

表一 1.1 水管理システム建設費

ITEM	NAME OF FACILITIES AND EQUIPMENT	PHASE I										PHASE II									
		FOREIGN CURRENCY (US\$)					LOCAL CURRENCY (TTS)					FOREIGN CURRENCY (US\$)					LOCAL CURRENCY (TTS)				
		SUPPLY		TOTAL			CIVIL WORKS		TOTAL			SUPPLY		TOTAL			CIVIL WORKS		TOTAL		
		PRIMARY INSTRUMENT EQUIPMENT	-ATION	TOTAL	F-W/C-V CHAMBER	BUILDING WORKS	INSTAL-LATION	SUB-TOTAL	TRANS-PORTATION	TOTAL	PRIMARY INSTRUMENT EQUIPMENT	-ATION	TOTAL	F-W/C-V CHAMBER	BUILDING WORKS	INSTAL-LATION	SUB-TOTAL	TRANS-PORTATION	TOTAL		
(1) CONSTRUCTION WORKS																					
	FLOW METER	494.2	1,229.8	1,724.0	1,438.4	775.2	2,213.6	155.0	2,368.7	2,387.3	4.4	1,363.0	1,367.4	10.1	581.1	591.2	116.2	707.4	1,533.8		
	CONTROL VALVE	2,156.4	3,779.8	5,936.2	1,396.5	2,522.9	3,919.4	504.6	4,424.0	6,977.1	296.2	1,620.7	1,916.9	115.0	814.7	929.7	162.9	1,092.6	2,174.0		
	LEVEL METER	32.5	278.6	311.1	312.0	132.6	132.6	26.5	159.1	349.5	6.5	312.8	319.3	27.1	135.7	162.8	27.1	192.8	357.6		
	PRESSURE GAUGE	---	566.7	566.7	---	240.8	240.8	48.2	289.0	634.7	---	593.9	593.9	---	252.4	252.4	50.5	302.9	651.1		
	CSS & CENTRAL EQUIP	---	5,861.9	5,861.9	---	385.3	1,902.6	2,287.9	380.5	6,489.7	---	3,486.9	3,486.9	---	1,481.9	1,481.9	296.4	1,778.3	3,905.3		
	REGIONAL OFFICE	---	211.6	211.6	---	89.9	89.9	18.0	107.9	236.9	---	317.3	317.3	---	134.3	134.3	27.0	161.3	365.4		
	REPEATER STATION	---	219.1	219.1	---	93.1	93.1	18.6	111.7	245.4	---	219.1	219.1	---	83.1	83.1	18.6	101.7	245.4		
	RTU STATION	---	11,832.0	11,832.0	---	2,219.5	5,028.6	7,248.1	1,005.7	8,253.8	---	9,973.3	9,973.3	---	4,238.7	4,238.7	847.7	5,086.4	11,170.1		
	BOOSTER P/S	---	226.7	226.7	---	96.3	96.3	19.3	115.6	253.9	---	249.3	249.3	---	0.0	0.0	0.0	0.0	253.9		
	SPARE PARTS	---	249.3	249.3	---	---	---	21.2	21.2	254.3	---	249.3	249.3	---	0.0	0.0	21.2	21.2	254.3		
	SUB-TOTAL	2,683.1	24,556.3	27,239.4	2,834.9	2,604.9	10,882.1	16,321.9	2,197.6	18,519.5	307.1	18,126.4	18,443.4	125.1	7,732.5	7,857.6	1,567.7	9,425.3	20,661.1		
	[US\$]	---	---	---	---	---	---	---	---	---	328.4	1,279.9	1,608.3	1,444.6	683.5	2,128.1	136.7	2,264.8	2,141.2		
	FLOW METER	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---		
	SUB-TOTAL	---	---	---	---	---	---	---	---	---	328.4	1,279.9	1,608.3	1,444.6	683.5	2,128.1	136.7	2,264.8	2,141.2		
	TOTAL	2,683.1	24,556.3	27,239.4	2,834.9	2,604.9	10,882.1	16,321.9	2,197.6	18,519.5	635.4	19,416.3	20,051.7	1,569.7	8,416.0	9,985.7	1,704.4	11,690.1	22,802.3		
[2] ENGINEERING SERVICES		---	---	3,437.0	---	---	---	---	2,109.3	3,933.3	---	---	6,311.1	---	---	---	---	3,809.3	7,207.4		
TOTAL OF ITEMS [1] & [2]		2,683.1	24,556.3	30,676.4	2,834.9	2,604.9	10,882.1	16,321.9	2,197.6	20,628.7	635.4	19,416.3	26,362.8	1,569.7	8,416.0	9,985.7	1,704.4	15,499.4	30,009.7		
[3] TAX (VAT)		---	---	---	---	---	---	---	22,650.5	5,329.5	---	---	---	---	---	---	---	19,131.2	4,501.5		
[4] CONTINGENCY		---	---	4,601.5	---	---	---	---	3,094.3	5,329.5	---	---	3,854.4	---	---	---	---	2,324.9	4,501.5		
[5] ADMINISTRATION		---	---	---	---	---	---	---	755.0	177.7	---	---	---	---	---	---	---	637.7	150.0		
GRAND-TOTAL		2,683.1	24,556.3	35,277.9	2,834.9	2,604.9	10,882.1	16,321.9	2,197.6	47,128.6	635.4	19,416.3	30,317.2	1,569.7	8,416.0	9,985.7	1,704.4	37,593.2	39,162.7		

NOTE: EQUIP.; EQUIPMENT. P/S: PUMPING STATION. F-W/C-V: FLOW METER AND CONTROL VALVE. VAT : VALUE ADDED TAX. EXCHANGE RATES: 1 US\$ = ¥ 135 AND 1 US\$ = TTS 4.25.

表-12 CSS (第一期) のための一次計器一覽表 (1)

NOTE: AN; ANNUBAR, P ; PROPELLAR TYPE, RES; RESERVOIR, (300); PIPE DIAMETER(MM),
 AP; AIR PURGE TYPE, PF; PARSHALL FLUME, IT ; INTAKE, "*" ; EXISTINGS TO BE USED,
 AV; ALTITUDE VALVE, V ; VENTURI TUBE, WW ; WATERWORKS, "Y" ; EXISTINGS (REPLACEMENT PERIPHERALS),
 B ; BOURDON TUBE, RD; ROAD, OT ; OFF-TAKE, "#"; INSTALLATION OF CONTROL EQUIPMENT,
 BU; BUTTERFLY VALVE, Av; AVENUE, JCT; JUNCTION,
 CV; CONE VALVE, HW; HIGH WAY, IC ; INTERCONNECTION,
 F ; FLOAT TYPE, SH; SHEET, BPS; BOOSTER PUMPING STATION,
 O ; ORIFICE PLATE, ST; STREET, D ; DIFFERENTIAL PRESSURE TYPE,

RTU NO. & LOCATION	MONITORING POINT	P H A S E I												
		EQUIPMENT TO BE INSTALLED				NUMBER OF MONITORING DATA BY CENTRAL SUPERVISORY SYSTEM (CSS)					EQUIPMENT TO BE CONTROLLED			
		LEVEL METER	PRESS GAUGE	FLOW METER	CONTROL VALVE	WATER LEVEL	WATER PRESS	FLOW RATE	VALVE STATUS	PUMP STATUS	ALARM	TOTAL	PUMP NO.	VALVE PLACE
1 NORTH OROPOUCHE WW	RAW WATER	F		Y	PF		1		1					
	CLEAR WATER RESERVOIR DISTRIBUTION (1050)	* D-2			AN	2			1					
											5			
2 HOLLIS WW	IMPOUNDING RESERVOIR	F				1								
	RAW WATER (300) DISTRIBUTION (600)				AN				1					
														3
3 GILL TRACE	QUARE WATER TANK	D				1								
	QUARE DISTRIBUTION (300)		Y B	Y V			1	1						
	GILL TRACE OT (300)		B	AN	BU		1	1	1				1	SITE
	QUARE (1) OT (150)		B	AN	BU		1	1	1				1	SITE
	QUARE (2) OT (150)		B	AN	BU		1	1	1				1	SITE
	TO SANGRE GRANDE OT (400)		B	AN	BU		1	1	1				1	SITE
														15
4 ARIPO BPS	ARIPO (NEW) RAW WATER (300)			Y O					1					
	ARIPO (OLD) RAW WATER (250)				AN				1					
	FORT READ RESERVOIR (250)	D			AN	1			1					
	FORT READ RESERVOIR (300)	D			AN	1			1					
	ARIPO BPS (300)		B	Y V	BU		1	1	1				1	SITE
	CUMOTO (1) OT (300)		B	AN	BU		1	1	1				1	SITE
	CUMOTO (2) OT (300)		B	AN	BU		1	1	1				1	SITE
														15
5 GUANAPO JUNCTION	GUANAPO RAW WATER (300)				AN				1					
	GUANAPO RESERVOIR (300)	D				1								
	GUANAPO WW DIST. (300)		B	AN	BU		1	1	1				1	SITE
	DOUBLE BRIDGE OT (150)		B	AN	BU		1	1	1				1	SITE
	GUANAPO JUNCTION OT (300)		B	AN	BU		1	1	1				1	SITE
														11
6 DEMERARA JUNCTION	DEMERARA JCT OT (300)		B	AN	BU		1	1	1				1	SITE
	TUMPUNA JCT OT (300)		B	AN	BU		1	1	1				1	SITE
														6
7 ARIMA OLD RESERVOIR	ARIMA NEW RESERVOIR (375)	F			AN		1		1					
	ARIMA OLD RESERVOIR (200)	D			AN	1			1					
	TO MORENO ST OT (150)		B	AN	BU		1	1	1				1	SITE
	QUESNEL ST OT (300)		B	AN	BU		1	1	1				1	SITE
	OMERA JCT OT (150)		B	AN	BU		1	1	1				1	SITE
	ARIMA BPS (300)		B	AN	BU		1	1	1				1	SITE
	ARIMA WELL (200)				AN				1					
	ARIMA B/PUMPS													
														17
8 MAUSICA JUNCTION	OLTON RD OT (150)		B	AN	BU		1	1	1				1	SITE
	BOYS LANE OT (200)		B	AN	BU		1	1	1				1	SITE
	MAUSICA JCT OT (150)		B	AN	BU		1	1	1				1	SITE
	CARAPO OT (300)		B	AN	BU		1	1	1				1	SITE
	MAUSICA OT (300)		B	AN	BU		1	1	1				1	SITE
	MALONEY JCT OT (300)		B	AN	BU		1	1	1				1	SITE
														18
9 AROUCA WW	CLEAR WATER TANK DISTRIBUTION (200)	D			AN	1			1					
	BORNE AREA #1 OT (150)		B	AN	BU		1	1	1				1	SITE
	LOPINOT IC OT (300)		B	AN	BU		1	1	1				1	SITE
														9
10 CAURA WW	RAW WATER (400)				AN				1					
	CLEAR WATER TANK DISTRIBUTION (400)	D				1			1					
			B	AN	BU		1	1	1				1	SITE
														5
11 TACARIGUA WW	CLEAR WATER RESERVOIR DISTRIBUTION (1) (300)	Y D				1			1					
	DISTRIBUTION (2) (400)		B	AN	BU		1	1	1				1	SITE
	TO CAURA BPS OT (225)		B	AN	BU		1	1	1				1	SITE
	PASEA RD OT (175)		B	AN			1	1	1				1	SITE

表-12 CSS (第一期) のための一次計器一覧表 (2)

NOTE: AN: ANNUBAR, P: PROPELLAR TYPE, RES: RESERVOIR, (300); PIPE DIAMETER(MM),
 AP: AIR PURGE TYPE, PF: PARSHALL FLUME, IT: INTAKE, "X": EXISTINGS TO BE USED,
 AV: ALTITUDE VALVE, V: VENTURI TUBE, WW: WATERWORKS, "Y": EXISTINGS (REPLACEMENT PERIPHERALS),
 B: BOURDON TUBE, RD: ROAD, OT: OFF-TAKE, "#": INSTALLATION OF CONTROL EQUIPMENT,
 BU: BUTTERFLY VALVE, Av: AVENUE, JCT: JUNCTION,
 CV: CONE VALVE, IM: HIGH WAY, IC: INTERCONNECTION,
 F: FLOAT TYPE, SH: SHEET, BPS: BOOSTER PUMPING STATION,
 O: ORIFICE PLATE, ST: STREET, D: DIFFERENTIAL PRESSURE TYPE,

RTU NO. & LOCATION	MONITORING POINT	P H A S E I																	
		EQUIPMENT TO BE INSTALLED				NUMBER OF MONITORING DATA BY CENTRAL SUPERVISORY SYSTEM (CSS)						EQUIPMENT TO BE CONTROLLED							
		LEVEL METER	PRESS GAUGE	FLOW METER	CONTROL VALVE	WATER LEVEL	WATER PRESS	FLOW RATE	VALVE STATUS	PUMP STATUS	ALARM	TOTAL	PUMP NO.	VALVE PLACE NO.	PLACE				
12	FLOW CONTROL STATION														11				
	PIARCO JCT OT (300)		B	AN	BU		1	1	1									1	SITE
	BY-PASS OT (300)		B	AN	BU		1	1	1									1	SITE
	FLOW CONTROL STATION(800)		B-2	Y V	# CV-2		2	1	2									2	SITE
13	ST AUGUSTINE RESERVOIR														10				
	RESERVOIR (750)	F		AN	AV	1		1											
	ST JOHN RD OT (300)		B	AN			1	1											
	TO TUNAPUNA OT (150)		B	AN			1	1											
	RABIR ST OT (200)		B	AN			1	1											
	RIVERSIDE RD OT (100)		B	AN			1	1											
14	TUNAPUNA BPS														48				
	TUNAPUNA(1) (150)		B	AN	BU		1	1	1									1	CSS
	TUNAPUNA(2) (200)		B	AN	BU		1	1	1									1	CSS
	TUNAPUNA(3) (525)		B	AN			1	1											
	PASEA ST OT (100)		B	AN	BU		1	1	1									1	SITE
	TUNAPUNA RIVER (1) (300)		B	AN	BU		1	1	1									1	SITE
	TUNAPUNA RIVER (2) (525)		B	AN	BU		1	1	1									1	SITE
	TUNAPUNA B/PUMPS									6	25		3	CSS					
15	ST JOSEPH RESERVOIR														15				
	RESERVOIR	F				1													
	TO ST JOSEPH OT (225)		B	AN	BU		1	1	1									1	SITE
	TO RIDER MAIN OT (200)		B	AN	BU		1	1	1									1	SITE
	MENDEZ STEEL SH. OT (200)		B	AN	BU		1	1	1									1	SITE
	MATERNITY HP. OT (100)		B	AN	BU		1	1	1									1	SITE
	ST JOSEPH(1) (175)			AN				1											
	ST JOSEPH(2) (300)			AN				1											
16	VALSAYN WW														41				
	RAW WATER (750)			Y V				1											
	CLEAR WATER RESERVOIR	Y D				1													
	DISTRIBUTION (750)		Y B	Y V	BU		1	1	1									1	SITE
	BOOSTER SUCTION (450)		Y B	Y AN			1	1											
	BOOSTER DELIVERY (450)		Y B	AN	BU		1	1	1									1	CSS
	VALSAYN B/PUMPS									6	25		3	CSS					
17	URIAH BUTLER HW JUNCTION														3				
	STAG/NESTL OT (300)		B	AN	BU		1	1	1									1	SITE
18	MT. HOPE RESERVOIR														23				
	RESERVOIR (600)	D		AN	AV	1		1											
	CARIB(1) OT (150)		B	AN	BU		1	1	1									1	SITE
	CARIB(2) OT (200)		B	AN	BU		1	1	1									1	SITE
	MT. HOPE OT (300)																		
	GORDON ST (1) OT (200)		B	AN	BU		1	1	1									1	SITE
	GORDON ST (2) OT (200)		B	AN	BU		1	1	1									1	SITE
	GORDON ST (3) OT (300)		B	AN	BU		1	1	1									1	SITE
	BROOM ST OT (200)		B	AN	BU		1	1	1									1	SITE
	TO SANTA CRUZ OT (250)		B	AN	BU		1	1	1									1	SITE
19	MALICK RESERVOIR														11				
	RESERVOIR (750)	D		AN	AV	1		1											
	TO BARATARIA OT (300)		B	AN	BU		1	1	1									1	SITE
	SIXTH Av. OT (300)		B	AN	BU		1	1	1									1	SITE
	TO LADY YOUNG Av. OT (450)		B	AN	BU		1	1	1									1	SITE
20	EL SOCORRO WW														49				
	RAW WATER (750)			Y V				1											
	CLEAR WATER RESERVOIR	Y AP				1													
	BOOSTER SUCTION (900)		Y B				1	1											
	BOOSTER DELIVERY (600)		Y B	Y AN	BU		1	1	1									1	CSS
	DISTRIBUTION (400)		Y B	Y AN	BU		1	1	1									1	SITE
	EL SOCORRO RD OT (150)		B	AN	BU		1	1	1									1	SITE
	DON MIGUEL RD OT (150)		B	AN	BU		1	1	1									1	SITE
	ELEVENTH ST OT (150)		B	AN	BU		1	1	1									1	SITE
	EL SOCORRO B/PUMPS									6	25		3	CSS					
21	LAVENTILLE														3				
	TO LAVENTILLE OT (300)		B	AN	BU		1	1	1									1	SITE
22	BLACK RIVER														12				

表-12 CSS (第一期) のための一次計器一覽表 (3)

NOTE: AN; ANNUBAR, P; PROPELLAR TYPE, RES; RESERVOIR, (300); PIPE DIAMETER(MM),
 AP; AIR PURGE TYPE, PF; PARSHALL FLUME, IT; INTAKE, "*" ; EXISTINGS TO BE USED,
 AV; ALTITUDE VALVE, V; VENTURI TUBE, WW; WATERWORKS, "Y"; EXISTINGS (REPLACEMENT PERIPHERALS),
 B; BOURDON TUBE, RD; ROAD, OT; OFF-TAKE, "#"; INSTALLATION OF CONTROL EQUIPMENT,
 BU; BUTTERFLY VALVE, AV; AVENUE, JCT; JUNCTION,
 CV; CONE VALVE, HW; HIGH WAY, IC; INTERCONNECTION,
 F; FLOAT TYPE, SH; SHEET, BPS; BOOSTER PUMPING STATION,
 O; ORIFICE PLATE, ST; STREET, D; DIFFERENTIAL PRESSURE TYPE,

RTU NO. & LOCATION	MONITORING POINT	PHASE I												
		EQUIPMENT TO BE INSTALLED				NUMBER OF MONITORING DATA BY CENTRAL SUPERVISORY SYSTEM (CSS)					EQUIPMENT TO BE CONTROLLED			
		LEVEL METER	PRESS GAUGE	FLOW METER	CONTROL VALVE	WATER LEVEL	WATER PRESS	FLOW RATE	VALVE STATUS	PUMP ALARM	TOTAL	PUMP NO.	VALVE PLACE	
	BLACK RIVER (1) OT (300)		B	AN	BU		1	1	1				1	SITE
	BLACK RIVER (2) OT (450)		B	AN	BU		1	1	1				1	SITE
	BLACK RIVER (3) OT (525)		B	AN	BU		1	1	1				1	SITE
	TO LADY YOUNG RD OT (300)		B	AN	BU		1	1	1				1	SITE
23	PICTON NO. 3 RESERVOIR											16		
	PICTON #1 RESERVOIR (400)	* D		AN	AV	1		1						
	PICTON #2 RESERVOIR (750)	* D-2		AN	AV-2	2		1						
	PICTON #3 RESERVOIR (900)	* D		AN	AV	1		1						
	MASALLAH ST OT (100)		B	AN	BU		1	1	1				1	SITE
	PRIZAR LANDS ST OT (100)		B	AN	BU		1	1	1				1	SITE
	KERR RD OT (100)		B	AN	BU		1	1	1				1	SITE
24	SERVOL LIFE CENTER											9		
	BEETHAM DUMP OT (100)		B	AN	BU		1	1	1				1	SITE
	SERVOL LIFE C. OT (100)		B	AN	BU		1	1	1				1	SITE
	TO LAVENTILLE OT (525)		B	AN	BU		1	1	1				1	SITE
25	KNAGGS HILL											19		
	RESERVOIR (525)	* D-2		AN	AV-2	2		1						
	TO BELMONT OT (300)		B	AN	BU		1	1	1				1	SITE
	TO CASCADE OT (600)		B	AN	BU		1	1	1				1	SITE
	TO ST CLAIR OT (350)		B	AN	BU		1	1	1				1	SITE
	WESTERN MAIN ROAD (525)		B	AN	BU		1	1	1				1	SITE
	FROM SAVANNAH WELLS (300)		B	AN	BU		1	1	1				1	SITE
	BARRACK (750)		B	AN	BU		1	1	1				1	SITE
26	NATIONAL FLOUR MILL											3		
	NFM OT (100)		B	AN	BU		1	1	1				1	SITE
	PORT AUTHORITY (300)													
	POST OFFICE (300)													
	NATIONAL STADIUM (300)													
27	TUMPUNA STORAGE LIFT PS											77		
	ARENA IMPOUNDING RES.	Y AP				1								
	TUMPUNA WEIR	F				1								
	TO/FROM RESERVOIR (1200)			Y V-2				2						
	RIVER DISCH. VALVE (1200)				Y BU-2				2				2	CARONI
	TUMPUNA S.L./PUMPS									12	59		6	CARONI
28	CARONI WTP											9		
	RAW WATER	Y AP		Y PF		1		1						
	CLEAR WATER RESERVOIR	Y AP				1								
	CARONI NORTH (900)	* B	Y AN	Y BU		1	1	1	1				1	CARONI
	CARONI SOUTH (1200)	* B	Y AN	Y BU		1	1	1	1				1	CARONI
29	KELLY VILLAGE											3		
	KELLY VILLAGE OT (300)		B	AN	BU		1	1	1				1	SITE
30	SCALE YARD											6		
	SCALE YARD OT (300)		B	AN	BU		1	1	1				1	SITE
	HINGKING RD OT (300)		B	AN	BU		1	1	1				1	SITE
31	LAS LOMAS WW											5		
	RAW WATER (600)			Y O				1						
	CLEAR WATER RESERVOIR	D				1								
	DISTRIBUTION (600)	Y B	Y V	BU		1	1	1	1				1	SITE
32	JERNINGHAM JUNCTION											5		
	TO LAS LOMAS OT (600)		B	AN			1	1						
	JERNINGHAM JCT OT (300)		B	AN	BU		1	1	1				1	SITE
33	CHAGUANAS											6		
	CHAGUANAS OT (300)		B	AN	BU		1	1	1				1	SITE
	LANGE PARK OT (300)		B	AN	BU		1	1	1				1	SITE
34	CARLSEN FIELD WW											7		
	CLEAR WATER RESERVOIR	F				1								
	DISTRIBUTION(1) (200)		B	AN	BU		1	1	1				1	SITE
	DISTRIBUTION(2) (250)		B	AN	BU		1	1	1				1	SITE
35	CARAPICHTAMA											7		
	CARAPICHTAMA OT (200)		B	AN	BU		1	1	1				1	SITE
	TO CARLSEN FIELD OT (300)		B	AN			1	1						
	TO FREEPORT WW OT (300)		B	AN			1	1						
36	WARDEN OFFICE											9		

表-13 CSS機器の仕様

COMPONENTS OF SYSTEM HARDWARE	QUANTITY	SPECIFICATIONS
(1) CENTRAL DATA PROCESSING SYSTEM (CDPS)		
CENTRAL PROCESSING UNIT (CPU)	2	MAIN MEMORY RAM 8 MB, CACHE 120 KB
FIXED DISK DRIVE	2	CAPACITY 547 MB, SPEED 2.4 MB/S
FLEXIBLE DISK DRIVE	2	CAPACITY 1.2 MB
CARTRIDGE TAPE DRIVE	2	CAPACITY 150 MB, SPEED 88 KB/S
COMMUNICATION INTERFACE	2	TYPE 16 bit, SPEED 10 KB/S
SERIAL INTERFACE	2	INTERVAL 10 ms
SERIAL INPUT/OUTPUT INTERFACE	2	SPEED 9600 bps
CRT DISPLAY	2	20 INCHES, COLOR, DISPLAY 4992 CHARACTERS
HARD COPIER	1	SPEED 60 S, COLOR 7
LINE PRINTER	1	SPEED 240 LINE/MINUTE, NUMBER OF CHARACTERS 136/LINE
SERIAL PRINTER	1	SPEED 120 C/S, NUMBER OF CHARACTERS 136/LINE
SYSTEM CONSOLE	1	CRT 12 INCHES, NUMBER OF CHARACTERS 136/LINE
GRAPHIC PANEL	1	SIZE ABOUT HEIGHT 2.0 M, WIDTH 7.0 M
UNINTERRUPTIBLE POWER SUPPLY	1	15 KVA, BACK UP 1 HOUR
MODEM	2	SPEED 4800 bps
(2) REMOTE TERMINAL UNIT (RTU)		
INTERNAL CONTROLLER	48	MICROPROCESSOR MAIN MEMORY RAM 512 KB
SERIAL INPUT/OUTPUT INTERFACE	48	INTERVAL 10 ms
PROCESS I/O INTERFACE	48	INPUT/OUTPUT DC 4 - 20 mA, INPUT FAILURE ALARM
(3) DATA RADIO COMMUNICATION SYSTEM (CSS BUILDING)		
UHF TRANSCEIVER	2	413.250 MHz, 418.025 MHz, 10 W
COMMUNICATION INTERFACE	2	POLLING 5 Minutes, SPEED 200 bps, MANUAL POLLING
(REPEATER STATION)		
UHF REPEATER	2	413.250 MHz, 418.025 MHz, 10 W
VHF REPEATER	2	153.950 MHz, 159.960 MHz, 1 W
UNINTERRUPTIBLE POWER SUPPLY	1	1 KVA, BACK UP 4 HOURS
(RTU STATION)		
VHF TRANSCEIVER	48	153.950 MHz, 159.960 MHz, 1 W
COMMUNICATION INTERFACE	48	POLLING 5 Minutes, SPEED 200 bps
UNINTERRUPTIBLE POWER SUPPLY	48	1 KVA, BACK UP 1 HOUR
(4) REGIONAL OFFICE		
WORK STATION (CRT AND COMPUTER)	2	20 INCHES, COLOR, MAIN MEMORY 8 MB, FDD 200 MB
OPTICAL CHARACTER READER (OCR)	2	RESOLUTION 300 DOT PER INCH, SCANNER
HARD COPIER	2	SPEED 60 S, COLOR 7

NOTE:

RAM; RANDOM ACCESS MEMORY, MB; MEGA-BYTE, KB; KILO-BYTE, MB/S; MEGA-BYTE PER SECOND, KB/S; KILO-BYTE PER SECOND, ms; MILLI-SECOND, bps; BIT PER SECOND, S; SECOND, C/S; CHARACTER PER SECOND, M; METER, KVA; KILO-VOLT-AMPERE, DC; DIRECT CURRENT, mA; MILLI-AMPERE, MHz; MEGA-HERTZ, W; WATT, I/O; INPUT/OUTPUT, FDD; FIXED DISK DRIVE,

表-14 計測機器類の仕様

COMPONENTS OF MONITORING AND CONTROL EQUIPMENT	QUANTITY	SPECIFICATIONS
(1) MONITORING EQUIPMENT		
LEVEL METER : FLOAT TYPE	10	DRUMS, FLOAT & FLOAT CABLE
: DIFFERENTIAL PRESSURE TYPE	11	DIAPHRAGM PRESSURE TRANSDUCER
FLOW METER : ANNUBAR TYPE	139	DIA. 100 MM - 1,200 MM, ACCURACY; ±1%, BI-DIRECTIONAL FLOW SENSING
PRESSURE GAUGE: BOURDON TUBE TYPE	111	PRESSURE RANGE; 0 kg/cm ² - 10 kg/cm ²
(2) INSTRUMENTATION		
LEVEL METER : AIR PURGE TYPE	4	INDICATOR, TRANSMITTER (DC 4 - 20 mA)
: DIFFERENTIAL PRESSURE TYPE	24	INDICATOR, TRANSMITTER (DC 4 - 20 mA)
: FLOAT TYPE	10	INDICATOR, TRANSMITTER (DC 4 - 20 mA)
FLOW METER : ANNUBAR TYPE	160	INDICATOR, ROTTER, TRANSMITTER (DC 4 - 20 mA)
PRESSURE GAUGE: BOURDON TUBE TYPE	125	INDICATOR, TRANSMITTER (DC 4 - 20 mA)
(3) CONTROL EQUIPMENT		
CONTROL VALVE : BUTTERFLY VALVE	106	MOTOR DRIVEN, FCD, DIA. 100 MM - 1,200 MM
CONTROL PANEL FOR CONTROL VALVE	113	INDICATOR, ONE LOOP CONTROLLER
INSTRUMENT PANEL FOR RTU AND CONTROL VALVE	113	INDICATOR, ONE LOOP CONTROLLER
REMOTE CONTROL PANEL FOR BOOSTER PUMPS	6	PUSH BUTTON, INDICATOR

NOTE: DC; DIRECT CURRENT, mA; MILLI-AMPERE, DIA.; DIAMETER, MM; MILLIMETER,

表—15 第一期建設費

ITEM	NAME OF FACILITIES AND EQUIPMENT	PHASE 1									
		FOREIGN CURRENCY (US\$)			LOCAL CURRENCY (TT\$)					TOTAL (TT\$)	TOTAL (US\$)
		PRIMARY EQUIPMENT	INSTRUMENTATION	TOTAL (US\$)	F-M/C-V CHAMBER	BUILDING WORKS	INSTAL-LATION	SUB-TOTAL (CIVIL)	SUPPLY TRANSPORTATION		
[1] CONSTRUCTION WORKS											
[CSS]											
	FLOW METER	494.2	1,329.8	1,824.0	1,438.4		775.2	2,213.6	155.0	2,368.7	2,381.3
	CONTROL VALVE	2,156.4	3,779.8	5,936.2	1,396.5		2,522.9	3,919.4	504.6	4,424.0	6,977.1
	LEVEL METER	32.5	279.6	312.0			132.6	132.6	26.5	159.1	349.5
	PRESSURE GAUGE		566.7	566.7			240.8	240.8	48.2	289.0	534.7
	CSS'S CENTRAL EQUIP		5,861.9	5,861.9		385.3	1,902.6	2,287.9	380.5	2,668.4	6,489.7
	REGIONAL OFFICE		211.6	211.6			89.9	89.9	18.0	107.9	236.9
	REPEATER STATION		219.1	219.1			93.1	93.1	18.6	111.7	245.4
	RTU STATION		11,832.0	11,832.0		2,219.5	5,028.6	7,248.1	1,005.7	8,253.8	13,774.1
	BOOSTER P/S		226.7	226.7			96.3		19.3	115.6	253.9
	SPARE PARTS		249.3	249.3					21.2	21.2	254.3
	SUB-TOTAL	2,683.1	24,556.3	27,239.4	2,834.9	2,604.9	10,882.1	16,321.9	2,197.6	18,519.5	31,596.9
[LSS]											
	FLOW METER										
	SUB-TOTAL										
	TOTAL	2,683.1	24,556.3	27,239.4	2,834.9	2,604.9	10,882.1	16,321.9	2,197.6	18,519.5	31,596.9
[2] ENGINEERING SERVICES											
				3,437.0						2,109.3	3,933.3
TOTAL OF ITEMS [1] & [2]											
		2,683.1	24,556.3	30,676.4	2,834.9	2,604.9	10,882.1	16,321.9	2,197.6	20,628.7	35,530.2
[3] TAX (VAT)											
										22,650.5	5,329.5
[4] CONTINGENCY											
				4,601.5						3,094.3	5,329.5
[5] ADMINISTRATION											
										755.0	177.7
GRAND-TOTAL											
		2,683.1	24,556.3	35,277.9	2,834.9	2,604.9	10,882.1	16,321.9	2,197.6	47,128.6	46,367.0

NOTE: EQUIP.; EQUIPMENT, P/S; PUMPING STATION, F-M/C-V; FLOW METER AND CONTROL VALVE,
 VAT ; VALUE ADDED TAX, EXCHANGE RATES; 1 US\$ = ¥ 135 AND 1 US\$ = TT\$ 4.25,

表一 1 6 经济利益表

ITEM	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2005	2007	2008	2008	2010	2011	2012	2013	2014	
Production(m3/day)	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	545636	
WITHOUT PROJECT																										
Un-accounted-for Water (%)	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Volume of Water Loss(m3/day)	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818
Available Sales Volume(m3/day)	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818
Water Demand(m3/day)	255682	273599	281753	290149	298795	307681	316611	325419	334221	343028	351830	360633	369436	378238	387040	395843	404645	413447	422249	431051	439853	448655	457457	466259	475061	483863
Sales Volume(m3/day)	265682	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818
Annual Sales Volume(1000m3)	96974	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579
Average Water Revenue (TTS/m3)	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94
Annual Water Revenue (TTS1000)	188129	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182
WITH PROJECT																										
Un-accounted-for Water (%)	50	50	50	50	50	50	40	40	40	40	40	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Volume of Water Loss(m3/day)	272818	272818	272818	272818	272818	218254	218254	218254	218254	218254	218254	163691	163691	163691	163691	163691	163691	163691	163691	163691	163691	163691	163691	163691	163691	163691
Available Sales Volume(m3/day)	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818
Water Demand(m3/day)	255682	273599	281753	290149	298795	307681	316611	325419	334221	343028	351830	360633	369436	378238	387040	395843	404645	413447	422249	431051	439853	448655	457457	466259	475061	
Sales Volume(m3/day)	265682	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818
Annual Sales Volume(1000m3)	96974	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579
Average Water Revenue (TTS/m3)	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94	1.94
Annual Water Revenue (TTS1000)	188129	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182	193182
Savings in Personal Costs (TTS1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Incremental Revenue Benefits (TTS 1000)	0	0	0	0	0	0	24686	31223	37955	38636	59489	66715	74148	77273	77273	77273	77273	77273	77273	77273	77273	77273	77273	77273	77273	77273
Total Benefits (TTS1000)	0	0	0	0	0	0	24686	31223	37955	38636	59489	66715	74148	77273	77273	77273	77273	77273	77273	77273	77273	77273	77273	77273	77273	

表一 1.8 財務便益表

ITEM	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	
Production(m3/day)																										
WITHOUT PROJECT																										
In-accounted-for Water (%)	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50	50
Volume of Water Loss(m3/day)	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818
Available Sales Volume (m3/day)	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818
Water Demand (m3/day)	265682	273599	281753	280149	288795	307681	316911	326419	336211	346298	356630	367035	377533	388130	399438	410788	422537	434621	447051	459837	472988	486516	500430	514742	529464	
Sales Volume (m3/day)	265682	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818	272818
Annual Sales Volume (1000m3)	96974	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579	99579
Average Water Revenue (T\$/m)	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Annual Water Revenue (T\$1000)	96004	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563	98563
WITH PROJECT																										
In-accounted-for Water (%)	50	50	50	50	50	40	40	40	40	40	40	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
Volume of Water Loss (m3/day)	272818	272818	272818	272818	272818	218254	218254	218254	218254	218254	218254	163091	163091	163091	163091	163091	163091	163091	163091	163091	163091	163091	163091	163091	163091	163091
Available Sales Volume (m3/day)	272818	272818	272818	272818	272818	327382	327382	327382	327382	327382	327382	381945	381945	381945	381945	381945	381945	381945	381945	381945	381945	381945	381945	381945	381945	381945
Water Demand (m3/day)	265682	273599	281753	280149	288795	307681	316911	326419	336211	346298	356630	367035	377533	388130	399438	410788	422537	434621	447051	459837	472988	486516	500430	514742	529464	
Sales Volume (m3/day)	265682	272818	272818	272818	272818	307681	307681	307681	307681	307681	307681	356630	356630	356630	356630	356630	356630	356630	356630	356630	356630	356630	356630	356630	356630	356630
Annual Sales Volume (1000m3)	96974	99579	99579	99579	99579	112304	112304	112304	112304	112304	130243	130243	130243	130243	130243	130243	130243	130243	130243	130243	130243	130243	130243	130243	130243	
Average Water Revenue (T\$/m)	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	
Annual Water Revenue (T\$1000)	96004	98563	98563	98563	98563	132446	132446	132446	132446	132446	128299	128299	128299	128299	128299	128299	128299	128299	128299	128299	128299	128299	128299	128299	128299	
Reduction of Personal Cost (T\$1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Incremental Revenue Benefits (T\$ 1000)	0	0	0	0	0	12588	15933	19369	19717	19717	30358	34045	37639	39433	39433	39433	39433	39433	39433	39433	39433	39433	39433	39433	39433	
Total Benefits (T\$1000)	0	0	0	0	0	132446	16581	20017	20365	20365	31006	34637	38287	40081	40081	40081	40081	40081	40081	40081	40081	40081	40081	40081	40081	

表一 1 9 用途別平均水価概算表

Customer Category	1990			1995		
	Annual Water Demand* (m3/year)	Water Rate** (TTS/m3)	Annual Revenue (TTS)	Annual Water Demand* (m3/year)	Water Rate** (TTS/m3)	Annual Revenue (TTS)
a. Domestic	68877026	1.08	74387188	77695276	2.64	204780549
b. Industrial/	2748947	0.51	1401963	3508910	1.50	5250783
Agriculture						
c. Commercial/	1374474	1.87	2570266	1754455	4.49	7876174
Public						
d. Special	28255745	0.51	14410430	34246344	1.30	44631658
Industrial						
e. Total or Average	101256192	0.92	92769847	117204985	2.24	262539164
f. Domestic Category Per Capia Demand (lpcd)	215.4			223.8		

Notes:

* Annual water demand was estimated by JICA study team.

** Water rates in 1990 were taken as the same as an average of those in 1988 and 1989.

Average water rate in 1990 is different from the actual figure of 0.99 since the former is based on the estimated water demand.

表-20 CSS (代替案-A) のための一次計器一覧表 (1)

NOTE: AN: ANNUBAR, F: FLOAT TYPE, Av: AVENUE, WW: WATERWORKS, (300): PIPE DIAMETER(MM),
 AP: AIR PURGE TYPE, O: ORIFICE PLATE, HW: HIGH WAY, OT: OFF-TAKE, "*" : EXISTINGS TO BE USED,
 AV: ALTITUDE VALVE, P: PROPELLAR TYPE, SH: SHEET, JCT: JUNCTION, "Y": EXISTINGS(REPLACEMENT PERIPHERALS),
 B: BOURDON TUBE, PF: PARSHALL FLUME, ST: STREET, IC: INTERCONNECTION, "#": INSTALLATION OF CONTROL EQUIPMENT,
 BU: BUTTERFLY VALVE, V: VENTURI TUBE, RES: RESERVOIR, BPS: BOOSTER PUMPING STATION,
 CV: CONE VALVE, RD: ROAD, IT: INTAKE, D: DIFFERENTIAL PRESSURE TYPE,

NUMBER & NAME OF RTU STAT. TO BE INSTALLED [STEP 2]	NAME OF MONITORING POINT	PHASE I																	
		STEP 1					STEP 3					EQUIPMENT TO BE CONTROLLED							
		EQUIPMENT TO BE INSTALLED			NUMBER OF MONITORING DATA BY RECORDER		INSTALL. EQUIP.	NUMBER OF MONITORING DATA BY CENTRAL SUPERVISORY SYSTEM (CSS)				PUMP		VALVE					
		LEVEL METER	PRESS GAUGE	FLOW METER	WATER LEVEL	WATER PRESSURE	TOTAL	CONTROL VALVE	WATER LEVEL	WATER PRESSURE	FLOW RATE	STATUS	PUMP STATUS	ALARM	TOTAL	PUMP NO.	PLACE	VALVE NO.	PLACE
1 NORTH OROPOUCHE WW	RAW WATER	F		Y PF	1		1												
	CLEAR WATER RESERVOIR DISTRIBUTION (1050)	* D-2		AN	2				2										
				AN			1												
2 KOLLIS WW	IMPOUNDING RESERVOIR RAW WATER (300)	F		AN	1				1										
	DISTRIBUTION (600)			AN			1												
3 GILL TRACE	QUARE WATER TANK	D			1				1										
	QUARE DISTRIBUTION (300)		Y B	Y V		1	1												
	GILL TRACE OT (300)		B	AN		1	1			BU		1	1					1	SITE
	QUARE (1) OT (150)		B	AN		1	1			BU		1	1					1	SITE
	QUARE (2) OT (150)		B	AN		1	1			BU		1	1					1	SITE
TO SANGRE GRANDE OT (400)		B	AN		1	1			BU		1	1					1	SITE	
4 ARIPO BPS	ARIPO(NEW)RAW WATER (300)			Y O			1						1						
	ARIPO(OLD)RAW WATER (250)			AN			1						1						
	FORT READ RESERVOIR (250)	D		AN	1		1				1		1						
	FORT READ RESERVOIR (300)	D		AN	1		1				1		1						
	ARIPO BPS (300)		B	Y V		1	1			BU		1	1					1	SITE
	CUMOTO(1) OT (300)		B	AN		1	1			BU		1	1					1	SITE
CUMOTO(2) OT (300)		B	AN		1	1			BU		1	1					1	SITE	
5 GUANAPO JUNCTION	GUANAPO RAW WATER (300)			AN			1						1						
	GUANAPO RESERVOIR (300)	D			1						1								
	GUANAPO WW DIST. (300)		B	AN		1	1			BU		1	1					1	SITE
	DOUBLE BRIDGE OT (150)		B	AN		1	1			BU		1	1					1	SITE
	GUANAPO JUNCTION OT (300)		B	AN		1	1			BU		1	1					1	SITE
6 DEMERARA JUNCTION	DEMERARA JCT OT (300)		B	AN		1	1			BU		1	1					1	SITE
	TUMPUNA JCT OT (300)		B	AN		1	1			BU		1	1					1	SITE
7 ARIMA OLD RESERVOIR	ARIMA NEW RESERVOIR (375)	F		AN	1		1				1		1						
	ARIMA OLD RESERVOIR (200)	D		AN	1		1				1		1						
	TO MORENO ST OT (150)		B	AN		1	1			BU		1	1					1	SITE
	QUESNEL ST OT (300)		B	AN		1	1			BU		1	1					1	SITE
	OMERA JCT OT (150)		B	AN		1	1			BU		1	1					1	SITE
	ARIMA BPS (300)		B	AN		1	1			BU		1	1					1	SITE
	ARIMA WELL (200)			AN			1						1						
	ARIMA B/PUMPS																		
8 MAUSICA JUNCTION	OLTON RD OT (150)		B	AN		1	1			BU		1	1					1	SITE
	BOYS LANE OT (200)		B	AN		1	1			BU		1	1					1	SITE
	MAUSICA JCT OT (150)		B	AN		1	1			BU		1	1					1	SITE
	CARAPO OT (300)		B	AN		1	1			BU		1	1					1	SITE
	MAUSICA OT (300)		B	AN		1	1			BU		1	1					1	SITE
	MALONEY JCT OT (300)		B	AN		1	1			BU		1	1					1	SITE
9 AROUCA WW	CLEAR WATER TANK DISTRIBUTION (200)	D		AN	1		1				1		1					1	SITE
	BORNE AREA #1 OT (150)		B	AN		1	1			BU		1	1					1	SITE
	LOPINOT IC OT (300)		B	AN		1	1			BU		1	1					1	SITE
10 CAURA WW	RAW WATER (400)			AN			1						1						
	CLEAR WATER TANK DISTRIBUTION (400)	D		AN	1		1				1		1					1	SITE
11 TACARIGUA WW	CLEAR WATER RESERVOIR DISTRIBUTION(1) (300)	Y D			1		1				1		1					1	SITE
	DISTRIBUTION(2) (400)		B	AN		1	1			BU		1	1					1	SITE
	TO CAURA BPS OT (225)		B	AN		1	1			BU		1	1					1	SITE
	PASEA RD OT (175)		B	AN		1	1					1	1					1	SITE

表-20 CSS (代替案-A) のための一次計器一覧表 (2)

NOTE: AN: ANNUBAR, F: FLOAT TYPE, Av: AVENUE, WW: WATERWORKS, (300): PIPE DIAMETER(MM),
 AP: ATR PURGE TYPE, O: ORIFICE PLATE, HW: HIGH WAY, OT: OFF-TAKE, "*" : EXISTINGS TO BE USED,
 AV: ALTITUDE VALVE, P: PROPELLAR TYPE, SH: SHEET, JCT: JUNCTION, "v" : EXISTINGS(REPLACEMENT PERIPHERALS),
 B: BOURDON TUBE, PF: PARSHALL FLUME, ST: STREET, IC: INTERCONNECTION, "#": INSTALLATION OF CONTROL EQUIPMENT,
 BU: BUTTERFLY VALVE, V: VENTURI TUBE, RES: RESERVOIR, BPS: BOOSTER PUMPING STATION,
 CV: CONE VALVE, RD: ROAD, IT: INTAKE, D: DIFFERENTIAL PRESSURE TYPE,

NUMBER & NAME OF RTU STAT. TO BE INSTALLED [STEP 2]	NAME OF MONITORING POINT	PHASE I														EQUIPMENT TO BE CONTROLLED			
		STEP 1			STEP 2				STEP 3							PUMP		VALVE	
		EQUIPMENT TO BE INSTALLED			NUMBER OF MONITORING DATA BY RECORDER				INSTALL EQUIP.	NUMBER OF MONITORING DATA BY CENTRAL SUPERVISORY SYSTEM (CSS)									
		LEVEL METER	PRESS GAUGE	FLOW METER	WATER LEVEL	WATER PRESSURE	FLOW RATE	TOTAL	CONTROL VALVE	WATER LEVEL	WATER PRESSURE	FLOW RATE	VALVE STATUS	PUMP STATUS	ALARM	TOTAL	NO.	PLACE	NO.
12	FLOW CONTROL STATION						7								11				
	PIARCO JCT OT (300)		B	AN		1	1		BU		1	1	1					1	SITE
	BY-PASS OT (300)		B	AN		1	1		BU		1	1	1					1	SITE
	FLOW CONTROL STATION(800)		B-2	v	V	2	1		# CV-2		2	1	2					2	SITE
13	ST AUGUSTINE RESERVOIR						10								10				
	RESERVOIR (750)		F	AN		1	1		AV		1		1						
	ST JOHN RD OT (300)		B	AN		1	1				1	1							
	TO TUNAPUNA OT (150)		B	AN		1	1				1	1							
	RABIR ST OT (200)		B	AN		1	1				1	1							
	RIVERSIDE RD OT (100)		B	AN		1	1				1	1							
14	TUNAPUNA BPS						12								48				
	TUNAPUNA (1) (150)		B	AN		1	1		BU		1	1	1					1	CSS
	TUNAPUNA (2) (200)		B	AN		1	1		BU		1	1	1					1	CSS
	TUNAPUNA (3) (525)		B	AN		1	1				1	1							
	PASEA ST OT (100)		B	AN		1	1		BU		1	1	1					1	SITE
	TUNAPUNA RIVER (1) (300)		B	AN		1	1		BU		1	1	1					1	SITE
	TUNAPUNA RIVER (2) (525)		B	AN		1	1		BU		1	1	1					1	SITE
	TUNAPUNA B/PUMPS												6	25		3			CSS
15	ST JOSEPH RESERVOIR						11								15				
	RESERVOIR		F			1					1								
	TO ST JOSEPH OT (225)		B	AN		1	1		BU		1	1	1					1	SITE
	TO RIDER MAIN OT (200)		B	AN		1	1		BU		1	1	1					1	SITE
	MENDEZ STEEL SH. OT (200)		B	AN		1	1		BU		1	1	1					1	SITE
	MATERNITY IP. OT (100)		B	AN		1	1		BU		1	1	1					1	SITE
	ST JOSEPH(1) (175)			AN		1	1				1	1							
	ST JOSEPH(2) (300)			AN		1	1				1	1							
16	VALSAYN WW						8								41				
	RAW WATER (750)			v	V		1	1				1							
	CLEAR WATER RESERVOIR		v	D							1								
	DISTRIBUTION (750)		v	B	v	V	1	1		BU		1	1	1				1	SITE
	BOOSTER SUCTION (450)		v	B	v	AN	1	1				1	1						
	BOOSTER DELIVERY (450)		v	B		AN	1	1		BU		1	1	1				1	CSS
	VALSAYN B/PUMPS												6	25		3			CSS
17	URTAH BUTLER HW JUNCTION						2								3				
	STAG/NESTL OT (300)		B	AN		1	1		BU		1	1	1					1	SITE
18	MT. HOPE RESERVOIR						16								23				
	RESERVOIR (600)		D			1	1		AV		1		1						
	CARIB(1) OT (150)		B	AN		1	1		BU		1	1	1					1	SITE
	CARIB(2) OT (200)		B	AN		1	1		BU		1	1	1					1	SITE
	MT. HOPE OT (300)																		
	GORDON ST (1) OT (200)		B	AN		1	1		BU		1	1	1					1	SITE
	GORDON ST (2) OT (200)		B	AN		1	1		BU		1	1	1					1	SITE
	GORDON ST (3) OT (300)		B	AN		1	1		BU		1	1	1					1	SITE
	BROOM ST OT (200)		B	AN		1	1		BU		1	1	1					1	SITE
	TO SANTA CRUZ OT (250)		B	AN		1	1		BU		1	1	1					1	SITE
19	MALICK RESERVOIR						8								11				
	RESERVOIR (750)		D			1	1		AV		1		1						
	TO BARATARIA OT (300)		B	AN		1	1		BU		1	1	1					1	SITE
	SIXTH Av. OT (300)		B	AN		1	1		BU		1	1	1					1	SITE
	TO LADY YOUNG Av. OT (450)		B	AN		1	1		BU		1	1	1					1	SITE
20	EL SOCORRO WW						13								49				
	RAW WATER (750)			v	V		1	1				1							
	CLEAR WATER RESERVOIR		v	AP			1				1								
	BOOSTER SUCTION (900)		v	B		1	1				1								
	BOOSTER DELIVERY (600)		v	B	v	AN	1	1		BU		1	1	1				1	CSS
	DISTRIBUTION (400)		v	B	v	AN	1	1		BU		1	1	1				1	SITE
	EL SOCORRO RD OT (150)		B	AN		1	1		BU		1	1	1					1	SITE
	DON MIGUEL RD OT (150)		B	AN		1	1		BU		1	1	1					1	SITE
	ELEVENTH ST OT (150)		B	AN		1	1		BU		1	1	1					1	SITE
	EL SOCORRO B/PUMPS												6	25		3			CSS
21	LAVENTILLE						2								3				
	TO LAVENTILLE OT (300)		B	AN		1	1		BU		1	1	1					1	SITE
22	BLACK RIVER						8								12				

表 20 CSS (代替案-A) のための一次計器一覽表 (3)

NOTE: AN; ANNUBAR, F; FLOAT TYPE, Av; AVENUE, WW; WATERWORKS, (300); PIPE DIAMETER(ØM),
 AP; AIR PURGE TYPE, O; ORIFICE PLATE, HW; HIGH WAY, OT; OFF-TAKE, "*" ; EXISTINGS TO BE USED,
 AV; ALTITUDE VALVE, P; PROPELLAR TYPE, SH; SHEET, JCT; JUNCTION, "¥"; EXISTINGS(REPLACEMENT PERIPHERALS),
 B; BOURDON TUBE, PF; PARSHALL FLUME, ST; STREET, IC; INTERCONNECTION, "#"; INSTALLATION OF CONTROL EQUIPMENT,
 BU; BUTTERFLY VALVE, V; VENTURI TUBE, RES; RESERVOIR, BPS; BOOSTER PUMPING STATION,
 CV; CONE VALVE, RD; ROAD, IT; INTAKE, D; DIFFERENTIAL PRESSURE TYPE,

NUMBER & NAME OF RTU STAT. TO BE INSTALLED [STEP 2]	NAME OF MONITORING POINT	P H A S E I																	
		STEP 1				STEP 3						EQUIPMENT TO BE CONTROLLED							
		EQUIPMENT TO BE INSTALLED		NUMBER OF MONITORING DATA BY RECORDER		INSTALL EQUIP.		NUMBER OF MONITORING DATA BY CENTRAL SUPERVISORY SYSTEM (CSS)				PUMP		VALVE					
		LEVEL METER	PRESS GAUGE	FLOW METER	WATER LEVEL	WATER PRESSURE	FLOW TOTAL	CONTROL VALVE	WATER LEVEL	WATER PRESSURE	FLOW	VALVE STATUS	PUMP STATUS	ALARM	TOTAL	NO.	PLACE	NO.	PLACE
	BLACK RIVER (1) OT (300)		B	AN		1	1											1	SITE
	BLACK RIVER (2) OT (450)		B	AN		1	1											1	SITE
	BLACK RIVER (3) OT (525)		B	AN		1	1											1	SITE
	TO LADY YOUNG RD OT (300)		B	AN		1	1											1	SITE
23	PICTON NO. 3 RESERVOIR																	13	
	PICTON #1 RESERVOIR (400)	* D		AN		1	1			AV	1		1						
	PICTON #2 RESERVOIR (750)	* D-2		AN		2	1			AV-2	2		1						
	PICTON #3 RESERVOIR (900)	* D		AN		1	1			AV	1		1						
	MASALLAH ST OT (100)		B	AN		1	1			BU		1	1	1					1
	PRIZAR LANDS ST OT (100)		B	AN		1	1			BU		1	1	1					1
	KERR RD OT (100)		B	AN		1	1			BU		1	1	1					1
24	SERVOL LIFE CENTER																	6	
	BEETHAM DUMP OT (100)		B	AN		1	1			BU		1	1	1					1
	SERVOL LIFE C. OT (100)		B	AN		1	1			BU		1	1	1					1
	TO LAVENTILLE OT (525)		B	AN		1	1			BU		1	1	1					1
25	KNAGGS HILL																	15	
	RESERVOIR (525)	* D-2		AN		2	1			* AV-2	2		1						
	TO BELMONT OT (300)		B	AN		1	1			BU		1	1	1					1
	TO CASCADE OT (600)		B	AN		1	1			BU		1	1	1					1
	TO ST CLAIR OT (350)		B	AN		1	1			BU		1	1	1					1
	WESTERN MAIN ROAD (525)		B	AN		1	1			BU		1	1	1					1
	FROM SAVANNAH WELLS (300)		B	AN		1	1			BU		1	1	1					1
	BARRACK (750)		B	AN		1	1			BU		1	1	1					1
26	NATIONAL FLOUR MILL																	2	
	NFM OT (100)		B	AN		1	1			BU		1	1	1					1
	PORT AUTHORITY (300)																		
	POST OFFICE (300)																		
	NATIONAL STADIUM (300)																		
27	TUMPUNA STORAGE LIFT PS																	4	
	ARENA IMPOUNDING RES.	¥ AP				1					1								
	TUMPUNA WEIR	F				1					1								
	TO/FROM RESERVOIR (1200)			¥ V-2			2						2						
	RIVER DISCH. VALVE (1200)									¥ BU-2				2					2
	TUMPUNA S.L./PUMPS													12	59			6	CARONI
28	CARONI WTP																	7	
	RAW WATER	¥ AP		¥ PF		1	1				1		1						
	CLEAR WATER RESERVOIR	¥ AP				1					1								
	CARONI NORTH (900)		* B	¥ AN		1	1			¥ BU		1	1	1					1
	CARONI SOUTH (1200)		* B	¥ AN		1	1			¥ BU		1	1	1					1
29	KELLY VILLAGE																	2	
	KELLY VILLAGE OT (300)		B	AN		1	1			BU		1	1	1					1
30	SCALE YARD																	4	
	SCALE YARD OT (300)		B	AN		1	1			BU		1	1	1					1
	HINGKING RD OT (300)		B	AN		1	1			BU		1	1	1					1
31	LAS LOMAS WW																	4	
	RAW WATER (600)			¥ O			1						1						
	CLEAR WATER RESERVOIR DISTRIBUTION (600)	D				1	1				1		1	1					1
			¥ B	¥ V															
32	JERNINGHAM JUNCTION																	4	
	TO LAS LOMAS OT (600)		B	AN		1	1					1	1						
	JERNINGHAM JCT OT (300)		B	AN		1	1			BU		1	1	1					1
33	CHAGUANAS																	4	
	CHAGUANAS OT (300)		B	AN		1	1			BU		1	1	1					1
	LANGE PARK OT (300)		B	AN		1	1			BU		1	1	1					1
34	CARLSEN FIELD WW																	5	
	CLEAR WATER RESERVOIR DISTRIBUTION(1) (200)	F				1					1								
	DISTRIBUTION(2) (250)		B	AN		1	1			BU		1	1	1					1
			B	AN		1	1			BU		1	1	1					1
35	CARAPICHAIMA																	6	
	CARAPICHAIMA OT (200)		B	AN		1	1			BU		1	1	1					1
	TO CARLSEN FIELD OT (300)		B	AN		1	1					1	1						
	TO FREEPORT WW OT (300)		B	AN		1	1					1	1						
36	WARDEN OFFICE																	6	

表-23 代替案-AおよびBの建設費の比較

UNIT: IN X US\$ 1,000

DESCRIPTION YEAR ITEM	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL	
	PHASE I - STEP 1			PHASE I - STEP 2 & 3			REPLACEMENT OF STEP 3														
OPTION A																					
[1] CONSTRUCTION	85	133	1,381	2,688			11,979	16,259					1,034	1,403				7,349	9,971	52,659	
[2] ENGINEERING SERVICES	35	109	107	194		477	1,082	599	1,088											3,824	
SUB-TOTAL	120	242	2,088	2,883		477	12,578	17,340					1,034	1,403				7,349	9,971	56,483	
[3] TAX (VAT)	13	29	313	432		71	162	1,867	2,601				135	210				1,102	1,496	8,472	
[4] CONTINGENCY	13	29	313	432		71	162	1,867	2,601				135	210				1,102	1,496	8,472	
[5] ADMINISTRATION	0	1	10	14		2	3	63	87				3	7				37	50	282	
TOTAL	111	252	2,725	3,762		622	14,111	18,414	22,629				1,349	1,831				9,591	13,013	73,710	
NET PRESENT VALUE																					
5% [43,722]																					
10% [27,981]																					
12% [23,816]																					
15% [18,995]																					
OPTION B																					
[1] CONSTRUCTION	578	1,311	13,407	18,190									8,257	11,501						51,355	
[2] ENGINEERING SERVICES	578	1,311	1,726	1,319																3,932	
SUB-TOTAL	1,156	2,622	14,133	19,509									8,257	11,501						55,288	
[3] TAX (VAT)	87	197	2,120	2,926									1,239	1,725						8,293	
[4] CONTINGENCY	87	197	2,120	2,926									1,239	1,725						8,293	
[5] ADMINISTRATION	3	7	71	98									41	58						276	
TOTAL	754	1,711	18,443	25,459									10,775	15,009						72,151	
NET PRESENT VALUE																					
5% [52,442]																					
10% [40,418]																					
12% [36,885]																					
15% [32,505]																					

NOTE: EXCHANGE RATES; 1 US\$ = ¥135.425 AND 1 US\$ = ¥135.%; DISCOUNT RATE

表-24 経済便益ならびに費用一覧表 (代替案-A)

UNIT: TJS 1,000

YEAR	C S S				LEASAGE REDUCTION				METER INSTALLATION				TOTAL COSTS (C)	BENEFIT (B)	B - C
	INITIAL INVESTMENT	REPLACE- MENT	RESIDUAL VALUE	SUB- TOTAL	INITIAL INVESTMENT	REPLACE- MENT	RESIDUAL VALUE	SUB- TOTAL	INITIAL INVESTMENT	REPLACE- MENT	RESIDUAL VALUE	SUB- TOTAL			
1992	866	0	0	0	23,647	0	0	23,647	17,544	0	0	17,544	42,057	0	-42,057
1993	1,962	0	0	1,962	26,035	0	0	26,035	17,544	0	0	17,544	45,541	0	-45,541
1994	21,243	0	0	21,243	17,298	0	0	17,298	17,544	0	0	17,544	56,095	0	-56,095
1995	29,319	0	0	29,319	18,379	0	0	18,379	17,544	0	0	17,544	65,242	24,686	-40,556
1996	0	534	0	534	18,379	0	823	19,202	0	915	0	915	20,651	31,223	-10,572
1997	1,958	0	0	1,958	18,379	0	823	19,202	0	915	0	915	22,609	37,955	-15,346
1998	4,448	0	0	4,448	18,379	0	823	19,202	0	915	0	915	25,099	38,636	-13,537
1999	47,891	0	0	47,891	18,379	0	823	19,202	0	915	0	915	68,542	38,636	-29,906
2000	66,113	0	0	66,113	18,379	0	823	19,202	0	915	0	915	68,365	59,489	-8,876
2001	0	0	0	0	0	0	823	823	0	915	0	915	3,476	66,715	-63,239
2002	0	0	0	0	0	0	823	823	0	915	0	915	21,020	74,148	-53,128
2003	0	0	0	0	0	0	823	823	0	915	0	915	21,020	77,273	-56,253
2004	0	5,244	0	5,244	0	0	823	823	0	915	0	915	26,264	77,273	-51,009
2005	0	7,115	0	7,115	0	0	823	823	0	915	0	915	28,139	77,273	-49,138
2006	0	0	0	0	0	0	823	823	0	915	0	915	3,476	77,273	-73,797
2007	0	0	0	0	0	0	823	823	0	915	0	915	9,867	77,273	-67,406
2008	0	0	0	0	0	0	823	823	0	915	0	915	9,867	77,273	-67,406
2009	0	34,674	0	34,674	0	6,391	823	7,214	0	915	0	915	38,150	77,273	-39,123
2010	0	41,046	0	41,046	0	6,391	823	7,214	0	915	0	915	50,522	77,273	-26,751
2011	0	0	0	0	0	0	823	823	0	915	0	915	3,476	77,273	-73,797
2012	0	0	0	0	0	0	823	823	0	915	0	915	21,020	77,273	-56,253
2013	0	0	0	0	0	0	823	823	0	915	0	915	21,020	77,273	-56,253
2014	0	0	-49,032	-49,032	0	0	823	-5,568	0	915	-24,727	-6,288	-59,130	77,273	136,403
	173,800	94,080		158,875	12,782			70,176	122,808						

EIRR= 12.5%

表-25 財務便益ならびに費用一覧表 (代替案-A)

UNIT: IT'S 1,000

YEAR	C S S				LEAKAGE REDUCTION				METER INSTALLATION				TOTAL COSTS		BENEFIT		
	INITIAL INVESTMENT	REPLACE-MENT	O & M	RESIDUAL VALUE	SUB-TOTAL	INITIAL INVESTMENT	REPLACE-MENT	O & M	RESIDUAL VALUE	SUB-TOTAL	INITIAL INVESTMENT	REPLACE-MENT	O & M	RESIDUAL VALUE	SUB-TOTAL	[C]	[B]
1992	893	0	0	0	893	28,064	0	0	0	28,064	18,496	0	0	0	18,496	47,453	0
1993	2,023	0	0	0	2,023	26,635	0	0	0	26,635	18,496	0	0	0	18,496	47,354	0
1994	21,900	0	0	0	21,900	17,873	0	0	0	17,873	18,496	0	0	0	18,496	58,269	0
1995	30,226	0	0	0	30,226	19,050	0	0	0	19,050	18,496	0	0	0	18,496	67,772	12,598
1996	0	0	550	0	550	19,050	0	874	0	19,924	18,496	0	972	0	972	21,446	15,933
1997	2,019	0	550	0	2,569	19,050	0	874	0	19,924	18,496	0	972	0	972	23,495	19,369
1998	4,586	0	550	0	5,136	19,050	0	874	0	19,924	18,496	0	972	0	972	26,032	19,717
1999	49,372	0	550	0	49,922	19,050	0	874	0	19,924	18,496	0	972	0	972	70,838	30,358
2000	68,157	0	550	0	68,707	0	0	874	0	874	0	0	972	0	972	70,553	34,045
2001	0	0	1,792	0	1,792	0	0	874	0	874	0	0	972	0	972	3,638	38,487
2002	0	0	1,792	0	1,792	0	0	874	0	874	0	0	972	0	972	22,134	40,081
2003	0	0	1,792	0	1,792	0	0	874	0	874	0	0	972	0	972	22,134	40,081
2004	0	5,406	1,792	0	7,198	0	0	874	0	874	0	0	972	0	972	27,540	40,081
2005	0	7,336	1,792	0	9,128	0	0	874	0	874	0	0	972	0	972	29,470	40,081
2006	0	0	1,792	0	1,792	0	0	874	0	874	0	0	972	0	972	3,638	40,081
2007	0	0	1,792	0	1,792	0	6,684	874	0	7,558	0	0	972	0	972	10,322	40,081
2008	0	0	1,792	0	1,792	0	5,684	874	0	7,558	0	0	972	0	972	10,322	40,081
2009	0	35,747	1,792	0	37,539	0	0	874	0	874	0	0	972	0	972	38,385	40,081
2010	0	48,501	1,792	0	50,293	0	0	874	0	874	0	0	972	0	972	52,139	40,081
2011	0	0	1,792	0	1,792	0	0	874	0	874	0	0	972	0	972	3,638	40,081
2012	0	0	1,792	0	1,792	0	0	874	0	874	0	0	972	0	972	22,134	40,081
2013	0	0	1,792	0	1,792	0	0	874	0	874	0	0	972	0	972	22,134	40,081
2014	0	0	1,792	-50,549	-48,757	0	0	874	-6,584	-5,810	0	0	972	-44,330	-24,922	-79,483	40,081
	179,176	96,989			168,022	13,368				73,984	128,472						

FIRR= 1.5%

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