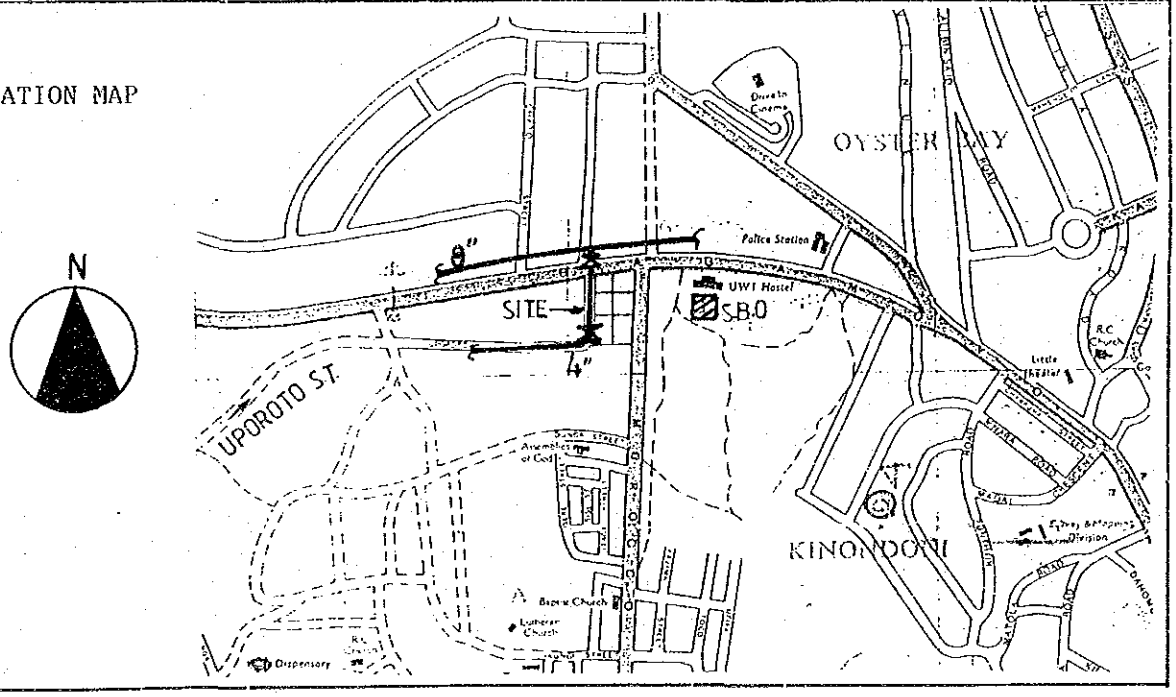
2. PIPE INTERNAL CONDITION

INTERNAL INVESTIGATION OF DISTRIBUTION IN KINONDONI

NAME OF S.B.O KINONDONI

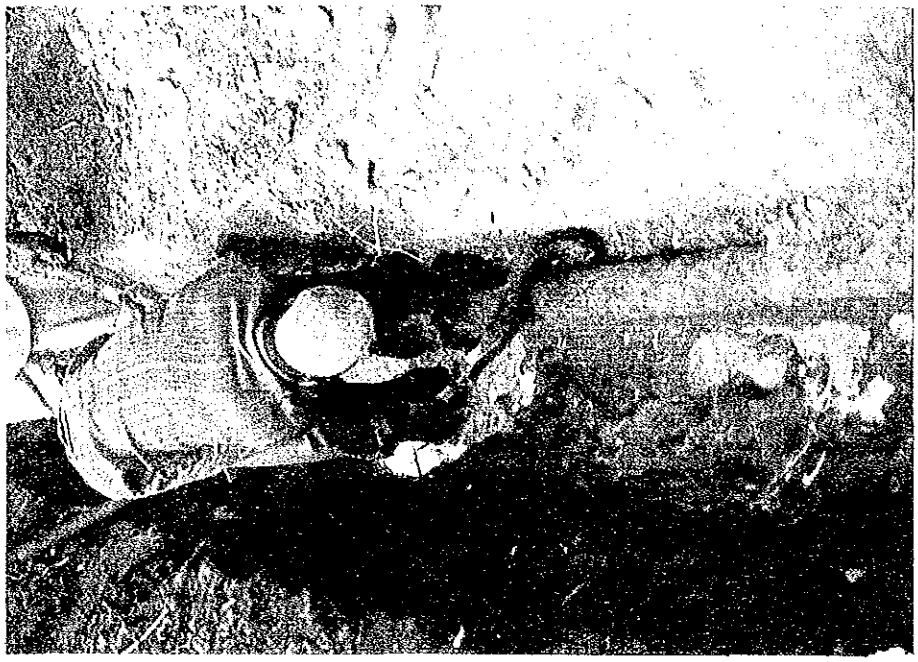
LOCATION OF PIPE	DOWN THE KINDERGARDEN OF UPOROTO STREET
DATE TO BE INVESTIGATED	MARCH 15th, 1990
INSIDE DIAMETER (MM)	100 mm
MATERIAL OF PIPE	CAST IRON PIPE
TYPE OF CONNECTION	MECHANICAL JOINT
SURFACE CORROSION (MM)	0.1mm, 0.3mm, 0.4mm
YEAR OF INSTALLATION	1953 A.C.
COVERING DEPTH (M)	0.60 m
CONDITION FOR WATER LEAKAGE	GOOD
CONDITION OF JOINTS	ONLY ONE PUSH RING HAS BEEN BROKEN AND IT CAN BE OBSERVED THE ERROSION OF RUBBER JOINTS.
THICKNES OF ENCRUSTRATION	TOP---10mm, BOTH OF SIDES---15 to 20mm, BOTTOM---30 to 35mm
KIND OF COLLOIDAL PARTICLES	RUST TUBERCLES(SAND,SILT AND COLLOIDAL MATTER)

LOCATION MAP



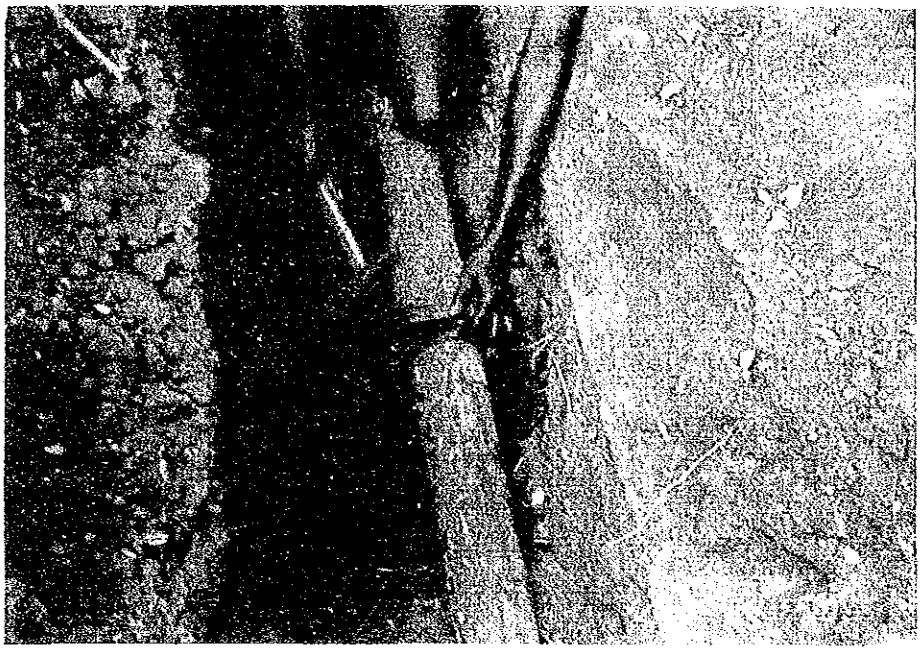
PHOTOGRAPH OF INTERNAL PIPE INVESTIGATION

TAKING OUT THE DISTRIBUTION PIPES

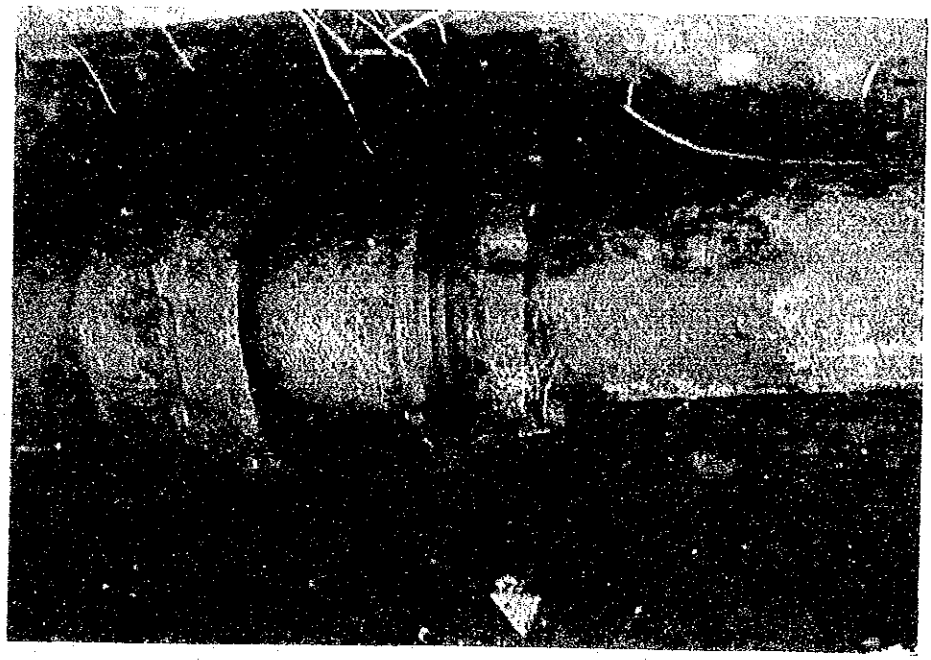


SITE OF INTERNAL INVESTIGATION

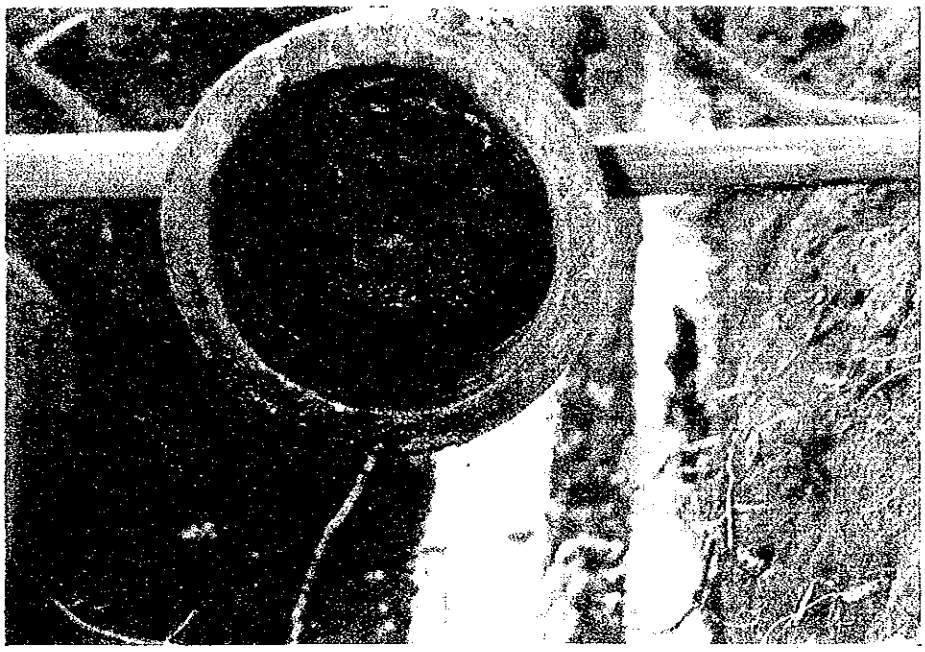
TAKING OUT THE PUSH RING(1/2)



TAKING OUT THE PUSH RING(2/2)



ENCRUSTRATION OF INTERNAL PIPE



BROKEN PUSH LING

AFTER COAKING WITH LEAD AND PACKING MATERIALS

REINSTALLATION OF DISTRIBUTION PIPES

3. WASTAGE MEASUREMENT IN SERVICE PIPE

3.1 Kariakoo Model Area

NOTE

Pipe Connection 1	:	House Connection or Yard Connection
Pipe Connection 2	:	No Connection or Disconnection
Pipe Connection 3	:	Kiosk
Water Meter 1	:	Working Meter
Water Meter 2	:	No Working Meter or No Installation Meter
Shs/M	:	Tanzanian Shilling per Month
?	:	Unknown
Zone Number	:	for NUWA
Tank	:	Using Tank in House
Pump	:	Using Pump in House
Study Date	:	January through February 1990

TABLE B.3.1 STUDY OF HOUSEHOLD SAIZE AND TAP IN KARIAKOO MODEL AREA (1)

Block Number	Ref. Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
Total			1,221	6,272		1,379	119	1,223					
Min.			1	1		1	1	1					
Ave.			2.8	14.0		3.8	1.4	3.8					
Max.			13	80		73	14	73					
A3	1	2	2	12									
A3	2	1	2	11		9		9					
A3	3	1	2	6		4		4					
A3	4	1	1	6		3		3					
A3	5	1				10	1	9					
A4	1	1	4	20		1		1					
A4	2	1	2	13		3		3					
A4	3	1	2	10		6		6					
A4	4	2	1	9									
B3	1	1	5	16		3	1	2					
B3	2	1				1		1					New House
B3	3	1	1	24		1		1					
B3	4	1	6	24		53		53					
B3	5	1	1	15		2		2					
B3	6	1	1	10		11		11					
B3	7	1	4	20		1	1						
B3	8	1	1	9		9	1	8					
B3	9	2	4	18									
B3	10	1	6	21		2		2					
B3	11	1	1	10		1	1						
B3	12	1	1	17		3	1	2					
B4	1	1	1	8		6		6					
B4	2	1	1	20		1		1					
B4	3	2	1	9									
B4	4	1	1	7		4	4						
B4	5	2	5	27									
B4	6	2	7	39									
B4	7	1	1	8		2	2						
B4	8	2	2	9									
B4	9	2	5	16									
B4	10	1		17		14	14						Restaurant
B4	11	1	1	7		2		2					
C2	1	1	8	28		1		1					
C2	2	1	5	26		3		3					
C2	3	2	5	18									
C2	4	2	6	25									
C2	5	2	4	17									
C2	6	2	2	12									
C2	7	1	1	10		5		5					
C2	8	1	1	10		6		6					
C3	1	1	1	13		1	1						
C3	2	1	2	20		4		4					
C3	3	1	2	13		4		4					
C3	4	2	4	18									
C3	5	1	2	12		3	3						
C3	6	2	7	30									
C3	7	1	3	17		7		7					

TABLE B.3.1 STUDY OF HOUSEHOLD SAIZE AND TAP IN KARIAKOO MODEL AREA (2)

Block Number	Ref. Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
C3	8	1	2	7		2		2					
C3	9	1	4	20		3		3					
C3	10	1	4	17		2	2						
C3	11	1	2	10		4		4					
C4	1	1	2	8		5	1	4					
C4	2	1	2	7		3	1	2					
C4	3	1	2	2		1	1						
C4	4	1	5	26		4		4					
C4	5	1	3	8		4		4					
C4	6	1	3	11		4		4					
C4	7	1	8	27		1		1					
C4	8	1	4	14		4	1	3					
C4	9	2	5	32									
C4	10	1	3	12		1		1					
C5	1	1	1	7		4	?	?					Flat
C5	2	1	1	7		4		4					Flat
C5	3	1	?	?		4	?	?					Flat
C5	4	1	1	2		5	1	4					Flat
C5	5	1	?	?		4		4					Flat
C5	6	1	1	4		4		4					Flat
C5	7	1	1	8		4		4					Flat
C5	8	1	1	5		4	?	?					Flat
C5	9	1	1	40		4		4					Flat
C5	10	1	?	?		4	?	?					Flat
C5	11	1	?	?		4	?	?					Flat
C5	12	1	1	7		4		4					Flat
C5	13	1	?	?		4	?	?					Flat
C5	14	1	1	8		4		4					Flat
C5	15	1	1	8		5		5					
C5	16	1	1	9		5		5					
C5	17	1	1	4		5	1	4					
C5	18	1	1	6		5		5					
C5	19	1	1	6		5		5					
C5	20	1	1	9		5		5					
C5	21	1	1	12		2		2					
C5	22	1	1	8		4		4					
C5	23	1	1	5		4		4					
C5	24	1	1	5		4		4					
C5	25	1	1	5		4		4					
C5	26	1	1	8		4	?	?					
C5	27	1	1	11		4	2	2					
C5	28	1	1	2		4		4					
C5	29	1	1	8		4		4					
C5	30	1	1	4		4		4					
C5	31	1	1	4		4		4					
C5	32	1	1	2		4		4					
C5	33	1	1	3		4		4					
C5	34	1	1	4		4		4					
C5	35	1	1	7		4		4					
C5	36	1	1	3		4		4					
C5	37	1	1	1		4	?	?					
C5	38	1	1	6		4		4					
C5	39	1	1	9		4		4					
C5	40	1	1	1		4	?	?					
C5	41	1		13		4		4					Petro Station
C5	42	3				1		1					Kiosk
D2	1	2	2	17									

TABLE B.3.1 STUDY OF HOUSEHOLD SAIZE AND TAP IN KARIAKOO MODEL AREA (3)

Block Number	Ref. Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number Total	Tap Number Leakage With	Tap Number Leakage Without	Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
D2	2	1	4	21		3	3						
D2	3	2	7	51									
D2	4	1	2	11		2		2					
D2	5	1		12		8		8					Restaurant
D2	6	2	1	2									
D2	7	1	1	3		5		5					
D2	8	1	2	4		2		2					
D2	9	1	7	10		1		1					
D2	10	2	7	62									
D2	11	2	2	8									
D2	12	1	6	16		1		1					
D3	1	1	6	14		1		1					
D3	2	2	4	10									
D3	3	1	3	12		7		7					
D3	4	1	1	7		7		7					
D3	5	1	3	19		7		7					
D3	6	1	4	17		3	1	2					
D3	7	2	2	13									
D3	8	1	3	12		4	1	3					
D3	9	1	1	12		1		1					
D3	10	1	2	13		6		6					
D3	11	1	4	18		2	1	1					
D3	12	1	1	7		6		6					
D3	13	1	1	8		12	1	11					
D3	14	1	7	18		1	1						
D3	15	3				1	1						Kiosk
D4	1	1				1		1					New House
D4	2	1	1	3		3		3					
D4	3	1	1	5		6		6					
D4	4	1	1	13		5		5					
D4	5	1	2	15		4		4					
D4	6	1	1	6		2		2					
D4	7	1	2	10		3	1	2					
D4	8	1	1	20		1	1						
D4	9	2	5	8									
D4	10	1	1	12		1		1					
D4	11	1				1		1					
D5	1	1	5	21		1	1						
D5	2	1	3	24		1	1						
D5	3	2	6	26									
D5	4	1	1	1		3		3					
D5	5	2	1	20									
D5	6	1	1	4		1	1						
D5	7	1	3	18		1		1					
D5	8	2	6	18									
D5	9	1	6	20		1		1					
D5	10	2	3	20									
D5	11	2	4	20									
D5	12	1	2	9		1		1					
E2	1	2	7	30									
E2	2	2	7	23									
E2	3	1	1	13		2		2					
E2	4	1	1	21		1		1					
E2	5	2	11	32									
E2	6	1	7	25		2	2						
E2	7	1	1	31		1		1					
E2	8	2	7	24									

TABLE B.3.1 STUDY OF HOUSEHOLD SAIZE AND TAP IN KARIAKOO MODEL AREA (4)

Block Number	Ref. Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
E2	9	1	1	7		2		2					
E2	10	1	3	11		2	2						
E2	11	2	9	15									
E2	12	1	3	10		3		3					
E3	1	1	4	29		1		1					
E3	2	1	1	12		2		2					
E3	3	1	4	12		2		2					
E3	4	2	7	29									
E3	5	2	12	20									
E3	6	1	7	9		4		4					
E3	7	2	4	31									
E3	8	2	4	17									
E3	9	1	2	11		1		1					
E3	10	1	1	8		4		4					
E3	11	1	8	36		3		3					
E3	12	2	6	24									
E3	13	2	3	16									
E4	1	2	8	24									
E4	2	1	1	6		3		3					
E4	3	1	2	19		8		8					
E4	4	2	5	14									
E4	5	1	1	21		4	1	3					
E4	6	1	1	7		5		5					
E4	7	1	1	25		5		5					
E4	8	1	4	8		3	3						
E4	9	1	6	17		2	1	1					
E5	1	1	1	6		1		1					
E5	2	1	1	13		7		7					
E5	3	1	1	7		7		7					
E5	4	1	1	13		3		3					
E5	5	2	1	25									
E5	6	1	1	15		1		1					
E5	7	1	4	20		1		1					
E5	8	2	9	41									
E5	9	1	1	7		1		1					
E5	10	1	2	13		2		2					
E5	11	1	1	15		1		1					
E5	12	2	1	4									
E5	13	1	3	13		1		1					
E6	1	1	5	15		2		2					
E6	2	1	1	6		6		6					
E6	3	1				3		3					Mosque
F1	1	1	5	11		1	1						
F1	2	2	5	20									
F1	3	2	1	10									
F1	4	1	1	15		7		7					
F2	1	2	1	10									
F2	2	1	1	20		4		4					
F2	3	1	5	9		1		1					
F2	4	1	1	8		1	1						
F2	5	1	6	18		1		1					
F2	6	1	6	22		1		1					
F2	7	1	1	12		5		5					
F2	8	1	1	11		1		1					
F2	9	1	6	30		3		3					
F2	10	2	2	9									
F2	11	1	3			1		1					Factory

TABLE B.3.1 STUDY OF HOUSEHOLD SAIZE AND TAP IN KARIAKOO MODEL AREA (5)

Block Number	Ref. Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
F2	12	2	3	3									
F2	13	1	6	16		1	1						
F2	14	2	7	35									
F3	1	1	1	14		3	1	2					
F3	2	1	1	6		4		4					
F3	3	1	1	8		6		6					
F3	4	2	5	12									
F3	5	1	1	14		4	1	3					
F3	6	1	7	18		1	1						
F3	7	1	4	12		6		6					
F3	8	2	1	25									
F3	9	2	1	6									
F3	10	1	4	27		1	1						
F3	11	1	1	22		4	1	3					Print Shop
F3	12	1				1		1					New House
F3	13	1	4	19		2		2					
F3	14	1	1	15		1	1						
F4	1	1	2	5		8		8					
F4	2	1	1	4		1		1					
F4	3	1	8	32		1		1					
F4	4	1	2	15		1		1					
F4	5	1	1	22	1	9	9						
F4	6	1	1	6		6	1	5					
F4	7	1	2	10		5		5					
F4	8	1	1	14		1		1					
F4	9	2	1	5									
F5	1	2	7	17									
F5	2	1	1	3		6		6					
F5	3	2	1	9									
F5	4	2	5	25									
F5	5	1	2	13		6		6					
F5	6	1	1	7		5		5					
F5	7	1	5	21		3	1	2					
F5	8	1	1	5		1		1					
F5	9	1	4	35		4		4					
F5	10	1	1	10		3		3					
F5	11	1		132		1		1					Islam Con.
F5	12	2	3	10									
F5	13	1	1	9		7		7					
F6	1	1	2	12		6	2	4					
F6	2	1	1	5		1		1					
F6	3	1	1	18		2		2					
F6	4	1	1	5		5		5					
F6	5	1	1	8		3	1	2					
F6	6	1	3	11		1		1					
F6	7	1	1	18		13		13					Meat Shop
F6	8	1	1	8		9	1	9					Restaurunt
F6	9	1	1	14		2		2					Tobaco Shop
F6	10	1	1	5		6		6					
F6	11	2	2	29									
F6	12	1	1	7		3	1	2					
F6	13	1	2	12		6	2	4					Flat
F6	14	1	1	4		3		3					Flat
F6	15	1		4		4		4					Flat, Office
F6	16	1	1	4		4		4					Flat
F6	17	1	1	5		4		4					Flat
F6	18	1	1	7		4		4					Flat

TABLE B.3.1 STUDY OF HOUSEHOLD SAIZE AND TAP IN KARIAKOO MODEL AREA (6)

Block Number	Ref. Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
F6	19	1	1	4		4		4					Flat
F6	20	1		4		4		4					Flat, Office
F6	21	1	1	5		3		3					Flat
G1	1	2	4	32									
G1	2	1	1	10		2		2					
G1	3	2	7	34									
G1	4	2	1	10									
G1	5	2	2	10									
G2	1	1	6	22		1		1					
G2	2	2	6	17									
G2	3	1	1	3		3		3					
G2	4	1	1	12		6		6					
G2	5	2	5	11									
G2	6	2	5	18									
G2	7	1	1	10		3		3					
G2	8	1	2	6		4		4					
G2	9	1	1	11		1		1					
G2	10	1	3	14		3		3					
G2	11	1	2	18		2		2					
G2	12	1	3	13		1	1						
G2	13	1	6	26		1		1					
G3	1	2	4	10									
G3	2	2	4	10									
G3	3	1	2	9		6		6					
G3	4	1	4	20		1		1					
G3	5	2	1	8									
G3	6	1	4	14		2		2					
G3	7	2	1	4									
G3	8	1	3	17		1		1					
G3	9	1	1	13		10	3	7					
G3	10	1	1	22		13	1	12					
G3	11	1	3	11		6		6					
G3	12	1	2	9		6		6					
G3	13	1	5	12		5		5					
G3	14	1	1	7		6		6					
G3	15	1	1	18		1		1					
G4	1	1	6	14		1	1						
G4	2	1	5	19		1		1					
G4	3	1	1	2		3		3					
G4	4	1	1	6		6		6					
G4	5	1	2	23		1	1						
G4	6	1	1	5		5		5					
G4	7	1	8	14		5	1	4					
G4	8	1	3	20		1	1						
G4	9	1	5	20		1		1					
G5	1	1	1	10		3		3					
G5	2	1	1	4		8		8					
G5	3	1	1	23		1		1					
G5	4	1	1	9		6		6					
G5	5	1	1	10		7		7					
G5	6	1	1	9		5		5					
G5	7	1	1	5		3		3					
G5	8	1	2	9		1		1					
G5	9	1	1	10		6		6					
G5	10	1	1	15		6		6					
G5	11	1	1	8		14	1	13					
G5	12	1	1	22		1		1					

TABLE B.3.1 STUDY OF HOUSEHOLD SAIZE AND TAP IN KARIAKOO MODEL AREA (7)

Block Number	Ref. Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number Total	Tap Number Leakage With	Tap Number Leakage Without	Instalation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
G5	13	1	1	6		4		4					
G5	14	1	1	4		5		5					
G5	15	1	1	15		5		5					
G5	16	3				1	1						Kiosk
H1	1	1	1	80		1		1					
H1	2	1	4	14		4		4					
H1'	1	1	1	12		4		4					
H1'	2	2	7	12									
H1'	3	1	1	10		1	1						
H2	1	1	1	29		1		1					
H2	2	1	1	9		1		1					
H2	3	1	4	15		5		5					
H2	4	1	3	20		1		1					
H2	5	2	3	17									
H2	6	1	1	30		1		1					
H2	7	1	3	11		3		3					
H2	8	1	1	2		5		5					
H2	9	1	1	8		2		2					
H2	10	1	1	6		3		3					
H2	11	1	1	4		1		1					
H2	12	1	1	5		1		1					
H2	13	1	6	30		1		1					
H3	1	2	1	17									
H3	2	2	6	15									
H3	3	1	1	20		3		3					
H3	4	1	3	11		1		1					
H3	5	1	2	8		1		1					
H3	6	2	7	36									
H3	7	1	2	15		5		5					
H3	8	1	1	11		2		2					
H3	9	1	1	4		5		5					
H3	10	1	1	12		2	?	?					
H3	11	1	1	3		1		1					Restaurant
H3	12	2		2		7		7					Guest house
H3	13	2	4	28									
H3	14	1	1	10		5		5					
H3	15	2	1	4									
H4	1	1	9	22		1		1					
H4	2	1	6	12		1		1					
H4	3	1	1	12		15		15					
H4	4	1	1	18		5		5					
H4	5	1	2	17		8		8					
H4	6	1	1	12		10		10					
H4	7	1	2	16		3		3					
H4	8	1	9	18		1		1					
H4	9	1	5	24		3		3					
H5	1	1	1	7		2		2					
H5	2	1	2	11		8		8					
H5	3	1		7		7	1	6					Restaurant
H5	4	1	1	5		4		4					
H5	5	1	2	14		4		4					
H5	6	1	1	11		1		1					
H5	7	1	3	15		4		4					
H5	8	1	3	17		3		3					
I1	1												Factory
I1	2	1	4	17		1	1						
I1	3	1	1	11		6		6					

TABLE B.3.1 STUDY OF HOUSEHOLD SAIZE AND TAP IN KARIAKOO MODEL AREA (8)

Block Number	Ref. Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
I2	1	1	2	13		5		5					
I2	2	1	3	12		1	1						
I2	3	2	5	37									
I2	4	1	6	20		1		1					
I2	5	2	1	12									
I2	6	2	5	22									
I2	7	2	7	20									
I2	8	1	5	18		1	1						
I2	9	1	1	9		1		1					
I2	10	1	1	21		1		1					
I2	11	1	1	8		1		1					
I2	12	1	2	10		3		3					
I2	13	1	1	14		5	1	4					Restaurant
I2	14	1	1	6		6		6					
I3	1	1	1	9		6		6					
I3	2	1	2	15		3		3					
I3	3	1	1	18		2		2					
I3	4	1	10	29		1		1					
I3	5	2	9	26									
I3	6	1	1	3		3		3					
I3	7	?	?	?		?	?	?					
I3	8	2	3	30									
I3	9	1	1	20		1		1					
I3	10	1	1	15		2	2						
I3	11	1	1	11		4	1	3					
I3	12	1	5	15		1		1					
I3	13	1	3	11		2		2					
I3	14	2	10	37									
I4	1	1	5	23		1		1					
I4	2	2	7	22									
I4	3	2	7	25									
I4	4	2	3	25									
I4	5	2	3	35									
I4	6	1	2	12		8		8					
I4	7	1	1	9		5		5					
I4	8	1	3	10		2		2					
I4	9	1	2	10		1	1						
I4	10	1	3	19		4		4					
I4	11	1	7	23		1	1						
J2.1	1	1	3	26		1		1					
J2.1	2	2	7	22									
J2.1	3	2	10	26									
J2.1	4	1	2	13		6	1	5					
J2.1	5	2	10	26									
J2.1	6	1	1	10		2	2						
J2.2	1	1	2	15		3		3					
J2.2	2	2	1	20									
J2.2	3	2	10	20									
J2.2	4	1	1	16		2	2						
J2.2	5	1	1	13		3		3					
J2.2	6	1	2	17		6		6					
J3.1	1	1	3	14		7		7					
J3.1	2	1	5	12		1		1					
J3.1	3	1	5	20		1		1					
J3.1	4	1	9	19		6		6					
J3.1	5	1	2	18		5		5					
J3.1	6	1	6	10		1		1					

TABLE B.3.1 STUDY OF HOUSEHOLD SAIZE AND TAP IN KARIAKOO MODEL AREA (9)

Block Number	Ref. Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
J3.2	1	1	2	21		9		9					
J3.2	2	1	4	7		1		1					
J3.2	3	1	2	12		2		2					
J3.2	4	1	7	24		1		1					
J3.2	5	1	2	12		5		5					
J3.2	6	1	1	20		1		1					
J3.2	7	1	2	16		1		1					
J3.2	8	2	13	42									
J3.2	9	1	7	17		1	1						
J3.2	10	1	4	28		2		2					
J4	1	1				73		73					Mosque
J4	2	1		11		8	1	7					Petro Station

3.2 Kinondoni Model Area

TABLE B.3.2 STUDY OF HOUSEHOLD SIZE AND TAP IN KINONDONI MODEL AREA (1)

Block Number	House Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
Total			961	4,392		1,255	113	1,141					
Min.			1	1		1	1	1					
Ave.			2.2	10.1		5.7	2.2	5.4					
Max.			12	42		35	35	21					
A	A1	1	1	3		4		4					Flat
A	A2	1	1	4		4		4					Flat
A	A3	1	1	2		4		4					Flat
A	A4	1	1	2		4		4					Flat
A	B1	1	1	8		4	1	3					Flat
A	B2	1	1	1		4		4					Flat
A	B3	1	1	2		4		4					Flat
A	B4	1	1	1		4		4					Flat
A	C1	1	1	6		4		4					Flat
A	C2	1	1	6		4		4					Flat
A	C3	1	?	?		?	?	?					Flat
A	C4	1	1	1		4		4					Flat
A	C5	1	1	4		4		4					Flat
A	C6	1	1	4		3		3					Flat
A	C7	1	1	4		6		6					Flat
A	C8	1	1	1		4		4					Flat
A	D1	1	1	3		4		4					Flat
A	D2	1	1	2		4		4					Flat
A	D3	1	1	5		4		4					Flat
A	D4	1	1	4		4		4					Flat
A	D5	1	1	1		4		4					Flat
A	D6	1	1	4		4		4					Flat
A	D7	1	1	1		4		4					Flat
A	D8	1	1	2		4		4					Flat
A	E1	1	1	7		3	1	2					Flat
A	E2	1	1	2		3		3					Flat
A	E3	1	1	6		2	1	1					Flat
A	E4	1	1	1		4		4					Flat
A	E5	1	1	3		4	2	2					Flat
A	E6	1	1	4		3		3					Flat
A	E7	1	1	5		4		4					Flat
A	E8	1	1	3		4	2	2					Flat
A	51	1	1	6		4	1	3					
A	50	1	1	8		8		8					
A	49	1	1	7		8		8					
A	48A	1	1	6		9		9					
A	48B	1	1	9		11	6	5					
A	64A	1	1	9		10	1	9					
A	64B	1	2	6		17	2	15					
A	63	1	1	8		12	1	11					
A	62	1	1	13		11	2	9					
A	61	1	1	15		18		18					
A	60	1	1	9		8		8					
A	59	1	1	13		18		18					
A	58	1	1	3		5		5					
A	33	1	1	5		10		10					
A	34	1	1	3		17		17					

TABLE B.3.2 STUDY OF HOUSEHOLD SIZE AND TAP IN KINONDONI MODEL AREA (2)

Block Number	House Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
A	35	1	1	9		10		10					
A	36	1	1	9		7		7					
A	37	1	1	6		5	3	2					
A	38A	1	1	7		11		11					
A	39B	1	1	6		6		6					
A	40	1	1	7		9		9					
A	41	1	1	4		8		8					
A	42	1	1	10		4		4					
A	43B	1	1	8		4	2	2					
A	43A	1	1	10		4		4					
A	44	1	1	5		5		5					
A	45	1	1	10		8	2	6					
A	46	1	1	9		8	1	7					
A	47	1	1	8		14		14					
A	15	1	1	6		8		8					
A	23	1	1	7		5		5					
A	22	1	1	4		12		12					
A	21	1	1	4		6		6					
A	20A	1	1	3		9		9					Tank, 2 Pumps
A	20	1	1	4		9		9					Tank, Pump
A	19	1	1	4		12		12					
A	18	1	1	9		10		10					
A	17	1	1	2		8		8					
A	16	1	2	20		16	2	14					
A	15	1	1	5		9		9					
A	14	1	0	20		35	35						Catholic Mi. Hospital
A	13A	1	1	7		6		6					
A	13B	1	1	4		5		5					
A	13C	1	1	4		4		4					
A	12	1	1	8		8		8					
A	11A	1	1	8		8		8					
A	10	1	1	5		6		6					
A	8	1	1	6		7		7					
A	7	1	1	5		12		12					Tank
A	6	1	1	6		10		10					
A	5	1	0	80		21		21					Hospital
A	4	1	1	4		16		16					
A	3	1	1	4		6		6					
A	2	1	1	7		8		8					
A	1	1	1	8		11		11					
A	32	1	2	18		20	2	18					
A	31	1	1	14		6		6					
A	30	1	2	11		10		10					
A	29	1	1	5		5		5					
A	28	1	1	9		7		7					
A	27	1	1	6		8	1	7					
A	26	1	1	11		14		14					
A	25	1	1	6		17		17					
A	24	1	1	14		8		8					
SA	-	1	0	120		4		4					Office
SA	177	1	1	8		13	2	11					
SA	172	1	1	4		7	3	4					
SA	173	1	1	8		7	3	4					
SA	-	1	1	6		6	2	4					
SA	-	1	1	3		7		7					
SA	65	1	1	8		8	1	7					
SA	93	1	1	10		12		12					

TABLE B.3.2 STUDY OF HOUSEHOLD SIZE AND TAP IN KINONDONI MODEL AREA (3)

Block Number	House Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
SA	92	1	1	3	1	12		12					
SA	91	1	1	11		12	1	11					
SA	70	1	1	6		12	1	11					
SA	71	1	1	6		11	1	10					
SA	45	1	1	4		6		6					
SA	57	1	1	5		12		12					
SA	56	1	1	10		6		6					
SA	55	1	1	4		12	1	11					
SA	54	1	1	6		7		7					
SA	53	1	1	6		8		8					
SA													Vacant House
SA	-	1	1	8		9	1	8					
SA	-	1	1	6		10		10					
SA	142	1	2	15		7	1	6					
SA	143	1	1	7		4		4					
SA	144	1	1	10		7	2	5					
SA	145	1	1	10		7	1	6					
SA	146	1	1	7		8	1	7					
SA	147	1	1	9		9	2	7					
SA	148	1	1	10		8		8					
SA	149	1	1	7		8	2	6					
SA	150	1	1	6		8	1	7					
SA	151	1	2	8		8		8					
SA	152	1	1	9		8	2	6					
SA	153	1	1	10		9		9					
SA	1A	1	1	12		12		12					
SA	2B	1	1	2		9	2	7					
SA	3C	1	1	3		6		6					
SA	4D	1	1	4		9		9					
SA	5E	1	1	6		6		6					
SA	-	1	1	6		3		3					
SA	159	1	1	9		7	1	6					
SA	160	1	1	8		6	1	5					
SA	159	1	1	7		4		4					
SA	158	1	1	11		8		8					
SA	157	1	1	13		9	2	7					
SA	156	1	1	8		8		8					
SA	155	1	1	11		10		10					
SA	379	2	1	10									
SA	-	2	5	30									
SA	380	1	1	9		1		1					Community
SA	387	2	4	22									
SA	2	2	1	6									
SA	5	2	1	2									
SA	91	2	1	3									
SA	39A	2	8	21									
SA	39B	2	1	2									
SA	391	2	4	12									
SA	3	1	3	9		1		1					Community
SA	406	1	1	7		1		1					
SA	284	1	1	12		2		2					
SA	403	2	5	13									
SA	393	2	4	15									
SA	396B	1	1	5		1		1					Community
SA	394	2	1	11									
SA	201	2	5	16									
SA	404	2	4	13									

TABLEB.3.2 STUDY OF HOUSEHOLD SIZE AND TAP IN KINONDONI MODEL AREA (4)

Block Number	House Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
SA	14	2	3	12									
SA	13	1	8	26		1		1					
SA	200	2	1	6									
SA	203	2	1	10									
SA	114	2	1	5									
SA	428	2	5	10									
SA	15	2	3	6									
SA	426	2	4	18									
SA	422	2	4	8									
SA	412	2	4	18									
SA	413	2	1	12									
SA	409	2	3	9									
SA	404	1	5	18		1		1					
SA	408	1	7	42		1		1					
SA	423	2	2	12									
SA	48	1	6	18		1	1						
SA	415	1	4	17		1		1					
SA	414	1	5	19		1	1						
SA	412	1	1	10		2		2					
SA	20	1	1	6		10	1	9					
SA	416	1	4	14		3	1	2					
SA	417	1	2	15		1		1					
SA	419	2	1	14									
SA	31	1	5	17		3		3					
SA	460	1	2	10		2		2					
SA	458	1	1	6		1		1					
SA	419A	1	1	4		1		1					Community
SA	421	2	5	16									
SA	424	2	3	15									
SA	425	2	3	20									
SA	426	2	1	10									
SA	378	1	1	9		1		1	86	Paid			
SA	382	1	1	5		2		1	86	Paid			
SA	383	1	1	6		1		1	86	Paid			
SA	122	2	5	12									
SA	196	2	2	12									
SA	-	1	1	9		1		1	85	Paid			
SA	198	1	2	12		1		1	88	450			
SA	185	2	1	5									
SA	-	1	1	10		6		6	85	Paid			
SA	191	2	1	5									
SA	190	1	1	7		1		1	85	Paid			
SA	200	2	1	6									
SA	-	2	1	8									
SA	201	2	7	24									
SA	202	2	1	5									
SA	203	2	1	5									
SA	205	2	1	3									
SA	-	2	4	12									
SA	325	2	3	7									
SA	204	2	1	11									
SA	206	2	4	28									
SA	207		3	12									
SA	211	1	1	3		4		4	85	450			Tank
SA	208	1	2	3		1	1		80	450			
SA	212	2	3	10									
SA	219	2	4	15									

TABLE B.3.2 STUDY OF HOUSEHOLD SIZE AND TAP IN KINONDONI MODEL AREA (5)

Block Number	House Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
SA	-	2	4	9									
SA	-	1	1	4		1		1	80	Paid			
SA	-	1	1	4		1		1	80	Paid			
SA	-	2	1	10									
SA	-	1	3	19		4		4	80				
SA	-	1	1	7		3	1	2	80	Paid			
SA	-	1	1	7		7		7	80	Paid			
SA	220	1	1	8		4		4	80	450			
SA	238	1	9	28		1	1		70	Paid			
SA	237	2	1	13									
SA	236	1	1	7		1	1		80	450			
SA	235	2	1	3									
SA	234	2	7	35									
SA	233	1	1	12		1		1	89	450			
SA	232	2	4	12									
SA	271	1	2	9		2		2	61	450			
SA	348	1	4	15		1		1	70	No Pay			
SA	351	2	1	6									
SA	349	2	4	7									
SA	249	2	1	6									
SA	-	1	1	13		1		1	78	450			
SA	242	2	6	12									
SA	241	1	1	4		3		3	80	450			
SA	240	2	3	18									
SA	239	2	3	7									
SA	121	2	2	6									
SA	184	2	1	6									
SA	186	2	1	5									
SA	185	2	8	14									
SA	188	1	1	8		2		2	75	450			
SA	180	2	2	17									
SA	179	1	10	29		1		1	83	450			
SA	-	2	1	6									
SA	125	2	6	13									
SA	183	1	12	32		1		1		Paid			
SA	-	2	1	2									
SA	402	2	6	39									
SA	117	2	4	16									
SA	400	2	6	17									
SA	116	2	3	15									
SA	115	2	1	4									
SA	-	2	3	11									
SA	136	2	8	30									
SA	129	2	6	20									
SA	132	1	10	30		1	1		80	No Pay			
SA	128	2	3	8									
SA	127	2	6	20									
SA	187	2	1	10									
SA	114	2	1	4									
SA	-	2	1	6									
SA	200	2	3	6									
SA	199	2	1	5									
SA	401	2	11	40									
SA	195A	1	1	4		1		1	80	Paid			
SA	197	2	7	30									
SA	-	2	4	14									
SA	196	2	1	4									

TABLE B.3.2 STUDY OF HOUSEHOLD SIZE AND TAP IN KINONDONI MODEL AREA (6)

Block Number	House Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
SA	198	2	1	5									
SA	194	2	3	6									
SA	193	2	1	12									
SA	104	1	6	4		1		1	80	450			
SA	103	2	3	14									
SA	112	2	9	30									
SA	110	2	1	10									
SA	109	2	5	14									
SA	108	2	1	8									
SA	106	2	1	6									
SA	107	2	1	4									
SA	183	2	1	9									
SA	104	2	2	9									
SA	154	2	1	8									
SA	153	2	2	13									
SA	152	2	2	13									
SA	181	2	3	5									
SA	429	1	4	9		1		1					
SA	481	1	1	7		1		1					
SA	432	2	5	27									
SA	204	2	2	4									
SA	204B	2	1	30									
SA	207	2	4	12									
SA	206	2	1	11									
SA	213	2	1	7									
SA	212	2	1	8									
SA	67	1	1	15		1		1					
SA	437	2	1	5									
SA	444	2	1	10									
SA	391	2	8	22									
SA	435	2	1	4									
SA	436	1	1	11		1		1					
SA	441	2	1	24									
SA	434	2	1	4									
SA	61	1	1	13		1		1					Community
SA	438	1	1	16		1		1					
SA	467	2	4	21									
SA	150	2	4	7									
SA	454A	2	1	9									
SA	454B	1	1	8		2		2		450			
SA	52	2	8	19									
SA	472	2	6	9									
SA	472B	2	1	9									
SA	473	2	5	15									
SA	475	2	1	12									
SA	474	1	1	5		1		1					
SA	141	2	1	13									
SA	520	2	1	10									
SA	544	2	1	5									
SA	546	2	1	15									
SA	545	1	7	12		1		1					
SA	702	1	1	11		1		1					
SA	186	2	1	6									
SA	704	2	4	14									
SA	705	1	1	12									
SA	706	2	5	20									
SA	477	2	1	4									

TABLE B.3.2 STUDY OF HOUSEHOLD SIZE AND TAP IN KINONDONI MODEL AREA (7)

Block Number	House Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
SA	478	2	1	7									
SA	479A	2	1	10									
SA	479B	2	1	10									
SA	476	2	3	9									
SA	80	2	1	25									Restaurant
SA	81	2	2	9									
SA	38	2	3	8									
SA	35	2	2	9									
SA	36	2	1	18									
SA	37	2	4	12									
SA	45	2	4	12									
SA	46	2	1	7									
SA	47	2	1	9									
SA	24	2	4	4									
SA	50	2	7	10									
SA	-	2	6	21									
SA	39	2	3	6									
SA	-	1	1	11		2		2	88	450			
SA	41	2	1	1									
SA	42	2	3	19									
SA	43	2	6	9									
SA	48	2	1	5									
SA	82	2	5	9									
SA	48	2	3	9									
SA	79	2	1	9									
SA	78	2	3	23									
SA	84	2	4	21									
SA	85	2	4	12									
SA	86	2	2	12									
SA	76	2	2	20									
SA	75	2	3	5									
SA	-	2	5	9									
SA	-	2	6	29									
SA	89	1	3	12		1		1	80	Paid			
SA	287	2	3	15									
SA	288	2	4	15									
SA	158	2	1	7									
SA	176	2	5	14									
SA	178	2	3	11									
SA	156	2	4	23									
SA	154	1	3	17		1		1	85	450			
SA	153	2	4	16									
SA	483	2	1	5									
SA	484	2	1	13									
SA	486	2	5	13									
SA	512	2	4	8									
SA	179	2	4	16									
SA	-	2	3	12									
SA	181	2	2	7									
SA	182	2	1	9									
SA	183	2	6	18									
SA	-	1	1	6		4		4	88	Paid			
SA	189	1	1	8		1		1	85	450			
SA	188	1	5	11		1		1	85	450			
SA	193	2	1	11									
SA	451	2	3	13									
SA	187	1	0	5		1		1	80	450			Guest House

TABLE B.3.2 STUDY OF HOUSEHOLD SIZE AND TAP IN KINONDONI MODEL AREA (8)

Block Number	House Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
SA	65	2	1	4									
SA	-	1	1	9		1		1	80	No Pay			
SA	203	2	1	5									
SA	204	2	5	18									
SA	214	2	2	6									
SA	502	1	1	9		1		1	80	450			
SA	192	2	6	16									
SA	150	1	1	6		2	2		88	120			Bar
SA	151	2	3	13									
SA	152	2	4	13									
SA	498	2	4	11									
SA	180	2	3	9									
SA	53	2	3	14									
SA	471	2	2	11									
SA	820	2	4	26									
SA	148	2	1	12									
SA	516	2	1	10									
SA	518	1	5	18		1		1					Community
SA	29	2	1	9									
SA	69	2	1	10									
SA	481	2	1	4									
SA	447	2	5	11									
SA	448	2	4	12									
SA	449	2	1	5									
SA	451A	2	4	18									
SA	450	2	4	13									
SA	452	1	4	18		1		1					
SA	-	2	2	12									
SA	-	2	2	10									
SA	290B	2	1	8									
SA	-	2	4	11									
SA	77	2	1	35									
SA	289	2	3	9									
SA	288	1	1	5		1		1					
SA	466	1	1	15		2		2					
SA	465A	1	2	5		2		2					
SA	465B	1	4	17		2		2					
SA	468	1	1	6		4		4					
SA	469	1	6	14		1		1					
SA	199	2	4	15									
SA	198	1	1	8		1		1					
SA	197	1	1	6		1		1					
SA	473	1	4	10		1		1					
SA	491	2	5	22									
SA	497	2	3	13									
SA	496	1	1	10		2		2					
SA	499	2	1	3									

3.3 Magomeni Model Area

TABLE B.3.3 STUDY OF HOUSEHOLD SIZE AND TAP IN MAGOMENI MODEL AREA (1)

Block Number	House Number	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
Total		613	1,606	6,510		751	140	601					
Min.		1	1	1		1	1	1					
Ave.		1.3	3.4	13.9		2.5	1.8	2.2					
Max.		2	11	33		35	6	32					
A	140	1	2	8		1		1	1,971	437	?	216	
A	142	1	4	15		1		1	?	437	?	216	
A	144	1	3	17		1		1	?	437	?	101	
A	146	1	5	10		1		1	?	437	?	205	
A	148	1	3	18		1		1	?	437	?	216	
A	150	1	8	8		6	2	4	1,967	437	?	101	Guest House
A	152	2	5	18									Disconnection
A	154	2	7	20									Disconnection
A	156	1	4	13		1	1		1,968	437	?	101	
A	158	1	6	14		1		1	?	?	?	?	
A	160	1	8	18		1	1		?	437	2,000	216	
A	162	1	1	4		5	?	?	?	437	3,000	101	
A	164	2	6	17									Disconnection
A	166	2	8	30									Disconnection
A	168	1	6	21		1	1		?	?	?	?	
A	170	1	5	14		1		1	?	?	?	?	
A	172	1	5	13		3		3	?	437	?	101	
A	174	1	6	28		1		1	?	437	3,500	101	
A	176	1	4	7		1		1	?	?	3,000	?	
A	178	1	4	16		1		1	1,967	437	2,000	101	
A	2	1	4	8		1	?	?	1,977	437	?	216	
A	1	1	2	6		1	?	?	?	437	3,600	216	
A	3	1	4	24		6	3	3	?	?	?	?	
A	5	1	5	16		1		1	?	?	?	?	
A	7	2	5	12									
A	9	1	3	10		1		1	?	?	?	?	
A	11	1	6	28		1		1	1,970	?	?	?	
A	13	2	5	20									Disconnection
A	15	2	9	21									
A	17	2	5	16									
A	19	1	5	23		1		1	1,973	437	?	216	
A	21	1	5	17		1		1	?	437	?	216	
A	12	1	2	10		1	1		1,964	437			
A	14	1	6	19		1		1	1,964	437			
A	16	2	5	6									
A	18	1	1	4		1		1	1,964	437			
A	20	1	6	18		1		1	1,964	437			
A	22	1	2	10		1		1	1,964	437			
A	24	1	4	11		4		4	1,964	437			
A	26	1	2	15		4		4	1,964	437			
A	28	1	2	5		1		1	1,964	437			
A	1	1	4	5		1		1	1,975	437		205	
A	3	2	5	27									Disconnection
A	5	2	8	20									
A	7	1	5	14		4		4	?	437		205	
A	9	1	4	8		1	?	?	?	437		205	
A	11	1	5	14		5	4	1	1,966	437		205	

TABLE B.3.3 STUDY OF HOUSEHOLD SIZE AND TAP IN MAGOMENI MODEL AREA (2)

Block Number	House No.	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
B	13	1	2	8		4	3	1	1,969	437		205	
B	15	1	3	15		5	4	1	1,966	437		205	
B	17	1	1	13		6	1	5	1,968	437		205	
B	19	1	1	5		2	1	1	1,966	437		205	
B	21	1	5	16		4		4	1,966	437		205	
B	23	1	1	12		4		4	1,967	437		205	
B	25	1	6	21		5	4	1	1,971	437		205	
B	27	1	7	23		1		1	?	437		205	
B	30	1	3	16		4	2	2	?	437		205	
B	32	1	5	30		4	1	3	1,967	437		205	
B	34	1	7	18		1		1	1,970	437		205	
B	36	2	6	22									Disconnection
B	38	2	5	16									Disconnection
B	40	2	10	27									
B	42	1	4	20		4		4	1,968	437		205	
B	44	1	6	23		3	2	1	1,968	437		205	
B	46	1	6	21		1		1	?	437		205	
B	48	1	2	9		4		4	1,966	437		205	
B	50	2	7	26									Disconnection
B	52	2	6	19									Disconnection
B	54	1	5	18		1		1	1,970	437		205	
B	56	1	7	24		1		1	1,974	437		205	
B	58	1	1	24		1		1	1,973	437		205	
B	60	1	2	10		1		1	1,975	437		205	
B	62	1	10	19		1		1	1,970	437		205	
B	196	1	6	19		2		2		437			
B	198	1	9	28		1		1	1,966	437			
B	200	1	6	7		1		1	1,964	437			
B	202	1	6	20		1		1	1,967	437			
B	204	1	6	11		1		1	1,964	437			
B	206	1	6	7		2		2	1,969	437			
B	208	1	8	19		1		1	1,962	437			
B	207	1	3	18		1		1	1,980	437			
B	206	1	1	13		1		1	1,986	437			
B	205	2	1	10									
B	204	1	4	20		3		3	1,980	437			
B	40	2	1	10									
B	211	1	1	12		5		5	1,970	437			
B	212	1	2	10		1		1	1,985	437			
B	213	1	1	12		1		1	1,980	437			
B	214	2	3	14									
B	215	2	1	9									
B	216	2	1	5									
B	148	1	2	20		1		1	?	437			
B	149	2	1	6									
B	151	1	3	17		3		3	1,983	437			
B	152	2	3	15									
B	153	2	2	20									
B	154	1	1	11		1		1	1,970	437			
B	155	2	1	7									
B	156	1	7	15		1	1		1,976	437			
B	157	1	1	18		3		3	1,985	437			
B	159	1	8	22		2		2	1,972	437			
B	198	1	1	5		3		3	1,984	437			
B	218	1	1	3		3		3	1,988	437			
B	182	1	3	10		3		3	1,979	437			
B	116	1	4	17		1		1	1,977	437			

TABLE B.3.3 STUDY OF HOUSEHOLD SIZE AND TAP IN MAGOMENI MODEL AREA (3)

Block Number	House No.	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
B	181	1	3	10		3		3	1,965	437			
B	175	2	1	8									
B	173	1	2	12		2		2	1,986	437			
B	171	1	2	8		2		2	1,984	437			
B	169	2	4	15									
B	167	2	2	10									
B	165	1	3	20		1		1	1,980	437			
B	C1	1	1	6		4	1	3	1,979	437			
B	C2	1	1	12		1		1	1,987	437			
B	178	1	1	10		6		6	1,976	437			
B	176	1	3	19		1		1	1,966	437			
B	174	1	6	23		1		1	1,964	437			
B	172	2	1	8									
B	170	2	4	29									
B	168	-	-	-									Under Build
B	166	2	3	19									
B	164	2	1	10									
B	194	1	1	8		1		1	1,984	437			
B	193A	1	1	5		1		1	1,984	437			
B	193B	1	3	10		1		1	1,984	437			
B	110	1	1	8		10		10	1,984	437			
D	44	1	5	17		3		3	1,964	437			
D	42	2	4	20									
D	40	1	7	12		2		2	1,964	437			
D	38	1	6	20		1		1	1,964	437			
D	36	1	4	13		1		1	1,972	437			
D	34	1	6	22		1		1	1,964	437			
D	32	1	1	22		4		4	1,964	437			
D	30	1	1	10		5		5	1,970	437			
D	28	1	5	11		1	1		1,964	437			
D	26	2	4	16									
D	24	1	1	12		8		8	1,978	437			
D	22	1	1	21		6		6	1,961	437			
D	20	2	5	17									
D	18	1	5	26		1		1	1,964	437			
D	16	1	4	19		1		1	1,967	437			
D	35	1	4	19		1		1	1,975	437			
D	33	1	8	14		1		1	1,980	437			
D	31	1	1	20		1		1	1,973	437			
D	54	2	4	20									
D	52	1	3	25		1		1	1,964	437			
D	50	1	2	6		2		2	1,989	437			
D	48	1	2	25		1		1	1,964	437			
D	46	1	3	27		1		1	1,964	437			
E	135	1	4	18		2	1	1	?	437	?		
E	1	1	1	5		2	2		?	437		216	
E	3	1	6	16		1		1	1,973	437	2,000	216	
E	5	1	4	24		1		1	1,989	-	?	-	
E	7	1	3	18		4		4	1,964	437	2,000	101	
E	9	1	4	12		1		1	1,971	437	3,000	216	
E	28	1	5	25		1		1	?	?	2,000	?	
E	11	1	6	21		1		1	1,988	No	2,075	NOT	
E	13	1	6	15		1		1	?	437	?	?	
E	15	1	4	25		1		1	1,973	437	?	216	
E	17	1	1	12		6		6	?	437	2,500	216	
E	19	1	5	23		3	1	2	?	437	?	216	
E	12	1	6	25		2		2	1,965	437	?	216	

TABLE B.3.3 STUDY OF HOUSEHOLD SIZE AND TAP IN MAGOMENI MODEL AREA (4)

Block Number	House No.	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
E	-	1	0	0		35	3	32	1,973	437	-	-	Mosque
E	14	1	5	15		5		5	1,970	437		216	
E	16	2	8	22									
E	15	1	6	19		1		1	1,990	?	?	?	
E	18	2	4	27									
E	20	1	5	19		1		1	?	437	?	216	
E	22	1	3	14		4		4	?	437	10,000	216	
E	24	1	1	10		4		4	?	437	3,000	216	
E	8	1	3	15		5		5	1,982	437	?	?	
E	10	2	5	20									
E	12	1	7	25		1		1	?	437	?	216	
E	11	2	3	8									
E	13	2	6	16									
E	175	1	1	8		4		4	1,964	437	?	?	
E	173	1	2	9		4	3	1	1,966	?	?	101	
E	171	1	4	13		4	2	2	1,967	?	?	101	
E	169	1	6	25		1		1	1,967	?	?	101	
E	167	1	11	24		1		1	1,964	?	?	101	
E	165	1	10	27		1		1	1,966	?	?	101	
E	163	1	0	0		12	6	6	1,966	?	?	101	Hotel
E	149	1	5	32		1		1	1,967	?	?	101	
E	147	1	5	9		4	3	1	1,966	?	?	101	
E	145	2	4	19							4,000		
E	143	1	7	22		1		1	1,964	437	?	?	
E	139	1	5	13		4	3	1	1,966	?	?	?	
E	137	1	6	19		2		2	1,966	?	?	?	
E	141	2	3	19							1,500		
E	2	1	3	15		1	1		?	?	?	?	
E	4	1	4	16		1	1		?	437	?	?	
E	6	1	2	15		3		3	?	437	6,100	216	
E	8	1	2	8		4		4	?	437	?	216	
E	10	1	5	29		1		1	?	437	3,540	216	
E	8	1	4	15		2	2		1,966	437	?	?	
E	6	1	7	17		3	2	1	1,967	437	2,200	216	
E	4	1	7	14		4	1	3	1,967	437	?	216	
E	2	1	1	8		4		4	1,963	450	?	216	
E	38	1	3	20		3	3		1,967	437	?	216	
E	36	1	1	9		4		4	1,967	437	?	216	
E	34	1	1	4		2		2	1,967	437	?	216	
E	32	1	1	10		1		1	1,967	437	?	216	
E	30	1	2	7		2		2	1,967	437	?	216	
E	12	1	3	16		1		1	1,966	437	?	216	
E	10	1	5	31		2	1	1	1,966	437	?	216	
E	8	1	8	22		1		1	1,967	437	?	216	
E	6	1	4	23		1		1	1,983	437	?	216	
E	1	2	5	14									
E	3	1	6	21		1		1	1,977	437	?	216	
E	5	1	4	18		1		1	1,967	437	2,075	216	
E	7	1	4	22		2	1	1	1,970	437	4,600	216	
E	9	1	4	15		1		1	?	437	?	216	
F	183	1	5	27		4	3	1	1,964	437	3,000	?	
F	185	1	8	33		2	1	1	1,968	437	?	?	
F	187	1	7	15		4		4	1,964	437	?	101	
F	189	1	6	11		3	1	2	1,968	437	?	101	
F	191	1	1	17		4		4	1,969	437	?	101	
F	193	1	5	18		4	1	3	1,968	437	5,400	101	
F	195	2	6	10									

TABLE B.3.3 STUDY OF HOUSEHOLD SIZE AND TAP IN MAGOMENI MODEL AREA (5)

Block Number	House No.	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
F	197	2	4	11									
F	199	1	7	21		4	1	3	1,966	437	?	101	
F	201	1	6	25		4	4					101	
F	34	1	6	29		4		4	1,964				
F	32	1	6	22		4	2	2	1,964	437		205	
F	30	1	7	29		1		1	1,964	437		205	
F	28	1	4	16		4	4		1,964	437		205	
F	26	1	2	18		4	3	1	1,966	437		205	
F	24	1	5	16		4	3	1	1,966	437		205	
F	22	1	7	18		4	3	1	1,966	437		205	
F	20	1	4	14		4	3	1	1,966	437		205	
F	49	1	5	21		1		1	1,960	437	?	205	
F	47	1	6	13		1		1	?	437	?	205	
F	45	1	5	20		1	1		1,965	437	?		
F	2	1	6	19		1		1	1,968	437	4,000	205	
F	4	1	2	11		5		5	?	437	?	205	
F	6	1	4	30		1	1		?	437	?	?	
F	8	1	3	23		3		3	?	437	?	?	
F	10	1	6	15		2		2	1,967	437	3,200	101	
F	2	1	4	21		1		1		437	?	?	
F	4	1	8	24		2	1	1	1,966	437	?	205	
F	6	1	4	15		1		1	?	437	?	?	
F	177	1	3	12		1		1	1,964	437	?	?	
F	179	1	6	24		1		1	1,963	437	12,420	?	2,070x6
F	181	1	4	20		11		11	1,986	847	6,300	?	D76+B771,Restaurant
F	18	1	4	18		1		1	1,964	437	10,300	?	
F	16	1	2	4		6	1	5	1,964	671	?	?	
F	14	1	4	18		4		4	1,966	437	?	?	
F	12	1	6	18		4	2	2	1,965	437	4,000	?	
F	10	1	5	15		3	2	1	1,965	437	3,845	?	
F	8	1	3	20		3	2	1	1,971	437	2,075	?	
F	51	1	4	16		1		1	1,976	437	2,075	?	
F	53	2	6	16									
F	13	1	5	14		1		1	1,965	437	?	?	
F	11	2	5	21									
F	9	1	2	12		6		6	1,965	437	?	?	
F	7	2	7	26									
F	5	1	8	21		4	3	1	1,969	437	?	?	
F	3	-	-	-									Under Build
F	1	1	2	7		2		2		437		205	
F	3	1	4	17		2	1	1		437		205	
G	2	1	1	12		9		9	1,989	833	?	?	
G	4	1	6	12		1		1	1,964	437	?	?	
G	6	1	8	20		2	2		1,964	437	?	?	
G	8	1	1	6		7		7	1,987	437	?	?	
G	10	-	-	-									
G	12	1	5	17		1		1	1,989	437	?	?	
G	14	1	5	23		1		1	1,979	437	?	?	
G	16	1	2	12		1	1		1,967	437	?	?	
G	18	1	1	16		6		6	1,989	437	?	?	
G	20	1	2	16		3		3	1,967	437	?	?	
G	22	1	1	8		7		7	1,970	437	?	?	
G	24	1	6	20		1		1	1,970	437	?	?	
G	26	1	1	15		1		1	1,978	437	?	?	
G	28	1	4	14		1		1	1,972	437	?	?	
G	30	1	4	7		3		3	1,964	437	?	?	
G	32	1	2	14		3		3	1,964	437	?	?	

TABLE B.3.3 STUDY OF HOUSEHOLD SIZE AND TAP IN MAGOMENI MODEL AREA (6)

Block Number	House No.	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
G	34	1	4	14		1		1	1,964	437	?	?	
G	36	2	1	9									
G	38	1	3	6		2		2	1,964	437	?	?	
G	40	1	1	18		1		1	1,968	437	?	?	
G	15	2	3	13									
G	17	1	5	10		1		1	1,962	437	?	?	
G	19	1	6	12		1		1	1,964	437	?	?	
G	21	1	5	17		1		1	1,964	437	?	?	
G	23	1	3	6		1	1		1,964	437	?	?	
G	25	2	6	21									
G	27	1	1	7		4		4	1,970	437	?	?	
G	29	1	3	15		5	5		1,964	437	?	?	
G	31	1	6	10		1		1	1,964	437	?	?	
G	33	1	3	18		3		3	1,964	437	?	?	
G	35	2	4	20									
G	37	2	6	15									
G	39	2	5	11									
G	41	1	2	16		6	6		1,964	437	?	?	
G	43	2	8	23									
G	45	1	4	14		4		4	1,964	437	?	?	
G	47	1	4	17		4		4	1,964	437	?	?	
G	49	1	1	9		2		2	1,964	437	?	?	
G	51	1	6	17		3		3	1,964	437	?	?	
G	53	2	2	6									
G	194	1	2	10		1		1	1,972	1,464	?	?	
G	192	1	3	21		1	1		1,964	437	?	?	
G	190	1	4	19		1	1		1,964	?	?	?	
G	188	-	-	-									
G	186	1	3	11		4		4	1,964	?	?	?	
G	184	1	6	19		1		1	1,964	?	?	?	
G	182	1	8	27		1	1		1,964	437	?	?	
G	180	1	2	17		4		4	1,964	437	?	?	
SA	20	1	3	9		1	?	?	?	?	?	?	Bar
SA	173	2	3	13									
SA	18	1	4	16		6		6	1,988	437	?	216	
SA	185	1	6	17		1	1	?	?	?	?	?	
SA	16	2	1	10									
SA	14A	1	1	3		4		4	?	?	?	?	
SA	12	2	4	15									
SA	9A	2	11	30									
SA	10A	2	3	20							8,000		Disconnection
SA	8	2	4	14									
SA	192	1	5	17		1		1	?	437	?	216	
SA	6	2	4	15									
SA	4	1	7	14		6		6	1,988	1,464	10,000	216	Guest House
SA	224	1	3	14		1		1	1,984	?	?	?	
SA	205	2	3	6									
SA	206	1	7	24		1		1	1,988	437	3,550	?	
SA	208	2	4	5									
SA	2	1	4	8		1		1	1,977	437		216	
SA	A01	-	-	-									Under Build
SA	A02	-	-	-									Under Build
SA	308	2	1	7									
SA	324	2	1	6									
SA	230	2	1	7									
SA	206A	1	6	19		1		1	1,988	437	?	216	
SA	202	1	3	11		3		3	?	?	?	?	

TABLE B.3.3 STUDY OF HOUSEHOLD SIZE AND TAP IN MAGOMENI MODEL AREA (7)

Block Number	House No.	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Instalation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
SA	A03	2	2	11									
SA	A04	2	1	1									
SA	A05	2	1	5									
SA	A06	2	1	4									
SA	216	2	2	6									
SA	217	2	1	9									
SA	218B	1	1	7		2		2	?	?	?	?	
SA	218A	1	1	9		3		3	?	437	?	216	
SA	218C	1	3	9		2	1	1	?	437	?	216	
SA	218	1	1	3		3		3	1,989	437	?	216	
SA	231	1	1	9		5		5	1,986	437	?	216	
SA	213	2	4	12									
SA	214	2	2	4									
SA	212	1	1	9		2		2	1,988	437	?	216	
SA	208A	2	4	9									
SA	107	2	3	11									
SA	209	2	4	10									
SA	A08	-	-	-									Under Build
SA	210	1	1	6		1		1	?	?	?	?	
SA	211	2	1	4									
SA	A012	2	1	10									
SA	A013	2	5	10									
SA	A09	-	-	-									Under Build
SA	A010	-	-	-									Under Build
SA	A011	-	-	-									Under Build
SA	201	1	1	11		1		1	?	437	?	216	
SA	A014	2	1	8									
SA	199	2	1	9									
SA	A15	2	3	11									
SA	A16	2	5	26									
SA	191	2	6	21									
SA	10B	2	4	10									
SA	197	2	1	7									
SA	198	2	2	6									
SA	190	2	1	8									
SA	189	2	1	8									
SA	A17	2	1	7									
SA	188	2	1	6									
SA	307	1	1	8		1		1	1,989	?	?	?	
SA	A18	-	-	-									
SA	190A	2	1	6									
SA	A19	-	-	-									Under Build
SA	14B	1	1	10		1		1	?	437	?	216	
SA	A20	2	-	-									Under Build
SA	A21	2	1	8									
SA	306	2	1	7									
SA	183	2	1	6									
SA	184	2	2	10									
SA	182	1	1	10		1	?	?	1,984	437	?	?	
SA	A22	-	-	-									Under Build
SA	A23	2	1	2									
SA	181	1	3	9		3	2	1	?	?	?	?	
SA	176	1	6	24		1	1		1,980	437	?	216	
SA	178	2	1	6									
SA	A24	1	3	13		3		3	1,989	?	?	?	
SA	A25	2	1	8									
SA	162	2	2	14									

TABLE B.3.3 STUDY OF HOUSEHOLD SIZE AND TAP IN MAGOMENI MODEL AREA (8)

Block Number	House No.	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
SA	162A	2	2	20									
SA	163B	1	5	5		1		1	?	437	?	216	
SA	A26	1	5	10		10		10	?	?	?	-	Bar & Guest House
SA	174	2	1	9									
SA	175	2	1	8									
SA	171	1	2	6		1		1	?	437	?	216	
SA	177	2	4	18									
SA	166	2	4	17									
SA	165	2	2	15									
SA	170	2	2	12									
SA	169	2	1	6									
SA	164	1	3	21		1	1		1,975	437	?	216	
SA	163A	2	3	12									
SA	160	2	6	17									
SA	161	2	6	16									
SA	159	1	7	21		1	1		?	?	?	?	
SA	158	1	5	5		5		5	?	?	?	?	Guest House
SA	158A	1	1	8		1		1	?	?	?	?	
SA	157	1	1	18		1		1	1,980	437	?	205	
SA	155A	2	3	13									
SA	155B	2	1	9									
SA	156	1	9	26		1	1		?	?	?	?	
SA	154A	2	1	11									
SA	154	2	1	2									
SA	158B	2	1	9									
SA	33	2	1	9									
SA	159	2	1	7									
SA	153	1	1	8		1	1		1,975	437	?	205	
SA	152	2	2	13									
SA	A27	2	1	4									
SA	305	1	2	12		1		1	1,989	?	?	?	
SB	1B1	2	1	7									
SB	2B1	1	1	7		3		3	1,989	437			
SB	304	2	1	9									
SB	302	2	2	10									
SB	149	2	1	7									
SB	218	1	1	5		4		4	1,987	437			
SB	300	1	3	11		3		3	1,983	437			
SB	151	2	1	7									
SB	34	2	1	10									
SB	148	2	1	10									
SB	298	2	1	8									
SB	30B	2	2	5									
SB	32B	1	1	4		3		3	1,985	437			
SB	34B	2	1	9									
SB	146	1	4	19		1		1	1,970	437			
SB	236	1	1	10		5		5	1,980	437			
SB	B1	2	1	6									
SB	144	1	1	15		3		3	1,989	437			
SB	143	2	5	18									
SB	142	1	1	12		3		3	1,978	437			
SB	140	2	1	6									
SB	296	2	1	14									
SB	129A	2	4	16									
SB	139	2	1	8									
SB	135	2	1	9									
SB	138	1	1	7		1		1	1,975	437			

TABLE B.3.3 STUDY OF HOUSEHOLD SIZE AND TAP IN MAGOMENI MODEL AREA (9)

Block Number	House No.	Pipe Connection	Household Number	Household Size	Water Meter	Tap Number			Installation Year	Water Charge Shs/M	Salary Shs/M	Zone Number	Remarks
						Total	Leakage						
							With	Without					
SB	123B	1	4	20		1		1	1,979	437			
SB	136	2	1	23									
SB	132	2	1	8									
SB	131	1	1	20		1		1	1,988	437			
SB	295	2	1	5									
SB	43	1	1	12		2		2	1,987	437			
SB	303	2	1	5									
SB	129	2	3	10									
SB	232	1	1	11		3		3	1,988	437			
SB	126	1	5	20		1		1	1,982	437			
SB	126A	1	2	16		1		1	1,980	437			
SB	B2	1	1	7		1		1	1,987	437			
SB	124	2	4	16									
SB	125	2	5	18									
SB	128	1	4	9		1		1	1,969	437			
SB	225	1	6	22		1		1	1,976	437			
SB	123A	2	1	10									
SB	127	2	1	12									
SB	122	2	1	7									
SB	104A	2	6	22									
SB	104B	2	4	23									
SB	120	2	1	7									
SB	B3	1	5	20		1		1	1,976	437			
SB	119	2	2	11									

4. FLOW MEASUREMENT IN DISTRIBUTION PIPE

TABLE B.4.1 (1) DISTRIBUTION PIPE FLOW

(Unit : l/sec)

Time (Hour)	(Minute)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
6	0																	
6	10																	
6	20																	
6	30													76.7				
6	40													81.7				
6	50													80.0				
7	0													81.7				
7	10												13.3	78.3				
7	20												13.3	78.3				
7	30												18.3	78.3	125.0			
7	40												20.0	78.3	331.7			
7	50												21.7	80.0	211.7			
8	0												25.0	80.0	181.7			
8	10												23.3	80.0	178.3			
8	20												21.7	78.3	178.3			
8	30												25.0	80.0	180.0			
8	40												26.7	78.3	173.3			
8	50												26.7	78.3	176.7			
9	0												23.3	80.0	175.0			
9	10												21.7	78.3	170.0			
9	20												23.3	80.0	121.7			
9	30												20.0	80.0	5.0			
9	40												20.0	80.0	3.3			
9	50												20.0	78.3				
10	0												20.0	81.7				
10	10												18.3	56.7				
10	20												18.3					
10	30												16.7					
10	40												21.7					
10	50												16.7			70.0		
11	0									0.0						70.0		
11	10									0.0						68.3		
11	20									0.0						66.7		
11	30			21.7						0.0						63.3		
11	40			23.3						5.8						61.7		
11	50	50.0	36.7	21.7						1.9						63.3		
12	0	50.0	35.0	21.7						0.0						65.0		
12	10	50.0	35.0	23.3						1.8						65.0		
12	20	50.0	35.0	21.7						0.0						63.3		1321.6
12	30	48.3	36.7	23.3						1.8						61.7		1309.9
12	40	48.3	36.7	23.3			0.0			-1.7						61.7		1368.3
12	50	50.0	35.0	23.3		48.3	-3.3			0.0						61.7		1338.3
13	0	48.3	35.0	23.3		48.3	-5.0			1.6						60.0		1368.3
13	10	48.3	35.0	23.3	3.3	50.0	-5.0			1.9						61.7		1361.6
13	20	48.3	35.0	21.7	3.3	48.3	-5.0			1.4						60.0	110.0	1333.3
13	30	50.0	36.7	23.3	3.3	50.0	-3.3			0.0		8.3				61.7	115.0	1301.6
13	40	48.3	36.7	23.3	5.0	48.3	-1.7		73.3	0.0		8.3				60.0	110.0	1329.9
13	50	48.3	35.0	23.3	3.3	50.0	-1.7		73.3	-1.4		10.0				60.0	110.0	1343.3
14	0	50.0	36.7	21.7	3.3	50.0	-3.3		75.0	1.9		10.0				60.0	113.3	1336.6
14	10	48.3	35.0	23.3	5.0	50.0	-3.3		75.0	-1.4		11.7				60.0	115.0	1324.9
14	20	50.0	36.7	23.3	3.3	48.3	-3.3		75.0	2.5		10.0				60.0	116.7	1349.9
14	30	50.0	35.0	21.7	3.3	50.0	-3.3		78.3	0.0		10.0				61.7	108.3	1383.3
14	40	48.3	35.0	23.3	5.0	50.0	-1.7		81.7	0.0		6.7				61.7	113.3	1336.6
14	50	51.7	35.0	23.3	3.3	48.3	-3.3	71.7	85.0	0.0	8.3	-5.0				60.0	113.3	1328.6
15	0	48.3	33.3	21.7	3.3	50.0	-3.3	75.0	88.3	1.9	21.7	-8.3				61.7	113.3	1296.6

TABLE B.4.1 (2) DISTRIBUTION PIPE FLOW

(Unit : l/sec)

Time (Hour)	(Minute)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
15	10	50.0	35.0	23.3	5.0	50.0	-1.7	73.3	93.3	0.0	30.0	-8.3				61.7	111.7	1378.3
15	20	48.3	35.0	21.7	3.3	48.3	-1.7	73.3	96.7	4.0	36.7	-5.0				60.0	101.7	1383.3
15	30	50.0	35.0	23.3	3.3	50.0	0.0	73.3	98.3	0.0	36.7	-1.7				61.7	101.7	1316.6
15	40	48.3	33.3	21.7	5.0	48.3	-1.7	75.0	100.0	1.6	43.3	3.3				61.7	103.3	1378.3
15	50	48.3	35.0	21.7	3.3	50.0	0.0	71.7	101.7	-2.4	46.7	3.3				60.0	105.0	1371.6
16	0	50.0	35.0	23.3	3.3	48.3	-1.7	70.0	101.7	0.0	50.0	6.7				61.7	103.3	1363.3
16	10	48.3	35.0	21.7	5.0	50.0	-3.3	71.7	101.7	0.0	51.7	5.0				61.7	100.0	1336.6
16	20	48.3	36.7	23.3	3.3	48.3	-1.7	71.7	103.3	-1.2	53.3	6.7				61.7	100.0	1329.9
16	30	50.0	35.0	21.7	3.3	48.3	-1.7	71.7	106.7	0.0	53.3	8.3				60.0	96.7	1369.9
16	40	50.0	36.7	23.3	5.0	48.3	0.0	71.7	106.7	-1.2	60.0	10.0				56.7	98.3	1368.3
16	50	48.3	35.0	21.7	3.3	46.7	0.0	70.0	108.3	0.0	70.0	11.7				55.0	100.0	1404.9
17	0	48.3	33.3	21.7	3.3	46.7	-1.7	70.0	106.7	1.5	66.7	13.3				58.3	98.3	1414.9
17	10	48.3	36.7	23.3	3.3	46.7	0.0	71.7	110.0	2.7	70.0	11.7				56.7	98.3	1413.3
17	20	48.3	35.0	23.3	5.0	46.7	0.0	70.0	108.3	1.9	70.0	11.7				60.0	98.3	1403.3
17	30	50.0	35.0	21.7	3.3	48.3	-1.7	70.0	111.7	1.2	71.7	13.3				60.0	103.3	1409.9
17	40	51.7	36.7	23.3	3.3	46.7	0.0	70.0	111.7	0.0	75.0	13.3				60.0	103.3	1406.6
17	50	48.3	36.7	23.3	3.3	45.0	-1.7	70.0	110.0	0.0	73.3	11.7				63.3	100.0	1408.3
18	0	48.3	35.0	21.7	5.0	48.3	-1.7	70.0	106.7	0.0	70.0	11.7				63.3	100.0	1408.3
18	10	50.0	35.0	23.3	3.3	46.7	-1.7	68.3	103.3	0.0	60.0	11.7				63.3	100.0	1399.9
18	20	50.0	33.3	21.7	3.3	45.0	0.0	70.0	100.0	0.0	51.7	10.0				63.3	95.0	1379.9
18	30	51.7	35.0	23.3	5.0	46.7	-1.7	70.0	95.0	1.5	45.0	10.0				63.3	98.3	1368.3
18	40	50.0	35.0	23.3	3.3	45.0	0.0	70.0	95.0	2.3	41.7	11.7				63.3	101.7	1384.9
18	50	51.7	35.0	21.7	3.3	46.7	-1.7	68.3	93.3	1.4	35.0	8.3				63.3	108.3	1396.6
19	0	50.0	33.3	23.3	3.3	46.7	0.0	68.3	93.3	0.0	33.3	11.7				60.0	110.0	1396.6
19	10	50.0	33.3	21.7	3.3	45.0	0.0	68.3	90.0	1.8	33.3	10.0				60.0	120.0	1393.3
19	20	50.0	33.3	23.3	5.0	46.7	0.0	66.7	93.3	0.0	30.0	10.0				58.3	145.0	1398.3
19	30	50.0	33.3	21.7	3.3	46.7	0.0	68.3	93.3	2.7	28.3	11.7				58.3	148.3	1393.3
19	40	50.0	33.3	23.3	3.3	45.0	0.0	68.3	93.3	3.6	26.7	11.7				58.3	146.7	1404.9
19	50	50.0	33.3	21.7	3.3	46.7	0.0	68.3	91.7	2.8	23.3	11.7				58.3	148.3	1404.9
20	0	46.7	33.3	23.3	3.3	46.7	-1.7	68.3	88.3	2.1	21.7	13.3				58.3	148.3	1399.9
20	10	48.3	33.3	21.7	5.0	46.7	0.0	68.3	86.7	2.4	18.3	11.7				60.0	148.3	1418.3
20	20	48.3	33.3	23.3	3.3	45.0	0.0	68.3	86.7	0.0	16.7	13.3				58.3	141.7	1403.3
20	30	46.7	33.3	23.3	5.0	46.7	0.0	70.0	86.7	1.8	16.7	13.3				60.0	145.0	1408.3
20	40	48.3	33.3	21.7	5.0	46.7	0.0	68.3	88.3	2.7	15.0	15.0				60.0	143.3	1394.9
20	50	46.7	33.3	23.3	5.0	46.7	0.0	70.0	86.7	3.7	13.3	13.3				60.0	141.7	1408.3
21	0	48.3	33.3	23.3	5.0	48.3	0.0	68.3	85.0	1.5	13.3	15.0				60.0	143.3	1398.3
21	10	46.7	33.3	21.7	5.0	45.0	25.0	71.7	86.7	1.4	11.7	15.0				60.0	143.3	1393.3
21	20	46.7	33.3	23.3	5.0	46.7	31.7	70.0	85.0	1.2	13.3	15.0				58.3	143.3	1394.9
21	30	46.7	33.3	23.3	5.0	48.3	31.7	70.0	85.0	0.0	11.7	15.0				58.3	143.3	1393.3
21	40	46.7	33.3	23.3	5.0	45.0	30.0	70.0	86.7	2.7	11.7	15.0				58.3	145.0	1391.6
21	50	46.7	33.3	21.7	5.0	46.7	30.0	71.7	88.3	2.3	13.3	15.0				56.7	146.7	1384.9
22	0	46.7	35.0	23.3	5.0	46.7	30.0	70.0	88.3	0.0	13.3	16.7				58.3	145.0	1388.3
22	10	46.7	33.3	23.3	5.0	46.7	31.7	68.3	86.7	-2.0	20.0	16.7				58.3	145.0	1391.6
22	20	46.7	33.3	23.3	5.0	46.7	30.0	70.0	86.7	0.0	26.7	18.3				56.7	153.3	1388.3
22	30	46.7	35.0	21.7	5.0	46.7	30.0	70.0	88.3	0.0	28.3	16.7				56.7	148.3	1384.9
22	40	45.0	33.3	23.3	5.0	46.7	30.0	70.0	86.7	0.0	30.0	18.3				56.7	153.3	1389.9
22	50	48.3	33.3	23.3	5.0	45.0	30.0	71.7	88.3	3.5	31.7	18.3				56.7	148.3	1396.6
23	0	46.7	35.0	23.3	5.0	46.7	30.0	71.7	91.7	0.0	33.3	18.3				55.0	118.3	1388.3
23	10	46.7	33.3	21.7	5.0	48.3	30.0	71.7	90.0	0.0	33.3	20.0				60.0	113.3	1359.9
23	20	46.7	33.3	23.3	5.0	46.7	30.0	73.3	90.0	0.0	35.0	20.0				58.3	118.3	1358.3
23	30	46.7	35.0	23.3	5.0	45.0	30.0	75.0	90.0	3.3	38.3	20.0				56.7	116.7	1358.3
23	40	46.7	33.3	23.3	5.0	48.3	30.0	73.3	90.0	0.0	36.7	21.7				58.3	125.0	1358.3
23	50	46.7	33.3	23.3	5.0	46.7	30.0	73.3	91.7	2.6	40.0	23.3				55.0	126.7	1378.3
0	0	48.3	35.0	23.3	5.0	46.7	30.0	76.7	90.0	-2.9	55.0	21.7				53.3	123.3	1383.3

TABLE B.4.1 (3) DISTRIBUTION PIPE FLOW

(Unit : l/sec)

Time (Hour)	(Minute)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
0	10	48.3	33.3	23.3	5.0	46.7	30.0	73.3	90.0	1.9	60.0	23.3				56.7	126.7	1376.6
0	20	46.7	35.0	21.7	5.0	48.3	30.0	76.7	91.7	2.1	60.0	25.0				56.7	125.0	1389.9
0	30	46.7	33.3	23.3	5.0	46.7	30.0	76.7	93.3	0.0	60.0	25.0				58.3	126.7	1381.6
0	40	48.3	35.0	23.3	5.0	48.3	31.7	76.7	93.3	1.2	61.7	25.0				60.0	125.0	1371.6
0	50	48.3	33.3	23.3	5.0	48.3	30.0	78.3	95.0	0.0	61.7	25.0				58.3	125.0	1379.9
1	0	46.7	35.0	23.3	5.0	46.7	30.0	76.7	93.3	0.0	61.7	25.0				58.3	128.3	1383.3
1	10	48.3	33.3	23.3	5.0	48.3	30.0	78.3	95.0	1.6	61.7	26.7				58.3	125.0	1381.6
1	20	48.3	33.3	23.3	3.3	46.7	30.0	76.7	93.3	1.2	63.3	25.0				58.3	125.0	1396.6
1	30	48.3	35.0	23.3	6.7	48.3	31.7	78.3	95.0	1.4	61.7	25.0				58.3	125.0	1399.9
1	40	46.7	35.0	23.3	3.3	46.7	30.0	78.3	93.3	0.0	63.3	25.0				58.3	126.7	1393.3
1	50	48.3	33.3	23.3	5.0	46.7	31.7	76.7	95.0	3.6	61.7	26.7				60.0	125.0	1394.9
2	0	48.3	35.0	23.3	5.0	46.7	30.0	78.3	91.7	2.8	63.3	25.0				58.3	128.3	1408.3
2	10	48.3	35.0	23.3	5.0	46.7	31.7	78.3	93.3	3.6	63.3	26.7				60.0	126.7	1398.3
2	20	48.3	33.3	23.3	5.0	48.3	30.0	78.3	95.0	-1.5	61.7	26.7				60.0	126.7	1393.3
2	30	48.3	35.0	23.3	5.0	46.7	31.7	78.3	93.3	1.4	61.7	25.0				58.0	125.0	1398.3
2	40	48.3	35.0	23.3	6.7	46.7	31.7	78.3	93.3	0.0	65.0	26.7				61.7	131.7	1401.6
2	50	48.3	33.3	23.3	5.0	46.7	30.0	80.0	93.3	2.6	61.7	26.7				61.7	125.0	1398.3
3	0	48.3	35.0	21.7	5.0	46.7	31.7	78.3	91.7	2.5	61.7	26.7				61.7	126.7	1406.6
3	10	50.0	35.0	23.3	5.0	48.3	31.7	80.0	91.7	1.5	63.3	28.3				61.7	128.3	1393.3
3	20	48.3	33.3	23.3	5.0	46.7	31.7	78.3	91.7	0.0	63.3	26.7				61.7	123.3	1416.6
3	30	48.3	35.0	23.3	5.0	46.7	31.7	78.3	93.3	3.9	61.7	26.7				63.3	126.7	1396.6
3	40	48.3	33.3	23.3	5.0	46.7	31.7	80.0	95.0	0.0	63.3	26.7				61.7	130.0	1383.3
3	50	48.3	35.0	23.3	5.0	46.7	31.7	80.0	93.3	0.0	63.3	26.7				63.3	131.7	1386.6
4	0	48.3	35.0	21.7	5.0	46.7	30.0	80.0	95.0	2.1	61.7	26.7				61.7	130.0	1384.9
4	10	48.3	33.3	23.3	5.0	46.7	31.7	78.3	93.3	0.0	63.3	28.3				65.0	131.7	1379.9
4	20	48.3	35.0	23.3	5.0	46.7	30.0	80.0	95.0	0.0	61.7	26.7				63.3	130.0	1393.3
4	30	50.0	33.3	23.3	5.0	46.7	31.7	80.0	95.0	1.8	61.7	26.7				65.0	126.7	1389.9
4	40	48.3	35.0	23.3	5.0	46.7	30.0	78.3	93.3	0.0	60.0	26.7				63.3	131.7	1374.9
4	50	50.0	35.0	23.3	5.0	46.7	31.7	78.3	93.3	0.0	61.7	26.7				63.3	130.0	1396.6
5	0	48.3	35.0	23.3	5.0	46.7	30.0	78.3	91.7	4.2	61.7	26.7				60.0	146.7	1409.9
5	10	50.0	35.0	23.3	5.0	46.7	30.0	78.3	95.0	1.2	40.0	26.7				56.7	138.3	1396.6
5	20	50.0	35.0	23.3	5.0	46.7	31.7	78.3	95.0	0.0	40.0	26.7				56.7	135.0	1393.3
5	30	50.0	35.0	23.3	5.0	46.7	30.0	76.7	93.3	4.0	40.0	26.7				56.7	133.3	1391.6
5	40	48.3	33.3	23.3	5.0	45.0	30.0	76.7	93.3	0.0	38.3	25.0				56.7	133.3	1391.6
5	50	50.0	35.0	21.7	5.0	48.3	31.7	75.0	91.7	1.7	35.0	25.0				55.0	133.3	1406.6
6	0	48.3	35.0	23.3	6.7	46.7	30.0	76.7	91.7	1.5	35.0	25.0				46.7	131.7	1466.6
6	10	48.3	35.0	23.3	5.0	46.7	31.7	76.7	90.0	0.0	33.3	21.7				50.0	81.7	1506.6
6	20	50.0	33.3	25.0	5.0	46.7	31.7	73.3	90.0	0.0	31.7	21.7				53.3	-40.0	1546.6
6	30	50.0	35.0	23.3	6.7	50.0	31.7	71.7	88.3	0.0	28.3	18.3				53.3	-43.3	1578.3
6	40	50.0	35.0	25.0	5.0	48.3	30.0	70.0	86.7	1.2	23.3	15.0				50.0	-43.3	1614.9
6	50	50.0	33.3	23.3	3.3	46.7	16.7	70.0	85.0	3.3	13.3	13.3				50.0	-43.3	1619.9
7	0	50.0	35.0	23.3	3.3	48.3	0.0	75.0	83.3	3.2	8.3	10.0				50.0	-45.0	1626.6
7	10	51.7	33.3	23.3	5.0	48.3	0.0	75.0	83.3	1.2	3.3	10.0				48.3	-41.7	1658.3
7	20	51.7	35.0	25.0	3.3	46.7	0.0	73.3	81.7	2.0	1.7	8.3				48.3	10.0	1664.9
7	30	51.7	33.3	23.3	3.3	48.3	1.7	75.0	81.7	2.7	0.0	6.7				50.0	116.7	1671.6
7	40	53.3	35.0	23.3	3.3	48.3	0.0	73.3	80.0	0.0	5.0	6.7				46.7	126.7	1704.9
7	50	51.7	33.3	25.0	5.0	46.7	1.7	73.3	80.0	0.0	6.7	6.7				46.7	126.7	1701.6
8	0	51.7	35.0	25.0	3.3	46.7	1.7	73.3	81.7	0.0	6.7	6.7				48.3	125.0	1724.9
8	10	53.3	35.0	25.0	3.3	46.7	-1.7	71.7	80.0	0.0	5.0	5.0				50.0	128.3	1721.6
8	20	53.3	33.3	23.3	5.0	48.3	-1.7	71.7	80.0	2.6	3.3	3.3				61.7	131.7	1641.6
8	30	53.3	35.0	25.0	3.3	46.7	-3.3	71.7	80.0	1.8	3.3	3.3				63.3	125.0	1578.3
8	40	53.3	33.3	25.0	5.0	46.7	0.0	68.3	80.0	2.5	5.0	3.3				63.3	130.0	1544.9
8	50	51.7	35.0	23.3	3.3	46.7	0.0	71.7	78.3	0.0	5.0	0.0				61.7	130.0	1523.3
9	0	53.3	35.0	23.3	3.3	48.3	0.0	70.0	80.0	2.5	1.7	1.7				61.7	125.0	1523.3

TABLE B.4.1 (4) DISTRIBUTION PIPE FLOW

(Unit : l/sec)

Time (Hour)	(Minute)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
9	10	51.7	33.3	23.3	3.3	46.7	0.0	70.0	78.3	1.2	1.7	1.7				60.0	131.7	1498.3
9	20	53.3	35.0	23.3	5.0	46.7	0.0	70.0	76.7	1.7	-1.7	3.3				60.0	135.0	1491.6
9	30	51.7	35.0	23.3	3.3	46.7	-1.7	70.0	78.3	0.0	-5.0	1.7				60.0	136.7	1481.6
9	40	51.7	33.3	21.7	3.3	46.7	0.0	68.3	80.0	0.0	-6.7	1.7				60.0	140.0	1463.3
9	50	53.3	35.0	23.3	3.3	46.7	0.0	70.0	80.0	0.0	-6.7	3.3				61.7	136.7	1461.6
10	0	51.7	35.0	23.3	5.0	46.7	0.0	68.3	76.7	0.0	-8.3	3.3				60.0	136.7	1431.6
10	10	50.0		21.7	3.3	48.3	0.0	68.3	80.0	0.0	-8.3	3.3				58.3	135.0	1414.9
10	20	53.3		23.3	3.3	46.7	-1.7	70.0	78.3	0.0	-10.0	3.3				58.3	135.0	1416.6
10	30	51.7		23.3	5.0	46.7	0.0	68.3	78.3	0.0	-10.0	1.7				60.0	135.0	1409.9
10	40	51.7		23.3	3.3	46.7	-1.7	68.3	78.3	2.3	-11.7	1.7				58.3	136.7	1401.6
10	50	50.0			3.3	46.7	0.0	68.3	80.0	0.0	-8.3	0.0				58.3	140.0	1373.3
11	0	51.7			3.3	46.7	-1.7	65.0	77.8	1.9	-10.0	0.0				58.3	138.3	1414.9
11	10	51.7				45.0	0.0	66.7	80.0	1.9	-10.0					58.3	145.0	1389.9
11	20	51.7				48.3	-1.7	66.7	80.0	0.0	-10.0					60.0	143.3	1391.6
11	30	50.0				46.7	1.7	66.7	80.0	0.0	-10.0					56.7	146.7	1371.6
11	40					46.7	1.7	66.7	78.3	0.0	-10.0					58.3	145.0	1363.3
11	50					46.7	1.7	66.7	80.0	0.0	-11.7					55.0	145.0	1426.6
12	0					46.7	1.7	65.0	80.0		-11.7					60.0	148.3	1366.6
12	10						3.3	66.7	80.0		-10.0					63.3		1389.9
12	20						3.3	66.7			-10.0					63.3		1356.6
12	30						5.0	66.7			-8.3					61.7		1378.3
12	40						1.7	65.0			-8.3					61.7		1328.3
12	50							66.7			-6.7					61.7		1346.6
13	0							66.7			-10.0					60.0		1349.9
13	10							66.7			-6.7					61.7		1341.6
13	20							68.3			-8.3							1296.6
13	30							63.3										
13	40							65.0										
13	50							65.0										
14	0																	

General Information																	
Date	7.Aug,90	7.Aug,90	8.Aug,90	8.Aug,90	9.Aug,90	27.Aug,90	9.Aug,90	10.Aug,90	7.Aug,90	10.Aug,90	11.Aug,90	12.Aug,90	16.Aug,90	15.Aug,90	13.Aug,90	16.Aug,90	13.Aug,90
Nominal Diameter(mm)	250	200	200	250	400	300	400	375	375	350	250	450	525	525	525	700	1350
Inner Diameter(mm)	261.9	216.0	212.9	261.9	398.1	318.1	378.6	385.4	381.0	359.5	260.3	450.0	526.2	526.2	542.4	698.6	1351.5
Measuring Flow(m3/day)																	
+ Integration(①)	4,227	2,774	1,934	347	3,969	1,092	6,012	7,308	85	2,605	1,128	285	1,082	1,327	5,658	9,818	128,008
- Integration(②)	0	0	0	0	0	-54	0	0	-6	-131	-17	0	0	0	0	-154	0
Total(①+②)	4,227	2,774	1,934	347	3,969	1,038	6,012	7,308	79	2,474	1,111	285	1,082	1,327	5,658	9,664	128,008
Measuring Time(hour)	23.8	22.3	23.3	22.0	23.3	24.0	23.2	22.7	25.0	22.7	21.7	3.8	3.8	2.3	26.5	22.8	25.2
Flow(m3/day)																	
+ Integration·24hours(③)	4,256	2,981	1,989	379	4,082	1,092	6,228	7,738	82	2,758	1,249	1,784	1,082	1,327	5,124	10,319	122,074
- Integration·24hours(④)	0	0	0	0	0	-54	0	0	-6	-139	-19	0	0	0	0	-162	0
Average(③+④)	4,256	2,981	1,989	379	4,082	1,038	6,228	7,738	76	2,619	1,231	1,784	1,082	1,327	5,124	10,157	122,074
Maximum	4,608	3,168	2,160	576	4,320	2,736	6,912	9,648	501	6,480	2,448	2,304	7,056	28,655	6,048	13,247	149,034
Minimum	3,888	2,880	1,872	288	3,888	-432	5,472	6,336	-254	-1,008	-720	1,152	0	0	4,032	-3,888	112,028
Velocity(m/s)																	
Average	0.915	0.942	0.647	0.081	0.380	0.151	0.641	0.768	0.008	0.299	0.268	0.130	0.058	0.071	0.257	0.307	0.985
Maximum	0.990	1.001	0.703	0.124	0.402	0.399	0.711	0.958	0.051	0.739	0.533	0.168	0.376	1.528	0.383	0.400	1.203

Note : NO.12,13 & 14 pipe are sometimes no water.

5. DETERMINATION OF ROUGHNESS COEFFICIENT

TABLE B.5.1 GENERAL INFORMATION OF DETERMINATION OF C-VALUE

Description	No. 1	No. 2	No. 3
Date	18. Aug, 90	18. Aug, 90	22. Aug, 90
Time	6:42- 7:11	6:46- 7:15	17:13-17:42
Pipe Material	CI	CI	CI
Age	37	27	37
Diameter(mm)	150	375	200
Distance(m)	200	357	137
Gauge Elavation - Up(m)	100.68	40.41	15.37
Gauge Elavation - Down(m)	98.91	38.62	14.97

TABLE B.5.2 C-VALUE MEASUREMENT (No. 1)

Time (Minute)	Up Side Pressure Effective (Measure) (bar)	Up Side Pressure Absolute (m)	Down Side Pressure Effective (Measure) (bar)	Down Side Pressure Absolute (m)	Difference Energy (m)	Flow (l/sec)	Velocity (m/s)
1	2.14	122.08	1.65	115.41	6.67	16.8	0.951
2	2.14	122.08	1.69	115.81	6.27	16.8	0.951
3	2.11	121.78	1.62	115.11	6.67	16.9	0.957
4	2.15	122.18	1.70	115.91	6.27	16.3	0.923
5	2.16	122.28	1.68	115.71	6.57	16.6	0.940
6	2.12	121.88	1.63	115.21	6.67	16.6	0.940
7	2.13	121.98	1.65	115.41	6.57	17.6	0.996
8	2.11	121.78	1.61	115.01	6.77	17.4	0.985
9	2.10	121.68	1.59	114.81	6.87	17.1	0.968
10	2.11	121.78	1.63	115.21	6.57	16.8	0.951
11	2.10	121.68	1.61	115.01	6.67	16.7	0.946
12	2.10	121.68	1.62	115.11	6.57	16.4	0.929
13	2.10	121.68	1.62	115.11	6.57	16.8	0.951
14	2.12	121.88	1.65	115.41	6.47	16.9	0.957
15	2.10	121.68	1.63	115.21	6.47	16.9	0.957
16	2.11	121.78	1.64	115.31	6.47	16.8	0.951
17	2.12	121.88	1.65	115.41	6.47	16.5	0.934
18	2.12	121.88	1.65	115.41	6.47	17.5	0.991
19	2.10	121.68	1.62	115.11	6.57	17.8	1.008
20	2.09	121.58	1.59	114.81	6.77	16.9	0.957
21	2.10	121.68	1.62	115.11	6.57	17.7	1.002
22	2.09	121.58	1.59	114.81	6.77	16.9	0.957
23	2.10	121.68	1.61	115.01	6.67	17.3	0.979
24	2.09	121.58	1.61	115.01	6.57	16.9	0.957
25	2.10	121.68	1.62	115.11	6.57	17.1	0.968
26	2.09	121.58	1.60	114.91	6.67	16.8	0.951
27	2.11	121.78	1.64	115.31	6.47	17.7	1.002
28	2.08	121.48	1.56	114.51	6.97	17.5	0.991
29	2.07	121.38	1.57	114.61	6.77	17.1	0.968
30	2.07	121.38	1.58	114.71	6.67	17.4	0.985

	Time (Minute)	Difference Energy (m)	Gradient (0/00)	Flow (l/sec)	Velocity (m/s)	C-VALUE
AVERAGE	1 - 10	6.59	32.95	16.9	0.956	56
	11 - 20	6.55	32.75	16.9	0.958	57
	21 - 30	6.67	33.35	17.2	0.976	57
	Total	6.60	33.02	17.0	0.963	57

TABLE B.5.2 C-VALUE MEASUREMENT (No. 2)

Time (Minute)	Up Side Pressure Effective (Measure) (bar)	Up Side Pressure Absolute (m)	Down Side Pressure Effective (Measure) (bar)	Down Side Pressure Absolute (m)	Difference Energy (m)	Flow (l/sec)	Velocity (m/s)
1	0.66	47.01	0.63	44.92	2.09	105.2	0.953
2	0.66	47.01	0.63	44.92	2.09	114.1	1.034
3	0.66	47.01	0.62	44.82	2.19	106.6	0.966
4	0.66	47.01	0.62	44.82	2.19	112.9	1.023
5	0.65	46.91	0.61	44.72	2.19	107.5	0.974
6	0.64	46.81	0.61	44.72	2.09	113.3	1.026
7	0.64	46.81	0.60	44.62	2.19	103.4	0.937
8	0.64	46.81	0.60	44.62	2.19	106.7	0.967
9	0.64	46.81	0.60	44.62	2.19	108.3	0.981
10	0.64	46.81	0.60	44.62	2.19	109.7	0.994
11	0.63	46.71	0.60	44.62	2.09	109.7	0.994
12	0.63	46.71	0.59	44.52	2.19	110.5	1.001
13	0.63	46.71	0.59	44.52	2.19	108.4	0.982
14	0.62	46.61	0.58	44.42	2.19	115.2	1.044
15	0.62	46.61	0.57	44.32	2.29	109.9	0.996
16	0.62	46.61	0.57	44.32	2.29	113.3	1.026
17	0.62	46.61	0.56	44.22	2.39	114.1	1.034
18	0.61	46.51	0.56	44.22	2.29	113.9	1.032
19	0.61	46.51	0.56	44.22	2.29	110.2	0.998
20	0.60	46.41	0.56	44.22	2.19	112.1	1.015
21	0.60	46.41	0.56	44.22	2.19	114.4	1.036
22	0.60	46.41	0.56	44.22	2.19	109.5	0.992
23	0.60	46.41	0.55	44.12	2.29	117.6	1.065
24	0.59	46.31	0.55	44.12	2.19	111.1	1.006
25	0.58	46.21	0.55	44.12	2.09	119.1	1.079
26	0.58	46.21	0.54	44.02	2.19	111.0	1.006
27	0.57	46.11	0.54	44.02	2.09	115.7	1.048
28	0.57	46.11	0.53	43.92	2.19	120.2	1.089
29	0.56	46.01	0.53	43.92	2.09	117.7	1.066
30	0.56	46.01	0.53	43.92	2.09	115.8	1.049

	Time (Minute)	Difference Energy (m)	Gradient (0/00)	Flow (l/sec)	Velocity (m/s)	C-VALUE
AVERAGE	1 - 10	2.16	6.06	108.8	0.986	81
	11 - 20	2.24	6.28	111.7	1.012	82
	21 - 30	2.16	6.06	115.2	1.044	86
	Total	2.19	6.13	111.9	1.014	83

TABLE B.5.2 C-VALUE MEASUREMENT (No. 3)

Time (Minute)	Up Side Pressure Effective (Measure) (bar)	Up Side Pressure Absolute (m)	Down Side Pressure Effective (Measure) (bar)	Down Side Pressure Absolute (m)	Difference Energy (m)	Flow (l/sec)	Velocity (m/s)
1	0.48	20.17	0.42	19.17	1.00	22.4	0.713
2	0.50	20.37	0.42	19.17	1.20	22.6	0.720
3	0.50	20.37	0.42	19.17	1.20	22.4	0.713
4	0.50	20.37	0.40	18.97	1.40	22.6	0.720
5	0.50	20.37	0.40	18.97	1.40	23.3	0.742
6	0.50	20.37	0.42	19.17	1.20	21.5	0.685
7	0.50	20.37	0.42	19.17	1.20	22.7	0.723
8	0.50	20.37	0.42	19.17	1.20	23.1	0.736
9	0.50	20.37	0.42	19.17	1.20	20.9	0.666
10	0.50	20.37	0.42	19.17	1.20	22.2	0.707
11	0.50	20.37	0.42	19.17	1.20	20.7	0.659
12	0.51	20.47	0.40	18.97	1.50	20.5	0.653
13	0.51	20.47	0.42	19.17	1.30	22.1	0.704
14	0.51	20.47	0.42	19.17	1.30	23.9	0.761
15	0.51	20.47	0.42	19.17	1.30	22.3	0.710
16	0.51	20.47	0.42	19.17	1.30	22.0	0.701
17	0.51	20.47	0.42	19.17	1.30	23.3	0.742
18	0.51	20.47	0.42	19.17	1.30	21.9	0.697
19	0.51	20.47	0.42	19.17	1.30	23.4	0.745
20	0.51	20.47	0.42	19.17	1.30	22.9	0.729
21	0.51	20.47	0.42	19.17	1.30	22.4	0.713
22	0.51	20.47	0.42	19.17	1.30	22.3	0.710
23	0.51	20.47	0.42	19.17	1.30	21.5	0.685
24	0.51	20.47	0.42	19.17	1.30	21.9	0.697
25	0.51	20.47	0.42	19.17	1.30	22.7	0.723
26	0.51	20.47	0.42	19.17	1.30	22.7	0.723
27	0.51	20.47	0.42	19.17	1.30	22.0	0.701
28	0.51	20.47	0.42	19.17	1.30	21.4	0.682
29	0.51	20.47	0.43	19.27	1.20	21.6	0.688
30	0.50	20.37	0.42	19.17	1.20	22.3	0.710

	Time (Minute)	Difference Energy (m)	Gradient (0/00)	Flow (l/sec)	Velocity (m/s)	C-VALUE
AVERAGE	1 - 10	1.22	8.91	22.4	0.713	71
	11 - 20	1.31	9.57	22.3	0.710	68
	21 - 30	1.28	9.35	22.1	0.703	68
	Total	1.27	9.28	22.3	0.709	69

C.
DATA TO CHAPTER 5

1. HYDRAURIC ANALYSIS

1.1 Analysis Case

TABLE C.1.1 HYDRAULIC NETWORK ANALYSIS CASE IN 1995

Analysis Case	Measure	Time
CASE A	Current System	Hourly Maximum & Hourly Minimum
CASE C	Existing Pipe Connection	ditto
CASE D	Additional Main Pipe	ditto
CASE E	Setting Up Middle Zone	ditto

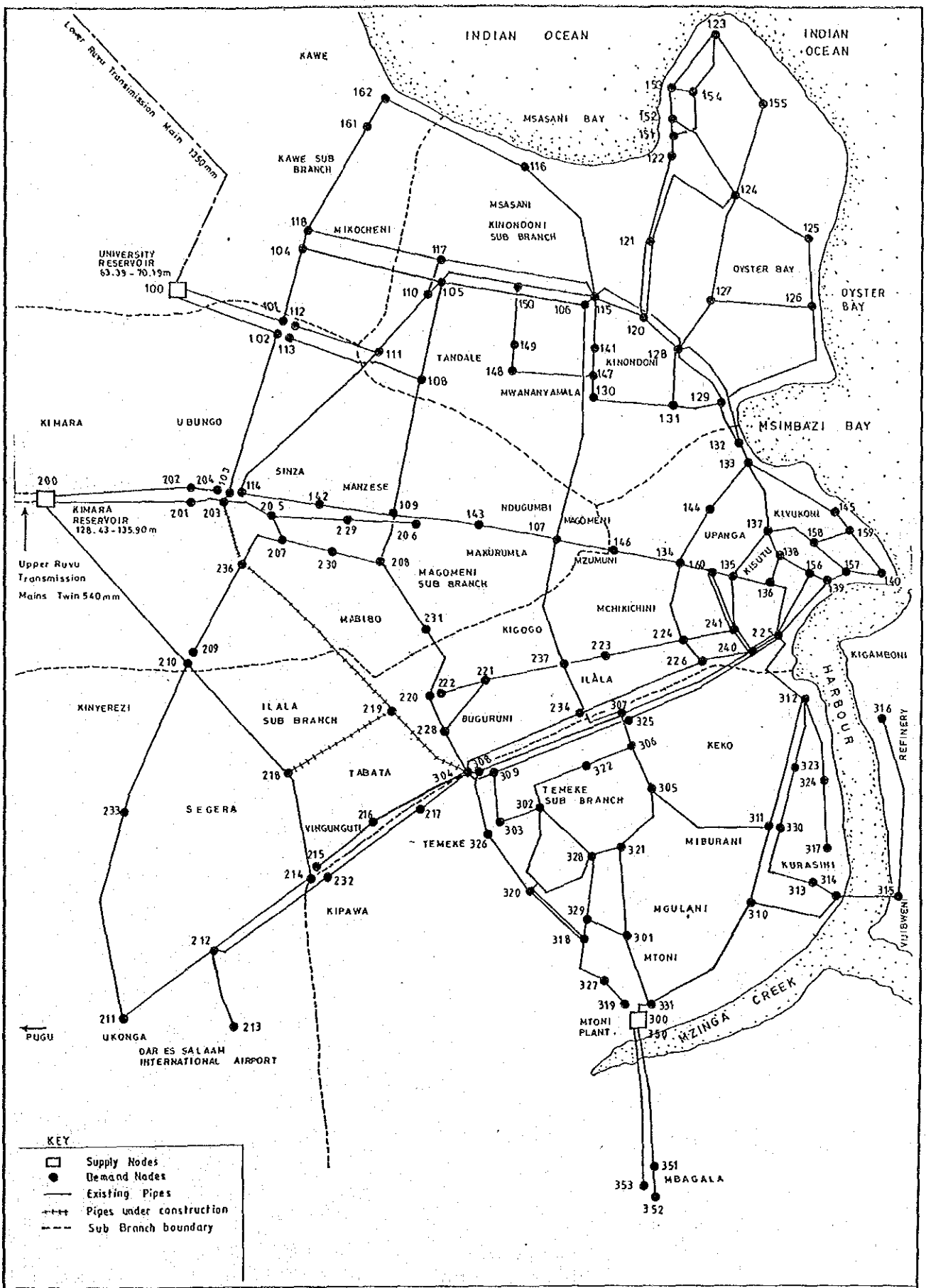


FIG. C.1.1 NETWORK MODEL FOR HYDRAULICK ANALYSIS

THE STUDY ON REHABILITATION OF DAR ES SALAAM WATER SUPPLY

1.2 Current System

DAR-ES-SALAAM NETWORK ANALYSIS - MAXIMUM DEMAND IN 1995 (CASE A)

CONNECTOR RESULTS.

NODE	NODE	TYP	DIAM	CVALUE	LENGTH	FLOW.	VEL.	GRA.	LOSS
			=MM=		===M==	=CUM/D=	=M/S=	=1/1000=	==M=
100	101	H 2	1350.	110.	1820.	201083.5	1.63	1.97	3.59
100	102	H 2	800.	110.	1820.	3716.9	.09	.02	.03
101	104	H 2	1350.	110.	1030.	201083.7	1.63	1.97	2.03
102	103	H 2	700.	110.	2700.	1406.2	.04	.00	.01
104	105	H 2	1350.	110.	1900.	197889.5	1.60	1.92	3.64
105	106	H 2	1200.	105.	2500.	141422.2	1.45	1.99	4.98
105	108	H 2	750.	110.	1440.	19429.8	.51	.46	.66
105	110	H 2	525.	110.	35.	15842.9	.85	1.78	.06
105	150	H 2	450.	110.	1200.	20493.8	1.49	6.08	7.30
150	115	H 2	450.	110.	1300.	11053.2	.80	1.94	2.52
106	107	H 2	1200.	105.	3420.	89931.8	.92	.86	2.95
107	143	H 2	375.	80.	1435.	4476.1	.47	1.60	2.29
107	146	H 2	375.	80.	825.	17033.6	1.79	18.93	15.62
107	237	H 2	1050.	100.	2400.	59691.5	.80	.85	2.03
237	307	H 2	1050.	100.	1600.	59691.5	.80	.85	1.35
108	109	H 2	750.	115.	1810.	15201.3	.40	.27	.49
108	113	H 2	800.	115.	2280.	1079.1	.02	.00	.00
109	142	H 2	375.	80.	900.	639.3	.07	.04	.04
109	143	H 2	375.	80.	2315.	7284.4	.76	3.93	9.10
109	208	H 2	600.	115.	1530.	4059.2	.17	.07	.11
110	111	H 2	525.	115.	1535.	8677.5	.46	.54	.83
110	117	H 2	150.	95.	55.	1673.7	1.10	16.33	.90
111	112	H 2	825.	115.	940.	1078.0	.02	.00	.00
111	114	H 2	525.	115.	3000.	1844.7	.10	.03	.09
114	142	H 2	375.	80.	1220.	1318.5	.14	.17	.20
115	116	H 2	150.	65.	2000.	930.5	.61	11.12	22.24
104	118	H 2	200.	115.	200.	3194.0	1.18	9.34	1.87
118	161	H 2	200.	115.	1600.	2050.3	.76	4.11	6.58
161	162	H 2	150.	115.	500.	2050.3	1.34	16.69	8.35
116	162	H 2	150.	65.	1700.	-932.5	-.61	-11.16	-18.98
115	117	H 2	200.	70.	2275.	-1215.1	-.45	-3.91	-8.90
115	120	H 2	450.	120.	1000.	41264.0	3.00	18.91	18.91
115	128	H 2	200.	70.	1370.	2539.4	.94	15.30	20.96
115	141	H 2	200.	70.	700.	6579.7	2.42	89.06	62.34
117	118	H 2	150.	65.	1900.	-310.2	-.20	-1.46	-2.77
120	121	H 2	250.	115.	1120.	11460.1	2.70	33.47	37.49
120	121	H 2	200.	110.	1120.	6095.5	2.25	33.51	37.53
121	124	H 2	200.	110.	1600.	2989.0	1.10	8.97	14.35
120	128	H 2	450.	120.	400.	19992.7	1.45	4.95	1.98
121	122	H 2	200.	100.	1255.	4133.6	1.52	19.48	24.45
122	151	H 2	200.	110.	500.	3388.4	1.25	11.31	5.65
151	152	H 2	200.	110.	300.	1722.9	.63	3.24	.97
152	153	H 2	200.	110.	500.	3018.4	1.11	9.13	4.56
153	123	H 2	150.	95.	1300.	1403.1	.92	11.78	15.32
151	154	H 2	150.	110.	800.	1665.5	1.09	12.34	9.87
153	154	H 2	125.	80.	750.	497.6	.47	5.78	4.34
123	154	H 2	150.	110.	1200.	-1417.8	-.93	-9.16	-10.99
152	124	H 2	150.	80.	1200.	-1295.5	-.85	-13.97	-16.76
123	155	H 2	150.	80.	1500.	585.2	.38	3.21	4.82
155	124	H 2	150.	80.	1300.	-2023.0	-1.33	-31.86	-41.42

DAR-ES-SALAAM NETWORK ANALYSIS - MAXIMUM DEMAND IN 1995 (CASE A)

CONNECTOR RESULTS.

NODE	NODE	TYP	DIAM	CVALUE	LENGTH	FLOW.	VEL.	GRA.	LOSS
			=MM=		===M==	=CUM/D=	=M/S=	=1/1000=	==M=
124	125	H 2	100.	75.	545.	-85.1	-.13	-.74	-.40
124	127	H 2	150.	80.	1800.	-1362.3	-.89	-15.33	-27.60
125	126	H 2	150.	80.	1040.	-1202.9	-.79	-12.18	-12.67
126	127	H 2	150.	80.	650.	-1670.2	-1.09	-22.35	-14.53
127	128	H 2	200.	70.	700.	-3777.7	-1.39	-31.91	-22.33
128	129	H 2	300.	70.	950.	6264.9	1.03	11.29	10.73
128	131	H 2	150.	65.	1050.	2714.4	1.78	80.59	84.62
128	132	H 2	300.	100.	1430.	7177.2	1.18	7.51	10.73
129	126	H 2	100.	60.	2640.	277.9	.41	9.93	26.22
129	132	H 2	400.	110.	480.	308.1	.03	.00	.00
130	131	H 2	150.	65.	850.	133.1	.09	.30	.26
130	147	H 2	200.	70.	350.	-3467.8	-1.28	-27.23	-9.53
147	141	H 2	200.	70.	600.	-5097.6	-1.88	-55.54	-33.33
147	148	H 2	150.	115.	1600.	-1829.7	-1.20	-13.52	-21.63
148	149	H 2	150.	115.	400.	-5981.1	-3.92	-120.96	-48.38
149	150	H 2	200.	115.	950.	-5981.0	-2.20	-29.80	-28.31
131	129	H 2	150.	65.	725.	-3081.1	-2.02	-101.88	-73.87
132	133	H 2	400.	110.	200.	7485.3	.69	1.68	.34
133	144	H 2	300.	70.	1020.	2092.3	.34	1.48	1.51
133	137	H 2	150.	65.	1540.	177.3	.12	.52	.80
133	145	H 2	150.	65.	1740.	341.3	.22	1.74	3.03
134	160	H 2	400.	110.	500.	2254.7	.21	.18	.09
160	135	H 2	400.	110.	330.	6794.3	.63	1.40	.46
156	225	H 2	150.	75.	850.	-1610.6	-1.05	-23.55	-20.02
137	158	H 2	200.	75.	750.	942.2	.35	2.15	1.61
157	158	H 2	200.	75.	600.	348.9	.13	.34	.21
158	159	H 2	150.	75.	750.	276.2	.18	.90	.68
134	144	H 2	300.	70.	1025.	6737.4	1.10	12.92	13.24
134	146	H 2	400.	110.	1005.	-15532.0	-1.43	-6.47	-6.50
134	224	H 2	200.	90.	1160.	75.6	.03	.01	.02
135	136	H 2	150.	75.	640.	1114.4	.73	11.91	7.62
135	137	H 2	250.	80.	940.	4730.1	1.12	12.74	11.98
136	138	H 2	150.	65.	600.	838.3	.55	9.17	5.50
136	225	H 2	150.	65.	340.	-1947.3	-1.28	-43.60	-14.82
137	138	H 2	150.	65.	420.	429.6	.28	2.66	1.12
138	156	H 2	200.	70.	410.	-501.7	-.18	-.76	-.31
139	156	H 2	200.	70.	250.	139.7	.05	.07	.02
139	157	H 2	200.	70.	350.	792.8	.29	1.78	.62
140	157	H 2	200.	70.	680.	-443.9	-.16	-.61	-.41
139	225	H 2	150.	65.	850.	-1395.2	-.91	-23.53	-20.00
140	159	H 2	150.	65.	1140.	156.6	.10	.41	.47
145	159	H 2	150.	65.	600.	74.6	.05	.10	.06
200	201	H 2	525.	115.	3650.	52563.7	2.81	15.11	55.15
200	202	H 2	525.	115.	3650.	2446.7	.13	.05	.19
200	210	H 2	600.	115.	5000.	34843.5	1.43	3.69	18.43
201	203	H 2	525.	115.	900.	49790.0	2.66	13.67	12.30
202	204	H 2	525.	115.	970.	325.7	.02	.00	.00
203	205	H 2	525.	115.	100.	29455.4	1.57	5.18	.52
205	229	H 2	400.	115.	990.	4000.9	.37	.48	.48
205	207	H 2	525.	115.	460.	25094.2	1.34	3.85	1.77

DAR-ES-SALAAM NETWORK ANALYSIS - MAXIMUM DEMAND IN 1995 (CASE A)

CONNECTOR RESULTS.

NODE	NODE	TYP	DIAM	CVALUE	LENGTH	FLOW.	VEL.	GRA.	LOSS
			=MM=		===M==	=CUM/D=	=M/S=	=1/1000=	==M=
206	229	H 2	400.	115.	985.	-2611.6	-.24	-.22	-.22
207	230	H 2	525.	115.	1125.	22909.9	1.22	3.25	3.66
207	209	H 2	600.	115.	3800.	487.4	.02	.00	.01
208	231	H 2	525.	115.	1970.	21853.3	1.17	2.98	5.87
208	230	H 2	525.	115.	1125.	-20345.2	-1.09	-2.61	-2.94
210	218	H 2	450.	110.	2700.	28001.4	2.04	10.84	29.27
210	233	H 2	300.	95.	2920.	6354.7	1.04	6.59	19.24
211	212	H 2	400.	110.	1890.	-1161.0	-.11	-.05	-.10
211	233	H 2	300.	95.	2925.	-6219.6	-1.02	-6.33	-18.52
212	213	H 2	150.	100.	1145.	310.3	.20	.66	.75
212	214	H 2	400.	110.	1875.	-7897.0	-.73	-1.85	-3.47
212	232	H 2	250.	100.	1895.	5177.9	1.22	9.97	18.89
215	216	H 2	400.	110.	1435.	-1010.8	-.09	-.04	-.06
216	304	H 2	300.	100.	2385.	-3925.8	-.64	-2.46	-5.86
217	232	H 2	250.	100.	1990.	-3658.0	-.86	-5.24	-10.43
217	304	H 2	300.	100.	1655.	1757.5	.29	.56	.92
218	214	H 2	400.	110.	2100.	8907.8	.82	2.31	4.85
220	228	H 2	450.	110.	1025.	11885.5	.86	2.22	2.28
220	231	H 2	525.	115.	1970.	-12876.0	-.69	-1.12	-2.21
221	222	H 2	300.	90.	645.	990.6	.16	.23	.15
221	223	H 2	300.	90.	1625.	3445.9	.56	2.35	3.81
221	228	H 2	300.	100.	1270.	-9813.5	-1.61	-13.39	-17.00
223	224	H 2	300.	90.	1125.	-3206.3	-.53	-2.05	-2.31
224	241	H 2	300.	90.	900.	-4517.5	-.74	-3.87	-3.49
224	226	H 2	200.	90.	435.	-2300.5	-.85	-8.01	-3.48
225	240	H 2	250.	95.	400.	-1847.9	-.44	-1.63	-.65
226	240	H 2	250.	95.	675.	-3632.3	-.86	-5.69	-3.84
225	240	H 2	550.	115.	400.	-17792.2	-.87	-1.62	-.65
240	307	H 2	550.	115.	1675.	-38655.2	-1.88	-6.82	-11.43
225	240	H 2	300.	100.	400.	-3142.0	-.51	-1.63	-.65
240	325	H 2	300.	100.	1600.	-999.1	-.16	-.20	-.31
240	241	H 2	300.	90.	350.	7916.9	1.30	10.94	3.83
240	241	H 2	250.	90.	350.	4901.3	1.16	10.94	3.83
135	241	H 2	250.	90.	600.	-3761.1	-.89	-6.71	-4.02
160	241	H 2	250.	90.	850.	-2917.4	-.69	-4.19	-3.56
160	241	H 2	200.	90.	850.	-1622.3	-.60	-4.20	-3.57
225	312	H 2	400.	110.	1245.	12716.7	1.17	4.47	5.56
226	234	H 2	250.	100.	1775.	-2543.9	-.60	-2.68	-4.75
228	304	H 2	300.	100.	645.	-2286.5	-.37	-.90	-.58
234	304	H 2	250.	100.	1995.	-3739.0	-.88	-5.46	-10.89
300	331	H 2	375.	75.	50.	5850.0	.61	2.95	.15
331	301	H 2	375.	75.	1515.	3074.3	.32	.90	1.36
331	310	H 2	250.	70.	2415.	1234.2	.29	1.36	3.28
301	321	H 2	375.	75.	1895.	-3017.9	-.32	-.87	-1.64
302	303	H 2	200.	75.	700.	-2476.5	-.91	-12.86	-9.00
303	309	H 2	200.	75.	800.	-4502.2	-1.66	-38.85	-31.08
302	322	H 2	150.	65.	1100.	-329.1	-.22	-1.63	-1.79
304	308	H 2	550.	115.	275.	19616.0	.96	1.95	.53
304	309	H 2	300.	100.	420.	9071.2	1.49	11.58	4.86
305	306	H 2	375.	75.	600.	-12926.9	-1.35	-12.80	-7.68

DAR-ES-SALAAM NETWORK ANALYSIS - MAXIMUM DEMAND IN 1995 (CASE A)

CONNECTOR RESULTS.

NODE	NODE	TYP	DIAM	CVALUE	LENGTH	FLOW.	VEL.	GRA.	LOSS
			=MM=		===M==	=CUM/D=	=M/S=	=1/1000=	==M=
305	311	H 2	200.	70.	1415.	1472.6	.54	5.58	7.90
305	321	H 2	375.	75.	1475.	7452.8	.78	4.62	6.82
306	307	H 2	375.	75.	700.	-16452.7	-1.72	-20.00	-14.00
306	322	H 2	150.	65.	850.	1700.4	1.11	33.92	28.84
308	307	H 2	550.	115.	2325.	-3719.2	-.18	-.09	-.21
308	326	H 2	350.	115.	1100.	22781.9	2.74	23.18	25.50
309	325	H 2	300.	100.	2600.	3999.8	.65	2.54	6.62
310	311	H 2	250.	70.	1125.	-1609.5	-.38	-2.22	-2.50
310	314	H 2	250.	80.	1600.	1428.8	.34	1.39	2.23
311	312	H 2	200.	70.	2485.	-1359.1	-.50	-4.81	-11.96
312	323	H 2	400.	110.	1050.	6280.4	.58	1.21	1.27
312	324	H 2	200.	70.	1600.	3465.7	1.28	27.20	43.52
313	314	H 2	200.	100.	950.	3532.7	1.30	14.57	13.84
313	330	H 2	400.	110.	1900.	-3742.8	-.34	-.46	-.88
330	323	H 2	400.	110.	1450.	-3742.8	-.34	-.46	-.67
314	315	H 2	200.	100.	1000.	4211.1	1.55	20.16	20.16
317	324	H 2	200.	70.	1365.	-910.8	-.34	-2.30	-3.13
321	328	H 2	150.	80.	650.	2004.6	1.31	31.33	20.36
320	328	H 2	150.	85.	1100.	523.3	.34	2.33	2.57
302	328	H 2	150.	85.	1150.	674.2	.44	3.73	4.29
328	329	H 2	150.	65.	1100.	286.0	.19	1.25	1.38
301	329	H 2	150.	85.	550.	2314.2	1.52	36.53	20.09
302	320	H 2	150.	115.	1500.	483.0	.32	1.15	1.73
320	318	H 2	200.	75.	800.	1453.1	.54	4.80	3.84
326	320	H 2	350.	115.	1200.	19335.5	2.33	17.11	20.53
320	318	H 2	350.	115.	1400.	7175.8	.86	2.73	3.83
318	327	H 2	350.	115.	900.	2840.4	.34	.49	.44
327	319	H 2	350.	115.	600.	340.8	.04	.01	.01
350	351	H 2	200.	115.	4015.	4039.5	1.49	14.42	57.88
350	353	H 2	75.	115.	5000.	257.8	.68	10.53	52.66
351	352	H 2	150.	65.	985.	1031.4	.68	13.45	13.25
315	316	H 2	200.	75.	3600.	4033.0	1.49	31.69	114.10
103	203	H 2	100.	110.	60.	880.0	1.30	27.30	1.64
106	115	H 2	300.	110.	20.	51490.4	8.43	240.98	4.82
318	329	H 2	150.	65.	500.	107.6	.07	.21	.10
203	236	H 2	600.	110.	1100.	19583.1	.80	1.38	1.52
236	219	H 2	600.	110.	4100.	19583.1	.80	1.38	5.65
219	304	H 2	600.	110.	2500.	37519.5	1.54	4.59	11.47
218	219	H 2	400.	110.	3200.	17936.4	1.65	8.44	27.00

DAR-ES-SALAAM NETWORK ANALYSIS - MAXIMUM DEMAND IN 1995 (CASE A)

NODE RESULTS.

NODE	REL. HEAD(M.)	HEAD(M.)	SUPPLY(CUM./DAY. -VE IN)
100	.800	63.300	-204800.400
200	1.900	128.400	-89853.880
350	60.000	98.500	-4297.316
300	-23.891	14.609	-5849.985
101	21.736	59.736	-.234
102	25.272	63.272	2310.712
103	5.259	63.259	526.164
104	34.719	57.719	.168
105	34.108	54.108	700.795
106	34.173	49.173	.063
107	29.254	46.254	8730.663
108	26.856	53.456	3149.453
109	14.977	52.977	3218.347
110	34.046	54.046	5491.666
111	19.929	53.229	5754.888
112	15.228	53.228	1077.970
113	15.453	53.453	1079.055
114	-4.862	53.138	526.154
115	29.402	44.402	12445.040
116	19.521	22.521	1863.043
117	33.162	53.162	768.771
118	32.880	55.880	833.499
120	13.200	25.700	3715.677
121	-19.307	-11.307	10433.030
122	-39.406	-35.406	745.206
123	-70.493	-61.493	2235.640
124	-29.435	-25.435	1117.802
125	-29.042	-25.042	1117.818
126	-17.082	-12.582	745.213
127	-6.279	1.721	745.212
128	9.744	23.744	2597.867
129	7.159	13.159	2597.947
130	-75.414	-59.414	3334.696
131	-68.168	-59.668	5928.510
132	10.157	13.157	.019
133	6.826	12.826	4874.317
134	11.902	24.402	6464.368
135	13.857	23.857	4710.931
136	5.856	16.356	2223.413
137	6.044	12.044	3535.600
138	3.946	10.946	1769.560
139	4.770	11.270	462.740
140	5.253	10.253	287.292
141	-32.636	-17.136	1482.078
142	4.939	52.939	1957.857
143	17.994	43.994	11760.470
144	.835	11.335	8829.660
145	6.354	9.854	266.706
146	24.819	30.819	1501.562
147	-66.017	-50.017	3459.534

DAR-ES-SALAAM NETWORK ANALYSIS - MAXIMUM DEMAND IN 1995 (CASE A)

NODE RESULTS.

NODE	REL. HEAD(M.)	HEAD(M.)	SUPPLY(CUM./DAY. -VE IN)
148	-51.730	-28.730	4151.356
149	-2.019	18.981	-.013
150	34.893	46.893	3459.566
151	-43.975	-40.975	-.009
152	-46.930	-41.930	-.005
153	-52.425	-46.425	1117.818
154	-56.684	-50.684	745.213
155	-72.226	-66.226	2608.252
156	4.752	11.252	1248.574
157	4.159	10.659	-.008
158	3.957	10.457	1014.884
159	4.793	9.793	507.444
160	14.313	24.313	.003
161	40.407	49.407	-.003
162	38.193	41.193	1117.824
201	-14.679	73.821	2773.704
202	39.714	128.214	2121.018
203	3.649	61.649	1631.466
204	70.213	128.213	325.685
205	8.637	61.137	360.319
206	26.451	60.451	2611.599
207	6.888	59.388	1696.903
208	17.373	52.873	2551.177
209	9.383	59.383	487.378
210	39.678	110.178	487.415
211	16.435	72.935	7380.600
212	20.034	73.034	1247.843
213	18.296	72.296	310.291
214	27.755	76.455	1010.811
215	-11.311	37.389	1010.795
216	-.253	37.447	2915.023
217	8.830	44.130	1900.518
218	38.244	81.244	1157.151
219	29.070	54.570	.010
220	24.897	44.897	990.559
221	-.133	25.867	5376.952
222	5.719	25.719	990.588
223	2.109	22.109	6652.249
224	8.386	24.386	3687.318
225	19.458	30.958	5112.325
226	11.316	27.816	3875.583
228	8.650	42.650	4358.517
229	12.665	60.665	1389.314
230	10.774	55.774	2564.681
231	19.074	47.074	8977.278
232	5.408	54.408	1519.927
233	11.202	91.202	135.022
234	10.994	32.494	1195.170
236	10.151	60.151	.008
237	22.243	44.243	.023

DAR-ES-SALAAM NETWORK ANALYSIS - MAXIMUM DEMAND IN 1995 (CASE A)

NODE RESULTS.

NODE	REL. HEAD(M.)	HEAD(M.)	SUPPLY(CUM./DAY. -VE IN)
240	18.599	31.599	421.776
241	14.822	27.822	-.013
301	-19.378	13.122	3778.014
302	-27.095	-1.095	1648.263
303	-22.228	7.772	2025.698
304	9.925	43.225	638.462
305	3.972	21.472	4001.500
306	10.562	29.062	1825.384
307	23.902	42.902	864.341
308	8.096	42.696	553.185
309	3.627	38.427	569.210
310	-11.265	11.235	1414.951
311	-2.806	13.694	1222.244
312	17.468	25.468	1611.536
313	7.181	22.681	210.139
314	1.044	9.044	750.408
315	-20.830	-10.830	178.034
316	-135.844	-123.344	4033.034
317	-36.025	-20.525	910.830
318	-47.064	-6.564	5680.925
319	-45.506	-7.006	340.844
320	-36.789	-2.789	10666.360
321	-6.257	14.743	2430.201
322	-22.839	.661	1371.362
323	11.715	24.215	2537.587
324	-33.943	-17.443	2554.834
325	12.907	31.907	3000.717
326	-17.501	17.499	3446.393
327	-47.001	-7.001	2499.561
328	-31.311	-5.311	2916.141
329	-38.665	-6.665	2707.860
330	6.551	23.551	-.006
331	-22.537	14.463	1541.417
351	-17.031	41.469	3008.124
352	-33.070	28.430	1031.389
353	-14.639	46.861	257.803

DAR-ES-SALAAM NETWORK ANALYSIS - MINIMUM DEMAND IN 1995 (CASE A)

CONNECTOR RESULTS.

NODE	NODE	TYP	DIAM	CVALUE	LENGTH	FLOW.	VEL.	GRA.	LOSS
			=MM=		===M==	=CUM/D=	=M/S=	=1/1000=	==M=
100	101	H 2	1350.	110.	1820.	9411.6	.08	.01	.01
100	102	H 2	800.	110.	1820.	-2161.3	-.05	-.01	-.01
101	104	H 2	1350.	110.	1030.	9411.3	.08	.01	.01
102	103	H 2	700.	110.	2700.	-2777.6	-.08	-.02	-.05
104	105	H 2	1350.	110.	1900.	8683.3	.07	.01	.01
105	106	H 2	1200.	105.	2500.	16524.4	.17	.04	.09
105	108	H 2	750.	110.	1440.	-14572.2	-.38	-.27	-.39
105	110	H 2	525.	110.	35.	2047.1	.11	.04	.00
105	150	H 2	450.	110.	1200.	4496.9	.33	.37	.44
150	115	H 2	450.	110.	1300.	1991.1	.14	.08	.11
106	107	H 2	1200.	105.	3420.	2196.4	.02	.00	.00
107	143	H 2	375.	80.	1435.	812.8	.09	.07	.10
107	146	H 2	375.	80.	825.	3870.5	.41	1.22	1.01
107	237	H 2	1050.	100.	2400.	-4815.2	-.06	-.01	-.02
237	307	H 2	1050.	100.	1600.	-4815.2	-.06	-.01	-.01
108	109	H 2	750.	115.	1810.	-15699.9	-.41	-.28	-.51
108	113	H 2	800.	115.	2280.	287.7	.01	.00	.00
109	142	H 2	375.	80.	900.	2374.9	.25	.49	.45
109	143	H 2	375.	80.	2315.	2323.4	.24	.47	1.10
109	208	H 2	600.	115.	1530.	-21256.5	-.87	-1.48	-2.26
110	111	H 2	525.	115.	1535.	109.5	.01	.00	.00
110	117	H 2	150.	95.	55.	473.0	.31	1.58	.09
111	112	H 2	825.	115.	940.	287.8	.01	.00	.00
111	114	H 2	525.	115.	3000.	-1712.5	-.09	-.03	-.08
114	142	H 2	375.	80.	1220.	-1852.8	-.19	-.31	-.38
115	116	H 2	150.	65.	2000.	266.6	.17	1.10	2.20
104	118	H 2	200.	115.	200.	728.0	.27	.61	.12
118	161	H 2	200.	115.	1600.	528.3	.19	.33	.54
161	162	H 2	150.	115.	500.	528.3	.35	1.36	.68
116	162	H 2	150.	65.	1700.	-230.2	-.15	-.84	-1.43
115	117	H 2	200.	70.	2275.	-245.3	-.09	-.20	-.46
115	120	H 2	450.	120.	1000.	10581.8	.77	1.52	1.52
115	128	H 2	200.	70.	1370.	648.7	.24	1.23	1.68
115	141	H 2	200.	70.	700.	1748.4	.64	7.67	5.37
117	118	H 2	150.	65.	1900.	22.7	.01	.01	.02
120	121	H 2	250.	115.	1120.	3054.0	.72	2.90	3.25
120	121	H 2	200.	110.	1120.	1624.4	.60	2.90	3.25
121	124	H 2	200.	110.	1600.	794.6	.29	.77	1.24
120	128	H 2	450.	120.	400.	4912.5	.36	.37	.15
121	122	H 2	200.	100.	1255.	1101.6	.41	1.69	2.12
122	151	H 2	200.	110.	500.	902.9	.33	.98	.49
151	152	H 2	200.	110.	300.	458.9	.17	.28	.08
152	153	H 2	200.	110.	500.	804.8	.30	.79	.40
153	123	H 2	150.	95.	1300.	374.1	.25	1.02	1.33
151	154	H 2	150.	110.	800.	444.0	.29	1.07	.86
153	154	H 2	125.	80.	750.	132.7	.13	.50	.38
123	154	H 2	150.	110.	1200.	-378.0	-.25	-.79	-.95
152	124	H 2	150.	80.	1200.	-346.0	-.23	-1.21	-1.46
123	155	H 2	150.	80.	1500.	155.9	.10	.28	.42
155	124	H 2	150.	80.	1300.	-539.7	-.35	-2.76	-3.59

DAR-ES-SALAAM NETWORK ANALYSIS - MINIMUM DEMAND IN 1995 (CASE A)

CONNECTOR RESULTS.

NODE	NODE	TYP	DIAM	CVALUE	LENGTH	FLOW.	VEL.	GRA.	LOSS
			=MM=		===M==	=CUM/D=	=M/S=	=1/1000=	==M=
124	125	H 2	100.	75.	545.	-24.8	-.04	-.08	-.04
124	127	H 2	150.	80.	1800.	-364.4	-.24	-1.34	-2.41
125	126	H 2	150.	80.	1040.	-322.9	-.21	-1.07	-1.11
126	127	H 2	150.	80.	650.	-444.1	-.29	-1.93	-1.25
127	128	H 2	200.	70.	700.	-1007.2	-.37	-2.77	-1.94
128	129	H 2	300.	70.	950.	1461.8	.24	.76	.73
128	131	H 2	150.	65.	1050.	725.6	.48	7.02	7.37
128	132	H 2	300.	100.	1430.	1673.8	.27	.51	.73
129	126	H 2	100.	60.	2640.	77.5	.11	.94	2.47
129	132	H 2	400.	110.	480.	-146.4	-.01	-.00	.00
130	131	H 2	150.	65.	850.	17.5	.01	.01	.01
130	147	H 2	200.	70.	350.	-906.7	-.33	-2.28	-.80
147	141	H 2	200.	70.	600.	-1353.2	-.50	-4.78	-2.87
147	148	H 2	150.	115.	1600.	-476.2	-.31	-1.12	-1.79
148	149	H 2	150.	115.	400.	-1583.2	-1.04	-10.35	-4.14
149	150	H 2	200.	115.	950.	-1583.2	-.58	-2.55	-2.42
131	129	H 2	150.	65.	725.	-837.9	-.55	-9.16	-6.64
132	133	H 2	400.	110.	200.	1527.4	.14	.09	.02
133	144	H 2	300.	70.	1020.	284.2	.05	.04	.04
133	137	H 2	150.	65.	1540.	-90.2	-.06	-.15	-.23
133	145	H 2	150.	65.	1740.	33.6	.02	.02	.04
134	160	H 2	400.	110.	500.	103.5	.01	.00	.00
160	135	H 2	400.	110.	330.	1659.2	.15	.10	.03
156	225	H 2	150.	75.	850.	-465.1	-.30	-2.37	-2.01
137	158	H 2	200.	75.	750.	248.4	.09	.18	.14
157	158	H 2	200.	75.	600.	128.4	.05	.05	.03
158	159	H 2	150.	75.	750.	106.1	.07	.15	.12
134	144	H 2	300.	70.	1025.	2070.5	.34	1.46	1.49
134	146	H 2	400.	110.	1005.	-3470.0	-.32	-.40	-.41
134	224	H 2	200.	90.	1160.	-427.8	-.16	-.36	-.41
135	136	H 2	150.	75.	640.	293.6	.19	1.01	.65
135	137	H 2	250.	80.	940.	1360.3	.32	1.27	1.19
136	138	H 2	150.	65.	600.	253.0	.17	1.00	.60
136	225	H 2	150.	65.	340.	-552.3	-.36	-4.24	-1.44
137	138	H 2	150.	65.	420.	78.8	.05	.12	.05
138	156	H 2	200.	70.	410.	-140.1	-.05	-.07	-.03
139	156	H 2	200.	70.	250.	8.0	.00	.00	.00
139	157	H 2	200.	70.	350.	271.7	.10	.24	.09
140	157	H 2	200.	70.	680.	-143.3	-.05	-.07	-.05
139	225	H 2	150.	65.	850.	-403.1	-.26	-2.37	-2.01
140	159	H 2	150.	65.	1140.	66.7	.04	.08	.10
145	159	H 2	150.	65.	600.	-37.5	-.02	-.03	-.02
200	201	H 2	525.	115.	3650.	45048.4	2.41	11.36	41.46
200	202	H 2	525.	115.	3650.	652.4	.03	.00	.02
200	210	H 2	600.	115.	5000.	25626.4	1.05	2.09	10.44
201	203	H 2	525.	115.	900.	44308.7	2.37	11.02	9.91
202	204	H 2	525.	115.	970.	87.2	.00	.00	.00
203	205	H 2	525.	115.	100.	28312.8	1.51	4.81	.48
205	229	H 2	400.	115.	990.	1067.0	.10	.04	.04
205	207	H 2	525.	115.	460.	27149.8	1.45	4.45	2.05

DAR-ES-SALAAM NETWORK ANALYSIS - MINIMUM DEMAND IN 1995 (CASE A)

CONNECTOR RESULTS.

NODE	NODE	TYP	DIAM	CVALUE	LENGTH	FLOW.	VEL.	GRA.	LOSS
			=MM=		===M==	=CUM/D=	=M/S=	=1/1000=	==M=
206	229	H 2	400.	115.	985.	-696.4	-.06	-.02	-.02
207	230	H 2	525.	115.	1125.	26567.3	1.42	4.28	4.81
207	209	H 2	600.	115.	3800.	130.0	.01	.00	.00
208	231	H 2	525.	115.	1970.	3946.6	.21	.13	.25
208	230	H 2	525.	115.	1125.	-25883.4	-1.38	-4.07	-4.58
210	218	H 2	450.	110.	2700.	21214.7	1.54	6.49	17.51
210	233	H 2	300.	95.	2920.	4281.7	.70	3.17	9.27
211	212	H 2	400.	110.	1890.	2277.5	.21	.19	.35
211	233	H 2	300.	95.	2925.	-4245.7	-.70	-3.12	-9.14
212	213	H 2	150.	100.	1145.	82.7	.05	.06	.07
212	214	H 2	400.	110.	1875.	-2818.4	-.26	-.28	-.52
212	232	H 2	250.	100.	1895.	4680.4	1.10	8.27	15.67
215	216	H 2	400.	110.	1435.	-269.6	-.02	-.00	-.01
216	304	H 2	300.	100.	2385.	-1046.9	-.17	-.21	-.51
217	232	H 2	250.	100.	1990.	-4275.0	-1.01	-6.99	-13.92
217	304	H 2	300.	100.	1655.	3768.2	.62	2.28	3.77
218	214	H 2	400.	110.	2100.	3088.0	.28	.33	.68
220	228	H 2	450.	110.	1025.	1288.4	.09	.04	.04
220	231	H 2	525.	115.	1970.	-1552.6	-.08	-.02	-.04
221	222	H 2	300.	90.	645.	264.2	.04	.02	.01
221	223	H 2	300.	90.	1625.	1904.1	.31	.78	1.27
221	228	H 2	300.	100.	1270.	-3602.2	-.59	-2.10	-2.66
223	224	H 2	300.	90.	1125.	130.1	.02	.01	.01
224	241	H 2	300.	90.	900.	-579.9	-.09	-.09	-.08
224	226	H 2	200.	90.	435.	-701.1	-.26	-.89	-.39
225	240	H 2	250.	95.	400.	-494.7	-.12	-.14	-.06
226	240	H 2	250.	95.	675.	-202.1	-.05	-.03	-.02
225	240	H 2	550.	115.	400.	-4763.0	-.23	-.14	-.06
240	307	H 2	550.	115.	1675.	-8064.0	-.39	-.38	-.63
225	240	H 2	300.	100.	400.	-841.1	-.14	-.14	-.06
240	325	H 2	300.	100.	1600.	-1735.8	-.28	-.54	-.87
240	241	H 2	300.	90.	350.	2091.6	.34	.93	.33
240	241	H 2	250.	90.	350.	1294.9	.31	.93	.33
135	241	H 2	250.	90.	600.	-1251.0	-.29	-.88	-.53
160	241	H 2	250.	90.	850.	-999.6	-.24	-.58	-.49
160	241	H 2	200.	90.	850.	-555.9	-.20	-.58	-.49
225	312	H 2	400.	110.	1245.	3314.9	.31	.37	.46
226	234	H 2	250.	100.	1775.	-1532.5	-.36	-1.05	-1.86
228	304	H 2	300.	100.	645.	-3476.0	-.57	-1.96	-1.27
234	304	H 2	250.	100.	1995.	-1851.2	-.44	-1.49	-2.97
300	331	H 2	375.	75.	50.	1560.0	.16	.26	.01
331	301	H 2	375.	75.	1515.	728.0	.08	.06	.09
331	310	H 2	250.	70.	2415.	420.9	.10	.19	.45
301	321	H 2	375.	75.	1895.	-621.6	-.07	-.05	-.09
302	303	H 2	200.	75.	700.	-811.3	-.30	-1.63	-1.14
303	309	H 2	200.	75.	800.	-1351.5	-.50	-4.19	-3.35
302	322	H 2	150.	65.	1100.	121.5	.08	.26	.28
304	308	H 2	550.	115.	275.	23645.6	1.15	2.75	.76
304	309	H 2	300.	100.	420.	4039.3	.66	2.59	1.09
305	306	H 2	375.	75.	600.	-2990.6	-.31	-.85	-.51

DAR-ES-SALAAM NETWORK ANALYSIS - MINIMUM DEMAND IN 1995 (CASE A)

CONNECTOR RESULTS.

NODE	NODE	TYP	DIAM	CVALUE	LENGTH	FLOW.	VEL.	GRA.	LOSS
			=MM=		===M==	=CUM/D=	=M/S=	=1/1000=	==M=
305	311	H 2	200.	70.	1415.	377.3	.14	.45	.64
305	321	H 2	375.	75.	1475.	1546.2	.16	.25	.37
306	307	H 2	375.	75.	700.	-3721.5	-.39	-1.28	-.90
306	322	H 2	150.	65.	850.	244.2	.16	.94	.80
308	307	H 2	550.	115.	2325.	16831.3	.82	1.47	3.41
308	326	H 2	350.	115.	1100.	6666.8	.80	2.39	2.63
309	325	H 2	300.	100.	2600.	2536.0	.42	1.10	2.85
310	311	H 2	250.	70.	1125.	-386.3	-.09	-.16	-.18
310	314	H 2	250.	80.	1600.	429.9	.10	.15	.24
311	312	H 2	200.	70.	2485.	-335.0	-.12	-.36	-.90
312	323	H 2	400.	110.	1050.	1626.0	.15	.10	.10
312	324	H 2	200.	70.	1600.	924.2	.34	2.36	3.77
313	314	H 2	200.	100.	950.	893.2	.33	1.14	1.09
313	330	H 2	400.	110.	1900.	-949.2	-.09	-.04	-.07
330	323	H 2	400.	110.	1450.	-949.2	-.09	-.04	-.05
314	315	H 2	200.	100.	1000.	1123.0	.41	1.75	1.75
317	324	H 2	200.	70.	1365.	-242.9	-.09	-.20	-.27
321	328	H 2	150.	80.	650.	276.5	.18	.80	.52
320	328	H 2	150.	85.	1100.	299.0	.20	.83	.91
302	328	H 2	150.	85.	1150.	289.1	.19	.78	.90
328	329	H 2	150.	65.	1100.	86.9	.06	.14	.15
301	329	H 2	150.	85.	550.	342.1	.22	1.06	.58
302	320	H 2	150.	115.	1500.	-38.8	-.03	-.01	-.02
320	318	H 2	200.	75.	800.	432.0	.16	.51	.41
326	320	H 2	350.	115.	1200.	5747.7	.69	1.81	2.18
320	318	H 2	350.	115.	1400.	2133.5	.26	.29	.41
318	327	H 2	350.	115.	900.	757.5	.09	.04	.04
327	319	H 2	350.	115.	600.	90.9	.01	.00	.00
350	351	H 2	200.	115.	4015.	1077.2	.40	1.25	5.02
350	353	H 2	75.	115.	5000.	68.7	.18	.91	4.56
351	352	H 2	150.	65.	985.	275.0	.18	1.17	1.15
315	316	H 2	200.	75.	3600.	1075.5	.40	2.75	9.89
103	203	H 2	100.	110.	60.	-2917.9	-4.30	-250.76	-15.05
106	115	H 2	300.	110.	20.	14327.8	2.35	22.61	.45
318	329	H 2	150.	65.	500.	293.1	.19	1.31	.66
203	236	H 2	600.	110.	1100.	12642.9	.52	.61	.67
236	219	H 2	600.	110.	4100.	12642.9	.52	.61	2.51
219	304	H 2	600.	110.	2500.	30461.1	1.25	3.12	7.80
218	219	H 2	400.	110.	3200.	17818.2	1.64	8.34	26.67

DAR-ES-SALAAM NETWORK ANALYSIS - MINIMUM DEMAND IN 1995 (CASE A)

NODE RESULTS.

NODE	REL. HEAD(M.)	HEAD(M.)	SUPPLY(CUM./DAY.-VE IN)
100	7.700	70.200	-7250.274
200	9.400	135.900	-71327.200
350	60.000	98.500	-1145.987
300	29.872	68.372	-1559.997
101	32.188	70.188	.292
102	32.210	70.210	616.278
103	12.257	70.257	140.321
104	47.181	70.181	.083
105	50.170	70.170	187.028
106	55.077	70.077	.170
107	53.074	70.074	2328.350
108	43.952	70.552	840.051
109	33.061	71.061	858.234
110	50.168	70.168	1464.643
111	36.868	70.168	1534.179
112	32.168	70.168	287.795
113	32.552	70.552	287.680
114	12.247	70.247	140.317
115	54.631	69.631	3318.767
116	64.469	67.469	496.826
117	50.083	70.083	205.012
118	47.062	70.062	222.274
120	55.626	68.126	990.880
121	56.929	64.929	2782.224
122	58.847	62.847	198.730
123	51.592	60.592	596.191
124	59.714	63.714	298.094
125	59.754	63.754	298.095
126	60.346	64.846	198.730
127	58.076	66.076	198.730
128	53.981	67.981	692.783
129	61.266	67.266	692.775
130	44.739	60.739	889.291
131	52.233	60.733	1580.989
132	64.266	67.266	.000
133	61.249	67.249	1299.845
134	56.182	68.682	1723.864
135	58.648	68.648	1256.283
136	57.514	68.014	592.926
137	61.473	67.473	942.855
138	60.425	67.425	471.898
139	60.954	67.454	123.398
140	62.320	67.320	76.614
141	48.843	64.343	395.234
142	22.622	70.622	522.101
143	43.978	69.978	3136.212
144	56.712	67.212	2354.641
145	63.708	67.208	71.123
146	63.082	69.082	400.427
147	45.523	61.523	922.577

DAR-ES-SALAAM NETWORK ANALYSIS - MINIMUM DEMAND IN 1995 (CASE A)

NODE RESULTS.

NODE	REL. HEAD(M.)	HEAD(M.)	SUPPLY(CUM./DAY. -VE IN)
148	40.283	63.283	1107.063
149	46.353	67.353	.000
150	57.735	69.735	922.574
151	59.366	62.366	.002
152	57.284	62.284	.000
153	55.895	61.895	298.094
154	55.526	61.526	198.731
155	54.184	60.184	695.556
156	60.954	67.454	332.987
157	60.870	67.370	.003
158	60.838	67.338	270.645
159	62.225	67.225	135.322
160	58.681	68.681	-.115
161	60.536	69.536	.000
162	65.870	68.870	298.095
201	6.385	94.885	739.670
202	47.384	135.884	565.227
203	27.077	85.077	435.142
204	77.884	135.884	87.176
205	32.102	84.602	96.022
206	50.543	84.543	696.442
207	30.078	82.578	452.433
208	37.793	73.293	680.326
209	32.578	82.578	130.034
210	55.085	125.585	129.973
211	50.943	107.443	1968.216
212	54.098	107.098	332.751
213	53.034	107.034	82.747
214	58.906	107.606	269.557
215	25.012	73.712	269.557
216	36.017	73.717	777.363
217	42.633	77.933	506.817
218	65.279	108.279	308.591
219	56.429	81.929	.002
220	53.006	73.006	264.167
221	44.346	70.346	1433.894
222	50.334	70.334	264.164
223	49.094	69.094	1773.981
224	53.087	69.087	983.312
225	57.929	69.429	1363.309
226	52.967	69.467	1033.514
228	38.970	72.970	1162.311
229	36.561	84.561	370.523
230	32.824	77.824	683.933
231	45.050	73.050	2394.011
232	42.650	91.650	405.325
233	36.451	116.451	36.007
234	49.798	71.298	318.720
236	34.412	84.412	-.002
237	48.093	70.093	.000

DAR-ES-SALAAM NETWORK ANALYSIS - MINIMUM DEMAND IN 1995 (CASE A)

NODE RESULTS.

NODE	REL. HEAD(M.)	HEAD(M.)	SUPPLY(CUM./DAY. -VE IN)
240	56.485	69.485	112.454
241	56.164	69.164	.002
301	35.766	68.266	1007.501
302	42.720	68.720	439.550
303	39.843	69.843	540.202
304	40.917	74.217	170.245
305	51.219	68.719	1067.099
306	50.723	69.223	486.787
307	51.106	70.106	230.484
308	38.870	73.470	147.492
309	38.344	73.144	151.793
310	45.419	67.919	377.331
311	51.594	68.094	325.942
312	60.974	68.974	429.761
313	53.251	68.751	56.036
314	59.682	67.682	200.115
315	55.963	65.963	47.481
316	43.731	56.231	1075.508
317	49.496	64.996	242.898
318	27.836	68.336	1514.958
319	29.798	68.298	90.892
320	34.736	68.736	2844.445
321	47.353	68.353	648.075
322	44.942	68.442	365.707
323	56.372	68.872	676.714
324	48.762	65.262	681.312
325	51.340	70.340	800.213
326	35.881	70.881	919.065
327	28.299	68.299	666.576
328	41.841	67.841	777.660
329	35.692	67.692	722.116
330	51.819	68.819	.004
331	31.359	68.359	411.062
351	35.067	93.567	802.191
352	30.939	92.439	275.047
353	32.533	94.033	68.749