Appendix 11.3.1   Selection of Alternative Segment A or B

Selection of Alternative Segment A or B

1. Planning

The traffic benefit for Segment A and Segment B would have an equal value due to the same road network. Therefore, the selection of Segment A and Segment B can be done based on the comparison of their construction costs and technical aspects.

The conceptual design was made using the aerial photographs of scale 1:2,000. Horizontal alignments of Segment A and B are shown in Fig. A.11.3.1.1.

1) Plan

Segment A and B were planned by the same conceptual ideas as follows:

*   The through traffic lane is planned as viaduct (flyover bridge);

*   Frontage roads on both sides are provided for inhabitants along the Project Road;

*   Intersections between frontage road and the existing road are at grade;

*   ON & OFF Ramps are planned only at the Middle Ring Road intersection;

*   Frontage roads are led to the through traffic lane at STA.No.10-11 where the route crosss over the existing Khlong Dan.

2) Profile

Basic consideration on vertical alignments are as follows:

*   The Middle Ring Road intersection is planned as grade separated intersection considering future traffic volumes and the capacity at the intrsection;

*   The crossing over Mahachai Railway should be planned as a flyover due to frequent passing of trains (30 times per day);

* Wutthakat Road is closely located with Mahachai Railway, with a distance of about 150 m to 180 m. Therefore, the intersection between the Project Road and Wutthakat Road should be planned as a grade separated one due to the short distance for the construction of ON, OFF Ramp. The profiles of Segment A and B are illustrated in Fig. A.11.3.1.2.

3) Cross-section

The cross-sections were based on above mentioned plan, profile, and forecasted traffic volume and lane capacity. The typical cross-sections on the individual area are illustrated in Fig. A.11.3.1.3.

2. Costs Estimate

The costs including construction cost, and land-acquisition cost with compensation cost were estimated for the selection of Segment A Segment B.

The unit cost of the individual construction items are shown in Table A.11.3.1.1 through examination of related projects or discussion with local contractors.

Land acquisition cost was estimated based on topographic maps with a scale of 1:1,000 surveryed by Study Team on October 1986. The unit cost of land was obtained from PWD.

Compensation cost was estimated based on the number of houses and buildings. A housing condition survey was carried out at the same time of the topographic survey. The total costs of Segment A and B are described below:

| | Items | Cost: 1,000 Baht | |
		Segment A	Segment B
1.	Construction Cost	621,210	598,203
2.	Land Acquisition Cost	79,056	90,790
3.	Compensation Cost	124,048	120,392
4.	Total	824,334	809,388

Total constructioin costs of Segment A and B are estimated as 824,334,000 Baht and 809,388,000 Baht respectively. The difference between Segment A and Segment B is only 1.8 %. We can say that costs of Segment A and Segment B are the same.

Their break down of construction cost, land acquisition cost and compensation cost are shown in Table A.11.3.1.1, Table A.aa.3.1.2 and Table A.11.3.1.3.

3. Selection of Segment A or B

Segment A was tentatively selected as the one proposed for the feasibility study. The reasons are as follows:

1) From viewpoint of economic aspects

  a. Total costs of Segment A and B are not different.

2) From viewpoints of technical aspects.

The tecnical aspects of Segment A and Segment B are also not much different. However,

  a. Running comfort on Segment A would be better than on Segment B.

  b. Traffic safety of Segment A would be better than Segment B due to the nose of ON and OFF Ramps in Segment B are located in the small radius curve section on through traffic lane. This risks a high possibility of traffic accidents in the accelation and deceleration lanes.

3) From viewpoint of other aspects

The alignment of Segment B passes partly the land of Wat Nang Chi.
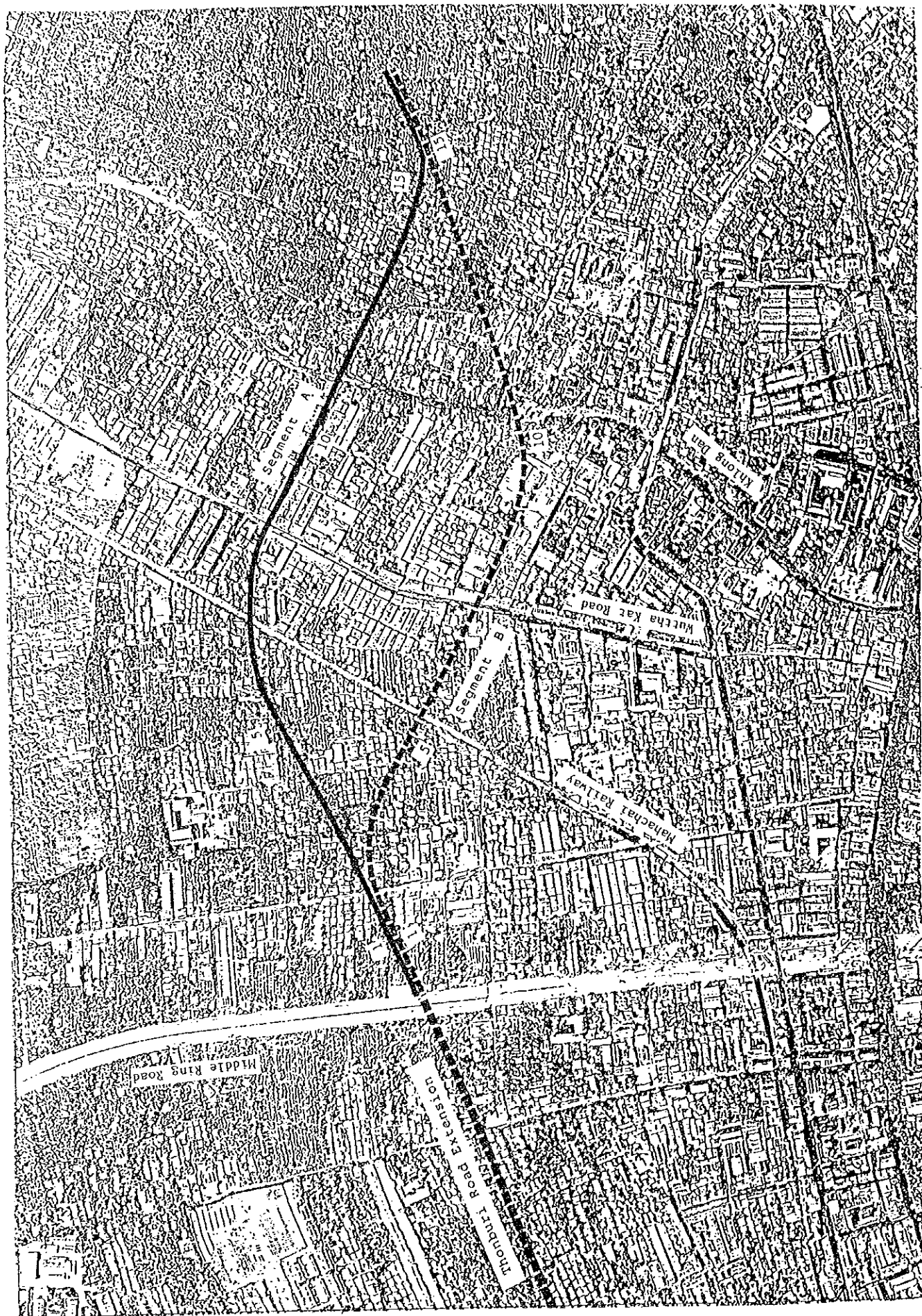
Fig.A.11.2.1.1 Alignment of Segment A and B

Segment A

Segment B

Wuttha Kat Road

Khlong Bangkok

Hachai Railway

Middle Ring Road

Thonburi Road Extension
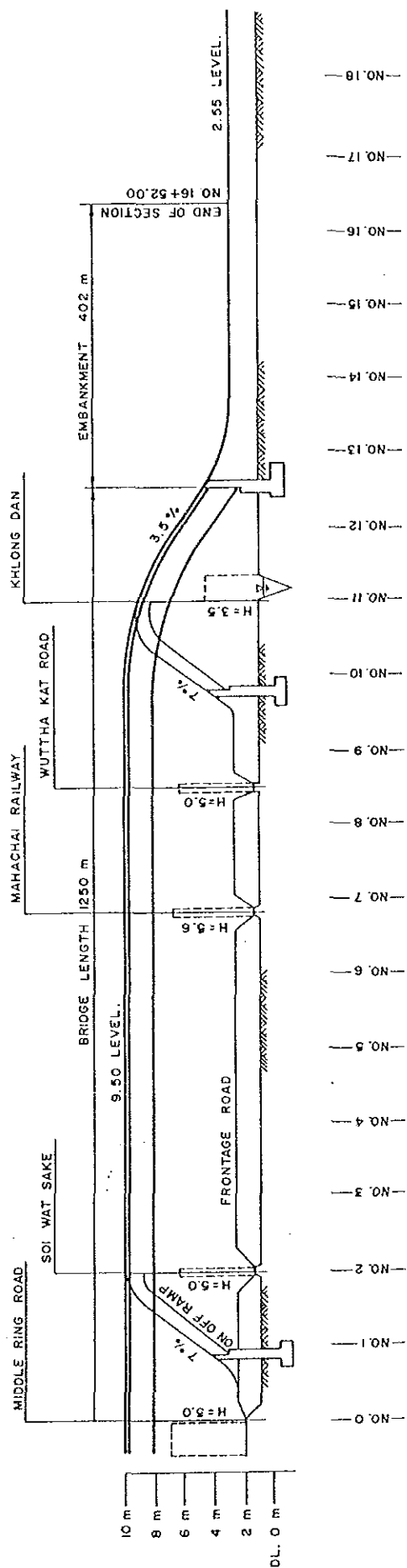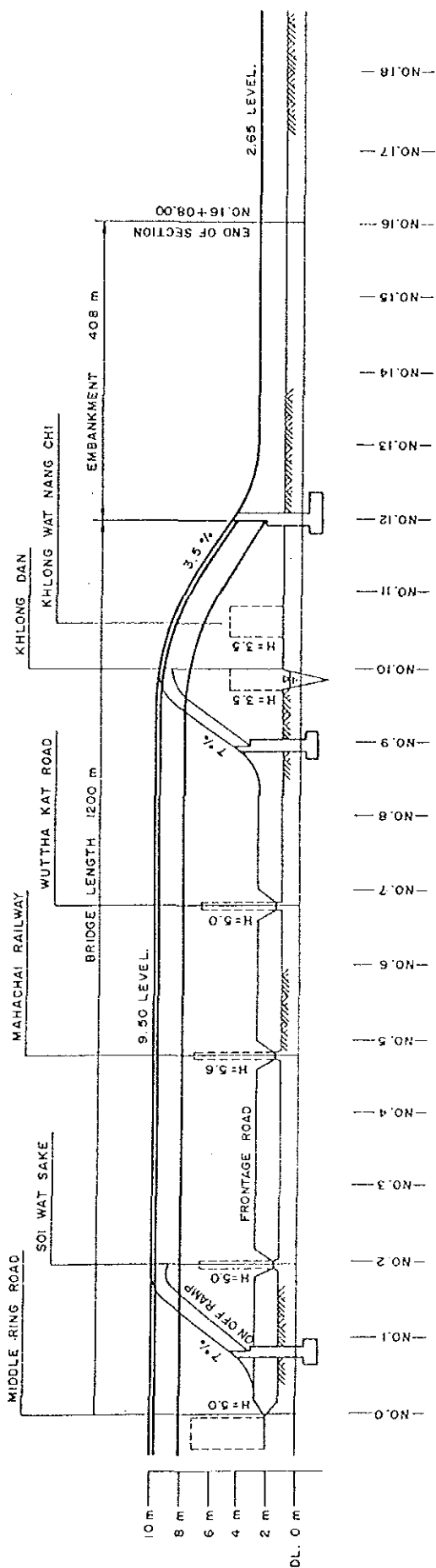
PROFILE SEGMENT A

PROFILE SEGMENT B

Fig. A.11.3.1.2 Profile of Segment A and B

A-11.6
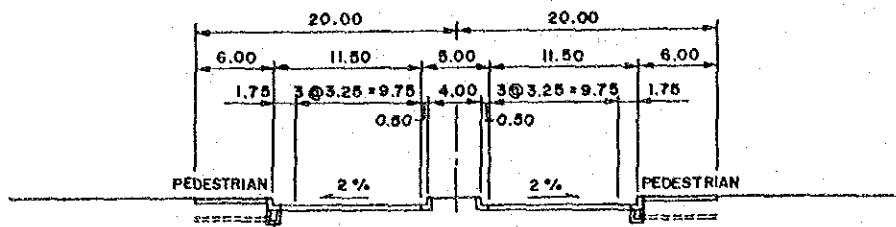
TYPICAL CROSS – SECTION (STA. NO. 13 ~ NO. 17)
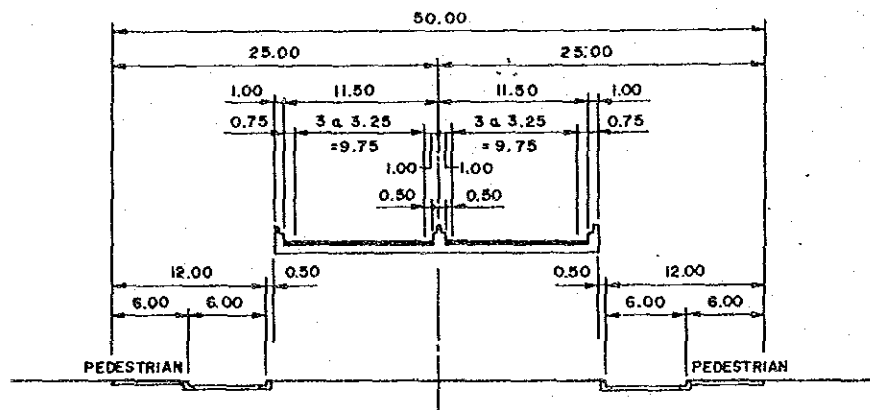
TYPICAL CROSS – SECTION (STA. NO. 6 ~ NO. 12)
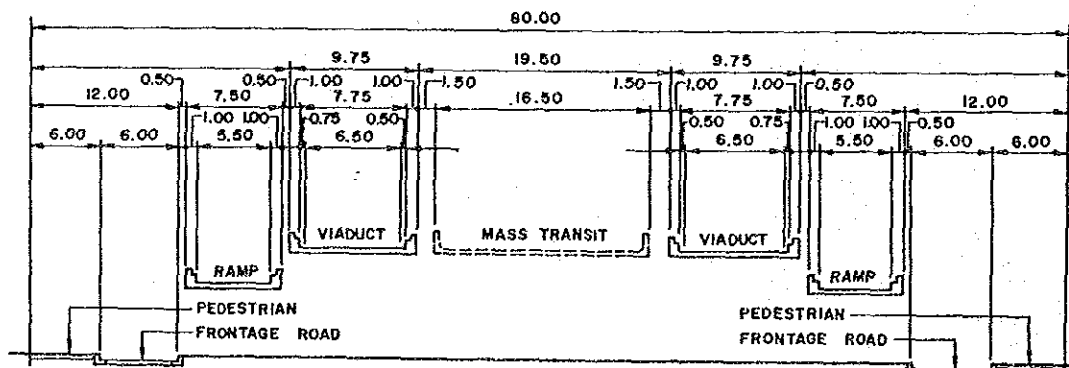
TYPICAL CROSS – SECTION (STA. NO. 0 ~ NO. 5)

Fig. A.11.3.1.3 Typical Cross-Section

Table A.11.3.1.1 Construction Cost

Items	Unit	Unit Cost	Quantities		Construction Cost (1000 ฿)	
			Segment A	Segment B	Segment A	Segment B
1. Site clearing	sq.m.	0.9	88,080	85,320	79	77
2. Embankment						
Frontage Road	cu.m.	250	34,920	32,400	8,730	8,100
Through lane	cu.m.	250	24,040	24,480	6,030	6,120
3. Pavement						
Frontage	sq.m.	490	11,640	10,800	5,704	5,292
Through lane	sq.m.	610	9,648	9,792	5,885	5,973
4. Drainage						
Frontage Road	m.	320	970	900	310	288
Through lane	m.	320	402	400	129	131
5. Bridge						
Ramp	sq.m.	12,000	1,650	1,650	19,800	19,800
Frontage	sq.m.	12,000	1,800	1,800	21,600	21,600
Through lane	sq.m.	20,000	27,500	26,400	550,000	528,000
6. Pedestrian	sq.m.	180	16,464	15,696	2,963	2,825
Total					621,230	598,206

Table A.11.3.1.2 Land Acquisition Cost

1) Segment A (1=1652)

	Distance (m.)	Width (m.)	Area (sq.m.)	Unit cost (฿/sq.m.)	Cost (1,000฿)
1*	50	80	40,000	5,000	20,000
2	150	80	12,000	3,000	36,000
3	300	80-50	19,500	1,000	19,500
4	300	50	15,000	1,000	15,000
5#	100	50	5,000	2,000	10,000
6	200	50	10,000	1,000	10,000
7	100	50-40	4,500	600	2,700
8	452	40	18,080	600	10,848
Total	1,652		88,080		124,048

2) Segment B (1=1608)

	Distance (m.)	Width (m.)	Area (sq.m.)	Unit cost (฿/sq.m.)	Cost (1,000฿)
1*	50	80	4,000	5,000	20,000
2	150	80	12,000	3,000	36,000
3	300	80-50	19,500	1,000	19,500
4	150	50	7,500	1,000	7,500
5#	100	50	5,000	2,000	10,000
6	250	50	12,500	1,000	12,500
7	100	50-40	4,500	600	2,700
8	508	40	20,320	600	12,192
Total	1,608		85,320		120,392

Note:
1* : Area along the MRR
5# : Area along Wutthakat Road
฿ : Thai Baht

Table A.11.3.1.3 Compensation Cost

1) Segment A

Type	Unit Cost (฿/sq.m)	Floor Area (sq.m)		Cost (1000 ฿)
1. Brick Build 1 storey	3,300	964	(6)*	3,181
2. Brick Build 2 storeys	3,000	10,576	(24)*	31,728
3. Brick Build 3-4 storeys	2,800	4,708	(9)*	13,182
4. Wooden House 1-2 storeys	1,200	25,804	(161)*	30,965
Total		42,052	(200)*	79,056

2) Segment B

Type	Unit Cost (฿/sq.m)	Floor Area (sq.m)		Cost (1000 ฿)
1. Brick Build 1 storey	3,300	3,820	(12)*	12,606
2. Brick Build 2 storeys	3,000	10,654	(29)*	31,962
3. Brick Build 3-4 storeys	2,800	6,662	(6)*	18,654
4. Wooden House 1-2 storeys	1,200	22,973	(153)*	27,568
Total		44,109	(200)*	90,790

Note: ( )* : Number of Building or Housing
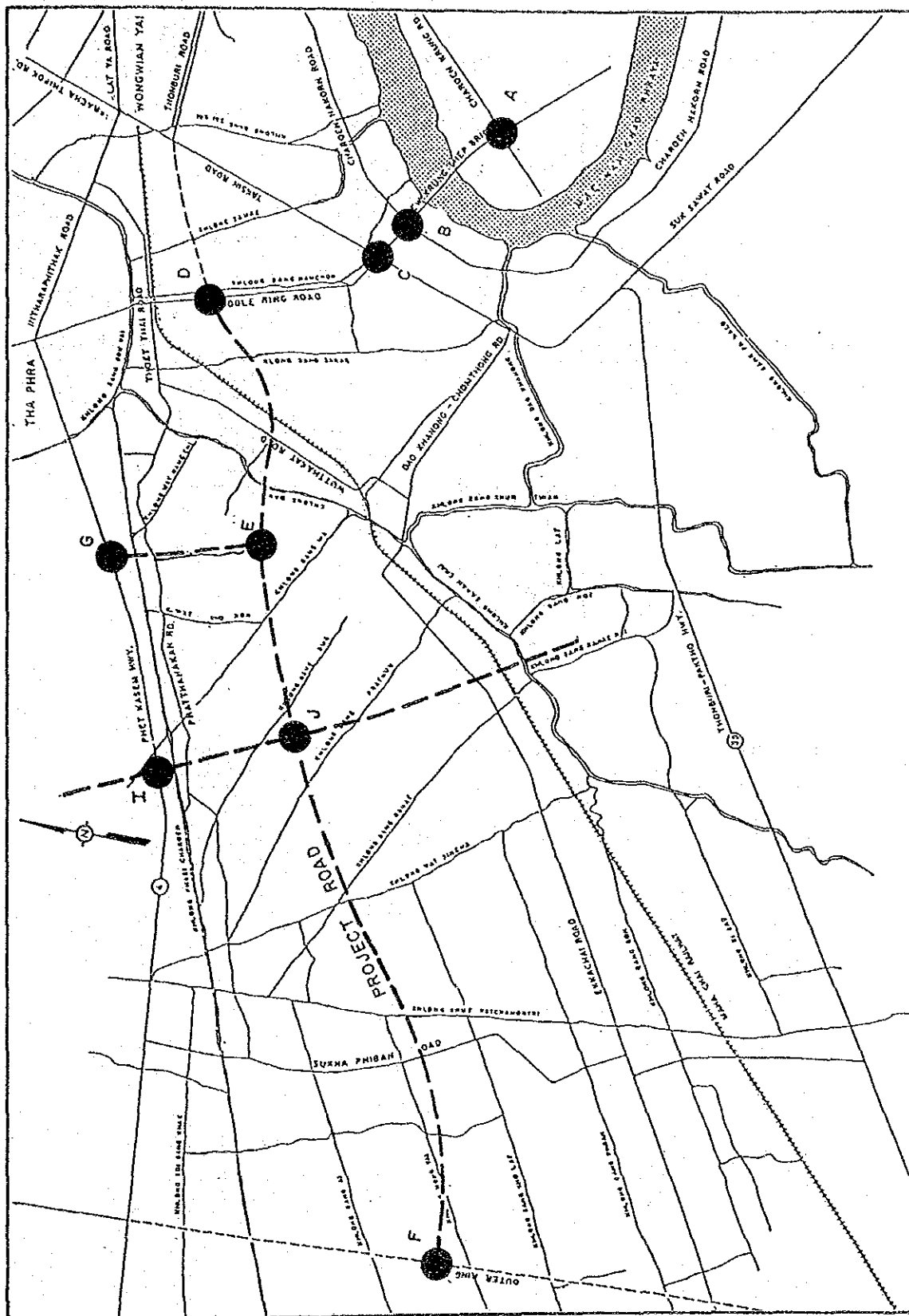
Locations of Intersections

Intersection "D" in 2001

a) Forecasted Traffic Volume (PCU/H)

Ⓑ

(6) 414
(5) 414
(4) 571
(3) 571
(2) 285
(1) 285

10 (1)
1160 (2)
Ⓐ 1160 (3)
1160 (4)
620 (5)
To ORR   620 (6)

MRR

To Taksin Br.

TRE Segment A

(6) 609
(5) 609
(4) 815
(3) 815   Ⓒ
(2) 815
(1) 19

428 (1)
428 (2)
720 (3)
720 (4)
648 (5)
648 (6)

Ⓓ

b) Calculation of Traffic Saturation Degree

Capacity and saturation degree

Section	Capacity(A) V/H	Future Traffic Volume(B) V/H	Saturation Degree B/A	Maximum Saturation Degree
A ① (1)	2000	10	0.005	
(2)	2200	1160	0.53	
(3)	2200	1160	0.53	
(4)	2200	1160	0.53	
② (5)	2000	620	0.31	
(6)	2000	620	0.31	
B ③ (1)	2000	285	0.14	
(2)	2000	285	0.14	
(3)	2200	571	0.26	
(4)	2200	571	0.26	
④ (5)	2000	414	0.21	
(6)	2000	414	0.21	
C ① (1)	2000	19	0.095	Phase1 0.53
(2)	2200	815	0.37	Phase2 0.31
(3)	2200	815	0.37	Phase3 0.33
(4)	2200	815	0.37	Phase4 0.32
② (5)	2000	609	0.30	
(6)	2000	609	0.30	1.49
D ③ (1)	2000	428	0.21	
(2)	2000	428	0.21	
(3)	2200	720	0.33	
(4)	2200	720	0.33	
④ (5)	2000	648	0.32	
(6)	2000	648	0.32	
Total				1.49 > 1.0

Intersection "D" in 2011

a) Forecasted Traffic Volume (PCU/H)

b) Calculation of Traffic Saturation Degree

Capacity and saturation degree

Section		Capacity(A) V/H	Future Traffic Volume(B) V/H	Saturation Degree B/A	Maximum Saturation Degree
A	① (1)	2000	8	0.004	
	(2)	2200	1203	0.55	
	(3)	2200	1203	0.55	
	(4)	2200	1203	0.55	
	② (5)	2000	615	0.31	
	(6)	2000	615	0.31	
B	③ (1)	2000	312	0.16	
	(2)	2000	312	0.16	
	(3)	2200	584	0.27	
	(4)	2200	584	0.27	
	④ (5)	2000	389	0.19	
	(6)	2000	389	0.19	
C	① (1)	2000	20	0.01	Phase1 0.55
	(2)	2200	768	0.35	Phase2 0.31
	(3)	2200	768	0.35	Phase3 0.51
	(4)	2200	768	0.35	Phase4 0.30
	② (5)	2000	599	0.30	
	(6)	2000	599	0.30	1.67
D	④ (1)	2000	531	0.27	
	(2)	2000	531	0.27	
	(3)	2200	1122	0.51	
	(4)	2200	1122	0.51	
	⑤ (5)	2000	591	0.30	
	(6)	2000	591	0.30	
Total					1.67 > 1.0

Intersection "D" in 2011 (with MRR Flyover)
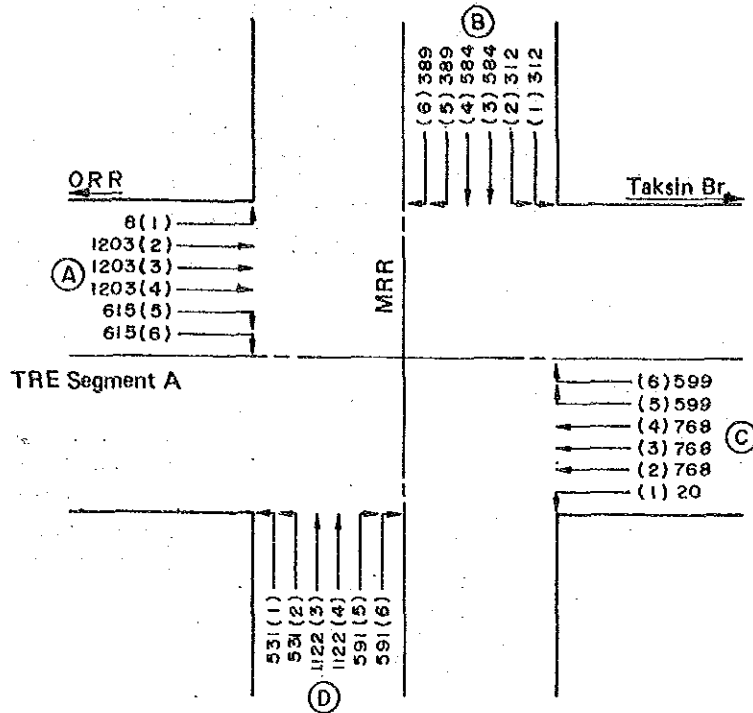
a) Forecasted Traffic Volume (PCU/H)

b) Calculation of Traffic Saturation Degree

Capacity and saturation degree

Section	Capacity(A) V/H	Future Traffic Volume(B) V/H	Saturation Degree B/A	Maximum Saturation Degree
A ① (1)	2000	8	Free	
(2)	2200	10	0.01	
② (3)	2000	615	0.31	
(4)	2000	615	0.31	
B (1)	2000	312	Free	
(2)	2000	312	Free	
③ (3)	2200	292	0.13	
(4)	2200	292	0.13	
(5)	2200	292	0.13	
(6)	2200	292	0.13	
④ (7)	2000	389	0.19	
(8)	2000	389	0.19	
C ① (1)	2000	20	Free	
(2)	2200	20	0.01	
② (3)	2000	599	0.30	
(4)	2000	599	0.30	
D (1)	2000	531	Free	Phase1 0.01
(2)	2000	531	Free	Phase2 0.31
③ (3)	2200	748	0.34	Phase3 0.19
(4)	2200	748	0.34	Phase4 0.34
(5)	2200	748	0.34	------------
(6)	2000	591	0.30	0.85
④ (7)	2000	591	0.30	
Total				0.85 > 1.0

Intersection "E" in 2011
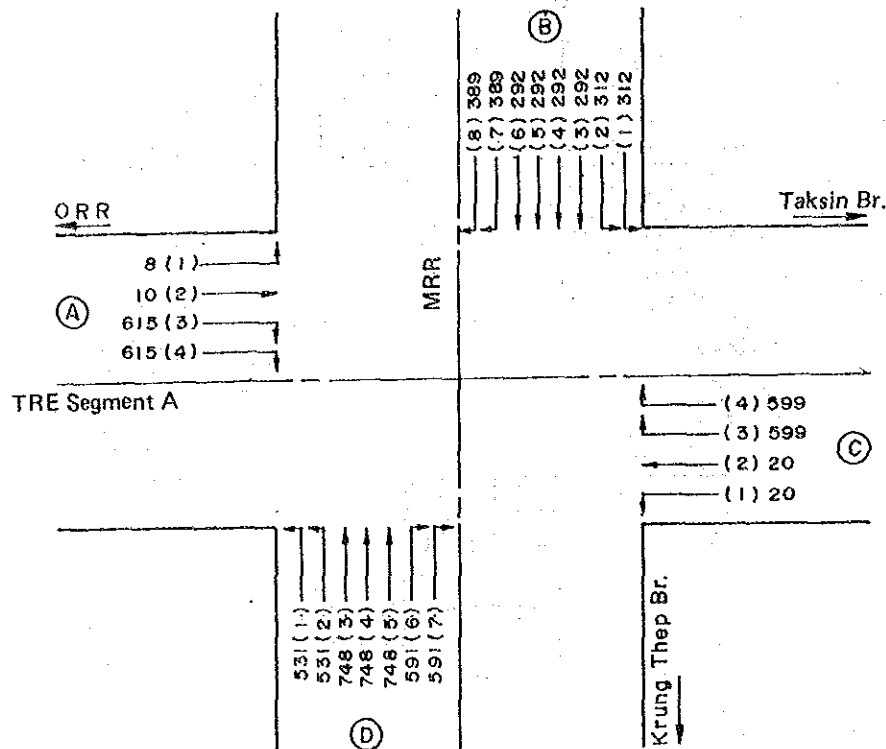
a) Forecasted Traffic Volume (PCU/H)

b) Calculation of Traffic Saturation Degree

Capacity and saturation degree

Section		Capacity(A) V/H	Future Traffic Volume(B) V/H	Saturation Degree B/A	Maximum Saturation Degree	
A ①	(1)	2000	97	0.05		
	(2)	2200	662	0.30		
	(3)	2200	662	0.30		
	(4)	2200	662	0.30		
	(5)	2200	662	0.30		
B ③	(1)	2000	678	0.34	Phase1	0.30
	(2)	2000	678	0.34	Phase2	0.36
	(3)	2000	678	0.34	Phase3	0.34
	(4)	2000	20	0.04		
						1.00
C ①	(1)	2200	891	Free		
	(2)	2200	891	Free		
②	(3)	2000	721	0.36		
	(4)	2000	721	0.36		
	(5)	2000	721	0.36		
Total					1.00 = 1.0	

Intersection "F" in 2011
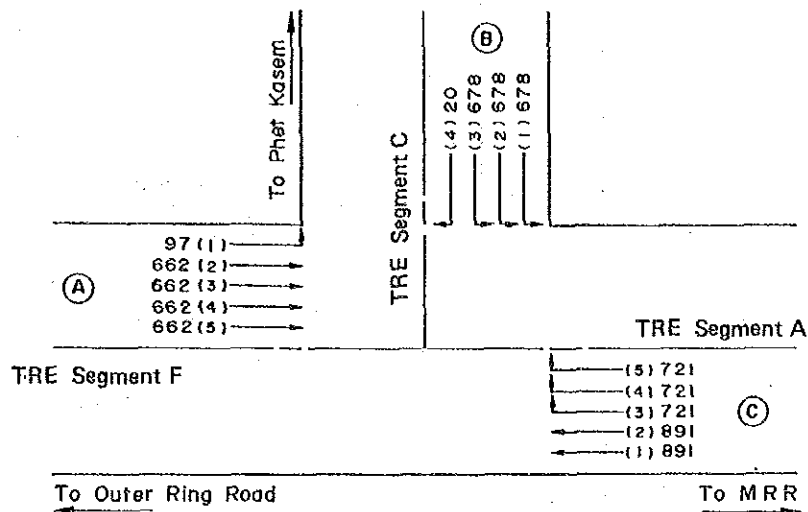
a) Forecasted Traffic Volume (PCU/H)

b) Calculation of Traffic Saturation Degree

Capacity and saturation degree

Section		Capacity(A) V/H	Future Traffic Volume(B) V/H	Saturation Degree B/A	Maximum Saturation Degree	
A ①	(1)	2000	322	0.16		
	(2)	2000	322	0.16		
	(3)	2200	548	0.25		
	(4)	2200	548	0.25		
B ③	(1)	2000	10	0.01	Phase1	0.22
	(2)	2000	15	0.01	Phase2	0.07
	(3)	2000	15	0.01	Phase3	0.01
C ①	(1)	2200	480	0.22		0.30
	(2)	2200	480	0.22		
②	(3)	2000	135	0.07		
Total					0.30 < 1.0	

Intersection "G" in 2011

a) Forecasted Traffic Volume (PCU/H)

Phet Kasem Highway

772(1) ──────►
772(2) ──────►
Ⓐ
749(3) ──────
749(4) ──────

To Bangkok

To West of BMR

◄─────(3)697
◄─────(2)697   Ⓑ
┌─────(1)20

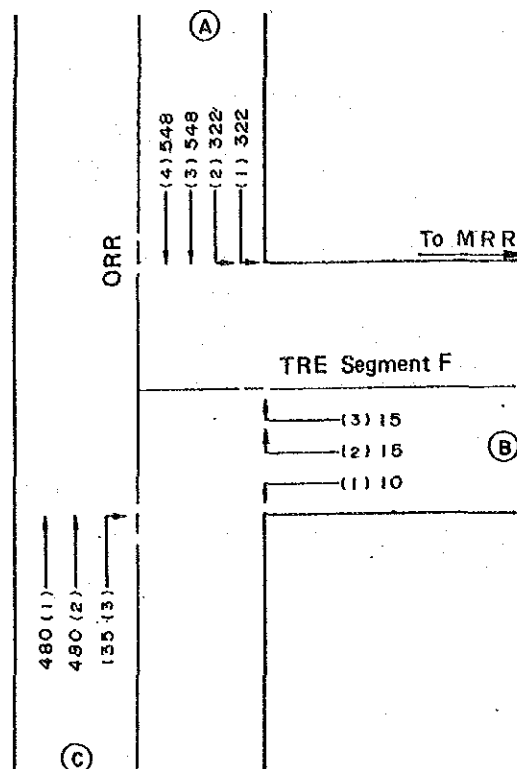652(1) 652(2) 491(3) 491(4)

Ⓒ

TRE Segment C

b) Calculation of Traffic Saturation Degree

Capacity and saturation degree

Section		Capacity(A) V/H	Future Traffic Volume(B) V/H	Saturation Degree B/A	Maximum Saturation Degree
A ①	(1)	2200	772	0.35	
	(2)	2200	772	0.35	
②	(3)	2200	749	0.37	
	(4)	2000	749	0.37	
B ①	(1)	2000	20	0.01	Phase1 0.35
	(2)	2200	697	0.32	Phase2 0.37
	(3)	2200	697	0.32	Phase3 0.32
C ③	(1)	2000	652	0.32	1.04
	(2)	2000	652	0.32	
	(3)	2000	491	0.25	
	(4)	2000	491	0.25	
Total					1.04 > 1.0

Intersection "I" in 2011
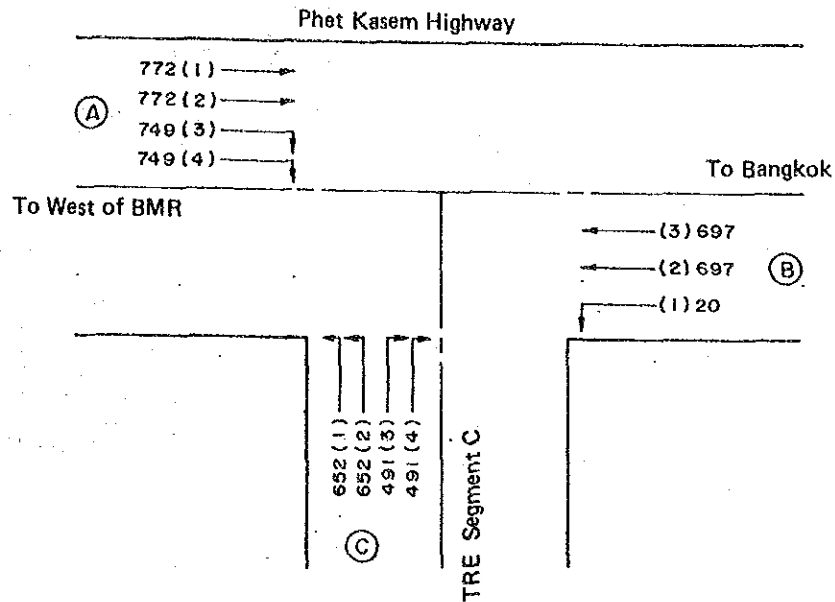
a) Forecasted Traffic Volume (PCU/H)

b) Calculation of Traffic Saturation Degree

Capacity and saturation degree

Section	Capacity(A) V/H	Future Traffic Volume(B) V/H	Saturation Degree B/A	Maximum Saturation Degree
A ① (1)	2000	86	0.04	
(2)	2200	969	0.44	
(3)	2200	969	0.44	
② (4)	2000	342	0.17	
(5)	2000	342	0.17	
B ③ (1)	2000	571	0.29	
(2)	2000	571	0.29	
(3)	2200	741	0.34	
(4)	2200	741	0.34	
④ (5)	2000	87	0.04	
C ① (1)	2000	135	0.07	Phase1 0.44
(2)	2200	815	0.37	Phase2 0.17
(3)	2200	815	0.37	Phase3 0.34
(4)	2200	815	0.37	Phase4 0.04
② (5)	2000	125	0.06	
				0.99
D ③ (1)	2000	638	0.32	
(2)	2000	638	0.32	
(3)	2200	558	0.25	
(4)	2200	558	0.25	
④ (5)	2000	77	0.04	
Total				0.99 < 1.0

"J" Intersection

a) Forecasted Traffic Volume in 2011 (PCU/H)

Ⓑ

IMRR

(5) 51
(4) 547
(3) 547
(2) 574
(1) 574

ORR   MRR

241 (1)
Ⓐ 500 (2)
500 (3)
208 (4)

TRE Segment F

(5) 608
(4) 608
(3) 172   Ⓒ
(2) 172
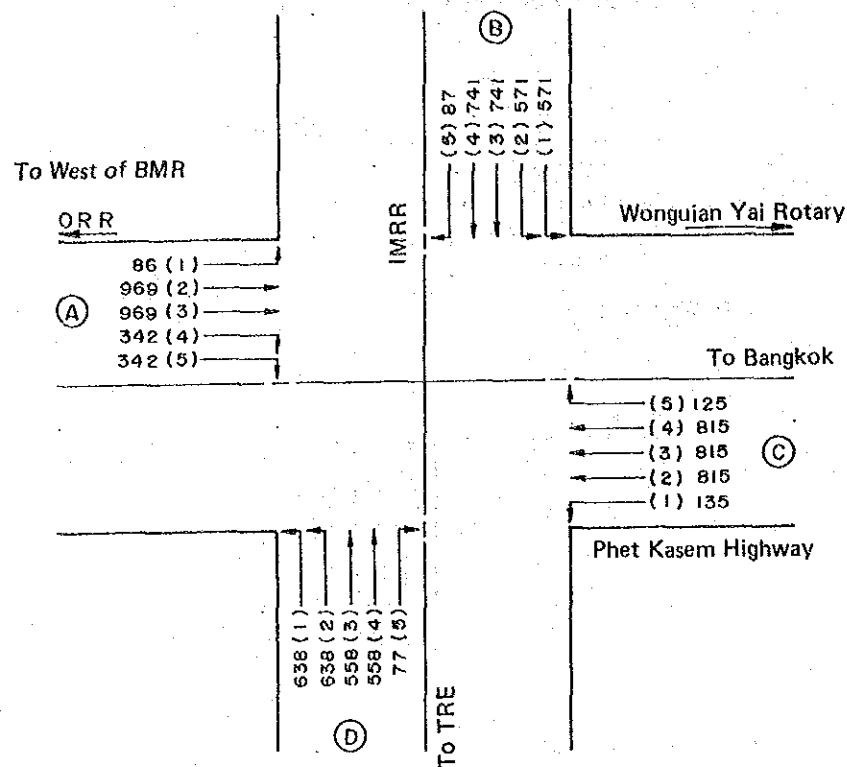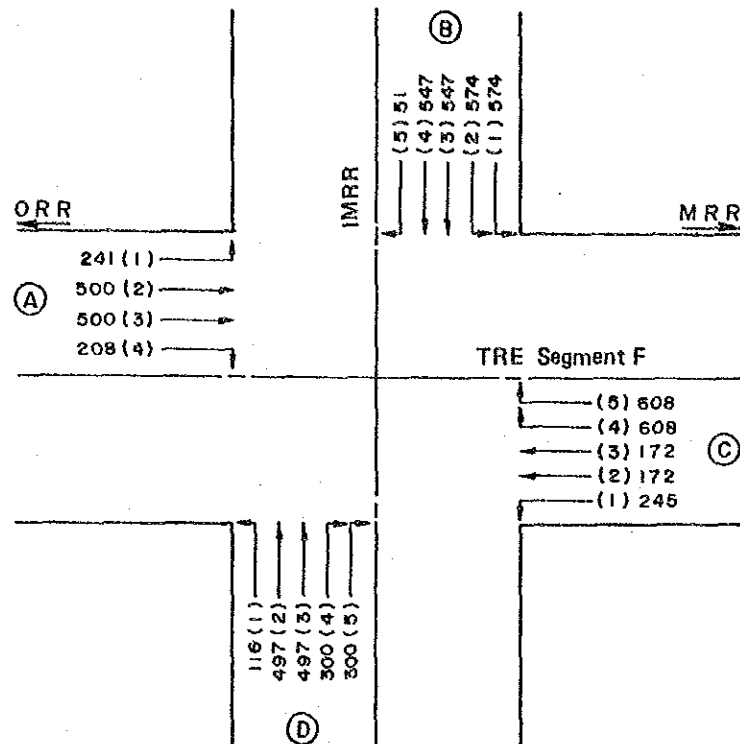(1) 245

116 (1)
497 (2)
497 (3)
300 (4)
300 (5)

Ⓓ

b) Calculation of Traffic Saturation Degree

Capacity and saturation degree

Section	Capacity(A) V/H	Future Traffic Volume(B) V/H	Saturation Degree B/A	Maximum Saturation Degree
A ① (1)	2000	241	0.12	
(2)	2200	500	0.23	
(3)	2200	500	0.23	
② (4)	2000	208	0.10	
B (1)	2000	574	0.29	
③ (2)	2000	574	0.29	
(3)	2200	547	0.25	
(4)	2200	547	0.25	
④ (5)	2000	51	0.03	
C ① (1)	2000	245	0.12	Phase1 0.23
(2)	2200	172	0.08	Phase2 0.30
(3)	2200	172	0.08	Phase3 0.29
② (4)	2000	608	0.30	Phase4 0.15
(5)	2000	608	0.30	
				0.97
D ③ (1)	2000	116	0.06	
(2)	2200	497	0.23	
(3)	2200	497	0.23	
④ (4)	2000	300	0.15	
(5)	2000	300	0.15	
Total				0.97 < 1.0

Appendix 12.1.2   Comments of Intersection Between TRE and MRR

Intersection Between Thonburi Road Extension (TRE)
And Middle Ring Road (MRR)

1. General

Existing Thonburi Road which connects Taksin Bridge and Taksin Road was constructed in 1982 by PWD.

At present, the detailed design of distance between the existing Taksin Road and MRR is conducted also by PWD. The Project Road is to be linked to the above mentioned TRE, and possibly connected to Phet Kasem and Outer Ring Road. The main purpose of this section is defined the difference of design between the Project Road and TRE Project.

2. Outline of the intersection design

1) TRE Project (refer to Fig. A 12.1.2.1)
   Outline of the intersection design on TRE Project are described belows:

   * At grade intersection was adopted.
   * Three legs intersection type was adopted.
   * Grade separated intersection was considered as future plan.

2) The Project Road (refer to Fig.A 12.1.2.2)
   Outline of the intersection design on the Project Road are described belows:

   * Grade separated intersection was adopted.
   * Four legs intersection type was adopted.

3. Comments of this intersection

1) Considering the characteristics and function of MRR and TRE, traffic saturation degree on the intersection, this intersection should be constructed as grade separated intersection.

2) 78.45 m right of way on approach section of TRE is prepared. It is rightfully width, howefer, when TRE and the Project Road will be constructed on the same time, the right of way on approach section of TRE can be reduced as shown in Fig.A 12.1.2.3.

Fig. A.12.1.2.1 Intersection Design on TRE Project

Labels (plan view):

- CURB MARKING TYPE 2
- CONC. CURB & GUTTER TYPE A WITH CURB MARKING AND 0.10 WHITE SOLID LINE W/ROAD STUDS @ 2.00 AROUND ISLAND
- 1.00 M. MARKING & 3.00 M. SPACE
- 1.00 M. MARKING & 5.00 M. SPACE
- PROPOSED R/W
- SIDEWALK
- 0.10 WHITE SOLID LINE
- CONC. CURB & GUTTER TYPE A
- 0.10 YELLOW SOLID LINE
- DETECTOR
- CHEVRON MARKING W/ROAD STUDS
- CONC. BARRIER
- CONC. CURB & GUTTER TYPE A WITH CURB MARKING AND 0.10 WHITE SOLID LINE AROUND ISLAND
- 0.10 YELLOW SOLID LINE
- 0.10 WHITE SOLID LINE
- PROPOSED R/W
- 1.00 M. MARKING & 3.00 M. SPACE
- 1.00 M. MARKING & 5.00 M. SPACE
- CONC. CURB & GUTTER TYPE A
- CURB MARKING TYPE 2
- DETECTOR
- LIMIT OF ROAD AND CURB MARKINGS
- DETECTOR
- DETECTOR
- 0.10 YELLOW SOLID LINE
- CURB MARKING TYPE 1 W/ROAD STUDS @ 2.00
- CONC. CURB & GUTTER TYPE A
- SIDEWALK
- 0.10 WHITE SOLID LINE
- CURB MARKING TYPE 1 W/ROAD STUDS @ 2.00
- CONC. CURB & GUTTER TYPE A
- 0.10 YELLOW SOLID LINE
- LIMIT OF ROAD AND CURB MARKINGS
- DOWELLED CURB

STAGE/PHASE ALLOCATION AND STAGE SEQUENCE DIAGRAM

STAGE SEQUENCE

NOTE :
- ☑ = YES
- ☒ = NO
- F : FROM STAGE
- T : TO STAGE

LEGEND :
- 2 — PEDESTRIAN SIGNAL HEADS (PD)
- 3 — SIGNAL HEADS (S1)
- 3 — SIGNAL HEADS WITH LEFT ON GREEN ARROW (S3)
- 3 — SIGNAL HEADS WITH ADDITIONAL RIGHT ON GREEN ARROW SIGNAL HEAD (S4)
- STANDARD POLE
- POLE WITH MAST ARM
- CONTROLLER

TRAFFIC LIGHT SIGNAL EQUIPMENT SCHEDULE

LOCATIONS	MATERIAL QUANTITY AT EACH LOCATION										TOTAL
MATERIAL CODES	1	2	3	4	5	6	7	8	9	10	
P 1			1								1
F 1			1								1
P 2	1	1		1	1	1	1	1	1	1	9
F 2	1	1		1	1	1	1	1	1	1	9
P D	1	1									2
S 1	1		1	1	2	1	1	1	2		10
S 2											—
S 3										1	1
S 4			1			1					2
TRAFFIC SIGNALS CONTROLLER	9 CONTROL CIRCUITS										1 SET

NOTES

1. CONTROLLER, SIGNAL HEADS AND POLES SHOWN IN THE DRAWING ARE RELOCATED FROM TAKSIN INTERSECTION. DRAWPITS, CONDUITS, SIGNAL CABLES, PEDESTRIAN SIGNAL HEADS, DETECTORS, FOUNDATIONS, GROUND RODS AND ALL NECESSARY REPLACEMENTS, REPAIRS, AND MODIFICATIONS SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR AS DIRECTED BY THE ENGINEER.
2. THE CONTRACTOR SHALL PROVIDE CABLE DRAW PITS AT SUITABLE LOCATIONS IN ACCORDANCE WITH MEA'S REGULATIONS.
3. THE CONTRACTOR SHALL PROVIDE TRAFFIC SIGNALS CABLE IN ACCORDANCE WITH MANUFACTURER STANDARDS.
4. THE CONTRACTOR SHALL PROVIDE CAR DETECTOR AT A SUITABLE POSITION OR AS INDICATED ON THIS DRAWING. CONTRACTOR SHALL PROVIDE CONDUIT AND CABLE FROM CAR DETECTOR TO TRAFFIC SIGNAL CONTROLLER.
5. THE CONTRACTOR SHALL INSTALL TRAFFIC SIGNALS CONTROLLER ON CONCRETE FOUNDATION AS INDICATED ON DWG. NO. E - 7. LEVEL OF CONCRETE FOUNDATION SHALL BE AS DIRECTED BY ENGINEER DURING THE CONSTRUCTION PERIOD.
6. THE CONTRACTOR SHALL SUBMIT SHOP DRAWINGS TO ENGINEER FOR APPROVAL.
7. FOR ROAD MARKINGS AND CURB MARKINGS, SEE DWG NO. HM-3.

REDUCED TO HALF SCALE

SCALE 1:500

KINGDOM OF THAILAND
MINISTRY OF INTERIOR - PUBLIC WORKS DEPARTMENT

TRE — THE THONBURI ROAD EXTENSION PROJECT

RATCHADA PHISEK INTERSECTION SIGNALS & MARKINGS

DESIGNED
DRAWN
CHECKED
SCALE: AS SHOWN
DATE: SEP. 1992
SUBMITTED BY: PROJECT MANAGER

REVISION	DATE	CHECKED

ASIAN ENGINEERING CONSULTANTS CORP. LTD.

DWG NO H-22 SHEET NO 32

MASS TRANSIT

FLYOVER   FLYOVER

FRONTAGE
ROAD

FRONTAGE
ROAD

R/W = 78.10

N

SECTION D-D
SCALE 1 : 500

R/W = 40.00

EXISTING R/W
SIDEWALK
FRONTAGE ROAD

SIDEWALK
FRONTAGE ROAD
ON RAMP WAY

TO SATHON BRIDGE
STA.-4

FUTURE MASS TRANSIT SPACE
STA.-3

STA.-2

STA.-1

STA.0
(2+583.5)

FUTURE MASS TRANSIT SPACE
STA.+1

TO OUTER RING ROAD
STA.+2

FRONTAGE ROAD

OFF RAMP WAY
FRONTAGE ROAD

SIDEWALK
EXISTING R/W

PROPOSED R/W

TO KRUNG THEP BRIDGE
MIDDLE RING ROAD

BUSH

PROPOSED R/W

COCONUT PLANTATION

TO THA PHRA
MIDDLE RING ROAD

SECTION B-B
SCALE 1 : 500

R/W = 40.00

SECTION C-C
SCALE 1 : 500

R/W = 40.00

MASS TRANSIT

ON RAMP   FLYOVER

FLYOVER   OFF RAMP

FRONTAGE ROAD

FRONTAGE ROAD

R/W = 90.00

SECTION E-E
SCALE 1 : 500

0 5 10 15 20 25 30 40 50 M.
GRAPHIC SCALE 1 : 500

0 10 20 30 50 75 100 M.
GRAPHIC SCALE 1 : 1000

PLAN

KEY MAP

TRANSITION SLAB 50.00   ABUTMENT STRUCTURE

VCL.= 100 M. R = 2,500 M.

PC T BEAM 6@25.00 = 150.00

2-SPAN CONTINUOUS STEEL BOX GIRDER
32.00+43.00 = 75.00

PC T BEAM

VCL.= 160 M., R = 4,000 M.

+ 15.00 M.

+ 10.00 M.

+ 5.00 M.

± 0.00 M.

4.0 %

(MRR)

5.00

GIRDER DEPTH

STA. 0
(2+583.50)

VERTICAL SCALE
0 5 10 15 30 M.

HORIZONTAL SCALE
0 10 20 30 40 50 100 M.

Fig. A.12.1.2.2   Intersection Design on the
Project Road

PROFILE

℄

64.00

12.00   —0.50   9.75   19.50   0.50   9.75   12.00

6.00   6.00   1.50   16.50   1.50   6.00   6.00

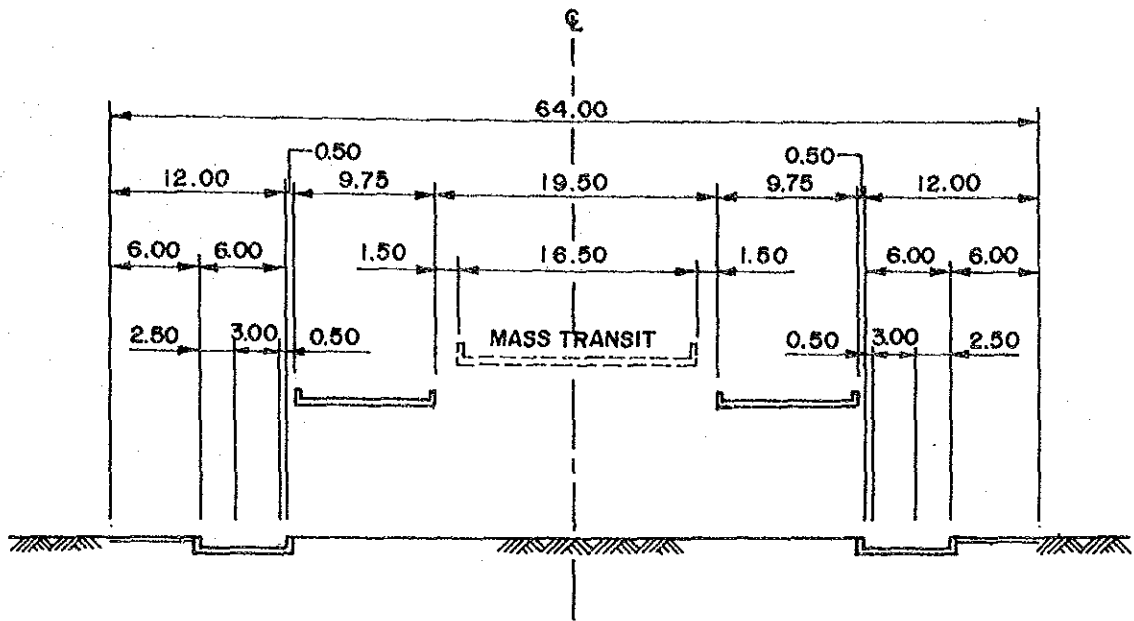2.50   3.00   0.50   MASS TRANSIT   0.50   3.00   2.50

Fig. A.12.1.2.3   Typical Cross-Section

Appendix 12.2.1   Thonburi Road Extension Project Construction Cost

Table A 12.2.1 (1) Thonburi Road Extension Project

Financial/Economic Construction Cost Table

(Segment A & C)

Item No.	Work Item	Unit	Quantity	Financial Unit Price	Component (%)			Financial Amount	Economic Amount
					F	L	Tax		
	1. MRR Flyover								
B-3	Precast PC Pile 60 cm dia	m	8,300	1,559	22.5	77.5	13.3	12,939,700	11,218,000
B-4	Precast RC Pile 22 x 22 sq. cm	m	2,300	856	32.6	67.4	11.3	1,968,800	1,746,000
B-2	Bridge Excavation	cu.m	3,400	251	51.0	49.0	16.3	853,400	714,000
B-6	Concrete of Substructure	cu.m	1,700	1,508	11.3	88.7	4.3	2,563,600	2,452,000
B-20	Concrete of Road structure	cu.m	1,800	1,477	10.6	89.4	2.9	2,658,600	2,581,000
B-8	Formwork for Substructure	sq.m	7,300	551	58.1	41.9	9.8	4,022,300	3,628,000
B-9	Re-bar for Substructure	ton	500	12,577	62.0	38.0	12.6	6,288,500	5,496,000
B-18	PC Concrete for T Beam Bridge	cu.m	1,200	5,141	35.6	64.4	9.4	6,169,200	5,589,000
B-15	Re-bar for Superstructure	ton	200	13,115	61.8	38.2	12.7	2,623,000	2,289,000
B-19	PC Tendon for T Beam Bridge	ton	70	58,239	22.4	77.6	8.7	4,076,730	3,722,000
B-33	Supply & Erection of Steel Girder	ton	300	42,473	40.4	59.6	6.8	12,741,900	11,875,000
P-14	Concrete for Steel Bridge Slab	cu.m	350	1,472	8.4	91.6	1.4	515,200	507,000
P-6	Forms for Steel Bridge Slab	sq.m	1,300	459	49.7	50.3	10.0	596,700	537,000
B-28	Bearing, Neoprene	Each	96	11,671	69.6	30.4	12.2	1,120,416	983,000
B-27	Bearing, Cast Iron	ton	10	130,567	67.6	32.4	12.7	1,305,670	1,139,000
B-29	Concrete Curb & Railing	m	1,240	1,816	22.8	77.2	4.9	2,251,840	2,141,000
R-8	Bridge Wearing Course	sq.m	4,805	197	20.3	79.7	8.6	946,585	865,000
R-3	Embankment, Sand	cu.m	1,000	283	46.8	53.2	12.0	283,000	249,000
R-6	Main Carriageway Pavement	sq.m	1,000	564	15.6	84.4	4.1	564,000	540,000
R-7	Frontage Road Pavement	sq.m	1,500	448	16.5	83.5	4.5	672,000	641,000
B-25	Expansion Joint, Rubber	m	16	9,220	65.8	34.2	12.8	147,520	128,000
B-26	Expansion Joint, Cut Off	m	120	8,107	67.5	32.5	12.1	972,840	855,000
R-11	Curb & Gutter	m	1,500	409	21.3	78.7	7.6	613,500	566,000
R-12	Curb Stone	m	850	111	15.3	84.7	7.7	94,350	87,000
R-10	Island Block	sq.m	200	193	30.1	69.9	8.8	38,600	35,000
R-24	Lane Marking	sq.m	400	70.0	67.7	32.3	13.1	28,000	24,000
R-26	Bridge Lighting Pole	Each	20	28,806	30.8	69.2	5.3	576,120	545,000
	Subtotal				36.7	63.3	9.6	67,632,071	61,152,000

Financial/Economic Construction Cost Table

(Segment A & C)

Item No.	Work Item	Unit	Quantity	Financial Unit Price	Component (%)			Financial Amount	Economic Amount
					F	L	Tax		
	2. Segment A	km	1.9						
R-1	Clearing & Grubbing	sq.m	134,380	48.0	33.8	66.2	12.3	6,450,240	5,656,000
R-3	Embankment, Sand	cu.m	173,354	283	46.8	53.2	12.0	49,059,182	43,172,000
R-4	Side Ditch Excavation	cu.m	4,770	54.4	46.1	53.9	16.2	259,488	217,000
R-13	Drainage, Box 3.0 x 3.0 x 2	m	26	19,867	20.7	79.3	4.7	516,542	492,000
R-18	Drainage, Pipe ø 1.50	m	182	10,810	14.8	85.2	3.4	1,967,420	1,900,000
R-19	Drainage, Pipe ø 0.60	m	2,215	3,514	8.3	91.7	2.0	7,783,510	7,627,000
R-20	Drainage, Ditch U 0.5 x 0.5	m	2,225	1,746	8.6	91.4	2.0	3,884,850	3,807,000
R-21	Drainage, Ditch U 0.3 x 0.5	m	1,070	1,614	7.3	92.7	1.7	1,726,980	1,697,000
R-22	Drainage, Manhole	Each	185	12,453	14.4	85.6	3.2	2,303,805	2,230,000
R-5	Topsoil & Sodding	sq.m	16,910	17.5	0.0	100.0	0.6	295,925	294,000
R-6	Main Carriageway Pavement	sq.m	14,064	564	15.6	84.4	4.1	7,932,096	7,606,000
R-7	Frontage & Rampway Pavement	sq.m	13,320	448	16.5	83.5	4.5	5,967,360	5,698,000
R-8	Bridge Wearing Course	sq.m	32,535	197	20.3	79.7	8.6	6,409,395	5,858,000
R-9	Side Walk Block	sq.m	17,220	201	12.9	87.1	10.0	3,461,220	3,115,000
R-10	Island Block	sq.m	2,500	193	30.1	69.9	8.8	482,500	440,000
R-11	Curb & Gutter	m	6,065	409	21.3	78.7	7.6	2,480,585	2,292,000
R-23	Traffic Signs	Each	5	33,354	28.0	72.0	2.9	166,770	161,000
R-24	Lane Marking	sq.m	1,620	70.0	67.7	32.3	13.1	113,400	98,000
R-25	Traffic Signals	Each	7	208,535	27.8	72.2	2.9	1,459,745	1,417,000
R-26	Bridge Lighting Pole	Each	92	28,806	30.8	69.2	5.3	2,650,152	2,509,000
R-27	Road Lighting Pole	Each	23	27,993	29.9	70.1	5.3	643,839	609,000
B-3	Precast PC Pile 60 cm dia	m	64,260	1,559	22.5	77.5	13.3	100,181,340	86,857,000
B-4	Precast RC Pile 22 x 22 sq.cm	m	7,680	856	32.6	67.4	11.3	6,574,080	5,831,000
B-1	Structure Excavation	cu.m	21,350	197	44.2	55.8	17.8	4,205,950	3,457,000
B-6	Concrete of Substructure	cu.m	14,543	1,508	11.3	88.7	3.3	21,930,844	21,207,000
B-20	Concrete of Road Sturcture	cu.m	5,317	1,477	10.6	89.4	2.9	7,853,209	7,625,000
B-8	Formwork for Substructure	sq.m	42,357	551	58.1	41.9	9.8	23,338,707	21,051,000
B-9	Re-bar for Substructure	ton	2,599	12,577	62.0	38.0	12.6	32,687,623	28,568,000
B-18	PC Concrete for T Beam Bridge	cu.m	14,216	5,141	35.6	64.4	9.4	73,084,456	66,214,000
B-15	Re-bar of Superstructure	ton	1,691	13,115	61.8	38.2	12.7	22,177,465	19,360,000
B-19	PC Tendon for T Beam Bridge	ton	856	58,239	22.4	77.6	8.7	49,765,584	45,515,000
B-28	Bearing, Neoprene	Each	494	11,671	69.6	30.4	12.2	5,765,474	5,062,000
B-26	Expansion Joint, Cut Off	m	525	8,107	67.5	32.5	12.1	4,256,175	3,741,000
B-23	Guardrail, Single Leaf	m	1,230	419	27.0	73.0	3.1	515,370	499,000
B-29	Concrete Curb & Railing	m	5,230	1,816	22.8	77.2	4.9	9,497,680	9,032,000
B-31	Railing for Pedestrian	m	800	221	22.2	77.8	2.7	176,800	172,000
B-32	Noise Barrier	m	2,500	8,261	68.0	32.0	12.1	20,652,500	18,153,000
	Subtotal				35.0	65.0	10.1	488,756,261	439,239,000

Continued to 3. Segment C···

Table A 12.2.1 (3) Thonburi Road Extension Project

Financial/Economic Construction Cost Table

(Segment A & C)

Item No.	Work Item	Unit	Quantity	Financial Unit Price	Component (%) F	L	Tax	Financial Amount	Economic Amount
	3. Segment C	km	1.0						
R-1	Clearing & Grubbing	sq.m	68,295	48.0	38.8	61.2	12.3	3,278,160	2,874,000
R-3	Embankment, Sand	cu.m	45,537	283	46.8	53.2	12.0	12,886,971	11,340,000
R-4	Side Ditch Excavation	cu.m	4,270	54.4	46.1	53.9	16.2	232,288	196,000
R-18	Drainage, Pipe Ø 1.50	m	144	10,810	14.8	85.2	3.4	1,556,640	1,503,000
R-21	Drainage, Ditch U 0.3 x 0.5	m	578	1,614	7.3	92.7	1.7	932,892	917,000
R-5	Topsoil & Sodding	sq.m	6,155	17.5	0.0	100.0	0.6	107,712	107,000
R-6	Main Carriageway Pavement	sq.m	14,267	564	15.6	84.4	4.1	8,046,588	7,716,000
R-8	Bridge Wearing Course	sq.m	5,038	197	20.3	79.7	8.6	992,486	907,000
R-9	Side Walk Block	sq.m	5,575	201	12.9	87.1	10.0	1,120,578	1,008,000
R-10	Island Block	sq.m	1,800	193	30.1	69.9	8.8	347,400	316,000
R-11	Curb & Gutter	m	2,390	409	21.3	78.7	7.6	977,510	903,000
R-23	Traffic Sings	Each	3	33,354	28.0	72.0	2.9	100,062	97,000
R-24	Lane Marking	sq.m	895	70.0	67.7	32.3	13.1	62,650	54,000
R-25	Traffic Signals	Each	5	208,535	27.8	72.2	2.9	1,042,675	1,012,000
R-26	Bridge Lighting Pole	Each	22	28,806	30.8	69.2	5.3	633,732	600,000
R-27	Road Lighting Pole	Each	23	27,993	29.9	70.1	5.3	643,839	609,000
B-3	Precast PC Pile 60 cm dia	m	10,530	1,559	22.5	77.5	13.3	16,416,270	14,232,000
B-4	Precast RC Pile 22 x 22 sq.cm	m	6,136	856	32.6	67.4	11.3	5,252,416	4,658,000
B-1	Structure Excavation	cu.m	5,036	197	44.2	55.8	17.8	992,092	815,000
B-6	Concrete of Substructure	cu.m	1,367	1,508	11.3	88.7	3.3	2,061,436	1,993,000
B-20	Concrete of Road Structure	cu.m	3,396	1,477	10.6	89.4	2.9	5,015,892	4,870,000
B-8	Formwork for Substructure	sq.m	11,927	551	58.1	41.9	9.8	6,571,777	5,927,000
B-9	Re-bar for Substructure	ton	680	12,577	62.0	38.0	12.6	8,552,360	7,474,000
B-18	PC Concrete for T Beam Bridge	cu.m	1,730	5,141	35.6	64.4	9.4	8,893,930	8,057,000
B-15	Re-bar of Superstructure	ton	200	13,115	61.8	38.2	12.7	2,623,000	2,289,000
B-19	PC Tendon for T Beam Bridge	ton	108	58,239	22.4	77.6	8.7	6,289,812	5,742,000
B-28	Bearing, Neoprene	Each	120	11,671	69.6	30.4	12.2	1,400,520	1,229,000
B-26	Expansion Joint, Cut Off	m	165	8,107	67.5	32.5	12.1	1,337,655	1,175,000
B-23	Guardrail, Single Leaf	m	836	419	27.0	73.0	3.1	350,284	339,000
B-31	Railing for Pedestrian	m	836	221	22.2	77.8	2.7	184,756	179,000
	Subtotal				34.7	65.3	9.9	98,904,380	89,138,000
	Itemized Cost Total (1 + 2 + 3)				35.1	64.9	10.0	655,292,712	589,529,000
T-2	4. Temporary Works	L.S	1		42.4	57.6	15.4	167,040,000	141,315,000
	Direct Cost Total				36.6	63.4	11.1	822,332,712	730,844,000
H-2	5. Over Head	L.S	1		38.0	62.0	35.3	240,000,000	155,280,000
	Total Construction Cost				36.9	63.1	16.6	1,062,332,712	886,124,000
	Physical Contingency	%	about 7.5		36.9	63.1	16.6	77,667,288	64,774,000
	Total				36.9	63.1	16.6	1,140,000,000	950,898,000

Table A 12.2.1 (4)   Thonburi Road Extension Project
Financial/Economic Construction Cost Table

(Segment F)

Item No.	Work Item	Unit	Quantity	Financial Unit Price	Component (%)			Financial Amount	Economic Amount
					F	L	Tax		
	6. Segment F	km	6.5						
R-1	Clearing & Grubbing	sq.m	454,110	48.0	38.8	61.2	12.3	21,797,280	19,116,000
R-3	Embankment, Sand	cu.m	575,551	283	46.8	53.2	12.0	162,880,933	143,335,000
R-4	Side Ditch Excavation	cu.m	38,790	54.4	46.1	53.9	16.2	2,110,176	1,768,000
R-14	Drainage, Box 3.0 x 3.0 x 1	m	86	19,867	20.7	79.3	4.7	1,708,562	1,628,000
R-14	Drainage, Box 3.0 x 3.0 x 2	m	141	37,767	20.8	79.2	4.7	5,325,147	5,074,000
R-15	Drainage, Box 3.0 x 3.0 x 3	m	121	54,011	20.9	79.1	4.8	6,535,331	6,221,000
R-16	Drainage, Box 4.0 x 4.0 x 2	m	73	50,692	24.4	75.6	5.4	3,700,516	3,500,000
R-18	Drainage, Pipe Ø 1.50	m	1,197	10,810	14.8	85.2	3.4	12,939,570	12,499,000
R-19	Drainage, Pipe Ø 0.60	m	90	3,514	8.3	91.7	2.0	316,260	309,000
R-21	Drainage, U 0.3 x 0.5	m	12,910	1,614	7.3	92.7	1.7	20,836,740	20,482,000
R-22	Drainage, Manhole	Each	6	12,453	14.4	85.6	3.2	74,718	72,000
R-5	Topsoil & Sodding	sq.m	73,500	17.5	0.0	100.0	0.6	1,286,250	1,278,000
R-6	Main Carriageway Pavement	sq.m	118,715	564	15.6	84.4	4.1	66,955,260	64,210,000
R-9	Side Walk Block	sq.m	68,207	201	12.9	87.1	10.0	13,709,607	12,338,000
R-11	Curb & Gutter	m	26,475	409	21.3	78.7	7.6	10,828,275	10,005,000
R-23	Traffic Signs	Each	6	33,354	28.0	72.0	2.9	200,124	194,000
R-24	Lane Marking	sq.m	3,545	70.0	67.7	32.3	13.1	248,150	215,000
R-25	Traffic Signals	Each	5	208,535	27.8	72.2	2.9	1,042,675	1,012,000
R-27	Road Lighting Pole	Each	55	27,993	29.9	70.1	5.3	1,539,615	1,458,000
	Subtotal				32.4	67.6	8.8	334,035,189	304,714,000
T-3	7. Temporary Works	L.S	1		26.0	74.0	13.0	46,000,000	40,020,000
	Direct Cost Total				31.6	68.4	9.3	380,035,189	344,734,000
H-3	8. Over Head	L.S	1		23.0	77.0	33.9	111,568,000	73,746,000
	Constructon Cost Total				29.7	70.3	14.9	491,603,189	418,480,000
	Physical Contingency	%	about 7.5		29.7	70.3	14.9	38,396,811	32,675,000
	Total				29.7	70.3	14.9	530,000,000	415,155,000
	Thonburi Road Extension								
	Itemized Cost Total (A, C & F)				34.2	65.8	9.3	989,327,901	894,243,000
	Temporary Works (A, C & F)				38.9	61.1	14.9	213,040,000	181,335,000
	Direct Cost Total				35.0	65.0	10.3	1,202,367,901	1,075,578,000
	Over Head (A, C & F)				33.2	66.8	34.9	351,568,000	229,026,000
	Total Project Cost				34.6	65.4	16.0	1,553,935,901	1,304,604,000
	Physical Contingency	%	about 7.5		34.6	65.4	16.0	116,064,099	97,449,000
	Total				34.6	65.4	16.0	1,670,000,000	1,402,053,000

Table A 12.2.2　Land Acquisition and Compensation for Thonburi Road Extension (1st stage, Segments A & C)

(Unit: Baht, October 1986 prices)

Location & Area	Financial Cost	Component (%)			Economic Cost
		F	L	Tax	
1) Land Acquisition					
Segment A					
Urban area (20,906.3 sq.wah)	142,685,156	–	100	4.8	135,890,625
Rural area (12,688.8 sq.wah)	53,292,750	–	100	4.8	50,755,000
Segment C					
Urban area (390 sq.wah)	2,457,000	–	100	4.8	2,340,000
Rural area (16,683.8 sq.wah)	70,071,750	–	100	4.8	66,735,000
Contingency (about 15%)	34,493,344	–	100	0.6	34,279,375
Subtotal	303,000,000	–	100	4.3	290,000,000
2) Building&Housing Compensation					
Segment A (28,600 sq.m)	67,575,000	–	100	4.8	64,380,000
Segment C (3,000 sq.m)	7,147,500	–	100	4.8	6,810,000
Contingency (about 25%)	21,277,500	–	100	2.2	20,810,000
Subtotal	96,000,000	–	100	4.2	92,000,000
Total	399,000,000	–	100	4.3	382,000,000

Table A 12.2.3 Land Acquisition and Compensation
for Thonburi Road Extension
(2nd stage, Segment F)

(Unit: Baht, October 1986 prices)

Location & Area	Financial Cost	Component (%)			Economic Cost
		F	L	Tax	
1) Land Acquisition					
Segment F1 Rural area (33,108.8 sq.wah)	69,528,375	–	100	4.8	66,217,500
Segment F2 & F3 Urban area (1,314.3 sq.wah)	6,923,437	–	100	4.8	6,593,750
Rural area (79,100 sq.wah)	124,582,500	–	100	4.8	118,650,000
Contingency (about 15%)	28,965,688	–	100	1.4	28,538,750
Subtotal	230,000,000	–	100	4.3	220,000,000
2) Building&Housing Compensation					
Segment F1 (2,500 sq.m)	6,300,000	–	100	4.8	6,000,000
Segment F2 & F3 (3,400 sq.m)	8,631,000	–	100	4.8	8,220,000
Contingency (about 30%)	4,069,000	–	100	7.1	3,780,000
Subtotal	19,000,000	–	100	5.2	18,000,000
Total	249,000,000	–	100	4.4	238,000,000

Appendix 13.1.1   Forecasted Traffic Volume in 1991, 2001 and 2011
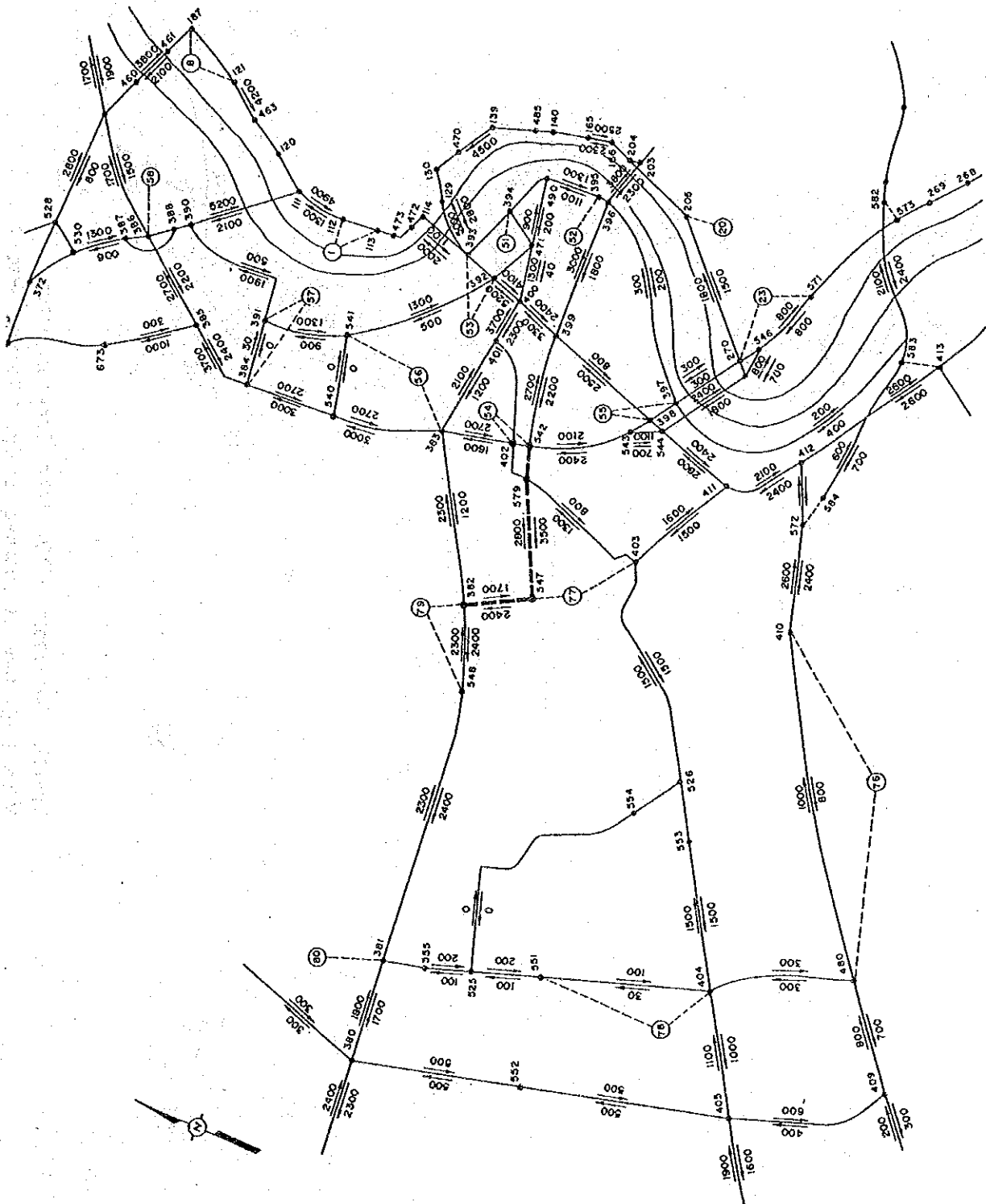
Traffic Forecasts 1991, With Thonburi Road
With High New Krungthep Bridge (Morning Peak)
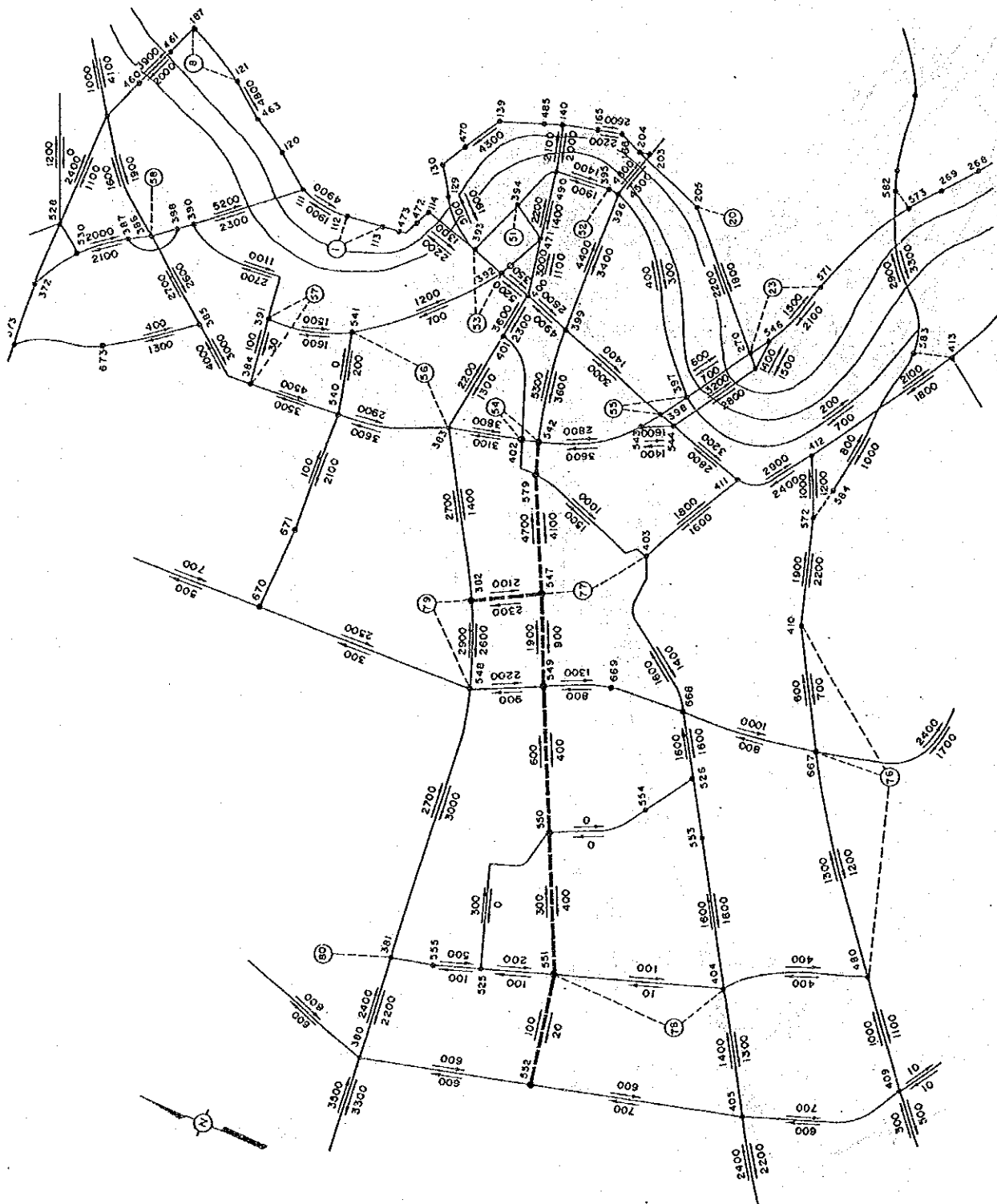
Traffic Forecasts 2001, With Thonburi Road
With High New Krungthep Bridge (Morning Peak)
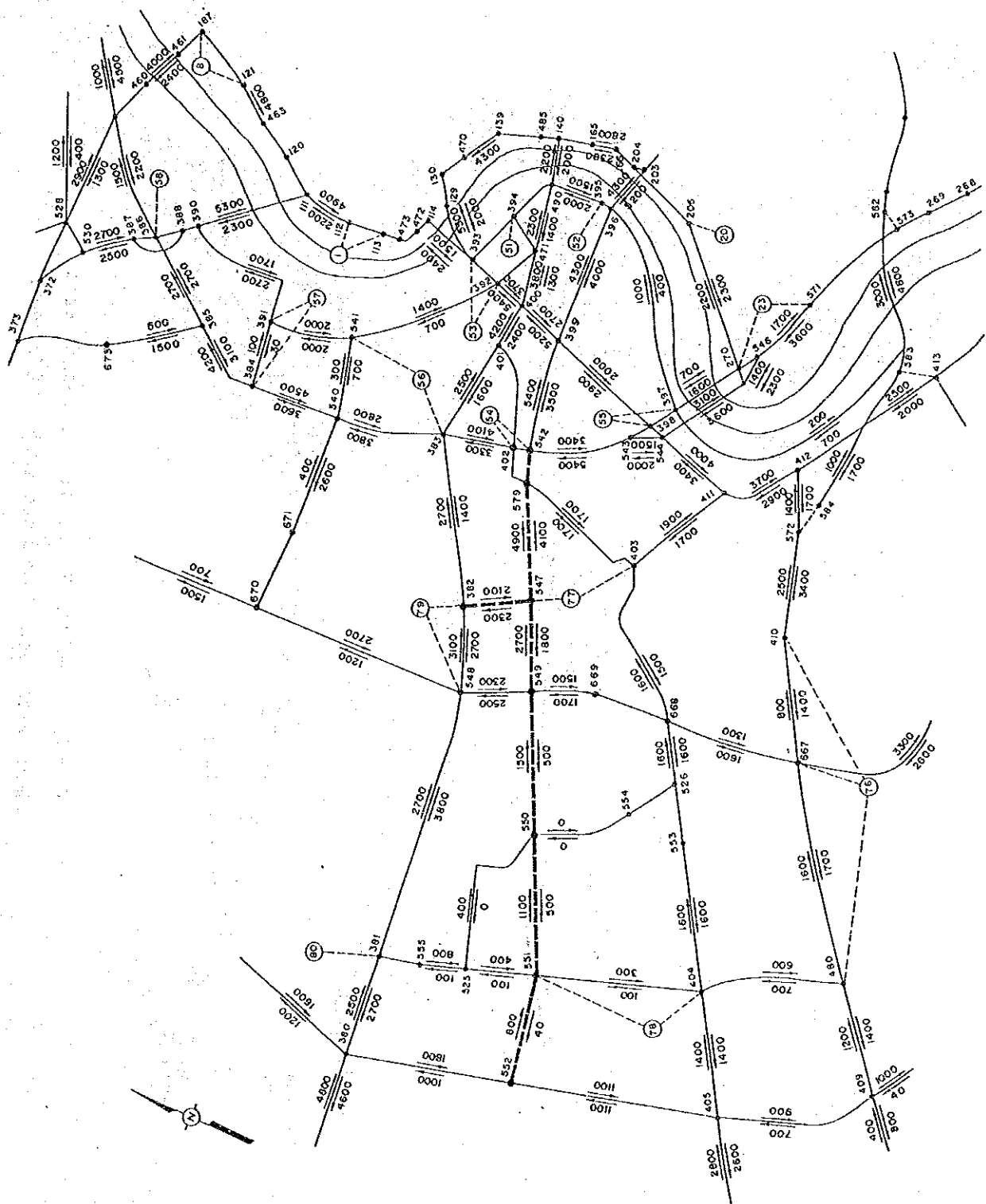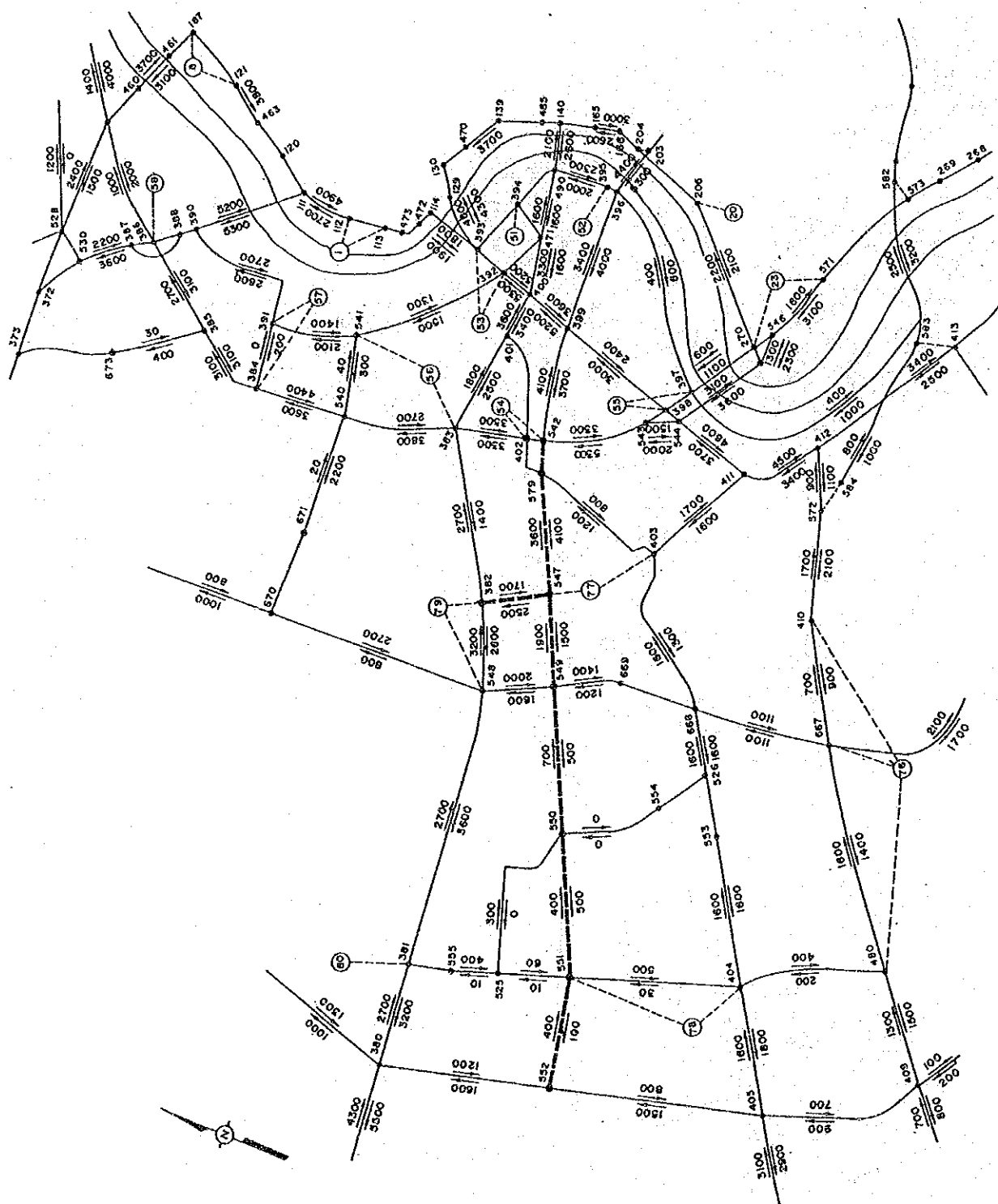
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Traffic Forecasts 2011, With Thonburi Road
With High New Krungthep Bridge (Morning Peak)

Traffic Forecasts 2011, With Thonburi Road
With High New Krungthep Bridge (Off Peak)

Appendix 13.1.2   Cost and Benefit Stream of Thonburi Road Extension

ECONOMIC EVALUATION

Thonburi Road Extension Project : Case 1

Discount Rate (%) = 12.0

UNIT : million Baht

YEAR	COST	BENEFIT	DISCOUNTED COST	DISCOUNTED BENEFIT
0	0.	0.	0.	0.
1	413.	0.	369.	0.
2	262.	0.	209.	0.
3	547.	0.	389.	0.
4	213.	0.	135.	0.
5	0.	1091.	0.	619.
6	0.	1108.	0.	561.
7	0.	1126.	0.	509.
8	0.	1144.	0.	462.
9	0.	1162.	0.	419.
10	0.	1179.	0.	380.
11	0.	1197.	0.	344.
12	0.	1215.	0.	312.
13	0.	1233.	0.	283.
14	0.	1250.	0.	256.
15	0.	1268.	0.	232.
16	0.	1152.	0.	188.
17	0.	1036.	0.	151.
18	0.	920.	0.	120.
19	0.	804.	0.	93.
20	0.	688.	0.	71.
21	0.	572.	0.	53.
22	0.	456.	0.	38.
23	0.	340.	0.	25.
24	0.	224.	0.	15.
25	-694.	108.	-41.	6.

NET PRESENT VALUE =   4073.
B/C RATIO =   4.83

IRR= 41.75

ECONOMIC EVALUATION

Thonburi Road Extension Project : Case 2

Discount Rate (%) =   12.0

UNIT : million Baht

			DISCOUNTED	
YEAR	COST	BENEFIT	COST	BENEFIT
0	0.	0.	0.	0.
1	662.	0.	591.	0.
2	398.	0.	317.	0.
3	754.	0.	537.	0.
4	343.	0.	218.	0.
5	1.	1131.	0.	642.
6	1.	1168.	0.	592.
7	1.	1204.	0.	545.
8	1.	1240.	0.	501.
9	1.	1276.	0.	460.
10	1.	1313.	0.	423.
11	1.	1349.	0.	388.
12	1.	1385.	0.	355.
13	1.	1421.	0.	326.
14	1.	1458.	0.	298.
15	1.	1494.	0.	273.
16	1.	1357.	0.	221.
17	1.	1221.	0.	178.
18	1.	1084.	0.	141.
19	1.	947.	0.	110.
20	1.	810.	0.	84.
21	1.	674.	0.	62.
22	1.	537.	0.	44.
23	1.	400.	0.	30.
24	1.	264.	0.	17.
25	-1023.	127.	-60.	7.

NET PRESENT VALUE =   4092.
B/C RATIO =   3.55

IRR=   33.40

ECONOMIC EVALUATION

Thonburi Road Extension Project : Case 3

Discount Rate (%) = 12.0

UNIT : million Baht

YEAR	COST	BENEFIT	DISCOUNTED COST	DISCOUNTED BENEFIT
0	0.	0.	0.	0.
1	413.	0.	369.	0.
2	262.	0.	209.	0.
3	547.	0.	389.	0.
4	213.	0.	135.	0.
5	0.	1091.	0.	619.
6	0.	1108.	0.	561.
7	0.	1126.	0.	509.
8	0.	1144.	0.	462.
9	0.	1162.	0.	419.
10	0.	1179.	0.	380.
11	250.	1197.	72.	344.
12	136.	1215.	35.	312.
13	207.	1233.	47.	283.
14	130.	1250.	27.	256.
15	1.	1494.	0.	273.
16	1.	1357.	0.	221.
17	1.	1221.	0.	178.
18	1.	1084.	0.	141.
19	1.	947.	0.	110.
20	1.	810.	0.	84.
21	1.	674.	0.	62.
22	1.	537.	0.	44.
23	1.	400.	0.	30.
24	1.	264.	0.	17.
25	-1084.	127.	-64.	7.

NET PRESENT VALUE =   4092.
B/C RATIO =   4.35

IRR=   41.46

ECONOMIC EVALUATION

Marginal of Segment F (Opening Year = 2001)

Discount Rate (%) = 12.0

UNIT : million Baht

YEAR	COST	BENEFIT	DISCOUNTED COST	DISCOUNTED BENEFIT
0	0.	0.	0.	0.
1	250.	0.	223.	0.
2	136.	0.	108.	0.
3	207.	0.	147.	0.
4	130.	0.	83.	0.
5	0.	41.	0.	23.
6	0.	59.	0.	30.
7	0.	78.	0.	35.
8	0.	96.	0.	39.
9	0.	115.	0.	41.
10	0.	133.	0.	43.
11	0.	152.	0.	44.
12	0.	170.	0.	44.
13	0.	189.	0.	43.
14	0.	207.	0.	42.
15	0.	226.	0.	41.
16	0.	205.	0.	33.
17	0.	184.	0.	27.
18	0.	164.	0.	21.
19	0.	143.	0.	17.
20	0.	122.	0.	13.
21	0.	102.	0.	9.
22	0.	81.	0.	7.
23	0.	61.	0.	5.
24	0.	40.	0.	3.
25	-329.	19.	-19.	1.

NET PRESENT VALUE =   18.
B/C RATIO =   1.03

IRR=   12.33

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ECONOMIC EVALUATION

Marginal of Segment F (Opening Year = 1995)

Discount Rate (%) =   12.0

UNIT : million Baht

YEAR	COST	BENEFIT	DISCOUNTED COST	DISCOUNTED BENEFIT
0	0.	0.	0.	0.
1	250.	0.	223.	0.
2	136.	0.	108.	0.
3	207.	0.	147.	0.
4	130.	0.	83.	0.
5	0.	115.	0.	65.
6	0.	133.	0.	67.
7	0.	152.	0.	69.
8	0.	170.	0.	69.
9	0.	189.	0.	68.
10	0.	207.	0.	67.
11	0.	226.	0.	65.
12	0.	205.	0.	53.
13	0.	184.	0.	42.
14	0.	164.	0.	34.
15	0.	143.	0.	26.
16	0.	122.	0.	20.
17	0.	102.	0.	15.
18	0.	81.	0.	11.
19	0.	61.	0.	7.
20	0.	40.	0.	4.
21	0.	19.	0.	2.
22	0.	19.	0.	2.
23	0.	19.	0.	1.
24	0.	19.	0.	1.
25	-329.	19.	-19.	1.

NET PRESENT VALUE =   145.
B/C RATIO =   1.27

IRR=   15.22

Appendix 14.3.1   Data on Disbursement Plan

Table A 14.3.1   New Krungthep Bridge Project
Disbursement Plan

Works	Financial Amount Economic Amount	First Year		Second Year		Third Year	
1. Main Bridge Substructure	164,968,593 148,620,000	65%	107,229,585 96,603,000	35%	57,739,008 52,017,000	—	—
2. Main Bridge Superstructure	149,313,946 134,854,000		— —	35%	52,259,881 47,199,000	65%	97,054,065 87,655,000
3. Approach Bridge Substructure	138,654,505 123,655,000	65%	90,125,428 80,376,000	35%	48,529,077 43,279,000	—	—
4. Approach Bridge Superstructure	258,721,895 231,263,000			35%	90,552,663 80,942,000	65%	168,169,232 150,321,000
5. Interchange & Access Road	125,966,656 113,421,000	25%	31,491,664 28,355,000	50%	62,983,328 56,711,000	25%	31,491,664 28,355,000
6. Temporary Works	233,000,000 196,885,000	70%	163,100,000 137,820,000	20%	46,600,000 39,377,000	10%	23,300,000 19,688,000
7. Over Head	314,448,750 202,504,000		115,116,941 73,248,000		105,341,619 68,204,000		93,990,190 61,052,000
Subtotal	1,385,074,345 1,151,202,000		507,063,618 416,402,000		464,005,576 387,729,000		414,005,151 347,071,000
Physical Contingency	114,925,655 95,503,000	—	—	25%	28,731,414 23,878,000	75%	86,194,241 71,627,000
Total	1,500,000,000 1,246,705,000		507,063,618 416,402,000		492,736,990 411,605,000		500,199,392 418,698,000

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Table A 14.3.2   Thonburi Road Extension A&C Segment Project
Disbursement Plan

Works	Financial Amount / Economic Amount	First Year		Second Year		Third Year	
1. MRR Flyover	67,632,071	16,908,018	25%	43,960,846	65%	6,763,207	10%
	61,152,000	15,288,000		39,749,000		6,115,000	
2. Segment A Bridge Works	382,750,257	57,412,539	15%	267,925,180	70%	57,412,538	15%
	342,344,000	51,352,000		239,641,000		51,351,000	
3. Segment A Road Works	106,006,004	21,201,201	20%	42,402,402	40%	42,402,401	40%
	96,895,000	19,379,000		38,758,000		38,758,000	
4. Segment C Bridge Works	65,942,200	9,891,330	15%	49,456,650	75%	6,594,220	10%
	58,979,000	8,847,000		44,234,000		5,898,000	
5. Segment C Road Works	32,962,180	4,944,327	15%	18,129,199	55%	9,888,654	30%
	30,159,000	4,524,000		16,587,000		9,048,000	
6. Temporary Works	167,040,000	116,928,000	70%	41,760,000	25%	8,352,000	5%
	141,315,000	98,920,000		35,329,000		7,066,000	
7. Over Head	240,000,000	66,333,855		135,312,905		38,353,240	
	155,280,000	42,134,000		88,025,000		25,121,000	
Subtotal	1,062,332,712	293,619,270		598,947,182		169,766,260	
	886,124,000	240,444,000		502,323,000		143,357,000	
Physical Contingency	77,667,288	-	-	19,416,822	25%	58,250,466	75%
	64,774,000	-		16,193,000		48,581,000	
Total	1,140,000,000	293,619,270		618,364,004		228,016,726	
	950,898,000	240,444,000		518,516,000		191,938,000	

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Table A 14.3.3   Thonburi Road Extension F Segment Project Disbursement Plan

Works	Financial Amount Economic Amount	First Year		Second Year		Third Year	
1. Drainage Works	54,832,270 51,553,000	24,674,521 23,199,000	45%	24,674,522 23,199,000	45%	5,483,227 5,155,000	10%
2. Road Works	184,679,213 163,729,000	64,637,725 57,305,000	35%	101,573,567 90,051,000	55%	18,467,921 16,373,000	10%
3. Pavement Works	94,523,706 89,432,000	- -	-	33,083,297 31,301,000	35%	61,440,409 58,131,000	65%
4. Temporary Works	46,000,000 40,020,000	32,200,000 28,014,000	70%	11,500,000 10,005,000	25%	2,300,000 2,001,000	5%
5. Over Head	111,568,000 73,746,000	35,672,692 23,214,000		50,151,451 33,063,000		25,743,857 17,469,000	
Subtotal	491,603,189 418,480,000	157,184,738 131,732,000		220,982,837 187,619,000		113,435,414 99,129,000	
Physical Contingency	38,396,811 32,675,000	- -	-	9,599,203 8,169,000	25%	28,797,608 24,506,000	75%
Total	530,000,000 451,155,000	157,184,938 131,732,000		230,582,040 195,788,000		142,233,022 123,635,000	

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