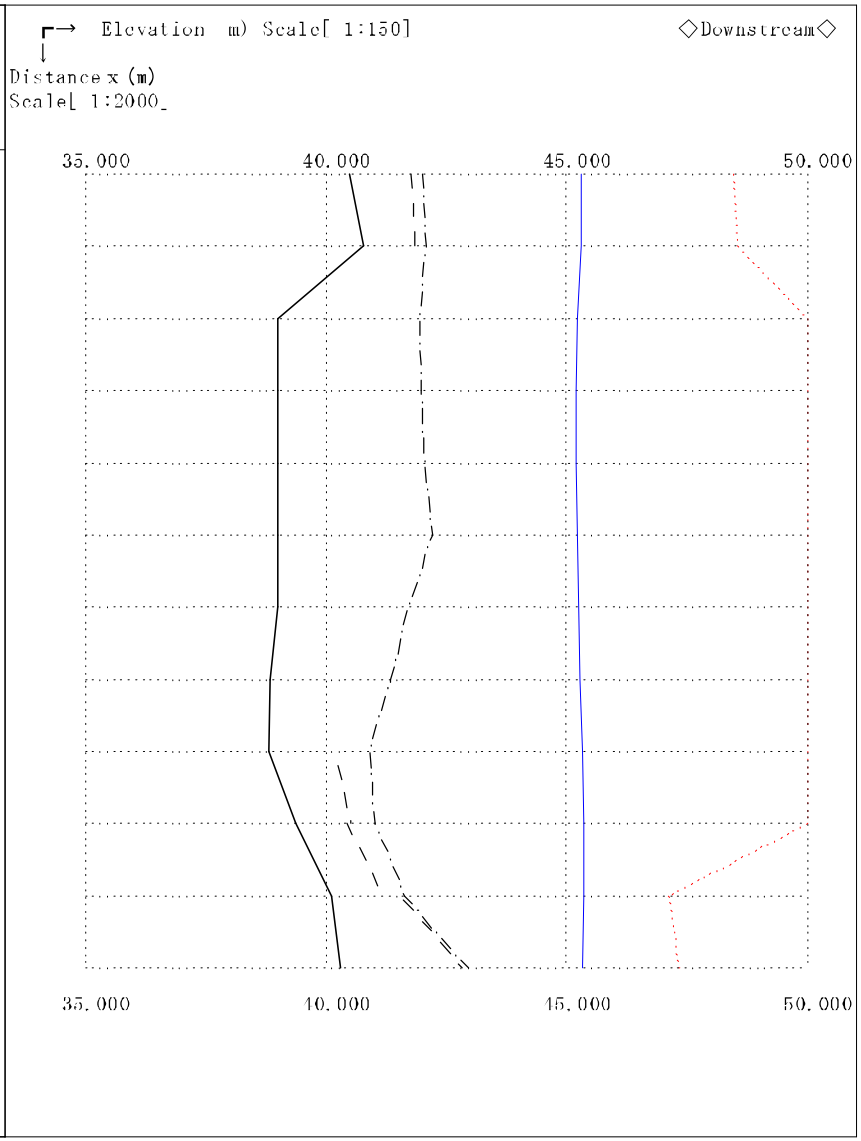
Station name	Velocity head $\frac{\beta \Sigma u_i^2 \cdot A_i}{2g \cdot A}$ ② (m)	Friction head $\frac{\Delta x}{2A}\Sigma\frac{N_i^2 \cdot u_i^2 \cdot Sb_i}{R_i^{1/3}}$ ③ (m) ④	Side resistance head $\frac{\Delta x}{2A}\Sigma\frac{\tau_i}{\rho \cdot g}S_i$ ③ (m) ④	Station Total head H_e ①+② (m)	head of △x/2 pos. UpStream Φ ①+②+③ (m)	DownStream Ψ ①+②−④ (m)	Localized Head loss or WL difference Type	Coef. f_{Loss}	Head or WL di. (m)	Specific E h+② (m)	Energy gradient Ie	a note
CS12	0.020	0.000	0.000	45.320	45.320						1.571E-005	
CS11	0.020	0.000 0.000	0.000 0.000	45.321	45.321	45.320					1.578E-005	
CS10	0.090	0.002 0.002	0.000 0.000	45.324	45.326	45.321					0.00022256	
CS9	0.143	0.004 0.004	0.000 0.000	45.330	45.333	45.326					0.00037897	
CS8	0.136	0.004 0.004	0.000 0.000	45.337	45.341	45.333					0.00035985	
CS7	0.131	0.001 0.004	0.000 0.000	45.344	45.348	45.340					0.00035182	
CS6	0.103	0.002 0.002	0.000 0.000	45.350	45.352	45.347					0.00024718	
CS5	0.083	0.002 0.002	0.000 0.000	45.354	45.356	45.352					0.00017689	
CS4	0.035	0.001 0.001	0.000 0.000	45.356	45.357	45.356					6.736E-005	
CS3	0.014	0.000 0.000	0.000 0.000	45.357	45.358	45.357					2.833E-005	
CS2	0.018	0.000 0.000	0.000 0.000	45.358	45.358	45.358					3.458E-005	
CS1	0.037	0.001	0.000	45.360		45.358					0.00011593	

Momentum correction Coefficient $\beta = 1.000$

water surface Profile of
non-uniform flow　Ibrahimia_5

Water level Zb+h ——　Bottom level Zb ——　Critical depth hc —·—·—　Normal depth ho — — —　bank level ·····

Station name No.	Accumulative distance x (m)	Flow rate Q (m³/sec)	Water rate h (m)	Water level Zb+h (m)	Normal depth ho Up-Stream	Normal depth ho Down-Stream	Critical depth hc (m)	Froude number Fr
CS12	0.000	162.000	1.810	15.300	1.285		1.543	0.106
CS11	20.000	162.000	1.521	15.301		1.077	1.308	0.105
CS10	40.000	162.000	6.234	45.234			2.937	0.209
CS9	60.000	162.000	6.187	45.187			2.975	0.263
CS8	80.000	162.000	6.201	45.201			3.071	0.258
CS7	100.000	162.000	6.213	45.213			3.218	0.256
CS6	120.000	162.000	6.216	15.216			2.717	0.217
CS5	140.000	162.000	6.441	45.271			2.507	0.186
CS4	160.000	162.000	6.512	15.322	1.375		2.077	0.122
CS3	180.000	162.000	5.973	15.343	1.068	1.143	1.652	0.085
CS2	200.000	162.000	5.220	45.340	1.450	1.063	1.532	0.093
CS1	220.000	162.000	5.043	15.323		2.544	2.670	0.160



Flow type :　Subcritical flow　　Energy regulation factor α = 1.000 , Acceleration of gravity g = 9.80(m/sec²)

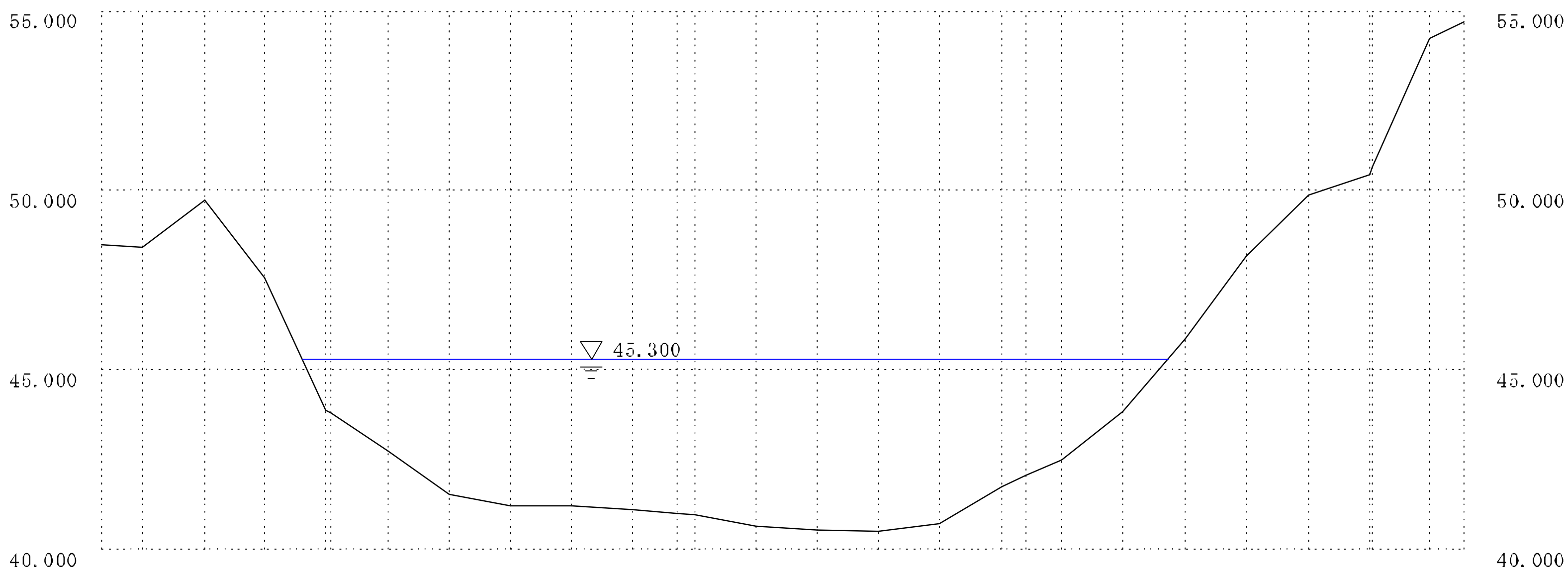
Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS12　　Flow rate Q＝ 162.000 (m³ sec) , Water level hi+Zi＝ 45.300 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	0.000	48.470	0.0250														
2	3.400	48.110	0.0250				0.000	0.000	0.000								
3	8.520	49.730	0.0250				0.000	0.000	0.000								
4	13.640	47.560	0.0250				0.000	0.000	0.000								
5	18.770	43.870	0.0250	1.430			1.988	1.121	2.119								
6	19.110	43.790	0.0250	1.510			0.340	0.500	0.349								
7	23.890	42.710	0.0250	2.590			4.780	9.799	4.900								
8	29.010	41.540	0.0250	3.760			5.120	16.256	5.252								
9	31.140	41.200	0.0250	4.100			5.130	20.161	5.141								
10	39.260	41.200	0.0250	4.100			5.120	20.992	5.120								
11	41.380	41.100	0.0250	4.200			5.120	21.248	5.121								
12	48.130	41.000	0.0250	4.300			3.750	15.938	3.751								
13	49.510	40.950	0.0250	4.350			1.380	5.968	1.381								
14	54.630	40.640	0.0250	4.660			5.120	23.066	5.129								
15	59.750	40.510	0.0250	4.790			5.120	24.192	5.122								
16	64.870	40.490	0.0250	4.810			5.120	24.576	5.120								
17	70.000	40.730	0.0250	4.570			5.130	24.060	5.136								
18	75.120	41.730	0.0250	3.570			5.120	20.838	5.217								
19	77.160	42.050	0.0250	3.250			2.040	6.956	2.065								
20	80.240	42.180	0.0250	2.820			3.080	9.348	3.110								
21	85.370	43.830	0.0250	1.470			5.130	11.004	5.305								
22	90.490	45.850	0.0250				3.726	2.739	4.005								
23	95.610	48.130	0.0250				0.000	0.000	0.000								
24	100.740	49.860	0.0250				0.000	0.000	0.000								
25	105.860	50.100	0.0250				0.000	0.000	0.000								
26	106.190	50.640	0.0250				0.000	0.000	0.000								
27	110.980	51.230	0.0250				0.000	0.000	0.000								
28	113.760	51.670	0.0250				0.000	0.000	0.000								
					1		72.311	259.061	73.673	3.516	0.0250						
						Σ＝	72.314	259.061	73.673	3.516							

Type : Level1a　　, Bottom level Zb＝ 40.490 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.106

Cross section
of stream　　Ibrahimia_5 No.CS12
→ Distance Y (m) Scale [1:600]
↓
Elevation Z (m)
Scale [1:200]

Streambed Line
Water surface Line



POINT No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Bottom elevation of stream Zi (m)	48.470	48.410	49.730	47.560	43.870	43.790	42.710	41.540	41.200	41.200	41.100	41.000	40.950	40.640
Horizontal distance Yi (m)	0.000	3.400	8.520	13.640	18.770	19.110	23.890	29.010	34.140	39.260	44.380	48.130	49.510	54.630

POINT No.	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Bottom elevation of stream Zi (m)	40.510	40.490	40.730	41.730	42.050	42.480	43.830	45.850	48.130	49.860	50.400	50.640	54.230	54.670
Horizontal distance Yi (m)	59.750	64.870	70.000	75.120	77.160	80.240	85.370	90.490	95.610	100.740	105.860	106.190	110.980	113.760

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS11　　Flow rate Q＝ 162.000 (m³ sec) , Water level hi+Zi＝ 45.301 (m)

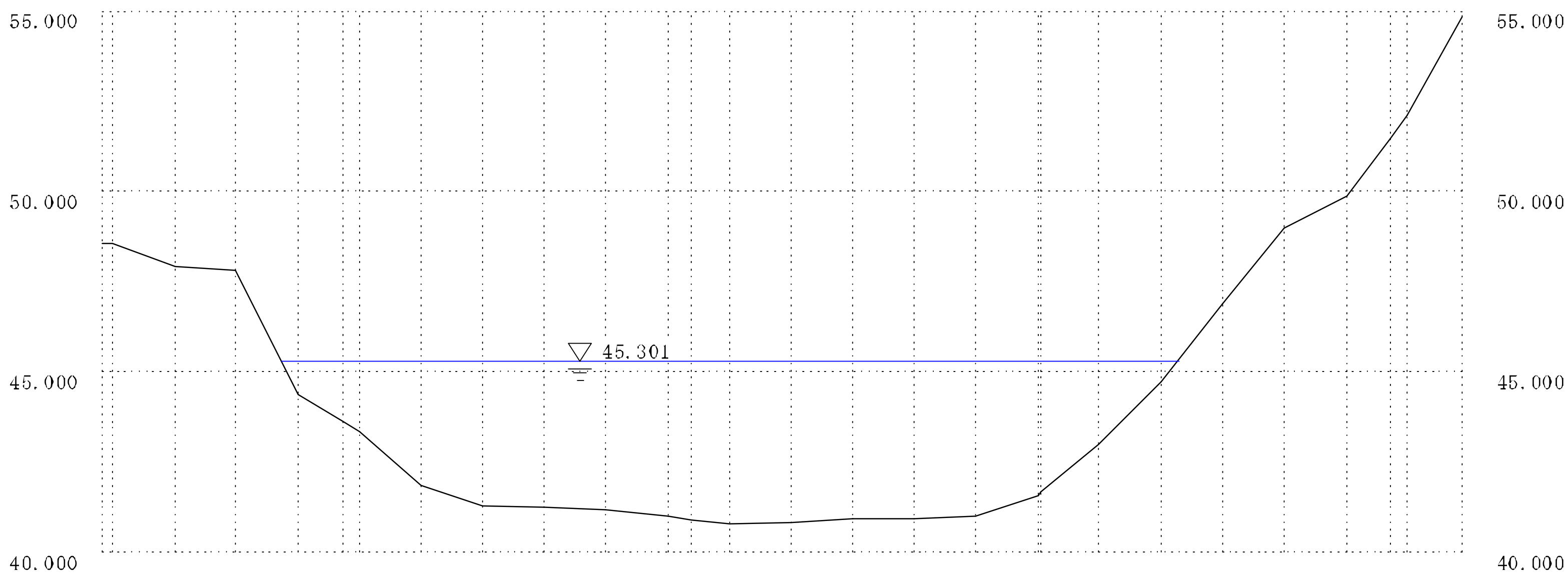
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted peri-sbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)	Velocily Ui (m)	Flowrate Qi (m³/sec)
1	0.000	48.350	0.0250														
2	0.850	48.350	0.0250				0.000	0.000	0.000								
3	5.970	47.900	0.0250				0.000	0.000	0.000								
4	11.090	47.790	0.0250				0.000	0.000	0.000								
5	16.220	11.380	0.0250	0.921			1.386	0.638	1.664								
6	19.920	43.620	0.0250	1.681			3.700	4.815	3.777								
7	21.340	43.340	0.0250	1.961			1.420	2.586	1.447								
8	26.460	41.820	0.0250	3.481			5.120	13.933	5.341								
9	31.580	41.250	0.0250	4.051			5.120	19.283	5.152								
10	36.710	41.230	0.0250	4.071			5.130	20.831	5.130								
11	41.830	41.160	0.0250	4.141			5.120	21.021	5.120								
12	46.950	40.980	0.0250	4.321			5.120	21.664	5.123								
13	48.950	10.900	0.0250	4.401			2.000	8.723	2.002								
14	52.080	40.780	0.0250	4.521			3.130	13.964	3.132								
15	57.200	40.830	0.0250	4.471			5.120	23.021	5.120								
16	62.320	40.920	0.0250	4.381			5.120	22.662	5.121								
17	67.450	10.910	0.0250	4.391			5.130	22.501	5.130								
18	72.570	11.000	0.0250	4.301			5.120	22.253	5.121								
19	77.690	11.570	0.0250	3.731			5.120	20.563	5.152								
20	77.970	11.650	0.0250	3.651			0.280	1.031	0.291								
21	82.820	42.980	0.0250	2.321			4.850	14.483	5.029								
22	87.940	44.700	0.0250	0.601			5.120	7.482	5.401								
23	93.060	46.890	0.0250				1.406	0.423	1.529								
24	98.180	48.970	0.0250				0.000	0.000	0.000								
25	103.310	49.880	0.0250				0.000	0.000	0.000								
26	107.000	51.150	0.0250				0.000	0.000	0.000								
27	108.430	52.090	0.0250				0.000	0.000	0.000								
28	113.010	51.820	0.0250				0.000	0.000	0.000								
					1		74.512	261.886	75.783	3.456	0.0250						
						Σ＝	74.512	261.886	75.783	3.456							

Type : Level1a　　, Bottom level Zb＝ 40.780 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.105

D-77

Cross section
of stream Ibrahimia_5 No.CS11
→ Distance Y (m) Scale [1:600]
↓
Elevation Z (m)
Scale [1:200]

Streambed Line
Water surface Line



Bottom elevation of stream Zi (m)	48.550	48.550	47.900	47.790	44.380	43.620	43.340	41.820	41.250	41.230	41.160	40.980	40.900	40.780	40.830	40.920	40.910	41.000	41.570	41.650	42.980	44.700	46.890	48.970	49.880	51.450	52.090	54.820
Horizontal distance Yi (m)	0.000	0.850	5.970	11.090	16.220	19.920	21.340	26.460	31.580	36.710	41.830	46.950	48.950	52.080	57.200	62.320	67.450	72.570	77.690	77.970	82.820	87.940	93.060	98.180	103.310	107.000	108.430	113.010
POINT No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS10　　Flow rate Q＝ 162.000 (m³ sec) , Water level hi+Zi＝ 45.234 (m)

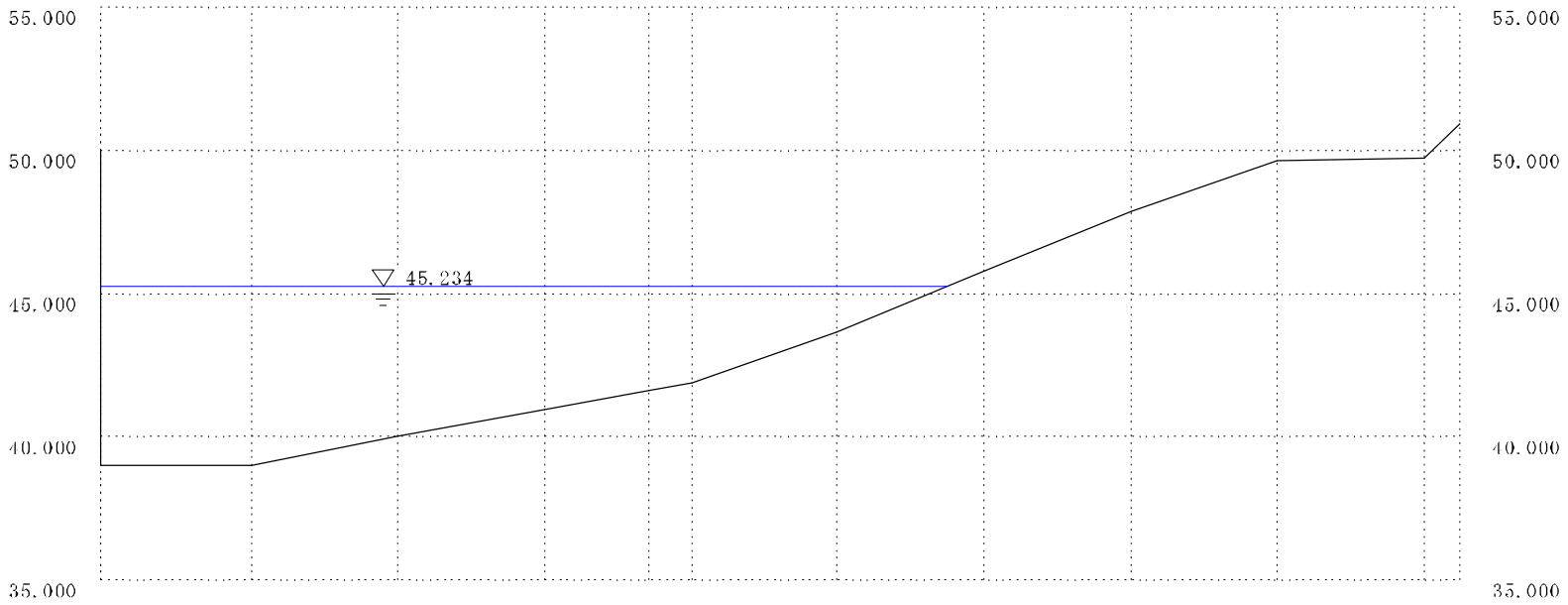
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted peri-sbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	59.000	50.000	0.0250														
2	59.000	39.000	0.0250	6.234			0.000	0.000	6.234								
3	61.250	39.000	0.0250	6.234			5.250	32.726	5.250								
4	69.370	40.000	0.0250	5.234			5.120	29.356	5.217								
5	71.500	40.930	0.0250	4.304			5.130	24.162	5.214								
6	78.140	41.600	0.0250	3.634			3.640	14.445	3.701								
7	79.620	41.880	0.0250	3.354			1.480	5.170	1.506								
8	84.740	43.630	0.0250	1.604			5.120	12.690	5.411								
9	89.870	45.760	0.0250				3.862	3.096	1.182								
10	91.990	47.890	0.0250				0.000	0.000	0.000								
11	100.110	49.610	0.0250				0.000	0.000	0.000								
12	105.230	49.690	0.0250				0.000	0.000	0.000								
13	106.410	50.930	0.0250				0.000	0.000	0.000								
					1		29.602	121.946	36.714	3.322	0.0250						
						Σ＝	29.602	121.946	36.714	3.322							

Type : Level1a　　, Bottom level Zb＝ 39.000 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.209

Cross section
of stream Ibrahimia_5 No.CS10
→ Distance Y (m) Scale [1:250]

Elevation Z (m)
Scale [1:250]

Streambed Line
Water surface Line



POINT No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Horizontal distance Yi (m)	59.000	59.000	64.250	69.370	74.500	78.140	79.620	84.740	89.870	94.990	100.110	105.230	106.440
Bottom elevation of stream Zi (m)	50.000	39.000	39.000	40.000	40.930	41.600	41.880	43.630	45.760	47.890	49.610	49.690	50.930

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS9　　Flow rate Q＝　162.000 (m³ sec) , Water level hi+Zi＝　45.187 (m)

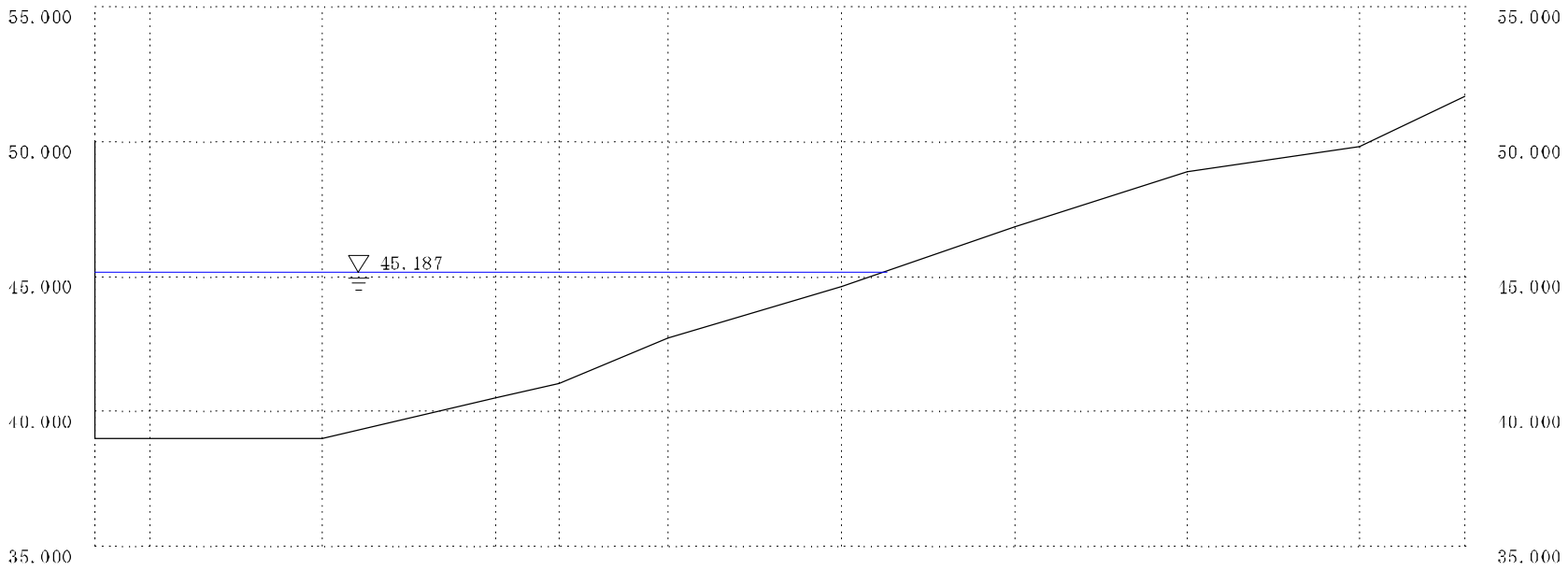
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perimeter Sbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)	Velocily Ui (m)	Flowrate Qi (m³/sec)
1	66.000	50.000	0.0250														
2	66.000	39.000	0.0250	6.187			0.000	0.000	6.187								
3	67.630	39.000	0.0250	6.187			1.630	10.085	1.630								
4	72.750	39.000	0.0250	6.187			5.120	31.678	5.120								
5	77.880	10.500	0.0250	4.687			5.130	27.892	5.315								
6	79.750	41.000	0.0250	4.187			1.870	8.297	1.936								
7	83.000	42.730	0.0250	2.457			3.250	10.797	3.682								
8	88.120	44.610	0.0250	0.577			5.120	7.767	5.454								
9	93.250	46.840	0.0250				1.327	0.383	1.147								
10	98.370	48.920	0.0250				0.000	0.000	0.000								
11	103.490	49.810	0.0250				0.000	0.000	0.000								
12	106.620	51.640	0.0250				0.000	0.000	0.000								
					1		23.147	96.899	30.801	3.146	0.0250						
						Σ＝	23.447	96.899	30.801	3.146							

Type : Level1a　　, Bottom level Zb＝　39.000 (m) , Energy regulation factor α＝　1.000 ,　　Froude number Fr＝ 0.263

Cross section
of stream Ibrahimia_5 No.CS9
→ Distance Y (m) Scale [1:200]

Elevation Z (m)
Scale [1:250]

Streambed Line
Water surface Line



POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m)
1	66.000	50.000
2	66.000	39.000
3	67.630	39.000
4	72.750	39.000
5	77.980	40.500
6	79.750	41.000
7	83.000	42.730
8	88.120	44.610
9	93.250	46.840
10	98.370	48.920
11	103.490	49.810
12	106.620	51.640

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS8　　Flow rate Q＝　162.000 (m³ sec) , Water level hi+Zi＝　45.201 (m)

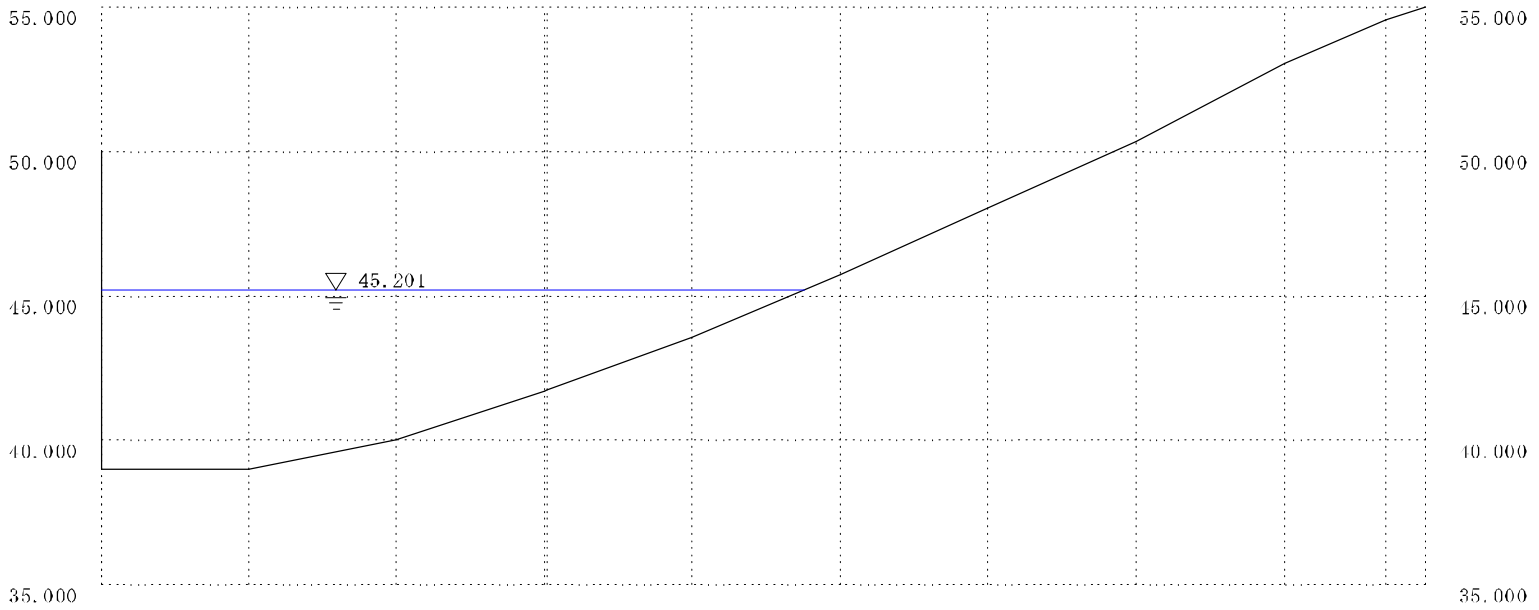
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted peri-sbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)	Velocily Ui (m)	Flowrate Qi (m³/sec)
1	66.000	50.000	0.0250														
2	66.000	39.000	0.0250	6.201			0.000	0.000	6.201								
3	71.070	39.000	0.0250	6.201			5.070	31.441	5.070								
4	76.200	40.000	0.0250	5.201			5.130	29.248	5.227								
5	81.320	41.680	0.0250	3.521			5.120	22.331	5.389								
6	81.430	41.720	0.0250	3.481			0.110	0.385	0.117								
7	86.440	43.570	0.0250	1.631			5.010	12.808	5.341								
8	91.560	45.710	0.0250				3.903	3.184	4.230								
9	96.690	48.060	0.0250				0.000	0.000	0.000								
10	101.810	50.350	0.0250				0.000	0.000	0.000								
11	106.930	53.040	0.0250				0.000	0.000	0.000								
12	110.460	54.520	0.0250				0.000	0.000	0.000								
13	111.800	51.990	0.0250				0.000	0.000	0.000								
					1		24.343	99.397	31.575	3.148	0.0250						
						Σ＝	24.343	99.397	31.575	3.148							

Type : Level1a　　, Bottom level Zb＝　39.000 (m) , Energy regulation factor α＝　1.000 ,　　Froude number Fr＝ 0.258

Cross section
of stream Ibrahimia_5 No.CS8
→ Distance Y (m) Scale [1:250]

Elevation Z (m)
Scale [1:250]

Streambed Line
Water surface Line



POINT No.	Horizontal distance Yi (m	Bottom elevation of stream Zi (m
1	66.000	50.000
2	66.000	39.000
3	71.070	39.000
4	76.200	40.000
5	81.320	41.680
6	81.430	41.720
7	86.440	43.570
8	91.560	45.710
9	96.690	48.060
10	101.810	50.350
11	106.930	53.040
12	110.460	54.520
13	111.800	54.990

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS7　　Flow rate Q＝　162.000 (m³ sec) , Water level hi+Zi＝　45.213 (m)

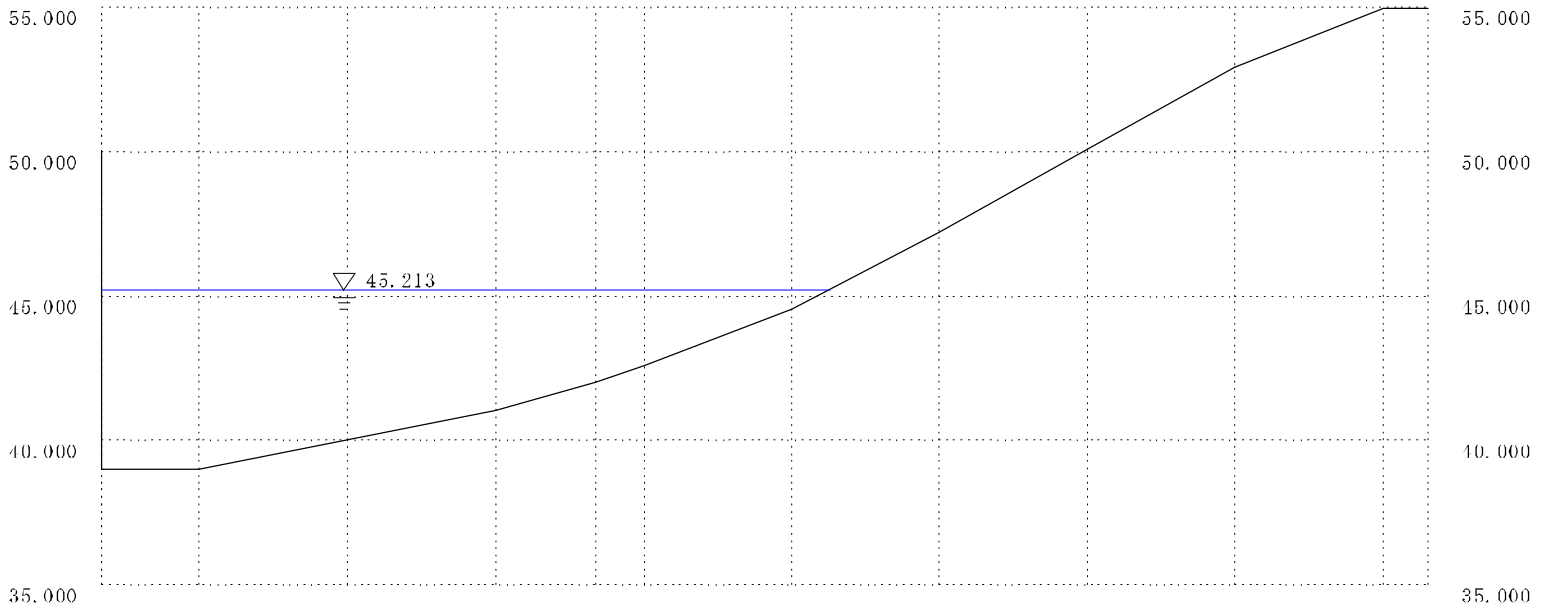
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	66.000	50.000	0.0250														
2	66.000	39.000	0.0250	6.213			0.000	0.000	6.213								
3	69.390	39.000	0.0250	6.213			3.390	21.062	3.390								
4	71.510	40.000	0.0250	5.213			5.120	29.250	5.217								
5	79.640	41.000	0.0250	4.213			5.130	24.177	5.227								
6	83.120	42.000	0.0250	3.213			3.480	12.921	3.621								
7	84.760	42.600	0.0250	2.613			1.640	4.777	1.746								
8	89.880	44.530	0.0250	0.683			5.120	8.437	5.472								
9	95.010	47.180	0.0250				1.322	0.151	1.188								
10	100.130	50.080	0.0250				0.000	0.000	0.000								
11	105.250	52.940	0.0250				0.000	0.000	0.000								
12	110.380	54.940	0.0250				0.000	0.000	0.000								
13	111.920	51.960	0.0250				0.000	0.000	0.000								
					1		25.202	101.077	32.373	3.122	0.0250						
						Σ＝	25.202	101.077	32.373	3.122							

Type : Level1a　　, Bottom level Zb＝　39.000 (m) , Energy regulation factor α＝　1.000 ,　　Froude number Fr＝ 0.256

Cross section
of stream Ibrahimia_5 No.CS7
→ Distance Y (m) Scale [1:250]

Elevation Z (m)
Scale [1:250]

Streambed Line
Water surface Line



Bottom elevation of stream Zi (m	50.000	39.000	39.000	40.000	41.000	42.000	42.600	44.530	47.180	50.080	52.940	54.960
Hori-zontal distance Yi (m	66.000	66.000	69.390	74.510	79.640	83.120	84.760	89.850	95.010	100.130	105.250	111.920
POINT No.	1	2	3	4	5	6	7	8	9	10	11	13

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS6　　Flow rate Q＝ 162.000 (m³ sec) , Water level hi+Zi＝ 45.246 (m)

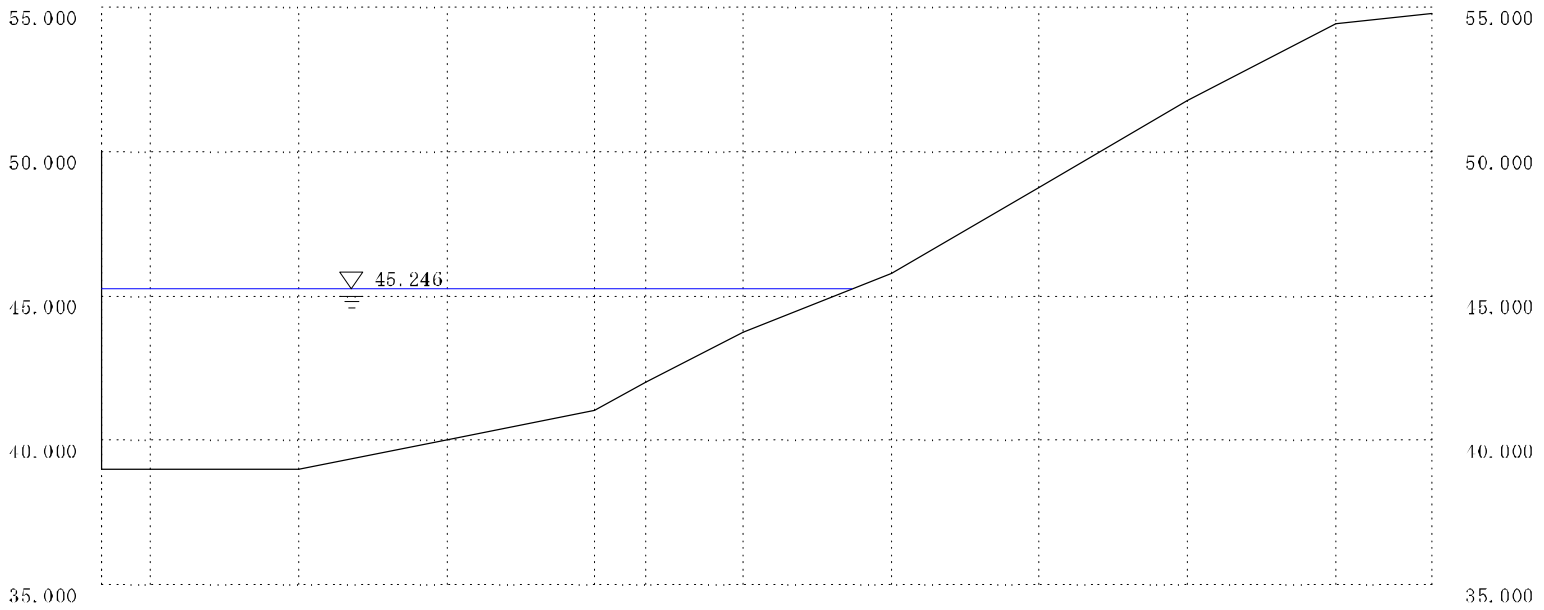
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted peri-sbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	66.000	50.000	0.0250														
2	66.000	39.000	0.0250	6.246			0.000	0.000	6.246								
3	67.710	39.000	0.0250	6.246			1.710	10.681	1.710								
4	72.830	39.000	0.0250	6.246			5.120	31.982	5.120								
5	77.960	10.000	0.0250	5.246			5.130	29.179	5.227								
6	83.080	41.000	0.0250	4.246			5.120	24.302	5.217								
7	84.800	42.000	0.0250	3.246			1.720	6.444	1.990								
8	88.200	43.750	0.0250	1.496			3.400	8.063	3.824								
9	93.330	45.780	0.0250				3.782	2.830	1.067								
10	98.450	48.740	0.0250				0.000	0.000	0.000								
11	103.570	51.780	0.0250				0.000	0.000	0.000								
12	108.700	54.390	0.0250				0.000	0.000	0.000								
13	112.040	51.800	0.0250				0.000	0.000	0.000								
					1		25.982	113.781	33.400	3.407	0.0250						
						Σ＝	25.982	113.781	33.400	3.407							

Type : Level1a　　, Bottom level Zb＝ 39.000 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.217

Cross section
of stream Ibrahimia_5 No.CS6
→ Distance Y (m) Scale [1:250]

Elevation Z (m)
Scale [1:250]

Streambed Line
Water surface Line



POINT No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Horizontal distance Yi (m)	66.000	66.000	67.710	72.830	77.960	83.080	84.800	88.200	93.330	98.450	103.570	108.700	112.040
Bottom elevation of stream Zi (m)	50.000	39.000	39.000	39.000	40.000	41.000	42.000	43.750	45.780	48.740	51.780	54.390	54.800

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS5　　Flow rate Q＝ 162.000 (m³ sec) , Water level hi+Zi＝ 45.271 (m)

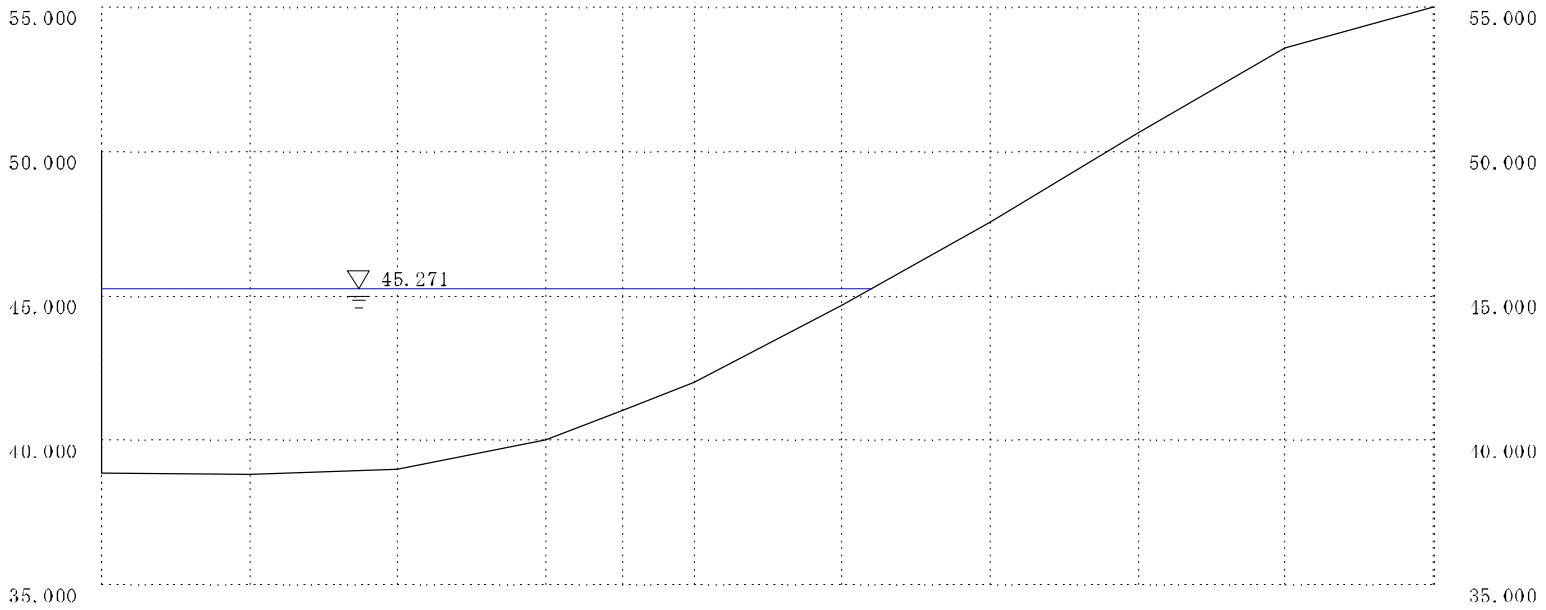
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted peri-sbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	66.000	50.000	0.0250														
2	66.010	38.850	0.0250	6.421			0.006	0.018	6.121								
3	71.140	38.830	0.0250	6.441			5.130	32.993	5.130								
4	76.260	39.000	0.0250	6.271			5.120	32.545	5.123								
5	81.380	40.000	0.0250	5.271			5.120	29.550	5.217								
6	84.000	41.000	0.0250	4.271			2.620	12.501	2.804								
7	86.510	42.000	0.0250	3.271			2.510	9.466	2.702								
8	91.630	44.680	0.0250	0.591			5.120	9.889	5.779								
9	96.750	47.530	0.0250				1.062	0.314	1.216								
10	101.870	50.630	0.0250				0.000	0.000	0.000								
11	107.000	53.560	0.0250				0.000	0.000	0.000								
12	112.120	55.000	0.0250				0.000	0.000	0.000								
13	112.140	55.000	0.0250				0.000	0.000	0.000								
					1		26.688	127.277	34.392	3.701	0.0250						
						Σ＝	26.688	127.277	34.392	3.701							

Type : Level1a , Bottom level Zb＝ 38.830 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.186

Cross section
of stream Ibrahimia_5 No.CS5
→ Distance Y (m) Scale [1:250]

Elevation Z (m)
Scale [1:250]

Streambed Line
Water surface Line



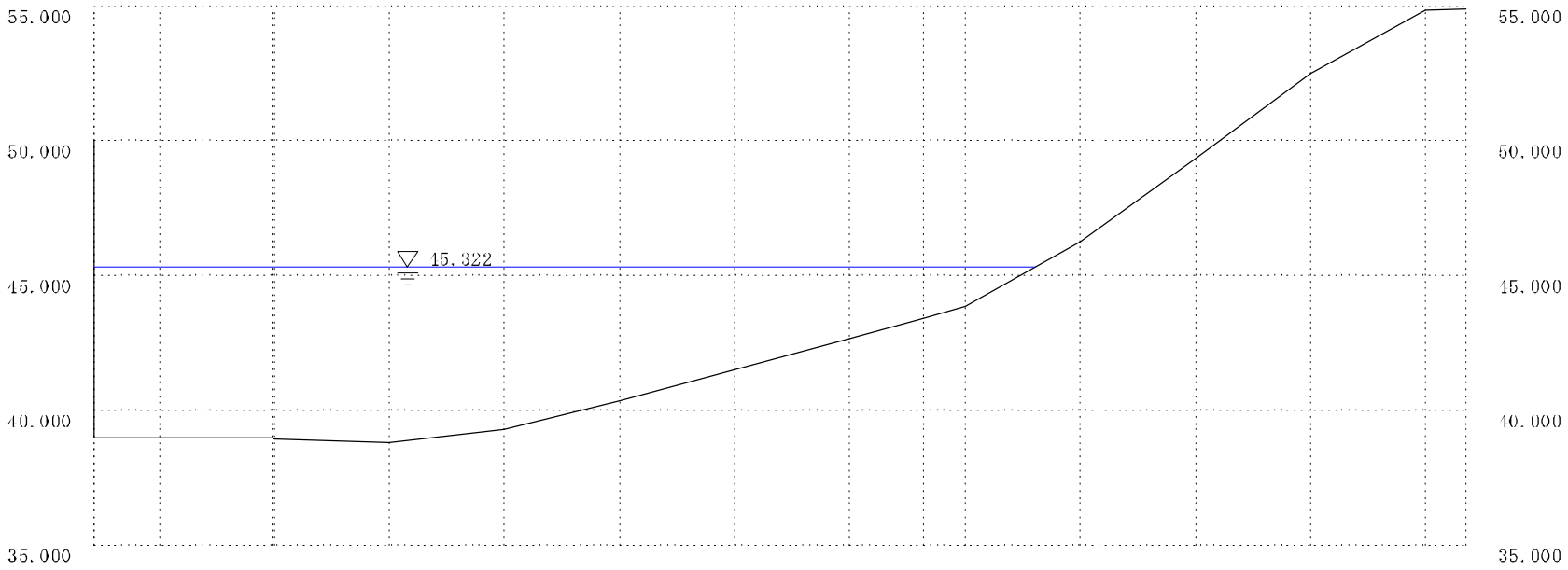
Bottom elevation of stream Zi (m	50.000	38.830	38.830	39.000	40.000	41.000	42.000	44.680	47.530	50.630	53.560	55.000	55.000
Hori-zontal distance Yi (m	66.000	66.010	71.140	76.260	81.380	84.000	86.510	91.630	96.750	101.870	107.000	112.120	112.140
POINT No.	1	2	3	4	5	6	7	8	9	10	11	12	13

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS4　　Flow rate Q＝　162.000 (m³ sec) , Water level hi+Zi＝　45.322 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perimeter Sbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)	Velocily Ui (m)	Flowrate Qi (m³/sec)
1	51.000	50.000	0.0250														
2	51.000	39.000	0.0250	6.322			0.000	0.000	6.322								
3	53.890	39.000	0.0250	6.322			2.890	18.269	2.890								
4	58.920	38.980	0.0250	6.342			5.030	31.848	5.030								
5	59.010	38.950	0.0250	6.372			0.090	0.572	0.095								
6	64.130	38.810	0.0250	6.512			5.120	32.981	5.122								
7	69.260	39.270	0.0250	6.052			5.130	32.225	5.151								
8	74.380	40.370	0.0250	4.952			5.120	28.168	5.237								
9	79.500	41.510	0.0250	3.812			5.120	22.131	5.215								
10	81.630	42.650	0.0250	2.672			5.130	16.629	5.255								
11	87.940	43.130	0.0250	1.892			3.310	7.552	3.101								
12	89.750	43.860	0.0250	1.462			1.810	3.035	1.860								
13	91.870	46.250	0.0250				3.131	2.288	3.155								
14	100.000	49.380	0.0250				0.000	0.000	0.000								
15	105.120	52.520	0.0250				0.000	0.000	0.000								
16	110.240	54.880	0.0250				0.000	0.000	0.000								
17	112.070	54.930	0.0250				0.000	0.000	0.000								
					1		41.881	196.002	49.063	3.995	0.0250						
						Σ＝	41.881	196.002	49.063	3.995							

Type : Level1a　　, Bottom level Zb＝　38.810 (m) , Energy regulation factor α＝　1.000 ,　　Froude number Fr＝ 0.122

Cross section
of stream Ibrahimia_5 No.CS4
→ Distance Y (m) Scale [1:300]
↓
Elevation Z (m)
Scale [1:250]



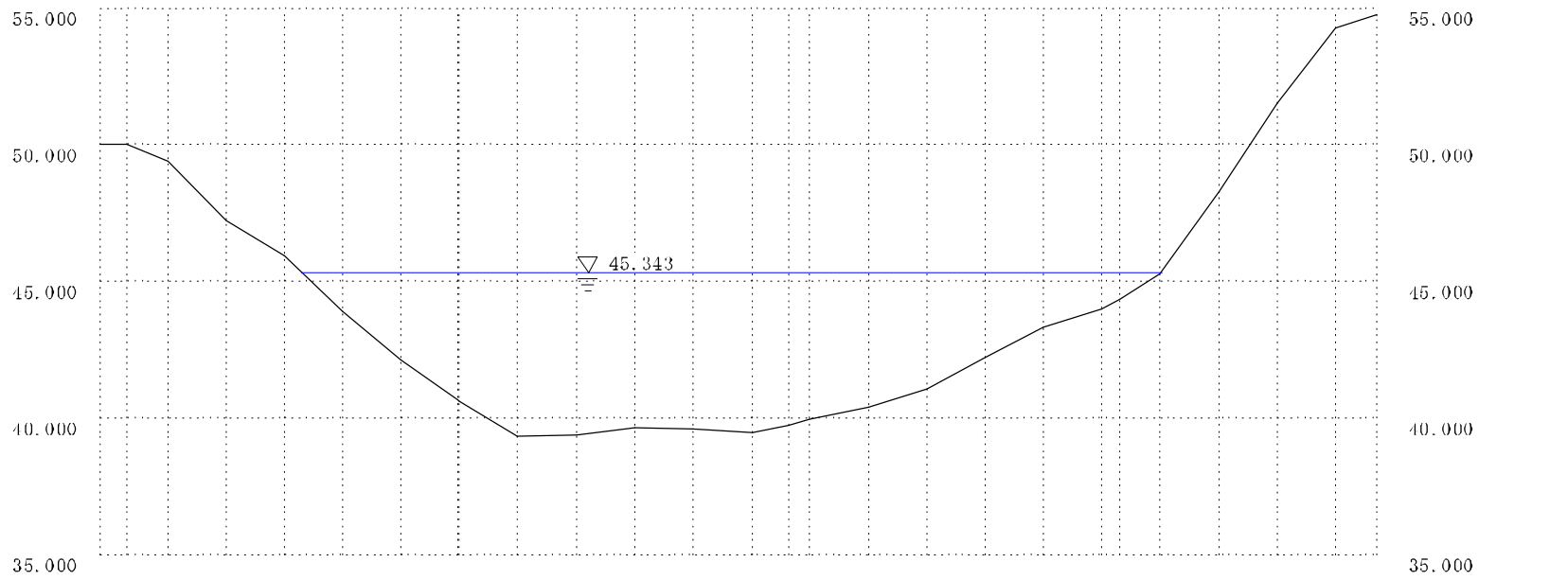
POINT No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Horizontal distance Yi (m)	51.000	51.000	53.890	58.920	59.010	64.130	69.260	74.380	79.500	84.630	87.940	89.750	94.870	100.000	105.120	110.240	112.070
Bottom elevation of stream Zi (m	50.000	39.000	39.000	38.980	38.950	38.810	39.270	40.370	41.510	42.650	43.430	43.860	46.250	49.380	52.520	54.880	54.930

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS3　　Flow rate Q＝ 162.000 (m³ sec) , Water level hi+Zi＝ 45.343 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perisbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter				Velocily Ui (m)	Flowrate Qi (m³/sec)
												Left Dead harbour S1(m)	Left effec-tive harbour S2(m)	Right Dead harbour S3(m)	Right effec-tive harbour S4(m)		
1	0.000	50.000	0.0250														
2	2.350	50.000	0.0250				0.000	0.000	0.000								
3	5.900	49.400	0.0250				0.000	0.000	0.000								
4	11.020	47.250	0.0250				0.000	0.000	0.000								
5	16.150	45.920	0.0250				0.000	0.000	0.000								
6	21.270	43.910	0.0250	1.433			3.650	2.615	3.921								
7	26.390	42.100	0.0250	3.243			5.120	11.970	5.431								
8	31.370	40.670	0.0250	4.673			4.980	19.710	5.181								
9	31.520	40.630	0.0250	4.713			0.150	0.704	0.155								
10	36.640	39.370	0.0250	5.973			5.120	27.356	5.273								
11	41.760	39.130	0.0250	5.913			5.120	30.128	5.120								
12	46.890	39.650	0.0250	5.693			5.130	29.769	5.135								
13	52.010	39.630	0.0250	5.713			5.120	29.199	5.120								
14	57.130	39.500	0.0250	5.843			5.120	29.583	5.122								
15	60.400	39.760	0.0250	5.583			3.270	18.681	3.280								
16	62.260	39.950	0.0250	5.393			1.860	10.207	1.870								
17	67.380	40.440	0.0250	4.903			5.120	26.357	5.143								
18	72.500	41.060	0.0250	4.283			5.120	23.516	5.157								
19	77.620	42.220	0.0250	3.123			5.120	18.959	5.250								
20	82.750	43.360	0.0250	1.983			5.130	13.096	5.255								
21	87.870	44.000	0.0250	1.343			5.120	8.514	5.160								
22	89.430	44.360	0.0250	0.983			1.560	1.814	1.601								
23	92.990	45.280	0.0250	0.063			3.560	1.861	3.677								
24	98.120	18.300	0.0250				0.107	0.003	0.124								
25	103.240	51.520	0.0250				0.000	0.000	0.000								
26	108.369	51.280	0.0250				0.000	0.000	0.000								
27	111.990	51.800	0.0250				0.000	0.000	0.000								
					1		75.477	304.341	76.975	3.954	0.0250						
						Σ＝	75.477	304.341	76.975	3.954							

Type : Levella , Bottom level Zb＝ 39.370 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.085

Cross section
of stream Ibrahimia_5 No.CS3
→ Distance Y (m) Scale [1:600]
↓
Elevation Z (m)
Scale [1:250]



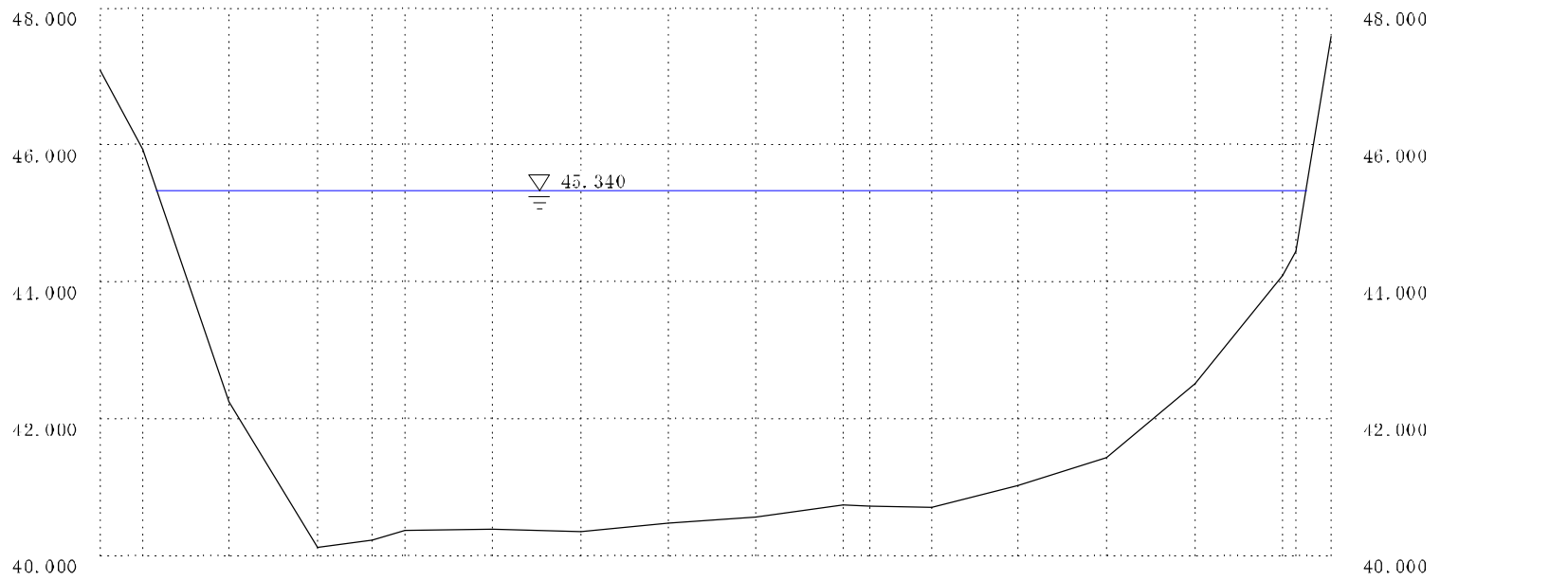
POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m
1	0.000	50.000
2	2.350	50.000
3	5.900	49.400
4	11.020	47.250
5	16.150	45.920
6	21.270	43.910
7	26.390	42.100
8	31.370	40.670
9	31.520	40.630
10	36.640	39.370
11	41.760	39.430
12	46.880	39.650
13	52.010	39.630
14	57.130	39.500
15	60.400	39.760
16	62.260	39.950
17	67.380	40.440
18	72.500	41.060
19	77.620	42.220
20	82.750	43.360
21	87.870	44.000
22	89.430	44.360
23	92.990	45.280
24	98.120	48.300
25	103.240	51.520
26	108.369	54.280
27	111.990	54.800

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS2　　Flow rate Q＝ 162.000 (m³ sec) , Water level hi+Zi＝ 45.340 (m)

POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted peri-sbjr Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)	Velocily Ui (m)	Flowrate Qi (m³/sec)
1	0.000	47.100	0.0250														
2	2.430	45.930	0.0250				0.000	0.000	0.000								
3	7.550	42.250	0.0250	3.090			4.300	6.641	5.295								
4	12.680	40.120	0.0250	5.220			5.130	21.317	5.555								
5	15.890	40.220	0.0250	5.120			3.210	16.597	3.212								
6	17.800	40.370	0.0250	4.970			1.910	9.637	1.916								
7	22.920	40.400	0.0250	4.940			5.120	25.372	5.120								
8	28.040	40.360	0.0250	4.980			5.120	25.397	5.120								
9	33.170	40.180	0.0250	4.860			5.130	25.241	5.131								
10	38.290	40.370	0.0250	4.770			5.120	24.655	5.121								
11	43.410	40.740	0.0250	4.600			5.120	23.989	5.123								
12	44.920	40.730	0.0250	4.610			1.510	6.954	1.510								
13	48.540	40.710	0.0250	4.630			3.620	16.726	3.620								
14	53.660	41.020	0.0250	4.320			5.120	22.914	5.129								
15	58.780	41.430	0.0250	3.910			5.120	21.071	5.136								
16	63.910	42.530	0.0250	2.810			5.130	17.239	5.247								
17	69.030	44.100	0.0250	1.240			5.120	10.370	5.355								
18	69.860	44.440	0.0250	0.900			0.830	0.888	0.897								
19	71.860	47.600	0.0250				0.570	0.257	1.066								
					1		67.180	275.266	69.553	3.958	0.0250						
						Σ＝	67.180	275.266	69.553	3.958							

Type : Level1a , Bottom level Zb＝ 40.120 (m) , Energy regulation factor α＝ 1.000 , Froude number Fr＝ 0.093

Cross section
of stream Ibrahimia_5 No.CS2
→ Distance Y (m) Scale [1:400]
↓
Elevation Z (m)
Scale [1:100]



POINT No.	Horizontal distance Yi (m)	Bottom elevation of stream Zi (m
1	0.000	47.100
2	2.430	45.930
3	7.550	42.250
4	12.630	40.120
5	15.890	40.220
6	17.800	40.370
7	22.920	40.400
8	28.040	40.360
9	33.170	40.480
10	38.290	40.570
11	43.410	40.740
12	44.920	40.730
13	48.540	40.710
14	53.660	41.020
15	58.780	41.430
16	63.910	42.530
17	69.030	44.100
18	69.860	44.440
19	71.860	47.600

Hydraulic value of cross section (1／1)　　Ibrahimia_5　No. CS1　　Flow rate Q＝　162.000 (m³ sec) , Water level hi+Zi＝　45.323 (m)

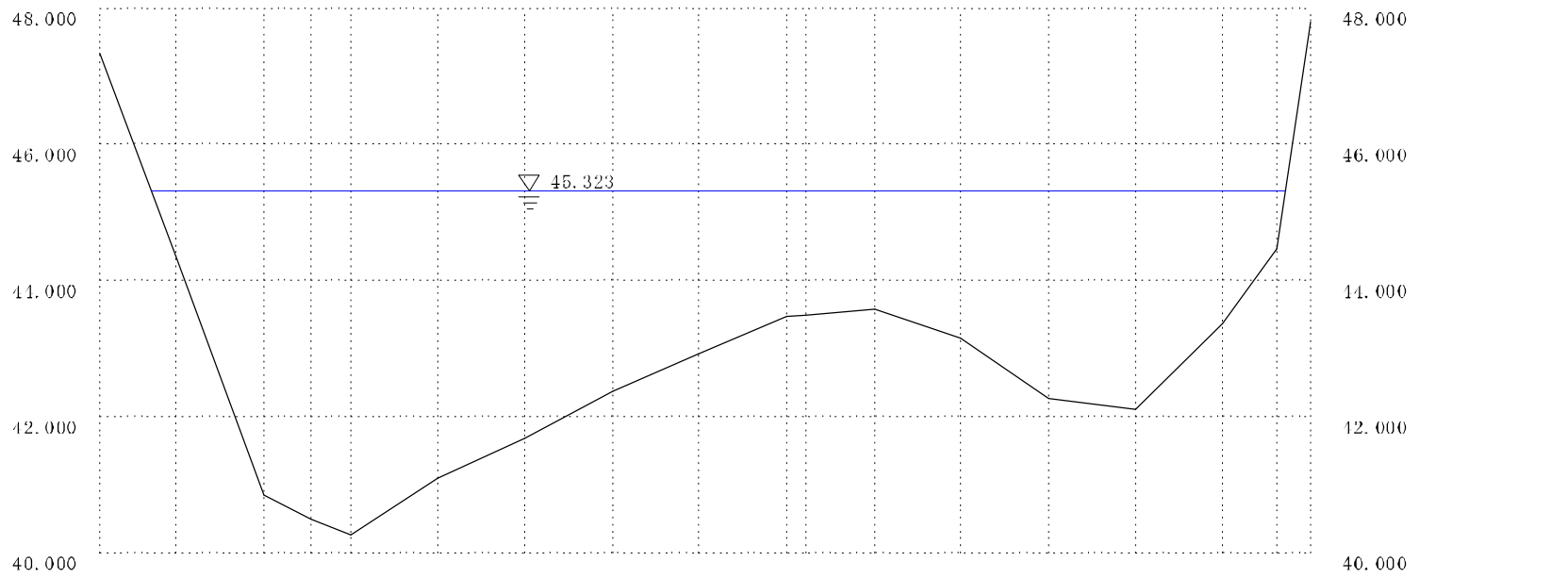
POINT No.	Horizontal distance Yj (m)	Bottom elevation of stream Zj (m)	Roughness factor nj (-)	Water depth H－Zj (m)	Sub-section No.	Dead harbour cope level Ti (m)	Width of stbjm Bi (m)	Cross-sectional aaj Ai (m²)	Wetted perimeter Sbi (m)	Hydrulic radius Ri (m)	Roughness factor Ni (-)	Boundary Wetted perimeter Left Dead harbour S1(m)	Left effective harbour S2(m)	Right Dead harbour S3(m)	Right effective harbour S4(m)	Velocily Ui (m)	Flowrate Qi (m³/sec)
1	0.000	47.340	0.0250														
2	1.480	44.350	0.0250	0.973			1.158	0.709	1.753								
3	9.600	40.850	0.0250	4.473			5.120	13.942	6.202								
4	12.430	40.490	0.0250	4.833			2.830	13.168	2.853								
5	14.730	40.280	0.0250	5.043			2.300	11.357	2.310								
6	19.850	41.110	0.0250	4.213			5.120	23.695	5.187								
7	24.970	41.680	0.0250	3.643			5.120	20.111	5.152								
8	30.090	42.370	0.0250	2.953			5.120	16.886	5.166								
9	35.220	42.930	0.0250	2.393			5.130	13.712	5.160								
10	40.340	43.470	0.0250	1.853			5.120	10.869	5.118								
11	41.460	43.490	0.0250	1.833			1.120	2.061	1.120								
12	45.460	43.580	0.0250	1.743			4.000	7.152	4.001								
13	50.590	43.150	0.0250	2.173			5.130	10.041	5.118								
14	55.710	42.280	0.0250	3.043			5.120	13.353	5.193								
15	60.830	42.100	0.0250	3.223			5.120	16.041	5.123								
16	65.960	43.370	0.0250	1.953			5.130	13.276	5.285								
17	69.160	44.480	0.0250	0.843			3.200	4.473	3.387								
18	71.100	47.800	0.0250				0.493	0.208	0.976								
					1		66.630	191.060	69.165	2.762	0.0250						
						Σ＝	66.630	191.060	69.165	2.762							

Type : Level1a　　, Bottom level Zb＝　40.280 (m) , Energy regulation factor α＝　1.000 ,　　Froude number Fr＝ 0.160

Cross section
of stream Ibrahimia_5 No.CS1

Distance Y (m) Scale [1:400]

Elevation Z (m)
Scale [1:100]



POINT No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Horizontal distance Yi (m)	0.000	4.430	9.600	12.430	14.730	19.850	24.970	30.090	35.220	40.340	41.460	45.160	50.590	55.710	60.830	65.960	69.160	71.100
Bottom elevation of stream Zi (m)	47.340	44.350	40.850	40.490	40.280	41.110	41.680	42.370	42.930	43.470	43.490	43.580	43.150	42.280	42.100	43.370	44.480	47.800