THE REPUBLIC OF INDONESIA

REPORT
OF
THE FEASIBILITY STUDY
ON
THE RAILWAY IMPROVEMENT
IN
KAMPUNG BANDAN STATION AREA

ANNEX

January 1986

JAPAN INTERNATIONAL COOPERATION AGENCY
(JICA)

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Annex 1 Field Surveys of the Traffic Conditions

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Annex 1 Field Surveys of the Traffic Conditions

1. Surveys Conducted

(1) Railway passenger counting survey at Jakarta Kota Station (Survey No. 1)

(2) Interview survey of railway passengers getting off at Jakarta Kota Station (Survey No. 2)

(3) Traffic volume survey around the Jakarta Kota Station Area (Survey No. 3)

(4) Average Bus Speed survey approaching Jakarta Kota Station (Survey No. 4)

(5) Interview Survey of Office Workers around Jakarta Kota Station (Survey No. 5)

2. Organization of the Survey Team

Survey Controller

|

Supervisor (2 Shifts)

|

Assistant Supervisor (2 Shifts)

|

Surveyor (2 Shifts)

(1) Survey Controller

(a) To supervise and control the whole survey

(b) Prior to each survey, the survey schedule and assignments must be confirmed; also, survey sheets and equipment must be prepared

(c) To supervise and instruct the Supervisor and Assistant Supervisor

(d) The survey results and equipment must be collected after the survey

(2) Supervisor and Assistant Supervisor

(a) Before the survey they must receive the survey sheets and equipment from the Survey Controller and deliver them to the Surveyors

(b) To take attendance of surveyors

(c) To allocate surveyors at the proper points smoothly

(d) To arrange a quick transfer from Shift 1 to Shift 2

(e) To collect the survey results and equipment

(3) Surveyor

(a) To assemble at a predetermined place 30 minutes before the starting time of one's assigned shift

(b) To receive the survey sheets and equipment

(c) To execute the survey in accordance with the instructions

(d) After the survey, shift 1 is to hand-over the survey sheets and equipment to shift 2, and shift 2 is to return the survey results and equipment to the Supervisor or Assistant Supervisor

3. Others

The forms of each survey are as follows.

FORM 1

FORMULIR PERHITUNGAN JUMLAH PENUMPANG

RAILWAY IMPROVEMENT IN KAMPUNGBANDAN STATION AREA

TANGGAL, BULAN, DAN TAHUN : - DESEMBER - 1984

NAMA SETASIUN : JAKARTA KOTA

LOKASI SURVEY :

NAMA SUPERVISOR
(SHIFT 1)
(SHIFT 2)
NAMA ASISTEN SUPERVISOR
(SHIFT 1)
(SHIFT 2)
NAMA SURVEYOR (SHIFT 1)
NAMA SURVEYOR (SHIFT 2)

NOMOR PERON	
1-2	(A)
3-4	(B)
5-6	(C)
7-8	(D)
9-10	(E)
11-12	(F)

PINTU PORTIR	(G)

JAM	MASUK (KE K.A.)			KELUAR (DARI K.A.)		
	0 ~ 30	30 ~ 60	TOTAL	0 ~ 30	30 ~ 60	TOTAL
6 - 7						
7 - 8						
8 - 9						
9 - 10						
10 - 11						
11 - 12						
12 - 13						
13 - 14						
14 - 15						
15 - 16						
16 - 17						
17 - 18						
18 - 19						
19 - 20						

FORMULIR INTERVIEW ASAL-TUJUAN PENUMPANG KERETA API

RAILWAY IMPROVEMENT IN KAMPUNGBANDAN STATION AREA.

FROM 2

TANGGAL :

LOKASI SURVEY : JAKARTA KOTA

NAMA SUPERVISOR :

NAMA SURVEYOR :

PILIH NOMOR JAWABAN DIBAWAH :

1. JALAN KAKI
2. SEPEDA, BECA
3. SEPEDA-MOTOR
4. KENDARAAN RODA TIGA (BAJAJ)
5. MINI BIS, OPLET, COLT
6. TAXI
7. BIS
8. SEDAN
9. TRUCK
10. LAIN-LAIN

PILIH NOMOR JAWABAN DIBAWAH :

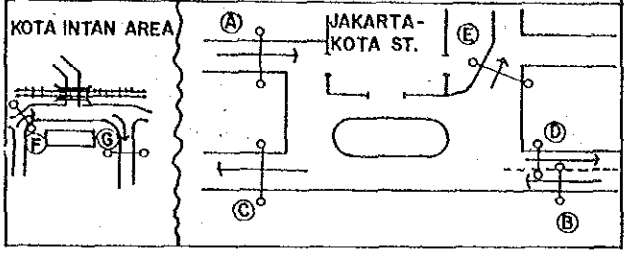
1. MENUJU KE TEMPAT KERJA
2. MENUJU KE SEKOLAH
3. BERDAGANG/BISNIS
4. BERBELANJA/KE PASAR
5. REKREASI
6. PULANG KE RUMAH
7. LAIN-LAIN

JAM SURVEY	SETASIUN ASAL PENUMPANG NAIK KERETA API.	BERANGKAT DARI : NAMA JALAN, DESA/KELURAHAN KECAMATAN, KOD./KAB.	NAIK APA KE STASIUN PEMBER-ANGKATAN	ALAMAT TUJUAN : NAMA JALAN, (DAN NOMOR) DESA/KELURAHAN, KECAMATAN	NAIK APA KE TUJUAN	WAKTU TEMPUH DARI SET.JAK. KE TU-JUAN (MENIT)	MAKSUD PERJALANAN
... 6- 7- 8- 9- / 10- 11- 12- 13- 14- / 15- 16- 17- / 18- 19-							
6- 7- 8- 9- / 10- 11- 12- 13- 14- / 15- 16- 17- / 18- 19-							
6- 7- 8- 9- / 10- 11- 12- 13- 14- / 15- 16- 17- / 18- 19-							
6- 7- 8- 9- / 10- 11- 12- 13- 14- / 15- 16- 17- / 18- 19-							
6- 7- 8- 9- / 10- 11- 12- 13- 14- / 15- 16- 17- / 18- 19-							

FORM 3

RESULT OF VEHICLE TRAFFIC COUNTING SURVEY NEAR JAKARTA KOTA STATION

SURVEY LOCATION



LOCATION ○ HOUR	MOTOR CYCLE	KENDA-RAAN RODA TIGA (BAJAJ)	SEDAN	TAXI	MINI-BUS OPLET COLT	BUS	TRUCK
6 — 7							
7 — 8							
8 — 9							
9 — 10							
10 — 11							
11 — 12							
12 — 13							
13 — 14							
14 — 15							
15 — 16							
16 — 17							
17 — 18							
18 — 19							
19 — 20							
20 — 21							
21 — 22							
TOTAL							

FORM 4

FORMULIR PERHITUNGAN KECEPATEN BERLARI MOBIL

RAILWAY IMPROVEMENT IN KAMPUNGBANDAN STATION AREA

TANGGAL, BULAN, DAN TAHUN :

NAMA SUPERVISOR
NAMA SURVEYOR

	NAMA TEMPAT	JARAK (K.METER)	JAM MENIT	KECEPATEN (KM/HOUR)
TEMPAT BERANGKAT				
LEWAT(1)				
LEWAT(2)				
LEWAT(3)				
LEWAT(4)				
LEWAT(5)				
LEWAT(6)				
LEWAT(7)				
LEWAT(8)				
TEMPAT TUJUAN				
TOTAL				

DEPARTEMEN PERHUBUNGAN
DIREKTORAT JENDERAL PERHUBUNGAN DARAT

(QUESTIONAIR UNTUK KARYAWAN
DISEKITAR STASIUN KOTA & KAMPUNG BANDAN)

QUESTIONAIR UNTUK KARYAWAN

FORM 5

Departemen Perhubungan Direktorat Jendral Perhubungan Darat sedang melaksanakan survey transportasi sekitar stasion Jakarta Kota.

Sebagai bagian dari pada survey ini, maka Questionair survey dibagikan kepada para karyawan yang berkantor disekitar stasiun Jakarta Kota.
Kerja sama anda dalam survey ini sangat dihargai.
Perlu kami tambahkan bahwa data dan informasi yang diperoleh dari survey ini hanya digunakan untuk survey transportasi, dan tidak akan digunakan untuk tujuan lain.
Pilihlah satu angka yang anda pikir paling sesuai dengan keadaan anda, dan isilah angka tersebut pada [ ], atau taruhlah jawaban anda dalam [ ]

(jangan di isi)

1. Dimanakah tempat tinggal anda ? [ ][ ][ ][ ][ ][ ]

   Jalan/No. : _____

   Kelurahan/Desa : _____

   Kecamatan : _____

   Kota/Kabupaten : _____

2. (1) Pukul berapakah anda biasanya berangkat dari rumah dan pukul berapa tiba di kantor. ?

   Berangkat dari rumah (jam : menit) [ ][ ] tiba di kantor (jam : menit) [ ][ ]

   (2) Pukul berapakah biasanya anda bergegas pulang dari kantor dan pukul berapa tiba dirumah ?

   Berangkat dari kantor (jam : menit) [ ][ ] tiba dirumah (jam : menit) [ ][ ]

3. Dengan alat transportasi apakah biasanya anda pergi dari rumah ke kantor ? [ ]

   1) Kereta Api
   2) Mobil pribadi
   3) Mobil pemerintah/perusahaan
   4) Taxi
   5) Bis
   6) Mini Bis/Colt
   7) Sepeda motor
   8) Sepeda, Bajaj
   9) Berjalan kaki
   10) Lain-lain

(Jika anda memilih "1) Kereta Api" pada pertanyaan diatas jawablah pertanyaan ini.
Jika tidak, jawablah pertanyaan no.5)

4. Apakah alasan anda menggunakan kereta api untuk menuju kantor anda ? [ ]

   1) Stasiun kereta api terletak didekat rumah/kantor.
   2) Naik kereta api lebih cepat dibanding transport jalan raya.
   3) Kereta api lebih menjamin ketepatan waktu dibanding transport jalan raya.
   4) Tarip kereta api lebih murah daripada bus.
   5) Tidak ada alat transport lain kecuali kereta api.
   6) Lain-lain : ( )

5. (Hanya untuk yang tidak menggunakan kereta api dalam berpergian)
   Apakah alasan anda tidak menggunakan kereta api dalam berpergian ke kantor ? [ ]

   1) Stasiun kereta api tidak ada didekat rumah/kantor
   2) Kereta api lebih lambat dibanding transport jalan raya
   3) Kereta api tidak menjamin ketepatan waktu dibanding transport jalan raya
   4) Tarip kereta api lebih mahal dibanding transport jalan raya (bus)
   5) Pelayanan kereta api tidak memuaskan terutama frekwensinya
   6) Kantor menyediakan jemputan ke kantor
   7) Lain-lain : ( )

6. (Untuk pemakai atau tidak pemakai kereta api)
   Perbaikan apakah yang anda pikir perlu untuk penggunaan yang lebih baik terhadap jaringan jalan kereta api yang ada sebagai alat bepergian anda setiap hari ?

Kelamin : 1) Laki2 [ ] 2) Perempuan — Umur :

Apakah anda memiliki kendaraan pribadi ? 1) Ya [ ] 2) Tidak

Apakah jenis kendaraan yang anda miliki ? [ ]
1) Motorcycle
2) Sedan/Jeep
3) Minibus
4) Pick up
5) Lain-lain

Jenis pekerjaan dikantor anda: [ ]

1) Tenaga akhli professional
2) Tenaga administrasi/Pengatur
3) Juru tulis
4) Sales/penjualan
5) Jasa
6) Produksi
7) Operator alat2/alat transport
8) Lain2.

Nama Kantor :

Tanggal :

Annex 2 Modal Split Curve between Railway and Bus

Corresponding Chapter
3.3.3

Annex 2 Modal Split Curve between Railway and Bus

Based on the up-to-date O/D tables for railway and bus passengers, a modal split ratio between railway and bus was estimated by comparing railway travel time with bus travel time for the interzonal movements.

A modal split curve between railway and bus traffic was estimated as follows.

(1) Railway O/D table and Bus O/D table

Based on the up-to-date O/D tables for railway and bus passengers, the O/D table for (railway + bus) passengers overall was obtained.

Railway O/D table

	1	2	3
1		R_{12}	R_{13}
2	R_{21}		R_{23}
3	R_{31}	R_{32}	

Bus O/D table

	1	2	3
1		B_{12}	B_{13}
2	B_{21}		B_{23}
3	B_{31}	B_{32}	

(Railway + Bus) O/D table

	1	2	3
1		$(R+B)_{12}$	$(R+B)_{13}$
2	$(R+B)_{21}$		$(R+B)_{23}$
3	$(R+B)_{31}$	$(R+B)_{32}$	

(2) Calculation of Railway Share

The railway share for an O/D pair was calculated as shown below.

Railway Share :

$$RS_{12} = \frac{R_{12}}{(R + B)_{12}}$$

$$RS_{13} = \frac{R_{13}}{(R + B)_{13}}$$

. .
. .
. .
. .
. .
. .

(3) Calculation of Travel Time

Travel time for an O/D pair of railway and bus was obtained by the minimum pass method, and based on the railway and road networks.

Railway travel time is the total of:

1) travel time on railway link;
2) access/egress time; and,
3) waiting time at the representative railway station.

Railway travel time : RTT_{12}

RTT_{13}

.
.
.
.
.
.

Bus travel time is the total of:

1) travel time on road link; and,

2) access/egress time.

Bus travel time : BTT_{12}

BTT_{13}

.
.
.
.
.
.

(4) Calculation of Travel Time Ratio

The travel time ratio was obtained by dividing railway travel time by bus travel time as shown below.

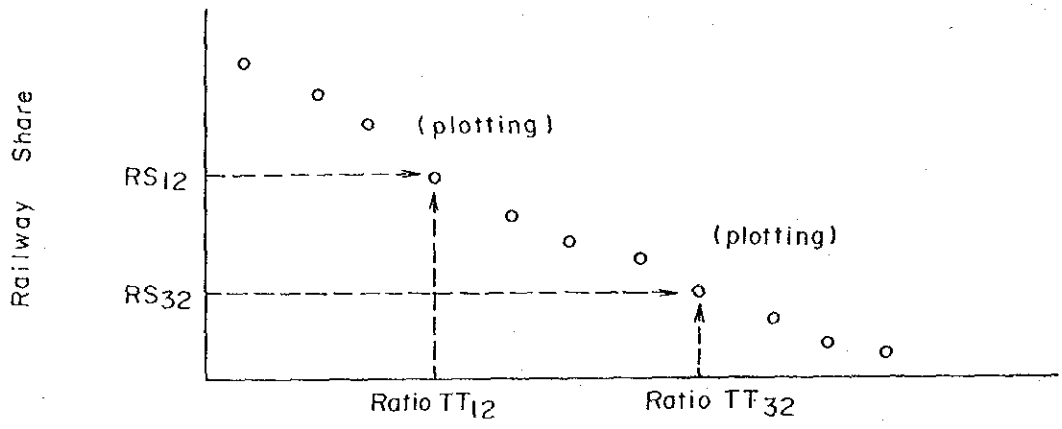
$$\text{Ratio } TT_{12} = \frac{RTT_{12}}{BTT_{12}}$$

$$\text{Ratio } TT_{13} = \frac{RTT_{13}}{BTT_{13}}$$

. .
. .
. .
. .
. .
. .

(5) Plotting

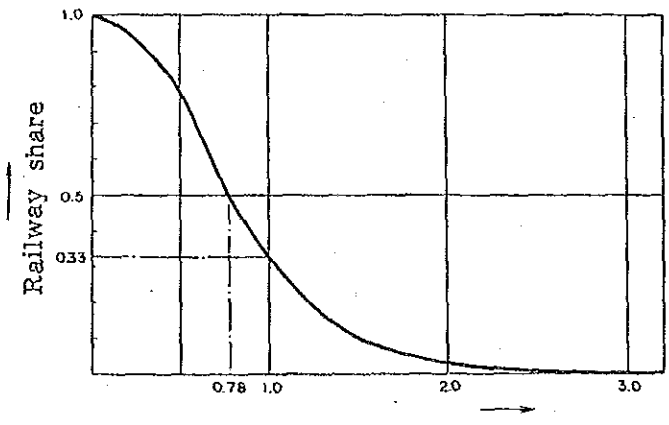
The intersection of the values for the railway share and the travel time ratio were plotted for the O/D pairs as shown below.



Travel Time Ratio

(6) Modal Split Curve

The modal split curve is the aggregate of these plottings.



Travel time ratio (Railway travel time/Bus travel time)

Modal split curve between Railway and Bus

Annex 3 Combination of Lines in Kampung Bandan Station Area

Corresponding Chapter
4.1.2, 4.1.3, 4.2, 5.2.1, 5.2.2, 5.2.3

Annex 3 Combination of Lines in Kampung Bandan Station Area

1. Basic Concept

The present track connections around Kampung Bandan are not adequate for smooth train operation. An effective combination of lines by adopting new link(s) or new passage(s) would ensure such smooth train operation, as well as provide good passenger service.

Therefore, all the alternatives should satisfy the following requirements:

1) At least one of the three lines, (Eastern, Centeral, or T. Priok, is to be connected to Jakarta Kota Station, since it is necessary to connect commuter trains with long-distance passenger trains there.

2) A new station is to be constructed where the two lines (the Western Line and another that is still undermind) connect with two other lines. This will enable passengers to transfer there.

3) The above-mentioned new station is also to serve the residents of the surrounding area.

4) Kota Intan Station (proposed in the JICA Reports of 1979 and 1984 on the Intermediate Program and on the Cengkareng Airport Line) is to be built to accomodate another commuter flow to the Kota Area.

5) The handling of long-distance passenger trains and freight trains is to remain as is.

6) All the work above is to be coordinated with the City project.

7) The construction is to be low-cost, as simple as possible, and to be done in a short period of time. The construction of a large scale structure is to be refrained from as much as possbile.

8) A Level-crossing is to be refrained from for the two lines that are double-tracked and used for commuter trains.

9) Cengkareng Airport Line is to be connected to the Central Line as proposed in the JICA Report of 1984, detouring the Jakarta Kota Station.

The connections of lines and alternatives for train operation and railway facility plans are shown in Table 3.1.

These alternatives are mainly for the "W-E connection", which is considered to be the best from the viewpoints of passenger convenience, train operation, and construction.

Table 3.1 Relation of Each Alternative

Connection of Lines	Commuter Train Operation Route Alternatives *1	Railway Facilities Plan Alternatives *2	Main Commuter Train Operation Routes	Location of the stations
W - E	1 or 2	P_{1-1}	W - E C T	Intersection of E and T
		P_{1-2}		
		P_{1-3}		
		P_{2-1}		
		P_{2-2}		
		P_3		
	3	P_4		
W - T	4	Q	W-T C E	Present Kampung Bandan Signal Station
W - C	5	R	W ┌ C (Double) └ E (Loop) T	*Intersection of CA and T* Intersection of E and T
	5B		W - C E T	Intersection of CA, E, and T
C - T	6	S	C - T E W	Present Kampung Bandan Signal Station

Notes : *1 Chapter 4
*2 Chapter 5

2. Combination of Lines

(1) Possible Line Combinations

The following lines approach the area:

Western Line (W) *

Central Line (C)

Eastern Line (E)

Cengkareng Airport Line (CA)

Tanjung Priok Line (T)

According to the 1983 JICA feasibility study, the Cengkareng Airport Line is to be connected to the Central Line.

The following combinations can be achieved in the area with the adoption of new link(s) or passage(s).

Western Line and Eastern Line (W-E Combination)

Western Line and Tanjung Priok Line (W-T Combination)

Western Line and Central Line (W-C Combination)

Central Line and Tanjung Priok Line (C-T Combination)

Central Line and Eastern Line (C-E Combination)

Eastern Line and Tanjung Priok Line (E-T Combination)

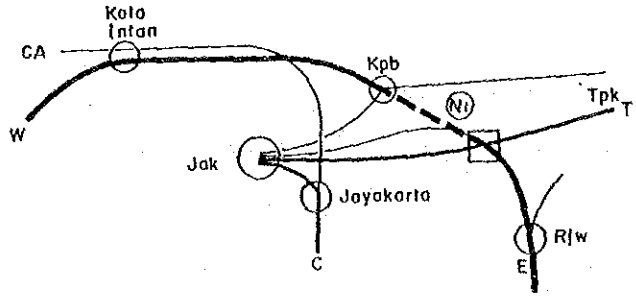
The combinations W-E, W-T and W-C contribute to elimination of the switch-back operation at Kampung Bandan Signal Station.

Among the above combinations, the E-T already exists. The C-E combination is not practical, since the Central and Eastern Lines run parallel to each other at a distance of 1 - 1.5km. Thus, these two combinations will no longer be considered (see Fig. 3.1).

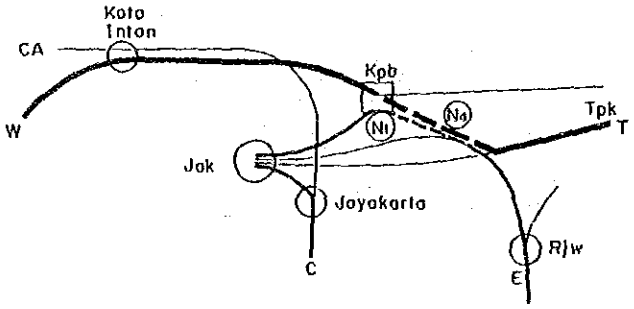
---

* The same abbreviations "W", "C", "E", and "CA" will be used in the tables and figures of this chapter.

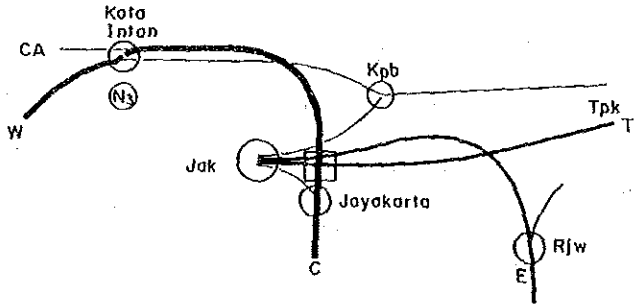
W - E combination



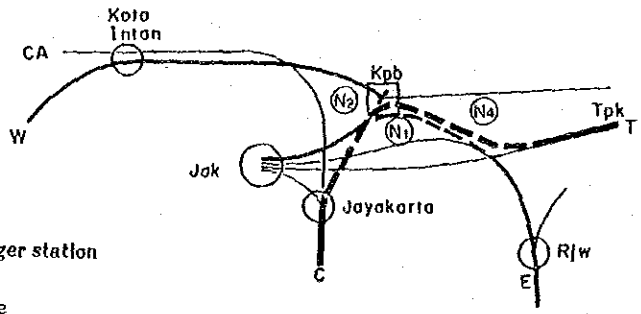
W - T combination



W - C combination



C - T combination



Remarks

□	:	New passenger station
W	:	Western Line
C	:	Central Line
E	:	Eastern Line
CA	:	Cengkareng Airport Line
T	:	Tanjung Priok Line
N1 - N4	:	New links required to be constructed

Fig. 3.1 Combination of Lines

(2) Links Required for Line Combination

Table 3.2 below indicates the proposed links needed to achieve the four line combinations.

Table 3.2 Combinations & Required Links

Combination	Required links
W - E	N_1
W - T	N_1, N_4
W - C	N_3
C - T	N_1, N_2, N_4

Notes N_1: Connection between Kampung Bandan and Rajawali

N_2: Connection between Kampung Bandan and Jayakarta

N_3: Connection of Cengkareng Airport Line and Western Line at Kota Intan Station

N_4: Connection between Kampung Bandan and Ancol

(3) Evaluation of Combinations

(a) Effective Service

The passenger flow of each line around the Kampung Bandan Station Area is shown in Fig. 3.13.

The Western-Line passenger flow divides mainly into two directions at Kampung Bandan. In the year 2005, the two main flows will be on the Eastern and Tanjung Priok Lines (93.3 and 63.5 thousand passengers respectively–all day, both ways), while the volume of passenger flow between the Central and Tanjung Priok Lines, (23.1), and between the Central and Western Line (0.2) will be less significant.

W-E connection would destribute radial line passengers to their ultimate destinations i.e. densely populated city centers, of which many are located along Eastern and Western Lines. Therefore, it can be said that the connection of the Western and Eastern Lines is the most effective option with respect to passenger flow.

(b) Train Operation Simplicity

Problems regarding train movement and operation on the combinations W-E, W-T, and C-T are not serious. However, the combination W-C, requires train flow to be divided at Kota Intan into two different directions, complicating train operations and scheduling. As this division must be carried out even in busy peak hours, the W-C combination cannot be recommended.

(c) Construction Simplicity and Investment Cost

1) N_1 can be constructed within a short time period and at the lowest cost, since the link does not require a large-scale structure.

2) N_2 crosses many lines converging on Jakarta Kota, therefore, the link should be elevated to cross these lines and descend to ground level before reaching Kampung Bandan Station. Thus, N_2 presents design and construction difficulties as well as requiring a large investment.

3) N_3 also poses design and construction difficulties, since the Cengkareng Airport Line will be on a viaduct and the Western Line must be embanked, and requires a very large investment for construction.

4) N_4, designed to connect the Tanjung Priok Line to Kampung Bandan Station, requires more investment than N_1 but less than N_2 or N_3. Special precautions should be taken during the construction of N_4 due to the geological conditions (soft ground) of the area. Embankment or viaduct construction should be done close to the present line.

(4) Proposed Combination

A comparison of the proposed line combinations is shown in Table 3.3.

Table 3.3 Comparison and Evaluation of Line Combinations

Criteria \ Combination	W-E	W-T	W-C	C-T
Effective passenger service	○	△	×	×
Ease of Train operation	○	○	△	○
Ease of Construction	○	△	×	×

Notes: ○ : "no problems"

△ : "with some problems"

× : "with serious problems"

As a measure to eliminate the switchback operation at the Kampung Bandan Signal Station, the W-E combination is preferable not only from the viewpoints of passenger convenience and ease of train operation, but also from the viewpoint of construction cost.

3. Commuter Train Operation Route Alternatives

Main train operation routes and main facilities to be constructded were studied. Seven alternatives are indicated in Table 3.4 with their advantages and disadvantages explained in each Alternative description.

The alternatives 1, 2, and 3, which have a W-E connection, are compared and evaluated in Table 3.5.

It can be said that Alternative 1 is the best, not only from the viewpoint of investment effectiveness, but also from the viewpoints of train operation simplicity and passenger convenience.

Table 3.4 Main Train Operation Routes and Main Facilities to be Constructed

Alternative	Line connection	Main train operation route	Main facilities to be construction							
			Link of Passage				Station			
			N1	N2	N3	N4	NKpb (New Kpb)	Npb-I (Improved Kpb)	Kpb (As it is	NS2 (New station)
Alt-1	W-E	W-E loop Tpk-Jak Boo-Jak	○				○			
Alt-2	W-E	W-E loop Tpk-Jak Boo-Kota Intan	○				○			○
Alt-3	W-E	W-E loop Tpk-Jak Boo-Jak	○			○		○		
Alt-4	W-T	Bks-Thb -Kpb-Tpk Boo-Jak Jak-Kpb-Jng	○			○		○		
Alt-5	W-C	W-E loop W-C loop Tpk-Jak	○		○		○			○
Alt-5B	W-C	W-C loop (Boo-Gmr-Kota Intan-Thb-Mri -Jng-Bks) Jak-Rjw-Jng Tpk-Jak			○				○	○
Alt-6	C-T	Bks-Thb-Kpb Boo-Gmr-Kpb-Tpk Jak-Rjw-Jng	○	○		○		○		

Table 3.5 Comparison and Evaluation of Train Route Alternatives 1, 2 and 3

			Alternative 1	Alternative 2	Alternative 3
Feature		Connection of Lines:	W-E	W-E	W-E
		Facilities to be built: New Station(s)	NKpb at the intersection of T and E	NKpb at the intersection of T and E NS2 at apprx 600m east of Jak	Existing Kpb (signal) upgrated to a passenger station
		New Link(s)	N1 connecting W and E	N1 connecting W and E	N1 connecting W and E N4 connecting Kpb and Ae
		Main Train Routes	Loop (W-E) C-Jak T-Jak	Loop (W-E) C-Kota Intan T-Jak	Loop (W-E) C-Jak T-Jak
		Sectional Train Operation	Bks-Mri-Du	Bks-Mri-Du	Dp-Mri-Du
Evaluation	Passenger Service	Passenger Convenience	◎	Passenger Volume from C to Jak is estimated to be the heaviest for this area. Passengers are required to change trains at NS2	◎
		Easy Access to the Railway Station	○ J1 M. Dua	○ J1 M. Dua	△ J1 Kampung Bandan
		Compatibility with DKI Project	○ Project J1. M. Dua	○ Project J1. M. Dua	△ Future Kota Area redevelopment
	Train Operation	Simplicity of Train Operations at Stations	○	○	△ Trains from C bifurcate at Mri in directions C and W
		Adaptability of Train Routes to Traffic Demand	○	○	△ Train flow ⑥, between Mri and Jng, does not satisfy the demand
	Investment & construction	Investment Cost	◎	x Additional investment at NS2 and	△ Additional investment at N4
		Easiness of Construction	○	x NS2 is to be built on the CA elevated structure, and requires construction work while existing tracks, are being used immediately below	△ Kpb is to be improved and requires work while existing adjacent tracks are being used.
		Provision of space for future improvement of Jak	○ 2 commuter train routes terminate at Jak.	◎ 1 commuter train route terminates at Jak.	○ 2 commuter train routes terminate at Jak.
Final Evaluation			◎	△	○

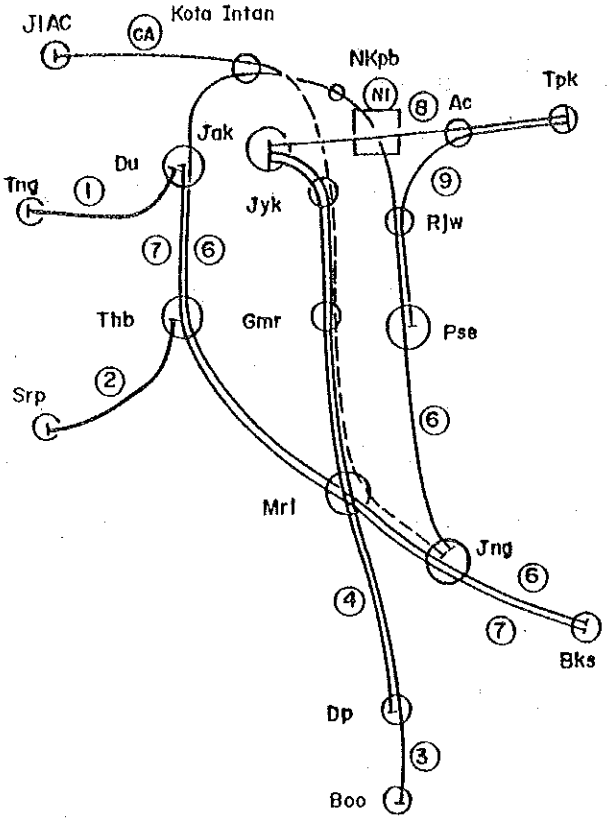
NS2 : Refer to page 3-11

N4 : Refer to Fig. 3.1

Notes:

◎ : Good
○ : No problems
△ : some problems
× : serious problems

Alternative 1 W-E Connection



Commuter train routes:

(1) Tng-Du
(2) Srp-Thb
(3) Boo-Mri-Gmr-Jak
(4) Dp-Mri-Jak
(6) Bks-Jng-Mri-Thb-NKbp-Pse-Jng
(7) Bks-Jng-Mri-Thb-Du
(8) Jak-NKpb-Tpk
(9) Pse-Rjw-Tpk
(CA) JIAC-Kota Intan-Gmr-Mri-Jng

Facilities to be built:

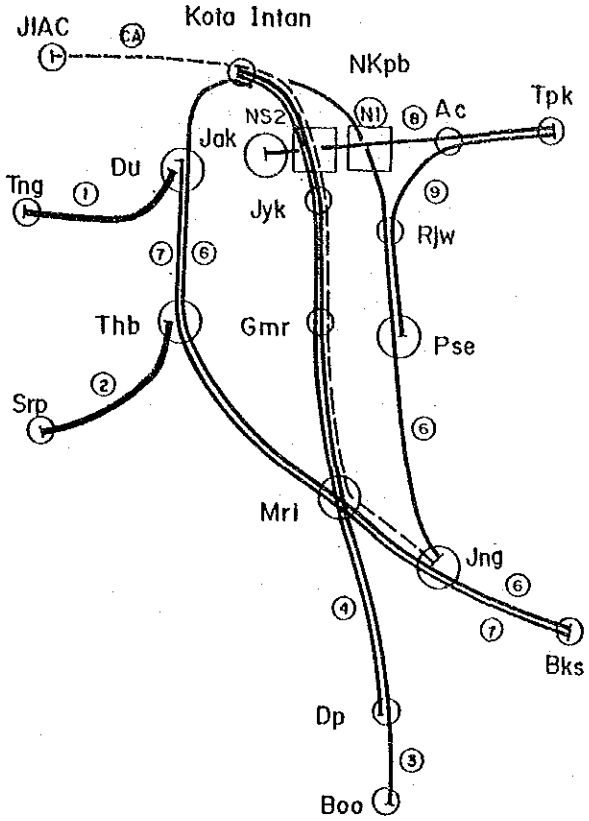
a. A new station (New Kampung Bandan, NKpb) at the intersection of T and E
b. A new link (N1) connecting W and E

Main train routes:
Loop (W-E), C-Jak, T-Jak

Advantages:
a. Train routes are well adapted to the forecasted passenger flows.
b. NKpb is located close to Jl. Mangga Dua and Jl. Gunung Sahari Ancol. Easy access to the station is expected.
c. A direct freight train route is secured from Jak-Gudang to E. Switchback operations at Jak, and Kpb are eliminated.
d. Construction work (costs and time period) is minimal- N1 and NKpb only.

Disadvantages:
Passengers going from Gmr to Kota Intan (estimated to be minor in number) are required to change trains at Jak and NKpb until the CA is completed.

Alternative 2 W-E Connection



Commuter train routes:

(1)	Tng-Du
(2)	Srp-Thb
(3)	Boo-Mri-Gmr-NS2-Kota Intan
(4)	Dp-Mri-Gmr-NS2-Kota Intan
(6)	Bks-Jng-Mri-Thb-NKbp-Pse-Jng
(7)	Bks-Jng-Mri-Thb-Du
(8)	Jak-NKpb-Tpk
(9)	Pse-Rjw-Tpk
(CA)	JIAC-Kota Intan-Gmr-Mri-Jng

Facilities to be built:

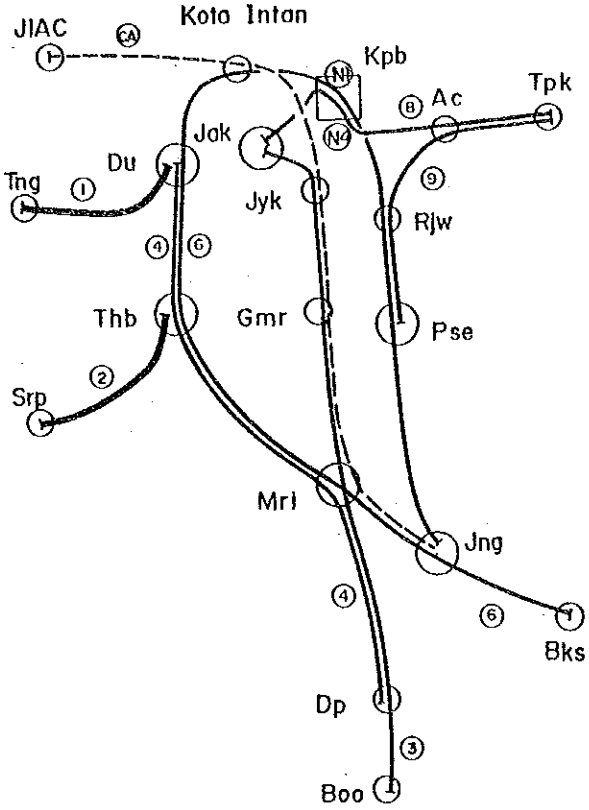
a. A new station (NKpb) at the intersection of T and E
b. Another new station (NS2) at the intersection of T and CA
c. A new link (N1) connecting W and E
d. CA

Main train routes:
Loop (W-E), C-Kota Intan, T-Jak

Advantages:
a. NKpb is located close to Jl. Mangga Dua and Jl. Gunung Sahari Ancol. Easy access to the station is expected.
b. Train handling at Jyk is simplified.
c. A direct freight train route is secured from Jak-Gudang to E. Switchback operations at Jak, and Kpb is eliminated.

Disadvantages:
a. Passengers going from C to Jak (estimated to be great in number) are required to change train at NS2.
b. Two new stations (NKpb and NS2) are required - NS2 will be expensive and pose constructing difficulties.
c. Not attainable unless CA is constructed.

Alternative 3 W-E Connection



Commuter train routes:

(1)	Tng-Du
(2)	Srp-Thb
(3)	Boo-Mri-Gmr-Jak
(4)	Dp-Mri-Thb-Du
(6)	Bks-Jng-Mri-Thb-NKpb-Pse-Jng
(8)	Jak-NKpb-Tpk
(9)	Pse-Rjw-Tpk
(CA)	JIAC-Kota Intan-Gmr-Mri-Jng

Facilities to be built:

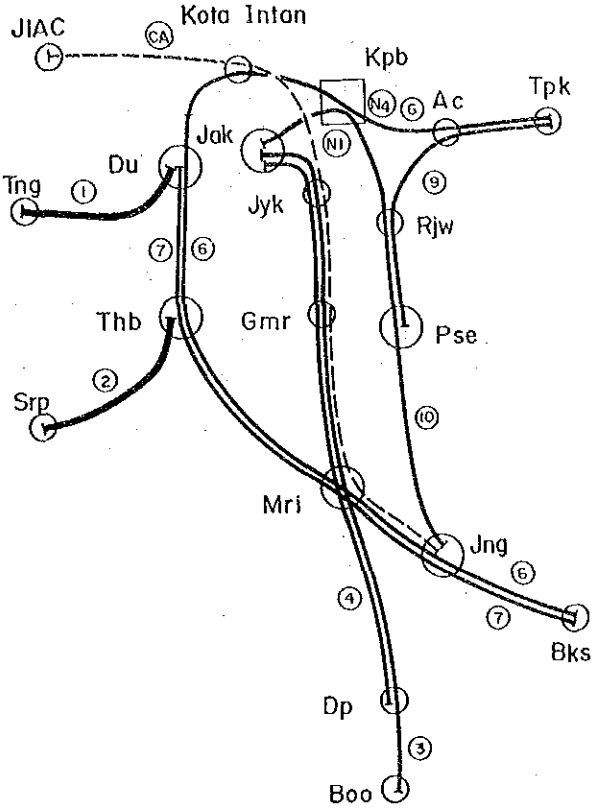
a. Existing Kampung Bandan (Kpb) Signal Station upgraded to a passenger station
b. A new link (N1) connecting W and E
c. Another new link (N4) connecting Kpb and Ac

Main train routes:
Loop (W-E), C-Jak, T-Jak

Advantages:
a. A direct freight train route is secured from Jak-Gudang to E. Switchback operations at Jak, and Kpb is eliminated.

Disadvantages:
a. The number of trains for flow (6) between Mri and Bks will be less than what is required. This is due to train flow (4) occupying half of the Mri-Thb-Du track capacity.
This situation can be resolved if additional trains are operated from Mri-Bks.
b. Train handling is complicated at Mri, since trains from Dp bifurcate in the directions Gmr and Thb. Punctual operation is keenly required.
c. Two new links (N1 and N4) are required.
d. Kpb improvement costs are high; also, construction is complex since works must be conducted while the existing Kpb tracks are being used.

Alternative 4 W-T Connection



Commuter train routes:

(1) Tng-Du
(2) Srp-Thb
(3) Boo-Mri-Gmr-Jak
(4) Dp-Mri-Gmr-Jak
(6) Bks-Jng-Mri-Thb-Kpb-Tpk
(7) Bks-Jng-Mri-Thb-Du
(9) Pse-Rjw-Tpk
(10) Jak-Kpb-Pse-Jng
(CA) JIAC-Kota Intan-Gmr-Mri-Jng

Facilities to be built:

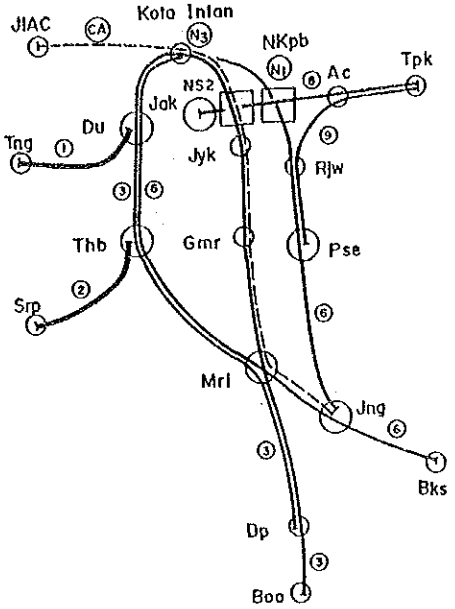
a. Existing Kampung Bandan Signal Station upgraded to a passenger station (Kpb)
b. A new link (N1) connecting W and E
c. A new link (N4) connecting Kpb and Ac or improvement of T (tracks for freight trains)

Main train routes:
W-T, C-Jak, E-Jak

Advantages:
a. A direct freight train route is secured from Jak-Gudang to E. Switchback operations at Jak, and Kpb are eliminated.

Disadvantages:
a. Passengers from W to E (estimated to be greater in number than passengers from W to T) must change trains at Kpb.
b. Two new links (N1 and N4) are required.
c. Kpb improvement is expensive; also, construction is complicated since work must be conducted while the existing Kpb tracks are being used.
d. If T (tracks for freight trains) is improved, instead of constructing N4, the track layout must be modified to reach not only Tpg but also Tpk, further more, the freight line must be electrified, double-tracked, and grade-separated at J1. Gunung Sahari Ancol.

Alternative 5 W-C Connection



Commuter train routes:

(1) Tng-Du
(2) Srp-Thb
(3) Boo-Mri-Gmr-NS2-Thb-Mri-Dp
(6) Bks-Jng-Mri-Thb-NKpb-Pse-Jng
(8) Jak-NS2-NKpb-Tpk
(9) Pse-Rjw-Tpk
(CA) JIAC-Kota Intan-Gmr-Mri-Jng

Facilities to be built:

a. A new station (NKpb) at the intersection of T and E
b. Another new station (NS2) at the intersection of T and CA
c. A new link (N1) connecting W and E
d. Another new link (N3) combining CA and W at Kota Intan
e. CA

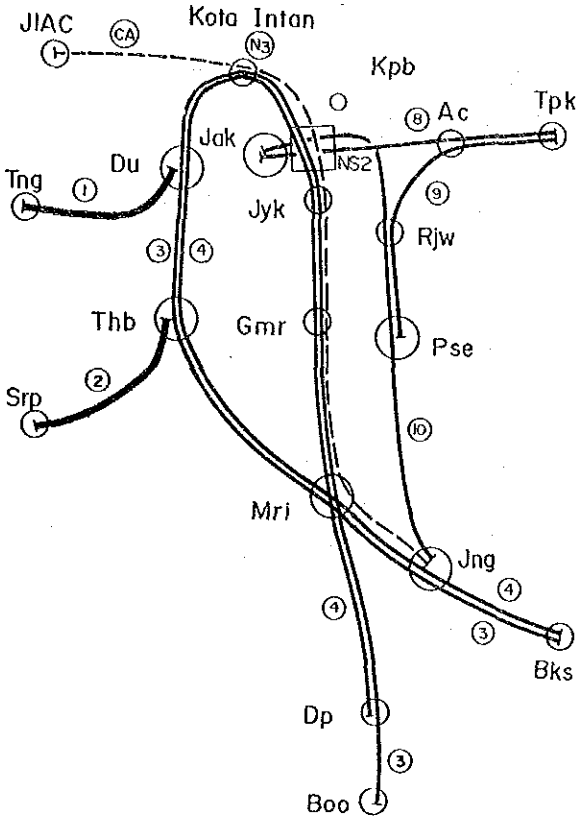
Main train routes
Loop (W-C), Loop (W-E), T-Jak

Advantages:
a. NKpb is located close to Jl. Mangga Dua and Jl Gunung Sahari Ancol. Easy access to the station is expected.
b. Passengers going from W to E and passengers from W to C are not required to change trains. However, the traffic, from W to C is estimated modest.
c. A direct freight train route is secured from Jak-Gudang to E. Switchback operations at Jak, and Kpb are eliminated.

Disadvantages:
a. Passengers (estimated to be great in number) from C to Jak are required to change trains at NS2.
b. The number of trains for flow (6) between Mri and Bks, will be less than required--see Alt. 3, Disadvantage b.
c. Train handling is complicated
   - at Mri, since trains from Dp bifurcate in the directions of Gmr and Thb
   - at Kota Intan, since trains from W bifurcate in the directions of E and C, and trains from C bifurcate in directions, W and CA.

   Punctual operation is keenly required.
d. Two new stations (NKpb and NS2) are required--NS2 would be expensive and base construction difficulties.
e. Two new links (N1 and N3) are required. N3 would be expensive and pose design/constructing difficulties.
f. Not attainable unless CA is constructed.

Alternative 5B W-C Connection



Commuter train routes:

(1) Tng-Du
(2) Srp-Thb
(3) Boo-Mri-Gmr-NS2-Thb-Mri-Jng-Bks
(4) Dp-Mri-Gmr-NS2-Thb-Mri-Jng-Bks
(8) Jak-NS2-Ac-Tpk
(9) Pse-Rjw-Tpk
(10) Jak-NS2-Pse-Jng
(CA) JIAC-Kota Intan-Gmr-Mri-Jng

Facilities to be built:

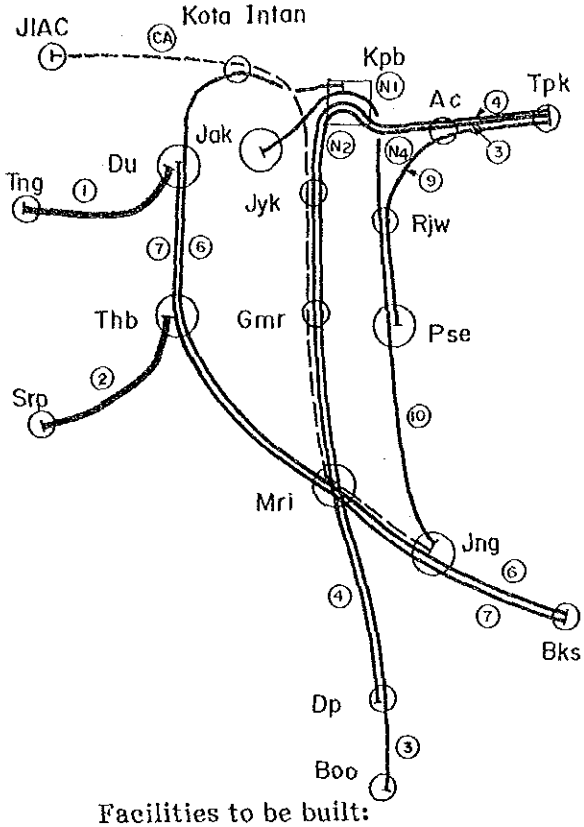
a. A new station (NS2) at the intersection of T and CA
b. A new link (N3) combining CA and W at Kota Intan.
c. CA (a part)

Main train routes:
Loop (W-C), E-Jak, T-Jak.

Advantage:
Transfer to any line is possible at NS2 since all the commuter trains stop there.

Disadvantages:
a. Passengers (estimated to be great in number) from C to Jak, and from W to E, are required to change trains at NS2.
b. Passenger traffic from W to C is estimated to be modest.
c. NS2 and N3 would be expensive and pose design (N3) and constructing (N3, NS2) difficulties.
d. Not attainable unless CA is constructed.
e. A direct freight train route is not secured from Jak-Gudang to E. Double switchback operations at Jak, therefore Kpb would remain.

Alternative 6 C-T Connection



Commuter train routes:

(1) Tng-Du
(2) Srp-Thb
(3) Boo-Mri-Gmr-Kpb-Tpk
(4) Dp-Mri-Kpb-Tpk
(6) Bks-Jng-Mri-Thb-Kpb
(7) Bks-Jng-Mri-Thb-Du
(9) Pse-Rjw-Tpk
(10) Jak-Kpb-Pse-Jng
(CA) JIAC-Kota Intan-Gmr-Mri-Jng

Facilities to be built:

a. Existing Kampung Bandan Signal Station upgraded to improved as a passenger station (Kpb)
b. A new link (N1) connecting W and E
c. Another link (N2) connecting Kpb and Jyk
d. Another link (N4) connecting Kpb and Ac, or improvement of T (tracks for freight trains)

Main train routes:
C-T, E-Jak, W-Kpb

Advantages:
a. Transfer to any line is possible at Kpb, since all the commuter trains stop there.
b. A direct freight train route is secured from Jak-Gudang to E. Switchback operations at Jak, and Kpb is eliminated.

Disadvantages:
a. Passengers from C to Jak (estimated great in number), and from W to E, are required to change trains at Kpb.
b. Traffic volume C and T are in a state of imbalance, so much so that the connection will not be practical.
c. Kpb and N2 would be expensive, and pose design (N2) and constructing (N2, Kpb) difficulties.
d. If T (tracks for freight trains) is improved instead of constructing N4, the track layout must be modified to reach not only Tpg but also Tpk, furthermore, the freight line must be electrified, double-tracked, and grade-separated at Jl. Gunung Sashari Ancol. (see Alt. 4. Disadvantage "d".)

4. Railway Facility Improvement Plan Alternative

The alternatives (P_{1-1}, P_{1-2}, P_{1-3}, P_{2-1}, P_{2-2}, P_3, P_4, Q, R, S) are compared and evaluated according to the following criteria: (See Table 3.6)

(1) Service criteria (in addition to the train operation route)

Location of the Station

Convenience of passenger transfer

Curve of platforms

(2) Cost criteria (including length of construction period)

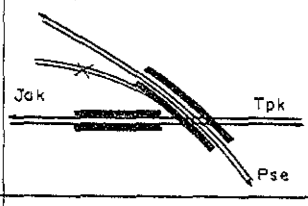
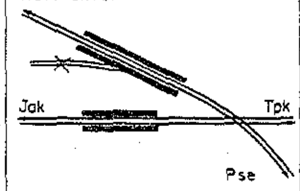
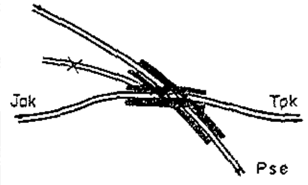
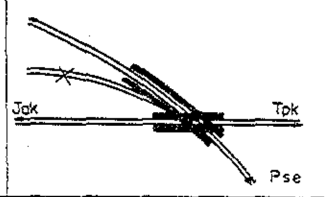
Land aquisition and warehouse removal compensation

Construction works

(3) Impact Criteria

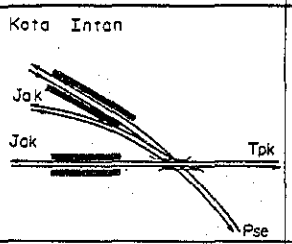
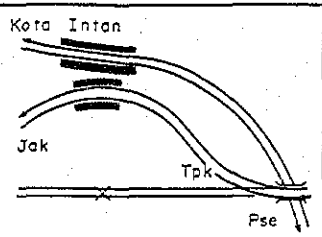
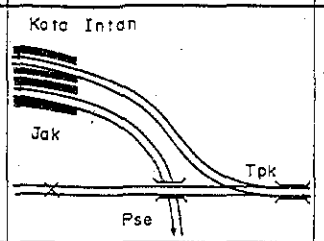
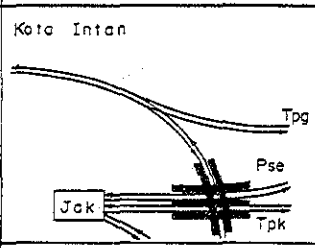
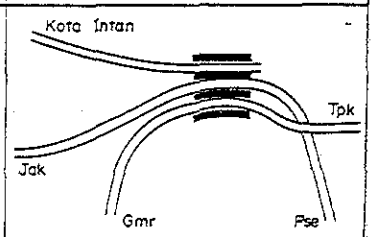
Impact on future plans

Table 3.6 (1) Comparison of Alternatives from Viewpoint of Railway Facility Plan

	Name	P1-1	P1-2	P1-3	P2-1	P2-2
	Sketch					
Planning feature	1. Connection of main lines	Western L. - Eastern L.	Western L. - Eastern L.	Western L. - Eastern L.	Western L. - Eastern L.	Western L. - Eastern L.
	2. Location of the Station	Intersection of Eastern L. and Tanjung Priok L.	Intersection of Eastern L. and Tanjung Priok L.	Intersection of Eastern L. and Tanjung Priok L.	Intersection of Eastern L. and Tanjung Priok L.	Intersection of Eastern L. and Tanjung Priok L.
	3. Corresponding to operation route (refer to chapter 4)	Alternative 1.(2)	Alternative 1.(2)	Alternative 1.(2)	Alternative 1.(2)	Alternative 1.(2)
	4. Route of Eastern L. to Jakarta Kota (long distance trains)	Through Kampung Bandan & present Western L.	Through Kampung Bandan & present Western L.	Through Kampung Bandan & present Western L.	Through Kampung Bandan & present Western L.	Through Kampung Bandan & present Western L.
	5. Curve radius of platform	600 m	Straight	400 m	600 m	600 m
Evaluation	6. Land acquisition	○ Unnecessary	○ Unnecessary	○ Unnecessary	○ Unnecessary	○ Unnecessary
	7. Warehouse removal	○ A little	△ Much	○ A little	○ A little	○ A little
	8. Transfer convenience	○	△ Long transfer distance	△ Long transfer distance	○	○
	9. Easiness of construction works	○	○	○	× Reconstruction of T.P. bridge on another line	× Reconstruction of T.P. bridge on existing line
	10. Construction cost	○	○	○	× Reconstruction of T.P. bridge	× Reconstruction of T.P. bridge
	11. Influence on future plans	○	○	○	○	○
	Remarks					

Notes :
○ No problems
△ With some problems
× With serious problems

Table 3.6(2) Comparison of Alternatives from Viewpoint of Railway Facility Plan

	Name	P3	P4	Q	R	S
	Sketch					
Planning feature	1. Connecting of main lines	Western L. - Eastern L.	Western L. - Eastern L.	Western L. - T. Priok L.	Western L. - Central L.	C —— T
	2. Location of the station	Intersection of Eastern L. and Tanjung Priok L.	Present Kampung Bandang Sig.St	Present Kampung Bandang Sig.St	Intersection of proposed Cengkareng Airport L. and Eastern L. and Tanjung Priok L.	Present Kampung Bandan Sig. St
	3. Corresponding to operation route (refer to chapter 4)	Alternative 1.(2)	Alternative 3	Alternative 4	Alternative 5	Alternative 6
	4. Route of Eastern L. to Jakarta Kota (long distance train)	Present Eastern L.	Through Kpb and Present Western L	Through Kpb and Present Western L	Through Kpb and Present Western L	Through Kpb and Present W.L
	5. Curve radius of platform	400 m	Straight	Straight	Straight	Straight
Evaluation	6. Land acquisition	○ Unnecessary	○ Unnecessary	○ Unnecessary	△ Necessary	○ Unnecessary
	7. Warehouse removal	○ A little	△ Significant	○ A little	○ A little	△ Significant
	8. Transfer convenience Easiness to transfer	△ Long transfer distance	○	○	○	○
	9. Easiness of construction works	△ Turnout facility on curved track	△ Track rearrangement at Kpb during normal train operation	△ Track rearrangement at Kpb during normal train operation	× Construction of a new Station during frequent train operation	△ Track rearrangement at Kpb during normal train operation
	10. Construction cost	○	△ Rearrangement of tracks at Kpb and construction of two connecting lines	△ Rearrangement of tracks at Kpb and construction of two connecting lines	× Construction of elevated Station	× Rearrangement of tracks at Kpb and construction of two connecting lines Construction of viaduct
	11. Influence on future plans	○	× Retrofit of Station facility when the future plan is applied at the location of Jak Depot	× Retrofit of Station facility when the future plan is applied at the location of Jak Depot	× The future plan is limited by the Station facility	× Retrofit of viaduct when the future plan is applied at the location of Jak Depot
	Remarks		New embankment or viaduct construction that connects with T.P. line	New embankment or viaduct construction that connects with T.P. line	A part of Cengkareng A.L. must be constructed Additional over-bridge & track raising at Kota Intan is necessary	New embankment or viaduct construction that connects with Kpb and T, Central elevated Line must be constructed

In these alternative, excluding those with serious problem (marked " ") and/or with curved track which has a radius of 400 m along the platforms, P_{1-1} and P_{1-2} were examined in detail. Consequently, P_{1-1} is considered as the most recommendable, because it requires less removal of warehouses and a shorter passageway for connection the Western-Eastern link line and Tanjung Priok Line (see Table 3.7 and 3.8).

Table 3.7 Comparison of P_{1-1} and P_{1-2}

	Items \ Alternative	Alternative P_{1-1}	Alternative P_{1-2}
Features	1. Connection of main lines	W - E	W - E
	2. Location of station	Intersection of E and T	Intersection of E and T
	3. Corresponding operation route (refer to Chapter 4)	Alternative 1	Alternative 1
	4. Curve radius applied to large portion of platforms	640 m	Straight
Evaluation	5. Land acquisition	○ unnecessary	○ unnecessary
	6. Warehouse removal	○ 2,000 m^2	△ 16,000 m^2
	7. Transfer convenience	○ Transfer distance : 20 m	△ Transfer distance : 50 m
	8. Maximum clearance between platform and rolling stock	○ 18 cm	○ 10 cm
	9. Easiness of construction	○	○
	10. Construction cost	○ 7.1 billion Rp	○ 7.3 billion Rp

Notes: ○ : No problems

△ : Some problems

Table 3.8 Estimated Construction Cost

Investment Items	Estimated Construction Cost (Million Rp)					
	P_{1-1}			P_{1-2}		
	Foreign Portion	Local Portion	Total	Foreign Portion	Local Portion	Total
Civil work	300	330	630	300	330	630
Station facilities	900	680	1,580	930	700	1,630
Track	1,720	250	1,970	1,700	250	1,950
Electrical facilities	220	240	460	220	240	460
Signalling facilities	740	100	840	750	100	850
Telecom. facilities	170	10	180	170	10	180
Compensation for land & houses		20	20		100	100
(Sub total)	4,050	1,630	5,680	4,070	1,730	5,800
Engineering service & Supervision of construction	510	170	680	510	170	680
Contingency	540	240	780	560	250	810
(Sub total)	1,050	410	1,460	1,070	420	1,490
Grand total	5,100	2,040	7,140	5,130	2,150	7,290

Note: Rounding figures of millions to ten millions

Annex 4 Train Operation Plan on theLoop Line

Corresponding Chapter
4.2.3

Annex 4 Train Operation Plan on Loop Line

The most efficient and convenient train operation for passengers should be planned on the loop line. This would be created by the W-E connection.

Two factors are to be considered there:

Satisfying the traffic demand and securing simplicity of train handling at Jatinegara.

1. Satisfying Traffic Demand

(1) The traffic demand forecast shows that link loads on sections around Jatinegara area as shown below:

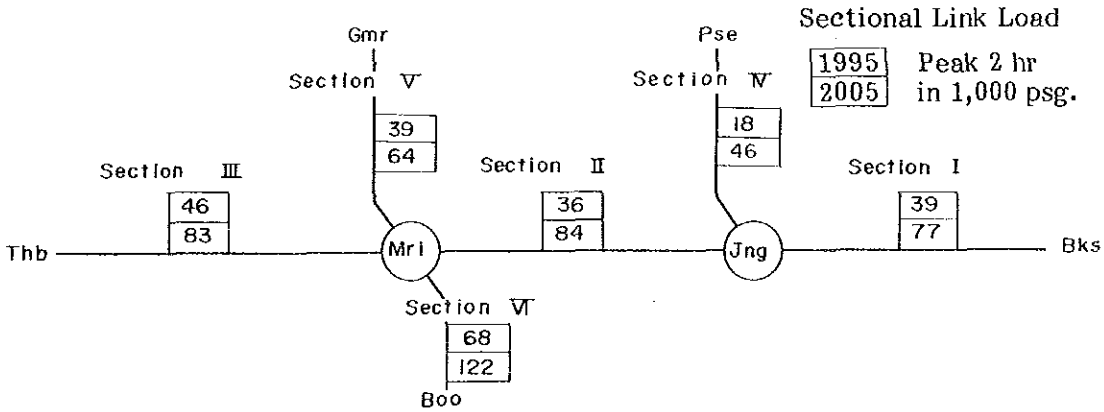


Fig. A 4.3.1 Link Load of Each Section in Terms of Number of Passengers (1,000, 2 ways)

The following can be observed:

a) Link loads are similar in Sections I, II, and III.

b) Link load on the Eastern Line (Section IV) is 1/2 - 3/5 of the load on the Bekasi Line (Section I).

c) Link Load of the Western Line (Section V) is 1/2 - 3/5 of the load on the Central Line (Section VI).

(2) The traffic demand also shows the distribution of the passenger flow of the Bekasi Line from Jatinegara to each section. Supposing the volume of traffic at the entrance of Jatinegara to be 100, distribution over the related sections are as shown below.

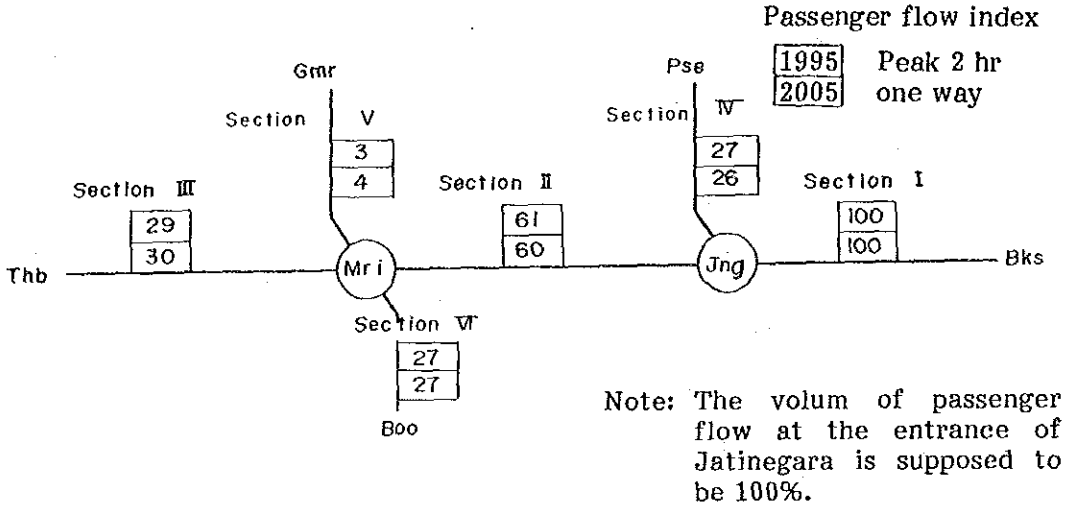


Fig. A 4.3.2 Distribution of Passenger Flow from Jatinegara (Percentage, one way)

It is observed that:

d) Less than 30% of the passengers of the Bekasi Line (Section I) enter the Eastern Line (Section IV).

e) 60% of the passengers of the Bekasi Line (Section I) flow into Section II of the Western Line.

f) Other passengers get off at Jatinegara or proceed to other sections.

(3) Priority for Majority

Convenience for the majority of passengers should prevail in planning of train routes. In the above case, six out of ten trains from the Bekasi Line should be secured for Section II (Manggarai direction) first. Then three trains should enter the Section IV (Pasar Senen direction).

2. Simplicity of Train Handling at Jatinegara

The simplicity of train handling is of primary importance in high-density commuter service. This alone will prevent train accidents and troubles, and keep the normal transportation capacity of the whole network intact.

3. Train Handling Plan at Jatinegara

It is proposed that train route Alternative 1 of this Report (p. 4-11) would best satisfy the two requirements mentioned above.

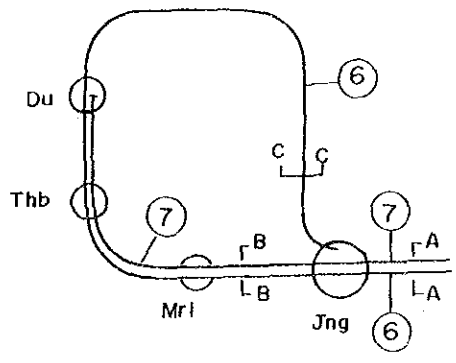
The reasons for this are:

It ensures the simplicity of train handling at Jatinegara, because it has no bifurcation of trains there (Compare it with "Plan B". See subsequent description).

It economizes on the required numbers of railcars (Compare it with "Plan A". See subsequent description).

It is better suited for the link loads of each Section (compare with Plan A).

Two plans (A and B) are compared with Alternative 1 in order to prove the superiority of the proposed train route.



Note: Figures in circles show the numbers given to train route (see p. 4-11)

Fig. A 4.3.3 Train Route "Alternative 1"

(1) Plan A

If all the trains from Bekasi did not bifurcate at Jatinegara, but proceeded northward onto the Eastern Line, the train routes would be as shown below.

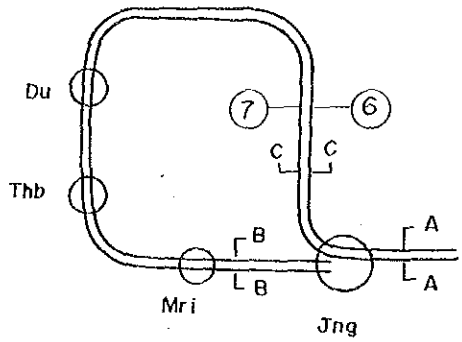


Fig. A 4.3.4 Train Route "Plan A"

Plan A would be advantageous in regards to simplicity of train handling at Jatinegara, but the following disadvantages would exist:

a) The number of trains at Section C-C would be superfluous (almost twice as many as are required).

b) More railcars would be required than in Alternative 1, because train route (7) shall be samely operated as train route (6).

c) Passengers from Bekasi to Manggarai (larger in number than those from Bekasi to Pasar Senen direction) would have to change trains at Jatinegara.

(2) Plan B

Should trains from Bekasi bifurcate at Jatinegara, an additional train route would have to be setup between Jatinegara and Duri; the link load at Section A-A being similar to the demand at B-B (see 1, (1) a)),

with the number of of trains becoming insufficient after the train bifurcation at Jatinegara. The train routes in this plan would be as shown below.

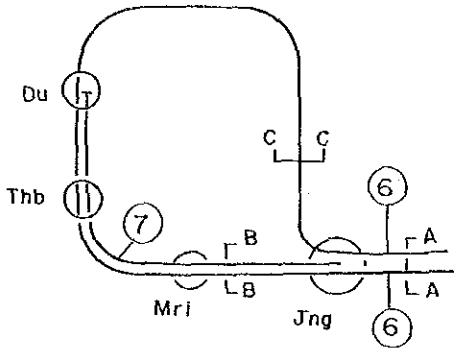


Fig. A 4.3.5 Train Route "Plan B"

Plan B would be advantageous in that it would solve traffic demand, and economize on the required number of railcars; but the disadvantage would be the loss simplicity of train handling at Jatinegara.

Every morning during rush hour one train would be switched to the Eastern Line, and/or to the Western Line, and a third would have to be prepared and set up at an adequate platform in order to start for the Duri direction — train operation would be too complicated.

4. Track Layout

Plans A and B are given below as the schematic track layouts of Jatinegara Station as substitutes for Alternative 1 of this Report the same train route as in the Master Plan. Figures in the squares indicate train headway (minutes), and the thick lines indicate the passage of commuter trains.

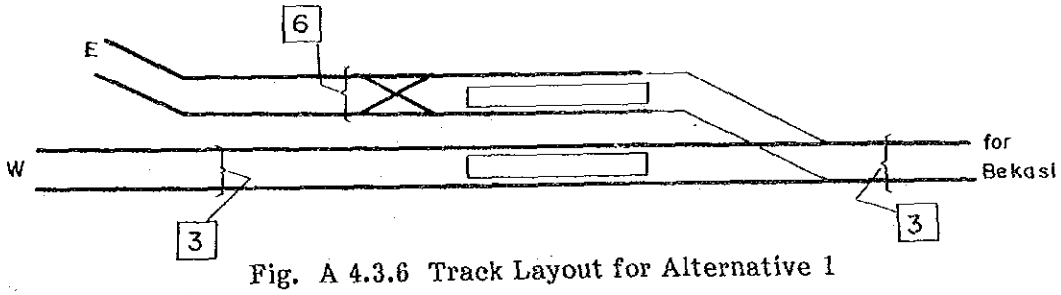


Fig. A 4.3.6 Track Layout for Alternative 1

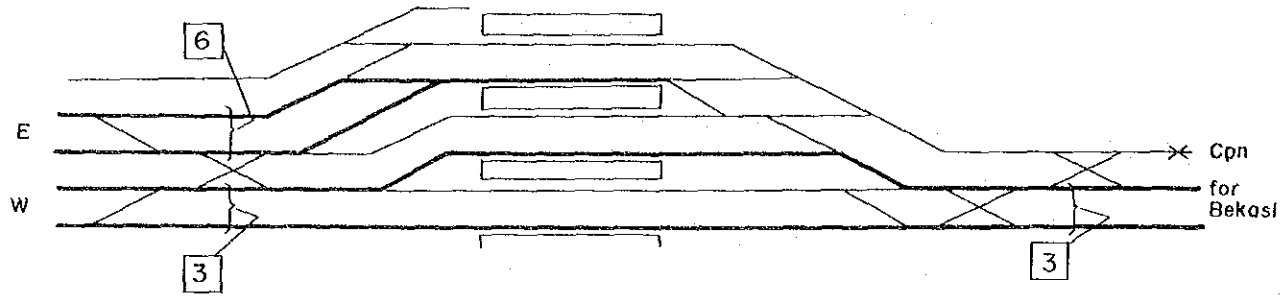


Fig. A 4.3.7 Track Layout (indentical with Alternative 1) of Master Plan

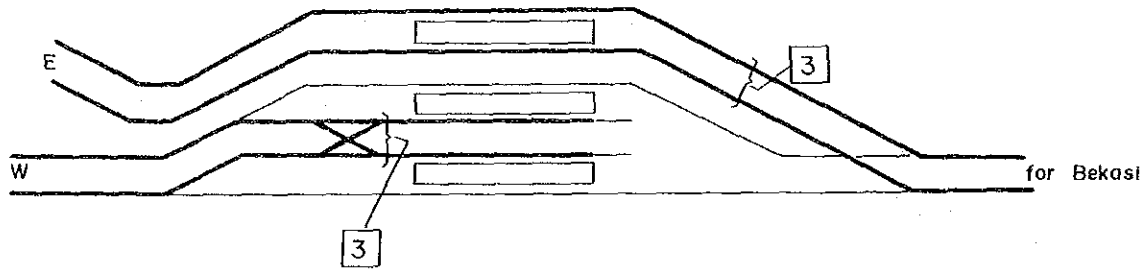


Fig. A 4.3.8 Track Layout of Plan A

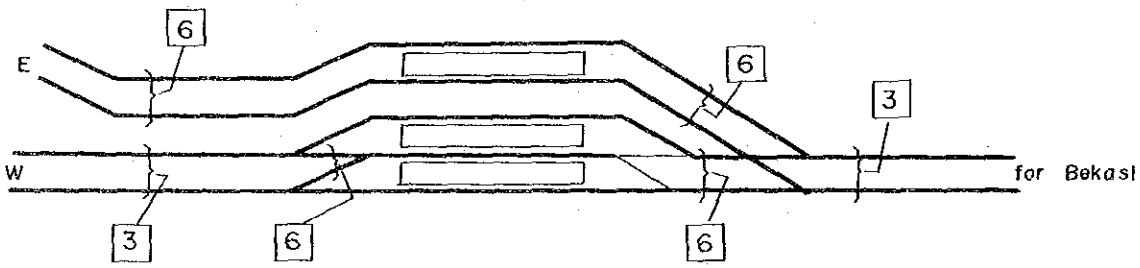


Fig. A 4.3.9 Track Layout of Plan B

Annex 5 "Passenger·Times "Measuring Convenience

Corresponding Chapter
4.2.3

Annex 5 "Passenger·Times" Measuring Convenience

To evaluate the passenger convenience of the railway network, "Passenger·times" (Number of Train Changes x Passenger Volume) is used as a scale of measurement. The smaller the passenger·times, the greater the passenger convenience.

Where there are plural number of routes between the origin and destination, a detour is the route with the minimum number of train changes. In this case, shorter routes with more changes are also indicated in parenthesis in each Alternatives.

The following table indicates passenger·times of train change (unit : 1,000) by Train Route Alternatives.

Table 5.1 Passenger·Times of Change Train

(Unit 1,000)

	Alt.-1	Alt.-2	Alt.-3	Alt.-4	Alt.-5	Alt.-5B	Alt.-6
Passenger· Times	543	797	589	638	821	810	829
Passenger· Times, avoiding detour	619	819	635	711	828	830	839

Alternative 1

	Tangerang	Kebayoran	Sudimara	Serpong	Klender Baru	Bekasi	Manggarai	Pasar Minggu	Depok	Bogor	Jakarta Kota	Gambir	Cikini	Kampung Bandan	Kota Intan	Duri	Tanah Abang	Rajawali	Kemayoran	Pasar Senen	Jatinegara	Ancol	Tg. Priok
Tangerang		8	0	0	5	2	4	8	0	2	6	0	0	1	8	0	6	2	1	2	4	4	8
Kebayoran	2		0	0	14	5	7	12	8	6	0	0	12	1	6	3	0	4	5	0	15	6	16
Sudimara	2	0		0	6	0	4	2	2	0	0	0	4	0	1	1	0	1	1	0	4	2	8
Serpong	2	0	0		0	0	0	0	0	0	0	0	0	0	78	0	0	0	1	0	4	2	8
Klender Baru	1	1	1	1		0	0	18	5	2	3	9	0	(1) 0	0	0	0	(1) 0	(11) 0	(9) 0	0	(6) 3	(20) 10
Bekasi	1	1	1	1	0		0	4	1	1	2	3	0	(1) 0	0	0	0	(1) 0	(6) 0	(6) 0	0	4	14
Manggarai	1	1	1	1	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Pasar Minggu	1	1	1	1	1	1	0		0	0	0	0	0	0	2	1	6	(2) 1	(10) 5	(6) 2	11	2	9
Depok	1	1	1	1	1	1	0	0		0	0	0	0	0	2	1	2	0	(8) 4	(4) 2	7	2	4
Bogor	2	2	2	2	1	1	0	0	0		0	0	0	0	3	1	1	0	(10) 5	(4) 2	5	4	4
Jakarta Kota	2	2	2	2	1	1	0	0	0	0		0	0	0	2	0	0	0	1	2	4	0	0
Gambir	2	2	2	2	1	1	0	0	0	0	0		0	0	0	0	0	0	0	0	3	0	0
Cikini	2	2	2	2	1	1	0	0	0	0	0	0		0	0	0	1	0	0	0	0	0	0
Kampung Bandan	1	1	1	1	1	1	1	1	1	1	0	1	1		0	0	0	0	0	0	0	0	0
Kota Intan	1	1	1	1	0	0	0	1	1	1	1	1	1	0		0	0	0	0	0	0	2	19
Duri	0	1	1	1	0	0	0	0	0	1	1	(2) 1	1	1	0		0	0	0	0	0	1	3
Tanah Abang	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	0		0	0	0	0	1	2
Rajawali	1	1	1	1	1	(1) 0	(2) 1	(2) 1	(2) 1	1	1	2	2	0	0	0	0		0	0	0	0	0
Kemayoran	1	1	1	1	1	1	1	(2) 1	(2) 1	(2) 1	1	2	2	0	0	0	0	0		0	0	0	0
Pasar Senen	1	1	1	1	1	1	1	2	2	2	1	2	2	0	0	0	0	0	0		0	0	0
Jatinegara	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0		5	13
Ancol	2	2	2	2	(2) 1	(2) 1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1		0
Tg. Priok	2	2	2	2	(2) 1	(2) 1	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	0	

The Number of Times Required to Change Trains weighted by Passenger Volume

The Number of Times Required to Change Trains

Total number of train changes with weight is 543, but if the detour is avoided, 619 (figures in parenthesis).

Alternative 2

	Tangerang	Kebayoran	Sudimara	Serpong	Klender Baru	Bekasi	Manggarai	Pasar Minggu	Depok	Bogor	Jakarta Kota	Gambir	Cikini	Kampung Bandan	Kota Intan	Duri	Tanah Abang	Rajawali	Kemayoran	Pasar Senen	Jatinegara	Ancol	Tg. Priok
Tangerang		16	0	0	5	2	4	8	0	2	6	0	0	1	8	0	8	2	1	2	4	4	8
Kebayoran	2		0	0	14	5	7	12	8	6	0	0	12	1	6	3	0	4	5	0	15	6	16
Sudimara	2	0		0	6	0	4	2	2	0	0	0	4	0	1	1	0	1	1	0	4	2	8
Serpong	2	0	0		0	0	0	0	0	0	0	0	0	0	28	0	0	0	1	0	4	2	8
Klender Baru	1	1	1	1		0	0	18	5	2	6	9	0	1	0	0	0	0	0 (11)	0 (9)	0	6	20
Bekasi	1	1	1	1	0		0	4	1	1	2 (4)	3	0	0	0	0	0	1	6	6	0	4	10
Manggarai	1	1	1	1	0	0		0	0	0	157	0	0	0	0	0	0	0	0	0	0	0	1
Pasar Minggu	2	2	2	2	1	1	0		0	0	8	0	0	0	0	1	6	1	10	6	11	2	9
Depok	2	2	2	2	1	1	0	0		0	37	0	0	0	0	1	3	0	8	4	9	2	4
Bogor	2	2	2	2	1	1	0	0	0		8	0	0	0	0	1	1	0	10	4	5	4	4
Jakarta Kota	2	2	2	2	2	1 (2)	1	1	1	1		0	0	0	2	0	0	0	1	2	4	0	0
Gambir	2	2	2	2	1	1	0	0	0	0	1		0	0	0	0	0	0	0	0	3	0	0
Cikini	2	2	2	2	1	1	0	0	0	0	1	0		0	0	0	1	0	0	0	0	0	0
Kampung Bandan	1	1	1	1	1	0	0 (1)	1	1	1	0	1	0		0	0	0	0	0	0	0	0	0
Kota Intan1	1	1	1	1	0	0	0	0	0	0	1	0	1	0		0	0	0	0	0	0	3	19
Duri	0	1	1	1	0	0	0	1	1	1	1	1	1	0	0		0	0	0	0	0	1	3
Tanah Abang	1	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0		0	0	0	0	1	2
Rajawali	1	1	1	1	0	1	0 (1)	1	1 (2)	1 (2)	1	2	1 (2)	0	0	0	0		0	0	0	1	9
Kemayoran	1	1	1	1	0 (1)	1	1	2	2	2	1	2	2	0	0	0	0	0		0	0	1	5
Pasar Senen	1	1	1	1	0 (1)	1	1	2	2	2	1	2	2	0	0	0 (1)	0	0	0		0	4	17
Jatinegara	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0		5	13
Ancol	2	2	2	2	2	2	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1		0
Tg. Priok	2	2	2	2	2	2	1	1	1	1	0	1	1	0	1	1	1	1	1	1	1	0	

The Number of Times Required to Change Trains weighted by Passenger Volume

The Number of Times Required to Change Trains

Total number of train changes with weight is 797, but if the detour is avoided, 819 (figures in parenthesis).

Alternative 3

	Tangerang	Kebayoran	Sudimara	Serpong	Klender Baru	Bekasi	Manggarai	Pasar Minggu	Depok	Bogor	Jakarta Kota	Gambir	Cikini	Kampung Bandan	Kota Intan	Duri	Tanah Abang	Rajawali	Kemayoran	Pasar Senen	Jatinegara	Ancol	Tg. Priok
Tangerang		16	0	0	5	2	4	4	0	2	6	0	0	1	8	0	6	2	1	2	4	4	8
Kebayoran	1		0	0	14	5	7	6	4	6	0	0	0	1	6	3	0	4	5	0	15	6	16
Sudimara	2	0		0	6	0	4	1	1	0	0	0	4	0	1	1	0	1	1	0	4	2	8
Serpong	2	0	0		0	0	0	0	0	0	0	0	0	0	78	0	2	0	1	0	4	2	8
Klender Baru	1	1	1	1		0	0	18	5	2	3	9	0	1	0	0	0	1	11	9	0	(6) 3	(20) 10
Bekasi	1	1	1	1	0		0	4	1	1	2	3	0	1	0	0	0	(1) 0	6	6	0	(4) 2	(20) 5
Manggarai	1	1	1	1	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Pasar Minggu	2	2	2	2	1	1	0		0	0	0	0	0	0	2	0	0	(2) 1	(10) 5	6	11	2	9
Depok	2	2	2	2	1	1	0	0		0	0	0	0	0	2	0	0	0	(8) 4	4	9	2	4
Bogor	2	2	2	2	1	1	0	0	0		0	0	0	0	3	1	1	0	(10) 5	4	5	4	4
Jakarta Kota	2	2	2	2	1	1	0	0	0	0		0	0	0	2	0	0	0	1	2	4	0	0
Gambir	2	2	2	2	1	1	0	0	0	0	0		0	0	0	0	0	0	0	0	3	0	0
Cikini	2	2	2	2	1	1	0	0	0	0	0	0		0	0	0	1	0	0	0	0	0	0
Kampung Bandan	1	1	1	1	(1) 0	(1) 0	(2) 1	1	1	1	0	1	1		0	0	0	0	0	0	0	0	0
Kota Intan	1	1	1	1	0	0	0	1	1	1	1	0	0	0		0	0	0	0	0	0	3	19
Duri	0	1	1	1	0	0	0	1	1	1	1	1	1	0	0		0	0	0	0	0	1	3
Tanah Abang	1	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0		0	0	0	0	1	2
Rajawali	1	1	1	1	(1) 0	(1) 0	1	(2) 1	(2) 1	(2) 1	1	2	2	0	0	0	0		0	0	0	1	9
Kemayoran	1	1	1	1	(1) 0	(1) 0	1	(2) 1	(2) 1	(2) 1	1	2	2	0	0	0	0	0		0	0	1	5
Pasar Senen	1	1	1	1	(1) 0	(1) 0	1	(2) 1	(2) 1	(2) 1	1	2	2	0	0	0	0	0	0		0	4	17
Jatinegara	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0		5	13
Ancol	2	2	2	2	(2) 1	1	1	1	1	1	0	1	1	0	1	1	1	0	0	0	1		0
Tg. Priok	2	2	2	2	(2) 1	2	1	1	1	1	0	1	1	0	1	1	1	0	0	0	1	0	

The Number of Times Required to Change Trains weighted by Passenger Volume

The Number of Times Required to Change Trains

Total number of train changes with weight is 589, but if the detour is avoided, 635 (figures in parenthesis).

Alternative 4

	Tangerang	Kebayoran	Sudimara	Serpong	Klender Baru	Bekasi	Manggarai	Pasar Minggu	Depok	Bogor	Jakarta Kota	Gambir	Cikini	Kampung Bandan	Kota Intan	Duri	Tanah Abang	Rajawali	Kemayoran	Pasar Senen	Jatinegara	Ancol	Tg. Priok
Tangerang		16	0	0	5	2	4	8	0	2	6	0	0	1	1	0	6	4	2	4	4	4	8
Kebayoran	2		0	0	14	5	7	12	6	6	0	0	12	1	6	3	0	8	10	0	15	6	16
Sudimara	2	0		0	6	0	4	2	2	0	0	0	4	0	1	1	4	2	2	0	4	2	8
Serpong	2	0	0		0	0	0	0	0	0	0	0	0	0	78	0	0	0	2	0	4	2	8
Klender Baru	1	1	1	1		0	0	18	5	2	3	9	0	1	(12) 0	0	0	1	11	9	0	6	20
Bekasi	1	1	1	1	0		0	4	1	1	2	3	0	1	(6) 0	0	0	1	6	6	0	4	10
Manggarai	1	1	1	1	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
Pasar Minggu	2	2	2	2	1	1	0		0	0	0	0	0	0	2	1	6	(2) 1	(10) 5	(6) 3	11	(6) 4	(27) 18
Depok	2	2	2	2	1	1	0	0		0	0	0	0	0	2	1	3	0	(8) 4	(4) 2	9	(6) 4	(12) 8
Bogor	2	2	2	2	1	1	0	0	0		0	0	0	0	3	1	1	0	(10) 5	(4) 2	5	(12) 8	(12) 8
Jakarta Kota	2	2	2	2	1	1	0	0	0	0		0	0	0	2	0	0	0	0	0	0	3	10
Gambir	2	2	2	2	1	1	0	0	0	0	0		0	0	0	0	0	0	0	0	3	0	0
Cikini	2	2	2	2	1	1	0	0	0	0	0	0		0	0	0	1	0	0	0	0	0	0
Kampung Bandan	1	1	1	1	1	1	1	1	1	1	0	1	1		0	0	0	0	0	0	0	0	0
Kota Intan	1	1	1	1	(2) 0	(2) 0	0	1	1	1	1	2	2	0		0	0	3	2	2	(8) 0	0	0
Duri	0	1	1	1	0	0	0	1	1	1	1	2	1	0	0		0	1	0	1	0	1	3
Tanah Abang	1	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0		0	0	0	0	1	2
Rajawali	2	2	2	2	1	1	1	(2) 1	(2) 1	(2) 1	0	1	(2) 1	0	1	1	1		0	0	0	0	0
Kemayoran	2	2	2	2	1	1	1	(2) 1	(2) 1	(2) 1	0	1	1	0	1	1	1	0		0	0	0	0
Pasar Senen	2	2	2	2	1	1	1	(2) 1	(2) 1	(2) 1	0	1	2	0	1	1	1	0	0		0	0	0
Jatinegara	1	1	1	1	0	0	0	1	1	1	0	1	1	0	(1) 0	0	0	0	0	0		5	13
Ancol	2	2	2	2	2	2	2	(3) 2	(3) 2	(3) 2	1	2	2	0	0	1	1	0	0	0	1		0
Tg. Priok	2	2	2	2	2	2	2	(3) 2	(3) 2	(3) 2	1	2	2	0	0	1	1	0	0	0	1	0	

The Number of Times Required to Change Trains weighted by Passenger Volume

The Number of Times Required to Change Trains

Total number of train changes with weight is 638, but if the detour is avoided, 711 (figures in parenthesis).

Alternative 5

	Tangerang	Kebayoran	Sudimara	Serpong	Klender Baru	Bekasi	Manggarai	Pasar Minggu	Depok	Bogor	Jakarta Kota	Gambir	Cikini	Kampung Bandan	Kota Intan	Duri	Tanah Abang	Rajawali	Kemayoran	Pasar Senen	Jatinegara	Ancol	Tg. Priok
Tangerang		16	0	0	5	2	4	4	0	2	3	0	0	1	8	0	6	2	1	2	4	4	8
Kebayoran	2		28	2	14	5	7	6	4	6	0	0	6	1	6	3	0	4	5	0	15	6	16
Sudimara	2	2		0	6	0	4	1	1	0	0	0	2	0	1	1	0	1	1	0	4	2	8
Serpong	2	2	2		0	0	0	0	0	0	0	0	0	0	78	0	0	0	1	0	4	2	8
Klender Baru	1	1	1	1		0	0	18	5	2	(6) 3	9	0	1	0	0	0	1	11	9	0	6	20
Bekasi	1	1	1	1	0		0	4	1	1	(4) 2	3	0	1	0	0	0	1	6	7	0	4	10
Manggarai	1	1	1	1	0	0		0	0	0	157	0	0	0	0	0	0	0	0	0	0	0	1
Pasar Minggu	1	1	1	1	1	1	0		0	0	8	0	0	0	0	0	0	2	10	6	11	2	9
Depok	1	1	1	1	1	1	0	0		0	37	0	0	0	0	0	0	0	8	4	9	2	4
Bogor	2	2	2	2	1	1	0	0	0		8	0	0	0	0	(1) 0	(1) 0	0	10	4	5	4	4
Jakarta Kota	1	1	1	1	(2) 1	(2) 1	1	1	1	1		0	0	0	2	0	0	0	1	2	4	0	0
Gambir	1	1	1	1	1	1	0	0	0	0	1		0	0	0	0	0	0	0	0	3	0	0
Cikini	1	1	1	1	1	1	0	0	0	0	1	0		0	0	0	0	0	0	0	0	0	0
Kampung Bandan	1	1	1	1	1	1	1	1	1	1	0	1	1		0	0	0	0	0	0	0	0	0
Kota Intan	1	1	1	1	0	0	0	0	0	0	1	0	0	0		0	0	0	0	0	0	3	19
Duri	0	1	1	1	0	0	0	0	0	(1) 0	1	0	0	0	0		0	0	0	0	0	1	3
Tanah Abang	1	0	0	0	0	0	0	0	0	(1) 0	1	(1) 0	(1) 0	0	0	0		0	0	0	0	1	2
Rajawali	1	1	1	1	1	1	(2) 0	2	(2) 1	2	1	2	2	0	0	0	0		0	0	0	0	0
Kemayoran	1	1	1	1	1	1	1	2	2	2	1	2	2	0	0	0	0	0		0	0	0	0
Pasar Senen	1	1	1	1	1	1	1	2	2	2	1	2	2	0	0	0	1	0	0		0	0	2
Jatinegara	1	1	1	1	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0		5	13
Ancol	2	2	2	2	2	2	1	1	1	1	0	1	1	0	1	1	1	0	0	0	1		0
Tg. Priok	2	2	2	2	2	2	1	1	1	1	0	1	1	0	1	1	1	0	0	0	1	0	

The Number of Times Required to Change Trains weighted by Passenger Volume

The Number of Times Required to Change Trains

Total number of train changes with weight is 821, but if the detour is avoided, 828 (figures in parenthesis).

Alternative 5B

	Tangerang	Kebayoran	Sudimara	Serpong	Klender Baru	Bekasi	Manggarai	Pasar Minggu	Depok	Bogor	Jakarta Kota	Gambir	Cikini	Kampung Bandan	Kota Intan	Duri	Tanah Abang	Rajawali	Kemayoran	Pasar Senen	Jatinegara	Ancol	Tg. Priok
Tangerang		16	0	0	5	2	4	4	0	2	6	0	0		8	0	6	4	2	4	4	4	8
Kebayoran	2		0	0	14	5	7	12	8	6	0	0	(12) 6		6	3	0	8	10	0	15	6	16
Sudimara	2	0		0	6	0	4	2	2	0	0	0	(4) 2		0	1	0	2	2	0	4	2	8
Serpong	2	0	0		0	0	0	0	0	0	0	0	0		78	0	0	0	2	0	4	1	4
Klender Baru	1	1	1	1		0	0	18	5	2	3	9	0		(6) 0	0	0	1	11	9	0	6	20
Bekasi	1	1	1	1	0		0	4	1	1	2	3	0		(3) 0	0	0	1	6	6	0	4	10
Manggarai	1	1	1	1	0	0		0	0	0	157	0	0		0	0	0	0	0	0	0	0	1
Pasar Minggu	1	2	2	2	1	1	0		0	0	8	0	0		0	(1) 0	6	1	5	3	11	2	9
Depok	2	2	2	2	1	1	0	0		0	37	0	0		0	(1) 0	3	0	4	2	9	2	4
Bogor	2	2	2	2	1	1	0	0	0		8	0	0		0	(1) 0	1	0	5	2	5	4	4
Jakarta Kota	2	2	2	2	1	1	1	1	1	1		0	0		2	0	0	0	0	0	0	0	0
Gambir	1	1	1	1	1	1	0	0	0	0	1		0		0	0	0	0	0	0	3	0	0
Cikini	(2) 1	(2) 1	(2) 1	(2) 1	1	1	0	0	0	0	1	0			0	0	1	0	0	0	0	0	0
Kampung Bandan																							
Kota Intan	1	1	1	1	(1) 0	(1) 0	0	0	0	0	1	0	0			0	0	3	2	2	8	3	19
Duri	0	1	1	1	0	0	0	(1) 0	(1) 0	(1) 0	1	0	(1) 0		0		0	1	0	1	0	1	3
Tanah Abang	1	0	0	0	0	0	0	1	1	1	1	1	1		0	0		0	0	0	0	1	2
Rajawali	2	2	2	2	1	1	1	1	1	1	0	1	1		1	1	1		0	0	0	0	0
Kemayoran	2	2	2	2	1	1	1	1	1	1	0	1	1		1	1	1	0		0	0	0	0
Pasar Senen	2	2	2	2	1	1	1	1	1	1	0	1	1		1	1	1	0	0		0	0	0
Jatinegara	1	1	1	1	0	0	0	1	1	1	0	1	1		1	0	0	0	0	0		5	13
Ancol	2	2	2	2	2	2	1	1	1	1	0	1	1		1	1	1	0	0	0	1		0
Tg. Priok	2	2	2	2	2	2	1	1	1	1	0	1	1		1	1	1	0	0	0	1	0	

The Number of Times Required to Change Trains weighted by Passenger Volume

The Number of Times Required to Change Trains

Total number of train changes with weight is 810, but if the detour is avoided, 830 (figures in parenthesis).

Alternative 6

	Tangerang	Kebayoran	Sudimara	Serpong	Klender Baru	Bekasi	Manggarai	Pasar Minggu	Depok	Bogor	Jakarta Kota	Gambir	Cikini	Kampung Bandan	Kota Intan	Duri	Tanah Abang	Rajawali	Kemayoran	Pasar Senen	Jatinegara	Ancol	Tg. Priok
Tangerang		16	0	0	5	2	4	8	0	2	6	0	0	1	6	0	6	4	2	4	4	4	8
Kebayoran	2		0	0	14	5	7	12	8	6	0	0	12	1	6	3	0	8	10	0	15	6	16
Sudimara	2	0		0	6	0	4	2	2	0	0	0	4	0	1	1	0	2	2	0	4	2	8
Serpong	2	0	0		0	0	0	0	0	0	0	0	0	0	78	0	0	0	2	0	4	2	8
Klender Baru	1	1	1	1		0	0	18	5	2	3	9	0	(1) 0	0	0	0	1	11	9	0	6	20
Bekasi	1	1	1	1	0		0	4	1	1	2	3	0	(1) 0	0	0	0	1	6	6	0	4	16
Manggarai	1	1	1	1	0	0		0	0	157	0	0	0	0	0	0	0	0	0	0	0	0	0
Pasar Minggu	2	2	2	2	1	1	0		0	0	8	0	0	0	2	1	6	1	5	6	11	0	0
Depok	2	2	2	2	1	1	0	0		0	37	0	0	0	2	1	3	0	4	4	9	0	0
Bogor	2	2	2	2	1	1	0	0	0		8	0	0	0	3	1	1	0	5	4	5	0	0
Jakarta Kota	2	2	2	2	1	1	1	1	1	1		0	0	0	2	0	0	0	0	0	0	3	10
Gambir	2	2	2	2	1	1	0	0	0	0	1		0	0	0	0	0	0	0	0	3	0	0
Cikini	2	2	2	2	1	1	0	0	0	0	1	0		0	0	0	1	0	0	0	0	0	0
Kampung Bandan	1	1	1	1	(1) 0	(1) 0	0	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0
Kota Intan	1	1	1	1	0	0	0	1	1	1	1	1	1	0		0	0	3	2	2	(8) 0	3	19
Duri	0	1	1	1	0	0	0	1	1	1	1	1	1	0	0		0	1	0	1	3	1	3
Tanah Abang	1	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0		0	0	0	0	1	2
Rajawali	2	2	2	2	1	1	1	1	1	1	0	1	1	0	1	1	1		0	0	0	0	0
Kemayoran	2	2	2	2	1	1	1	1	1	1	0	1	1	0	1	1	1	0		0	0	0	0
Pasar Senen	2	2	2	2	1	1	1	2	2	2	0	1	1	0	1	1	1	0	0		0	0	0
Jatinegara	1	1	1	1	0	0	0	1	1	1	0	1	1	0	(1) 0	1	0	0	0	0		5	13
Ancol	2	2	2	2	2	2	0	0	0	0	1	0	0	0	1	1	1	0	0	0	1		0
Tg. Priok	2	2	2	2	2	2	0	0	0	0	1	0	0	0	1	1	1	0	0	0	1	0	

The Number of Times Required to Change Trains weighted by Passenger Volume

The Number of Times Required to Change Trains

Total number of train changes with weight is 829, but if the detour is avoided, 839 (figures in parenthesis).

Annex 6 Topography/Geology/Hydrology Around the Kampung Bandan Station

Corresponding Chapter
5.1.1

Annex 6 Topography/Geology/Hydrology around Kampung Bandan Station Area

(1) General

This section describes the topographical, geological, and hydrological studies needed for designing the station facilities, as well as other facilities to be constructed in the proposed area.

Topographical investigations of the proposed area were made by the Study Team in the field survey. As to geological information and data, the Team used the results of previous reports submitted by JICA[1]. The hydrological data and information were obtained mainly from the Master Plan of the concerned Ministry.[2]

(2) Topography

The Plain of Batavia surrounds Jakarta City, is about 40 km wide, and extends from Serang and Rankasbitung in Bantan to Cirebon. The plain consists of alluvial river deposits and lahars (mud flows) from volcanoes in the hinterlands, with occasional exposures of slightly folded marine tertiary sediments.

The Project site is located on an estuary of the Ciliwung River, which has formed a large delta plain, and is surrounded with rivers and canals (Ciliwung, Ancol, Gunung Sahari) on three sides.

The ground in this area is nearly flat and is extremely low with an altitude of 1.6 m.[3]

Note: 1) "Feasibility Study on Jakarta Harbour Road Project" (Nov. 1981, JICA)

"Feasibility Study for Track Elevation of Central Line" (Mar. 1982, JICA)

"New Railway Line for Cengkareng Airport Construction Project" (Feb. 1984, JICA)

2) "Master Plan for Drainage and Flood Control of Jakarta" (Dec. 1973, Ministry of Public Works and Electric Power)

3) DKI result of P.P.137 (Dinas Pemetaan Pengukuran Tanah DKI Jakarta)

Furthermore, in the area of this delta, the ground has been continuously subsiding due to the lowering of the underground water level.

(3) Geology

(a) Geological Characteristics

The outline of geological stratification in the Project area is shown in Table 6.1.

Table 6.1 The Geological Stratification

Geological Period		Stratum	Description
Quaternary	Holocene	Alluvium	Loose sediments composed principally of cohesive soil forming the delta.
	Pleistocene	Diluvium	Volcanic ash forming the diluvial plateau in the south which is lateritized to a substantial depth.
Neogene	Pliocene	Genten Formation	Basement rock, alternation of thin sandstone and mudstone layers. The upper portion of these alternate layers is weathered and becomes soft.

The alluvium sediments consist of non-concrete sandy soil, clayey soil, and detrital materials that have eroded to form a coastal plain, delta, swampy areas, and natural levees.

The diluvium sediments consist of volcanic ash soil and have formed a hilly area in the southern district, which has been laterized by weathering.

The Genten Formation consists of fine-grained tuffaceous sandstone, which is interspersed with coarse-grained layers, as well as with tuff clay which is used as fill material. Tuff clay has a fair bearing capacity.

(b) Soil Condition

Detailed soil surveys, including boring and laboratory tests, were not carried out in this Study. Consequently, the soil conditions of the Project area are to be assumed and evaluated with the results of other studies conducted in this area (refer to Note 1).

Based on these studies, the results of boring in the Project area are shown in Fig. 6.1.

The soil conditions derived from these results are summarized as follow:

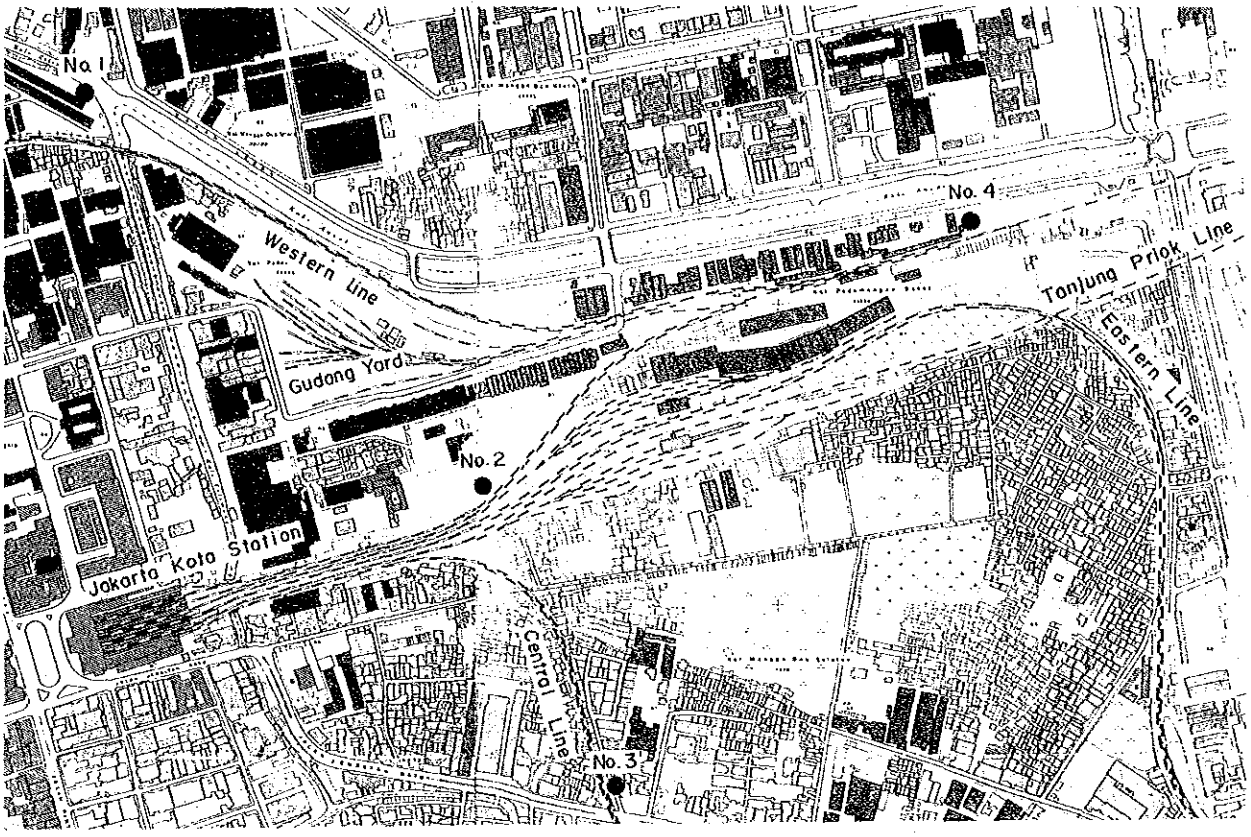
The Project area is located in a delta formed by deposits transported by the flow of the Ciliwung River and filled with fine-grained soil such as clay and silt.

The alluvium consists of river sediments containing organic materials (detrital material eroded) and shells, and covered by blue-grayish marine deposits. The depth of the layer is approximately 10 to 20 meters.

It was shown that such alluvium layers with N-values (standard penetration test) of less than 5 will cause consolidation lasting long periods when weights greater than that of soil weight itself were applied.

(c) Technical Aspects

In the Project area, station facilities such as a station building, platforms, and passageways will be constructed for the new station. Some heavy structures will require piles for their foundations because of the unreliable soil condition therein. The piles will be driven down to the diluvium layer, which has an N-value of more than 30.



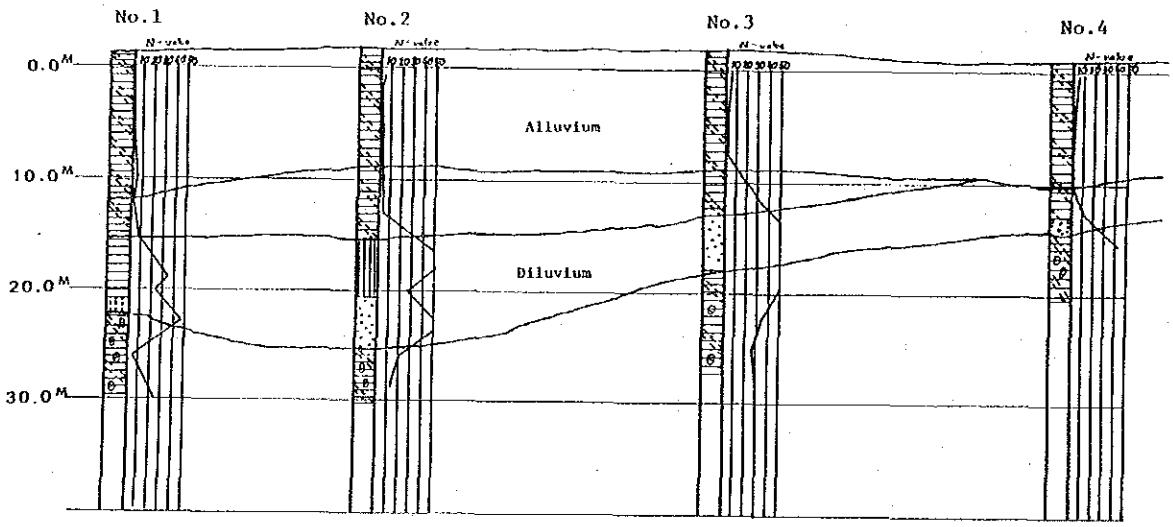


Fig. 6.1 Geological Profile

Legend:
- Silty clay
- Clay stone
- Sand
- Silty clay with shell frements
- Clay

(4) Hydrology

(a) Flooding Problems

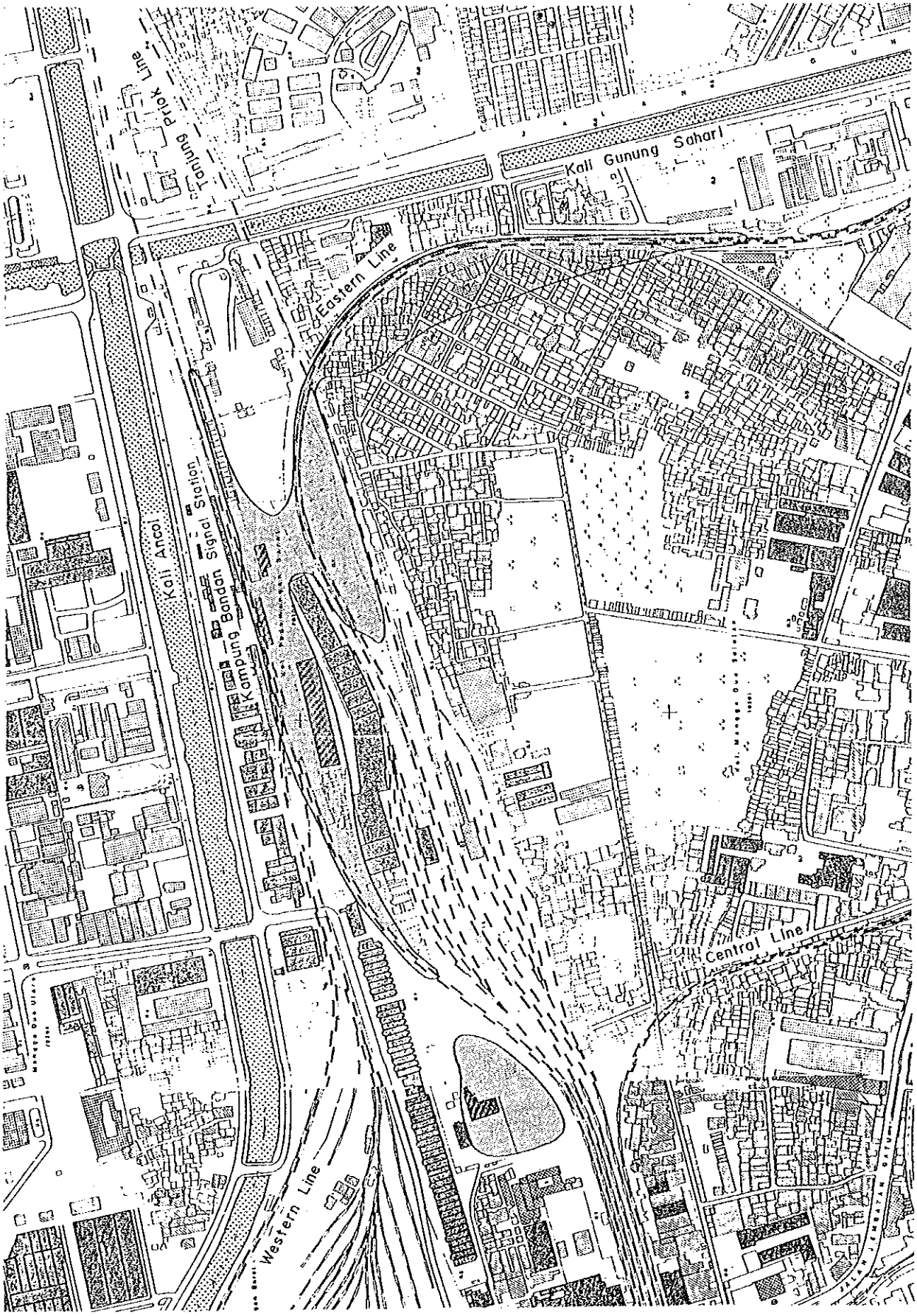
According to statistics, a flood occurs once every two years with rainfall exceeding 115 mm per day. The principal reasons for this are:

1) the discharge capacity of the rivers is small compared with the size of the catchment area and the rainfall volume;
2) the river slope is too gradual and the rivers meander; and,
3) each river is affected by tidal movements at the estuary. Furthermore, a large part of the area in Jakarata, is prone to flooding since it is quite low when compared with sea level, making minimum drainage during high tide impossible.

The Project area, 1.6 m height above sea level, has seen inundations this year as well as in the past. (see Fig. 6.2) The tracks in the area were inundated 40 cm above top of the rail.

In order to control the frequent floods in Jakarta City, the Master Plan proposed such countermeasures as promoting the construction of two flood canals, new construction of other diversion canals, rehabilitation of existing open canals, major evacuation drain construction, and raising the lowest parts of the city. (Refer to Note 2)

These countermeasures, however, have not yet been achieved and the progress of such work is insufficient.



Legend: Inundated Area

Fig. 6.2 Inundation Area

(b) Hydrologic Data

1) Climate

For reference, a brief description of the climate of Indonesia and of Jakarta is given below.

The climate of Indonesia is tropical. There are two seasons: the rainy season (November through March) and the dry season (April through September), with variations in different districts.

Jakarta has an annual average temperature of 27°C with little monthly fluctuation, but greater hourly fluctuation can be observed (see Table 6.2).

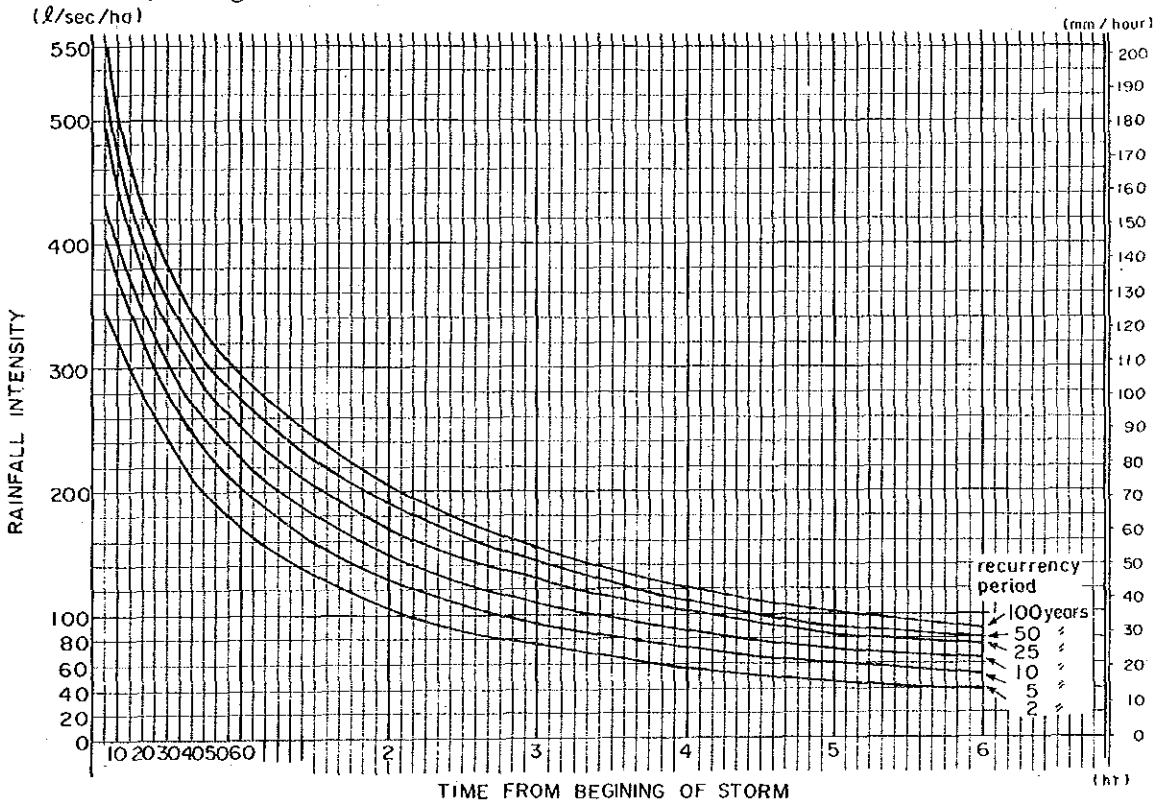
Table 6.2 Climate Information (1981, 1982)

Month	Average Temperature (°C)	Actual Humidity (%)	Actual Rainfall (mm)	Wind Direction	Wind Velocity (m/sec)
January 1981	25.5	85	576.1	NW	0.9
1982	25.7	87	354.6	NW	7.8
February	26.6	81	179.3	N	2.0
	26.7	83	230.6	W	1.8
March	27.3	80	266.1	N	1.5
	27.1	82	123.5	W	1.5
April	27.6	80	283.4	E	1.4
	27.5	81	53.1	N	1.3
May	27.9	78	66.7	E	1.7
	28.1	77	32.1	N	1.3
June	27.8	77	90.4	E	1.4
	27.5	79	101.5	E	1.4
July	27.2	77	70.0	E	1.4
	27.2	76	23.3	E	1.5
August	27.5	74	47.4	E	1.6
	27.1	72	38.2	N	1.4
September	27.7	75	85.7	E	1.5
	27.6	71	-	N	1.3
October	28.0	74	84.6	E	1.5
	28.2	70	49.1	N	1.3
November	27.2	79	209.0	W	1.8
	28.5	73	4.8	N	1.3
December	27.0	98	379.0	W	1.9
	27.3	78	182.7	N	1.2
Annual Average or Total	27.3	79.8	2,337.7	E	1.6
	27.4	77.4	1,193.5	N	1.4
1974	26.9	78	2,204.0	W	2.2
1975	27.0	78	1,713.3	W	2.5
1976	27.1	76	1,867.7	W	2.6
1977	27.3	76	2,829.5	E	2.4
1978	27.3	76	2,020.3	N	1.9
1979	27.4	76	2,230.2	W	1.9
1980	27.4	78	2,185.4	E	1.4
1981	27.3	79.8	2,337.7	E	1.6
1982	27.4	77.4	1,193.5	N	1.4

Sources: Statistical Yearbook of Jakarta 1982, 1983
Statistical Yearbook of Indonesia 1982, 1983

2) Rainfall

The Rainfall Intensity Curve for the Jakarta Area was analyzed in the Master Plan (see Fig. 6.3).



Source: The "Master Plan for Drainage and Flood Control of Jakarta" (The Ministry of Public works and Electric Power)

Fig. 6.3 Rainfall Intensity Curve

(c) Tidal Movements

The tidal movements were measured and analyzed in the Master Plan, and the mean sea level data collected. The following figures indicate the Master Plan's results.

High High Water	P.P.[4]	+ 1.15 m
Mean Sea Level	P.P.	+ 0.60
Low Low Water	P.P.	+ 0.00

Since the Master Plan's measurements, tidal changes have been continuously observed. Actual rises in tide level have been ascertained by the concerned authorities.[5]

According to these results, the new High High Water level has been reset at P.P. + 1.85 m. Consequently, the sea level figures should be accepted only after modifying the Master Plan's figures in order to determine the design required.

Note: 4) P.P. (Priok Peil) corresponds to mean low low water

5) Dinas Pekerjaan Umum (Public Works), DKI