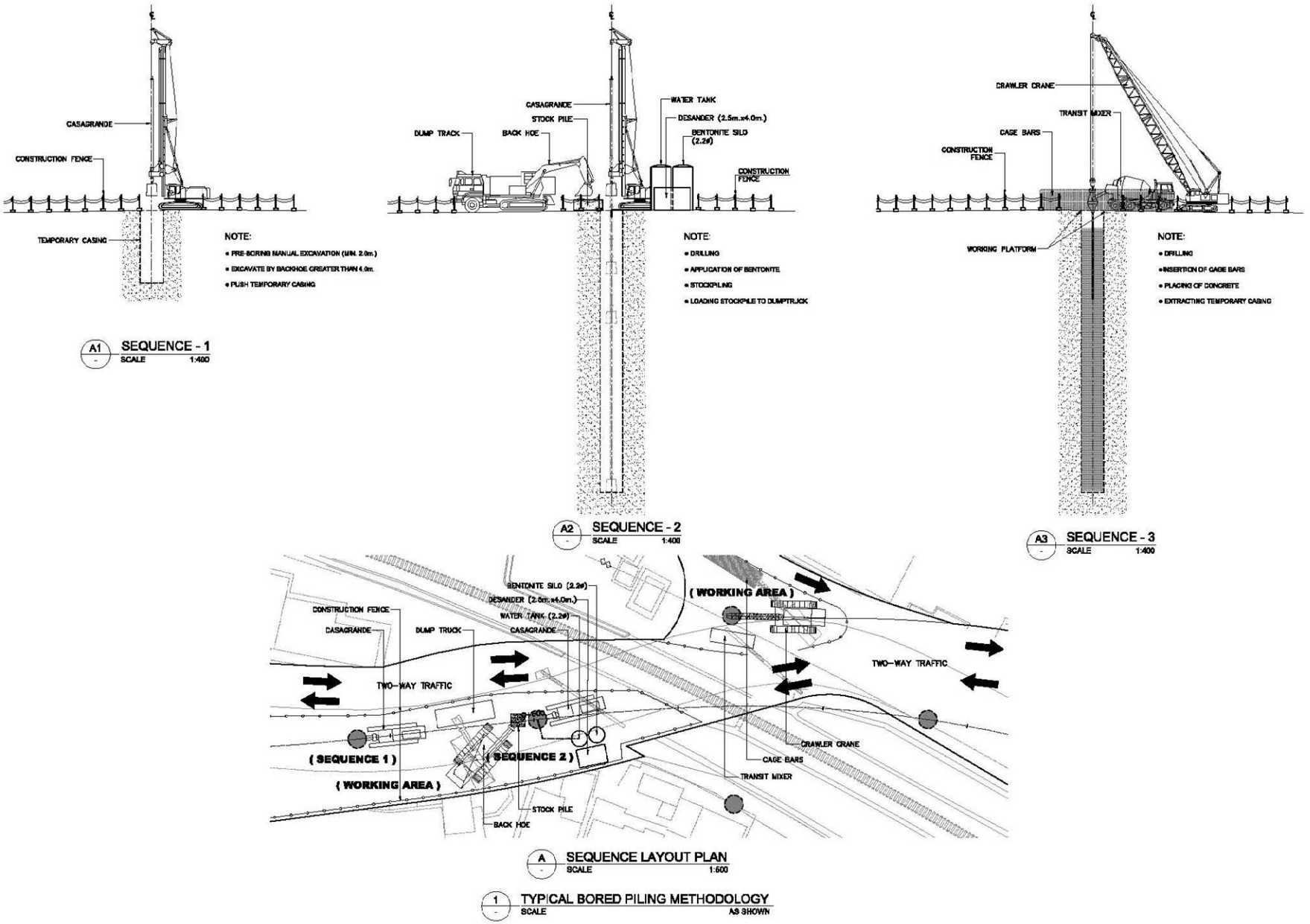


FIGURE 17.5.2-13 BORED PILING METHODOLOGY AND TRAFFIC FLOW (NAGREG FLYOVER)

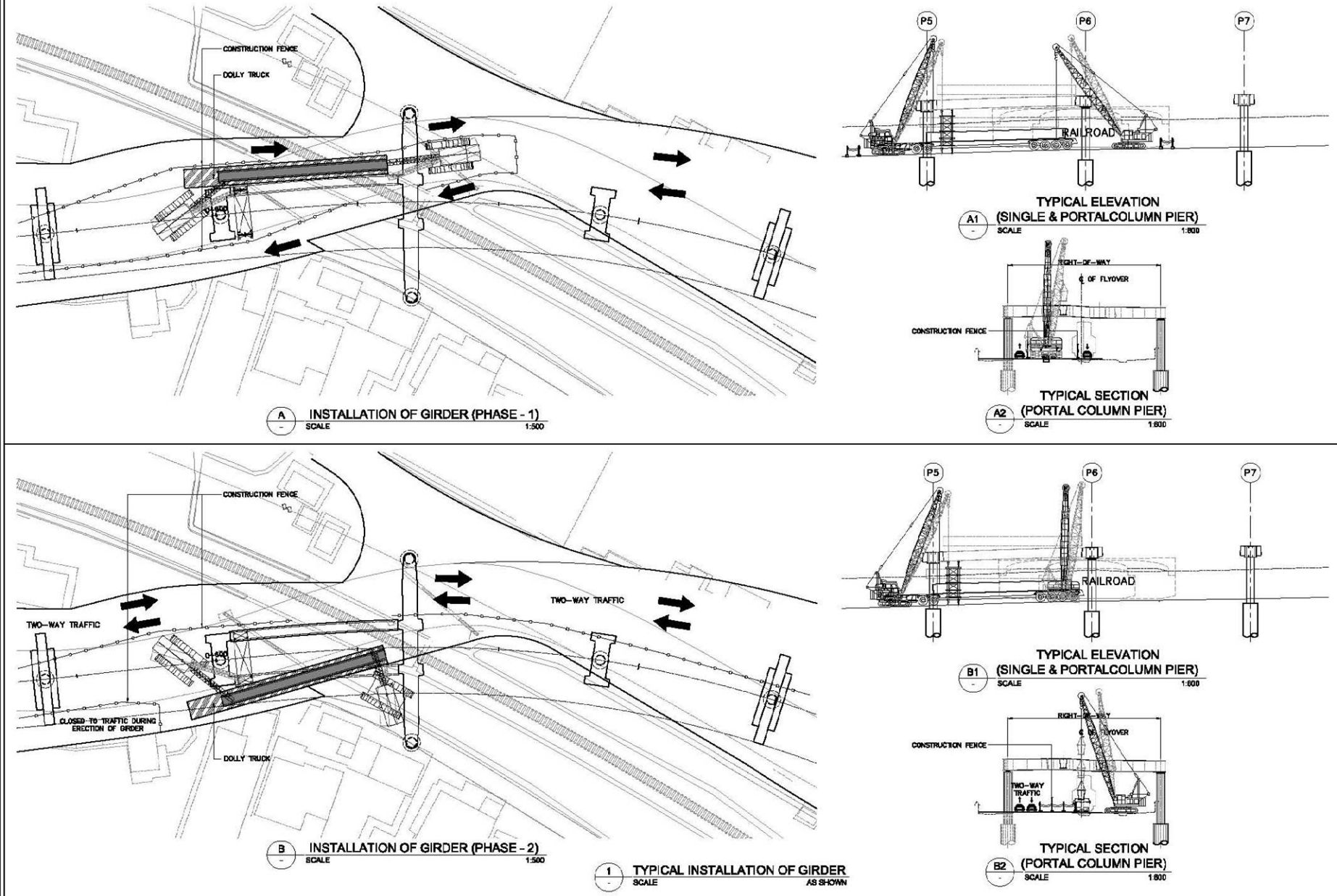
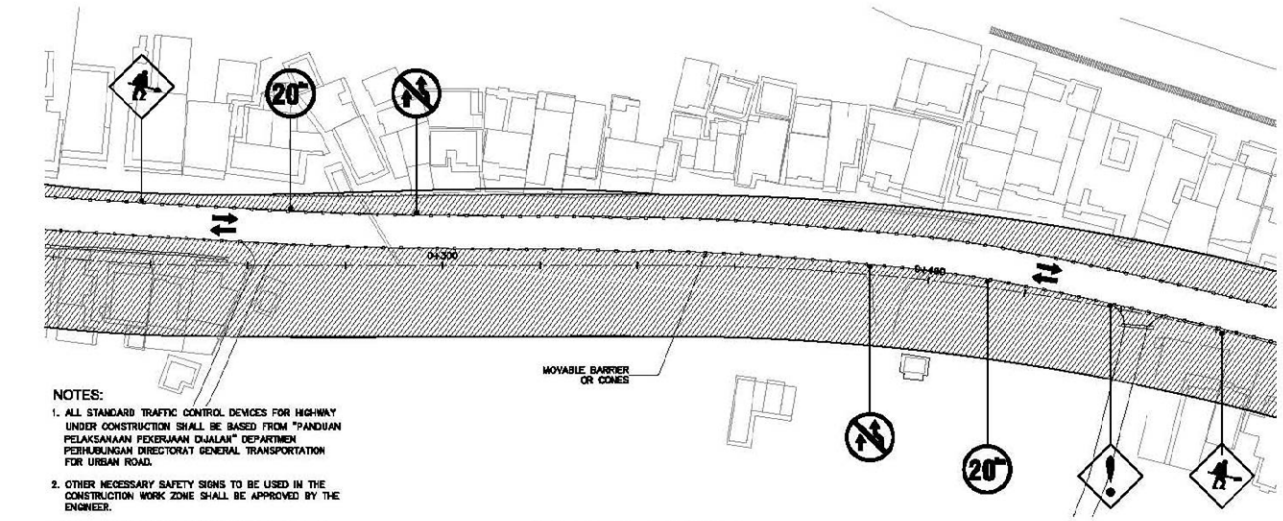


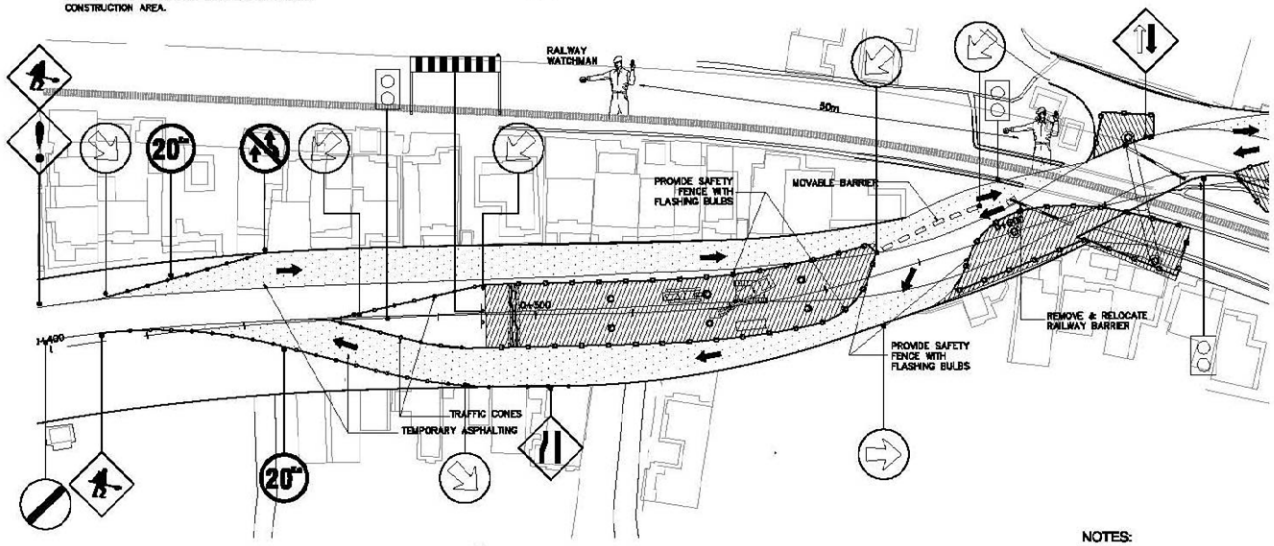
FIGURE 17.5.2-14 INSTALLATION OF GIRDER AND TRAFFIC FLOW (NAGREG FLYOVER)



NOTES:

1. ALL STANDARD TRAFFIC CONTROL DEVICES FOR HIGHWAY UNDER CONSTRUCTION SHALL BE BASED FROM "PANDUAN PELAKSANAAN PEKERJAAN DIJALAN" DEPARTMEN PERHUBUNGAN DIRECTORAT GENERAL TRANSPORTATION FOR URBAN ROAD.
2. OTHER NECESSARY SAFETY SIGNS TO BE USED IN THE CONSTRUCTION WORK ZONE SHALL BE APPROVED BY THE ENGINEER.
3. FOR STANDARD WORK SIGNS, REFER TO DWG. NTR-017
4. INSTALL TWO (2) PROJECT SIGN BOARDS AS SHOWN IN THE STANDARD DRAWING AT EACH END OF PROJECT CONSTRUCTION AREA.

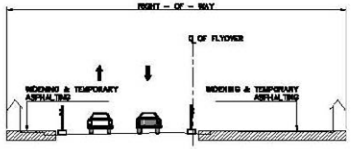
A - AT WIDENING AREA
SCALE 1:1000



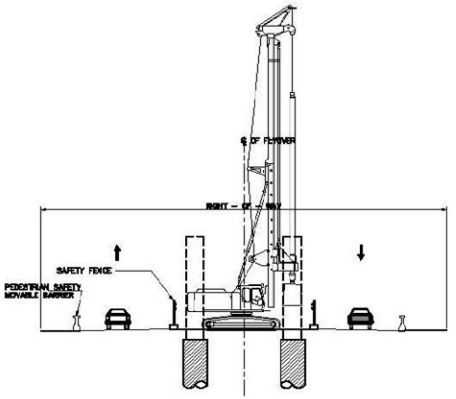
C - AT CONSTRUCTION OF SUBSTRUCTURES
SCALE 1:1000

NOTES:
ALTERNATIVE ROAD IS A PROPOSED ROAD (BY OTHERS) TO BE COMPLETED BY APRIL 2007.

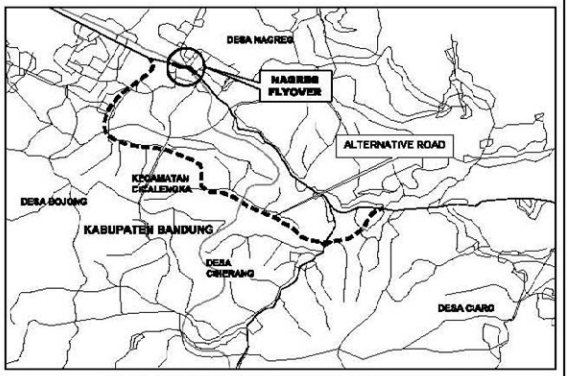
1 - TRAFFIC MANAGEMENT LAYOUT
SCALE 1:1000



B - TYPICAL SECTION
SCALE 1:300



D - TYPICAL SECTION
SCALE 1:300



ALTERNATIVE ROAD DURING CONSTRUCTION
NOT TO SCALE

FIGURE 17.5.2-15 TRAFFIC MANAGEMENT LAYOUT (1/2) (NAGREG FLYOVER)

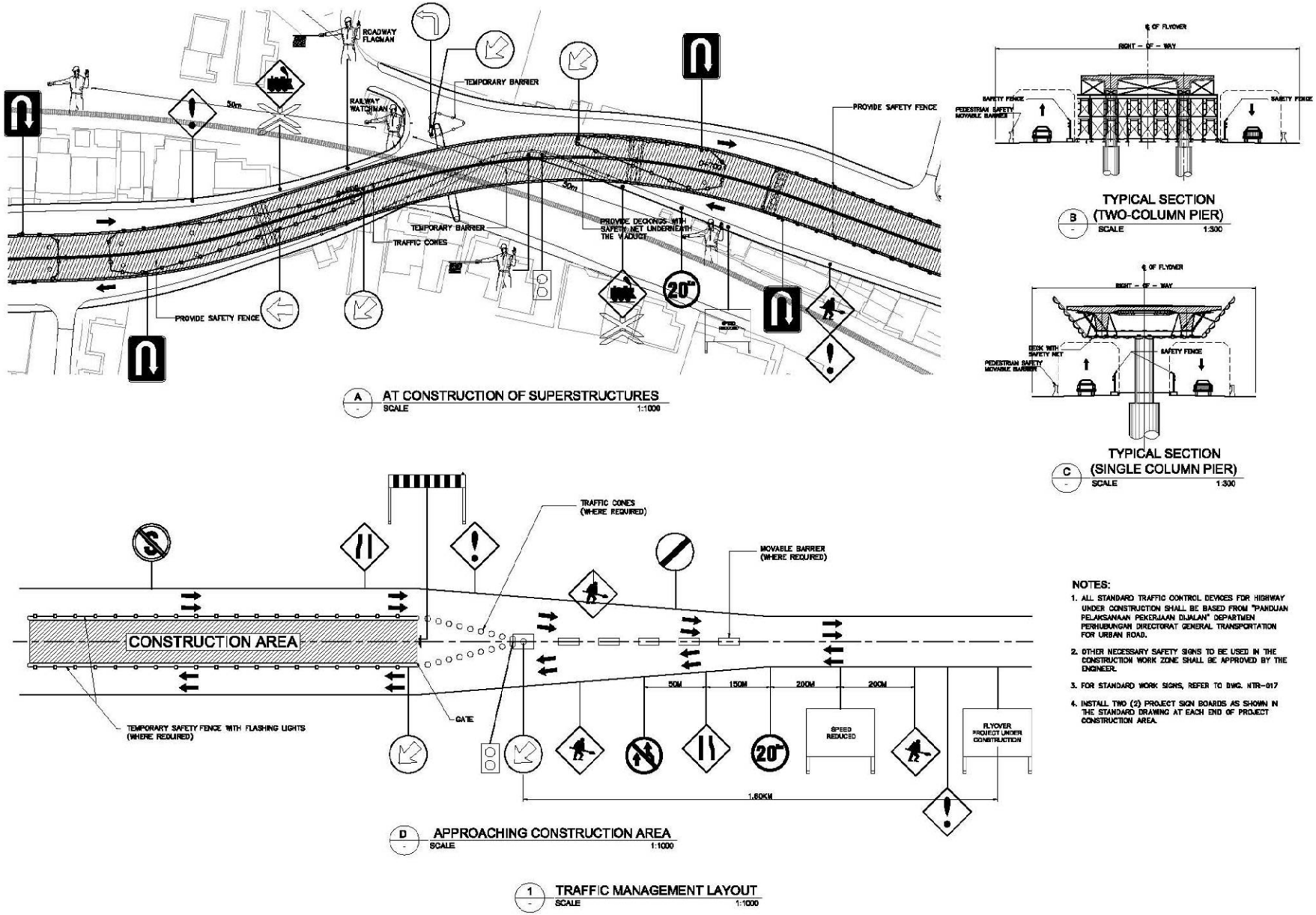


FIGURE 17.5.2-16 TRAFFIC MANAGEMENT LAYOUT (2/2) (NAGREG FLYOVER)

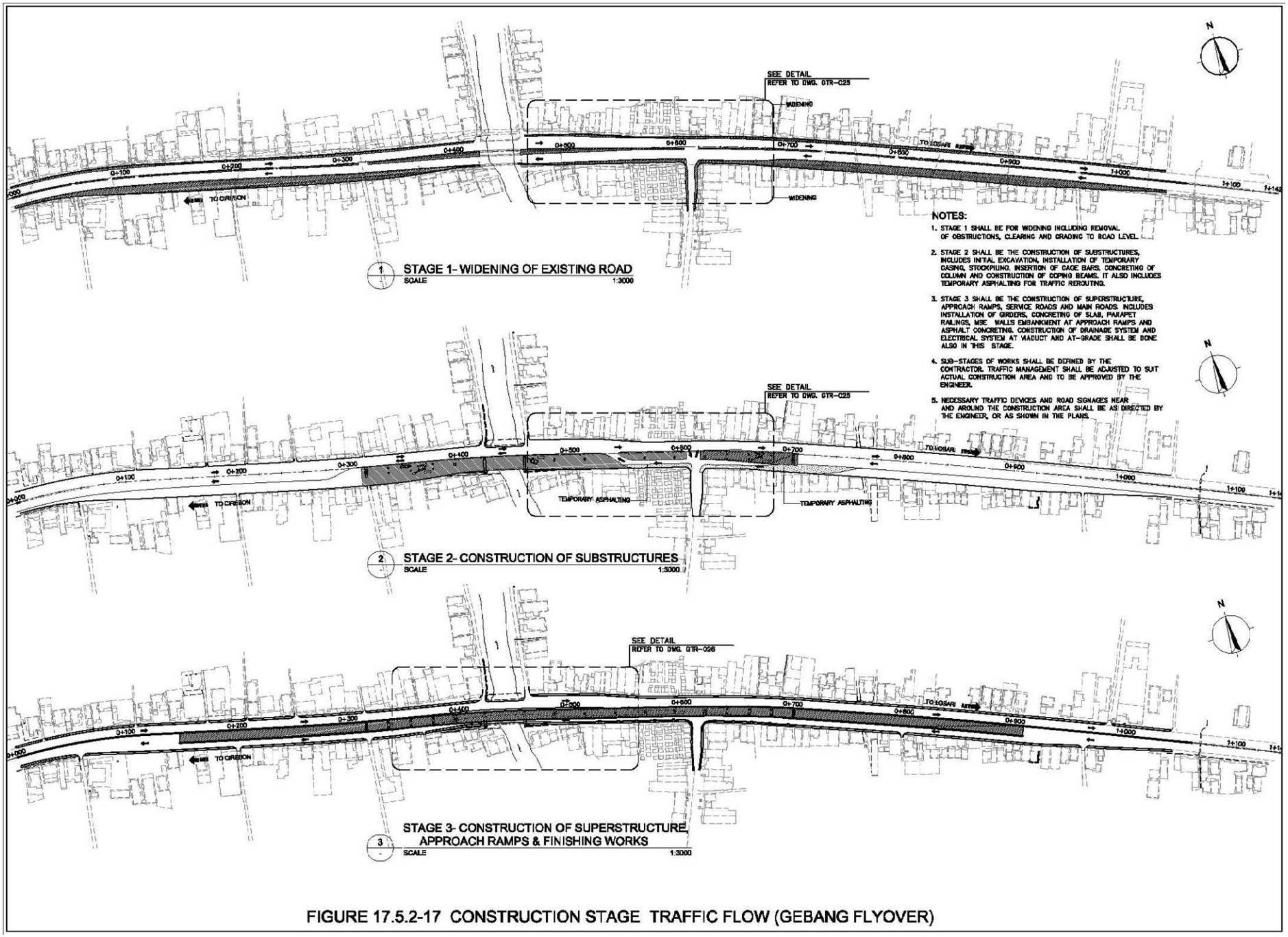


FIGURE 17.5.2-17 CONSTRUCTION STAGE TRAFFIC FLOW (GEBANG FLYOVER)

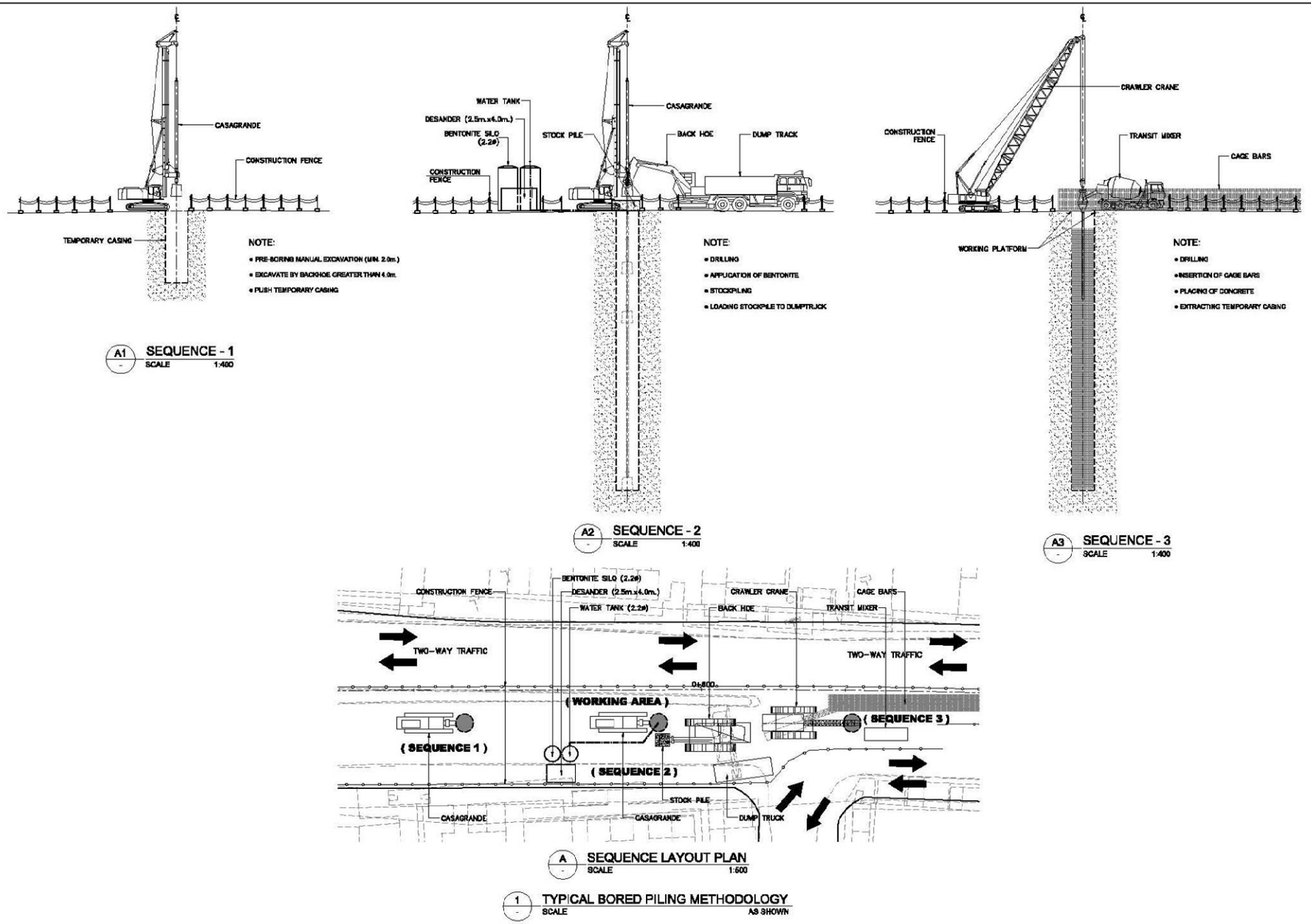
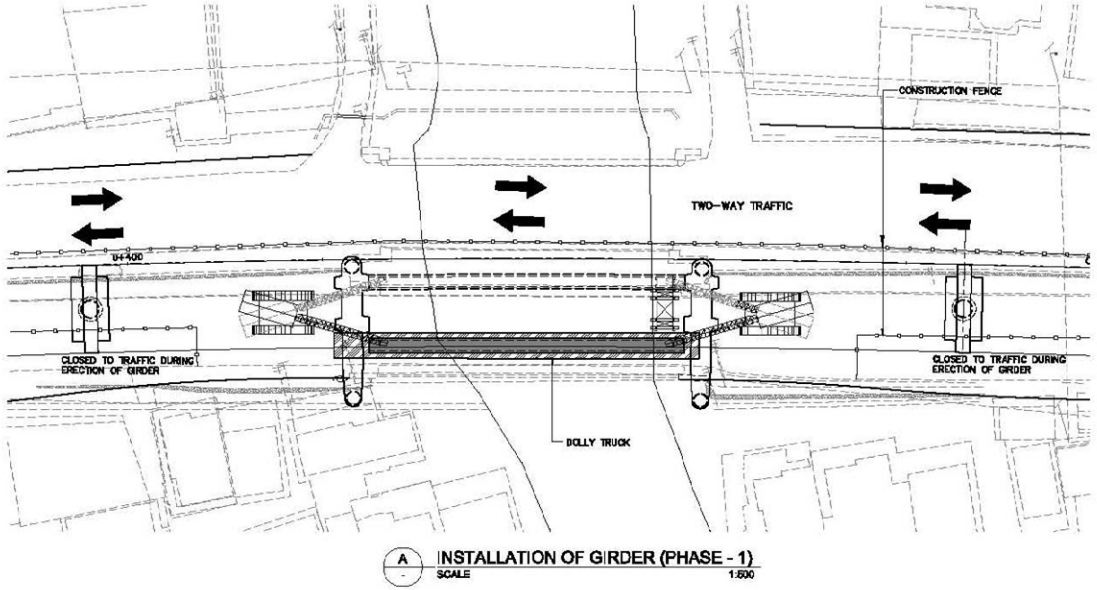
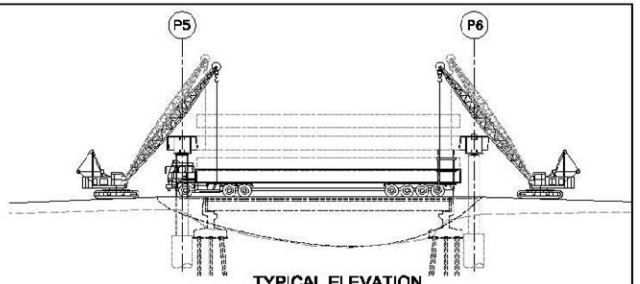


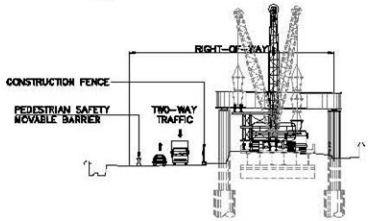
FIGURE 17.5.2-18 BORED PILING METHODOLOGY AND TRAFFIC FLOW (GEBANG FLYOVER)



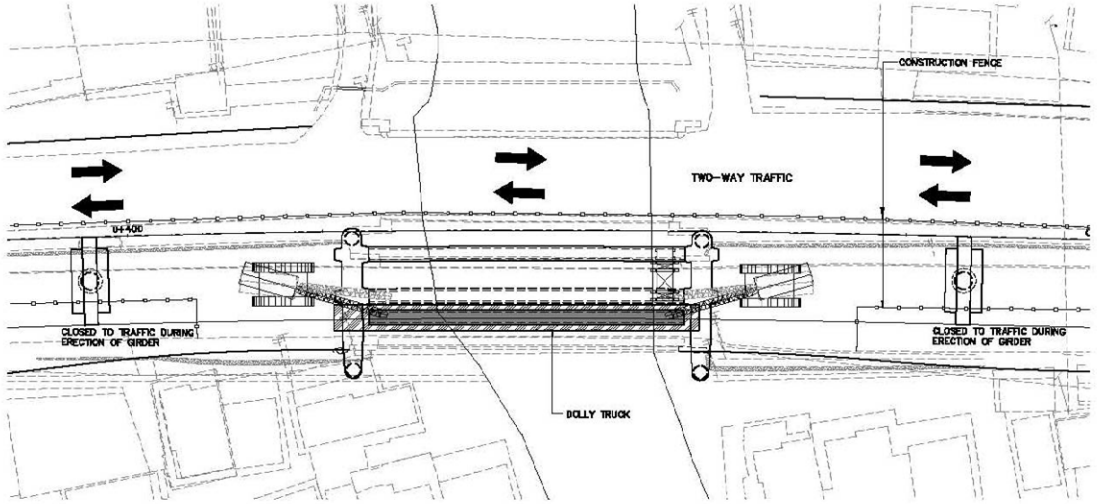
A - INSTALLATION OF GIRDER (PHASE - 1)
SCALE 1:500



A1 - TYPICAL ELEVATION (PORTAL COLUMN PIER)
SCALE 1:800

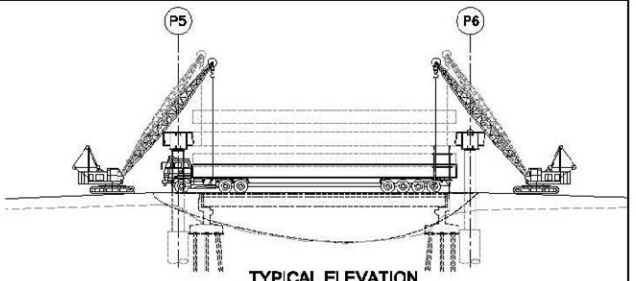


A2 - TYPICAL SECTION (PORTAL COLUMN PIER)
SCALE 1:800

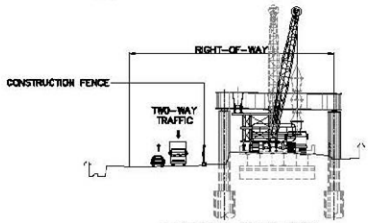


B - INSTALLATION OF GIRDER (PHASE - 2)
SCALE 1:500

1 - TYPICAL INSTALLATION OF GIRDER
SCALE AS SHOWN



B1 - TYPICAL ELEVATION (PORTAL COLUMN PIER)
SCALE 1:500



B2 - TYPICAL SECTION (PORTAL COLUMN PIER)
SCALE 1:800

FIGURE 17.5.2-19 INSTALLATION OF GIRDER AND TRAFFIC FLOW (GEBANG FLYOVER)

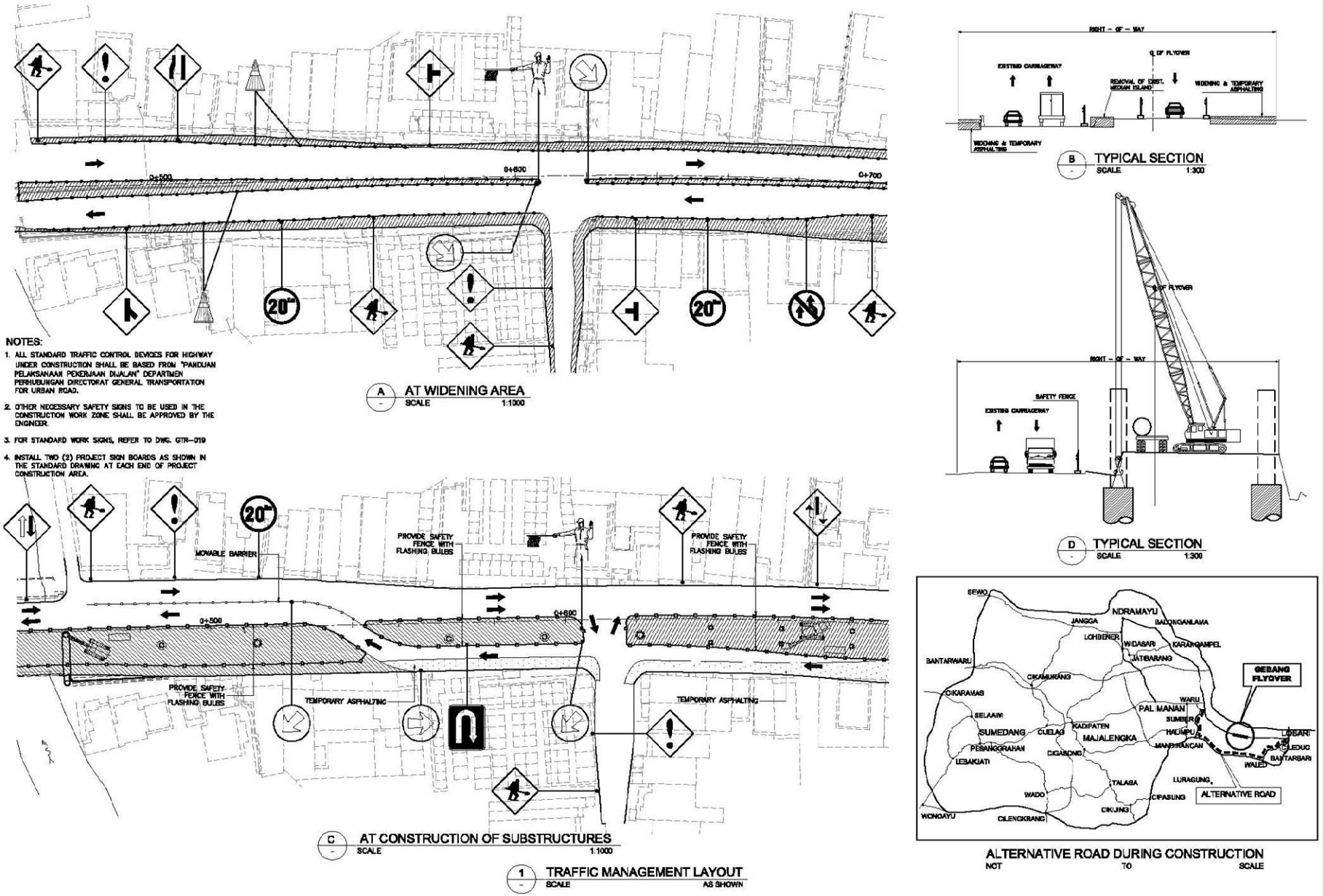
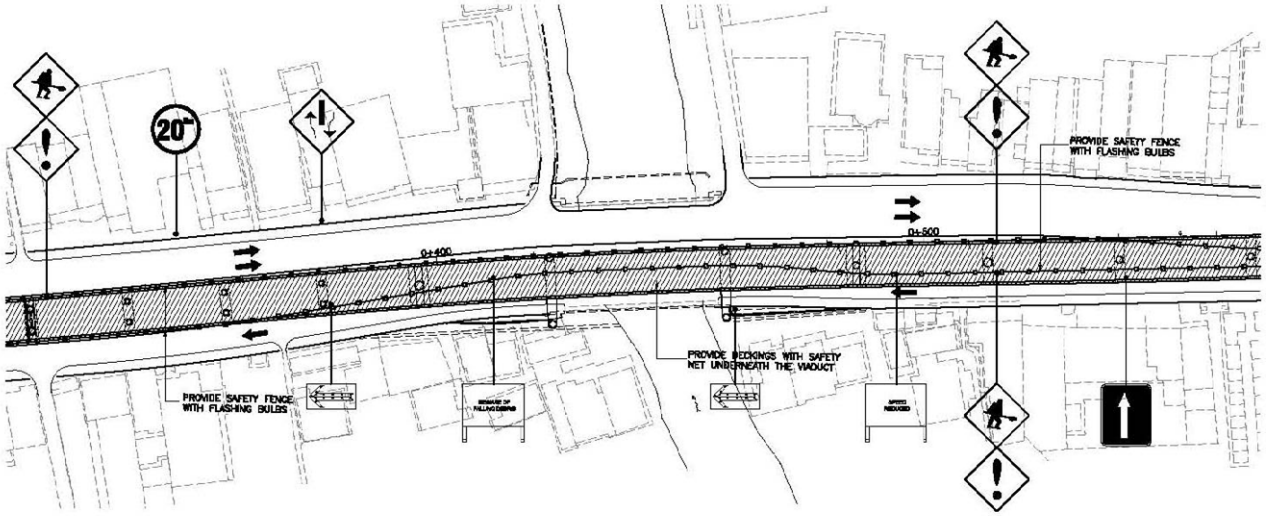
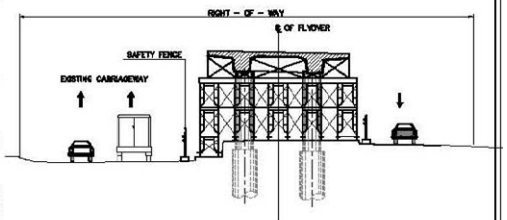


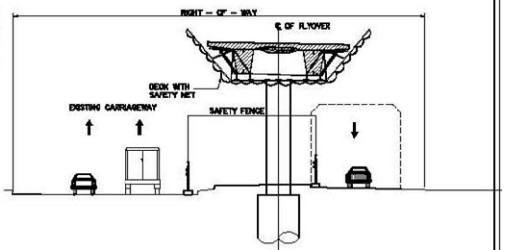
FIGURE 17.5.2-20 TRAFFIC MANAGEMENT LAYOUT (1/2) (GEBANG FLYOVER)



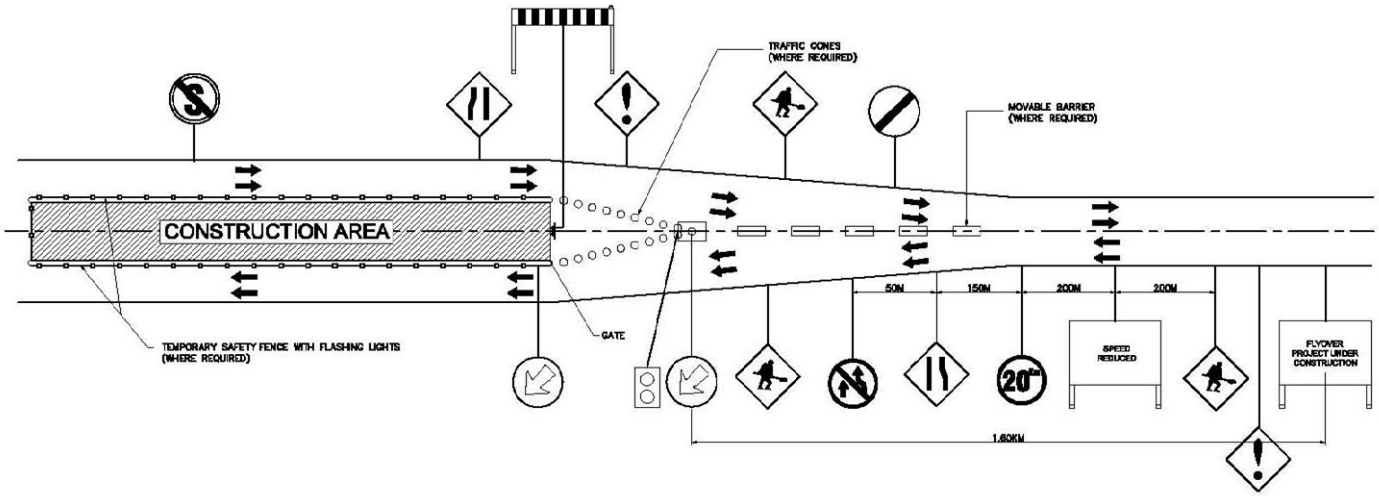
A AT CONSTRUCTION OF SUPERSTRUCTURES
SCALE 1:1000



B TYPICAL SECTION (TWO-COLUMN PIER)
SCALE 1:300



C TYPICAL SECTION (SINGLE COLUMN PIER)
SCALE 1:300



D APPROACHING CONSTRUCTION AREA
SCALE 1:1000

NOTES:

1. ALL STANDARD TRAFFIC CONTROL DEVICES FOR HIGHWAY UNDER CONSTRUCTION SHALL BE BASED FROM "PANDUAN PELAKSANAAN PEKERJAAN DUALAN" DEPARTMEN PERHUBUNGAN DIRECTORAT GENERAL TRANSPORTATION FOR URBAN ROAD.
2. OTHER NECESSARY SAFETY SIGNS TO BE USED IN THE CONSTRUCTION WORK ZONE SHALL BE APPROVED BY THE ENGINEER.
3. FOR STANDARD WORK SIGNS, REFER TO DWG. GTR-019
4. INSTALL TWO (2) PROJECT SIGN BOARDS AS SHOWN IN THE STANDARD DRAWING AT EACH END OF PROJECT CONSTRUCTION AREA.

1 TRAFFIC MANAGEMENT LAYOUT
SCALE AS SHOWN

FIGURE 17.5.2-21 TRAFFIC MANAGEMENT LAYOUT (2/2) (GEBANG FLYOVER)

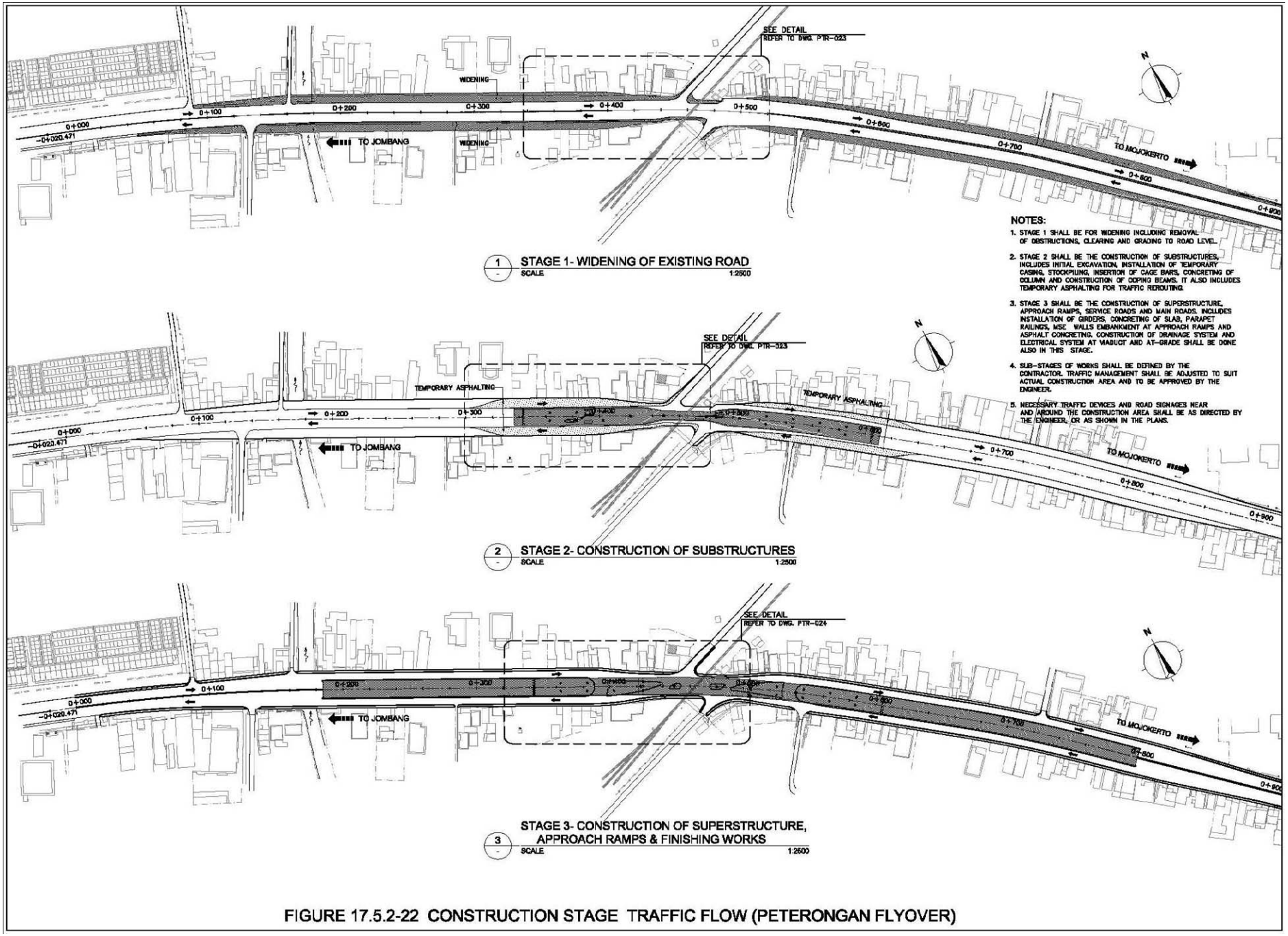


FIGURE 17.5.2-22 CONSTRUCTION STAGE TRAFFIC FLOW (PETERONGAN FLYOVER)

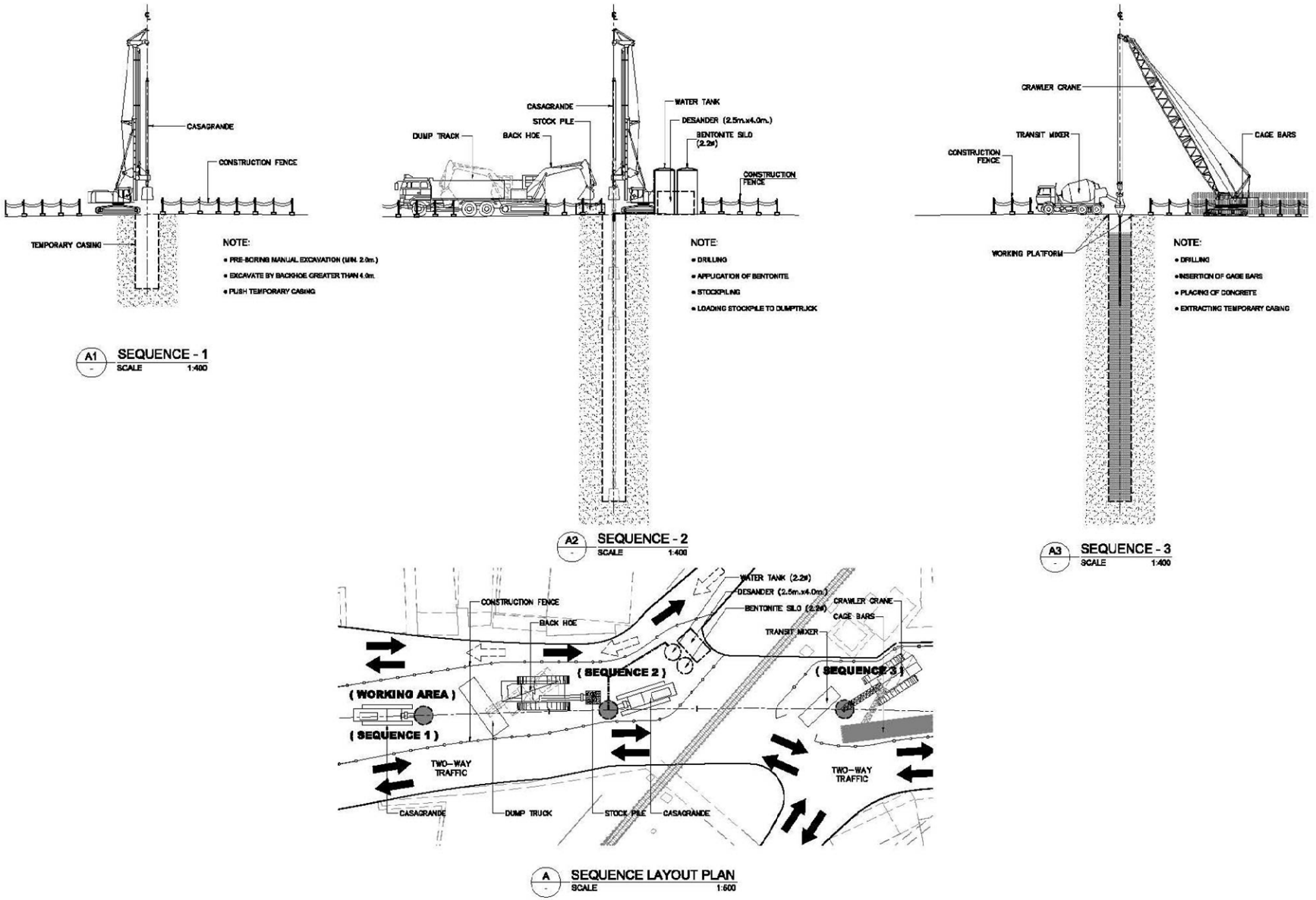


FIGURE 17.5.2-23 BORED PILING METHODOLOGY AND TRAFFIC FLOW (PETERONGAN FLYOVER)

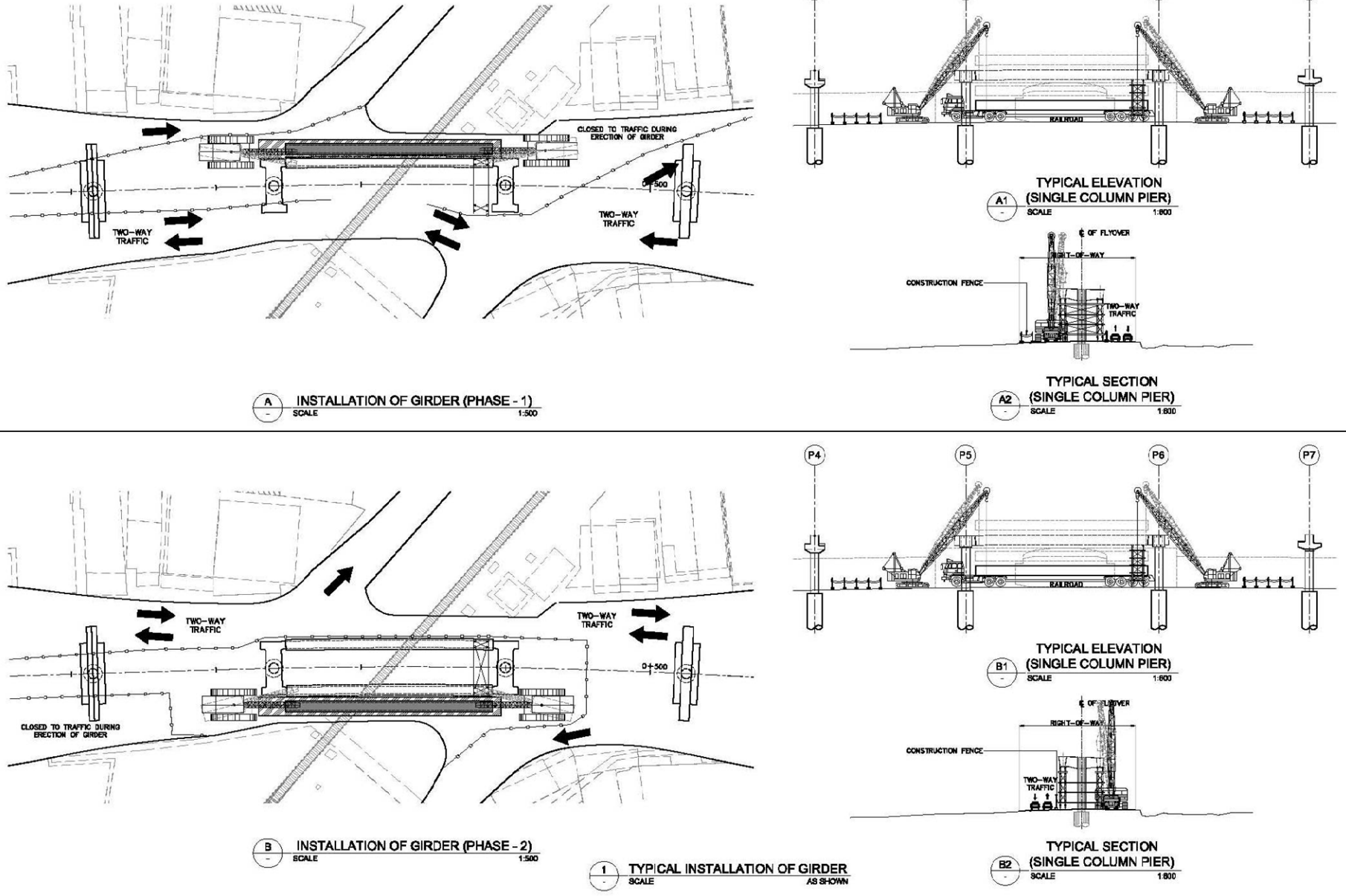


FIGURE 17.5.2-24 INSTALLATION OF GIRDER AND TRAFFIC FLOW (PETERONGAN FLYOVER)

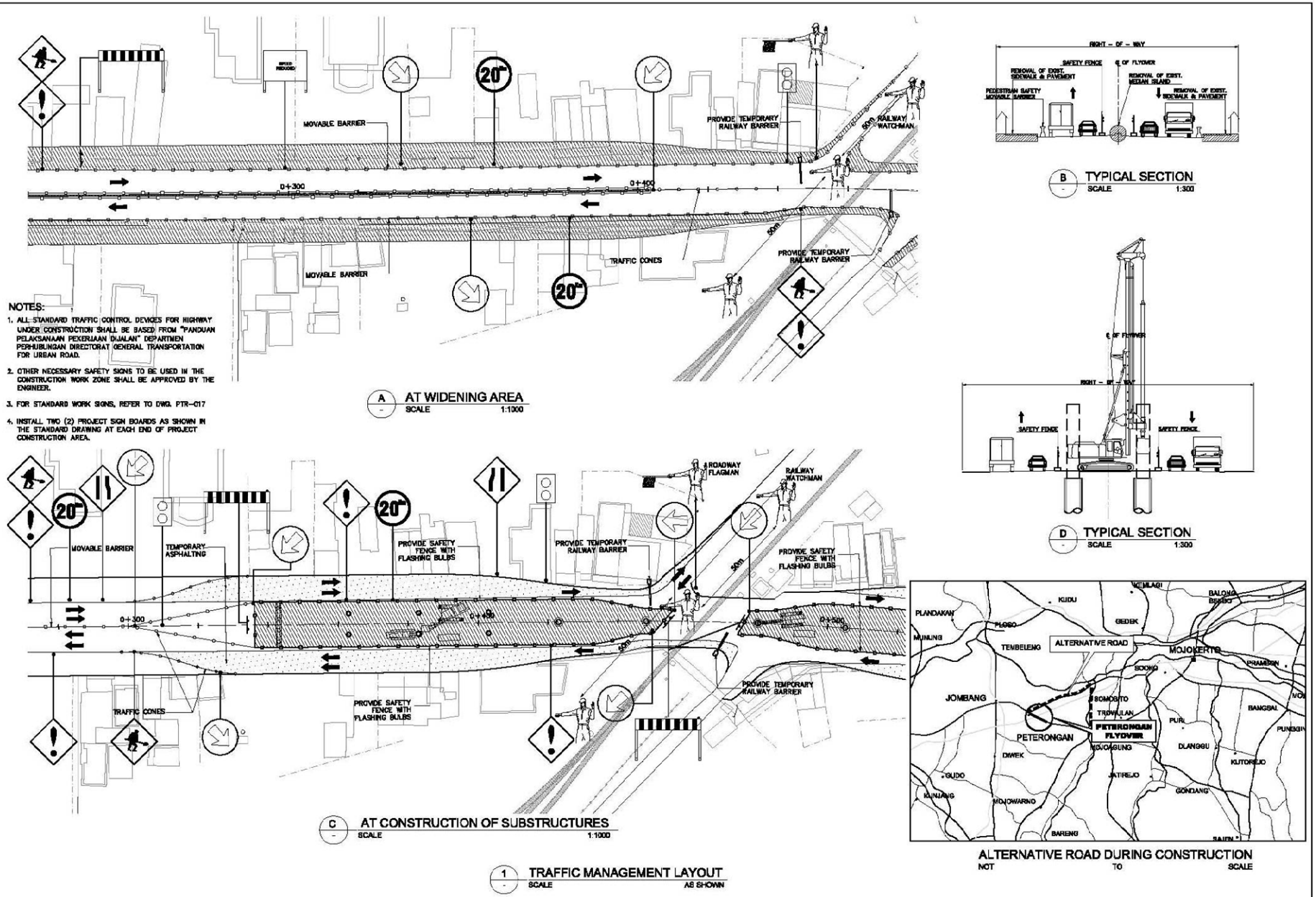


FIGURE 17.5.2-25 TRAFFIC MANAGEMENT LAYOUT (1/2) (PETERONGAN FLYOVER)

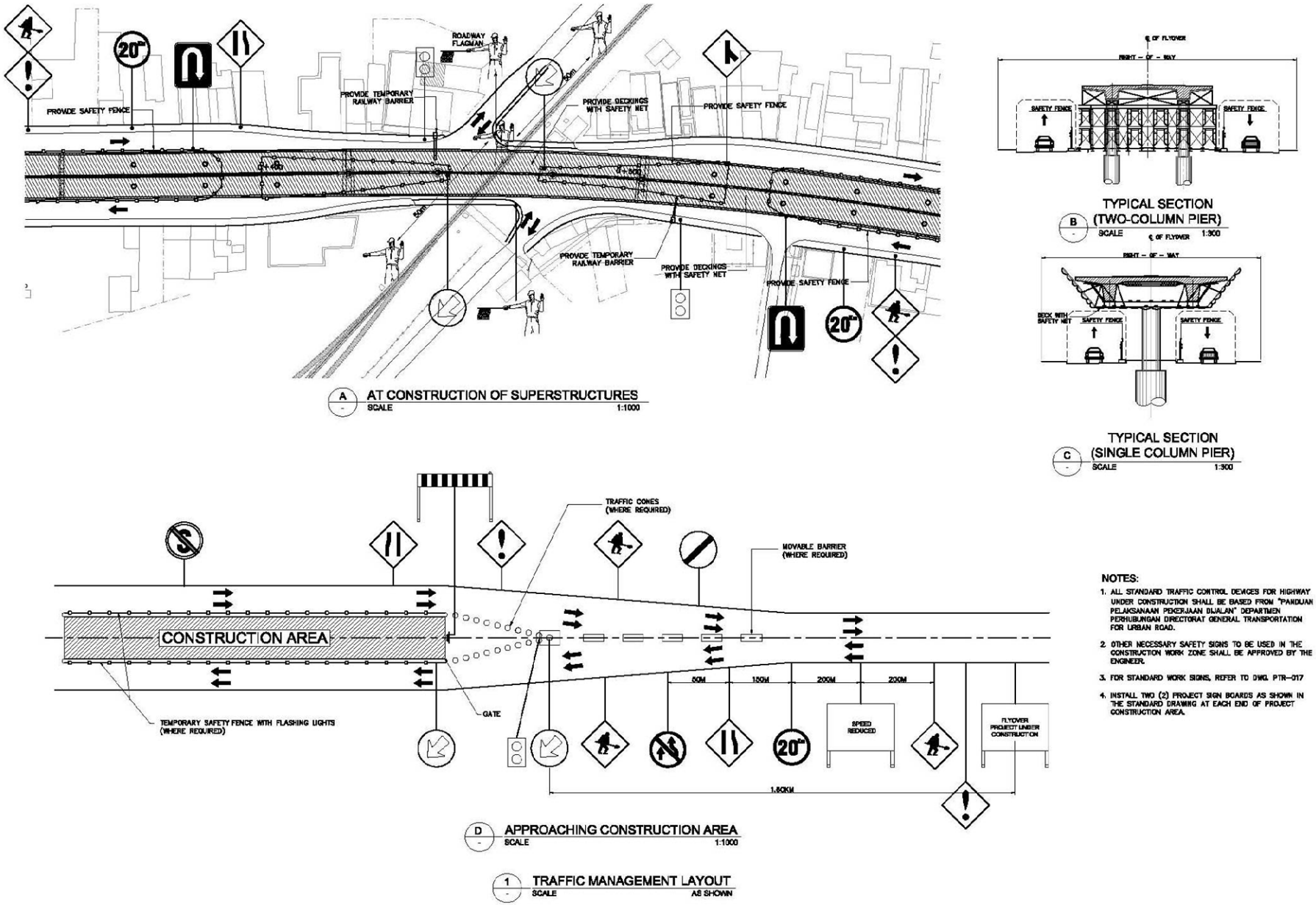


FIGURE 17.5.2-26 TRAFFIC MANAGEMENT LAYOUT (2/2) (PETERONGAN FLYOVER)

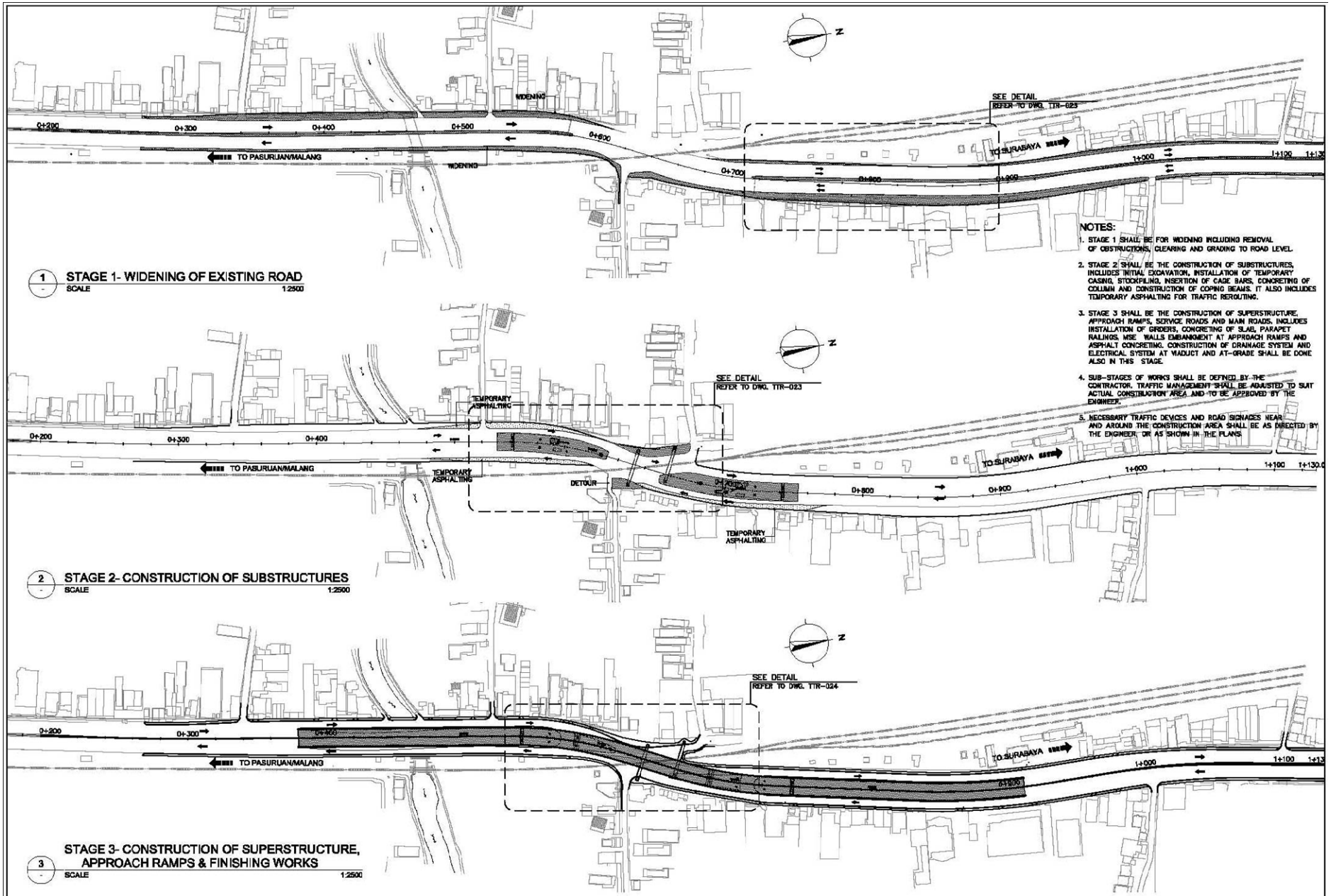


FIGURE 17.5.2-27 CONSTRUCTION STAGE TRAFFIC FLOW (TANGGULANGIN FLYOVER)

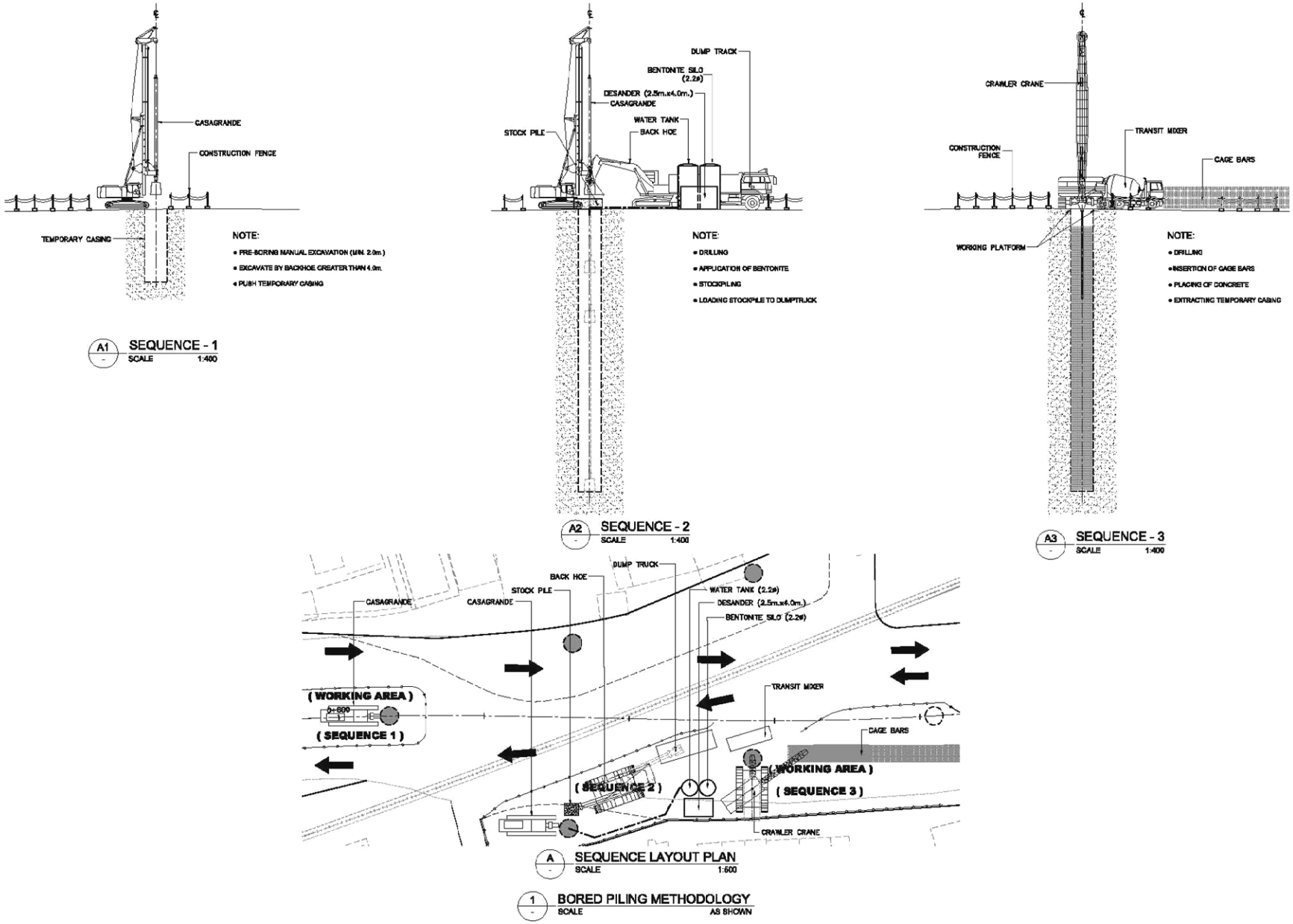
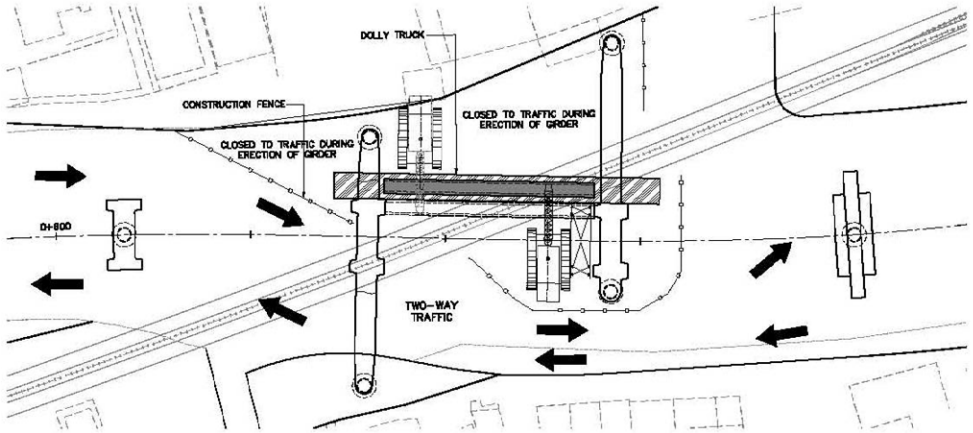
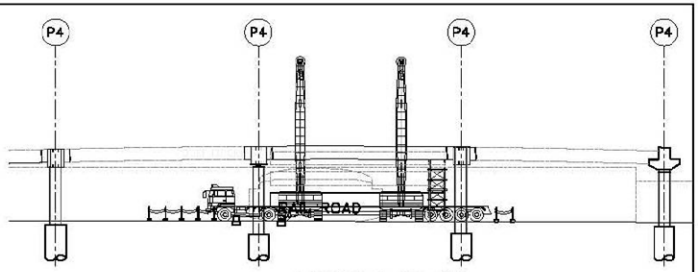


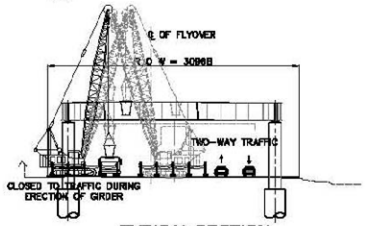
FIGURE 17.5.2-28 BORED PILING METHODOLOGY AND TRAFFIC FLOW (TANGGULANGIN FLYOVER)



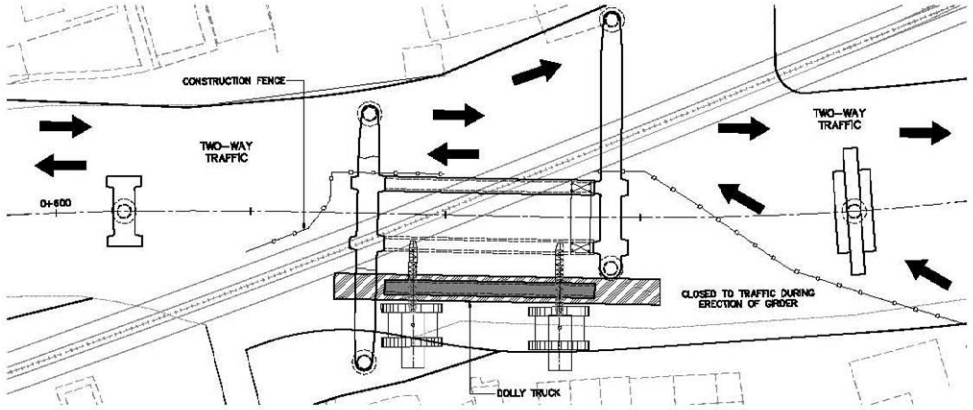
A INSTALLATION OF GIRDER (PHASE - 1)
SCALE 1:500



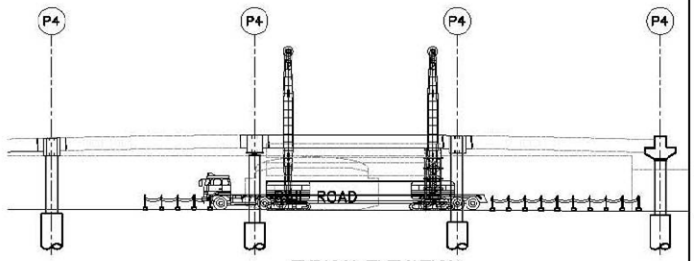
A1 TYPICAL ELEVATION (PORTAL COLUMN PIER)
SCALE 1:600



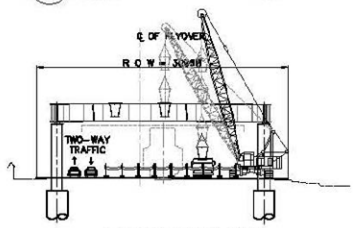
A2 TYPICAL SECTION (PORTAL COLUMN PIER)
SCALE 1:600



B INSTALLATION OF GIRDER (PHASE - 2)
SCALE 1:500



B1 TYPICAL ELEVATION (PORTAL COLUMN PIER)
SCALE 1:600



B2 TYPICAL SECTION (PORTAL COLUMN PIER)
SCALE 1:600

1 TYPICAL INSTALLATION OF GIRDER
SCALE AS SHOWN

FIGURE 17.5.2-29 INSTALLATION OF GIRDER AND TRAFFIC FLOW (TANGGULANGIN FLYOVER)

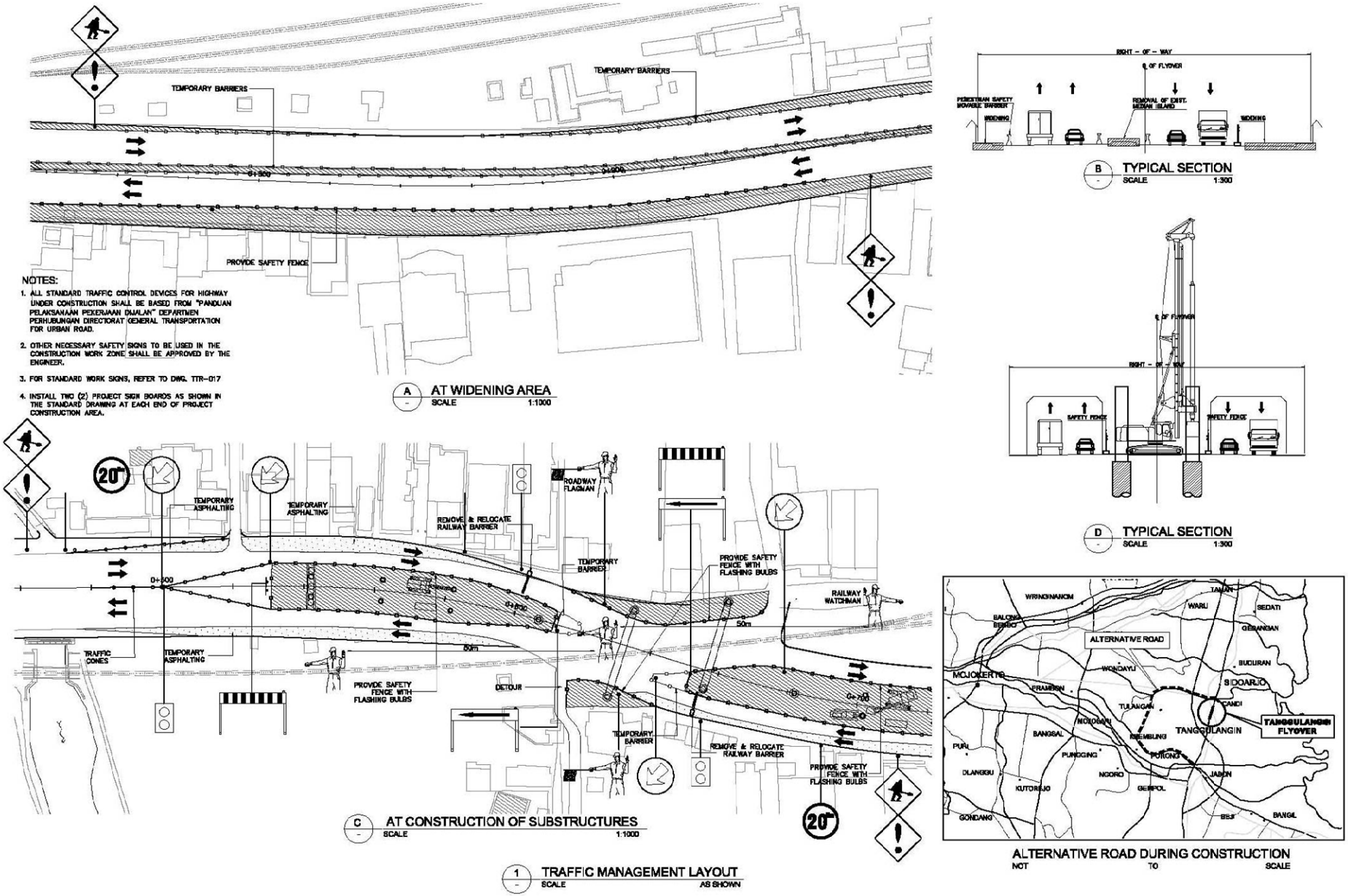


FIGURE 17.5.2-30 TRAFFIC MANAGEMENT LAYOUT (1/2) (TANGGULANGIN FLYOVER)

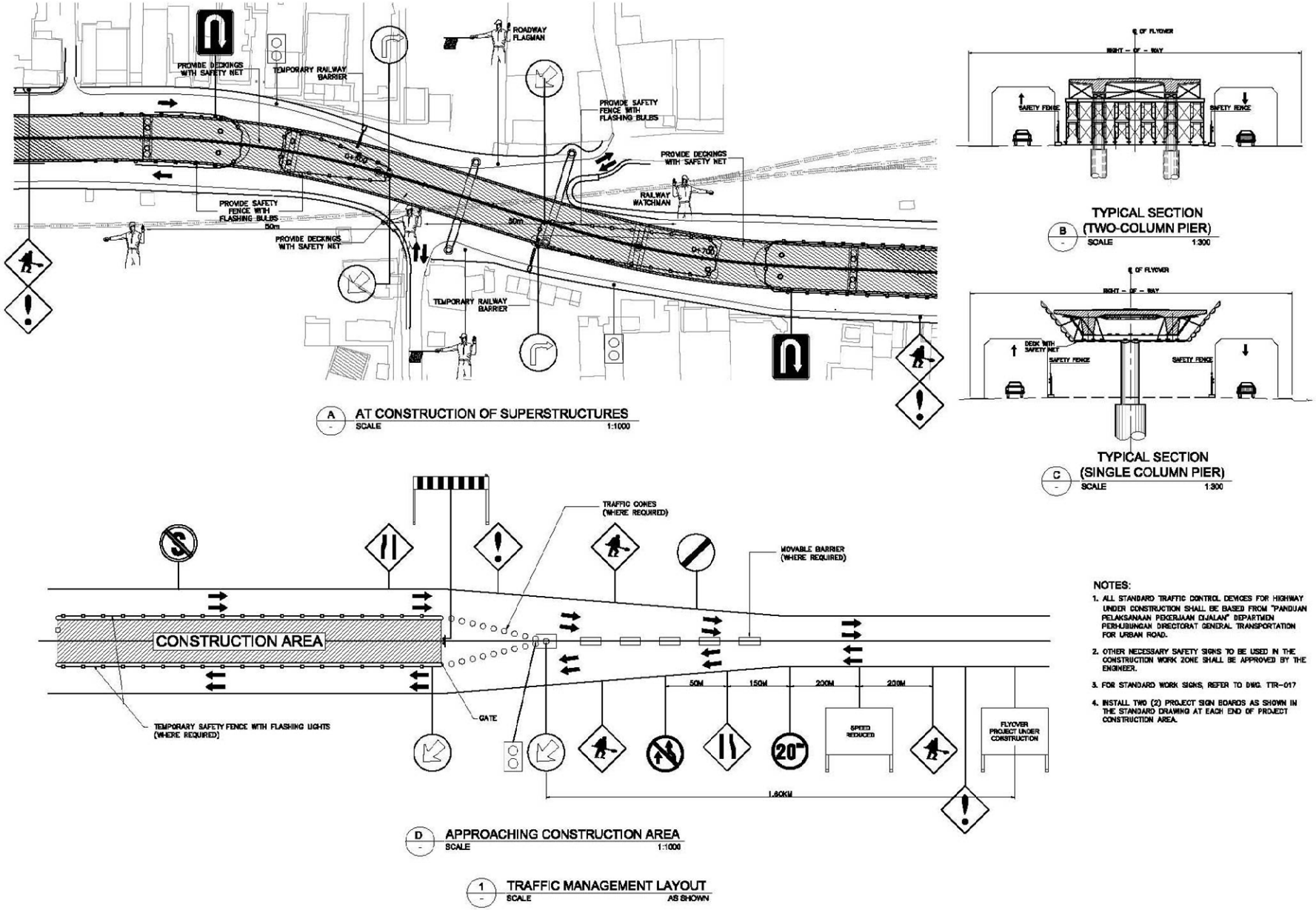


FIGURE 17.5.2-31 TRAFFIC MANAGEMENT LAYOUT (2/2) (TANGGULANGIN FLYOVER)

Chapter 18

PROJECT COST ESTIMATE

18.1 METHODOLOGY FOR COST ESTIMATION

The construction cost comprises of two components viz. direct and indirect costs. The total direct cost is a summation of the direct costs of all construction pay items. Such direct cost is the product of the estimated quantity and the determined unit rate per item of work in the Bill of Quantities (BOQ). The Quantities of each item are estimated from the construction drawings, while the unit rates are made up of three components, labor cost, material cost and the applicable equipment costs derived from the productivity requirement of the adopted construction methods and procedures.

The indirect cost on the other hand consists of profit, overhead, contingencies and miscellaneous (OCM). The total indirect cost equivalent to 10% of the total direct cost shall be applied.

A Value Added Tax (VAT) of 10% shall be applied to the total of the direct and indirect costs.

The derivation of Unit Cost for each item in the BOQ is based on the PU Guide Book (BAHAN BACAAN DAN REFERENSI, ANALISA HARGA SATUAN).
The Unit Cost Analysis / development for pay items which are not included in the PU Guide Book are based on the Civil Works Cost Estimation Standard for Steel Bridges, (Ministry of Land and Transportation, Japan) and Cost Estimation Standard (Japan Construction Cost Investigation Association / Ministry of Land and Transportation, Japan).

The procedure for cost estimation is summarized in **Figure 18.1-1**.

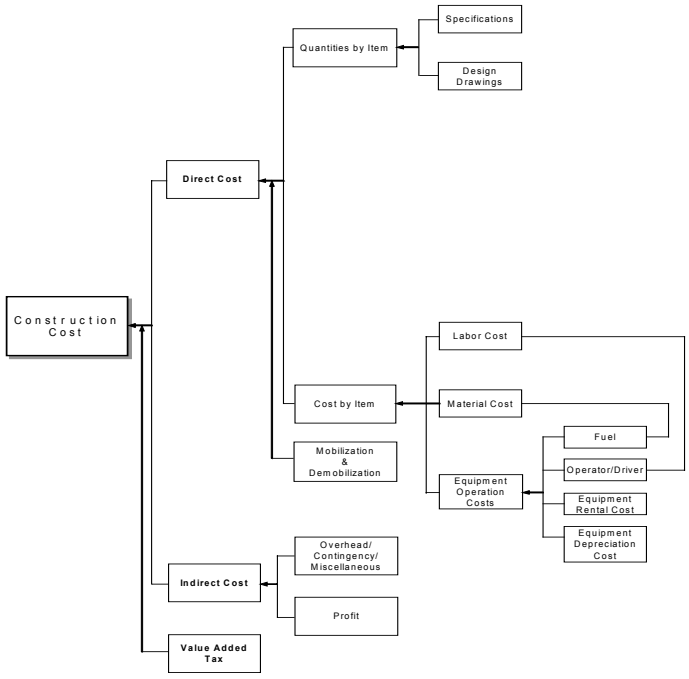


FIGURE 18.1-1 PROCEDURE FOR COST ESTIMATION

18.2 BASIS FOR THE DETERMINATION OF BASIC COSTS

18.2.1 Labour Cost

The basic labour costs are determined in accordance with the Indonesian Guide Books, which are published by each province. (PATOKAN HARGA SATUAN BAHAN DAN UPAH PEKERJAAN BIDANG PEMBORONGAN, DKI JAKARTA, BANTEN, WEST JAVA, EAST JAVA)

Costs of Social Charge, Bonus & Leaves are considered in the Unit Rates for Labour.

18.2.2 Material Cost

The monetary data used in establishing the Unit Cost of Major Items is based on the Indonesian Guide Book (PATOKAN HARGA SATUAN BAHAN DAN UPAH PEKERJAAN BIDANG PEMBORONGAN). These are for construction material, equipment rental and labor wages. The unit cost of materials are based on current market prices. This analysis is applied for local currency and for the construction components originating in Japan, an exchange rate of Rupiah 1.0 to Japanese Yen 0.0133 (1 Rp = ¥ 0.0133) is applied.

18.2.3 Equipment Cost

Equipment costs are derived based on PU Guide Book (BAHAN BACAAN AND REFERENSI, ANALISA HARGA SATUAN). Equipment rental rates are calculated using the formula in the PU Guide Book, which include maintenance cost, fuel & lubricants and operation costs. Equipment prices are updated from the quotations from the manufacturers. For the items which are not available in the PU Guide Book, the Construction Machines Depreciation Guide Book of Japan (Japan Construction Machine Association) is adopted.

18.3 SITE INVESTIGATION

Current market prices for basic materials, labour and equipment are confirmed from the data gathered during the site visits and are incorporated in the estimates.

The locations of Concrete Batching Plant, Asphalt Mixing Plant and Quarry are also identified during the site visits.

The locations of the above material sources are shown in the attached location maps. (Figure 18.3-1 ~ Figure 18.3-4)

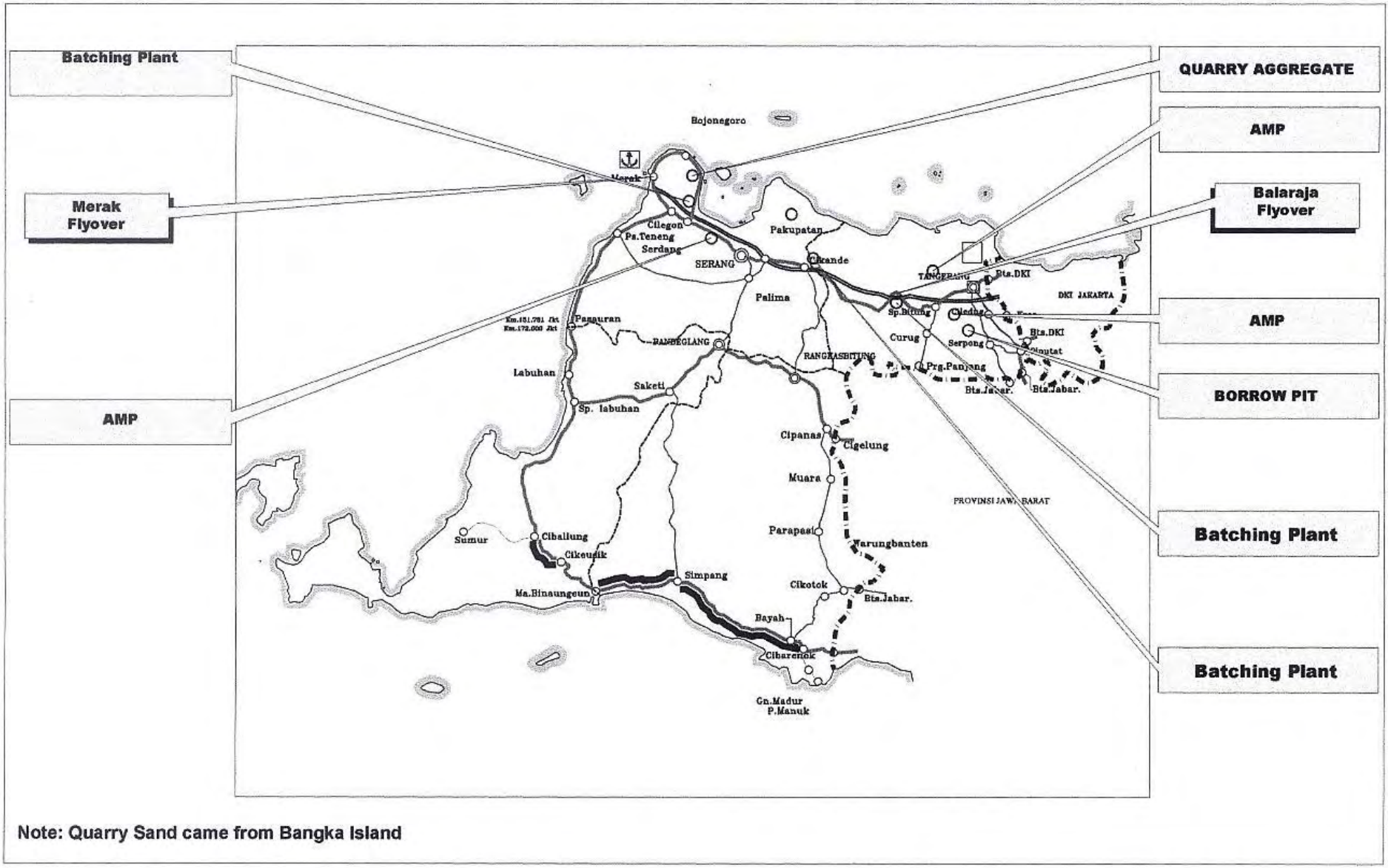
18.4 JAPAN COMPONENT

The total costs of goods procured from Japan shall not be less than thirty percent (30%) of the total price of the contract.

The goods procured from the eligible local manufacturing companies invested by Japanese companies can be regarded and counted as Japanese origin if such companies satisfy the condition stated in the Loan Agreement.

The following items of goods are to be counted under Japan component:

1) Fabricated Steel Box Girder
2) Fabricated Steel Coping and Portal
3) Ribbed Steel Pipe
4) Reinforcement Bar D51 and Splicing
5) PC Strand, PC Bar and accessories
6) Admixtures for PC Girder Concrete
7) Bridge Bearings
8) Restrainer
9) Steel Gutter Screen
10) MSE Wall
11) Precast Concrete Pipes
12) Precast Concrete U-Drain
13) Precast Concrete Manhole
14) Precast Concrete Curb
15) Other Precast Concrete Members



Note: Quarry Sand came from Bangka Island

FIGURE 18.3-1 LOCATION MAP OF BATCHING PLANT. ASPHALT MIXING PLANT AND QUARRY MERAK AND BALARAJA FLYOVER

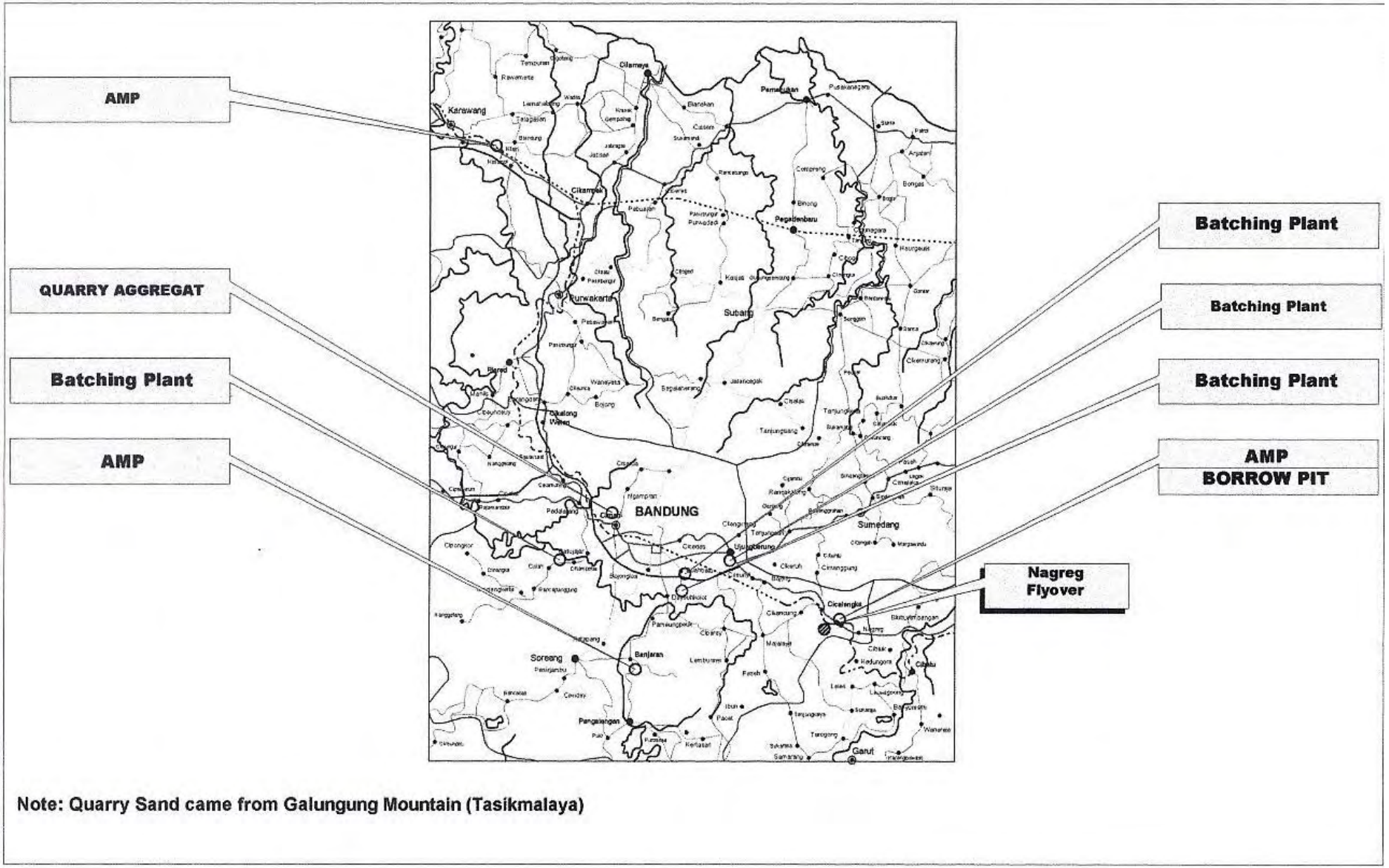


FIGURE 18.3-2 LOCATION MAP OF BATCHING PLANT. ASPHALT MIXING PLANT AND QUARRY NAGREG FLYOVER

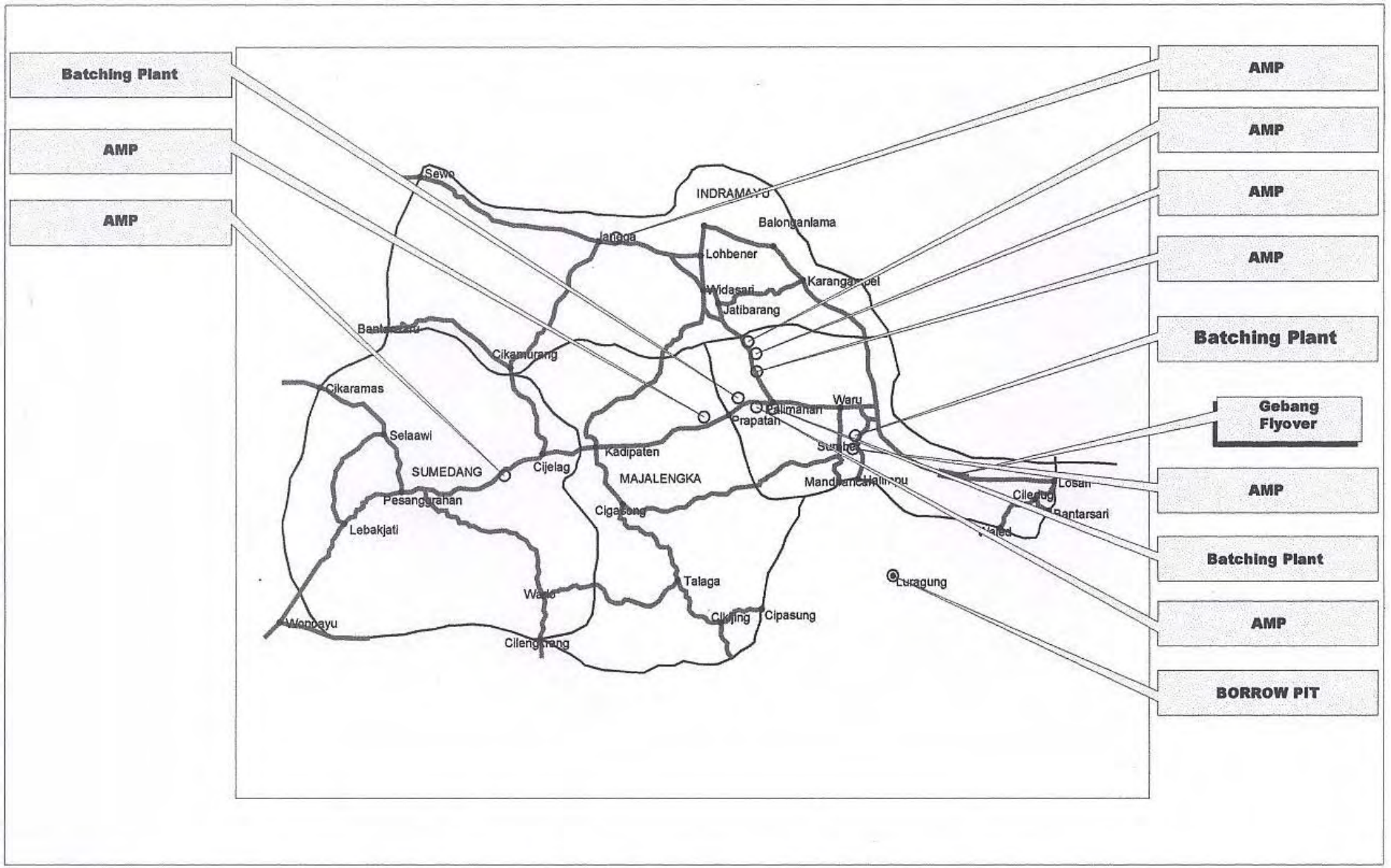


FIGURE 18.3-3 LOCATION MAP OF BATCHING PLANT. ASPHALT MIXING PLANT AND QUARRY GEBANG FLYOVER

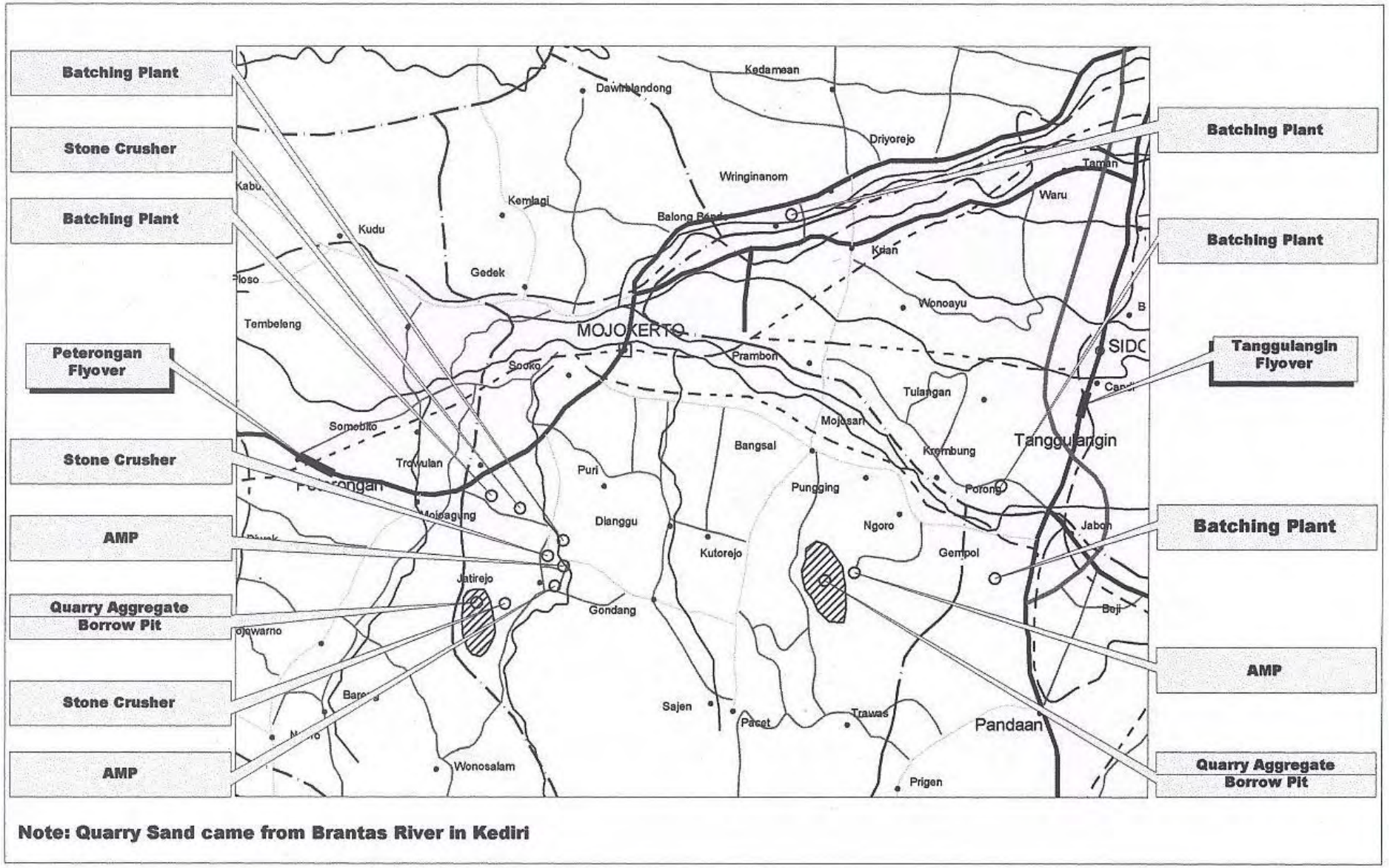


FIGURE 18.3-4 LOCATION MAP OF BATCHING PLANT, ASPHALT MIXING PLANT AND QUARRY PETERONGAN AND TANGGULANGIN FLYOVER

18.5 TOTAL CONSTRUCTION COST

Total construction cost and Japan component are summarized in **Table 18.5-1** and **Table 18.5-2**.

TABLE 18.5-1 TOTAL CONSTRUCTION COST AND JAPAN COMPONENT (RUPIAH)

(UNIT ; Million Rupiah)

NO	DESCRIPTION	TOTAL CONSTRUCTION COST				TOTAL	UTILITIES RELOCATION		TOTAL	GRAND TOTAL
		JAPAN PORTION	LOCAL PORTION	SUB TOTAL	VAT (10%)	WITH VAT	LOCAL PORTION	VAT (10%)	WITH VAT	
		(Million Rupiah)	(Million Rupiah)	(Million Rupiah)	(Million Rupiah)	(Million Rupiah)	(Million Rupiah)	(Million Rupiah)	(Million Rupiah)	(Million Rupiah)
1	MERAK	24,630.32	44,008.38	**68,638.70**	6,863.87	75,502.57	826.96	82.70	909.66	**76,412.23**
2	BALARAJA	11,986.11	27,826.34	**39,812.45**	3,981.25	43,793.70	3,917.41	391.74	4,309.15	**48,102.85**
3	NAGREG	18,775.36	34,862.98	**53,638.34**	5,363.83	59,002.17	10,437.14	1,043.71	11,480.85	**70,483.03**
4	GEBANG	21,794.59	39,527.32	**61,321.91**	6,132.19	67,454.10	689.96	69.00	758.96	**68,213.06**
5	PETERONGAN	14,243.83	31,371.24	**45,615.07**	4,561.51	50,176.58	2,252.89	225.29	2,478.18	**52,654.76**
6	TANGGULANGIN	14,518.70	38,401.94	**52,920.64**	5,292.06	58,212.70	512.49	51.25	563.74	**58,776.44**
	TOTAL	105,948.91	215,998.20	**321,947.11**	32,194.71	354,141.82	18,636.85	1,863.69	20,500.54	**374,642.36**
	PORTION PERCENTAGE	32.9%	67.1%	100.0%						

JAPAN PORTION INCLUDING UTILITIES RELOCATION **31.11%**

TABLE 18.5-2 TOTAL CONSTRUCTION COST AND JAPAN COMPONENT (YEN)

(UNIT ; Million Yen)

NO	DESCRIPTION	TOTAL CONSTRUCTION COST				TOTAL	UTILITIES RELOCATION		TOTAL	GRAND TOTAL
		JAPAN PORTION	LOCAL PORTION	SUB TOTAL	VAT (10%)	WITH VAT	LOCAL PORTION	VAT (10%)	WITH VAT	
		(Million Yen)	(Million Yen)	(Million Yen)	(Million Yen)	(Million Yen)	(Million Yen)	(Million Yen)	(Million Yen)	(Million Yen)
1	MERAK	328.40	586.78	**915.18**	91.52	1,006.70	11.03	1.10	12.13	**1,018.83**
2	BALARAJA	159.81	371.02	**530.83**	53.08	583.92	52.23	5.22	57.46	**641.37**
3	NAGREG	250.34	464.84	**715.18**	71.52	786.70	139.16	13.92	153.08	**939.77**
4	GEBANG	290.59	527.03	**817.63**	81.76	899.39	9.20	0.92	10.12	**909.51**
5	PETERONGAN	189.92	418.28	**608.20**	60.82	669.02	30.04	3.00	33.04	**702.06**
6	TANGGULANGIN	193.58	512.03	**705.61**	70.56	776.17	6.83	0.68	7.52	**783.69**
	TOTAL	1,412.65	2,879.98	**4,292.63**	429.26	4,721.89	248.49	24.85	273.34	**4,995.23**
	PORTION PERCENTAGE	32.9%	67.1%	100.0%						

(NOTE) ; EXCHANGE RATE 1 Yen = 75 Rupiah

JAPAN PORTION INCLUDING UTILITIES RELOCATION **31.11%**

CHAPTER 19

PREPARATION OF DRAFT PQ AND TENDER DOCUMENTS

19.1 BASIS FOR DRAFT AND PQ AND TENDER DOCUMENTS

In the preparation of the draft PQ and Tender Documents, the following are used as a base (or guide) documents:

(1) Presidential Decree No. 8 year 2006, Implementation Guidelines concerning Procurement of Goods and Services (Peraturan Presiden Republik Indonesia Nomor 8 tahun 2006) supplementing Presidential Decree No. 67 of year 2005.

(2) Contract Management for Construction Implementing Services (Serial of procurement of Construction Services), 2004 Ministry of Public Works (Pedoman Penyelenggaraan Kontrak jasa Pelaksanaan Konstruksi, 2004, Pekerjaan Umum)

(3) Standard Technical Specifications by the Ministry of Public Works (Spesifikasi Teknik).

(4) Conditions of Contract for Construction – Federation Internationale des Ingeniurs-Conseils, (FIDIC), First Edition, 1999.

(5) Sample Prequalification Documents under JBIC ODA Loans, Procurement of Works, Major Equipment, Industrial Installations and Turnkey Contracts, Japan Bank for International Cooperation (JBIC), November 1999.

(6) Sample Bidding Documents under JBIC ODA Loans, Procurement of Civil Works, Japan Bank for International Cooperation (JBIC), November 1999.

(7) Guidelines for Procurement under JBIC ODA Loans, Japan Bank for International Cooperation (JBIC), October 1999

(8) Guidelines for Procurement under JBIC ODA Loans, Japan Bank for International Cooperation (JBIC), January 2005.

(9) Indonesian Civil Law Code (Kitab Undang-Undang Hukum Perdata, 2006).

19.2 ORGANIZATION OF DRAFT PQ AND TENDER DOCUMENTS

Draft tender documents consisting of the following are prepared for each of the three (3) Packages under this project (1. Package I – Construction of Merak and Balaraja Flyovers; 2. Package II – Construction of Nagreg and Gebang Flyovers; and 3. Package III –Construction of Peterongan and Tanggulangin Flyovers):

1) Prequalification Documents

a) Glossary (Definitions)

b) Invitation for Prequalification

c) Section I – Instructions to Applicants
- General
- Contents of Prequalification Document
- Preparation of Applications
- Submission of Applications
- Evaluation of Applications
- Cancellation of Procurement

d) Section II – Application Data Sheet (ADS)

e) Section III – Prequalification Criteria

f) Section IV – Application Forms
- Form I - Letter of Application
- Form II - General Information
- Form III - General Experience of Applicant
- Form IV - Experience in Contract of Similar Works
- Form V - Joint Venture Data
- Form VI - Description of Works and Site Conditions in Contract
- Form VII - Proposed Site Organization
- Form VIII - Proposed Subcontractors
- Form IX - Summary of Contract Commitments and Work Progress
- Form X - Personnel / Staff Proposed for the Project
- Form XI - Experience Summary of Key Personnel Proposed for the Project
- Form XII(a) - Summary List – Equipment proposed for the Project
- Form XII(b) - Equipment proposed for the Project
- Form XIII - Financial Data
- Form XIV - Litigation History
- Form XV - Statement / Legal Status
- Form XVI - Additional Information

g) Section V – Scope of Contract

2) Tender Documents

a) Volume I
- Section I - Invitation for Bids
- Section II - Instructions to Bidders
- Section III – Bidding Data

b) Volume II
- Section IV - Part I- General Conditions of Contract (FIDIC 1st Edition, 1999)*
- Section V - Part II – Conditions of Particular Application

c) Volume III
- Section VI - Technical Specifications

d) Volume IV
- Section VII - Drawings

e) Volume V

- Section VIII - Bid Form, Appendices to Bid and Bid Security Form
- Section IX - Bill of Quantities
- Section X - Schedules of Supplementary Information
- Section XI - Form of Agreement and Sample Forms of Securities
- Section XII - Disputes Resolution Procedure
- Section XIII - Evaluation Procedure of Bid Proposals
- Section XIV - Post Qualification

Note: * This document is an official publication which form part of the tender / contract documents.

PART VII

PROJECT IMPLEMENTATION AND RECOMENDATION

Chapter 20

UPDATING OF ENVIRONMENTAL MANAGEMENT PLAN (UKL) AND ENVIRONMENTAL MONITORING PLAN (UPL)

20.1 SOCIAL SURVEY

The public hearings (socialization) and negotiation with the affected families have been completed before the Study commenced at Balaraja and Gebang Flyovers and these activities were on-going at Nagreg Flyover, therefore, the social surely was undertaken at the remaining three flyovers, namely Merak, Peterongan and Tanggulangin Flyovers. Survey results are summarized hereunder.

20.1.1 Study Method and Number of Respondents

The questionnaire was prepared and the home interview survey within the project influence area was undertaken. Number of respondents was as follows:

Flyover	No. of Respondents
Merak	165
Peterongan	118
Tanggulangin	88

20.1.2 Status of Family

Status of families is summarized in **Table 20.1.2-1**.

TABLE 20.1.2-1 STATUS OF FAMILY

	Merak	Peterongan	Tanggulangin
1. Last Education of Respondent			
1.1 No Education	2	-	3
1.2 Elementary School, not finished	14	5	2
1.3 Elementary School, finished	7	17	12
1.4 Jr. High School, not finished	-	1	4
1.5 Jr. High School, finished	23	9	16
1.6 Sr. High School, not finished	17	2	5
1.7 Sr. High School, finished	71	48	25
1.8 Academy	-	4	3
1.9 University	12	8	12
1.10 No Answer	10	24	5
2. Status of Demography			
2.1 Native	148	83	80
2.2 Outside of Kecamatan	14	5	2
2.3 Outside of Province	2	6	1
2.4 Outside of Island	-	-	-
2.5 No answer	1	24	5
3. No. of Families in One House			
3.1 One (1)	145	75	59
3.2 Two (2)	3	17	16
3.3 Three (3)	1	2	3
3.4 Four (4)	-	-	-
3.5 No answer	16	24	10
4. No. of Persons in One Family			
4.1 Two (2)	2	16	3
4.2 Three (3)	16	10	15
4.3 Four (4)	22	23	22
4.4 Five (5)	41	13	18
4.5 Six (6)	36	4	8
4.6 More than six	24	28	13
4.7 No answer	24	24	9
5. Main Occupation of Head of Family			
5.1 Farmer (owner)	-	1	4
5.2 Farmer (tenant)	-	8	4
5.3 Laborer	10	32	3
5.4 Merchant	88	11	21
5.5 Fisherman	1	-	-
5.6 Government Employee	12	5	3
5.7 Army	1	-	2
5.8 Company Employee	16	24	27
5.9 Pensioner	3	12	7
5.10 Entrepreneur	11	2	6
5.11 Driver	11	-	-
5.12 Government Corporation Employee	4	-	-
5.13 Housewife	-	9	-
5.14 Others	-	-	6
5.15 No Answer	8	24	5
6. Monthly Family Income			
6.1 < Rp 500,000	22	25	18
6.2 500,000 – 1,000,000	62	27	26
6.3 1,000,000 – 2,000,000	37	19	24
6.4 2,000,000 – 3,000,000	21	9	4
6.5 > 3,000,000	14	14	3
6.6 No answer	9	24	13
7. Monthly Family Expenditure			
7.1 < Rp 500,000	30	20	18
7.2 500,000 – 1,000,000	69	29	26
7.3 1,000,000 – 2,000,000	30	20	24
7.4 2,000,000 – 3,000,000	17	12	4
7.5 > 3,000,000	10	13	3
7.6 No answer	9	24	13

20.1.3 Distance to Workplace and Transportation Used

Distance from home to workplace, travel time and means of transportation are summarized in **Table 20.1.3-1**.

TABLE 20.1.3-1 DISTANCE TO WORKPLACE AND TRANSPORTATION

	Merak	Peterongan	Tanggulangin
1. Distance from Home to Workplace			
1.1 0-3 km	119	79	57
1.2 3-5 km	5	4	4
1.3 5-7 km	-	5	3
1.4 7-9 km	-	1	-
1.5 More than 9 km	15	5	16
1.6 No Answer	26	24	8
2. Time Required t Workplace			
2.1 0 minute	12	65	20
2.2 1 – 20 minutes	62	13	15
2.3 20 – 30 minutes	2	9	39
2.4 More than 30 minutes	21	7	6
2.5 No Answer	18	24	28
3. Means of Transportation			
3.1 Walking	58	55	12
3.2 Bicycle	6	2	3
3.3 Motorcycle	49	13	19
3.4 Motorbike Taxi (Ojek)	3	-	1
3.5 Private Car	27	6	3
3.6 Bus / Mini Bus	11	4	6
3.7 Train	-	-	1
3.8 Pedicab (Becak)	-	-	-
3.9 Government car	1	-	-
3.10 Others	-	-	14
3.11 No Answer	10	28	29

20.1.4 Status of House

Status of house is summarized in **Table 20.1.4-1**.

TABLE 20.1.4-1 STATUS OF HOUSE

	Merak	Peterongan	Tanggulangin
1. Lighting Source			
1.1 Electricity	150	92	82
1.2 Generator	10	1	-
1.3 Kerosene	-	1	-
1.4 No Answer	5	24	6
2. House Material			
2.1 Brick	160	84	80
2.2 Wood	-	9	2
2.3 Bamboo	-	1	-
2.4 Others	-	-	1
2.5 No Answer	5	24	5
3. House Condition			
3.1 Good	99	70	50
3.2 Middle	57	46	37
3.3 Bad	5	2	1
3.4 No Answer	4	-	-
4. Floor Area of House			
4.1 < 50 m^2	87	5	17
4.2 51 – 100	29	28	17
4.3 101 – 200	18	25	13
4.4 201 – 300	9	11	9
4.5 301 – 400	3	10	4
4.6 401 – 500	5	6	2
4.7 > 500	6	8	1
4.8 No Answer	8	24	25
5. Ownership of House Land			
5.1 Owned	49	80	64
5.2 Rental	72	6	3
5.3 Company Land	-	-	2
5.4 Parent's Land	-	3	14
5.5 Government Land	39	3	-
5.6 No Answer	5	26	5
6. Ownership of House			
6.1 Owned	103	80	70
6.2 Rental	42	6	1
6.3 Company House	1	3	1
6.4 Parent's House	-	3	10
6.5 Government House	8	3	-
6.6 No Answer	11	26	6

20.1.5 Knowledge and Opinion on the Project

Knowledge about the Project and opinions on the Project are summarized in **Table 20.1.5-1.**

TABLE 20.1.5-1 KNOWLEDGE AND OPINION ON THE PROJECT

	Merak	Peterongan	Tanggulangin
1. Knowledge about the Project			
1.1 Have known	47	65	42
1.2 Do not know	112	53	34
1.3 No Answer	6	-	12
2. Source of Information			
2.1 Officer of Desa/Kecamatan	14	61	10
2.2 Neighbor	29	10	6
2.3 Radio / TV	1	-	-
2.4 Newspaper	-	1	3
2.5 Others	3	46	18
2.6 No Answer	118	-	51
3. Opinion on the Project			
3.1 Give Benefit	20	36	17
3.2 Harming	122	47	41
3.3 No Change	14	35	24
3.4 No Answer	9	-	6
4. Reason why the Project is Harming	-	5	1
4.1 Increase noise	-	35	2
4.2 Increase air pollution	114	46	34
4.3 Land and/or house be taken	1	-	-
4.4 Decrease income	1	-	-
4.5 Less of business			
5. Reason Why Project is Beneficial			
5.1 Smooth Traffic Attained	26	13	7
5.2 Faster Travel	1	5	5
5.3 Increase of Land Price	2	15	5
5.4 New Business Opportunity	1	-	-
5.5 Obtaining Compensation	1	-	-
5.6 Others	-	3	-
6. Expectation from the Project			
6.1 Job opportunity during construction	76	3	2
6.2 Obtain New Livelihood	35	9	12
6.3 No expectation	46	80	51
6.4 Smooth Traffic	1	-	-
6.5 Getting Compensation	2	-	16
6.6 Others	-	26	7
6.7 No Answer	4	-	-

20.1.6 Method of Compensation

Methods of compensation preferred by respondents for land acquisition and/or house demolition are as follows:

Method	Merak	Peterongan	Tanggulangin
1. Money	153	94	61
2. Alternative Land	5	-	4
3. Up to the Government	1	24	16
4. Do not know yet	2	-	-
5. Business Place	-	-	-
6. No Answer	4	-	7

20.2 UPDATING OF UKL AND UPL

20.2.1 Original UKL and UPL

According to the decree of Ministry of Environment No. 17/2001, EIA (AMDAL) is not required for construction of flyover of less than 2 km in length, in stead, the Environmental Management Plan (UKL) and the Environmental Monitoring Plan (UPL) are required. All flyovers have the length of less than 2 km, thus EIA is exempted, but UKL and UPL are required.

Based on the Feasibility Study undertaken in year 2003, original UKL and UPL were prepared and approved by the respective local environmental agency as follows:

Flyover	Original UKL & UPL Approved on
Merak	October 8, 2003
Balaraja	October 6, 2003
Nagreg	February 16, 2005
Gebang	October 3, 2003
Peterongan	October 8, 2003
Tanggulangin	October 8, 2003

20.2.2 Updating of UKL and UPL

Based on the Basic Design of the project, original UKL and UPL were updated. Basic concept, nature of the Project and project site condition are almost the same as those of the feasibility study stage, updating was focused on the revision of the scope of work of the Project. Updated UKL and UPL were submitted to the respective local environmental agency and approved on the date as follows:

Flyover	Original UKL & UPL Approved on
Merak	June 22, 2006
Balaraja	June 13, 2006
Nagreg	November 24,2006
Gebang	July 6, 2006
Peterongan	June 13, 2006
Tanggulangin	June 16, 2006

20.2.3 Summary of UKL and UPL

Summary of UKL and UPL is presented in **Table 20.2.3-1** and **Table 20.2.3-2**, respectively.

TABLE 20.2.3-1 SUMMARY OF ENVIRONMENTAL MANAGEMENT EFFORT (UKL)

No.	Type of Impact	Source of Impact	Indicator of Impact	Environmental Management Effort			
				Effort of Management	Location	Time	Executor
I. PRE-CONSTRUCTION PHASE							
1.	Decrement of community income	Land Procurement	- Emergence of community that loss income source - Decrement of buyer	- Not to close access to and out of the business spots. - To give job opportunity to community that affected by the project. - Carry out socialization	Respective flyover Section	From the pre-construction phase till post construction phase	Initiator and Land Acquisition Committee
II. CONSTRUCTION PHASE							
1.	Decrease of Air Quality	a. Transportation of Material b. Soil Works	Many dusts spread on the surface of road and house roofs, etc.	- Covering the truck basin by canvas/ plastic during transportation of material, specially in the form of filler soil and cement - Compacting on soil works must be conducted soon after aggregate being spread along with watering (by remain to watch quality of allowed material) to compacted layer	Respective flyover construction site and its corridor	During construction	Contractor
2.	Increase of Noise	a. Transportation of Material b. Structure Works c. Pavement Works	Amount of complaint from society made on noise of transport equipment and project equipment	- Use less sound originating equipment. - Managing of work execution at sensitive area such as education area and settlement - In school area, be avoid work at the time of school hours - In settlement area have to be avoided night work	Respective flyover site	During construction	Contractor

No.	Type of Impact	Source of Impact	Indicator of Impact	Environmental Management Effort			
				Effort of Management	Location	Time	Executor
3.	Damage of Existing Road/Bridge	Mobilization of Equipments	Intensity of damage of road/ material transportation route during project execution	- Transportation of heavy equipment with steel wheel from source location to project location is conducted by trailer with appropriate axle load in line with road and bridge class - Heavy equipment with rubber wheel, the mobilization can be executed by running the equipment on source to project location, if economically cheaper	Along flyover corridor	During construction	Contractor
		Transportation of Material		- Loading of dump trucks and trailers must be adjusted within capacity of road and bridges - Immediately repair damage existing road/bridge caused by material transportation	Flyover corridor including transportation route	During construction	Contractor
4.	Traffic Disturbance	a. Mobilization of Equipments b. Transportation of Materials c. Soil Works d. Bridges Works e. Pavement Works f. Drainage Works	Duration of traffic jam and length of queuing of vehicles	- Conducting traffic management around project location to reduce traffic disturbance - Conducting special efforts to ensure traffic flow smoothness such as installation of barricade fringe about existence of the project at 500 m before entering project area so that road user	Flyover construction site	During construction	Contractor Contractor

No.	Type of Impact	Source of Impact	Indicator of Impact	Environmental Management Effort			
				Effort of Management	**Location**	**Time**	**Executor**
				may take alternative route - Construction work sequence is so planned that same traffic lanes are provided - Levying traffic officer	At the Balaraja Flyover	During construction	
5.	Social Jealousy	Mobilization of Labor	Amount of local resident involved in the project	- Giving opportunity to local labor potency around the project to fill position of labor in project. This matter can be done through office of Kelurahan/Kecamatan - Giving opportunity to local people which have potency in entrepreneurship to conduct food stall and or giving service for consumption need of the project labor	Flyover construction site.	Before mobilization of labor During construction	Contractor
6.	Disturbance of Environment Comfort/ Health	a. Soil Works	- Amount of materials un-used and un-disposed at the site.	- Immediately dispose of un-used materials and construction waste at the designated location by the client.	Flyover construction site	During construction	Contractor
		b. Pavement Works	- Amount of construction waste remain at the site				

No.	Type of Impact	Source of Impact	Indicator of Impact	Environmental Management Effort			
				Effort of Management	Location	Time	Executor
III. POST CONSTRUCTION PHASE							
1.	Increase of Noise	Operation of flyover	Existing noise level compared with before the project Complaint of society to noise level	- Making of landscape which have function as noise barrier - Need to consider to build noise barrier to reduce noise intensity around school, religious place and settlement	Respective flyover site	Planning phase Post construction phase	Planning Consultant DGH and/or Local Government Public Works
2.	Accident Prone	Operation of flyover	Intensity of traffic accident	- Development of side walk to be protect pedestrian. - Traffic management around flyover location. - Strict enforcement of traffic law.	Flyover Corridor	During planning phase Post construction phase	Planning Consultant Local Government Local Traffic Police
3	Security interference	Illegal land utilization	Emergence of building under the flyover as shelter	- landscaping under flyover - fences making - adequate lightning	Under Flyover	During post construction	Local Government

TABLE 20.2.3-2 SUMMARY OF ENVIRONMENTAL MONITORING EFFORT (UPL)

No.	Type of Impact	Source of Impact	Benchmark of Impact	Environmental Monitoring Effort			
				Effort of Monitoring	Location	Time	Executor
I. PRE-CONSTRUCTION PHASE							
1.	Decrement of community income	Land Procurement	- Emergence of community that loss income source - Decrement of buyer	Monitor the following: - Not to close access to and out of the business spots. - To give job opportunity to community that affected by the project. - Socialization is properly undertaken	Respective flyover site	At pre – construction and the construction phase as well as post construction phase	Environmental Agency
II. CONSTRUCTION PHASE							
1.	Decrease of Air Quality	a. Transportation of Material b. Soil Works c. Structure Works d. Pavement Works	From amount of dust exist on the surface and house roof, etc. and Government Regulation number 41 Year 1999 regarding Controlling of Air Pollution	- Conducting monitoring of dust visually on activities which have potency to produce dust - Conducting sampling in field and then conducting laboratory analysis	Respective flyover site	During construction, every six month	Supervision Consultant
2.	Increase of Noise	a. Transportation of Material b. Soil Works c. Structure Works d. Pavement Works	Noise level exceed threshold limit allowed, for settlement area is 55 dBA and for commerce area is 70 dBA.	- Measuring noise intensity with sound level meter - Monitoring maintenance of heavy equipment which is mobilized - Monitoring work hour as agreement result with society at location of school, religious place	Respective flyover site	During construction, every six month	Supervision Consultant

No.	Type of Impact	Source of Impact	Benchmark of Impact	Environmental Monitoring Effort			
				Effort of Monitoring	Location	Time	Executor
				- Need to measure air quality periodically during the project			
3.	Traffic Disturbance	a. Mobilization of Equipments b. Soil work c. Transportation of Material d. Structure Works e. Pavement Works f. Drainage system installation	Traffic queue length and travel speed	- Monitor if approval traffic management plan is implemented - Traffic guide signs, traffic safety measures are implemented or not.	Respective flyover site	During construction	Supervision Consultant
4.	Social Jealousy	Labor mobilization	Amount of local people which absorbed in the project including who have effort to open food stall to service daily need of project employee	- Conducting identification and visual observation to contractor labor - Conducting monitoring whether there is society complaint	Respective flyover site	During mobilization of labor and During construction	Supervision Consultant
5.	Disturbance of Environment Comfort and Health	a. Soil Works b. Pavement Works c. Structure Works	Amount of society complaint against cleanness of project environment	Field observation if any complaints from society are raised	Respective flyover site	During construction	Supervision Consultant

No.	Type of Impact	Source of Impact	Benchmark of Impact	Environmental Monitoring Effort			
				Effort of Monitoring	Location	Time	Executor
III. POST CONSTRUCTION PHASE							
1.	Noise	Operation of respective Flyover	Decree of Minister of Living Environment number 48/11/1996 concerning Noisy Level Standard	Measurement of noise level in field with sound level meter then compare to the standard allowed by Decree of Minister of Living Environment number 48/11/1996 concerning Noisy Level, n relation with allotment of area and paying attention to society complaint about the noise	Respective flyover site	During post construction phase, two measurement in a year	Environmental Agency
2.	Accident Prone	Operation of respective Flyover	Number and intensity of traffic accident	Visual observation at location and inventory of the traffic accident	Respective flyover site	During post construction phase, conducted recording of accident case happened	Office of Police Sector of Local Government
3.	Security Interference	Illegal land utilization	Emergence of illegal building under the flyover as a trading place or shelter.	Observation in the field in order to know how many illegal shelter emerged and intensity of occurrence of security interference around the flyover	Under the Flyover	During post construction with period once a month	Order and Security Service of Local Government

Chapter 21

ROW ACQUISITION AND RESETTLEMENT ACTION PLAN

21.1 ROW ACQUISITION PROCESS

ROW acquisition process is shown in Figure 21.1-1. ROW acquisition is undertaken by the Land Acquisition Committee (formerly called Team -9), however, if land area to be acquired is less than one (1) ha., Project Manager can undertake land acquisition.

Budget for land acquisition is basically prepared by the local government(s) (provincial and district). However, in case that local government can not prepare enough budget, the Central Government (DGH for this project) provides additional fund to local governments.

21.2 PRESENT STATUS/PROGRESS OF ROW ACSUITIION

Present status of ROW acquisition as of September 15, 2006 is shown in **Table 21.2-1**.

Merak Flyover

- ROW acquisition is undertaken by Project Manager.
- ROW boundary map was provided on June 9, 2006.
- Public hearing / socialization was held on September 12, 2006.
- Budget (24 Billion Rp.) was prepared by the Provincial Government.
- Completion of ROW acquisition is targeted to be the end of December, 2006.

Balaraja and Gebang Flyovers

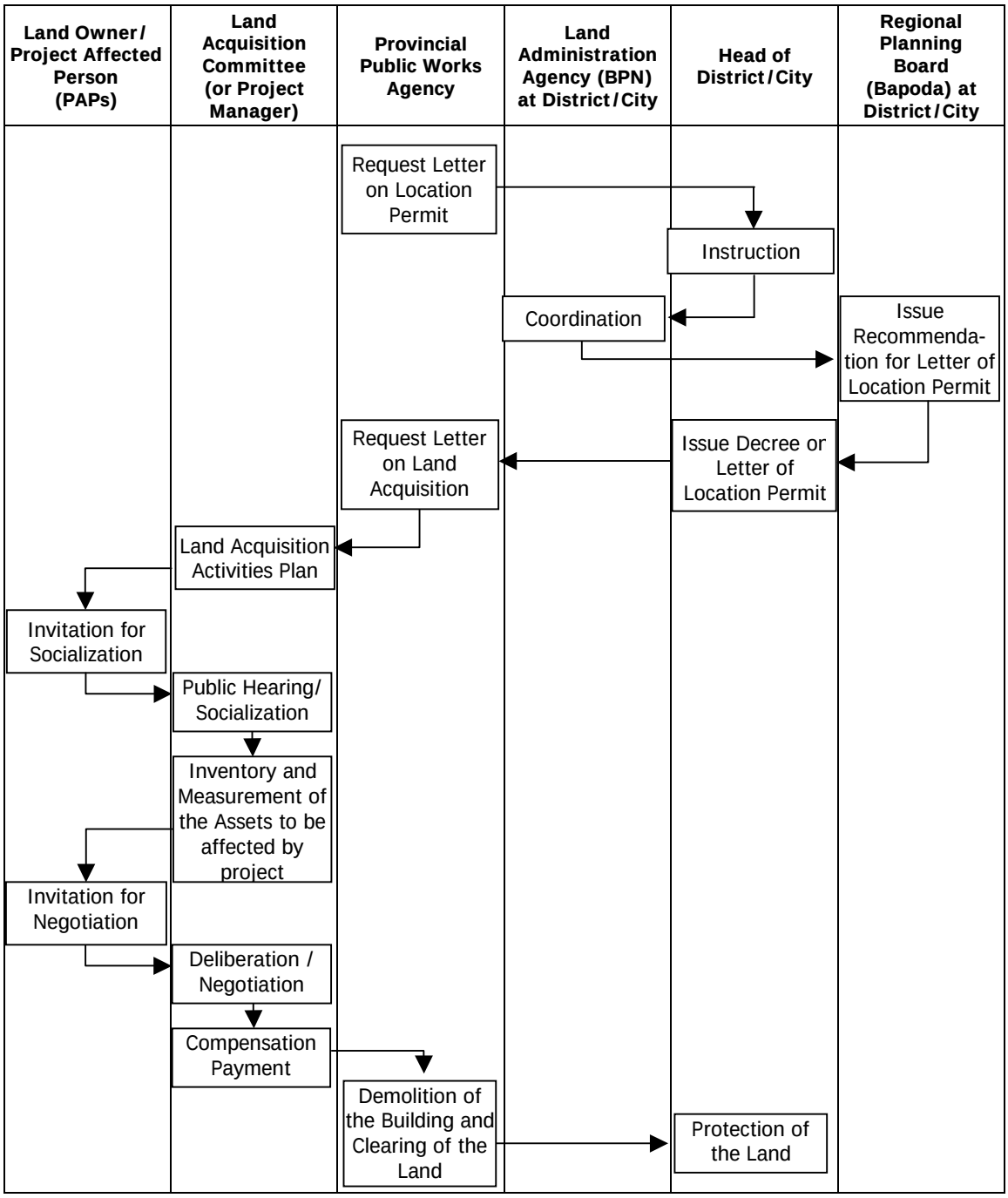
- ROW acquisition was undertaken based on the SAPROF design.
- Most of the activities have completed and demolition of affected structures and clearing of land is on-going.

Nagreg Flyover

- ROW acquisition activities have started based on the SAPROF design.
- Public hearing/socialization was completed on November 22, 2005.
- Although negotiation was undertaken for three times, no agreement was reached yet, due to difference of estimated land value and compensation cost between the Land Acquisition Committee and project affected people.
- In order to expedite land acquisition activities, additional budgetary support will be needed.

Peterongan Flyover

- ROW boundary map was provided to the local government on June 9, 2006.
- Public hearing/socialization was held on August 8, 2006.
- Measurement of affected assets is on-going.
- Deliberation/negotiation is scheduled to be held on September 22, 2006.
- Land acquisition budget was shared by the local government and the Central Government.



Note: If land area to be acquired is less than 1 ha. Project Manager can undertake land acquisition.

FIGURE 21.1-1 ROW ACQUISITION PROCESS

TABLE 21.2-1 PRESENT STATUS OF ROW ACQUISITION

As of September 15, 2006

No.	Project Name	Location	Land Acquisition Required (m2)	No. of Families or Houses Affected	Location Permit (from District/ Capital)	Team-9 Organized	ROW Boundary Map Provided	Staking Out of ROW Limit	Public Hearing/ Socialization	Inventory of The PAP Assets	Measuring Affected Assets	Deliberation / Negotiation	Payment Status	Demolition and Clearing	Budget for ROW Acquisition	Source of Fund (billion)			Remarks
																APBD-II (District)	APBD-I (Province)	APBN (Central)	
PACKAGE - 1																			
1.	Merak Flyover	Tamansari Village	3,670.00	waiting	Already	By Project	June 9, 2006	Completed by	Completed	NY	NY	NY	NY	NY	24 Billion	-	24	-	1. Budget for land acquisition can be realized
		Pulomerak Sub-District		measurement	available	Manager		Land Administration	(Sept 12, 2006)										on Middle of August 2006
		Cilegon City		of assets	(August 29,2006)			Agency, Project											2. Socialization will be conduct with the Head of
		Banten Province						Manager and											Sub District, Head of Village, Group of
								Local Consultant											Neigbourhood, Group of Household
2.	Balaraja Flyover	Balaraja Village	2,620.74	71 HH	Already	Yes	Based on	Completed by	Completed	Completed	Completed	Completed	Completed	OG	-	-	-	-	1. Execution for payment compensation already
		Talagasari Village		48 Unit	available		SAPROF Study	Land Administration	(June 10, 2005)	(Sept. 6, 2004)	(Dec 24, 2004)	(July 15, 2005)	(Oct., 2005)						done
		Balaraja Sub District			(June 1, 2005)			Agency, Project											2. Land clearing of buildings and others asset
		Tangerang District						Manager and											is on going
		Banten Province						Local Consultant											
PACKAGE - 2																			
3.	Nagreg Flyover	Nagreg Village	7,488.00	60 HH	Already	Yes	Based on	Completed by	Completed	Completed	Completed	OG	NY	NY	6 Billion	-	6	-	1. Negotiation to Project Affected Person (PAPs)
		Nagreg Sub District			available		SAPROF Study	Land Administration	(Nov. 22, 2005)			(Sept. ,2006)							is underway
		Bandung District			(Sept. 22,2005)			Agency, Project											
		West Java Province						Manager and											
								Local Consultant											
4.	Gebang Flyover	Gebang Ilir Village	3,928.51	81 HH	Already	Yes	Based on	Completed by	Completed	Completed	Completed	Completed	Completed	OG	-	-	-	-	1. Execution for payment compensation already
		Gebang Kulon Village		91 Unit	available		SAPROF Study	Land Administration	(March 5,2005)	(March 10,2005)	(March 30,2005)	(June 23,2005)	(Oct. -						done
		Gebang Mekar Village			(April18,2005)			Agency, Project					Dec.,2005)						2. Land clearing of buildings and others asset
		Gebang Sub District						Manager and											is on going
		Cirebon District						Local Consultant											
		West Java Province																	
PACKAGE - 3																			
5.	Peterongan Flyover	Peterongan Village	7,509.27	measurement	NY	Yes	June 9, 2006	Completed by	Yes	Yes	OG	NY	NY	NY	7 Billion	3.0	2	2.0	1. Estimated amount ROW by Project Manager,
		Peterongan Sub District		of assets is				Land Administration	(August 8,2006)	(August, 2006)		(Sept. 22,2006)							2. Project socialization that given affect to
		Jombang District		under process				Agency, Project											person already done
		East Java Province						Manager and											3. Measurement of assets is under process
								Local Consultant											4. preparation of Location Permit Decree is
																			under process
6.	Tanggulangin Flyover	Ketapang Village	4,357.50	measurement	NY	By Project	May 9, 2006	Completed by	Yes	Yes	OG	NY	NY	NY	3.5 Billion	1.5	-	2.0	1. Estimated amount by Project Manager.
		Kalitengah Village		of assets is		Manager		Land Administration	(August 4,2006)	(July,2006)		(Sept. 15,2006)							2. Project socialization that given affect to
		Tanggulangin Sub District		under process				Agency, Project											person already done
		Sidoarjo District						Manager and											3. Measurement of assets is under process
		East Java Province						Local Consultant											4. preparation of Location Permit Decree is
																			under process

Note :
PAP = Project Affected Person
NY = Not Yet
OG = On Going
HH = Household/Family

21.3 RESETTLEMENT OF PROJECT-AFFECTED PEOPLE

So far, all project-affected peopled preferred to be compensated by money. Most of the case, only a partial of a house/store/building is affected, therefore, people still stay in the same place. Two school buildings were affected at Balaraja Flyover. The Local Government built alternate school building within the same school compound.

Chapter 22

PROJECT IMPLEMENTATION PROGRAM

22.1 IMPLEMENTING AGENCY AND ORGANIZATION

The implementing agency is the Directorate General of Highways (DGH), Ministry of Public Works. Project implementing organization is shown in **Figure 22.1-1**. The project is divided into three (3) contract packages as follows:

Package 1 : Merak and Balaraja Flyovers in Banten Province
Package 2 : Nagreg and Gebang Flyovers in West Java Province
Package 3 : Peterongan and Tanggulangin Flyovers in East Java Province

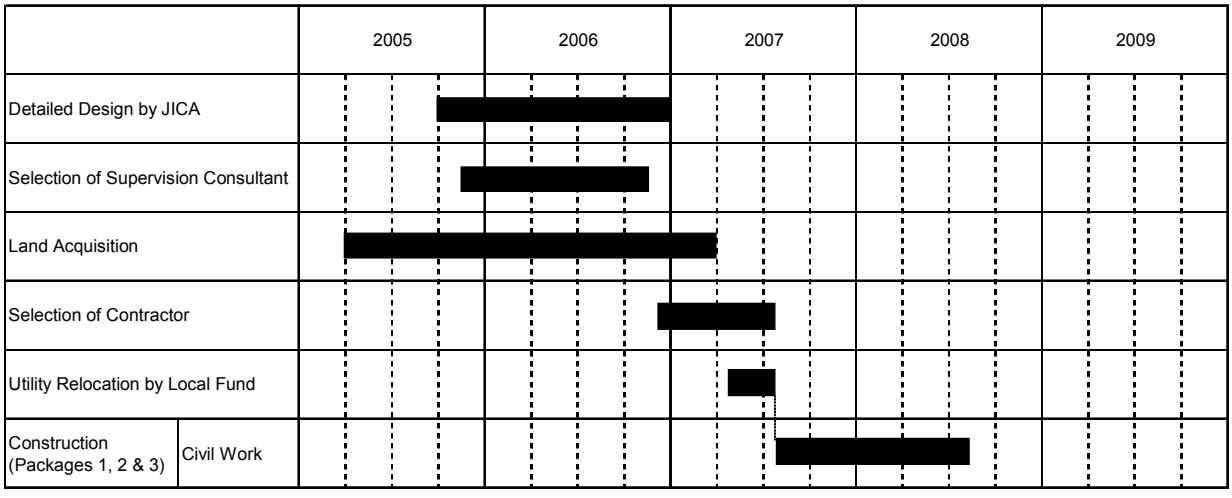
Directorate of Road and Bridge for western Region is responsible for selection of supervision consultant and contractors. During construction phase, it is responsible for field works of Packages 1 and 3.
Directorate of Freeway & Urban Road is responsible for the field works of Package 2.
Directorate of Planning is responsible for programming and budgeting and PMU – JBIC makes close coordination with JBIC.
Directorate of Technical Affairs closely monitors technical matters of the Project.

The Consultant for the pre – construction stage and construction supervision stage is employed and the core team and field teams are organized.

22.2 IMPLEMENTATION SCHEDULE

Implementation schedule is shown in **Table 22.2-1.**

TABLE 22.2-1 IMPLEMENTATION SCHEDULE



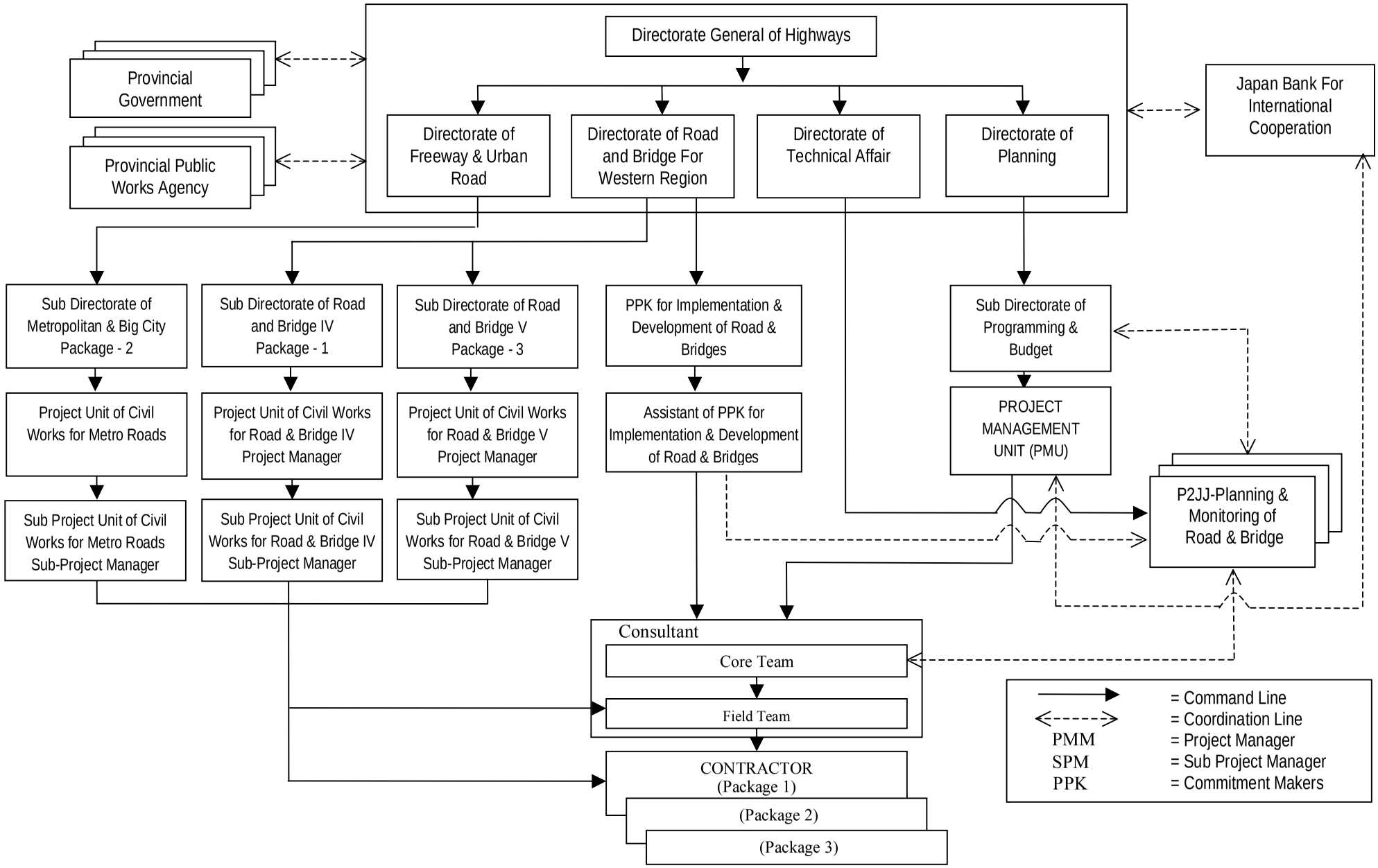


FIGURE 22.1-1 PROJECT IMPLEMENTATION ORGANIZATION

22.3 ANNUAL FUND REQUIREMENT

Annual fund requirement is prepared based on the Option – 1: "Shortage of Lane is Covered by Local Counterpart Fund" (refer to Section 24.3 of Chapter 24), and shown in **Table 22.3-1**. Annual fund requirement by source fund is summarized below:

ANNUAL FUND REQUIREMENT BY SOURCE OF FUND

Fund Source	Year	
	2007	2008
JBIC Loan (Million Yen)	1,670	2,411
Local Counterpart Fund (Billion Rp.)	32.55	41.10
Local Fund (Billion Rp.)	20.48	-
Total (Million Yen)	2,377	2,959

Note: 1¥ = 75 Rp.

TABLE 22.3-1 ANNUAL FUND REQUIREMENT BY SOURCE OF FUND

Unit: Million Yen

Fund Source	Year		
	2007	2008	Total
A. Construction of Flyover			
A-1. Consultancy Services	176	165	341
- JBIC Loan	160	150	310
- Local Counterpart Fund (Tax)	16	15	31
A-2. Civil Work	1,928	2,794	4,722
- JBIC Loan	1,510	2,261	3,771
- Local Counterpart Fund			
Local Portion	243	279	522
Tax	175	254	429
Total	418	533	951
B. Utility Relocation			
- Local Fund	273	-	273

Note: 1¥ = 75 Rp.

Chapter 23

FLYOVER/BRIDGE MAINTENANCE PLAN & SYSTEM

23.1 INTRODUCTION

23.1.1 Necessity of Flyover Management Plan & Systems

Flyover/Bridges managed in the traditional may undergo inspections sometimes at random intervals. Deterioration and defects that are detected are treated when it is apparent that the safety or the function of the bridge is at risk.

Flyover Management should be carried out with awareness of the existing social, and legal environmental within the constrains of limited available funding.

It should optimize benefits for both present and future use.

The purpose of the flyover/bridge management system is to combine management, engineering, safety and economic inputs to help determine the best actions to threat the subject flyover/bridge.

The flyover/bridge management system involves taking a traditional, systematic approach to planning, programming and implementing the wide range of activities associated with flyover/bridge management.

Flyover management systems are necessary for the exacting task of minimizing flyover deterioration and optimizing service levels of the flyover under the constrain of the limited funding.

The selected system should not be complicated as to discourage its application.

A list of the main components of any flyover/bridge management system is provided in following Table.

Basic Components of a Flyover Management System

- A comprehensive, up-to-date inventory of Flyover.
- A system for inspection and a standard means of recording inspection results.
- A system for recording all flyovers and their associated cost.
- Procedures to establish priorities for maintenance, rehabilitation and improvement.
- A system of identifying, practical deterioration models and treatment options to minimize deterioration of the flyover structural component.
- System for production of reports for evaluating and supporting management decisions.

23.1.2 Scope of the Manual

In recognition of the current poor state of many flyover/bridges in Indonesia and lack of appropriate management practices, effective and efficient Manual has to be produced to assist Bina Marga of improving the management of Flyover assets.

The need for and scope of the Manual shall be decided on the basis of a survey of the requirements of maintenance office who are directly in-charge and experienced in the management of flyover/bridge assets.

Its purpose is primarily to provide maintenance engineer with an awareness of the importance of adopting a flyover/bridge asset management system and the basis approach and actions necessary.

For Better Management of Flyover/Bridge Assets

- Establish effective and efficient bridge asset management system.
- Develop flyover inventory system based on the typical data for a flyover/bridge inventory.
- Conduct initial condition assessments on all flyover/bridges.
- Determine from the initial condition surveys those flyover/bridge that require a detailed report from inspector. If further detailed inspection is required this should be undertaken by a qualified structural engineer.
- Based on the inspection reports received determine the nature of the problems and possible solutions.
- Undertake comparison between improvement and rehabilitation to establish the most appropriate actions to be taken.
- Report on the findings of the evaluation and put forward recommendations that are based on sound condition and economic assessment, social assessment.
- Monitor on a regular basis the condition of the flyover/bridge assets and ongoing management actions.

It's purpose is also to provide a "state of the art" manual for inspector to better manage in a more practical and economical ways of maintaining, repairing and rehabilitating flyover/bridges.

The Manual has to be prepared using the accumulated knowledge and practical experiences.

It is intended to lead to a more informed approach for the better management of flyover/bridge assets for the benefit of the Indonesia Government

23.1.3 Use of the Manual

The Manual shall be centered on the management aspects relating to flyover/bridges. Its concentrates on all those processes necessary to ensure that flyover/bridges on the road network have to be kept in a safe condition with the most cost efficient use of resources.

Good management practices can significantly increase the life of a flyover/bridges with general expectations ranging from up to 100years or more for steel and concrete flyover/bridges. While poor management practices can significantly shorten a flyovers life and increase its life cycle cost.

Recent development in transport and flyover/bridge technology have increased the need for maintenance and accurate assessment and monitoring of the condition. This has resulted in an increased need for flyover management due to the following reasons;

1) Increased traffic numbers, size and weight limits of commercial vehicles.
2) Improved knowledge of materials and structural behavior and how to prolong the life of the flyover.
3) Making higher deterioration reducing flyovers serviceability.

23.1.4 Manual Contents

The Manual has to be prepared to cover those key management activities necessary for the concerned Agency to develop a flyover management program

The proposed Manual will contain the followings;

Chapter I Introduction
Introduce the scope of the Manual and its intended use.
Chapter II General Management Practices.
This covers a wide range of management practices, including maintenance and aspects and provides a detail understanding of the requirements of a flyover/bridge management system
Chapter III Asset Management Practices
It covers flyover inspection and assessment procedures, the identification on common problems and solutions for concrete and steel, and the evaluation of rehabilitation and improvement options.
Chapter IV List of Appendices
Chapter V Directory of Service Providers
Information on various service providers and suppliers in the flyover/bridge industry to assist inspection office in-charge.

23.1.5 Updating the Manual

Flyover/bridge technology and practices are continuously being improved. For this reason it will be necessary from time to time to update the Manual to reflect current best practice.

23.2 FLYOVER MANAGEMENT DECISION PROCESS

The maintenance manager (bridge engineer) in-charge has a responsibility to minimize structural deterioration and optimize the functional service levels of the flyover components, within the constrains of limited funding.

The structural service life of a flyover/bridge (period before any instability of the structure would cause the flyover to close), in the absence of overload or natural disaster, may be from 20 to 100 years. However it is often happen, that well maintain concrete and steel flyover/bridges become functionally inadequate before the structure condition reach to replacement needs.

1) Functional Level of Services
Factors which affect the functional level of services of a flyover are;

- Load capacity
- Width
- Overhead Clearance
- Change in traffic usage.

The functional level of service of a flyover is deficient if any of there factors does not meet the usual criteria for the road network where flyover is a component.

2) Structural Level of Service

The need for maintenance and repair of flyover is caused drom the following cases;

- Deterioration of decay of the materials used in the flyover.
- Damage by external forces to the structural elements of the flyover.
- Failure of joints and bearing.

Without appropriate maintenance and repair, the structural level of services of flyover will decrease below the original design level either gradually or suddenly.

3) Performance Measurement

It is useful to quantify, where possible, the performance of flyovers. By implementing such quantification of performance, it becomes practical to evaluate flyover component at intervals and measure the effects of management strategies and expenditures on level of services.

There are variety of performance indicators that can be selected to describe functional and structural levels of service of a flyover. The indicator as typical shows as follows;

- Condition rating.
- Deck width.
- Road alignment.
- Maintenance cost.
- Safety aspects (e.g. guardrail).

To quantify the relative adequacy of the flyover a single index can be calculated which incorporates the individual ratings. A method should be used which gives weighting to the relative importance of each of the indicators.

4) Life Cycle Cost

It is necessary for life cycle costing to predict the rate and extent of future deterioration of the flyover/bridge asset.

This is requiring careful inspections and assessment of functional and structural levels. The qualified and experienced engineer in assessing the condition of similar structures is needed to estimate future deterioration. Available inspection and records and historical condition rating data are necessary.

Details and how to inspect and assess the condition of various part of flyover must be established.

Even where records are available, it must be recognized that the current condition of a flyover is the result of its past environment history and past maintenance. Consequently future effects from environmental factors and maintenance will be different from those of the past.

A management strategy for a flyover, whether a proposed new structure or an existing structure, should take account of all future costs and benefits in the long term. Where appropriate, as for example in considering the ongoing maintenance of an old flyover that is subject to a load limit and an alternative of replacing it with a new flyover, consideration should be given to both direct cost and community travel cost.

All future financial costs and benefits, along with the time over which each will occur, should be listed for each strategy option. The costs of such activities as design, inspection and supervision should be included. Timings of costs and benefits are important as early cost and benefits have greater values in current value than similar costs and benefits accrued at a later time.

23.3 MAINTENANCE MANAGEMENT PLAN

23.3.1 Maintenance Strategy

Without appropriate maintenance, flyover will deteriorate prematurely throughout their service of life. Material damage and defects will usually accelerate this deterioration.

It is necessary for a flyover manager to develop and implement a maintenance strategy with regard to a flyover component that, within the constraints of available funding, will:

- Preserve flyover;
- Ensure the safety of users of the flyover; and
- Optimize the overall functional performance of the flyover components.

Maintenance is required in a pro-active approach to minimize deterioration of a flyover structure and in a reactive response to damage and defects. The reactive maintenance activities will usually take priority.

The nature and extent of maintenance required, in general, will largely be dependent on the condition of a flyover. This will often be linked to the age of the structure. Deterioration of well-designed and constructed newer structures is generally much less than for older structures, but routine maintenance is cost effective for all flyover. Routine inspections and maintenance are valuable in the detection and treatment of defects and serviceability problems at an early stage.

In determining maintenance strategy there is a need to identify risk exposure. The most important risks are usually those relating to passing traffic.

Risks associated with an event are usually rated in terms of the product of the probability of the event occurring and the magnitude of the consequences of the event. Risk management in a maintenance strategy requires evaluation of acceptable levels of risk and the undertaking of appropriate risk control measures. Provision for the safety of flyover users is a priority in risk management.

The definition of maintenance needs will be based on available information about the flyover component. Comprehensive information gained from recent inspections is usually essential. If extensive historical data on the condition levels of the flyover is available, deterioration trends may be evident. It is important that the designated procedures for inspection provide for uniformity, completeness and ease or reporting. Inspectors are required to be able to judge the condition of

structures and significance of visual defects. Inspectors need to have the available support of an experienced bridge engineer when assistance is needed in interpreting visual evidence of defects.

A maintenance strategy should take account of traffic needs, including those relating to the economic importance of specific flyover.

There is a need to exercise engineering judgment to take account of the many complex factors involved in developing a maintenance strategy for the flyover component, which is inclusive of strategies for the maintenance of each individual structures.

23.3.2 Maintenance Planning and Programming

Maintenance planning involves determining the maintenance task and scheduling and matching it to the resources required, so the work can be done safely, on time and on cost.

Of fundamental importance in maintenance management of flyover component is the assessment of priorities. The determination of the individual tasks should include a quantitative or qualitative assessment of benefit cost and risk associated with carrying out the task in a particular year or not at all. Inspection and testing reports should incorporate such judgments.

Maintenance planning and programming for a flyover component needs to be systematic. Equipment, materials and skills need to be scheduled for the programmed work. Planning should make provision for the preparation and retention of clear records of work done and of cost incurred that are able to be readily accessed in the future.

Provision should be made for clear understanding by all personnel involved of:

- What task need to be done and why
- Who will carry out the work
- How the work will be done
- The budgeted amount for each task
- Health and safety requirement

Management must still assess the need, determine a cost effective remedy and arrange resources while adjusting programmed maintenance works for the remainder of the flyover components as necessary to meet budget constraints.

23.3.3 Maintenance Practices

There is a requirement for flyover maintenance to be carried out in a systematic manner, with provision for effective inspection and reporting. Routine flyover maintenance is usually carried out in conjunction with routine road pavement maintenance. Other maintenance requirements will be met at intervals of one to five years as appropriate. Personnel involved should have the training, experience, equipment and materials appropriate for the tasks to be carried out.

It is important that attention be given to the total structure. Many components of flyover, for example decks, longitudinal and transverse beams, barriers, and parts of piers, abutments and retaining walls above ground and above water are readily accessible for visual or more sophisticated investigation. The conditions of those

parts of piers, abutments and retaining walls underground are less readily investigated. However the assessment of the condition of these parts is important.

Maintenance will vary in nature and extent across the flyover components. Typical maintenance practices include the following activities:

- Repair of the road surface, on and adjacent to the flyover, to ensure user safety and reduce traffic impact loadings on the flyover deck;
- Cleaning the structure – removing any silt, bird droppings;
- Clearing all drainage components to avoid water retention;
- Scaling of concrete cracking, application of protective coating and renewal of cathodic protection.

23.3.4 Maintenance Management Systems

Procedures are necessary to ensure and facilitate transfer of information on flyover component condition to a comprehensive flyover asset condition database, thus enabling maintenance scheduling.

Details of appropriate inspection and reporting procedures must be established. Appropriate forms on which to record information obtained from designated site inspections must be included.

Chapter 24

PROJECT EVALUATION AND RECOMMENDATIONS

24.1 PROJECT EVALUATION

24.1.1 Operation and Effect Indicators of the Project

Operation and effect indicators selected for the projects were as follows:

Operation Indicator :
1) Daily Traffic Volume (Veh/day)
   - At-grade road
   - Flyover

Effect Indicator :
2) Travel Speed (Km/hour)
   - At-grade road
   - Flyover
3) Travel Time Reduction (Veh-hr/day)
4) Travel Cost Reduction (1,000 RP/day
5) Maximum Traffic Queue Length at Railway Crossing during Railway Passing (m)

Operation and effect indicators of each flyover are shown in **Table 24.1.1-1** for the following years:

- Present (2005)
- Opening Year (2008)
- 10 years after opening year (2018)

TABLE 24.1.1-1 (1/6) OPERATION AND EFFECT INDICATOR: MERAK FLYOVER

Operation / Effect Indicator		Year		
		2005	2008	2018
1) Daily Traffic Volume (veh/day)	At-grade	8,445	4,993	7,712
	Flyover	-	4,757	6,981
2) Travel Speed (km/hr)	At-grade	19.7	40.0	37.2
	Flyover	-	40.0	40.0
3) Travel Time Reduction (veh-hr/day)		-	216	1,810
4) Travel Cost Savings (1,000 Rp/day)		-	10,437	65,688
5) Maximum Traffic Queue Length at Railway Crossing during Train Passing (m)		115	68	105

TABLE 24.1.1-1 (2/6) OPERATION AND EFFECT INDICATOR: BALARAJA FLYOVER

Operation / Effect Indicator		Year		
		2005	2008	2018
1) Daily Traffic Volume (veh/day)	At-grade	14,607	10,778	16,694
	Flyover	-	6,135	9,466
2) Travel Speed (km/hr)	At-grade	9.8	38.4	28.7
	Flyover	-	40.0	38.7
3) Travel Time Reduction (veh-hr/day)		-	215	1,801
4) Travel Cost Savings (1,000 Rp/day)		-	13,819	91,431
5) Maximum Traffic Queue Length at Railway Crossing during Train Passing (m)		-	-	-

TABLE 24.1.1-1 (3/6) OPERATION AND EFFECT INDICATOR: NAGREG FLYOVER

Operation / Effect Indicator		Year		
		2005	2008	2018
1) Daily Traffic Volume (veh/day)	At-grade	17,783	7,672	11,853
	Flyover	-	12,868	19,638
2) Travel Speed (km/hr)	At-grade	27.9	39.1	25.8
	Flyover	-	41.1	29.9
3) Travel Time Reduction (veh-hr/day)		-	293	1,752
4) Travel Cost Savings (1,000 Rp/day)		-	16,213	75,698
5) Maximum Traffic Queue Length at Railway Crossing during Train Passing (m)		430	185	288

TABLE 24.1.1-1 (4/6) OPERATION AND EFFECT INDICATOR: GEBANG FLYOVER

Operation / Effect Indicator		Year		
		2005	2008	2018
1) Daily Traffic Volume (veh/day)	At-grade	10,338	3,627	5,639
	Flyover	-	8,345	12,869
2) Travel Speed (km/hr)	At-grade	25.1	37.6	29.9
	Flyover	-	59.5	46.3
3) Travel Time Reduction (veh-hr/day)		-	293	1,752
4) Travel Cost Savings (1,000 Rp/day)		-	22,104	111,177
5) Maximum Traffic Queue Length at Railway Crossing during Train Passing (m)		-	-	-

TABLE 24.1.1-1 (5/6) OPERATION AND EFFECT INDICATOR: PETERONGAN FLYOVER

Operation / Effect Indicator		Year		
		2005	2008	2018
1) Daily Traffic Volume (veh/day)	At-grade	15,864	5,073	7,784
	Flyover	-	13,241	20,248
2) Travel Speed (km/hr)	At-grade	27.1	40.0	29.3
	Flyover	-	48.3	38.6
3) Travel Time Reduction (veh-hr/day)		-	243	1,065
4) Travel Cost Savings (1,000 Rp/day)		-	17,501	55,839
5) Maximum Traffic Queue Length at Railway Crossing during Train Passing (m)		300	96	147

TABLE 24.1.1-1 (6/6) OPERATION AND EFFECT INDICATOR: TANGGULANGIN FLYOVER

Operation / Effect Indicator		Year		
		2005	2008	2018
1) Daily Traffic Volume (veh/day)	At-grade	15,572	6,804	10,519
	Flyover	-	11,198	17,171
2) Travel Speed (km/hr)	At-grade	43.4	40.0	32.8
	Flyover	-	53.7	37.5
3) Travel Time Reduction (veh-hr/day)		-	161	522
4) Travel Cost Savings (1,000 Rp/day)		-	10,524	36,628
5) Maximum Traffic Queue Length at Railway Crossing during Train Passing (m)		160	69	108

24.2 ECONOMIC EVALUATION

24.2.1 Introduction

(i) Methodology

Economic evaluation is pursued to determine the effects of the construction of the six flyovers from the view point of nation's economic well-being and to assess the economic viability of the project. For this purpose, the following parameters were utilized: (i) Economic Internal Rate of Return, (ii) Net Present Value, and (iii) Benefit-Cost Ratio. Conventional method of Cost Benefit Analysis of discounted cast flow was employed.

(ii) Assumption

Some assumptions were made to proceed to the analysis. These are:

a. "With Project" and "Without Project" cases were compared. The quantified economic benefits which would be realized from implementation of the project are defines as the difference of vehicle operating costs and vehicle time costs between the two cases.

b. The construction of the proposed flyover will be carried out from a total of 12 months from the middle of year 2007.

24.2.2 Project Costs

Economic cost to be considered in the economic analysis for a flyover construction project consists of the following components.

1) Construction cost (excluding tax components)
   - » Cost of flyover construction
   - » Cost of service road construction
   - » Other accost for ancillary works

2) Engineering service cost of consultant
   - » Cost of construction supervision (7% of construction cost)

The total cost of erecting flyovers is summarized in **Table 24.2.2-1**. The said cost is consist of construction cost, consultancy cost and ROW cost. The total cost stands at 371024 billion rupiah.

TABLE 24.2.2-1 SUMMARY OF COST

Million Rp

Flyover Name	Construction Cost	Consultancy Cost	Total
Merak	70,225	4,915	75,141
Balaraja	44,444	3,111	47,555
Nagreg	65,191	4,563	69,754
Gebang	63,296	4,431	67, 727
Peterongan	48,870	3,421	52,291
Tanggulangin	54,925	3,831	58,556
Total	346,751	24,273	371,024

1.0 Yen = Rp 75

24.2.3 Estimation of Vehicle Operation Cost and Travel Time Cost

Road/bridge projects that generate a series of benefits can be quantified to a large extent using the empirically verified physical consumption of resources by vehicles. This can be represented by a series of mathematical relationships. Any vehicle operating at a particular speed will consume a specific amount of fuel, lubricants, tires, spare parts and maintenance labor. The commonly used tool for Vehicle Operating Costs (VOC) calculation is using formulas established in the previous studies and widely used and accepted in Indonesia.

The benefits that can be achieved by the implementation of the project are:

1) Savings in vehicle operating cost

2) Savings in vehicle time cost

Other indirect benefits as a result of the completion of the six flyovers might include:

1) Enhancement of social welfare as a result of higher mobility made available through erection of the flyovers;

2) Re-vitalization of economic activities as the place becomes easily accessible;

(i) Derivations of Vehicle Operating Costs

VOC consists of running cost and standing cost as follows:

Running Cost

(1) Fuel consumption cost
(2) Lubricants consumption cost
(3) Tire consumption cost
(4) Vehicle maintenance cost
(5) Spare parts consumption cost
(6) Travel time cost

Standing Cost

(7) Depreciation cost
(8) Interest cost
(9) Insurance cost
(10) Overhead cost

Running Costs are incurred during operation of vehicles when they travel the road while Standing Costs are mainly incurred by possession of vehicles. The methods to derive each cost component are briefly discussed in the following sections.

(1) Fuel Consumption Cost

The fuel consumption cost is derived from the rate of fuel consumptions (liter/1,000 km) multiply by the fuel price/liter;

Fuel Consumption Cost = Fuel Consumption Rate* Unit Cost of Fuel

Fuel consumption rate by vehicle category is computed from the following empirical formulae:

Passenger car : $Y = 0.07629*S^2 - 8.45703*S + 349.79116$
Bus : $Y = 0.21692*S^2 - 24.15409*S + 954.78824$
Truck : $Y = 0.21557*S^2 - 24.17699*S + 947.90882$
where :

Y = Fuel consumption (liter/1000 kms)
S = Travel speed (km/h)

Conversion of fuel prices from financial prices into economic prices is calculated by multiplying by Economic Accounting Ratio (EAR) which is 10%. The economic fuel prices use in this study are shown in **Table 24.2.3-1**.

TABLE 24.2.3-1 ECONOMIC FUEL PRICES

Fuel Type	Financial Price (Rp.)*	Economic Price (Rp.)
Premium	4,500	4,050
Diesel (solar)	4,300	3,870

*: Dealer's 2005 prices

(2) Lubricants Consumption Cost

Lubricant consumption cost is calculated as follows;

Lubricant Consumption Cost = Lubricant Consumption Rate * Unit Cost of Lubricant

Lubricant consumption rate by each vehicle category is obtained from the following equations.

Passenger car : $Y = 0.00037*S^2 - 0.04070*S + 2.20403$
Bus : $Y = 0.00209*S^2 - 0.24413*S + 13.29445$
Truck : $Y = 0.00188*S^2 - 0.22035*S + 12.06488$

where :
Y = Lubricants consumption (liter/1,000 km)
S = Travel speed (km/h)

Conversion of lubricant prices from financial prices into economic prices is calculated by multiplying by Economic Accounting Ratio (EAR) which is 10%. The economic lubricant prices are shown in **Table 24.2.3-2**.

TABLE 24.2.3-2 ECONOMIC LUBRICANT PRICES

Lubricant Type	**Financial Price (liter/Rp)***	**Economic Price (liter/Rp)**
Lubricants – car	15,000	13,636
Lubricants – truck & bus	18,000	16,364

*: Dealer's 2005 prices

(3) Tire Consumption Cost

Tire consumption cost is calculated as follows;

Tire Consumption Cost = Tire Consumption Rate * Unit Cost of Lubricant
Tire consumption rate by each vehicle category is obtained from the following equations.

Passenger car : $Y = 0.0008848*S - 0.0045333$
Bus : $Y = 0.0012356*S - 0.0064667$
Truck : $Y = 0.001553*S - 0.0059333$

where :

Y = Tire consumption per 1,000 km
S = Travel speed (km/h)

Discounts on the published retail prices of tires were obtained and verified according to tire size. Conversion from financial prices into economic prices is calculated by multiplying Economic Accounting Ratio (EAR) which is 20%. The economic tire prices are shown in **Table 24.2.3-3**.

TABLE 24.2.3-3 ECONOMIC TIRE PRICES

Vehicle Type	Financial Price*	Economic Price
Car	Rp. 331.500	Rp. 267.189
Small/Medium Bus	Rp. 457.500	Rp. 368.745
Large Bus	Rp. 879.000	Rp. 708.474
Light Truck	Rp. 457.500	Rp. 368.745
Medium Truck	Rp. 879.000	Rp. 708.474
Large Truck	Rp. 879.000	Rp. 708.474

*: Dealer's 2005 prices

(4) Vehicle Maintenance Cost

Vehicle maintenance cost is calculated as;

Vehicle Maintenance Cost = Maintenance Time * Maintenance Labor Cost per Hour

Maintenance time (hour/1,000 km) of each vehicle category is obtained from the following equations.

Passenger car : Y = 0.00362*S + 0.36267
Bus : Y = 0.02311*S + 1.97733
Truck : Y = 0.01511*S + 1.21200

where :

Y = Maintenance time (hour/1,000 km)
S = travel speed (km/h)

Basic maintenance labor costs are obtained from the results of Strategic Urban Roads Improvement Project Study (SURIP, 2000) and updated using escalation rate of 7% per year.

Using income data, an assumption that mix of 20% skilled, 40% semi-skilled and 40% unskilled labor in typical vehicle workshops was made. The updated hourly maintenance costs are shown in **Table 24.2.3-4**.

TABLE 24.2.3-4 MAINTENANCE LABOR COSTS

Labor Category	Cost per hour* 1999 (Rp/hr)	2005 (Rp/hr)	Percentage (%)
Skilled	3,274	4,913	20
Semi Skilled	2,351	3,528	40
Unskilled	1,484	2,227	40
Average	2,189	3,285	100

*: SURIP, 2000 based on 1999 Income Statistic

(5) Spare Parts Consumption Cost

Spare parts consumption cost is derived from the following equations;

Spare Parts Consumption Cost = Spare Parts Consumption Rate * Vehicle Price

Spare parts consumption rates are;

Passenger car	:	Y = 0.0000064*S + 0.0005567
Bus	:	Y = 0.0000332*S + 0.0020891
Truck	:	Y = 0.0000191*S + 0.0015400

where :

Y = Spare parts consumption per 1,000 km
S = Travel speed (km/h)

Vehicle Prices can be obtained directly from dealer surveys with additional information from the Motor Industries Association. Conversion from financial prices into economic prices is calculated by multiplying by Economic Accounting Ratio (EAR) which is 56% for private cars and 23% for commercial cars.

Table 24.2.3-5 shows economic vehicle prices for typical vehicle categories.

TABLE 24.2.3-5 ECONOMIC VEHICLE PRICES – OCTOBER 2005

Vehicle Type	Financial Price*	Economic Price
Car - Toyota Vios G 1.5 M/T	Rp165,150,000	Rp105,865,385
Small/Medium Bus- Mitsubishi Colt FE 447 F	Rp193,200,000	Rp123,846,154
Large Bus - Mercedes Benz OH 1518	Rp624,960,000	Rp508,097,561
Light Truck - Mitsubishi Colt FE 349	Rp167,040,000	Rp135,804,878
Medium Truck - Mitsubishi Fuso FM 517H	Rp335,880,000	Rp273,073,171
Large Truck - Mitsubishi Fuso FN 527M	Rp477,600,000	Rp388,292,683

*: Dealer's 2005 prices

(6) Travel Time Cost

Travel time cost is derived from the following equations;

Travel Time Cost = Travel Time * Crew Cost

Bus	:	Y = 1,000/S
Truck	:	Y = 1,000/S

where :

Y = Travel time (hour/1,000 km)
S = Travel speed (km/h)

Crew costs are obtained from the result of Strategic Roads Improvement Project Study (SRIP, 2004) and updated by using escalation rate of 7% per year.

SRIP estimate was derived from the survey conducted in Java Arterial Roads Network Study (JARNS, 2000). Adjustments were then made for changes in the price level and for increases in real earnings up to first quarter in 2004.

JARNS found that only 30% of passenger cars had professional drivers and no estimate of crew costs for this vehicle type was made. In this study, the JARNS's estimate for share of professional driver is adopted. It has further been assumed that the cost of a driver is 70% of the JARNS estimate of the crew (driver plus assistant) for a passenger utility.

Details of crew costs are given in **Table 24.2.3-6**.

TABLE 24.2.3-6 CREW COSTS (IN RP1,000 PER HOUR)

Vehicle Type	JARNS 2000	SRIP 2004	This Study 2005
Car	0.00	4.30	4.60
Passenger Utility	4.50	6.20	6.63
Freight Utility	6.40	8.90	9.52
Small Bus	6.50	8.90	9.52
Large Bus	8.70	12.00	12.84
Light Truck	7.10	9.80	10.49
Medium Truck	9.50	14.20	15.19
Heavy Truck	10.70	14.80	15.84
Articulated Truck	10.70	14.80	15.84

Notes: JARNS survey carried out Dec 2000

(7) Depreciation Cost

Depreciation cost is calculated by multiplying;

Depreciation Cost = Depreciation Rate * Vehicle Price

Depreciation rate by each vehicle category is obtained from the following equations.

Passenger car : $Y = 1/(2,500*S + 125)$
Bus : $Y = 1/(8,756*S + 350)$
Truck : $Y = 1/(6,129*S + 245)$

Where;
Y = Rate of depreciation per 1,000 km
S = Travel speed (km/h)

(8) Interest Cost

Interest cost is calculated as;

Interest Cost = Unit Interest Cost * Vehicle Price

Passenger car : $Y = (0.15 * 1,000)/(500*S)$
Bus : $Y = (0.15 * 1,000)/(2,571*S)$
Truck : $Y = (0.15 * 1,000)/(1,714*S)$

where :
Y = Unit interest cost per 1,000 km
S = Travel speed (km/h)

(9) Insurance

Insurance cost is calculated as;

Insurance Cost = Unit Insurance Rate * Vehicle Price

Passenger car	:	Y = (0.035 * 1,000 * 0.5)/(500*S)
Bus	:	Y = (0.040 * 1,000 * 0.5)/(2,500*S)
Truck	:	Y = (0.060 * 1,000 * 0.5)/(1,750*S)

where :
Y = Unit insurance cost per 1,000 km
S = Travel speed (km/h)

(10) Overhead Cost

Overhead cost is estimated as;

Bus	:	10 % subtotal from (1) to (9)
Truck	:	10 % subtotal from (1) to (9)

TABLE 24.2.3-7 (1/3) VEHICLE OPERATING COST - PASSENGER CAR (RP./VEH-KM)

Speed km/hr	Fuel	Lubricants	Tyre	Maintenance	Spare parts	Depreciation Cost	Interest Cost	Insurance Cost	Travel Time	Over Head Cost	Total VOC
10	1,116.20	25.01	1.19	1.31	65.71	4.21	3,175.96	370.53	0.00	0.00	4,760
15	982.23	22.87	2.41	1.37	69.10	2.81	2,117.31	247.02	0.00	0.00	3,445
20	863.86	20.97	3.64	1.43	72.49	2.11	1,587.98	185.26	0.00	0.00	2,738
25	761.10	19.33	4.86	1.49	75.87	1.69	1,270.38	148.21	0.00	0.00	2,283
30	673.94	17.95	6.08	1.55	79.26	1.41	1,058.65	123.51	0.00	0.00	1,962
35	602.39	16.81	7.30	1.61	82.65	1.21	907.42	105.87	0.00	0.00	1,725
40	546.44	15.93	8.52	1.67	86.04	1.06	793.99	92.63	0.00	0.00	1,546
45	506.09	15.30	9.75	1.73	89.42	0.94	705.77	82.34	0.00	0.00	1,411
50	481.36	14.92	10.97	1.79	92.81	0.85	635.19	74.11	0.00	0.00	1,312
55	472.22	14.79	12.19	1.85	96.20	0.77	577.45	67.37	0.00	0.00	1,243
60	478.69	14.92	13.41	1.90	99.59	0.71	529.33	61.75	0.00	0.00	1,200
65	500.77	15.30	14.64	1.96	102.98	0.65	488.61	57.00	0.00	0.00	1,182
70	538.45	15.93	15.86	2.02	106.36	0.60	453.71	52.93	0.00	0.00	1,186
75	591.73	16.81	17.08	2.08	109.75	0.56	423.46	49.40	0.00	0.00	1,211
80	660.62	17.95	18.30	2.14	113.14	0.53	397.00	46.32	0.00	0.00	1,256
85	745.11	19.33	19.52	2.20	116.53	0.50	373.64	43.59	0.00	0.00	1,320
90	845.21	20.97	20.75	2.26	119.91	0.47	352.88	41.17	0.00	0.00	1,404
95	960.92	22.87	21.97	2.32	123.30	0.45	334.31	39.00	0.00	0.00	1,505
100	1,092.22	25.01	23.19	2.38	126.69	0.42	317.60	37.05	0.00	0.00	1,625
105	1,239.14	27.41	24.41	2.44	130.08	0.40	302.47	35.29	0.00	0.00	1,762
110	1,401.66	30.05	25.63	2.50	133.46	0.38	288.72	33.68	0.00	0.00	1,916
115	1,579.78	32.96	26.86	2.56	136.85	0.37	276.17	32.22	0.00	0.00	2,088
120	1,773.51	36.11	28.08	2.62	140.24	0.35	264.66	30.88	0.00	0.00	2,276

Source: Consultant's Calculation

TABLE 24.2.3-7 (2/3) VEHICLE OPERATING COST - BUS (RP./VEH-KM)

Speed km/hr	Fuel	Lubricants	Tyre	Maintenance	Spare parts	Depreciation Cost	Interest Cost	Insurance Cost	Travel Time	Over Head Cost	Total VOC
10	2,872.94	181.02	4.31	7.25	1,230.16	1,161.21	2,964.40	406.48	1,284.00	1,011.18	11,123
15	2,506.84	165.32	8.84	7.63	1,314.50	1,055.59	1,976.26	270.99	856.00	816.20	8,978
20	2,183.13	151.33	13.36	8.01	1,398.84	967.58	1,482.20	203.24	642.00	704.97	7,755
25	1,901.82	139.05	17.89	8.39	1,483.19	893.12	1,185.76	162.59	513.60	630.54	6,936
30	1,662.90	128.48	22.42	8.77	1,567.53	829.30	988.13	135.49	428.00	577.10	6,348
35	1,466.39	119.62	26.94	9.15	1,651.88	774.00	846.97	116.14	366.86	537.79	5,916
40	1,312.27	112.47	31.47	9.53	1,736.22	725.60	741.10	101.62	321.00	509.13	5,600
45	1,200.55	107.03	35.99	9.91	1,820.56	682.91	658.75	90.33	285.33	489.14	5,381
50	1,131.23	103.30	40.52	10.29	1,904.91	644.96	592.88	81.30	256.80	476.62	5,243
55	1,104.30	101.28	45.04	10.67	1,989.25	611.00	538.98	73.91	233.45	470.79	5,179
60	1,119.78	100.97	49.57	11.05	2,073.60	580.44	494.07	67.75	214.00	471.12	5,182
65	1,177.65	102.38	54.09	11.43	2,157.94	552.80	456.06	62.54	197.54	477.24	5,250
70	1,277.92	105.49	58.62	11.81	2,242.29	527.66	423.49	58.07	183.43	488.88	5,378
75	1,420.59	110.31	63.14	12.19	2,326.63	504.72	395.25	54.20	171.20	505.82	5,564
80	1,605.66	116.84	67.67	12.57	2,410.97	483.68	370.55	50.81	160.50	527.92	5,807
85	1,833.12	125.08	72.19	12.95	2,495.32	464.33	348.75	47.82	151.06	555.06	6,106
90	2,102.98	135.03	76.72	13.33	2,579.66	446.47	329.38	45.16	142.67	587.14	6,459
95	2,415.24	146.69	81.25	13.71	2,664.01	429.93	312.04	42.79	135.16	624.08	6,865
100	2,769.90	160.06	85.77	14.09	2,748.35	414.57	296.44	40.65	128.40	665.82	7,324
105	3,166.96	175.14	90.30	14.47	2,832.69	400.27	282.32	38.71	122.29	712.31	7,835
110	3,606.41	191.93	94.82	14.85	2,917.04	386.93	269.49	36.95	116.73	763.51	8,399
115	4,088.26	210.43	99.35	15.22	3,001.38	374.44	257.77	35.35	111.65	819.39	9,013
120	4,612.51	230.64	103.87	15.60	3,085.73	362.74	247.03	33.87	107.00	879.90	9,679

Source: Consultant's Calculation

TABLE 24.2.3-7 (3/3) VEHICLE OPERATING COST - TRUCK (RP/VEH-KM)

Speed km/hr	Fuel	Lubricants	Tyre	Maintenance	Spare parts	Depreciation Cost	Interest Cost	Insurance Cost	Travel Time	Over Head Cost	Total VOC
10	2,844.63	163.30	7.03	4.48	672.13	1,267.73	3,398.13	665.64	1,583.60	1,060.67	11,667
15	2,477.41	147.68	12.72	4.73	709.22	1,152.43	2,265.42	443.76	1,055.73	826.91	9,096
20	2,152.33	133.03	18.41	4.97	746.30	1,056.35	1,699.06	332.82	791.80	693.51	7,629
25	1,869.39	119.35	24.09	5.22	783.38	975.06	1,359.25	266.26	633.44	603.54	6,639
30	1,628.57	106.63	29.78	5.47	820.46	905.39	1,132.71	221.88	527.87	537.88	5,917
35	1,429.90	94.88	35.47	5.72	857.54	845.01	970.89	190.18	452.46	488.20	5,370
40	1,273.35	84.09	41.16	5.97	894.63	792.18	849.53	166.41	395.90	450.32	4,954
45	1,158.94	74.27	46.84	6.21	931.71	745.56	755.14	147.92	351.91	421.85	4,640
50	1,086.67	65.41	52.53	6.46	968.79	704.13	679.63	133.13	316.72	401.35	4,415
55	1,056.52	57.52	58.22	6.71	1,005.87	667.06	617.84	121.03	287.93	387.87	4,267
60	1,068.52	50.59	63.91	6.96	1,042.95	633.70	566.35	110.94	263.93	380.79	4,189
65	1,122.64	44.63	69.60	7.21	1,080.04	603.52	522.79	102.41	243.63	379.65	4,176
70	1,218.90	39.64	75.28	7.46	1,117.12	576.08	485.45	95.09	226.23	384.12	4,225
75	1,357.30	35.61	80.97	7.70	1,154.20	551.02	453.08	88.75	211.15	393.98	4,334
80	1,537.83	32.54	86.66	7.95	1,191.28	528.06	424.77	83.21	197.95	409.02	4,499
85	1,760.49	30.45	92.35	8.20	1,228.36	506.93	399.78	78.31	186.31	429.12	4,720
90	2,025.29	29.31	98.04	8.45	1,265.45	487.43	377.57	73.96	175.96	454.14	4,996
95	2,332.22	29.15	103.72	8.70	1,302.53	469.37	357.70	70.07	166.69	484.01	5,324
100	2,681.28	29.94	109.41	8.94	1,339.61	452.61	339.81	66.56	158.36	518.65	5,705
105	3,072.48	31.71	115.10	9.19	1,376.69	437.00	323.63	63.39	150.82	558.00	6,138
110	3,505.82	34.43	120.79	9.44	1,413.77	422.43	308.92	60.51	143.96	602.01	6,622
115	3,981.28	38.13	126.47	9.69	1,450.86	408.80	295.49	57.88	137.70	650.63	7,157
120	4,498.89	42.79	132.16	9.94	1,487.94	396.02	283.18	55.47	131.97	703.84	7,742

Source: Consultant's Calculation

(ii) Passenger Travel Time Cost

The estimates of the passenger travel time have followed the conventional approach, based on GDP per head, a proxy for average earnings (Table 24.2.3-8).

The following assumptions have been made:

1. Working time
   - » Bus passengers: equal to average value of output per worker (GDP/workforce)
   - » Car passengers: 2.6 times value of bus passengers (following JARNS,2000)

2. Non-working time: 30% of working time

TABLE 24.2.3-8 DERIVATION OF GDP PER WORKER (2005 PRICES)

GDP Indicators	Indicative Values
GRDP 2003 in Billion Rp (current prices)	1,863,300
Labor Force in 1,000	102,631
Annual hours worked	2,000
GDP per worker	
Annual GDP in 1,000 Rp (2003 prices)	18,155
Growth in GDP per worker 2003 to 2005 (%)	20
Annual GDP in 1,000 Rp (2005 prices)	21,786
Hourly GDP in 1,000 Rp/h	10.89

The estimates of the value of passenger travel time for different vehicle types are shown in **Table 24.2.3-9**.

TABLE 24.2.3-9 PASSENGER TRAVEL TIME COST BY VEHICLE TYPE

(RP/HOUR 2005 PRICES)

Value of Passenger Time	Car	Buses		
		Pass Utility	Medium	Large
Working time (Rp 000 per hour)	28.32	10.89	10.89	10.89
Non-working Time (Rp 000 per hour)	8.50	3.27	3.27	3.27
Percent working	25	20	15	15
Average value of time (Rp 000 per hour per person)	13.45	4.79	4.41	4.41
Vehicle occupancy	2.2	3	17	35
Value of passenger time per vehicle (Rp 000 per hour)	29.60	14.38	75.00	154.41

24.2.4 Estimation of Benefits

The VOC and VTC cost derived from the construction of flyovers is shown in **Table 24.2.4-1.**

TABLE 24.2.4-1 ESTIMATED ANNUAL BENEFITS (YEAR 2020)

000 Rupiah/Year

Flyover	Savings in Vehicle Operating Cost (VOC)	Saving in Vehicle Time Cost(VTC)	Total Benefits
Merak	17,042,166	6,606,987	23,649,153
Balaraja	19,389,673	14,456,290	33,845,963
Nagreg	29,877,296	13,217,714	43,095,010
Gebang	25,260,934	14,803,111	40,064,045
Peterongan	10,577,126	5,262,394	15,839,520
Tanggulangin	8,147,232	2,478,712	10,625,944

Based on the above estimated costs and benefits, the cost benefits analysis is made. Analysis period after completion of the flyover is set until year 2030. The calculation result is summarized in **Table 24.2.4-2**.

The results of economical feasibility evaluation show that Merak, Balaraja Nagreg, Gebang, Peterongan, Tanggulangin has an EIRR of 14.5%, 23.0%, 21.0%, 21.9% 17.3%, 13.6% respect which is economically feasible to be implemented.

TABLE 24.2.4-2 SUMMARY OF COST BENEFIT ANALYSIS

Flyover	Economic Internal Rate of Return-EIRR	Net Present Value (Million Rp.)	Benefit Cost Ratio
Merak	14.5%	17,102	1.30
Balaraja	23.0%	63,371	2.74
Nagreg	21.0%	71,085	2.33
Gebang	21.9%	80,788	2.56
Peterongan	17.3%	23,833	1.59
Tanggulangin	13.6%	8,101	1.18

NPV and BCR are based on Discounted Rate 12%

MERAK FLYOVER

Undiscounted Cost Benefit Stream Revenue

Millon Rp.

Sq.	Year	Construction & Consultancy Cost	O & M Cost	Cost Total	Benefit	Benefit - Cost
0	2005					
1	2006			-		-
2	2007	37,570.20		37,570.20		-37,570.20
3	2008	37,570.20		37,570.20		-37,570.20
4	2009		7.51	7.51	3,350.24	3,342.73
5	2010		7.51	7.51	3,586.29	3,578.78
6	2011		7.51	7.51	5,687.43	5,679.92
7	2012		7.51	7.51	6,112.92	6,105.41
8	2013		7.51	7.51	6,571.69	6,564.18
9	2014		7.51	7.51	10,203.08	10,195.57
10	2015		7.51	7.51	10,905.89	10,898.38
11	2016		7.51	7.51	11,726.63	11,719.12
12	2017		7.51	7.51	18,838.79	18,831.28
13	2018		2,417.77	2,417.77	19,706.55	17,288.78
14	2019		7.51	7.51	21,390.18	21,382.67
15	2020		7.51	7.51	23,649.15	23,641.64
16	2021		7.51	7.51	27,138.19	27,130.68
17	2022		7.51	7.51	30,874.23	30,866.72
18	2023		7.51	7.51	31,877.24	31,869.73
19	2024		7.51	7.51	32,872.99	32,865.48
20	2025		7.51	7.51	32,989.00	32,981.49
21	2026		7.51	7.51	33,947.03	33,939.52
22	2027		7.51	7.51	34,900.82	34,893.31
23	2028		2,417.77	2,417.77	35,206.18	32,788.41
24	2029		7.51	7.51	36,132.95	36,125.44
25	2030		7.51	7.51	37,054.41	37,046.90
Residual Value						-
Total		75,140.40	4,985.74	80,126.14	474,721.89	394,595.75

Discounted Cost Benefit Stream Revenue

Millon Rp.

Sq.	Year	Discounted	Construction & Consultancy Cost	O & M Cost	Cost Total	Benefit	Benefit - Cost
	2005						
1	2006	1.120	-				-
2	2007	1.254	29,950.73	-	29,950.73		-29,950.73
3	2008	1.405	26,741.73	-	26,741.73		-26,741.73
4	2009	1.574	-	4.77	4.77	2,129.14	2,124.37
5	2010	1.762	-	4.26	4.26	2,034.96	2,030.70
6	2011	1.974	-	3.80	3.80	2,881.43	2,877.63
7	2012	2.211	-	3.40	3.40	2,765.18	2,761.78
8	2013	2.476	-	3.03	3.03	2,654.19	2,651.16
9	2014	2.773	-	2.71	2.71	3,679.33	3,676.62
10	2015	3.106	-	2.42	2.42	3,511.40	3,508.99
11	2016	3.479	-	2.16	2.16	3,371.13	3,368.97
12	2017	3.896	-	1.93	1.93	4,835.45	4,833.52
13	2018	4.363	-	554.09	554.09	4,516.23	3,962.14
14	2019	4.887	-	1.54	1.54	4,376.86	4,375.32
15	2020	5.474	-	1.37	1.37	4,320.61	4,319.24
16	2021	6.130	-	1.23	1.23	4,426.83	4,425.60
17	2022	6.866	-	1.09	1.09	4,496.66	4,495.56
18	2023	7.690	-	0.98	0.98	4,145.30	4,144.33
19	2024	8.613	-	0.87	0.87	3,816.78	3,815.90
20	2025	9.646	-	0.78	0.78	3,419.86	3,419.08
21	2026	10.804	-	0.70	0.70	3,142.12	3,141.43
22	2027	12.100	-	0.62	0.62	2,884.29	2,883.67
23	2028	13.552	-	178.40	178.40	2,597.79	2,419.39
24	2029	15.179	-	0.49	0.49	2,380.51	2,380.02
25	2030	17.000	-	0.44	0.44	2,179.66	2,179.22
Residual Value		17.000	-			-	-
	Total		56,692.46	771.08	57,463.54	74,565.72	17,102.18

12.0%

Net Present Value (Million Rp)	17,102
B/C Ratio	1.30
EIRR	14.5%

BALARAJA FLYOVER

Undiscounted Cost Benefit Stream Revenue

Millon Rp.

Sq.	Year	Construction & Consultancy Cost	O & M Cost	Cost Total	Benefit	Benefit - Cost
0	2005					
1	2006		-	-		-
2	2007	23,777.81	-	23,777.81		-23,777.81
3	2008	23,777.81	-	23,777.81		-23,777.81
4	2009		4.76	4.76	4,412.66	4,407.90
5	2010		4.76	4.76	4,136.46	4,131.70
6	2011		4.76	4.76	6,945.84	6,941.08
7	2012		4.76	4.76	7,565.41	7,560.65
8	2013		4.76	4.76	8,296.69	8,291.93
9	2014		4.76	4.76	13,264.18	13,259.42
10	2015		4.76	4.76	13,542.98	13,538.22
11	2016		4.76	4.76	14,893.30	14,888.54
12	2017		4.76	4.76	24,710.82	24,706.06
13	2018		1,998.61	1,998.61	27,249.32	25,250.71
14	2019		4.76	4.76	30,592.97	30,588.21
15	2020		4.76	4.76	33,845.96	33,841.20
16	2021		4.76	4.76	42,491.10	42,486.34
17	2022		4.76	4.76	43,905.71	43,900.95
18	2023		4.76	4.76	45,289.38	45,284.62
19	2024		4.76	4.76	44,125.04	44,120.28
20	2025		4.76	4.76	45,348.25	45,343.49
21	2026		4.76	4.76	46,525.67	46,520.91
22	2027		4.76	4.76	46,742.29	46,737.53
23	2028		1,998.61	1,998.61	43,460.85	41,462.24
24	2029		4.76	4.76	44,274.39	44,269.63
25	2030		4.76	4.76	45,035.65	45,030.89
Residual Value						-
Total		47,555.62	4,092.42	51,648.04	636,654.92	585,006.88

Discounted Cost Benefit Stream Revenue

Millon Rp.

Sq.	Year	Discounted	Construction & Consultancy Cost	O & M Cost	Cost Total	Benefit	Benefit - Cost
	2005						
1	2006	1.120	-	-	-	-	-
2	2007	1.254	18,955.52	-	18,955.52	-	-18,955.52
3	2008	1.405	16,924.58	-	16,924.58	-	-16,924.58
4	2009	1.574	-	3.03	3.03	2,804.33	2,801.30
5	2010	1.762	-	2.70	2.70	2,347.14	2,344.44
6	2011	1.974	-	2.41	2.41	3,518.98	3,516.57
7	2012	2.211	-	2.15	2.15	3,422.21	3,420.05
8	2013	2.476	-	1.92	1.92	3,350.89	3,348.97
9	2014	2.773	-	1.72	1.72	4,783.19	4,781.48
10	2015	3.106	-	1.53	1.53	4,360.48	4,358.94
11	2016	3.479	-	1.37	1.37	4,281.47	4,280.10
12	2017	3.896	-	1.22	1.22	6,342.65	6,341.43
13	2018	4.363	-	458.03	458.03	6,244.84	5,786.81
14	2019	4.887	-	0.97	0.97	6,259.93	6,258.95
15	2020	5.474	-	0.87	0.87	6,183.53	6,182.66
16	2021	6.130	-	0.78	0.78	6,931.22	6,930.44
17	2022	6.866	-	0.69	0.69	6,394.62	6,393.93
18	2023	7.690	-	0.62	0.62	5,889.41	5,888.79
19	2024	8.613	-	0.55	0.55	5,123.22	5,122.66
20	2025	9.646	-	0.49	0.49	4,701.11	4,700.61
21	2026	10.804	-	0.44	0.44	4,306.40	4,305.96
22	2027	12.100	-	0.39	0.39	3,862.90	3,862.51
23	2028	13.552	-	147.47	147.47	3,206.89	3,059.41
24	2029	15.179	-	0.31	0.31	2,916.89	2,916.58
25	2030	17.000	-	0.28	0.28	2,649.15	2,648.87
Residual Value		17.000	-			-	-
	Total		35,880.10	629.96	36,510.06	99,881.43	63,371.36

12.0%	

Net Present Value (Million Rp)	63,371
B/C Ratio	2.74
EIRR	23.0%

NAGREG FLYOVER

Undiscounted Cost Benefit Stream Revenue

Millon Rp.

Sq.	Year	Construction & Consultancy Cost	O & M Cost	Cost Total	Benefit	Benefit - Cost
0	2005					
1	2006		-	-		-
2	2007	34,877.27	-	34,877.27		-34,877.27
3	2008	34,877.27	-	34,877.27		-34,877.27
4	2009		6.98	6.98	7,713.49	7,706.51
5	2010		6.98	6.98	8,214.61	8,207.63
6	2011		6.98	6.98	7,311.02	7,304.04
7	2012		6.98	6.98	7,973.26	7,966.28
8	2013		6.98	6.98	12,895.90	12,888.92
9	2014		6.98	6.98	12,511.63	12,504.65
10	2015		6.98	6.98	13,636.77	13,629.79
11	2016		6.98	6.98	21,080.98	21,074.00
12	2017		6.98	6.98	20,713.52	20,706.54
13	2018		2,156.62	2,156.62	22,709.36	20,552.74
14	2019		6.98	6.98	39,286.62	39,279.64
15	2020		6.98	6.98	43,095.01	43,088.03
16	2021		6.98	6.98	43,053.46	43,046.48
17	2022		6.98	6.98	51,017.95	51,010.97
18	2023		6.98	6.98	65,354.12	65,347.14
19	2024		6.98	6.98	71,897.91	71,890.93
20	2025		6.98	6.98	70,361.49	70,354.51
21	2026		6.98	6.98	71,070.70	71,063.72
22	2027		6.98	6.98	60,125.90	60,118.92
23	2028		2,156.62	2,156.62	59,447.27	57,290.65
24	2029		6.98	6.98	52,953.06	52,946.08
25	2030		6.98	6.98	49,447.53	49,440.55
Residual Value						-
	Total	69,754.54	4,452.84	74,207.38	811,871.55	737,664.17

Discounted Cost Benefit Stream Revenue

Millon Rp.

Sq.	Year	Discounted	Construction & Consultancy Cost	O & M Cost	Cost Total	Benefit	Benefit - Cost
	2005						
1	2006	1.120	-	-	-	-	-
2	2007	1.254	27,803.95	-	27,803.95	-	-27,803.95
3	2008	1.405	24,824.95	-	24,824.95	-	-24,824.95
4	2009	1.574	-	4.44	4.44	4,902.06	4,897.62
5	2010	1.762	-	3.96	3.96	4,661.19	4,657.23
6	2011	1.974	-	3.54	3.54	3,703.99	3,700.45
7	2012	2.211	-	3.16	3.16	3,606.70	3,603.54
8	2013	2.476	-	2.82	2.82	5,208.44	5,205.62
9	2014	2.773	-	2.52	2.52	4,511.82	4,509.30
10	2015	3.106	-	2.25	2.25	4,390.68	4,388.43
11	2016	3.479	-	2.01	2.01	6,060.28	6,058.27
12	2017	3.896	-	1.79	1.79	5,316.65	5,314.85
13	2018	4.363	-	494.24	494.24	5,204.40	4,710.16
14	2019	4.887	-	1.43	1.43	8,038.82	8,037.39
15	2020	5.474	-	1.28	1.28	7,873.30	7,872.02
16	2021	6.130	-	1.14	1.14	7,022.95	7,021.81
17	2022	6.866	-	1.02	1.02	7,430.48	7,429.46
18	2023	7.690	-	0.91	0.91	8,498.62	8,497.72
19	2024	8.613	-	0.81	0.81	8,347.83	8,347.02
20	2025	9.646	-	0.72	0.72	7,294.15	7,293.42
21	2026	10.804	-	0.65	0.65	6,578.28	6,577.63
22	2027	12.100	-	0.58	0.58	4,968.96	4,968.38
23	2028	13.552	-	159.13	159.13	4,386.49	4,227.36
24	2029	15.179	-	0.46	0.46	3,488.66	3,488.20
25	2030	17.000	-	0.41	0.41	2,908.67	2,908.26
Residual Value		17.000	-			-	-
	Total		52,629	689	53,318.14	124,403.39	71,085.25

12.0%

Net Present Value (Million Rp)	71,085
B/C Ratio	2.33
EIRR	21.0%

GEBANG FLYOVER

Undiscounted Cost Benefit Stream Revenue

Millon Rp.

Sq.	Year	Construction & Consultancy Cost	O & M Cost	Cost Total	Benefit	Benefit - Cost
0	2005					
1	2006		-	-		-
2	2007	33,863.39	-	33,863.39		-33,863.39
3	2008	33,863.39	-	33,863.39		-33,863.39
4	2009		6.77	6.77	6,794.06	6,787.29
5	2010		6.77	6.77	7,140.14	7,133.37
6	2011		6.77	6.77	7,745.34	7,738.57
7	2012		6.77	6.77	11,256.42	11,249.65
8	2013		6.77	6.77	12,207.47	12,200.70
9	2014		6.77	6.77	12,496.06	12,489.29
10	2015		6.77	6.77	18,516.12	18,509.35
11	2016		6.77	6.77	20,140.91	20,134.14
12	2017		6.77	6.77	22,013.54	22,006.77
13	2018		2,224.52	2,224.52	33,353.06	31,128.54
14	2019		6.77	6.77	35,816.20	35,809.43
15	2020		6.77	6.77	40,064.05	40,057.28
16	2021		6.77	6.77	45,739.34	45,732.57
17	2022		6.77	6.77	57,622.88	57,616.11
18	2023		6.77	6.77	66,746.47	66,739.70
19	2024		6.77	6.77	68,662.42	68,655.65
20	2025		6.77	6.77	69,136.91	69,130.14
21	2026		6.77	6.77	70,857.75	70,850.98
22	2027		6.77	6.77	70,238.61	70,231.84
23	2028		2,224.52	2,224.52	69,707.99	67,483.47
24	2029		6.77	6.77	70,883.84	70,877.07
25	2030		6.77	6.77	71,922.00	71,915.23
Residual Value						-
Total		67,726.77	4,584.44	72,311.21	889,061.56	816,750.35

Discounted Cost Benefit Stream Revenue

Millon Rp.

Sq.	Year	Discounted	Construction & Consultancy Cost	O & M Cost	Cost Total	Benefit	Benefit - Cost
	2005						
1	2006	1.120	-	-	-	-	-
2	2007	1.254	26,995.68	-	26,995.68	-	-26,995.68
3	2008	1.405	24,103.29	-	24,103.29	-	-24,103.29
4	2009	1.574	-	4.30	4.30	4,317.75	4,313.45
5	2010	1.762	-	3.84	3.84	4,051.51	4,047.67
6	2011	1.974	-	3.43	3.43	3,924.03	3,920.60
7	2012	2.211	-	3.06	3.06	5,091.83	5,088.77
8	2013	2.476	-	2.73	2.73	4,930.39	4,927.66
9	2014	2.773	-	2.44	2.44	4,506.20	4,503.76
10	2015	3.106	-	2.18	2.18	5,961.69	5,959.51
11	2016	3.479	-	1.95	1.95	5,790.03	5,788.08
12	2017	3.896	-	1.74	1.74	5,650.33	5,648.59
13	2018	4.363	-	509.80	509.80	7,643.66	7,133.86
14	2019	4.887	-	1.39	1.39	7,328.70	7,327.32
15	2020	5.474	-	1.24	1.24	7,319.55	7,318.31
16	2021	6.130	-	1.10	1.10	7,461.08	7,459.97
17	2022	6.866	-	0.99	0.99	8,392.45	8,391.46
18	2023	7.690	-	0.88	0.88	8,679.68	8,678.80
19	2024	8.613	-	0.79	0.79	7,972.17	7,971.39
20	2025	9.646	-	0.70	0.70	7,167.20	7,166.50
21	2026	10.804	-	0.63	0.63	6,558.57	6,557.94
22	2027	12.100	-	0.56	0.56	5,804.69	5,804.14
23	2028	13.552	-	164.14	164.14	5,143.61	4,979.47
24	2029	15.179	-	0.45	0.45	4,669.98	4,669.53
25	2030	17.000	-	0.40	0.40	4,230.69	4,230.29
Residual Value		17.000	-			-	-
	Total		51,098.97	708.73	51,807.70	132,595.80	80,788.09

12.0%

Net Present Value (Million Rp)	80,788
B/C Ratio	2.56
EIRR	21.9%

PETERONGAN FLYOVER

Undiscounted Cost Benefit Stream Revenue

Millon Rp.

Sq.	Year	Construction & Consultancy Cost	O & M Cost	Cost Total	Benefit	Benefit - Cost
0	2005					
1	2006		-	-		-
2	2007	26,145.36	-	26,145.36		-26,145.36
3	2008	26,145.36	-	26,145.36		-26,145.36
4	2009		5.23	5.23	4,954.51	4,949.28
5	2010		5.23	5.23	5,229.64	5,224.41
6	2011		5.23	5.23	7,703.13	7,697.90
7	2012		5.23	5.23	7,240.20	7,234.97
8	2013		5.23	5.23	7,709.66	7,704.43
9	2014		5.23	5.23	6,837.05	6,831.82
10	2015		5.23	5.23	10,819.89	10,814.66
11	2016		5.23	5.23	11,488.29	11,483.06
12	2017		5.23	5.23	10,135.10	10,129.87
13	2018		2,043.26	2,043.26	16,751.62	14,708.36
14	2019		5.23	5.23	14,813.89	14,808.66
15	2020		5.23	5.23	15,839.52	15,834.29
16	2021		5.23	5.23	17,110.56	17,105.33
17	2022		5.23	5.23	26,278.61	26,273.38
18	2023		5.23	5.23	28,574.42	28,569.19
19	2024		5.23	5.23	24,281.24	24,276.01
20	2025		5.23	5.23	28,726.25	28,721.02
21	2026		5.23	5.23	35,616.48	35,611.25
22	2027		5.23	5.23	28,510.37	28,505.14
23	2028		2,043.26	2,043.26	25,316.92	23,273.66
24	2029		5.23	5.23	19,397.46	19,392.23
25	2030		5.23	5.23	16,589.23	16,584.00
Residual Value						-
	Total	52,290.72	4,191.12	56,481.84	369,924.03	313,442.19

Discounted Cost Benefit Stream Revenue

Millon Rp.

Sq.	Year	Discounted	Construction & Consultancy Cost	O & M Cost	Cost Total	Benefit	Benefit - Cost
0	2005						
1	2006	1.12	-	-	-	-	-
2	2007	1.25	20,842.92	-	20,842.92	-	-20,842.92
3	2008	1.40	18,609.75	-	18,609.75	-	-18,609.75
4	2009	1.57	-	3.32	3.32	3,148.68	3,145.36
5	2010	1.76	-	2.97	2.97	2,967.44	2,964.47
6	2011	1.97	-	2.65	2.65	3,902.64	3,899.99
7	2012	2.21	-	2.37	2.37	3,275.10	3,272.73
8	2013	2.48	-	2.11	2.11	3,113.80	3,111.69
9	2014	2.77	-	1.89	1.89	2,465.51	2,463.62
10	2015	3.11	-	1.68	1.68	3,483.72	3,482.03
11	2016	3.48	-	1.50	1.50	3,302.61	3,301.11
12	2017	3.90	-	1.34	1.34	2,601.43	2,600.08
13	2018	4.36	-	468.26	468.26	3,839.04	3,370.78
14	2019	4.89	-	1.07	1.07	3,031.22	3,030.15
15	2020	5.47	-	0.96	0.96	2,893.82	2,892.87
16	2021	6.13	-	0.85	0.85	2,791.10	2,790.25
17	2022	6.87	-	0.76	0.76	3,827.33	3,826.57
18	2023	7.69	-	0.68	0.68	3,715.81	3,715.13
19	2024	8.61	-	0.61	0.61	2,819.22	2,818.61
20	2025	9.65	-	0.54	0.54	2,977.96	2,977.42
21	2026	10.80	-	0.48	0.48	3,296.65	3,296.16
22	2027	12.10	-	0.43	0.43	2,356.17	2,355.74
23	2028	13.55	-	150.77	150.77	1,868.08	1,717.32
24	2029	15.18	-	0.34	0.34	1,277.95	1,277.60
25	2030	17.00	-	0.31	0.31	975.83	975.53
Residual Value		17.00	-			-	-
		Total	39,452.67	645.90	40,098.58	63,931.09	23,832.52

12.0%

Net Present Value (Million Rp)	23,833
B/C Ratio	1.59
EIRR	17.3%

TANGGULANGIN FLYOVER

Undiscounted Cost Benefit Stream Revenue

Millon Rp.

Sq.	Year	Construction & Consultancy Cost	O & M Cost	Cost Total	Benefit	Benefit - Cost
0	2005					
1	2006		-	-		-
2	2007	29,277.83	-	29,277.83		-29,277.83
3	2008	29,277.83	-	29,277.83		-29,277.83
4	2009		5.86	5.86	4,253.48	4,247.62
5	2010		5.86	5.86	4,463.63	4,457.77
6	2011		5.86	5.86	4,721.68	4,715.82
7	2012		5.86	5.86	5,002.07	4,996.21
8	2013		5.86	5.86	6,693.99	6,688.13
9	2014		5.86	5.86	7,060.25	7,054.39
10	2015		5.86	5.86	7,431.78	7,425.92
11	2016		5.86	5.86	6,877.98	6,872.12
12	2017		5.86	5.86	10,487.01	10,481.15
13	2018		2,053.87	2,053.87	10,988.41	8,934.54
14	2019		5.86	5.86	10,104.75	10,098.89
15	2020		5.86	5.86	10,625.94	10,620.08
16	2021		5.86	5.86	16,856.30	16,850.44
17	2022		5.86	5.86	15,687.18	15,681.32
18	2023		5.86	5.86	16,602.13	16,596.27
19	2024		5.86	5.86	25,818.63	25,812.77
20	2025		5.86	5.86	27,324.28	27,318.42
21	2026		5.86	5.86	29,189.60	29,183.74
22	2027		5.86	5.86	26,900.20	26,894.34
23	2028		2,053.87	2,053.87	29,811.51	27,757.64
24	2029		5.86	5.86	34,632.54	34,626.68
25	2030		5.86	5.86	30,150.86	30,145.00
Residual Value						-
Total		58,556	4,225	62,781	341,684	278,904

Discounted Cost Benefit Stream Revenue

Millon Rp.

Sq.	Year	Discounted	Construction & Consultancy Cost	O & M Cost	Cost Total	Benefit	Benefit - Cost
	2005						
1	2006	1.120	-	-	-	-	-
2	2007	1.254	23,340.10	-	23,340.10	-	-23,340.10
3	2008	1.405	20,839.38	-	20,839.38	-	-20,839.38
4	2009	1.574	-	3.72	3.72	2,703.16	2,699.44
5	2010	1.762	-	3.33	3.33	2,532.78	2,529.46
6	2011	1.974	-	2.97	2.97	2,392.15	2,389.18
7	2012	2.211	-	2.65	2.65	2,262.68	2,260.03
8	2013	2.476	-	2.37	2.37	2,703.59	2,701.23
9	2014	2.773	-	2.11	2.11	2,546.00	2,543.88
10	2015	3.106	-	1.89	1.89	2,392.83	2,390.95
11	2016	3.479	-	1.68	1.68	1,977.26	1,975.57
12	2017	3.896	-	1.50	1.50	2,691.76	2,690.25
13	2018	4.363	-	470.69	470.69	2,518.26	2,047.57
14	2019	4.887	-	1.20	1.20	2,067.63	2,066.43
15	2020	5.474	-	1.07	1.07	1,941.32	1,940.25
16	2021	6.130	-	0.96	0.96	2,749.63	2,748.67
17	2022	6.866	-	0.85	0.85	2,284.75	2,283.90
18	2023	7.690	-	0.76	0.76	2,158.93	2,158.17
19	2024	8.613	-	0.68	0.68	2,997.72	2,997.04
20	2025	9.646	-	0.61	0.61	2,832.62	2,832.01
21	2026	10.804	-	0.54	0.54	2,701.78	2,701.24
22	2027	12.100	-	0.48	0.48	2,223.10	2,222.62
23	2028	13.552	-	151.55	151.55	2,199.73	2,048.18
24	2029	15.179	-	0.39	0.39	2,281.66	2,281.28
25	2030	17.000	-	0.34	0.34	1,773.57	1,773.23
Residual Value		17.000	-			-	-
	Total		44,179.48	652.36	44,831.84	52,932.92	8,101.08

12.0%	

Net Present Value (Million Rp)	8,101
B/C Ratio	1.18
EIRR	13.6%

24.3 LOAN AMOUNT VS ESTIMATED COST

1) Drastic changes from the Time of Project Appraisal to Present

As discussed in Chapter 10 BASIC DESIGN, there were some drastic changes since the project was appraised in 2004 as follows:

i) Domestic construction prices went up by 1.41 times due mainly to fuel cost increase made in 2005.
ii) Japan's steel material price went up by 1.2 times
iii) Japanese Yen value depreciated by 1.1 times.
iv) Deep soft ground was found at Gebang and Tanggulangin Flyovers. At Merak Flyover, liquefaction layer was found. These soil conditions were not assumed during the project appraised.
v) There were no survey data on public utilities during the appraisal, cost for public utility relocation/protection could not estimated and not included in the loan.

Impact of i), ii) and iii) is shown in **Table 24.3-1**.

2) Amount of JBIC Loan

JBIC Loan consists of the following:

Unit: Million Yen

Base cost for civil work	2,993
Price escalation (19%)	578
Contingency (5%)	178
Total	3,749

In addition to above, the consultancy cost for the detailed design (200 Million Yen) is available. Contingency should be kept to cope with some changes during construction. Available amount of loan is as follows:

	Available Amount of Loan (Million Yen)
• Base cost for civil work	2,993
• Price escalation (19%)	578
• Unused cost for Detailed Design	200
Total	3,771

3) Estimated Cost and Shortage of Loan Amount

Estimated cost and shortage of loan amount is as follows:

Unit: Million Yen

	Estimated Cost		
	(Japan Portion + Local Portion)	(Tax)	(Total)
Civil Work	4,293	429	4,722
Available JBIC Loan	3,771	-	-
Shortage of JBIC Loan	522 (39.2 Billion Rp.)		

Note: DGH decided to implement the public utility relocation/protection by using the local fund.

TABLE 24.3-1 COMPARISON OF ESTIMATED COST

Unit: Million Yen

Flyover	At Project Appraisal		B/D (March 2006)	(B) Detailed Design (December 2006)	B/A	Factors of Cost Increase/Decrease	
	Year 2004	(A) Escalated to Present				Cost Increase Factors	Cost Decrease Factors
Merak	514	735	-	915.2	1.25	• Flyover scheme change • Steel bridge over railway • Liquefaction layer	-
Balaraja	451	645	499	530.8	0.82	-	• Bridge length reduction • All steel bridge during appraisal. D/D adopts partially PC bridge
Nagreg	597	854	669	715.2	0.84	-	• Same as above
Gebang	640	915	807	817.6	0.89	• Deep soft ground	• Same as above
Peterongan	423	605	656	608.2	1.01	• All PC Bridge during appraisal. Steel bridge adopted at railway crossing	• Bridge length reduction
Tanggulangin	368	526	683	705.6	1.34	• Same as above • Deep soft ground	• Same as above
Total	2,993	4,280	3,314 (Merak not included)	4,292.6 (3,377.4 without Merak, 1.9% increase compare to B/D)	1.00	Cost reduction efforts were made to cover price escalation, Yen depreciation and other condition changes as much as possible	
Remarks	1¥ = 83.3 Rp.	1¥ = Rp.75	1¥ = Rp.75	1¥ = Rp.75			

Appraised cost is escalated based on domestic construction price increase, Japan's steel material price increase and Yen value depreciation.

4) Options to Cover Shortage of Loan

Option	Measures to Cover Shortage of Loan	Remarks
Option – 1	The shortage is covered by the local counterpart fund (64.1 Billion Rp.)	• This option is in accordance with the condition of Loan Agreement
Option – 2	The scope of work is to be slimed down (such as overlay of an at – grade road, lighting for an at –grade road). Such work is to be done after completion of the flyover by local fund. Work which can be slimed down is limited, thus the local counterpart fund is still needed.	• Amount of scope down is not extensive. • Scope down to be studied waiting for bid result.
Option – 3	Defer implementation of one of flyovers, which is to be constructed by new loan or local fund.	• Preparation for implementation such as socialization and ROW acquisition is being undertaken by respective local government • This option is possible when ROW acquisition of a certain flyover is not successful in time.
Option – 4	Defer implementation of Exit Ramp of Merak Flyover which is to be constructed by local fund. Cost reduction of this option is not enough, thus local counterpart fund is still needed.	• MoT and ASDP will not agree on this option.

In view of above, Option – 1 is recommended

5) Share of Local Counterpart Fund In Case of Option – 1 is selected

If Option – 1 is selected, amount and share of local counterpart fund will be as follows:

	Estimated Cost Including Utility Relocation	Amount covered by Loan	Local Counterpart Fund Required
Japan Portion and Local Portion	4,293	3,771	522 (39.2 Billion Rp.)
Tax	429	-	429 (32.2 Billion Rp.)
Total	4,722	3,771 (80%)	951 (71.3 Billion Rp.) (20%)

Note: At the time of the project appraisal, tax portion was estimated at 35.7 Billion Rp.

24.4 CONCLUSION

The Project was evaluated technically, economically, financially and environmentally feasible.

Technical Feasibility: the project utilizes Japanese technologies in line with STEP Loan condition. Construction will be implemented by Japanese Contractor or Japanese Contractor in joint venture with Indonesian Contractor (Japanese contractor as a lead firm) who can execute the work efficiently. Japan portion is estimated to be 31.1% which satisfies STEP Loan requirement.

Economic Feasibility: all flyovers were evaluated economically feasible.

Financial Feasibility: although the project requires additional local counterpart fund which is, however, not extensive and manageable by DGH.

Environmental Feasibility: the project is not environmentally critical, thus EIA (AMDAL) is not required for this project. The project should be implemented and operated in accordance with requirements of UPL and UKL.

24.5 RECOMMENDATIONS

1) The six (6) Flyovers are located along the trunk line (national road) with high traffic volume and congested area due to railway crossing, commercial activities and larger road side friction, etc.

   Construction of those flyovers must be undertaken without major traffic disruption and be completed within the limited time frame, especially Ramadan season must be considered with top priority.

   The construction plan prepared under this study fully considered above conditions, therefore, it should be fully understood and implemented by contractors and monitored by the supervision consultant.

2) The project was conceptualized based on the Special Term Economic Partnership (STEP) between Japan and Indonesia. One of major requirement is the application of new Japanese technology and compliance with the 30% as Japanese contents.

   The Japanese contents doesn't necessary be originated from Japan, but can be produced in Indonesia by Indonesia & Japanese joint operation company.

   With the above concept, project cost will not be fully dependent on Japanese product come from Japan.

   The project cost under STEP Loan is still highly competitive with the domestic project cost.

   Application of STEP Loan to other similar projects is highly recommended.

3) Indonesia has similar geographical condition with Japan in terms of earthquake. Under this condition, urban flyover has a big role after earthquake attack, since flyover must be operational & passable for rescue purpose, especially in urban

area. Therefore, flyover located in urban area and along the trunk road, high earthquake resistant system is demanded.

In line with the policy above, the design of six (6) flyovers has been prioritized on the high-performance against strong earthquake. This policy was based on the valuable earthquake experiences in Kobe, Japan.

The proposed aseismic design concept for the six (6) flyovers are;

- Total flyover system are monolithically connected for high performance of strong earthquake attack.
  Bridge fall, large bridge displacement, serious damage at concentrated location will be avoided by the proposed monolitical structure system.
- Pier and column has high ductility adopting composite column (steel casing and high strength concrete fill).
- Single column and pile (or twin column and twin bored pile) system is adopted to avoid discontinuous structural member, such as massive footing.
- With this concept, structural behavior will be improved by adopting continuous member rigidity. Total flyover system become flexible and absorb ground movement during strong earthquake.
- Abutment is also integrated to the flyover integrated system to avoid damage prone zone such as independent abutment.
  Earthpressure to abutment is fully independent by mechanical stabilized earth wall (MSE) or Expanded polystyrene System (EPS).
- High performance bearing at expansion pier is adopted using separate type shoe for vertical load and horizontal earthquake load.
- At the soft ground area, such as Gebang and Tanggulangin, super light weight embankment method, EPS, is adopted to avoid consolidation settlement. This method has advantages of higher earthquake resistance and faster construction.

  It is recommended that technologies introduced by this study should be positively applied to other similar projects.

4) Advantageous flyover concept for fast construction with less traffic disturbance.
All of six (6) flyovers are located in urban area with high traffic volume corridor.

For the fast construction of the flyover structure, large size bored pile (single or twin) is adopted which can minimize traffic disruption during construction due to the smaller area occupied.

This concept can be applied to other similar urban projects.

5) Flyover in urban area must be designed taking into account the slenderness and lesser obstruction for the aesthetic purpose, especially for residence/ houses and business establishment along the flyover.

High priority on aesthetic design and slender structure system to comply with the above requirement are considered.

6) Most of six (6) flyovers are located along the curved road, especially railway crossing area.

Flyover along the curve must be designed properly taking into account the safety of motorist.

Concrete barrier type at both side and median separator is considered to provide safety protection for the motorist as well as houses underneath along the flyover.

7) Location of the flyovers are selected from the North Java Corridor, while there are many candidate flyovers at middle and south Java Corridor. Therefore the success of the six (6) flyovers for efficient infrastructure with high performance during strong earthquake will provide good precedent for the succeeding flyover project at the other critical area.

8) Flyover system at soft ground is also established in the project, at Merak, Gebang, and Tanggulangin. Monolithical flyover structural system can be applied at such soft ground with high aseismic design requirement.

   To cope with a super soft ground area condition, part of soft soil was improved by soil mixing method. Combination of structural monolitical system and soil improvement at critical zone of soft ground are considered as the optimum solution in terms of cost as well as safety of structure stability, especially during earthquake.

9) Due to drastic changes in external conditions, loan amount is estimated to be insufficient. Options to cover shortage of loan were discussed in the study which recommended to put up additional local counterpart fund. It is recommended that DGH should further study options and decision should be made as early as possible.

10) PT. KAI required closure of an at-grade road at railway crossing, however, it should be done at later stage with proper provisions for local traffic and pedestrians.

11) Near Tanggulangin Flyover, mudflows from natural gas well are seriously affecting operation of the Surabaya-Gempol Toll road which may result in closure of the toll road. If the toll road is closed, traffic on it will be diverted to the national road where Tanggulangin Flyover is located, thus traffic condition should be carefully monitored during the construction of the flyover. The effects of mudflows are getting worse, DGH should decide whether construction of this flyover be implemented or not.