TABLE E.3.5 EVALUATION OF EXISTING DISCHARGE CAPACITY OF 27 CANAL SYSTEM

Zone	Catch-ment	Name of Catchment	Area (km²) / Length (km)	Existing capasity & Design Runoff	Downstream Reaches	Middlestream Reaches	Upstream Reaches
C	C.1	Nhieu Loc - Thi Nghe	31.670	Existing Cap.	100 - 100	35 - 70	10 - 30
			9.376	Des. Runoff	150 - 170	140 -160	110 - 130
	C.2	R. Cau Son - R. Tau Vam Tat	5.140	Existing Cap.	100 -110	100 -110	100 -110
			2.259	Des. Runoff	50 - 75	40 - 50	25 - 40
	C.3	Tan Hoa - Lo Gom	20.220	Existing Cap.	10 - 100	5 - 40	5 - 20
			7.773	Des. Runoff	90 - 100	90 - 100	65 - 90
	C.4	Tau Hu - Ben Nghe and Doi - Te	41.500	Existing Cap.	1,200 - 1,500	600 -1,000	250 -700
			13.517	Des. Runoff	180 - 200	180 - 200	180 - 200
N	N.1	Rach Ben Da - Rach Ba Hong	19.870	Existing Cap.	40 - 80	10 - 40	5 - 10
			9.988	Des. Runoff	40 - 50	40 -50	30 - 40
	N.2	Tham Luong - Ben Cat Canal	107.569	Existing Cap.	40 -250	10 - 30	1 - 10
			24.674	Des. Runoff	100 - 150	30 - 100	10 - 30
W	W.1	Rach Chua - Rach Nuoc Len	72.910	Existing Cap.	10 -60	10 - 40	1 - 10
			13.541	Des. Runoff	40 -50	30 - 40	10 -30
S	S.1	R. Xom Cui - R. Ba Lao	14.330	Existing Cap.	400 - 1,000	50 - 400	20 - 50
			6.850	Des. Runoff	50 - 100	40 - 50	30 - 40
	S.2	R. Ong Lon - K. Cay Kho	15.660	Existing Cap.	300 - 230	250 - 400	400 - 500
			8.390	Des. Runoff	60 - 80	30 - 60	20 - 30
	S.3	R. Tan - R. Ca Cam - R. Roi - R. Tom - Muong Chuoi Canal	31.510	Existing Cap.	1,400 - 4,000	1,000 - 1,400	20 - 180
			11.923	Des. Runoff	150 - 190	40 -150	30 - 40
	S.4	R. Cau Kinh	2.360	Existing Cap.	25 - 180	10 - 25	5 - 10
			2.450	Des. Runoff	20 -10	10 - 20	5 - 10
	S.5	R. AP3 Phu My	2.230	Existing Cap.	150 - 250	80 - 150	10 - 80
			2.422	Des. Runoff	20 -40	10 - 20	5 - 10
NE	NE.1	R. Ong Dua	3.320	Existing Cap.	20 - 60	10 - 15	10 - 15
			3.856	Des. Runoff	20 - 25	10 - 20	10 - 20
	NE.2	R. Go Dua	9.530	Existing Cap.	110 - 160	80 - 110	50 - 80
			3.549	Des. Runoff	50 - 60	30 - 50	10 - 30
	NE.3	R. Thu Duc	7.150	Existing Cap.	10 - 100	5 - 10	5 - 10
			3.336	Des. Runoff	30 - 50	15 - 30	10 - 15
	NE.4	R. Truong Tho	2.650	Existing Cap.	10 - 20	5 - 10	5 - 10
			2.653	Des. Runoff	20 - 30	15 - 20	10 - 15
	NE.5	R. Nhum - R. Cau - R. Go Gone	34.380	Existing Cap.	40 - 150	10 - 20	5 - 10
			12.581	Des. Runoff	90 - 100	50 - 100	30 - 50
SE	SE.1	R. Binh Khanh	1.980	Existing Cap.	100 -300	40 - 300	20 - 40
			2.457	Des. Runoff	10 - 20	10 - 20	5 - 10
	SE.2	R. Ca Tre Nho	2.600	Existing Cap.	120 -140	120 - 250	10 - 50
			2.203	Des. Runoff	20 - 25	20 - 25	10 - 20
	SE.3	R. Da Do	1.920	Existing Cap.	30 - 50	20 - 30	10 - 20
			3.672	Des. Runoff	25 - 30	15 - 25	10 - 15
	SE.4	R. Giong Ong To	7.800	Existing Cap.	150 - 300	70 - 150	20 - 70
			5.614	Des. Runoff	40 - 60	30 - 40	20 - 30
	SE.5	R. Muong	3.830	Existing Cap.	50 - 130	40 - 50	20 - 40
			2.852	Des. Runoff	25 - 30	15 - 25	10 -15
	SE.6	R. Ky Ha	5.100	Existing Cap.	50 - 80	50 - 80	15 - 20
			5.399	Des. Runoff	25 - 30	20 - 25	15 - 20
	SE.7	R. Kinh Ong Hong - R. Chuiee	14.580	Existing Cap.	140 - 350	100 - 140	50 - 100
			6.752	Des. Runoff	60 - 65	50 - 60	40 - 50
	SE.8	R. Ong Cay - R. Ba Cua - R. Ong Kieu	11.330	Existing Cap.	110 - 150	80 - 150	50 - 100
			6.993	Des. Runoff	50 - 60	50 - 60	20 - 50
	SE.9	R. Tan - R. Ong Nhieu	21.110	Existing Cap.	250 - 1,200	200 - 250	100 - 200
			6.946	Des. Runoff	90 - 105	70 - 90	60 - 70
	SE.10	Tac River	24.880	Existing Cap.	700 - 1,200	700 - 1,200	700 - 1,200
			13.850	Des. Runoff	110 - 300	60 - 110	50 - 60

Note:

TABLE E.3.6 GENERAL INFORMATION OF EXISTING PORT

No.	Name	Location	Main Struct. Materials	Length (m)	Completion Year	Existing Condition
PF.1	Tan Cang	Sai Gon River	Rein. Steel Concrete	2,600	1972	Good
PF.2	Sai Gon Port	-do-	-do-	2,000	1960	-do-
PF.3	Ben Nghe Port, Vietranschart	-do-	-do-	3,300	1995	-do-

TABLE E.3.7 STRUCTURAL FEATURES OF EXISTING EMBANKMENT

No.	Location	Width (m)	Length (m)	Top Elevation (m.MSL)	Completion Year	Existing Condition
D.1	Embankment along Dong Nai River	3	27.5	2	1976 – 1980	Partly collapsed
D.2,3	Embankment along Sai Gon River	3	6.2 8.5	2	1992 – 1997 1976 – 1980	Good Partly collapsed
D.4	Embankment along Dong Nai River	3	10.5	2	1976 – 1980	-do-
D.5	Embankment along Doi channel, Muong Chuoi channel	3	12.0	2	1979 – 1985	Eroded, uncontinuous
D.6	Embankment along channel of Long Thoi commune, Nhon Duc, Phu Xuan	2 - 3	25.0	2	1980 – 1985	Eroded
D.7	Embankment along Cay Kho – Ba Lao canal	1.5 - 2	9.0	2	1976 – 1980	-do-
D.8	Embankment along Can Giuoc canal – Ba Lao channel	3	21.0	2	-do-	Good
D.9	Embankment along Can Giuoc River	3	9.5	2	-do-	-do-
D.10	Embankment along Cau Gia River	2 - 3	7.5	2	-do-	-do-
D.11	Embankment along Huong Nhon,Bau Goc,Nuoc Len channel	1 – 1.5	20.5	2	-do-	-do-
D.12	Embankment along Tan Tuc, Binh Chanh communes	4 - 5	11.5	2	-do-	-do-
D.13	Embankment along Lien Vung canal	4 - 5	29.0	2	1990 - 1994	-do-
D.14	Embankment along Cho Dem River	3	4.3	2	1976 - 1980	-do-
D.15	Embankment along Ngang canal	2 – 3	5.0	2	-do-	-do-
D.16	Embankment along Ba Ty channel	2	3.8	2	-do-	-do-
D.17	Embankment along C canal	4 – 5	14.2	2	-do-	-do-
D.18	Embankment along A, B canal	3 – 5	21.5	2	-do	-do-
Total			**246.5**			

TABLE E.3.8 STRUCTURAL FEATURES OF EXISTING DAM

No.	Location	Main Material	Width (m)	Length (m)	Completion Year	Existing Condition
Da.1	Rach Chiec	Earth	5 - 6	70	1976 - 1980	Good
Da.2	Rach Muong	-do-	-do-	60	-do-	-do-
Da.3	Ky Ha	-do-	-do-	40	-do-	-do-
Da.4	Ba Cua	-do-	-do-	70	-do-	-do-
Da.5	Ong Nhieu	-do-	-do-	80	-do-	-do-
Da.6	Song Tac	-do-	-do-	230	-do-	-do-
Da.7	Rach Bang	-do-	-do-	70	-do-	Damaged
Da.8	Rach Dia	-do-	-do-	110	-do-	Damaged

TABLE E.3.9 STRUCTURAL FEATURES OF EXISTING GATE

No.	Location	Main Material	Dimension			Completion Year	Existing Condition
			Width (m)	Height (m)	No. of section		
G.1	Rach Chiec	Concrete	2.5	2.5	6	1976 - 1980	Good
G.2	Rach Muong	-do-	ϕ 1.0	-	5	-do-	Damaged
G.3	Ky Ha	-do-	ϕ 1.0	-	2	-do-	-do-
G.4	Ba Cua	-do-	2.0	2.0	2	-do-	-do-
G.5	Ong Nhieu	-do-	3.5	-	1	-do-	-do-
G.6	Nuoc Duc	-do-	ϕ 1.0	-	5	-do-	-do-
G.7	Giong Ong To	-do-	3.5	-	1	-do-	Damaged
G.8	Rach Ca Tre	-do-	ϕ 1.0	-	2	-do-	Damaged
G.9	An Ha	-do-	5.0	-	2	1994 - 1996	Good
G.10	Kenh C	-do-	7.5	-	2	1994 - 1996	Good

TABLE E.3.10 STRUCTURAL FEATURES OF EXISTING BANK PROTECTION

No.	Location	Main material	Length (m)	Completion year	Existing condition
BP.1	Sai Gon river, Thanh Da	Stone masonry	600	1970	Good
BP.2	Sai Gon river, Bach Dang	-do-	1,500	1972	-do-
BP.3	Sai Gon river, Thu Thiem	Concrete block	2,800	1998	-do-
BP.4	Doi canal, Ben Nguyen Duy	Stone masonry	500	1996	Good
BP.5	Te canal, Tran Xuan Soan	Stone masonry	3,700	1970	Good
BP.6	Tau Hu canal, Binh Dong	Stone masonry	6,500	1970-1996	Good
BP.7	Tau Hu canal, W.15, Dist. 8	Concrete	900	1950	Partly eroded
BP.8	Ngang canal 2, 2 sides of canal	Stone masonry	700	1970	Good
BP.9	Thi Nghe channel, W.16, 17 Binh Thanh	Stone masonry	1,200	1998	Good
BP.10	Thi Nghe channel, Thi Nghe	-do-	900	1970	Partly eroded
BP.11	Thi Nghe channel, along the zoo	-do-	900	1996	Good

TABLE E.3.11 (1/4) STRUCTURAL FEATURES OF EXISTING BRIDGE

Drainage Zone	Bridge No.	Name of Bridge	Name of Canal	Bridge Length (m)	Width (m)	Area (m2)	No. of Span	Type of Super-structure	Type of Abutment	Type of Pier	Completion Year	Clearance for Navigation	Allowable Load (ton)	Remarks
Central City Zone (C-Zone)	B-C.1	Ton Duc Thang	Nhieu Loc Thi Nghe	132.0	43.5	5,742.0	5	PC	RC	RC	1998	2.5	30	
	B-C.2	Thi Nghe	do	102.2	16.7	1,701.6	5	do	do	do	TR.1975	2	20	
	B-C.3	D. Bien Phu	do	124.0	17.8	2,207.2	5	do	do	do	do	2	23	
	B-C.4	Bui Huu Nghia	do	94.9	13.4	1,271.0	4	do	do	do	1998	3.4	-	
	B-C.5	Bong	do	56.7	19.2	1,088.6	3	do	do	do	TR.1975	-	20	
	B-C.6	Kieu	do	38.7	14.0	541.8	3	ST/RC	do	do	do	2.2	20	
	B-C.7	Cong Ly	do	46.0	18.0	828.0	3	RC	do	do	do	1.6	25	
	B-C.8	Le Van Si	do	46.0	18.2	837.2	3	do	do	do	do	1.5	13	
	B-C.9	Tran Quang Dieu	do	38.6	11.1	428.5	3	do	do	do	do	-0.22	13	
	B-C.10	Den (Railway)	do	23.0	3.5	80.5	3	ST/RC	do	do	do	1	-	
	B-C.11	Do	R. Cau Son - R. Tau Vam Tat	64.0	6.8	435.2	4	ST	ST	ST	TR.1975	1.4	12	
	B-C.12	Bang Ky	do	62.7	17.0	1,065.9	3	PC	RC	RC	1995	0.5	13	
	B-C.13	Chu Van An	do	37.6	10.1	381.2	3	do	do	do	1992	0.45	13	
	B-C.14	Bui Dinh Tuy	do	37.6	10.0	376.8	3	do	do	do	do	-	13	
	B-C.15	Son	do	19.0	10.6	201.4	1	do	do	none	TR.1975	-	22	
	B-C.16	Hau Giang	Tan Hoa - Logom	28.8	14.7	423.4	3	RC	do	RC	do	3	25	
	B-C.17	Ong Buong 1	do	39.6	15.0	594.0	2	PC	do	do	1994	0.9	30	
	B-C.18	Ong Buong 2	do	19.5	12.1	236.0	1	RC	do	none	1995	0.9	30	
	B-C.19	Dang Nguyen Can	do	12.0	9.0	108.0	1	ST/RC	do	none	1990	-	13	
	B-C.20	Tan Hoa	Tau Fu - Ben Nghe	38.7	8.0	309.6	3	PC	do	RC	TR.1975	-	13	
	B-C.21	Khanh Hoi	do	91.8	17.0	1,560.6	4	do	do	do	do	-	25	
	B-C.22	Mong	do	96.0	5.0	480.0	6	ST	-	-	do	6	-	
	B-C.23	Caimette	do	84.4	15.3	1,291.3	4	PC	BTCT	BTCT	-	-	17	
	B-C.24	Ong Lanh	do	50.4	7.0	352.8	3	RC	do	do	do	4		
	B-C.25	Cha Va	do	62.7	26.4	1,656.1	5	PC	do	do	1997	3.5	30	
	B-C.26	So 1	do	74.9	10.0	749.0	3	do	do	do	1993	3.5	30	
	B-C.27	So 2	do	116.0	5.0	580.0	7	ST	-	-	-	2.5	1.5	
	B-C.28	Vinh Mau	do	20.0	6.5	130.1	3	RC	do	do	TR.1975	5.86	1	
	B-C.29	Van Nguyen	do	48.8	2.5	122.0	3	ST	ST	ST	do	4.32		
	B-C.30	So 3	do	141.0	3.5	493.5	9	do	do	do	do	5	1	

TABLE E.3.11 (2/4) STRUCTURAL FEATURES OF EXISTING BRIDGE

Drainage Zone	Bridge No.	Name of Bridge	Name of Canal	Bridge Length (m)	Width (m)	Area (m2)	No. of Span	Type of Super-structure	Type of Abutment	Type of Pier	Completion Year	Clearance for Navigation	Allowable Load (ton)	Remarks
Central City Zone (C-Zone)	B-C.31	Tan Thuan	Doi Te	234.2	12.8	2,997.8	8	ST/RC	RC	RC	do	5.5	30	
	B-C.32	Chu Y	do	512.0	12.0	6,144.0	24	do	do	do	do	3.5	13	
	B-C.33	Nhi Thien Duong	do	150.9	11.0	1,659.9	7	do	do	do	do	0.7	5	
	B-C.34	Mat	R. Ong Nho	22.0	8.2	180.4	3	RC	do	do	-	-0.4	10	
	B-C.35	Ba Tang	R. Ba Tang	25.4	10.0	254.0	5	PC	do	do	1973	-	25	
	B-C.36	Rach Ngang	do	6.9	10.6	73.1	1	RC	do	none	TR.1975	-	10	
	B-C.37	Da Lon	R. Ba Lon	74.0	10.6	784.0	3	PC	do	RC	1997	3.5	30	
City Zone	B-N.1	Ba Hong	R. Ben Da - R. Ba Hong	55.7	10.0	557.0	3	do	do	do	1994	-	30	
	B-N.2	Vong	do	38.2	10.0	381.8	2	do	do	do	do	-	30	
	B-N.3	Dua	do	32.2	10.0	322.0	5	RC	do	do	TR.1975	0.2	18	
	B-N.4	Dai Han	R. Dai Hai	13.8	10.0	138.0	1	ST/RC	do	none	-	-	-	
	B-N.5	An Loc	Tham Luong - Ben Cat	124.5	14.0	1,743.0	9	PC	do	RC	TR.1975	1.8	25	
	B-N.6	Ben Phan	do	112.0	10.0	1,120.0	4	do	do	do	-	-	-	
	B-N.7	Truong Day	do	49.7	7.4	367.5	3	ST	do	do	1990	3.2	10	
	B-N.8	Cho Cau	do	25.4	10.0	254.0	2	PC	do	none	1993	1.6	25	
	B-N.9	Tham Luong	do	11.0	13.5	148.5	1	RC	do	none	TR.1975	1.6	25	
	B-N.10	Ben Cat	R. Ben Cat	148.2	10.6	1,570.9	6	PC	do	RC	do	2.2	25	
	B-N.11	Ca Bon	R. Ba Con	13.6	10.0	136.0	1	do	do	none	do	2.0	25	
Western City Zone (W-Zone)	B-W.1	An Lac	R. Chua - R. Nuoc Len	74.9	13.5	1,012.6	3	do	do	RC	TR.1975	0.6	25	
	B-W.2	An Lap	do	45.6	3.0	136.8	8	ST/RC	do	do	do	0.7	16	
	B-W.3	Tan Tao	do	12.2	3.4	41.5	1	do	do	none	S.1975	1.4	16	
	B-W.4	Binh Thuan	do	13.8	10.6	146.3	1	do	do	none	1983	1.0	16	
	B-W.5	Tan Ky Tan Quy	do	12.5	10.6	132.5	1	RC	do	none	1983	1.0	10	
	B-W.6	Ba Tieng	R. Nhanh	30.0	7.0	210.0	2	do	do	RC		1.0	10	
	B-W.7	Tan Kien	R.Cai Trung - R. Ba Doc	24.5	6.5	159.3	3	ST	ST	ST	TR.1975	-	15	
	B-W.8	Binh Dien 1	Ben Luc River	181.5	12.5	2,268.8	5	PC	RC	RC	1999	6.0	30	
	B-W.9	Binh Dien 2	do	123.5	15.5	1,914.3	8	do	do	do	1999	6.0	30	
	B-W.10	Cho Dem	do	137.5	9.0	1,237.5	8	do	do	do	TR.1975	6.0	13	
	B-W.11	Can Giouc	Can Giuoc River	93.0	4.3	399.9	3	ST	do	ST	TR.1975	4.2	8	

TABLE E.3.11 (3/4) STRUCTURAL FEATURES OF EXISTING BRIDGE

Drainage Zone	Bridge No.	Name of Bridge	Name of Canal	Bridge Length (m)	Width (m)	Area (m2)	No. of Span	Type of Super-structure	Type of Abutment	Type of Pier	Completion Year	Clearance for Navigation	Allowable Load (ton)	Remarks
Southern City Zone (S-Zone)	B-S.1	Rach Ngang	Rach Ba Lao	6.0	10.6	63.6	1	PC	do	none	1997	1.0	30	
	B-S.2	Hiep An 1	Rach Xom Cui	72.0	8.2	590.4	3	do	do	RC	do	3.0	10	
	B-S.3	Xom Cui	do	278.4	10.6	2,951.0	11	do	do	do	do	5.0	30	
	B-S.4	Rach Ong	R. Ong Lon - Kinh Cay Kho	198.2	9.0	1,783.8	9	do	do	do	TR.1975	5.5	10	
	B-S.5	Ong Lon	do	393.4	10.6	4,170.0	15	do	do	do	1997	6.0	30	
	B-S.6	Ong Be	Rach Ong Be	73.6	10.6	780.4	3	do	do	do	1980	1.5	30	
	B-S.7	Muong Chuoi	R. Tan - R. Roi - R. Tom - Muong Chuoi Canal	198.0	9.4	1,861.2	9	do	do	do	TR.1975	-	1	
	B-S.8	Phu Xuan	do	87.5	3.5	306.3	3	do	do	do	1995	1.0	18	
	B-S.9	Thay Tieu	Rach Thay Tieu	49.1	25.1	1,231.9	3	do	do	do	1997	2.5	30	
	B-S.10	Dia	Rach Dia	121.2	3.2	387.8	5	ST	do	do	TR.1975	0.2	2	
	B-S.11	Long Kien	Phuoc Khien - R. Cay Kho	106.2	3.2	339.8	3	do	do	do	S.1975	0.9	2	
	B-S.12	Ong Bon	do	49.0	7.0	343.0	3	PC	do	do	do	3.0	25	
	B-S.13	Long Kieng	Rach Phu Xuan	181.3	15.8	2,864.4	8	do	do	do	1991	1.8	25	
North-Eastern City Zone (NE-zone)	B-NE.1	Ong Dua	R. Ong Dua	30.5	12.7	387.4	2	RC	do	do	TR.1975	-	20	
	B-NE.2	Go Dua (Railway)	R. Go Dua	70.0	3.5	245.0	3	ST/RC	do	do	do	2.0	-	
	B-NE.3	Go Dua	do	69.0	8.0	552.0	4	RC	do	do	do	2.0	-	
	B-NE.4	Thu Duc	R. Thu Duc	30.0	3.0	90.0	3	do	do	do	do	2.0	3	
	B-NE.5	Trong Tho	R. Truong Tho	6.5	7.8	50.7	1	ST/RC	do	none	do	-	2	
	B-NE.6	Go Cong	R. Nhum - R. Go Gone	60.6	3.5	212.1	3	ST	do	RC	do	-	8	
	B-NE.7	Ben Noc	do	56.0	5.7	319.2	2	PC	do	do	1993	0.8	-	
	B-NE.8	Suoi Cai	do	24.7	19.5	481.7	2	do	do	do	-	1.0	20	

TABLE E.3.11 (4/4) STRUCTURAL FEATURES OF EXISTING BRIDGE

Drainage Zone	Bridge No.	Name of Bridge	Name of Canal	Bridge Length (m)	Width (m)	Area (m2)	No. of Span	Type of Super-structure	Type of Abutment	Type of Pier	Completion Year	Clearance for Navigation	Allowable Load (ton)	Remarks
South-Eastern City Zone (SE-Zone)	B-SE.1	Ca Tre 1	Rach Binh Khanh	57.0	3.5	199.5	4	RC	do	do	S.1975	1.0	10	
	B-SE.2	Ong Tranh	Rach Ca Tre Nho	34.8	9.0	313.2	2	do	do	do	do	2.5	18	
	B-SE.3	Den	Rach Da Do	24.8	3.9	96.7	2	ST	do	do	TR.1975	2.0	25	
	B-SE.4	Ong To	Rach Gion Ong To	46.6	9.2	428.5	5	ST/RC	ST	do	S.1975	2.7	25	
	B-SE.5	My Thuy	Rach Ky Ha	44.5	10.6	471.7	3	PC	do	do	TR.1975	3.0	25	
	B-SE.6	Rach Chiec	R. Chiec - R. K. Ong Hong	149.2	16.5	2.461.8	9	do	do	do	do	1.2	20	
	B-SE.7	Thuy Loi	do	20.0	8.0	160.0	7	RC	do	do	do	-	8	
	B-SE.8	Moi	do	48.0	7.0	336.0	4	ST/RC	do	do	do	1.5	8	
	B-SE.9	Xay Dung	R. Ong Cay - R. Ba Cua - R. Ong Kieu	36.0	7.0	252.0	3	RC	RC	do	do	1.5	3	
	B-SE.10	Ong Nhieu	R. Tan - R. Ong Nhieu	69.0	3.5	241.5	4	ST	do	do	-	1.0	8	
	B-SE.11	Trau Trau	Rach Trau Trau	66.0	3.5	231.0	5	do	do	do	-	1.0	8	
	B-SE.12	Tang Long	do	60.0	6.0	360.0	3	ST/RC	do	do	TR.1975	1.0	13	

Note: Legend of the bridge type is as follows:

(1) RC: Reinforced Concrete, (2) ST: Steel, (3) ST/RC: Steel and Concrete, (4) PC: Prestress Concrete, (5) TR. 1975: Before 1975, (6) S. 1975: After 1975

TABLE E.3.12 STRUCTURAL FEATURES OF EXISTING CULVERT

Drainage Zone	Culvert No.	Name of Canal	Type of Culvert	Dimension (mm)	Length (m)	Remarks
N-Zone	Cu-N.1	Rach Cau Dua	RC Pipe	1,000 x 2	7.0	
	Cu-N.2	do	do	800 x 2	6.0	
	Cu-N.3	Rach Cho Cau	do	1,500 x 2	14.0	
	Cu-N.4	do	do	800 x 2	5.0	
	Cu-N.5	do	RC Box	1,500x1,500	6.0	
	Cu-N.6	do	RC Pipe	1,000 x 3	8.0	
	Cu-N.7	do	do	800 x 3	6.0	
SE-Zone	Cu-SE.1	Rach Ca Tre	do	1,000 x 2	3.0	
NE-Zone	Cu-NE.1	Rach Suoi Cai	Corrugate Pipe	2,000 x 2	14.0	

Note: Location of the existing culverts is illustrated in Fig. E.3.8 (2/2).

TABLE F.3.13 (1/2) LIST OF NAVIGABLE CANAL ADMINISTRATED BY OWM IN THE STUDY AREA

Zone	Canal No.	Name of Canal	Length (km)	Grade	Location
Central City Zone (C-Zone)	C-C.1	Nhieu Loc - Thi Nghe Canal	6.5	6	Sai Gon River - Hoa hung Railway Station
	C-C.2	R. Cau Son - R. Tau Vam Tat	6.0	6	Vam Thuat River - Da Kao Bridge
	C-C.3	Tan Hoa - Lo Gom Canal	2.5	6	Tau hu Canal - Ong Buong Bridge
	C-C.4	Tau Hu - Ben Nghe Canal	8.9 3.5	4 5	Sai Gon River - Ben Luc River
	C-C.5	Doi - Te Canal	13.2	3	Sai Gon River - Ben Luc River
	C-C.6	Rach Ba Tang	4.0	6	Can Giuoc River - Rach Ba Lao
	C-C.7	Rach Ba Lon - Rach Chom	8.1	5	Doi Canal - Rach Ba Tang
	C-C.8	Rach Ong Nho	2.4	6	Doi Canal - Rach Ong Lon
	C-C.9	Binh Trieu River	2.8	6	Sai Gon River - Rach Lang
	C-C.10	Tanda Canal	1.3	3	Sai Gon River - Sai Gon River
	C-C.11	Rach Van Thang	2.0	6	Thi Nghe Canal - Van Thanh Bridge
	C-C.12	Ngang Canal No.1	0.4	4	Doi Canal - Tau Hu Canal
	C-C.13	Ngang Canal No.2	0.4	4	Doi Canal - Tau Hu Canal
	C-C.14	Ngang Canal No.3	0.4	4	Doi Canal - Tau Hu Canal
	C-C.15	Rach Ruot Ngua	5.7	6	Lo Gom Canal - End of the line
	Number of navigation canals: 15 canals, Length of navigation canals: 68.1 km				
Northern City Zone (N-Zone)	C-N.1	Rach Ba Hong	3.8	6	Sai Gon River - Ba Nam Bridge
	C-N.2	Tham Luong - Ben Cat Canal	9.5	4	Sai Gon River - Tham Luong Bridge
	C-N.3	Rach 19 - 5	8.0	5	Rach Tham Luong - Rach Chua
	C-N.4	Rach Ben Cat	9.9	6	Ben Cat River -
	C-N.5	Rach Ba Ca Bon	4.0	6	Sai Gon River - Ben Cat River
	Number of navigation canals: 5 canals, Length of navigation canals: 35.2 km				
Western City Zone (W-Zone)	C-W.1	Rach Chua - Rach Nuoc Len	13.8	5	Rach 19-5 - Ben Luc River
	C-W.3	Rach Cai Trung - Rach Ba Doc	4.5	6	Ben Luc River - End of the line
	C-W.4	Ben Luc River	6.4	3	Doi Canal - Long An Boundary
	C-W.5	Can Giuoc River	4.0	3	Ben Luc River - Rach Ba Lao
	C-W.6	Sang Canal	2.0	4	An Ha Canal - Ben Luc River
	C-W.7	Chua River	7.0	6	Sang River - Rach Nuoc Len
	C-W.8	Rach Ba Ty	3.5	6	Ben Luc River - End of the line
	C-W.9	Rach Ong Giao -Rach Ong De	2.8	6	Ben Luc River - End of the line
	C-W.10	Rach Ong Den - Rach Ba Dap	3.5	6	Ben Luc River - End of the line
	Number of navigation canals: 9 canals, Length of navigation canals: 47.5 km				
Southern City Zone (S-Zone)	C-S.1	Rach Ba Lao	9.3	4	Can Guioc River - End of the line
	C-S.2	Rach Xom Cui	7.0	4	Doi Canal - Rach Ba Lao
	C-S.3	Rach Ong Lon - Kinh Cay Kho	8.3	3	Doi Canal - Rach Ba Lao
	C-S.4	Rach Ong Be	3.0	6	Rach Ong Nho - Rach Ong Lon
	C-S.5	R. Ca Cm - R. Roi - R. Tom - Muong Chuoi Canal	5.8 2.0	4 6	Nha Be River - Phu Xuan River, Rach Ong Nho - Rach Ong Lon
	C-S.6	Rach Thay Tieu	3.4	6	Ach Bang Bridge - Rach Dia
	C-S.7	Rach Dia	3.9	4	Rach Ba Lao - Rach Roi
	C-S.8	Rach Tom - Phuoc Khien River	5.2	5	Rach Ong Lon - Muong Chuoi Canal
	C-S.9	Rach Ben Ro -	4.5	5	Rach Xom Cui - Kinh Cay Kho
	C-S.10	Rach Cay Kho	4.8	4	Kinh Cay Kho - Phuoc Kieng River
	C-S.11	Rach Ong Tu Dinh	1.3	6	Rach Ong Lon - Rach Dia
	C-S.12	Rach Tu B4 - B9	1.1	6	Rach Ong Lon - Rach Bang
	C-S.13	Rach Tu B0 - B3	0.9	6	Rach Ong Lon - Rach Bang
	C-S.14	Rach Phu Xuan	2.8	4	Nha Be River - Rach Tom
	C-S.15	R. Ngang - R. Muong Chuoi (B)	2.2	6	Muong Chuoi River - Nha Be River
	C-S.16	Rach Bang - Rach Thuy Tieu	2.5	6	Rach Thay Tieu - End of the line
	C-S.17	Rach Thu Dao	3.0	6	Can Giuoc River - Rach Ba Lao
	C-S.18	Rach Ba Thanh	3.2	6	Rach Tac Ben Ro - Rach Dia
	C-S.19	Rach Dua Sap	1.2	6	Rach Thay Tieu - Rach Dia
	Number of navigation canals: 19 canals, Length of navigation canals: 75.4 km				

TABLE E.3.13 (2/2) LIST OF NAVIGABLE CANAL ADMINISTRATED BY OWM IN THE STUDY AREA

Zone	Canal No.	Name of Canal	Length (km)	Grade	Location
North-Eastern City Zone (NE-Zone)	C-NE.1	Rach Ong Dau	4.3	6	Sai Gon River - Rach Go Dua
	C-NE.2	Rach Go Dua - Nuoc Trong	6.2	6	Sai Gon River - End of the line
	C-NE.5	R. Nhum - R. Cau - R. Go Gone	5.7	6	Tac River - Tan Phu Comm.
	C-NE.6	Rach Cau Dap	2.0	6	Sai Gon iver - Rach Nuoc Trong
	Number of navigation canals: 4 canals, Length of navigation canals: 18.2 km				
South-Eastern City Zone (SE-Zone)	C-SE.2	Rach Ca Tre Nho	2.2	6	Sai Gon River - End of the line
	C-SE.3	Rach Da Do	2.0	6	Sai Gon River - End of the line
	C-SE.4	Rach Giong Ong To	5.0	4	Sai Gon river - Rach Ong Cay
	C-SE.6	Rach Ky Ha	4.0	6	Sai Gon River - Tan My Loi Commune
	C-SE.7	R. Chiec - R. Kinh Ong Hong	6.6	4	Sai Gon River - Rach Trau Trau
	C-SE.8	R. Ong Cay - R. Ba Cua - R. Ong Kieu	6.3	6	Dong Nai River - Rach Gion Ong To
	C-SE.9	Rach Cau Ong Nhieu	5.2	4	Dong Nai River - Rach Chiec
	C-SE.10	Rach Trau Trau	4.4	4	Tac River - Rach Kinh Ong Hong
	C-SE.11	Tac River	11.5	4	Dong Nai River - Dong Nai River
	C-SE.15	Rach Mon - Rach Nuoc Duc	3.6	6	Tac River - Dong Nai River
	C-SE.16	Rach Cay Cam	3.2	6	Tac River - Rach Trau Trau
	C-SE.17	Rach Ba Da - Rach Giang	4.5	6	Tac River - Dong nai River
	C-SE.18	Rach Dat Set	3.0	6	Rach Cau Ong Nhieu - Rach Giong Ong To
	C-SE.19	Rach Ba Hien - Rach Ngon Muo	3.2	6	Rach Ong Nhieu Bridge - Rach Ba Cua
	Number of navigation canal: 14 canals, Length of navigation canals: 61.7 km				
Total number of navigation canal: 66 canals, Total length of navigation canal: 309.1 km Grade 3: 3 canals (33.2 km), Grade 4: 17 canals (87.9 km), Grade 5: 3 canals (43.1 km), Grade 6: 41 canals (144.9 km)					

TABLE E.3.14 DESIGN CRITERIA FOR INLAND WATERWAY TRANSPORT IN VIET NAM

Grade	Dimension of the Waterway (m)					Dimensions of the Structure (m)			
	Natural River		Man-made Canal		Radius for Curve of Waterway	Bridge			Clearance for electric cable with no security for magnetic
						Width		Clearance	
	Water Depth	Bottom Width	Water Depth	Bottom Width		River	Canal		
I	more than 3.0	more than 90	more than 4.0	more than 50	more than 700	80	50	10	12
II	2.0 to 3.0	70 to 90	3.0 to 4.0	40 to 50	500 to 700	60	40	9	11
III	1.5 to 2.0	50 to 70	2.5 to 3.0	30 to 40	300 to 500	50	30	7	9
IV	1.2 to 1.5	30 to 50	2.0 to 2.5	20 to 30	200 to 300	40	25	6 (5)	8
V	1.0 to 1.2	20 to 30	1.2 to 2.0	10 to 20	100 to 200	25	20	3.5	8
VI	less than 1.0	10 to 20	less than 1.2	10	60 to 150	15	10	2.5	8

Note: The figure in ( ) is only permitted to use under the approval of the designated authorities.

Table E.3.15 Dimensions of Typical Cross-section

Type		A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	A-11	A-12	A-13	A-14	A-15	A-16	B-1	B-2	B-3	B-4
Dimensions (m)	H	1.80	1.40	1.30	1.20	1.40	1.15	1.40	1.20	1.20	1.10	1.00	1.80	0.80	0.70	1.80	1.70	1.70	1.15	1.00	1.00
	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.90	0.60	0.60	0.60
	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.63	0.10	0.10	0.10
	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.64	0.40	0.40	0.40
	D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.20	0.20	0.20	0.30
	E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.63	0.10	0.10	0.10
	W	1.40	1.10	1.00	0.90	0.80	0.80	0.60	0.80	0.60	0.60	0.60	0.75	0.60	0.60	1.20	1.10	-	-	-	-
	W1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Type		B-5	B-6	C-1	D-1	D-2	E-1	E-2	E-3	E-4	F-1	F-2	F-3	F-4	F-5	G-1	G-2	G-3	G-4	H-1	J-1
Dimensions (m)	H	1.00	0.80	2.10	1.10	1.50	-	-	-	-	-	-	-	-	-	1.70	1.50	1.45	1.80	1.45	2.25
	A	0.60	0.60	0.80	-	-	-	-	-	-	-	-	-	-	-	1.10	0.60	0.75	0.70	0.75	2.50
	B	0.10	0.10	0.50	-	-	-	-	-	-	-	-	-	-	-	0.50	0.40	0.25	0.40	0.50	0.65
	C	0.40	0.40	0.30	-	-	-	-	-	-	-	-	-	-	-	0.50	0.20	0.50	0.30	0.25	1.20
	D	0.15	0.20	-	-	-	2.00	1.50	1.20	1.00	1.50	1.20	1.00	0.90	0.80	0.20	0.20	0.20	0.20	0.20	0.45
	E	0.10	0.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.65
	W	-	-	-	1.20	1.50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.10
	W1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	R	-	-	0.70	-	-	-	-	-	-	-	-	-	-	-	0.575	0.40	0.425	0.65	0.375	-
	r	-	-	0.15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Type		J-2	J-3	J-4	K-1	K-2	K-3	K-4	K-5	K-6	K-7	K-8	K-9	K-10	K-11	K-12	K-13	L-1	M-1
Dimensions (m)	H	2.10	1.90	1.90	1.60	1.60	1.80	1.80	1.60	1.40	1.20	1.00	1.00	0.80	1.10	1.50	1.50	-	1.40
	A	2.40	2.50	2.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	B	0.80	0.83	0.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	C	0.80	0.84	0.70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	D	0.20	0.20	0.20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	E	0.80	0.83	0.65	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	W	2.30	2.40	1.65	1.35	1.20	1.00	0.80	0.80	0.80	0.80	0.80	0.70	0.80	1.00	1.50	1.10	0.80	1.40
	W1	-	-	-	1.20	0.80	0.85	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.80	1.30	0.80	-	1.80
	R	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.40	-
	r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table E.3.16 (1) Total Length of Drainage Pipes by District and Type

District	1	2	3	4	5	6	7	8	9	10	11	12	Binh Thanh	Go Vap	Phu Nhuan	Tan Binh	Thu Duc	Binh Chanh	Nha Be	Total
A-1					138															138
A-2	257																			257
A-3	200																			200
A-4					252															252
A-5					43															43
A-6					90															90
A-7					31															31
A-8					70															70
A-9					425															425
A-10					149															149
A-11				90	591	164									15					860
A-12	672																			672
A-13					662															662
A-14					22															22
A-15			894																	894
A-16			370																	370
Sub-Total	1,129	-	1,264	90	2,473	164	-	-	-	-	-	-	-	-	15	-	-	-	-	5,135
B-1					520															520
B-2					36															36
B-3					25															25
B-4					244															244
B-5					98															98
B-6					69															69
Sub-Total	-	-	-	-	992	-	-	-	-	-	-	-	-	-	-	-	-	-	-	992
C-1			1,062																	1,062
Sub-Total	-	-	1,062	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,062
D-1			94																	94
D-2			318																	318
Sub-Total	-	-	412	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	412
E-1	1,099																			1,099
E-2	2,617																			2,617

Table E.3.16 (2) Total Length of Drainage Pipes by District and Type

District	1	2	3	4	5	6	7	8	9	10	11	12	Binh Thanh	Go Vap	Phu Nhuan	Tan Binh	Thu Duc	Binh Chanh	Nha Be	Total
E-3	3,200																			3,200
E-4	2,014		293																	2,307
Sub-Total	8,930	-	293	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,223
F-1	356				680	521														1,557
F-2	449		634		580	846				765	1,582									4,856
F-3	4,711		1,645	1,035	1,723	2,298				3,105	2,661		937		3,141					21,256
F-4						434														434
F-5	3,707		2,732	4,850	450	723		890		6,495	4,581		1,494		6,650	3,710				36,282
Sub-Total	9,223	-	5,011	5,885	3,433	4,822	-	890	-	10,365	8,824	-	2,431	-	9,791	3,710	-	-	-	64,385
G-1					123						203									326
G-2					255															255
G-3										170										170
G-4			674																	674
Sub-Total	-	-	674	-	378	-	-	-	-	170	203	-	-	-	-	-	-	-	-	1,425
H-1										165										165
Sub-Total	-	-	-	-	-	-	-	-	-	165	-	-	-	-	-	-	-	-	-	165
J-1					362															362
J-2					535															535
J-3																				0
J-4					265															265
Sub-Total	-	-	-	-	1,162	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1,162
K-1					490															490
K-2	134																			134
K-3					90															90
K-4	2,865		1,642																	4,507
K-5	1,639		682	70																2,391
K-6	14,518		2,447	195	1,642					65										18,867
K-7	5,423		799	140	231	565				525										7,683
K-8	664																			664
K-9					365															365
K-10	146																			146

Table E.3.16 (3) Total Length of Drainage Pipes by District and Type

District	1	2	3	4	5	6	7	8	9	10	11	12	Binh Thanh	Go Vap	Phu Nhuan	Tan Binh	Thu Duc	Binh Chanh	Nha Be	Total
K-11					460															460
K-12					530															530
K-13					374															374
Sub-Total	25,389	-	5,570	405	4,182	565	-	-	-	590	-	-	-	-	-	-	-	-	-	36,701
L-1	294																			294
Sub-Total	294	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	294
M-2					970					420										1,390
Sub-Total	-	-	-	-	970	-	-	-	-	420	-	-	-	-	-	-	-	-	-	1,390
Pipes																				
ϕ 2500mm															270					270
ϕ 2000mm											800									800
ϕ 1800mm														550						550
ϕ 1500mm	400						630				2,666			2,175		600				6,471
ϕ 1400mm														240						240
ϕ 1200mm										460	1,858			995	450			2,000		5,763
ϕ 1100mm														250						250
ϕ 1000mm	600	1,200	910				250	2,190		1,680	1,837		7,070	5,924	1,600	7,145				30,406
ϕ 800mm		950	1,050			7,097	4,060	5,570		4,600	5,849		15,577	3,304	1,457	16,705	300	1,400		67,919
ϕ 600mm	13,985	1,000	18,655	15,070	8,829	6,678	1,010	9,370	5,700	14,180	20,491		6,140	7,702	5,553	21,170				155,533
ϕ 500mm	17,206	300	15,230	7,320	2,075	3,437	650	1,520		3,210	11,416		3,015		2,035	2,480	500			70,394
ϕ 400mm	405		4,400	6,140	5,720	9,804		3,420			8,390		540			3,125				41,944
Sub-Total	32,596	3,450	40,245	28,530	16,624	27,016	6,600	22,070	5,700	24,130	53,307	-	32,342	21,140	11,365	51,225	800	3,400	-	380,540
Box Culvert																				
2m x 2m x 2			400													450				850
2.75m x 1.2m x 2															1,009					1,009
2.5m x 2.5m x 2																550				550
2.5m x 2.5m															1,400					1,400
3m x 2m				600																600
2m x 2.5m					340															340
2m x 2m	530									402				475	500	1,000				2,907
2m x 1m															875					875

Table E.3.16 (4) Total Length of Drainage Pipes by District and Type

District	1	2	3	4	5	6	7	8	9	10	11	12	Binh Thanh	Go Vap	Phu Nhuan	Tan Binh	Thu Duc	Binh Chanh	Nha Be	Total
1.6m x 2m										1,228						960				2,188
1.6m x 1.6m						400														400
1.4m x 1.6m														803						803
1.1m x 1.75m						180														180
1.1m x 1.5m						1,414														1,414
1m x 1m				450																450
(1-2.5)m x 1.3m															920					920
0.8m x 1.5m													300							300
1m x 1.2m														200						200
0.8m x 1.0m															330					330
(0.6-0.8)m x 0.8m																	3,100			3,100
0.5m x 0.4m		1,000												1,190						2,190
0.4m x 0.4m													800							800
Sub-Total	530	1,000	400	1,050	340	1,994	-	-	-	1,630	-	-	1,100	2,668	5,034	2,960	3,100	-	-	21,806
Grand Total	79,246	6,450	58,208	19,540	30,514	34,561	6,610	21,190	0	67,470	34,549	0	31,901	38,808	21,220	59,895	3,100	3,400	0	516,662

Table E.3.17 Existing Combined Sewer having Insufficient Discharge Capacity

Line No.	Section Upstream	Section Downstream	Road Name	Length (m)	Diameter / Sewer Type (mm)
1	U73A_1	U73B_1	NGUYEN TAT THANH	1,480	800
1	U73B_1	Ben Nghe Canal	ditto	724	800
Sub-total				2,204	
3	55B_1	55C_1	Cong Quynh	182	F-5
3	147A_1	145B_1	Tran Hung Dao	192	F-6
3	145AA_1	145BA_1	ditto	173	F-5
3	145B_1	145BA_1	ditto	33	A-2
3	145BA_1	55C_1	ditto	46	A-2
3	55C_1	Ben Nghe Canal	Huynh Quang Tien	513	E-3
Sub-total				1,139	
4	51_1	134B_1	Nguyen Dieu	147	F-5
4	134B_1	Ben Nghe Canal	Tran Binh Trong	362	F-3
5	49_1	253_1	Le Hong Phong	391	F-5
5	253_1	50B_1	Hung Vuong	298	F-5
5	50B_1	50EA_1	Tran Binh Trong	932	M-1
6	140A_1	47C_1	Dien Bien Phu	714	F-5
6	141A_1	47B_1	Dien Bien Phu	714	F-5
7	142_1	63DB_1	Dien Bien Phu	926	F-5
Sub-total				4,484	
8	117A_1	Hun Bang	Trinh Hoai Duc	724	A-9
9	106A_1	Ben Nghe Canal	Hau Giang	1,108	F-5
9	3A_1/3B_1	Lo Gom Canal	Minh Phung	183	F-3
10	4AA_2	Lo Gom Canal	Hung Vuong	1,108	K-7
11	112E_1	Lo Gom Canal	Hung Vuong	107	F-5
11	112D_1	Lo Gom Canal	Phu Lam	152	F-3
11	112E_1	Lo Gom Canal	Hung Vuong	1,233	F-5
13	2A_1	2B_1	Minh Phung	641	F-5
Sub-total				5,256	
14	U40_1_1	Lo Gom Canal	HUONG LO 14	356	800
14	U40_2A1	Lo Gom Canal	ditto	483	800
14	U40_2C1	Lo Gom Canal	ditto	339	800
Sub-total				1,178	
15	U4BA_1	U4AA_1	QUANG TRUNG	38	600
15	U4BB_1	U4AB_1	ditto	321	800
Sub-total				359	
Total				14,620	

TABLE E.5.1 FLOOD AND FLOOD DAMAGE CONDITIONS BY DISTRICT

Item	Name of District										
	2	5	6	8	10	12	B.Thanh	T.Binh	B.Chanh	Go Vap	P.Nhuan
A. Habitual Inundation											
A.1: Area (ha)	190.2	2.6	-	46.3	1.0	300.0	289.8	503.8	3,100	585.8	5.0
A.2: Depth (cm)	20-30	20-50	-	30-60	20-50	20-50	35-60	20-50	60-120	30-50	20-120
A.3: Dration (hour)	5.0	0.5-3.0	1.0-6.0	2.0	0.5-2.0	0.5-2.0	1.0-3.0	5.0-12	6.0-8.0	1.5	0.5-5.0
A.4: Frequency (time/year)	many	-	-	many	-	-	many	-	many	101	-
A.5: Cause of Inundation											
(1) By rainfall	-	X	-	-	X	X	-	-	-	-	X
(2) By Tide	-	-	-	-	-	-	-	-	-	-	X
(3) By Both Rainfall/Tide	X	-	-	-	-	-	X	-	X	X	-
(4) By Poor Drain	X	X	X	-	X	X	X	X	-	X	X
(5) No Drain	-	-	-	-	-	-	-	X	-	-	X
B. Maximum Inundation											
B.1: Date	-	-	-	1988	-	-	Nov.'96	-	Oct.'96	-	-
B.2: Area (ha)	-	-	-	15.0	-	-	-	-	3,100	-	-
B.3: Depth (cm)	-	-	-	20-40	-	-	60	-	100-150	-	-
B.4: Duration (hour)	-	-	-	-	-	-	10	-	6.0	-	-
B.5; Frequency (time/year)	-	-	-	-	-	-	-	-	-	-	-
C. Flood Damage											
C.1: No. of People Suffered	60,000	-	-	22,000	-	-	52,000	-	26,600	71,238	-
C.2: No. of House Affected	-	-	-	4,500	-	-	5,600	-	6,670	13,968	-
C.3: Damage Cost (billion VND)	-	-	-	-	-	-	-	-	15.4	-	-

TABLE E.5.2 FLOOD CONDITIONS BY ZONE AND CATCHMENT AREA

Zone	Catchment		Flood Condition								
			Flood Area (km^2)			Flood Depth (cm)			Flood Duration (hr)		
	No.	Area (km2)	Built-up Area	Agricultural Land	Total	Built-up Area			Built-up Area		
						Min.	Abe.	Max.	Min.	Abe.	Max.
C-Zone	C.1	31.85	4.809	0	4.809	33.0	37.5	42.0	6.6	7.0	7.3
	C.2	5.14	1.805	0	1.805	27.0	33.5	40.0	2.2	3.0	3.8
	C.3	20.22	4.454	0	4.454	28.0	35.5	43.0	10.6	11.2	11.8
	C.4	41.32	6.186	9.218	15.404	28.0	40.0	52.0	2.0	6.1	10.2
	C.a	4.91	3.727	0	3.727	58.0	68.5	79.0	2.1	4.0	5.9
	C.b	1.29	0.222	0	0.222	33.0	42.5	52.0	2.2	3.1	4.0
	C.c	1.68	0	0	0	-	-	-	-	-	-
	Sub-total	106.41	21.203	9.218	30.421	34.4	43.0	51.6	4.9	6.7	8.5
N-Zone	N.1	19.87	0	2.315	2.315	-	-	-	-	-	-
	N.2	107.57	7.463	21.034	28.497	26.0	26.0	26.0	4.3	4.3	4.3
	N.a	8.75	0	7.707	7.707	-	-	-	-	-	-
	Sub-total	136.19	7.463	31.056	38.519	26.0	26.0	26.0	4.3	4.3	4.3
W-Zone	W.1	72.91	2.739	31.903	34.642	22.0	22.5	23.0	10.9	10.9	10.9
	Sub-total	72.91	2.739	31.903	34.642	22.0	22.5	23.0	10.9	10.9	10.9
S-Zone	S.1	7.99	0	11.285	11.285	-	-	-	-	-	-
	S.2	8.29	0	10.534	10.534	-	-	-	-	-	-
	S.3	48.21	1.460	27.300	28.760	21.0	30.0	39.0	2.6	4.4	6.1
	S.4	2.36	0	0	0	-	-	-	-	-	-
	S.5	2.23	0.068	0.912	0.98	20.0	25.0	30.0	3.0	3.5	4.0
	S.a	3.46	0	0	0	-	-	-	-	-	-
	S.b	3.86	0.278	3.400	3.678	20.0	25.0	30.0	3.0	3.5	4.0
	S.c	5.33	0	5.253	5.253	-	-	-	-	-	-
	Sub-total	81.74	1.806	58.684	60.49	20.8	0.9	1.1	0.2	8.5	9.2
NE-Zone	NE.1	3.32	0	3.262	3.262	-	-	-	-	-	-
	NE.2	9.53	0	6.375	6.375	-	-	-	-	-	-
	NE.3	7.14	0	0	0	-	-	-	-	-	-
	NE.4	2.65	0	0	0	-	-	-	-	-	-
	NE.5	34.38	0	2.798	2.798	-	-	-	-	-	-
	NE.a	3.76	0	3.680	3.680	-	-	-	-	-	-
	NE.b	2.50	0	0.257	0.257	-	-	-	-	-	-
	NE.c	1.62	0	0	0	-	-	-	-	-	-
	Sub-total	64.91	0	16.372	16.372	-	-	-	-	-	-
SE-Zone	SE.1	1.98	0	1.557	1.557	-	-	-	-	-	-
	SE.2	2.60	0.123	0.856	0.979	20.0	35.0	50.0	12.0	12.0	12.0
	SE.3	1.92	0	0	0	-	-	-	-	-	-
	SE.4	7.80	0.223	5.154	5.377	20.0	20.0	20.0	1.0	1.0	1.0
	SE.5	3.83	0	2.810	2.81	-	-	-	-	-	-
	SE.6	5.11	0	3.247	3.247	-	-	-	-	-	-
	SE.7	14.58	0	8.184	8.184	-	-	-	-	-	-
	SE.8	11.33	0	8.896	8.896	-	-	-	-	-	-
	SE.9	21.11	0	15.822	15.822	-	-	-	-	-	-
	SE.10	24.88	0	22.018	22.018	-	-	-	-	-	-
	SE.a	3.67	0.518	0	0.518	27.0	34.5	42.0	2.7	3.1	3.5
	SE.b	5.16	0.542	2.417	2.959	20.0	25.0	30.0	4.0	5.0	6.0
	SE.c	1.82	0	1.236	1.236	-	-	-	-	-	-
	SE.d	1.30	0	0.201	0.201	-	-	-	-	-	-
	SE.e	2.77	0	2.624	2.624	-	-	-	-	-	-
	SE.f	9.53	0	8.416	8.416	-	-	-	-	-	-
	Sub-total	119.36	1.406	83.438	84.844	22.6	28.6	34.6	3.7	4.3	4.8
Total		581.51	34.617	230.671	265.288	30.4	34.9	40.5	4.9	6.5	7.7

Note: Agricultural lands in N, S, NE and SE zones have been suffered from the flood of the Saigon, Dong Nai and Nha Be rivers in high tide season due to the insufficient dyke system. Average flood depth ranges from 0.5 to 0.8 m. Flood duration in S zone is mostly every day in high tide season. However, that in N, NE and SE zones is more than one week. Especially, N zone is inundated during the embankment along the Saigon River will be damaged by erosion.

TABLE E.5.3 PRESENT AND FUTURE VULNERABLE POPULATION BY CATCHMENT AREA

Zone	Catchment	Flood Area (km^2)			Flood Vulnerable Population					
		Built-up Area	Agricultural Land	Total	Built-up Area		Agricultural Land		Total	
					1997	2020	1997	2020	1997	2020
C-Zone	C.1	4.809	0	4.809	195,629	219,281	0	0	195,629	219,281
	C.2	1.805	0	1.805	33,081	46,084	0	0	33,081	46,084
	C.3	4.454	0	4.454	157,552	171,003	0	0	157,552	171,003
	C.4	6.186	9.218	15.404	344,210	315,553	19,723	67,070	363,933	382,623
	C.a	3.727	0	3.727	9,839	18,947	0	0	9,839	18,947
	C.b	0.222	0	0.222	2,880	3,826	0	0	2,880	3,826
	Sub-total	21.203	9.218	30.421	743,191	774,694	19,723	67,070	762,914	841,764
N-Zone	N.1	0	2.315	2.315	0	0	2,728	18,612	2,728	18,612
	N.2	7.463	21.034	28.497	54,758	115,567	69,565	216,250	124,323	331,817
	N.a	0	7.707	7.707	0	0	10,181	58,030	10,181	58,030
	Sub-total	7.463	31.056	38.519	54,758	115,567	82,474	292,892	137,232	408,459
W-Zone	W.1	2.739	31.903	34.642	35,236	44,773	38,989	243,813	74,225	288,586
	Sub-total	2.739	31.903	34.642	35,236	44,773	38,989	243,813	74,225	288,586
S-Zone	S.1	0	11.285	11.285	0	0	9,458	72,952	9,458	72,952
	S.2	0	10.534	10.534	0	0	11,995	46,364	11,995	46,364
	S.3	1.460	27.300	28.760	15,567	39,076	26,754	116,257	42,321	155,333
	S.5	0.068	0.912	0.98	84	348	1,115	4,503	1,199	4,851
	S.b	0.278	3.400	3.678	320	1,909	3,947	21,044	4,267	22,953
	S.c	0	5.253	5.253	0	0	9,717	15,479	9,717	15,479
	Sub-total	1.806	58.684	60.49	15,971	41,333	62,986	276,599	78,957	317,932
NE-Zone	NE.1	0	3.262	3.262	0	0	7,814	30,295	7,814	30,295
	NE.2	0	6.375	6.375	0	0	24,057	81,682	24,057	81,682
	NE.5	0	2.798	2.798	0	0	2,855	6,437	2,855	6,437
	NE.a	0	3.680	3.680	0	0	7,141	29,702	7,141	29,702
	NE.b	0	0.257	0.257	0	0	681	2,560	681	2,560
	Sub-total	0	16.372	16.372	0	0	42,548	150,676	42,548	150,676
SE-Zone	SE.1	0	1.557	1.557	0	0	6,156	35,327	6,156	35,327
	SE.2	0.123	0.856	0.979	590	4,729	2,316	12,596	2,906	17,325
	SE.4	0.223	5.154	5.377	1,106	3,462	8,088	51,565	9,194	55,027
	SE.5	0	2.81	2.81	0	0	2,078	26,296	2,078	26,296
	SE.6	0	3.247	3.247	0	0	2,522	22,091	2,522	22,091
	SE.7	0	8.184	8.184	0	0	14,386	55,571	14,386	55,571
	SE.8	0	8.896	8.896	0	0	8,470	27,788	8,470	27,788
	SE.9	0	15.822	15.822	0	0	11,178	55,350	11,178	55,350
	SE.10	0	22.018	22.018	0	0	10,235	55,681	10,235	55,681
	SE.a	0.518	0	0.518	805	10,452	0	0	805	10,452
	SE.b	0.542	2.417	2.959	4,242	17,154	7,240	59,788	11,482	76,942
	SE.c	0	1.236	1.236	0	0	884	11,526	884	11,526
	SE.d	0	0.201	0.201	0	0	174	657	174	657
	SE.e	0	2.624	2.624	0	0	931	9,471	931	9,471
	SE.f	0	8.416	8.416	0	0	2,150	8,781	2,150	8,781
	Sub-total	1.406	83.438	84.844	6,743	35,797	76,808	432,488	83,551	468,285
Total		34.617	230.671	265.288	855,899	1,012,164	323,528	1,463,538	1,179,427	2,475,702

TABLE E.6.1 CLASSIFIED AREA BY DRAINAGE ZONE

Drainage Zone	Area (km^2)				
	A	B	C	D	Total
Central (C)	75.814	8.32	10.429	5.5224	100.086
Northern (N)	11.338	38.22	34.667	38.305	122.532
Western (W)	-	14.977	19.950	29.919	64.847
Southern (S)	-	11.658	27.737	28.143	67.539
North-Eastern (NE)	-	12.397	23.733	10.903	47.033
South-Eastern (SE)	-	13.573	38.263	48.060	99.895
Total	87.152	99.148	154.780	160.852	501.932

TABLE E.6.2 HYDRAULIC DESIGN OF CANAL IMPROVEMENT FOR ALTERNATIVES I-I AND I-II

Drainage Zone) Name of Canal, nd Their Sectio	Canal Length L (m)	Design Scale Discharge Frequency (Year)	Discharge Qd (m^3/s)	Design Cross Section Width B1 (m)	B2 (m)	B3 (m)	B4 (m)	B5 (m)	Bank Slope	Height H (m)	h (m)	Flow Area A (m^2)	Hydraulic Radius R (m)	Roughness Coefficient n	Canal Bed Slope i (%)	Flow Velocity V (m/s)	Discharge Capacity Qc (m3/s)
Alternative I (5 and 10-year frequency plans)																	
Dai Han Canal																	
N 2 A	970	5	57	30 0	20 0	5 0	18 4	7 2	2	3 2	2 8	35 8	1 82	0 030	0 001000	1 57	56
N 2 B	1,680	5	86	35 0	25 0	5 0	23 4	9 4	2	3 9	3 5	52 4	2 29	0 030	0 000667	1 50	86
N 2 C	4,090	5	111	42 5	32 5	5 0	30 9	14 9	2	4 4	4 0	91 6	2 79	0 030	0 000400	1 32	121
N 2 D1	2,490	5	111	72 5	62 5	5 0	60 9	36 9	2	6 4	6 0	293 4	4 60	0 030	0 000020	0 41	121
Tham Luong - Ben Cat Canal																	
N 2 D2	3,340	5	28	43 0	30 0	6 5	28 4	8 4	2	5 4	5 0	92 0	2 99	0 030	0 000020	0 31	28
N 2 E	1,560	5	120	75 5	62 5	6 5	60 9	36 9	2	6 4	6 0	293 4	4 60	0 030	0 000020	0 41	121
N 2 F	2,250	5	120	75 5	62 5	6 5	60 9	36 9	2	6 4	6 0	293 4	4 60	0 030	0 000020	0 41	121
N 2 G1	4,370	5	120	75 5	62 5	6 5	60 9	36 9	2	6 4	6 0	293 4	4 60	0 030	0 000020	0 41	121
N 2 G2	3,100	5	16	40 0	27 0	6 5	25 4	11 4	2	3 9	3 5	64 4	2 38	0 030	0 000020	0 27	17
N 2 G3	2,490	5	24	46 0	33 0	6 5	31 4	17 4	2	3 9	3 5	85 4	2 58	0 030	0 000020	0 28	24
N 2 H	1,570	5	120	75 5	62 5	6 5	60 9	36 9	2	6 4	6 0	293 4	4 60	0 030	0 000020	0 41	121
N 2 I	2,500	5	120	75 5	62 5	6 5	60 9	36 9	2	6 4	6 0	293 4	4 60	0 030	0 000020	0 41	121
N 2 J	2,610	5	120	75 5	62 5	6 5	60 9	36 9	2	6 4	6 0	293 4	4 60	0 030	0 000020	0 41	121
N 2 E	1,560	10	132	75 5	62 5	6 5	60 9	36 9	2	6 4	6 0	293 4	4 60	0 025	0 000020	0 50	145
N 2 F	2,250	10	132	75 5	62 5	6 5	60 9	36 9	2	6 4	6 0	293 4	4 60	0 025	0 000020	0 50	145
N 2 G1	4,370	10	132	75 5	62 5	6 5	60 9	36 9	2	6 4	6 0	293 4	4 60	0 025	0 000020	0 50	145
N 2 H	1,570	10	132	75 5	62 5	6 5	60 9	36 9	2	6 4	6 0	293 4	4 60	0 025	0 000020	0 50	145
N 2 I	2,500	10	132	75 5	62 5	6 5	60 9	36 9	2	6 4	6 0	293 4	4 60	0 025	0 000020	0 50	145
N 2 J	2,610	10	132	75 5	62 5	6 5	60 9	36 9	2	6 4	6 0	293 4	4 60	0 025	0 000020	0 50	145
Alternative II (5 and 10-year frequency plans)																	
Dai han canal																	
N 2 A	970	5 (daily)	7	19 5	9 5	5 0	7 9	1 1	2	2 1	1 7	7 7	0 88	0 030	0 001000	0 97	7
N 2 B	1,680	5 (daily)	11	21 5	11 5	5 0	9 9	1 9	2	2 4	2 0	11 8	1 09	0 030	0 000667	0 91	11
N 2 C	4,090	5 (daily)	19	25 0	15 0	5 0	13 4	3 4	2	3 4	3 0	22 2	1 50	0 030	0 000400	0 87	19
N 2 D1	2,490	5 (daily)	24	38 5	28 5	5 0	26 9	8 9	2	4 9	4 5	80 6	2 76	0 030	0 000020	0 29	24
Tham Luong - Ben Cat Canal																	
N 2 D2	3,340	5	28	43 0	30 0	6 5	28 4	8 4	2	5 4	5 0	92 0	2 99	0 030	0 000020	0 31	28
N 2 E	1,560	5	99	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 030	0 000020	0 39	99
N 2 F	2,250	5	99	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 030	0 000020	0 39	99
N 2 G1	4,370	5	99	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 030	0 000020	0 39	99
N 2 G2	3,100	5	16	40 0	27 0	6 5	25 4	11 4	2	3 9	3 5	64 4	2 38	0 030	0 000020	0 27	17
N 2 G3	2,490	5	24	46 0	33 0	6 5	31 4	17 4	2	3 9	3 5	85 4	2 58	0 030	0 000020	0 28	24
N 2 H	1,570	5	99	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 030	0 000020	0 39	99
N 2 I	2,500	5	99	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 030	0 000020	0 39	99
N 2 J	2,610	5	99	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 030	0 000020	0 39	99
N 2 E	1,560	10	108	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 025	0 000020	0 47	118
N 2 E	2,250	10	108	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 025	0 000020	0 47	118
N 2 G1	4,370	10	108	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 025	0 000020	0 47	118
N 2 H	1,570	10	108	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 025	0 000020	0 47	118
N 2 I	2,500	10	108	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 025	0 000020	0 47	118
N 2 J	2,610	10	108	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 025	0 000020	0 47	118

TABLE E.6.3 BILL OF QUANTITIES OF ALTERNATIVES 1-I AND 1-II

Item	Canal Length		Excavation Amount			Maintenance Road				Filling Amount			Pavement			Bank Protection						Existing Canal		Land Acquisition	
				Volume		Top	Side	Height	Bottom		Volume		Width	Area		Grass (Sod)		Stone Masonry		Concrete Slope		Slope Reformation			
(Drainage Zone)	Discrete	Accum.	Discrete	Discrete	Total	Width	Slope		Width	Discrete	Discrete	Total		Discrete	Total	Discrete	Total	Discrete	Total	Discrete	Total	Discrete	Total	Discrete	Total
Name of Canal	Length	Length	Area							Area															
Canal Section	(m)	(m)	(m2)	(m3)	(m3)	(m)	(h : v)	(m)	(m)	(m2)	(m3)	(m3)	(m)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)
Alternative I (5 and 10-year frequency plans)																									
Kach Dai Han Canal																									
N. 2. A (Dai Han)	970	23,120	36	34,538	1,321,498	5	1	0.31	5.92	3.33	3,229	9,350	4	7,760	73,840	15,183	144,472	-	-	-	-	-	-	26,782	396,585
N. 2. B (Dai Han)	1,680	21,440	58	96,841		5	1	0.26	5.79	2.84	4,767		4	13,440		26,296								52,964	
N. 2. C (Dai Han)	4,090	17,350	104	425,540		5	1	-0.12	5.00	Existing	Existing		4	32,720		64,019								155,256	
N. 2. D1 (Dai Han)	2,490	14,860	307	764,580		5	1	0.05	5.16	0.54	1,354		4	19,920		38,975								161,583	
Tham Luong - Ben Cat Canal																									
N. 2. D2 (May 19)	3,340	0	125	416,579	2,706,415	5	1	-0.95	5.00	Existing	Existing	318,157	4	26,720	190,320	52,279	372,372	-	-	-	-	-	87,497	119,254	753,808
N. 2. E (Tham Luong)	1,560	13,300	280	436,852		5	1	0.36	6.09	4.03	6,294		4	12,480		24,418								90,166	
(5) N. 2. F (Tham Luong)	2,250	11,050	220	495,893		5	1	1.36	9.09	19.19	43,177		4	18,000		35,218								122,968	
N. 2. G1 (Tham Luong)	4,370	6,680	204	889,333		5	1	1.34	9.01	18.72	81,807		4	34,960		68,401								211,856	
N. 2. G2 (R. Ben Cat)	3,100	2,490	-45	Existing		5	1	1.03	8.10	13.55	42,017		4	24,800		48,523						48,523		50,240	
N. 2. G3 (R. Ben Cat)	2,490	0	-49	Existing		5	1	0.70	7.09	8.40	20,920		4	19,920		38,975						38,975		35,286	
N. 2. H (Ben Cat)	1,570	5,110	147	231,039		5	1	1.19	8.56	16.07	25,229		4	12,560		24,574								30,962	
N. 2. I (Ben Cat)	2,500	2,610	70	175,425		5	1	1.40	9.21	19.97	49,916		4	20,000		39,131								46,071	
N. 2. J (Ben Cat)	2,610	0	23	61,296		5	1	1.33	9.00	18.70	48,798		4	20,880		40,853								47,006	
N. 2. E (Tham Luong)	1,560	13,300		-	-						-	-		-	-	-	-	44,650	425,318	-	-		-		-
N. 2. E (Tham Luong)	2,250	11,050		-							-			-		-		64,399							
(10) N. 2. G1 (Tham Luong)	4,370	6,680		-							-			-		-		125,077							
N. 2. H (Ben Cat)	1,570	5,110		-							-			-		-		44,936							
N. 2. I (Ben Cat)	2,500	2,610		-							-			-		-		71,554							
N. 2. J (Ben Cat)	2,610	0		-							-			-		-		74,703							
Total					4,027,913							327,508			264,160		516,845		425,318		-		87,497		1,150,393
Alternative II (5 and 10-year frequency plans)																-									
Kach Dai Han Canal																									
N. 2. A (Dai Han)	970	23,120	6	6,226	333,435	5	1	0.31	5.92	3.33	3,229	9,350	4	7,760	73,840		102,993	-	-	-	-	-	-	16,597	207,485
N. 2. B (Dai Han)	1,680	21,440	10	17,126		5	1	0.26	5.79	2.84	4,767		4	13,440										30,284	
N. 2. C (Dai Han)	4,090	17,350	26	104,833		5	1	-0.12	5.00	Existing	Existing		4	32,720		64,019								83,681	
N. 2. D1 (Dai Han)	2,490	14,860	82	205,251		5	1	0.05	5.16	0.54	1,354		4	19,920		38,975								76,923	
Tham Luong - Ben Cat Canal																									
N. 2. D2 (May 19)	3,340	0	125	416,579	2,183,263	5	1	-0.95	5.00	Existing	Existing	318,157	4	26,720	190,320	52,279	347,955	-	-	-	-	-	128,350	119,254	716,993
N. 2. E (Tham Luong)	1,560	13,300	239	372,744		5	1	0.36	6.09	4.03	6,294		4	12,480										83,926	
(5) N. 2. F (Tham Luong)	2,250	11,050	183	412,415		5	1	1.36	9.09	19.19	43,177		4	18,000		35,218								113,968	
N. 2. G1 (Tham Luong)	4,370	6,680	166	726,748		5	1	1.34	9.01	18.72	81,807		4	34,960		68,401								194,376	
N. 2. G2 (R. Ben Cat)	3,100	2,490	-45	Existing		5	1	1.03	8.10	13.55	42,017		4	24,800		48,523						48,523		50,240	
N. 2. G3 (R. Ben Cat)	2,490	0	-49	Existing		5	1	0.70	7.09	8.40	20,920		4	19,920		38,975						38,975		35,286	
N. 2. H (Ben Cat)	1,570	5,110	109	171,680		5	1	1.19	8.56	16.07	25,229		4	12,560		24,574								26,866	
N. 2. I (Ben Cat)	2,500	2,610	33	83,097		5	1	1.40	9.21	19.97	49,916		4	20,000		39,131								46,071	
N. 2. J (Ben Cat)	2,610	0	+14	Existing		5	1	1.33	9.00	18.70	48,798		4	20,880		40,853								47,006	
N. 2. E (Tham Luong)	1,560	10,690			-							-			-		-		291,561		-		-		-
N. 2. E (Tham Luong)	2,250	8,440																115,305							
(10) N. 2. G1 (Tham Luong)	4,370	4,070																41,425							
N. 2. H (Ben Cat)	1,570	2,500																65,964							
N. 2. I (Ben Cat)	2,500	0																68,866							
N. 2. J (Ben Cat)	2,610	0																							
Total					2,516,698							327,508			264,160		450,948		291,561		-		128,350		924,478

TABLE E.6.4 COST COMPARISON OF ALTERNATIVES I-I AND I-II

Item	Alternative I-I			Alternative I-II			Remarks
	Quantity	Unit	Cost (Billion D	Quantity	Unit	Cost (Billion D)	
I. Construction							
1. Excavation	4.028	$x10^6 m^3$	326.3	2.517	$x10^6 m^3$	203.9	
2. O/M Road							
(1) Filling	0.328	$x10^6 m^3$	86.6	0.328	$x10^6 m^3$	86.6	
(2) Pavement	0.264	$x10^6 m^2$	47.5	0.264	$x10^6 m^2$	47.5	
Sub-total			134.1			134.1	
3. Bank protection							
(1) Grass/Sod	0.516	$x10^6 m^2$	37.2	0.451	$x10^6 m^2$	32.5	
(2) Stone Masonry	0.425	$x10^6 m^2$	229.5	0.291	$x10^6 m^2$	157.1	
Sub-total			266.7			189.6	
4. Slope Reformation	0.087	$x10^6 m^2$	4.7	0.128	$x10^6 m^2$	6.9	
Total			731.7			534.5	
II. Land Acquisition	1.15	$x10^6 m^2$	22.2	0.946	$x10^6 m^2$	18.3	
Grand Total			753.9			552.8	

TABLE E.6.5 HYDRAULIC DESIGN OF CANAL IMPROVEMENT FOR ALTERNATIVES 2-I AND 2-II

Drainage Zone) Name of Canal od Their Sectio	Canal Length L (m)	Design Scale Discharge Frequency (Year)	Discharge Qd (m^3/s)	Design Cross Section Width B1 (m)	B2 (m)	B3 (m)	B4 (m)	B5 (m)	Bank Slope	Height H (m)	S (m)	Flow Area A (m^2)	Hydraulic Radius R (m)	Roughness Coefficient n	Canal Bed Slope i (‰)	Flow Velocity V (m/s)	Discharge Capacity Qc (m3/s)
Alternative I (5 and 10-year frequency plans)																	
N 2 Tham Luong - Ben Cat																	
N 2 A	970	5 (daily)	69	19 5	9 5	5 0	7 9	11	2	2 1	1 7	7 7	0 88	0 030	0 001000	0 97	7
N 2 B	1,680	5 (daily)	78	28 5	11 5	5 0	9 9	19	2	2 4	2 0	11 8	1 09	0 030	0 000667	0 91	11
N 2 C	4,090	5 (daily)	78	25 0	15 0	5 0	13 4	14	2	3 4	3 0	22 2	1 50	0 030	0 000400	0 87	19
N 2 D1	2,490	5 (daily)	78	38 5	28 5	5 0	26 9	8 9	2	4 9	4 5	80 6	2 78	0 030	0 000020	0 29	24
N 2 D2	3,340	5	28	43 0	30 0	6 5	28 4	8 4	2	5 4	5 0	92 0	2 99	0 030	0 000020	0 31	28
N 2 E	1,560	5	99	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 030	0 000020	0 39	99
N 2 F	2,250	5	99	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 030	0 000020	0 39	99
N 2 G1	4,370	5	99	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 030	0 000020	0 39	99
N 2 G2	3,100	5	16	40 0	27 0	6 5	25 4	11 4	2	3 9	3 5	64 4	2 38	0 030	0 000020	0 27	17
N 2 G3	2,490	5	24	46 0	33 0	6 5	31 4	17 4	2	3 9	3 5	85 4	2 58	0 030	0 000020	0 28	24
N 2 H	1,570	5	99	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 030	0 000020	0 39	99
N 2 I	2,500	5	99	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 030	0 000020	0 39	99
N 2 J	2,610	5	99	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 030	0 000020	0 39	99
N 2 E	1,560	10	108	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 025	0 000020	0 47	118
N 2 E	2,250	10	108	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 025	0 000020	0 47	118
N 2 G1	4,370	10	108	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 025	0 000020	0 47	118
N 2 H	1,570	10	108	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 025	0 000020	0 47	118
N 2 I	2,500	10	108	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 025	0 000020	0 47	118
N 2 J	2,610	10	108	71 5	58 5	6 5	56 9	34 9	2	5 9	5 5	252 5	4 24	0 025	0 000020	0 47	118
W. I K Cua - K Nuoc Len																	
W. I A	2,600	5	65	35 0	25 0	5 0	23 4	8 2	2	4 2	3 8	60 0	2 38	0 030	0 000333	1 09	65
W. I B'	1,700	5	65	61 0	48 0	6 5	46 4	24 4	2	5 9	5 5	194 7	3 97	0 030	0 000016	0 33	65
W. I B	350	5 (daily)	12	34 0	24 0	5 0	22 4	0 4	2	5 9	5 5	62 7	2 51	0 030	0 000016	0 25	15
W. I C1'	3,110	5 (daily)	14	34 0	24 0	5 0	22 4	0 4	2	5 9	5 5	62 7	2 51	0 030	0 000016	0 25	15
W. I C1	1,000	5	65	61 0	48 0	6 5	46 4	24 4	2	5 9	5 5	194 7	3 97	0 030	0 000016	0 33	65
W. I C2	2,200	5	33	50 0	37 0	6 5	35 4	17 4	2	4 9	4 5	118 8	3 17	0 030	0 000016	0 29	34
W. I D1	4,490	5	65	61 0	48 0	6 5	46 4	24 4	2	5 9	5 5	194 7	3 97	0 030	0 000016	0 33	65
W. I D2	2,070	5	21	43 0	30 0	6 5	28 4	12 4	2	4 4	4 0	81 6	2 69	0 030	0 000016	0 26	21
W. I E1	2,720	5	65	61 0	48 0	6 5	46 4	24 4	2	5 9	5 5	194 7	3 97	0 030	0 000016	0 33	65
W. I E2	4,900	5	32				Existing Cross Section					74 40	2 51	0 030	0 000016	0 25	18
W. I E3	1,360	5	14				Existing Cross Section					467 36	4 97	0 030	0 000016	0 39	181
W. I F	1,180	5	65				Existing Cross Section					578 45	5 34	0 030	0 000016	0 41	235
W. I G	1,850	5	65				Existing Cross Section					598 45	4 16	0 030	0 000016	0 34	206
W. I H	1,760	5	65				Existing Cross Section					544 72	5 02	0 030	0 000016	0 39	212
W. I B'	1,700	10	72	61 0	48 0	6 5	46 4	24 4	2	5 9	5 5	194 7	3 97	0 025	0 000016	0 40	78
W. I C1	1,000	10	72	61 0	48 0	6 5	46 4	24 4	2	5 9	5 5	194 7	3 97	0 025	0 000016	0 40	78
W. I D1	4,490	10	72	61 0	48 0	6 5	46 4	24 4	2	5 9	5 5	194 7	3 97	0 025	0 000016	0 40	78
W. I E1	2,720	10	72	61 0	48 0	6 5	46 4	24 4	2	5 9	5 5	194 7	3 97	0 025	0 000016	0 40	78
W. I F	1,180	10	72				Existing Cross Section					578 45	5 34	0 030	0 000016	0 41	235
W. I G	1,850	10	72				Existing Cross Section					598 45	4 16	0 030	0 000016	0 34	206
W. I H	1,760	10	72				Existing Cross Section					544 72	5 02	0 030	0 000016	0 39	212
Alternative II (5 and 10-year frequency plans)																	
N 2 Tham Luong - Ben Cat																	
N 2 E	1,560	5	90	68 0	55 0	6 5	53 4	31 4	2	5 9	5 5	233 2	4 16	0 030	0 000020	0 39	90
N 2 F	2,250	5	90	68 0	55 0	6 5	53 4	31 4	2	5 9	5 5	233 2	4 16	0 030	0 000020	0 39	90
N 2 G1	4,370	5	90	68 0	55 0	6 5	53 4	31 4	2	5 9	5 5	233 2	4 16	0 030	0 000020	0 39	90
N 2 G2	3,100	5	16	40 0	27 0	6 5	25 4	11 4	2	3 9	3 5	64 4	2 38	0 030	0 000020	0 27	17
N 2 G3	2,490	5	24	46 0	33 0	6 5	31 4	17 4	2	3 9	3 5	85 4	2 58	0 030	0 000020	0 28	24
N 2 H	1,570	5	90	68 0	55 0	6 5	53 4	31 4	2	5 9	5 5	233 2	4 16	0 030	0 000020	0 39	90
N 2 I	2,500	5	90	68 0	55 0	6 5	53 4	31 4	2	5 9	5 5	233 2	4 16	0 030	0 000020	0 39	90
N 2 J	2,610	5	90	68 0	55 0	6 5	53 4	31 4	2	5 9	5 5	233 2	4 16	0 030	0 000020	0 39	90
N 2 E	1,560	10	100	68 0	55 0	6 5	53 4	31 4	2	5 9	5 5	233 2	4 16	0 025	0 000020	0 46	108
N 2 E	2,250	10	100	68 0	55 0	6 5	53 4	31 4	2	5 9	5 5	233 2	4 16	0 025	0 000020	0 46	108
N 2 G1	4,370	10	100	68 0	55 0	6 5	53 4	31 4	2	5 9	5 5	233 2	4 16	0 025	0 000020	0 46	108
N 2 H	1,570	10	100	68 0	55 0	6 5	53 4	31 4	2	5 9	5 5	233 2	4 16	0 025	0 000020	0 46	108
N 2 I	2,500	10	100	68 0	55 0	6 5	53 4	31 4	2	5 9	5 5	233 2	4 16	0 025	0 000020	0 46	108
N 2 J	2,610	10	100	68 0	55 0	6 5	53 4	31 4	2	5 9	5 5	233 2	4 16	0 025	0 000020	0 46	108
W. I K Cua - K Nuoc Len																	
N 2 A	970	5	69	19 5	9 5	5 0	7 9	11	2	2 1	1 7	7 7	0 88	0 030	0 001000	0 97	7
N 2 B	1,680	5	78	21 5	11 5	5 0	9 9	19	2	2 4	2 0	11 8	1 09	0 030	0 000667	0 91	11
N 2 C	4,090	5	78	25 0	15 0	5 0	13 4	14	2	3 4	3 0	22 2	1 50	0 030	0 000400	0 87	19
N 2 D1	2,490	5	78	38 5	28 5	5 0	26 9	8 9	2	4 9	4 5	80 6	2 78	0 030	0 000020	0 29	24
N 2 D2	3,340	5	78	75 0	62 0	6 5	60 4	38 4	2	5 9	5 5	271 7	4 31	0 030	0 000031	0 29	79
W. I A	2,600	5	65	35 0	25 0	5 0	23 4	8 2	2	4 2	3 8	60 0	2 38	0 030	0 000333	1 09	65
W. I B'	1,700	5	78	75 0	62 0	6 5	60 4	38 4	2	5 9	5 5	271 7	4 31	0 030	0 000031	0 29	79
W. I B	350	5 (daily)	12	34 0	24 0	5 0	22 4	0 4	2	5 9	5 5	62 7	2 51	0 030	0 000031	0 20	13
W. I C1'	3,110	5 (daily)	14	34 0	24 0	5 0	22 4	0 4	2	5 9	5 5	62 7	2 51	0 030	0 000031	0 20	13
W. I C1	1,000	5	78	75 0	62 0	6 5	60 4	38 4	2	5 9	5 5	271 7	4 31	0 030	0 000031	0 29	79
W. I C2	2,200	5	33	50 0	37 0	6 5	35 4	17 4	2	4 9	4 5	118 8	3 17	0 030	0 000016	0 29	34
W. I D1	4,490	5	78	75 0	62 0	6 5	60 4	38 4	2	5 9	5 5	271 7	4 31	0 030	0 000031	0 29	79
W. I D2	2,070	5	21	43 0	30 0	6 5	28 4	12 4	2	4 4	4 0	81 6	2 69	0 030	0 000016	0 26	21
W. I E1	2,720	5	78	75 0	62 0	6 5	60 4	38 4	2	5 9	5 5	271 7	4 31	0 030	0 000031	0 29	79
W. I E2	4,900	5	12				Existing Cross Section					74 40	2 51	0 030	0 000016	0 25	18
W. I E3	1,360	5	14				Existing Cross Section					467 36	4 97	0 030	0 000016	0 39	181
W. I F	1,180	5	78				Existing Cross Section					578 45	5 34	0 030	0 000031	0 33	193
W. I G	1,850	5	78				Existing Cross Section					598 45	4 16	0 030	0 000031	0 28	169
W. I H	1,760	5	78				Existing Cross Section					544 72	5 02	0 030	0 000031	0 32	175
N 2 D2	3,340	10	87	43 0	30 0	6 5	28 4	8 4	2	5 4	5 0	92 0	2 99	0 030	0 000031	0 23	21
W. I B'	1,700	10	87	61 0	48 0	6 5	46 4	24 4	2	5 9	5 5	194 7	3 97	0 025	0 000031	0 33	64
W. I C1	1,000	10	87	61 0	48 0	6 5	46 4	24 4	2	5 9	5 5	194 7	3 97	0 025	0 000031	0 33	64
W. I D1	4,490	10	87	61 0	48 0	6 5	46 4	24 4	2	5 9	5 5	194 7	3 97	0 025	0 000031	0 33	64
W. I E1	2,720	10	87	61 0	48 0	6 5	46 4	24 4	2	5 9	5 5	194 7	3 97	0 025	0 000031	0 33	64
W. I F	1,180	10	87				Existing Cross Section					578 45	5 34	0 030	0 000031	0 33	193
W. I G	1,850	10	87				Existing Cross Section					598 45	4 16	0 030	0 000031	0 28	169
W. I H	1,760	10	87				Existing Cross Section					544 72	5 02	0 030	0 000031	0 32	175

TABLE E.6.6 (1/2) BILL OF QUANTITIES OF ALTERNATIVES 2-I AND 2-II

Item	Canal Length		Excavation Amount			Maintenance Road				Filling Amount				Pavement		Bank Protection						Existing Canal		Land Acquisition	
(Drainage Zone)	Discrete	Accum.	Discrete	Volume		Top	Side	Height	Bottom	Discrete	Volume		Width	Area		Grass (Sod)		Stone Masonry		Concrete Slope		Slope Reformation			
Name of Canal	Length	Length	Area	Discrete	Total	Width	Slope		Width	Area	Discrete	Total		Discrete	Total	Discrete	Total	Discrete	Total	Discrete	Total	Discrete	Total	Discrete	Total
Canal Section	(m)	(m)	(m2)	(m3)	(m3)	(m)	(h : v)	(m)	(m)	(m2)	(m3)	(m3)	(m)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)
Alternative I (5 and 10-year frequency plans)																									
N. 2: Tham Luong - Ben Cat																									
N. 2. A (Dai Han)	970	23,120	6	6,226	2,516,698	5	1	0.31	5.92	3.33	3,229	327,508	4	7,760	266,160	15,183	516,845		-		-		128,350	16,597	924,478
N. 2. B (Dai Han)	1,680	21,440	10	17,126		5	1	0.26	5.79	2.84	4,767		4	13,440		26,296								30,296	
N. 2. C (Dai Han)	4,090	17,350	26	104,833		5	1	-0.12	5.00	Existing	Existing		4	32,720		64,019								83,681	
N. 2. D1 (Dai Han)	2,490	14,860	82	205,251		5	1	0.05	5.16	0.54	1,354		4	19,920		38,975								76,923	
N. 2. D2 (May 19)	3,340	0	125	416,579		5	1	-0.95	5.00	Existing	Existing		4	26,720		52,279								119,254	
N. 2. E (Tham Luong)	1,560	13,300	239	372,744		5	1	0.36	6.09	4.03	6,294		4	12,480		24,418								83,926	
(5) N. 2. E (Tham Luong)	2,250	11,050	183	412,415		5	1	1.36	9.09	19.19	43,177		4	18,000		35,218								113,968	
N. 2. G1 (Tham Luong)	4,370	6,680	166	726,748		5	1	1.34	9.01	18.72	81,807		4	34,960		68,401								196,376	
N. 2. G2 (R. Ben Cat)	3,100	2,490	-45	Existing		5	1	1.03	8.10	13.55	42,017		4	24,800		48,523						48,523		50,240	
N. 2. G3 (R. Ben Cat)	2,490	0	-49	Existing		5	1	0.70	7.09	8.40	20,920		4	19,920		38,975						38,975		35,286	
N. 2. H (Ben Cat)	1,570	5,110	109	171,680		5	1	1.19	8.56	16.07	25,229		4	12,560		24,574								26,866	
N. 2. I (Ben Cat)	2,500	2,610	33	83,097		5	1	1.40	9.21	19.97	49,916		4	20,000		39,131								46,071	
N. 2. J (Ben Cat)	2,610	0	+14	Existing		5	1	1.33	9.00	18.70	48,798		4	20,880		40,853						40,853		47,006	
N. 2. E (Tham Luong)	1,560	13,300																41,162	392,090		-				
N. 2. E (Tham Luong)	2,250	11,050																59,368							
(10) N. 2. G1 (Tham Luong)	4,370	6,680																115,305							
N. 2. H (Ben Cat)	1,570	5,110																41,425							
N. 2. I (Ben Cat)	2,500	2,610																65,964							
N. 2. J (Ben Cat)	2,610	0																68,866							
W. 1: R. Cua - R. Nuoc Len																									
W. 1. A	2,600	0	53	136,552	1,638,819	5	1	0.21	5.63	2.25	5,850	404,306	4	20,800	250,320	40,696	394,156		-		-		77,350	66,100	808,069
W. 1. B' (Cua)	1,700	11,670	180	305,841		5	1	-0.01	5.00	Existing	Existing		4	13,600		26,609								71,615	
W. 1. B (Cua)	350	11,320	27	9,610		5	1	1.11	8.33	14.77	5,170		4	2,800		5,478								8,152	
W. 1. C1' (Cua)	3,110	8,210	41	127,739		5	1	0.89	7.67	11.29	35,119		4	24,880		48,679								74,462	
W. 1. C1 (Cua)	1,000	7,210	147	146,826		5	1	0.91	7.74	11.61	11,611		4	8,000		15,652								42,492	
W. 1. C2	2,200	0	78	171,218		5	1	1.20	8.59	16.28	35,826		4	17,600		34,435								82,271	
(5) W. 1. D1 (Nuoc Len)	4,490	2,720	100	451,058		5	1	1.79	10.36	27.46	123,298		4	35,920		70,280								196,699	
W. 1. D2	2,070	0	48	99,453		5	1	1.13	8.38	15.06	31,169		4	16,560		32,401								62,620	
W. 1. E1 (Nuoc Len)	2,720	0	70	190,523		5	1	1.32	8.97	18.49	50,290		4	21,760		42,575								73,840	
W. 1. E2	4,900	0	+3	Existing		5	1	1.19	6.19	13.27	65,017		4	39,200		34,300						34,300		60,624	
W. 1. E3 (Ben Luc)	1,360	1,180	-20	Existing		5	1	0.50	5.50	5.22	7,093		4	10,880		9,520						9,520		14,951	
W. 1. F (Ben Luc)	1,180	0	0	Existing		5	1	0.56	5.56	5.90	6,967		4	9,440		8,260						8,260		13,120	
W. 1. G (Can Guioc)	1,850	1,760	-6	Existing		5	1	0.80	5.80	8.64	15,979		4	14,800		12,950						12,950		21,459	
W. 1. H (Can Guioc)	1,760	0	-18.4	Existing		5	1	0.59	5.59	6.20	10,917		4	14,080		12,320						12,320		19,663	
W. 1. B' (Cua)	1,700	13,000																44,856	261,481		-				
W. 1. C1 (Cua)	1,000	12,000																26,386							
W. 1. D1 (Nuoc Len)	4,490	7,510																118,471							
(10) W. 1. E1 (10-year)	2,720	4,790																71,769							
W. 1. F (Ben Luc)	1,180	3,610																							
W. 1. G (Can Guioc)	1,850	1,760																							
W. 1. H (Can Guioc)	1,760	0																							
Total					4,155,518							731,814			514,480		911,001		653,571		-		205,700		1,732,546

TABLE E.6.6 (2/2) BILL OF QUANTITIES OF ALTERNATIVES 2-I AND 2-II

Item	Canal Length		Excavation Amount			Maintenance Road				Filling Amount			Pavement			Bank Protection						Existing Canal Slope Reformation		Land Acquisition	
				Volume		Top	Side	Height	Bottom		Volume		Width	Area		Grass (Sod)		Stone Masonry		Concrete Slope					
(Drainage Zone)	Discrete	Accum.	Discrete	Discrete	Total	Width	Slope		Width	Discrete	Discrete	Total		Discrete	Total	Discrete	Total	Discrete	Total	Discrete	Total	Discrete	Total	Discrete	Total
Name of Canal	Length	Length	Area							Area															
Canal Section	(m)	(m)	(m2)	(m3)	(m3)	(m)	(h : v)	(m)	(m)	(m2)	(m3)	(m3)	(m)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)
Alternative II (5 and 10-year frequency plans)																									
N. 2: Tham Luong - Ben Cat																									
N. 2. E	1,560	13,300	220	342,516	2,760,138	5	1	0.36	6.09	4.03	6,294	191,608	4	12,480	163,600	24,418	320,093						128,350	78,466	779,905
N. 2. F	2,250	11,050	167	376,681		5	1	1.36	9.09	19.19	43,177		4	18,000		35,218								106,093	
N. 2. G1 (5-year)	4,370	6,680	265	1,156,140		5	1	-0.35	5.00	Existing	Existing		4	34,960		68,401								253,682	
(5) N. 2. G2	3,100	2,490	-60	Existing		5	1	0.75	7.25	9.20	28,529		4	24,800		48,523						48,523		44,970	
N. 2. G3	2,490	0	-39	Existing		5	1	1.23	8.68	16.77	41,755		4	19,920		38,975						38,975		43,216	
N. 2. H	1,570	5,110	247	387,180		5	1	0.02	5.06	0.20	309		4	12,560		24,574								88,766	
N. 2. I	2,500	2,610	109	497,621		5	1	0.74	7.23	9.10	22,747		4	20,000		39,131								117,705	
N. 2. J	2,610	0	-30	Existing		5	1	1.33	9.00	18.70	48,798		4	20,880		40,853						40,853		47,006	
N. 2. E	1,560	13,300																41,162	392,090		-				
N. 2. F	2,250	11,050																59,368							
(10) N. 2. G1 (10-year)	4,370	6,680																115,305							
N. 2. H	1,570	5,110																41,425							
N. 2. I	2,500	2,610																65,964							
N. 2. J	2,610	0																68,866							
W. 1: R. Cua - R. Nuoc Len																									
N. 2. A (Dai Han)	970	10,860	6	6,226	3,695,930	5	1	0.31	5.92	3.33	3,229	585,701	4	7,760	350,880	15,183	590,908		-		-		77,350	16,597	1,426,590
N. 2. B (Dai Han)	1,680	9,180	10	17,126		5	1	3.76	16.29	80.11	134,586		4	13,440		26,296								65,564	
N. 2. C (Dai Han)	4,090	5,090	26	104,833		5	1	-0.12	5.00	Existing	Existing		4	32,720		64,019								83,681	
N. 2. D1 (Dai Han)	2,490	2,600	82	205,251		5	1	1.05	8.16	13.87	34,524		4	19,920		38,975								91,863	
N. 2. D2 (May 19)	3,340	0	351	1,171,378		5	1	-1.00	5.00	Existing	Existing		4	26,720		52,279								226,767	
W. 1. A	2,600	0	55	142,436		5	1	0.12	5.36	1.23	3,193		4	20,800		40,696								65,617	
W. 1. B' (Cua)	1,700	11,670	214	363,307		5	1	1.04	8.11	13.58	23,089		4	13,600		26,609								105,950	
W. 1. B (Cua)	350	11,320	42	14,778		5	1	0.84	7.51	10.44	3,655		4	2,800		5,478								8,341	
(5) W. 1. C1' (Cua)	3,110	8,210	28	86,970		5	1	0.87	7.61	10.97	34,111		4	24,880		48,679								57,248	
W. 1. C1 (Cua)	1,000	7,210	215	214,995		5	1	1.12	8.37	15.04	15,037		4	8,000		15,652								62,249	
W. 1. C2	2,200	0	80	175,589		5	1	1.14	8.41	15.24	33,527		4	17,600		34,435								82,001	
W. 1. D1 (Nuoc Len)	4,490	2,720	161	721,893		5	1	1.74	10.21	26.43	118,684		4	35,920		70,280								259,111	
W. 1. D2	2,070	0	49	101,489		5	1	1.09	8.26	14.42	29,845		4	16,560		32,401								62,461	
W. 1. E1 (Nuoc Len)	2,720	0	136	369,660		5	1	1.29	8.88	17.93	48,762		4	21,760		42,575								111,768	
W. 1. E2	4,900	0	-3	Existing		5	1	1.16	6.16	12.97	63,533		4	39,200		76,672						34,300		60,384	
W. 1. E3 (Ben Luc)	1,360	1,180	-20	Existing		5	1	0.47	5.47	4.95	6,727		4	10,880		9,520						9,520		14,885	
W. 1. F (Ben Luc)	1,180	0	0	Existing		5	1	0.54	5.54	5.67	6,686		4	9,440		8,260						8,260		13,069	
W. 1. G (Can Guioc)	1,850	1,760	-6	Existing		5	1	0.79	5.79	8.48	15,684		4	14,800		12,950						12,950		21,408	
W. 1. H (Can Guioc)	1,760	0	-18.4	Existing		5	1	0.58	5.58	6.15	10,829		4	14,080		12,320						12,320		19,647	
W. 1. D2	3,340	0																	261,481		-				
W. 1. B' (Cua)	1,700	13,000																44855.52							
W. 1. C1 (Cua)	1,000	12,000																26385.6							
(10) W. 1. D1 (Nuoc Len)	4,490	7,510																118471.4							
W. 1. E1 (Nuoc Len)	2,720	4,790																71768.84							
W. 1. F (Ben Luc)	1,180	3,610																							
W. 1. G (Can Guioc)	1,850	1,760																							
W. 1. H (Can Guioc)	1,760	0																							
Total					6,456,062							777,309			514,480		911,001		653,571		-		205,700		2,206,495

TABLE E.6.7 COST COMPARISON OF ALTERNATIVES 2-I AND 2-II

Item	Alternative 2-I			Alternative 2-II			Remarks
	Quantity	Unit	Cost (Billion D)	Quantity	Unit	Cost (Billion D)	
I. Construction							
1. Excavation	4.156	$x10^6 m^3$	336.6	6.456	$x10^6 m^3$	522.9	
2. O/M Road							
(1) Filling	0.732	$x10^6 m^3$	193.2	0.777	$x10^6 m^3$	205.1	
(2) Pavement	0.514	$x10^6 m^2$	92.5	0.514	$x10^6 m^2$	92.5	
Sub-total			285.8			297.6	
3. Bank protection							
(1) Grass/Sod	0.911	$x10^6 m^2$	65.6	0.911	$x10^6 m^2$	65.6	
(2) Stone Masonry	0.654	$x10^6 m^2$	353.2	0.654	$x10^6 m^2$	353.2	
Sub-total			418.8			418.8	
4. Slope Reformation	0.206	$x10^6 m^2$	11.1	0.206	$x10^6 m^2$	11.1	
Total			1,052.3			1,250.5	
II. Land Acquisition	1.732	$x10^6 m^2$	33.4	2.206	$x10^6 m^2$	42.6	
Grand Total			1,085.7			1,293.0	

TABLE E.6.8 BILL OF QUANTITIES FOR CONSTRUCTION WORKS OF ALTERNATIVE 3-I AND 3-II

Newly Developed Area (A)	Existing Ground Elevation (El)	Alternative 3-I				Alternative 3 - II												
		Land Filling				Land Filling		Dike Construction						Bank Protection	Construction of Pumping Station		Construction of Retarding Pond	
		Required Hight (H1)	Additional Hight (H2)	Total Hight (H3)	Total Volume (V1)	Total Hight (H3)	Total Volume (V1)	Top Width of Dike (B1)	Bottom Width of Dike (B2)	Hight of Dike (H4)	Cross Section of Dike (A1)	Length of Dike (L1)	Total Volume of Dike (V2)	Protection Area (A2)	Specific Capacity (Qs)	Required Capacity (Q)	Specific Volume (Vs)	Required Area (A3)
(km2)	(EL. m)	(m)	(m)	(m)	($x10^3$ m3)	(m)	($x10^3$ m3	(m)	(m)	(m)	(m2)	L (km)	($x10^3$ m3)	($x10^3$ m2)	(m3/km2)	(m3/s)	(m3/km2)	($x10^3$ m2)
1.0	0.6	1.4	0.35	1.75	1.750	0.4	400	5.0	18.44	2.2	26.3	4.0	105	33.6	2.1	2.1	69.000	34.5
3.0	0.6	1.4	0.35	1.75	5.250	0.4	1.200	5.0	18.44	2.2	26.3	6.9	182	58.2	2.1	6.3	69.000	103.5
6.0	0.6	1.4	0.35	1.75	10.500	0.4	2.400	5.0	18.44	2.2	26.3	9.8	257	82.3	2.1	12.6	69.000	207.0
10.0	0.6	1.4	0.35	1.75	17.500	0.4	4.000	5.0	18.44	2.2	26.3	12.7	332	106.3	2.1	21.0	69.000	345.0
1.0	0.9	1.1	0.275	1.38	1.375	0.4	400	5.0	15.92	1.8	19.0	4.0	76	26.4	2.1	2.1	69.000	34.5
3.0	0.9	1.1	0.275	1.38	4.125	0.4	1.200	5.0	15.92	1.8	19.0	6.9	132	45.7	2.1	6.3	69.000	103.5
6.0	0.9	1.1	0.275	1.38	8.250	0.4	2.400	5.0	15.92	1.8	19.0	9.8	187	64.7	2.1	12.6	69.000	207.0
10.0	0.9	1.1	0.275	1.38	13.750	0.4	4.000	5.0	15.92	1.8	19.0	12.7	241	83.5	2.1	21.0	69.000	345.0
1.0	1.2	0.8	0.2	1.00	1.000	0.4	400	5.0	13.4	1.4	12.9	4.0	52	19.2	2.1	2.1	69.000	34.5
3.0	1.2	0.8	0.2	1.00	3.000	0.4	1.200	5.0	13.4	1.4	12.9	6.9	89	33.3	2.1	6.3	69.000	103.5
6.0	1.2	0.8	0.2	1.00	6.000	0.4	2.400	5.0	13.4	1.4	12.9	9.8	126	47.0	2.1	12.6	69.000	207.0
10.0	1.2	0.8	0.2	1.00	10.000	0.4	4.000	5.0	13.4	1.4	12.9	12.7	163	60.7	2.1	21.0	69.000	345.0

TABLE E.6.9 COST COMPARISON OF ALTERNATIVES 3-I AND 3-II

Development Area (km^2)	Existing Ground Elevation (EL.m)	Alternative 3-I	Alternative 3-II					
		Land Fill Cost (billion D)	Land Fill Cost (billion D)	Construction Cost of Dike (billion D)	Construction Cost of P. S. (billion D)	O/M Cost (billion D)	Land Acquisition Cost (billion D)	Total Cost (billion D)
1	0.6	370.0	87.8	30.1	281.5	273.9	2.1	675.4
1	0.9	293.8	87.8	22.0	281.5	271.9	1.9	665.1
1	1.2	215.9	87.8	15.0	281.5	270.1	1.7	656.1
3	0.6	1,001.4	257.7	52.2	689.2	665.5	4.5	1,669.1
3	0.9	813.5	257.7	38.1	689.2	662.0	4.1	1,651.1
3	1.2	611.8	257.7	26.0	689.2	659.0	3.8	1,635.7
6	0.6	1,738.4	498.1	73.8	1,111.5	1,070.5	7.5	2,761.4
6	0.9	1,454.9	498.1	54.0	1,111.5	1,065.5	7.0	2,736.1
6	1.2	1,122.9	498.1	36.7	1,111.5	1,061.2	6.6	2,714.1
10	0.6	2,309.4	791.8	95.4	1,758.1	1,688.2	11.2	4,344.7
10	0.9	2,062.0	791.8	69.6	1,758.1	1,681.8	10.6	4,311.9
10	1.2	1,679.6	791.8	47.4	1,758.1	1,676.3	10.0	4,283.6

TABLE E.6.10 COST COMPARISON OF DRAINAGE SYSTEM ALTERNATIVES OF LONG TRUONG DEVELOPMENT IN SE-ZONE

Item	Case A (Gravity Discharge)			Case B (Pump Discharge)			Remarks
	Quantity	Unit	Cost (billion VND)	Quantity	Unit	Cost (billion VND)	
1. Land Development							
(1) Filling for East Pa	11,130	x1,000 m3	1,005.01	2,968	x1,000 m3	336.61	A= 7.42 km2
(2) Filling for West P	2,520	x1,000 m3	289.56	672	x1,000 m3	81.35	A= 1.68 km2
Sub-total	13,650	x1,000 m3	1,294.57	3,640	x1,000 m3	417.96	
2. Construction of Polder Dike							
(1) Embankment				342	x1,000 m3	90.32	
(2) Bank Protection				125	x1,000 m2	9.00	grass protection
(3) Pavement of O/M Road				50	x1,000 m2	9.00	
(3) Land Acquisition				238	x1,000 m3	4.51	
Sub-total						112.83	
3. Construction of Pumping Station							
(1) P1 Pumping Station				15.6	m3/s	1,289.71	
(2) P2 pumping Station				3.5	m3/s	431.16	
(3) Land Acquisition				6.0	x1,000 m2	0.11	
Sub-total						1,720.99	
4. Construction of Retarding Pond							
(1) R1 Pond				256	x1,000 m2	2.21	
(2) R2 Pond				58	x1,000 m2	1.08	
(3) Land Acquisition				314	x1,000 m2	5.97	
Sub-total						9.26	
5. O/M Cost of Pumping Staion and Retarding Pond							
(1) Replacement of P1 Pump Equipment				15.6	m3/s	902.80	one time replace
(2) Replacement of P2 Pump Equipment				3.5	m3/s	301.81	one time replace
(3) O/M Cost				9,162.4	M D/year	458.12	40 years
Sub-total						1,662.73	
6. Total Cost			1,294.57			3,923.77	

TABLE E. 6.11 HYDRAULIC DESIGN OF CANAL IMPROVEMENT FOR ALTERNATIVES 4-I AND 4-II

(Drainage Zone), Name of Canal, and Their Section	Canal Length L (m)	Design Scale/Discharge		Bed Elevation		High Water Level		Design Cross Section								Flow Area A (m^2)	Hydraulic Radius R (m)	Roughness Coefficient n	Canal Bed Slope i (%)	Flow Velocity V (m/s)	Discharge Capacity Qc (m3/s)
		Frequency (Year)	Discharge Qd (m^3/s)	Start (EL.m)	End (EL.m)	Start (EL.m)	End (EL.m)	Width B1 (m)	B2 (m)	B3 (m)	B4 (m)	B5 (m)	Bank Slope	Height H (m)	h (m)						
Alternative I (5 and 10-year frequency plans)																					
NE. 5. A1	3,350	5	124	0.95	9.33	3.65	12.03	30.0	20.0	5.0	18.8	10.7	1.5	3.1	2.7	39.8	1.95	0.025	0.002500	3.12	124
NE. 5. A2	2,340	5	77	1.05	7.74	3.65	10.34	25.0	15.0	5.0	13.8	6.0	1.5	3.0	2.6	25.7	1.67	0.025	0.002857	3.02	78
(5) NE. 5. B	1,700	5	216	-1.95	0.05	1.65	3.65	39.0	29.0	5.0	27.8	17.0	1.5	4.0	3.6	80.6	2.69	0.025	0.001176	2.65	214
NE. 5. C	2,830	5	216	-4.42	-4.35	1.58	1.65	101.0	88.0	6.5	86.4	62.4	2	6.4	6.0	446.4	5.00	0.030	0.000025	0.49	218
NE. 5. D1	4,400	5	216	-4.53	-4.42	1.47	1.58	101.0	88.0	6.5	86.4	62.4	2	6.4	6.0	446.4	5.00	0.030	0.000025	0.49	218
NE. 5. A1	3,350	10	140	0.65	9.03	3.65	12.03	30.0	20.0	5.0	18.8	9.8	1.5	3.4	3.0	42.9	2.08	0.025	0.002500	3.26	140
NE. 5. A2	2,340	10	87	0.65	7.34	3.65	10.34	25.0	15.0	5.0	13.8	4.8	1.5	3.4	3.0	27.9	1.79	0.025	0.002857	3.15	88
(10) NE. 5. B	1,700	10	243	-2.35	-0.35	1.65	3.65	39.0	29.0	5.0	27.8	15.8	1.5	4.4	4.0	87.2	2.89	0.025	0.001176	2.78	243
NE. 5. C	2,830	10	243	-4.42	-4.35	1.58	1.65	101.2	88.2	6.5	86.6	62.6	2	6.4	6.0	447.6	5.00	0.025	0.000025	0.59	262
NE. 5. D1	4,400	10	243	-4.53	-4.42	1.47	1.58	101.0	88.0	6.5	86.4	62.4	2	6.4	6.0	446.4	5.00	0.025	0.000025	0.59	261
Alternative II (5 and 10-year frequency plans)																					
NE. 5. A1	3,350	5	83	0.65	9.03	3.65	12.03	29.0	19.0	5.0	17.4	5.4	2	3.4	3.0	34.2	1.82	0.030	0.002500	2.48	85
NE. 5. A2	2,340	5	47	0.65	7.34	3.65	10.34	24.5	14.5	5.0	12.9	0.9	2	3.4	3.0	20.7	1.45	0.030	0.002857	2.28	47
(5) NE. 5. B	1,700	5	133	-2.35	-0.35	1.65	3.65	35.5	25.5	5.0	23.9	7.9	2	4.4	4.0	63.6	2.47	0.030	0.001176	2.09	133
NE. 5. C	2,830	5	133	-4.42	-4.35	1.58	1.65	75.0	62.0	6.5	60.4	36.4	2	6.4	6.0	290.4	4.59	0.030	0.000025	0.46	134
NE. 5. D1	4,400	5	133	-4.53	-4.42	1.47	1.58	75.0	62.0	6.5	60.4	36.4	2	6.4	6.0	290.4	4.59	0.030	0.000025	0.46	134
NE. 5. A1	3,350	10	93	0.65	9.03	3.65	12.03	29.0	19.0	5.0	17.4	5.4	2	3.4	3.0	34.2	1.82	0.025	0.002500	2.98	102
NE. 5. A2	2,340	10	53	0.65	7.34	3.65	10.34	24.5	14.5	5.0	12.9	0.9	2	3.4	3.0	20.7	1.45	0.025	0.002857	2.73	57
(10) NE. 5. B	1,700	10	149	-2.35	-0.35	1.65	3.65	35.5	25.5	5.0	23.9	7.9	2	4.4	4.0	63.6	2.47	0.025	0.001176	2.51	159
NE. 5. C	2,830	10	149	-4.42	-4.35	1.58	1.65	75.0	62.0	6.5	60.4	36.4	2	6.4	6.0	290.4	4.59	0.025	0.000025	0.55	161
NE. 5. D1	4,400	10	149	-4.53	-4.42	1.47	1.58	75.0	62.0	6.5	60.4	36.4	2	6.4	6.0	290.4	4.59	0.025	0.000025	0.55	161

TABLE E.6.12 Bill OF QUANTITIES OF ALTERNATIVES 4-I AND 4-II

Item	Canal Length		Excavation Amount			Maintenance Road				Filling Amount			Pavement			Bank Protection						Existing Canal Slope Reformation		Land Acquisition	
(Drainage Zone)	Discrete	Accum.	Discrete	Volume		Top	Side	Height	Bottom	Discrete	Volume		Width	Area		Grass (Sod)		Stone Masonry		Concrete Slope				
Name of Canal	Length	Length	Area	Discrete	Total	Width	Slope		Width	Area	Discrete	Total		Discrete	Total	Discrete	Total	Discrete	Total	Discrete	Total	Discrete	Total	Discrete	Total
Canal Section	(m)	(m)	(m2)	(m3)	(m3)	(m)	(h : v)	(m)	(m)	(m2)	(m3)	(m3)	(m)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)	(m2)
Alternative I (5-and 10-year frequency plans)																									
NE. 5. A1	3,350	8,930	99	330,006	3,919,212	5	1	-2.54	5.00	Existing	Existing	39,788	4	26,800	116,960		113,167	41,067	303,657	-	-	-	-	96,950	715,252
NE. 5. A2	2,340	8,930	90	210,385		5	1	-3.38	5.00	Existing	Existing		4	18,720				28,686		-		-		61,950	
(5) NE. 5. B	1,700	7,230	196	333,160		5	1	-3.79	5.00	Existing	Existing		4	13,600				26,970		-		-		56,164	
NE. 5. C	2,830	4,400	594	1,682,131		5	1	-1.44	5.00	Existing	Existing		4	22,640		44,297				-		-		256,648	
NE. 5. D1	4,400	0	304	1,338,445		5	1	0.74	7.22	9.04	39,788		4	35,200		68,871				-		-		243,540	
NE. 5. A1	3,350	8,930	3	9,849	25,086	-	-	-	-	-	-	-	-	-	-	-	-		206,935	-	-	-	-	-	-
NE. 5. A2	2,340	8,930	2	4,493		-	-	-	-	-	-		-	-		-				-		-		-	
(10) NE. 5. B	1,700	7,230	6	10,744		-	-	-	-	-	-		-	-		-				-		-		-	
NE. 5. C	2,830	4,400	-	-		-	-	-	-	-	-		-	-		-		80,999		-		-		-	
NE. 5. D1	4,400	0	-	-		-	-	-	-	-	-		-	-		-		125,935		-		-		-	
Total					3,944,298	-	-	-	-	-		39,788			116,960		113,167		510,592		-		-		715,252
Alternative II (5-and 10-year frequency plans)																									
NE. 5. A1	3,350	8,930	76	254,473	2,455,036	5	1	-2.54	5.00	Existing	Existing	39,788	4	26,800	116,960		113,167	41067.23	303,657	-	-	-	-	83,550	494,952
NE. 5. A2	2,340	8,930	71	165,588		5	1	-3.38	5.00	Existing	Existing		4	18,720				28685.77		-		-		54,930	
(5) NE. 5. B	1,700	7,230	140	238,743		5	1	-3.79	5.00	Existing	Existing		4	13,600				26969.52		-		-		44,264	
NE. 5. C	2,830	4,400	391	1,105,291		5	1	-1.44	5.00	Existing	Existing		4	22,640		44,297				-		-		183,068	
NE. 5. D1	4,400	0	157	690,941		5	1	0.74	7.22	9.04	39,788		4	35,200		68,871				-		-		129,140	
NE. 5. A1	3,350	8,930	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		206,935	-	-	-	-	-	-
NE. 5. A2	2,340	8,930	-	-		-	-	-	-	-	-		-	-		-				-		-		-	
(10) NE. 5. B	1,700	7,230	-	-		-	-	-	-	-	-		-	-		-				-		-		-	
NE. 5. C	2,830	4,400	-	-		-	-	-	-	-	-		-	-		-		80,999		-		-		-	
NE. 5. D1	4,400	0	-	-		-	-	-	-	-	-		-	-		-		125,935		-		-		-	
Total					2,455,036							39,788			116,960		113,167		510,592		-		-		494,952

TABLE E.6.13 COST COMPARISON OF ALTERNATIVES 4-I AND 4-II

Item	Alternative 4-I			Alternative 4-II			Remarks
	Quantity	Unit	Cost (Billion D	Quantity	Unit	Cost (Billion D)	
I. Canal Improvement							
1. Excavation	3.919	$x10^6 m^3$	317.4	2.455	$x10^6 m^3$	198.9	
2. O/M Road							
(1) Filling	0.398	$x10^6 m^3$	105.1	0.398	$x10^6 m^3$	105.1	
(2) Pavement	0.117	$x10^6 m^2$	21.1	0.117	$x10^6 m^2$	21.1	
Sub-total			126.1			126.1	
3. Bank protection							
(1) Grass/Sod	0.113	$x10^6 m^2$	8.1	0.113	$x10^6 m^2$	8.1	
(2) Stone Masonry	0.510	$x10^6 m^2$	275.4	0.510	$x10^6 m^2$	275.4	
Sub-total			283.5			283.5	
4. Land Acquisition	0.715	$x10^6 m^2$	13.8	0.495	$x10^6 m^2$	9.6	
Total			740.9			618.1	
II. Onsite Retarding Basin							
1. Excavation	-	-	-	17.0	$x10^3 m^3/km^2$	47.3	
2. Slope Protection	-	-	-	0.9	$x10^3 m^2/km^2$	2.2	
3. Inlet/Outlet Structure	-	-	-	1.0	L.S/km2	13.8	
4. O/M Road	-	-	-	1.2	$x10^3 m^2/km^2$	7.5	
5. Land Acquisition	-	-	-	7.3	$x10^3 m^2/km^2$	4.8	
Total			0			75.6	
Grand Total			740.9			693.7	

Note: 1

TABLE E.6.14 (1/2) DESIGN DISCHARGES OF THE CANALS BY RATIONAL METHOD (1/2)

Drainage Area	Catchment ID	Catchment Area (km2)	Canal ID	Canal Name	Canal Area (km2)	Runoff Point ID	Runoff Point Area (km2)	Runoff Coefficient	Segment's Flow Length (km)	Segment's Flow Velocity (m/s)	Time of Concentration (minutes)	Rainfall Intensity 5-Yr. R.P. (mm/hr)	Rainfall Intensity 10-Yr. R.P. (mm/hr)	Areal Reduction Factor	Design Discharge 5-Yr. R.P. (m3/s)	Design Discharge 10-Yr. R.P. (m3/s)
Northern Zone	N.1	19.87	C-N.1	Rach Ben Da - Rach Ba Hong *	19.87	N.1.A	3.33	0.51	1.07	0.35	101	54.9	61.5	0.99	25	
						N.1.B	9.93	0.55	2.78	0.35	233	24.5	26.8	0.97	36	
						N.1.C	14.17	0.52	2.04	0.50	301	19.1	20.8	0.96	37	
						N.1.D	19.87	0.51	3.61	0.50	421	13.9	15.2	0.94	37	
	N.2	107.57	C-N.2	Rach Dai Han **	34.65	N.2.A	11.67	0.48	0.97	0.70	124	46.0	51.5	0.96	69	
						N.2.B	18.10	0.47	1.68	0.70	163	35.4	39.4	0.94	78	
						N.2.C	29.33	0.50	4.09	0.60	277	20.7	22.6	0.91	78	
						N.2.D1	34.65	0.52	2.49	0.40	381	15.3	16.7	0.90	78	
			C-N.4	Kinh 19 Thang 5	10.98	N.2.D2	10.98	0.63	3.34	0.30	379	15.4	16.8	0.96	28	
			C-N.3	Kinh Tham Luong	107.57	N.2.E	56.82	0.57	1.56	0.35	455	13.0	14.2	0.86	99	108
						N.2.F	64.30	0.58	2.25	0.35	562	10.7	11.7	0.84	99	108
						N.2.G1	78.22	0.59	4.37	0.35	770	8.1	8.9	0.83	99	108
			C-N.5	Rach Ben Cat	11.86	N.2.G2	6.32	0.49	3.10	0.30	295	19.5	21.3	0.98	16	
						N.2.G3	11.86	0.53	2.49	0.35	413	14.2	15.5	0.96	24	
			C-N.3	Kinh Tham Luong	107.57	N.2.H	95.79	0.59	1.57	0.35	845	7.4	8.2	0.81	99	108
						N.2.I	100.68	0.59	2.50	0.35	964	6.6	7.3	0.81	99	108
						N.2.J	107.57	0.60	2.61	0.35	1088	5.9	6.6	0.81	99	108
Central Zone	C.1	31.67	C-C.1	Rach Nhieu Loc - Rach Thi Nghe	31.67	C.1.A	7.54	0.76	0.55	1.50	78	67.2	75.4	0.98	104	117
						C.1.B	11.09	0.76	2.14	0.70	129	44.2	49.4	0.96	104	117
						C.1.C	16.96	0.77	1.77	0.70	171	33.8	37.6	0.95	116	129
						C.1.D	24.54	0.76	2.32	0.70	227	25.2	27.5	0.93	121	131
						C.1.E	31.67	0.76	2.15	0.70	278	20.7	22.5	0.91	126	137
	C.2	5.14	C-C.2	Rach Cau Son - Rach Tau Vam Tat	5.14	C.2.A	5.14	0.78	2.09	0.40	116	48.5	54.3	0.98	43	
	C.3	20.22	C-C.3	Rach Tan Hoa - Rach Lo Gom	14.35	C.3.A	5.86	0.79	2.26	1.40	72	71.1	79.8	0.98	90	
						C.3.B	10.58	0.74	1.97	1.20	100	55.4	62.1	0.97	117	
						C.3.C1	14.35	0.76	2.84	0.60	179	32.5	36.1	0.95	117	
				Rach Ruoi Ngua	5.88	C.3.C2	5.88	0.69	1.50	0.40	135	42.6	47.6	0.98	47	
	C.4	41.50	C-C.5	Kinh Doi - Kinh Te	61.73	C.4.A1	1.84	0.85	3.34	0.40	154	37.4	41.7	0.99	16	18
			C-C.6	Rch Ba Tang	2.88	C.4.A2	2.88	0.67	3.33	0.40	227	25.2	27.5	0.99	13	
			C-C.7	Rach Ba Lon	6.52	C.4.A3	3.41	0.62	2.56	0.40	190	30.1	33.0	0.99	18	
						C.4.A4	6.52	0.58	3.18	0.40	344	16.8	18.3	0.98	18	
						C.4.B	36.71	0.71	2.02	0.40	369	15.8	17.2	0.90	117	131
						C.4.C	44.22	0.71	1.40	0.40	427	13.8	15.0	0.88	117	131
			C-C.5	Kinh Doi - Kinh Te	61.73	C.4.D	50.86	0.71	1.97	0.40	509	11.7	12.8	0.87	117	131
						C.4.E	61.73	0.71	4.25	0.40	687	8.9	9.8	0.85	117	131
Western Zone	W.1	72.91		Rach Tan Phu	9.68	W.1.A	9.68	0.66	2.60	0.50	154	37.5	41.8	0.97	65	
			C-W.1	Kinh Chua - Rach Nuoc Len ***	43.26	W.1.B	14.81	0.59	2.05	0.40	239	23.9	26.1	0.95	65	72
						W.1.C1	19.55	0.55	4.11	0.40	411	14.3	15.6	0.94	65	72
						W.1.C2	8.62	0.52	2.20	0.30	211	27.2	29.7	0.97	33	
						W.1.D1	36.36	0.57	4.49	0.40	598	10.1	11.1	0.90	65	72
			C-W.2	Rach Nhanh	3.20	W.1.D2	3.20	0.69	2.07	0.30	167	34.7	38.7	0.99	21	
			C-W.1	Rach Chua - Rach Nuoc Len	43.26	W.1.E1	43.26	0.58	2.72	0.40	711	8.7	9.5	0.88	65	72
			C-W.3	Rach Cai Truong - Rach Ba Goc	6.04	W.1.E2	6.04	0.44	4.90	0.30	346	16.8	18.3	0.98	12	
			C-W.4	Song Ben Luc	50.55	W.1.E3	7.02	0.50	1.36	0.40	402	14.5	15.9	0.98	14	15
						W.1.F	50.55	0.57	1.18	0.40	760	8.2	9.0	0.87	65	72
			C-W.5	Song Can Giuoc	72.91	W.1.G	59.41	0.57	1.85	0.40	837	7.5	8.3	0.85	65	72
						W.1.H	72.91	0.56	1.76	0.40	910	7.0	7.7	0.83	65	72

*: Canal improvement plan for Rach Ben Da - Ba Hong has been proposed considering inundation in the upper two reaches. The design discharges shown in this table represent discharges under inundation condition.

**: Canal improvement plan for Rach Daihan has been proposed considering inundation. Design (5-year) discharges through main channel at runoff points N.2.A, N.2.B, N.2.C and N.2.D1 are 7, 11, 19 and 24 m3/s respectively.
The design discharges along Rach Daihan, as shown in this table represent total discharges through main channel and flood plain at different runoff points, under inundation condition.

***: Canal improvement plan for Kinh Chua has been proposed considering inundation. Design (5-year) discharges through main channel for lengths of 0.35 and 3.11 km along reaches W.1.B and W.1.C1 are 12 and 14 m3/s respectively.
The design discharges along Kinh Chua (runoff points W.1.B and W.1.C1), as shown in this table represent total discharges through main channel and flood plain, under inundation condition.

TABLE E.6.14 (2/2) DESIGN DISCHARGES OF THE CANALS BY RATIONAL METHOD (2/2)

Drainage Area	Catchment ID	Catchment Area (km2)	Canal ID	Canal Name	Canal Area (km2)	Runoff Point ID	Runoff Point Area (km2)	Runoff Coefficient	Segment's Flow Length (km)	Segment's Flow Velocity (m/s)	Time of Concentration (minutes)	Rainfall Intensity 5-Yr. R.P. (mm/hr)	Rainfall Intensity 10-Yr. R.P. (mm/hr)	Areal Reduction Factor	Design Discharge 5-Yr. R.P. (m3/s)	Design Discharge 10-Yr. R.P. (m3/s)
Southern Zone	S.1	14.33	C-S.1	Rach Ba Lao	14.33	S.1.A	2.68	0.57	2.54	0.40	137	41.8	46.7	0.99	18	
						S.1.B1	6.72	0.53	2.51	0.40	242	23.7	25.8	0.98	23	
			C-S.2	Rach Xom Cui	0.33	S.1.B2	4.38	0.55	4.00	0.40	217	26.3	28.7	0.99	17	
						S.1.B3	6.33	0.52	2.06	0.40	303	19.0	20.7	0.98	17	
			C-S.1	Rach Ba Lao	14.33	S.1.C	14.33	0.52	1.39	0.40	342	16.9	18.4	0.95	34	
	S.2	15.66	C-S.3	Kach Ong Lon + Kinh Cay Kho	13.70	S.2.A1	2.40	0.48	2.02	0.40	158	36.6	40.8	0.99	12	
			C-S.4	Rach Ong Bay	1.96	S.2.A2	1.96	0.59	1.90	0.40	150	38.4	42.9	0.99	12	
						S.2.B	7.21	0.52	1.51	0.40	218	26.2	28.6	0.98	26	
			C-S.3	Rach Ong Lon + Kinh Cay Kho	13.70	S.2.C	15.66	0.53	3.39	0.40	359	16.2	17.6	0.95	36	
	S.3	34.51	C-S.5	Rach Roi + Rach Tom + Song Muong Chuoi	34.51	S.3.A	2.17	0.71	1.57	0.40	123	46.1	51.5	0.99	20	22
						S.3.B1	4.49	0.73	2.43	0.40	225	25.5	27.8	0.99	23	25
			C-S.6	Rach Thay Tieu	4.79	S.3.B2	4.79	0.74	3.12	0.40	198	29.0	31.7	0.98	28	
			C-S.7	Rach Dia	5.75	S.3.B3	5.75	0.56	3.58	0.40	292	19.7	21.5	0.98	17	
						S.3.C	19.33	0.65	2.60	0.40	333	17.4	18.9	0.94	57	62
			C-S.5	Rach Roi + Rach Tom + Song Muong Chuoi	34.51	S.3.D1	23.68	0.65	2.63	0.40	442	13.3	14.5	0.93	57	62
			C-S.8	Phuoc Khien River	6.45	S.3.D2	6.45	0.54	3.41	0.40	259	22.2	24.1	0.98	21	
			C-S.5	Rach Roi + Rach Tom + Song Muong Chuoi	34.51	S.3.E	34.51	0.63	2.41	0.40	543	11.1	12.1	0.90	64	69
	S.4	2.36	C-S.9	Rach Cau Kinh	2.36	S.4.A	2.36	0.67	1.92	0.40	133	43.1	48.2	0.99	19	
	S.5	2.23	C-S.10	Rach AP3 Phu My	2.23	S.5.A	2.23	0.60	1.86	0.40	116	48.5	54.3	0.99	18	
North-Eastern Zone	NE.1	3.32	C-NE.1	Rach Ong Dau	3.32	NE.1.A	3.32	0.57	3.58	0.40	170	34.0	37.9	0.99	18	
	NE.2	9.53	C-NE.2	Rach Go Dua	9.53	NE.2.A	4.78	0.68	2.57	0.40	172	33.6	37.4	0.98	30	
						NE.2.B	9.53	0.65	2.20	0.40	264	21.7	23.7	0.97	36	
	NE.3	7.15	C-NE.3	Rach Thu Duc	7.15	NE.3.A	7.15	0.64	3.14	0.40	161	35.8	39.9	0.98	44	
	NE.4	2.65	C-NE.4	Rach Truong Tho	2.65	NE.4.A	2.65	0.73	2.17	0.40	143	40.2	44.9	0.99	21	
	NE.5	34.38	C-NE.5	Rach Nhum + Rach Cau + Rach Go Cong *	34.38	NE.5.A1	10.12	0.42	3.35	2.33	69	0.0	82.4	0.97	83	93
						NE.5.A2	4.72	0.46	2.34	2.90	62	0.0	89.2	0.98	47	53
						NE.5.B	17.99	0.45	1.70	1.84	85	63.2	71.0	0.94	133	149
						NE.5.C	28.17	0.45	2.83	0.77	146	39.5	44.1	0.92	133	149
						NE.5.D1	34.38	0.45	4.44	0.32	378	15.4	16.8	0.90	133	149
South-Eastern Zone	SE.1	1.98	C-SE.1	Rach Binh Khanh	1.98	SE.1.A	1.98	0.50	2.32	0.40	128	44.7	50.0	0.99	12	
	SE.2	2.60	C-SE.2	Rach Ca Tre Nho	2.60	SE.2.A	2.60	0.65	2.08	0.40	118	48.1	53.8	0.99	22	
	SE.3	1.92	C-SE.3	Rach Da Do	1.92	SE.3.A	1.92	0.80	2.50	0.40	205	27.9	30.5	0.99	12	
	SE.4	7.80	C-SE.4	Rach Giong Ong To	7.80	SE.4.A	5.40	0.63	3.41	0.40	200	28.6	31.3	0.98	18	
						SE.4.B	7.80	0.44	2.05	0.40	285	20.2	21.9	0.97	19	
	SE.5	3.83	C-SE.5	Rach Muong	3.83	SE.5.A	3.83	0.65	1.11	0.40	173	33.6	37.3	0.99	23	
	SE.6	5.10	C-SE.6	Rach Ky Ha	5.10	SE.6.A	5.10	0.80	4.39	0.40	263	21.8	23.7	0.98	24	
	SE.7	14.58	C-SE.7	Rach Chiec + Rach Kinh Ong Hong	14.58	SE.7.A	8.39	0.56	1.50	0.60	191	30.0	32.8	0.97	38	
						SE.7.B	14.58	0.55	3.20	0.40	325	17.8	19.4	0.95	38	
	SE.8	11.33	C-SE.8	Rach Ong Cay + Rach Ba Cua + Rach Ong Kieu	11.33	SE.8.A	2.77	0.46	1.95	0.40	164	35.3	39.3	0.99	12	
						SE.8.B	11.33	0.53	4.12	0.40	336	17.2	18.8	0.96	27	
	SE.9	21.11	C-SE.9	Rach Tan + Rach Ong Nhieu	21.11	SE.9.A	7.46	0.65	2.47	0.40	147	39.1	43.6	0.98	51	
						SE.9.B	13.73	0.57	4.24	0.40	324	17.8	19.4	0.96	51	
						SE.9.C	21.11	0.56	2.83	0.40	442	13.3	14.6	0.94	51	
	SE.10	24.88	C-SE.11	Tac River	59.26	SE.10.A	7.57	0.43	3.62	0.40	265	21.6	23.6	0.98	19	21
						SE.10.B	19.00	0.52	4.08	0.00	435	13.5	14.7	0.94	35	38
						SE.10.C	59.26	0.54	2.41	0.40	458	12.9	14.1	0.85	133	149

* Canal improvement plan for Rach Go Cong has been proposed considering construction of on-site storage ponds to reduce peak runoff due to rapid urbanization such that discharges under existing landuse condition can be kept. The design discharges along Rach Go Cong shown in this table represent discharges under existing landuse condition.

TABLE E.6.15 (1/4) HYDRAULIC DESIGN OF CANAL IMPROVEMENT

(Drainage Zone), Name of Canal, and Their Section	Canal Length L (m)	Design Scale/Discharge		Bed Elevation		High Water Level		Design Cross Section								Flow Area A (m^2)	Hydraulic Radius R (m)	Roughness Coefficient n	Canal Bed Slope i (%)	Flow Velocity V (m/s)	Discharge Capacity Qc (m3/s)
								Width					Bank Slope	Height							
		Frequency (Year)	Discharge Qd (m^3/s)	Start (EL.m)	End (EL.m)	Start (EL.m)	End (EL.m)	B1 (m)	B2 (m)	B3 (m)	B4 (m)	B5 (m)		H (m)	h (m)						
(C - Zone)																					
C. 1: Nhieu Loc - Thi Nghe																					
C. 1. A	550	5	104	-2.36	-2.14	1.74	1.96	34.0	24.0	5.0	22.8	10.5	1.5	4.5	4.1	68.3	2.70	0.025	0.000400	1.55	106
C. 1. B	2,140	5	104	-3.37	-3.26	1.63	1.74	53.0	40.0	6.5	38.8	23.8	1.5	5.4	5.0	156.5	3.74	0.025	0.000050	0.68	107
C. 1. C	1,770	5	116	-3.56	-3.47	1.54	1.63	55.0	42.0	6.5	40.8	25.5	1.5	5.5	5.1	169.1	3.85	0.025	0.000050	0.70	118
C. 1. D	2,320	5	121	-3.67	-3.56	1.43	1.54	56.0	43.0	6.5	41.8	26.5	1.5	5.5	5.1	174.2	3.88	0.025	0.000050	0.70	122
C. 1. E	2,150	5	126	-3.78	-3.67	1.32	1.43	57.0	44.0	6.5	42.8	27.5	1.5	5.5	5.1	179.3	3.91	0.025	0.000050	0.70	126
C. 1. A	550	10	117	-2.76	-2.54	1.74	1.96	34.0	24.0	5.0	22.8	9.3	1.5	4.9	4.5	72.2	2.83	0.025	0.000400	1.60	116
C. 1. B	2,140	10	117	-3.87	-3.76	1.63	1.74	53.0	40.0	6.5	38.8	22.3	1.5	5.9	5.5	168.0	3.99	0.025	0.000050	0.71	120
C. 1. C	1,770	10	129	-3.96	-3.87	1.54	1.63	55.0	42.0	6.5	40.8	24.3	1.5	5.9	5.5	179.0	4.06	0.025	0.000050	0.72	129
C. 1. D	2,320	10	131	-4.07	-3.96	1.43	1.54	56.0	43.0	6.5	41.8	25.3	1.5	5.9	5.5	184.5	4.09	0.025	0.000050	0.72	134
C. 1. E	2,150	10	137	-4.18	-4.07	1.32	1.43	57.0	44.0	6.5	42.8	26.3	1.5	5.9	5.5	190.0	4.12	0.025	0.000050	0.73	138
C. 2: Cau Son - Tau Vat Tat																					
C. 2. A	500	5	53	-2.68	-2.66	1.32	1.35	43.0	30.0	6.5	28.8	16.8	1.5	4.4	4.0	91.2	2.92	0.025	0.000050	0.58	53
C. 2. A'	1,500	5	22	-2.16	-2.08	1.35	1.42	33.0	20.0	6.5	18.8	8.3	1.5	3.9	3.5	47.4	2.27	0.025	0.000050	0.49	23
C. 2. A"	1,500	5	17	-2.16	-2.08	1.35	1.42	30.0	17.0	6.5	15.8	5.3	1.5	3.9	3.5	36.9	2.06	0.025	0.000050	0.46	17
C. 3: Tan Hoa - Lo Gom																					
C. 3. A	2,260	5	90	-1.14	-0.24	2.36	3.26	27.5	17.5	5.0	17.1	13.6	0.5	3.9	3.5	53.7	2.51	0.022	0.000400	1.68	90
C. 3. B	1,970	5	117	-2.43	-1.64	1.57	2.36	29.0	19.0	5.0	18.6	14.6	0.5	4.4	4.0	66.4	2.82	0.022	0.000400	1.82	121
C. 3. C1'	1,840	5	117	-3.52	-3.43	1.48	1.57	52.0	39.0	6.5	38.2	28.2	1	5.4	5.0	166.0	3.92	0.025	0.000050	0.70	117
C. 3. C1	1,000	-	Navigation	-3.87	-3.82	1.43	1.48	60.0	47.0	6.5	46.2	35.6	1	5.7	5.3	216.8	4.28	0.025	0.000050	0.75	162
C. 3. C2	1,500	5	47	-2.6	-2.54	1.43	1.46	51.0	38.0	6.5	36.8	24.8	1.5	4.4	4.0	123.2	3.14	0.025	0.000020	0.38	47
C. 4: Tau Hu - Ben Nghe, Doi - Te					0																
C. 4. A2' (R. Ba Tang)	1,330	5	15	-2.03	-2.00	1.47	1.50	42.0	32.0	5.0	30.4	16.4	2	3.9	3.5	81.9	2.56	0.030	0.000020	0.28	23
C. 4. A2 (R. Ba Tang)	2,000	5	15	-2.07	-2.03	1.43	1.47	Existing Cross Section								233.3	3.27	0.030	0.000020	0.33	77
C. 4. A3 (R. Ba Lon)	2,560	5	18	-2.01	-1.96	1.49	1.54	38.0	28.0	5.0	26.4	12.4	2	3.9	3.5	67.9	2.42	0.030	0.000020	0.27	18
C. 4. A4 (R. Ba Lon)	3,180	5	18	-3.07	-3.01	1.43	1.49	Existing Cross Section								97.4	2.60	0.030	0.000020	0.28	27
C. 4. A1 (Tau Hu)	2,680	-	Navigation	-4.27	-4.25	1.43	1.46	65.6	58.6	3.5	56.2	22.0	3	6.1	5.7	222.9	3.84	0.025	0.000011	0.33	73
C. 4. B (Tau Hu)	2,130	-	Navigation	-4.30	-4.27	1.40	1.43	65.6	58.6	3.5	56.2	22.0	3	6.1	5.7	222.9	3.84	0.025	0.000011	0.33	73
C. 4. C (Tau Hu)	2,190	-	Navigation	-3.12	-3.10	1.38	1.40	57.4	50.4	3.5	48.0	21.0	3	4.9	4.5	155.3	3.14	0.025	0.000011	0.29	44
C. 4. D (Tau Hu)	1,980	-	Navigation	-3.14	-3.12	1.36	1.38	57.4	50.4	3.5	48.0	21.0	3	4.9	4.5	155.3	3.14	0.025	0.000011	0.29	44
C. 4. E (Ben Nghe)	3,170	5	52	-3.18	-3.14	1.32	1.36	62.4	55.4	3.5	53.0	26.0	3	4.9	4.5	177.8	3.26	0.025	0.000011	0.29	52
C. 4. A1 (Doi)	3,470	5	16	-5.37		1.43	1.47	Existing Cross Section								271.8	2.91	0.030	0.000011	0.23	62
C. 4. B (Doi)	2,020	5	117	-5.40	-5.37	1.40	1.43	Existing Cross Section								409.2	4.28	0.030	0.000011	0.29	120
C. 4. C (Doi)	1,400	5	117	-5.41	-5.40	1.39	1.40	Existing Cross Section								550.3	5.50	0.030	0.000011	0.35	191
C. 4. D (Te)	1,970	5	117	-5.43	-5.41	1.37	1.39	Existing Cross Section								490.6	5.15	0.030	0.000011	0.33	163
C. 4. E (Te)	4,250	5	117	-5.48	-5.43	1.32	1.37	Existing Cross Section								793.4	6.24	0.030	0.000011	0.38	299
C. 4. A1 (Doi)	3,470	10	18	-7.07	-7.03	1.43	1.47	Existing Cross Section								271.8	2.91	0.030	0.000011	0.23	62
C. 4. B (Doi)	2,020	10	131	-7.10	-7.07	1.40	1.43	Existing Cross Section								409.2	4.28	0.030	0.000011	0.29	120
C. 4. C (Doi)	1,400	10	131	-7.11	-7.10	1.39	1.40	Existing Cross Section								550.3	5.50	0.030	0.000011	0.35	191
C. 4. D (Te)	1,970	10	131	-7.13	-7.11	1.37	1.39	Existing Cross Section								490.6	5.15	0.030	0.000011	0.33	163
C. 4. E (Te)	4,250	10	131	-7.18	-7.13	1.32	1.37	Existing Cross Section								793.4	6.24	0.030	0.000011	0.38	299
(N - Zone)																					
N. 1: Ben Da Ba Hog																					
N. 1. A	1,070	5	25	-0.03	1.04	2.97	4.04	22.0	14.0	4.0	12.4	0.4	2	3.4	3.0	19.2	1.39	0.030	0.001000	1.31	25
N. 1. B	2,780	5	36	-1.92	-0.33	1.58	2.97	26.0	18.0	4.0	16.4	2.4	2	3.9	3.5	32.9	1.82	0.030	0.000500	1.11	37
N. 1. C	2,040	5	37	-3.02	-2.92	1.48	1.58	40.0	29.0	5.5	27.4	9.4	2	4.9	4.5	82.8	2.80	0.030	0.000045	0.45	37
N. 1. D	3,610	5	37	-3.18	-3.02	1.32	1.48	40.0	29.0	5.5	27.4	9.4	2	4.9	4.5	82.8	2.80	0.030	0.000045	0.45	37

TABLE E.6.15 (2/4) HYDRAULIC DESIGN OF CANAL IMPROVEMENT

(Drainage Zone), Name of Canal, and Their Section	Canal Length L (m)	Design Scale/Discharge Frequency (Year)	Design Scale/Discharge Discharge Qd (m^3/s)	Bed Elevation Start (EL.m)	Bed Elevation End (EL.m)	High Water Level Start (EL.m)	High Water Level End (EL.m)	Design Cross Section Width B1 (m)	B2 (m)	B3 (m)	B4 (m)	B5 (m)	Bank Slope	Height H (m)	Height h (m)	Flow Area A (m^2)	Hydraulic Radius R (m)	Roughness Coefficient n	Canal Bed Slope i (%)	Flow Velocity V (m/s)	Discharge Capacity Qc (m^3/s)
N. 2: Tham Luong - Ben Cat																					
N. 2. A	970	5 (daily)	7	3.72	4.69	5.42	6.39	19.5	9.5	5.0	7.9	1.1	2	2.1	1.7	7.7	0.88	0.030	0.001000	0.97	7
N. 2. B	1,680	5 (daily)	11	1.30	2.42	3.30	4.42	21.5	11.5	5.0	9.9	1.9	2	2.4	2.0	11.8	1.09	0.030	0.000667	0.91	11
N. 2. C	4,090	5 (daily)	19	-1.33	0.30	1.67	3.30	25.0	15.0	5.0	13.4	1.4	2	3.4	3.0	22.2	1.50	0.030	0.000400	0.87	19
N. 2. D1	2,490	5 (daily)	24	-2.88	-2.83	1.62	1.67	38.5	28.5	5.0	26.9	8.9	2	4.9	4.5	80.6	2.78	0.030	0.000020	0.29	24
N. 2. A	970	5	69	3.72	4.69	5.42	6.39	19.5	9.5	5.0	7.9	1.1	2	2.1	1.7	7.7	0.88	0.030	0.001000	0.97	7
N. 2. B	1,680	5	78	1.30	2.42	3.30	4.42	21.5	11.5	5.0	9.9	1.9	2	2.4	2.0	11.8	1.09	0.030	0.000667	0.91	11
N. 2. C	4,090	5	78	-1.33	0.30	1.67	3.30	25.0	15.0	5.0	13.4	1.4	2	3.4	3.0	22.2	1.50	0.030	0.000400	0.87	19
N. 2. D1	2,490	5	78	-2.88	-2.83	1.62	1.67	38.5	28.5	5.0	26.9	8.9	2	4.9	4.5	80.6	2.78	0.030	0.000020	0.29	24
N. 2. D2	3,340	5	28	-3.38	-3.32	1.62	1.68	43.0	30.0	6.5	28.4	8.4	2	5.4	5.0	92.0	2.99	0.030	0.000020	0.31	28
N. 2. E	1,560	5	99	-3.91	-3.88	1.59	1.62	71.5	58.5	6.5	56.9	34.9	2	5.9	5.5	252.5	4.24	0.030	0.000020	0.39	99
N. 2. F	2,250	5	99	-3.96	-3.91	1.54	1.59	71.5	58.5	6.5	56.9	34.9	2	5.9	5.5	252.5	4.24	0.030	0.000020	0.39	99
N. 2. G1	4,370	5	99	-4.05	-3.96	1.45	1.54	71.5	58.5	6.5	56.9	34.9	2	5.9	5.5	252.5	4.24	0.030	0.000020	0.39	99
N. 2. G2	3,100	5	16	-2.00	-1.93	1.50	1.57	40.0	27.0	6.5	25.4	11.4	2	3.9	3.5	64.4	2.38	0.030	0.000020	0.27	17
N. 2. G3	2,490	5	24	-2.05	-2.00	1.45	1.50	46.0	33.0	6.5	31.4	17.4	2	3.9	3.5	85.4	2.58	0.030	0.000020	0.28	24
N. 2. H	1,570	5	99	-4.08	-4.05	1.42	1.45	71.5	58.5	6.5	56.9	34.9	2	5.9	5.5	252.5	4.24	0.030	0.000020	0.39	99
N. 2. I	2,500	5	99	-4.13	-4.08	1.37	1.42	71.5	58.5	6.5	56.9	34.9	2	5.9	5.5	252.5	4.24	0.030	0.000020	0.39	99
N. 2. J	2,610	5	99	-4.18	-4.13	1.32	1.37	71.5	58.5	6.5	56.9	34.9	2	5.9	5.5	252.5	4.24	0.030	0.000020	0.39	99
N. 2. E	1,560	10	108	-3.91	-3.88	1.59	1.62	71.5	58.5	6.5	56.9	34.9	2	5.9	5.5	252.5	4.24	0.025	0.000020	0.47	118
N. 2. F	2,250	10	108	-3.96	-3.91	1.54	1.59	71.5	58.5	6.5	56.9	34.9	2	5.9	5.5	252.5	4.24	0.025	0.000020	0.47	118
N. 2. G1	4,370	10	108	-4.05	-3.96	1.45	1.54	71.5	58.5	6.5	56.9	34.9	2	5.9	5.5	252.5	4.24	0.025	0.000020	0.47	118
N. 2. H	1,570	10	108	-4.08	-4.05	1.42	1.45	71.5	58.5	6.5	56.9	34.9	2	5.9	5.5	252.5	4.24	0.025	0.000020	0.47	118
N. 2. I	2,500	10	108	-4.13	-4.08	1.37	1.42	71.5	58.5	6.5	56.9	34.9	2	5.9	5.5	252.5	4.24	0.025	0.000020	0.47	118
N. 2. J	2,610	10	108	-4.18	-4.13	1.32	1.37	71.5	58.5	6.5	56.9	34.9	2	5.9	5.5	252.5	4.24	0.025	0.000020	0.47	118
(W - Zone)																					
W. 1: R. Cua - R. Nuoc Len																					
W. 1. A	2,600	5	65	-2.12	-1.26	1.68	2.54	35.0	25.0	5.0	23.4	8.2	2	4.2	3.8	60.0	2.38	0.030	0.000333	1.09	65
W. 1. B'	1,700	5	65	-3.85	-3.82	1.65	1.68	61.0	48.0	6.5	46.4	24.4	2	5.9	5.5	194.7	3.97	0.030	0.000016	0.33	65
W. 1. B	350	5 (daily)	12	-3.85	-3.85	1.65	1.65	34.0	24.0	5.0	22.4	0.4	2	5.9	5.5	62.7	2.51	0.030	0.000016	0.25	15
W. 1. C1'	3,110	5 (daily)	14	-3.90	-3.85	1.60	1.65	34.0	24.0	5.0	22.4	0.4	2	5.9	5.5	62.7	2.51	0.030	0.000016	0.25	15
W. 1. C1	1,000	5	65	-3.92	-3.90	1.58	1.60	61.0	48.0	6.5	46.4	24.4	2	5.9	5.5	194.7	3.97	0.030	0.000016	0.33	65
W. 1. C2	2,200	5	33	-2.92	-2.88	1.58	1.62	50.0	37.0	6.5	35.4	17.4	2	4.9	4.5	118.8	3.17	0.030	0.000016	0.29	34
W. 1. D1	4,490	5	65	-3.99	-3.92	1.51	1.58	61.0	48.0	6.5	46.4	24.4	2	5.9	5.5	194.7	3.97	0.030	0.000016	0.33	65
W. 1. D2	2,070	5	21	-2.49	-2.46	1.51	1.54	43.0	30.0	6.5	28.4	12.4	2	4.4	4.0	81.6	2.69	0.030	0.000016	0.26	21
W. 1. E1	2,720	5	65	-4.03	-3.99	1.47	1.51	61.0	48.0	6.5	46.4	24.4	2	5.9	5.5	194.7	3.97	0.030	0.000016	0.33	65
W. 1. E2	4,900	5	12	-3.58	-2.05	1.47	1.54	Existing Cross Section								74.40	2.51	0.030	0.000016	0.25	18
W. 1. E3	1,360	5	14	-6.71	-11.26	1.47	1.49	Existing Cross Section								467.36	4.97	0.030	0.000016	0.39	181
W. 1. F	1,180	5	65	-8.46	-6.71	1.45	1.47	Existing Cross Section								578.45	5.34	0.030	0.000016	0.41	235
W. 1. G	1,850	5	65	-6.19	-6.16	1.42	1.45	Existing Cross Section								598.45	4.16	0.030	0.000016	0.34	206
W. 1. H	1,760	5	65	-6.22	-6.19	1.39	1.42	Existing Cross Section								544.72	5.02	0.030	0.000016	0.39	212
W. 1. B'	1,700	10	72	-3.85	-3.82	1.65	1.68	61.0	48.0	6.5	46.4	24.4	2	5.9	5.5	194.7	3.97	0.025	0.000016	0.40	78
W. 1. C1	1,000	10	72	-3.92	-3.90	1.58	1.60	61.0	48.0	6.5	46.4	24.4	2	5.9	5.5	194.7	3.97	0.025	0.000016	0.40	78
W. 1. D1	4,490	10	72	-3.99	-3.92	1.51	1.58	61.0	48.0	6.5	46.4	24.4	2	5.9	5.5	194.7	3.97	0.025	0.000016	0.40	78
W. 1. E1	2,720	10	72	-4.03	-3.99	1.47	1.51	61.0	48.0	6.5	46.4	24.4	2	5.9	5.5	194.7	3.97	0.025	0.000016	0.40	78
W. 1. F	1,180	10	72	-8.46	-6.71	1.45	1.47	Existing Cross Section								578.45	5.34	0.030	0.000016	0.41	235
W. 1. G	1,850	10	72	-6.19	-6.16	1.42	1.45	Existing Cross Section								598.45	4.16	0.030	0.000016	0.34	206
W. 1. H	1,760	10	72	-6.22	-6.19	1.39	1.42	Existing Cross Section								544.72	5.02	0.030	0.000016	0.39	212

TABLE E.6.15 (3/4) HYDRAULIC DESIGN OF CANAL IMPROVEMENT

(Drainage Zone), Name of Canal, and Their Section	Canal Length L (m)	Design Scale/Discharge Frequency (Year)	Design Scale/Discharge Discharge Qd (m^3/s)	Bed Elevation Start (EL.m)	Bed Elevation End (EL.m)	High Water Level Start (EL.m)	High Water Level End (EL.m)	Design Cross Section Width B1 (m)	B2 (m)	B3 (m)	B4 (m)	B5 (m)	Bank Slope	Height H (m)	Height h (m)	Flow Area A (m^2)	Hydraulic Radius R (m)	Roughness Coefficient n	Canal Bed Slope i (%)	Flow Velocity V (m/s)	Discharge Capacity Qc (m3/s)
(S - Zone)																					
S. 1: R. Xom Cui - R. Ba Lao																					
S. 1. A	2,540	5	18	-2.55	-2.51	1.45	1.49	41.0	28.0	6.5	26.4	10.4	2	4.4	4.0	73.6	2.60	0.030	0.000016	0.25	18
S. 1. B1	2,510	5	23	-7.00	-4.15	1.41	1.45	Existing Cross Section								229.86	3.63	0.030	0.000016	0.31	72
S. 1. B2	4,000	5	17	-1.75	-3.50	1.44	1.51	Existing Cross Section								144.37	2.67	0.030	0.000016	0.26	37
S. 1. B3	2,000	5	17	-4.80	-1.75	1.41	1.44	Existing Cross Section								152.21	2.43	0.030	0.000016	0.24	37
S. 1. C	1,390	5	34	-7.39	-7.00	1.39	1.41	Existing Cross Section								163.21	2.51	0.030	0.000016	0.25	40
S. 2: R. Ong Lon - K. Cay Ko																					
S. 2. A1	2,020	5	12	-8.40	-6.05	1.47	1.50	Existing Cross Section								579.96	5.88	0.030	0.000016	0.43	251
S. 2. A2	1,900	5	12	-2.50	-1.78	1.47	1.50	Existing Cross Section								417.93	3.81	0.030	0.000016	0.32	135
S. 2. B	1,510	5	26	-5.90	-8.40	1.44	1.47	Existing Cross Section								334.39	3.54	0.030	0.000016	0.31	103
S. 2. C	3,390	5	36	-5.73	-5.90	1.39	1.44	Existing Cross Section								352.42	3.68	0.030	0.000016	0.32	112
S. 3: Tan - Ca Cam - Roi - Tom - Muong chuoi																					
S. 3. A	1,570	5	20	-2.95	-2.93	1.55	1.57	41.0	28.0	6.5	26.4	8.4	2	4.9	4.5	78.3	2.74	0.030	0.000016	0.26	20
S. 3. B1	2,430	5	23	-4.65	-2.95	1.51	1.55	Existing Cross Section								252.5	3.3	0.030	0.000016	0.30	75
S. 3. B2	3,120	5	28	-5.40	-2.55	1.51	1.56	Existing Cross Section								121.1	2.4	0.030	0.000016	0.24	29
S. 3. B3	3,580	5	17	-8.35	-7.95	1.51	1.57	Existing Cross Section								592.2	5.2	0.035	0.000016	0.34	202
S. 3. C	2,600	5	57	-9.00	-4.65	1.47	1.51	Existing Cross Section								775.4	5.7	0.035	0.000016	0.36	280
S. 3. D1	2,630	5	57	-12.00	-9.00	1.43	1.47	Existing Cross Section								832.8	6.3	0.035	0.000016	0.39	324
S. 3. D2	3,410	5	21	-7.07	-8.80	1.43	1.48	Existing Cross Section								642.6	6.0	0.035	0.000016	0.38	241
S. 3. E	2,410	5	64	-21.05	-12.00	1.39	1.43	Existing Cross Section								1635.5	10.0	0.035	0.000016	0.53	867
S. 3. A	1,570	10	22	-2.95	-2.93	1.55	1.57	41.0	28.0	6.5	26.4	8.4	2	4.9	4.5	78.3	2.74	0.025	0.000016	0.31	24
S. 3. B1	2,430	10	25	-4.65	-2.95	1.51	1.55	Existing Cross Section								252.5	3.3	0.030	0.000016	0.30	75
S. 3. C	2,600	10	62	-9.00	-4.65	1.45	1.49	Existing Cross Section								775.4	5.7	0.035	0.000016	0.36	280
S. 3. D1	2,630	10	62	-12.00	-9.00	1.42	1.46	Existing Cross Section								832.8	6.3	0.035	0.000016	0.39	324
S. 3. E	2,410	10	69	-21.05	-12.00	1.39	1.43	Existing Cross Section								1635.5	10.0	0.035	0.000016	0.53	867
S. 4: R. Cau Kinh																					
S. 4. A	1,920	5	19	-3.10	-1.65	1.39	1.49	Existing Cross Section								62.64	1.45	0.030	0.000050	0.30	19
S. 5: R. AP3Phu My																					
S. 5. A	1,860	5	18	-4.30	-1.25	1.39	1.48	Existing Cross Section								69.26	1.94	0.030	0.000050	0.37	25
(NE - Zone)																					
NE. 1: R. Ong Dua																					
NE. 1. A	1,500	5	18	-2.18	-2.15	1.32	1.35	41.0	28.0	6.5	26.4	12.4	2	3.9	3.5	67.9	2.42	0.030	0.000020	0.27	18
NE. 2: R. Go Dua																					
NE. 2. A	2,570	5	30	-3.14	-3.08	1.36	1.42	45.0	32.0	6.5	30.4	12.4	2	4.9	4.5	96.3	2.96	0.030	0.000020	0.31	30
NE. 2. B	2,200	5	36	-3.18	-3.14	1.32	1.36	49.1	36.1	6.5	34.5	16.5	2	4.9	4.5	114.8	3.13	0.030	0.000020	0.32	37
NE. 3: R. Thu Duc																					
NE. 3. A	2,140	5	23	-2.68	-2.63	1.32	1.37	41.0	28.0	6.5	26.4	10.4	2	4.4	4.0	73.6	2.60	0.030	0.000025	0.32	23
NE. 4: R. Truong Tho																					
NE. 4. A	2,170	5	14	-2.7	-2.63	1.32	1.37	35.0	22.0	6.5	20.4	4.4	2	4.4	4.0	49.6	2.23	0.030	0.000025	0.28	14
NE. 5: R. Nhum - R. Cau - R. Go Gong																					
NE. 5. A1	3,350	5	83	0.65	9.03	3.65	12.03	29.0	19.0	5.0	17.4	5.4	2	3.4	3.0	34.2	1.82	0.030	0.002500	2.48	85
NE. 5. A2	2,340	5	47	0.65	7.34	3.65	10.34	24.5	14.5	5.0	12.9	0.9	2	3.4	3.0	20.7	1.45	0.030	0.002857	2.28	47
NE. 5. B	1,700	5	133	-2.35	-0.35	1.65	3.65	35.5	25.5	5.0	23.9	7.9	2	4.4	4.0	63.6	2.47	0.030	0.001176	2.09	133
NE. 5. C	2,830	5	133	-4.42	-4.35	1.58	1.65	75.0	62.0	6.5	60.4	36.4	2	6.4	6.0	290.4	4.59	0.030	0.000025	0.46	134
NE. 5. D1	4,440	5	133	-4.50	-4.42	1.47	1.58	75.0	62.0	6.5	60.4	36.4	2	6.4	6.0	290.4	4.59	0.030	0.000025	0.46	134

TABLE E.6.15 (4/4) HYDRAULIC DESIGN OF CANAL IMPROVEMENT

(Drainage Zone), Name of Canal, and Their Section	Canal Length L (m)	Design Scale/Discharge		Bed Elevation		High Water Level		Design Cross Section								Flow Area A (m^2)	Hydraulic Radius R (m)	Roughness Coefficient n	Canal Bed Slope i (%)	Flow Velocity V (m/s)	Discharge Capacity Qc (m3/s)
		Frequency (Year)	Discharge Qd (m^3/s)	Start (EL.m)	End (EL.m)	Start (EL.m)	End (EL.m)	Width B1 (m)	B2 (m)	B3 (m)	B4 (m)	B5 (m)	Bank Slope	Height H (m)	h (m)						
NE. 5. A1	3,350	10	93	0.65	9.03	3.65	12.03	29.0	19.0	5.0	17.4	5.4	2	3.4	3.0	34.2	1.82	0.025	0.002500	2.98	102
NE. 5. A2	2,340	10	53	0.65	7.34	3.65	10.34	24.5	14.5	5.0	12.9	0.9	2	3.4	3.0	20.7	1.45	0.025	0.002857	2.73	57
NE. 5. B	1,700	10	149	-2.35	-0.35	1.65	3.65	35.5	25.5	5.0	23.9	7.9	2	4.4	4.0	63.6	2.47	0.025	0.001176	2.51	159
NE. 5. C	2,830	10	149	-4.42	-4.35	1.58	1.65	75.0	62.0	6.5	60.4	36.4	2	6.4	6.0	290.4	4.59	0.025	0.000025	0.55	161
NE. 5. D1	4,440	10	149	-4.53	-4.42	1.47	1.58	75.0	62.0	6.5	60.4	36.4	2	6.4	6.0	290.4	4.59	0.025	0.000025	0.55	161
(SE - Zone)																					
SE. 1: R. Binh Khanh																					
SE. 1. A	2,320	5	12	-3.96	-2.45	1.47	1.53	Existing Cross Section								114.10	2.39	0.030	0.000025	0.30	34
SE. 2: R. Ca Tre Nho																					
SE. 2. A	2,080	5	22	-4.20	-1.10	1.47	1.52	Existing Cross Section								109.55	2.61	0.030	0.000025	0.32	35
SE. 3: R. Da Do																					
SE. 3. A	2,500	5	12	-2.70	-2.34	1.47	1.53	Existing Cross Section								59.28	1.71	0.030	0.000025	0.24	14
SE. 4: R. Giong Ong To																					
SE. 4. A	3,410	5	18	-2.13	-1.36	1.52	1.61	Existing Cross Section								100.03	2.12	0.030	0.000025	0.27	29
SE. 4. B	2,050	5	19	-3.93	-2.13	1.47	1.52	Existing Cross Section								172.25	3.08	0.030	0.000025	0.35	61
SE. 5: R. Muong																					
SE. 5. A	1,110	5	23	-2.03	-2.00	1.47	1.50	40.0	30.0	5	28.4	14.4	2	3.9	3.5	74.9	2.49	0.030	0.000025	0.31	23
SE. 6: R. Ky Ha																					
SE. 6. A	4,390	5	24	-2.23	-2.12	1.47	1.58	40.0	30.0	5	28.4	13.6	2	4.1	3.7	77.7	2.58	0.030	0.000025	0.31	24
SE. 7: R. Kinh Ong Hong - R. Chuiec																					
SE. 7. A	2,500	5	38	-2.97	-2.92	1.53	1.58	51.0	38.0	6.5	36.4	18.4	2	4.9	4.5	123.3	3.20	0.030	0.000020	0.32	40
SE. 7. B	3,200	5	38	-5.66	-3.12	1.47	1.53	Existing Cross Section								360.0	4.00	0.030	0.000020	0.38	135
SE. 8: R. Ong Cay - R. Ba Cua - R. Ong Kieu																					
SE. 8. A	1,950	5	12	-2.00	-1.61	1.55	1.59	Existing Cross Section								116.06	2.94	0.030	0.000020	0.31	36
SE. 8. B	4,120	5	27	-1.03	-2	1.47	1.55	Existing Cross Section								129.22	2.56	0.030	0.000020	0.28	36
SE. 9: R. Tan - R. Ong Nhieu																					
SE. 9. A	2,470	5	51	-2.93	-2.89	1.57	1.61	58.0	45.0	6.5	43.4	40.0	2	4.9	4.5	187.7	3.12	0.030	0.000014	0.27	51
SE. 9. B	4,240	5	51	-5.25	-2.94	1.51	1.57	Existing Cross Section								185.58	3.64	0.030	0.000014	0.30	55
SE. 9. C	2,830	5	51	-6.69	-5.25	1.47	1.51	Existing Cross Section								499.19	4.57	0.030	0.000014	0.35	173
SE. 10: Tac River																					
SE. 10. A	3,620	5	19	-6.56	-5.49	1.56	1.61	Existing Cross Section								1317.21	6.32	0.035	0.000014	0.37	487
SE. 10. B	4,080	5	35	-6.83	-6.56	1.50	1.56	Existing Cross Section								975.50	5.30	0.035	0.000014	0.33	320
SE. 10. C	2,410	5	216	-8.95	-6.83	1.47	1.50	Existing Cross Section								951.20	5.65	0.035	0.000014	0.34	326
SE. 10. A	3,620	10	21	-6.56	-5.49	1.56	1.61	Existing Cross Section								1317.21	6.32	0.030	0.000014	0.43	568
SE. 10. B	4,080	10	38	-6.83	-6.56	1.50	1.56	Existing Cross Section								975.50	5.30	0.030	0.000014	0.38	374
SE. 10. C	2,410	10	243	-8.95	-6.83	1.47	1.50	Existing Cross Section								951.20	5.65	0.030	0.000014	0.40	381

TABLE E.6.16 SUMMARY OF BILL OF QUANTITES ON CANAL IMPROVEMENT

Item (Drainage Zone) Name of Canal Canal Section	Canal Length L (m)	Excavation/ Dredging (E/D) (m3)	Bank Protection Type (T)	Existing Bank Reformation (BR) (m2)	Grass (Sod) (GS) (m2)	Stone Masonry (SM) (m2)	Concrete Wall (CW) (m2)	O/M Road Filling (F) (m3)	O/M Road Pavement (P) (m2)	Road and Railway Crossing Box Culvert (BC) Number (place)	Road and Railway Crossing Bridge (BR) Number (Bridge Area) (Place) (m2)	Land Acquisition (LA) (m2)
(C - Zone)												
C. 1: Nhieu Loc - Thi Nghe	8,930	708,663	C	-	-	187,983	-	54,795	71,440	-	-	157,365
C. 2: Cau Son - Tau Vat Tat	3,500	13,055	C	-	-	50,116	-	34,691	28,000	-	-	49,310
C. 3: Tan Hoa - Lo Gom	8,570	674,003	C,D	-	-	68,022	39,091	16,355	68,560	-	(2) (862)	176,373
C. 4: Tau Hu - Ben Nghe, Doi - Te	34,330	819,154	A,B,C	128,030	188,918	413,038	-	191,309	274,640	-	-	308,151
(1) R. Ba Tang	3,330	39,014	A,B	14,000	34,818	-	-	37,059	26,640	-	-	60,151
(2) R. Ba Lon	5,740	3,545	A,B	22,260	62,330	-	-	52,772	45,920	-	-	45,920
(3) Tau Hu - Ben Nghe	12,150	776,595	C	-	-	413,038	-	58,444	97,200	-	(2) (527)	97,200
(4) Doi - Te	13,110	-	A	91,770	91,770	-	-	43,034	104,880	-	-	104,880
Sub-total	55,330	2,214,875		128,030	188,918	719,159	39,091	297,150	442,640	-	(4) (1,389)	691,199
(N - Zone)												
N. 1: Ben Da - Ba Hong	9,500	101,731	B	56,505	148,698	-	-	63,127	76,000	2	-	127,701
N. 2: Tham Luong - Ben Cat	47,880	2,516,654	B,C	128,351	516,845	323,224	-	327,555	264,160	2	(7) (2,483)	924,491
(1) 5- year	33,020	2,516,654	B	128,351	516,845	-	-	327,555	264,160	2	(7) (2,483)	924,491
(2) 10-year	14,860	-	C	-	-	323,224	-	-	-	-	-	-
Sub-total	57,380	2,618,385		184,856	665,543	323,224	-	390,682	340,160	4	(7) (2,483)	1,052,192
(W - Zone)												
W. 1: R. Cua - R. Nuoc Len	46,170	1,638,837	A,B,C	77,350	394,155	261,482	-	404,299	251,040	-	(3) (1,181)	808,067
(1) 5-year	31,380	1,638,837	A,B	77,350	394,155	-	-	404,299	251,040	-	(3) (1,181)	808,067
(2) 10-year	14,790	-	A,C	-	-	261,482	-	-	-	-	-	-
Total	46,170	1,638,837		77,350	394,155	261,482	-	404,299	251,040	-	(3) (1,181)	808,067
(S - Zone)												
S. 1: R. Xom Cui - R. Ba Lao	12,500	2,212	A,B	69,720	109,477	-	-	138,128	100,000	-	-	163,764
S. 2: R. Ong Lon - K. Cay Ko	8,820	-	A	61,740	61,740	-	-	92,855	70,560	-	-	104,617
S. 3: Tan - Ca Cam - Roi - Tom - Muong chuoi	33,390	-	A,B,C	63,424	63,424	34,404	-	286,445	174,000	-	-	275,809
(1) 5-year	21,750	-	A,B	63,424	63,424	-	-	286,445	174,000	-	-	275,809
(2) 10-year	11,640	-	A,C	-	-	34,404	-	-	-	-	-	-
S. 4: R. Cau Kinh	1,920	-	A	13,440	13,440	-	-	29,127	15,360	-	-	24,338
S. 5: R. AP3Phu My	1,860	-	A	13,020	13,020	-	-	28,687	14,880	-	-	25,651
Sub-total	58,490	2,212		221,344	261,101	34404	-	575,242	374,800	-	-	592,179
(NE - Zone)												
NE. 1 R. Ong Dua	2,250	66,877	B	-	35,218	-	-	14,943	18,000	-	-	35,944
NE. 2: R. Go Dua	4,770	38,573	B	34,435	74,662	-	-	47,507	38,160	-	-	70,636
NE. 3: R. Thu Duc	2,140	76,988	B	-	33,496	-	-	5,918	17,120	-	(1) (228)	35,660
NE. 4: R. Truong Tho	2,170	55,873	B	-	33,966	-	-	57,784	17,360	-	(1) (211)	77,023
NE. 5: R. Nhum - R. Cau - R. Go Gong	29,320	2,612,667	B,C	-	229,466	328,049	-	38,965	117,280	-	-	540,851
(1) 5- year	14,660	2,612,667	B	-	229,466	-	-	38,965	117,280	-	(3) (1,017)	540,851
(2) 10-year	14,660	-	C	-	-	328,049	-	-	-	-	-	-
Sub-total	40,650	2,850,978		34,435	406,808	328,049	-	165,117	207,920	-	(5) (1,456)	760,114
(SE - Zone)												
SE. 1: R. Binh Khanh	2,320	-	A	16,240	16,240	-	-	1,651	18,560	-	-	23,528
SE. 2: R. Ca Tre Nho	2,080	-	A	14,560	14,560	-	-	5,079	16,640	-	-	21,792
SE. 3: R. Da Do	2,500	-	A	17,500	17,500	-	-	11,110	20,000	-	-	27,131
SE. 4: R. Giong Ong To	5,460	-	A	38,220	38,220	-	-	13,917	43,680	-	-	57,310
SE. 5: R. Muong	1,110	37,017	B	-	17,374	-	-	-	8,880	-	-	11,100
SE. 6: R. Ky Ha	4,390	90,090	B	-	68,714	-	-	-	35,120	-	-	43,900
SE. 7: R. Kinh Ong Hong - R. Chuiec	5,700	-	A,B	61,531	61,531	-	-	38,877	45,600	-	-	72,645
SE. 8: R. Ong Cay - R. Ba Cua - R. Ong Kieu	6,070	-	A	42,490	42,490	-	-	5,265	48,560	-	-	61,740
SE. 9: R. Tan - R. Ong Nhieu	9,540	-	A	49,490	88,152	-	-	80,724	76,320	-	-	157,149
SE. 10: Tac River	10,110	-	A	-	-	-	-	46,161	80,880	-	-	109,941
Sub-total	49,280	127,107		240,031	364,781	0	0	202,784	394,240	-	-	586,236
Total	307,300	9,452,394		886,046	2,281,306	1,666,318	39,091	2,035,274	2,010,800	4	(19) (6,509)	4,489,987

TABLE E.6.17 (1/5) BREAKDOWN FOR BILL OF QUANTITES ON CANAL IMPROVEMENT

Item (Drainage Zone) Name of Canal Canal Section	Canal Length L (m)	Designed Hydraulic Section (Wb x Wu x H) (m x m x m)	Excavation/ Dredging (E/D) (m3)	Bank Protection					O/M Road		Road and Railway Crossing		Land Acquisition (LA) (m2)
				Type (T)	Existing Bank Reformation (BR) (m2)	Grass (Sod) (GS) (m2)	Stone Masonry (SM) (m2)	Concrete Wall (CW) (m2)	Filling (F) (m3)	Pavement (P) (m2)	Box Culvert (BC) Number (BxHxNxL) (mxmxsectionxm)	Bridge Number (BxL)	
(C - Zone)													
C. 1: Nhieu Loc - Thi Nghe (10-year frequency plan)													
C. 1. A (Nhieu Loc)	550	9.3x24.0x4.5	41,763	C	-	-	9,717	-	Existing	4,400	-	-	9,682
C. 1. B (Nhieu Loc)	2,140	22.3x40.0x5.5	283,524	C	-	-	45,524	-	15,359	17,120	-	-	59,216
C. 1. C (Nhieu Loc)	1,770	24.3x42.0x5.5	194,305	C	-	-	37,653	-	9,503	14,160	-	-	30,902
C. 1. D (Thi Nghe)	2,320	25.3x43.0x5.5	189,071	C	-	-	49,353	-	21,601	18,560	-	-	32,239
C. 1. E (Thi Nghe)	2,150	26.3x44.0x5.5	Existing	C	-	-	45,736	-	8,332	17,200	-	-	25,326
Sub-total	8,930		708,663		-	-	187,983	-	54,795	71,440	-	-	157,365
C. 2: Cau Son - Tau Vat Tat (5-year frequency plan)													
C. 2. A (Tau Vat Tat)	500	16.8x30.0x4.0	Existing	C	-	-	7,932	-	2,375	4,000	-	-	6,072
C. 2. A' (Cau Son)	1,500	8.3x20.0x3.5	13,055	C	-	-	21,092	-	16,158	12,000	-	-	21,619
C. 2. A"	1,500	5.3x17.0x3.5	Existing	C	-	-	21,092	-	16,158	12,000	-	-	21,619
Sub-total	3,500		13,055		-	-	50,116	-	34,691	28,000	-	-	49,310
C. 3: Tan Hoa - Lo Gom (5-year frequency plan)													
C. 3. A (Tan Hoa)	2,260	13.6x17.5x3.5	132,304	D	-	-	-	19,709	-	18,080	-	-	39,960
C. 3. B (Tan Hoa)	1,970	14.6x19.0x4.0	104,197	D	-	-	-	19,382	-	15,760	-	1 (9.0x19.0)	28,033
C. 3. C' (Lo Gom)	1,840	28.2x39.0x5.0	278,557	C	-	-	28,103	-	5,598	14,720	-	1 (14.7x47.0)	66,133
C. 3. C1 (Lo Gom)	1,000	35.6x47.0x5.3	111,264	C	-	-	16,122	-	4,175	8,000	-	-	19,900
C. 3. C2	1,500	24.8x38.0x4.0	47,681	C	-	-	23,797	-	6,582	12,000	-	-	22,347
Sub-total	8,570		674,003		-	-	68,022	39,091	16,355	68,560	-	2	176,373
C. 4: Tau Hu - Ben Nghe, Doi - Te (10-year frequency plan except R. Ba Tang and R. Ba Lon)													
(5) C. 4. A2' (R. Ba Tang)	1,330	16.4x32.0x3.5	39,014	B	-	20,818	-	-	24,171	10,640	-	-	37,721
C. 4. A2 (R. Ba Tang)	2,000	Existing Section	Existing	A	14,000	14,000	-	-	12,888	16,000	-	-	22,430
Sub-total	3,330	Existing Section	39,014		14,000	34,818	-	-	37,059	26,640	-	-	60,151
(5) C. 4. A3 (R. Ba Lon)	2,560	12.4x28.0x3.5	3,545	B	-	40,070	-	-	27,433	20,480	-	-	20,480
C. 4. A4 (R. Ba Lon)	3,180	Existing Section	Existing	A	22,260	22,260	-	-	25,339	25,440	-	-	25,440
Sub-total	5,740	Existing Section	3,545		22,260	62,330	-	-	52,772	45,920	-	-	45,920
C. 4. A1 (Tau Hu)	2,680	22.0x58.6x5.7	243,291	C	-	-	103,394	-	27,867	21,440	-	1 (2.5x58.5)	21,440
C. 4. B (Tau Hu)	2,130	22.0x58.6x5.7	208,529	C	-	-	82,175	-	10,134	17,040	-	1 (6.5x58.5)	17,040
C. 4. C' (Tau Hu)	2,190	21.0x50.4x4.5	154,311	C	-	-	67,869	-	7,288	17,520	-	-	17,520
C. 4. D (Tau Hu)	1,980	21.0x50.4x4.5	58,116	C	-	-	61,361	-	7,784	15,840	-	-	15,840
C. 4. E (Ben Nghe)	3,170	26.0x55.4x4.5	112,348	C	-	-	98,239	-	5,371	25,360	-	-	25,360
Sub-total	12,150	26.0x55.4x4.5	776,595		-	-	413,038	-	58,444	97,200	-	2	97,200
C. 4. A1' (Doi)	3,470	Existing Section	Existing	A	24,290	24,290	-	-	21,076	27,760	-	-	27,760
C. 4. B' (Doi)	2,020	Existing Section	Existing	A	14,140	14,140	-	-	3,198	16,160	-	-	16,160
(10) C. 4. C' (Doi)	1,400	Existing Section	Existing	A	9,800	9,800	-	-	-	11,200	-	-	11,200
C. 4. D' (Doi)	1,970	Existing Section	Existing	A	13,790	13,790	-	-	4,546	15,760	-	-	15,760
C. 4. E' (Te)	4,250	Existing Section	Existing	A	29,750	29,750	-	-	14,214	34,000	-	-	34,000
Sub-total	13,110		-		91,770	91,770	-	-	43,034	104,880	-	2	104,880
Sub-total	34,330		819,154		128,030	188,918	413,038	-	191,309	274,640	-	4	308,151
Total	55,330		2,214,875		128,030	188,918	719,159	39,091	297,150	442,640	-	4	691,199

TABLE E.6.17 (2/5) BREAKDOWN FOR BILL OF QUANTITES ON CANAL IMPROVEMENT

Item (Drainage Zone) Name of Canal Canal Section	Canal Length L (m)	Designed Hydraulic Section (Wb x Wu x H) (m x m x m)	Excavation/ Dredging (E/D) (m3)	Bank Protection					O/M Road		Road and Railway Crossing		Land Acquisition (LA) (m2)
				Type (T)	Existing Bank Reformation (BR) (m2)	Grass (Sod) (GS) (m2)	Stone Masonry (SM) (m2)	Concrete Wall (CW) (m2)	Filling (F) (m3)	Pavement (P) (m2)	Box Culvert (BC) Number (BxHxNxL) (mxmxsectionxm)	Bridge Number (BxL)	
(N - Zone)													
N. 1: Ben Da - Ba Hong (5-year frequency plan)													
N. 1. A (Ben Da)	1,070	0.4x14.0x3.0	6,610	B	-	16,748	-	-	4,818	8,560	2 (3x3x2x7, 3x3x2x6)	-	13,700
N. 1. B (Ben Da)	2,780	2.4x18.0x3.5	28,713	B	-	43,514	-	-	17,327	22,240	-	-	36,754
N. 1. C (Ben Da)	2,040	9.4x29.0x4.5	66,408	B	-	31,931	-	-	12,713	16,320	-	-	26,970
N. 1. D (Ba Hong)	3,610	9.4x29.0x4.5	Existing	B	56,505	56,505	-	-	28,269	28,880	-	-	50,277
Sub-total	9,500		101,731		56,505	148,698	-	-	63,127	76,000	2	-	127,701
N. 2: Tham Luong - Ben Cat (5 and 10-year frequency plans)													
N. 2. A (Dai Han)	970	1.1x9.5x1.7	6,226	B	-	15,183	-	-	3,229	7,760	1 (2x2.1x2x6)	-	16,597
N. 2. A (Dai Han)	1,680	1.9x11.5x2.0	17,126	B	-	26,296	-	-	4,767	13,440	1 (2x2.4x2x6.)	-	30,284
N. 2. A (Dai Han)	4,090	1.4x15.0x3.0	104,833	B	-	64,019	-	-	Existing	32,720	-	2 (7x15, 10x15)	83,681
N. 2. D1 (Dai Han)	2,490	8.9x28.5x4.5	225,251	B	-	38,975	-	-	1,354	19,920	-	-	76,923
N. 2. D2 (May 19)	3,340	8.4x30.0x5.0	476,534	B	-	52,279	-	-	Existing	26,720	-	2 (6x30, 8x30)	119,249
N. 2. E (Tham Luong)	1,560	34.9x58.5x5.5	372,744	B	-	24,418	-	-	6,294	12,480	-	1 (13.5x58.5)	83,926
(5) N. 2. F (Tham Luong)	2,250	34.9x58.5x5.5	412,415	B	-	35,218	-	-	43,177	18,000	-	1 (10.0x58.5)	113,968
N. 2. G1(Tham Luong)	4,370	34.9x58.5x5.5	726,748	B	-	68,401	-	-	81,807	34,960	-	1 (7.4x58.5)	194,376
N. 2. G2 (R. Ben Cat)	3,100	11.4x27x3.5	Existing	B	48,523	48,523	-	-	42,047	24,800	-	-	50,251
N. 2. G3 (R. Ben Cat)	2,490	17.4x33.0x3.5	Existing	B	38,975	38,975	-	-	20,937	19,920	-	-	35,293
N. 2. H (Ben Cat)	1,570	34.9x58.5x5.5	171,680	B	-	24,574	-	-	25,229	12,560	-	-	26,866
N. 2. I (Ben Cat)	2,500	34.9x58.5x5.5	83,097	B	-	39,131	-	-	49,916	20,000	-	-	46,071
N. 2. J (Ben Cat)	2,610	34.9x58.5x5.5	Existing	B	40,853	40,853	-	-	48,798	20,880	-	-	47,006
Sub-total	33,020		2,516,654		128,351	516,845	-	-	327,555	264,160	2	7	924,491
N. 2. E (Tham Luong)	1,560	34.9x58.5x5.5	-	C	-	-	41,162	-	-	-	-	-	-
N. 2. F (Tham Luong)	2,250	34.9x58.5x5.5	-	C	-	-	59,368	-	-	-	-	-	-
(10) N. 2. G1(Tham Luong)	4,370	34.9x58.5x5.5	-	C	-	-	115,305	-	-	-	-	-	-
N. 2. H (Ben Cat)	1,570	34.9x58.5x5.5	-	C	-	-	41,425	-	-	-	-	-	-
N. 2. I (Ben Cat)	2,500	34.9x58.5x5.5	-	C	-	-	65,964	-	-	-	-	-	-
N. 2. J (Ben Cat)	2,610	34.9x58.5x5.5	-	C	-	-	68,866	-	-	-	-	-	-
Sub-total	14,860		-		-	-	323,224	-	-	-	-	-	-
Total	57,380		2,618,385		184,856	665,543	323,224	-	390,682	340,160	4	7	1,052,192
(W - Zone)													
W. 1: R. Cua - R. Nuoc Len (5 and 10-year frequency plans)													
W. 1. A	2,600	8.2x25x3.8	136,554	B	-	40,696	-	-	5,850	20,800	-	-	66,100
W. 1. B' (Cua)	1,700	24.4x48.0x5.5	305,843	B	-	26,609	-	-	Existing	13,600	-	2 (10.6x48.0)	71,615
W. 1. B (Cua)	350	0.4x24.0x5.5	9,610	B	-	5,478	-	-	5,170	2,800	-	-	8,152
W. 1. C1' (Cua)	3,110	0.4x24.0x5.5	127,741	B	-	48,679	-	-	35,117	24,880	-	-	74,462
W. 1. C1 (Cua)	1,000	24.4x48.0x5.5	146,828	B	-	15,652	-	-	11,611	8,000	-	1 (3.4x48.0)	42,491
W. 1. C2 (Cua)	2,200	17.4x37.0x4.5	171,220	B	-	34,435	-	-	35,825	17,600	-	-	82,271
(5) W. 1. D1 (Nuoc Len)	4,490	24.4x48.0x5.5	451,063	B	-	70,280	-	-	123,295	35,920	-	-	196,699
W. 1. D2	2,070	12.4x30.0x4.0	99,455	B	-	32,401	-	-	31,168	16,560	-	-	62,620
W. 1. D1 (Nuoc Len)	2,720	24.4x48.0x5.5	190,523	B	-	42,575	-	-	50,290	21,760	-	-	73,840

TABLE E.6.17 (3/5) BREAKDOWN FOR BILL OF QUANTITES ON CANAL IMPROVEMENT

Item (Drainage Zone) Name of Canal Canal Section	Canal Length L (m)	Designed Hydraulic Section (Wb x Wu x H) (m x m x m)	Excavation/ Dredging (E/D) (m3)	Bank Protection					O/M Road		Road and Railway Crossing		Land Acquisition (LA) (m2)
				Type (T)	Existing Bank Reformation (BR) (m2)	Grass (Sod) (GS) (m2)	Stone Masonry (SM) (m2)	Concrete Wall (CW) (m2)	Filling (F) (m3)	Pavement (P) (m2)	Box Culvert (BC) Number (BxHxNxL) (mxmxsectionxm)	Bridge Number (BxL)	
W. 1. E2	4,900	Existing Section	Existing	A	34,300	34,300	-	-	65,017	39,200	-	-	60,624
W. 1. E3 (Ben Luc)	1,360	Existing Section	Existing	A	9,520	9,520	-	-	7,093	10,880	-	-	14,951
W. 1. F (Ben Luc)	1,180	Existing Section	Existing	A	8,260	8,260	-	-	6,967	9,440	-	-	13,120
W. 1. G (Can Guioc)	1,850	Existing Section	Existing	A	12,950	12,950	-	-	15,979	14,800	-	-	21,459
W. 1. H (Can Guioc)	1,850	Existing Section	Existing	A	12,320	12,320	-	-	10,917	14,800	-	-	19,663
Sub-total	31,380		1,638,837		77,350	394,155	-	-	404,299	251,040	-	3	808,067
W. 1. B' (Cua)	1,700	24.4x48.0x5.5	-	C	-	-	44,856	-	-	-	-	-	-
W. 1. C1 (Cua)	1,000	24.4x48.0x5.5	-	C	-	-	26,386	-	-	-	-	-	-
W. 1. D1 (Nuoc Len)	4,490	24.4x48.0x5.5	-	C	-	-	118,471	-	-	-	-	-	-
(10) W. 1. D1 (Nuoc Len)	2,720	24.4x48.0x5.5	-	C	-	-	71,769	-	-	-	-	-	-
W. 1. F (Ben Luc)	1,180	Existing Section	-	A	-	-	-	-	-	-	-	-	-
W. 1. G (Can Guioc)	1,850	Existing Section	-	A	-	-	-	-	-	-	-	-	-
W. 1. H (Can Guioc)	1,850	Existing Section	-	A	-	-	-	-	-	-	-	-	-
Sub-total	14,790		-		-	-	261,482	-	-	-	-	-	-
Total	46,170		1,638,837		77,350	394,155	261,482	-	404,299	251,040	-	3	808,067
(S = Zone)													
S. 1: R. Xom Cui - R. Ba Lao (5-year frequency plan)													
S. 1. A (Ba Lao)	2,540	10.4x28.0x4.0	2,212	B	-	39,757	-	-	59,108	20,320	-	-	49,465
S. 1. B1 (Ba Lao)	2,510	Existing Section	Existing	A	17,570	17,570	-	-	21,841	20,080	-	-	29,143
S. 1. B2 (Xom Cui)	4,000	Existing Section	Existing	A	28,000	28,000	-	-	34,514	32,000	-	-	46,392
S. 1. B3 (Xom Cui)	2,060	Existing Section	Existing	A	14,420	14,420	-	-	15,275	16,480	-	-	23,457
S. 1. C (Ba Lao)	1,390	Existing Section	Existing	A	9,730	9,730	-	-	7,390	11,120	-	-	15,307
Sub-total	12,500		2,212		69,720	109,477	-	-	138,128	100,000	-	-	163,764
S. 2: R. Ong Lon - K. Cay Ko (5-year frequency plan)													
S. 2. A1 (Ong Lon)	2,020	Existing Section	Existing	A	14,140	14,140	-	-	37,660	16,160	-	-	26,689
S. 2. A2 (Ong Be)	1,900	Existing Section	Existing	A	13,300	13,300	-	-	34,264	15,200	-	-	24,928
S. 2. B (Ong Lon)	1,510	Existing Section	Existing	A	10,570	10,570	-	-	2,689	12,080	-	-	15,629
S. 2. C (Cay Kho)	3,390	Existing Section	Existing	A	23,730	23,730	-	-	18,242	27,120	-	-	37,371
Sub-total	8,820		-		61,740	61,740	-	-	92,855	70,560	-	-	104,617
S. 3: Tan - Ca Cam - Roi - Tom - Muong Chuoi (5 and 10-year frequency plans)													
S. 3. A (Tan)	1,570	8.4x28.0x4.0	Existing	B	24,574	24,574	-	-	27,461	12,560	-	-	27,638
S. 3. B1 (Cam)	2,430	Existing Section	Existing	A	17,010	17,010	-	-	35,102	19,440	-	-	30,524
S. 3. B2 (Thay Tieu)	3,120	Existing Section	Existing	A	21,840	21,840	-	-	44,958	24,960	-	-	39,173
S. 3. B3 (Dia)	3,580	Existing Section	Existing	A	-	-	-	-	51,675	28,640	-	-	44,963
(5) S. 3. C (Roi)	2,600	Existing Section	Existing	A	-	-	-	-	29,872	20,800	-	-	31,411
S. 3. D1 (Tom)	2,630	Existing Section	Existing	A	-	-	-	-	36,956	21,040	-	-	32,870
S. 3. D2 (Cay Kho)	3,410	Existing Section	Existing	A	-	-	-	-	32,375	27,280	-	-	40,055
S. 3. E (Muong Chuoi)	2,410	Existing Section	Existing	A	-	-			28,046	19,280	-	-	29,175
Sub-total	21,750		-		63,424	63,424	-	-	286,445	174,000	-	-	275,809

TABLE E.6.17 (4/5) BREAKDOWN FOR BILL OF QUANTITES ON CANAL IMPROVEMENT

Item (Drainage Zone) Name of Canal Canal Section	Canal Length L (m)	Designed Hydraulic Section (Wb x Wu x H) (m x m x m)	Excavation/ Dredging (E/D) (m3)	Bank Protection					O/M Road		Road and Railway Crossing		Land Acquisition (LA) (m2)
				Type (T)	Existing Bank Reformation (BR) (m2)	Grass (Sod) (GS) (m2)	Stone Masonry (SM) (m2)	Concrete Wall (CW) (m2)	Filling (F) (m3)	Pavement (P) (m2)	Box Culvert (BC) Number (BxHxNxL) (mxmxsectionxm)	Bridge Number (BxL)	
S. 3. A (Tan)	1,570	8.4x28.0x4.0	Existing	C	-	-	34,404	-	-	-	-	-	-
S. 3. B1 (Cam)	2,430	Existing Section	Existing	A	-	-	-	-	-	-	-	-	-
(10) S. 3. C (Roi)	2,600	Existing Section	Existing	A	-	-	-	-	-	-	-	-	-
S. 3. D1 (Tom)	2,630	Existing Section	Existing	A	-	-	-	-	-	-	-	-	-
S. 3. E (Muong Chuoi)	2,410	Existing Section	Existing	A	-	-	-	-	-	-	-	-	-
Sub-total	11,640		-		-	-	34,404	-	-	-	-	-	-
S. 4: R. Cau Kinh (5-year frequency plan)													
S. 4. A	1,920	Existing Section	Existing	A	13,440	13,440	-	-	29,127	15,360	-	-	24,338
Sub-total	1,920		-		13,440	13,440	-	-	29,127	15,360	-	-	24,338
S. 5: R. AP3Phu My (5-year frequency plan)													
S. 5. A	1,860	Existing Section	Existing	A	13,020	13,020	-	-	28,687	14,880	-	-	23,651
Sub-total	1,860		-		13,020	13,020	-	-	28,687	14,880	-	-	23,651
Total	58,490		2,212		221,344	261,101	34,404	-	575,242	374,800	-	-	592,179
(NE - Zone)													
NE. 1 R. Ong Dua (5-year frequency plan)													
NE. 1. A	2,250	12.4x28.0x3.5	66,877	B	-	35,218	-	-	14,943	18,000	-	-	35,944
Sub-total	2,250		66,877		-	35,218	-	-	14,943	18,000	-	-	35,944
NE. 2: R. Go Dua (5-year frequency plan)													
NE. 2. A	2,570	12.4x32.0x4.5	38,573	B	-	40,227	-	-	28,379	20,560	-	-	39,188
NE. 2. B	2,200	16.5x36.1x4.5	Existing	B	34,435	34,435	-	-	19,128	17,600	-	-	31,448
Sub-total	4,770		38,573		34,435	74,662	-	-	47,507	38,160	-	-	70,636
NE. 3: R. Thu Duc (5-year frequency plan)													
NE. 3. A	2,140	10.4x28.0x4.0	76,988	B	-	33,496	-	-	5,918	17,120	-	1 (6.0x38.0)	35,660
Sub-total	2,140		76,988		-	33,496	-	-	5,918	17,120	-	-	35,660
NE. 4: R. Truong Tho (5-year frequency plan)													
NE. 4. A	2,170	4.4x22.0x4.4	55,873	B	-	33,966	-	-	57,784	17,360	-	1 (7.8x27.0)	77,023
Sub-total	2,170		55,873		-	33,966	-	-	57,784	17,360	-	-	77,023
NE. 5: R. Nhum - R. Cau - R. Go Gong (5 and 10-year frequency plans)													
NE. 5. A1 (Nhum)	3,350	5.4x19.0x3.4	311,937	B	-	52,436	-	-	Existing	26,800	-	-	102,118
NE. 5. A2	2,340	0.9x14.5x3.4	207,427	B	-	36,627	-	-	Existing	18,720	-	-	68,706
(5) NE. 5. B (Cau)	1,700	7.9x25.5x4.4	291,066	B	-	26,609	-	-	Existing	13,600	-	1 (10.0x29.0)	56,626
NE. 5. C (Go Gong)	2,830	36.4x62.0x6.4	1,105,148	B	-	44,297	-	-	Existing	22,640	-	1 (5.7x79.0)	183,060
NE. 5. D1 (Go Gong)	4,440	36.4x62.0x6.4	697,089	B	-	69,497	-	-	38,965	35,520	-	1 (3.5x79.0)	130,341
Sub-total	14,660		2,612,667		-	229,466	-	-	38,965	117,280	-	-	560,851
NE. 5. A1 (Nhum)	3,350	5.4x19.0x3.4	-	C	-	-	50,938	-	-	-	-	-	-
NE. 5. A2	2,340	0.9x14.5x3.4	-	C	-	-	35,580	-	-	-	-	-	-
(10) NE. 5. B (Cau)	1,700	7.9x25.5x4.4	-	C	-	-	33,452	-	-	-	-	-	-
NE. 5. C (Go Gong)	2,830	36.4x62.0x6.4	-	C	-	-	80,999	-	-	-	-	-	-
NE. 5. D1 (Go Gong)	4,440	36.4x62.0x6.4	-	C	-	-	127,080	-	-	-	-	-	-
Sub-total	14,660		-		-	-	328,049	-	-	-	-	-	-
Total	40,650		2,850,978		34,435	406,808	328,049	-	165,117	207,920	-	-	760,114

TABLE E.6.17 (5/5) BREAKDOWN FOR BILL OF QUANTITES ON CANAL IMPROVEMENT

Item (Drainage Zone) Name of Canal Canal Section	Canal Length L (m)	Designed Hydraulic Section (Wb x Wu x H) (m x m x m)	Excavation/ Dredging (E/D) (m3)	Bank Protection					O/M Road		Road and Railway Crossing		Land Acquisition (LA) (m2)
				Type (T)	Existing Bank Reformation (BR) (m2)	Grass (Sod) (GS) (m2)	Stone Masonry (SM) (m2)	Concrete Wall (CW) (m2)	Filling (F) (m3)	Pavement (P) (m2)	Box Culvert (BC) Number (BxHxNxL) (mxmxsectionxm)	Bridge Number (BxL)	
(SE - Zone)													
SE. 1: R. Binh Khanh (5-year frequency plan)													
SE. 1. A	2,320	Existing Section	Existing	A	16,240	16,240	-	-	1,651	18,560	-	-	23,528
Sub-total	2,320		-		16,240	16,240	-	-	1,651	18,560	-	-	23,528
SE. 2: R. Ca Tre Nho (5-year frquency plan)													
SE. 2. A	2,080	Existing Section	Existing	A	14,560	14,560	-	-	5,079	16,640	-	-	21,792
Sub-total	2,080		-		14,560	14,560	-	-	5,079	16,640	-	-	21,792
SE. 3: R. Da Do (5-year frequency plan)													
SE. 3. A	2,500	Existing Section	Existing	A	17,500	17,500	-	-	11,110	20,000	-	-	27,131
Sub-total	2,500		-		17,500	17,500	-	-	11,110	20,000	-	-	27,131
SE. 4: R. Giong Ong To (5-year frequency plan)													
SE. 4. A	3,410	Existing Section	Existing	A	23,870	23,870	-	-	10,677	27,280	-	-	36,172
SE. 4. B	2,050	Existing Section	Existing	A	14,350	14,350	-	-	3,240	16,400	-	-	21,138
Sub-total	5,460		-		38,220	38,220	-	-	13,917	43,680	-	-	57,310
SE. 5: R. Muong (5-year frequency plan)													
SE. 5. A	1,110	14.4x30.0x3.5	37,017	B	-	17,374	-	-		8,880	-	-	11,100
Sub-total	1,110		37,017		-	17,374	-	-	-	8,880	-	-	11,100
SE. 6: R. Ky Ha (5-year frequency plan)													
SE. 6. A	4,390	13.6x30.0x3.7	90,090	B	-	68,714	-	-		35,120	-	-	43,900
Sub-total	4,390		90,090		-	68,714	-	-	-	35,120	-	-	43,900
SE. 7: R. Kinh Ong Hong - R. Chuiec (5-year frequency plan)													
SE. 7. A (Ong Hong)	2,500	18.4x38.0x4.5	Existing	B	39,131	39,131	-	-	29,309	20,000	-	-	38,785
SE. 7. B (Chuiec)	3,200	Existing Section	Existing	A	22,400	22,400	-	-	9,568	25,600	-	-	33,860
Sub-total	5,700		-		61,531	61,531	-	-	38,877	45,600	-	-	72,645
SE. 8: R. Ong Cay - R. Ba Cua - R. Ong Kieu (5-year frequency plan)													
SE. 8. A (Ong Cay)	1,950	Existing Section	Existing	A	13,650	13,650	-	-	-	15,600	-	-	19,500
SE. 8. B (Ong Kieu)	4,120	Existing Section	Existing	A	28,840	28,840	-	-	5,265	32,960	-	-	42,240
Sub-total	6,070		-		42,490	42,490	-	-	5,265	48,560	-	-	61,740
SE. 9: R. Tan - R. Ong Nhieu (5-year frequency plan)													
SE. 9. A (Tan)	2,470	Existing Section	Existing	A	-	38,662	-	-	44,135	19,760	-	-	79,478
SE. 9. B (Ong Nhieu)	4,240	Existing Section	Existing	A	29,680	29,680	-	-	23,552	33,920	-	-	46,874
SE. 9. C (Ong Nhieu)	2,830	Existing Section	Existing	A	19,810	19,810	-	-	13,037	22,640	-	-	30,797
Sub-total	9,540		-		49,490	88,152	-	-	80,724	76,320	-	-	157,149
SE. 10: Tac River (10-year frequency plan)													
SE. 10. A	3,620	Existing Section	Existing	A	-	-	-	-	18,286	28,960	-	-	39,689
SE. 10. B	4,080	Existing Section	Existing	A	-	-	-	-	16,030	32,640	-	-	43,889
SE. 10. C	2,410	Existing Section	Existing	A	-	-	-	-	11,845	19,280	-	-	26,363
Sub-total	10,110		-		-	-	-	-	46,161	80,880	-	-	109,941
Total	49,280		127,107		240,031	364,781	0	0	202,784	394,240	-	-	586,236
Grand Total			9,452,394		886,046	2,281,306	1,666,318	39,091	2,035,274	2,010,800	4	14	4,489,987

TABLE E.6.18 BILL OF QUANTITIES FOR PROPOSED PUMP DRAINAGE PLAN

Item	Unit	Pump Drainage Area				Remarks
		Than Da	Vissan	Ben Me Coc (1)	Ben Me Coc (2)	
1. Pumping Station						
(1) Number	place	1	1	1	1	
(2) Capacity	m^3/s	1.1	11.5	1.4	1.4	
2. Retarding Pond						
(1) Number	Place	1	1	1	1	
(2) Storage Volume	m^3	19200	113,500	26400	25000	
3. Water Gate						
(1) Number	place	1	1	1	1	
(2) Width,Hight,Unit	m	2.0 x 2.0 x 1	4.0 x 4.0 x 4	2.5 x 2.5 x 1	2.5 x 2.5 x 1	Miter gate
4. Dike/Revetment						
(1) New construction	m	200	1,500	4,200	3,400	Bank protection/
(2) Rehabilitation	m	1,200	1,100	-	-	retaining wall
5. Drainage Pipe/Ditch						New construction/
(1) Service Area	m^2	0.495	5.474	0.677	0.640	rehabilitation

TABLE F.6.19 BILL OF QUANTITIES FOR PROPOSED ONSITE STORAGE POND IN NE.3, NE.4 AND NE.5 BASINS IN NE ZONE

Name of Drainage Catchment / Item		NE.3	NE.4	NE.5	Remarks
Drainage Area	(A) (km^2)	7.15	2.65	34.38	
Population (person)	1997	40,365	18,519	51,183	
	2020	120,434	59,289	127,214	
	Difference	80,069	40,770	76,031	
Built-up Area (km2)	1997	2.39	1.50	5.13	
	2020	6.25	2.48	21.46	
	Difference	3.86	0.98	16.33	
Run-off Coefficient (C)	1997	0.50	0.57	0.45	
	2020	0.64	0.73	0.57	
	Difference (ΔC)	0.14	0.16	0.12	
Specific Requirement of Onsite Storage Pond (Vs) (x 1000 $m^3/km2$)		17.2	19.0	15.3	
Total Requirement of Onsite Storage Pond (V=VsxA) (x 1000 m3)		123.0	50.5	526.1	
Proposed Typical Capacity of Onsite Storage Pond (Vt) (x 1000 m3)		31.0	25.5	44.4	
Proposed Number of Onsite Storage Pond (N=V/Vt) (place)		4	2	12	

Note: 1. Formula for estimation of apecific requirement of onsite storage pond is as follows:

(a) NE.3 and NE.4 (5-year return period): $Vs = 76,852 \times \Delta C^{0.76112}$

(b) NE.5 (10-year return period): $Vs = 85,679 \times \Delta C^{0.76201}$

2. Proposed typical dimension of onsite storage ponds are as follows:
   (a) NE.3 : 100 m in width x 100 m in length x 3.1 m in depth
   (b) NE.4 : 90 m in width x 90 m in length x 3.1 m in depth
   (a) NE.5 : 120 m in width x 120 m in length x 3.1 m in depth
3. Onsite storage pond shall be provided the following facilities:
   (a) Operation and maintenance road with a total width of 5 m around the pond
   (b) Inlet and outlet structures (box culvert: 2 m in width x 2 m in hight x 20 m in length with ga
   (c) Slope protection by stone masonry
   (d) Guard fence around the pond

Table E.6.20 Length of Proposed Drainage Pipes and Channel

Drainage Zone		Sewerage Zone				Length of Proposed Sewer (m)				
				Area (ha)				Drainage Line		
Zone Name	Area (ha)	Collection System	Zone Name	Existing Combined Area	Out of Existing Combined Area	Main Sewer (111m/ha)	Secondary/Tertiary Sewer (48m/ha)	Stormwater Sewer (11m/ha)	Open Channel (100x2m/ha)	Sub-Total	Total
C-Zone	10,641	Combined Sewer	NLTN	2,132	1,803	200.133	86.544	-	-	-	286.677
			THLG	958	776	86.136	37.248	-	-	-	123.384
			THBNDT	2,403	662	73.482	31.776	-	-	-	105.258
			Total	5,493	3,241	359.751	155.568	-	-	-	515.319
		Separate Sewer	SS	0	145	16.095	6.960	1.595	29.000	30.595	53.650
			Total	0	145	16.095	6.960	1.595	29.000	30.595	53.650
		Out of Sewerage Zone	Built-up Area	0	927	-	-	10.197	185.400	195.597	195.597
			Other Land Use	0	835	-	-	-	-	-	-
			Total	0	1,762	-	-	10.197	185.400	195.597	195.597
		Total		5,493	5,148	375.846	162.528	11.792	214.400	226.192	764.566
N-Zone	13,620	Combined Sewer	TLBC	421	1,074	119.214	51.552	-	-	-	170.766
			Total	421	1,074	119.214	51.552	-	-	-	170.766
		Separate Sewer	SW	0	1,315	145.965	63.120	14.465	263.000	277.465	486.550
			Total	0	1,315	145.965	63.120	14.465	263.000	277.465	486.550
		Out of Sewerage Zone	Built-up Area	0	4,112	-	-	45.232	822.400	867.632	867.632
			Other Land Use	0	6,696	-	-	-	-	-	-
			Total	0	10,808	-	-	45.232	822.400	867.632	867.632
		Total		421	13,197	265.179	114.672	59.697	1,085.400	1,145.097	1,524.948
W-Zone	7,291	Combined Sewer	THLG	233	480	53.280	23.040	-	-	-	76.320
			Total	233	480	53.280	23.040	-	-	-	76.320
		Out of Sewerage Zone	Built-up Area	0	1,776	-	-	19.536	355.200	374.736	374.736
			Other Land Use	0	4,802	-	-	-	-	-	-
			Total	0	6,578	-	-	19.536	355.200	374.736	374.736
		Total		233	7,058	53.280	23.040	19.536	355.200	374.736	451.056
S-Zone	8,174	Separate Sewer	SS	67	1,343	149.073	64.464	14.773	268.600	283.373	496.910
			Total	67	1,343	149.073	64.464	14.773	268.600	283.373	496.910
		Out of Sewerage Zone	Built-up Area	0	1,733	-	-	19.063	346.600	365.663	365.663
			Other Land Use	0	5,031	-	-	-	-	-	-
			Total	0	6,764	-	-	19.063	346.600	365.663	365.663
		Total		67	8,107	149.073	64.464	33.836	615.200	649.036	862.573
NE-Zone	6,491	Separate Sewer	SN-I	0	2,114	234.654	101.472	23.254	422.800	446.054	782.180
			SN-II	0	191	21.201	9.168	2.101	38.200	40.301	70.670
			Total	0	2,305	255.855	110.640	25.355	461.000	486.355	852.850
		Out of Sewerage Zone	Built-up Area	0	909	-	-	9.999	181.800	191.799	191.799
			Other Land Use	0	3,277	-	-	-	-	-	-
			Total	0	4,186	-	-	9.999	181.800	191.799	191.799
		Total		0	6,491	255.855	110.640	35.354	642.800	678.154	1,044.649
SE-Zone	11,936	Separate Sewer	SN-II	0	961	106.671	46.128	10.371	192.200	202.771	355.570
			SE	0	1,690	187.590	81.120	18.590	338.000	356.590	625.300
			Total	0	2,651	294.261	127.248	29.161	550.200	559.361	980.870
		Out of Sewerage Zone	Built-up Area	0	1,635	-	-	17.985	327.000	344.985	344.985
			Other Land Use	0	7,650	-	-	-	-	-	-
			Total	0	9,285	-	-	17.985	327.000	344.985	344.985
		Total		0	11,936	294.261	127.248	47.146	857.200	904.346	1,325.855

Table E.6.21 Proposed Sewer to Improve Existing Discharge Capacity

Line No.	Section Upstream	Section Downstream	Road Name	Length (m)	Diameter / Type (mm)	Average Earth Covering Depth (m)
a	U73A_1	U73B_1	NGUYEN TAT THANH	1,480	1,000	1
a	U73B_1	U73C_1	ditto	724	1,000	1
Sub-total				2,204		
b	55B_1	55C_1	Cong Quynh	182	1,200	1
b	55C_1	Ben Nghe Canal	Cong Quynh	513	2,000	1
c	147A_1	145B_1	Tran Hung Dao	192	1,000	1
c	145B_1	145BA_1	ditto	33	1,000	1
d	145AA_1	145BA_1	ditto	173	1,000	1
d	145BA_1	55C_1	ditto	46	1,000	1
Sub-total				1,139		
e	51_1	134B_1	Nguyen Dieu	147	1,200	1
e	134B_1	Ben Nghe Canal	Tran Binh Trong	362	2,000	3
f	49_1	253_1	Le Hong Phong	391	1,000	1
f	253_1	50B_1	Hung Vuong	298	2,000	1
f	50B_1	50EA_1	Tran Binh Trong	932	1,000	3
g	140A_1	47C_1	Dien Bien Phu	714	1,400	1
g	141A_1	47B_1	Dien Bien Phu	714	1,400	2
h	142_1	63DB_1	Dien Bien Phu	926	2,000	2
Sub-total				4,484		
i	117A_1	Hun Bang	Trinh Hoai Duc	724	BC 3000 x 2000	3
j	106A_1	Ben Nghe Canal	Hau Giang	1,108	2,000	4
k	109A_1	Lo Gom Canal	Hung Vuong	1,285	BC 4000 x 2000	2
l	3A_1/3B_1	Lo Gom Canal	Minh Phung	183	1,600	4
n	4AA_1	Lo Gom Canal	Hung Vuong	1,108	BC 3000 x 2000	3
o	112D_1	Lo Gom Canal	Phu Lam	152	1,600	4
m	2A_1	2B_1	Minh Phung	641	1,600	4
p	112E_1	Lo Gom Canal	Hung Vuong	107	1,200	2
q	112E_1	Lo Gom Canal	Hung Vuong	1,233	BC 3000 x 2000	3
Sub-total				5,817		
r	U40_1_1	Lo Gom Canal	HUONG LO 14	356	1,200	1
s	U40_2A1	Lo Gom Canal	ditto	483	1,000	1
t	U40_2C1	Lo Gom Canal	ditto	339	1,200	1
Sub-total				1,178		
u	U4BA_1	U4AA_1	QUANG TRUNG	38	1,000	1
v	U4BB_1	U4AB_1	ditto	321	1,000	2
Sub-total				359		
Total				15,181		

TABLE E.8.1 EXISTING HYDRAULIC FEATURES OF TAU HU - BEN NGHE CANAL

Station	Accumu-late Distance (m)	Canal Bed Elevation E1 (m)	Left Bank Elevation E2 (m)	Right Bank Elevation E3 (m)	Top Width B (m)	Depth H (m)	Maximum Flow Area A (m2)	Weted Perimeter P (m)	Hydraulic Radius R (m)	Average Gradiant I	Average Velocity V (m/s)	Discharge Capacity Q (m3/s)
No.0	0					0.0						
No.1	60	-2.55	2.07	1.53	112.6	4.1	306.06	113.12	2.71	0.00003	0.28	85
No.2	180	-2.72	2.69	1.64	95.0	4.4	262.19	96.28	2.72	0.00003	0.28	73
No.3	395	-2.51	2.19	2.49	64.4	4.7	222.94	66.25	3.37	0.00003	0.32	72
No.4	615	-2.21	1.93	2.03	68.9	4.1	215.70	70.54	3.06	0.00003	0.30	65
No.5	800	-2.01	2.15	2.00	59.9	4.0	163.07	61.58	2.65	0.00003	0.27	45
No.6	980	-2.36	1.83	1.85	39.0	4.2	114.44	41.36	2.77	0.00003	0.28	32
No.7	1,180	-2.12	2.10	1.74	67.7	3.9	180.12	69.02	2.61	0.00003	0.27	49
No.8	1,370	-1.99	1.97	1.85	38.0	3.8	121.58	41.62	2.92	0.00003	0.29	35
No.9	1,565	-2.02	1.72	2.09	55.9	3.7	159.87	57.92	2.76	0.00003	0.28	45
No.10	1,745	-2.06	2.04	2.89	52.8	4.1	169.81	55.34	3.07	0.00003	0.30	51
No.11	1,965	-1.82	2.10	1.83	53.8	3.7	152.07	55.19	2.76	0.00003	0.28	43
No.12	2,170	-2.09	2.97	2.13	64.9	4.2	204.57	66.73	3.07	0.00003	0.30	62
No.13	2,350	-2.33	2.14	2.02	44.9	4.4	152.77	46.93	3.26	0.00003	0.31	48
No.14	2,545	-2.26	1.73	1.89	47.8	4.0	153.33	49.90	3.07	0.00003	0.30	46
No.15	2,735	-2.55	1.77	1.57	58.8	4.1	193.87	60.68	3.19	0.00003	0.31	60
No.16	2,960	-3.53	2.14	1.88	94.7	5.4	349.24	96.00	3.64	0.00003	0.34	118
No.17	3,140	-7.87	1.90	1.83	101.9	9.7	552.51	105.79	5.22	0.00003	0.43	238
No.18	3,230	-10.50	1.99	1.86	99.7	12.4	693.67	103.58	6.70	0.00003	0.51	352
No.19	3,365	-2.98	1.98	1.57	68.9	4.6	175.36	70.27	2.50	0.00003	0.26	46
No.20	3,570	-2.93	2.34	1.63	55.1	4.6	175.92	57.14	3.08	0.00003	0.30	53
No.21	3,795	-2.66	2.10	1.63	46.0	4.3	142.36	47.85	2.98	0.00003	0.30	42
No.22	3,990	-2.84	2.06	1.48	37.2	4.3	119.18	39.81	2.99	0.00003	0.30	35
No.23	4,165	-2.75	2.37	1.44	43.4	4.2	139.38	45.96	3.03	0.00003	0.30	42
No.24	4,370	-2.69	1.97	1.40	57.7	4.1	131.18	59.91	2.19	0.00003	0.24	32
No.25	4,540	-2.74	2.15	1.67	54.0	4.4	166.18	56.61	2.94	0.00003	0.29	49
No.26	4,750	-1.91	2.32	1.65	59.8	3.6	153.13	61.15	2.50	0.00003	0.26	40
No.27	4,940	-2.03	1.67	1.66	62.0	3.7	168.49	64.13	2.63	0.00003	0.27	46
No.28	5,135	-1.73	1.24	1.44	73.4	3.0	161.46	74.08	2.18	0.00003	0.24	39
No.29	5,325	-1.71	1.44	1.41	81.9	3.1	169.47	82.73	2.05	0.00003	0.23	39
No.30	5,515	-1.40	2.09	1.75	43.4	3.2	100.38	44.54	2.25	0.00003	0.25	25
No.31	5,695	-1.58	1.98	1.79	47.9	3.4	125.92	50.00	2.52	0.00003	0.26	33
No.32	5,880	-1.71	1.75	1.49	49.0	3.2	132.02	51.36	2.57	0.00003	0.27	35
No.33	6,080	-1.85	1.77	1.89	45.6	3.6	123.48	47.44	2.60	0.00003	0.27	33
No.34	6,165	-1.52	2.94	2.40	45.8	3.9	123.70	47.63	2.60	0.00003	0.27	33
No.35	6,275	-1.50	2.14	1.99	42.8	3.5	111.59	44.19	2.53	0.00003	0.26	30
No.36	6,520	-1.49	2.05	1.84	39.5	3.3	96.20	40.66	2.37	0.00003	0.25	24
No.37	6,705	-1.63	2.50	1.77	37.3	3.4	93.94	39.32	2.39	0.00003	0.26	24
No.38	6,900	-1.63	1.86	1.94	35.9	3.5	97.55	37.60	2.59	0.00003	0.27	26
No.39	7,045	-1.71	1.79	1.75	44.3	3.5	112.14	45.60	2.46	0.00003	0.26	29
No.40	7,155	-1.84	2.13	1.78	33.2	3.6	84.92	34.98	2.43	0.00003	0.26	22
No.41	7,270	-2.07	1.73	1.95	46.6	3.8	110.45	48.35	2.28	0.00003	0.25	27
No.42	7,460	-2.69	1.86	1.79	53.5	4.5	173.40	55.20	3.14	0.00003	0.31	53
No.43	7,660	-3.16	1.81	1.78	49.8	4.9	176.30	52.01	3.39	0.00003	0.32	57
No.44	7,850	-2.81	1.54	1.64	51.61	4.4	156.31	53.06	2.95	0.00003	0.29	46
No.45	8,060	-3.27	1.66	1.31	32.58	4.6	96.73	35.06	2.76	0.00003	0.28	27
No.46	8,260	-2.72	1.62	1.55	37.29	4.3	120.42	39.94	3.02	0.00003	0.30	36
No.47	8,490	-3.25	1.46	1.45	30.98	4.7	79.17	32.83	2.41	0.00003	0.26	20
No.48	8,660	-3.69	1.41	1.34	40.97	5.0	132.92	44.27	3.00	0.00003	0.30	40
No.49	8,835	-3.76	1.37	1.47	54.19	5.1	200.86	56.42	3.56	0.00003	0.33	67
No.50	8,930	-3.81	1.62	1.47	56.67	5.3	188.80	58.04	3.25	0.00003	0.31	59
No.51	9,030	-3.08	1.49	1.40	56.68	4.5	200.68	58.38	3.44	0.00003	0.33	65
No.52	9,130	-3.02	1.45	1.49	54.57	4.5	172.99	56.25	3.08	0.00003	0.30	52
No.53	9,230	-3.00	1.55	1.43	51.48	4.4	170.84	53.48	3.19	0.00003	0.31	53
No.54	9,335	-2.97	1.41	1.63	59.25	4.4	181.84	60.67	3.00	0.00003	0.30	54
No.55	9,435	-2.84	1.27	1.53	57.61	4.1	169.93	58.96	2.88	0.00003	0.29	49
No.56	9,670	-1.84	1.40	1.14	52.96	3.0	108.16	53.66	2.02	0.00003	0.23	25
No.57	9,875	-1.93	1.58	0.95	56.22	2.9	105.50	56.81	1.86	0.00003	0.22	23
No.58	10,080	-1.79	1.37	1.17	51.69	3.0	113.15	52.46	2.16	0.00003	0.24	27
No.59	10,300	-2.06	1.20	1.16	43.93	3.2	97.00	44.83	2.16	0.00003	0.24	23
No.60	10,480	-2.37	1.44	1.12	50.09	3.5	111.93	50.83	2.20	0.00003	0.24	27
No.61	10,700	-3.60	1.35	0.70	52.00	4.3	138.40	53.09	2.61	0.00003	0.27	37
No.62	10,890	-3.62	1.02	1.10	49.80	4.6	139.03	51.2	2.72	0.00003	0.28	39
No.63	11,070	-3.96	1.28	1.06	50.28	5.0	138.73	51.63	2.69	0.00003	0.28	38
No.64	11,280	-2.97	0.92	0.86	49.78	3.8	98.33	50.68	1.94	0.00003	0.22	22
No.65	11,470	-3.66	1.40	0.97	51.00	4.6	102.40	52.37	1.96	0.00003	0.22	23
No.66	11,720	-2.90	1.19	1.17	46.97	4.1	119.95	48.29	2.48	0.00003	0.26	31
No.67	11,900	-3.56	1.17	0.92	46.84	4.5	111.82	48.09	2.33	0.00003	0.25	28
No.68	12,090	-3.98	1.38	1.61	47.68	5.4	141.56	50.07	2.83	0.00003	0.29	40
No.69	12,170											

TABLE E.8.2 WATER QUALITY OF BEN NGHE – TAU HU CANAL

Parameter \ Location	Y Bridge (Tau Hu Canal)		Khanh Hoi Bridge (Ben Nghe Canal)	
	High Tide	Low Tide	High Tide	Low Tide
Temperature, C	28.4 (16.3)	29.9 (28.0)	27.9 (26.0)	29.9 (28.5)
PH	6.7 (6.8)	6.6 (6.8)	6.1 (6.7)	6.4 (6.9)
DO, mg/l	2.8 (4.6)	0.0 (1.9)	2.6 (3.4)	0.2 (0.6)
Conductivity, mS/m	306.0 (41.0)	331.0 (64.0)	38.0 (30.0)	214.0 (57.0)
BOD5, mg/l	151.0 (84.0)	251.0 (124.0)	81.0 (50.0)	157.0 (104.0)
COD, mg/l	249.0 (125.0)	400.0 (200.0)	200.0 (98.0)	211.0 (176.0)
Total Solids, mg/l	70.0 (67.0)	216.0 (92.0)	11.0 (33.0)	41.0 (38.0)
Total Nitrogen (T-N), mg/l	2.0 (1.9)	11.2 (3.1)	1.6 (1.5)	10.4 (8.0)
Total Phosphorus (T-P), mg/l	0.1 (1.1)	0.6 (2.5)	0.1 (1.6)	0.9 (6.2)
Total Coliform, MPN/100ml	1.50E+0.6 (1.10E0.6)	2.10E+0.6 (1.50E0.6)	9.0E+0.2 (1.10E+0.6)	9.3E+0.3 (1.10E+0.6)
Fecal Coliform, MPN/100ml	9.30E+0.4 (2.00E+0.4)	9.30E+0.4 (5.70E+0.5)	2.1E+0.2 (5.70E+0.4)	5.7E+0.3 (1.50E+0.5)
$SO_4^{(-2)}$, mg/l	81.1 (25.0)	97.4 (43.1)	26.9 (219.0)	317.3 (22.1)
Chloride (Cl^-), mg/l	769.6 (78.0)	782.1 (120.6)	123.1 (49.0)	520.4 (74.3)
Cadmium, µg/l	<1 (2.9)	<1 (2.1)	2.7 (3.7)	3.8 (4.1)
Lead, µg/l	<2 (<2)	<2 (<2)	<2 (<2)	2.2 (<2)
Hexavelent Chromium (Cr^{+6}), µg/l	<0.04 (<0.04)	<0.04 (<0.04)	<0.04 (<0.04)	<0.04 (<0.04)
Arsenic (As), µg/l	0.9 (0.9)	0.3 (0.3)	0.6 (0.6)	2.8 (2.8)
Total Mercury (Hg), µg/l	<2.5 (<2.5)	<2.5 (<2.5)	<2.5 (<2.5)	<2.5 (<2.5)

Note: The upper and lower figures in the table mean the water quality in rainy season and the early dry season.

TABLE E.8.3 MAIN FEATURES OF EXISTING ELECTRIC WIRES

No.	Name of Power Line	Location	Name of Canal	Voltage	Length of Line (m)	Hight of Line (m)	Electric Pole Materials
1	Phu Xuan	Khanh Hoi Bridge	Ben Nghe	Medium	80	6	Concrete
2	Vinh Hoi	360 Ben Van Don	Ben Nghe	Midium	200	12	Concrete
3	Da Phuoc	Bridge S.1	Ngang No.1	Medium	50	8	Concrete
4	Da Phuoc	Bridge S.2	Ngang No.2	Medium	50	8	Concrete
5	Da Puoc	Bridge S.3	Ngang No.3	Medium	50	8	Concrete
6		Rach Cat Bridge	Tau Hu	Medium			Concrete
7		Ben Me Coc	Tau Hu	Medium			Concrete
8	Lo Gach, District 8	Vinh Mau Bridge	Tau Hu	Medium			Concrete
9	Phu Lam-Phu Dinh 110kv line	Rach Lao	Tau Hu	High			Steel
10	Phu Dinh-Hung Vuong 66kvline	Nguyen Duy Street	Tau Hu	High			Steel
11		Nguyen Che Nghia Street	Tau Hu	Medium			Concrete
12		Tran Nguyen Han Street	Tau Hu	Medium			Concrete
13	Chanh Hung-Cho Quan	Cho Quan Power Plant	Ben Nghe	Medium			Underground
14	Cho Quan-Khanh Hoi	360 Ben Van Don	Ben Nghe	Medium			Underground

Source: The Feasibility Study on the Project to Dredge and Rehabilitate Ben Nghe - Tau Hu - Lo Gom Canal for Navigation, December 1995.

TABLE E.8.4 MAIN STRUCTURAL FEATURES OF EXISTING BRIDGES

No.	Name of Bridge	Name of Canal	Bridge Length (m)	Width (m)	No. of Span	Type of Super-structure	Complet-ion Year	Clearance for Naviga-tion (m)	Allow-able Load (ton)
1	Khanh Hoi	Ben Nghe	91.8	17.0	4	PC	Before 1975	0.5	25
2	Mong	-do-	96.0	5.0	6	Steel	-do-	6.0	-
3	Calmette	-do-	84.4	15.3	4	PC	-do-	0.5	17
4	Ong Lanh	-do-	50.4	7.0	3	RC	-do-	4.0	-
5	Chu Y	Tau Hu	512.0	12.0	24	RC	-do-	3.5	30
6	Cha Va	-do-	62.7	26.4	5	PC	1997	-do-	-do-
7	Binh Tay	-do-	47.6	3.0	1	Steel	Before 1975	3.5	-
8	Chu U	-do-	204.2	4.0	-do-	-do-	-do-	-do-	-
9	Nha May Ruou	-do-	79.8	3.0	-do-	-do	-do-	-do-	-
10	Van Nguyen	Lo Gom	48.8	2.5	3	-do	-do-	4.32	-
11	Nha Thuong	-do-	75.0	3.0	1	-do-	-do-	3.5	-
12	S. No.1	Ngang No.1	74.9	11.0	3	PC	1993	3.5	30
13	S. No.1	-do-	116.0	4.0	-	Steel	Before 1975	2.5	-
14	S. No.2	Ngang No.2	116.0	4.0	7	Steel	-do-	2.5	1.5
15	S. No.2	-do-	-	-	-	PC	Under Construction	-	-
16	S. No.3	Ngang No.3	146.0	4.0	9	Steel	Before 1975	5.0	1.0

TABLE E.8.5 STRUCTURAL FEATURES OF EXISTING BANK PROTECTION ALONG TAU HU - BEN NGHE CANAL

No.	Canal	Location	Length (m)	Structure				Completion Year	Structural Drawings	Existing Condition
				Type	Slope	Depth of Foundation	Main Materials			
BP.1	Ben Nghe	0.00 - 0.16 (R)	160	I	1:3	-1.5	stone and mortar	before 1985	None	old, no crack & erosion, good
BP.2	do	0.00 - 0.16 (L)	60	I	1:3	-1.5	ditto	ditto		ditto
BP.3	Tau Hu	4.50 - 4.74 (R)	240	III	vertical	-	ditto	before 1955		relatively new, good
BP.4	do	5.85 - 6.25 (R)	400	I	1:1.5	-1.5	ditto			new one, good
BP.5	do	6.95 - 7.24 (R)	310	I	1:1.5	-1.5	ditto	before 1990		relatively new, good
BP.6	do	7.24 - 7.42 (R)	180	II	vertical	-1.5		before 1993		new one, good
BP.7	do	7.14 - 7.24 (L)	75	I	1:1.5	-1.5	stone and mortar	-		relatively old, to be replaced
BP.8	do	7.45 - 7.60 (R)	150	III	vertical	-		before 1996		relatively old, but good condition
BP.9	do	7.60 - 7.75 (R)	31	I	1:1.5	-1.5	stone and mortar	before 1993		ditto
BP.10	do	7.75 - 7.90 (R)	150	III	vertical	-1.5		before 1956		ditto
BP.11	do	7.90 - 8.00 (R)	100	I	1:1.5	-1.5	stone and mortar	before 1993		little bit old, but good condition
BP.12	do	8.00 - 8.55 (R)	550	II	vertical	-1.5		before 1955		new one, good
BP.13	do	7.35 - 7.98 (L)	630	I	1:1.5	-1.5	stone and mortar	before 1990		old, partly eroded, to be replaced
BP.14	do	8.65 - 8.85 (R)	200	III	vertical	-		before 1956		under construction
BP.15	do	8.85 - 9.45 (R)	600	I	1:1.5	-1.5		before 1997		new one, good condition
BP.16	do	9.45 - 9.65 (R)	200	III	vertical	-1.5	stone and mortar	before 1956	old, dirty	new one, good condition
BP.17	do	8.95 - 9.28 (L)	330	I	1:1.5	-1.5		-		relatively old, to be replaced
BP.18	do	9.40 - 9.53 (L)	130	I	ditto	-1.5	stone and mortar	-		ditto
BP.19	Lo Gom	10.20 - 10.40 (L)	200	I	ditto	-1.5	ditto	-		old, partly eroded, to be replaced
BP.20	do	12.05 - 12.25 (R)	200	I	ditto	-1.5	ditto	1997		new, partly eroded, to be replaced
BP.21	do	12.05 - 12.35 (L)	300	I	ditto	-1.5	ditto	1998		new, good condition

Note: 1. (R) and (L) mean the right and left bank respectively.

2. Type I: Stone masonry with the slope of 1:1.5 - 1:2 shown in Fig. 8.3 (a)

3. Type II: Stone masonry with the vertical slope (Gravity Type Revetment) shown in Fig. 8.3.(b)

4. Type III: Concrete pile fixed by reinforced concrete top beam on the stone masonry bank protection shown in Fig. 8.3 (c)

TABLE E.8.6 PROPOSED LONGITUDINAL PROFILE OF TAU HU - BEN NGHE CANAL

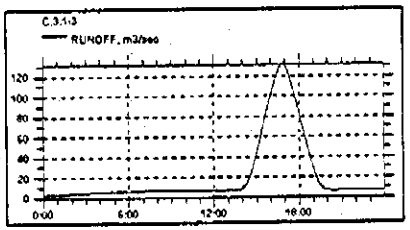
Station	Distance (m)	Accumulate Distance (m)	Existing			Design		
			Bed Elevation EL1 (m)	Left Bank Elevation EL2 (m)	Right Bank Elevation EL3 (m)	Canal Bed Elevation EL4 (m)	High Water Level EL5 (m)	Dike Crown Elevation EL6(m)
No.0	0	0				-3.45	1.32	
No.1	60	60	-2.55	2.07	1.53	-3.45	1.32	2.00
No.2	120	180	-2.72	2.69	1.64	-3.44	1.32	2.00
No.3	215	395	-2.51	2.19	2.49	-3.43	1.33	2.00
No.4	220	615	-2.21	1.93	2.03	-3.42	1.34	2.00
No.5	185	800	-2.01	2.15	2.00	-3.41	1.34	2.00
No.6	180	980	-2.36	1.83	1.85	-3.40	1.34	2.00
No.7	200	1,180	-2.12	2.10	1.74	-3.39	1.35	2.00
No.8	190	1,370	-1.99	1.97	1.85	-3.38	1.35	2.00
No.9	195	1,565	-2.02	1.72	2.09	-3.37	1.36	2.00
No.10	180	1,745	-2.06	2.04	2.89	-3.36	1.36	2.00
No.11	220	1,965	-1.82	2.10	1.83	-3.35	1.37	2.00
No.12	205	2,170	-2.09	2.97	2.13	-3.34	1.37	2.00
No.13	180	2,350	-2.33	2.14	2.02	-3.33	1.38	2.00
No.14	195	2,545	-2.26	1.73	1.89	-3.32	1.38	2.00
No.15	190	2,735	-2.55	1.77	1.57	-3.31	1.39	2.00
No.16+40	265	3,000	-3.53	2.14	1.88	-3.30	1.40	2.00
No.17	140	3,140	-7.87	1.90	1.83	-3.39	1.40	2.00
No.18	90	3,230	-10.50	1.99	1.86	-3.45	1.40	2.00
No.19-45	90	3,320	-2.98	1.98	1.57	-3.50	1.40	2.00
No.20	250	3,570	-2.93	2.34	1.63	-3.49	1.41	2.00
No.21	225	3,795	-2.66	2.10	1.63	-3.48	1.41	2.00
No.22	195	3,990	-2.84	2.06	1.48	-3.47	1.42	2.00
No.23	175	4,165	-2.75	2.37	1.44	-3.46	1.42	2.00
No.24	205	4,370	-2.69	1.97	1.40	-3.45	1.43	2.00
No.25	170	4,540	-2.74	2.15	1.67	-3.44	1.43	2.00
No.26	210	4,750	-1.91	2.32	1.65	-3.43	1.44	2.00
No.27	190	4,940	-2.03	1.67	1.66	-3.42	1.44	2.00
No.28	195	5,135	-1.73	1.24	1.44	-3.41	1.45	2.00
No.29	190	5,325	-1.71	1.44	1.41	-3.40	1.45	2.00
No.30	190	5,515	-1.40	2.09	1.75	-3.39	1.46	2.00
No.31	180	5,695	-1.58	1.98	1.79	-3.38	1.46	2.00
No.32	185	5,880	-1.71	1.75	1.49	-3.37	1.47	2.00
No.33	200	6,080	-1.85	1.77	1.89	-3.36	1.47	2.00
No.34	85	6,165	-1.52	2.94	2.40	-3.36	1.47	2.00
No.35	110	6,275	-1.50	2.14	1.99	-3.35	1.48	2.00
No.36	245	6,520	-1.49	2.05	1.84	-3.34	1.48	2.00
No.37	185	6,705	-1.63	2.50	1.77	-3.33	1.49	2.00
No.38	195	6,900	-1.63	1.86	1.94	-3.32	1.49	2.00
No.39	145	7,045	-1.71	1.79	1.75	-3.32	1.50	2.00
No.40	110	7,155	-1.84	2.13	1.78	-3.31	1.50	2.00
No.41+90	205	7,360	-2.07	1.73	1.95	-3.30	1.50	2.00
No.41+90	0	7,360	-2.07	1.73	1.95	-4.54	1.50	2.00
No.42	100	7,460	-2.69	1.86	1.79	-4.54	1.51	2.00
No.43	200	7,660	-3.16	1.81	1.78	-4.53	1.51	2.00
No.44	190	7,850	-2.81	1.54	1.64	-4.52	1.52	2.00
No.45	210	8,060	-3.27	1.66	1.31	-4.51	1.52	2.00
No.46	200	8,260	-2.72	1.62	1.55	-4.50	1.53	2.00
No.47	230	8,490	-3.25	1.46	1.45	-4.48	1.53	2.00
No.48	170	8,660	-3.69	1.41	1.34	-4.48	1.54	2.00
No.49	175	8,835	-3.76	1.37	1.47	-4.47	1.54	2.00
No.50	95	8,930	-3.81	1.62	1.47	-4.46	1.54	2.00
No.51	100	9,030	-3.08	1.49	1.40	-4.46	1.55	2.00
No.52	100	9,130	-3.02	1.45	1.49	-4.45	1.55	2.00
No.53	100	9,230	-3.00	1.55	1.43	-4.45	1.55	2.00
No.54	105	9,335	-2.97	1.41	1.63	-4.44	1.55	2.00
No.55	100	9,435	-2.84	1.27	1.53	-4.44	1.56	2.00
No.56	235	9,670	-1.84	1.40	1.14	-4.43	1.56	2.00
No.57	205	9,875	-1.93	1.58	0.95	-4.41	1.57	2.00
No.58	205	10,080	-1.79	1.37	1.17	-4.40	1.57	2.00
No.59	220	10,300	-2.06	1.20	1.16	-4.39	1.58	2.00
No.60	180	10,480	-2.37	1.44	1.12	-4.38	1.58	2.00
No.61	220	10,700	-3.60	1.35	0.70	-4.37	1.59	2.00
No.62	190	10,890	-3.62	1.02	1.10	-4.36	1.59	2.00
No.63	180	11,070	-3.96	1.28	1.06	-4.36	1.60	2.00
No.64	210	11,280	-2.97	0.92	0.86	-4.34	1.60	2.00
No.65	190	11,470	-3.66	1.4	0.97	-4.34	1.61	2.00
No.66	250	11,720	-2.9	1.19	1.17	-4.32	1.61	2.00
No.67	180	11,900	-3.56	1.17	0.92	-4.31	1.62	2.00
No.68	190	12,090	-3.98	1.38	1.61	-4.30	1.62	2.00
No.69	80	12,170				-4.30	1.62	2.00

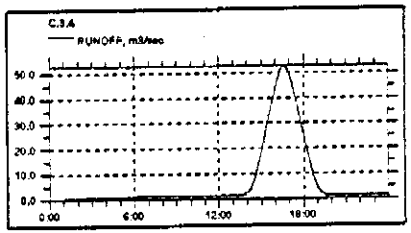
TABLE E.8.7 DESIGN CROSS SECTION OF TAU HU-BEN NGHE CANAL

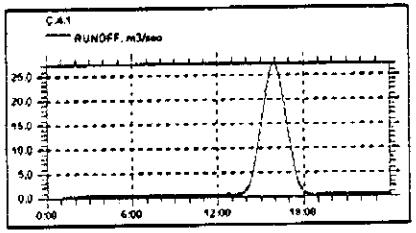
Name of Canal	Section		Length (L) (m)	Bed Elevation		Dike Elevation		Type of Cross Section	Canal Width (m)						Bank Slope		Depth	
				Start	End	Start	End		Bottom	Middle	Top	O/M Road (B4)		Total	Left	Right	Start	End
	Start	End		(m above MSL)		(m above MSL)			(B1)	(B2)	(B3)	Left	Right	(B5)	(S1)	(S2)	(H1) (m)	(H2) (m)
Ben Nghe	No.0	No.2 + 20	200	-3.45	-3.44	2.00	2.00	Existing	21.0	70.0 - 100.0	90.0 - 120.0	None	None	90.0 - 120.0	1 : 3	1 : 3	5.45	5.44
	No.2 + 20	No.2 + 110	90	-3.44	-3.44	2.00	2.00	A1	21.0	58.0 - 78.0	70.0 - 90.0	5.0	5.0	80.0 - 100.0	1 : 1.5	1 : 1.5	5.44	5.44
	No.2 + 110	No.5 +40	550	-3.44	-3.41	2.00	2.00	A1	21.0	58.0	70.0	5.0	5.0	80.0	1 : 1.5	1 : 1.5	5.44	5.41
	N0.5 + 40	No.5 + 140	100	-3.41	-3.40	2.00	2.00	A1	21.0	48.0 - 58.0	60.0 - 70.0	5.0	5.0	70.0 - 80.0	1 : 1.5	1 : 1.5	5.41	5.40
	No.5 + 140	No.15 + 105	1,900	-3.40	-3.31	2.00	2.00	A1	21.0	48.0	60.0	5.0	5.0	70.0	1 : 1.5	1 : 1.5	5.40	5.31
	No.15 + 105	No.16 + 40	160	-3.31	-3.30	2.00	2.00	A1	21.0	48.0 - 72.5	60.0 - 84.5	5.0	5.0	70.0 - 94.5	1 : 1.5	1 : 1.5	5.31	5.30
	No.16 + 40	No.17	140	-3.30	-3.48	2.00	2.00	A2	21 - 35	56.0 - 72.5	84.5 - 100.0	5.0	None	89.5 - 105.0	1 : 1.5	Existing	5.30	5.48
Tau Hu (Down-stream)	No.17	No.19 - 45	180	-3.48	-3.48	2.00	2.00	A2	21 - 30	38.0 - 54.0	50.0 - 96.0	5.0	None	55.0 - 101.0	1 : 1.5	Existing	5.48	5.48
	No.19 - 45	No.21 - 40	435	-3.48	-3.45	2.00	2.00	A1	21.0	38.0	50.0	5.0	5.0	60.0	1 : 1.5	1 : 1.5	5.48	5.45
	No.21 - 40	No.21 + 90	130	-3.45	-3.45	2.00	2.00	C1	21.0	40.0 - 50.0	40.0 - 50.0	5.0	5.0	50.0 - 60.0	Vertical	Vertical	5.45	5.45
	No.21 + 90	No.23 + 30	310	-3.45	-3.43	2.00	2.00	C1	21.0	40.0	40.0	5.0	5.0	50.0	Vertical	Vertical	5.45	5.43
	No.23 + 30	No.24 - 90	85	-3.43	-3.43	2.00	2.00	C1	21.0	40.0 - 50.0	40.0 - 50.0	5.0	5.0	50.0 - 60.0	Vertical	Vertical	5.43	5.43
	No.24 - 90	No.24 + 50	140	-3.43	-3.43	2.00	2.00	A1	21.0	38.0	50.0	5.0	5.0	60.0	1 : 1.5	1 : 1.5	5.43	5.43
	No.24 + 50	No.25 + 100	220	-3.43	-3.42	2.00	2.00	A4	21.0	44.0	50.0	5.0	5.0	60.0	1 : 1.5	Vertical	5.43	5.42
	No.25 + 100	No.26 + 10	120	-3.42	-3.42	2.00	2.00	A1	21.0	38.0	50.0	5.0	5.0	60.0	1 : 1.5	1 : 1.5	5.42	5.42
	No.26 + 10	No.27 - 15	165	-3.42	-3.41	2.00	2.00	A1	21.0	38.0 - 48.0	50.0 - 60.0	5.0	5.0	60.0 - 70.0	1 : 1.5	1 : 1.5	5.42	5.41
	No.27 - 15	No.29 + 70	470	-3.41	-3.38	2.00	2.00	A1	21.0	48.0	60.0	5.0	5.0	70.0	1 : 1.5	1 : 1.5	5.41	5.38
	No.29 + 70	No.30 + 10	130	-3.38	-3.38	2.00	2.00	A1	21.0	38.0 - 48.0	50.0 - 60.0	5.0	5.0	60.0 - 70.0	1 : 1.5	1 : 1.5	5.38	5.38
	No.30 + 10	No. 32	355	-3.38	-3.37	2.00	2.00	A1	21.0	48.0	60.0	5.0	5.0	70.0	1 : 1.5	1 : 1.5	5.38	5.37
	No.32	No.33 + 75	275	-3.37	-3.36	2.00	2.00	A3	21.0	38.0	50.0	5.0	5.0	60.0	1 : 1.5	1 : 1.5	5.37	5.36
	No.33 + 75	No.38	745	-3.36	-3.32	2.00	2.00	B1	21.0	41.0	45.0	5.0	5.0	55.0	1 : 0.5	1 : 0.5	5.36	5.32
	No.38	No.41 + 90	460	-3.32	-3.30	2.00	2.00	B2	21.0	37.0	45.0	5.0	5.0	55.0	1 : 0.5	1 : 1.5	5.32	5.30
Tau Hu (Upstream)	No.41 + 90	No.44 + 80	570	-4.54	-4.51	2.00	2.00	A4	22.0	44.0	50.0	5.0	5.0	60.0	1 : 1.5	Vertical	6.54	6.51
	No.44 + 80	No.44 + 110	30	-4.51	-4.51	2.00	2.00	B3	22.0	43.0 - 44.0	45.0 - 50.0	5.0	5.0	55.0 - 60.0	1 : 0.5	Vertical	6.51	6.51
	No.44 + 110	No.47 + 35	565	-4.51	-4.48	2.00	2.00	B3	22.0	43.0	45.0	5.0	5.0	55.0	1 : 0.5	Vertical	6.51	6.48
	No.47 + 35	No.56 -110	1,035	-4.48	-4.43	2.00	2.00	A2	22.0	38.0	50.0	5.0	5.0	60.0	1 : 1.5	1 : 1.5	6.48	6.43
	No.56 - 110	No.60 + 30	950	-4.43	-4.38	2.00	2.00	A1	22.0	38.0	50.0	5.0	5.0	60.0	1 : 1.5	1 : 1.5	6.43	6.38
	No.60 + 30	No.68 + 80	1,660	-4.38	-4.30	2.00	2.00	A1	22.0	38.0	50.0	5.0	5.0	60.0	1 : 1.5	1 : 1.5	6.38	6.30
Ngang No.1	No.1	No.1 + 80	80	-4.54	-4.54	2.00	2.00	A1	22.0	41.0	45.0	5.0	5.0	55.0	1 : 0.5	1 : 0.5	6.54	6.54
	No.1 +80	No.2 - 40	20	-4.54	-4.54	2.00	2.00	A1	22.0	41.0 - 48.0	45.0 - 60.0	5.0	5.0	55.0 - 70.0	1 : 1.5	1 : 1.5	6.54	6.54
	No.2 - 40	No.4 + 15	290	-4.54	-4.54	2.00	2.00	A1	22.0	48.0	60.0	5.0	5.0	70.0	1 : 1.5	1 : 1.5	6.54	6.54
Ngang	No.1	No.4 + 20	420	-4.48	-4.38	2.00	2.00	Existing	22.0	39.0	45.0	5.0	5.0	55.0	1 : 1.5	1 : 1.5	6.48	6.38
Ngang No.3	No.1 - 10	No.2	120	-4.38	-4.38	2.00	2.00	A1	22.0	38.0	50.0	5.0	5.0	60.0	1 : 1.5	1 : 1.5	6.38	6.38
	No.2	No.2 + 20	20	-4.38	-4.38	2.00	2.00	A1	22.0	38.0 - 48.0	50.0 - 60.0	5.0	5.0	60.0 - 70.0	1 : 1.5	1 : 1.5	6.38	6.38
	No.2 + 20	No.4 + 40	260	-4.38	-4.38	2.00	2.00	A1	22.0	48.0	60.0	5.0	5.0	70.0	1 : 1.5	1 : 1.5	6.38	6.38

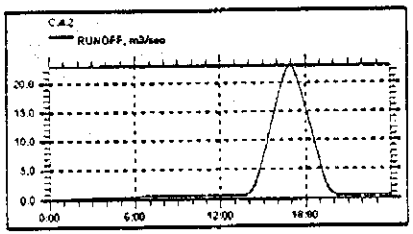
TABLE E.8.8 SUB-CATCHMENTS FOR RUNOFF HYDROGRAPHS

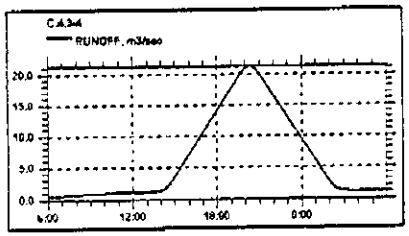
Catchment	Sub-Catchment	Area (km2)	Runoff Coefficient (Future Landuse)	Inlet Length (km)	Inlet Time (minutes)	Flow Length (km)	Flow Time (minutes)	Time of Concentration (minutes)	Areal Reduction Factor	10-Year Rainfall Intensity (mm/hr)	10-Year Peak Runoff (Future Landuse) (m3/s)	Specific Runoff (m3/s/km2)
C.3	C.3.1 + C.3.2 + C.3.3	14.35	0.76	1.80	45	7.07	97	143	0.95	45	131	9
	C.3.4	5.88	0.69	2.00	72	1.50	63	135	0.98	48	53	9
C.4	C.4.1	1.84	0.85	0.59	19	3.34	80	98	0.99	63	27	15
	C.4.2	2.88	0.67	1.60	72	5.33	79	151	0.99	43	23	8
	C.4.3 + C.4.4	6.52	0.58	1.51	84	5.75	240	323	0.98	19	20	3
	C.4.5	5.24	0.79	2.60	63	2.06	49	112	0.98	56	63	12
	C.4.6	7.51	0.75	4.10	97	0.79	19	115	0.98	55	84	11
	C.4.7	6.64	0.76	3.00	72	1.00	24	96	0.98	64	88	13
	C.4.8	10.86	0.76	2.00	50	4.25	71	127	0.97	53	116	11
	Total	61.72									Average	10

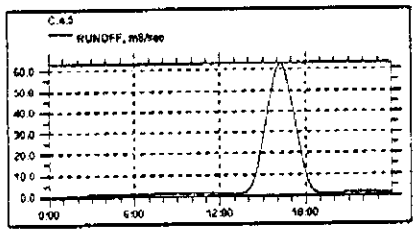


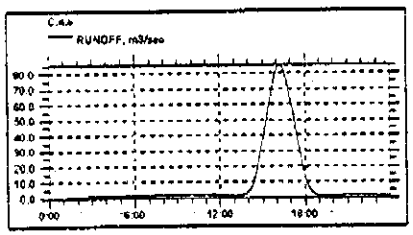


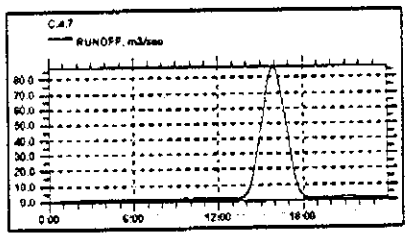


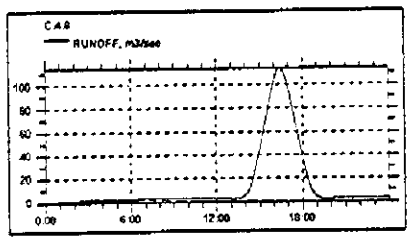












Note : Represents runoff hydrographs for the sub-catchments for 10-year rainfall with peak intensity occurring at 12th hour.

TABLE E.8.9 SET UP OF HD MODEL FOR DIFFERENT CASES

Canal Condition	Model Case	Model Sub-Case	Cross-Section	Rainfall Peak Occurring at	Boundary Conditions: Saigon River	Boundary Conditions: Ben Luc River	Boundary Conditions: Southern Canals
Existing	1	1A	Existing*	12th hour	Constant W.L. of EL. +1.32 m	Constant Discharge of 0.0 m3/s	None (closed system)
	2	2A		11th hour	Dynamic W.L. with crest level of EL. +1.32 m	Constant Discharge of 0.0 m3/s	None (closed system)
		2B		12th hour			
		2C		13th hour			
	3	3A		12th hour	Constant W.L. of EL. +1.32 m	Constant W.L. of EL. +1.39 m with 1-hr phase lag	Constant W.L. of EL. +1.39 m with 1-hr phase lag
		3B		12th hour		Constant W.L. of EL. +1.25 m with 1-hr phase lag	Constant W.L. of EL. +1.25 m with 1-hr phase lag
	4	4A		11th hour	Dynamic W.L. with crest level of EL. +1.32 m	Dynamic W.L. with crest level of EL. +1.39 m with 1-hr phase lag	Dynamic W.L. with crest level of EL. +1.39 m with 1-hr phase lag
		4B		12th hour			
		4C		13th hour			
Proposed	1	1A	Alternative I**	12th hour	Constant W.L. of EL. +1.32 m	Constant Discharge of 0.0 m3/s	None (closed system)
		1B	Alternative II***	12th hour			
	2	2A	Alternative I	11th hour	Dynamic W.L. with crest level of EL. +1.32 m	Constant Discharge of 0.0 m3/s	None (closed system)
		2B		12th hour			
		2C		13th hour			
	3	3A		12th hour	Constant W.L. of EL. +1.32 m	Constant W.L. of EL. +1.39 m with 1-hr phase lag	Constant W.L. of EL. +1.39 m with 1-hr phase lag
		3B		12th hour		Constant W.L. of EL. +1.25 m with 1-hr phase lag	Constant W.L. of EL. +1.25 m with 1-hr phase lag
	4	4A		11th hour	Dynamic W.L. with crest level of EL. +1.32 m	Dynamic W.L. with crest level of EL. +1.39 m with 1-hr phase lag	Dynamic W.L. with crest level of EL. +1.39 m with 1-hr phase lag
		4B		12th hour			
		4C		13th hour			

* : For all canals, existing cross-sections have been used.

** : For Tau-Hu canal, cross-sections as of Alternative I have been used.
For Ben Nghe and Ngang 1, 2 & 3 canals, proposed cross-sections have been used.
For other canals, existing cross-sections have been used.

*** : For Tau-Hu canal, cross-sections as of Alternative II have been used.
For Ben Nghe and Ngang 1, 2 & 3 canals, proposed cross-sections have been used.
For other canals, existing cross-sections have been used.