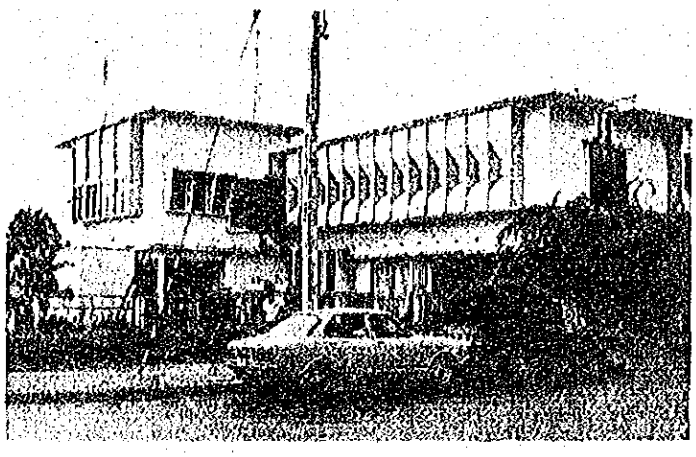
CHAPTER 4. THUNGMAHAMEK TELEPHONE EXCHANGE (MM)

4.1 Service Area

This telephone exchange is in the suburbs of Bangkok City where rapid progress in the construction of residences has been made recently.

The exchange area will be largely scaled down with the cut-over of service areas and service-in of the TC Exchange, as shown in Fig. 4.4.1.



View of MM Exchange Office.

(1) Cut-over to TC Exchange

The area on the west side of the Saint Louis Soi 3.

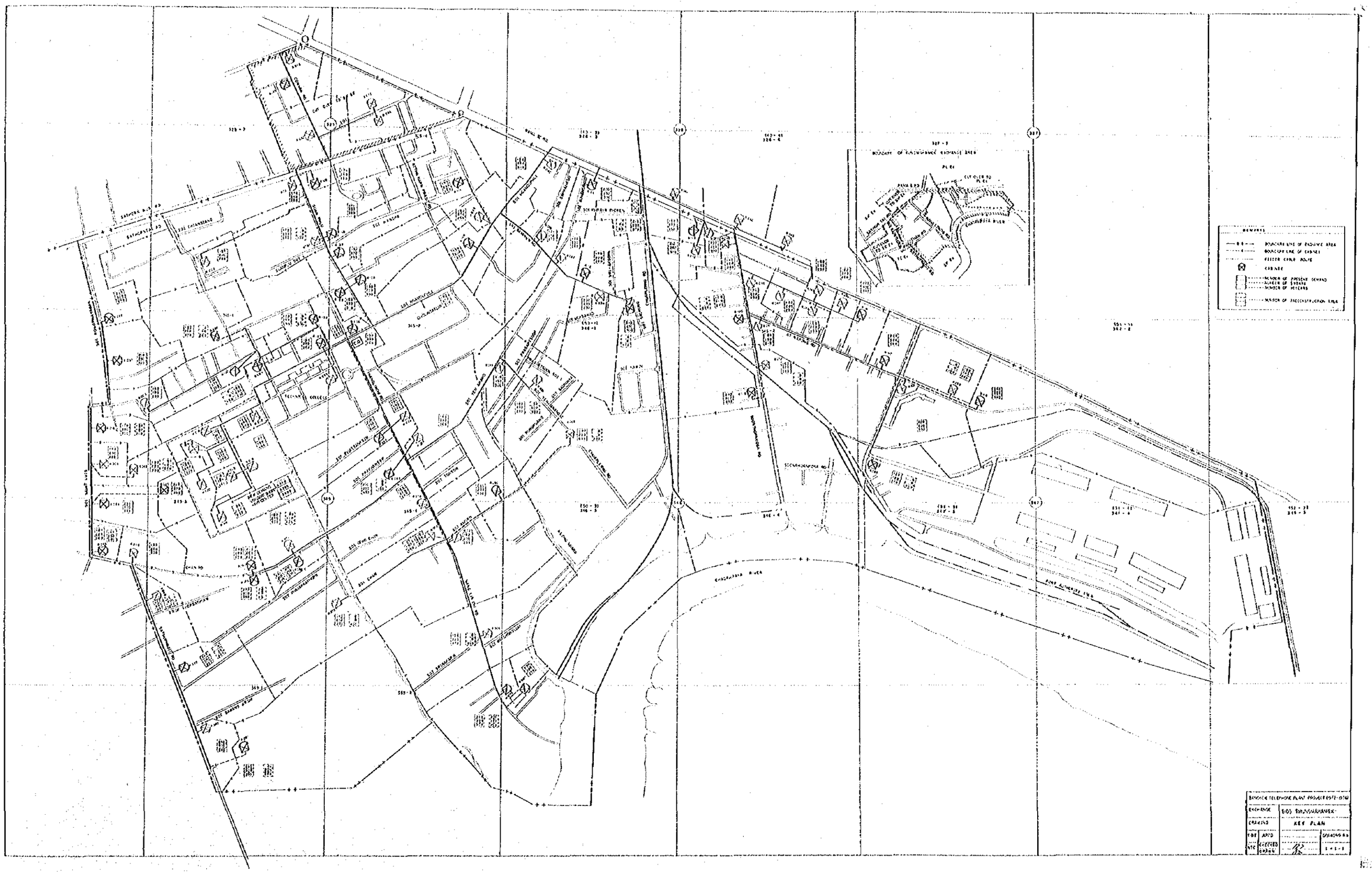
(2) Cut-over to SW Exchange

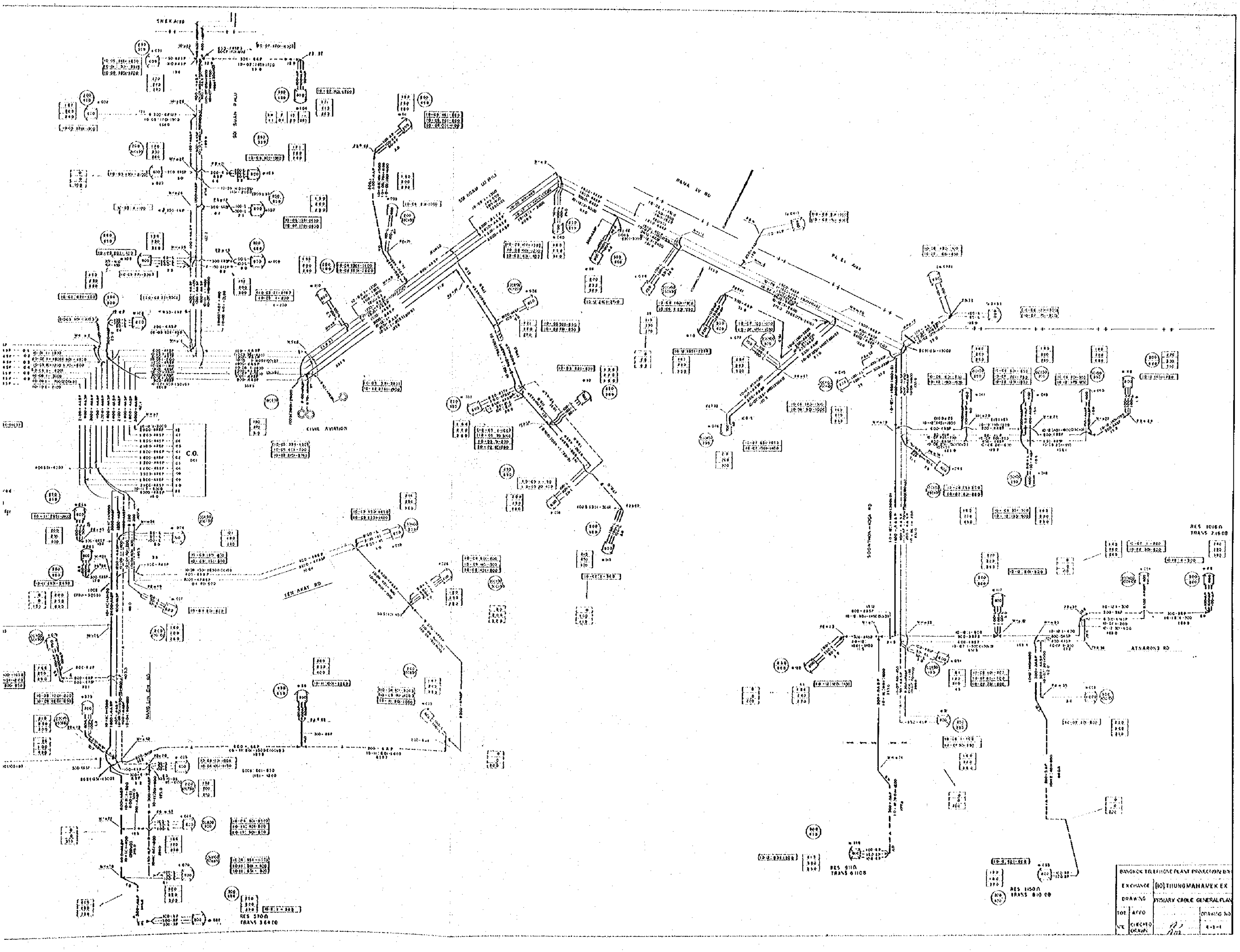
The area on the north side of the Sathorn Road.

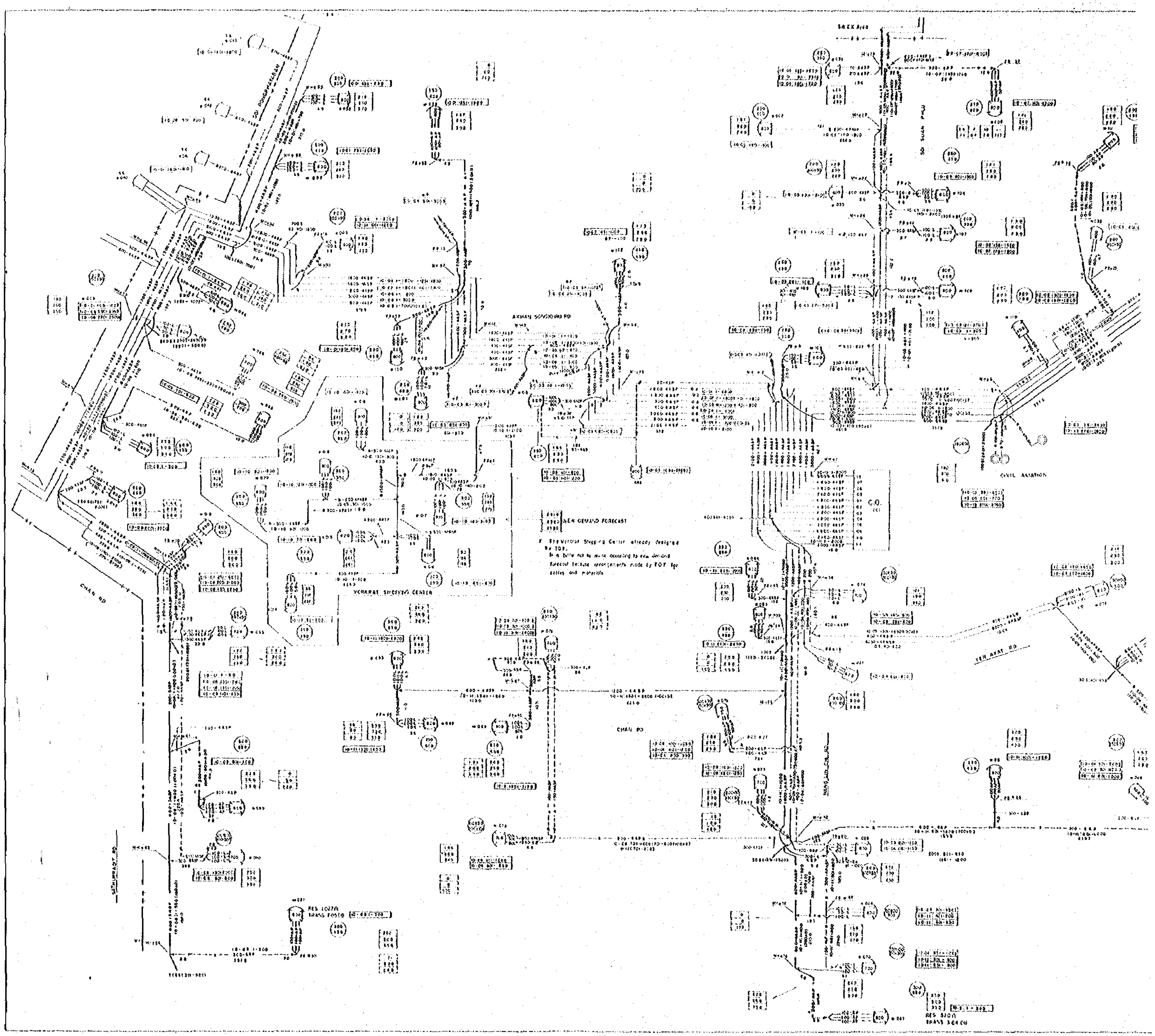
(3) Cut-over to PL Exchange

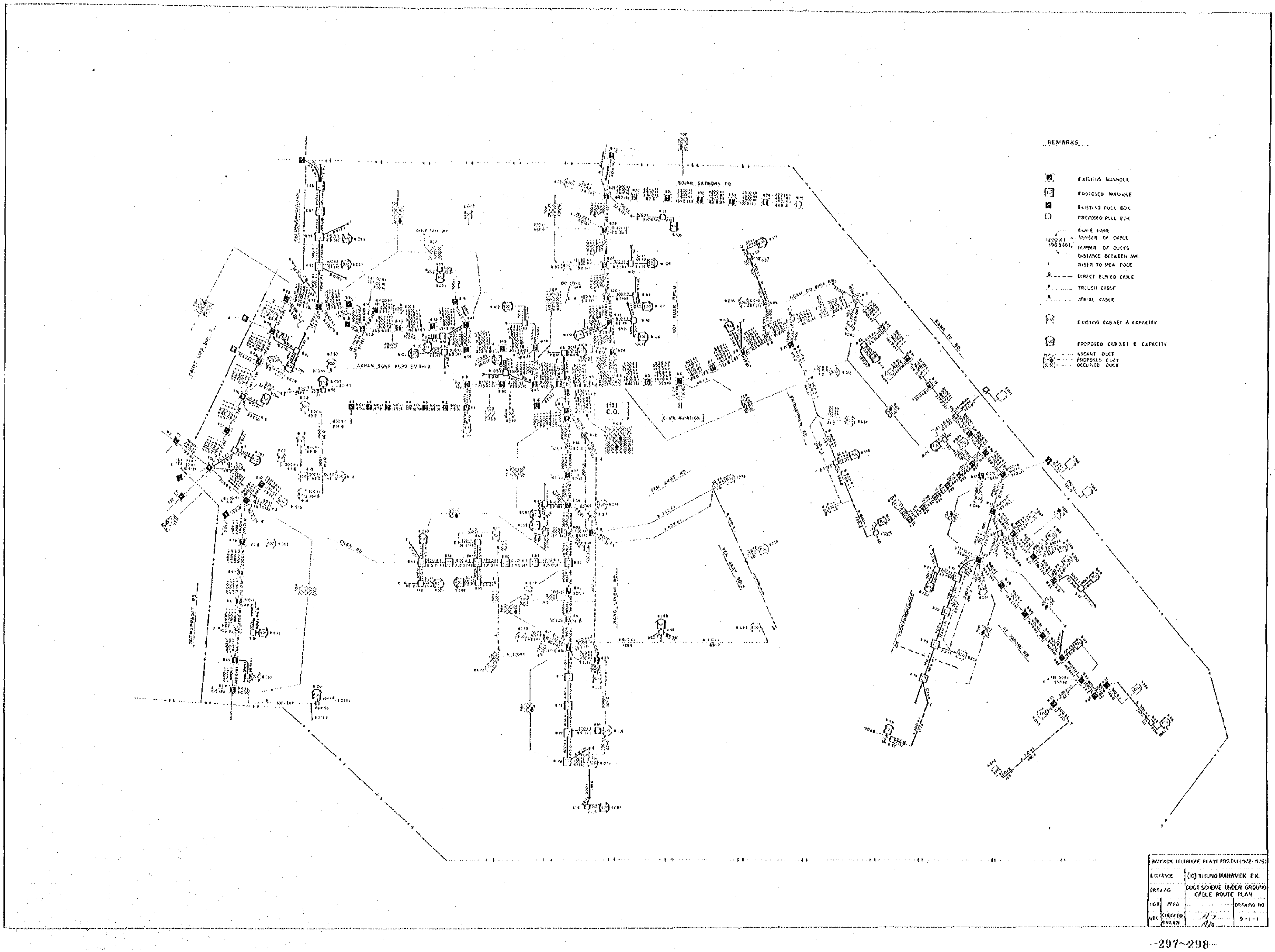
The area on the north side of the Rama 4 Road.

With the foregoing cut-overs, the service area of this exchange will occupy about 1,220 hectares.


KEY PLAN


CIVIL AVIATION
C.O.
TEN AKAT RD
ATNARONG RD
RES 3150 Ω
RES 3700 Ω
BANGKOK TELEPHONE PLANT PROJECT
EXCHANGE
(10) THUNGMAHAMEK EX
DRAWING
PRIMARY CABLE GENERAL PLAN
APPD
CHECKED
DRAWN
DRAWING NO


NEW DEMAND FORECAST
C.O.
CIVIL AVIATION
CHAN RD

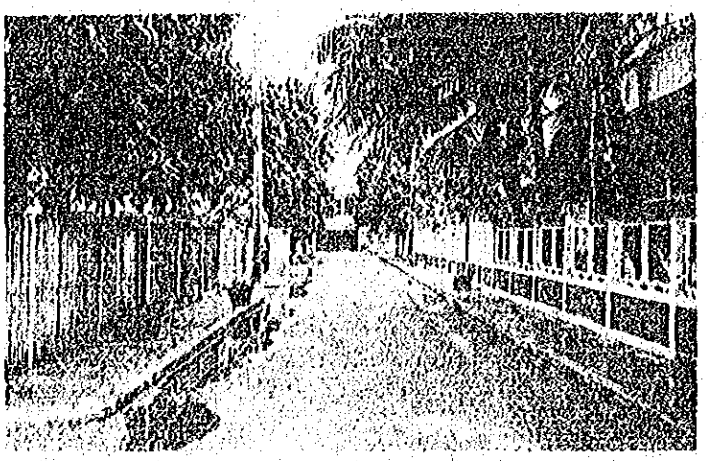


REMARKS
EXISTING MANHOLE
PROPOSED MANHOLE
EXISTING PULL BOX
PROPOSED PULL BOX
CABLE PAIR
NUMBER OF CABLE
NUMBER OF DUCTS
DISTANCE BETWEEN MH.
RISER TO MEA POLE
DIRECT BURIED CABLE
TROUGH CABLE
AERIAL CABLE
EXISTING CABINET & CAPACITY
PROPOSED CABINET & CAPACITY
VACANT DUCT
PROPOSED DUCT
OCCUPIED DUCT
SOUTH SATHORN RD
(10) C.O.
CIVIL AVIATION
(10) THUNGMAHAMEK EX.
DUCT SCHEME UNDER GROUND CABLE ROUTE PLAN
DRAWING NO

4.2 Demand Forecast and Outline of Area

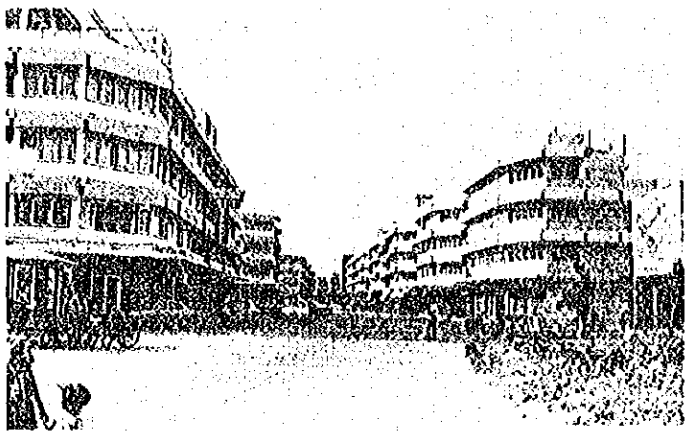
The Thungmahamek area has developed as the residential district of Bangkok and there are some places where farmland or marshes have been made into residential land. With the centralization of population in Bangkok from the outlying regions, the construction of residences in the suburbs has taken a very rapid tempo. The special features of this area are as follows:

(1) Although there is no rapid development of embassies, schools and high-class residential districts along the Sathorn Road, high-class apartment houses are under construction in some parts.

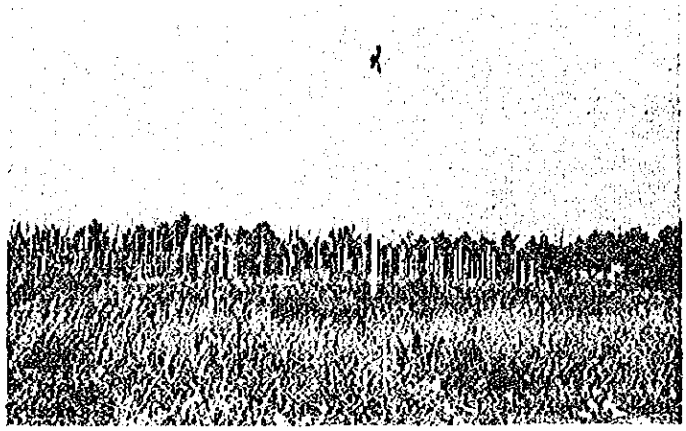


High-class residential district

(2) There is a great deal of farmland and vacant lots remaining in the southern part of the area and the building of residences is continually being made. A large housing area will be constructed in the vacant lots.



New housing area



New housing area under construction on farmland.

(3) The Sathupradit Road leading to the pier to be constructed for the No. 2 Bangkok Harbor will be a trunk road in the future, and it is believed that a large demand for telephones will be generated along this road.

In view of the foregoing points, there will be a large inflow of population in this area in line with the construction of residences and there will be an increase in social activity. Consequently, a large numerical value was acquired for the demand growth ratio in comparison with other exchanges.

Table 4.4.1 Demand Forecast

Area \ Year	1976	1978	1980	1982	1985	1987
Commercial area	4,232	5,248	6,297	7,305	8,760	9,720
Residential area	8,572	10,642	12,700	14,813	17,920	19,890
Special area (including pre-construction area)	1,936	2,410	2,733	3,282	4,120	4,690
Total	14,750	18,300	21,800	25,400	30,800	34,300
Demand Growth Ratio	100.0	129.0	147.7	172.7	208.8	232.5

DEMAND FORECAST OF MM EX.SERVICE AREA

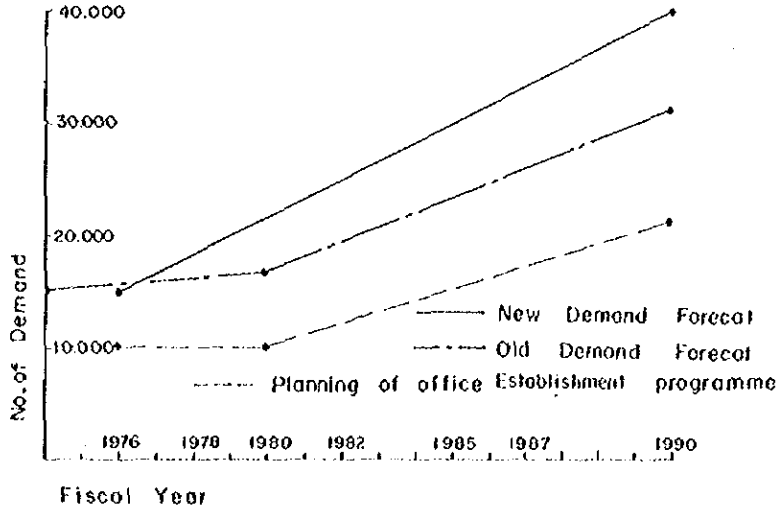


Fig. 4.4.4

4.3 Primary Cable Network Design

4.3.1 Objective Demand for Design

25,400 (in 1982) of Primary cable
34,300 (in 1987) of Secondary cable

4.3.2 Entrance Cable Pairs

The number of pairs of the entrance cables for this exchange is 18,600 pairs and 6,000 pairs will be newly installed.

Existing	3,000 pairs - 4 ASP	1	cable(s)
"	2,100 " - 4 ASP	2	"
"	1,800 " - 4 ASP	5	"
"	1,200 " - 4 ASP	2	"
New Installation	3,000 pairs - 4 ASP	2	"
Total:		12 cables	24,600 pairs

Out of the foregoing, the distributed number of cable pairs under this design work is 23,150 pairs.

4.3.3 Installation of New Cables for Each Direction

(1) Direction of Nang Linchi Road

Although there still are many vacant lots onwards from the intersection of the Chan Road, new conduits will be constructed to meet the future demand growth. The installation of 1,800 pairs of new cables will satisfy the demand in 1982.

(2) Direction of New Chan Road

This road has been completed by extension of the existing Chan Road to connect the Nang Linchi Road and is most suitable as a cable route to the Chan Road. Telephone demand is being generated along the new road. New cables of 1,200 pairs will be installed to meet the demand in 1982.

(3) Direction of Sathupradit Road

With the service-in of the TC Exchange, this road will be the boundary of the service area. There are new conduits in the road and new demands are being generated along the road. To meet such demand in 1982, 1,800 pairs will be placed.

(4) Direction of Soi Rong Phayaban

For the road which is the boundary between the TC Exchange and MM Exchange, 600 pairs will be placed in order to cut-over the secondary cables distributed from the TC Exchange side.

(5) Direction of Rama 4 Road

In the direction from the Rama 4 Road to the Sunthornkosa Road, 3,000 pairs will be placed to meet the demand in 1982.

4.3.4 Selection of Trough, Direct Buried and Aerial Routes

(1) This route is one is which underground conduits was desired but due to the narrowness of the road and heavy volume of traffic which make the new construction of underground conduits very difficult, the direct buried system was adopted for 900 pairs of Stalpeth armoured cable.

(2) Aerial System

The aerial system was adopted for primary cables at 13 places but since they are nearly all of 300 pairs or less, there is no problem.

4.3.5 Line Loss and D.C. Resistance

Although the existing facilities of this exchange have been designed for 9 dB, it will be 7 dB in this design work.

There are some places in the existing cross-connecting cabinet areas which exceed 7 dB and although areas where new cables will be installed have been designed to 7 dB or less as much as possible, the following areas exceeded 7 dB. However, since the demand in these areas 10 years hence will be within 5% of the total demand of 34,300, the TOT has agreed to this matter.

(1) Direction of Rama 4 Road

Maximum Line Loss	7.73 dB
Maximum D.C. Resistance	1,083 Ω
Demand	390

(2) Direction of Sathupradit Road

Maximum Line Loss	7.54 dB
Maximum D.C. Resistance	1,085 Ω
Demand	590

4.3.6 Plan for Non-Removal of Cables

The 02 cable of 1,800 - 4 ASP between the MH #2 and MH #52 will not be removed and will be kept in reserve for the future demand growth in the Vorarat commercial district and surrounding areas.

4.3.7 Cables to be Removed

Table 4.4.2

Section	No. of Pairs	Span Length	Reason for Removal
MH #1 - MH #47	400 - 4 ASP	716.0 m.	Not required due to cut-over to TC Exch.
MH #29 - MH #73	600 - 4 ASP	40.0	"
MH #46 - MH #47	300 - 4 ASP	53.9	"
MH #47 - MH #50	200 - 4 ASP	579.9	"
MH #25 - MH #26	150 - 4 ASP	122.2	"
MH #58 - MH #69	300 - 4 ASP	209.8	Change to big cable.
MH #27 - MH #28	100 - 4 ASP	189.9	"
MH #58 - MH #69	400 - 4 ASP	209.8	"
MH #4 - MH #6	100 - 4 ASP	337.5	"
MH #29 - MH #73	600 - 4 PASP	40.0	Not required due to cut-over.
Total		2,499.0	

4.4 Underground Conduit Design

4.4.1 New Main Conduit Route on Nang Linchi Road

(1) The number of ducts will be 4 and the manhole will be the "A-1" type.

(2) This route will be an extension of the existing underground facilities placed on the Nang Linchi Road.

(3) Position of conduit in the road will be on the same side as the existing underground facilities. Furthermore, for sections where there is no distinction between sidewalk and carriage way, the distance from the road center line to the position in the road was inscribed on the design drawing.

Position of conduit in Nang Linchi Road.

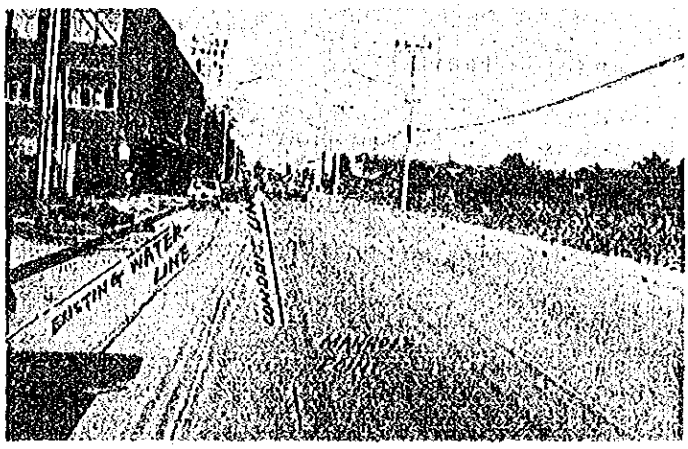
4.4.2 New Main Conduit Route on Chan Road

(1) The connection of this route with the existing conduit on the Nang Linchi Road will be made by construction of a new manhole on the existing route. The manhole will be the "J-3" type, and standard drawing No. 1082 will be applied.

(2) The number of ducts for the new route will be 4, and the manholes will be the "A-1" type.

(3) Due to the existence of underground hindrances and in consideration of the connection with the existing route of the TC Exchange, the position of the conduit will be the same as in the Chan Road of the TC Exchange area.

(4) In the selection of this new main route, since the Chan Road is of high-grade concrete pavement, a round about route on the Soi Chan was considered but the pavement is also of concrete and furthermore, the conduit length and cable length would be longer. Therefore, for economy reasons, the Chan Road route was selected.



Position of conduit in Chan Road.

4.4.3 New Main Conduit Route on Sunthon Kosa Road

(1) The original instruction from the TOT was for this route to be a branch route with 3" ducts. However, the route will have to cross under the railway tracks and since the construction method, soil covering, etc. would make the use of pulling box unsuitable, discussions were held with the TOT and the design was changed to construction of a new manhole and the use of 4" cuts for the conduit route.

(2) Method of the railway undercross will not be by excavation but by underground Piercing Method, and G.I.P. of 6 meter length will be used as ducts.

(3) The route to be extended in the future from the MH #97 will be by the placing of cap pipes.

4.5 Gas Pressurization System Design

4.5.1 Design of Inside Facilities

Since two new cables are to be lead-in in this design, gas distribution and alarm facilities will be additionally installed.

A 5,000 type air dryer is already installed, and its capacity is sufficient.

4.5.2 Design of Outside Facilities

(1) Attachment of pressure guard

The attachment of pressure guards will be inside the cross-connecting cabinets, in principle, but the pressure guards for the following cables will be inside the manholes.

02 cable -- MH #52 12 cable -- MH #74
08 cable -- MH #68

(2) Alarm circuits

The pair numbers of the alarm circuits will be the last pair numbers at each riser point but since the alarm circuits for the following pressure guards will use the pair numbers for other cables, attention must be paid.

A. As to the pressure guard on 07 cable in MH #29 on Soi Suanphlu, this will be attached inside the nearby cross-connecting cabinet #31 to facilitate measurement by leading-in the cable with a copper tube and of the 05 : 1,451 - 1,700 cable terminated in cross-connecting cabinet #31, the 1,699 pair number will be used for the alarm circuit.

B. The 12 cable of pulling box #35 on At Narong Road will be lead-in by copper tube to the cabinet #053 and of the 07 : 201 - 500 cable terminated in this cabinet, the 500 pair number will be used for the alarm circuit.

(3) Attachment of by-pass valve

A by-pass valve will be attached to the 02 cable inside the MH #2 to enable separate measurement.

4.6 Secondary Cable Network Design

4.6.1 Service Area where Direct Distribution will be Changed to System of Cabinet Distribution

The existing direct distribution has 12 distribution blocks (100 pair units) in the A to O groups. Excluding the E & F groups (Civil Aviation), all the blocks will be installed with cross-connecting cabinets. Consequently, 10 new cross-connecting cabinets will be installed in this area.

4.6.2 Cross-Connecting Cabinets with Secondary Cables Held in Reserve

There are many vacant lots in the service area of this exchange and it would be more economical not to suspend aerial cables until the time when telephone demand will be generated. Therefore, the secondary cables will be held in reserve in the following cross-connecting cabinets.

(1) Cross-connecting cabinet #049

There presently are markets and commercial districts in this area but for the forecasted increase in demand, 100 pairs will be held in reserve.

(2) Cross-connecting cabinet #051

Although there are many vacant lots in this area, the construction of residences is projected in the future and 100 pairs will be reserved.

(3) Cross-connecting cabinet #095

This area is now a residential district but there are vacant lots in some parts and 100 pairs will be held in reserve.

(4) Cross-connecting cabinet #110

Buildings are under construction at present in this area but upon consultation with the TOT, the lead-in of secondary cables will not be made and 200 pairs will be held in reserve in the cabinet.

(5) Cross-connecting cabinet #118

There presently are wide vacant spaces and since the construction of residences for official use is anticipated in the future, 200 pairs will be reserved in this cabinet.

4.6.3 Attention to be Paid in Aerial Cabling Work

Aerial cables for army use are suspended in the Jusmag area of the Sathorn Road, and due attention must be paid in the construction work in this area.

4.6.4 Desk Work Design

There is a project for the construction of residences in the area of the cross-connecting cabinet #087 and the cable design was executed from such residence construction design drawings.

Furthermore, a part of the construction work of Nakhon Thai Village is not completed in the area of cross-connecting cabinet #091 and the design was made from the residence construction design drawings for that area.

4.7 Design of Relevant Works

The design for the Vorarat Shopping Center has already been completed by the TOT and is awaiting commencement of construction work. Consequently, the design for this part in this design work is the design made by the TOT.

Sketch of completed Vorarat Shopping Center.

4.8 Construction Period

Since this exchange will utilize the cables which will become vacant after service-in of the TC Exchange for additional installation of secondary cables, the construction work will be after the service-in of the TC Exchange.

4.9 Amount of Works and List of Materials

Refer to the annexed Table 4.4.3 Amount of Works and Tables 4.4.4 to 4.4.13 List of Materials.

TABLE 4.4.3 MM EX. AMOUNT OF WORKS

ITEM	BREAKDOWN	Q'ty	REMARK
1. POLE	8 MC	54 ea	
	10 "	22 "	
	TOTAL	76 "	
2. GUY	(1) UPPER GUY 6 M	221 ea	
	" 10 M	21 "	
	" 16 M	1 "	
	TOTAL	243 "	
	(2) ANCHOR ROD ϕ 2	211 ea	
	5/8" x 7'	— "	
	3/4" x 7'	18 "	
	1" x 7	1 "	
	TOTAL	230 "	
3. CABLE	(1) UNDERGROUND CONDUIT CABLE		
	3600 – 32 ASP	— m	STALPETH CABLE
	3000 – 4 "	2346.4 "	
	2400 – 4 "	1119.0 "	
	1800 – 4 "	825.3 "	
	1200 – 4 "	639.4 "	
	900 – 4 "	1042.6 "	
	600 – 4 "	2344.3 "	
	300 – 4 "	1009.2 "	
	1800 – 5 "	230.0 "	
	1200 – 5 "	412.0 "	
	900 – 5 "	1030.3 "	
	600 – 5 "	427.2 "	
	300 – 5 "	395.0 "	
	100 – 65 "	"	
	SUB TOTAL	11820.7 "	
	(2) DIRECT BURIED CABLE		
	900 – 4 ASPT	15.0m	STALPETH SHEATHED AND STEEL TAPE ARMOURED CABLE
	600 – 4 "	366.0 "	
	300 – 4 "	— "	
	400 – 4 JF	— "	JELLY FILLED CABLE
	300 – 4 "	— "	
	200 – 4 "	66.7 "	
	100 – 4 "	44.7 "	
	50 – 4 "	58.5 "	
	SUB TOTAL	550.9	
	(3) TROUGH CABLE		
	2400 – 4 ASPT	— m	
	1800 – 4 "	— "	
	1200 – 4 "	— "	

ITEM	BREAKDOWN	Q'ty	REMARK
3. CABLE	900 – 4 ASPT	— m	
	600 – 4 "	— "	
	300 – 4 "	— "	
	900 – 5 "	— "	
	600 – 5 "	— "	
	300 – 5 "	— "	
	SUB TOTAL	"	
	UNDERGROUND CABLE TOTAL	12371.6 "	
	(4) AERIAL CABLE		
	600 – 4 AP	— m	INCLUDE AP & AP(8) CABLE
	400 – 4 "	335.9 "	
	300 – 4 "	3263.3 "	
	200 – 4 "	7026.0 "	
	100 – 4 "	11904.2 "	
	50 – 4 "	15177.9 "	
	25 – 4 "	5140.5 "	
	10 – 4 "	312.3 "	
	400 – 5 "	— "	
	300 – 5 "	1534.0 "	
	200 – 5 "	1859.1 "	
	100 – 5 "	1169.6 "	
	50 – 5 "	1807.1 "	
	25 – 5 "	385.3 "	
	10 – 5 "	— "	
	AERIAL CABLE TOTAL	49915.2 "	
4. POT HEAD	2400 P	ea	
	1800 P	2 "	
	1200 P	2 "	
	TOTAL	4 "	
5. CROSS CONNECTING CABINET	800 P	37 Box	
6 TERMINAL	(1) TERMINAL BOX		
	FOR AERIAL 25P	18 ea	
	" 15P	372 "	
	" 10P	557 "	
	FOR BURIAL 20P	— "	
	" 15P	— "	
	" 10P	— "	
	TOTAL	947 "	
	(2) TERMINAL BLOCK		
	LEAD SHEATHED STUB 100P	68 ea	
	" 50P	25 "	
	POLYETHYLENE SHEATHED STUB 100P	176 "	
	" 50P	31 "	
	TOTAL	300 "	

ITEM	BREAKDOWN	Q'ty	REMARK
7. GAS EQUIPMENT	AIR DRYER MODEL 1500	— ea	
	METER PANEL	1 "	
	ALARE PANEL	1 "	
	PRESSURE GUARD	22 "	
	TESTING VALVE	31 "	
8. CONDUIT	24 – 4"	— m	
	16 – 4"	— "	
	12 – 4"	— "	
	8 – 4"	— "	
	6 – 4"	— "	
	4 – 4"	2082.7 "	
	4 – 3"	235.2 "	
	3 – 3"	— "	
	2 – 3"	284.6 "	
	TOTAL	2602.5 "	
9. MANHOLE & PULL BOX	TYPE – A	12 ea	
	" C	— "	
	" V	— "	
	" J	1 "	
	" T	— "	
	" L	1 "	
	ENLARGE	— "	
	REBUILD	— "	
	TYPE - JUF - 6	24 "	
	" JUF -11	3 "	
	TOTAL	41 "	

MM EX.

LIST OF MATERIALS

CABLE DESCRIPTION	T.O.T. CODE NO.	A.E. CODE NO.	UNIT	QUANTITY	REMARK
STALPETH CABLE 3600 - 32 ASP			M		
" " 300 - 4 "			"	1 336	
" " 600 - 4 "			"	2 458	
" " 900 - 4 "			"	1 081	
" " 1200 - 4 "			"	673	
" " 1800 - 4 "			"	860	
" " 2400 - 4 "			"	1 161	
" " 3000 - 4 "			"	2 437	
" " 300 - 5 "			"	424	
" " 600 - 5 "			"	446	
" " 900 - 5 "			"	1 060	
" " 1200 - 5 "			"	422	
" " 1800 - 5 "			"	237	
" " 100 - 65 "			"		
STALPETH STEEL TAPE ARMOURED CABLE					
300 - 4 ASPT			"		
600 - 4 "			"	372	
900 - 4 "			"	525	
1200 - 4 "			"		
1800 - 4 "			"		
2400 - 4 "			"		
900 - 5 "			"		
600 - 5 "			"		
300 - 5 "			"		
ALEPETH CABLE 10 - 4 AP			"		
" " 25 - 4 "			"	1 000	
" " 50 - 4 "			"	5 500	
" " 100 - 4 "			"	6 000	
" " 200 - 4 "			"	7 500	
" " 300 - 4 "			"	3 500	
" " 400 - 4 "			"	3 500	
" " 600 - 4 "			"	500	
" " 10 - 5 "			"		
" " 25 - 5 "			"	500	
" " 50 - 5 "			"	500	
" " 100 - 5 "			"	1 000	
" " 200 - 5 "			"	2 000	
" " 300 - 5 "			"	2 000	
" " 400 - 5 "			"		

DESCRIPTION	T.O.T. CODE NO.	A.E. CODE NO.	UNIT	QUANTITY	REMARK
ALEPETH CABLE 600 - 5 AP			M		
" " 10 - 4 AP (8)			"	500	
" " 25 - 4 "			"	5 000	
" " 50 - 4 "			"	10 500	
" " 100 - 4 "			"	7 000	
" " 10 - 5 "			"		
" " 25 - 5 "			"	500	
" " 50 - 5 "			"	2 000	
" " 100 - 5 "			"	1 000	
TERMINATING CABLE 300 - 5 P			"	200	
JELLY FILLED CABLE 50 - 4			"	500	
" " " 100 - 4			"	500	
" " " 200 - 4			"	500	
" " " 300 - 4			"		

MM EX.

LIST OF MATERIALS

DESCRIPTION	T.O.T CODE NO	A.E CODE NO	UNIT PCS	QUANTITY	REMARK
CLAMP EXTENSION - ARM.					
FIGURE 8 CABLE CLAMPS - TYPE PA 296	ECH - 2002		PCE	400	
CABLE LASHING CLAMP TYPE "D"	ECH - 2100		PCE		
" " " "E"	" - 2101				
CABLE SUSPENSION CLAMPS (ONE BOLT CLAMP)	ECH - 2151		PCE	900	
" " " 11/16" THREE BOLTS TYPE	" - 2155		"	500	
CURVED CABLE SUSPENSION CLAMPS 11/16"	ECH - 2171		"	200	
THREE BOLTS TYPE					
GULVANIZE STEEL KLING GROUND CLAMP	ECH - 2195		"	200	
STRAND GROUND CLAMPS	ECH - 2200		"	100	
GROUND CLAMP (FIG 8)			"	300	
U-CLAMPS 3/8"			"		
BRANCH STRAND CLAMP (6M)			"	30	
ONE-SIDE CLAMP (FIG 8)			"	80	
CABLE EXTENSION METAL ARM TYPE M1	ECH - 2052		"	2000	
" " " " " M2	"		"	200	
" " " " " M3	"				
HOSE CLAMP		(JAPAN) 3622			
ADJUSTABLE HOSE CLAMP 1/2" - 29/32"	ECS - 0245				
" " " 13/16" - 1 3/4"	" - 0246				
" " " 1 13/16" - 2 3/4"	" - 0247				
" " " 2 9/16" - 3 1/2"	" - 0248				
" " " 3 1/4" - 4"	" - 0249				
" " " 15/16" - 4"	" - 0250				
GULVANIZED STEEL CABLE SUSPENSION HOOK	S - 524015				
BOLT					
ANGLED THIMBLEYE BOLT 5/8" x 8"	ECH - 1001		PCE	150	
" " " " x 10"	" - 1002		"	50	
" " " " x 12"	" - 1003		"	100	
" " " " x 14"	" - 1004		"	10	
" " " " x 16"	" - 1005		"		
" " " 1/2" x 8"					
" " " " x 10"		S - 27798			
" " " " x 12"					

DESCRIPTION	T.O.T CODE NO	A.E CODE NO	UNIT PCS	QUANTITY	REMARK
DOUBLE ARMING BOLT 5/8" x 8"	ECH - 1102			40	
" " " " x 10"	" - 1103				
" " " " x 12"	" - 1104				
" " " " x 14"	" - 1105				
" " " " x 16"	" - 1106				
MACHINE BOLT 1/2" x 4"	ECH - 1209	S - 511308			
" " " x 6"	" - 1212				
" " " x 8"	" - 1213				
" " " x 12"	" - 1214			5	
" " " x 14"	" - 1215			15	
" " " x 16"	" - 1216				
" " 5/8" x 8"	ECH - 1218	S - 511416	PCE	160	
" " " x 10"	" - 1220	S - 511420	"	150	
" " " x 12"	" - 1221	S - 511422	"	150	
" " " x 14"	" - 1222	S - 511424		30	
" " " x 16"	" - 1223	S - 511426		5	
" " " x 18"	" - 1224			5	
" " 3/4" x 8"		S - 2908			
" " " x 10"		S - 511510			
" " " x 12"		S - 511512			
" " " x 14"		S - 511514			
STRAIGHT THIMBLEYE BOLT 5/8" x 6"	ECH - 1323				
" " " " x 8"	" - 1324		PCE	70	
" " " " x 10"	" - 1325		"	30	
" " " " x 12"	" - 1326		"	60	
" " " " x 14"	" - 1327			10	
" " " " x 16"	" - 1328			10	
EXTENSION SHIELD WITH BOLT				4 400	
BRIDLE RINGS 1 5/8" WOOD SCREW THREAD	ECF - 1002				
GRIP NUT					
PREFORMED GUY GRIP FOR FALSE DEAD-END					
FIG (8)	ECH - 3001		PCE	60	
6M			"	100	
10M					
PREFORMED GUY GRIP DEAD-END FIG (8)	ECF - 3131		"	800	
" " " 6M				1 200	
" " " 10M				100	
" " " 16M	ECF - 3132		"		
PREFORMED STRAND SPLICE 6M				10	
10M	ECF - 3133		"		

MM EX.

LIST OF MATERIALS

DESCRIPTION	T.O.T. CODE NO.	AE CODE NO.	UNIT PCS	QUANITITY	REMARK
GRIP NUT					
FORGED EYE NUTS 5/8"	ECH-3501		PCE	300	
" " " "	" -3503				
MACHINE BOLTS W/2 NUTS					
GULVANIZED NUTS 5/8" BOLT SIZE	ECH-5072		PCE	700	
EXPANSION SHIELD. STRAP. CLAMP					
THIMBLEYE . ROD LIFT PLATE . PROTECTOR . SUPPORT					
DOUBLE EXPANSION SHIEIDS 3/8" x 2"	ECF-4010 4012				
TWO-HOLE CONDUIT AND CABLE STRAPS			PCE	150	
ONE-HOLE STEEL CABLE CLAMPS			"		
FORGED ANGLE THIMBLEYE 5/8"	ECH-4020		"	100	
GALVANIZED STEEL GROUND ROD 1/2" x 5 FEET	ECH-4222		PCE	200	
CURVED LIFT-PLATE 5/8" (2 1/2" x 7" x 3/16")	ECI-5510		"	60	
GALVANIZED GUY WIRE PROTECTORS 7 FEET	ECH-5550		"	250	
B-LASHED CABLE SUPPORTS 3/4 x 10"	ECH-6902		"	500	
" " " 1 3/16 x 16"	" -6903		"	2000	
" " " 2 x 22"	" -6904		"	2500	
" " " 2 5/8 x 28"	" -6905		"		
" " " 3 1/8 x 34"	" -6906			500	
LAG-SCREW. STAPLE. STRAP					
LAG SCREWS 5/16" x 2 1/2"	ECH-7027				
" " 3/8" x 3 1/2"	" -7043				
" " 3/8" x 4" GIMLET POINT FOR CURVE LIFT PLATE	ECH-7044		PCE	20	
" " 1/2" x 4" GIMLET POINT FOR SIDEWALK GUY FITTING	ECH-7048			10	
SERVISLEEVS 5/16" (6M)	ECH-7101			1000	
GALVANIZED STEEL STAPLE	ECH-7140				

DESCRIPTION	T.O.T. CODE NO.	AE CODE NO.	UNIT PCS	QUANITITY	REMARK
STRANDVISE 5/16"-4M-TYPE 5151	ECH-7251				
" " -6M- " 5101	" -7252				
" " -6M- " 5151	" -7256				
WASHER WIRE LINK					
CURVED WASHER 5/8 (2 1/2" x 2 1/2" x 3/16")	ECH-9001		PCE		
SQUARE " " (2 1/4" x 2 1/4" x 3/16")	" -9043		"		
LONG SQUARE WASHER 5/8			"		
CURVED WASHER 5/8"(2 1/2" x 2 1/2" x 3/16" x 1/16" HOLE DIAM	ECH-9001		"	600	
" " 3/4 (3" x 3" x 1/4" x 13/16" " ")	" -9004		"		
ROUND WASHER 1/2" (2" x 2" x 1/8"-9/16" HOLE DIAM)	ECH-9041				
" " 1/2" (2" x 2" x 1/4-9/16" " ")	" -9042			80	
" " 5/8" (2 1/4 x 2 1/4" x 3/16" x 11/16" " ")	" -9043				
WIRE LINK-TYPE 5059	ECH-9100				
STRAND LINK FOR FIG(8) CABLE			PCE	60	
STEEL FLAT CROSS ARM BRACES 1 1/2 x 24" x 3/16"				40	
" " " " " 1 1/2 x 30 x 3/16"					
CABLE EXTENSION ARMS (3" x 3" x 3 - 3")				20	
ANCOHOR RODS 3/4" X (REQUIRED LENGTH)			PCE	20	
WOOD LOG FOR ANCHOR ROD					
" " " 1" (")				1	
ONE BOLT GUY ATTACHMENTS		S-518205			
SIDE-WALK GUY FITTINGS. FOR WOODEN POLE		SR-329	PCE	1	
" " " POR CONCRETE POLE			"	21	
			"		
GALVANIZED STEEL PIPE ø 2 1/2" (2M)			"	10	
" " " (4M)			"	15	
S-LON PIPE ø1/2" x 25 METER			"	120	
S-LON 90°					
U-GUARDS			PCE	10	
GUY STRAIN INSULATOR TYPE 506	ECI-0073		PCE	250	

MM · EX.

LIST OF MATERIALS

DESCRIPTION	T.O.T CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
STEARINE, C-CEMENT, COMPOUND					
STEARINE (250G)		3307	PCE	300	
STEARINE CANDLE	ECS-0100				
C-CEMENT 100G/PCE	〃 -0230		PCE	250	
〃 〃 4 02	〃 -0231				
SCOTCH KOTE	ECS-0380				
WATER PROOF COMPOUND	ECS-0470	3704	KG	10	
MOISTURE PROOF COMPOUND		3705			
NO.1 ADHENSION AGENT		3706			
NO.2 SPECIAL COMPOUND (WITH HARDNER)		3703	KG	40	
NO.3 〃 〃		3708			
NO.4 〃 〃 (RESIN)		3701	KG	100	
NO.4 〃 〃 (HARDNER)		3702			
NO.5 〃 〃		3707	PCE	50	
DESICCANT, DESICCAN-CLOTH, FLOSS-SILK					
PROTEK SORB DESICCANT 160 G	ECS-1020				
〃 〃 〃 50 G	〃 -1021				
DESICCANT (DRY AGENT) 50G/BAG	ECS-1091	3031	BAG	1700	
DESICCANT CLOTH 20 x 36 x 25 CM		3034	PCE	10	
〃 〃 24 x 36 x 29 〃		〃	〃	20	
〃 〃 27 x 36 x 32 〃		〃	〃	5	
〃 〃 27 x 45 x 32 〃		〃	〃	25	
〃 〃 31 x 36 x 36 〃		〃	〃	5	
〃 〃 31 x 45 x 36 〃		〃	〃	10	
〃 〃 34 x 45 x 39 〃		〃	〃	5	
〃 〃 37 x 45 x 42 〃		〃	〃	25	
〃 〃 40 x 45 x 45 〃		〃	〃	5	
〃 〃 44 x 45 x 49 〃		〃	〃	20	
〃 〃 48 x 45 x 53 〃		〃	〃	5	
〃 〃 51 x 45 x 55 〃		〃	〃	10	
〃 〃 53 x 45 x 58 〃		〃	〃	10	
〃 〃 55 x 45 x 60 〃		〃	〃	10	
〃 〃 57 x 45 x 62 〃		〃	〃	10	
〃 〃 59 x 45 x 64 〃		〃	〃	5	
〃 〃 62 x 45 x 67 〃		〃	〃	5	
〃 〃 68 x 45 x 73 〃			〃	5	
〃 〃 80 x 45 x 85 〃			〃	5	
PLASTIC TUBE FITTING-PIPE COUPLING	ECS-1500				
〃 〃 〃 MALE COUPLING	〃 -1501				
〃 〃 〃 FERRULE	〃 -1502				

DESCRIPTION	T.O.T CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
FLOSS SILK 10 PCS/BAG	ECS-1700		BAG	5	
TAPE, BONDING-RIBON					
SEALING TAPE NO.1 30-280MM-6 PCS/BAG	ECT-1158	3601	BAG	120	
〃 〃 NO.2 40-280 -6 〃	〃 -1159	3602	〃	100	
〃 〃 NO.3 30-280 -3 〃	〃 -1160	3603	〃	520	
〃 〃 NO.4 40-280 -3 〃	〃 -1161	3604	〃	320	
ADHESIVE ALUMINUM TAPE NO.1 30MM x 20M/ROLL	EC2-1000		ROLL	200	
〃 PAPER TAPE 50M/〃			〃		
〃 GLASS FIBER TAPE 52M/〃	EC2-1203		〃	10	
〃 P.V.C TAPE NO.1 10M/〃		3611	〃	900	
〃 〃 〃 NO.2 20M/〃	-1001	3612	〃	1300	
〃 〃 〃 (GENERAL) 20M/〃		3620	〃		
BONDING COPPER TAPE 10M/ROLL	EC2-1060	3613	〃	50	
〃 〃 〃 (SELF) NO.2 5M/〃		3619	〃		
COTTON TAPE 38MMx 30M/〃	EC2-1090		〃	30	
〃 〃 50MMx 30M/〃	-1091		〃	30	
CR TAPE 28" x 20'	ECS-7024				
DR TAPE 3/4" x 15'	EC2-1120		〃		
〃 〃 2" x 15'	〃 -1121		〃		
ELECTRICAL TAPE 3/4" x 66'	〃 -1132		〃		
ELICTION TAPE 3/4" x 60'	〃 -1185		〃		
〃 〃 2" x 60'	〃 -1186		〃		
GLASS TAPE 1" x 108'	〃 -1201		〃		
GLASS FIBER TAPE 38MMx 30M/ROLL	〃 -1202		〃	100	
POLYETHIYLENE TAPE 30MMx 20M/〃	〃 -1275	3605	〃		
〃 〃 60MMx 20M/〃	〃 -1276	3606	〃	100	
〃 〃 (BLACK) 20M/〃	〃 -1277	3405	〃		
VALCANIZED RUBBER TAPE 10M/〃	〃 -1300	3406	〃		
P.V.C TAPE FOR TERMINATING JOINT 20M/〃	〃 -1345	3618	〃	10	
SOFT BONDING TAPE 5M/〃		3419	〃	10	
LACING TWINE 6 PLIES	EC2-1501				
ALUMINIUM FOIL TAPE 2" x 20'	ECS-7000				
〃 〃 〃 4" x 20'	〃 -7001				
V.N TAPE 10M/ROLL		3610	ROLL	1000	
SPACER TAPE			〃		
BONDING RIBBON 0.375" x 60'	ECS-4600		〃	10	

MM EX.

LIST OF MATERIALS

DESCRIPTION	T.O.T. CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
SOLDER					
NO. 1 SOLDER 250G / ROLL		3301	ROLL		
NO. 2 〃 1KG / ROLL	ECS-5700	3302			
NO. 3 〃		3303			
NO. 4 (CREAM) SOLDER 100G / TIN	ECS-5722	3304	TIN		
NO. 4 (〃) 〃 200G / TIN		3305			
BAR SOLDER 1 1/2 LBS	ECS-5612				
KESTER SOLDER 1/16" x 0.062 (1LBS)	ECS-5672				
〃 〃 1/8 x 0.125 (5LBS)	〃 -5606				
TERMINATING MATERIALS					
NO. 50 P.V.C LID FOR TERMINATING JOINT	ECS-3050				
NO. 75 〃 〃 〃	〃 -3051				
NO. 100 〃 〃 〃	〃 -3052				
NO. 125 〃 〃 〃	〃 -3053				
NO. 150 〃 〃 〃	〃 -3054		PCE	4	
NO. 200 〃 〃 〃	〃 -3055		〃	4	
NO. 50 〃 SLEEVE 〃	ECS-5270				
NO. 75 〃 〃 〃	〃 -5271				
NO. 100 〃 〃 〃	〃 -5272				
NO. 125 〃 〃 〃	〃 -5273				
NO. 150 〃 〃 〃	〃 -5274		PCE	2	
NO. 200 〃 〃 〃	〃 -5275		〃	2	
NO. 50 〃 TUBE 〃	ECS-7230				
NO. 75 〃 〃 〃	〃 -7231				
NO. 100 〃 〃 〃	〃 -7232				
NO. 125 〃 〃 〃	〃 -7233				
NO. 150 〃 〃 〃	〃 -7234		PCE	2	
NO. 200 〃 〃 〃	〃 -7235		〃	2	
NO. 50 TERMINATING SLEEVE RECEPTACLE BAND		4601			
NO. 75 〃 〃 〃 〃		4602			
NO. 100 〃 〃 〃 〃	ECS-5300	4603			
NO. 125 〃 〃 〃 〃	〃 -5301	4604			
NO. 150 〃 〃 〃 〃	〃 -5302	4605	PCE	2	
NO. 200 〃 〃 〃 〃	〃 -5303	4606	〃	2	

DESCRIPTION	T.O.T. CODE NO	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
NO. 50 TERMINATING SLEEVE FIXING BAND		4611			
NO. 75 〃 〃 〃 〃		4612			
NO. 100 〃 〃 〃 〃	ECS-5286	4613			
NO. 125 〃 〃 〃 〃	〃 -5287	4614			
NO. 150 〃 〃 〃 〃	〃 -5288	4615	PCE	2	
NO. 200 〃 〃 〃 〃	〃 -5289	4616	PCE	2	
CABLE FIXING BAND			PCE	4	
SLEEVE					
COTTON SLEEVE 3/32" x 3 1/4" x 900 (0.4MM)	ECS-5021				
〃 〃 1/8" x 3 1/4" x 700 (0.5 〃)	〃 -5022				
〃 〃 5/32" x 3 1/4" x 400 (0.65 〃)	〃 -5023				
〃 〃 1/4" x 3 1/4" x 200 (0.9 〃)	〃 -5024				
COMPOUND FILLED PE SLEEVE FOR 0.4MM	ECS-5050				
〃 〃 〃 〃 〃 0.5	〃 〃				
〃 〃 〃 〃 〃 0.65	〃 〃				
〃 〃 〃 〃 〃 0.9	〃 〃				
PLASTIC SLEEVES 0.106" x 3" x 250 (GREEN)	ECS-5150				
〃 〃 0.125" x 3" x 250 (BLACK)	〃 -5151				
〃 〃 0.148" x 3" x 250 (RED)	〃 -5152				
〃 〃 0.208" x 3" x 250 (YELLOW)	〃 -5153				
PAPER SLEEVE FOR 0.4MM CONDUCTOR 200/BAG	ECS-5180	3001	BAG	1300	
〃 〃 〃 0.5 〃 〃	〃 -5181	3002	〃	110	
〃 〃 〃 0.65 〃 〃	〃 -5182	3003	〃		
〃 〃 〃 0.9 〃 〃	〃 -5183	3004	〃		
PLASTIC FILLED SPLICE SLEEVE x 550 (YELLOW)	ECS-5200				
〃 〃 〃 〃 0.106x 450 (GREEN)	〃 -5201				
〃 〃 〃 〃 0.125 x 350 (CLEAR)	〃 -5202				
〃 〃 〃 〃 0.145 x 275 (RED)	〃 -5203				
〃 〃 〃 〃 0.145 x 225 (BLUE)	〃 -5204				
POLYETHYLENE SLEEVE FOR 0.32MM CONDUCTOR 200/BAG	ECS-5225	3011	BAG		
〃 〃 〃 0.4 〃 〃	〃 〃	3012	〃	850	
〃 〃 〃 0.5 〃 〃	〃 〃	3013	〃	150	
〃 〃 〃 0.65 〃 〃	〃 〃	3014			
〃 〃 〃 0.9 〃 〃	〃 〃	3015			
AUXILIARY PE SLEEVE NO. 363		3244			
〃 〃 〃 NO. 364		3255			
MAIN LEAD SLEEVE					
LEAD SLEEVE 3/4" x 15"	ECS-5334				
〃 1" x 15"	〃 -5335				
〃 1/4" x 15"	〃 -5336				

MM EX.

LIST OF MATERIALS

DESCRIPTION	T.O.T. CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
MAIN LEAD SLEEVE					
LEAD SLEEVE. 1 1/2" x 15"	ECS-5337				
" " 1 3/4" x 17"	"-5338				
" " 2" x 17"	"-5339				
" " 2 1/4" x 17"	"-5340				
" " 2 1/4" x 20"	"-5341				
" " 2 3/4" x 20"	"-5342				
" " 3" x 20"	"-5343				
" " 3 1/2" x 20"	"-5344				
" " 4" x 20"	"-5345				
" " 4 1/2" x 20"	"-5346				
" " 4 1/2" x 22"	"-5347				
" " 5" x 20"	"-5348				
" " 5" x 22"	"-5349				
" " 5 1/2" x 20"	"-5350				
" " 5 1/2" x 22"	"-5351				
" " 6" x 22"	"-5352				
" " 6 1/2" x 24"	"-5353				
" " 7" x 24"	"-5354				
" " 8" x 24"	"-5355				
MAIN LEAD SLEEVE 30 - 300 MM	ECS-5405		PCE		
" " " 40 - 300 "	"-5408		"	200	
" " " 40 - 400 "	"-5409		"		
" " " 50 - 400 "	"-5412		"	500	
" " " 60 - 400 "	"-5415		"	400	
" " " 70 - 500 "	"-5420		"	800	
" " " 80 - 500 "	"-5426		"	30	
" " " 90 - 500 "	"-5432		"	100	
" " " 100 - 500 "	"-5435		"	30	
" " " 110 - 500 "	"-5438		"	30	
" " " 120 - 500 "			"	70	
" " " 130 - 500 "			"	30	
" " " 140 - 500 MM	ECS-5441		"	10	
" " " 150 - 500 "	"-5444		"	10	
" " " 160 - 500 "	"-5447		"	10	
" " " 170 - 500 "	"-5450		"	10	
" " " 180 - 500 "	"-5453		"	10	
" " " 190 - 500 "	"-5457		"	10	
" " " 200 - 500 "	"-5460		"	10	
" " " 210 - 500 "	"-5463		"	5	
" " " 220 - 500 "	"-5466		"	5	
" " " 250 - 500 "			"		
AUXILIARY LEED SLEEVE 30 - 110 MM		3141	"	2200	
" " " 50 - 110 "		3142	"	900	
" " " 70 - 110 "		3143	"		

DESCRIPTION	T.O.T. CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
AUXILIARY LEAD SLEEVE 50 - 150 MM		3145			
" " " 70 - 150 "		3146			
" " " 35 - 130 "	ECS-5406		PCE		
" " " 40 - 130 "	"-5407		"		
" " " 45 - 130 "	"-5410		"	5	
" " " 50 - 130 "	"-5411		"	100	
" " " 55 - 130 "	"-5413		"	10	
" " " 60 - 130 "	"-5414		"	50	
" " " 65 - 130 "	"-5417		"	30	
" " " 70 - 130 "	"-5418		"	10	
" " " 75 - 130 "	"-5423		"	20	
" " " 80 - 130 "	"-5424		"		
" " " 85 - 130 "	"-5429		"	20	
" " " 90 - 130 "	"-5430		"	20	
" " " 95 - 130 "		3135	"		
" " " 100 - 130 "		3136	"	30	
LEAD PLATE					
LEAD PLATE ø 90		3167	PCE	30	
" " ø110		3151	"	10	
" " ø120		3152	"		
" " ø130		3153	"	10	
" " ø140		3154			
" " ø150		3155			
" " ø160		3156			
" " ø170		3157			
" " ø180		3158			
" " ø190		3159			
" " ø200		3160			
" " 4 x 20 CM x 33 CM	ECS-3000			50	
PERFORATED LEAD PLATE 40 - 250 MM	"-3001	3147	PCE	200	
SPACER					
PLASTIC CABLE SPACER 1/4"	ECS-5800		PCE	2500	
" " " 1/2"	"-5801		"		
" " " 3/4"	"-5802		"	2500	
" " " 1"	"-5803		"	500	
SPACER FOR ADAPTER SPCR A 170		3260			
" " " " A 150		3261			
" " " " A 120		3262			
" " " " A 100		3263			
" " " " A 140		3264			
" " " " A 85		3265			
" " " " A 57		3266			
" " " " A 36		3267			

MM EX.

LIST OF MATERIALS

DESCRIPTION	T.O.T. CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
SPACER					
SPACER FOR AUXILIARY PE SLEEVE-SPCR AV x 85					
" " " " " " " 57					
" " " " " " " 36					
PE-CAP, BASE METAL					
PRESSURE VALVE (TEST VALVE)					
PE CAP ø20 WITH PRESSURE VALVE		4915			
" " ø22 " " "		"			
" " ø24 " " "		"			
" " ø26 " " "		"			
" " ø28 " " "		"			
" " ø30 " " "		"			
" " ø32 " " "		"			
" " ø34 " " "		"			
" " ø36 " " "		"			
" " ø38 " " "		"			
" " ø40 " " "		"			
" " ø42 " " "		"			
" " ø44 " " "		"			
" " ø46 " " "		"			
" " ø48 " " "		"			
" " ø50 " " "		"			
" " ø52 " " "		"			
" " ø54 " " "		"			
" " ø56 " " "		"			
" " ø58 " " "		"			
" " ø60 " " "		"			
" " ø62 " " "		"			
" " ø64 " " "		"			
" " ø66 " " "		"			
" " ø68 " " "		"			
" " ø70 " " "		"			
" " ø72 " " "		"			
" " ø74 " " "		"			
" " ø76 " " "		"			
" " ø78 " " "		"			
" " ø80 " " "		"			
" " ø82 " " "		"			
P.V.C CAP ø12MM		4915	PCE		
" " ø14 "		"	"		
" " ø16 "		"	"		
" " ø18 "		"	"	10	
" " ø20 "		"	"		

DESCRIPTION	T.O.T. CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
P.V.C CAP, ø22MM		4915	PCE	5	
" " ø24 "		"	"		
" " ø26 "		"	"		
" " ø28 "		"	"	5	
" " ø30 "		"	"		
" " ø32 "		"	"		
" " ø34 "		"	"		
" " ø36 "		"	"		
" " ø38 "		"	"		
" " ø40 "		"	"	5	
" " ø42 "		"	"		
" " ø44 "		"	"		
BASE METAL FOR COMPOUND INJECTOR		4917	PCE		
" " " NO.6 VALVE		4918	"	30	
WIRE, CORD					
GULVANIZED STEEL STRAND GUY WIRE 5/16"-(6M)	DCP-2002		KG	6000	
GUY STRAND 3/8" (10M)	DCP-2003		KG	200	
COPPERWELD TELEPHONE LINE WIRE AWG #6			M	50	
0.9MM ANNEALED CAPPER WIRE		2940	M	10	
1.6MM IRON WIRE			KG	15	
JUMPERING WIRE			M	10000	
ø5MM CABLE BINDING CORD			M	400	
CABLE LASHING WIRE (0.045")			ROLL	200	

MM EX.

LIST OF MATERIALS

DESCRIPTION	T.O.T. CODE NO.	AE CODE NO.	UNIT	QUANTITY	REMARK
HARDWARES IN M.H					
CABLE RACK EXTENSION			PCE	350	
RACK SECTION (8 HOLES)			PCE	100	
" " (14 ")			"	150	
(18 ")			"		
RACK HOOK (4" LGTH)			"	100	
" " (7½" ")			"	300	
" " (10" ")			"	50	
" " FOR CABLE VAULT			"	30	
CABLE RACK INSULATOR			"	400	
ZINC CABLE DUCT SHIELD			"	400	
GALVANIZED IRON PIPE ø2" FOR RISER CABLE PROTECTION			PCE	80	
GALVANIZED IRON PIPE ø3" FOR BURRIED CABLE PROTECTION			"	15	

DESCRIPTION	T.O.T. CODE NO.	AE CODE NO.	UNIT	QUANTITY	REMARK
POLE					
CONCRETE POLE (8 M)			PCE	54	
" (10 M)			"	22	
GUY					
DRIVING ANCHOR #2			PCE	220	
" " #3			"		
AUXILIARY EYES					
CROSS CONNECTING CABINET 800P			"	37	
TERMINAL BLOCK FOR CABINET					
50P - LEAD SHEATH STUB			PCE	25	
100P - " " "			"	68	
50P - POLYETHYLENE SHEATH STUB			"	31	
100P - " " "			"	176	
RELIABLE TYPE ST CABLE TERMINAL					
10 P			PCE	557	
15 P			"	372	
25 P			"	18	
WALL MOUNT TERMINAL BOX (JAPAN)					
FOR TROUGH CABLE 10 P			PCE		
" " " 15 P "			"		
" " " 20 P			"		
6P-TERMINAL BLOCK (FOR READY ACCES)			"	200	
STRAIGHT NOZZLE (FOR READY ACCES)			"	20	
BRANCH NOZZLE (")			"		
TERMINAL FOR M.D.F					
25B-TERMINAL BLOCK			"	60	

MM EX.

LIST OF MATERIALS

DESCRIPTION	T.O.T CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
PUREGAS EQUIPMENT & MATERIALS					
MODEL 1500 AIR DRYER					
METER PANEL			PCE	1	
DUAL PRESSURE PANEL			"		
PEC 522 ALARM PANEL				1	
" 522A MASTER ALARM MODULE					
" 522B ALARM MODULE					
" 522C LOCAL AIR DRYER ALARM MODULE					
" 522D MODULE BLANKS					
" 522E ALARM PANEL FRAME					
" 412 MAILE ELBOW			PCE		
" 523 PRESSURE GUARD (CABLE MOUNTED)			"		
" 524 " " (POLE, WALL MOUNTED)			"	19	
" 525 " " (UNDERGROUND)			"	3	
" 401C FLANGE			"		
PEC 402D FLANGE			"	17	
" 404B PRESSURE TESTING ELL			"	20	
" 405 SEALING CLAMPS					
PEC 408 LEAD TUBING (O.D 1/2", 50FT COILS)			M	20	
" 409 COPPER TUBING (O.D 3/8")			"	30	
PEC 501F PRESSURE TESTING VALVE (INSTALLED IN CORD FLANGE)			PCE	10	
" 502P " " " (END OF LEAD PIPE)			"	50	
" 503C " " " (DIRECT INSTALLATION)			"	30	
" 504M VALVE CAP (INSTALLED BY WRENCH)			"		
" 505R " " (" " HAND)			"	100	
PEC 508 DUAL STEM BY-PASS VALVE				1	
PEC 419 MALE ELBOW			PCE	2	
" 421 UNION (EXTEND LENGTH OF PLASTIC TUBING)					
" 424 TEE (BRANCH AIR FLOW - " ")					
" 426 PLASTIC SHEATH FITTING			"	2	
" 429 PLASTIC TUBE RACK					
PEC 431 POLY-CORTUBING 3 TUBES			M		
" 5 "			"	40	
" 10 "			"		

DESCRIPTION	T.O.T CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK

MM EX.

CABLE DRUM LENGTH SHEET

DRUM NO.	KIND OF CABLE			CABLE LENGTH (M)	LOCATION
1	3000 - 4 ASP			209.0	CABLE VAULT ~ MH #36
2	3000 - 4 〃			125.0	MH #36 ~MH# 37
3	3000 - 4 〃			167.0	〃 #37 ~ 〃 #38
4	3000 - 4 〃			166.0	〃 #38 ~ 〃 #39
5	3000 - 4 〃			237.0	CABLE VAULT ~ MH#4
6	3000 - 4 〃			171.0	MH# 4 ~MH# 5
7	3000 - 4 〃			199.0	〃 # 5 ~ 〃 # 6
8	3000 - 4 〃			169.0	〃 # 6 ~ 〃 # 7
9	3000 - 4 〃			179.0	〃 # 7 ~ 〃 # 8
10	3000 - 4 〃			204.0	〃 # 8 ~ 〃 #10
11	3000 - 4 〃			190.0	〃 #10 ~ 〃 #11
12	3000 - 4 〃			229.0	〃 #11 ~ 〃 #12
13	3000 - 4 〃			192.0	〃 #12 ~ 〃 #13
14	2400 - 4 〃			195.0	〃 #39 ~ 〃 #15
15	2400 - 4 〃			186.0	〃 #13 ~ 〃 #14
16	2400 - 4 〃			232.0	〃 #15 ~ 〃 #16
17	2400 - 4 〃			284.0	〃 #16 ~ 〃 #70
18	2400 - 4 〃			264.0	〃 #70 ~ 〃 #19
19	1800 - 4 〃			217.0	〃 #58 ~ 〃 #69
20	1800 - 4 〃			212.0	〃 #69 ~ 〃 #59
21	1800 - 4 〃			249.0	〃 #84 ~ 〃 #41
22	1800 - 4 〃			182.0	〃 #41 ~ MH#42,CABLE VAULT
23	1200 - 4 〃			218.0	〃 #84 ~ 〃 #85
24	1200 - 4 〃			222.0	〃 #85 ~ 〃 #86
25	1200 - 4 〃			233.0	〃 #86 ~ 〃 #87, INSERT
26	900 - 4 〃			333.0	〃 # 2 ~ 〃 # 5
27	900 - 4 〃			199.0	〃 # 5 ~ 〃 # 6
28	900 - 4 〃			348.0	〃 # 6 ~ 〃 # 8
29	900 - 4 〃			204.0	〃 # 8 ~ 〃 #10
30	600 - 4 〃			203.0	〃 #52 ~ 〃 #65
31	600 - 4 〃			224.0	〃 #52 ~ 〃 #54
32	600 - 4 〃			212.0	〃 #87 ~ 〃 #88
33	600 - 4 〃			222.0	〃 #88 ~ 〃 #89
34	600 - 4 〃			181.0	〃 #42 ~ 〃 #75

DRUM NO.	KIND OF CABLE			CABLE LENGTH (M)	LOCATION
35	600 - 4 ASP			191.0	MH#75 ~ MH#76
36	600 - 4 〃			186.0	〃 #76 ~ 〃 #77
37	600 - 4 〃			222.0	〃 #77 ~ 〃 #78
38	600 - 4 〃			329.0	〃 #54 ~ 〃 #56
39	600 - 4 〃			279.0	〃 #19 ~ 〃 #21
40	600 - 4 〃			209.0	〃 #21 ~ MH22, MH#23 ~ MH#71 RISER, INSERT CABLE
41	300 - 4 〃			435.0	MH#47 ~ PB #39, OTHERS
42	300 - 4 〃			432.0	BETWEEN MANHOLE & PULLINGBOX
43	300 - 4 〃			469.0	〃 〃
44	1800 - 5 〃			237.0	MH#19 ~ MH#23
45	1200 - 5 〃			205.0	〃 #59 ~ 〃 #60
46	1200 - 5 〃			217.0	〃 #60 ~ 〃 #61
47	900 - 5 〃			225.0	〃 #61 ~ 〃 #62
48	900 - 5 〃			163.0	〃 #62 ~ 〃 #63
49	900 - 5 〃			337.0	〃 #23 ~ 〃 #80
50	900 - 5 〃			335.0	〃 #80 ~ 〃 #82
51	600 - 5 〃			205.0	MH#63 ~ 〃 #64
52	600 - 5 〃			241.0	〃 #82 ~ PB #37
53	300 - 5 〃			424.0	〃 #83 ~ MH#74
54	900 - 4 〃			200.0	〃 #10 ~ CAB#036
55	900 - 4 〃			325.0	CAB#036 ~ PB #59
56	600 - 4 〃			372.0	PB #59 ~ 〃 #60
57	600 - 4 〃			200.0	MH#42~CAB#086(SOIAMORN)
58					
59					
60					
61					
62					
63					
64					
65					
66					
67					
68					

"MM" ANNEX Demand Forecast for the Special Area in MM Exchange

Bldg. Name	Demand Forecast			Remarks
	1976	1980	1985	
Civil Aviation	-	-	-	
Laos Embassy	16	24	36	
Korean Embassy	8	12	18	
Song Thai Co. Laboratory	4	6	9	
Mobil Oil Gas Storage	4	6	9	
New Zealand Embassy	12	18	27	
Bara Winser Co.	18	21	32	
Pharmacy Factory	2	3	5	
Car Repair (Mercedes Benz)	5	8	12	
Bangkok Nursing Home	8	12	18	
Rose Court	10	15	22	
Bangrak Hospital	10	15	22	
Phiriya-nukraw Orphanage	1	2	3	
Kosaya Court	12	18	27	
Y.W.C.A.	10	15	22	
Y.M.C.A.	12	18	27	
Chinese Embassy	15	20	28	
Malaysian Embassy	14	21	32	
Danish Embassy	8	12	18	
Thai Phokkasab Co.	6	9	14	

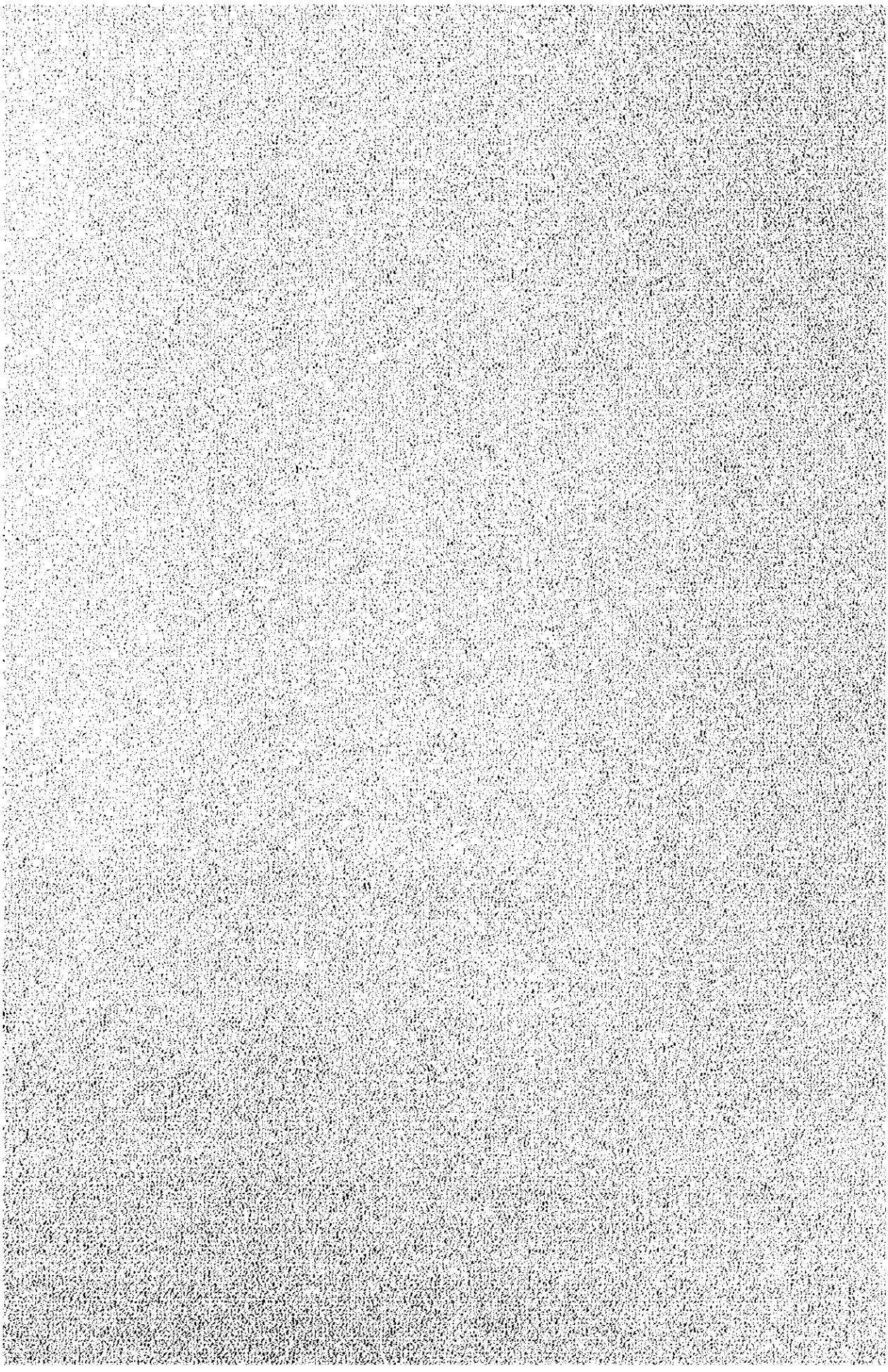
(Cont'd)

Bldg. Name	Demand Forecast			Remarks
	1976	1980	1985	
Thai Glue Factory	4	6	9	
Praneet Industries Factory	6	9	14	
Chanphen Restaurant	6	9	14	
Bunyium and Friends Co., Ltd.	6	9	14	
Thai Fire Brigade Industries Factory	6	9	14	
Sahamit Soap Factory	4	6	9	
Thai Visahakit Co.	6	9	14	
Pattanakit Industry	6	9	14	
Chinese Siam Partnership	6	9	14	
Thai Flower Co.	6	9	14	
Pattanakit Textile Co.	6	9	14	
English Language (Enter Royal Thai Navy)	2	2	5	
Water Filter Plant	2	3	5	
Sukkamol Co.	4	6	9	
Thong Thai Co.	4	6	9	
Aluminium Factory	4	6	9	
Praharutai Convent School	2	3	3	
Food Storage No.1	1	2	5	
Food Storage No.2	1	2	5	
Diotheim and Singer Storage	10	15	22	

(Cont'd)

Bldg. Name	Demand Forecast			Remarks
	1976	1980	1985	
Union Gasvel Service Storage	6	9	14	
Shell Storage	25	37	56	
Sahaviriya Trading Co.	5	7	10	
Intransit Warehouse	2	3	5	
Customs Department	50	75	112	
Thai Prasit School	3	3	5	
Port Authority of Thailand	120	180	270	
Port Hospital	3	3	5	
U.S. Army Warehouse	20	30	45	
Colgate Palmolive	15	22	33	
Jusmac	15	22	33	
Ampac	3	3	5	
Yellow Bus Garage	3	3	5	
Twit Building	20	30	45	
Vacant Area (Govt. Housing)	-	-	300	
Lion Co.	8	12	18	
Charoen Phokkaphan	16	24	36	
Caltex Gas Station	4	5	6	
Rice Mill	4	6	9	
Metropolian Electricity Authority	100	150	225	
Bangkok Technical College	18	27	40	

(Cont'd)



CHAPTER 5. TROKCHAN TELEPHONE EXCHANGE (TC)

5.1 Service Area

This exchange office will be located in the present MM exchange office service area and will start as a new branch office. The boundaries of the Trokchan Exchange service area, as shown in Fig. 4.5.1, are as follows:

(1) Cut-Over from MM Exchange

(a) Areas on west side of Shaint Luis Soi 3, Sathupradit Road and Soi Rangpaya Ban.

(b) Area on south side of Sathorn Road.

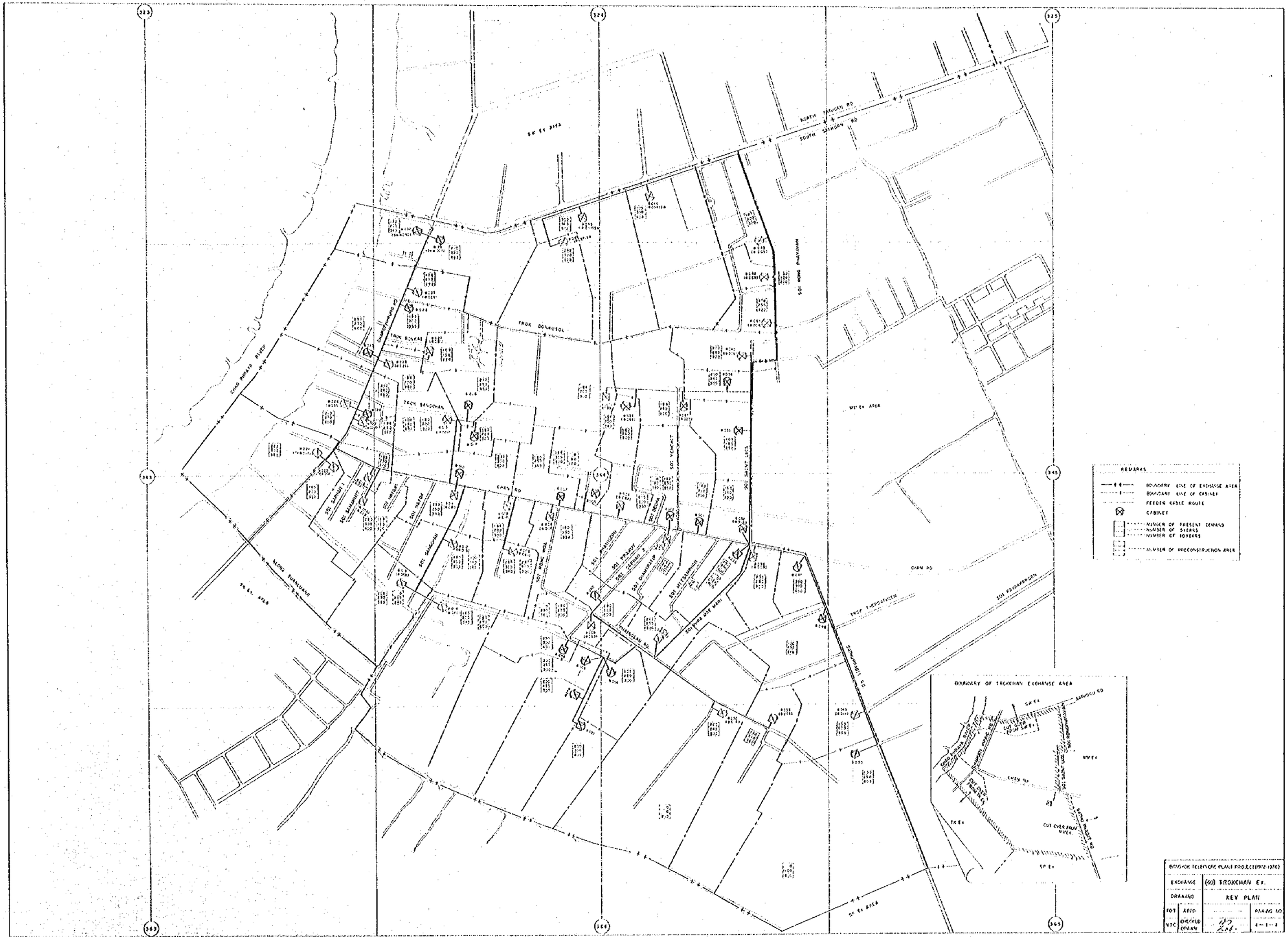
(2) Cut-Over from SW Exchange

Cross-connecting cabinets Nos. 7, 11, 30, 54 and 87.

(3) Cut-Over from TK Exchange

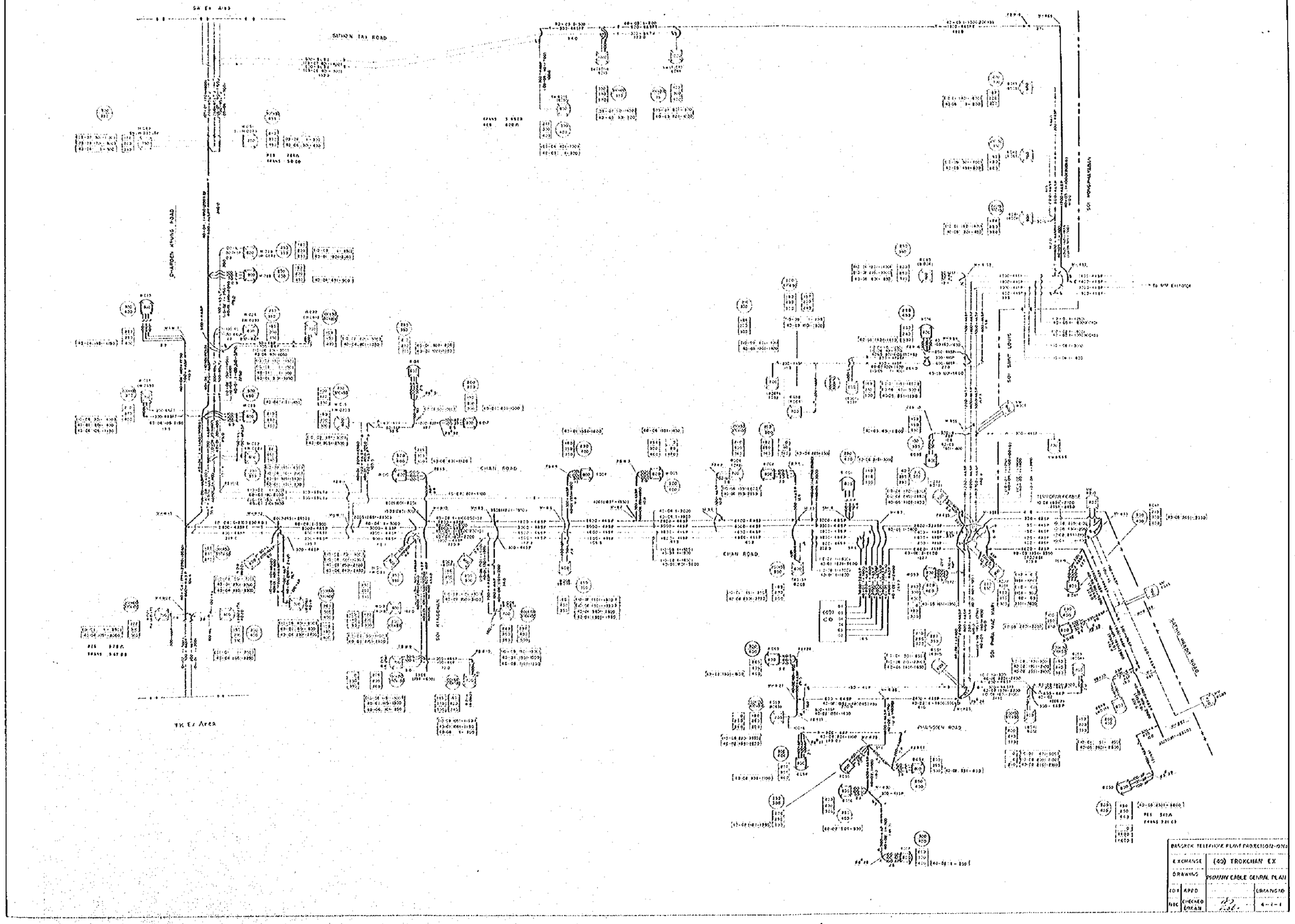
Cross-connecting cabinets Nos. 2 and 17.

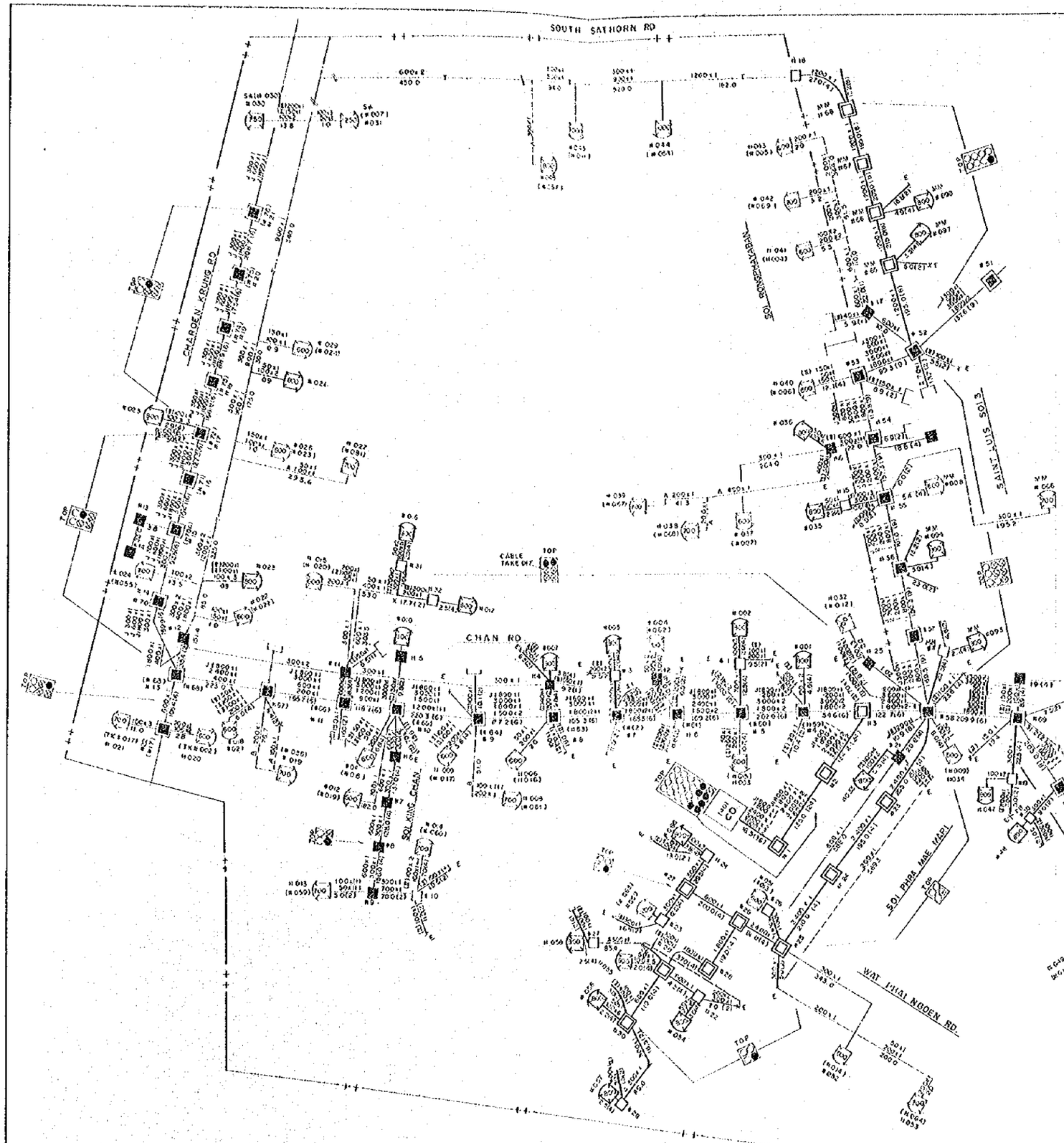
With the above cut-over, the service area will cover approx. 650 ha.



BANGKOK TELEPHONE PLANT PROJECT(1972-1976)

EXCHANGE	(40) TROKCHAN Ex.
DRAWING	KEY PLAN


SATHON TAI ROAD
CHAN ROAD
TK Ex Area



REMARKS

- EXISTING MANHOLE
- PROPOSED MANHOLE
- EXISTING PULL BOX
- PROPOSED PULL BOX
- 1200x1 / 1995 (6): CABLE PAIR / NUMBER OF CABLE / NUMBER OF DUCTS / DISTANCE BETWEEN MH.
- RISER TO MEA POLE
- D ..... DIRECT BURIED CABLE
- T ..... TROUGH CABLE
- A ..... AERIAL CABLE
- EXISTING CABINET & CAPACITY
- PROPOSED CABINET & CAPACITY
- TOP: VACANT DUCT / PROPOSED DUCT / OCCUPIED DUCT

BANGKOK TELEPHONE PLANT PROJECT (1972-1976)			
EXCHANGE		(40) TROKCHAN EX.	
DRAWING		DUCT SCHEME PLAN	
T.O.T	APPD		DRAWING NO
NTC	CHECKED		9-1-1
	DRAWN		

5.2 Demand Forecast and Outline of Area

The Exchange area is in the oldest part of the city and comprises the area along the Charoen Krung Road and the fields in the undeveloped southern part. The shops alongside the Charoen Krung Road are very old with a history of about 80 years and this road is the most traffic congested in the city of Bangkok. On the other hand, there are fields and undeveloped areas in the southern part and it is believed that any development in these areas hereafter will bring about a big change in the TC service area. The special features of the Trokchan service area are as follows:

(1) The districts along the Charoen Krung Road and Trokchan Road are densely populated and very active in commercial operations with a heavy demand for telephone service. The rebuilding into high-rise buildings in the future can be envisaged.

(2) A special feature of land development in Bangkok is that when a road is constructed, houses and shops are immediately constructed on both sides of the road. Consequently, it can be assumed that houses shortly will be built in the area surrounding the recently completed Sathupradit Road, generating a large demand for telephone service.

Now Sathupradit Road

(3) It has the largest number of undeveloped empty lots as compared with other exchange areas and should have a big population growth in the future.

In view of the foregoing, it is envisaged that the Trokchan exchange will have a high demand growth ratio.

Table 4.5.1 Demand Forecast

Area \ Year	1976	1978	1980	1982	1985	1987
Commercial area	4,396	5,275	6,330	7,343	8,812	9,693
Residential area	7,254	8,705	10,446	12,117	14,540	15,994
Special area	850	1,020	1,224	1,540	2,648	3,313
Total	12,500	15,000	18,000	21,000	26,000	29,000
Demand growth ratio	100	120	144	168	208	232

DEMAND FORECAST OF TC EX. SERVICE AREA

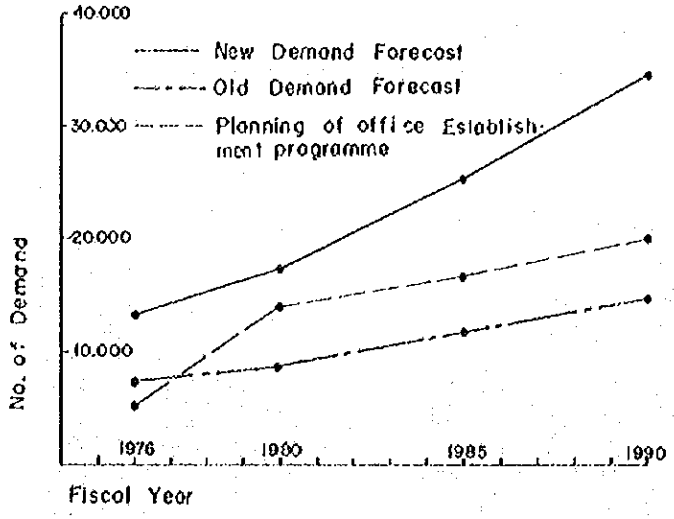


Fig. 4.5.4

5.3 Primary Cable Network Design

5.3.1 Objective Demand for Design

18,000 (in 1980) of Primary cable
26,000 (in 1985) of Secondary cable

5.3.2 Entrance Cable Pairs

The number of entrance cable pairs will be 17,400 pairs, as follows:

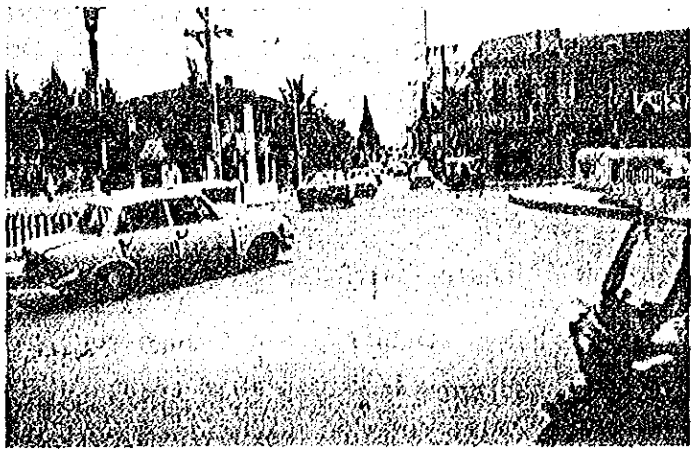
New installation	3,600 pairs	-	32 ASP	2	cable(s)
"	3,000 "	-	4 ASP	2	"
"	2,400 "	-	4 ASP	1	"
"	1,800 "	-	4 ASP	1	"
Total				6	" 17,400 pairs

Of the foregoing, the number of cable pairs for distribution in this design is 15,500 pairs.

5.3.3 Installation of New Cables for Each Direction

(1) Direction of Sathorn Road

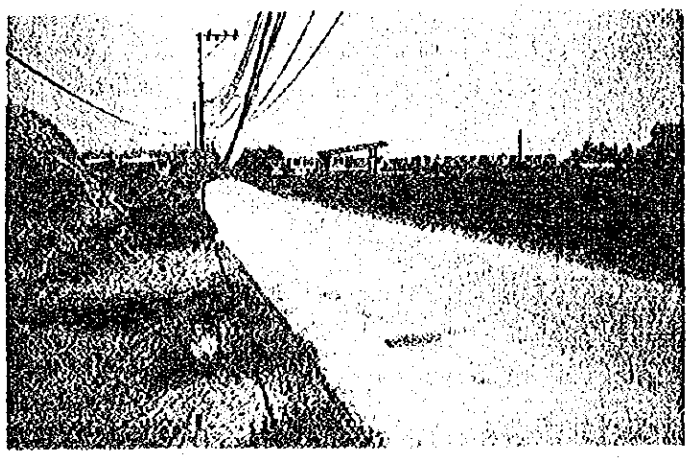
Of the SW area, in order that a part of area along the Sathorn Road can be cut-over to the Trokchan Exchange in this construction design, the laying of 1,200 pairs via the Soi Rongphayaban was designed.



View of Sathorn Road from Saint Louis Road.

(2) Direction of Sathupradit Road

It is envisaged that this area will be developed rapidly with the recent construction of roads and with the connection with the loop road, construction of harbor, etc. but there presently are many fields and empty lots in this area. In order to cope with the rapid growth in demand, the design will be for the laying of 1,800 cable pairs.



New residences in vicinity of Sathupradit Road.

(3) Direction of Soi Phramae Mari and Phaigoen Road

There is a rapid change of the fields into residential districts in this direction and a large demand is anticipated in the future but since the demand for the undeveloped area will be coped with at the time of generating of demand, this design is for the laying of 2,400 cable pairs.

(4) Direction of Charoenkrung Road

This route has a conduit and a trough route, and the cross-connecting cabinets #030 and #031 to be cut-over from the existing cross-connecting cabinets of SW Exchange are all distributed by trough cables.

Consequently, in this design work, the cross-connecting cabinet #025 to be newly installed will be distributed from MI #17 while the other cross-connecting cabinets will be distributed by utilizing the existing troughs.

5.3.4 Selection of Trough, Direct Buried and Aerial Cable Routes

(1) Direction of Sathorn Road

Since there are existing troughs in which secondary cables are presently being laid for distribution, the design is for utilizing these troughs for the laying of primary cables to the cross-connecting cabinets along the Sathorn Road.

(2) Direction of Charoenkrung Road

Since the primary cables of the existing cross-connecting cabinets along the Charoenkrung Road are laid in the troughs, the cables to be additionally laid cannot be placed in the conduits without digging up the road to connect each cross-connecting cabinet with the manholes. However, digging up the road is difficult so the design was made to lay such cables in the troughs.

(3) Aerial Cable Route

There are 8 places where the primary cables are designed for the aerial cabling system and since each of the cables are of 300 pairs or less, there is no problem.

5.3.5 Line Loss and D.C. Resistance

The exchange lines have all been designed to be within the allowable values as follows:

Maximum line loss	5.5 dB
Maximum D.C. resistance	900 Ω

5.3.6 Removal of Cables

Table 4.5.2

Section	No. of Pairs	Span Length	Reasons for Removal
MH #58 - MH #69	150 - 4 ASP	209.9 m.	Unification of small number of pairs due to no vacant ducts.
"	100 - 4 ASP	209.9	
"	50 - 4 ASP	209.9	
MH #3 - MH #58	1,800 - 4 ASP	122.7	Due to difficulty of cut-over in MH #58.
MH #58 - MH #5	200 - 4 ASP	379.3	For raising number of pairs due to lack of vacant duct.
Sathorn Road Trough Cable	600 - 5 LTJ	994.0	Trough cables, reverse distribution due to cut-over.
	300 - 5 LTJ	520.0	
Total		2,645.7	

5.4 *Underground Conduit Design*

5.4.1 New Main Conduit Route on Soi Rang Mukao Road

(1) Hardwares in the exchange building and conduit 36-4" from the exchange building to MH #1 will be designed by TOT. (Design drawings already received from TOT).

(2) Connection with the existing conduit route will be made by the new construction of a manhole in the existing conduit section on Chan Road. This new manhole will be of the "V-1" type and standard drawing No. 1052 will be applied.

(3) There will be 24 ducts and the manhole will be the "A-3" type. However, the exchange manhole will be the "V-2C" type.

(4) Position of conduit on the road will be on the exchange office side. The exchange MH #1 will be outside the exchange office compound according to the wishes of the TOT.

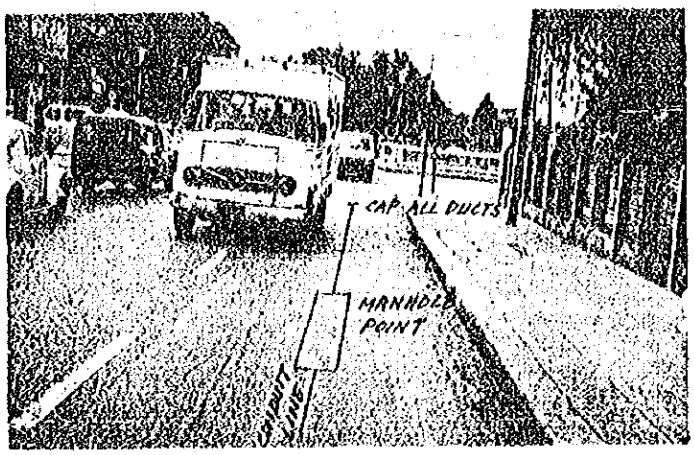
5.4.2 Main Conduit Route on Soi Rong Phaya Ban Road

(1) The underground facilities will be extended from the existing MH #52. Furthermore, a window will be attached to the existing manhole.

(2) Since this is a junction cable route to the SW Exchange, the conduit will be extended to near the Sathorn Road and fixed with cap pipes so that the conduit can be connected when the point of crossing the Sathorn waterway is clarified in the future.

(3) There will be 8 ducts and the manhole will be the "A-1" type.

(4) Position of the conduit will be on the carriage way of the road and on the opposite side of the position of the buried water supply pipe.

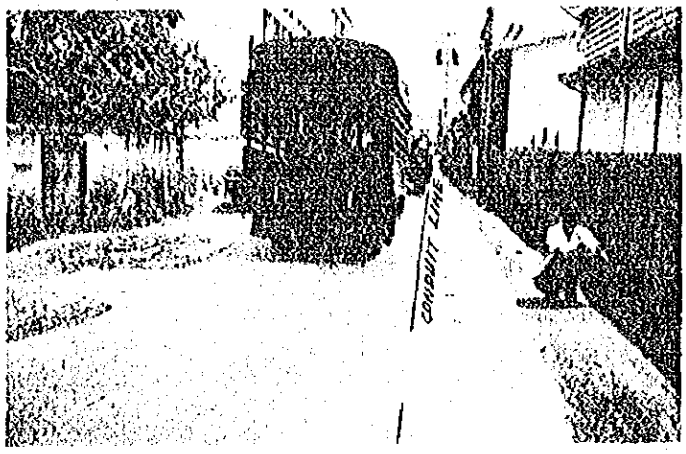


Position of conduit on Soi Rong Phaya Ban Road.

5.4.3 New Main Conduit Route on Soi Phra Mea Mari Road

(1) There will be 4 ducts and the manhole will be the "A-1" type.

(2) Since the road shape on one side between MH #24 and MH #25 is not clear and the road may be widened, the position of the conduit was made on the side where the road shape is clear.

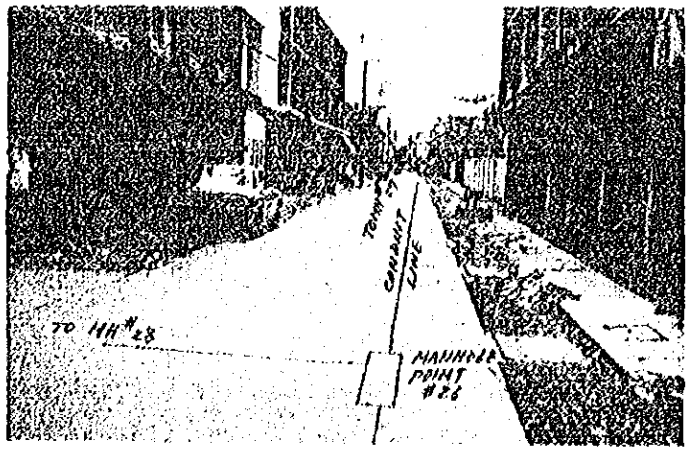


Position of conduit on Soi Phra Mea Mari Road.

5.4.4 New Main Conduit Route on Wat Phaigoon Road and Soi Phonthong Road

(1) In respect to the future route in the east direction from MH #25, 4.6 meters of cap pipes (4 pipes of 4") will be placed. The MH #25 will be the "T" type and standard drawing No. 1077 will be applied.

(2) There will be 4 ducts.



Position of conduit on Wat Phaigoon Road.

5.5 Gas Pressurization System Design

5.5.1 Design of Inside Facilities

(1) Since this is a new exchange, the following gas pressurization facilities will be newly installed.

Air dryer (Type 1,500)
Meter panel
Alarm panel

(2) The installation of the air dryer and the meter panel will be in the Air-Conditioning Room on the 1st floor.

(3) The alarm panel will be installed in the Test Room to facilitate gas pressure supervision.

5.5.2 Design of Outside Facilities

(1) Installation of Pressure Guards

Pressure guards will be installed in the cross-connecting cabinet at the end of each cable in principle to facilitate gas pressure maintenance but since the end of the 05 cable is by aerial distribution, the pressure guard will be installed inside MH #62.

(2) Test Valves

Test valves will be attached to the jointing point or stub cables inside each cross-connecting cabinet in principle but such valves to be attached to the cables inside the manholes or pulling boxes are as follows:

MH #8 & MH #13	--	04 cable
PB #11	--	01 cable
PB #18	--	03 cable

(3) Attachment of by-pass valve

Since the 01 cable of 3,600 pairs will be branched into two cables of 1,800 pairs each in the MH #3, a by-pass valve will be attached for the cut and divide test.

5.6 Secondary Cable Network Design

5.6.1 Service Area where Direct Distribution will be changed to System of Cabinet Distribution

Areas of cross-connecting cabinets #016 and #017.

5.6.2 Cross-Connecting Cabinets with Reservation of Secondary Cables

This exchange office is in an area where rapid demand growth is anticipated in the future but presently there are only fields or vacant lots. In this design work, the installation of new cross-connecting cabinets or the division of existing blocks will not be made and until the new cabinets are installed, the primary cables will be held in reserve in the manholes or the secondary cables held in reserve in the cross-connecting cabinets.

(1) Cross-connecting Cabinet #044

The Saint Louis Hospital is now under construction and 200 pairs for the hospital will be held in reserve in this cabinet.

(2) Cross-connecting Cabinet #001

Since construction of the houses in the residential district has just been started, the 1 - 100 pairs, out of the 02 : 1-200 cable, for distribution to this district will be held in reserve at the #0001 terminal pole.

5.7 Design of Relevant Works

The design for the service areas to be cut-over from the SW and TK Exchanges have already been completed by the TOT. Consequently, the design work for such areas have been executed on the presumption that the construction works have already been completed, based on the TOT design.

5.8 Service Area Cut-Over Design

Refer to Table 4.5.3.

5.8.1 Cut-Over Method

With reference to Table 4.5.3, since this exchange will service-in from the MM Exchange, the method of cut-over will be as follows:

(1) At MH #3, loop jumpering via the new exchange by using the existing cable 02 and the new cables 01 and 03.

(2) Existing cable 08 will be bridge jointed with the new cable 08 at the MH #3.

Through the above (1) and (2) procedures, the circuit connection of 3,600 pairs will be made between the old and new exchanges.

By doing so, it will be possible to connect the subscribers on the west side of the MM Exchange to that exchange by loop jumpering at the TC Exchange.

(3) New cable 05 and existing cable 01 will be bridge jointed in MH #58 and circuit connection will be made between the new and old exchanges.

(4) Existing cable in the direction of Phaingoen Road will be cut over to the new cable 02 and the service area cut-over by loop jumpering at the new exchange.

(5) Existing cable in the direction of Sathupradit Road will be cut over by loop jumpering at the new exchange.

(6) Existing cable on the Soi Saint Louis and Soi Rongphayaban will be cut-over to the new exchange by loop jumpering at the old exchange.

(7) In the direction of Sathorn Road, the existing cable 02 and the new cable 03 will be bridge jointed at the MH #52 and cut-over to the new exchange.

(8) After service-in of the new exchange, each bridge jointing point will be made to standard jointing.

5.8.2 Attention to be Paid in Cut-Over Work

(1) With the service-in of the TC Exchange, the secondary cables distributed to the MM Exchange from the cross-connecting cabinet of the TC Exchange will be cut at the Soi Rongpayaban and Soi Saint Louis which will become the exchange boundaries between the TC Exchange and MM Exchange. Therefore, as shown in the cut-over drawings, cross-connecting cabinets #093, #094, #096, #097 and #098 must be worked on simultaneously in accordance with the MM Exchange design drawing for cut-over of the MM Exchange secondary cables.

(2) Cut-over of the direct buried cable alongside cross-connecting cabinet #051 will be made by putting the cable into the pulling box alongside the cabinet.

5.8.3 Exchange Line Loss Allocation Value and D.C. Resistance Limited Value during Cut-Over Work Period

As shown in the diagram below, the line loss is 10 dB or less and the D.C. resistance is 1,500 Ω or less in line with this cut-over.

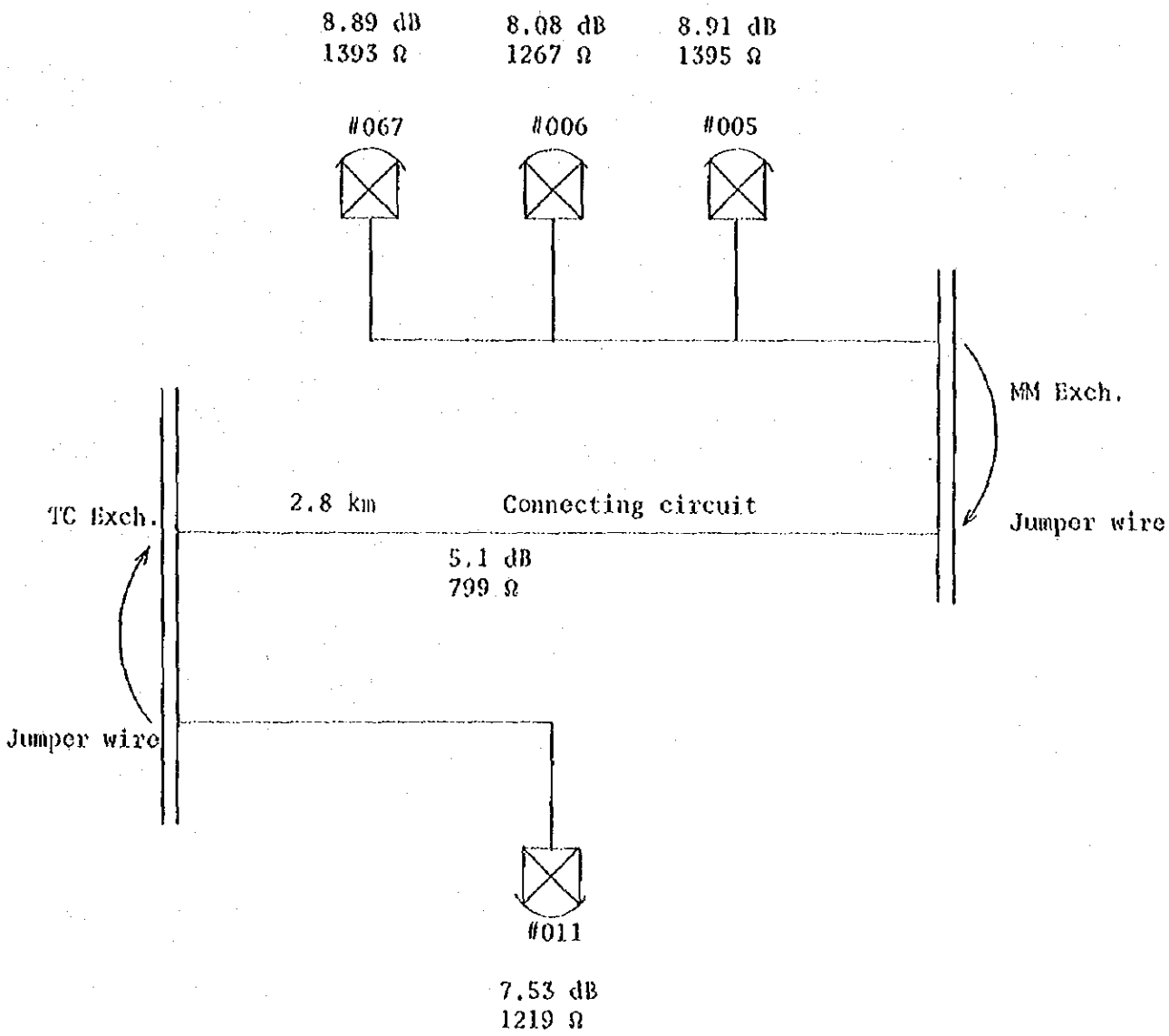

8.89 dB
1393 Ω
8.08 dB
1267 Ω
8.91 dB
1395 Ω
#067
#006
#005
MM Exch.
TC Exch.
2.8 km
Connecting circuit
Jumper wire
5.1 dB
799 Ω
Jumper wire
#011
7.53 dB
1219 Ω

Fig. 4.5.5

Table 4.5.3 Cut Sheet

Cut-over Point	Cut-over Method	Name of Cable & Pair No.		No. of Circuits Now Used	Connecting Cable (pairs)
		Existing	New		
MH #3	C	02 : 1-1800	01 : 1801-3600	1,125	
"	C	02 : 1-1800	03 : 1-1800	0	675
"	B	08 : 1-1800	01 : 1-1800	686	1789
CAB #015	C	01 : 651-850	06 : 2501-2750	121	1688
MH #58	B	01 :1801-2350	05 : 1401-1950	416	1822
"	B	08 : 1701-1800	05 : 1101-1200	100	1722
"	B	08 : 2451-2650	05 : 1201-1400	135	1787
MH #58 (CAB #009)	C	01 : 851-1050	05 : 3351-3550	179	1608
"	C	02 : 451-500	05 : 3551-3600	50	1558
MH #55	B	01 : 1051-1150	05 : 1051-1150	17	1641
(SW) CAB #087	B	(SW) 06 : 401-700	03 : 1-300	150	1491
(SW) CAB #011	B	(SW) 07: 1101-1400	03 : 301-700	150	1341
(SW) CAB #054	B	(SW) 07 : 801-900	03 : 701-800	20	1321
(SW) CAB #030	B	(SW) 07 : 901-1000	04 : 1-100	50	1271
"	B	(SW) 07 : 1701-1800	04 : 101-200	50	1221
(SW) CAB #031	B	(SW) 06 : 1-300	04 : 301-650	150	1071
(TK) MH #22	B	(TK) 01 : 1-200	04 : 2051-2250	100	971
(TK) MH #22	B	(TK) 02 : 1-250	04 : 1751-2000	100	871
CAB #011	C	01 : 51-250	05 : 2601-2800	93	778
MH #58	C	01 : 1-1050	05 : 1-1100	0	1828
MH #25	C	01 : 401-500	02 : 2201-2300	87	1741
NEW CAB #047	C	SECONDARY	05 : 3051-3350	30	1711
NEW CAB #012	C	"	03 : 1651-1800	30	1681

(Cont'd)

Cut-over Point	Cut-over Method	Name of Cable & Pair No.		No. of Circuits Now Used	Connecting Cable (pairs)
		Existing	New		
CAB #067, 068, 007	L	09: 1-500	Loop JUMPER MM	111	1570
CAB #007	L	01 : 1151-1250	" "	55	1515
CAB #006	L	01 : 1201-1400	" "	171	1344
"	L	08 : 2951-3000	" "	51	1293
CAB #005, 004	L	01 : 1401-1800	" "	300	993
CAB #69	L	09 : 501-700	" "	141	852
				4,668	

B : BRIDGE JOINT

C : CUT-OVER

L : LOOP JUMPERING

5.9 Construction Period

Although there is no particular restriction in respect to the time for starting construction of this exchange building, the completion of the construction work as early as possible is desired in order to speed up the extension of the nearby exchanges.

5.10 Amount of Works and List of Materials

Refer to the annexed Table 4.5.4 Amount of Works and Tables 4.5.5 to 4.5.14 List of Materials.

TABLE 4.5.4 TC EX. AMOUNT OF WORKS

ITEM	BREAKDOWN	Q'ty	REMARK
1 POLE	8 MC	25 ea	
	10 "	— "	
	TOTAL	25 "	
2. GUY	(1) UPPER GUY 6 M	40 ea.	
	" 10 M	17 "	
	" 16 M	— "	
	TOTAL	57 "	
	(2) ANCHOR ROD #2	26 ea.	
	5/8" x 7'	— "	
	3/4" x 7'	16 "	
	1" x 7	— "	
	TOTAL	42 "	
3 CABLE	(1) UNDERGROUND CONDUIT CABLE		
	3600 - 32 ASP	718.5 m	STALPETH CABLE
	3000 - 4 "	2251.7 "	
	2400 - 4 "	1448.9 "	
	1800 - 4 "	1817.3 "	
	1200 - 4 "	1067.3 "	
	900 - 4 "	5.0 "	
	600 - 4 "	867.9 "	
	300 - 4 "	1043.4 "	
	1800 - 5 "	— "	
	1200 - 5 "	— "	
	900 - 5 "	— "	
	600 - 5 "	— "	
	300 - 5 "	— "	
	100 - 65 "	— "	
	SUB TOTAL	9220.0 "	
	(2) DIRECT BURIED CABLE		
	900 - 4 ASPT	— m	STALPETH SHEATHED AND STEEL TAPE ARMORED CABLE
	600 - 4 "	— "	
	300 - 4 "	— "	
	400 - 4 JF	— "	JELLY FILLED CABLE
	300 - 4 "	35.0 "	
	200 - 4 "	154.2 "	
	100 - 4 "	54.6 "	
	50 - 4 "	98.5 "	
	SUB TOTAL	342.3	
	(3) TROUGH CABLE		
	2400 - 4 ASPT	223.0 m	
	1800 - 4 "	275.0 "	
	1200 - 4 "	407.0 "	

ITEM	BREAKDOWN	Q'ty	REMARK
3. CABLE	900 - 4 ASPT	1035.0m	
	600 - 4 "	— "	
	300 - 4 "	107.5 "	
	900 - 5 "	— "	
	600 - 5 "	— "	
	300 - 5 "	— "	
	SUB TOTAL	2047.5 "	
	UNDERGROUND CABLE TOTAL	11609.8 "	
	(4) AERIAL CABLE		
	600 - 4 AP	— m	INCLUDE AP & AP(8) CABLE
	400 - 4 "	180.0 "	
	300 - 4 "	1750.4 "	
	200 - 4 "	3993.4 "	
	100 - 4 "	8538.1 "	
	50 - 4 "	11262.6 "	
	25 - 4 "	4711.0 "	
	10 - 4 "	333.0 "	
	400 - 5 "	— "	
	300 - 5 "	— "	
	200 - 5 "	— "	
	100 - 5 "	— "	
	50 - 5 "	— "	
	25 - 5 "	— "	
	10 - 5 "	— "	
	AERIAL CABLE TOTAL	30768.5 "	
4. POT HEAD	2400 P	1 ea.	
	1800 P	7 "	
	1200 P	2 "	
	TOTAL	10 "	
5. CROSS CONNECTING CABINET	800 P	22 Box	
6. TERMINAL	(1) TERMINAL BOX		
	FOR AERIAL 25P	13 ea.	
	" 15P	309 "	
	" 10P	398 "	
	FOR BURIAL 20P	— "	
	" 15P	— "	
	" 10P	— "	
	TOTAL	720 "	
	(2) TERMINAL BLOCK		
	LEAD SHEATHED STUB 100P	46 ea.	
	" 50P	14 "	
	POLYETHYLENE SHEATHED STUB 100P	105 "	
	" 50P	19 "	
	TOTAL	184 "	

ITEM	BREAKDOWN	Q'ty	REMARK
7. GAS EQUIPMENT	AIR DRYER MODEL 1500	1 ea.	
	METER PANEL	1 "	
	ALARE PANEL	1 "	
	PRESSURE GUARD	13 "	
	TESTING VALVE	13 "	
8. CONDUIT	24 - 4"	269.2 m	
	16 - 4"	— "	
	12 - 4"	— "	
	8 - 4"	827.2 "	
	6 - 4"	— "	
	4 - 4"	1636 "	
	4 - 3"	273.7 "	
	3 - 3"	— "	
	2 - 3"	1998 "	
	TOTAL	2733.5 "	
9. MANHOLE & PULL BOX	TYPE - A	10 ea.	
	" C	— "	
	" V	2 "	
	" J	1 "	
	" T	1 "	
	" L	1 "	
	ENLARGE	— "	
	REBUILD	— "	
	TYPE - JUF - 6	16 "	
	" JUF - 11	3 "	
	TOTAL	34 "	

TC EX.

LIST OF MATERIALS

CABLE DESCRIPTION			T.O.T. CODE NO.	A.E. CODE NO.	UNIT	QUANTITY	REMARK
STALPETH CABLE	3600 - 32	ASP			M	767	
" "	300 - 4	"			"	1211	
" "	600 - 4	"			"	912	
" "	900 - 4	"			"	7	
" "	1200 - 4	"			"	1114	
" "	1800 - 4	"			"	1909	
" "	2400 - 4	"			"	1526	
" "	3000 - 4	"			"	2351	
" "	300 - 5	"			"		
" "	600 - 5	"			"		
" "	900 - 5	"			"		
" "	1200 - 5	"			"		
" "	1800 - 5	"			"		
" "	100 - 65	"			"		
STALPETH STEEL TAPE ARMOURED CABLE							
	300 - 4	ASPT			"	115	
	600 - 4	"			"		
	900 - 4	"			"	1050	
	1200 - 4	"			"	414	
	1800 - 4	"			"	291	
	2400 - 4	"			"	232	
	900 - 5	"			"		
	600 - 5	"			"		
	300 - 5	"			"		
ALEPETH CABLE	10 - 4	AP			"		
" "	25 - 4	"			"	200	
" "	50 - 4	"			"	3000	
" "	100 - 4	"			"	3500	
" "	200 - 4	"			"	4500	
" "	300 - 4	"			"	2000	
" "	400 - 4	"			"	200	
" "	600 - 4	"			"		
" "	10 - 5	"			"		
" "	25 - 5	"			"		
" "	50 - 5	"			"		
" "	100 - 5	"			"		
" "	200 - 5	"			"		
" "	300 - 5	"			"		
" "	400 - 5	"			"		

DESCRIPTION			T.O.T. CODE NO.	A.E. CODE NO.	UNIT	QUANTITY	REMARK
ALEPETH CABLE	600 - 5	AP			M		
" "	10 - 4	AP (8)			"	500	
" "	25 - 4	"			"	5000	
" "	50 - 4	"			"	9000	
" "	100 - 4	"			"	5500	
" "	10 - 5	"			"		
" "	25 - 5	"			"		
" "	50 - 5	"			"		
" "	100 - 5	"			"		
TERMINATING CABLE	300 - 5	P			"	600	
JELLY FILLED CABLE	50 - 4				"	500	
" " "	100 - 4				"	500	
" " "	200 - 4				"	500	
" " "	300 - 4				"	500	

TC EX.

LIST OF MATERIALS

DESCRIPTION	T.O.T CODE NO	A E CODE NO.	UNIT PCS	QUANTITY	REMARK
CLAMP · EXTENSION - ARM.					
FIGURE 8 CABLE CLAMPS - TYPE PA 296	ECH - 2002		PCE	300	
CABLE LASHING CLAMP TYPE "D"	ECH - 2100		PCE		
" " " " "E"	" - 2101				
CABLE SUSPENSION CLAMPS (ONE BOLT CLAMP)	ECH - 2151		PCE	1000	
" " " 11/16" THREE BOLTS TYPE	" - 2155		"	200	
CURVED CABLE SUSPENSION CLAMPS 11/16"	ECH - 2171		"	200	
THREE BOLTS TYPE					
GULVANIZE STEEL KLING GROUND CLAMP	ECH - 2195		"	140	
STRAND GROUND CLAMPS	ECH - 2200		"	140	
GROUND CLAMP (FIG 8)			"	420	
U-CLAMPS 3/8"			"		
BRANCH STRAND CLAMP (6M)			"	10	
ONE-SIDE CLAMP (FIG 8)			"	100	
CABLE EXTENSION METAL ARM TYPE M1	ECH - 2052		"	1600	
" " " " M2	"		"	220	
" " " " M3	"				
HOSE CLAMP		(JAPAN) 3622			
ADJUSTABLE HOSE CLAMP 1/2" - 29/32"	ECS - 0245				
" " " 13/16" - 1 3/4"	" - 0246				
" " " 1 13/16" - 2 3/4"	" - 0247				
" " " 2 9/16" - 3 1/2"	" - 0248				
" " " 3 1/14" - 4"	" - 0249				
" " " 15/16" - 4"	" - 0250				
GULVANIZED STEEL CABLE SUSPENSION HOOK	S - 524015				
BOLT					
ANGLED THIMBLEYE BOLT 5/8" x 8"	ECH - 1001		PCE	50	
" " " " x 10"	" - 1002		"	10	
" " " " x 12"	" - 1003		"	40	
" " " " x 14"	" - 1004		"		
" " " " x 16"	" - 1005		"	30	
" " " 1/2" x 8"					
" " " " x 10"		S - 27798			
" " " " x 12"					

DESCRIPTION	T.O.T CODE NO	A E CODE NO	UNIT PCS	QUANTITY	REMARK
DOUBLE ARMING BOLT 5/8" x 8"	ECH - 1102				
" " " " x 10"	" - 1103				
" " " " x 12"	" - 1104				
" " " " x 14"	" - 1105				
" " " " x 16"	" - 1106				
MACHINE BOLT 1/2" x 4"	ECH - 1209	S - 511308			
" " " x 6"	" - 1212				
" " " x 8"	" - 1213				
" " " x 12"	" - 1214				
" " " x 14"	" - 1215				
" " " x 16"	" - 1216				
" " 5/8" x 8"	ECH - 1218	S - 511416	PCE	100	
" " " x 10"	" - 1220	S - 511420	"	10	
" " " x 12"	" - 1221	S - 511422	"	100	
" " " x 14"	" - 1222	S - 511424			
" " " x 16"	" - 1223	S - 511426			
" " " x 18"	" - 1224				
" " 3/4" x 8"		S - 2908			
" " " x 10"		S - 511510			
" " " x 12"		S - 511512			
" " " x 14"		S - 511514			
STRAIGHT THIMBLEYE BOLT 5/8" x 6"	ECH - 1323				
" " " " x 8"	" - 1324		PCE	50	
" " " " x 10"	" - 1325		"	10	
" " " " x 12"	" - 1326		"	50	
" " " " x 14"	" - 1327		"		
" " " " x 16"	" - 1328		"	10	
EXTENSION SHIELD WITH BOLT			"	3700	
BRIDLE RINGS 1 5/8" WOOD SCREW THREAD	ECF - 1002				
GRIP NUT					
PREFORMED GUY GRIP FOR FALSE DEAD-END					
FIG (8)	ECH - 3001		PCE	100	
6M			"	100	
10M			"		
PREFORMED GUY GRIP DEAD-END FIG (8)	ECF - 3131		"	1100	
" " 6M			"	300	
" " " 10M			"	100	
" " " 16M	ECF - 3132		"		
PREFORMED STRAND SPLICE 6M			"	10	
10M	ECF - 3133		"		

LIST OF MATERIALS

DESCRIPTION	T.O.T. CODE NO.	AE CODE NO.	UNIT PCS	QUANITITY	REMARK
GRIP NUT					
FORGED EYE NUTS 5/8"	ECH-3501		PCE	100	
" " " "	" -3503				
MACHINE BOLTS W/2 NUTS					
GULVANIZED NUTS 5/8" BOLT SIZE	ECH-5072		PCE	400	
EXPANSION SHIELD. STRAP. CLAMP					
THIMBLEYE. ROD. LIFT PLATE. PROTECTOR. SUPPORT					
DOUBLE EXPANSION SHIELDS 3/8" x 2"	ECH-4010 4012				
TWO-HOLE CONDUIT AND CABLE STRAPS			PCE	400	
ONE-HOLE STEEL CABLE CLAMPS			"		
FORGED ANGLE THIMBLEYE 5/8"	ECH-4020		"	10	
GALVANIZED STEEL GROUND ROD 1/2" x 5 FEET	ECH-4222		PCE	140	
CURVED LIFT PLATE 5/8" (2 1/2" x 7" x 3/16")	ECH-5510		"	40	
GALVANIZED GUY WIRE PROTECTORS 7 FEET	ECH-5550		"	70	
B-LASHED CABLE SUPPORTS 3/4 x 10"	ECH-6902		"	200	
" " " 1 3/16 x 16"	" -6903		"	900	
" " " 2 x 22"	" -6904		"	1200	
" " " 2 5/8 x 28"	" -6905		"		
" " " 3 1/8 x 34"	" -6906		"	100	
LAG-SCREW. STAPLE. STRAP					
LAG SCREWS 5/16" x 2 1/2"	ECH-7027				
" " 3/8" x 3 1/2"	" -7043				
" " 3/8" x 4" GIMLET POINT			PCE	60	
FOR CURVE LIFT PLATE	ECH-7044				
" " 1/2" x 4" GIMLET POINT				20	
FOR SIDEWALK GUY FITTING	ECH-7048				
SERVISLEEVS 5/16" (6M)	ECH-7101			1500	
GALVANIZED STEEL STAPLE	ECH-7140				

DESCRIPTION	T.O.T. CODE NO.	AE CODE NO.	UNIT PCS	QUANITITY	REMARK
STRANDVISE 5/16"-4M-TYPE 5151	ECH-7251				
" " -6M " 5101	" -7252				
" " -6M " 5151	" -7256				
WASHER WIRE LINK					
CURVED WASHER 5/8 (2 1/2" x 2 1/2" x 3/16")	ECH-9001		PCE	100	
SQUARE " " (2 1/4" x 2 1/4" x 3/16")	" -9043		"	400	
LONG SQUARE WASHER 5/8			"	60	
CURVED WASHER 5/8"(2 1/2" x 2 1/2" x 3/16" x 1/16" HOLE DIAM	ECH-9001		"	110	
" " 3/4 (3" x 3" x 1/4" x 13/16" " ")	" -9004		"		
ROUND WASHER 1/2" (2" x 2" x 1/8"-9/16" HOLE DIAM)	ECH-9041				
" " 1/2" (2" x 2" x 1/4"-9/16" " ")	" -9042				
" " 5/8" (2 1/4 x 2 1/4" x 3/16" x 11/16" " ")	" -9043				
WIRE LINK - TYPE 5059	ECH-9100				
STRAND LINK FOR FIG(8) CABLE			PCE	50	
STEEL FLAT CROSS ARM BRACES 1 1/2 x 24" x 3/16"					
" " " " 1 1/2 x 30 x 3/16"					
ANCONOR RODS 3/4" X (REQUIRED LENGTH)			PCE	20	
WOOD LOG FOR ANCHOR ROD				20	
ONE BOLT GUY ATTACHMENTS		S-518205			
SIDE-WALK GUY FITTINGS FOR WOODEN POLE		SR-329	PCE	10	
" " " POR CONCRETE POLE			"	10	
			"		
GALVANIZED STEEL PIPE ø2 1/2" (2M)			"	15	
" " " (4M)			"	5	
S-LON PIPE ø1/2" x 2.5 METER			"	110	
S-LON 90°					
U-GUARDS			PCE	20	
GUY STRAIN INSULATOR TYPE 506	ECI-0073		PCE	60	

TC EX.

LIST OF MATERIALS

DESCRIPTION	T. O. T CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
STEARINE, C-CEMENT, COMPOUND					
STEARINE (250G)		3307	PCE	200	
STEARINE CANDLE	ECS-0100				
C-CEMENT 100G/PCE	〃 -0230		PCE	200	
〃 〃 4 02	〃 -0231				
SCOTCH KOTE	ECS-0380				
WATER PROOF COMPOUND	ECS-0470	3704	KG	20	
MOISTURE PROOF COMPOUND		3705			
NO. 1 ADHENSION AGENT		3706			
NO. 2 SPECIAL COMPOUND (WITH HARDNER)		3703	KG	20	
NO. 3 〃 〃		3708			
NO. 4 〃 〃 (RESIN)		3701	KG	200	
NO. 4 〃 〃 (HARDNER)		3702			
NO. 5 〃 〃		3707	PCE	50	
DESICCANT, DESICCAN-CLOTH, FLOSS-SILK					
PROTEK SORB DESICCANT 160 G	ECS-1020				
〃 〃 〃 50 G	〃 -1021				
DESICCANT (DRY AGENT) 50G/BAG	ECS-1091	3031	BAG	1500	
DESICCANT CLOTH 20 x 36 x 25 CM		3034	PCE	10	
〃 〃 24 x 36 x 29 〃		〃	〃	10	
〃 〃 27 x 36 x 32 〃		〃	〃		
〃 〃 27 x 45 x 32 〃		〃	〃	10	
〃 〃 31 x 36 x 36 〃		〃	〃	10	
〃 〃 31 x 45 x 36 〃		〃	〃	10	
〃 〃 34 x 45 x 39 〃		〃	〃	20	
〃 〃 37 x 45 x 42 〃		〃	〃	20	
〃 〃 40 x 45 x 45 〃		〃	〃	10	
〃 〃 44 x 45 x 49 〃		〃	〃	20	
〃 〃 48 x 45 x 53 〃		〃	〃	10	
〃 〃 51 x 45 x 55 〃		〃	〃	10	
〃 〃 53 x 45 x 58 〃		〃	〃	10	
〃 〃 55 x 45 x 60 〃		〃	〃	10	
〃 〃 57 x 45 x 62 〃		〃	〃	10	
〃 〃 59 x 45 x 64 〃		〃	〃	10	
〃 〃 62 x 45 x 67 〃		〃	〃	10	
〃 〃 68 x 45 x 73 〃			〃	10	
〃 〃 80 x 45 x 85 〃			〃		
PLASTIC TUBE FITTING-PIPE COUPLING	ECS-1500				
〃 〃 〃 MALE COUPLING	〃 -1501				
〃 〃 〃 FERRULE	〃 -1502				

DESCRIPTION	T. O. T CODE NO	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
FLOSS SILK 10 PCS/BAG	ECS-1700		BAG	10	
TAPE, BONDING-RIBON					
SEALING TAPE NO.1 30-280MM-6 PCS/BAG	ECT-1158	3601	BAG	100	
〃 〃 NO.2 40-280 -6 〃	〃 -1159	3602	〃	80	
〃 〃 NO.3 30-280 -3 〃	〃 -1160	3603	〃	450	
〃 〃 NO.4 40-280 -3 〃	〃 -1161	3604	〃	250	
ADHESIVE ALUMINUM TAPE NO.1 30MM x 20M/ROLL	EC2-1000		ROLL	100	
〃 PAPER TAPE 50M/〃			〃		
〃 GLASS FIBER TAPE 52M/〃	EC2-1203		〃	10	
〃 P.V.C TAPE NO.1 10M/〃		3611	〃	500	
〃 〃 〃 NO.2 20M/〃	〃 -1001	3612	〃	1000	
〃 〃 〃 (GENERAL) 20M/〃		3620	〃		
BONDING COPPER TAPE 10M/ROLL	EC2-1060	3613	〃	60	
〃 〃 〃 (SELF) NO.2 5M/〃		3619	〃	〃	
COTTON TAPE 38MMx 30M/〃	EC2-1090		〃	20	
〃 〃 50MMx 30M/〃	〃 -1091		〃	20	
CR TAPE 20" x 20'	ECS-7024				
OR TAPE 3/4" x 15'	EC2-1120		〃		
〃 〃 2" x 15'	〃 -1121		〃		
ELECTRICAL TAPE 3/4" x 66'	〃 -1132		〃		
ELICTION TAPE 3/4" x 60'	〃 -1185		〃		
〃 〃 2" x 60'	〃 -1186		〃		
GLASS TAPE 1" x 108'	〃 -1201		〃		
GLASS FIBER TAPE 38MMx 30M/ROLL	〃 -1202		〃	50	
POLYETHIYLENE TAPE 30MMx 20M/〃	〃 -1275	3605	〃		
〃 〃 60MMx 20M/〃	〃 -1276	3606	〃	20	
〃 〃 (BLACK) 20M/〃	〃 -1277	3405	〃		
VALCANIZED RUBBER TAPE 10M/〃	〃 -1300	3406	〃		
P.V.C TAPE FOR TERMINATING JOINT 20M/〃	〃 -1345	3618	〃	30	
SOFT BONDING TAPE 5M/〃		3419	〃	5	
LACING TWINE 6 PLIES	EC2-1501				
ALUMINIUM FOIL TAPE 2" x 20'	ECS-7000		ROLL		
〃 〃 〃 4" x 20'	〃 -7001		〃		
V N TAPE 10M/ROLL		3610	〃	700	
SPACER TAPE			〃		
BONDING RIBBON 0.375"x 60'/ROLL	ECS-4600		〃	5	

TC EX.

LIST OF MATERIALS

DESCRIPTION	T.O.T. CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
SOLDER					
NO. 1 SOLDER 250G / ROLL		3301	ROLL	1500	
NO. 2 " 1KG / ROLL	ECS-5700	3302			
NO. 3 "		3303			
NO. 4 (CREAM) SOLDER 100G / TIN	ECS-5722	3304	TIN	400	
NO. 4 (") " 200G / TIN		3305			
BAR SOLDER 1 1/2 LBS	ECS-5612				
KESTER SOLDER 1/16" x 0.062 (1LBS)	ECS-5672				
" " 1/8 x 0.125 (5LBS)	" -5686				
TERMINATING MATERIALS					
NO. 50 P.V.C LID FOR TERMINATING JOINT	ECS-3050				
NO. 75 " " "	" -3051				
NO. 100 " " "	" -3052				
NO. 125 " " "	" -3053				
NO. 150 " " "	" -3054		PCE	4	
NO. 200 " " "	" -3055		"	16	
NO. 50 " SLEEVE "	ECS-5270				
NO. 75 " " "	" -5271				
NO. 100 " " "	" -5272				
NO. 125 " " "	" -5273				
NO. 150 " " "	" -5274		PCE	2	
NO. 200 " " "	" -5275		"	8	
NO. 50 " TUBE "	ECS-7230				
NO. 75 " " "	" -7231				
NO. 100 " " "	" -7232				
NO. 125 " " "	" -7233				
NO. 150 " " "	" -7234		PCE	2	
NO. 200 " " "	" -7235		"	8	
NO. 50 TERMINATING SLEEVE RECEPTACLE BAND		4601			
NO. 75 " " " "		4602			
NO. 100 " " " "	ECS-5300	4603			
NO. 125 " " " "	" -5301	4604			
NO. 150 " " " "	" -5302	4605	PCE	2	
NO. 200 " " " "	" -5303	4606	"	8	

DESCRIPTION	T.O.T. CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
NO. 50 TERMINATING SLEEVE FIXING BAND		4611			
NO. 75 " " " "		4612			
NO. 100 " " " "	ECS-5286	4613			
NO. 125 " " " "	" -5287	4614			
NO. 150 " " " "	" -5288	4615	PCE	1	
NO. 200 " " " "	" -5289	4616	PCE	8	
CABLE FIXING BAND			PCE	10	
SLEEVE					
COTTON SLEEVE 3/32"x 3 1/4"x 900 (0.4MM)	ECS-5021				
" " 1/8"x 3 1/4"x 700 (0.5 ")	" -5022				
" " 5/32"x 3 1/4"x 400 (0.65 ")	" -5023				
" " 1/4"x 3 1/4"x 200 (0.9 ")	" -5024				
COMPOUND FILLED PE SLEEVE FOR 0.4 MM	ECS-5050				
" " " " " 0.5	" "				
" " " " " 0.65	" "				
" " " " " 0.9	" "				
PLASTIC SLEEVES 0.106" x 3" x 250 (GREEN)	ECS-5150				
" " 0.125" x 3" x 250 (BLACK)	" -5151				
" " 0.148" x 3" x 250 (RED)	" -5152				
" " 0.208" x 3" x 250 (YELLOW)	" -5153				
PAPER SLEEVE FOR 0.4MM CONDUCTOR 200/BAG	ECS-5180	3001	BAG	1800	
" " " 0.5 "	" -5181	3002	"	100	
" " " 0.65 "	" -5182	3003	"		
" " " 0.9 "	" -5183	3004	"		
PLASTIC FILLED SPLICE SLEEVE x 550 (YELLOW)	ECS-5200				
" " " 0.106x 450 (GREEN)	" -5201				
" " " 0.125 x 350 (CLEAR)	" -5202				
" " " 0.145x 275 (RED)	" -5203				
" " " 0.145x 225 (BLUE)	" -5204				
POLYETHYLENE SLEEVE FOR 0.32MM CONDUCTOR 200/BAG	ECS-5225	3011	BAG	120	
" " 0.4 " "	" "	3012	"	600	
" " 0.5 " "	" "	3013		100	
" " 0.65 " "	" "	3014			
" " 0.9 " "	" "	3015			
AUXILIARY PE SLEEVE NO. 363		3244			
" " " NO. 364		3255			
MAIN LEAD SLEEVE					
LEAD SLEEVE 3/4" x 15"	ECS-5334				
" 1" x 15"	" -5335				
" 1 1/4" x 15"	" -5336				

TC EX.

LIST OF MATERIALS

DESCRIPTION	T.O.T. CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
MAIN LEAD SLEEVE					
LEAD SLEEVE 1 1/2" x 15"	ECS-5337				
" " 1 3/4" x 17"	" -5338				
" " 2" x 17"	" -5339				
" " 2 1/4" x 17"	" -5340				
" " 2 1/4" x 20"	" -5341				
" " 2 3/4" x 20"	" -5342				
" " 3" x 20"	" -5343				
" " 3 1/2" x 20"	" -5344				
" " 4" x 20"	" -5345				
" " 4 1/2" x 20"	" -5346				
" " 4 1/2" x 22"	" -5347				
" " 5" x 20"	" -5348				
" " 5" x 22"	" -5349				
" " 5 1/2" x 20"	" -5350				
" " 5 1/2" x 22"	" -5351				
" " 6" x 22"	" -5352				
" " 6 1/2" x 24"	" -5353				
" " 7" x 24"	" -5354				
" " 8" x 24"	" -5355				
MAIN LEAD SLEEVE 30 - 300 MM	ECS-5405		PCE	210	
" " " 40 - 300 "	" -5408		"		
" " " 40 - 400 "	" -5409		"		
" " " 50 - 400 "	" -5412		"	300	
" " " 60 - 400 "	" -5415		"	300	
" " " 70 - 500 "	" -5420		"	120	
" " " 80 - 500 "	" -5426		"	30	
" " " 90 - 500 "	" -5432		"	100	
" " " 100 - 500 "	" -5435		"	30	
" " " 110 - 500 "	" -5438		"	30	
" " " 120 - 500 "			"	40	
" " " 130 - 500 "			"	40	
" " " 140 - 500 MM	ECS-5441		"	5	
" " " 150 - 500 "	" -5444		"	5	
" " " 160 - 500 "	" -5447		"	5	
" " " 170 - 500 "	" -5450		"	10	
" " " 180 - 500 "	" -5453		"	5	
" " " 190 - 500 "	" -5457		"	10	
" " " 200 - 500 "	" -5460		"	5	
" " " 210 - 500 "	" -5463		"		
" " " 220 - 500 "	" -5466		"	5	
" " " 250 - 500 "			"		
AUXILIARY LEED SLEEVE 30 - 110 MM		3141	"	1750	
" " " 50 - 110 "		3142	"	500	
" " " 70 - 110 "		3143	"		

DESCRIPTION	T.O.T. CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
AUXILIARY LEAD SLEEVE 50 - 150 MM		3145			
" " " 70 - 150 "		3146			
" " " 35 - 130 "	ECS-5406		PCE		
" " " 40 - 130 "	" -5407		"		
" " " 45 - 130 "	" -5410		"	5	
" " " 50 - 130 "	" -5411		"	90	
" " " 55 - 130 "	" -5413		"	5	
" " " 60 - 130 "	" -5414		"	25	
" " " 65 - 130 "	" -5417		"	10	
" " " 70 - 130 "	" -5418		"	30	
" " " 75 - 130 "	" -5423		"		
" " " 80 - 130 "	" -5424		"		
" " " 85 - 130 "	" -5429		"	50	
" " " 90 - 130 "	" -5430		"	30	
" " " 95 - 130 "		3135	"	5	
" " " 100 - 130 "		3136	"	40	
LEAD PLATE					
LEAD PLATE ø 90		3167	PCE	10	
" " ø 110		3151	"	10	
" " ø 120		3152	"	10	
" " ø 130		3153	"	15	
" " ø 140		3154			
" " ø 150		3155			
" " ø 160		3156			
" " ø 170		3157			
" " ø 180		3158			
" " ø 190		3159			
" " ø 200		3160			
" " 4 x 20 CM x 33 CM	ECS-3000				
PERFORATED LEAD PLATE 40 - 250 MM	" -3001	3147	PCE	170	
SPACER					
PLASTIC CABLE SPACER 1/4"	ECS-5800		PCE	1200	
" " " 1/2"	" -5801		"		
" " " 3/4"	" -5802		"	1100	
" " " 1"	" -5803		"	100	
SPACER FOR ADAPTER SPCR A 170		3260			
" " " " A 150		3261			
" " " " A 120		3262			
" " " " A 100		3263			
" " " " A 140		3264			
" " " " A 85		3265			
" " " " A 57		3266			
" " " " A 36		3267			

LIST OF MATERIALS

DESCRIPTION	T.O.T. CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
SPACER					
SPACER FOR AUXILIARY PE SLEEVE-SPCR AV x 85					
" " " " " " " 57					
" " " " " " " 36					
PE-CAP, BASE METAL					
PRESSURE VALVE (TEST VALVE)					
PE CAP ø20 WITH PRESSURE VALVE		4915			
" " ø22 " " "		"			
" " ø24 " " "		"			
" " ø26 " " "		"			
" " ø28 " " "		"			
" " ø30 " " "		"			
" " ø32 " " "		"			
" " ø34 " " "		"			
" " ø36 " " "		"			
" " ø38 " " "		"			
" " ø40 " " "		"			
" " ø42 " " "		"			
" " ø44 " " "		"			
" " ø46 " " "		"			
" " ø48 " " "		"			
" " ø50 " " "		"			
" " ø52 " " "		"			
" " ø54 " " "		"			
" " ø56 " " "		"			
" " ø58 " " "		"			
" " ø60 " " "		"			
" " ø62 " " "		"			
" " ø64 " " "		"			
" " ø66 " " "		"			
" " ø68 " " "		"			
" " ø70 " " "		"			
" " ø72 " " "		"			
" " ø74 " " "		"			
" " ø76 " " "		"			
" " ø78 " " "		"			
" " ø80 " " "		"			
" " ø82 " " "		"			
P.V.C CAP ø12MM		4915	PCE		
" " ø14 "		"	"		
" " ø16 "		"	"		
" " ø18 "		"	"		
" " ø20 "		"	"	6	

DESCRIPTION	T.O.T. CODE NO.	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
P.V.C CAP, ø22MM		4915	PCE		
" " ø24 "		"	"		
" " ø26 "		"	"		
" " ø28 "		"	"	5	
" " ø30 "		"	"		
" " ø32 "		"	"		
" " ø34 "		"	"		
" " ø36 "		"	"		
" " ø38 "		"	"		
" " ø40 "		"	"		
" " ø42 "		"	"		
" " ø44 "		"	"		
BASE METAL FOR COMPOUND INJECTOR		4917	PCE		
" " " NO.6 VALVE		4918	"	20	
WIRE, CORD					
GULVANIZED STEEL STRAND GUY WIRE 5/16"-(6M)	DCP-2002		KG	8400	
GUY STRAND 3/8" (10M)	DCP-2003		KG	200	
COPPERWELD TELEPHONE LINE WIRE AWG #6			M	1200	
0.9MM ANNEALED CAPPER WIRE		2940	M		
1.6MM IRON WIRE			KG	10	
JUMPERING WIRE			M	64200	
ø5MM CABLE BINDING CORD			M	700	
CABLE LASHING WIRE (0.045")			ROLL	100	

TC EX.

LIST OF MATERIALS

DESCRIPTION	T.O.T. CODE NO.	AE CODE NO.	UNIT	QUANTITY	REMARK
HARDWARES IN M.H.					
CABLE RACK EXTENSION			PCE	250	
RACK SECTION (8 HOLES)			PCE	50	
" " (14 ")			"	100	
(18 ")			"		
RACK HOOK (4" LGTH)			"	50	
" " (7½" ")			"	250	
" " (10" ")			"		
" " (FOR CABLE VAULT)			"	60	
CABLE RACK INSULATOR			"	300	
ZINC CABLE DUCT SHIELD			"	250	
GALVANIZED IRON PIPE ø2"			PCE	40	
FOR RISER CABLE PROTECTION					
" IRON PIPE ø3"			PCE	50	
FOR BURIED CABLE PROTECTION					

DESCRIPTION	T.O.T. CODE NO.	AE CODE NO.	UNIT	QUANTITY	REMARK
POLE					
CONCRETE POLE (8 M)			PCE	25	
" (10 M)			"		
GUY					
DRIVING ANCHOR #2			PCE	30	
" " #3			"		
AUXILIARY EYES				1	
CROSS CONNECTING CABINET 800P			"	22	
TERMINAL BLOCK FOR CABINET					
50P - LEAD SHEATH STUB			PCE	14	
100P - " " "			"	46	
50P - POLYETHYLENE SHEATH STUB			"	19	
100P - " " "			"	105	
RELIABLE TYPE ST CABLE TERMINAL					
10 P			PCE	398	
15 P			"	309	
25 P			"	13	
WALL MOUNT TERMINAL BOX (JAPAN)					
FOR TROUGH CABLE 10 P			PCE		
" " " 15 P			"		
" " " 20 P			"		
6P-TERMINAL BLOCK (FOR READY ACCES)			"	120	
STRAIGHT NOZZLE (FOR READY ACCES)			"	20	
BRANCH NOZZLE (")			"	5	
TERMINAL FOR M.D.F					
258 - TERMINAL BLOCK			PCE	174	

TC EX.

LIST OF MATERIALS

DESCRIPTION	T.O.T CODE NO	JAPAN CODE NO.	UNIT	QUANTITY	REMARK
PUREGAS EQUIPMENT & MATERIALS					
MODEL 1500 AIR DRYER			PCE	1	
METER PANEL			"	1	
DUAL PRESSURE PANEL			"		
PEC 522 ALARM PANEL			"	1	
" 522A MASTER ALARM MODULE			"		
" 522B ALARM MODULE			"		
" 522C LOCAL AIR DRYER ALARM MODULE			"		
" 522D MODULE BLANKS			"		
" 522E ALARM PANEL FRAME			"		
" 412 MAILE ELBOW			PCE	13	
" 523 PRESSURE GUARD (CABLE MOUNTED)			"		
" 524 " " (POLE,WALL MOUNTED)			"	12	
" 525 " " (UNDERGROUND)			"	1	
" 401C FLANGE			"	12	
PEC 402D FLANGE			"	14	
" 404B PRESSURE TESTING ELL			"	6	
" 405 SEALING CLAMPS			"		
PEC 408 LEAD TUBING (OD 1/2", 50FT COILS)			M	10	
" 409 COPPER TUBING (OD 3/8" OR 1/2")			"	5	
PEC 501F PRESSURE TESTING VALVE (INSTALLED IN CORD FLANGE)			PCE	15	
" 502P " " " (END OF LEAD PIPE)			"		
" 503C " " " (DIRECT INSTALLATION)			"	40	
" 504M VALVE CAP (INSTALLED BY WRENCH)			"	15	
" 505R " " (" " HAND)			"	15	
PEC 508 DUAL STEM BY-PASS VALVE			"	1	
PEC 419 MALE ELBOW			PCE	6	
" 421 UNION (EXTEND LENGTH OF PLASTIC TUBING)			"		
" 424 TEE (BRANCH AIR FLOW " " ")			"		
" 426 PLASTIC SHEATH FITTING			"	6	
" 429 PLASTIC TUBE RACK					
PEC 431 POLY-CORTUBING 3 TUBES			M		
" 5 "			"		
" 10 "			"	50	

TC EX.

CABLE DRUM LENGTH SHEET

DRUM NO.	KIND OF CABLE			CABLE LENGTH (M)	LOCATION
1	3600 - 32 ASP			320.0	CABLE VAULT ~ MH#2
2	3600 - 32 〃			178.0	CABLE VAULT ~ MH# 1
3	3600 - 32 〃			269.0	MH#2 ~ MH#58
4	3000 - 4 〃			177.0	CABLE VAULT ~ MH#2
5	3000 - 4 〃			201.0	MH#2 ~ MH#4
6	3000 - 4 〃			207.0	〃 #4 ~ 〃 #5
7	3000 - 4 〃			166.0	〃 #5 ~ 〃 #6
8	3000 - 4 〃			173.0	〃 #6 ~ 〃 #7
9	3000 - 4 〃			234.0	〃 #7 ~ 〃 #11
10	3000 - 4 〃			183.0	〃 #8 ~ 〃 #9
11	3000 - 4 〃			226.0	〃 #9 ~ 〃 #10
12	3000 - 4 〃			201.0	〃 #11 ~ 〃 #12
13	3000 - 4 〃			174.0	CABLE VAULT ~ MH#2
14	3000 - 4 〃			202.0	MH#2 ~ MH#4
15	3000 - 4 〃			207.0	〃 #4 ~ 〃 #5
16	2400 - 4 〃			184.0	POT HEAD ~ MH#2
17	2400 - 4 〃			275.0	MH# 2 ~ MH#58
18	2400 - 4 〃			214.0	〃 #58 ~ 〃 #23
19	2400 - 4 〃			202.0	〃 #23 ~ 〃 #24
20	2400 - 4 〃			217.0	〃 #24 ~ 〃 #25
21	2400 - 4 〃			255.0	〃 #25 ~ 〃 # 6
22	2400 - 4 〃			179.0	〃 # 6 ~ 〃 #58
23	1800 - 4 〃			307.0	〃 #76 ~ 〃 # 3
24	1800 - 4 〃			181.0	POT HEAD ~ MH#2
25	1800 - 4 〃			215.0	MH #58 ~ MH #69
26	1800 - 4 〃			211.0	〃 #69 ~ 〃 #59
27	1800 - 4 〃			205.0	〃 #59 ~ 〃 #60
28	1800 - 4 〃			217.0	〃 #60 ~ 〃 #61
29	1800 - 4 〃			225.0	〃 #61 ~ 〃 #62
30	1800 - 4 〃			348.0	〃 # 7 ~ 〃 # 9, CABLE VAULT
31	1200 - 4 〃			203.0	〃 #52 ~ 〃 #65
32	1200 - 4 〃			222.0	〃 #65 ~ 〃 #66
33	1200 - 4 〃			212.0	〃 #66 ~ 〃 #67
34	1200 - 4 〃			234.0	〃 #67 ~ PB#18

DRUM NO.	KIND OF CABLE			CABLE LENGTH (M)	LOCATION
35	1200 - 4 ASP			243.0	MH# 9 ~ MH# 10 CABLE VAULT
36	900 - 4 〃			7.0	〃 #58
37	600 - 4 〃			221.0	〃 #26 ~ PB#22
38	600 - 4 〃			126.0	〃 #29 ~ MH#30
39	600 - 4 〃			278.0	〃 #30 ~ 〃 #54
40	600 - 4 〃			287.0	#10 ~ PB# 8
41	300 - 4 〃			360.0	RISER CABLE
42	300 - 4 〃			479.0	PB#14 ~ PB#17
43	300 - 4 〃			372.0	RISER CABLE
44	2400 - 4 ASPT			232.0	MH#12 ~ MH#13
45	1800 - 4 〃			281.0	〃 #13 ~ CAB#023
46	1200 - 4 〃			186.0	PB#18 ~ 〃 #044
47	1200 - 4 〃			228.0	CAB#023 ~ 〃 #027
48	900 - 4 〃			263.0	〃 #044 ~ SPLICING POINT
49	900 - 4 〃			263.0	SPLICING POINT ~ CAB#045
50	900 - 4 〃			321.0	CAB#027 ~ CAB#030
51	900 - 4 〃			203.0	〃 #028 ~ SPLICING POINT
52	300 - 4 〃			115.0	〃 #045 ~ CAB#024
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"TC" ANNEX Demand Forecast for Special Area in TC Exchange

Bldg. Name	Demand Forecast			Remarks
	1976	1980	1985	
Saint Louis Hospital	6	150	200	
Chinese Trading Center	4	6	9	
Tobacco Monopoly Hospital	14	21	32	
Samachavanich Bldg.	4	6	9	
Thai Rice Company	2	3	5	
Thai Marine Navigation Company	14	21	32	
Bangkok Dock Company	4	6	9	
New Pengchieng Restaurant	8	12	18	
Bangkok Fishery Organization	25	38	57	
Dept. of Fishery Industry Lab.	2	3	5	
Charoen Phokkaphan Co.	16	24	36	