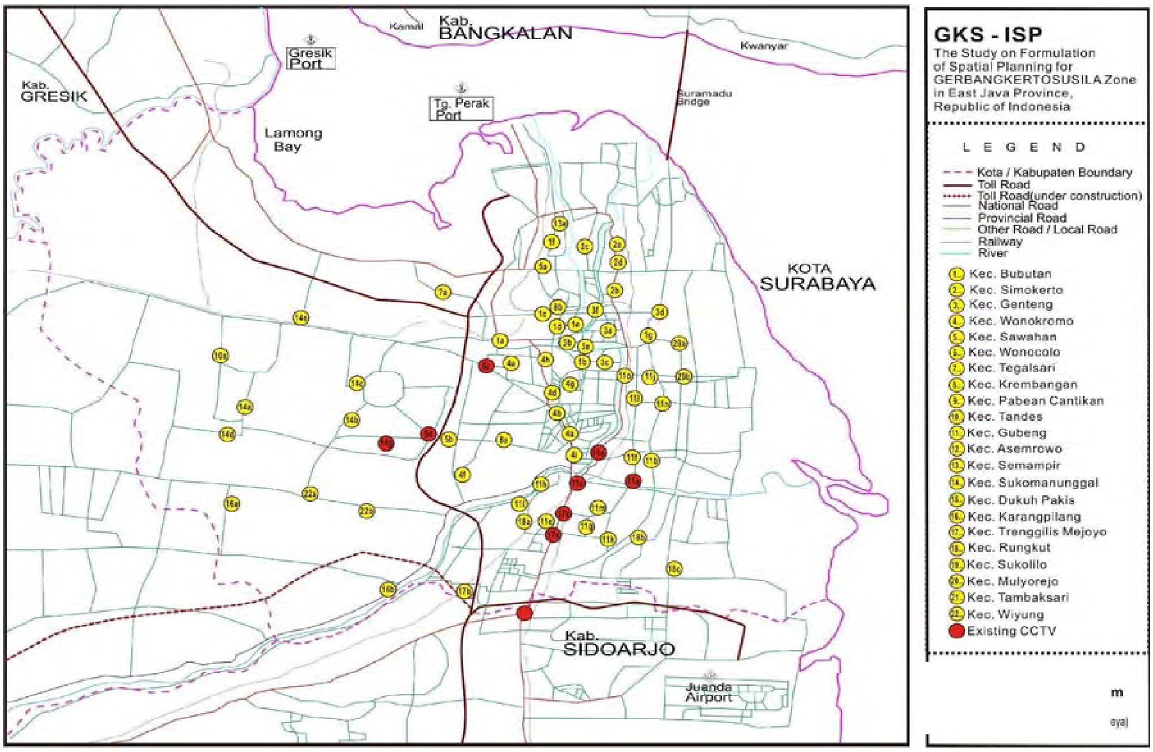
5.3.3 Traffic Control and Management

1) Traffic Information System

Traffic congestion is becoming more serious in the SMA due to the continuing rise in the number of automobiles and motorcycles. An essential element in traffic management is the identification of bottlenecks through such tools as the intelligent transport systems (ITS) technology, optimal traffic signal control, and the provision of traffic information. Traffic conditions in intersections can also be monitored through the ATCS project, currently under way in Surabaya, as shown in Figure 5.3.29. In addition to traffic monitoring, an efficient and inexpensive way of compiling data and disseminating traffic information is also necessary in the SMA.

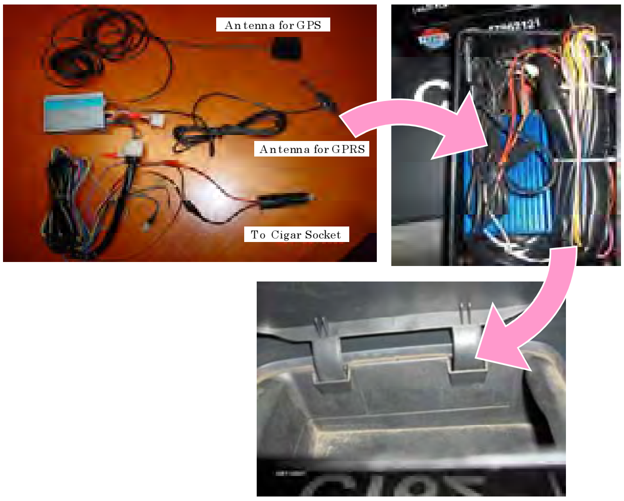


Source: Dinas Perhubungan, Kota Surabay
a

Figure 5.3.29 Planned ATCS System in Surabaya

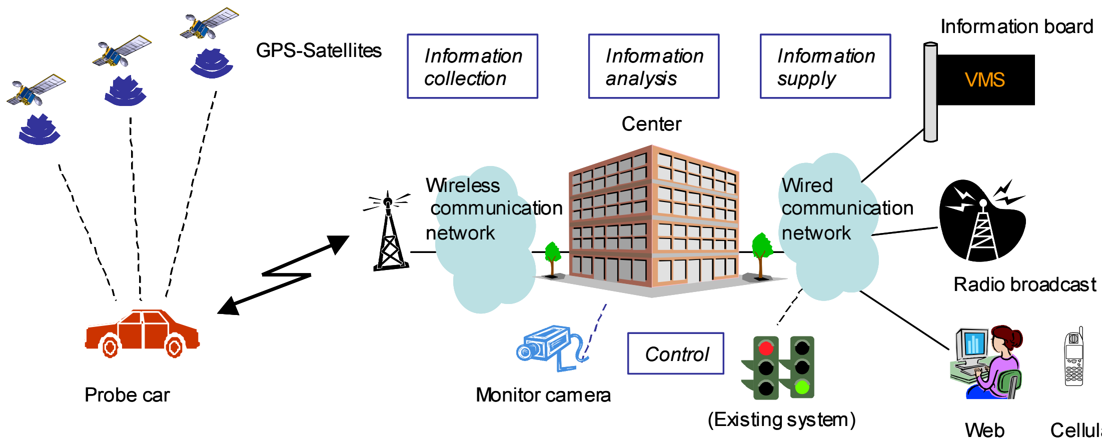
In the travel speed survey, average travel speed on each road section was measured by the obtained floating car data. 50 taxis were utilized in the survey, each equipped with a global positioning system (GPS) device (Figure 5.3.30), which automatically collected and measured data on vehicle location, speed, direction, and time information. The collected data were transmitted to the data center every 20 seconds via General Packet Radio Service, or GPRS. The data were collected over a period of one month for the road sections in which the 50 taxis were driven for every hour. Real time information of traffic speed will be available if enough number of such probe cars are to be utilized

The traffic information system as proposed by the Study Team will include probe cars, a central function, and basic information functions. Figure 5.3.31 illustrates the system outline. The in-vehicle unit installed in the "probe car" will have position detection and transmission capabilities to send the GPS data to the Center via wireless network. Taxis will function as probe cars. At present more than 2,000 taxis are operated in Surabaya. The Center will have data processing capabilities in order to make use of the incoming data, and compile data from multiple vehicles to gain a real-time understanding of traffic conditions.



Source: JICA Study Team

Figure 5.3.30 Example of In-Vehicle Unit

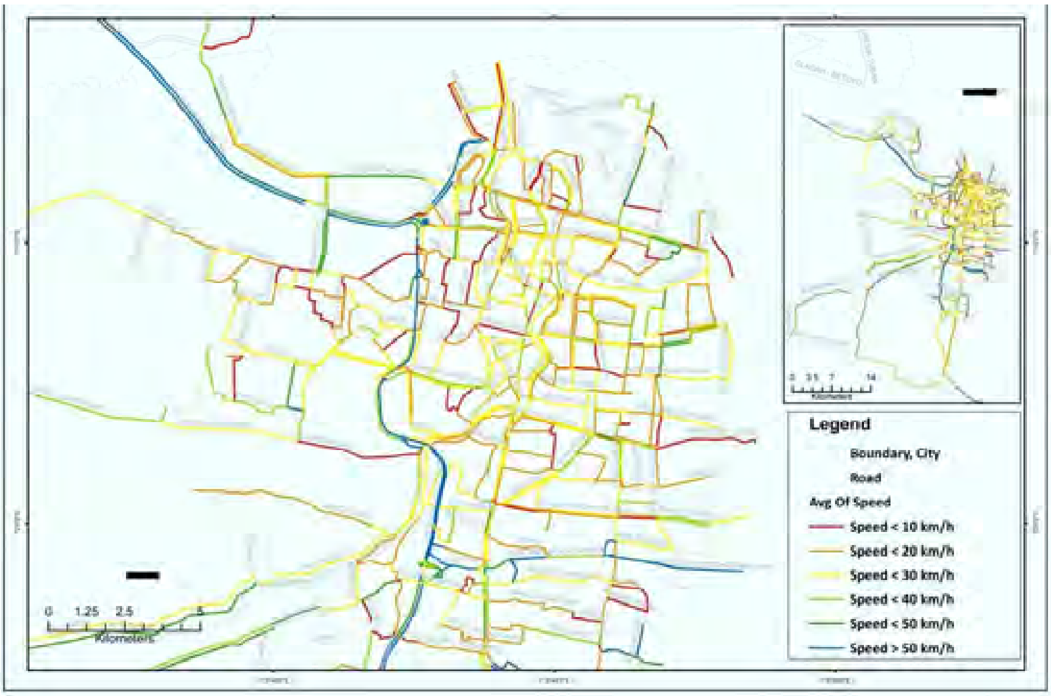


Source: Study on Development of Traffic Information System Aided by Probe Car on Arterial Road Network in Jakarta in the Republic of Indonesia" (JETRO, 2007)

Figure 5.3.31 Traffic Information System Aided by Probe Cars

Average travel time will be calculated for each road segment, after which the average travel speed for the road segment will be estimated. The results will be shown not only on the variable message signboard (VMS) but also on a color-coded map (graphical information board) (Figure 5.3.32). Information on traffic congestion will also be disseminated via the internet to the general public, while specific information, such as traffic conditions in specific areas, will be provided on-demand for a certain fee for users through SMS, or other means.

The proposed traffic information system will eventually be integrated with the signal control server which will have an interface with existing ATCS to send and receive traffic data effectively for signal control. The signal control that is best suited to the traffic situation will be implemented through this form of dynamic information system.

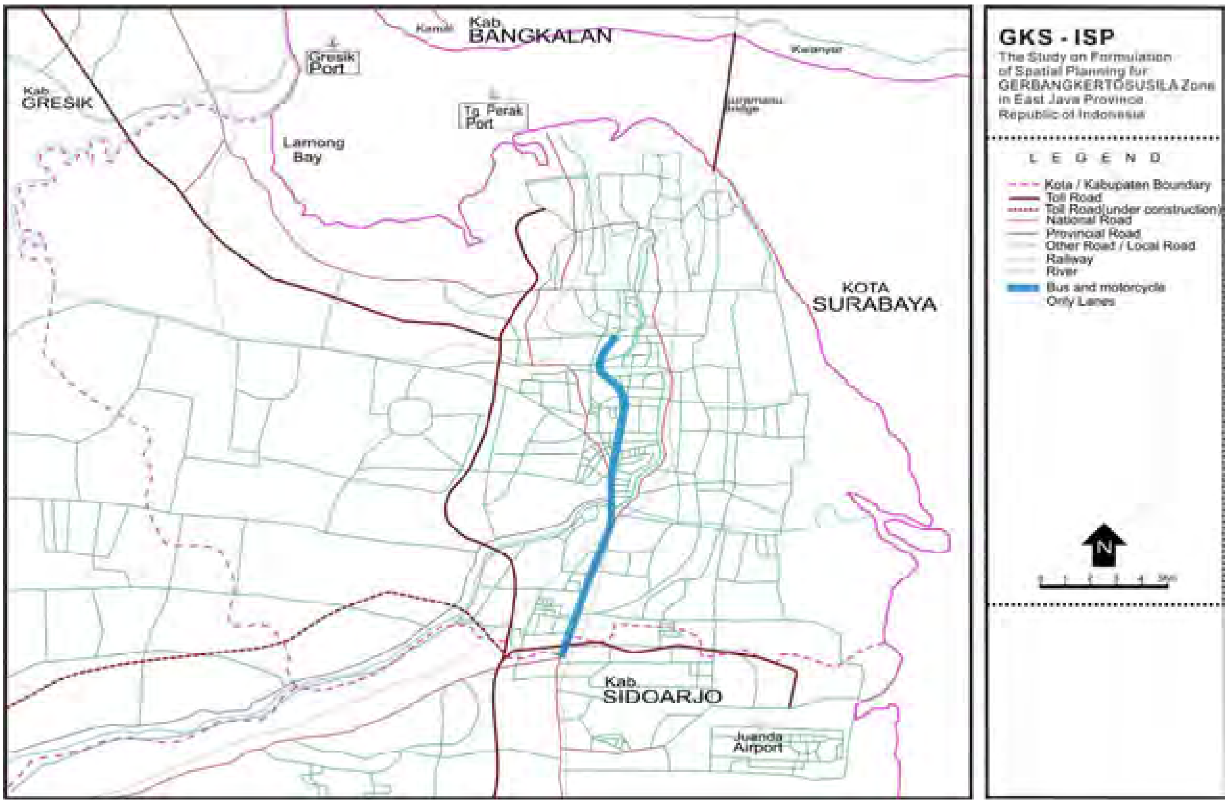


Source: JICA Study Team

Figure 5.3.32 Visual Display of Real-Time Traffic Information (Example)

2) Bus and Motorcycle Lanes

Usually in many metropolitan areas, road traffic demand overwhelmingly exceeds road capacities thus causing chronic traffic congestions, especially in CBDs. In the context of urban transportation, public transport is given priority over private vehicles to secure smoother travel for those who use public transport within the limited road space. From the viewpoint of safety and order the current policy of separating motorcycles and public transport from other private automobiles should be maintained. The policy will even be more effective if it is applied in more continuous road sections (Figure 5.3.33), which means considering extending target roads. It may also be necessary to add another lane for motorcycles and buses if motorcycles and buses make frequent stops, or if traffic is unbalanced, as shown in Figure 5.3.34.



Source: JICA Study Team

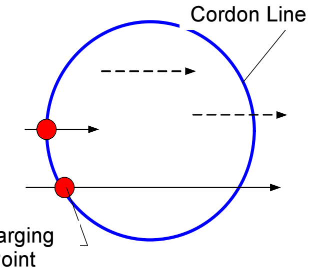
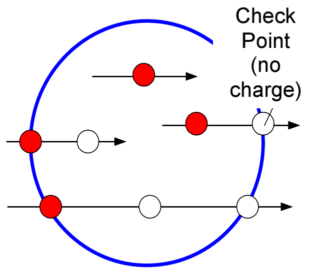
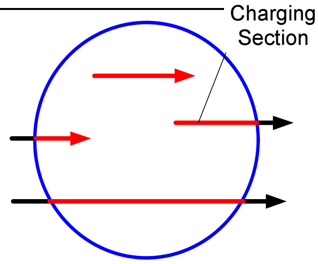
Figure 5.3.33 Current Location of Bus and Motorcycle Lanes

Source: Dinas Perhubungan East Java Province

Figure 5.3.34 Unbalanced Traffic Situation on Bus/Motorcycle Lanes (Jl. A. Yani)

3) Electronic Road Pricing (ERP)

Road pricing refers to a measure that limit traffic volume through fees levied on vehicle users using roads located within the city center. It is one way of alleviating congestion and minimizing air pollution caused by excessive volumes of vehicles inside a CBD. Road pricing is currently being considered for implementation in Jakarta through an electronic road pricing (ERP) method. For more direct traffic demand management, the ERP should eventually be applied in Surabaya in the long term. For the long term, as well, the proposed public transport system should be implemented, to serve as a better alternative to private vehicle use. The following three charging methods shown in Figure 5.3.35 are the main road pricing schemes being used in various countries.

Charging Method	Concept Figure	Description
1. Cordon Pricing Eg: Oslo, Norway (1990), ERP in Singapore (1998)		Method where entering vehicles that cross over the cordon line that has been installed around the restricted area are charged a fee. In most cases payment is made every time one crosses over. When the cordoned area is large, it is difficult to accommodate internal traffic.
2. Area Pricing Eg: London(2003.2) ALS in Singapore (1975-98)		Method where in addition to entering vehicles that cross the cordon line, internal traffic within the cordoned area is also charged a fee. Most cases use a prepaid system.
3. Distance-Proportional Charging Eg: Charging heavy vehicles in Switzerland (2001)		Method where fee is charged according to the distance traveled within the restricted area. In Switzerland all large vehicles have an OBU installed, and the fee is calculated according to a vehicle's maximum load, emission characteristics, and distance traveled.

Note: ⟶ trip that will be charged a fee
⋯⋯▸ trip that will not be charged a fee

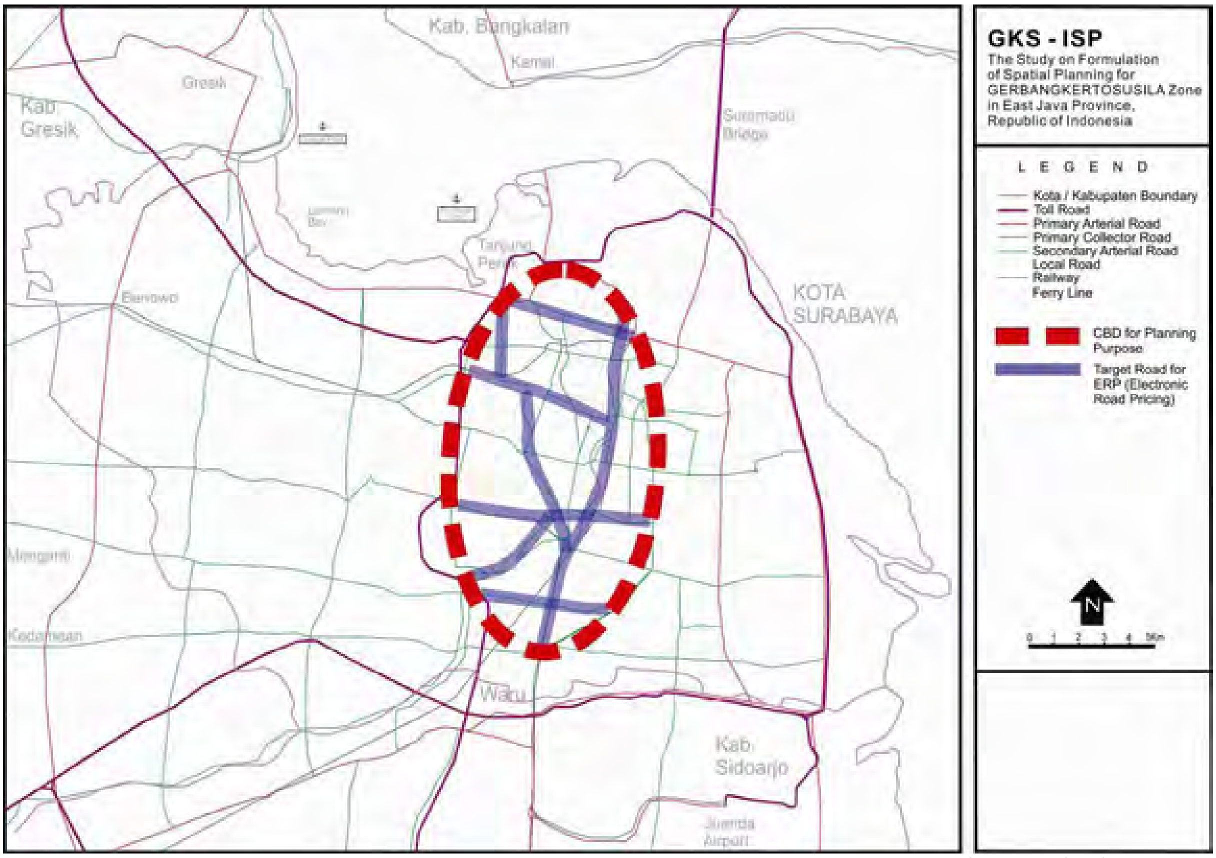
Figure 5.3.35 Main Charging Methods

Based on the charging methods described above, the preferable pricing method for Surabaya may be considered as follows:

- Surabaya's road network is characterized by major trunk roads complemented by various small streets and private roads which could be used as bypass routes. Because it requires levying fees at cordon lines, the Cordon Pricing Method, will require the installation of toll gates on small streets and lead to a tremendous number of gates. And since small streets often function as residential roads, imposing an area pricing on these streets may not be practical since it could restrict the flow of all cars.

- The charging method should have minimal social impacts and should be acceptable to citizens since regional differences may arise due to its effect on areas within and outside the road pricing area and also in terms of access to public transport systems proposed in this Study.

With all things considered, the most ideal charging method for Surabaya would be the "Area Pricing" method limited to major trunk roads. Vehicles traveling on the trunk roads within the CBD, as defined in the travel demand analysis in Section 5.3.1, will be charged a fee. Toll gates will be installed at certain intervals so that even vehicles traveling relatively short sectors will be charged. A sampling of the ERP targeted roads is presented in Figure 5.3.36. A further study will be necessary to discuss the necessity and technological contents of these approaches as well as to assess environmental, economical, and financial feasibilities.



Source: JICA Study Team

Figure 5.3.36 Example of Target ERP Roads in Surabaya

5.3.4 Public Transportation Development

1) Rail-Based Transport Improvement

(1) Potential for Improving the Existing Railway Network

The growth of urbanization tends to change urban lifestyles and people's values for goods and services. In this context, public transportation services should satisfy various types of demands in the city. This Study proposes the improvement of the existing railway network to attract people who currently use private modes of transportation. The improvement of existing railway lines and the construction of new MRT lines will significantly increase passenger capacity and service coverage.

Service coverage was partly analyzed by measuring the distances of train stations to the commuting population. Populations covered by existing railway stations within 350m (i.e. preferred walking distance), 650m (i.e. average walking distance), and 2,000m (i.e. difficult walking distance) from a train station is summarized in Table 5.3.12 and illustrated in Figure 5.3.37. The analysis revealed that populations covered within a generally accepted walking distances (i.e. 350m to 650m) was quite small, while the coverage ratio of population covered within 2,000m was much greater, or about 40% in Surabaya, 29% in the SMA, and 22% in the GKS, excluding Kabupaten Bangkalan.

Furthermore, if the rail-based network system is developed as proposed later in this section, the ratio of population covered within 2,000m is expected to be even greater, or about 53% in Surabaya, 37% in the SMA, and 28% in the GKS, as shown in Table 5.3.12 and Figure 5.3.38. Coverage within 350m and 650m is expected to increase double or even more. The analysis implies that the railway will have greater potential to attract more passengers. The coverage of the rail-based transport network will expand further if people living as far as 2,000m from a station can be served by some kind of feeder transport.

Table 5.3.12 Population Coverage by Rail-Based Transport

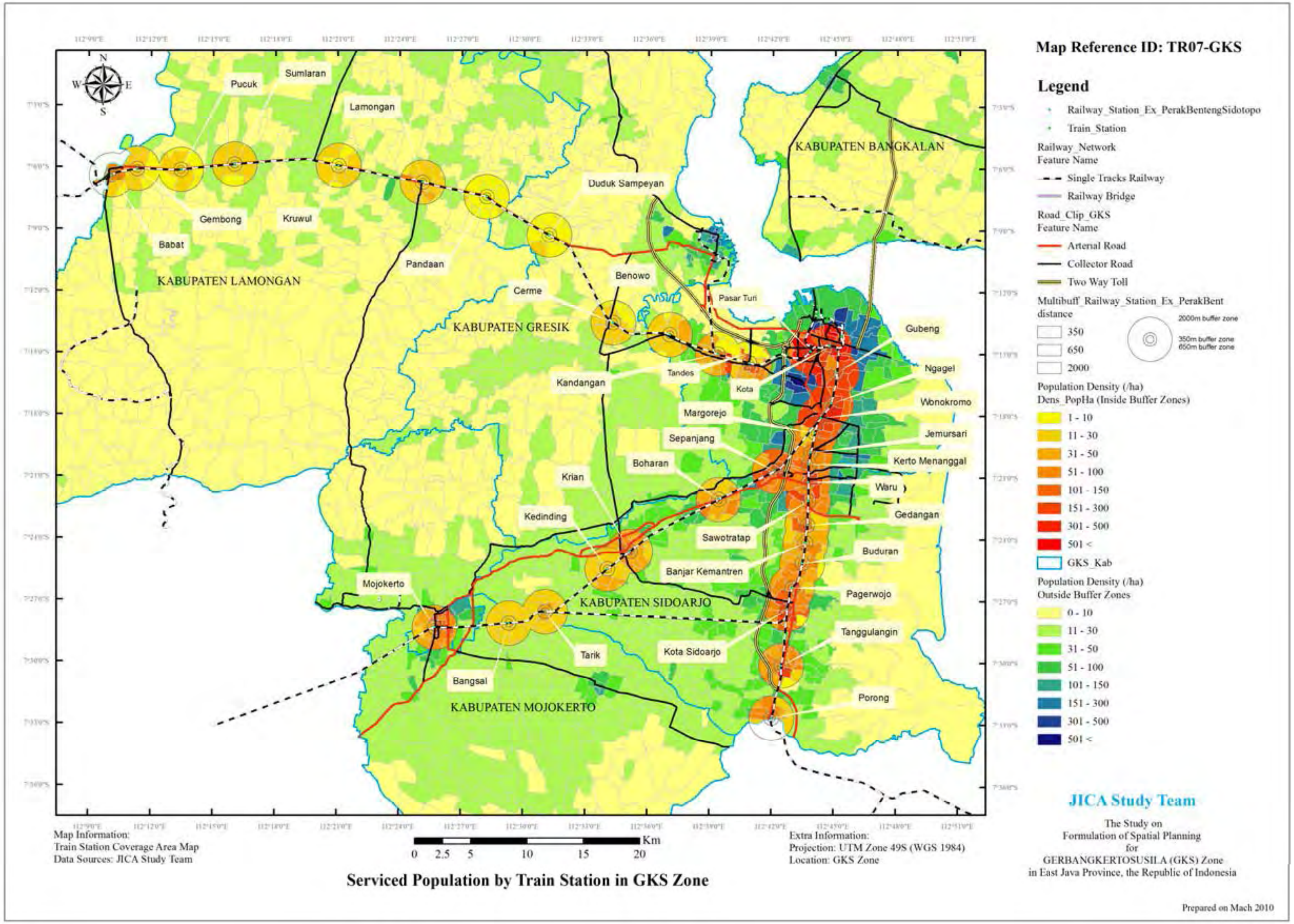
[Existing: 2008] (Unit: 1,000)

Area	Total Pop.	350 m		650 m		2000 m	
SURABAYA	2,764	56	2.02%	138	4.99%	1,088	39.38%
SMA 1)	5,854	99	1.69%	236	4.03%	1,692	28.91%
GKS 2)	8,355	107	1.28%	258	3.09%	1,874	22.43%

[Future: 2030]

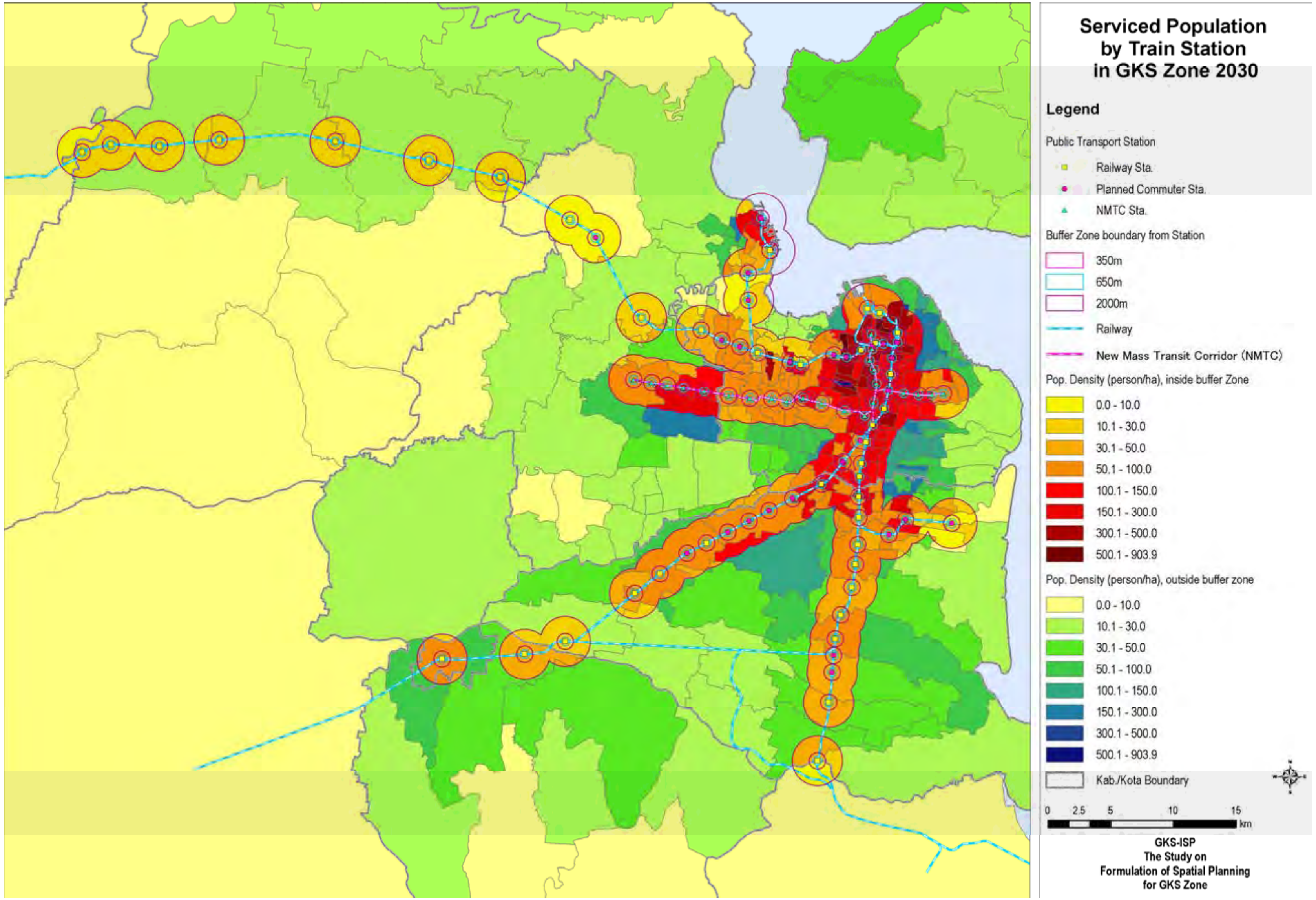
Area	Total Pop.	350 m		650 m		2000 m	
SURABAYA	3,574	266	7.43%	577	16.14%	1,881	52.61%
SMA 1)	8,880	364	4.10%	807	9.08%	3,271	36.84%
GKS 2)	12,618	373	2.96%	829	6.57%	3,518	27.88%

Source: JICA Study Team
Notes: 1) SMA includes Kota Surabaya, Kab. Sidoarjo, and SWP II and SWP III of Kab. Gresik.; 2) Kab. Bangkalan is not included in the GKS total because there is no railway at present.



Source: JICA Study Team

Figure 5.3.37 Serviced Population by Train Station in GKS Zone (Existing: 2008)



Source: JICA Study Team

Figure 5.3.38 Serviced Population by Train Station in GKS Zone (Future: 2030)

(2) Improvement of the Commuter Rail

High service frequency, punctuality, speed, comfort, affordability, consistent fare system, and intermodality are the other essential elements that attract commuters, especially those who use private modes of transportation. New, comfortable, safe, and air-conditioned commuter trains should be ideally operated at intervals of at least 30 minutes to avoid excessive, or long, waiting periods. Improvement of the existing railway lines and construction of new MRT lines, as shown in the staged development (Figure 5.3.39, Figure 5.3.40, and Table 5.3.13), will substantially increase passenger capacity and service coverage.

Stage I (up to 2018): The existing PT. KA railway network and system should be improved to enhance traffic capacity and convenience of commuters, especially on the Surabaya–Sidoarjo corridor. In this stage, the following projects should be implemented:

- Track elevation (and double-tracking and electrification), to remove grade crossings on the most frequently used lines, i,e., between Kota/Sidotopo and Sidoarjo (and up to Tanggulangin) (W1). Renovation of Sidotopo as an elevated commuter station and placement of the train depot at-grade. Major stations, such as Gubeng and Wonokromo will remain at-grade due to the physical constraints posed by the railway tracks and the existing roads;
- Reactivation of the Tarik and Sidoarjo line, which is being constructed as an at-grade single track for long-haul railway service;
- Relocation of the Sidoarjo – Porong line to Sidoarjo – Tulangan – New Porong line (single track of which alignment is shown in W9) to skirt around the mud flow area. While the existing Porong station will be relocated, the line from Sidoarjo to Tanggulangin will be retained; Tanggulangin station will be renovated and remain as a commuter terminal station with two additional commuter shelters between Sidoarjo and Tanggulangin, i.e., Larangan (located close to the bus terminal) and Candi;
- Increase of the maximum running speed to 120 km/h by replacing manual spacing of trains with an automatic block system and signaling system that can space the trains three minutes apart with a better level of safety for New Kota/Sidotopo – Tanggulangin (W1). In particular, a centralized signal substation will be developed in Gubeng to manage all the lines in the SMA, including Stages II and III;
- Modernization of the New Kota/Sidotopo–Sidoarjo–Tanggulangin (W1) train stations, as part of intermodality consisting of more appropriate track layouts and improvements of station facilities for better passenger services (e.g., information system, length, width and height of platforms, and track crossings).
- Construction of the elevated railway link between Waru and Juanda Airport (W2) which will enable the direct operation from Gubeng/Kota/Sidotopo stations using the renovated existing line (W1); and
- Purchase of a high-performance electrified self-propelled unit (EMU) for the regular "commuter" services on the New Kota/Sidotopo–Sidoarjo–Tanggulangin (W1) and Waru–Juanda (W2) lines.

The modernization of the infrastructure, improvement of operational conditions, along with investments in modern, high-performance trains will improve regular "commuter" services in central SMA, especially between Surabaya and Sidoarjo/Juanda Airport. Significant travel time can be saved for passengers on this corridor. It should also be noted that, even after elevating the tracks between New Kota/Sidotopo – Tanggulangin (W1), the existing railway tracks will remain at-grade for freight train services. Though the impact of the freight train operation on the crossing road traffic may be minor, the existing freight railway track should also be elevated if it is concluded to be economically viable in a further study.

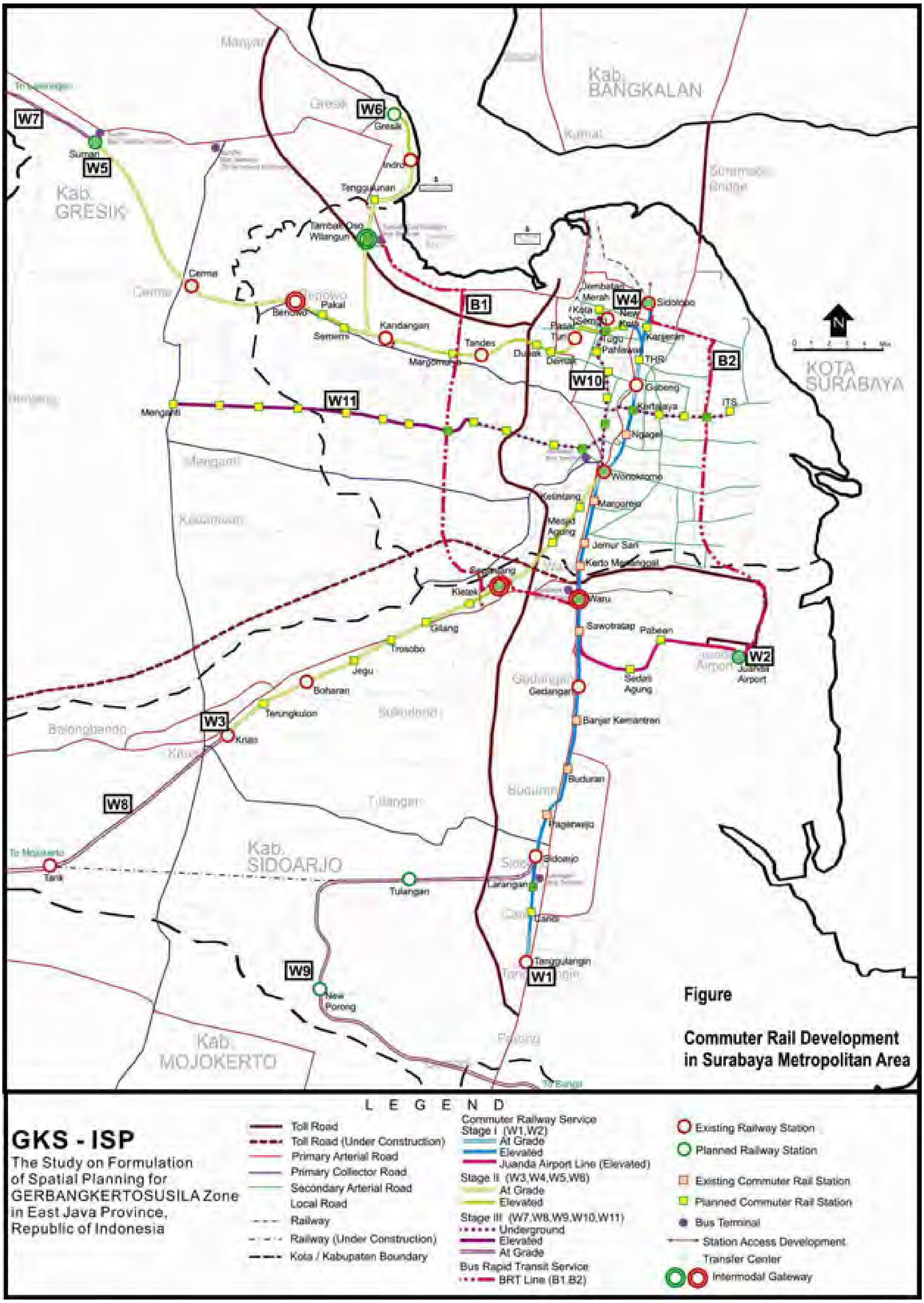
Stage II (up to 2020): After Stage I has been implemented, the commuter railway service development should be applied as soon as possible to other existing railway lines within 20km of Surabaya (i.e., SMA). Particularly, the direct railway line through Pasar Turi, New Kota, and Gubeng stations should be implemented by connecting the railway tracks near Kota station, to improve frequency and travel time. The following projects should be implemented at this stage:

- Double-track connection between Pasar Turi-New Kota-Gubeng, and Sidotopo–Gubeng stations (W4), to enable direct train operations between the northwest and south parts of Surabaya;
- Relocation of the existing Kota station to a New Kota station as a commuter shelter, and the operation of long-distance trains to/from Gubeng station. The Kota station area will be redeveloped, as illustrated in Figure 5.3.41;
- Double-tracking (and electrification and partial track elevation) of the existing railway in the SMA, namely, between Surabaya and Krian (W3), Sumari (W5, to which the existing Bunder bus terminal is planned to be relocated), and Indoro (W6). For W6, in particular, the railway from Indro to Gresik, which is now used only for freight transport, will be revitalized for commuter train services;
- Modernization of the methods of managing train operations by replacing old signal substations with a centralized signal substation in Gubeng to manage all the lines in the SMA, thereby improving performance and safety;
- Electrification of all lines (except for the Sidoarjo–Tarik section), to reduce route time, improve performance, reduce energy consumption, and improve equipment availability; and
- Enhancement of intermodality, continued modernization of existing train stations and train operation in the same manner as in Stage I.

With the completion of these projects, other railway services in East Java can also be improved including long-distance passenger and freight services in Java Island. On the other hand, the double-tracking project for the Java north trunk line connecting Semarang and Surabaya is soon to be implemented. For the double tracking of the Sumari (Duduksampeyan)–Pasar Turi section (W5), coordination between relevant agencies is required to ascertain which section should be elevated.

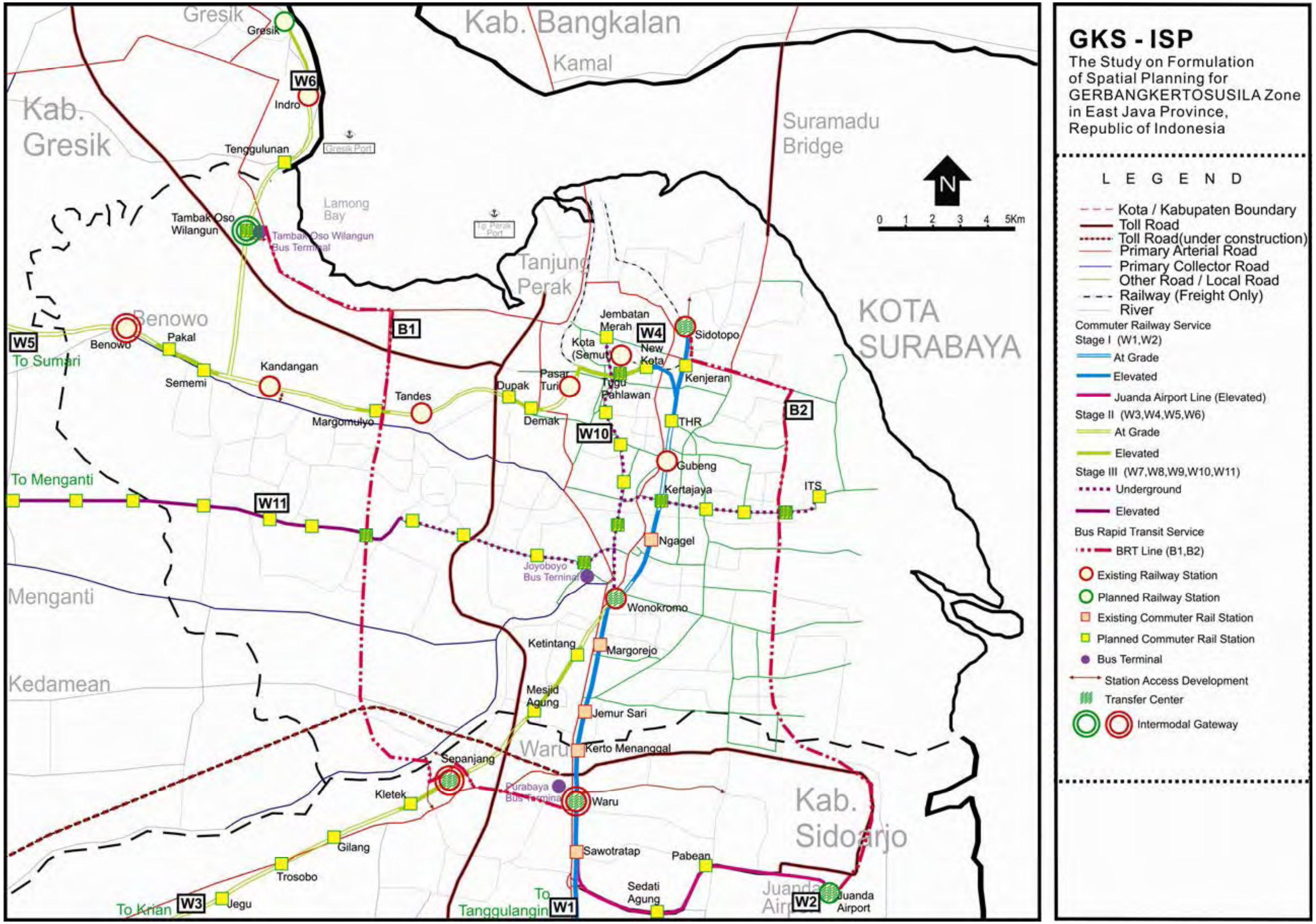
Stage III (up to 2030): In the final stage, the commuter railway service development should be extended to cover transportation requirements between major cities in the GKS (i.e. within 40km of Surabaya). In addition, since the current railway runs peripheral to the CBD, a mass rapid transit (MRT) system would be ideal to serve central Surabaya, running in a north-south direction. The MRT line will mitigate traffic congestion of the north-south flow between Jl. Raya Darmo and Jl. Pahalawan. Also, from an SMA viewpoint, the most "blank" area not currently served by railway is the area from West Surabaya to South Gresik. The area has large-scale residential and industrial developments as planned in the GKS spatial plan. Hence, this corridor should also be served by a new mass transit system, such as an MRT, which could also serve as core of the transit-oriented development (TOD). The following projects should be implemented:

- Extension of double-tracking and electrification up to Lamongan (W7), Mojokerto (W8), and Bangil (W9) and increasing of the maximum running speed to 120km/h through an automatic block and signaling system;
- Development of an MRT system in a north-south direction (W10) to support the business and commercial activities in the CBD. The MRT should be connected at Wonokromo station to the existing South trunk line and operated continuously to Sidoarjo/Juanda Airport, to enhance overall transport capacity as well as passenger convenience. The line will run from Wonokromo to Old Kota via Jl. Raya Darmo, Jl. Basuki Rahmad, Jl. Tunjungan and Jl. Pahlawan up to Jembatan Merah. Avoiding at-grade crossing with roads, this line will be constructed as an underground railway.
- Another east-west MRT line (W11) will be developed between ITS and Menganti in Kabupaten Gresik through Jl. Kertajaya, Jl. HR Muhammad and along the new planned development corridor toward south Kabupaten Gresik, and it will be connected to the existing railway line at Kertajaya station. Large-scale residential developments will be planned in the GKS spatial plan, and this corridor also matches with the additional road development corridors mentioned earlier. This MRT line will be constructed as an underground railway between the ITS and end of the Jl. HR. Muhammad, for about 13km, after which it will continue on an elevated structure for about 11km along the new arterial road, serving as the core of the transit-oriented development (TOD).



Source: JICA Study Team

Figure 5.3.39 Public Transport Development in Surabaya Metropolitan Area



Source: JICA Study Team

Figure 5.3.40 Public Transport Development in Surabaya

Table 5.3.13 List of Railway Development Projects

Project ID	Section	Length (km)				Stage	Total Cost (mil. Yen)	Annual O&M Cost (mil. Yen)
		At Grade	Elevated	Under Ground	Total			
W1	Sidotopo/New Kota -Tanggulangin	3.16	29.9	-	33.16	I	90,548	195
W2	Sawotratap-Juanda	0.0	7.5	-	7.5	I	27,547	195
W3	Wonokromo - Krian	16.7	4.3	-	21.0	II	29,949	188
W4	New Kota – Ps. Turi	0.5	0.9	-	1.4	II	7,908	188
W5	Ps. Turi - Kandangan - Sumari	19.2	7.3	-	26.6	II	40,228	188
W6	Kandangan - Gresik	9.7	3.0	-	12.6	II	20,773	188
W7	Lamongan-Sumari	14.4	0.0	-	14.4	III	17,557	220
W8	Krian-Mojokerto	19.2	0.0	-	19.2	III	21,399	220
W9	Sidoarjo-Bangil	33.4	0.0	-	33.4	III	32,841	220
W10	Wonokromo-Jembatan Merah	0.0	0.0	8.0	8.0	III	101,910	432
W11	ITS-Menganti	0.0	11.0	13.0	24.0	III	193,930	756

Source: JICA Study Team

Figure 5.3.41 Example: Redevelopment Plan of Old Kota Station

2) Bus Transport Improvement

(1) Intra-City Bus Transportation

Due to its decreasing ridership, the improvement of the current level of bus services is urgently needed, especially in the following aspects:

- In Surabaya, minibuses, or angkot, which number more than 5,000, have taken on the role as city bus service, instead of the conventional larger buses, which only number around 400 units. Though the capacity of the minibuses are smaller they offer frequency and flexibility. In the future, while keeping the current frequent services, it will be more practical to gradually shift to new, larger, air-conditioned buses. The existing minibuses could be deployed to new feeder bus routes serving train stations and their vicinities.

- Current dedicated lanes for public transport vehicles and motorcycles should be maintained, or implemented in continuous sections of other trunk roads, which is one method of maintaining stable bus speeds during heavy traffic. Although completely dedicated lanes for buses may not be feasible except in some new trunk roads, the current dedicated lane system that allows motorcycles could be implemented more easily and efficiently.
- In addition to the new feeder bus routes serving train stations, it is recommended that new types of bus services should be introduced including a commuter express and CBD circular bus services. The commuter express bus provides speedy, comfortable transport services with limited stops especially for corridors that are not served by rail-based transport.
- Bus rapid transit (BRT), which takes the centermost lane of the road, as a dedicated bus lane just like Transjakarta (Figure 5.3.42), is an ideal mode of transport if the right-of-way (ROW) is wide enough. The Study Team proposes two BRT lines: one connecting Tambak Oso Wilangun bus terminal, Sepanjang station, Purabaya bus terminal, and Waru station, through Middle West Ring Road (MWRR) (B1); the other connecting Juanda Airport, Jl. Kenjeran, and Sidotopo station, via Middle East Ring Road (MERR) (B2). The current CBD circular buses could serve as feeder buses.

Source: JICA Study Team

Figure 5.3.42 Example of BRT: Transjakarta

(2) Intercity Bus Transportation

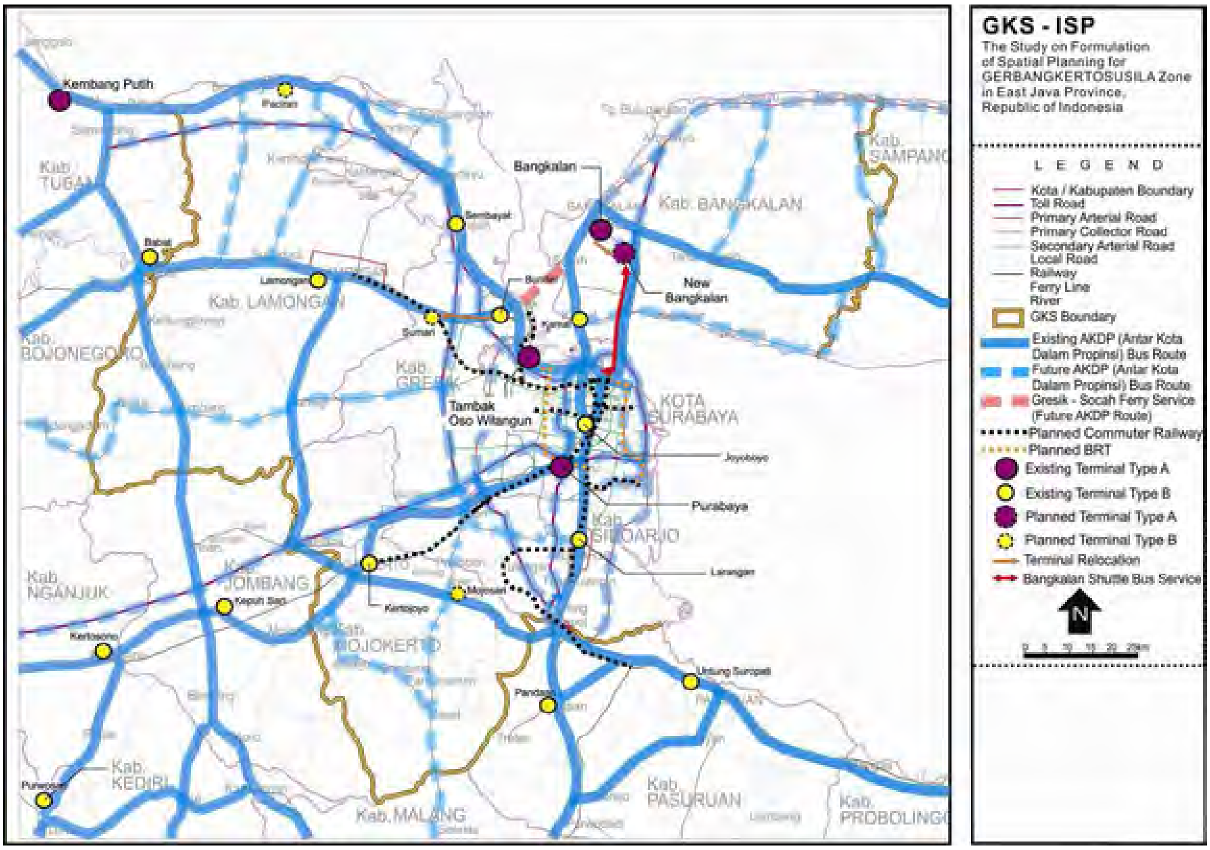
While interprovincial, intercity (AKDP: *antar kota antar propinsi*) bus services are for interprovincial travel only, intra-provincial intercity (AKDP: *antar kota dalam propinsi*) bus services are used for travel within the GKS, or throughout East Java. Each kabupaten/kota has intercity bus terminal(s) from which bus services connect the major cities in and outside the GKS. Existing intercity bus terminals in the GKS, by type of terminal, are listed in Table 5.3.14. Type A terminals are for both inter- and intra-provincial intercity bus services, while Type B terminals are mainly for intra-provincial intercity bus services, as well as local transport services.

Table 5.3.14 Intercity Bus Terminals in GKS

Kota/Kabupaten	Terminal Name	Type	Remarks
Kota Surabaya	Purabaya (Bungur Asih)	A	
	Tambak Oso Wilangun	A	
	Joyoboyo	B	
Kabupaten Sidoarjo	Larangan	B	
Kabupaten Mojokerto Kota Mojokerto	Kertojoyo	B	
Kabupaten Mojokerto	Mojosari	B	Newly constructed terminal
Kabupaten Lamongan	Lamongan	B	
	Babat	B	
Kabupaten Gresik	Bundetr	B	To be relocated to Sumari (Kec. Duduksampeyan
	Sembayat	B	
Kabupaten Bangkalan	Bangkalan	B	To be relocated to Masaran (Kec. Tragah)
	Kamal	B	

Source: Dinas Perhubungan, East Java Province

In the GKS, most intra-provincial intercity (AKDP) bus routes connect Surabaya with its surrounding cities. Although the above-mentioned rail-based transport improvement is proposed by the Study Team, the existing AKDP network is essentially larger and more comprehensive than the planned commuter railway network, as seen in Figure 5.3.43. Intercity bus services should be maintained in the future to complement public transport in the GKS. Roads for intra-provincial intercity bus services in the GKS are the national and provincial roads, as presented in Figure 5.3.43. Both of the two Type A terminals in Surabaya, namely Purabaya and Tambak Oso Wilangun, are located close to the toll road, so most of the intercity buses, as well as inter-provincial buses, go through the toll road network and through the planned national (i.e., primary arterial) or provincial (i.e., primary collector) roads. Also, since there is no commuter railway development planned for Bangkalan, the Study Team proposes an intensive shuttle bus service to connect the center of Surabaya with Bangkalan. Furthermore, new ferry, and AKDP services, that will connect Gresik-Socah should also be studied, or developed, to secure another access to Kabupaten Bangkalan, as explained in the ferry development.



Source: JICA Study Team

Figure 5.3.43 Proposed Intercity Bus Transport Network

3) Ferry Transport Improvement

Table 5.3.15 shows the existing and planned ferry lines in the GKS Zone. The Study Team proposes a new ferry line connecting Gresik and Socah (Kabupaten Bangkalan) in addition to the existing Ujung–Kamal ferry service. This new ferry line will solve the long term congestion problem forecasted on the Suramadu Bridge. However, a further study might be needed to examine its feasibility since the ferry service will run through the busy Madura Strait. Additional ferry lines may be necessary in the long term, while the existing ferry lines, including Paciran–Bawean, also need to be improved and maintained.

Table 5.3.15 Ferry Lines in GKS

No	Development	Function	Remarks
1.	Paciran - Bawean	Inter-Kabupaten	Existing Ferry Service (for freight only)
2.	Ujung - Kamal	Inter-Kabupaten	Existing
3.	Gresik - Bawean	Intra-Kabupaten	Existing
4.	Gresik - Socah	Inter-Kabupaten	Plan

Source: Tatrawil East Java Province 2009-2029 and JICA Study Team

Table 5.3.16 shows the ferry port development. Serving both inter-kabupaten and intra-kabupaten ferry services, the development of the Bawean Port will be crucial in supporting the economic activities in Bawean Island. The planned Socah Port will help with the development of the industrial estate, as well as the proposed ferry line connecting Gresik and Socah. The planned port in Paciran will also serve the inter-island ferry lines.

Table 5.3.16 Ferry Port Development in GKS Area

No	Port	Location	Function	Remarks
1.	Bawean	Kab. Gresik	Inter-Kabupaten	Existing (Planned to be improved)
2.	Paciran	Kab. Lamongan	Inter-Kabupaten & Inter-Province	Plan
3.	Gresik	Kab. Gresik	Intra-Kabupaten & Inter-Kabupaten	Existing
4.	Socah	Kab. Bangkalan	Inter-Kabupaten	Plan
5.	Ujung	Kota Surabaya	Inter-Kabupaten	Existing
6.	Kamal	Kab. Bangkalan	Inter-Kabupaten	Existing

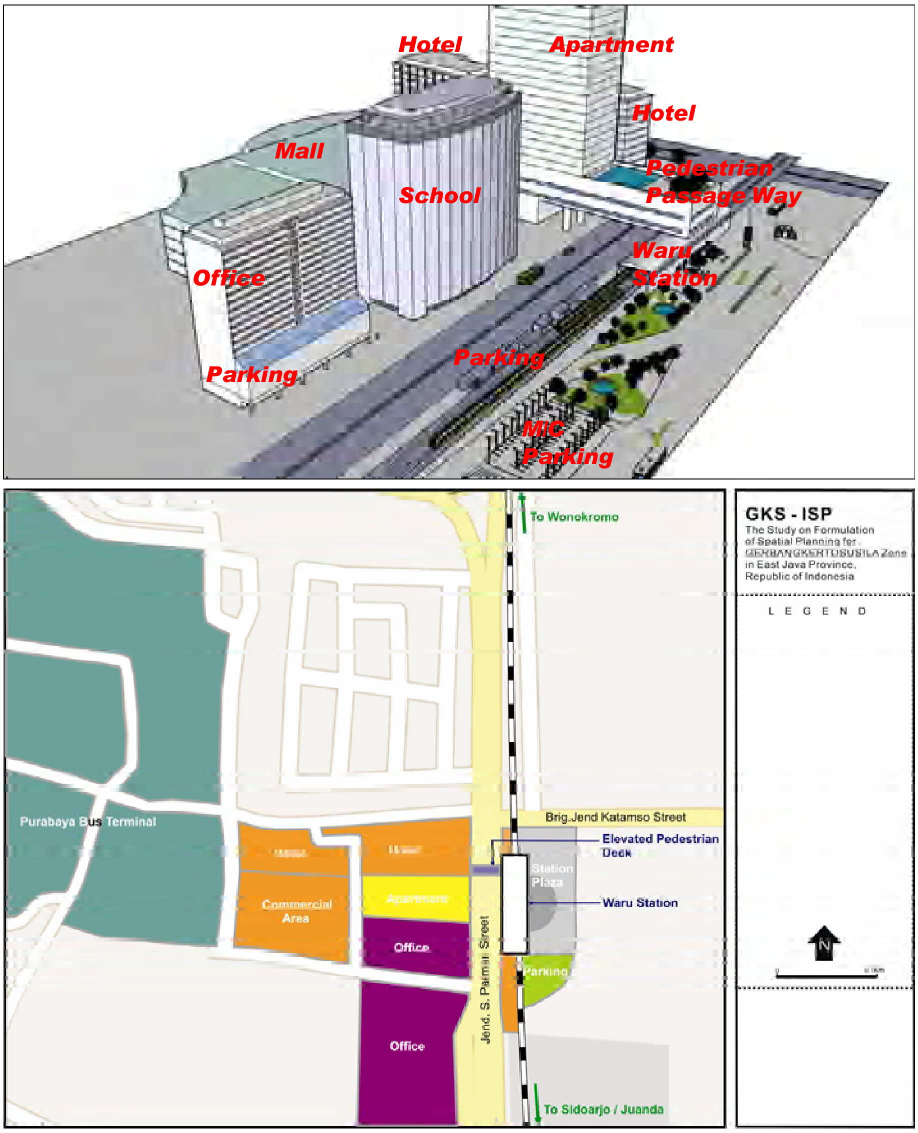
Source: Tatrawil East Java Province 2009-2029 and JICA Study Team

4) Intermodal Development

Attention should also be paid to intermodal transfer functions between different rail-based transport modes, between feeder bus and railway, and between private transport modes and railway. Since a railway is a network utility, intermodal transfer functions at railway stations should be improved to enhance transfer convenience for passengers from one public transport mode to another. The following measures deserve to be implemented for this purpose:

- Improve the user-friendliness of transport facilities by providing pedestrian walks, vehicle parking lots, and other transport services;
- Enhance transfer convenience levels by improving physical conditions, such as shortening walking distances from railway to another mode, provision of information on timetables and operational conditions, and provision of station plazas; and
- Create safe and comfortable waiting spaces for transferring passengers.

As an alternative to the feeder bus system, a car and motorcycle park and ride system could be used for station access. This is important especially where feeder bus services are not available due to distance or in thinly populated areas. This underscores the necessity of providing parking facilities near railway stations, especially in the outskirts of the CBD. The major candidate stations with large-scale parking facilities are: Tambak Oso Wilangun (Surabaya – Gresik line), Benowo (Surabaya – Lamongan line), Sepanjang (Surabaya – Mojokerto Line), and Waru (Surabaya – Sidoarjo Line), as indicated in Figure 5.3.40. These stations will serve as gateway stations to the CBD, in which private vehicle users can park their vehicles and take the commuter train to go to work, or for other trip purposes to the city center. A sketch of intermodal gateway development around Waru Station is shown in Figure 5.3.44.



Source: JICA Study Team

Figure 5.3.44 Example: Intermodal Gateway Development around Waru Station

(1) Transit Oriented Development

Using public transportation to combat urban traffic problems entails not only improving the railway system but also ensuring that the surrounding land is used in such a way as to encourage railway use. Both land use and transport infrastructures should be integrated under the Transit Oriented Development (TOD) concept, and the promotion of high-density commercial land use around stations will benefit both urban economy and business of the operator.

(2) Public Transport Fare System Development

One aspect in mass transport that discourages commuters from using the public transport system is the cumulative cost of the aggregate transfers, such as train and bus fares and parking fees, which often negatively affects especially low and middle income commuters.

Reduction of the total public transport cost will lead to an increase in ridership. One possible way of reducing cost is the introduction of a transfer discount ticket system between different bus and railway operators. Applying a common ticket system will greatly improve users' utility, as well.

A zone fare system is another feasible fare integration system that is worth studying. This system merely requires commuters to use the same fare even for different transport modes as long as they travel within the same zone. The fare only increases if travel is made to another zone.

5.3.5 Port Development

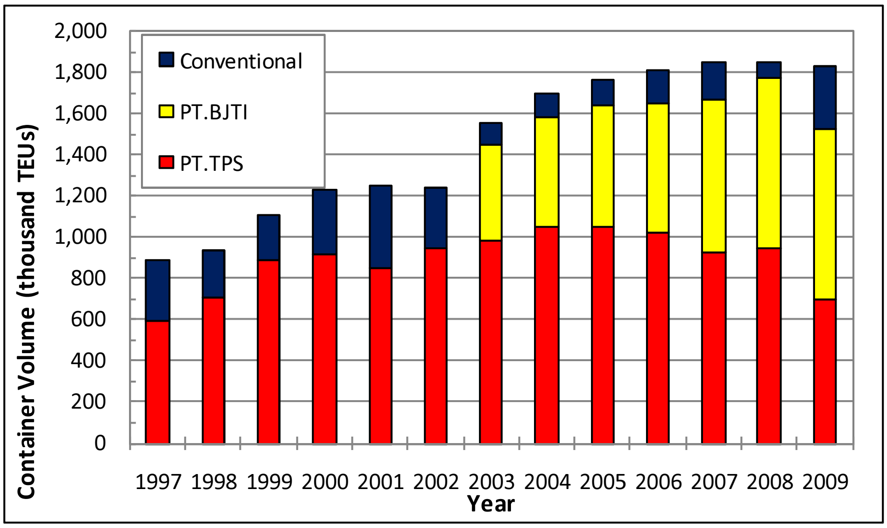
1) Port Functions

Among the ports in the GKS Zone, Tg. Perak Port, has been designated as a first class port through governmental decision No.724/KPTS.BL.382/ PIII-92, 1992. Managed by PT. (Persero) Pelabuhan Indonesia (Pelindo), it is the second largest port in Indonesia and is the prime gateway of the economic activities in East Java and the other islands in the area.

The following are some of the attributes of Tg. Perak Port, as of 2009:

- Total annual container throughput is about 1.8 million TEUs, and the volume has recently its ceiling;
- The total volume of non-container cargos, which mainly consist of domestic inter-island cargos, is about 3.25 million tons, excluding fuel. Recently the volume has fluctuated; and
- Over 70% of its inter-island cargos are unloaded cargos including oil fuel, cement, fertilizer, plywood, and so on.

A diagram of Tg. Perak's container throughput trend is presented in Figure 5.3.45. Container handling is mostly done at TPS (Surabaya Container Terminal). However, since its opening in 2003, Berlian Jasa Terminal Indonesia (BJTI) has rapidly increased its share of container cargo handling because of its lower fees. Inter-island containers are mostly handled at BJTI, but due to the lack of space, some inter-island containers are handled at conventional terminals, reflecting that Tg. Perak has reached its container handling threshold.



Source: Pelindo III, PT. TPS, and PT. BJTI

Figure 5.3.45 Container Throughput at Tg. Perak (1997-2009)

2) Existing Port Development Plans

Since Tg. Perak is operating at full capacity, a 50 hectare reclamation is being planned in Lamong Bay to handle container yard expansion. The reclamation space is equivalent to 1.5 million TEUs per year. The East Java provincial government has limited the proposed 120 hectares of Lamong Bay development by Pelindo III to only 50 hectares. Current status of the 50 hectare development is currently under strategic environmental assessment (SEA), and the assumption is that the development is vital even if it is located close to a preservation mangrove area at the mouth of Lamong River (Kali Lamong).

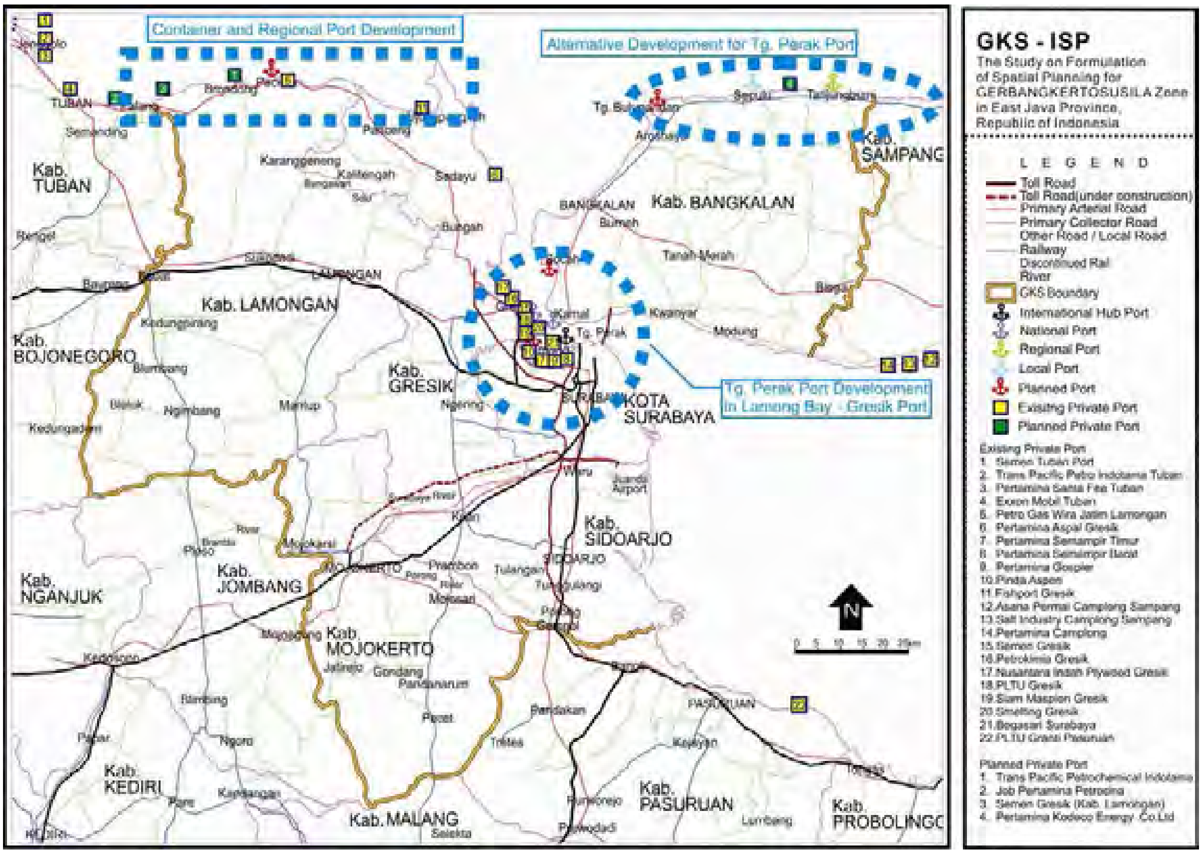
As shown in Figure 5.3.46, on-pile construction of a 3.5 kilometer-long bridge connecting the land and the pier is planned in order to solve the sedimentation problem. The length of the bridge is designed quite long to meet proper depth since sea level is extremely steep between shallow water (3.5m) and deep water (14m).

Source: Pelindo III

Figure 5.3.46 Map of Lamong Bay

Port development plans in the GKS are presented in Figure 5.3.47. Along the north Java coast, especially in Kabupaten Lamongan, Kabupaten Gresik and up to Kabupaten Tuban, various types of ports are being developed including the Paciran Passenger Ferry Port, Sedayu Lawas Cargo Port, Brondong Fish Port, and other industrial ports which will be developed by the private sector. The number of port operators has increased as a result of new seaport regulations (No. 17, 2008 and No.61, 2010) that allowed the shift of operators from public to private.

Likewise, in the northern coastal area of Kabupaten Bangkalan, several other ports are to be developed including an international container port at Tg. Bulu Pandan, and traditional ports like Sepulu and Tg. Bumi. Some of the planned cargo ports will be developed as an alternative to Tg. Perak Port.



Source: Tatrawil Java Timur 2009-2029, Dinas Perhubungan of East Java Province

Figure 5.3.47 Existing and Planned Port Development in GKS Zone

3) Long-term Metropolitan Port Development Plan (Proposed by the JICA Study)

A November 2007 JICA study titled "Study for the Development of the Greater Surabaya Metropolitan Ports in the Republic of Indonesia" assessed the most appropriate long term port projects (i.e. 2030) under the premise that a new Surabaya Metropolitan Port is undoubtedly needed to cover the physical constraints of Tg. Perak, whose function, nevertheless, will remain vital to the GKS economy.

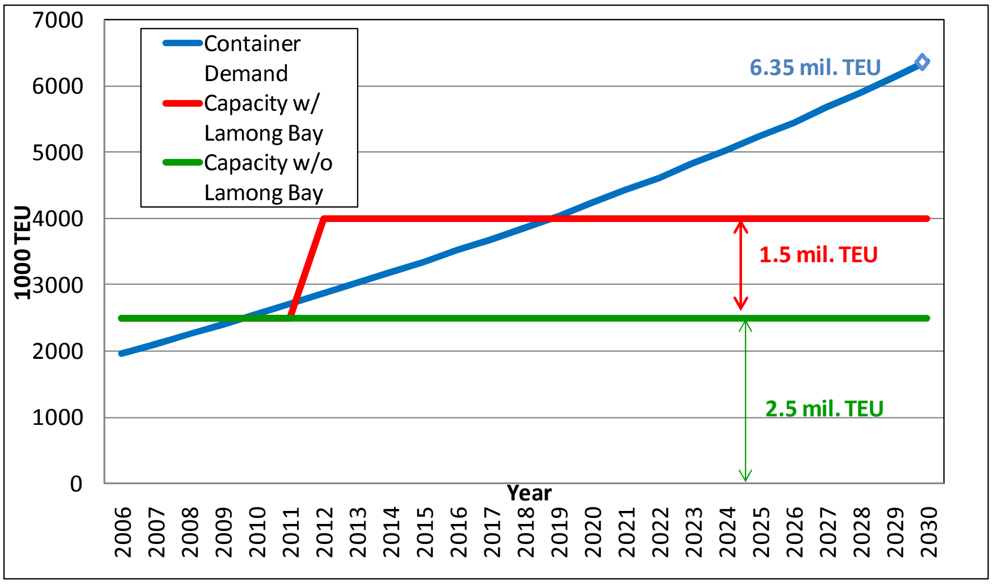
(1) Future Port Cargo Traffic Demand

According to the study, Tg. Perak Port's freight traffic will increase 2.6 times its present capacity, or from 45 million tons in 2005 to 115 million tons in 2030. Based on the latest data, container traffic will substantially increase to 6.4 million TEUs in 2030, compared to about 1.8 million TEUs in 2005, or 3.6 times from 2005 to 2030, as presented in Figure 5.3.48. These increases have the following implications:

- New container berths, with a total length of 2,550 meters, should be developed by 2030 to accommodate the increasing container demand;
- The number of ships coming in/out the port will total about 29,040 vessels in 2030. Such traffic volume cannot be accommodated by Lamong Bay, which is the critical constraint in the expansion of Tg. Perak Port; and,

- ➢ The capacity of existing facilities at Tg.Perak, including Lamong Bay Port with its additional capacity of 1.5 million TEU per year can absorb demand up to 2019. However, the remaining demand should be shouldered by a new container port with a capacity of 1.2 million TEU in 2025 and 2.4 million TEU in 2030.

Eventually, a new metropolitan gateway port should be developed to functionally supplement Tg. Perak Port.



Source: JICA Study (Nov. 2007)

Figure 5.3.48 Container Traffic Demand at Tg. Perak

(2) Search for Six Candidate Port Locations

Six candidate ports were identified, namely: (i) Lamong Bay, in Kota Surabaya; (ii) Gresik South and (iii) Gresik North, in Kabupaten Gresik; (iv) Socah, (v) Tg. Bulu Pandan; and (vi) Tg. Bumi, in Kabupaten Bangkalan, as shown in Figure 5.3.49.

After an evaluation based on several criteria, Tg. Bulu Pandan was selected to undergo further detailed assessments as a gateway container port. The following were its basic merits:

- ➢ A deep seaport with navigable channel and sufficient depth can be developed (more than -14~-15 meters);
- ➢ Available spacious hinterland for the development of support facilities and industries;
- ➢ Economic benefits synchronized with benefits from the Suramadu Bridge can be expected; and,
- ➢ The project will boost economic development in Madura Island and Kabupaten Bangkalan.

A long-term development plan was formulated in this JICA Study to pave the way for an effective gateway port development under the regional development context, taking into account port design, construction methods, sea and land access, connection with direct hinterland developments, initial environmental assessments, as well as economic and financial analyses.

Tg. Bulu Pandan has been added into the national spatial planning with another proposed port in Tg. Bumi. Presidential Decree 27, 2008 has given Tg. Bulu Pandan a legal cloak along with the development of a 600 hectare industrial area, and the development at the foot of the Suramadu Bridge. Meanwhile, Socah was recommended as a general cargo port in the JICA Study. PT. MISI, using the concept of the Madura Industrial Sea Port City, has proposed developing the area, which currently is undergoing strategic environmental assessment (SEA).

Source: JICA Study (Nov. 2007)

Figure 5.3.49 Six Candidate Locations for a New Regional Gateway Port

(3) Infrastructure Requirements of New Port

The Study proposes the following variables for the Tg. Bulu Pandan port project:

- Container Berth: 8 berths;
- Water Depth: -14m ~ -15m;
- Container Yard: 203ha;
- Total Project Cost: US$ 870 million (at 2007 prices);
- Economic Internal Rate of Return (EIRR): 17.2%; and,
- Financial Internal Rate of Return (FIRR): 6.9%.

Tg. Bulu Pandan is considered an expensive port project due to the superstructure of its breakwater. Though it has been given legal authority to proceed by a presidential decree, further study is still required to come up with new strategic solutions regarding other obstacles to its development. Applying the cited new seaport regulation which allows the entry of private operators, Tg. Bulu Pandan port could be operated under a public private partnership (PPP) scheme.

In order to support the development of Tg. Bulu Pandan, two toll road projects and one primary arterial road project have been proposed for the medium term (2015 – 2020), namely, the toll road connecting Perak-Suramadu (R8st), the toll road connecting the existing Suramadu Bridge to Tg. Bulu Pandan port (R6at), with arterial road (R6a) as its frontage road.

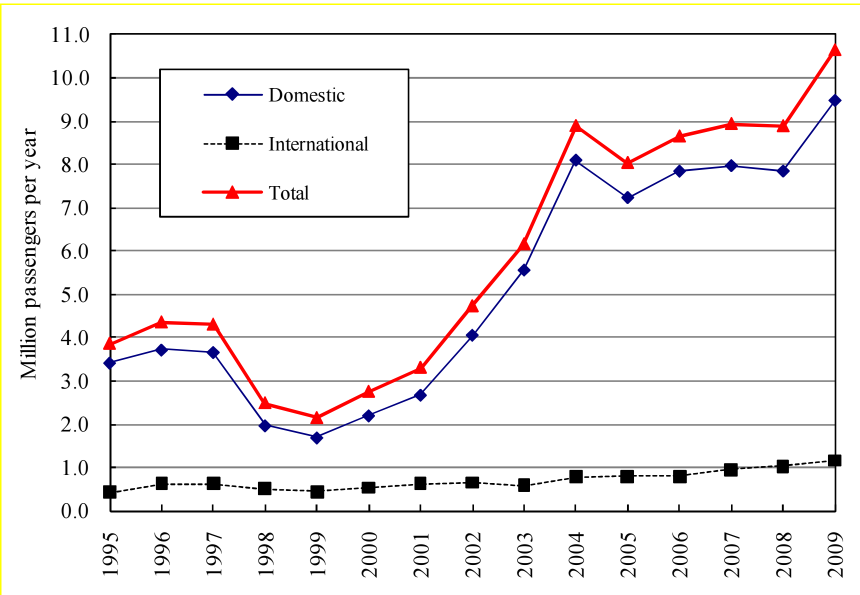
5.3.6 Airport Development

1) Background

Juanda International Airport, located in Kabupaten Sidoarjo, in the southern part of Surabaya, is the major international airport in East Java. Only 20km from the city, Juanda International Airport renewed operations on 15 November 2006, through financial assistance from the Japanese government. The passenger terminal was relocated from the south side of the runway to the north side, not only to increase passenger capacity but also to separate the passenger terminal from the mix-use base terminal of the Indonesian Navy. It has a total area of 4,773 hectares and is 2.74 meters above sea level. The airport has a single 3,000m runway which can receive a B747 class aircraft. Its passenger terminal has a total area of 30,100 square meters and has a service capacity for six million passengers and 45,000 tons of cargo freight per year. The airport currently serves 11 domestic airways and seven international airways, accounting for 1,620 domestic flights and 190 international flights per week. The airport currently has flights to 15 cities and seven countries.

2) Air Transport Demand

The annual air passenger trend at Juanda Airport is shown in Figure 5.3.50. As the graph implies future passenger trend will increase like those in the last couple of years. Designed in 1994, the terminal was meant to handle six million passengers per year (i.e. five million domestic passengers and one million international passengers per year). However, after just a year of operating, passenger demand immediately jumped to seven million. Its number of passengers reached nine million in 2008. In mid 2010 total passengers already reached 11 million for domestic and international flights. About 13 million passengers were expected by the end of 2010.



Source: Angkasa Pura I

Figure 5.3.50 Trend of Annual Air Passengers at Juanda Airport

Passenger demand per year is now twice larger than the capacity of the terminal due to the increase of Low Cost Carriers (LCCs). During peak hours of the regular season, flight frequency is 25 flights per hour, which makes Juanda a high-risk airport due to its close flight intervals that could lead to accidents.

Thus, Juanda Airport cannot accommodate further passenger demands, and since its apron is commonly in full use by aircrafts, aviation companies have been forced to shift to larger aircrafts (e.g Airbus planes) in order to accommodate as many passengers as possible. Operating hours also often extend up to midnight. Transportation links has also become an issue, especially in how to connect the ever increasing number of passenger to other areas in Surabaya through other transportation modes. As mentioned earlier, one solution to this problem is the development of the Waru-Juanda Railway Link (W2), or the Juanda Airport-Sidotopo BRT line (B2).

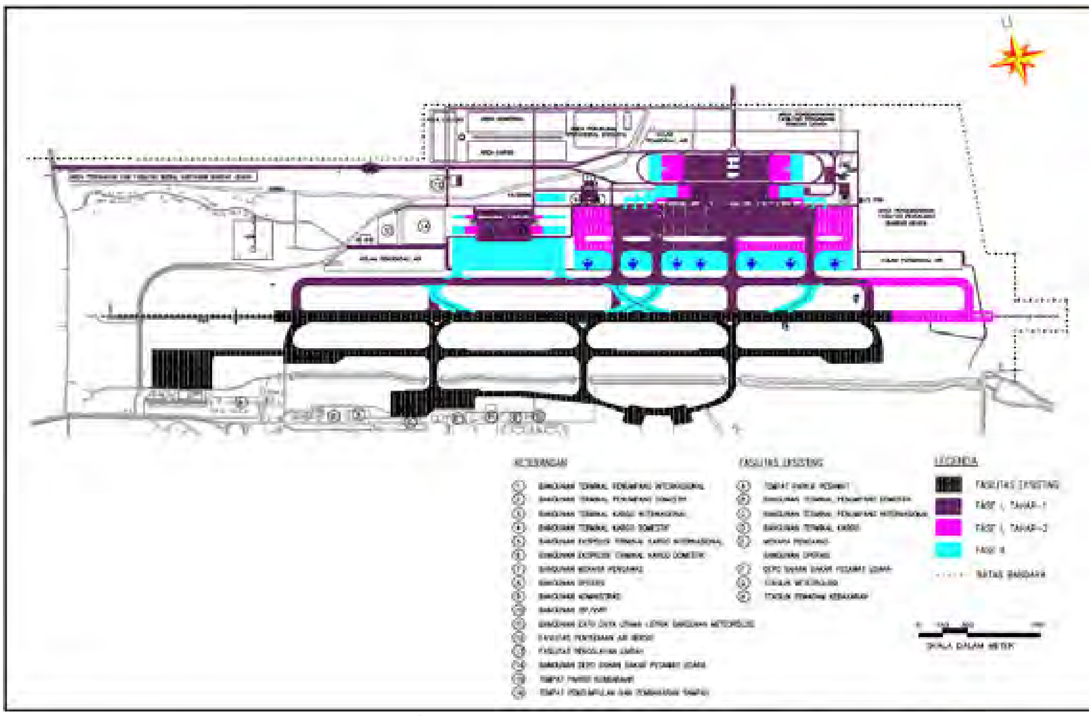
A Civil Aviation policies give airport operators the right to conduct the necessary developmental actions if the general usage of the airport facility (e.g. apron, runway, terminal building, parking lot, etc) has reached 80% of their capacity. In Juanda's case capacity has already reached 95% and significant expansion project has yet to be conducted, which necessitates implementing such a project as soon as possible.

3) Airport Development Master Plan

Transportation Ministerial Decree No. 20, 2002 is the master plan for the development of Juanda Airport (Figure 5.3.51). The master plan consists of several development phases. Stage I of Phase I (i.e. the area colored in purple) was implemented and completed through financial assistance from Japan. Stage II of Phase I (i.e. the area colored in light purple) is currently under way.

The additional runway extension of about 500 meters and the terminal building expansion, which were mandated by the said decree, are the first priorities. Due to the policy of "lesser interference" from donor countries, Angkasa Pura I, the airport operator, will have to conduct terminal development by itself, while the central government (i.e., Ministry of Transport) will be responsible for the runway extension. Starting with a detailed design for a new terminal (eastward of the existing terminal), Angkasa Pura I's target expectation is to realize all development plans by using its own budget.

On the other hand, Angkasa Pura I also has a plan to extend the terminal building northward to accommodate 30 million passengers per year in the next 15-20 years. However, this plan does not consider arrangement of the terminal station of the above-mentioned Waru - Juanda Railway Link (W2), which is to be located in the same premises.



Source: Transportation Ministerial Decree number 20 year 2002

Figure 5.3.51 Juanda Airport Master Plan

Aside from the increasing air transport demand, in the "Master Plan Study on the Strategic Policy of the Air Transport Sector in the Republic of Indonesia" (JICA, 2004), air passenger volume and aircraft movements are forecasted and shown in Table 5.3.17 and Table 5.3.18. This Study has concluded that the above-mentioned master plan for Juanda Airport is adequate in principle. Furthermore, the study also has proposed that Angkasa Pura I should examine the feasibility of land acquisition for the second runway that would be required after 2025. While the forecasts have underestimations, the Study also suggests that such development in the master plan should be implemented with adjustments in the facility requirements.

Table 5.3.17 Passenger Volume Forecast

(Unit: million/year)

Year	2009	2015	2025
Domestic	6.96	9.25	13.99
International	0.92	1.32	2.39
Total	7.89	10.57	16.38

Source : "The Master Plan Study on the Strategic Policy of the Air Transport Sector in the Republic of Indonesia" (JICA, 2004)

Table 5.3.18 Aircraft Movements Forecast

(Unit: 1,000/year)

Year	2009	2015	2025
Domestic	97.6	87.6	138.9
International	9.5	13.8	18.9
Total	107.0	101.3	157.7

Source : "The Master Plan Study on the Strategic Policy of the Air Transport Sector in the Republic of Indonesia" (JICA, 2004)

4) Second Runway Development

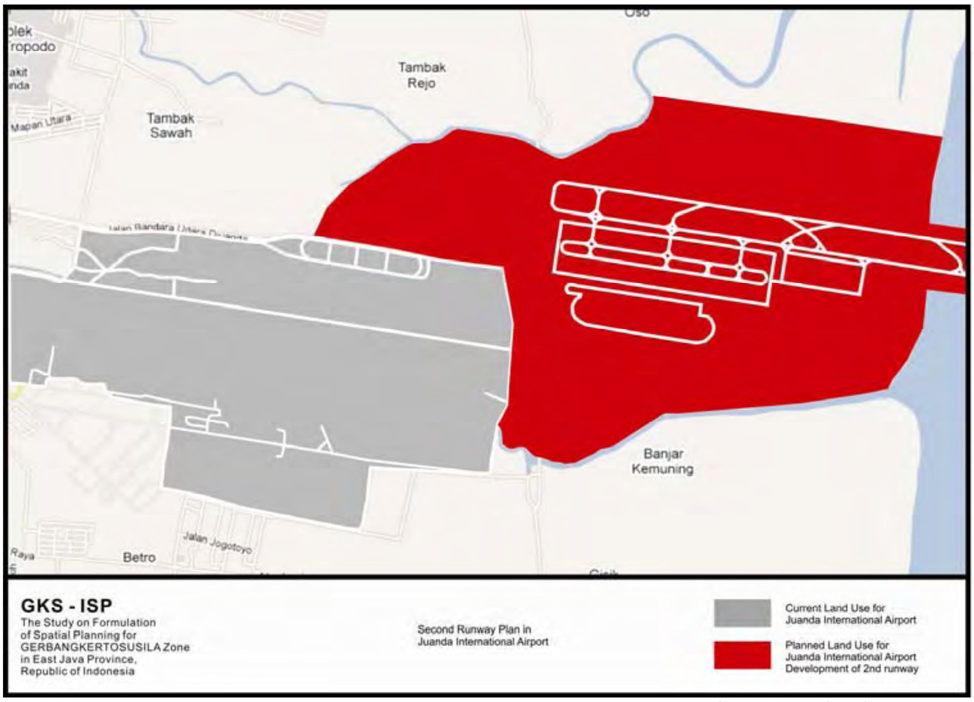
Juanda Airport is not only a primary airport in Indonesia, it is also the center of the Indonesian Navy. Sharing the single runway with the navy remains a matter of concern even after the passenger terminal and the navy terminal have been separated. Since it shares its lone runway and airspace with the navy, the capacity of civil aviation has become limited. The current flight headway of 1 minute and 20 seconds during peak hours means that Juanda is nearing its capacity threshold. Aside from its regular flights there are about 20 military flights per day. The problem of full capacity is contributed by the speed discrepancy between military planes (low speed) and commercial planes (high speed). This discrepancy constantly leads to full time slots, thereby limiting the number of additional commercial planes. Thus, additional flights are currently being rejected.

A second runway will serve 25-26 flights per hour. It should be 3500 meters long to meet the air traffic demands and safety. The airport operator also plans to make this runway as the main runway in the future. A rough layout and land for this second parallel runway is depicted in Figure 5.3.52. Another passenger terminal will also be constructed along with the second runway.

There are two main design criteria to meet the feasibility of the second runway:

- The gradient for horizontal clearance should be at least within three degrees from the runway tip; and
- The slope for vertical clearance should be at least 2.5% from the runway tip.

In rough estimation, current planned location of the second runway meets the requirement mentioned. Another affecting factor to be considered is the clearance against high rise buildings in the surrounding area in the south of Surabaya. The benefit of a second runway that juts out of the coastline is the lack of constraints in a plane's take off and landing. However, this will involve land acquisition of the new housing complex and the old residential area around the new runway location. On concerns that the second runway might affect the mangrove area on the coast, an on-pile structure, as shown in Figure 5.3.53, may be a partial solution to minimize its impact. Furthermore, it should be noted that, for air passengers' convenience, the extension of the Waru-Juanda Airport Rail Link (W2) to the second runway/terminal should be implemented to facilitate passenger transfer between the two terminals.



Source: JICA Study Team

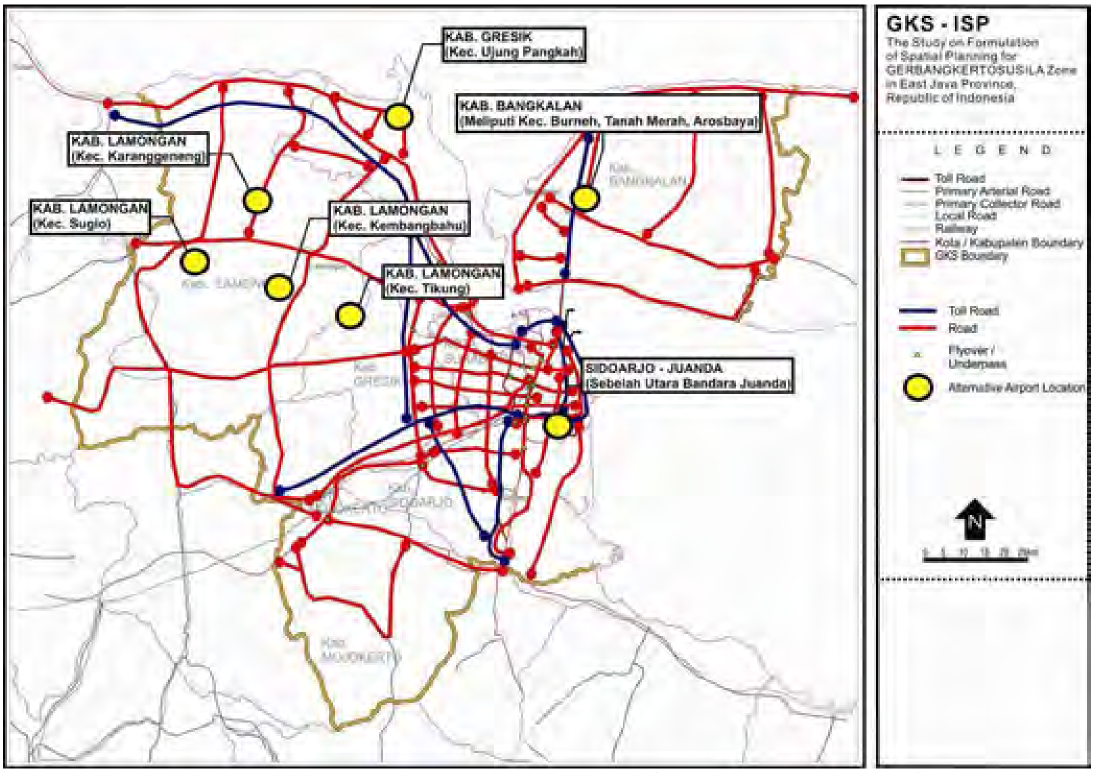
Figure 5.3.52 Rough Layout and Land of the Parallel Second Runway

Source: Nippon Steel Corporation

Figure 5.3.53 Example of an On-Pile Structure of Tokyo's Haneda Airport

5) Second Airport Development

While the construction of an additional runway and terminal facilities is a partial solution, a feasibility study has yet to be conducted on them. The development of a new airport has also been considered with several alternative locations, as shown in Figure 5.3.54. If a new airport will be constructed in Kabupaten Bangkalan or Kabupaten Lamongan, their airspace may still overlap with Juanda Airport. In terms of a plane's rotating radius, Kecamatan Ujung Pangkah, in Kabupaten Gresik may be the best alternative. Although, if it is located in Kabupaten Lamongan, it will serve not only GKS but also the Tuban and Bojonegoro areas. Even if all the candidate locations are close to arterial and toll roads in the road transport development plan, construction of a proper access road will still be required including the toll road option when the location of a new airport, which will need at least 3,000 hectares of available space, has been determined.



Source: Dinas Perhubungan of East Java Province

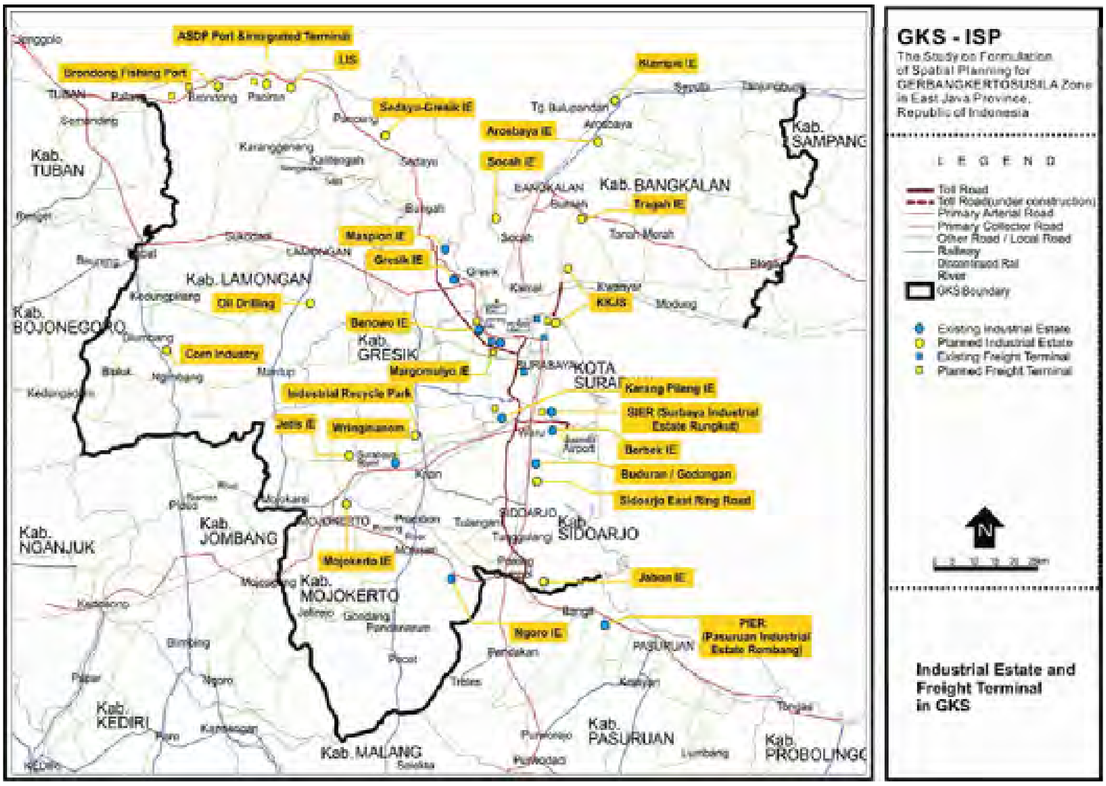
Figure 5.3.54 Alternative Second Airport Locations and Related Road Development

While the central government has been apprised of the second runway and second airport development plans for Surabaya, a feasibility study is necessary to give priorities to those plans in order to deal with the ever increasing air transportation demand. After several alternatives on basic design, they need to be compared and evaluated not only from an economic or financial perspective but also from various essential aspects, including accessibility by land transport and environmental evaluation. For this, it is needless to say that data collection regarding present conditions will be essential, and this includes not only field surveys but also origin-destination (OD) and opinion surveys, which should be conducted as soon as possible. The results of these surveys should be discussed among the related agencies and the central, provincial, and local governments, as well as the airport operator.

5.3.7 Freight Transportation System

1) Locations of Industrial Estates

Both existing and planned industrial estates in the GKS Zone are presented in Figure 5.3.55. Those industrial estates tend to cluster around gateway port developments: namely, Tg. Perak-Gresik port development area, north Lamongan-Gresik coastal port development area, and north Bangkalan port development area. Existing and planned freight terminals are also located near the gateway ports. Three major industrial corridors have been formed from these clustering, namely: 1) the coastal line from Surabaya to Gresik and up to north Lamongan, 2) the road from Rungkut/Juanda Airport to Sidoarjo and up to Pasuruan; and, 3) the primary arterial road that runs from Surabaya to Mojokerto. These industrial corridors will be served by freight trunks consisting of toll roads and primary arterial roads.



Source: JICA Study Team

Figure 5.3.55 Industrial Estates and Freight Terminal in GKS Zone

2) Major Truck Routes

The only main existing freight transport corridor in the GKS is the north-south toll road which connects Manyar (Kab. Gresik), Surabaya, and Gempol (Kab. Pasuruan) and also extends to Tg. Perak Port. Since the section near the center of Surabaya, namely the Dupak–Waru toll road, which runs along the west periphery of CBD of Surabaya, this toll road is also used by many commuting vehicles.

In fact, all the existing toll road sections in the GKS have dual four-lane carriageways, except for sections of the Dupak–Waru, which has six lanes serving as a trunk freight transport corridor. As the table below shows, the composition of trucks is very high on the toll roads, especially on sections near Tg. Perak Port. This significantly impacts the traffic flow, as large slow moving vehicles take up considerable space on the toll roads.

Table 5.3.19 Vehicle Compositions at Major Toll Road Sections

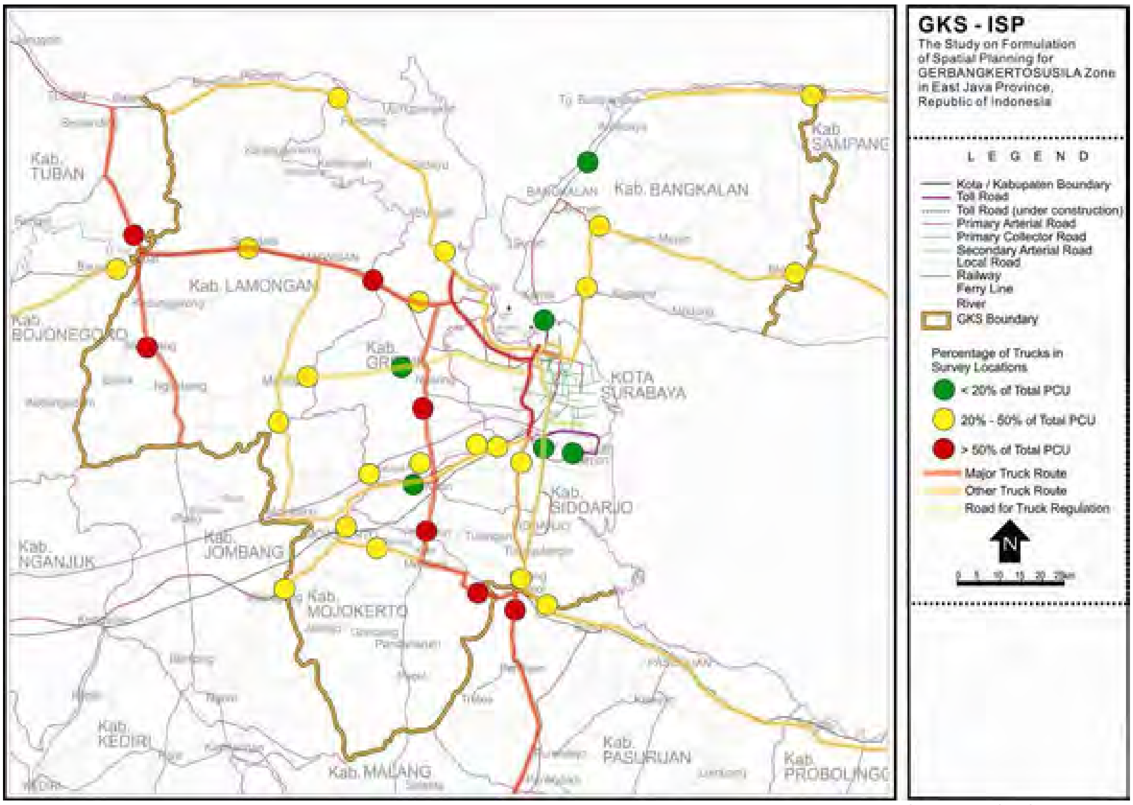
(Unit: vehicles/day)

Location	Passenger Car	Truck				Bus		Total
		Pick Up	2-Axle Truck	3-Axle Truck	4 or more Axle Truck	Small Bus	Medium /Large Bus	
Dupak-Tg. Perak (near Tg. Perak, TCS01)	10,959 (33%)	3,257 (10%)	6,962 (21%)	4,404 (13%)	6,740 (21%)	39 (0.1%)	473 (1%)	32,834 (100%)
Dupak-Gresik (near Dupak Jct., TCS14)	25,161 (45%)	8,706 (16%)	8,498 (15%)	5,045 (9%)	5,914 (11%)	1,655 (2.9%)	1,166 (2%)	56,145 (100%)
Dupak-Gempol (near Gedangan, TC10)	34,540 (55%)	4,950 (8%)	12,048 (19%)	4,001 (6%)	4,500 (7%)	76 (0.1%)	2,690 (4%)	62,805 (100%)

Source: Traffic Survey, JICA Study Team
Note: Number of passengers was estimated based on the result of roadside occupancy observation.

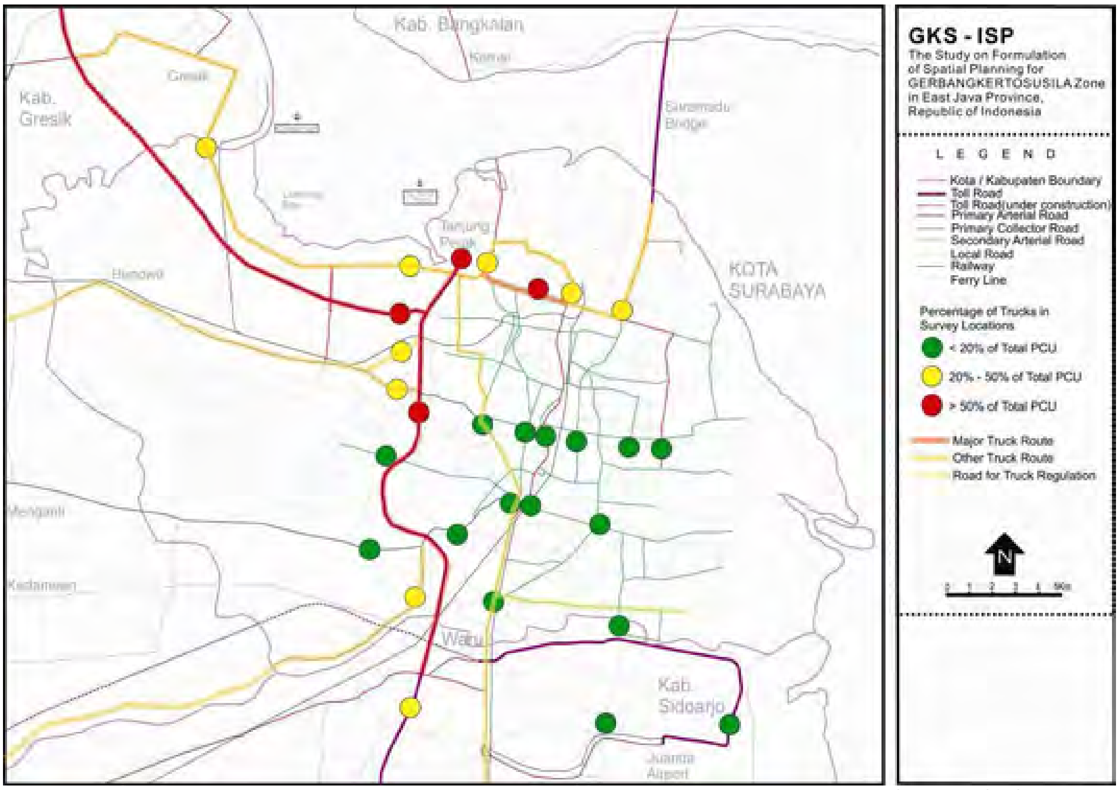
Based on the traffic count survey, which was conducted at more than 60 locations in Surabaya and the GKS, vehicle composition was calculated at each location, and roads that were loaded with trucks are presented in Figure 5.3.56, for the GKS, and Figure 5.3.57, for Surabaya. In the GKS, current truck-loaded roads partially match with the road development corridor. The major truck routes are: Surabaya–Gresik (Corridor No. 1), Surabaya–Lamongan–Babat (Corridor No. 2), Tuban–Babat–Jombang (Corridor No. 11), Gresik–Krian–Mojosari–Gempol (Corridor No. 9), and Gempol–Malang (Corridor No. 5). On the other hand, truck compositions on other routes such as Surabaya–Sidoarjo (except for Dupak–Waru), Gresik–Paciran–Tuban, and Surabaya–Bangkalan are still high, but the percentages are relatively minor.

In Surabaya, trucks transporting between the port and the industrial areas in south Surabaya or Sidoarjo, have no alternative routes except to go through the CBD where they are banned during peak hours, as shown in Figure 5.3.57. While this regulation has minimized the number of trucks from this road, it has also increased the volume on the existing toll roads and has resulted in the mixture of slow and fast traffic, as explained earlier. Such a burden on the existing toll roads (i.e. Waru–Dupak–Perak toll road, and Gresik–Dupak toll road) should be alleviated by the provision of more alternative roads for both trucks and passenger vehicles. The other truck-loaded roads in Surabaya were: Jl. Kembang Jepun-Jl. Kapasan, and Jl. Margomulyo.



Source: JICA Study Team

Figure 5.3.56 Major Truck Routes in GKS



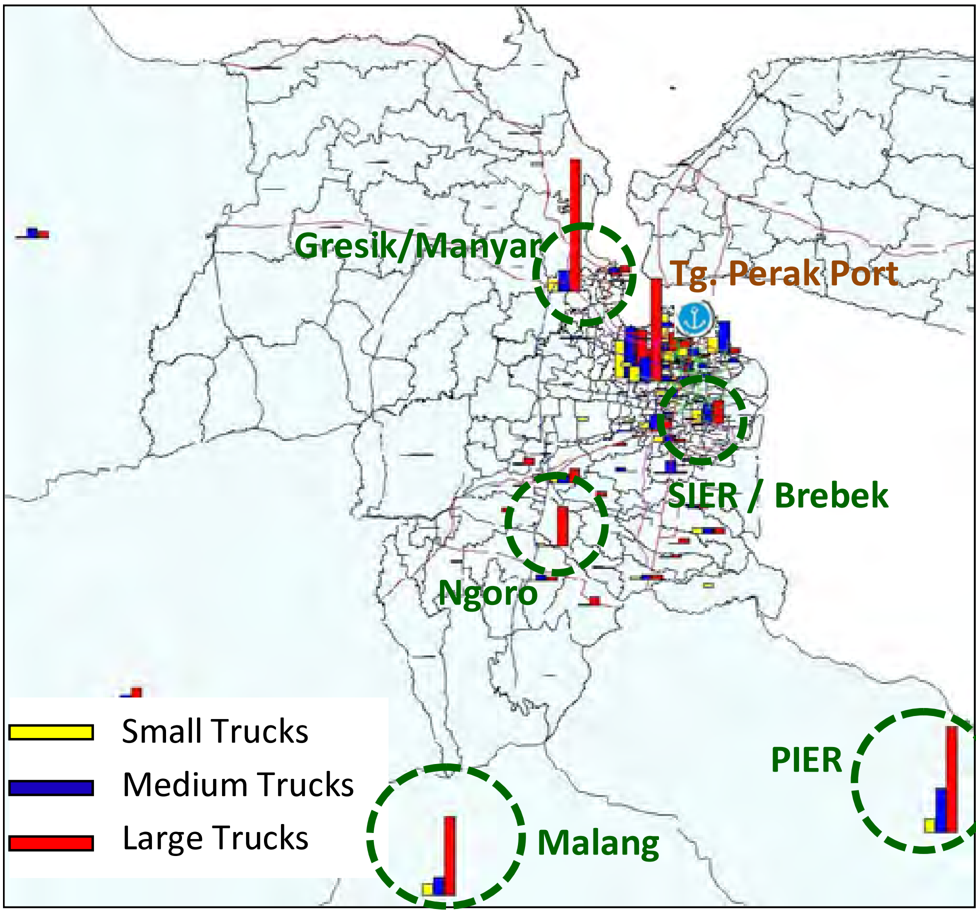
Source: JICA Study Team

Figure 5.3.57 Major Truck Routes in Surabaya

3) Truck Traffic to/from the Ports

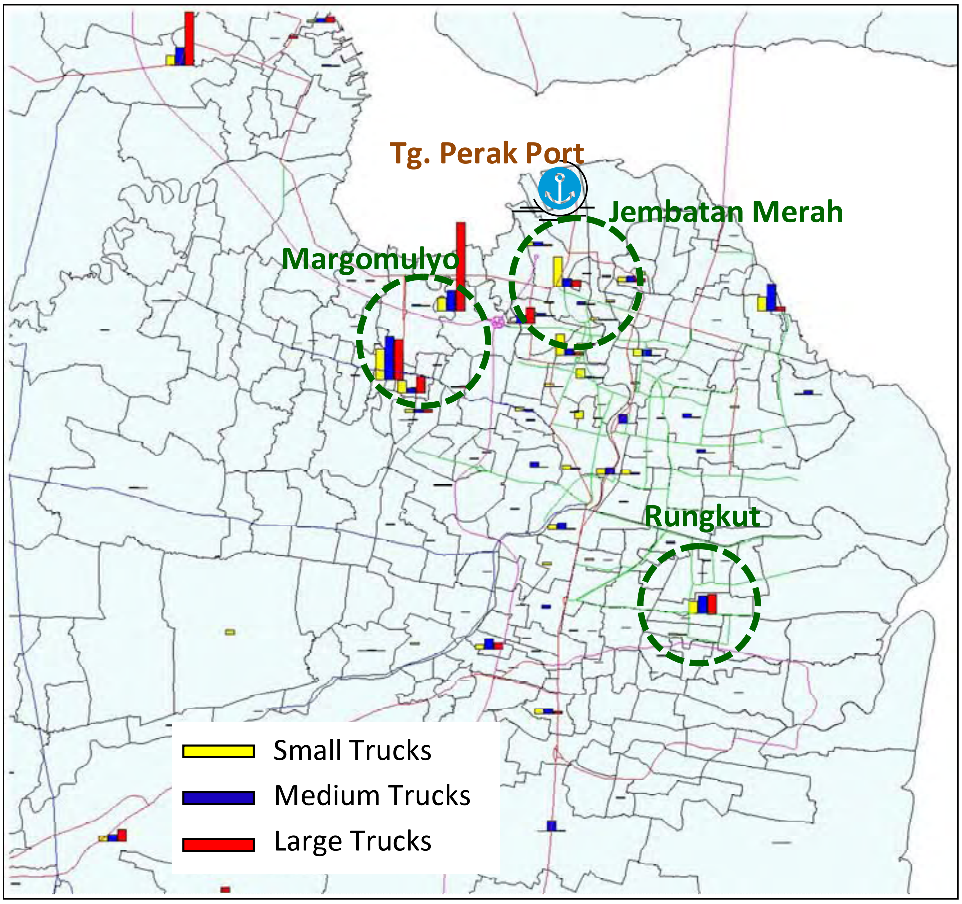
The truck-loaded roads in Surabaya were also assessed through the origin/destination of trucks to/from Tg. Perak Port (Figure 5.3.58 and Figure 5.3.59). In the GKS, high freight trip generation zones are near the industrial areas of Gresik/Manyar and Ngoro. Outside the GKS Zone, high freight trip concentration is observed in Pasuruan (i.e. PIER IE) and Malang. All these areas are located near the above-mentioned major truck routes to/from Tg. Perak Port.

In Surabaya, large truck trips are generated in the Margomulyo and Rungkut industrial areas, which are also warehouse areas. The surrounding roads, however, didn't have a high number of trucks, which was probably due to the truck regulation. In the old Kota area, especially in Pasar Atom/Jembatan Merah, relatively large volumes of small truck trips to/from Tg. Perak Port are observed.



Source: JICA Study Team

Figure 5.3.58 Origin/Destination of Trucks to/from Tg. Perak Port (GKS)



Source: JICA Study Team

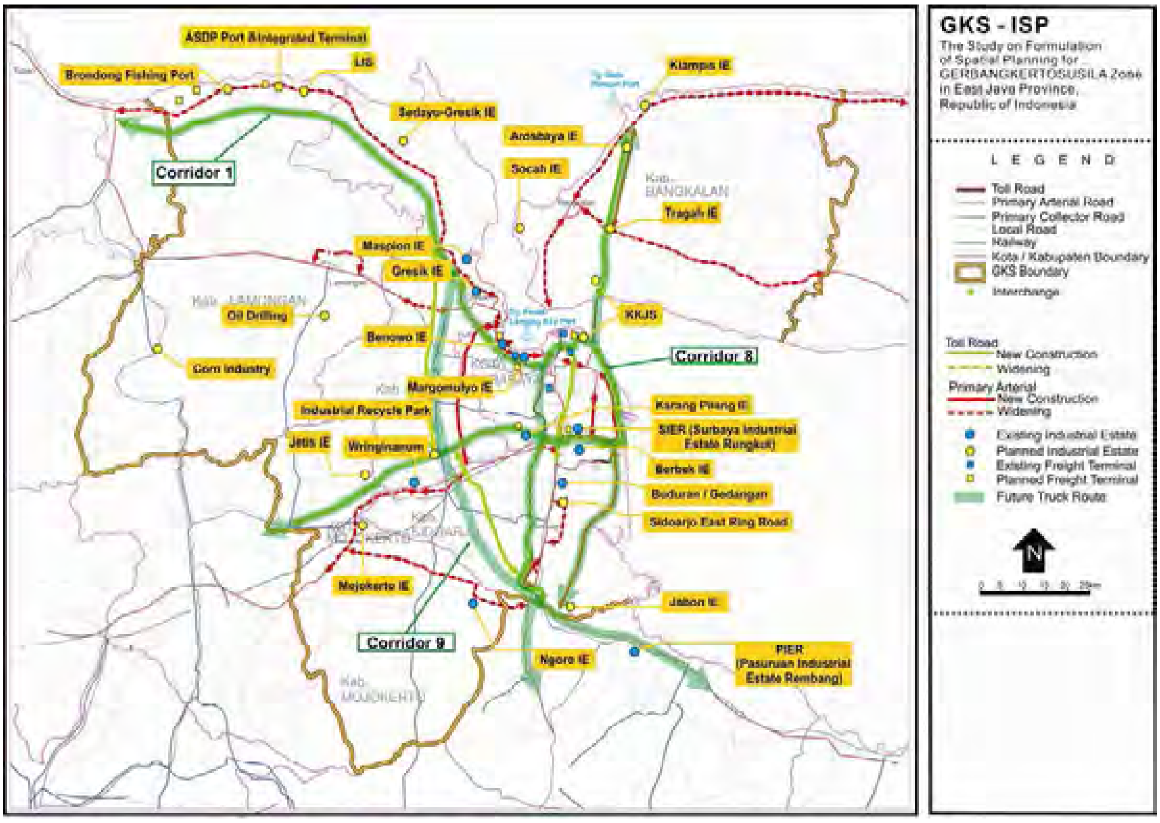
Figure 5.3.59 Origin/Destination of Trucks to/from Tg. Perak Port (Surabaya)

4) Future Freight Distribution Plan

(1) Future Truck Routes

To ensure smoother freight distribution and truck traffic, future truck routes in the GKS are proposed in light of the planned industrial estates and the port and road developments, as seen in Figure 5.3.60. The future truck network will mostly be based on the future toll roads, which will also serve nearby industrial estates and the future major ports of Tg. Perak, Lamong Bay, and Tg. Bulu Pandan. It will also provide several alternative truck routes which will skirt around central Surabaya and prevent mixing of freight with other vehicles on non-toll roads.

It should be noted that Corridor 1, namely, the north coastal toll road development, connecting Surabaya-Gresik-Paciran-Tuban, will serve not only the industrial estates but also freight traffic between Tuban and Surabaya/Malang. It is expected to reduce the heavy truck composition of the primary arterial road (i.e. Babat-Lamongan-Gresik) and the primary collector road (i.e. Tuban-Babat-Jombang). In addition, Corridor 9, namely, the SMA ring road development, connecting Manyar-Krian- Gempol, will serve as a truck route, bypassing Surabaya and connecting the industrial estates in Malang and Pasuruan with the Java north trunk road. Since this toll road will be developed in the long term the primary arterial road will serve this corridor in the meantime. Similarly, Corridor 8, which is expected to divert freight traffic from the Dupak-Waru toll road, will be served by primary arterial road (i.e., Outer East Ring Road) in the short term and then by the toll road (i.e., Surabaya East Ring Road) in the medium term.



Source: JICA Study Team

Figure 5.3.60 Future Truck Routes in GKS Zone

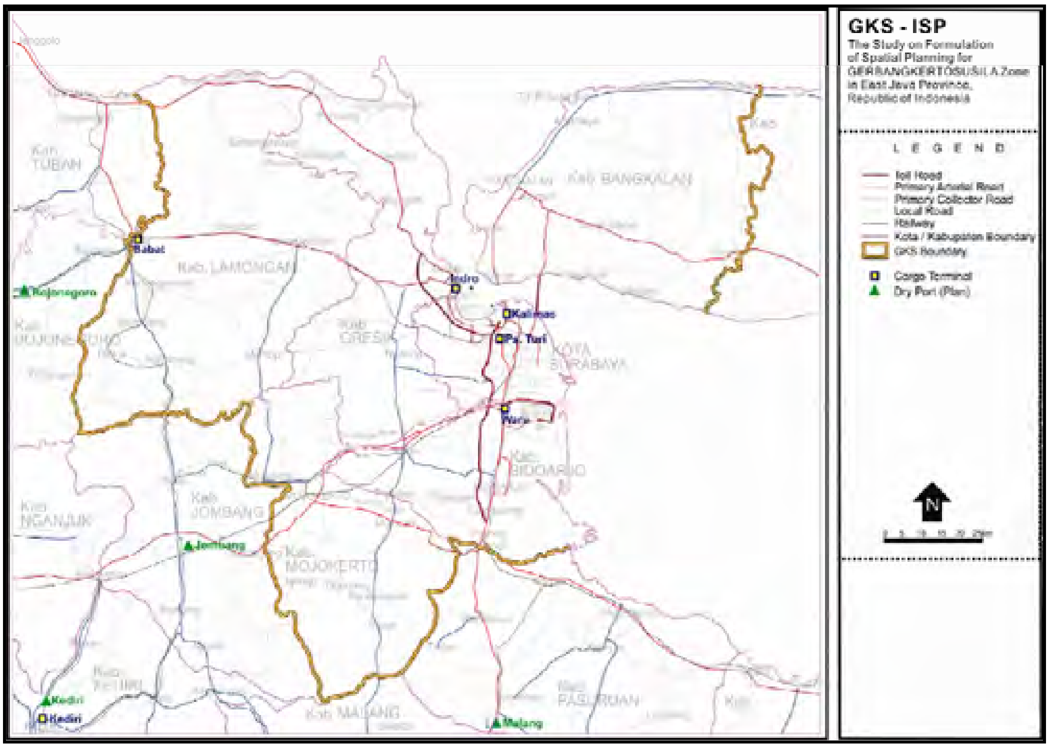
(2) Railway Freight Routes

For efficient railway freight, the existing railway freight terminals in Surabaya, namely, Kalimas, Pasar Turi, and Waru (Figure 5.3.61), should be integrated into a single station, which is Kalimas. One of the two current container operators has moved from Pasar Turi to Kalimas. Furthermore, Kalimas station should be reformed as a container marshaling yard and station, since it has enough land space for a new railway marshaling yard. Figure 5.3.62 shows the location of Kalimas station and its area surrounded by Jl. Tanjung Perak Timur, Jl. Kalimas Baru, and north of Jl. Sisingmangaraja.

In addition, PT. KA plans to revitalize the operation of freight trains to deal with the container traffic in Tg. Perak Port, i.e., the berths of Nilam, Berlian and TPS (Terminal Petikemas Surabaya or Surabaya Container Terminal). Hence, the existing dedicated single-track freight railway track (port access), that connects Pasar Turi and Kalimas station, up to Tg. Perak Port, should be rehabilitated for faster, smoother, and more reliable freight train services. A study of an elevated single track may also be needed except for the marshaling yard area.

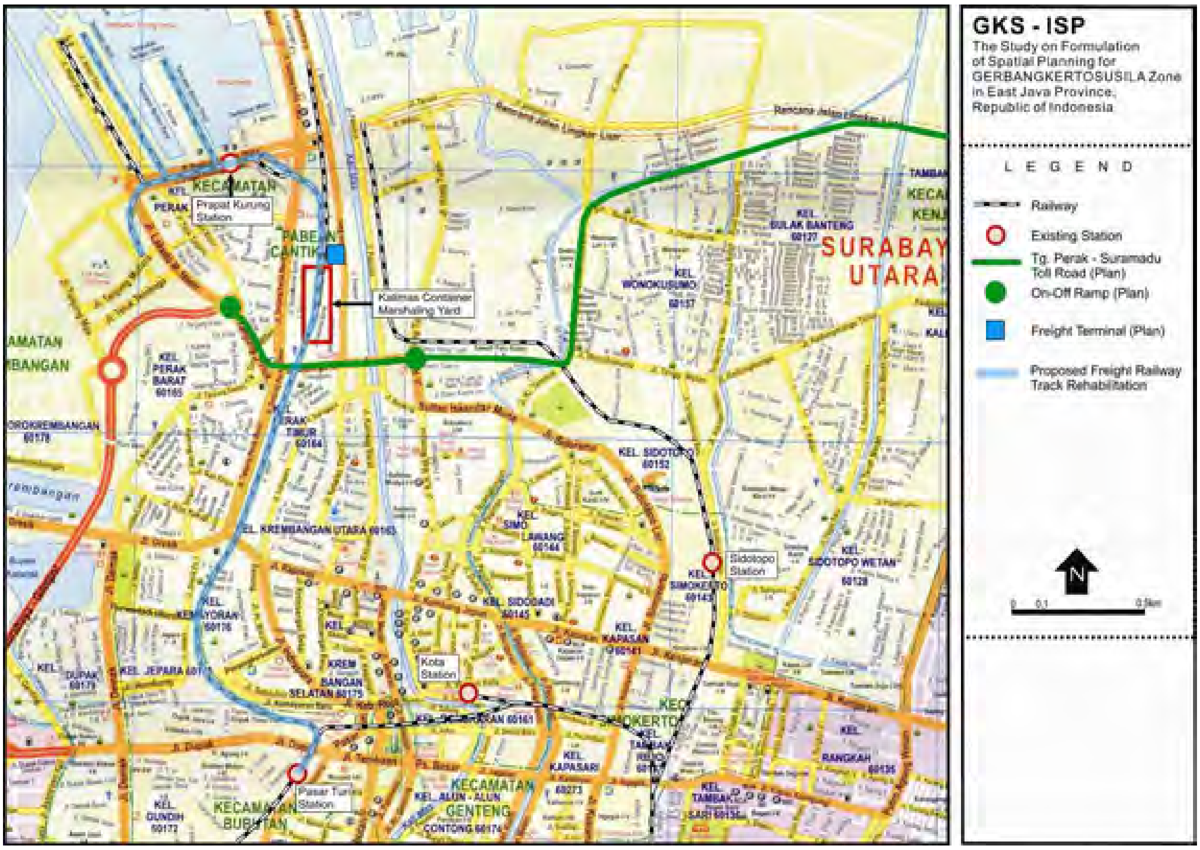
Kalimas station also needs to be equipped with freight handling facilities. All containers designated to be transported by railway should be brought to this area by shanty locomotive and then arranged for long-haul trips using container handling equipment such as stacker, or RTG. This space should be enough to arrange several trains with 20 – 30 freight wagons designed to carry 40ft containers. Likewise, the facilities of Prapat Kurung station to Port Section (From Kalimas) needs revitalization because it is old and unutilized.

Furthermore, in future, if Kalimas freight station reaches its full capacity for handling containers, Kandangan station, which is located close to the Margomulyo industrial area, will need to be developed into another freight terminal in the long term (Figure 5.3.63).



Source: Dinas Perhubungan of East Java Province

Figure 5.3.61 Railway Freight Terminals

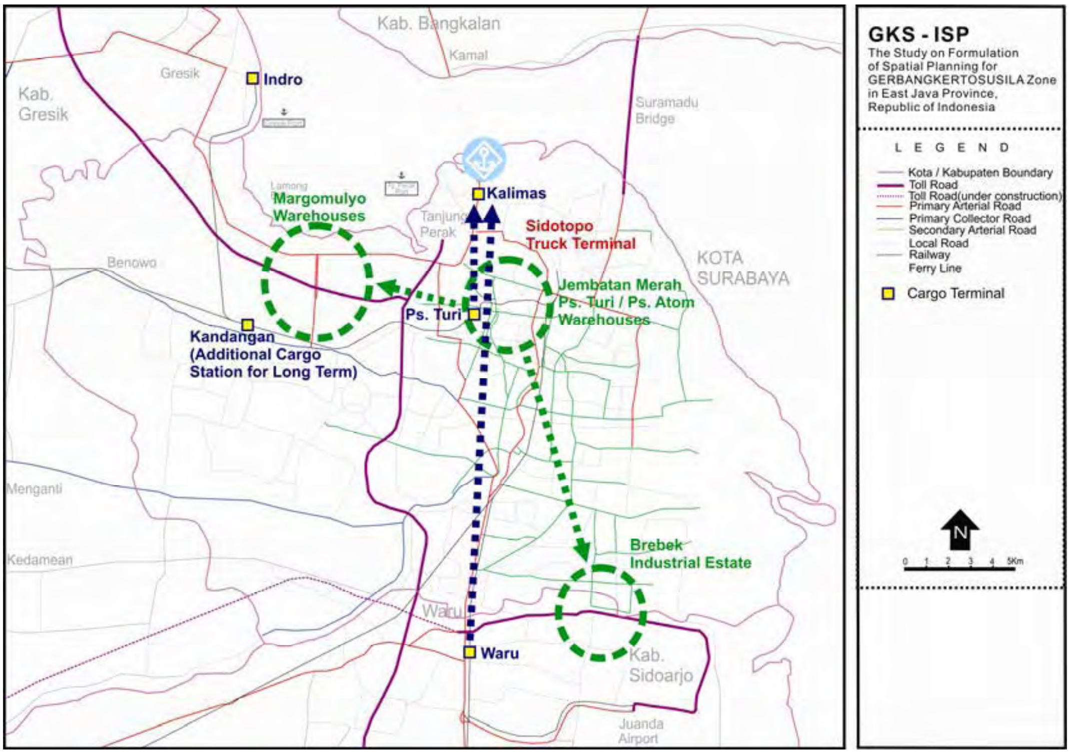


Source: JICA Study Team

Figure 5.3.62 Railway Port Access Development

(3) Relocation of Warehouses in Old Kota

The Old Kota area, namely, Pasar Atom/Jembatan Merah, have a large concentration of warehouses that generate a high volume of small truck trips to/from Tg. Perak Port causing chronic traffic congestion not only on the arterial roads but also on the local streets. Though it is underutilized, freight traffic to/from the existing Sidotopo truck terminal may be served by the planned Perak–Suramadu toll road, as well as the primary arterial road (Figure 5.3.63). However, to reduce truck traffic in the old Kota area, it is highly recommended that the existing warehouses should be relocated to other areas in/around Surabaya. Space for these warehouses seems to be available in the industrial areas of Margomulyo and Berbek, both of which are located close to the toll road. Such land can be reserved in order to promote relocation of the private warehouses.



Source: JICA Study Team

Figure 5.3.63 Freight Terminals/Warehouses in Surabaya