4.5 Construction Planning

4.5.1 Policy for study

This section will discuss the general policy regarding construction planning for this project. As a rule, matters relating to the railway station will be considered outside the scope of the discussion.

1) Overall Plan View

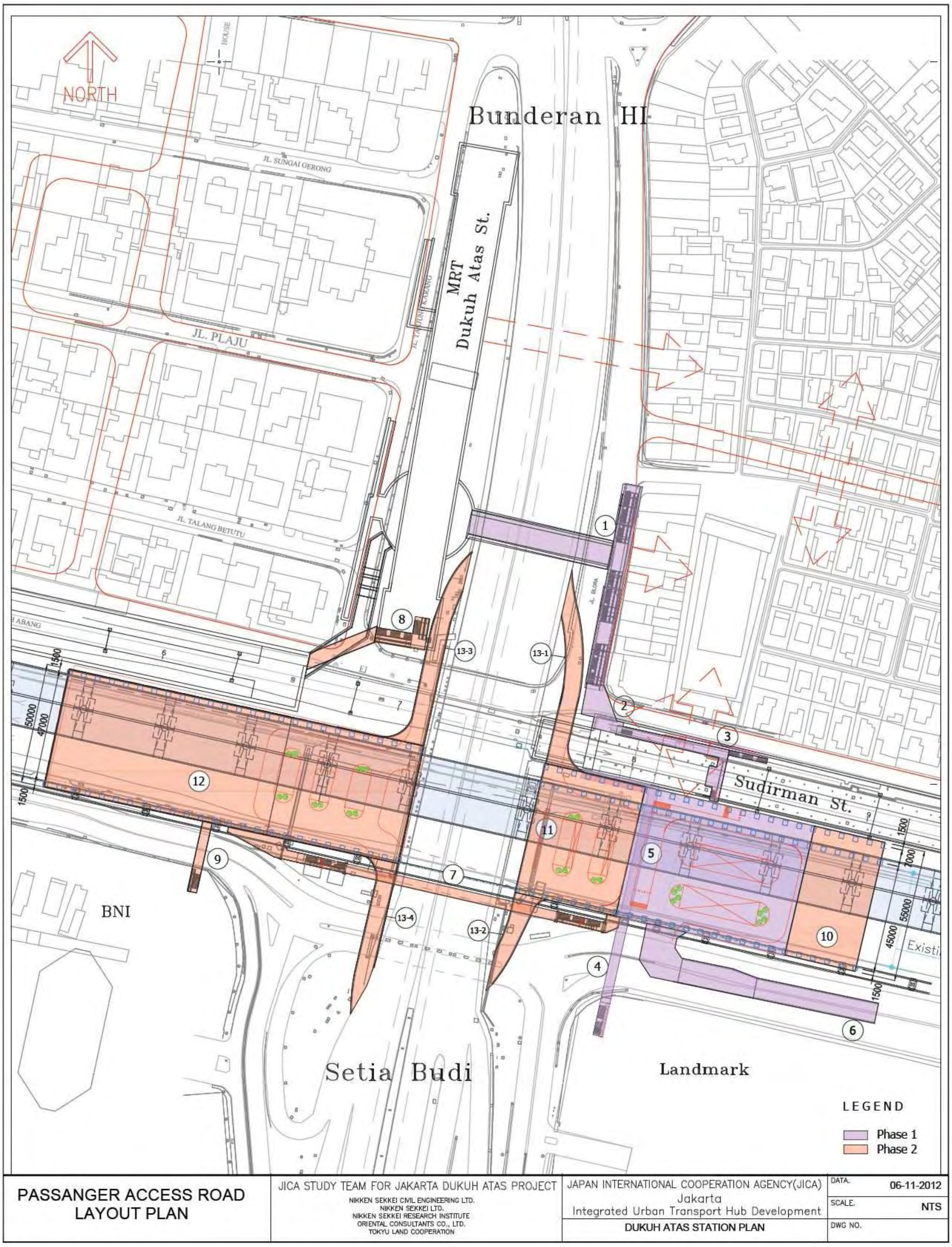


Fig-4.5.1 Overall Plan View (source : Study Team)

2) Conditions for study

- The method must be one that minimizes impact on the surrounding area.
- In construction terms, the method must be safe and commonly used.
- In economic terms, the most advantageous methods must be studied.
- Since the period of construction is after the completion of the MRT J and the construction work is similar, it is assumed that materials and construction machinery can be prepared, and that personnel will have experience with that type of construction.
- References provided by MRT J will be used with regard to soil conditions.
- When the construction will impede ordinary transport, it will be done at night when there is little traffic.
- For construction adjacent to railway lines, the requisite safety measures will be provided.
- It is considered that Japanese design standards will be used.
- As this project can be carried out independently of the construction according to the Phase-1 of Underground Railway North-South Line MRT ongoing, this project will not affect the scope, schedule and bidding procedure of MRT Project.

3) Items for study

- Temporary placement methods and construction methods for underground structures
- With regard to the artificial ground: access roads, construction materials and equipment yard, need for pier, use of park
- Road detours

4) Content of study

(1) Phase-1 Structures

①Study of construction method for underground passageway under Thamrin Street
②Study of passageway on the east side of Thamrin Street
③Study of temporary passageway between Sudirman Stn. and artificial ground, and passageway around Sudirman Stn.
④study of passageway between artificial ground and South/East block
⑤Study of construction method for artificial ground
⑥Study of construction method for BRT access road

(2) Phase-2 Structures

⑦Study of construction method for passageway between East and West artificial ground
⑧Study of construction method for passageway between airport line station and MRT station
⑨Study of construction method for passageway between artificial ground and South/West Block
⑩Study of construction method for artificial ground construction methods (the East End)
⑪Study of artificial ground construction methods (East side of Sudirman Bridge)
⑫Study of artificial ground construction methods (West side of Sudirman Bridge)
⑬Study of Access Road from Thamrin/Sudirman Street to Artificial Ground

4.5.2 PHASE1 Construction Study

1) Conditions for Study

(1) Road names: Thamrin Street, area near Sudirman Station — on bridge

East side of Thamrin Street: Bolar Street
West side of Thamrin Street: Tanjung Karang Street

(2) Road specifications: Thamrin Street, roads in area near Sudirman Station — roads on bridge

(in north direction)	Sidewalk + 3 + 1 (BRT)
(in south direction)	1 (BRT) + 5 + sidewalk
Center	TransJakarta up and down tracks
	Width 4.0 m x 2
Total width	Approximately 40 m

Longitudinal gradient of road on north side I=approximately 3%
Around 2006, east side was widened to approximately 8 m
Pile + slab construction
East side of Thamrin Street:
Bolar Street Width W=16 m One-way traffic in south direction
West side of Thamrin Street: Tanjung Karang Street
Width W=8 m Two-way traffic

(3) Road traffic status

As noted earlier, Thamrin/Sudirman Street is a main road passing north to south through the center of Jakarta, Indonesia. It has an extremely high volume of traffic and is always congested in the morning and evening, and it a “3-in-1” target route.

The other two roads also have a high volume of traffic during the day.

2) Study of Construction Methods

(1) Construction methods for Thamrin Street and Sudirman Street

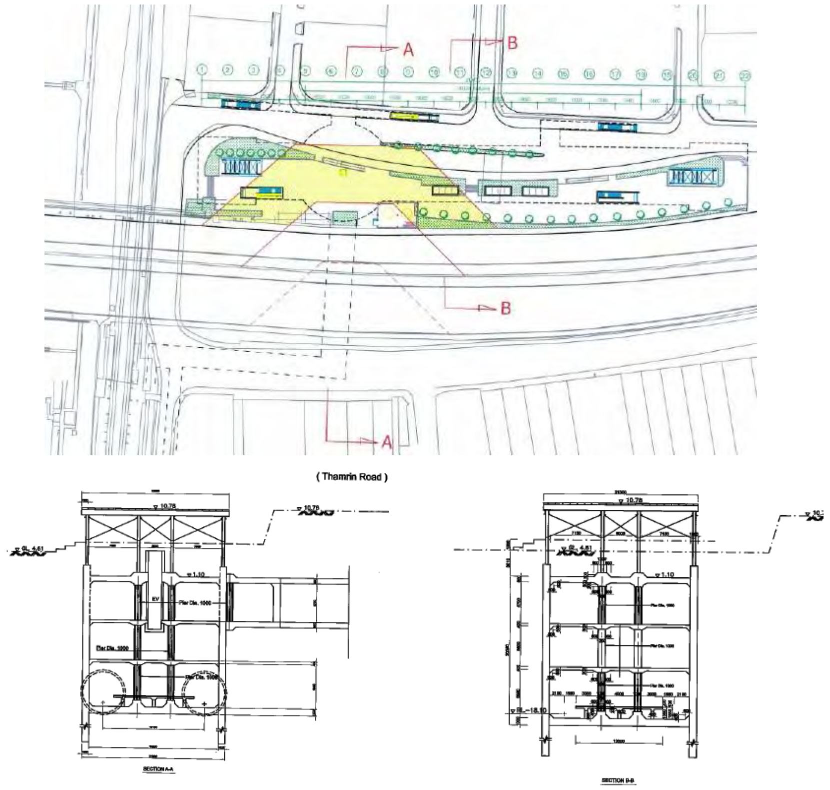
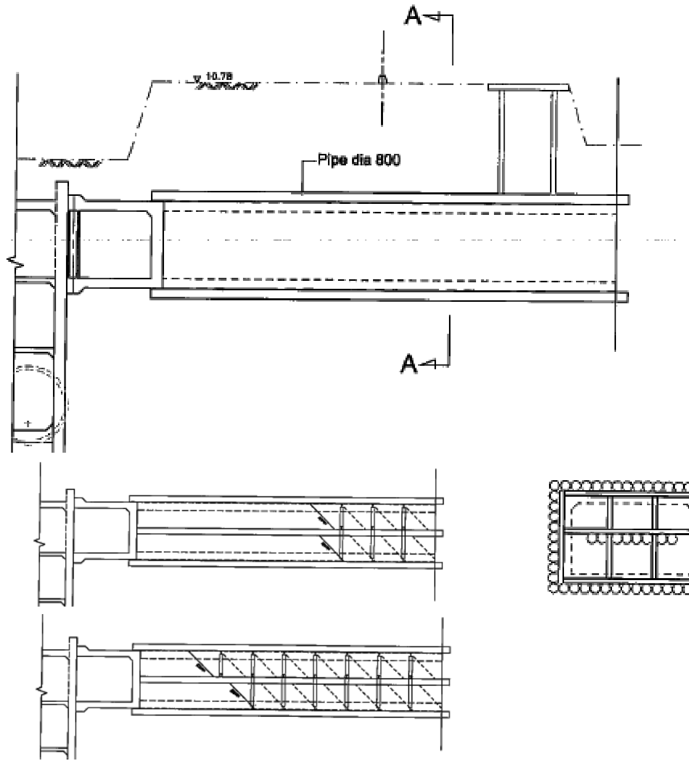
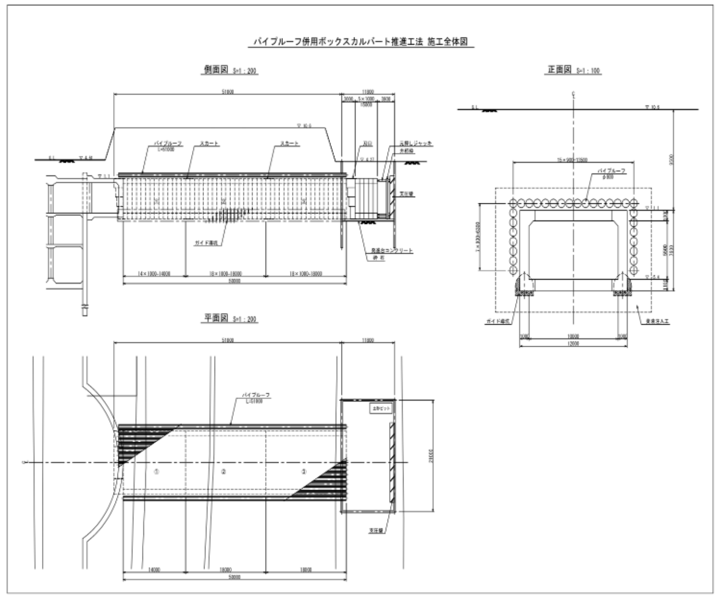
The method used to construct the underground passageways beneath main roads will be the cut-and-cover method and the non-cut-and-cover method. Normally when constructing underground structures beneath roads, normally the road is lined to enable the road surface to be used, and then the cut-and-cover method is used to excavate underground. The non-cut-and-cover method does not impede surface level roads, but construction costs are high and advanced technologies and many processes are required. For this project, three cases will be considered: a) full road surface lining, b) partial temporary support and partial road surface lining, and c) underpass construction.

Jakarta Province is desirous of a method that avoids creating traffic congestion to the greatest extent possible. The following conditions must be met in the course of the study.

- The period of construction will be following the completion of the MRT J Dukuh Atas underground station.
- The width of roads used for temporary detours must be at least as wide as the present roads, 20 meters in each direction
- The support piles for temporary detours will be those placed on the side walls of the underground station and medium columns.
- The roads used for temporary detours will have the road surface lined, and the road gradient will be matched to that of the present roads.

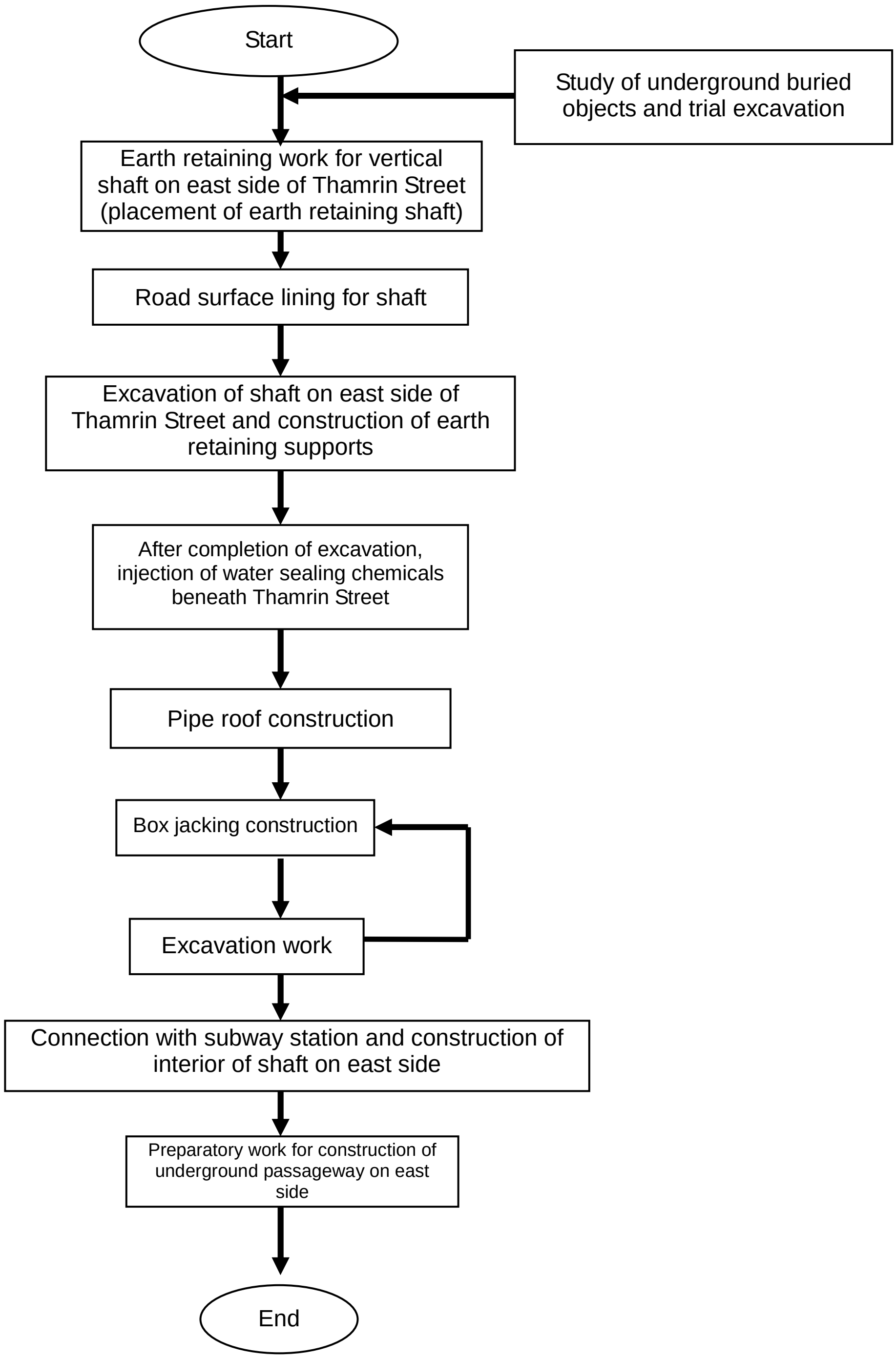
(a) Comparison Study of Construction Methods

Table 4.5.1 Comparative Study of Construction Methods

	Partial temporary support/partitioned road surface lining method	Underpass construction (pipe roof method)	Underpass construction (combined pipe roof and jacking method)
Conceptual diagram			
Features	• As the road is curved, the speed of vehicles is reduced, increasing traffic congestion. • As the construction will start after the subway station has been completed, there is the problem of using the space above the station. • The main structure will be constructed in sections. • There is the problem of what to do about the bottom edge of the lining support piles.	• As the road surface is not used, the work poses no obstacles to traffic. • As the departure shaft will be positioned on Bolar Street on the east side of Thamrin Street, one lane of Bolar Street will be closed to traffic at night. • The construction is difficult and will require a long period of time, and the quality of the main unit structure will be poor. • There are many joints, so leakage water treatment will be needed. • The scope of construction is limited in cross-sectional terms. • This method is disadvantageous in economic terms.	• As the road surface is not used, the work poses no obstacles to traffic. • As the departure shaft will be positioned on Bolar Street on the east side of Thamrin Street, one lane of Bolar Street will be closed to traffic at night. • The main structure is a factory product, so quality is high. • The scope of construction is limited in cross-sectional terms. • This method is disadvantageous in economic terms.
Construction period	21 months	25 months	21 months
Construction costs	1.0 (¥900 million)	1.9 (¥1.7 billion)	2.1 (¥1.9 billion)
Overall assessment	C	B	A

Source: Study Team

(b) Construction Procedure for Underpass Method (combined pipe roof and jacking method)

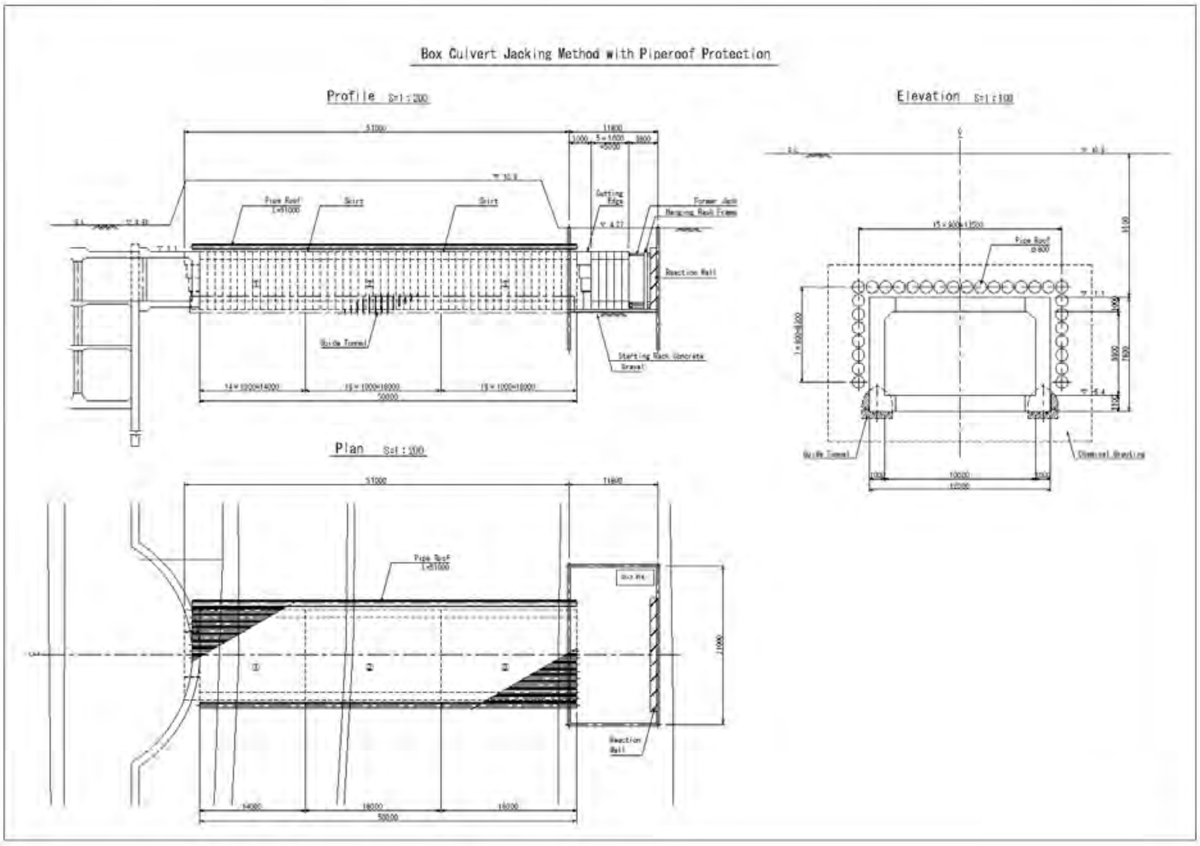


Source: Study Team

Figure. 4.5.2 Construction procedure using combined pipe roof and jacking method beneath Thamrin Street

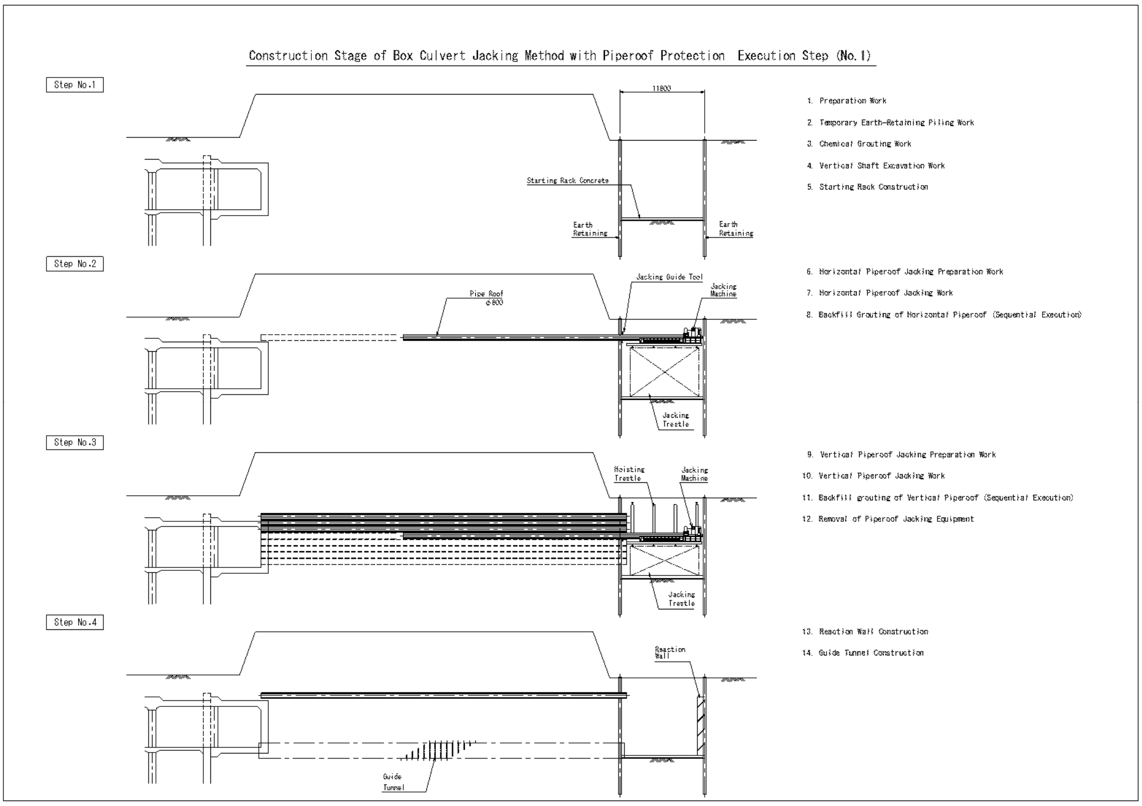
(c) Construction Procedure for Underpass Method

As some of the structures on the east side of Thamrin Street are bridge forms with a pile + slab structure, the need for pipe roof method after-treatment should be studied. In addition, in the case of the pipe roof method, the arrival side will be the subway station side where excavation has not been conducted.



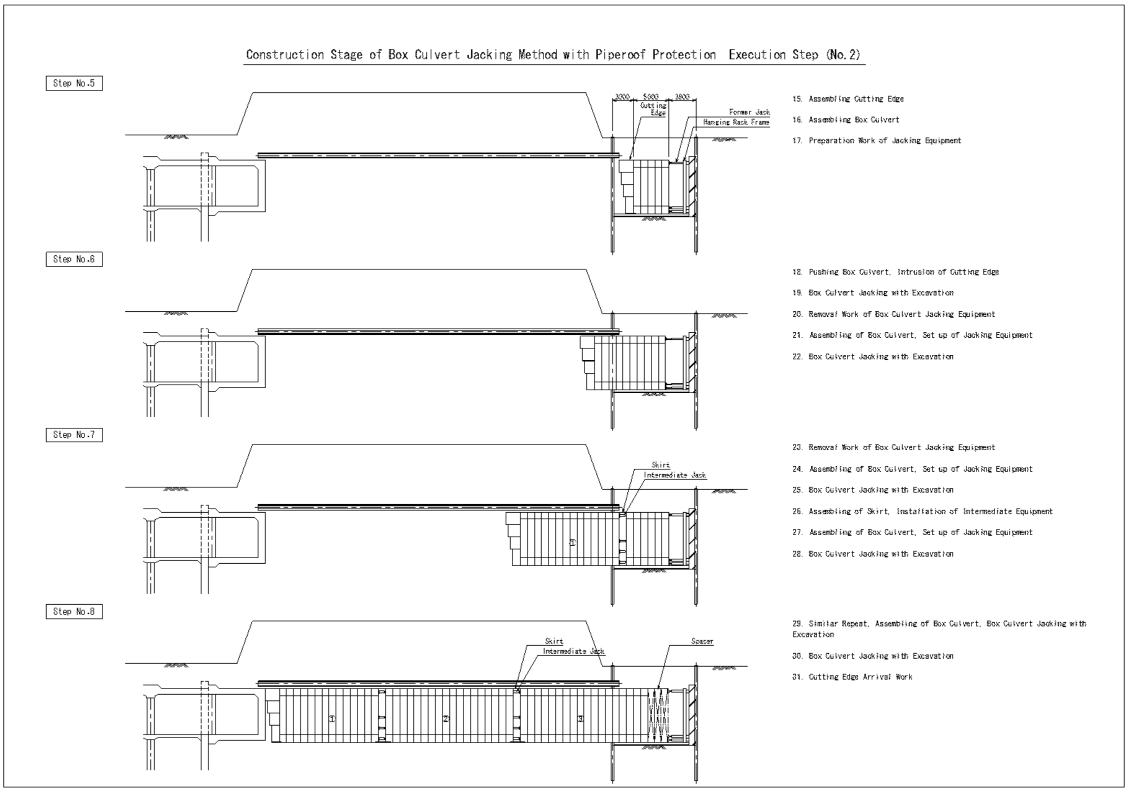
Source: Study Team

Figure. 4.5.3 Construction using Combined Pipe Roof and Box Culvert & Jacking Method



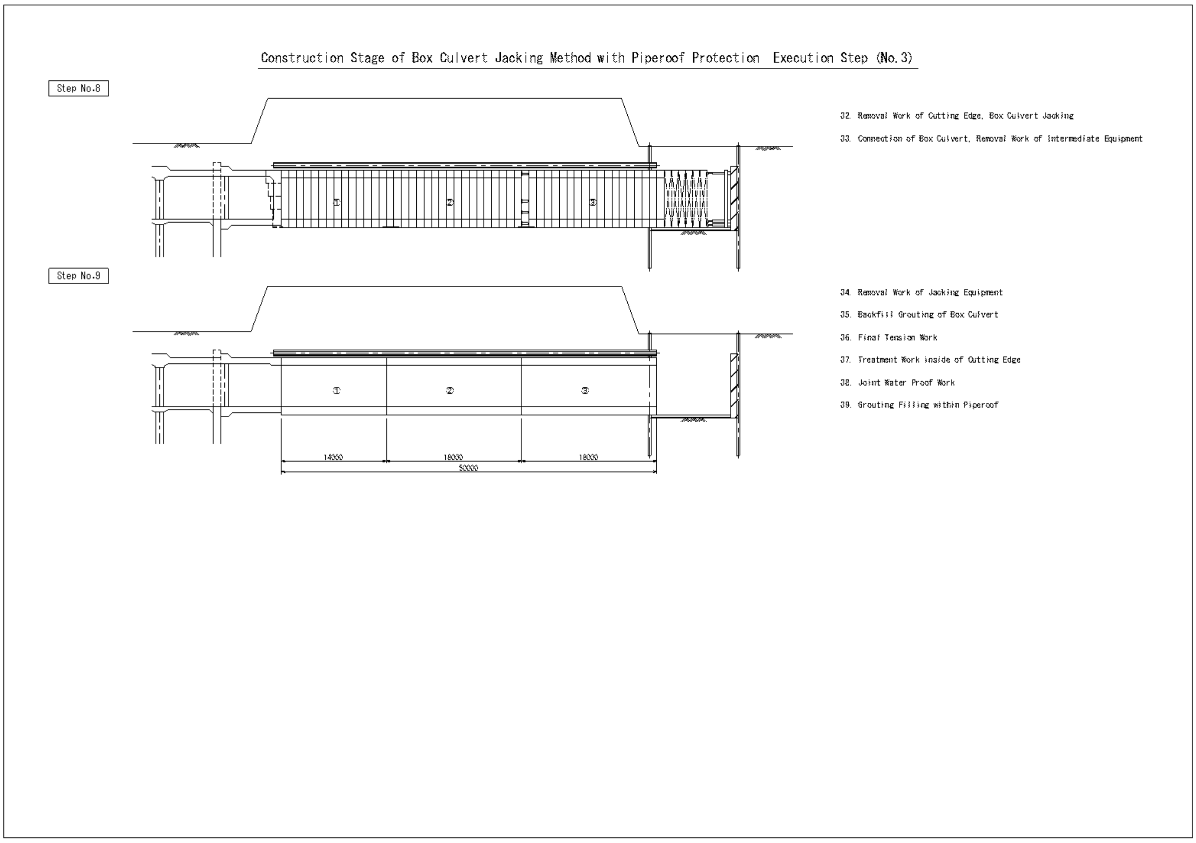
Source: Study Team

Figure. 4.5.4 Construction Procedure using Combined Pipe Roof and Box Culvert & Jacking Method



Source: Study Team

Figure. 4.5.5 Construction Procedure using Combined Pipe Roof and Box Culvert & Jacking Method



Source: Study Team

Figure. 4.5.6 Construction Procedure using Combined Pipe Roof and Box Culvert & Jacking Method

(d) Implementation Schedule

Table 4.5.2 Pipe Roof Jacking Method Schedule

Boxculvert Jacking Method with Piperoof Protection

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
East Vertical Shaft at Thamrin St.																								
Preparation Work	—																							
Temporary Decking Work	—																							
Piling Work		—	—																					
Temporary Road Decking Work			—																					
Excavating Work				—	—	—																		
Earth-Retaining Support Work				—	—	—																		
Under Thamrin St																								
Chemical Grouting Work						—	—	—																
Preparation Work (Excavating Machinery Installation)									—	—														
Pipe-roof Protection										—	—	—	—	—	—									
Assembling Work of Boxculvert																—	—	—	—	—	—	—	—	
Boxculvert Drilling Work															—	—	—	—	—	—	—	—	—	
Connection Work of Arrival Area																								—

Source: Study Team

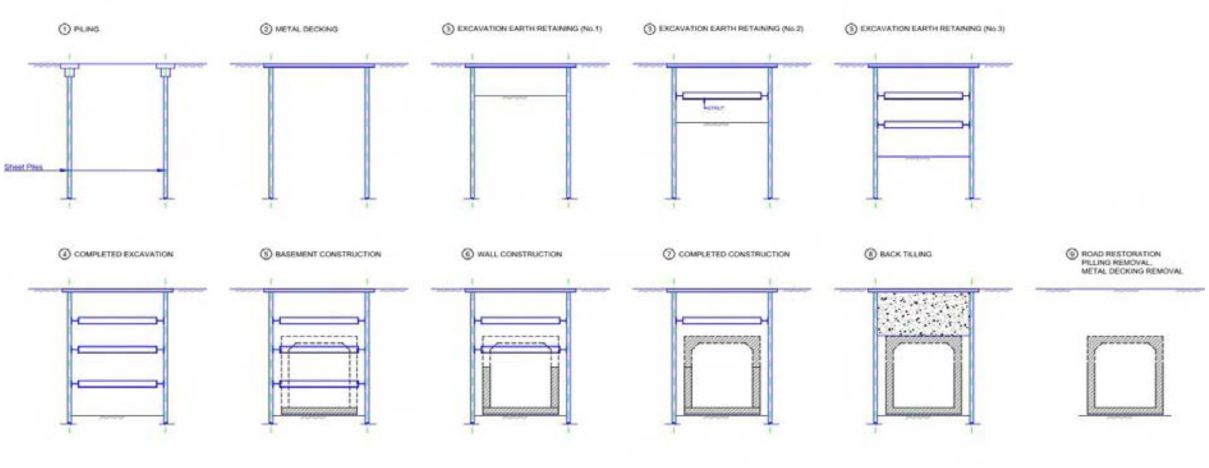
2) Method of Construction on East Side of Thamrin Street

Bolar Street Width=16 m One-way traffic (in south direction)

The underground passageway to be constructed will have an interior width of 8.0 m and a height of 5.5-3.7 m. The excavation depth will be approximately 9.2-11 m. Accordingly, earth bracing will be done using the customary steel sheet piles, after which the road surface will be lined and the passageway will be constructed using the cut-and-cover method. The earth retaining will be done using standard lining with short strut supports. The construction will be done at night when there is little traffic, and the road will be opened to traffic during the day. At night during the construction, traffic will be rerouted.

A press fit method that creates no vibration or noise will be used for construction of the earth retaining piles so there is no impact on the surrounding area from noise, vibration, etc. Drainage will be done by sump pit drainage inside the cut-and-cover section.

The construction method is shown in the Figure below.



Source: Study Team

Figure. 4.5.7 Construction Procedure on East Side of Thamrin Street

3) Study of Underground Passageway Connecting to Existing Railway Sudirman Station

As the area of the existing Sudirman Station is small, connection to the existing Sudirman Station from the MRT underground station via the underground passageway will be done at two connecting points, and people will go up via escalators placed within the railway site between the station and Kendal Street in front of the station. It is considered that the stairs that are currently being used will be moved to a different location.

4) Study of connecting passageway lining east side artificial ground and southeast block

Galunggung Street Width = 20 m Traffic in both east and west directions

Construction will be done by arranging footings and support columns in the central median strip on the road, and considering ease of construction, steel will be used. The passageway will be 4 m wide, and the stairs and escalator will be arranged on privately owned land and will connect to the artificial ground.

The construction method will be the same as that used in the past to construct the BRT pedestrian bridges, etc.

5) Study of East Artificial Ground

As noted earlier, the artificial ground will be constructed over the canal. Both sides of the canal are embankments that are used as sidewalks and parks. As the support piles cannot be placed in the canal, they will be placed within the embankments.

The following section discusses the delivery of construction materials and equipment, the method to be used for construction and so on.

(1) Establishment of scope of construction work

The planned scope of construction for the east side artificial ground is approximately 47 m distant from the east side of the Thamrin/Sudirman Street highway bridge. The area will be 55 m in width and 72 m in length.

(2) Study of construction methods

(a) Access roads, work roads and placement of temporary pier

Support piles will be placed on the embankments on the north and south sides of the canal. On the north side, there is a railroad track between the local road and the embankment, making access to the embankment difficult. Based on these site circumstances, the access road to the embankment in the area of construction will be from a point approximately 300 m to the east from Thamrin Street on the south side of the canal, where there are few level differences with the local road.

At the access location, a temporary pier will be placed in the canal to enable work vehicles to enter from the west and turn around. As there is no access road to the embankment on the north side of the canal, the idea of placing a traverse temporary pier in the canal is being considered. The support piles for the temporary pier will be H-400 and L=18 m (based on the results of the soil survey), and the width of the temporary pier will be B=8.0 m. The temporary pier will be constructed using a vibro hammer.

In addition, temporary use of the sidewalk and greenery areas within the embankments as work roads is being considered.

Source: Study Team

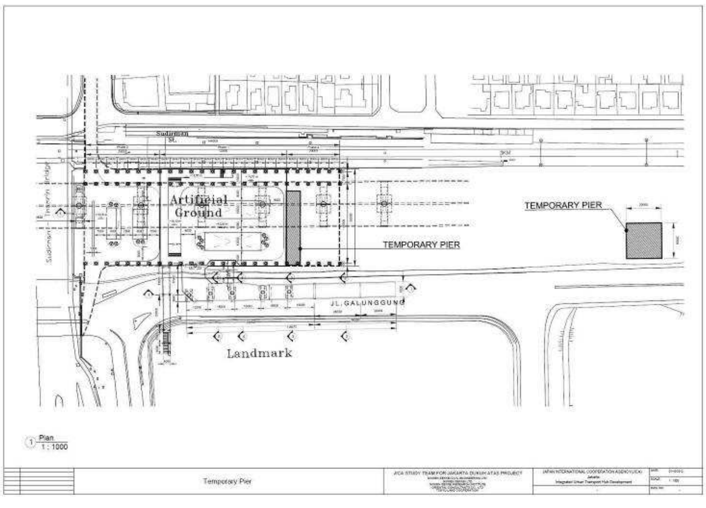
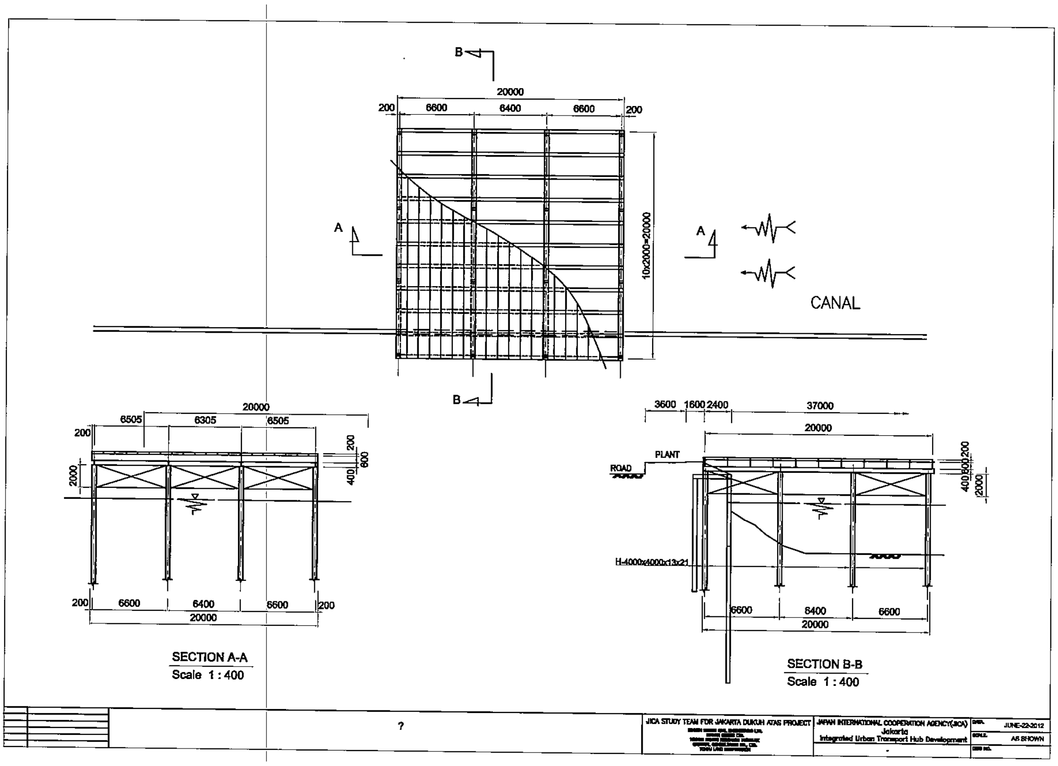
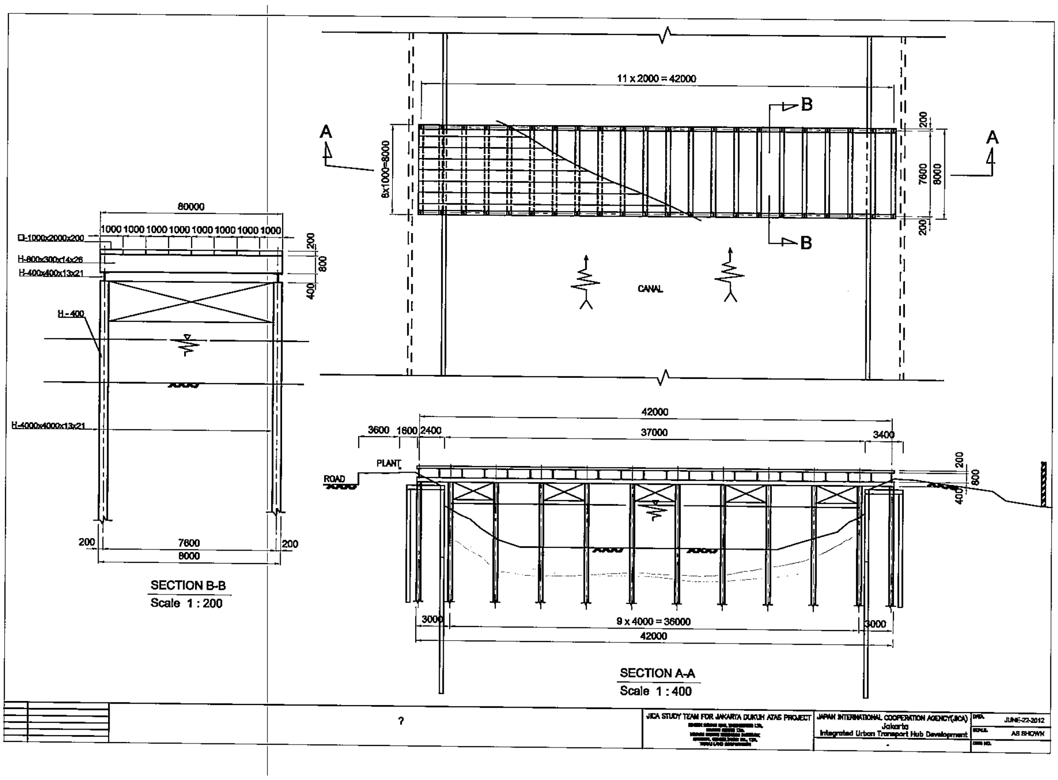


Figure-4.5.8 Temporary Pier Top View



Source: Study Team

Figure. 4.5.9　Temporary Pier Cross-Section (1)



Source: Study Team

Figure. 4.5.10　Temporary Pier Cross-Section (2)

(b) Artificial Ground Construction

① Preparatory work

The use of the greenery sections and pavilion on the embankments as the construction materials and equipment yard for the construction work is being considered. To avoid obstructing traffic, materials will be delivered at night.

② Substructure

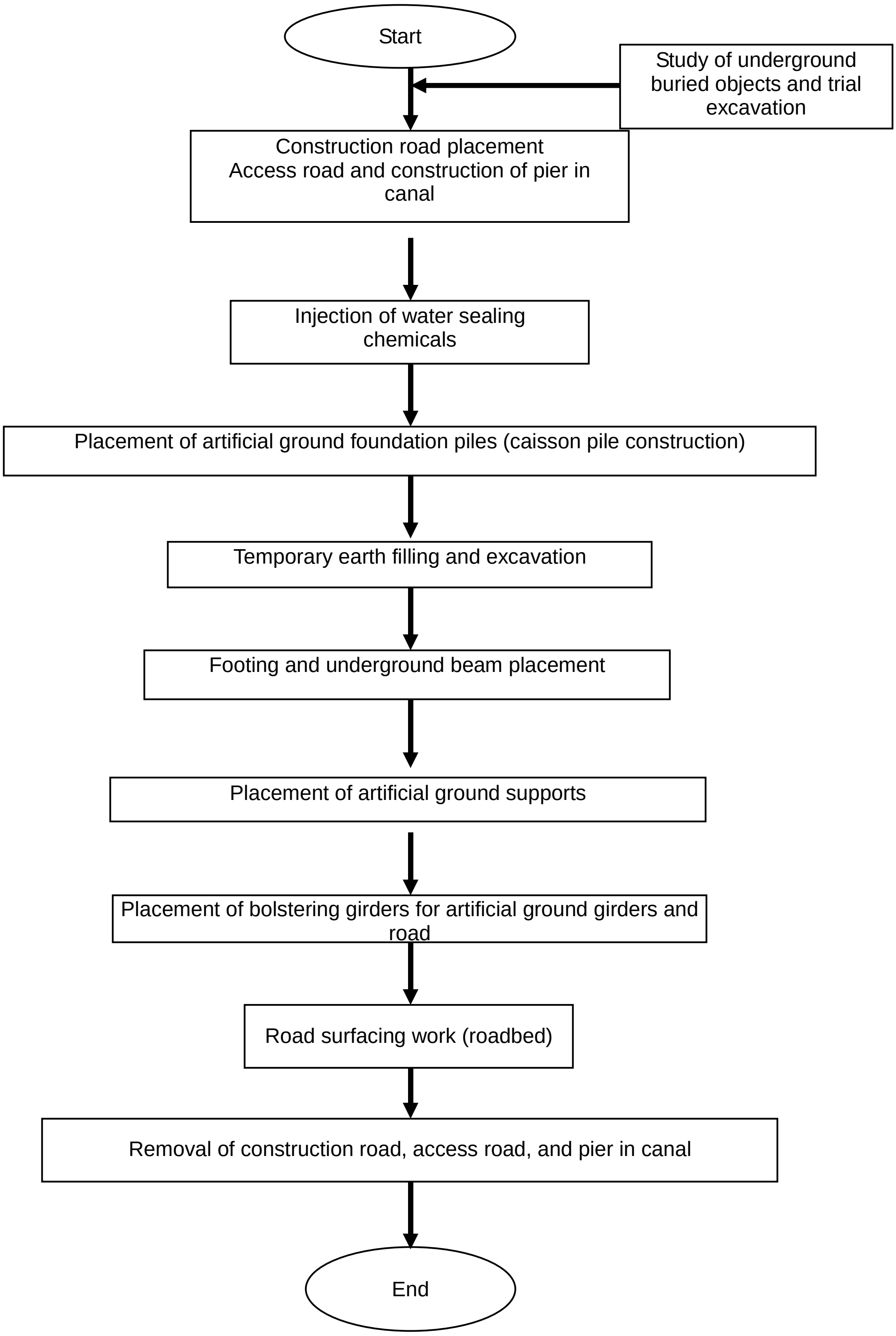
Substructure is constructed with two sets of cast-in-place pile construction machinery towards the East from the Thamrin / Sudirman Street considering the procedure workability. As BH piles are constructed by small drilling machinery, cast-in-place piles are installed in the bank. (BH Pile: rotary drilling pile method (Boring Hole))

③ Superstructure

After the substructure has been completed, the bolstering girders will be put in place. As the bolstering girders are long (length approximately 40 m), they will be transported in sections and connected on the temporary pier that will be provided in the canal. A method is being considered in which two cranes will be used to place them on top of the girder holders, and two winches will be used to slide them to the west. When the bolstering girders have been placed in the proper position, they will be bolted to the girder holders and braces will be put in place between the girders. The bolstering girders will be placed at intervals of 1.5 m.

Methods being considered include a method in which precast concrete is placed on top of the bolstering girders between the girders followed by the placement of concrete slabs, and a method in which deck plates are installed and asphalt pavement is placed on top of these deck plates

(3) Construction Procedure

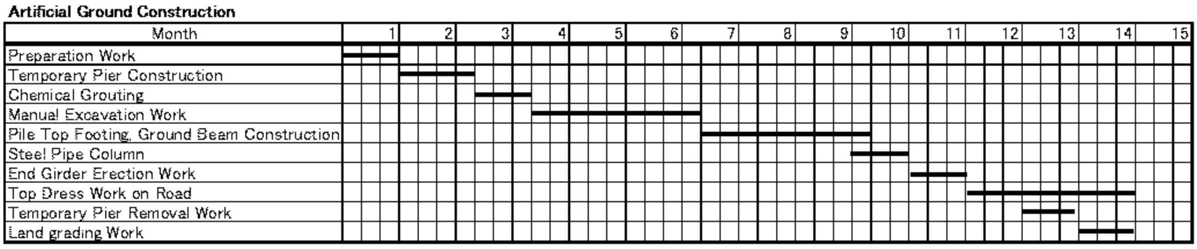


Source: Study Team

Figure. 4.5.11 Construction Procedure for Artificial Ground

(4) Implementation Schedule

Table 4.5.3 Artificial Ground Construction Schedule



Source: Study Team

6) BRT Access Road

As the construction will take place on local roads, the work will be done at night when there is little traffic. A working zone will be placed in the center and traffic will be rerouted before the work begins.

(1) Study of construction methods

(a) Substructure

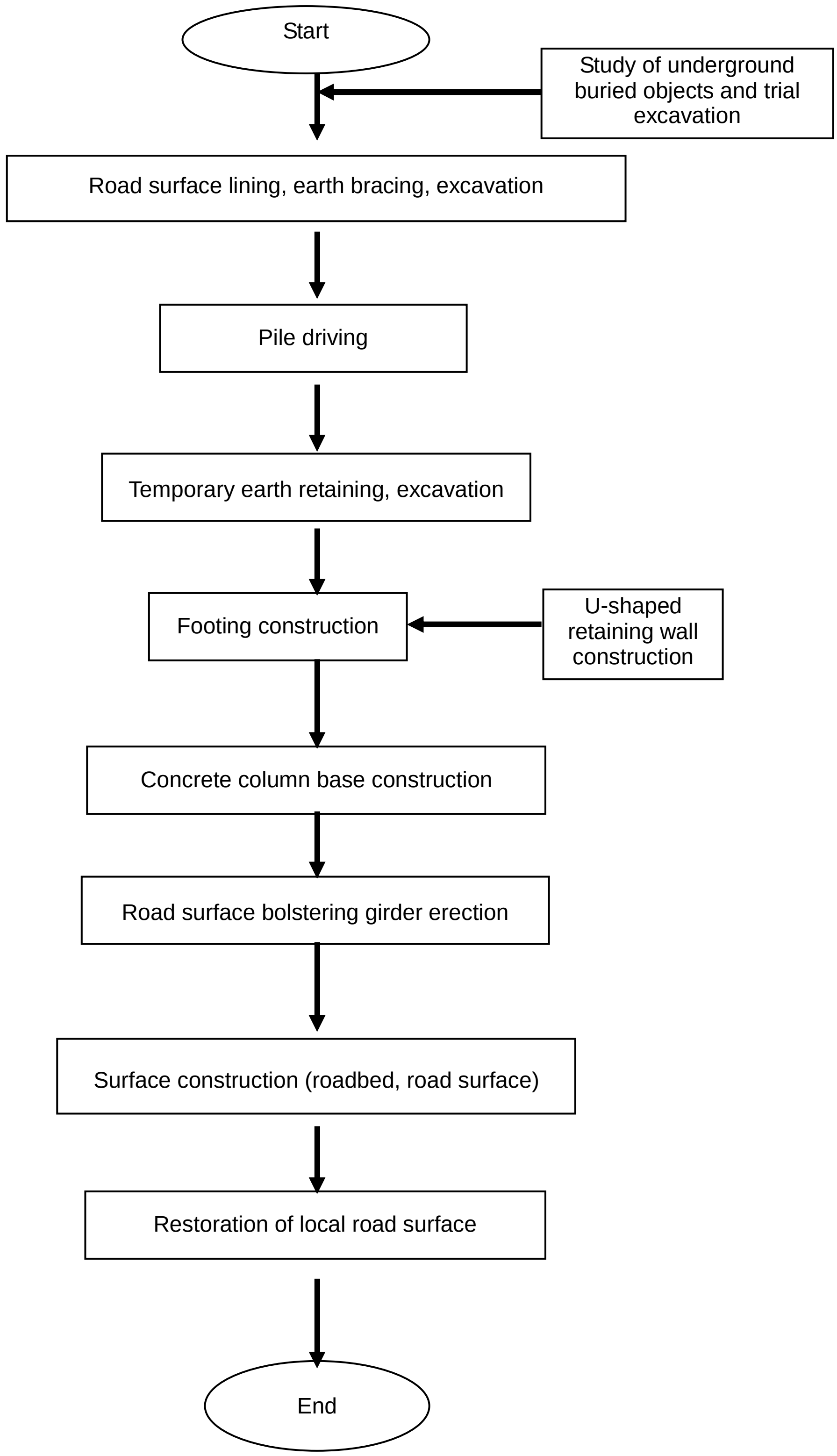
For the foundation position of the access road, earth retaining work, road lining work and excavation will be conducted and precast concrete piles (ø 600 L=10 m) will be driven in. Subsequently, the footing, concrete column bases, U-shaped retaining wall and so on will be constructed.

(b) Superstructure

The bolstering girders for the superstructure are erected in sequence and fastened in place with nine cranes per span, using steel members (H=800 L=15 m) out of consideration for ease of construction. Because this will be a road crossing, an effective height of 5.0 m will be secured for the connection with the artificial ground. Accordingly, factory manufactured grid girders with a girder height of 500 mm will be used and erected through single lift erection at the site.

After the main girders are in place, the concrete deck will be constructed and finished as an asphalt bed. The median strip and side guardrails and so on will then be put in place to complete the access road.

(2) Construction Procedure

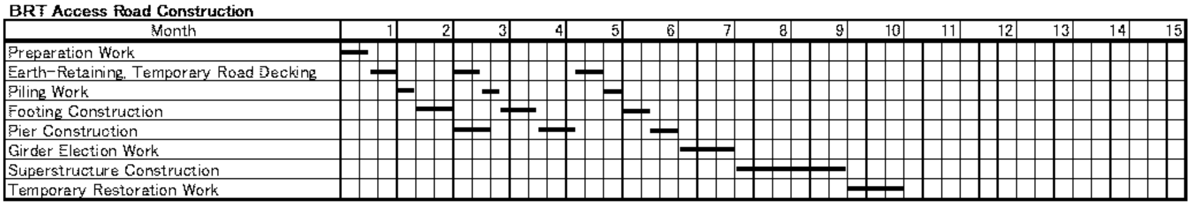


Source: Study Team

Figure. 4.5.12 Procedure for Construction of BRT Access Road for Artificial Ground

(3) Implementation Schedule

Table 4.5.4 BRT Access Road Construction Schedule



Source: Study Team

4.5.3 Construction planning for Phase 2 structures

1) Study for construction of connecting passageway linking east and west artificial grounds

Thamrin/Sudirman Highway Bridge Width = 42.5 m Traffic in both directions

The elevated pedestrian bridges to be constructed will be 4 m wide and will cross above major roads with heavy traffic. Support columns will be arranged on the east and west sides of the road, and the bridges will be constructed with steel that facilitates construction process. For delivery of the main girders to the site, the girders will be separated into lengths of approximately L = 8 m. A work yard will be built at the site on top of the embankment, and the girders will be connected there and then lifted together at night using two cranes. In consideration of the location (major roads) and the need to re-grade the road in the future, an effective height clearance limit of H = 7.0 m or greater, the same as the adjacent monorail, will be secured. The construction equipment and materials will be placed temporarily on the west side embankment.

During the construction, the locations of drainage pumping stations, water pipes and other obstructions will be confirmed and thorough measures will be taken to protect these facilities.

2) Study for construction of a connecting passageway linking the Airport Line and the MRT North-South Line

Tanjung Karang Street Width = 8 m Traffic in both directions

At the time of construction of the connecting passageway, the construction of the underground station for the MRT North-South Line is expected to be complete, and construction of the elevated station for the Airport Line will be in progress. This connecting passageway will extend from the elevated station of the Airport Line and will pass over Tanjung Karang Street at a height of approximately 10 m, with a span of approximately 30 m. The passageway will be of ordinary metal construction and will be 6 m wide and supported by footings and support columns arranged in the park above the underground station. It will be located in the upper section of the subway station, giving consideration to access to the stairs and escalator from the underground station.

3) Study of the construction of a connecting passageway linking the artificial ground on the west side and the southwest block

Karet Pasarbaru Timur Street Width = 14 m Traffic in east and west directions

This connecting passageway will pass over the road, with the footing and support columns arranged in the sidewalk area, and it will be constructed with steel to facilitate construction work. The passageway will be 4 m wide with the stairs and escalator arranged on privately owned land, and it will be connected to the artificial ground. The method of construction will be the same one that has been used up to now to construct pedestrian bridges and the like for BRT facilities.

4) Study for construction of the artificial ground on the eastern end

The construction work will use the artificial ground constructed in Phase 1. Work vehicles will access the artificial ground using the BRT access road. As the BRT will be operating on the artificial ground during the day, the artificial ground can be used only at night when the BRT is not in operation (10:00 p. m. - 5:00 a. m.).

5) Study of construction of artificial ground on east side of highway bridge

Prior to the start of construction, the connecting passageway between the existing Sudirman Station and the artificial ground will be removed to secure room for construction. Station and BRT users will use the connecting passageway that leads from the north side of the station via the east side. As in the case of the east end artificial ground, the construction will use the artificial ground constructed in Phase 1, and the work will be done at night. The procedure for construction will be the same one used for artificial grounds up to that time. The work to connect the artificial ground with Thamrin/Sudiran Street will be done last.

6) Study of construction of west side artificial ground

At present, the work is scheduled to begin in 2017 after the MRT has been completed, and when the construction of the Serpong-Bekasi Line underground station, Airport Line elevated station, Toll Road 6, etc., is in progress. For the construction, work vehicles will enter from the Banjir Kanal south side. Using the same method as in Phase 1, a temporary pier will be constructed in the Banjir Kanal, and bolstering girders will be assembled on top of this pier. The construction procedure will be cast in place piles (ø 1.20 m), footings, column placement, girder supports, bolstering girder placement and surface work.

7) Study of connecting road linking Thramrin/Sudirman Street with artificial ground

Due to the plan to increase the height of the existing highway bridge, the existing highway bridge and the artificial ground will be isolated. This will eliminate the interference between the artificial ground and the essential utilities provided adjacent to the road, and it will also eliminate the need to take into consideration restrictions on the height of the artificial ground. The artificial ground is 1.7-2.3 m higher than the existing road.

Access roads and exit roads of approximately two lanes each will be constructed to connect to the east and west artificial grounds from a total of four locations on the north and south side of the highway bridge. At present, there are no detailed drawings, but the substructure will be constructed with ø600 mm pile supports, footings and bridge piers arranged at approximately 20 m intervals. A superstructure consisting of three prestressed concrete I-girders (girder height 2 m) is being considered. The construction will be proceed so as to not interfere with existing roads and railways based on the scope of construction.

In addition, the use of retaining walls is planned, as there are slopes in some places.

8) Pending issues

(1) Muddy water during construction

The muddy water, etc., produced during construction will not be allowed to flow directly into the Banjir Kanal. A method is being considered in which a sand basin or the like will be provided to purify the muddy water before it is allowed to flow into the canal. (This will avoid the problem of decreased cross-sectional area of the Banjir Kanal due to abnormal deposition on the canal floor.)

(2) Flood control measures during construction

As a measure to deal with flooding that is expected to occur during the construction period, as a rule, the work inside the Banjir Kanal will be done in the dry season. In the event that this is not possible for scheduling reasons, appropriate safety measures will be devised.

(3) Flood control measures after completion

The plan calls for freeboards that are 50 cm higher than the high water level to be placed on both banks of the Banjir Kanal. The period of implementation is reportedly scheduled to begin soon. The freeboards are made of concrete and are 1.2 meters in height.

(4) Sudirman highway bridge

The existing Sudirman highway bridge was constructed many years ago, and reportedly the passing section of the cross-sectional area of the Banjir Kanal is not compatible with the design flood volume of 500 m3/second. For this reason, the Ministry of Public Works (PU) is planning replacement work in which the height of the bridge road will be increased.

(5) Temporary pier during construction

The construction of a temporary pier for use in the construction is planned. However, the pier piles will reduce the cross-sectional area of the canal. In order to prevent this, a method is being considered in which the bottom of the canal would be dredged on both the upstream and downstream sides, within a large enough area to provide sufficient leeway.

Based on the results of relevant environmental analyses, the earth deposited in the canal is known to contain arsenic and other heavy metals. Accordingly, during the dredging process, it is essential to determine the quantity of earth that is taken in. Initially, however, the heavy metal content in the area to be dredged should be studied, and if the presence of heavy metals is confirmed, measures should be devised to prevent these substances from spreading to the surrounding environment, and the necessary detoxification measures and environmental management measures must be taken.

(6) Toll Road 6

Under the current plan, the bridge piers for Toll Road 6 will be arranged inside the Banjir Kanal. In that case, however, construction after the artificial ground has been completed will be difficult unless at least the foundations of the bridge piers are constructed prior to the artificial ground construction.

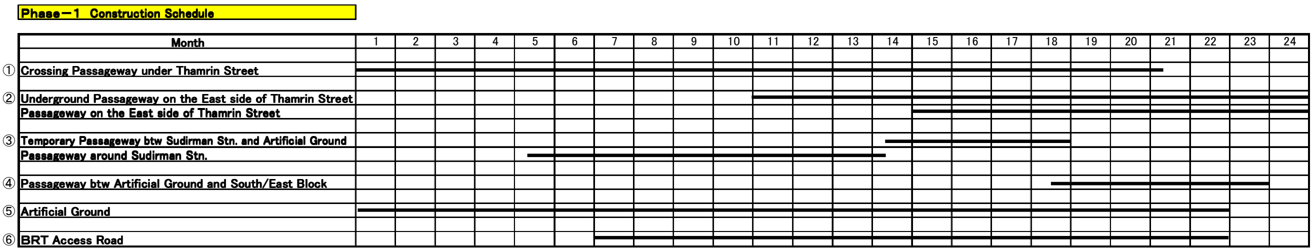
(7) Monorail (or Elevated Busway)

The monorail planned for the south side of the Banjir Kanal should also be constructed prior to the construction of the artificial ground.

4.5.4 Implementation Schedule

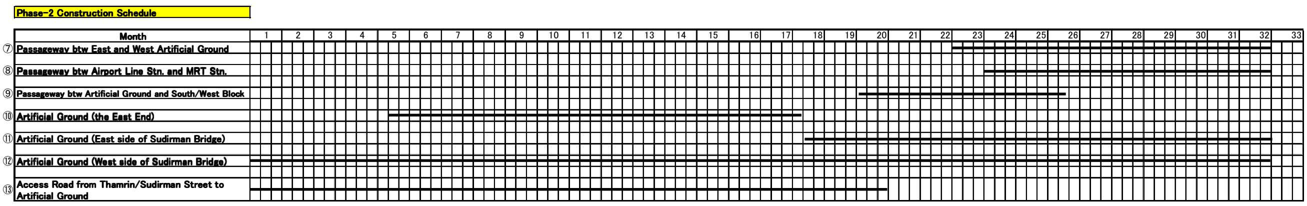
1) Phase-1

Table-4.5.5 Implementation Schedule for Phase 1



2) Phase-2

Table-4.5.6 Implementation Schedule for Phase 2



4.5.5 Study of measures to prevent traffic congestion during construction work

As there has been no particular study of measures taken by the Jakarta city authorities to ease traffic congestion during the construction in the Dukuh Atas Station development, and for the operation of public transport, etc., the following measures will be studied.

1) Basic approach

As has been noted several times, traffic congestion is a serious problem in Jakarta. For this reason, the construction will be done primarily at night to avoid road congestion during the day, and the movement of work vehicles during the day will be avoided to the greatest extent possible. The work hours during which the roads will be used will be 10:00 p. m. - 6:00 a. m.

2) Traffic congestion measures during the construction of each structure

(1) Construction of underground passageway crossing Thamrin Street and underground/above-ground passageways on the east side of Blora Street

To avoid the transit of work vehicles during the day and to ensure rapid promotion of construction work at night, temporary storage of the construction equipment and materials in a yard at the site is planned. The roadside slope on the east side of Thamrin Street will be leveled and converted into a construction equipment and materials yard (approximately 3.0 m x 50 m). This section of Thamrin Street is an elevated bridge with concrete slabs supported by piles, so effective use of the area below is also envisioned.

The shaft used for construction of the underground passageway crossing Thamrin Street will have the road surface covered so the road can be opened to traffic during the day. In addition, the construction of stairs in the above-ground section (the section leading from underground to the ground surface and the section that connects the ground surface with the 2nd floor of the existing Sudirman Station) will use the wide road width of the current Blora Street to create a work zone in the eastern half of the street to allow road traffic to continue to transit normally to ensure that further traffic congestion is not produced as a result of the construction.

Figure.-4.5.13 Blora Street ramp on east side of Thamrin Street and use of Blora Street

(2) Connecting passageway linking east side artificial ground with southeast block

As this construction work involves arranging support columns near the center of the road, a work zone (approximately 1.0 m wide and 2.0 m long) in the center of the road will be needed for a short period of time during the construction process. This is to protect the support columns, and the construction will be conducted simultaneously with that of the nearby BRT access road. Every effort will be made to avoid impeding traffic.

(3) Construction of artificial ground

In the construction of the artificial ground on the east side of Thamrin Street in Phase 1, it will be possible to avoid using the road apart from the delivery and removal of construction equipment and materials, so the plan calls for construction equipment and materials to be delivered at night when the traffic situation is favorable. The entrance for delivery and removal of construction equipment and materials and the temporary storage yard is the location noted in the separate construction plan. A gate will be provided at the entrance and a person will be stationed there to monitor traffic.

In the Phase 2 artificial ground construction, the artificial ground on the east side of Thamrin Street constructed in Phase 1 will be used for construction work at night.

As in Phase 1, a temporary pier will be constructed and used as a construction equipment and materials yard for the artificial ground on the west side, and a work access road will be provided in order to prevent traffic congestion during the construction.

(4) BRT access road

The plan calls for the substructure for the access road to be placed in the center of the road. For this reason, the road surface will be covered and the excavation work, pile arrangment work, footing construction, etc., will be conducted beneath the road covering and the road will be opened to traffic during the day. During the construction of the bridge piers and superstructure, the access road will consist of one dedicated lane in each direction. At present, elevated highway bridges are under construction in Jakarta, and the work is being promoted with a substructure work zone having been secured. The same method will be used for this work. In order to minimize traffic congestion, consideration is being given to temporarily cutting away the sidewalk on the road leading west on the south side to widen the vehicle road. The road leading east will be reduced from the present three lanes to two lanes, and there are expected to be no problems as the tunnel beneath Sudirman Street on the upstream side has two lanes. Construction equipment and materials will be stored temporarily on the temporary pier built for the construction of the artificial ground and the temporary access road in order to avoid traffic congestion.

(5) Connecting passageways linking Thamrin/Sudirman Street and artificial ground

The plan calls for the construction of connecting passageways linking the existing road with the artificial ground in four locations — north, south, east, and west. These will be constructed in the same manner as the existing elevated highway bridge, from foundation piles, foundation footings, bridge piers and other substructure elements to the superstructure with I-girders. Nevertheless, the connecting road will be on the outside of Thamrin/Sudirman Street, and every effort will be made to avoid using the existing road. The substructure will be entirely outside the existing road, and the superstructure construction will be done at night to avoid any impact on traffic congestion.

(6) Other

For other structures, use of the existing roads will be limited to transport of materials, and in general materials will be transported at night to avoid traffic congestion.

4.6 PRELIMINARY COST ESTIMATE

4.6.1 Demarcation for Preliminary Cost Estimate

Project costs were estimated as construction work costs (including civil engineering work costs, building work costs, etc.) and consulting fees. The unit price for each type of construction work took into consideration realistic and economical construction methods, and the breakdown of costs was divided between local currency and foreign currency based on the possibility of purchasing in Indonesia. Project costs were allocated annually and took into consideration emergency reserves, interest rates during the construction period, commitment charges, etc.

Project costs were estimated separately for Phase 1 and Phase 2.

Table-4.6.1 Phase-1 and Phase-2 Construction Demarcation

Phase-1	①	Crossing Passageway under Thamrin Street	Width=10ｍ, Length=60ｍ
	②	Passageway on the East side of Thamrin Street	Width=6ｍ, Length=101ｍ
	③	Temporary Passageway btw Sudirman Stn. And Artificial Ground (Including The Way Around Sudirman St.)	Width=4ｍ, Length=92ｍ
	④	Passageway btw Artificial Ground and South/East Block	Width=4ｍ, Length=50ｍ
	⑤	Artificial Ground	Width=55ｍ, Length=72ｍ Area=3,960m2
	⑥	BRT Access Road	Width=9ｍ, Length=137ｍ
Phase-2	⑦	Passageway btw Eastside Artificial ground and West side Artificial Ground	Width=4ｍ, Length=133ｍ
	⑧	Passageway btw Airport Line Stn. MRT Stn.	Width=6ｍ, Length=53ｍ
	⑨	Passageway btw Artificial Ground and South/West Block	Width=4ｍ, Length=23ｍ
	⑩	Artificial Ground(the East End)	Width=55ｍ, Length=30ｍ Area=1,650m2
	⑪	Artificial Ground(East side of Sudirman Bridge)	Width=55ｍ, Length=42ｍ Area=2,310m2
	⑫	Artificial Ground(West side of Sudirman Bridge)	Width=50ｍ, Length=150ｍ Area=7,500m2
	⑬	Access Road from Thamrin/Sudirman Street to Artificial Ground	Width=7ｍ, Length=140+120m+50m+85m

Project costs were estimated on the assumption that they would be paid by Public Sector.

4.6.2 Summary of Cost Estimate (Phase-1)

The Project Cost and Construction Cost of Phase-1 were summarized in Table 4.6.2 and Table 4.6.3.

Table-4.6.2 Summary of Project Cost (Phase-1)

為替レート ：1IDR=0.00911JPY

Item			Cost		Equivalent Total Amount	
			Mil.JPY	Mil.IDR	in Mil.JPY	in Mil.IDR
A. ELIGIBLE PORTION						
I)	Procurement / Construction	a)=c)+d)+e)	2,289	301,887	5,040	553,149
	Phase-1	b)=b1 to b8	2,029	227,022	4,098	449,745
	Crossing Passageway under Thamrin Street	b1	738	132,051	1,941	213,061
	Undreground Passageway on The East side of Thamrin Street	b2	1	354	4	464
	Passageway on The East side of Thamrin Street	b3	121	5,759	174	19,041
	Temporary Passageway btw Sudirman Stn. And Artificial Ground	b4	8	1,547	22	2,425
	Passegeway around Sudirman St.	b5	23	4,261	62	6,786
	Passageway btw Artificial Ground and South/East Block	b6	49	3,971	85	9,350
	Artificial Ground	b7	1,003	68,552	1,628	178,651
	BRT Access Road	b8	86	10,527	182	19,967
	Base cost for JICA financing	c)=b)	2,029	227,022	4,098	449,744
	Price escalation	d)	151	60,489	702	77,064
	Physical contingency	e)	109	14,376	240	26,341
II)	Consulting services	f)=f1 to f3	357	26,022	594	65,210
	Base cost	f1	323	20,872	513	56,328
	Price escalation	f2	17	3,910	53	5,776
	Physical contingency	f3	17	1,239	28	3,105
Total (I + II)		g)=a)+f)	2,647	327,908	5,634	618,468

B. NON ELIGIBLE PORTION					
a Procurement / Construction		0	0	0	0
Base cost for JICA financing		0	0	0	0
Price escalation		0	0	0	0
Physical contingency		0	0	0	0
b Land Acquisition		0	0	0	0
Base cost		0	0	0	0
Price escalation		0	0	0	0
Physical contingency		0	0	0	0
c Administration cost	h)	0	6,185	56	6,185
d VAT	i)	0	32,791	299	32,791
e Import Tax	j)	0	0	0	0
Total (a+b+c+d+e)	k)=h)+i)+j)	0	38,975	355	38,975
TOTAL (A+B)	l)=g)+k)	2,647	366,884	5,989	657,444
C. Interest during Construction	m)=m1+m2	93	0	93	10,209
Interest during Construction(Const.)	m1	93	0	93	10,209
Interest during Construction (Consul.)	m2	0	0	0	0
D. Commitment Charge	n)	17	0	17	1,866
GRAND TOTAL (A+B+C+D)	o)=l)+m)+m)	2,757	366,884	6,100	669,518
E. JICA finance portion incl. IDC (A + C + D)	p)=g)+m)+n)	2,757	327,908	5,744	630,542

Table-4.6.3 Summary of Construction Cost (Phase-1)

item	unit	Quantity	Unit Price		Cost		Total
			Foreign	Local	Foreign	Local	
			yen	Rp	yen	Rp	yen
Phase-1							
① Crossing Passageway under Thamrin Street							
Slope Area Construction	LS	1	119,309,660	3,503,481,000	119,309,660	3,503,481,000	151,226,372
Piperoof Jacking Work/Subsidiary Work	LS	1	3,375,080	2,285,470,000	3,375,080	2,285,470,000	24,195,712
Piperoof Jacking Work/Shaft Work	LS	1	23,015,080	3,020,840,000	23,015,080	3,020,840,000	50,534,932
Piperoof Jacking Work/Chemical Grouting	m3	3583.1	39,790	8,332,000	142,571,549	29,854,389,200	414,545,035
Piperoof Jacking Work/Box Culvert Work	LS	1	48,244,000	25,158,025,000	48,244,000	25,158,025,000	277,433,608
Piperoof Jacking Work/Pipe Roof Work	LS	1	37,079,800	32,191,335,000	37,079,800	32,191,335,000	330,342,862
Piperoof Jacking Work/Box Culvert Jackinng Work	LS	1	353,486,691	31,016,187,600	353,486,691	31,016,187,600	636,044,160
Piperoof Jacking Work/Joint Waterproofing	LS	1	4,236,600	1,551,694,000	4,236,600	1,551,694,000	18,372,532
Facilities	LS	1	6,654,530	3,470,071,000	6,654,530	3,470,071,000	38,266,877
Sub Total					737,972,990	132,051,492,800	1,940,962,089
②-1 Undreground Passageway on The East side of Thamrin Street							
Stairs Work	LS	1	531,300	222,173,000	531,300	222,173,000	2,555,296
Station Reconstruction Work	LS	1	63,760	132,193,000	63,760	132,193,000	1,268,038
Sub Total					595,060	354,366,000	3,823,334
②-2 Passageway on The East side of Thamrin Street							
Steel Structure Work	t	45.4	39,930	20,820,000	1,812,822	945,228,000	10,423,849
ESC(B=1,000mm Rise6,000mm)	Set	2	6,442,010	20,829,000	12,884,020	41,658,000	13,263,524
Surface Work	m2	170	700	1,453,000	119,000	247,010,000	2,369,261
Surface Asfalt Work	m2	170	2,620	549,000	445,400	93,330,000	1,295,636
Roof and Steel Fence	m2	558	189,670	7,943,000	105,835,860	4,432,194,000	146,213,147
Total					121,097,102	5,759,420,000	173,565,418
③-1 Temporary Passageway btw Sudirman Stn. And Artificial Ground							
Steel Structure Work	t	30.5	39,930.0	20,820,000	1,217,865	635,010,000	7,002,806
Surface Work	m2	142	700	1,453,000	71,400	148,206,000	1,421,557
Surface Asfalt Work	m2	142	2,620	549,000	267,240	55,998,000	777,382
Roof and Steel Fence(temporary)	m2	142	66,410	6,943,000	6,773,820	708,186,000	13,225,394
Sub Total					8,330,325	1,547,400,000	22,427,139

③-2 Passegeway around Sudirman St.							
Steel Structure Work	t	58	39,930	20,820,000	2,315,940	1,207,560,000	13,316,812
Surface Work	m2	296	700	1,453,000	207,200	430,088,000	4,125,302
Surface Asfalt Work	m2	296	2,620	549,000	775,520	162,504,000	2,255,931
Roof and Steel Fance	m2	296	66,410	6,943,000	19,657,360	2,055,128,000	38,379,576
Piles(□-200×200)	m	468	250	523,000	117,000	244,764,000	2,346,800
Pile Head Footing	m3	27	5,570	2,327,000	150,390	62,829,000	722,762
Excavation(Including Disposal)	m3	165	950	593,000	156,750	97,845,000	1,048,118
Sub Total					23,380,160	4,260,718,000	62,195,301
④ Passageway btw Artificial Ground and South/East Block							
Steel Structure Work	t	90	39,930	20,820,000	3,593,700	1,873,800,000	20,664,018
Base Concrete Work	m3	38	5,570	2,327,000	213,331	89,124,100	1,025,252
ESC(B=1,000mm Rise6,000mm)	Set	1	6,382,240	27,077,000	6,382,240	27,077,000	6,628,911
Surface Work	m2	203	700	1,453,000	142,100	294,959,000	2,829,176
Surface Asfalt Work	m2	203	2,620	549,000	531,860	111,447,000	1,547,142
Roof and Steel Fance	m2	203	189,670	7,943,000	38,503,010	1,612,429,000	53,192,238
Sub Total					49,366,241	4,008,836,100	85,886,738
⑤ Artificial Ground							
Subsidiary Work	LS	1	5,229,720	3,714,480,000	5,229,720	3,714,480,000	39,068,633
Substructure Work	LS	1	32,542,537	4,472,351,500	32,542,537	4,472,351,500	73,285,659
Superstructure Work	LS	1	965,566,800	60,364,810,000	965,566,800	60,364,810,000	1,515,490,219
Sub Total					1,003,339,057	68,551,641,500	1,627,844,511
⑥ BRT Access Road							
Subsidiary Work	LS	1	531,300	222,173,000	531,300	222,173,000	2,555,296
Substructure Work	LS	1	6,120,450	2,747,595,000	6,120,450	2,747,595,000	31,151,040
Superstructure Work	LS	1	79,195,280	7,556,835,000	79,195,280	7,556,835,000	148,038,047
Sub Total					85,847,030	10,526,603,000	181,744,383
Total Phase-1					2,029,927,965	227,060,477,400	4,098,448,914

4.6.3 Summary of Cost Estimate (Phase-2)

The Project Cost and Construction Cost of Phase-2 were summarized in Table 4.6.4 and Table4.6.5.

Table-4.6.4 Summary of Project Cost (Phase-2)

為替レート ：1IDR=0.00911JPY

Item			Cost		Equivalent Total Amount	
			Mil.JPY	Mil.IDR	in Mil.JPY	in Mil.IDR
A. ELIGIBLE PORTION						
I)	Procurement / Construction	a)=c)+d)+e)	160	10,425	255	27,988
	Phase-2	b)=b1 to b7	3,064	218,301	5,053	554,633
	Passageway btw East and West Artificial Ground	b1	160	10,425	255	27,988
	Passageway btw Airport Line Stn. and MRT Stn.	b2	102	6,924	165	18,120
	Passageway btw Artificial Ground and South/West Block	b3	34	2,999	61	6,731
	Artificial Ground(the East End)	b4	417	25,088	646	70,862
	Artificial Ground(East of Sudirman Bridge)	b5	584	35,124	904	99,229
	Artificial Ground(West of Sudirman Bridge)	b6	1,543	103,717	2,488	273,091
	Access Road from Thamrin/Sudirman Street to Artificial Ground	b7	224	34,024	534	58,612
	Base cost for JICA financing	c)=b)	3,065	218,301	5,053	554,744
	Price escalation	d)	418	113,567	1,452	159,451
	Physical contingency	e)	174	16,593	325	35,693
II)	Consulting services	f)=f1 to f3	174	14,334	305	33,434
	Base cost	f1	146	8,941	227	24,967
	Price escalation	f2	20	4,710	63	6,905
	Physical contingency	f3	8	683	15	1,561
Total (I + II)		g)=a)+f)	3,830	362,796	7,135	783,213

B. NON ELIGIBLE PORTION					
a Procurement / Construction		0	0	0	0
Base cost for JICA financing		0	0	0	0
Price escalation		0	0	0	0
Physical contingency		0	0	0	0
b Land Acquisition		0	0	0	0
Base cost		0	0	0	0
Price escalation		0	0	0	0
Physical contingency		0	0	0	0
c Administration cost	h)	0	7,832	71	7,832
d VAT	i)	0	36,280	331	36,280
e Import Tax	j)	0	0	0	0
Total (a+b+c+d+e)	k)=h)+i)+j)	0	44,112	402	44,112
TOTAL (A+B)	l)=g)+k)	3,830	406,908	7,537	827,325
C. Interest during Construction	m)=m1+m2	155	0	155	17,014
Interest during Construction(Const.)	m1	155	0	155	17,014
Interest during Construction (Consul.)	m2	0	0	0	0
D. Commitment Charge	n)	22	0	22	2,415
GRAND TOTAL (A+B+C+D)	o)=l)+m)+m)	4,007	406,908	7,714	846,754
E. JICA finance portion incl. IDC (A + C + D)	p)=g)+m)+n)	4,007	362,796	7,312	802,642

Table-4.6.5 Summary of Construction Cost (Phase-2)

item	unit	Quantity	Unit Price		Cost		Total
			Foreign	Local	Foreign	Local	
			yen	Rp	yen	Rp	yen
Phase-2							
⑦ Passageway btw East and West Artificial Ground							
Steel Structure Work	t	260	39,930	20,820,000	10,381,800	5,413,200,000	59,696,052
Base Concrete Work	m3	30	5,570	2,327,000	167,100	69,810,000	803,069
ESC(B=1,000mm Rise9,000mm	Set	2	26,325,920	24,995,000	52,651,840	49,990,000	53,107,249
SurfaceConcrete Work	m2	460	700	1,453,000	322,000	668,380,000	6,410,942
Surface Work	m2	460	2,620	549,000	1,205,200	252,540,000	3,505,839
Roof and Steel Fence	m2	500	189,670	7,943,000	94,835,000	3,971,500,000	131,015,365
Sub Total					159,562,940	10,425,420,000	254,538,516
⑧ Passageway btw Airport Line Stn. MRT Stn.							
Steel Structure Work 1	t	130	39,930	20,820,000	5,190,900	2,706,600,000	29,848,026
Surface Work 1	m2	151	2,760	578,000	416,760	87,278,000	1,211,863
Roof and Steel Fence 1	m2	181	189,670	7,943,000	34,330,270	1,437,683,000	47,427,562
Steel Structure Work 2	t	33	39,930	20,820,000	1,317,690	687,060,000	7,576,807
ESC(B=1,000mm Rise6,000mm)	Set	2	6,442,010	20,829,000	12,884,020	41,658,000	13,263,524
ESC(B=1,000mm Rise3,000mm)	Set	2	5,744,020	24,370,000	11,488,040	48,740,000	11,932,061
SurfaceConcrete Work 2	m3	104	700	1,453,000	72,800	151,112,000	1,449,430
Surface Work 2	m2	104	2,760	578,000	287,040	60,112,000	834,660
Roof and Steel Fence 2	m2	186	189,670	7,943,000	35,278,620	1,477,398,000	48,737,716
Excavation(Including Disposal)	m3	224	950	593,000	212,800	132,832,000	1,422,900
Base Concrete Work	m3	40	5,570	2,327,000	222,800	93,080,000	1,070,759
Sub Total					101,701,740	6,923,553,000	164,775,308
⑨ Passageway btw Artificial Ground and South/West Block							
Steel Structure Work	t	90	39,930	20,820,000	3,593,700	1,873,800,000	20,664,018
ESC(B=1,000mm Rise3,000mm)	Set	1	5,744,020	24,370,000	5,744,020	24,370,000	5,966,031
Surface Work	m2	100	2,760	578,000	276,000	57,800,000	802,558
Roof and Steel Fence	m2	129	189,670	7,943,000	24,467,430	1,024,647,000	33,801,964
Base Concrete Work	m3	8	5,570	2,327,000	44,560	18,616,000	214,152
Sub Total					34,125,710	2,999,233,000	61,448,723

⑩ Artificial Ground(the East End)							
Artificial Ground	m2	1,650	253,030	15,205,000	417,499,500	25,088,250,000	646,053,458
Sub Total					417,499,500	25,088,250,000	646,053,458
⑪ Artificial Ground(East of Sudirman Bridge)							
Artificial Ground	m2	2,310	253,030	15,205,000	584,499,300	35,123,550,000	904,474,841
Sub Total					584,499,300	35,123,550,000	904,474,841
⑫ Artificial Ground(West of Sudirman Bridge)							
Subsidiary Work	LS	1	5,161,580	3,487,290,000	5,161,580	3,487,290,000	36,930,792
Substructure Work	LS	1	42,727,190	5,702,852,000	42,727,190	5,702,852,000	94,680,172
Superstructure Work	LS	1	1,495,323,650	94,527,307,000	1,495,323,650	94,527,307,000	2,356,467,417
Sub Total					1,543,212,420	103,717,449,000	2,488,078,380
⑬Access Road from Thamrin/Sudirman Street to Artificial Ground							
Temporary Work Road	LS	1	379,880	238,008,000	379,880	238,008,000	2,548,133
PHC-Piles(φ600)	m	1,530	3,950	827,000	6,043,500	1,265,310,000	17,570,474
Excavation(Including Disposal)	m3	1,530	1,770	924,000	2,708,100	1,413,720,000	15,587,089
Footing,Beam Concrete	m3	1,428	4,650	2,423,000	6,640,200	3,460,044,000	38,161,201
Engineering Retaining Wall	m	550	5,440	5,678,000	2,992,000	3,122,900,000	31,441,619
PC Hollow Girder Bridge	m2	2,185	42,510	2,219,000	92,884,350	4,848,515,000	137,054,322
Surface Concrete Work	m3	2,185	700	1,453,000	1,529,500	3,174,805,000	30,451,974
Surface Asfalt Work	m2	2,185	2,620	549,000	5,724,700	1,199,565,000	16,652,737
Road Pavenent	m2	7,363	2,900	608,000	21,352,700	4,476,704,000	62,135,473
Car Guard Fence	m	910	3,830	7,932,000	3,485,300	7,218,120,000	69,242,373
Other Facilities of The Bridge	m2	2,185	35,690	1,121,000	77,982,650	2,449,385,000	100,296,547
Drainage facilities	LS	1	2,218,180	1,156,690,000	2,218,180	1,156,690,000	12,755,626
Sub Total					223,941,060	34,023,766,000	533,897,568
Total Phase-2					3,064,542,670	218,301,221,000	5,053,266,793

4.6.4 Basis and Conditions for Preliminary Cost Estimate

The basis and conditions for Preliminary Cost estimate are shown as follows,

1) Basis and Conditions for Preliminary Cost Estimate

(1) Base Year & Month for Cost Estimate
Sep.2012

(2) Exchange Rate
Sep. 2012
1JPY＝109.77IDR
1IDR＝0.00911JPY
1USD=82.4JPY=9,048IDR

(3) Price Escalation Rate:
Foreign Currency Component(FCC), Japanese Yen : 2.10％
Local Currency Component(LCC), Indonesia Rupiah : 7.10％

(4) Physical Contingency
Construction : 5.0%
Consultant : 5.0％

(5) Interest during Construction（※ Public: In case of ODA Loan）
Public Construction : 1.40％
Consultant : 0.01％

The principal is added the equivalent amount of interest that have assumed to be borrowed.

(6) Tax and VAT
10% for Local Currency Component (LCC)

(7) Rate of Commitment Charges（※ In case of ODA Loan）
0.1％ per year

(8) Administration Cost
5.0% for Local Currency Component (LCC)

(9) Land Acquisition Cost
For cost of land acquisition, there is no land acquisition by adopting the right conversion method to be described later.

4.6.5 Construction Cost

1) Composition of Construction Cost

The Construction Cost consists of the items in Figure. 4.6.1 and Figure. 4.6.2

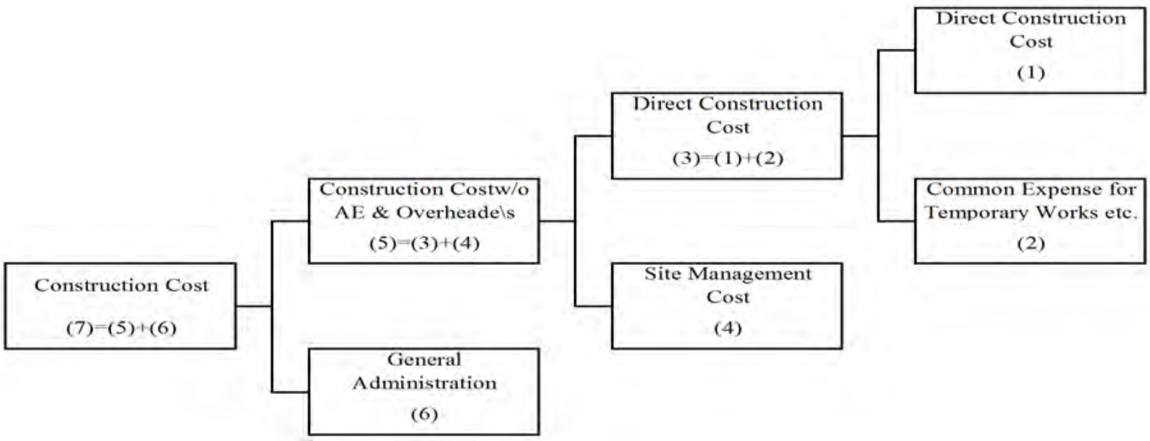


Figure-4.6.1 Components of Construction Cost（1/2）

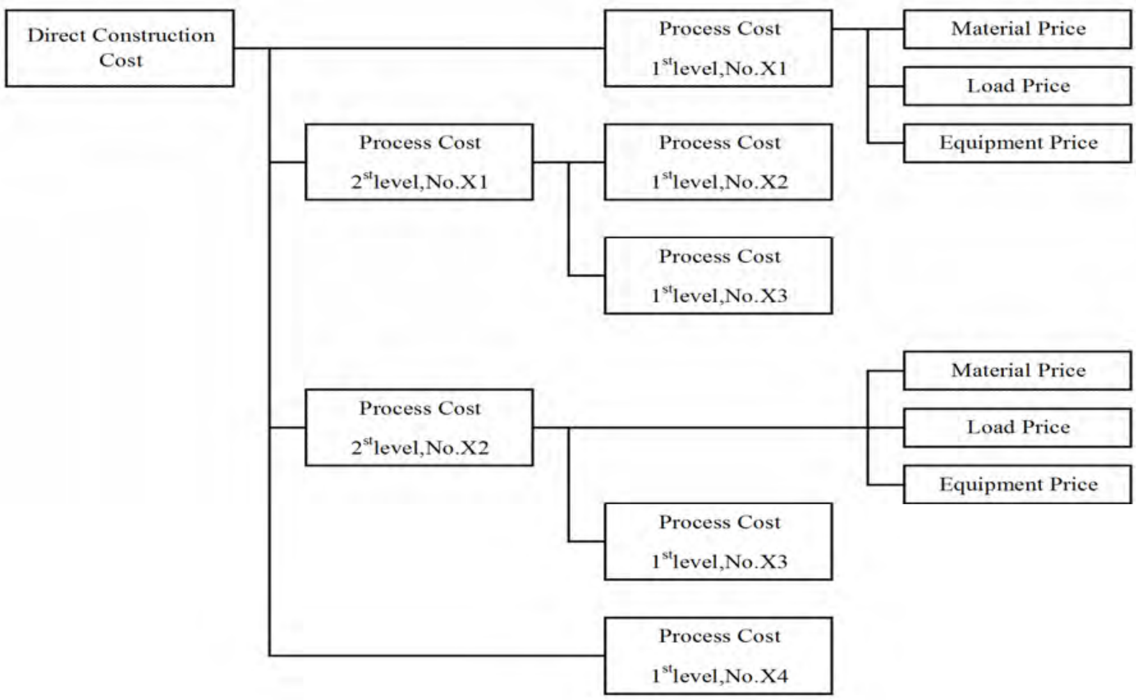


Figure-4.6.2 Components of Construction Cost（2/2）

(1) Direct Construction Cost

The calculation method of Direct Construction Cost was described in the following Table 4.6.6.

Table-4.6.6 Calculation Method of Direct Construction Cost

<Civil Works>
i) General The construction costs were calculated the quantities of major construction works multiplied by the unit prices. The quantities of major construction works were calculated in the Study, and unit prices were set up based Indonesian construction sample and the data of the similar projects etc. Then, the unit prices were assumed with referring to the supplier's quotations. ii) Material Prices Prices of major materials are collected from suppliers in Jakarta, in general. For several materials not available in Indonesia, the import prices from Japan were surveyed. iii) Labor Prices Indonesian labor cost was included in the unit price of each item of Engineering. Salary of Foreign Expatriate was based on Japanese Norm. iv) Equipment Prices Equipment operation cost was calculated including as well as labor cost.
<Architectural Works>
The construction cost for architectural works was estimated by multiplying roof area (m2) and the unit price estimated for artificial ground roof, walkway roof.
<Facilities>
The construction costs for facilities were estimated with reference to the unit price per m2 of three major items "Electrical System", "Air Conditioning & Ventilation System" and "Water Supply & Drainage System" of Japan. The costs for escalators were individually calculated.

(2) Indirect Construction Cost

The following indirect costs were estimated as percentage multiplied to the construction costs generally based on the Japanese standards for construction cost estimate.

- Common Expense for Temporary Works
- Site Management Cost
- General Administration Expenses & Overheads

(3) Items estimated in FCC and LCC

Breakdown of the construction unit price was divided into Foreign Currency and Local Currency on the basis of the possibility of procurement in Indonesia. After the unit price of each item of construction was estimated, the construction costs were calculated to multiply by the quantity.

Items estimated in FCC (Foreign Currency Components in Japanese Yen)

(1) Construction Cost
- Material, Labor and Equipment to be imported
- General Administration Expenses & Overheads in Construction Cost

(2) Interest during Construction for Construction & Consulting Services

(3) Commitment Charge

Items estimated in LCC (Local Currency Components in Indonesia Rupiah)

(1) Construction Cost
- Material, Labor and Equipment to be procured in Indonesia

(2) Administration Cost

(3) VAT

The ratios of cost of FCC and LCC were summarized in Table-4.6.7.

Table-4.6.7 Summary of Cost of FCC and LCC

Item	Cost		
	F.C.C (Mil.JPY)	L.C.C (Mil.IDR)	Total in Mil. JPY
Phase-1	2,757 (45.2%)	366,884 (54.8%)	6,100
Phase-2	4,007 (51.9%)	406,908 (48.1%)	7,714

4.6.6 Consulting Service Fee

The assumed Consulting Services in the Project Cost were summarized in the followings:
Public Sector

(1) Project Management Consultant, including
  - Coordination of design and construction between Public and Private
  - Project Management and Advisory Services for the Employer

(2) Detail Design（Public）

(3) Construction Supervision (Public）

Chapter 5. Facilities Introduced by the Private Sector

5.1 Planning Area of Facilities Introduced by the Private Sector and Outline

Considering walking distance from the station, the scope to perform facility plan introduced by Private Sector in this plan is in the range north of the west line and both sides of Thamrin / Sudirman street, about 6.2ha area. The number of households of each area are approximately as follows:

Table-5.1.1 Area and Households （Source: Study Team）

	Area（ha）	Households
A Block	1.55	67
B Block	0.92	16
C Block	1.32	18
D Block	2.38	107
Total	6.17	208

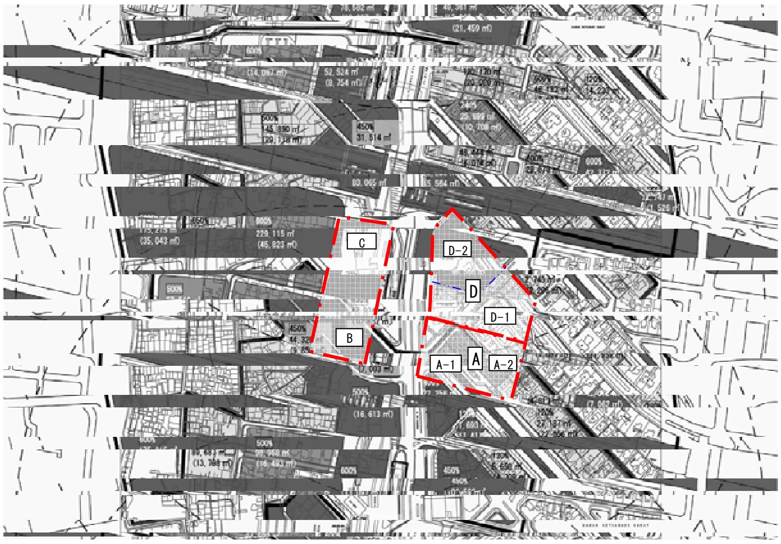


Figure-5.1.2 Planning Area of Facilities Introduced by the Private Sector （Source: Study Team）

Development costs and assuming maximum development area of each block is as follows.

Table-5.1.2 Floor Area and Assumued Development Cost of Each Block （Source: Study Team）

	Floor Area（ha）	Assumued Development Cost (Bil IDR)
A Block	23.0	2,800
B Block	14.0	1,700
C Block	19.0	2,400
D Block	35.0	4,300
Total	91.0	11,200

5.2 Development Planning Policy

5.2.1 Key points for planning the development of centers in integrated station - urban area development

The aim at the planning site is for public transport oriented urban development that integrates the railway station, transport node development and the surrounding area. Considered from the standpoint of center construction, five perspectives that should be incorporated: the formation of centers, foot traffic, the centralization of functions, creation of identity and environmental consciousness. These perspectives will be key to the successful formation of an attractive and compact city.

Key points for planning the development of centers in integrated station - urban area development
(1) Formation of Centers → Improved convenience and modal shift through high-density development centering on the railway station (2) Foot traffic → Improved ability to walk through the city through integration of the railway station with the city (3) Centralization of Functions → Creation of attractive urban area and vibrant activity through the introduction of high-level complex use, cultural facilities etc. (4) Creation of Identity → Creation of an urban identity by means of a “face” that has impact (5) Environmental Consciousness → Use of natural energies to reduce environmental load

1) Planning point (1): Formation of Centers

→ Improved convenience and modal shift through high-density development in the station area

A compact city that is very convenient for station users and visitors will be formed through the introduction of high-level, multipurpose land use and the placement of volumes that concentrate facilities primarily in areas right next to the station.

Central stations are the starting point for the area and require a station facility plan that is straightforward and “barrier-free.” This increases the ease of railway use and makes it easy to transfer to other forms of public transport, making the movement of people more efficient.

Along with railway station construction, traffic plazas (which serve as transport nodes) that are suitable for a central station should be secured, and public transport facilities should be upgraded. This will increase the convenience of transferring to means of transport within the region through smooth connections with railways and the construction of urban infrastructure. It will also create pedestrian spaces and places for people to congregate, providing connectivity with the surrounding area.

Furthermore, the vehicular transport load should be reduced and restrictions should be placed on the inflow of vehicles to the station area to alleviate congestion. This will secure safe and comfortable environments for pedestrians. The result will be an increase in the attractiveness of the region and the creation of vibrant activity centering on the station, helping to form a rich pedestrian environment.

Constructing station facilities and public transport facilities and concentrating development in the area right next to the station will increase the continuity and convenience of the area and achieve urban planning that is not overly dependent on vehicular transport. The result will be a public transport oriented community.

2) Planning point (2) Foot traffic

→ Improved ability to walk through the city through integration of the railway station with the city

Railway and station facilities, road infrastructure and so on should be constructed in an integrated manner and a pleasant and easily understandable pedestrian network should be formed. This will be a wide-area network that matches the topography and the centralization of functions and connects the station and the surrounding area on multiple levels. Moreover, longitudinal axis spaces that connect to this network will be placed here and there in the area around the station, forming an urban area that does not simply function as a space for movement and a gateway to the area but creates spaces for people to relax and congregate and forms a city environment that encourages foot traffic.

In order to create a pedestrian network centered on the station, it would be best to connect and construct the surrounding buildings so they are integrated with station facilities. However, normally urban development construction is done in stages in accordance with the increased momentum for development. It is essential to establish an overarching policy for the entire district and individual city blocks so they share a common future vision for the pedestrian network in the district. Based on this shared vision, building developers can secure access paths to the continuous pedestrian routes underground or overhead (on elevated walkways) at the time of development, and can expand the pedestrian route further to other city blocks and so on. This will achieve urban planning that creates continuous vibrant activity over a wide area with the station at the center, and allows pedestrians to enjoy walking through the city safely and securely.

3) Planning point (3) Centralization of Functions

→ Creation of attractiveness and vibrant activity through the introduction of high-level complex use, cultural facilities etc.

In order to create attractiveness and vibrant activity in the city, use introduced in the area right next to the station must not be single use; rather, high-level complex use including offices, commercial establishments, hotels, residences, entertainment and culture, lifestyle support facilities and so on should be promoted to encourage many people with various objectives to congregate at the station. This will enable the city to develop as one that is always a place of vibrant activity, day and night, on both workdays and non-workdays.

Providing low-rise commercial establishments and giving consideration to ensuring the continuity of the station with the surrounding area will incorporate the existing vibrancy into the development area. Moreover, the convenience of a good location right next to the station can be used to form a center of vibrancy that includes new station users as well. Meanwhile, creating layers of different uses that are separate from the office functions — for example, places of entertainment and cultural facilities and lifestyle support facilities on the upper floors — will produce a vertical movement of people with different objectives coming and going.

This will be integrated with the vibrant activity of commercial establishments on the lower levels (placed continuously starting from the station) to achieve further vibrant activity.

The introduction of cultural facilities and the like is also an element that gives character to the city and serves to promote the city to other cities as well, creating a center for the communication of information about cultural and artistic activities, one that appeals to a wide range of customers.

4) Planning point (4): Creation of Identity

→ Creation of an urban identity by means of a “face” that has impact

The railway station is the gateway to the city, and its features will define the city. For this reason, it is important for it to embody the city’s identity.

At Tokyo Station, the gateway to the capital, the Marunouchi entrance has a restored historical station building. In contrast, the Tokyo Station Yaseu Entrance Development project used a large roof with a membrane structure to create a new gateway that imparts an impression of innovation and ultra-modernity to the capital. It is essential to form the city’s identity through this type of symbolic building style and distinctive facade.

Creation of a continuous space between the station and the surrounding area is also important. A continuous space is essential to provide visitors with a sense of arrival, that they have reached their final destination. At Minatomirai Station, a station core has been constructed that provides integrated development of the station and the station area.

In integrated station - urban area development, the station space where many visitors and station users gather must effectively present an identity that is unique to that city.

5) Planning point (5) Environmental Consciousness

→ Use of natural energies to reduce environmental load

As noted earlier, integrated station - urban area development will enable public transport centered urban development and the achievement of a low carbon city. In this study, we stress the importance of efforts to reduce environmental load through the active use of natural energies. Integrated station - urban area development is an effort to concentrate high-density urban activity in the central area around the station, and the use of natural energy is the most effective way to reduce environmental load.

The effective use of natural energy is key to the centralization of urban activity and integrated station - urban area development.

5.2.2 Facilities Introduced by the Private Sector

1) Introduction of Complex Use to Create a City of Vibrant Activity Regardless of the Day or Time

The city center of Jakarta focuses primarily on offices and business functions for business and production activities, in addition to luxury hotels, commercial establishments, eating and drinking establishments and city center residences and service apartments whose main role is to provide business support, interaction functions and tourist functions.

Peripheral functions will include the following:

- Creation of a culture and arts hall that will characterize the city and an information infrastructure for activities
- Creation of spaces where people with diverse objectives can congregate, interact and communicate
- Vibrant activity created by amusement and recreation functions and functions for off-time activity
- Urban development that creates a city that is easy to work in, through the introduction of lifestyle and cultural support functions (childcare assistance, hospitals, public libraries, sports gyms, etc.)
- Education and cultural functions created through the improvement of business skills and lifetime learning functions (satellite campuses, graduate schools, cultural schools, etc.)

These functions will create a city that offers vibrant activity regardless of the day or time.

2) Gateway Character and Centralization of Functions as an International City and a Terminal Station for the Airport Express Line

As the gateway to Jakarta for international passengers, the introduction of convenient functions for the Meetings, Incentives, Conventions and Exhibitions Industry (MICE) and the centralization of government agencies with international functions and so on can be expected to help Jakarta develop as an international city.

- A large conference room and support facilities as a peripheral function for the Convention Center
- Service and concierge functions for foreigners residing in Indonesia
- Creation of an Information Center that will centralize tourist, information, and communication functions for the entire country of Indonesia in order to welcome visitors

Figure-5.2.1 Positional Relationship of Convention Center and Planning Site

(Source: Study Team)

3) Horizontal and Vertical Routes to Facilitate Foot traffic

In integrated station - urban area development, it would be most efficient to construct foot traffic routes that are designed to produce convenience and efficiency so as to extend across both public and private sites. Even for individual buildings, effective horizontal and vertical routes will need to be upgraded and constructed within buildings as public facilities.

5.3 Preparatory Study of Facility Scale

5.3.1 Study of Use Configuration

1) Examples of typical large-scale complexes in Japan

As noted earlier, transforming the planning site into a central urban core of Jakarta will require high-level complex use and the creation of vibrant activity in the city. Accordingly, a comparative study will be conducted of the use of major development projects in Japan to serve as a foundation for the use framework for this project.

The case studies that have been selected are the Roppongi Hills and Tokyo Midtown developments in Tokyo’s Roppongi district that opened one after another at the beginning of the 2000s and received a tremendous amount of publicity; Queen’s Square and Landmark Tower, which constitute the new face of Yokohama’s Minato Mirai district; and the Shinagawa Intercity and Shinagawa Grand Commons developments that opened at the beginning of the 2000s at the east entrance to Shinagawa Station in Tokyo.

Each of these developments is even now recognized as a large-scale development brimming with vitality, one that commands a high market price. Moreover, the emphasis on “mixed use” within a single development has created diversity in the type of people it attracts and affinity with the local community, and the developments have maintained a high ability to attract customers, both day and night, and on both workdays and non-workdays.

In terms of use configuration, office use is the dominant type of use, accounting for 50% or more. However, there is a good balance with other types of use — commercial, cultural, hotel, and residential — as well. Moreover, in accordance with the topographical features of the development site and the development concept, consideration also must be given to ensuring variety by stressing commercial use in some cases and emphasizing hotel or residential use in others.

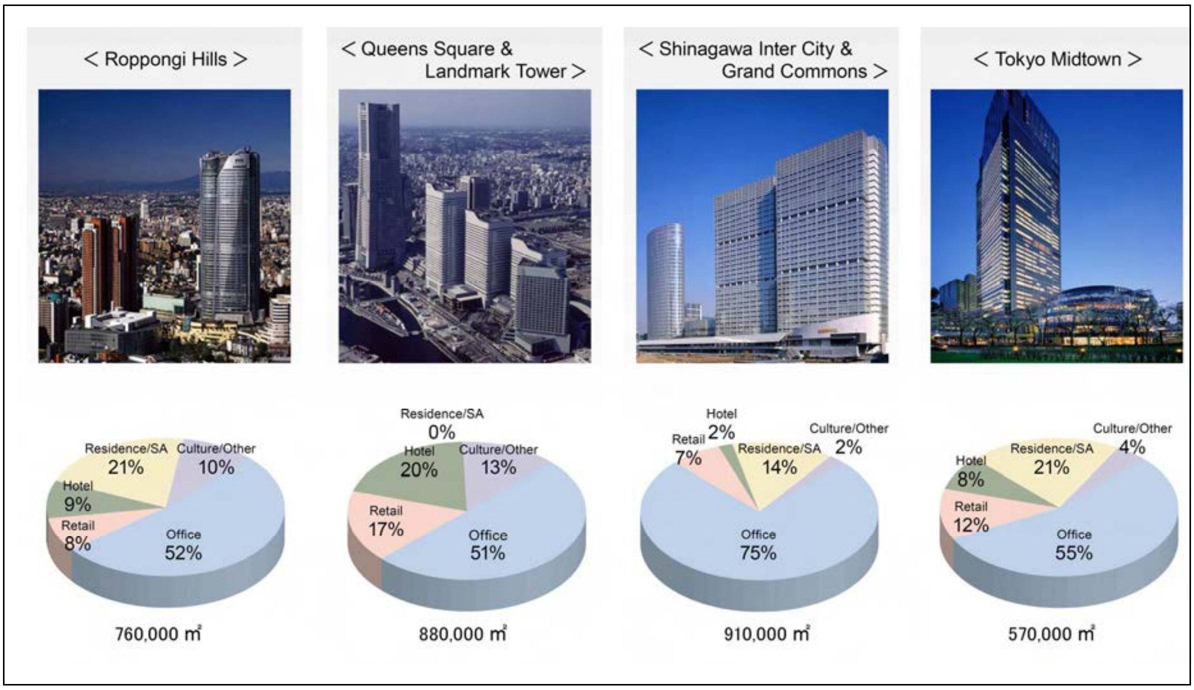


Figure-5.3.1 Comparison of Use of Large-scale Facility Complexes

(Source : Prepared by Study Team to use http://www.mori.co.jp/, NIKKEN SEKKEI, http://www.obayashi.co.jp/)

2) The Presumed Use of the Planning Site

Based on these case studies, the presumed use of the planning site is established as below.

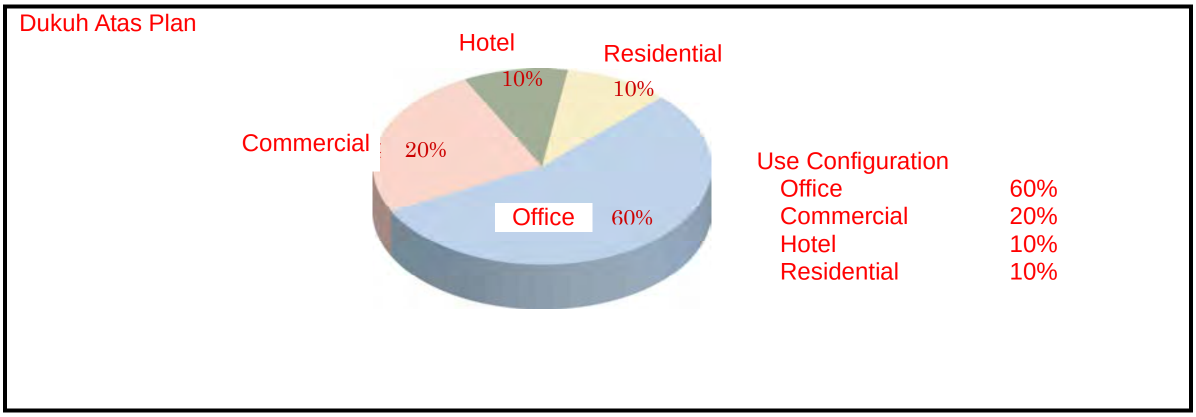


Figure-5.3.2 Use Configuration Planning for Dukuh Atas Area (Source: Study Team)

5.3.2 Planning policy for floor area

1) Japan's Capital Sphere

Japan's capital sphere is a metropolitan area covering 70 kilometers with 37 million people. It is the world's largest metropolitan area, and its framework is determined by its railway network. In no other place in the world is there such an enormous metropolitan area in which people are not dependent on automobiles because the area is connected by mass transit. In this way, Tokyo is a Japanese-style model for urban design. Transit networks that are centered on railways are formed in a concentrated manner, and these networks make it possible to establish a metropolitan sphere that supports a population that is greater than any other city on earth. The establishment of this metropolitan sphere dramatically increased the efficiency and convenience of economic activities, and it was one of the major factors supporting Japan's remarkable economic growth.

2) Designated Ratio of Building Volume to Lot and Assessed Ratio of Building Volume to Lot in Central Tokyo

(1) Tokyo Station Area

The districts of Marunouchi, Otemachi, Yurakucho, and Yaesu that comprise the central core of Tokyo are located in the area surrounding Tokyo Station.

The designated ratio of building volume to lot is 800% to 1,300%. However, these districts belong to the Special Urgent Urban Renewal Development Zone, enabling the ratio of building volume to lot to be increased because of their contribution to the public good (including areas outside of the site). This enables the maximum limit for the assessed ratio of building volume to lot to be increased to 1,630%.

(2) Shinjyuku Station Area

The site of a former water purification plant that existed on the west side of Shinjuku Station became a skyscraper district beginning in the 1970s, with a designated ratio of building volume to lot of 1,000%. As a result of the creation of vacant lots within the site and other factors, the assessed ratio of building volume to lot is approximately 1,100%. However, there is debate on this subject, to the effect that if this is compared to the Special Urban Renewal District Standards, the increase in the ratio of building volume to lot should be assessed even higher. There are some buildings near the station with a value of 1,370% as a result of the Special Urban Renewal District Standards.

The area on the east side of the station has a designation of 800% to 900%. However, together with the west entrance, there is momentum for future redevelopment in the area around the station, and it is possible that buildings with an assessed ratio of building volume to lot equal to that of the Tokyo Station area will be created.

The high ratio of building volume to lot of the Tokyo Station and Shinjuku Station areas is made possible by public transport oriented urban design.

3) Dukuh Atas Development Framework

As noted in Chapter 2, the designated ratio of building volume to lot is currently being studied within the municipal government.

As a project framework, it is proposed that the development profits from future development projects be returned to public facility construction. Accordingly, as the amount of development profits that can be returned is coupled to the ratio of building volume to lot that can be used, it is possible that, depending on the results of the study, a ratio of building volume to lot of 1,000% or 1,500% will be needed. However, the values indicated above are for a major city in Japan's capital sphere, one with a high ratio of building volume to lot in which public transport oriented urban development is possible. In cities other than Tokyo, for example in New York, values of 2,000 are achieved, and the city is similar to Tokyo in the sense that it has a well-developed subway network. As the city of Jakarta continues to develop into a major city, public transport oriented urban development will proceed and it is very possible that Jakarta will also become a city that achieves a high ratio of building volume to lot. It is essential that the designated ratio of building volume to lot and , the designated ratio of building volume to lot will be determined taking into consideration future development profits.

A study of the public facility construction scheme by means of return of development profits from future development projects to public facility construction was conducted in Chapter 8 of this study. For sensitivity analysis results, the planned ratio of building volume to lot is tentatively established as 1,500% from the yield of the property investment. This planned ratio is considered to be feasible by reestablishment of the urban infrastructure involving a traffic infrastructure and a pedestrian network, the utilities infrastructure including waterworks and sewerage, and others.

From the building layout on site and the planned ratio of building volume to lot at the current stage, the allowable floor area according to the code is obtained as approximately 900,000 m2, which exceeds the Roppongi Hills, one of the largest-scale redevelopment projects in Japan.

5.3.3 Future survey and study required by use of building and an increase in floor area ratio

Regarding the building uses assumed in its study, a survey on the main points listed below will be conducted in the future. In the process of the survey, while examining the feasibility of the uses, it is essential to achieve a balance between the grade of facility use suited to this project and the expected synergy effects among them as a complex-use facility.

1) Market survey for use of building

① Office

② Commercial

③ Hotel

④ High-rise apartments

2) Survey of demands and supply trends by use

① Office

- Survey of specifications for offices by class and region
- Special specifications (dealing room, etc.)
- Survey of rents by class and region
- Survey of the current status and future predictions of the industry structure

② Commercial (specialty stores, department stores, large specialty stores, foods supermarkets, etc.)

- Survey of commercial specifications by class and region
- Survey of rents by class and region
- Study of the current status and future predictions of the consumption structure

③ Hotel

- Survey of ADRs and utilization rates by class and region
- Survey of the current status and trends of hotel guests in Indonesia and other countries, etc.
- Demand for banquets, necessity for ballrooms, capacity established, and ancillary facilities

④ High-rise apartments

- Survey of the current status and trends of anticipated purchasers by class and region
- Survey of rents and selling prices by class and region, etc.

3) Survey of operating cost

① Office

- Lease management fees
- Building management fees
- Insurance premiums
- Utility charges
- Real estate taxes

② Commercial

- Lease management fees
- Building management fees
- Insurance premiums
- Utility charges
- Real estate taxes

③ Hotel (management contract type)

- Personnel cost
- Operation cost of restaurants and the purchasing cost
- Building management fees
- Insurance premiums
- Utility charges
- Real estate taxes

④ High-rise apartments

- Lease management fees
- Building management fees
- Insurance premiums
- Utility charges
- Real estate taxes

4) Demands for public, cultural, and life assistance facilities

① Public facilities

- Library
- Community service facilities

② Cultural facilities

- Music hall
- Art museum

③ Life assistance facilities

- Facilities to support families raising children
- Educational facilities
- Medical services and clinics
- Foreigner services facilities
- Elderly life assistance facilities

Based on the results of surveys above, a scenario for facility composition will be determined and along with the assessment of the business viability, an overall program is established.

5.4 Reference information of planning for Facilities Introduced by the Private Sector

1) Example of Formation of Centers

[Case Study: Shin-Yokohama Station (Following Vertical Restructuring of the Station Plaza)]

The Shin-Yokohama Chuo Building is a terminal complex that integrates Shin-Yokohama Station on the Tokaido Shinkansen (Bullet Train) Line with the station plaza, hotel, commercial establishments, eating and drinking facilities and so on. This facility serves as a transport center that connects transport networks over a wide area in Yokohama City.

The purpose of this project was to accommodate the increased number of bullet train users, and to alleviate pedestrian and vehicular congestion caused by the many foreign-owned and IT companies in the area as determined through an assessment of wide-area transport use.

Along with the construction of upgraded station functions for the Shin-Yokohama bullet train station, the Vertical Urban Planning Program was employed to construct a terminal building within the scope of the station plaza and concentrate vertically (on the 1st and 2nd floors) the functions of the passenger facilities and station traffic plaza that had previously been placed beneath the railway tracks. The project was a joint public sector-private sector development project and was not limited to improving the station house and station building but also included the construction of an elevated walkway (which connects the station entrance with the surrounding city zones on the same level), a taxi pool, a bus depot and other urban infrastructure, in order to create a center that improves convenience and makes it easy to walk throughout the entire area.

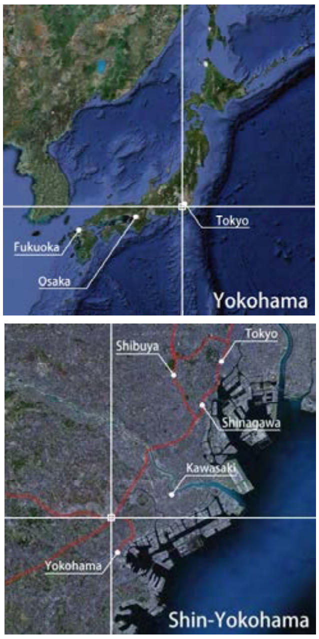



Photo Source：NIKKEN SEKKEI


Before

http://www.city.yokohama.lg.jp/toshi/tosai/seibi/pdf/sinyoko.pdf

Offices and commercial establishments

Hall for special events

Hotel

Stadium Hospital Entertainment facilities

Figure-5.4.1 Shin-Yokohama Station Following Vertical Restructuring of the Station Plaza

(Source: Prepared by Study Team to use http://www.yokohama-arena.co.jp/, http://www.yokohamah.rofuku.go.jp/, http://www.raumen.co.jp/home/, hhttp://www.princehotels.co.jp/, http://www.nissan-stadium.jp/)

2) Example of Foot traffic

[Case Study: Shibuya (currently implementing plans to create an elevated pedestrian network that utilizes the topography of the area)]

The Hikarie Shibuya New Cultural District is a leading project for development in the area of Shibuya Station, one of the busiest railway stations in Japan, where eight railway lines converge.

Building on the momentum from the construction of a new public transport system, a series of station area development projects is being conducted in the area around Shibuya Station. The goal is to promote comprehensive urban development of the area as a model district that promotes an urban renaissance in Tokyo.

Among these projects, the Shibuya New Cultural District will restructure the station and the infrastructure in an integrated manner, as the starting point for a network that is open to the Shibuya area, with the aim of constructing a multilevel pedestrian network that connects to the infrastructure in the central station district. Natural energy will be actively employed to help reduce environmental load, for example by promoting energy conservation in the adjacent public transport facilities. In addition, a facility complex with a theater that features primarily musicals will be created to enhance the functions of Shibuya as one of Japan's centers for cultural communication.

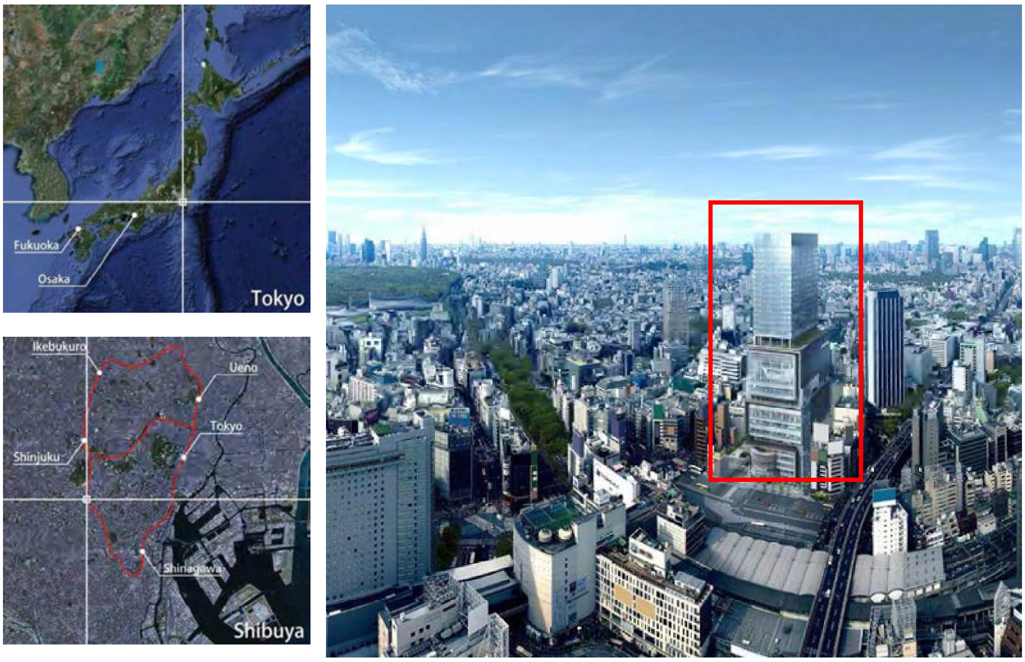


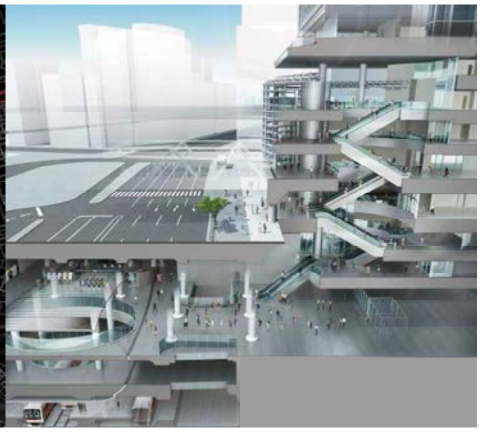
Figure-5.4.2 Shibuya — Currently Implementing a Plan to Create a Network of Elevated Walkways Utilizing the Topography of the Area (Source: Tokyu Corporation)

Eight railway lines converge at Shibuya Station, serving some three million passengers per day. This makes Shibuya one of the busiest railway terminals in Japan. From Shibuya Station, it takes 7 minutes to reach Shinjuku Station, 11 minutes to reach Shinagawa Station, 22 minutes to reach Tokyo Station and 26 minutes to reach Haneda Airport. In this way, Shibuya Station offers quick access to major areas in the center of Tokyo, and commercial, business, and cultural functions are concentrated here. Shibuya is an area in which many young people have congregated in recent years, and in which a new culture is being born.

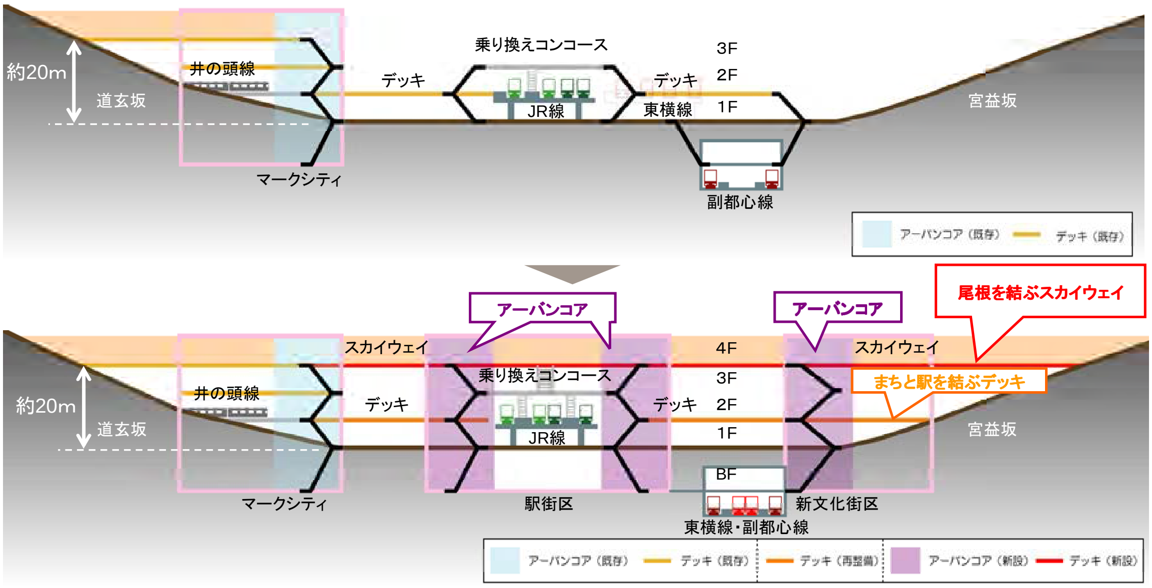
This network of elevated walkways, scheduled for completion in FY 2012, is expected to spur a large-scale development project centering on the station that is currently being studied, one that takes advantage of the restructuring of the urban infrastructure in the area around Shibuya Station. Along with the upgrading of the station infrastructure, the project involves integrated large-scale development planning and construction that takes advantage of the relocation of the Ginza Line (for which Shibuya Station is the terminus) and the start of mutual direct operation of the Fukutoshin and Tokyu Toyoko (underground) lines.

The valley topography of the area around Shibuya Station forms a pedestrian environment that is rich in variation, prominently including hills such as Miyamasuzaka and Dogenzaka. In the Shibuya New Cultural District, located at a place that is linked to the valley topography, the city is working to build a pedestrian network on multiple levels, with this area as the origin of a network that is open to the Shibuya area. “Urban cores” (longitudinal nodes) that connect the underground and above-ground areas on multiple levels will achieve barrier-free movement while at the same time enhancing the connectivity and ease of strolling through neighboring areas.

The network will be adjacent to secondary roads on the 1st, 2nd and 3rd floors, and on B3F it will be connected directly to Shibuya Station on the Tokyu Toyoko Line and the Tokyo Metro Fukutoshin Line. In this and other ways, it will increase convenience as a transport node for the area, and it will provide stimulation to the entire Shibuya area by creating activity and enhancing the ability to walk through the surrounding city zones.

(Source:NIKKEN SEKKEI, Tokyu Corporation)



(Source:NIKKEN SEKKEI)

Figure-5.4.3　Shibuya (currently implementing plans to create an elevated pedestrian network that utilizes the topography of the area)

3) Example of Creation of Identity

[Case Study: Yokohama Minatomirai Station Core — A Distinctive Connecting Space between Station and Station Area]

Minatomirai Station — in the international port city of Yokohama, one of Japan's major cities — is located approximately five minutes by train from Yokohama Station. This is a complex waterfront development area centering on the station that consists of three city zones: Pacifico Yokohama, Yokohama Landmark Tower, and Queen's Square Yokohama. Queen's Square Yokohama is one of the largest building complexes in Japan, covering a total area of approximately 500,000 m^2 and comprising three office buildings, hotels, classical music concert halls, commercial facilities and parking areas. The Station Core that links the station with the promenade — the major pedestrian network that forms the framework for the area — is an example of integrated station and station area development.

Figure-5.4.4 Yokohama Minatomirai Station Core (Photo Source:NIKKEN SEKKEI)

The Station Core directly links Minatomirai Station, located underground in the center of the block, with the Queen's Mall indoor promenade, the major pedestrian network in the area. The Station Core is an enormous atrium that extends from B3F to the fifth aboveground floor (5F). This is a dynamic area that not only provides access to high-rise buildings with offices, hotels and commercial facilities but also attracts a variety of people who relax on the benches in the terrace-like plaza, crowds of people who gather for special events, people who enjoy shopping in the stores and so on.

The three buildings that comprise Queen's Square Yokohama are placed in a flying-geese pattern, gradually increasing in height from the ocean to the mountains in the direction of Yokohama Landmark Tower. The heights of the three office and hotel buildings that make up Queen's Square Yokohama were set so as to match the gently increasing height of the skyline from ocean to land in the direction from Pacifico Yokohama to Yokohama Landmark Tower. At 296 m in height, Minato Mirai 21 Landmark Tower on the southwest side has been the tallest skyscraper in Japan since it was completed. Along with the uniquely shaped Yokohama Grand Intercontinental Hotel on the north east side, the three zones form an overall plan called Minato Mirai 21 that creates a suitable cityscape for the waterfront city of Yokohama.

Figure-5.4.5 A suitable cityscape for the waterfront city

(Source: http://www.minatomirai21.com/)

4) Example of Environmental Consciousness

[Case Study: Hikarie, Shibuya — Achievement of a Station with Natural Ventilation]
Under this plan, an atrium space was built inside the building to enable natural ventilation in the adjacent underground station. This promotes reduced energy consumption in the public transport facilities and uses the escalator shafts and void spaces inside the building to secure ventilation paths. Outside air is allowed in at night (night purge). These and other methods are used to actively employ natural energies in order to reduce CO_2 emissions.

The achievement of natural ventilation at Shibuya Station on the Fukutoshin and Toyoko Lines will enable a reduction in the power used for mechanical ventilation, and this will enable CO_2 emissions in all station facilities to be reduced approximately 1,000 t/year. It is also expected to reduce energy requirements through reduced air conditioning load in interim periods, helping to improve the environment outside the site as well.

In addition, the night purge conducted using the escalator shafts and void spaces, the introduction of highly efficient energy systems, the promotion of greening and the like, in addition to suitable energy management once the building has begun operation (such as control of equipment operating times to match business hours and so on) are expected to result in a reduction in energy consumption of approximately 21% (primary energy consumption) as compared to ordinary building levels.

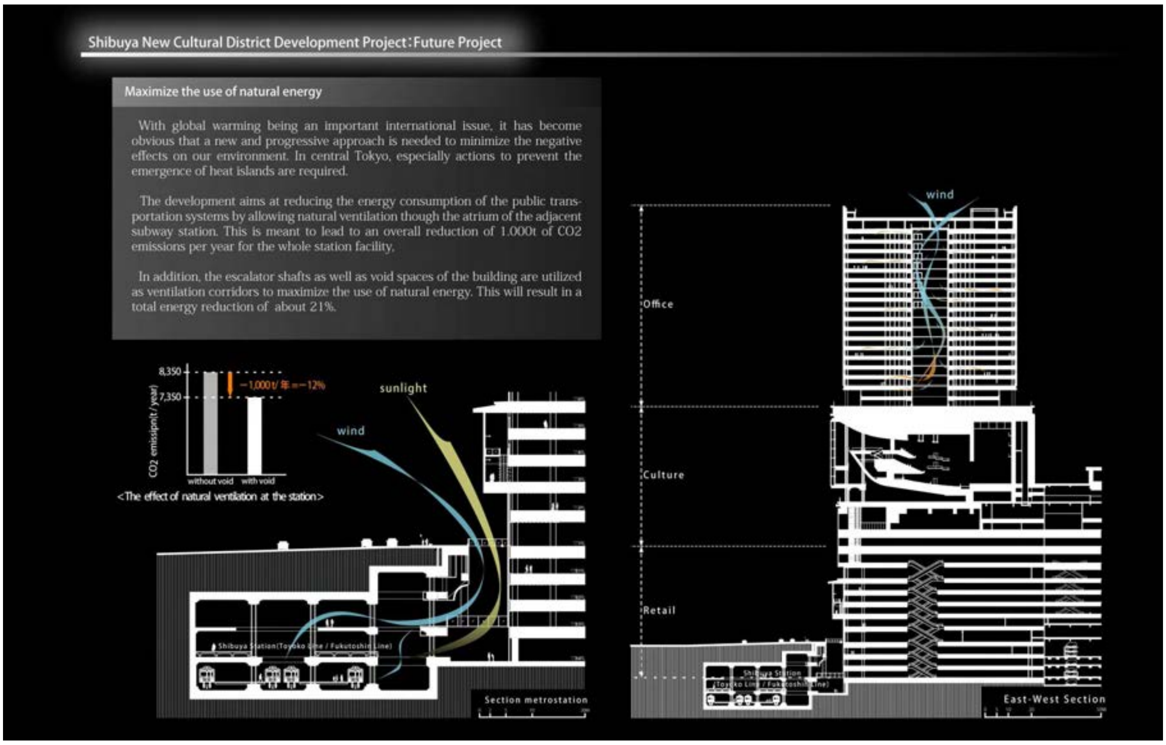


Figure-5.4.6 Achievement of a Station with Natural Ventilation

(Source: NIKKEN SEKKEI, Tokyu Corporation)

5) Example of Cultural Facility Complex

[Case Study: Shibuya Hikarie — a Cultural Facility Complex Specializing in Musical Theater]
Shibuya is home to a collection of content industries that combine creative prowess with communication capabilities, giving it the potential to become an advanced center for the communication of lifestyle and culture. Hikarie is a building that houses three cultural facilities

designed to utilize this potential: a theater that features primarily musicals, an exhibition hall designed to be a center for the communication of new community information, and an academy whose mission is to nurture new creators. This will help to achieve a gateway to Asia that will enhance Tokyo's urban appeal.

Moreover, although there were many cultural facilities in Shibuya, there was no large-scale cultural facility near Shibuya Station. The formation of a space for cultural interchange near a station with great name recognition will dramatically increase Tokyo's communication power as a cultural city, and it will help to expand the diversity of cultural activities of people through improved convenience.

The theater is a hall-style theater suited for musicals that seats approximately 2,000, and is the largest in Japan. It will enable full-fledged cultural communication by featuring musicals and other cultural content with worldwide appeal that everyone can enjoy.

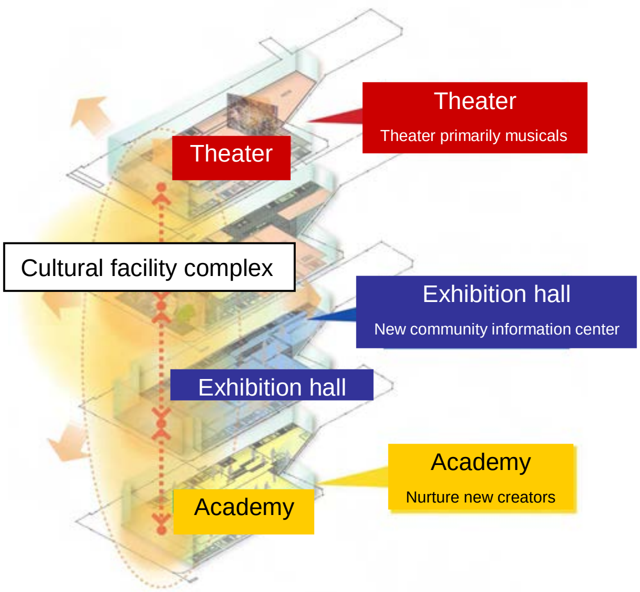


Figure-5.4.7 Cultural Facility Complex (Source: Study Team)

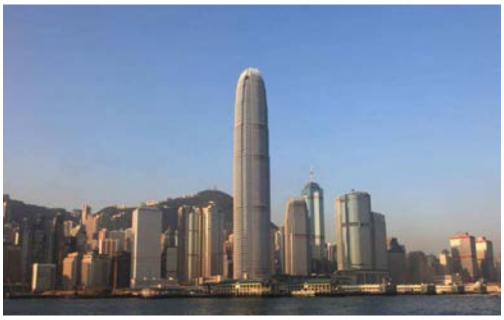
6) Examples of Airport Shuttle Terminal

Hong Kong's International Finance Centre (IFC) Mall is a typical example of the development of an airport line terminal station.

○ Overview of Development

Hong Kong is the world's third largest financial center, behind London and New York, and the largest in Asia. The Central District on Hong Kong Island is the nerve center for financial services and constitutes Hong Kong's political, economic and financial center.

The area is also connected to Central Station on the subway (Hong Kong MTR) and the place where the ferry terminal is located and bus routes converge, so it has also been called a center of transport. For this reason, in view of the profit resulting from the added value of convenience and so on, a facility complex was constructed above Hong Kong Station at the time of the construction of the Airport Express Line.



Business Functions	Offices (Two towers, 415 m and 210 m)
Commercial Functions	IFC Mall (200 stores and 40 restaurants), ranging from brand name shops to supermarkets and including two department stores
Cultural and Interchange Functions	Palace IFC Cinema complex
Accommodation and Residence Functions	Four Seasons Hotel, Four Seasons Place (SA), and Fitness Clubs
Environmental and Disaster Mitigation Functions	Rooftop gardens
Tourism and Conference Functions	Concierge services (approximately 1 km from the Hong Kong Convention and Exhibition Centre)
Transport Functions	Two MTR stations (including the Airport Express Line), bus terminal, taxi bay, airport check-in and left luggage services, ferry terminal, connected to the overhead walkway leading to neighboring city zones

Figure-5.4.8 Analysis of Hong Kong IFC Mall

(Photo Source: NIKKEN SEKKEI

Route map Source: http://www.mtr.com.hk/chi/homepage/cust_index.html)

7) Ratio of Building Volume to Lot in the Tokyo Station area

Tokyo Station

A total of 13 lines (6 JR lines, 6 Bullet Train lines, 1 subway line)

Used by approximately 1.13 million passengers each day

Approximately 75 minutes to Narita Airport

Approximately 36 minutes to Haneda Airport

[Overview]

Tokyo Station is the nearest station to the Marunouchi district, Japan's largest business district. It is the central station in Japan's railway network, where Bullet Trains that provide service to the entire country converge.

Nearby Yurakucho Station is the nearest station to the Ginza district, one of the country's major shopping areas.

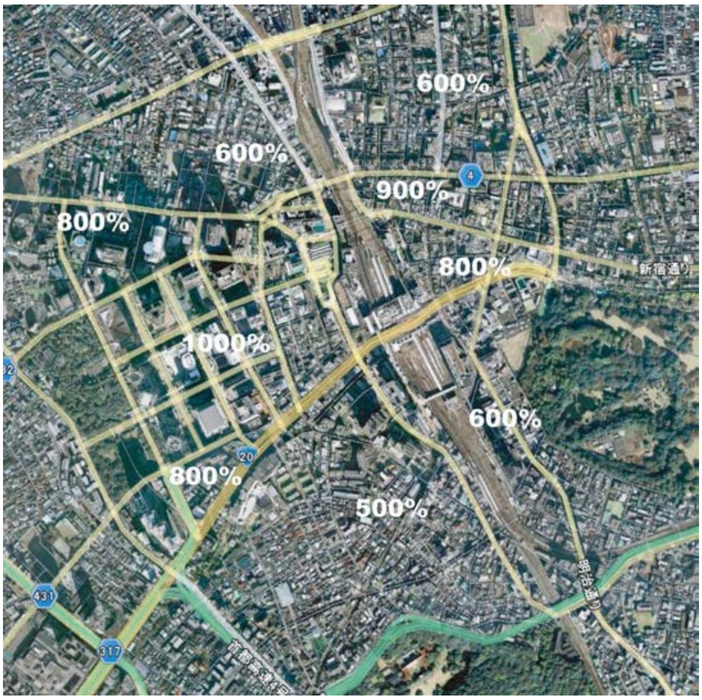
Akihabara, famous for electrical and electronics products, is also only two railway stations away (4 minutes).

Once the Marunouchi district was purely an office-building district. In recent years, low-rise commercial facilities have been introduced to the area, transforming it into an area that is bustling and crowded with people even on non-workdays.

Figure-5.4.9 Ratio of Building Volume to Lot in the Tokyo Station Area

(Source: Study Team)

8) Ratio of Building Volume to Lot in the Shinjuku Station



Shinjuku Station

12 lines (six JR lines, three private railway lines, three subway lines)

Used by approximately 3.61 million passengers each day

Approximately 75 minutes to Narita Airport

Approximately 47 minutes to Haneda Airport

[Overview]

Shinjuku Station is the central station of the suburban area, said to have the highest passenger volume of any station in the world. On the west side is a large-scale office area. In 1991, the Tokyo Metropolitan Government offices were moved here.

In the area above and right next to the station are concentrated department stores affiliated with railway corporations, so the area is always crowded with shoppers. In the 1990s, commercial facility complexes opened on the former site of a railway yard to the south, and a promenade and overhead walkway over the railway station were constructed, creating a new foot traffic route.

Shinjuku Station is the nearest station to the Kabuki-cho district, one of the country's major entertainment districts that is crowded with people both day and night.

Moreover, Shinjuku Station is also the gateway to the city center and the enormous residential areas in the west and southwest parts of Tokyo, and these areas and Shinjuku Station are connected by both JR and private railway lines. The enormous residential population in these outlying areas is another factor that gives Shinjuku Station its tremendous potential.

Figure-5.2.10 Ratio of Building Volume to Lot in the Shinjuku Station Area

(Source: Study Team)

9) Overview of Roppongi Hills

(1) Overview of Roppongi Hills

Table 5.4.1 Overview of Roppongi Hills

Location	6-10-1 Roppongi, Minato-ku, Tokyo, and others	
Construction area	Approximately 11 ha	
Site area	Approximately 8.9 ha	
Total floor area	Approximately 76 ha	
Use	Office、Apartment、Hotel、Shop、Museum、Movie Theater、TV Studio、School、Mosque、Stock Strage、etc.	
Urban planning scheme	Redevelopment district plan	
Business scheme	Category I urban area redevelopment project	Construction by Union
Number of stakeholders	Before: about 500	After: about 400
Chronological development process	1986	Specified as “Redevelopment introduction district.”
	1990	“Redevelopment preparation association” was established.
	1995	Received notification that “the project was determined as an urban plan.”
	2000	“Right conversion plan” was approved.
	2000	Commencement
	2003	Completion

(2) Land use

Features of the land before the project:

- The TV Asahi’s property occupied the center of the planning site.
- Wooden houses, small apartments, and multi-dwelling residential buildings were densely built across a nearly 4-m wide road.
- No access by fire engines was possible, posing problems in fire protection.

August 1999 [Land use before the project]

January 2003 [Land use after the project]

Figure-5.4.11 Land use before and after Roppongi Hills (Source: http://www.mori.co.jp/)

Figure-5.4.12 Capacity and Layout of Major Facilities of Roppongi Hills(Source:http://www.mori.co.jp/)

Table-5.4.2 Major facilities of Roppongi Hills

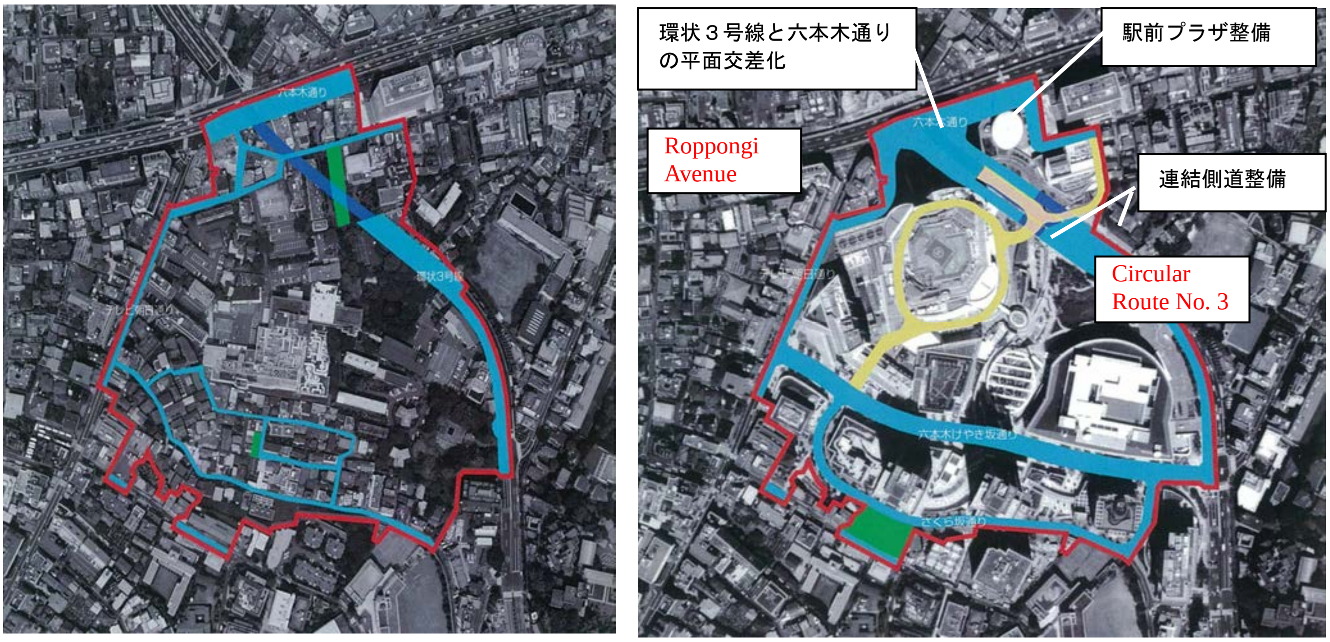
Name	Total floor area	Capacity
Roppongi Hills Mori Tower	379,000m^2	54 stories with 6-level basement
Grand Hyatt Tokyo	69,000m^2	21 stories with 2-level basement
Roppongi Hills Residence A, B, C, and D	150,000 ㎡	43 stories with 2-level basement (Residences B and C)
TV Asahi	74,000m^2	8 stories with 3-level basement

With the concept of "cultural urban center," the Roppongi Hills is a complex town comprising various functions such as "dwelling, working, having fun, relaxing, learning, and creating" which contains offices, residential units, commercial facilities, cultural centers, hotel, cinema complex, and broadcasting center.

This town, a fusion between art and intelligence, is termed "Artelligent City," attracting people from around the world and provides a base to disseminate new cultures and information created from the multicultural interchanges of people.

(3) Construction of public infrastructure

① Connection at grade between Circular Route No. 3 and Roppongi Avenue
② Construction of an elevated plaza
③ Improvement of passages within the district including Keyakizaka Street
④ Construction of a park



Road：About 13,980m^2
Park：About　1,120m^2

Road：About24,000m^2（+10,020m^2）、
Park：About1,540m^2（+420m^2）

Figure-5.4.13　Construction of Public Infrastructure in Roppongi Hills
(Source:http://www.mori.co.jp/)

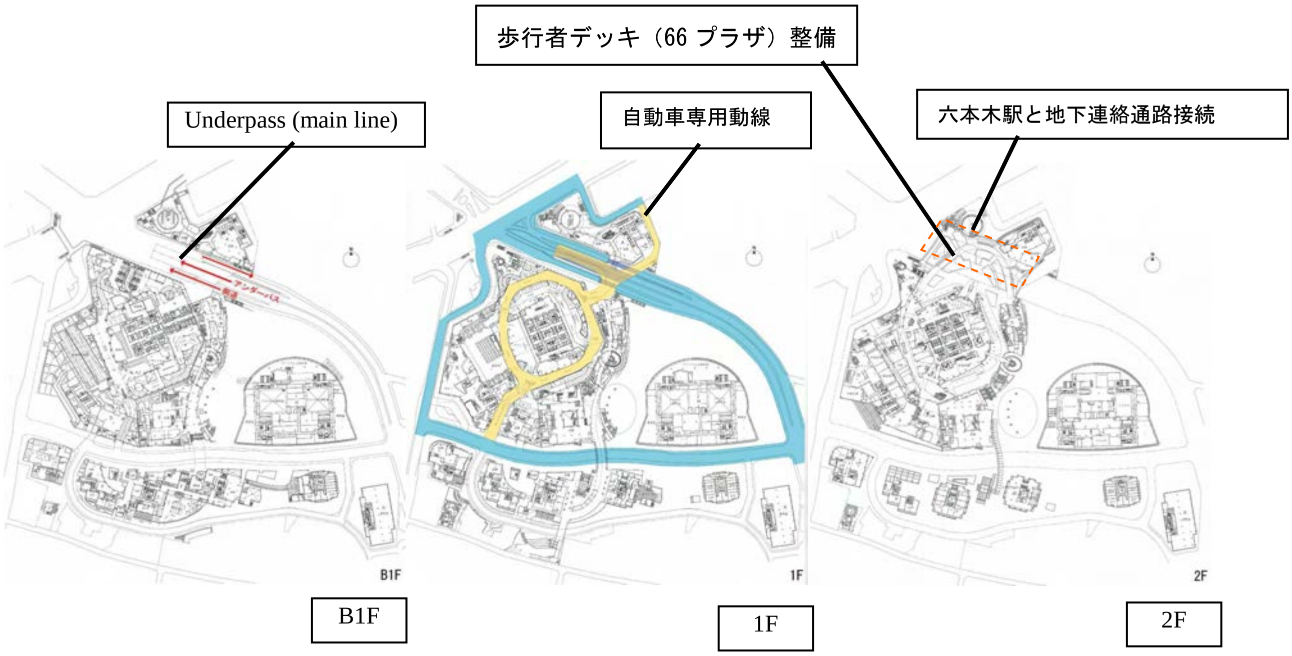


Figure-5.4.14 Public Infrastructure Facilities on Floors of Roppongi Hills

(Source: "KINDAIKENCHIKU",2003.08)

This redevelopment project improved the wide-area traffic network by constructing a side road, which had not been improved, to connect Circular Route No. 3 (on the Azabu-juban side) and Roppongi Avenue at grade.

Above the connecting side road, a plaza-like pedestrian deck (66 Plaza) was installed and the existing underground pedestrian crossing was reconstructed, establishing the current intersection.

The 66 Plaza is linked to the connection passage to Roppongi Station on the Hibiya Line through a direct escalator at the adjoining Metro Hat. This increased convenience of station users and also separated the traffic between pedestrians and vehicles at the Roppongi 6-chome intersection, ensuring the continuity of the townscape from Roppongi to Nishi-azabu.

The 66 Plaza is a three-level structure. Under the plaza, there is a connecting side road and an entrance to a driveway within the site. The Azabu Tunnel runs under the side road. This was only achieved by employing the scheme as an urban redevelopment project by planning the road work and the building work on both sides as an integrated plan and constructing them concurrently.

The main street of the district, "Keyakizaka Street," extends east to west through the district, connecting TV Asahi Street and Circular Route No. 3. Lined with zelkova trees, Keyakizaka Street was constructed as a street space having a virtual width of 24 m including setbacks on the lots on both sides. The integrated construction of the roads and roadway structures has produced a spacious pedestrian space which was designed to be part of the streetscape.

(4) Traffic access

- Directly connected to the stations on the Subway Hibiya Line and the Oedo Line

Figure-5.4.15 Status of Traffic Access to Roppongi Hills(Source: http://www.mori.co.jp/)

(5) Conversion of previous stakeholders' right

The dwelling facilities were planned as four buildings comprising two super high-rise buildings and a mid- and a small-rise building, of which one super high-rise building and the low-rise building were subjected to the conversion of the right of land owners. The rights were converted according to the size of the right they held and through this coordination process, previous right holders occupy about 300 residential units. To deal with the increased running costs for residential units with previous right, the condominium association members collectively own one floor of the office tower while Mori Building operates it and returns the profits to them form life support.

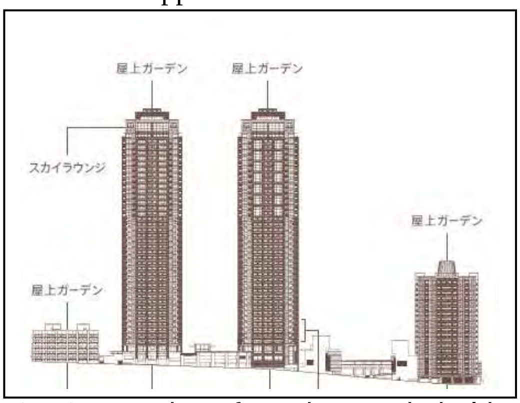


Figure-5.4.16 Conversion of previous stakeholders' right (Source:ZERO-FREE)