3.8 Caloocan Station

1) Existing Situation

3.110 The Caloocan Station area is located at the central part of South Caloocan in the National Capital Region (Metro Manila) as shown in Figure 3.8.1. The major facilities within 1 km from the station are the Caloocan Central Post Office, Caloocan City Hall, University of the East Caloocan (UE), and public markets. The station is close to Samson Road. Along Samson Road leading to Quezon City, a lot of informal settlers occupy part of the property (see Figure 3.8.2).

Source: JICA Study Team.

Figure 3.8.1 Vicinity Map of Caloocan Station Area

Samson Road **University of the East** **Informal Settlements**

Source: JICA Study Team.

Figure 3.8.2 Surrounding Environment of Caloocan Station Area

(1) Road Network

3.111 The road network around Caloocan Station consists of national roads, city roads and barangay roads. The national and city roads are normally used by all types of vehicles such as private and public vehicles, commercial and cargo vehicles, and even the slow-moving tricycles and pedicabs.

3.112 More specifically, the Caloocan Station is bounded by three major roads, namely: Samson Road on the north, P. Burgos St. on the south, and barangay roads on the west and the east.

3.113 The area around Caloocan Station is heavily crowded with mixed developments such as residential, commercial, institutional and industrial developments, and the roads are laid out on an unplanned community. There are 189 roads within 1 km from the station, which are mostly city roads while closer to the stations are about 10 barangay roads (see ***Appendix 3.1)***.

(2) Signals

3.114 Slow traffic and congestion characterize most of the streets and roads surrounding the station. The main roads act as collector roads of minor roads since the latter connect to the former at various locations, such that numerous turning movements are expected at short distances.

3.115 To minimize traffic congestion and which becomes standstill of vehicles during peak hours, the flow of traffic from all directions especially along intersections is controlled and managed by a traffic signaling system supplemented by the presence of traffic enforcers when the traffic situation is already unbearable. Traffic signals are provided at the intersections of A. Mabini St. and Samson Road, 5th Ave. and Juan Luna St., and some of the city roads carrying significant volume of vehicles. Despite the presence of traffic signals, the intersections become bottlenecks when unruly and undisciplined drivers ignore the traffic lights. This particularly happens during bumper-to-bumper traffic that often results in gridlocks and standstill traffic at the intersections.

(3) Public Transportation Terminals

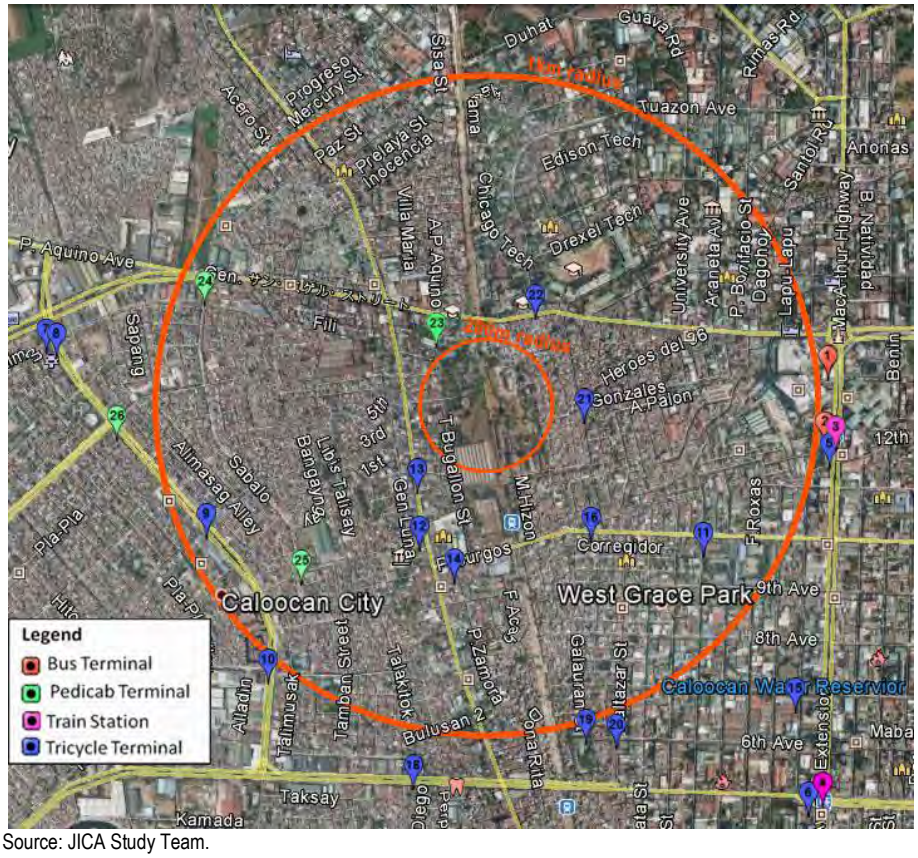
3.116 Since the major transportation terminals such as a bus terminal are located around LRT 1 Monument station, there are only several tricycle and pedicab terminals nearby proposed Caloocan station as shown in Table 3.8.1 and Figure 3.8.3.

Table 3.8.1 Public Transportation Terminals around Caloocan Station

Mode	No	Terminals	Location
Provincial buses	1	Victory Liner Terminal	713 Rizal Ave. Extension, Monumento, Caloocan City
	2	First North Luzon Transit	Florencia St., Caloocan City
Train	3	LRT1 Monumento Station	Rizal Ave. Extension, Monumento, Caloocan City
	4	LRT1 5th Ave. Station	Rizal Ave. Extension corner 5th Ave, Caloocan City
Tricycle	5	TAWTODA	Florencia St. corner Rizal Ave. Extension, Caloocan City
	6	FAWTODA	5th Ave. West corner Rizal Ave.
	7	C-4 DDL / KAMANATODA	Dagat-Dagatan Ave. corner Salmon St., Caloocan City
	8	SSD TODA	Dagat-Dagatan Ave.
	9	SPLD TODA	Dagat-Dagatan Ave. corner Langaray St., Caloocan City
	10	DDT TODA	Tanique St. corner Dagat-Dagatan Ave.
	11	NTE TODA	P. Sevilla St., Caloocan City
	12	Unnamed	Espiña St., Caloocan City
	13	SMP TODA	Plaridel St., Caloocan City

Mode	No	Terminals	Location
	14	ZAMCENTODA	P. Zamora St., Caloocan City
	15	SAW TODA	7th Ave. corner J. Teodoro St., Caloocan City
	16	H. Del 96 TODA	G. Aglipay St., Caloocan City
	17	SGT TODA	Sisa St., Malabon City
	18	KVC-3 TODA	Talakitok St. corner C-3
	19	SIAWTODA	Brillantes St., Caloocan City
	20	SIAWTODA	Baltazar St., Caloocan City
	21	H. TODA	Gonzales St., Caloocan City
	22	UE TODA	UE Tech, Caloocan City
Pedicab	23	TORBUPODA	Torres Bugallon St., Sangandaan, Caloocan City
	24	LETSPODA	Sabalo St., Caloocan City
	25	LETSPODA	Sabalo St., Caloocan City
	26	SSD PODA	Dagat-Dagatan Ave. corner Lapu-Lapu Extension

Source: JICA Study Team.



Source: JICA Study Team.
Note: The numbers correspond to the numbers in Table 3.8.1

Figure 3.8.3 Public Transportation Terminals around Caloocan Station

(4) Existing Access Improvement Plan

3.117 There are two ongoing projects within the Caloocan Station area, as shown in Table 3.8.2. In addition, nine projects have been planned in the area, including flood control projects and rehabilitation of existing roads. All these planned and ongoing projects are to be implemented by Department of Public Works and Highways (DPWH).

Table 3.8.2 Access Improvement Projects in Caloocan Station Area

	Project	Status	Implementing Agency
1	J Rizal Ave. Chainage 0178.90 Chainage 0514, K0006 + 063 K0006 + 643 PAVED (CONCRETE) TO PAVED (CONCRETE)/Manila District 3,North Manila District Engineering	On-going	DPWH
2	Road Construction Brgy. 177, District 1, Caloocan City GRAVEL TO PAVED/District-wide, Metro Manila 3rd District Engineering Office, Metro Manila	On-going	DPWH

Source: DPWH, Caloocan City.

(5) Current Land Use

3.118 The Caloocan City Hall, Caloocan Police Station, Caloocan Central Post Office, Caloocan Judicial Complex, and Sangandaan Public Cemetery are located within 1 km from the station (see Figure 3.8.4). Several local public markets are also located within this radius. Shopping malls, such as Bonifacio Market and SM Hypermarket, are located at the Monumento Circle near LRT 1 Monumento Station. UE, University of Caloocan City, AMA Computer University, STI Academic Center, and Divine Mercy College are located within 1 km from the station. Manila Central University is approximately 1.2 km away from the station but is still within the station's area of influence.

3.119 PNR has a big 29 hectare property surrounding the station (see Figure 3.8.5 and Table 3.8.3) portions of which are currently being used by a missionary association and the police. A portion of this property is also occupied by informal settlement families (ISFs).

Source: JICA Study Team based on Open Street Map.

Figure 3.8.4 Current Land Use of Caloocan Station Area

Source: Land Use Survey by JICA Study Team.

Figure 3.8.5 Available Vacant Lots in Caloocan Station Area

Table 3.8.3 Ownership of Vacant Lots in Caloocan Station Area

Property No. 1)	Barangay	Lot Owner	Area (sq. m.)	Actual Use
1	80	Philippine National Railways	25,938	Public
2	5, 9, 64, 73	Philippine National Railways	221,172	Railway, School, Residential (ISFs)
3	74	Philippine National Railways	47,300	Residential (ISFs)
Total			294,410	

Source: Land Use Survey by JICA Study Team.
1) Property No. corresponds with the numbers in Figure 3.7.4.

2) Concept Plan

(1) Issues

3.120 Even as the Caloocan Station area within 1 km from the station plays a significant role as a political, commercial and educational center with many major facilities within it, safe and convenient access to these facilities are not secured due to the lack of arterial streets with sufficient width. Samson Road is the only national road serving as an east-west axis in station area. However, it only has a 12 m wide carriageway and even for the section with sidewalk and median, its total width is only 16m which is below the 20 m minimum width for a national road. A similar situation applies to the north-south axis served by Mabini St., also a national road with only a 12 m wide carriageway and a total width of 14 m even for the section with sidewalk. Therefore, it is essential to take advantage of the redevelopment of the PNR Caloocan property by utilizing the property for the road improvement as well as for open/green space for the community. Open/green space is one of the most lacking urban elements in the station area and necessary from the perspective of disaster prevention/management as well as urban amenity. ISFs are living in the PNR properties (2 and 3 in Figure 3.8.5). While ISFs in PNR property 2 will be relocated by SM, further coordination will be required for the relocation of ISFs in PNR property 3 in order to implement the redevelopment project.

(2) Concept of TOD

3.121 The concept of TOD for the Caloocan Station area is the “Development of a new transport hub-urban core in the northwest of Metro Manila”. Due to its significant role not only for the City of Caloocan but also for Metro Manila, it is necessary to establish this new urban center with sufficient transport capacity by public transportation facilities and road improvements.

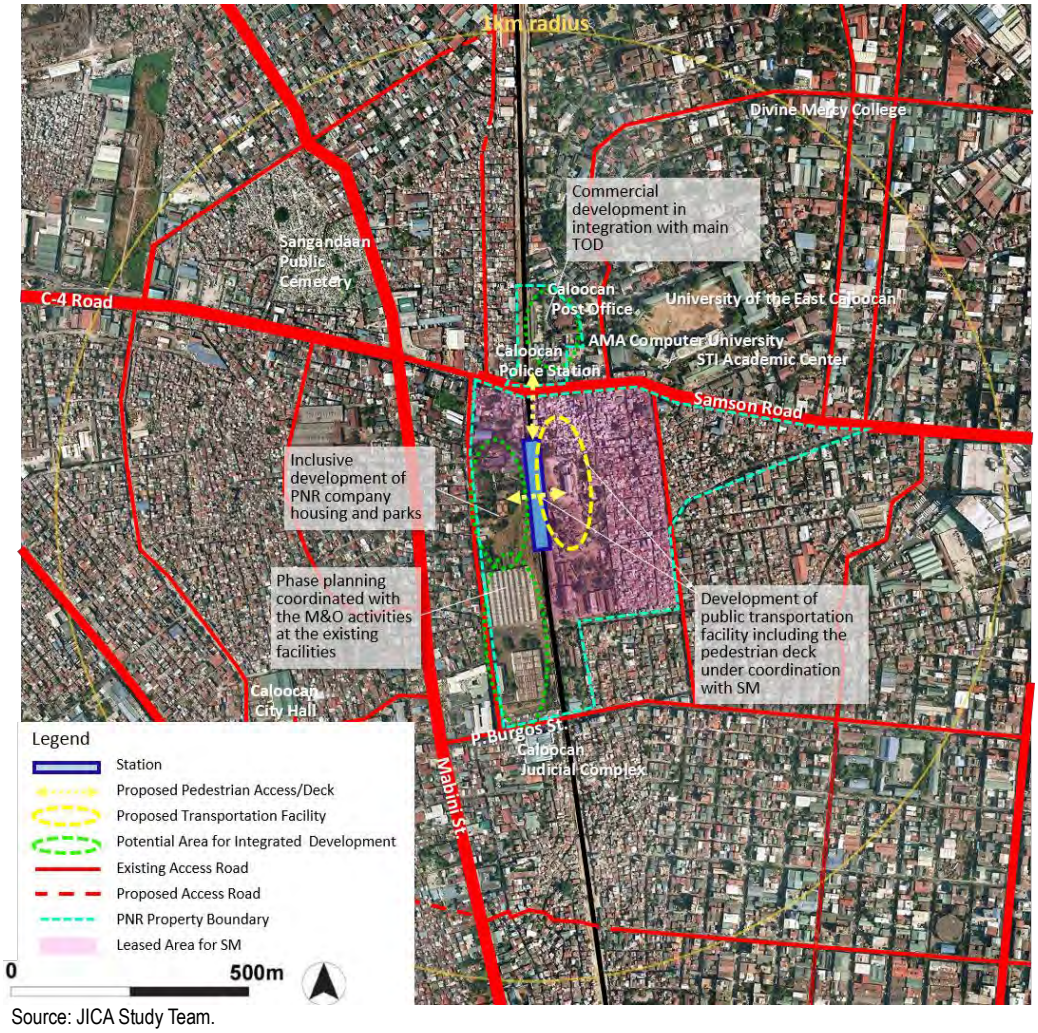
(3) Concept Plan

3.122 To address the issues in the Caloocan Station area according to the TOD concept, the following key interventions will be needed as the major components of the concept plan (see Figure 3.8.6);

(i) Prepare a strategic redevelopment plan for the PNR Caloocan property as a catalyst to improve urban and transportation issues;

(ii) Coordinate with SMDC's commercial development project and MNTC's NLEx Segment 10 project in an effective manner to incorporate the road improvements, public transportation facilities, and security of open/green spaces in these private sector projects; and,

(iii) Implement arterial road widening (Samson Road and Mabini St.) as well as new road construction for better accessibility to the station and major facilities in the community.



Source: JICA Study Team.

Figure 3.8.6 Concept Plan of Caloocan Station Area

3) Transportation Access Improvement Plan

3.123 In order to solve the issues identified through the preparation of the concept plan and provide specific solutions to improve mobility and accessibility, overall approach for access improvement in the walkable area (within 1 km from the station) where takes an important role for the passengers and the local residents was summarized as shown in Table 3.8.4.

Table 3.8.4 Access Improvement Approach for Caloocan Station Area

No	Measures	Contents
1	Road capacity upgrading and enhancement	• Road surface improvement (reconstruction, rehabilitation and overlay/strengthening), lane widening and expansion, and alignment extension. • Repair of existing and installation of new road drainage systems. • Restoration of affected utilities and provision of new utility lines and their accessories.
2	Development of public transportation facility	• Installation of pavement markings and traffic signs. • Installation of medians. • Establishment of public and private vehicle parking areas. • Establishment of public utility vehicles terminal / loading and unloading bays.
3	Intersection capacity enhancement	• Geometric alignment improvement. • Installation of pavement markings and traffic signs. • Installation of pedestrian relief islands and PWD access system. • Installation of traffic and pedestrian signaling system.
4	Traffic control and management	• Installation of traffic signaling system. • Establishment of traffic control and management center. • Establishment of traffic stations. • Deployment of sufficient number of traffic enforcers.
5	Sidewalk clearing and improvement	• Strict enforcement of city ordinance on illegal sidewalk vending. • Construction and beautification of sidewalk area to deter establishment of illegal sidewalk stores and the like. • Establishment of adequate pedestrian loading and unloading areas. • Provision for planting strip.
6	Traffic information dissemination campaign	
7	Installation of digital screen and monitoring boards	

Source: JICA Study Team.

3.124 Based on these measures listed above, certain actions are specified as the access improvement plan for the Caloocan Station area with the following elements (see Figure 3.8.7):

(a) **Road Capacity Upgrading and Enhancement:** The existing national and city roads adjacent to the station are proposed for widening to improve access and circulation around it by increasing the road capacity. Samson Road only has less than 15 m width with four lanes, and jeepneys often occupy one to two lanes for loading and unloading. After opening the NSCR, this road will be congested further by additional traffic to access the Caloocan Station. Widening this road together with the redevelopment of the PNR property can lessen the impact on communities on the north side. The city roads are T. Burgos St. and New Abbey Road, which can be integrated with the commercial development of the area surrounding the station.

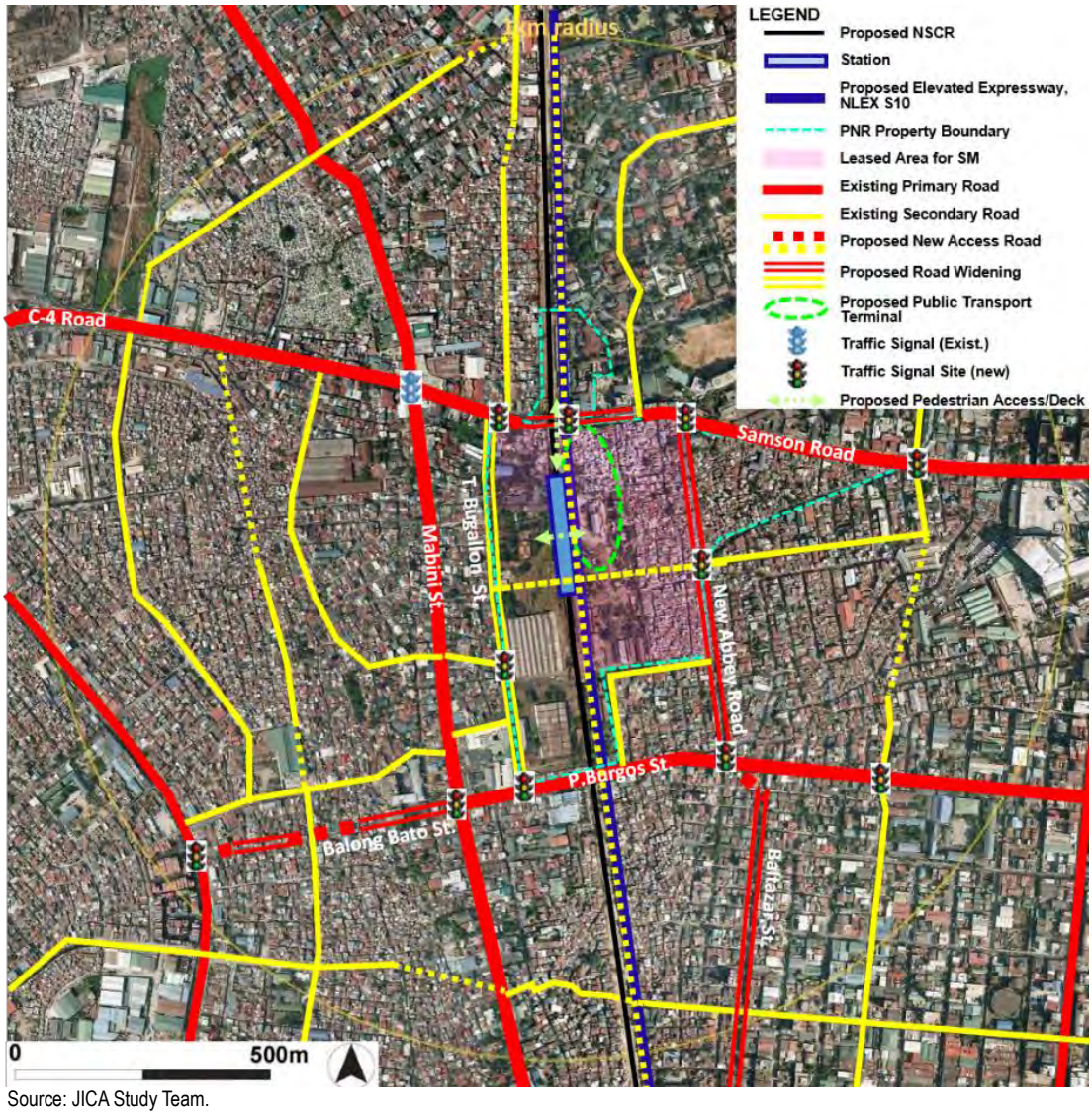
The space under the viaduct of the NSCR will be utilized as a new access road. This new road connects Samson Road and P. Burgos St. to reduce the loads on A. Mabini St. as well as provide better mobility within the redevelopment area of the PNR property.

Additional new roads and road widening are also proposed considering the

accessibility and mobility in the station area. Those proposed roads and existing roads will structure a grid road network with appropriate road hierarchy.

In addition, in order to improve the drainage system, DPWH has planned a number of flood control projects that can be implemented as per the agency's schedule in accordance with the availability of the funds.

(b) **Development of Public Transportation Facility:** The TOD project is expected to encourage people to access the Caloocan Station area by public transport system such as buses and jeepneys. However, the nearby bus and jeepney terminals are located at the Monumento area, which is about 1 km away from Caloocan Station. In this project, the public transport terminal is proposed at the east side of the station, i.e., within the lease area for SM. Since it is estimated that about 150,000 passengers will use the station in 2020, at least one hectare of public transport terminal is required to accommodate loading/unloading area for jeepneys, taxis and buses as well as drop-off area for private vehicular.



Source: JICA Study Team.

Figure 3.8.7 Transport Access Improvement Plan of Caloocan Station Area

(c) **Intersection Capacity Enhancement:** Installation of a traffic signaling system at the intersections is proposed to implement necessary traffic control by the appropriate

management devices to mitigate the current traffic congestion and delays in travel. Most of the existing traffic signals are located outside the project area as shown in Figure 3.8.6. The proposed locations to install new traffic signals include the intersections of Samson Road and T. Bugallon St., Samson Road and the new access road under the NSCR viaduct, Samson Road and New Abbey Road, P. Burgos St. and T. Bugallon St., and P. Burgos St. and the new access road under the NSCR viaduct. Synchronization of the traffic signals along the main roads is also important to mitigate traffic congestion and delays in travel.

(d) **Traffic Control and Management:** The Traffic Control and Management Center can be housed in the Caloocan Station to monitor the traffic conditions in this area. Traffic enforcers need to control the traffic according to the results of the monitoring. Major role of traffic enforcers includes the management of the loading/unloading of public transport vehicles, regulation of on-street parking, control of activities on sidewalks, etc.

(e) **Sidewalk Clearing and Improvement:** In addition to the fundamental solutions to provide a comfortable pedestrian environment such as securing sidewalk and providing street trees and furniture, it is important to provide a pedestrian overpass/deck where significant traffic volume is expected at the ground level. Considering the current traffic condition along Samson Road, pedestrian overpass is proposed to secure safe and convenient access as well as to enhance the connection between the station and the area located at the north side of Samson Road where major public facilities are located. Since the station concourse will be located at the second floor, it is proposed to provide the pedestrian deck attached to the station to link the access from/to the concourse, the north side of Samson Road via pedestrian overpass, and commercial facility located in the leased area for SM.

4) Major Projects/Programs/Action Items

3.125 The major projects were identified based on the abovementioned transport access improvement plan for the Caloocan Station area. As shown in Table 3.8.5, the major projects include road widening, new road development, development of a public transport terminal, development of pedestrian decks, and installation of traffic signals. While infrastructure facilities directly related to the station area need to be implemented by 2020 as a short-term project, others can be mid- to long-term projects.

Table 3.8.5 Profile of Major Projects for Caloocan Station

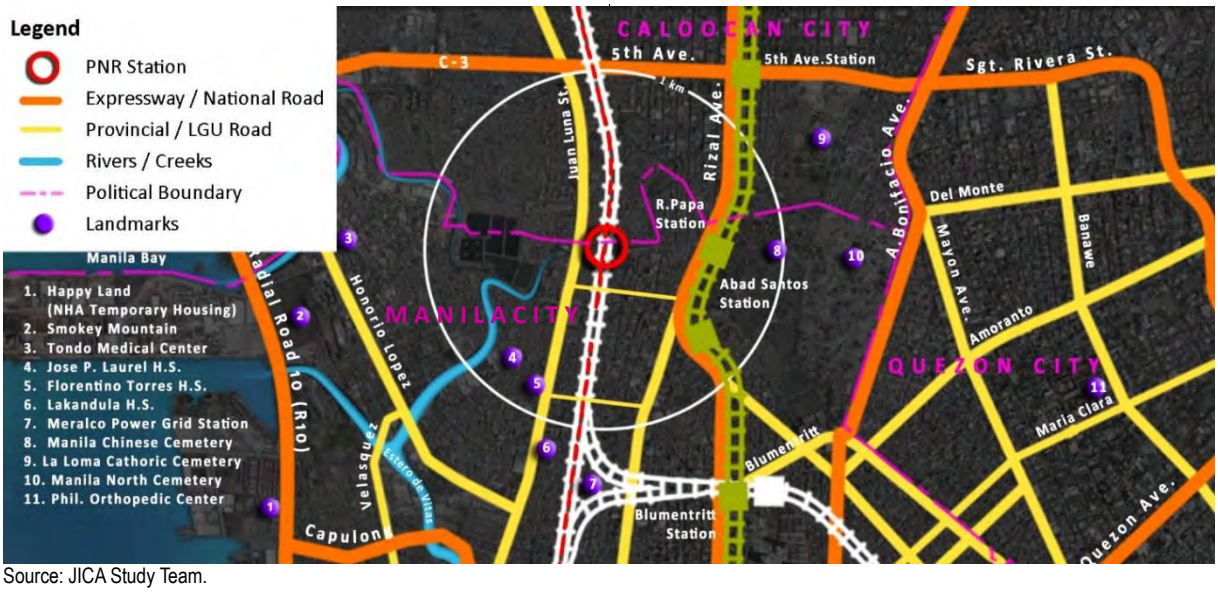
	Project	Term*	Specification (sq. m.)	Cost (PHP 000)
1	Road widening of Samson Road	Short-term	5,200 (W=20 m, L=260 m)	7,940
2	Road widening of T. Bugallon St.	Short-term	9,120 (W=12 m, L=760 m)	12,650
3	Road widening of New Abbey Road	Short-term	13,000 (W=20 m, L=650 m)	18,730
4	Road widening of Baltazar St.	Medium-term	2,800 (W=20 m, L=140 m)	4,030
5	Development of public transport terminal	Short-term	About 1.0 hectare	33,870
6	Development of pedestrian decks	Short-term	750 (W=3 m, L=250 m)	45,000
7	Installation of traffic signals	Medium-term	11 intersections	22,000
8	Development of new access road under NSCR viaduct	Medium-term	24,000 (W=12 m, L=2,000 m)	158,660
9	Development of other new access road within 1 km radius from the station	Medium to Long-term	24,400 (W=12 m, L=1,700 m)	134,860
10	Road widening of BalongBato St.	Medium to Long-term	2,700 (W=10m, L=270m)	4,460

Source: JICA Study Team.
* Short-Term: by 2020, Mid-term: by2020–2030, Mid- to Long- term: by 2030-2040

3.9 Solis Station

1) Existing Situation

3.126 Solis Station is located at the northern part of Manila City (see Figure 3.9.1) and northwest of the Manila City Hall, about 5 km away. The area around the station is a high-density residential area with some Informal Settlement Families (ISFs) especially along the Tutuban creek (see Figure 3.9.2). The major facilities within 1 km from the station are the Jose P. Laurel High school, Florentino Torres High school and Manila Chinese Cemetery.



Source: JICA Study Team.

Figure 3.9.1 Vicinity Map of Solis Station Area

Residential Area at West Side

NHA Housing

Informal Settlements

Source: JICA Study Team.

Figure 3.9.2 Surrounding Environment of Solis Station Area

(1) Road Network

3.127 Solis Station rests on an urban area with a complicated mix of residential, commercial, institutional and industrial developments around it. Since these developments are created by the land and property owners themselves and are divided into small parcels, they are generally unrestricted and not uniform. As a consequence, the road network system in the area is not organized and complicated.

3.128 Major roads surround the developments, which on the other hand are served by minor roads such as barangay roads and subdivision roads. Solis Station is bounded on east and west sides by Abad Santos Ave. and Juan Luna St., respectively. These roads

are the main collector roads of barangay and subdivision roads intersecting them at their sides and along their routes. Helmosa St. is located on the south side of the station.

3.129 The station is bounded by mixture of national, city and barangay roads. Solis Station can be accessed from the west by a barangay road which is connected to Juan Luna St., while from the east by another barangay road connected to Abad Santos Ave.

(2) Signals

3.130 Due to the high volume and numerous types of vehicles passing it, congestion on the road network system of the Solis Station area is unavoidable. To remedy this, major intersections were provided with traffic signaling devices installed at the corner or sometimes hanging over the road intersections.

3.131 Some of the intersections which presently have traffic signals are Juan Luna and Tayuman St. intersection, Tayuman St. and Rizal Ave. intersection, and Tayuman St. and Abad Santos Ave. intersection. Some minor city roads in a few locations, especially those carrying large volumes of vehicles, are likewise provided with traffic signals to control and manage the flow of vehicles along the major roads to preclude aggravation of the traffic situation especially during peak hours.

(3) Public Transportation Terminal

3.132 Majority of the public transportation terminals are located nearby LRT 1 stations and only several tricycle and pedicab terminals are identified In the vicinity of Solis Station as shown in Table 3.9.1 and Figure 3.9.3.

Table 3.9.1 Transportation Terminals around the Solis Station

Mode	No	Terminals	Location
Jeepney	1	Jeepney bay (roadside queue only)	Tomas Mapua St., Tondo, Manila
Pedicab	2	Informal	Pampanga St. / Juan Luna St., Gagalangin, Tondo, Manila
	3	Informal	Cavite St. corner Severino Reyes St.
Train	4	LRT1 R. Papa Station	Rizal Avenue Extension
	5	LRT1 Abad Santos Station	Rizal Avenue Extension
	6	LRT1 Blumentritt Station	Rizal Avenue Extension
Tricycle	7	LRT BOTODA	R. Papa St., Barrio Obrero, Tondo, Manila
	8	HERTODA	Hermosa St., Tondo, Manila
	9	ATODA	Abad Santos Ave. corner Mt. Samat St.
	10	CAMATODA	Cavite St. corner Rizal Avenue
	11	LATODA	Laguna St., Sta Cruz, Manila
	12	NATRODA	New Antipolo St., Manila
	13	INFORMAL	Benita St., Gagalangin, Tondo, Manila
	14	INFORMAL	Molave St., Tondo, Manila

Source: JICA Study Team.

Source: JICA Study Team.
Note: The numbers correspond to the numbers in Table 3.9.1.

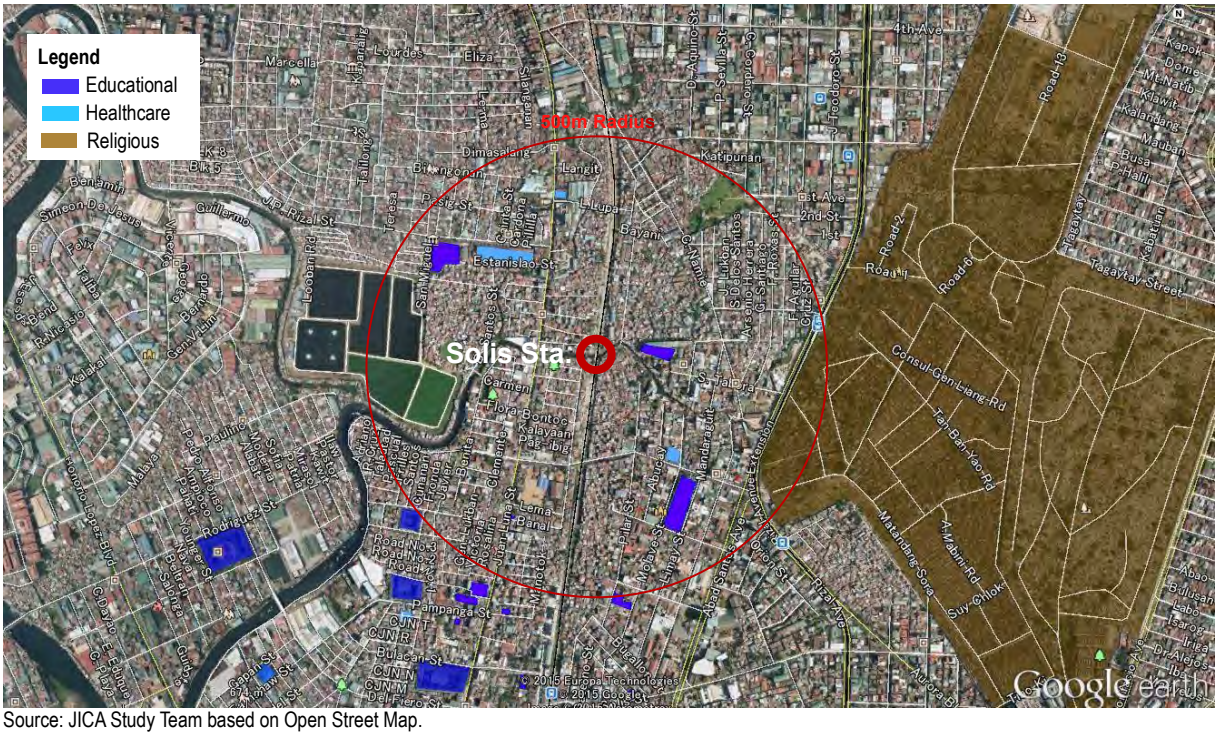
Figure 3.9.3 Public Transportation Terminals around Solis Station

(4) Existing Access Improvement Plan

3.133 There are six ongoing access improvement projects in the Solis Station area and all of them are the same projects previously listed in Table 3.10.3 for the Tutuban Station considering the close proximity of these two stations. In addition, 25 planned projects and three completed projects have also been identified. While DPWH is the implementer for all ongoing and completed projects, some of the planned projects include the projects by LGU.

(5) Current Land Use

3.134 There is no available vacant lot suited for integrated development (large, contiguous vacant lot excluding multiple subdivisions and part of an existing development plan) within 1 km from the station. Within this radius are located several high schools and hospitals. However, there are no major commercial facilities located within this distance (see Figure 3.9.4).



Source: JICA Study Team based on Open Street Map.

Figure 3.9.4 Current Land Use of Solis Station Area

2) Concept Plan

(1) Issues

3.135 Since the area around Solis Station is highly developed, very limited spaces are available both for public transportation facilities and parks. The lack of open spaces increases susceptibility to disasters as the area is flood-prone due to its proximity to the creeks. The areas along the creeks are occupied by ISFs, thus a redevelopment plan needs to be prepared not only for the improvements of the residential area but also for disaster management and access improvement through the integration of development of walkways for pedestrians and bicycle lanes along the creeks.

3.136 Access to the station is currently limited due to the lack of an east-west connection. Even though Solis St. is the only national road that serves as an east-west arterial within 1 km from the station, it has only 11 m width. Since separation of the community on the east side and west side of the station can be expected due to the proposed elevated NLEx-SLEx Connector Road as well as NSCR, enhancement of east-west connection becomes a major improvement needs to be implemented in the vicinity of the station.

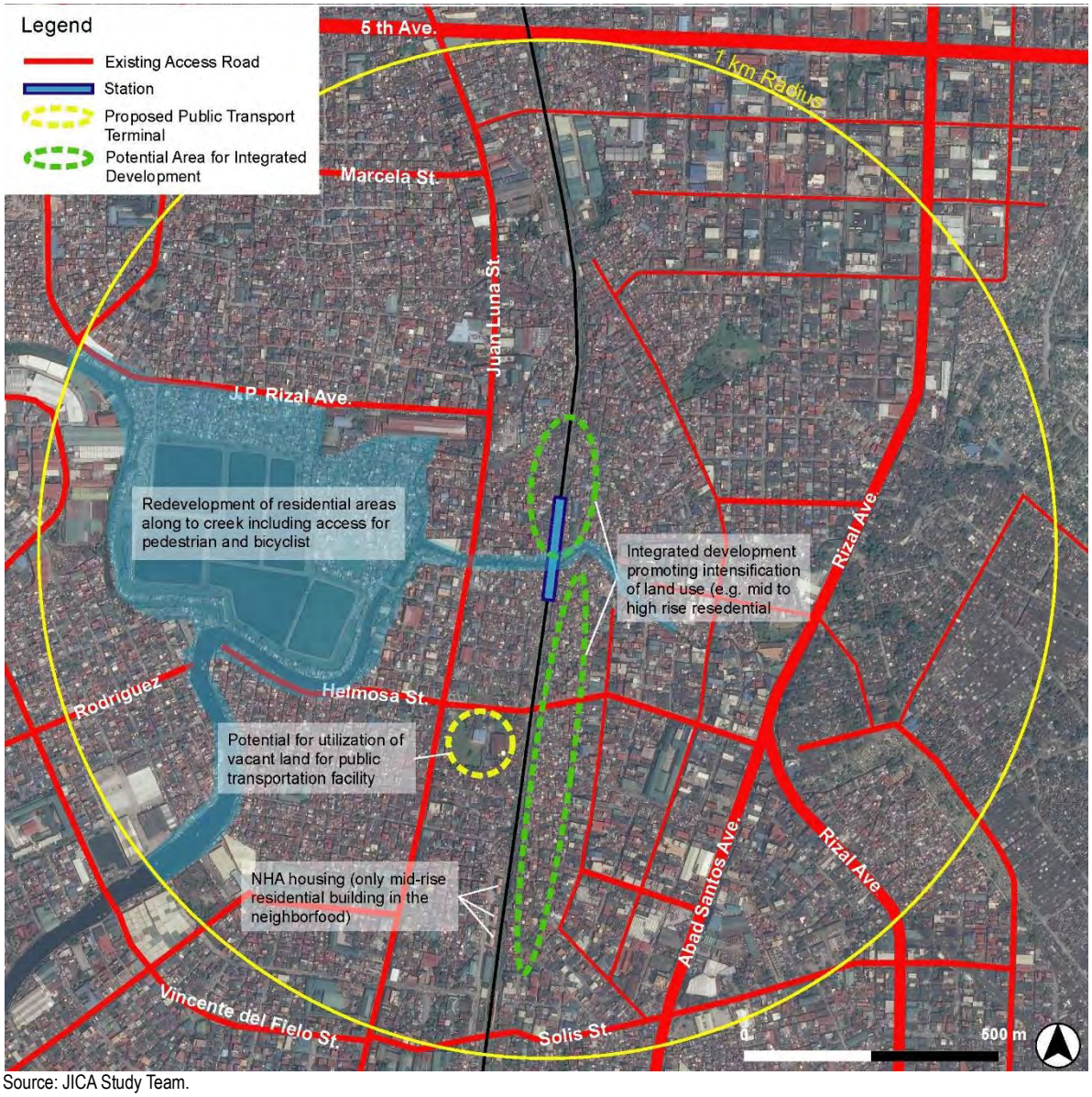
(2) Concept of TOD

3.137 The concept of TOD for the Solis Station is the “Catalyst to encourage urban renewal in adjacent areas”. While the development associated with railway construction is limited due to the scarcity of land, such development needs to stimulate the redevelopment in the adjacent areas through its multiplier effects.

(3) Concept Plan

3.138 To maximize the positive impact by the NSCR as a catalyst to redevelop the neighborhood, coordination among relevant stakeholders such as the local community, LGU, DPWH, and DOTC is essential. Since the location of Solis Station as well as the NLEx-SLEx Connector Road is not yet finalized, continuous information gathering from the

relevant government agencies will be needed. As previously described, limited availability of land for redevelopment including allocation of open space is the major issue to implement TOD. Therefore, the City of Manila needs take the initiative to implement urban redevelopment in a holistic and strategic manner, such as by land readjustment project integrated into the current infrastructure project including the NSCR and NLEx-SLEx Connector Road. Coordination with local stakeholders is also important in this regard as it contributes to utilization of the exiting vacant lot and identification of the potential site for the land readjustment project (see Figure 3.9.5).



Source: JICA Study Team.

Figure 3.9.5 Concept Plan of Solis Station Area

3) Transportation Access Improvement Plan

3.139 Similar to the accessibility improvement approach of Caloocan Station, the following measures were developed as the foundamental approach for access improvement of Solis Station (see Table 3.9.2).

Table 3.9.2 Access Improvement Approach for Solis Station Area

No	Measures	Contents
1	Road capacity upgrading and enhancement	• Road surface improvement (reconstruction, rehabilitation and overlay/strengthening), lane widening and expansion, and alignment extension. • Repair of existing and installation of new road drainage systems. • Restoration of affected utilities and provision of new utility lines and their accessories.
2	Development of Public Transportation Facility	• Installation of pavement markings and traffic signs. • Installation of medians. • Establishment of public and private vehicle parking areas. • Establishment of public utility vehicles terminal / loading and unloading bays.
3	Intersection capacity enhancement	• Geometric alignment improvement. • Installation of pavement markings and traffic signs. • Installation of pedestrian relief islands and PWD access system. • Installation of traffic and pedestrian signaling system.
4	Traffic control and management	• Installation of traffic signaling system. • Establishment of traffic control and management center. • Establishment of traffic stations. • Deployment of sufficient number of traffic enforcers.
5	Sidewalk clearing and improvement	• Strict enforcement of city ordinance on illegal sidewalk vending. • Construction and beautification of sidewalk area to deter establishment of illegal sidewalk stores and the like. • Establishment of adequate pedestrian loading and unloading areas. • Provision for planting strip.
6	Traffic Information dissemination campaign	
7	Installation of digital screen and monitoring boards	

Source: JICA Study Team.

3.140 Based on the measures listed above, following improvements are proposed as more specific solutions for the access improvement in the vicinity of the Caloocan Station:

(a) **Road Capacity Upgrading and Enhancement:** Support infrastructure projects identified for developing the Solis Station include the widening of Hermosa St. and S. Tabora since these two roads are nearest to the station. In addition to widening those road, new road construction is required to provide the direct access to the station, which can be proposed from Juan Luna St. to S. Tabora. The boundaries of those roads are heavily built up such that the widening will affect many privately owned structures and properties.

The widening of other roads such as Pilar St., Rajah Soliman St. and Hermosa Extension will improve accessibility to the Station for passengers coming from surrounding communities.

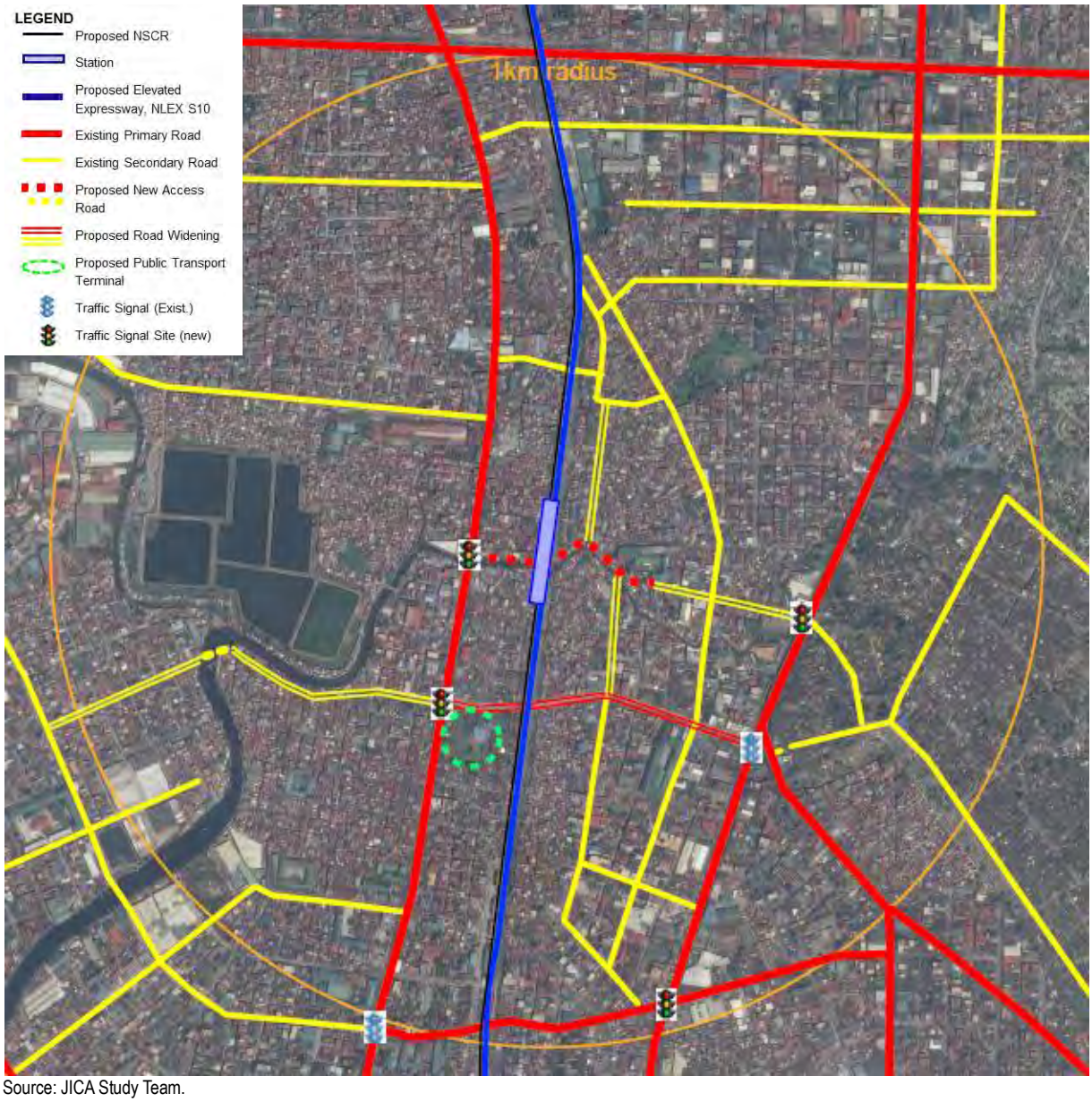
(b) **Development of Public Transportation Facility:** Due to limited available land next to the station, an alternative location can be considered for public transportation terminal at the corner of Juan Luna St. and Hermosa St. Another option is to provide only a drop-off bay at the ground floor of the station building. Considering the characteristics of the Solis station area, a large terminal facility is not required.

(c) **Intersection Capacity Enhancement:** In accordance with road widening and new road development, installation of traffic signals is required at the main intersections such as Hermosa St.Pilar St., Solis St.Dagupan St., etc.

(d) **Traffic Control and Management:** Improvements on the traffic control and management will enhance the traffic movement along major intersections in the vicinity of the Solis Station and instill discipline among motorists. Currently, there are

no official traffic enforcers assigned in this area, but the opening of the NSCR and Solis Station will increase the traffic demand in the area. The appropriate allocation of traffic enforcers can encourage more people to use the NSCR, especially those accessing public transport service and/or are on foot.

3.141 The access improvement proposals are further illustrated in Figure 3.9.6.



Source: JICA Study Team.

Figure 3.9.6 Transport Access Improvement Plan of Solis Station Area

4) Major Projects/Programs/Action Items

3.142 The major projects were identified based on the abovementioned transport access plan for Solis Station. As shown in Table 3.9.3, the major projects are similar to the ones in the Caloocan area, consisting of road widening, new road development, development of public transport terminal, and installation of traffic signals. While infrastructure directly related to the station area need to be implemented by 2020 as a short-term project, others can be medium-term projects.

Table 3.9.3 Profile of Major Projects for Solis Station

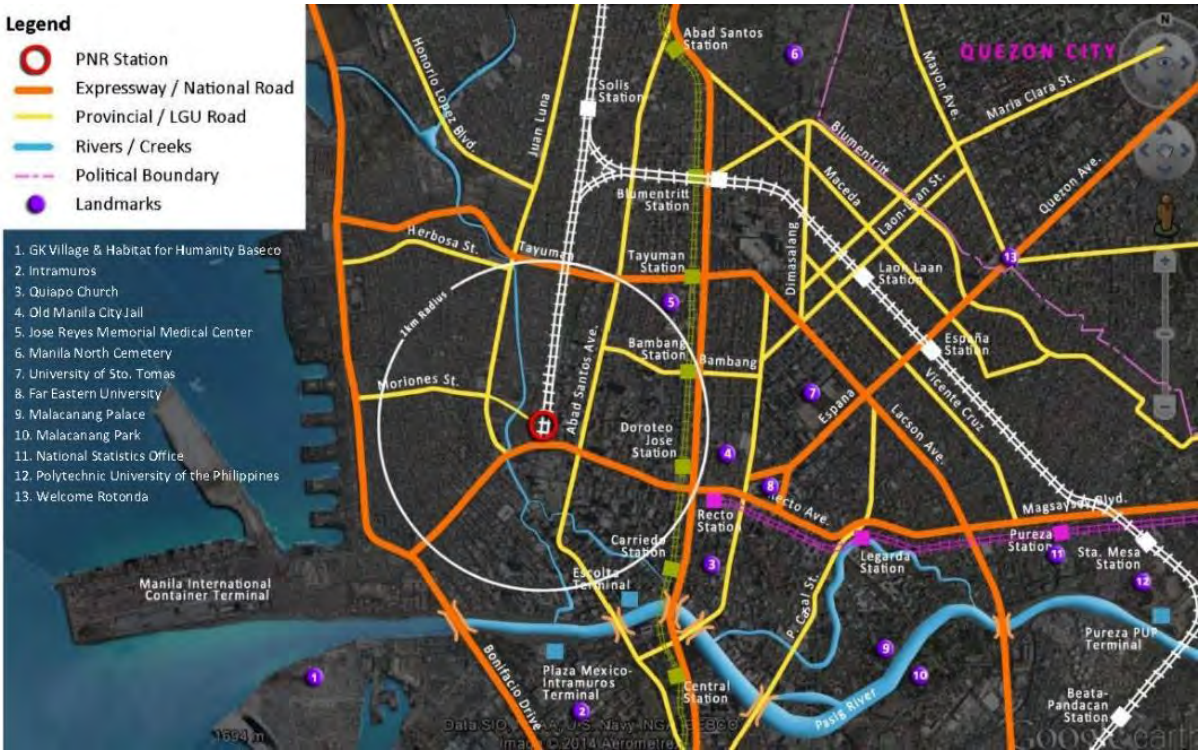
	Project	Term*	Specification (sq.m.)	Cost (PHP000)
1	Road widening of Hermosa St.	Short-term	9,600 (W=15 m, L=640 m)	13,830
2	Road widening of S. Tabora St.	Short-term	4,725 (W=15 m, L=315 m)	6,800
3	New Road Construction to Station	Short-term	6,000 (W=15 m, L=400 m)	39,670
5	Development of public transport terminal	Short-term	About 1.0 hectare	33,870
7	Installation of traffic signals	Medium-term	4 intersections	8,000
8	Road widening of other access roads within 1 km radius from the station	Medium-term	14,400 (W=12m, L=1,200 m)	95,200
9	Development of other new access roads within 1 km radius from the station	Medium-term	840 (W=12 m, L=70 m)	4,6420

Source: JICA Study Team.
Note: * Short-Term: by 2020, Mid-term: by2020–2030

3.10 Tutuban Station

1) Existing Situation

3.143 Tutuban Station is proposed at the south end of the existing Tutuban Mall, approximately 500 m south from the existing PNR Tutuban Station. Details of Tutuban Mall and PNR Tutuban Station are described in ***Chapter 4.*** The south side of Tutuban Station area is called Divisoria, a district is famous for various local market and the oldest Chinatown in the world. While ISFs exist especially along creeks, several high-rise condominiums have been constructed mainly at the water front (see Figure 3.10.2).



Source: JICA Study Team.

Figure 3.10.1 Vicinity Map of Tutuban Station Area

PNR Tutuban Station

168 Shopping Mall and High-rise Condominiums

Street Vendors along C.M. Recto Ave.

Source: JICA Study Team

Figure 3.10.2 Surrounding Environment of Tutuban Station Area

(1) Road Network

3.144 The Tutuban Station area is enclosed at its boundaries by major roads such as C.M. Recto Ave., Tayuman St., Antonio Rivera St., and Dagupan St. Other roads such as Bambang St., Padre Algue St., La Torre St. and other city roads feed into Antonio Rivera St. and Dagupan St., bringing in motorists from both sides of the station. While the short city roads divide the blocks of development, the national roads intersect their terminus near Tutuban area. Mayhaligue St. cuts through the area until it connects with Dagupan St. Moriones St., on the other hand, cuts through the mall area but ends up at its intersection with Bonifacio Drive.

3.145 The Tutuban Center is a heavily built up area, where all types of traffic converge and all types of people go for trade and other personal needs. The existing roads, whether classified as national roads or city roads, are inadequate in capacity such that traffic flow is very slow especially when vehicles carrying goods and produce will park alongside, blocking other vehicles at the back and, thus, creating congestion.

3.146 The existing roads, however, especially the major ones are in fair to good condition. Existing pavement surfaces were maintained and strengthened with AC overlay. The interior roads are not well maintained such that during rainy season, the surfaces are easily prone to deterioration as heavy trucks and other heavy commercial vehicles pass by.

3.147 Tayuman St. serves motorist bound to Tutuban Center from Radial Road R10 and Rizal Ave. Dagupan St. is intersected at its end by C.M Recto Ave. at the south and by Tayuman St. at the north. Similarly, Antonio Rivera St. serves motorists from both roads.

3.148 In general, accessibility within the commercial area is well provided for with the network of national and city roads surrounding the project area. On the other hand, traffic congestion will continue to worsen without any capacity intervention as many mall goers tend to increase with the development of more commercial spaces within the area mixing with vehicles coming from all directions. The roads surrounding the Tutuban area within around 200 meters are as follows (see ***Appendix 3.2*** in detail).

Table 3.10.1 List of Roads in Tutuban Station Area (within 200 m from Tutuban Station)

Road Class	Road Name	Type of Surface
National Highway	A. Rivera	PCCP
	C. M. Recto	PCCP
	Dagupan	PCCP
	Mayhaligue	PCCP
	Moriones	PCCP
	Roman	PCCP
	Soler	PCCP
City Road	Tayuman St.	PCCP
Barangay Road	Brgy. Menu	PCCP
	Zona A	PCCP
	Zona A1	PCCP
	Zona B	PCCP
	Zona C	PCCP
Private Road	Bonifacio Drv. (Tutuban Center)	PCCP

Source: JICA Study Team.

(2) Signals

3.149 Traffic movements along major intersections of Tutuban Center are controlled and managed by traffic signaling system and these are located at the following areas:

(i) C.M. Recto Ave.–Antonio Rivera Intersection

(ii) C.M. Recto Ave.–Dagupan St. Intersection

(iii) Dagupan St.–Tayuman St. Intersection

(iv) Antonio Rivera St.–Tayuman St. Intersection

(v) Mayhaligue St.–Dagupan St. Intersection

(vi) Bambang ST.–Antonio Rivera St. Intersection

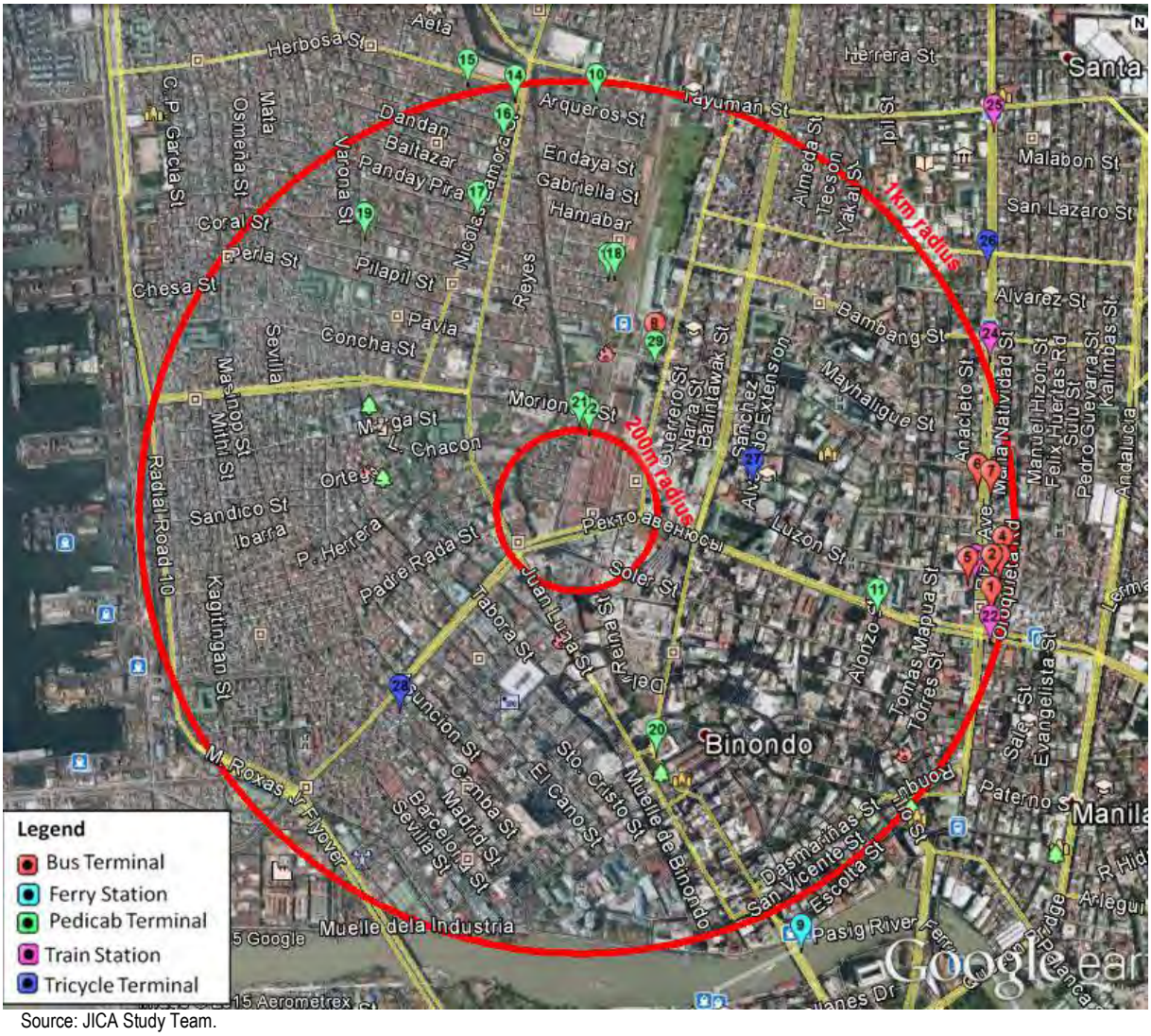
(3) Public Transportation Terminal

3.150 As shown in Table 3.10.2 and Figure 3.10.3, majority of the public transportation facilities are located nearby LRT 1 stations along Rizal Ave. within approximately 1.0 km from the Tutuban Station.

Table 3.10.2 List of Public Transportation Terminal in Tutuban Area

Mode	No	Terminals	Location	Operator
Bus	1	Philippine Rabbit	Rizal Ave, Sta Cruz, Manila	Philippine Rabbit
	2	Mersan | ES Transport	-	-
	3	Genesis | Saulog	Oroquieta St, Avenida, Manila	Genesis Transport Inc
	4	Bataan Transit | Five Star	Oroquieta St, Avenida, Manila	Bataan Transit Inc
	5	Santrans / SST	JP Rizal Avenue	Santrans Line
	6	Candon Bus Lines	Rizal Ave, Manila	Candon Bus Line
	7	Santa Lucia	JP Rizal Avenue	Sta. Lucia Bus Inc
	8	Tutuban Bus Terminal	Mayhaligue St, Tutuban, Manila	-
Ferry	9	Pasig River Ferry (Escolta Station)	Escolta, Manila	MMDA / PRRC
Pedicab	10	-	Perfecto St, Manila	-
	11	-	Alonzo St	-
	12	-	Dagupan St.	-
	13	-	Linampas St, Manila	-
	14	-	Herbosa St, Manila	-
	15	-	Franco St, Manila	-
	16	-	Francisco St, Pritil, Manila	-
	17	-	Panday Pira corner Nicolas Zamora	-
	18	-	Linampas St corner Dagupan St, Manila	-
	19	-	Pacheco St	-
	20	-	Veronica St, Manila	-
	21	-	Moriones St, Manila	-
Train	22	LRT Recto Station	Rizal Ave, Manila	-
	23	LRT Doroteo Jose Station	Rizal Ave, Manila	-
	24	Bambang Station	Rizal Ave, Manila	-
	25	Tayuman Station	Rizal Ave, Manila	-
Tricycle	26	-	Quiricada St, Manila	-
	27	-	Alvarado Extension, Manila	-
	28	-	CM Recto Ave	-
Tricycle / Pedicab	29	Mixed	Mayhaligue St, Tutuban, Manila	-

Source: JICA Study Team.
Note: The numbers correspond to the numbers in Table 3.10.2.



Source: JICA Study Team.

Note: The numbers correspond to the numbers in Table 3.10.3.

Figure 3.10.3 Public Transportation Terminals around Tutuban Station

(4) Existing Access Improvement Plans/Projects

3.151 There are around 34 improvement projects that were planned, implemented and completed in Tutuban Station area by DPWH or LGU (see Table 3.10.3).

Table 3.10.3 Access Improvement Projects in Tutuban Area

	Project Name	Status	Implementing Agency
1	J Rizal Ave, Chainage 0000 Chainage 0514 and Chainage 3798 Chainage 4138 PAVED (CONCRETE) TO PAVED (CONCRETE)/Manila District 3,North Manila District Engineering Office, Metro Manila	Completed	DPWH
2	Repair/rehabilitation/improvement of J. Abad Santos Avenue, with exceptions PAVED (CONCRETE) TO PAVED (CONCRETE)/Manila District 2,North Manila District Engineering Office,Metro Manila	Completed	DPWH
3	Juan Luna St K0003 + (181) K0003 + (007) PAVED (ASPHALT) TO PAVED (ASPHALT)/Manila District 3,North Manila District Engineering Office	Completed	DPWH
4	J Rizal Ave Chainage 0178.90 Chainage 0514, K0006 + 063 K0006 + 643 PAVED (CONCRETE) TO PAVED (CONCRETE)/Manila District 3,North Manila District Engineering	On-going	DPWH
5	Road Construction Brgy. 177, District 1, Caloocan City GRAVEL TO PAVED/District Wide, Metro Manila 3rd District Engineering Office, Metro Manila	On-going	DPWH

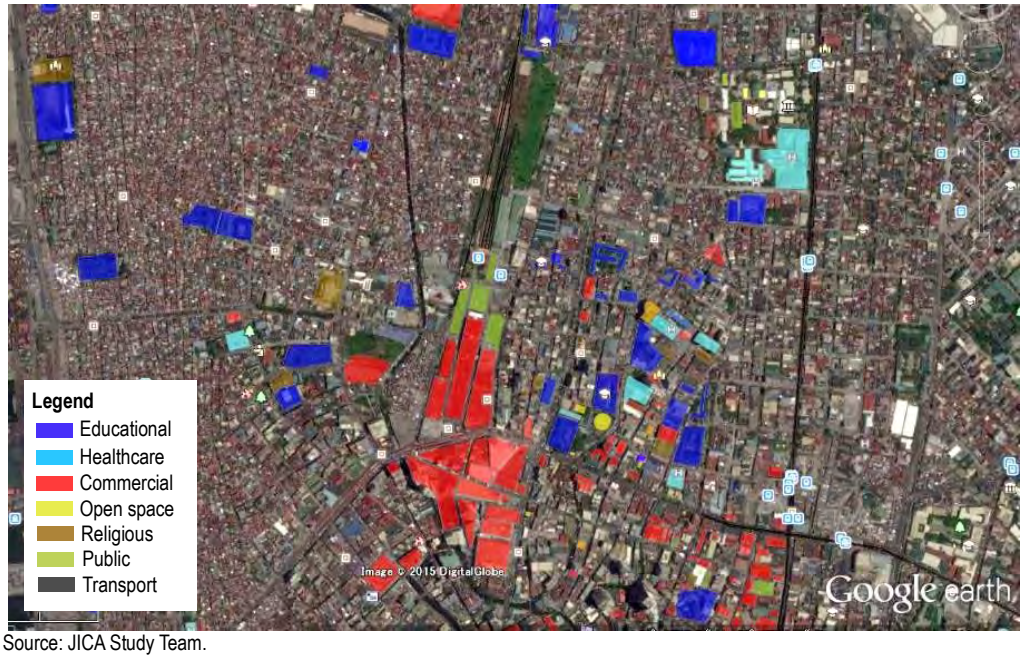
	Project Name	Status	Implementing Agency
6	Sto. Cristo St. Chainage 0000 Chainage 0685 RAISING OF GRADE WITH DRAINAGE IMPROVEMENT/Manila District 3,North Manila District Engineering Office, Metro Manila	On-going	DPWH
7	San Fernando St Chainage 000 470 RAISING OF GRADE WITH DRAINAGE IMPROVEMENT/Manila District 3,North Manila District Engineering Office	On-going	DPWH
8	Reina Regente Chainage 0000 Chainage 0600 RAISING OF GRADE WITH DRAINAGE IMPROVEMENT/Manila District 3,North Manila District Engineering Office, Metro Manila	On-going	DPWH
9	C. M. Recto Chainage 0928.10 Chainage 1291.10 RAISING OF GRADE WITH DRAINAGE IMPROVEMENT/Manila District 3,North Manila District Engineering Office, Metro Manila	On-going	DPWH
10	Oroquieta St Chainage 0151 Chainage 0439.40 PAVED (CONCRETE) TO PAVED (CONCRETE)/Manila District 3,North Manila District Engineering Office, Metro Manila	Planned	DPWH
11	Rodriquez St Chainage 0000 Chainage 0239 ASPHALT OVERLAY (80 MM THICK)/Manila District 1,North Manila District Engineering Office, Metro Manila	Planned	DPWH
12	Rehabilitation of Roads Cavite St., Brgy. 363, 364 and 369, Zone 37, Sta. Cruz, Manila GRAVEL TO PAVED/District Wide,North Manila District Engineering Office, Metro Manila	Planned	DPWH
13	J Rizal Ave K0005 + 002.88 K0004 + 288.90, Chainage 1590.20 Chainage 1668.50; Chainage 2780.20 Chainage 3212; Chainage 0836.70 Chainage 0513 ASPHALT OVERLAY (50 MM THICK)/Manila District 3,North Manila District Engineering Office, Metro Manila	Planned	DPWH
14	J Rizal Ave K0006 + (662) K0006 + 110, K0006 + 282 K0006 + 673 ASPHALT OVERLAY (80 MM THICK)/Manila District 2,North Manila District Engineering Office, Metro Manila	Planned	DPWH
15	Construction/Rehabilitation of Various Projects in Manila City 2nd LD Rehabilitation with drainage improvement of Almeda St. and vicinity Raising of Grade with Drainage Improvement / Manila District 2,North Manila District Engineering Office, Metro Manila	Planned	DPWH
16	JA Santos Ave K0004 + 625 K0005 + 384, K0005 + 055 K0004 + 372, K0006 + (516) K0006 + (337) ASPHALT OVERLAY (50 MM THICK)/Manila District 2,North Manila District Engineering Office, Metro Manila	Planned	DPWH
17	Plaza Moraga Chainage 0000 Chainage 0123 RAISING OF GRADE WITH DRAINAGE IMPROVEMENT/Manila District 3,North Manila District Engineering Office, Metro Manila	Planned	DPWH
18	Juan Luna St Chainage 2195 Chainage 3639 RAISING OF GRADE WITH DRAINAGE IMPROVEMENT/Manila District 1,North Manila District Engineering Office, Metro Manila	Planned	DPWH
19	T Mapua St Chainage 0474 Chainage 1411 PAVED (CONCRETE) TO PAVED (CONCRETE)/Manila District 3,North Manila District Engineering Office, Metro Manila	Planned	DPWH
20	Road Improvement Along Bulacan St	Planned	LGU
21	Road Improvement Along Serrano St	Planned	LGU
22	Road Improvement Along Fernandez St	Planned	LGU
23	Road Improvement Along Corregidor St	Planned	LGU
24	Road Improvement Along Morong St	Planned	LGU
25	Road Improvement Along Laguna St	Planned	LGU
26	Road Improvement Along Benita St	Planned	LGU
27	Road Improvement Along S. Tabora St	Planned	LGU
28	Road Improvement Along Perfecto St	Planned	LGU
29	Road Improvement Along Narcisa Rizal St	Planned	LGU
30	Road Improvement Along Mayhaligue St	Planned	LGU
31	Road Improvement Along Yakal St	Planned	LGU
32	Road Improvement Along Narra St	Planned	LGU
33	Road Improvement Along Padre Algue St	Planned	LGU
34	Road Improvement Along Sta. Maria St	Planned	LGU

Source: DPWH, Manila City

(5) Current Land Use

3.152 The major land use in the Tutuban Station area is commercial and educational, as shown in Figure 3.10.4. Educational facilities include higher education institutions such as universities and technical colleges which can contribute to a potential increase in ridership of the NSCR and LRT 2. Tutuban Mall, 168 Mall, 999 Mall and Lucky China Town Mall are the large-scale commercial facilities in the area while others are mainly small-scale shops. Facilities in the PNR property, such as the Tutuban Station and Meralco substations, are

the major public facilities in the area.



Source: JICA Study Team.

Figure 3.10.4 Current Land Use at Tutuban

3.153 According to Manila Comprehensive Land Use Plan and Zoning Ordinance 2005 – 2030, Tutuban PNR property is categorized in three zones as shown in Figure 3.10.5. Area for the existing Tutuban Mall is designated as the most intense land-use (High Intensity Commercial/Mixed-Use Zone) in City of Manila.

Color	Land Use	PLO[1)]	FAR[2)]
	High Density Residential/Mixed-Use Zone (R-3/MXD)	0.6	4
	Medium Intensity Commercial/Mixed-Use Zone(C-2/MXD)	0.8	6
	High Intensity Commercial/Mixed-Use Zone (C-3/MXD)	0.8	7
	General Institutional Zone (INS-G)	0.6	4

Source: Manila Comprehensive Land Use Plan and Zoning Ordinance 2005–2030, City Planning and Development Office of City of Manila
Note: 1) Percentage of Land Occupancy, 2) FAR: Floor Area Ratio

Figure 3.10.5 City of Manila Zoning Ordinance

2) Concept Plan

(1) Issues

3.154 The Tutuban area has various characteristics showing certain strengths and weaknesses. Therefore, a SWOT analysis was conducted to highlight both the positive and negative aspects to strategize and maximize the potentials of the area. As shown in Table 3.10.4, some of these aspects cover a range of multiple categories that imply significant influence on the area. For example, while control of population density, street vendors, foot and vehicular traffic can be a strength as well as an opportunity when they succeed, they can be a weakness and threat when they fail. Therefore, the TOD for Tutuban Station area focuses on urban development aspects as well as access improvement.

3.155 One of the major issues in urban development of the area is the relatively low quality of living. Majority of residential areas are occupied by single or two-story houses without any open spaces. ISFs along creeks are a typical example. Such unorganized land use increases the vulnerability of the area to natural disasters. Therefore, it is highly recommended to intensify the land use to secure the open space/parks not only from a disaster prevention standpoint but also for the improvement of urban ecology and amenity. Promotion of mixed-use also needs to be considered to implement efficient and effective land use.

3.156 Traffic congestion is the major issue regarding accessibility and mobility in the Tutuban area. The traffic congestion is caused not only by street vendors but also by the insufficient width of roads. Even though the PNR property is surrounded by national roads, two of them (Dagupan St. and Rivera St.) do not satisfy the required minimum width (20 m) for national roads. Poor traffic management also aggravates traffic congestion as it causes street parking and inappropriate jeepney operation.

Table 3.10.4 SWOT Analysis for Tutuban Station Area

Strengths	**W**eaknesses
• Strategic location for business and commerce • Proximity to the important districts such as Divisoria market, Ongpin, Binondo, Quiapo, Escolta, and North and South Harbor, among others, making it a very attractive retail and trading center. • Favorite shopping place for bargain-seeking buyers. • Offers a wide array of products and services (one-stop shop shopping place). • Cheap retail rents. • Various cultural/historic heritage and reputation (oldest Chinatown worldwide)	• Limited number of parking spaces • Traffic congestion in streets leading to the Tutuban area due to mostly to the street vendors and jeepneys • High crime rate causing bad reputation for the neighborhood. • Old buildings with poor condition • Occupation of the land along creeks by Informal Settler Families • Susceptibility to flooding • Lack of open spaces • Lack of traffic management
• Population Density (adequate; stimulate local economy, excess; cause degradation of living environment including vulnerability to natural disasters) • Street Vendors, High vehicle and foot traffic volume (adequate; create livelihood, excess; cause congestion)	
Opportunities	**T**hreats
• Planned NSCR and LRT-Line 2 stations and re-development of Tutuban Mall in accordance with construction of the stations. • Privileged location with availability of PNR property surrounded by national roads including C.M. Recto Ave. which can play a core role of identified CBD (Central Manila). • Institutions of higher education to increase ridership and enhance identity in the neighborhood. • High household consumption expenditures (growth rate; around 6% per annum) which accounts for close to 70% of GDP • Strong demand for office space particularly from business process outsourcing (BPO) companies. • The worsening traffic conditions in Metro Manila promoting mixed use and intensification of land use in urban area. • Continued increase in arrivals of foreign tourists will lead to greater demand for hotels, motels and inns. • Existence of local business associations (e.g., Filipino-Chinese Chamber of Commerce)	• Possibility of a glut in retail and commercial space in the medium term. • Continued increase in land values may affect financial viability of property development projects in the future. • The change in administration may result in the reversal of the economic gains of the Aquino government. • Possibility of a real estate bubble in the near future. The Bangko Sentral ng Pilipinas has taken pre-emptive measures to prevent the real estate market for overheating. • Mortgage rates in the Philippines remain high • Uncontrolled environmental degradation due to air and water pollution, loss of biodiversity in urban environment, etc. • Population decrease due to degradation of living environment by rapid population increase, limited housing and infrastructure capacity. • Compliance of safeguard for resettlement of informal settlers and relocation of current business owners at Tutuban Mall
• Increase of high-rise residential buildings in Binondo (soundness of investment can provide either positive or negative impact) • Development of other CBDs (While it can provide positive impact with sufficient access to them, it can deprive of the opportunities without sufficient access)	

Source: JICA Study Team.

(1) Concept of TOD

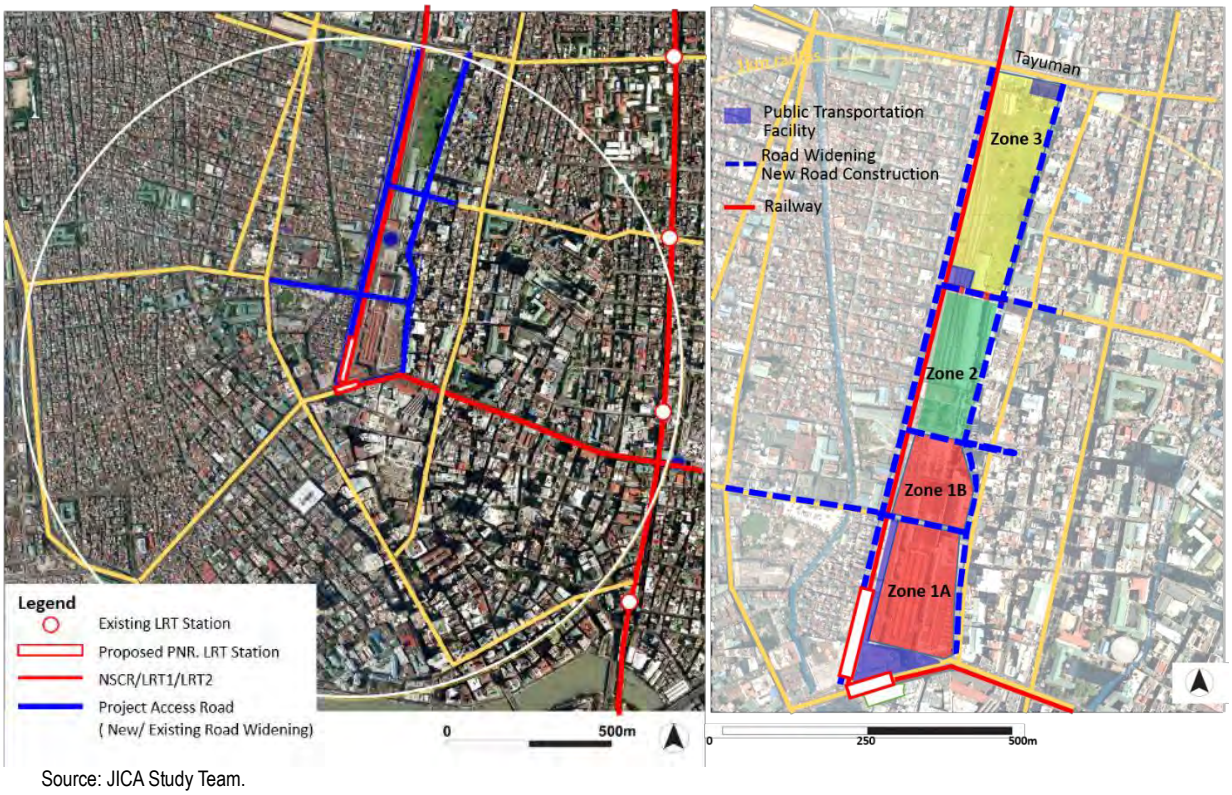
3.157 The concept of TOD for the Tutuban Station is “Old and New Heart of Manila”. Since the Tutuban area used to be a center of Manila and still has various potentials as previously described, TOD aims at revitalization of the area to be a center of the identified CBD (Central Manila).

(2) Concept Plan

3.158 To overcome the development issues previously described according to the concept of TOD, concept plans were prepared both for access improvement and urban development. The concept plan for access improvement aims to increase the ridership of the NSCR and LRT 2 as well as enhance the comfort of these passengers and residents. Improvement of connectivity with feeder services is needed to provide more convenience for the passengers as well as for the residents and visitors in the Tutuban area. In order to mitigate traffic congestion, enhancement of the road network is essential, as shown in

Figure 3.10.6.

3.159 The concept plan for urban development intends to establish a distinct new urban core for the area incorporating the legacy of old Manila by introducing new technology, such as renewable energy and grey water recycling, in addition to the conventional approach to intensifying the land use in an effective and efficient manner to create a sustainable city. Such approach enables the growth of the local economy and facilitates urban renewal in the adjacent areas. Zone 1 in Figure 3.10.6 is an upgraded commercial and business center integrated with the NSCR and LRT 2 stations as well as multi-modal transportation facilities. Zone 2 has a landmark facility with public open space to attract visitors and residents to the area. Zone 3 is a mixed-use area with residential, commercial, business and public facilities. Details of the development plan are described in ***Chapter 4***.



Source: JICA Study Team.

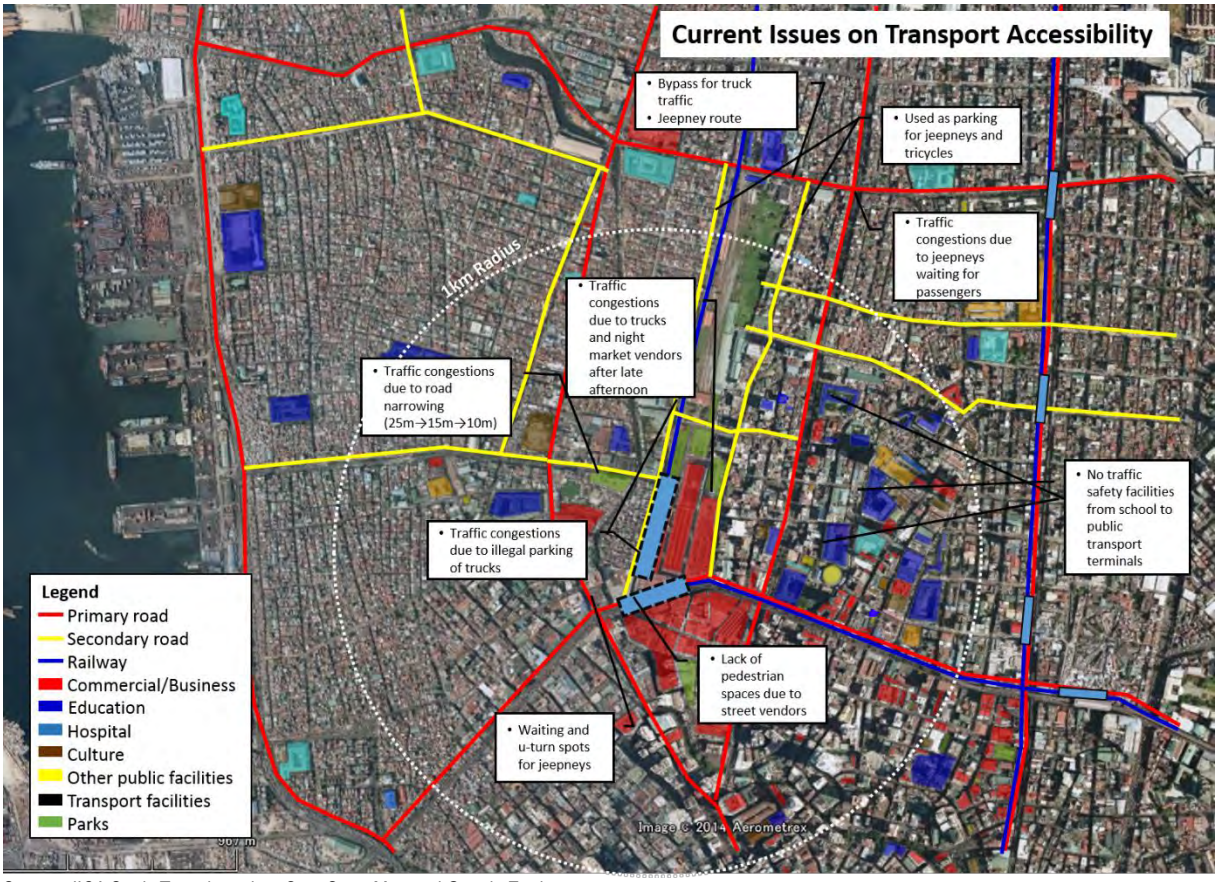
Figure 3.10.6 Concept Plan of Access Improvement of Tutuban Station (left) and Urban Development (right)

3) Access Improvement Plan

(1) Issues of Transportation Access

3.160 The PNR Tutuban property is surrounded by major national roads around its periphery, namely C.M. Recto Ave., Dagupan St., A. Rivera St., and Tayuman St. Feeding into these roads are other city roads, which serve residential and commercial areas around the Tutuban Station. While the periphery is well served by the national roads, the capacities of these roads are insufficient to provide convenient and safe access for the motorists traversing the area as well as for the pedestrians who are going to the Tutuban Mall. Two of the peripheral national roads (Dagupan St. and Rivera St.) do not satisfy the required minimum width of 20 m for a national road. The road network around the station consists of 236 city roads and 18 national roads within its 1 km radius.

3.161 As shown in Figure 3.10.7, traffic congestion is the major transportation issue in the Tutuban area especially during peak hours in the evening as well as during the holiday seasons of Christmas and Chinese New Year. Even though the area is well known for its vibrant commercial activities, there are also many schools, from elementary schools to universities, located especially on the north side of C.M. Recto Ave. Therefore, providing a safe, secure and convenient access is essential not only for the passengers of the NSCR and LRT 2 but also for the residents, shoppers and students in the community. With the proposed Tutuban redevelopment plan, the capacities of the existing roads will be further stressed with the increase in traffic volume that will be generated from businesses and other commercial establishments. The current traffic conditions could be further aggravated if the construction of high-rise mixed-use residential buildings in the project were implemented without any corresponding access improvement measures.



Source: JICA Study Team based on OpenStreetMap and Google Earth.

Figure 3.10.7 Current Issues on Transportation Accessibility in Tutuban Area

3.162 Aside from physical deficiencies such as insufficient transport capacity, poor traffic management also aggravates the traffic congestion as it causes on-street parking and inappropriate jeepney and tricycle operations.

3.163 In addition to traffic congestions and lack of safety for pedestrians, the other transportation issue that needs to be highlighted is the area's vulnerability to flooding. Due to its low elevation near the Manila Bay and insufficient drainage system, the area has been suffering from road flooding at many low spots during heavy rainfall (see Figure 3.10.8).

Source: JICA Study Team.

Figure 3.10.8 Road Flooding at Tayuman St. (left) and Rivera St. (right)

(2) Approach for Access Improvement

3.164 In order to develop solutions for the abovementioned issues, the approach for access improvement was studied. The accessibility improvement approach considers fundamental factors such as roadway capacity, vehicle turning and pedestrian movements, vehicle types and classifications, and driving habits of motorists. Once a holistic approach is adopted to solve the fundamental issues of traffic congestion and luck of safety and convenience for motorists and pedestrians, multiplier effects can be expected such as increase in revenue for local business owners due to the reduction of travel time and number of accidents. Securing a safe, convenient and comfortable pedestrian access contributes to a decrease in crime rate and provides a better impression of the neighborhood, thereby attracting more visitors and residents who contribute to the increase in revenue of the local community as well as the LGU.

3.165 In this study, the following approaches are proposed to solve the major transportation issues in the Tutuban area in a holistic and systematic manner:

(i) Road capacity upgrading and enhancement;
(ii) Development of Public Transportation Facility
(iii) Intersection capacity enhancement;
(iv) Traffic control and management;
(v) Sidewalk clearing and improvement; and
(vi) Traffic Information dissemination campaign.

3.166 To formulate the Access Improvement Plan according to these approaches, further study was conducted to list the action items for each approach, as shown in Table 3.10.5.

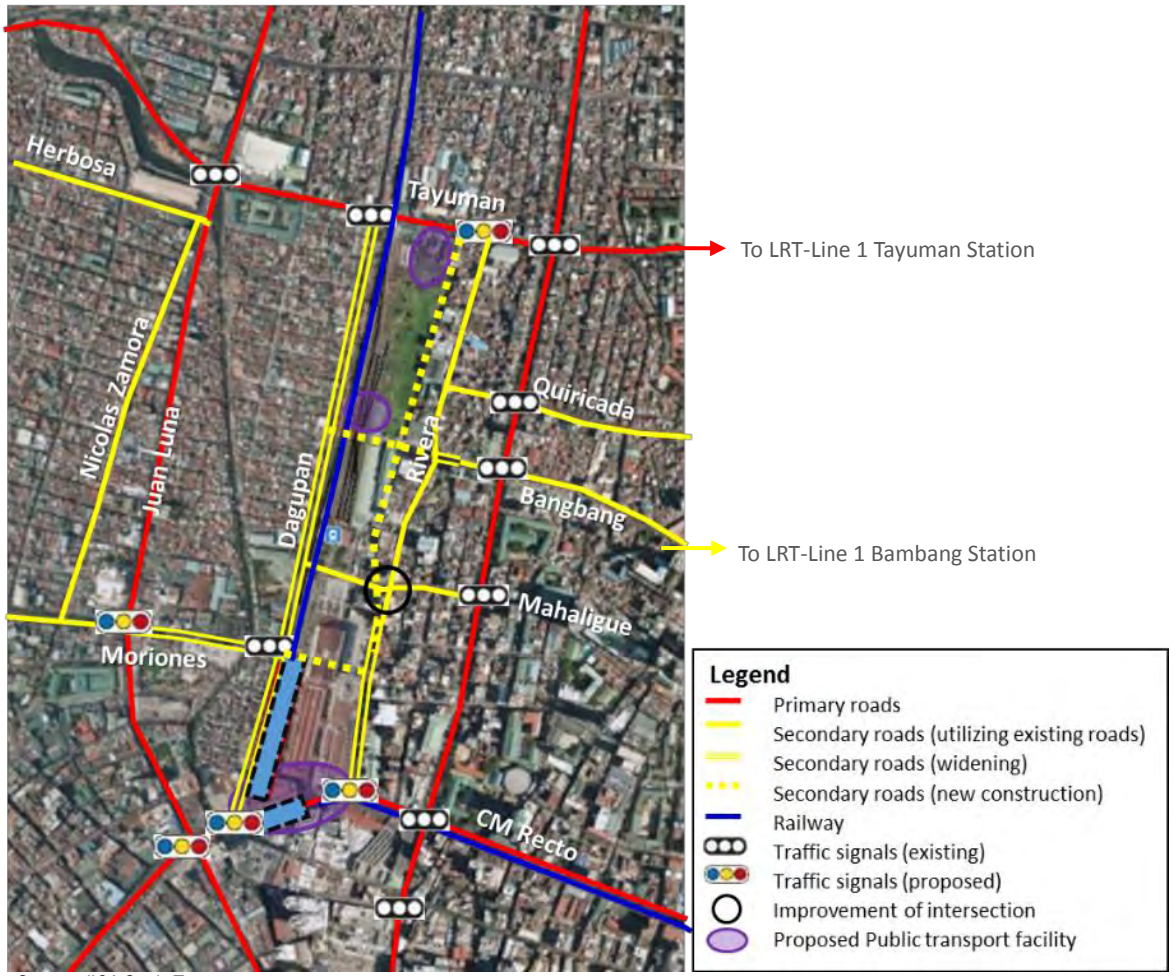
Table 3.10.5 Access Improvement Approach

Approaches	Actions
Road Capacity Upgrading and Enhancement	• Road surface improvement (reconstruction, rehabilitation and overlay / strengthening), lane widening and expansion and alignment extension. • Repair of existing and installation of new road drainage systems. • Restoration of affected utilities and provision of new utility lines and their accessories.
Development of Public Transportation Facility	• Installation of pavement markings and traffic signs. • Installation of medians. • Establishment of public and private vehicle parking areas. • Establishment of public utility vehicles terminal / loading and unloading bays.
Intersection Capacity Enhancement	• Geometric alignment improvement. • Installation of pavement markings and traffic signs. • Installation of pedestrian relief islands and PWD access system. • Installation of traffic and pedestrian signaling system.
Traffic Control and Management	• Installation of integrated traffic signaling system. • Establishment of traffic stations. • Deployment of sufficient number of traffic enforcers. • Training of traffic enforcers.
Sidewalk Clearing and Improvement	• Strict enforcement of City Ordinance on illegal sidewalk vending. • Construction and beautification of sidewalk area to deter establishment of illegal sidewalk stores and the like. • Establishment of adequate pedestrian loading and unloading areas. • Provision for planting strip and street lights.
Traffic Information Dissemination Campaign	• Installation of digital screen and monitoring boards. • Conduct of traffic enforcement events.

Source: JICA Study Team.

(3) Access Improvement Plan

3.167 Based on the action items under the access improvement approach, an access Improvement plan was prepared to indicate the specific locations for these actions (see Figure 3.10.9). The plan aims to establish the backbone of accessibility by strengthening the primary and secondary roads and constructing new roads in the walkable area (within 1 km from the station). For the new road construction, both enhancement of the north-south and east-west connections are proposed, including the consideration for access to LRT 1 stations. Improvements on the existing roads are proposed for Tayuman St., Dagupan St., Bambang St., Rivera St., and C.M. Recto Ave. Except for C.M. Recto Ave., regarding all actions listed in Table 3.10.5. For C.M. Recto Ave., all improvements except for road capacity upgrading and enhancement are proposed. Although C.M. Recto Ave. has 6 lanes, majority of them are currently occupied by the street vendors. Therefore, retrieving its functionality as a major arterial road, by relocating the street vendors from the carriageway to the sidewalk or other appropriate locations, is the key to the success of access improvement for C.M. Recto Ave.



Source: JICA Study Team

Figure 3.10.9 Access Improvement Plan of Tutuban Station Area

3.168 The implementation process is also considered in the preparation of the access improvement plan. Since the accessible area to Tutuban Station will be expanded dramatically after completion of the NSCR and the LRT 2 west extension, major access improvement projects need to be completed prior to the railway construction to maximize the benefits of railway as well as to mitigate the negative impacts of the construction activities. Details of the implementation schedule are discussed in ***Chapter 5***.

3.169 Since the access improvement projects involve various stakeholders such as DOTC, DPWH, MMDA, City of Manila, and local community, etc., coordination needs to be started at the earliest opportunity by sharing the future vision of the Tutuban redevelopment plan among all stakeholders. Since DOTC is the implementer of these railway projects which will catalyze Tutuban redevelopment, it is desirable that DOTC takes the lead in informing the stakeholders at the initial stage of the project of the importance of access improvement.

3.170 Securing the necessary funding is always an issue in the implementation of the access improvement plan. Therefore, integration of the railway projects needs to be considered not only from the financial perspective but also from the viewpoint of maximizing the benefits from these railway projects. The costs of selected measures under the proposed access improvement plan are listed in ***Chapter 5***.

3.171 Since insufficient funds trigger the risk of ignoring the environmental and social

impacts of the project on the local residents and business owners, a detailed analysis needs to be conducted to identify the potential affected people as well as the structures to be impacted upon to start consultations at the design phase of the project.

4) Detailed Access Improvement Plan

3.172 In the proposed access improvement plan, the projects with high priority for implementation upon the commencement of railway operation were selected and further analyzed to prepare the detailed access improvement plan. These priority projects will maximize the effects of the railway development as well as the redevelopment of the PNR Tutuban property.

(1) Improvement Plan of Dagupan St.

(a) **Existing Conditions:** Dagupan St. is an existing portland cement concrete pavement (PCCP) road with asphalt concrete pavement (ACP) overlay on substandard four-lane bidirectional travelway measuring 9.0 m in width and 1.5 m shoulders at both sides. However, two lanes are always blocked due to the unauthorized on-street parking of jeepneys and trucks (see Figure 3.10.10). The roadsides were provided with curb and gutters and concrete shoulders while heavily built up developments line up at the existing road ROW boundaries. Part of the ROW is illegally occupied by some barangay offices and shops in the north section.

Electrical poles line up one side (eastside) of Dagupan St. while service connections cross the roadway to the other side. Drainage and sewer systems consist of underground pipeline and curb inlet manholes.

Clusters of ornamental trees were also observed freestanding in a few locations, specifically along the vacant lots located east of the existing street.

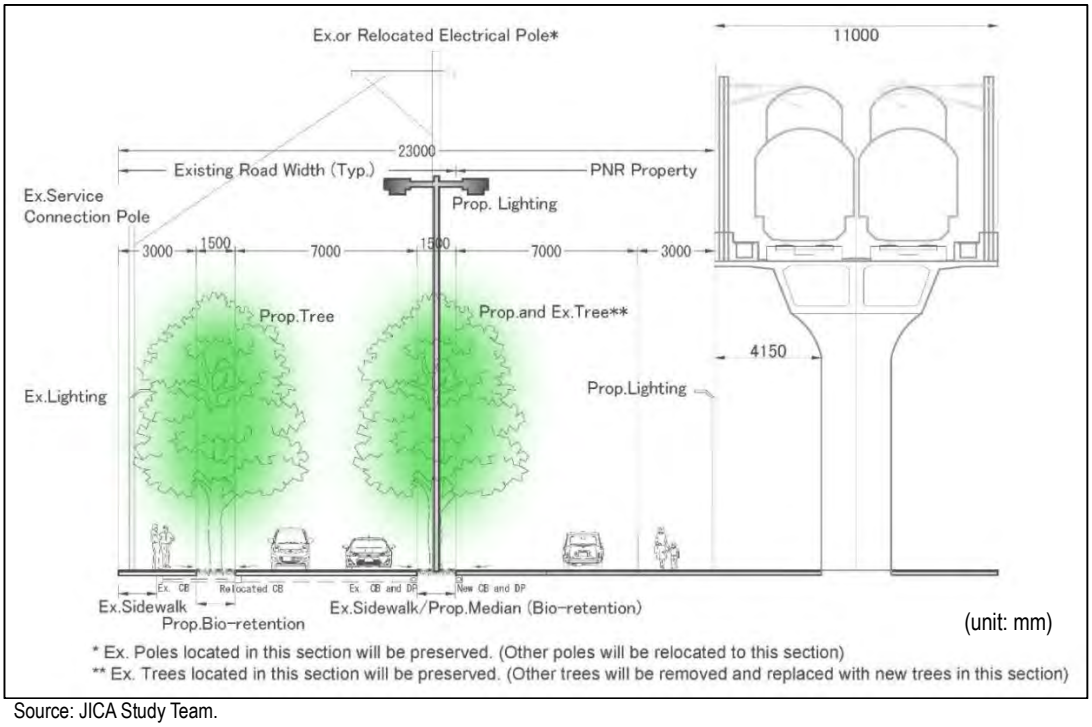
Both outer lanes are being used as parking areas such that only two lanes are available for through vehicular movement. The sidewalks are also obstructed with electrical poles and other structures such that pedestrians are forced to walk along the main roadway lanes, mixing with vehicular traffic. The existing roadway is provided with a street lighting system.

Source: JICA Study Team.

Figure 3.10.10 Existing Situation of Dagupan St.

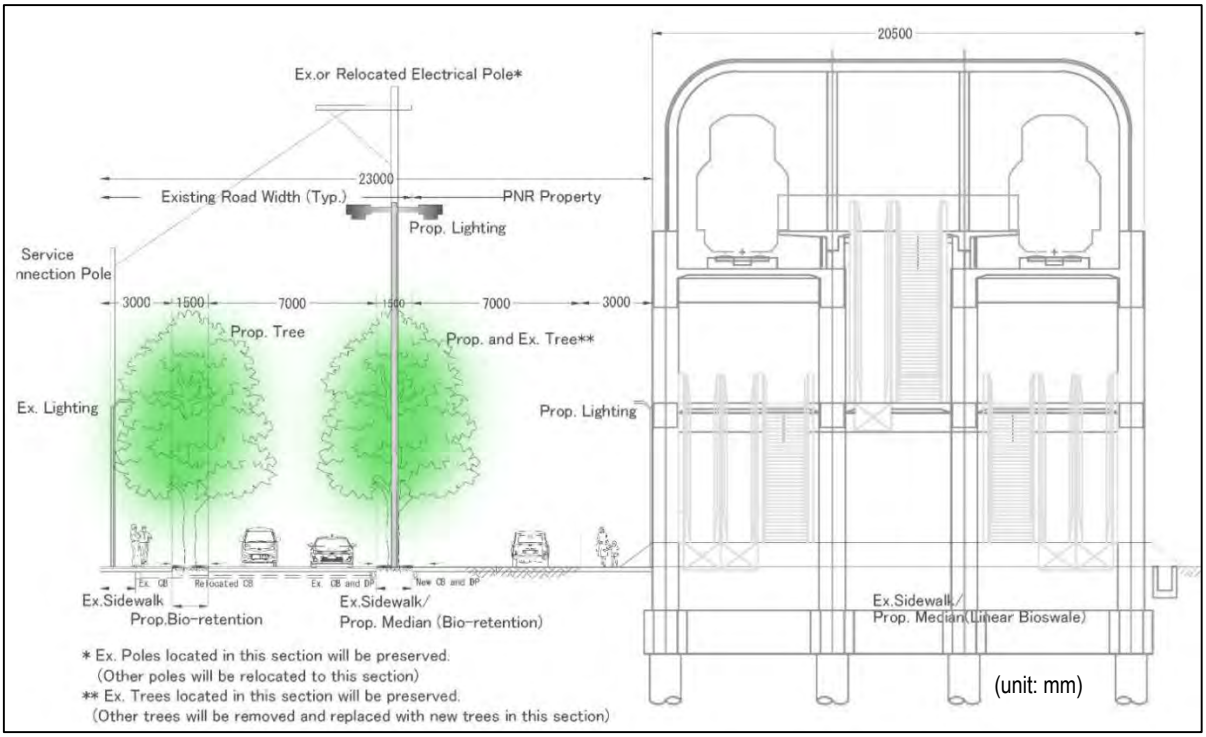
(b) **Proposed Improvements:** Dagupan St. traverses parallel to the western boundary of the PNR Station property throughout its entire alignment between C.M. Recto Ave. and Tayuman St. except for the first hundred or so meters from its intersection with C.M. Recto Ave., the eastern side of Dagupan St. offers space for the expansion of the existing roadway. On the other hand, proposed widening will require encroaching the PNR Station ROW, as shown in Figure 3.10.11 and Figure 3.10.12. Other observations are as follows:

- Relocation of existing electrical poles, which are lined up along the eastern side of Dagupan St., can be arranged with the power service provider. This will not be too difficult since new lines and poles can be installed ahead of the road widening construction and removal of the existing electric poles and power lines. Some existing poles on the eastern side located in the proposed median can remain. Service connections are located along one side only, which will facilitate immediate restoration of electrical and telecommunication systems services.
- Service connections for drainage and sewer are located also in one side such that extension of cross drains both for drainage and sewer will not be difficult and complicated since, similar to the new power lines, maintenance manholes could be installed ahead of the removal of any existing drainage and sewer structures which will no longer be utilized. Water service interruptions will be minimal since the existing water mainlines might not be affected by the road widening activities. The water mainlines can be retained at their existing locations even if the existing road will be widened.



Source: JICA Study Team.

Figure 3.10.11 Typical Section of Dagupan St. Widening (Viaduct Section)



Source: JICA Study Team.

Figure 3.10.12 Typical Section of Dagupan St. Widening (Station Section)

- Environmentally, the proposed widening will not severely affect the existing vegetation conditions along the project area since the existing trees can be saved as the planting strip in the proposed median. Since planting strips in the median and sidewalk will be a continuous liner vegetated area with curb-cuts to intercept storm water from the carriageway as a bioretention, they will mitigate the road flooding (see Figure 3.10.13).

Source: http://www.landscapeonline.com/research/article/18148.

Figure 3.10.13 Example of Bioretention

- The largest building to be impacted by the Dagupan St. widening is Cluster Building 2 in Tutuban Mall (see ***Figure 4.1.4 in Chapter 4***). Since this building is also considered as an affected structure by the NSCR project and listed in its Resettlement Action Plan (RAP), consultation for compensation will be conducted as part of the NSCR project. Other affected structures are considered illegal according to DOTC and PNR as they encroach on both the

ROW of Dagupan St. and the PNR property as previously described. As a result of the preliminary survey, the number of these unauthorized structures is placed at 18 (6 barangay halls, 5 shops, 3 offices, 1 residential, 1 daycare, 2 others). After completion of the NSCR, the space under the viaduct can be utilized for these facilities through coordination among DOTC, PNR and leaders of local communities (e.g., barangay officials).

3.173 As observed, widening of the existing Dagupan St. is feasible through the acquisition of PNR property. Since the impact on the western side can be minimized due to the utilization of the PNR property, restoration and improvement of existing service utility systems on the eastern side will not be difficult, but instead the available vacant lots offer sufficient space for any expansion and extension requirements of both the existing roadway and service utility systems. The Dagupan St. widening needs to be implemented prior to the construction of the NSCR in order to mitigate the negative impact on the traffic during the construction. Therefore, DOTC selected the Dagupan St. widening and station plaza phase 1, described later, as an immediate-term project. Details of this immediate-term project including the implementation schedule are introduced in ***Chapter 5.***

(2) Improvement Plan of Moriones St.

(a) **Existing Conditions:** The section between R-10 and Juan Luna St. has a length of 880 m and width of approximately 25 m with a six-lane divided carriageway, 2 m-wide shoulders, and 8m-wide median with large trees (see Figure 3.10.14). However, in the section between Juan Luna St. and Dagupan St., which is 210 m long, the width starts to narrow down towards Dagupan St. with approximately two-lane bidirectional travel way measuring 9 m and 2 m-wide concrete paved shoulders at both sides. An existing 30 m-long concrete bridge spanning over a creek becomes a bottleneck with only about 10 m width (see Figure 3.10.15).

Source: JICA Study Team.

Figure 3.10.14 Existing Situation of Moriones St. (Wide Section)

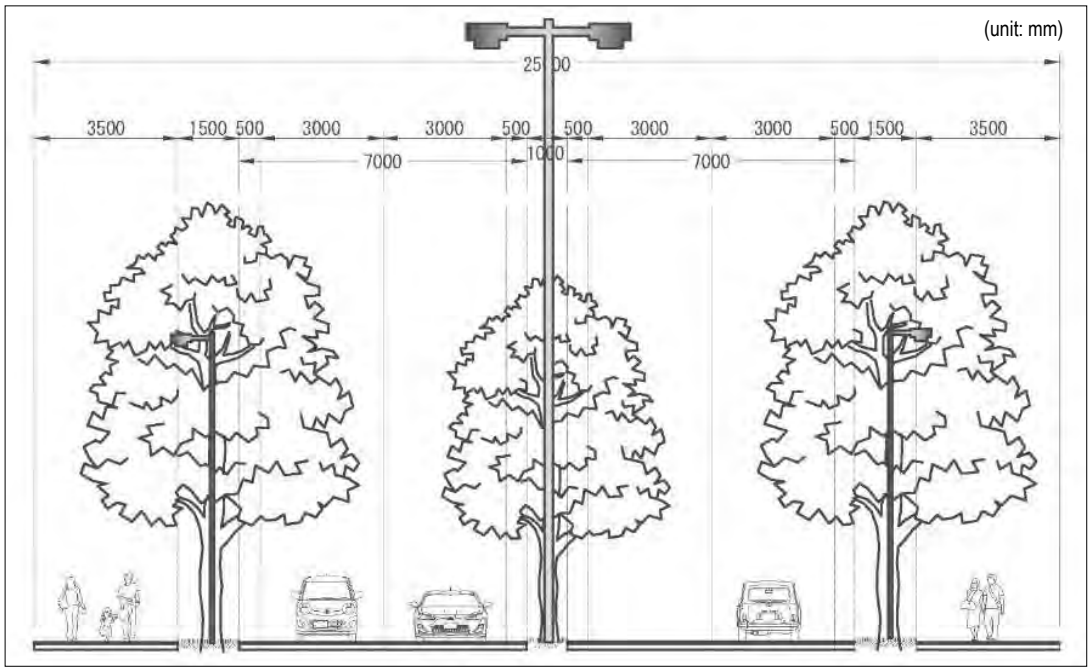
Electrical lines and poles were erected at both sides of the existing street. The drainage system along Moriones St. consists of curb inlet manholes and underground pipes. Since a currently large open vacant land (approximately 2.6 hectare) on the south side of Moriones St. between Juan Luna St. and the creek (narrow section) is about to start construction for the development by Filinvest Land Inc., it is desirable for the City of Manila to start negotiating with Filinvest the land acquisition on the south side at the earliest opportunity prior to the

construction. Even though such coordination among private developers, the City of Manila, DPWH, and local residents will be required, the widening of Dagupan St. will provide significant benefits from the traffic improvement, including reduction of congestion in the community as well as travel time, noise, vibration and air pollution.

Source: JICA Study Team.

Figure 3.10.15 Existing Situation of Moriones St. and Bridge (Narrow Section)

(b) **Proposed Improvements:** As Figure 3.10.16 illustrates, maintaining a 25 m width from Juan Luna St. is recommended to prevent traffic congestion. The widening of Moriones St. can be implemented in two phases, namely: Phase 1: From Juan Luna St. to the bridge, and Phase 2: From the bridge to Dagupan St. While Phase 1 will require coordination with Filinvest Land Inc. for land acquisition on the south side, Phase 2 will require demolition of the existing old and dilapidated building structures at the southwest corner but will avoid hitting the existing five-story building at the northwest corner.



Source: JICA Study Team.

Figure 3.10.16 Typical Section of Moriones St. Widening

In order to implement this project, the following aspects need to be considered:

(i) Existing electrical lines located at the south side of Moriones St. will have to be relocated farther south though, similar to Dagupan St., the restoration of service connections would not be difficult since new lines and poles could be installed before cutting off service connections.

(ii) The drainage and sewer systems are also concentrated in one side such that replacement drainage and sewer lines and structures can be installed ahead of any drainage and sewer service connection interruptions.

(iii) There will be lesser adverse social impact if widening would be implemented at one side since only a number of structures would be affected at the south side while the whole stretch of the north side of the existing street is heavily built up with commercial structures.

(iv) All existing trees on the south side of the existing road will have to be removed for the road widening, but new trees need to be replanted in the proposed planting strip of the widened road as a mitigation measure for the environmental impact. Planting strips in the median and sidewalk will be continuous to serve as a bio-retention to mitigate road flooding.

(v) The existing concrete bridge will have to be widened but the widening can be done at one side only such that there will be minimum traffic flow interruption along the existing street during construction. The existing bridge can still be used while a new bridge structure is under construction.

(vi) Since the widened road section will be connected to the proposed new east-west access road in the Tutuban redevelopment site, which is currently planned to be completed by 2020, coordination with the developer of the redevelopment site will be required.

3.174 As observed and evaluated, widening of the existing Moriones St. is possible if the ROW would be acquired from Filinvest Land Inc. and other affected property owners. Since significant commercial and business activities are concentrated at the northern side of the existing Moriones St., restoration and improvement of existing service utility systems at the southern side will not be difficult but rather the available vacant lot offers sufficient space for any expansion and extension requirements of both the existing roadway and service utility systems.

(3) Improvement Plan of Antonio Rivera St.

(a) **Existing Conditions:** Antonio Rivera St. extends from C.M. Recto Ave. to Tayuman St. with a length of 1.2 km, 12 m carriageway consisting of 3 m shoulders on both sides and 6–7 m bidirectional travel way paved in general with PCCP in good condition (see Figure 3.10.17). Certain sections are overlaid with ACP in fair to good condition. Some sections have been widened to substandard four lanes, which have occupied the “supposed sidewalks” that are actually used as parking areas. Since even the original lanes are occupied by on-street parking, the road cannot fully serve its transportation function. Both roadsides are provided with curb and gutters with underground drainage system consisting of manholes and drain pipes.

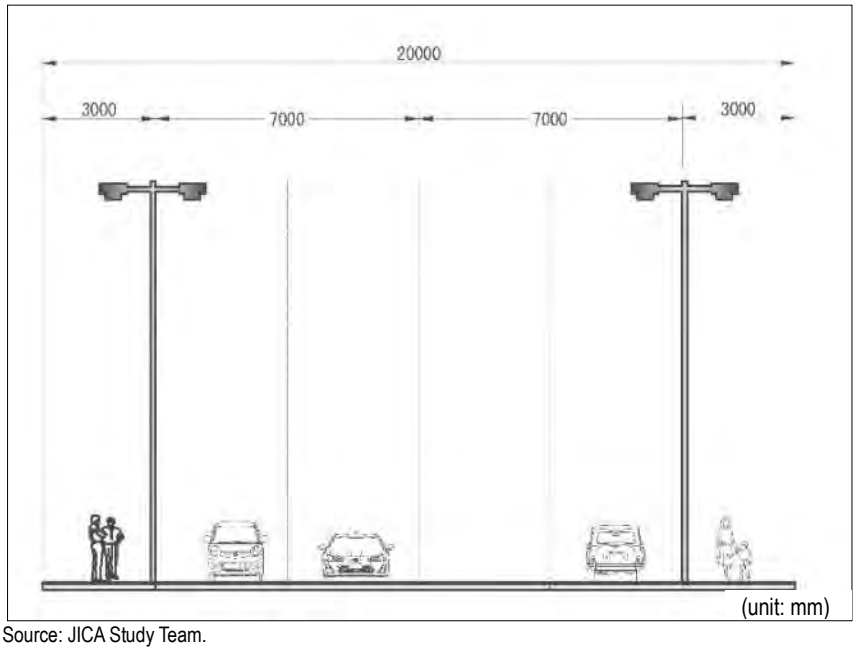
Both concrete and wooden poles are located along both sides of the roadway supporting main electrical (power, cable and telecommunication) lines while

service connections cross the roadway towards the buildings and service areas. Small to medium trees with a height of 3–5 m exist in some parts of the sidewalk.

Source: JICA Study Team.

Figure 3.10.17 Existing Situation of Antonio Rivera St.

(b) **Proposed Improvements:** Widening of the existing Antonio Rivera St. along its present alignment for the entire section between C.M. Recto Ave. and Tayuman St. will be basically expensive and very difficult as there is not sufficient space to install the additional lanes. Limiting the widening section from C.M. Recto Ave. to Mayhaligue St., where Rivera St. runs adjacent to the PNR property, makes the project feasible through the utilization of the PNR property for the widening. As Figure 3.10.18 illustrates, the proposed road width is 20 m, which is the minimum width as a national road, to prevent further impact on the adjacent community. Even by taking such potential impacts into account, the following aspects still need to be considered to implement this project.



Source: JICA Study Team.

Figure 3.10.18 Typical Section of Rivera St. Widening

- Electrical poles will have to be relocated, which will cause utility service interruption with the cutting off of power supply, and telecommunication systems during construction. While temporary connections can be provided,

this will have to be performed prior to actual construction and new mainlines will have to be added and installed at one side to accommodate the loads.

- Vehicular access to existing establishments will be cut off during construction duration, which will aggravate the existing traffic congestion along the existing road especially during peak hours. Alternate parking areas will have to be provided for the business owners as well as for the customers.
- Drainage and sewer lines will be affected and service connections will be cut off, causing aggravation of the existing drainage and sewer systems' conditions and occurrence of unbearable drainage and sewage flow issues.
- The water supply connection at one side of the existing roadway will have to be cut off.
- A new traffic management and control plan should be established for the area since there are other roads and streets which are connected to the existing Antonio Rivera St.
- Since this widening will be implemented by the private developer in conjunction with the access road construction for the Tutuban Redevelopment Zone 1, certain involvement by the public sector will be needed to secure the open access to public.

3.175 As observed, widening of the existing Antonio Rivera St. has potential to cause interruption of utility services in the adjacent community. Therefore, consultation with the utility service companies needs to be commenced at the earliest opportunity in the detailed design.

(4) Improvement of Bambang St.

(a) **Existing Conditions:** Bambang St., which spans from Antonio Rivera St. to A. Mendoza St., has a length of 1.2 km, substandard four-lane undivided and bidirectional travelway measuring 8.5 sq.m m shoulders, and paved with PCCP in good condition. Both roadsides are heavily developed with concrete structures of commercial and residential classifications (see Figure 3.10.19).

Source: JICA Study Team.

Figure 3.10.19 Existing Situation of Bambang St.

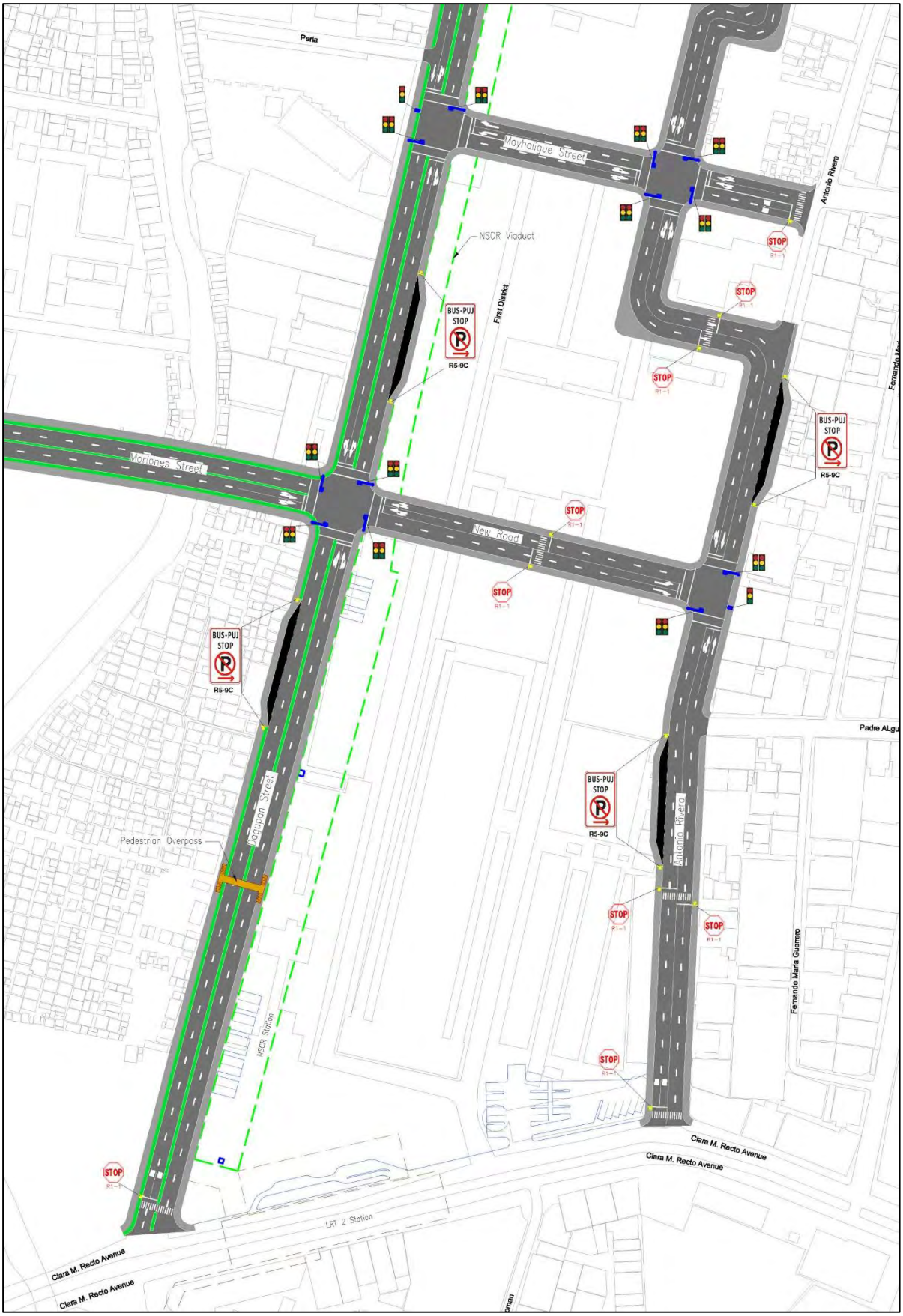
High power electrical primary and secondary lines are installed at both sides of the roadway. Service connections are hanging from one side to the other as they cross over the roadway.

While Bambang St. maintains a sufficient width for four lanes between Abad Santos Ave. and Narra St., the width becomes narrower in the section between Narra St. and Rivera St. due to the informal structures on the north side.

(b) **Proposed Improvements:** Construction of a new east-west access road to be directly connected to Bambang St. is proposed in conjunction with the relocation of the PNR Tutuban Station. Since the section with narrow width between Narra St. and Rivera St. is only about 60 m long, it is strongly recommended to include the road widening of this section in the construction of the new access road. Relocation of the station and the construction of new access road will be implemented by DOTC since the existing PNR station will be impacted by the construction of the NSCR. Therefore, once this project is included as a part of the construction of the new east-west access road, it will be implemented in a timely manner prior to the operation of the NSCR. In order to minimize the impact on the adjacent community, the proposed width is 20 m with the same proposed section for Rivera St. widening. In addition to the consultation with the affected households (approximately 20), determination of the potential impacts on the existing utility services needs to be conducted prior to the widening and construction of the road.

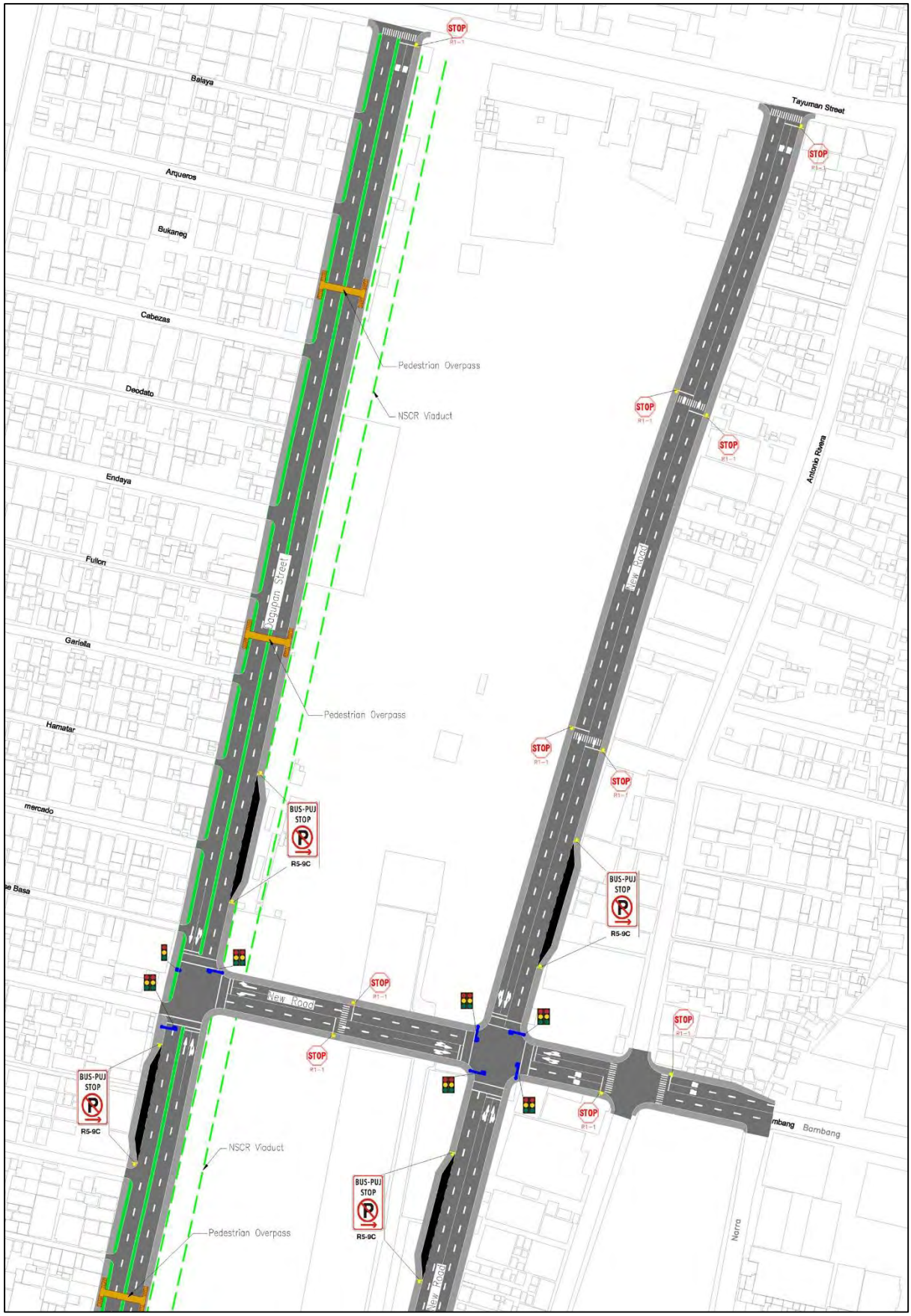
(5) Improvement of pedestrian crossings, signs, pavement markings

3.176 In order to secure safety, convenience and conform for pedestrians, pedestrian crossings are proposed at certain intervals are shown in Figure 3.10.20 and Figure 3.10.21. Due to the expected high traffic volume, pedestrian bridges are recommended along Dagupan St. In addition to the pedestrian crossings, necessary signs and pavement markings are proposed to ensure safe and smooth traffic circulation.



Source: JICA Study Team.

Figure 3.10.20 Improvement of Pedestrian Crossings, Sings, and Pavement Markings (South side of Tutuban PNR Property)



Source: JICA Study Team.

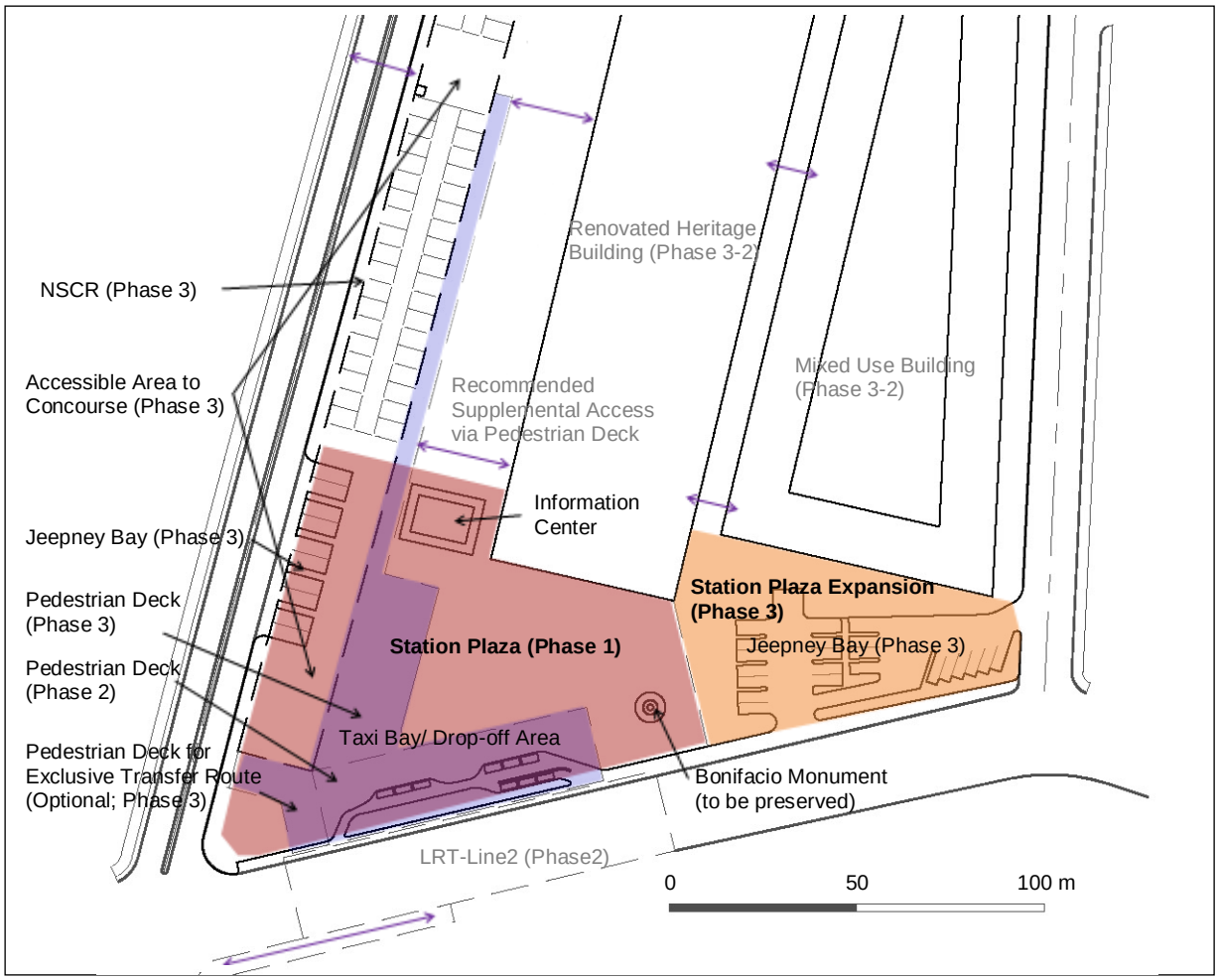
Figure 3.10.21 Improvement of Pedestrian Crossings, Sings, and Pavement Markings (North Side of Tutuban PNR Property)

(6) Tutuban Station Plaza

3.177 The proposed Station Plaza will be constructed in phases by the different implementers (see Figure 3.10.22). Phase 1 will be implemented by DOTC as part of its intermediate-term project to start construction in 2015. Details of the implementation schedule is described in ***Chapter 5.3***. As Figure 4.1.4 shows, the former Prime Block 1 site is vacant as it was demolished due to the damage by the fire that occurred in 2012. Therefore, it is essential to secure and utilize this open space as a future station plaza. Since the national roads surrounding the PNR Tutuban property already suffer from heavy traffic congestion, the proposed NSCR and LRT 2 Tutuban Station project should not further deteriorate the traffic condition, such as the situation often seen around the LRT and MRT stations during peak hours. Due to its importance for the NSCR and LRT 2 project, DOTC decided to implement the development of the Tutuban station plaza (Phase 1) as well as the Dagupan St. widening prior to the NSCR project as its pilot project. The Tutuban Station Plaza Phase 1 will include the following facilities:

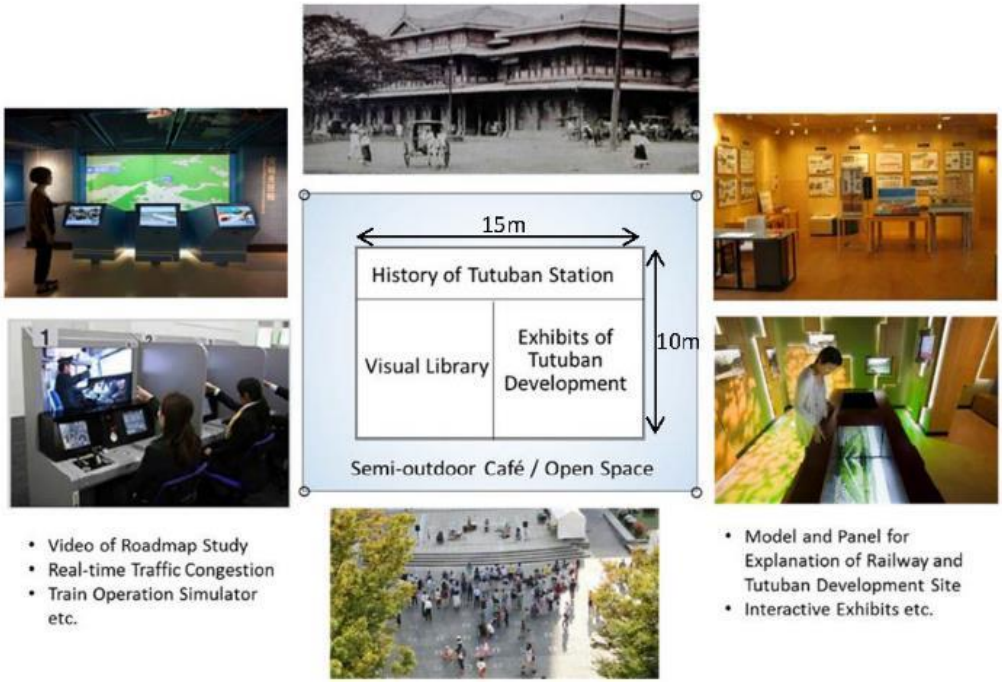
(a) **Boarding/Alighting Area for Taxi and Drop-off Area for Private Vehicles:** This area is designed under the pedestrian deck to be constructed under the LRT 2 West Extension project. Due to the proximity to/from the both stations and the elevator connecting the pedestrian deck and station plaza, a safe and convenient access is secured for all users including wheelchair users.

(b) **Information Center:** An information center, disseminating relevant information through various facilities such as scale models and audio-visual equipment, will feature the proposed development plan of the railway including the NSCR and LRT 2 Tutuban stations as well as the entire PNR property (see Figure 3.10.23).



Source: JICA Study Team.

Figure 3.10.22 Tutuban Station Plaza



Source: JICA Study Team; Nakanoshima Information Center, http://mirai82.blog.so-net.ne.jp/2007-11-12; http://www.architecturelist.cosq.m012/10/23/hong-kong-city-gallery-opens-featuring-exhibition-design-by-met-studio/; Railway Museum, http://www.railway-museum.jp/experience/operate.html.

Figure 3.10.23 Exhibit Contents of Information Center

3.178 According to the current construction schedule, the construction of LRT 2 West Extension project will start in Phase 2 prior to the NSCR construction. The structure to be constructed in this phase is the following:

(a) **Pedestrian Deck for LRT 2:** Since the pedestrian deck will be an access point to the ground floor for all passengers of LRT 2, sufficient area (20 m x 75 m) is planned to secure smooth movement without congestion during peak hours. In addition to the stairs and escalators, an elevator will provide a universal access to the ground floor next to the taxi bay.

In Phase 3, the viaduct of the NSCR will be completed in 2019 according to the current construction schedule and the facilities under the viaduct will be developed accordingly. The pedestrian deck for the NSCR will be completed in 2020 in accordance with the completion of the NSCR Tutuban Station. It is expected that the development of Zone 1-A (shown in Figure 3.10.6) will also be completed by 2020 when the NSCR starts its operation. The structure and facilities to be constructed in this phase are as follows:

(b) **Jeepney Bays under the Viaduct:** This area will be a redevelopment of the station plaza completed in Phase 1. To determine the necessary number of jeepney bays, a preliminary survey was conducted to identify the current jeepney routes in the Tutuban Station area. As Table 3.10.6 shows, 24 routes are currently being operated in the area and majority of them start from Divisoria. Since these jeepneys cause traffic congestion, the appropriate number of jeepney bays need to be secured. The jeepney bay under the viaduct offers 10 bays including the future routes, in addition to the current 5 routes taking Dagupan St. This jeepney bay will be constructed by DOTC as a part of the NSCR project.

Table 3.10.6 Public Utility Jeepney Routes and Frequency at Tutuban Station Area

No.	PUJ Routes					Headway (HH:MM:SS)
	Corresponding Route Code	Origin	Destination	Via	Streets	
1	0960	Divisoria	Blumentritt		A. Rivera St.	0:01:38
	0960	Divisoria	Blumentritt	Tayuman	A. Rivera St.	
	0960	Divisoria	Blumentritt	J.A. Santos	A. Rivera St.	
	0960	North Harbor	Blumentritt	Divisoria	A. Rivera St.	
2	1580	Divisoria	Karuhatan	J.A. Santos	A. Rivera St.	0:10:00
	1600	Divisoria	Malanday	J.A. Santos	A. Rivera St.	0:02:31
	1610	Divisoria	Malinta	J.A. Santos	A. Rivera St.	0:07:06
3	1630	Divisoria	MCU	J.A. Santos	A. Rivera St.	0:01:00
4	1280	Divisoria	Cubao		C.M. Recto Ave.	0:04:56
	1280	Divisoria	Cubao	Sta.Mesa	C.M. Recto Ave.	
	1280	Divisoria	Cubao	Recto	C.M. Recto Ave.	
	1280	North Harbor	Cubao	Divisoria	C.M. Recto Ave.	
5	1751	Divisoria	Gastambide	Morayta	C.M. Recto Ave.	0:04:19
6	1700	Divisoria	Quiapo		C.M. Recto Ave.	0:05:26
	1700	North Harbor	Quiapo	Divisoria	C.M. Recto Ave.	
	1700	Divisoria	Quiapo	Evangelista	C.M. Recto Ave.	
7	1730	Divisoria	San Juan	Sta.Mesa	C.M. Recto Ave.	0:04:57
	1730	Divisoria	San Juan	Recto	C.M. Recto Ave.	
8	1565	Divisoria	Don Bosco	Moriones	Dagupan St.	>30 minutes
	1670	Divisoria	North Pier	Moriones	Dagupan St.	0:02:00
9	1620	Divisoria	Pajo		Dagupan St	>30 minutes

No.	PUJ Routes					Headway (HH:MM:SS)
	Corresponding Route Code	Origin	Destination	Via	Streets	
10	1720A	Divisoria	Sangandaan	Pajo	Dagupan St	0:01:00
	1720A	Divisoria	Sangandaan		Dagupan St	
11	2190	Herbosa/Pritil	P. Guevarra	Tayuman	Tayuman St	0:00:25

Source: JICA Study Team.

(c) **Pedestrian Deck for the NSCR:** This pedestrian deck connects two concourse areas as well as LRT 2 at the second floor level. If the transfer route between the NSCR and LRT 2 needs to be separated, this additional pedestrian deck can offer the exclusive transfer route (see Figure 3.10.22).

(d) **Jeepney Bay in Station Plaza Expansion:** Since the Station Plaza area constructed in Phase 1 is limited (approximately 0.92 hectare) to serve the two major stations, it needs to be expanded through integration with the adjacent private development. Even though this Station Plaza will be constructed by the private developer in accordance with the adjacent mixed-use facility, it has to be opened to the public as it needs to include the jeepney bays. There are currently 18 jeepney routes operating along C.M. Recto Ave. and Rivera St. and majority of them start from these roads. A sufficient number of jeepney bays need to be provided to control their unauthorized parking on the street to wait for passengers.

3.179 Additional access routes via the pedestrian deck are proposed for further improvement on accessibility and mobility for pedestrians. Regarding the additional pedestrian decks within the PNR property connecting the proposed commercial/mixed-use facilities, they are also proposed in the design guidelines for the Tutuban redevelopment described in ***Chapter 4***. The other pedestrian decks connecting to the adjacent neighborhood need coordination with the LGU and/or local community.

(7) Other Public Transportation Facilities

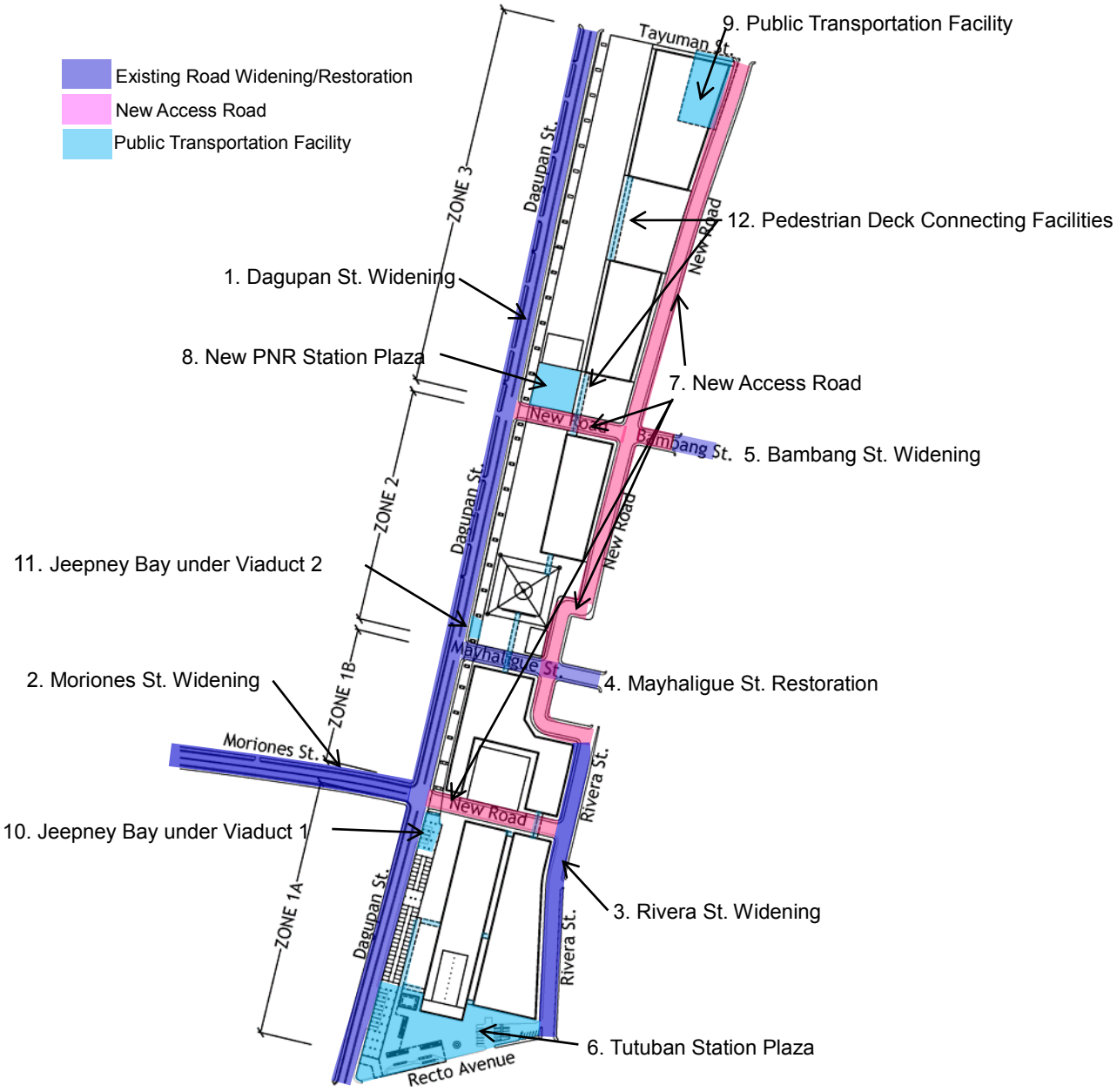
3.180 The proposed public transportation facilities (including road improvements/ construction) for the PNR Tutuban property also includes the restoration of Mayhaligue St. and construction of new roads, a new PNR station and station plaza, public transportation facility along Tayuman St., and additional jeepney bays under the viaduct along Dagupan St. Figure 3.10.24 indicates the location of these access improvements as well as the improvements previously discussed.

3.181 The proposed road section of Mayhaligue St. as well as the construction of new roads are the same as the Rivera St. widening (see Figure 3.10.18). The new PNR station and station plaza are required due to the impact of the NSCR viaduct on the existing PNR station. Therefore, construction of these facilities, including consultation with PNR, will be implemented by DOTC as part of the NSCR project. The new PNR station plaza is currently planned to include parking space for PNR staff and passengers with disabilities (see Table 3.10.7). A public transportation facility along Tayuman St. is planned at the ground floor of the mixed-use facility to be constructed by the private developer. Thus, coordination with the private developer based on the design guidelines for the Tutuban redevelopment is essential to include the necessary elements shown in Table 3.10.7 in a similar manner to be applied for the Tutuban Station Plaza expansion previously described.

Table 3.10.7 Summary of Proposed Public Transportation Facilities

No.	Project	Area (hectare)	Contents
1	Dagupan St. Widening	2.94	Proposed width: 23 m (carriageway, median, planting strip, sidewalk)
2	Moriones St. Widening	1.39	Proposed width: 25 m (carriageway, median, planting strip, sidewalk)
3	Rivera St. Widening	0.84	Proposed width: 20 m (carriageway, median, sidewalk)
4	Mayhaligue St. Restoration	0.33	
5	Bambang St. Widening	0.10	
6	Tutuban Station Plaza (ground floor level; phase1 and 3)	0.92	Jeepney bays (min.10 bays), Taxi bay/Drop-off area, Information Center
	Tutuban Station Plaza (second floor level)	0.50	Pedestrian deck for NSCR and LRT 2 Tutuban Stations including stairs / escalators, elevator
	Tutuban Station Plaza (ground floor level; phase 3)	0.19	Jeepney bays (min. 22 bays)
7	New Access Roads	2.45	Proposed width: 20 m (carriageway, median, sidewalk)
8	New PNR Station Plaza	0.25	Drop-off area, Parking (min. 50 stalls)
9	Public Transportation Facility	0.40	Drop-off area, Parking (min.30 stalls), Jeepney bays (min. 4 bays)
10	Jeepney Bay under Viaduct 1 (Corner of Moriones St. and Dagupan St.)	0.06	Jeepney bays (min. 4 bays) including boarding / alighting area
11	Jeepney Bay under Viaduct 2 (Corner of Mayhaligue St. and Dagupan St.)	0.04	Jeepney bays (min.10 bays), Taxi bay/Drop-off area, Information Center
12	Pedestrian Deck connecting Facilities	0.19	Proposed minimum width: 5m

Source: JICA Study Team.



Source: JICA Study Team.

Figure 3.10.24 Location of Proposed Public Transportation Facilities for Tutuban PNR

4 TUTUBAN REDEVELOPMENT CONCEPT DESIGN

4.1 Background of Tutuban Station Area

1) History of Tutuban Station, PNR Railway, and the Tutuban Mall

4.1 The Tutuban station was constructed in 1887 (see Figure 4.1.1) as the terminal station of the Manila-Dagupan Ferrocarril line which was 195.4 km long at the time of its opening in 1892. The Ferrocarril de Manila–Dagupan became the Manila Railroad Company (MRRCo) during the American colonial period (1898–1946). MRRCo expanded its railroad network to some 1,140 route-kilometers (see Figure 4.1.2). The first Bicol train was put into operation in 1931. The unified system of railroad from San Fernando, La Union in the north to Legazpi in the south was formally inaugurated in 1938.

Source: Philippine Journeys Website: Discovering Philippines "Railways, Waterways, Stone-ways."

Figure 4.1.1 Tutuban Station in Early 1900s

Source: JICA Study Team.

Figure 4.1.2 Past MRRCo (PNR) Railway Network

4.2 Most of the improvements on the rail network were lost during World War II. Only 452 route-kilometers were operational after the war. In 1946, the US Army restored the control of the railway to the Commonwealth Government. From 1954 to 1956, MRRCo converted its fleet of trains from steam to diesel engines. Within the following decade, MRRCo was given a new charter under Republic Act No. 4156, and the company changed its name to the Philippine National Railways (PNR). Barely 50% of the railway network was

rehabilitated during the 1960s and early 1970s. The train and the railroad served as the transportation backbone of Luzon.

4.3 In the decade of the 1970s, the railroad was relegated to its own backwaters as the buses and trucks and the much faster airliners took over the role of railway. By the late 1990s to the present decade, PNR trains and the railroad looked battered and suffering from neglect, mismanagement, and typhoons. For these reasons, the North Mainline northward from Tutuban Station, was closed in 1998.

4.4 A second rehabilitation began in 2001 with the removal and relocation of informal settlers along the tracks and other PNR right-of-way. A project to revive the North Mainline through a Chinese loan was undertaken but it was saddled with issues of anomalous arrangements with foreign financiers. Since then, only the south railway from Tutuban to Calamba as a Metro South Commuter Train has been operating.

4.5 For the Tutuban area, PNR evaluated the possibility of renting 20 hectare of the land to develop and help promote the site as a center of trade in 1988. In 1989, PNR contracted Gotesco Investments, Inc. (Gotesco) for the 25-year right to use this land. After that, the lease rights were transferred from Gotesco to Prime Orion Philippines, Inc. (Prime Orion) in 1990. Tutuban Properties, Inc. (TPI), a subsidiary of Prime Orion, is mainly in charge of the area management. In 1991, the station was relocated along Mayhaligue Street from its original place.

4.6 In 1934, the past Tutuban Station was listed in the National Historical Institute (NHI), which became the National Historical Commission of the Philippines (NHCP) in 2010. The station was renovated in 1993 as the Tutuban Center Mall 1 with the original structure and facade (see Figure 4.1.3). Subsequently, Tutuban Center Mall 2, Prime Block, and Cluster Buildings 1 and 2 were constructed as shopping malls, making Tutuban the country's wholesale and retail center. Around Center Mall 1 and 2, there is a daily night market from 7:00 PM to midnight. Cluster Building 1 was damaged by fire in 2012. It has still not been cleared of the rubble as of December 2014. In front of the Tutuban Center Mall is located the monument of Andres Bonifacio, a Philippine hero who was believed to be born in the Tutuban area. The monument was erected by the NHI in 1971.

4.7 The Tutuban Station and surrounded area had important roles as center of the transport and business in the past, so that the area has a potential of reviving as the center of Metro Manila by redevelopment project with the North South Commuter Rail (NSCR).

Source: JICA Study Team.

Figure 4.1.3 Current Center Mall 1

No	Name of Facility
1	Robinson
2	Cluster Building 2
3	Cluster Building 1
4	Center Mall 1
5	Center Mall 2
6	Prime Block
7	Parking Building

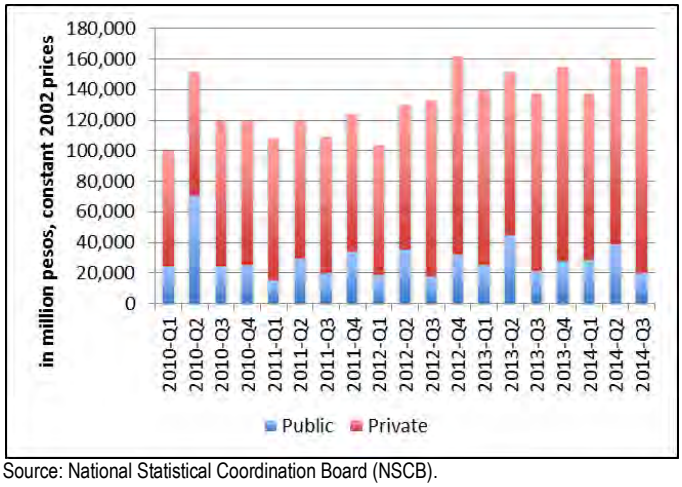
Source: JICA Study Team.

Figure 4.1.4 Buildings in the Tutuban Mall

2) Existing Situation of Commercial / Mixed Use Development in Metro Manila

(1) Trends and Developments in the Construction Sector

4.8 There was a noticeable deceleration in the growth of gross value in construction in the first three quarters of 2014 compared to 2012 and 2013 (see Figure 4.1.5). The expansion in the construction sector in the two previous years was due to the government's pump-priming program in an effort to spur economic activities. On the other hand, the sluggish growth in 2014 was largely attributed to the slowdown in the government's public infrastructure program. Gross value in public construction fell by 3.4% relative to its year-ago level, while gross value in private construction posted a steady growth of 7.7%. The private sector accounts for close to 80% of gross value in construction.

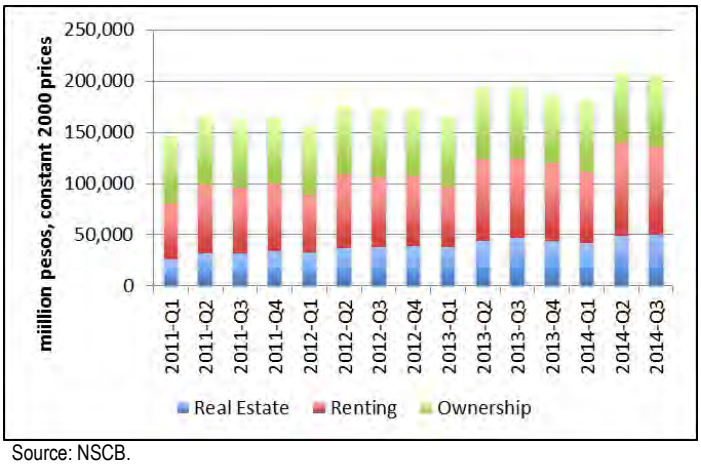


Source: National Statistical Coordination Board (NSCB).

Figure 4.1.5 Gross Value in Public and Private Construction

4.9 Gross value added (GVA) in the real estate, renting and business activities managed to sustain a robust growth of 8.0% in the first three quarters of 2014 from the

previous year (see Figure 4.1.6). This strong performance is attributed to the 14.8% increase in the renting and other business activities, and the 8.6% growth in the real estate business. Renting and other business activities and real estate business account for 41.5% and 23.7% of total gross value added, respectively. However, growth in ownership of dwellings decelerated to 0.6% in the first three quarters of 2014. The ownership of dwellings contributes some 34.8% of total gross value added.



Source: NSCB.

Figure 4.1.6 Gross Value in Real Estate, Renting and Business Activities

(2) Trends and Developments in the National Capital Region

4.10 Metro Manila remains as the leading region in terms of GVA share in construction and real estate, renting and business activities (see Table 4.1.1). In 2013, the Metro Manila accounted for 23.7% of GVA in construction and 53.0% of GVA in real estate, renting and business activities. However, the fastest growing regions in the construction sector are Zamboanga Peninsula and Davao with growth rates of 29.1% and 18.9%, respectively. These rates are much higher than the national average of 9.5%. On the other hand, the fastest growing regions in the real estate, renting and business activities are the Cordillera Autonomous Region (CAR) with 19.7% and Bicol with 14.1%, both much higher than the national average of 8.7%.

Table 4.1.1 GVA in Construction and Real Estate, Renting and Business Activities, 2012–2103

Region	GVA in Construction (%)		GVA in Real Estate, Renting and Business Activities (%)	
	2012	2013	2012	2013
Metro Manila	23.8	23.7	52.8	53.0
CAR	2.1	2.2	1.5	1.6
Ilocos	3.8	4.1	2.2	2.2
Cagayan Valley	1.9	2.0	1.0	1.1
Central Luzon	10.7	10.1	6.6	6.7
CALABARZON	15.3	15.1	13.8	14.0
MIMAROPA	1.8	1.8	1.1	1.1
Bicol	3.3	3.4	1.8	1.9
Western Visayas	5.5	5.6	3.2	2.8
Central Visayas	12.9	12.0	6.6	6.5
Eastern Visayas	3.0	3.0	1.4	1.1
Zamboanga Penninsula	2.0	2.4	1.2	1.1
Northern Mindanao	4.2	4.1	1.7	1.7

Region		GVA in Construction (%)		GVA in Real Estate, Renting and Business Activities (%)	
		2012	2013	2012	2013
Davao		6.1	6.7	2.7	2.7
SOCCSKSARGEN		2.9	3.1	1.4	1.3
CARAGA		0.7	0.6	0.5	0.5
ARMM		0.2	0.1	0.5%	0.5
GVA, Philippines	(%)	100.0	100.0	100.0	100.0
	(PHP million)	344,766.3	377,609.9	677,236.2	736,339.7

Source: NSCB.

4.11 Trends and developments in the construction sector can also be gleaned from the private construction statistics[1] of the National Statistics Office (NSO). In the first three quarters of 2014, there was a noticeable drop of 11.5% in the number of new private construction projects in the Metro Manila (see Table 4.1.2). However, there were significant increases in terms of floor area (12.3% increase) and value of construction (47.2%). This indicates a shift to larger and higher value projects. For instance, the average floor area has increased from 343 sq.m in 2009 to 763 sq.m by 2014. For the value of construction, the increase was more substantial, from an average of PHP3.9 million in 2009 to PHP15.4 million in 2014.

Table 4.1.2 New Private Construction Projects in the Metro Manila

Year	Number	Floor Area[1] (000 sq.m)	Average Floor Area (sq. m)	Value of Construction[2] (PHP billion)	Average Value of Construction (PHP million)
2009	13,866	4,763	343	53.8	3.9
2010	14,623	8,729	597	99.5	6.8
2011	13,378	6,289	470	87.6	6.5
2012	13,854	8,561	618	109.6	7.9
2013	13,948	8,055	578	122.6	8.8
1Q to 3Q 2014	9,552	7,288	763	147.1	15.4

Source: National Statistics Office (NSO).
Notes: 1-The sum of the area of each floor of the building measured to the outer surface of the outer walls including the area of lobbies, cellars, elevator shafts and all communal spaces in multi-dwellings. Areas of balconies are excluded.
2-The total cost per square meter of floor area of the building based on group classifications. This value is derived from the approved building permit and represents the estimated value of the building or structure when completed.

4.12 Most of the new private construction projects between 2012 and 2014 were located in Quezon City, Makati, Taguig, Manila and Paranaque (see Table 4.1.3). Over the past three years, Quezon City had the largest share (21.6%) in total floor area of new private construction projects in Metro Manila. On the other hand, Paranaque posted the largest share (25%) in terms of total value of construction. About 60% of new private construction activities in Quezon City are residential projects. In the case of Paranaque, over 80% of the value of construction is in the non-residential sector. At a distant second and third in terms of floor area are Taguig and Paranaque with shares of 15.2% and 14.3%, respectively. Quezon City has the second highest share of total value of construction at 17.3% and was followed by Taguig with 14.8%. The share of Manila is only 7.4% in terms of total floor area and 5.8% in terms of total value of construction.

[1] Private construction statistics from approved building permits relate to data on new constructions, additions, alterations and repairs of residential and non-residential buildings and other structures undertaken in all regions/ provinces of the country.

Table 4.1.3 New Private Construction Projects in Metro Manila: 2012 to First Three Quarters of 2014

City/ Municipality	Number			Floor Area (000 sq.m)			Value (PHP million)		
	2012	2013	2014*	2012	2013	2014*	2012	2013	2014*
Metro Manila	13,854	13,948	9,552	8,561	8,055	7,288	109,628	122,563	147,105
Manila	1,343	1,109	368	941	697	131	11,327	8,450	2,261
Quezon City	2,337	2,468	1,942	1,832	1,605	1,721	20,807	20,066	24,634
Mandaluyong City	385	496	293	571	467	243	11,644	9,096	3,416
Marikina City	515	636	388	81	119	68	1,820	1,470	831
Pasig City	1,004	978	539	656	373	539	9,393	6,405	9,094
San Juan	73	62	59	187	58	68	2,231	654	723
Caloocan City	973	761	718	169	165	115	1,334	1,398	1,100
Malabon	364	368	257	83	105	66	814	1,086	625
Navotas	93	91	96	7	61	7	50	386	52
Valenzuela City	1,185	933	398	332	247	108	2,488	1,947	801
Makati City	1,583	1,968	1,374	430	459	361	8,527	8,510	7,733
Pateros	86	107	77	22	23	13	358	178	146
Taguig	1,126	1,138	833	1,361	1,333	943	15,408	22,986	17,615
Las Pinas	697	747	719	167	233	241	1,549	2,787	3,119
Muntinlupa City	639	668	457	212	315	445	2,960	4,578	6,487
Paranaque City	1,049	1,071	748	829	1,144	1,451	9,541	23,817	61,365
Pasay City	402	347	286	680	652	768	9,377	8,750	7,104

Source: NSO.
* Note: Covers only the first three quarters of 2014.

4.13 The largest new private construction projects, in terms value of construction per square meter, are located in the major business districts of Metro Manila, namely: Paranaque (PHP42,201), Makati (PHP16,972), Taguig (PHP15,800) and Pasig (PHP15,742). The significantly higher value for Paranaque is due to a major hotel project with a total construction value in excess of PHP50 billion.

4.14 Over the past three years, most of new private construction projects started in Makati, Pasig and Taguig are in the residential sector, both in terms of floor area and value of construction (see Table 4.1.4). In Paranaque, 66% of the total floor area and 83% of value of construction are for non-residential projects.

Table 4.1.4 New Private Construction Projects in Makati, Paranaque, Pasig and Taguig, 2012, 2013 and First Three Quarters of 2014 [1)]

Building Type	Items	Makati	Paranaque	Pasig	Taguig
Residential	Number	942	2,126	1,066	1,297
	Floor Area (000 sq.m)	785.9	1,134.0	929.3	1,911.9
	Value of Construction (PHP million)	12,570	15,210	15,606	29,554
Non-Residential	Number	240	250	210	293
	Floor Area (000 sq.m)	389.8	2,266.7	581.9	1,693.1
	Value of Construction (PHP million)	5,954	78,564	6,055	21,122
Others[2)]	Number	4,467	502	1,550	1,542
	Floor Area (000 sq.m)	74.9	23.0	56.5	31.4
	Value of Construction (PHP million)	6,396	959	3,285	5,390

Source: NSO.
Notes: 1) Figures may not add up due rounding-off errors.
2) Includes additions, alterations/ repairs, demolitions and street furniture

4.15 Close to half (or 378,359 sq.m) of total floor area of new private construction projects in Makati is for residential condominium buildings. The shares of Pasig and

Taguig are even higher at 75% (692,571 sq.m) and 85% (1,625,538 sq.m), respectively. The remainder of the new residential building construction consists of single units, duplexes/quad duplexes, and apartment buildings.

4.16 Majority of the new private non-residential construction projects in these four major business cities of Metro Manila consists of commercial buildings. Over the past three years, Paranaque has the largest total floor area of new commercial construction, registered at more than 2 million sq.m. Not far behind is Taguig with 1.5 million sq.m The potential new commercial floor areas for Makati and Pasig total 254,911 sq.m and 420,834 sq.m, respectively. Except for Paranaque, most of the new commercial construction projects started are condominiums/office buildings. In the case of Paranaque, about 70% of the new commercial space is for a major hotel chain to be constructed in the area.

(3) Trends in the Tondo Area and the Rest of Manila

4.17 The NSO also provides data on new private construction projects for the 14 areas of Manila (see Table 4.1.5). The coverage area includes Tondo where the Tutuban Station is located. The main terminal of PNR is located in the Tutuban area. A portion of the PNR property in Divisoria has already been converted into a mall called Tutuban Center.

4.18 The Divisoria area is a shopping place suited for bargain hunters, small- and medium-scale businesses involved in buy-and-sell, and industry providers in search of raw materials and finished products. Unlike those in Makati and Ortigas Center, most of the shopping malls in Divisoria are of the community mall type. Aside from Tutuban Center, other community malls in the area include 168 Shopping Mall, located along Sta. Elena St., and 999 Shopping Mall along Soler St.

4.19 Megaworld Corporation bucked the trend with the establishment of the Lucky Chinatown Mall. Located at the corner of Reina Regente and Dela Reina St., the mall has more than 62,000 sq.m. of commercial space and two residential towers. The retail and food establishments found inside the mall are of the same caliber as those in the upscale shopping malls of Makati and Ortigas Center.

4.20 Moreover, Double Dragon Properties Corporation will be constructing the Dragon 8 Shopping Center in its 5,972 sq.m property along C.M. Recto Ave. and Dagupan Streets. Once completed, it is envisioned to be one of the most modern tiangge (bazaar or flee market) shopping centers in Divisoria. The shopping center will house several retail shops, food court and tiangge stalls[2].

Table 4.1.5 New Private Construction Projects in Manila: 2012 to First Three Quarters of 2014

City/ Municipality	Number			Floor Area (000 sq.m)			Value (PHP million)		
	2012	2013	2014*	2012	2013	2014*	2012	2013	2014*
MANILA	1,343	1,109	368	941	697	131	11,327	8,450	2,261
Tondo	212	205	57	64	100	20	717	1,001	585
Binondo	150	88	36	87	171	6	888	2,300	135
Quiapo	35	39	9	10	4	0	186	90	25
San Nicolas	10	15	8	3	0	0	31	10	9
Sta. Cruz	114	93	38	99	21	12	1,596	334	186
Sampaloc (Sta. Mesa)	327	297	101	314	190	33	3,297	1,890	523
San Miguel	13	9	5	20	3	11	284	60	96
Ermita	114	85	24	113	56	28	1,802	981	361

[2] http://dragon8.com.ph.

City/ Municipality	Number			Floor Area (000 sq.m)			Value (PHP million)		
	2012	2013	2014*	2012	2013	2014*	2012	2013	2014*
Intramuros	37	24	15	1	1	2	41	30	45
Malate	126	105	28	167	56	4	1,847	853	121
Paco	58	51	22	31	73	9	288	671	103
Pandacan	40	21	6	6	4	1	63	40	10
Port Area	5	3	1	0	2	1	9	9	12
Sta. Ana	102	74	18	27	16	4	280	181	48

Source: NSO.
Note: * Covers only the first three quarters of 2014.

4.21 In the last two years, there have significant declines in the number, floor area and value of construction of new private construction projects in Manila. The contraction in new private construction projects cuts across the 14 areas of Manila, except Port Area and San Nicolas, which posted upticks in the value of construction in the first three quarters of 2014. In Tondo, the number, floor area and value of production declined by 66.5%, 78.1% and 36.3%, respectively, in the first three quarters of 2014 relative to their comparable figures the previous year.

4.22 In the past 11 quarters, there were 474 new private construction projects in the Tondo area with a total floor area of 185,056 sq.m and total construction value of PHP2,303 million (see Table 4.1.6). Residential projects account for 53%, 74% and 55% of total number, total floor area and total value of construction of new private construction activities in Tondo, respectively. On the other hand, non-residential projects comprise about 14%, 22% and 18%, respectively. Additions, alteration, repairs, demolitions and street furniture account for the remaining new private construction projects.

Table 4.1.6 New Private Construction Projects in the Tondo Area*

Area	Items	2012	2013	1Q to 3Q 2014
Residential	Number	112	117	35
	Floor Area (sq.m)	36,134	82,623	17,899
	Value of Construction (PHP'000)	344,099	745,380	179,729
Non-Residential	Number	38	23	6
	Floor Area (sq.m)	24,869	14,716	1,457
	Value of Construction (PHP'000)	251,936	156,290	16,031
Others**	Number	69	79	19
	Floor Area (sq.m)	3,305	2,969	1,084
	Value of Construction (PHP'000)	126,376	107,355	393,251

Source: NSO.
Notes: * Figures may not add up due rounding-off errors.
** Includes additions, alterations/ repairs, demolitions and street furniture.

4.23 Majority of the residential projects in the Tondo area consist of residential condominium buildings (see Table 4.1.7). In the past 11 quarters, residential condominiums accounted for 61% of total floor area and 59% of total value of construction of new private residential construction projects in Tondo. At a distant second was apartment/accessoria with 23% share of total floor area and 26% of total value production. Single residential units have the most number of projects but its share of total floor area and value of construction were much lower at 15.6% and 15.8%, respectively.

Table 4.1.7 New Private Residential Construction Projects in the Tondo Area, 2012 to Third Quarter of 2014

Year	Number	Floor Area (sq.m)	Value of Construction (PHP 000)
Single	151	21,275	201,067
Duplex / Quadruplex	0	0	0
Apartment / Accessoria	97	31,639	325,324
Residential Condominium	15	83,685	742,363
Others	1	57	450
Total	264	136,656	1,269,204

Source: NSO.

4.24 Most of the new private non-residential construction projects in the Tondo area are composed of commercial units / buildings (see Table 4.1.8). In the past 11 quarters, there were 43 new commercial construction projects in Tondo with total floor area of 22,789 sq.m and total value of construction of PHP199.92 million. Institutional units likewise accounted for a significant portion of new non-residential construction projects, with 34% of total floor area and 43% of total value of construction. Institutional projects consist of private school buildings, hospital buildings and other related projects.

Table 4.1.8 New Private Non-Residential Construction Projects in the Tondo Area, 2012 to Third Quarter of 2014

Year	Number	Floor Area (sq.m)	Value of Construction (PHP 000)
Commercial	43	22,789	199,921
Industrial	7	4,165	40,304
Institutional	13	14,088	180,308
Others	4	-	3,719
Total	67	41,042	424,252

Source: NSO.

4.25 Majority of the new commercial projects in the Tondo area consisted of commercial/office buildings and retail stores (see Table 4.1.9). This is hardly surprising considering that major business districts and shopping areas such as Tutuban and Divisoria are located in Tondo. Moreover, the Manila North Harbor and the Manila Container Terminal lie at the western portion of the Tondo area.

Table 4.1.9 New Private Commercial Building Construction in the Tondo Area, 2012 to Third Quarter of 2014

Year	Number	Floor Area (sq.m)	Value of Construction (PHP 000)
Commercial / Office Building	17	9,944	95,283
Store	20	8,722	87,166
Banks	0	0	0
Hotel / Motel	0	0	0
Others	6	4,123	17,469
Total	43	22,789	199,918

Source: NSO.

4.26 Another source of information on trends and developments in the real estate sector is the Housing and Land Use Regulatory Board (HLURB). The HLURB is the planning, regulatory and quasi-judicial national government body tasked to regulate land use and real estate and housing development. Real estate developers are required to apply for licenses to sell with the HLURB prior to selling units/ houses or lots. These

licenses issued by the HLURB provide information on which property development projects have been completed or nearing completion.

4.27 From 2011-2013, the HLURB issued 557 licenses to sell for property development projects in the Metro Manila (see Table 4.1.10). Most of the licenses issued were for projects in Quezon City, Makati, Manila and Taguig. These cover about 138,000 residential units and 900 commercial units in Quezon City, where among the biggest projects are the mixed-used condominium buildings of the SM Development Corporation (SMDC).

4.28 In Taguig, the licenses to sell issued during the same period cover some 22,000 residential units and 1,700 commercial units. The major projects for residential buildings are The Big Apple of Federal Land Inc. and The Venice Luxury Residences of Megaworld Corporation, while for commercial buildings it is the Shangri-la at the Fort of Fort Bonifacio Shangri-la Hotel Inc.

4.29 In Makati, the licenses to sell cover 34,500 residential units and 1,350 commercial units. The Jazz Residences of SMDC has most of the residential units for sale, while the Laureano Di Trevi Towers of Household Development Corporation account for the biggest number of commercial units.

Table 4.1.10 Licenses to Sell Issued by HLURB in Metro Manila, 2011-2013

City	Number of Licence							
	CC	RC	RCC	EH	SH	OM	Others	Total
Caloocan	1	3	-	8	-	2		14
Las Pinas	-	3	1	-	-	5	1	10
Makati	2	16	52	-	-	-	1	71
Malabon	-	2	1	-	-	1	-	4
Mandaluyong	-	17	18	-	-	-	-	35
Manila	3	24	36	-	-	-	4	67
Marikina	-	-	1	-	-	1	-	2
Muntinlupa	-	5	11	1	-	2	-	19
Paranaque	-	28	8	1	-	5	2	44
Pasay	-	16	3	-	-	1	3	23
Pasig	-	21	15	1	-	2	-	39
Quezon City	-	52	56	1	3	29	2	143
San Juan	-	3	6	-	-	1	-	10
Taguig	11	15	28	1	2	4	1	62
Valenzuela	-	4	0	5	-	4	1	14
Total	17	209	236	18	5	57	15	557

Source: Housing and Land Use Regulatory Board (HLURB).
Note: CC = Commercial Condominium, RC = Residential Condominium, EC = Economic Housing, RCC = Residential / Commercial Condominium, SH = Socialized Housing, OM = Open Market.

4.30 In Manila, the bulk of these units for sale by property developers are located in Malate, Paco and Sta. Cruz. Majority of the units are in residential condominium buildings and mixed use residential/ commercial condominium buildings (see Table 4.1.11).

Table 4.1.11 Licenses to Sell in Manila Issued by HLURB, 2011–2013

District	Licenses Issued	No. of Project by License Type					
		COL	CC	RC	RCC	PL	UNC
Tondo	3	-	-	1	2	-	-
Binondo	8	-	3	-	4	-	1
Quiapo	1	-	-	-	1	-	-
Sta. Cruz	9	-	-	-	9	-	-
Sampaloc	8	-	-	5	3	-	-
Sta. Mesa	8	-	-	5	3	-	-
Ermita	3	-	-	1	2	-	-
Malate	16	-	-	4	12	-	-
Paco	10	-	-	8	-	2	-
Sta. Ana	1	1	-	-	-	-	-
Total	67	1	3	24	36	2	1

Source: HLURB.
Note: COL = Columbarium, CC = Commercial Condominium, RC = Residential Condominium, RCC = Residential / Commercial Condominium, PL = Parking Only, UNC = Unclassified.

4.31 Table 4.1.12 below summarizes the types of units for sale in the Manila area by property developers. A large majority of these units for sale are residential units in the Malate area. There are 470 residential units and 20 commercial units for sale in the Tondo area.

Table 4.1.12 Units for Sale in Manila Based on License to Sell Issued by HLURB

District	Area (hectare)	No. of Units			
		Residential	Commercial	Parking Lots	Lots*
Tondo	0.48	470	20	588	0
Binondo	1.51	1,460	527	990	0
Quiapo	0.00	20	61	0	0
Sta. Cruz	0.99	5,814	83	1,394	0
Sampaloc	0.81	3,326	19	953	0
Sta. Mesa	3.45	3,978	17	842	0
Ermita	0.37	2,487	22	376	0
Malate	3.07	15,055	210	3,070	0
Paco	44.91	2,749	0	2,014	0
Sta. Ana	0.04	0	0	0	2,123
Total	55.63	35,359	959	10,227	2,123

Source: HLURB.
Note: * For the columbarium in Sta. Ana.

4.32 Several real estate developers have been issued licenses to sell by the HLURB in Tondo (see Table 4.1.13). The developer of the Orchard Residences is Far East Property Development Corporation. The developers of The Orchard Tower and the Supreme Garden Residences are S & U Real Estate Corporation and Keppeland Realty Corporation, respectively.

Table 4.1.13 Projects with Licenses to Sell in the Tondo Area

Project Name	Address	Area (hectare.)	No. of Units		
			Res.	Com.	PL
The Orchard Tower	Juan Luna St., Tondo	0.117	201	16	28
Supreme Garden Residences	Cor. P. Algue and Sanchez Sts., Tondo	0.073	72	4	64
Orchard Residences	1311-1325 Masangkay St., Brgy. 262, Tondo	0.289	197	-	496

Source: HLURB.
Note: Res. = Residential, Com. = Commercial, PL = Parking lots.

(4) Redevelopment Plan of Tutuban Center and Other Projects in the Neighboring Areas

4.33 According to Colliers International Philippines Research (CIPR)[3], once the new private construction projects identified by NSO and HLURB have been completed, these would add about 482,000 sq.m to the supply of office space in Metro Manila (see Table 4.1.14). More than 25% of the new supply will be located in the Ortigas area. Based on Colliers' projections, an additional 476,000 sq.m and 565,000 sq.m of new net usable office space will be added in Metro Manila in 2015 and 2016, respectively. Hence, the total office space in Metro Manila will exceed 8 million sq.m by the end of 2016.

Table 4.1.14 Projected New Office Supply in Metro Manila (square meters, net usable space)

Location	End-2013	2014F	2015	2016	Total
Makati CBD	2,827,865	22,802	---	---	2,827,865
Ortigas	1,160,350	125,999	75,072	17,378	1,378,799
Fort Bonifacio	929,810	69,529	133,050	250,783	1,383,172
Eastwood	300,264	---	---	---	300,364
Alabang	305,707	75,956	---	16,200	397,863
Other Locations*	1,027,220	187,702	268,486	280,453	1,763,861
Total	6,551,217	481,988	476,608	564,814	8,074,627

Source: Colliers International Philippine Research (CIPR).
Note: * Includes Manila, Pasay, Mandaluyong, Quezon City and other fringe locations.

4.34 The primary determinants of demand for office space are a strong domestic economy and an expanding labor force. The Philippine economy has expanded by an average of 6% per year since 2010. This impressive performance in the last four years is expected to be sustained with the expected strong growth in consumption spending. Moreover, the expected massive spending for the May 2016 elections would provide an additional boost to the local economy in the near future.

4.35 The impact of the strong economic performance on demand for office space can be seen in the low vacancy rates in the Makati CBD. CIPR is projecting vacancy rates to further drop from 1.9% in the third quarter of 2014 to 1.6% in the third quarter of 2015 (see Table 4.1.15).

Table 4.1.15 Vacancy Rates in the Makati CBD (%)

Office Grade	2Q2014	3Q2014	3Q2015F
Premium	0.56	0.21	0.11
Grade A	6.79	6.74	5.92
Grade B and Below	1.01	0.74	0.60
All Grades	2.14	1.90	1.62

Source: CIPR.

4.36 The sustained demand for offices space will come from the off shoring and outsourcing (O&O) sector. The Philippine Economic Zone Authority (PEZA) encourages development of IT parks in Metro Manila and other parts of the country. The PEZA-registered parks in Metro Manila are the Eastwood City Cyberpark in Quezon City and the E-Square IT Park in Taguig City. O&O locators can avail of fiscal incentives including a 5% tax on gross income in place of the regular 30% corporate income tax if

[3] Based on the "Third Quarter 2014 Market Overview of the Philippine Estate Market" by Colliers International Philippine Research.

they operate in these IT parks. Most of the office space in the pipeline will serve the anticipated strong demand from O&O companies. Business process outsourcing (BPO) is one of the country's fastest growing industries. According to the Business Processing Association of the Philippines, industry annual revenues can grow from USD9 billion in 2010 to an estimated USD25 billion by 2016, which is equivalent to a 10% share of the global market. Direct employment in BPO firms can also increase from 500,000 in 2010 to 900,000 employees in 2016.

4.37 The strong demand for office space is also evident in the continued rise in rental rates. CIPR projects an increase in rental rates by about 7% by the third quarter of 2015 despite the expected significant increase in supply (see Table 4.1.16). The rate increase will be highest for the grade B segment at 8%.

Table 4.1.16 Makati CBD Office Rental Rates*

Office Grade	2Q2014	3Q2014	% Change (Q on Q)	3Q2015F	% Change (Year on Year)
Premium	930–1,270	970–1,280	2.27	1,030–1,370	6.6
Grade A	650–985	685–995	2.75	725–1,070	6.7
Grade B	515–715	530–735	2.85	515–800	8.1

Source: CIPR.
* Note: Based on net usable area (pesos per square meter per month).

4.38 A new supply of 258,000 sq.m will be added to the retail stock by the third quarter of 2015. This will bring retail stock to over 6 million sq.m by the end of the third quarter of 2015 (see Table 4.1.17). Most of the additional space will be for retail stores in the district and neighborhood centers. Ayala Land Inc. (ALI) and SM Prime Holdings will account for the majority of the new retail space to be delivered next year.

Table 4.1.17 Retail Stock in Metro Manila (square meters)

Particulars	2Q2014	3Q2014	% Change (Q on Q)	3Q2015	% Change (Year on Year)
Super-Regional	3,657,635	3,657,635	0.0	3,714,635	1.6
Regional	934,983	934,983	0.0	1,014,983	8.6
District / Neighborhood	1,180,983	1,200,843	1.7	1,321,860	10.1
All Levels	5,772,836	5,793,461	0.4	6,051,478	4.5

Source: CIPR.

4.39 Property developers continue to construct more retail space in Metro Manila due to the continued improvement in the purchasing power of consumers and the entry of more retail brands in the country.[4] In the past two years, there was an influx of convenience stores, restaurants and coffee bars, and mid-range fashion retailers in the country. Most of these convenience stores are located in the ground of office and residential condominium buildings in the metropolis.

4.40 The main determinants of demand for retail space are demographics and a robust domestic economy. The Philippines will continue to have a huge domestic market given its population of close to 100 million with a projected growth rate of 1.6% per annum. Moreover, consumption spending remains as the main engine of growth of the domestic economy. Household consumption spending, which accounts to close to 70% of GDP, grew by some 6% in the past three years. As long as there are no significant changes in these variables, there will continue to be strong demand for retail space particularly in

[4] Ibid.

areas where there is huge foot traffic and rental rates are reasonable.

4.41 There is currently a wide range in the lease rates for retail space in prime locations in Metro Manila. In the Bonifacio Global City, the asking rate of different malls ranges from a low of PHP900 per sq.m per month to a high of PHP2,400 per sq.m per month.5 In the Makati CBD, the lease rates are from PHP1,100 to PHP1,500 per sq.m per month. With the delivery of new retail space, the lease rates in Ortigas has increased to a range of PHP1,300 to PHP3,000 per sq.m per month.

4.42 Due the worsening of the traffic congestion and the sustained improvement in purchasing power, property companies have slowly shifted to the integrated mixed-use development projects in Metro Manila.6 These are property developments located near CBDs and will allow the urbanites to live close to where they work, shop, and spend their leisure time. According to Lamudi Philippines, there are currently seven such projects being developed in Metro Manila, namely:

(i) South Park District of ALI in Alabang, Muntinlupa;

(ii) Vertis North of ALI in Quezon City;

(iii) Circuit Makati of ALI in Makati City;

(iv) Arca South of ALI in Taguig City;

(v) Woodside City of Megaworld Corporation in Pasig City;

(vi) Uptown Bonifacio of Megaworld Corporation in Taguig City; and

(vii) Veritown Fort of Federal Land in Taguig City.

(a) **South Park District**[7]**:** This will be the first large-scale, mixed-used master planned development of Avida Land Corporation, the affordable market developer of ALI. The South Park District is envisioned to integrate residential, retail and business centers while creating a vibrant sense of community. The 6.6 hactare property development project is located at the former Nestle factory compound along the National Road near Alabang. Its main components include the Avida Towers Altura, the soon to rise residential tower, South Park Mall, South Park Corporate Center, and a transport terminal. On top of the mall is the South Park Corporate Center, a 38,000 sq.m office building. The project is estimated to cost PHP12 billion.

(b) **Vertis North**[8]**:** This will be ALI's first large-scale, mixed-use sustainable city center in Quezon City. Vertis North, which has a total land area of 29 hectare, is a joint venture between ALI and the NHA. Once the PHP65 billion project is completed, it will have about 45 towers and buildings composed of offices, shopping malls, hotels and residential condominiums. This project is located between EDSA, North Avenue and Mindanao Avenue.

(c) **Circuit Makati**[9]**:** This is a 21 hectare mixed-use development in the former Sta. Ana Racetrack property of the Philippine Racing Club, Inc. (PRCI). Circuit Makati, which is a collaborative project among ALI, PRCI and the City of Makati, is envisioned to be Makati's entertainment hub. Once completed, Circuit Makati will have a world-class

5 Metro Manila Market View, Third Quarter 2014. CBRE Philippines.
6 The discussions in this section are largely based on the article entitled "12 Township Projects in the Philippines" by Lamudi Philippines dated October 2014.
7 www.ayalaland.com.ph/south-park-district.
8 www.vertisnorthayala.com.
9 www.makeitmakati.com/circuit-makati.

indoor theater, multi-purpose entertainment spaces, and open grounds integrated with commercial, hotel and residential blocks.

(d) **Arca South**[10]**:** This a 74 hectare strategically located along the East Service Road of the South Luzon Expressway in the area, which was once part of the FTI Complex. Arca South is envisioned to be the gateway of the south since it is right beside DOTC's Intermodal Transport System. Once completed, it will offer 103,000 sq.m of shopping floor area, 96,000 sq.m of gross leasable office space, a 265 room hotel, 240 bed hospital, and low- to mid-rise residential buildings. ALI is expected to infuse some PHP80 billion in the development of Arca South in the first five years.

(e) **Woodside City**[11]**:** This a PHP35 billion development project located in the 12-hectare former Ajinomoto plant along C5 Road in Pasig City. Woodside City is envisioned to be an environment-friendly, mixed-use property development. The project will feature office towers, residential condominiums, a lifestyle mall, retail and commercial strips, open parks and a transport hub. Megaworld is currently constructing the Leadership in Energy and Environmental Design (LEED) registered office building, the first of its three sustainable office towers in the area.

(f) **Uptown Bonifacio**[12]**:** This is a 15 hectare property development project located in the heart of Fort Bonifacio, Taguig City. Uptown Bonifacio is envisioned to interconnect luxurious condominium enclaves, glamorous lifestyle destinations, and state-of-the-art corporate hubs. Once the project is completed, it will have close to 500,000 sq.m of residential space, 400,000 sq.m of commercial space, and 90,000 sq.m of retail and restaurant space.

(g) **Veritown Fort**[13]**:** This is a 10 hectare property development project located within the boundary of Taguig and Makati. Veritown Fort is envisioned to incorporate luxurious residential condominiums, grade A office buildings, high-end shopping facilities, and a six-star hotel. The main anchor of the property development project is the Grand Hyatt Hotel, a 66 storey building consisting of grade A financial and corporate offices, lavish hotel amenities, and 400 luxury rooms and suites. Aside from office spaces, Veritown Fort will be constructing high-end residential buildings such as Grand Hyatt Residences, Central Parkwest, Parkwest, Madison Parkwest, and Time Square West.

3) Potential Affected People by Tutuban Redevelopment and Their Current Situation

(1) Residents in Tutuban Area

4.43 In order to promote TOD at the Tutuban development area, it is important to gather and analyze the residents' social profile and current living conditions. In addition, some people will be relocated since this area is supposed to be redeveloped with the NSCR and LRT 2 West Extension projects. The conditions for relocation can be suggested by getting the residents' opinions about moving. In this study, the household interview survey was implemented with a sampling size of 450 households in 25 barangays (see Table 4.1.18). The survey area is located in five zones around the Tutuban station area (see Figure

[10]www.ayalaland.com.ph/arca-south-convivial-spaces-work-leisure.
[11]www.megaworld.com/megaworld-to-develop-p35-b-woodside-city-township-in-pasig-city.
[12]www.megaworldinternational.com/uptown-bonifacio.
[13]www.veritownfort.com.ph.

4.1.7).

Table 4.1.18 Survey Area and Sample Number

Zone	Sample No.	Barangay Name	Characteristics
1	119	50, 51, 53	Low rise built- up area
2	120	56, 58, 60, 61	Low rise built- up area
3	120	8, 48, 49	Low rise built-up area, Adjacent area for redevelopment of high-rise condominium
4	120	234, 235, 236, 237, 238, 239, 242, 243, 244, 245, 246, 247, 248, 344	Industrial area, Residential area
5	21	294	Commercial area, A few small houses

Source: JICA Study Team.

Source: JICA Study Team.

Figure 4.1.7 Survey Area and Sample Number

4.44 **Characteristic of households:** Tutuban is mainly a high density and relatively poor residential area. The southern part is a commercial area considered as one of the biggest wholesale and retail markets in the Philippines. Thus, the area is usually crowded with people. Following are the characteristics of households in this area:

(i) The largest number of people (20% of total households) live in their current house for more than 50 years.

(ii) The single house accounts for 70% of housing types, and 92% of house roofs are made of galvanized iron or aluminum.

(iii) Basic infrastructure is supplied for almost all households (more than 96% of households), such as electricity, water, and solid waste collection.

(iv) “Service, shop and market sales worker” and “plant and machine operator and assembler” are the main jobs of the residents.

(v) About 63% of household heads work within the City of Manila.

4.45 As one of the features of residents in the area, the share of the informal settler families (or ISFs, defined in this report according to house attainment, that is, has “own

house, rent-free without owner's consent" and "rent-free house and lot without owner's consent") is 8.2% (see Table 4.1.19). The category of the households which have "rent-free house and lot with owner's consent" is supposed to be included many ISFs, and the share is 14.0%.

4.46 Regarding the housing floor area, households who have houses with a floor area less than 10 sq.m is 8.8%, 10 – 29 sq.m is 45.0% of total (see Table 4.1.20), which is a substantial share. According to the 2011 Annual Poverty Indicators Survey published by the NSO, the share of households in Metro Manila living in houses with a floor area less than 10 sq.m is 0.1%, and 10 – 29 sq.m is 32.0%. These results indicate that there are many low-income people in the whole area. Zone 5 is especially faced with serious poverty owing to the rather small floor area of the residents' houses and the large share of ISFs and households who have "rent-free house and lot with owner's consent."

Table 4.1.19 Households' Ownership of House and Lot

Ownership	Zone 1		Zone 2		Zone 3		Zone 4		Zone 5		Total		Remark
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Own house and lot	30	29.1	75	55.1	63	52.5	43	35.8	0	-	211	42.2	
Rent house/room including lot	42	40.8	32	23.5	24	20.0	38	31.7	3	14.3	139	27.8	
Own house, rent lot	2	1.9	0	-	1	0.8	4	3.3	0	-	7	1.4	
Own house, rent-free with owner's consent	5	4.9	8	5.9	3	2.5	8	6.7	4	19.0	28	5.6	
Own house, rent-free without owner's consent	4	3.9	9	6.6	0	-	19	15.8	6	28.6	38	7.6	Defined as ISFs.
Rent-free house and lot without owner's consent	0	-	0	-	0	-	1	0.8	2	9.5	3	0.6	Total No: 41 (8.2%)
Rent-free house and lot with owner's consent	19	18.4	10	7.4	29	24.2	6	5.0	6	28.6	70	14.0	Including many ISFs
No answer	1	1.0	2	1.5	0	-	1	0.8	0	-	4	0.8	
Total	103	100.0	136	100.0	120	100.0	120	100.0	21	100.0	500	100.0	

Source: JICA Study Team.

Table 4.1.20 Housing Floor Area

Floor Area/ House (sq.m)	Zone 1		Zone 2		Zone 3		Zone 4		Zone 5		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 10	14	11.8	4	3.3	15	12.5	4	3.3	7	33.3	44	8.8
10–29	60	50.4	58	48.3	52	43.3	44	36.7	11	52.4	225	45.0
30–49	23	19.3	19	15.8	30	25.0	24	20.0	3	14.3	99	19.8
50–79	9	7.6	20	16.7	10	8.3	24	20.0	0	-	63	12.6
80–119	8	6.7	8	6.7	8	6.7	11	9.2	0	-	35	7.0
120–149	3	2.5	5	4.2	3	2.5	3	2.5	0	-	14	2.8
150–199	0	-	3	2.5	1	0.8	5	4.2	0	-	9	1.8
200 and above	1	0.8	2	1.7	1	0.8	4	3.3	0	-	8	1.6
No answer	1	0.8	1	0.8	0	-	1	0.8	0	-	3	0.6
Total	119	100.0	120	100.0	120	100.0	120	100.0	21	100.0	500	100.0

Source: JICA Study Team.

4.47 **Living Environment:** The most serious problem in the Tutuban area is the drainage system. About 56.4% of the households in the area experienced the flood in the past one year. Flood occurs and is more wide spread at the east side of the Tutuban area, in Zone 4 and Zone 5. Some 97.5% of households in Zone4 and 92.5% in Zone 5 have experienced the floods.

4.48 Aside from drainage, there is also a need to improve traffic, greenery, shade for the sidewalks, playground space, and safety/security. Regarding the traffic, 71.4% of respondents considered the traffic conditions as “So-so”, “Bad” or “Very bad”. Many people are also dissatisfied with the current greenery, shade and playground at their living area. From 70–80% considered the situation regarding pickpockets and other crimes as “So-so”, “Very bad” or “Bad” (see Table 4.1.21). This area has heavy traffic congestions by the jeepneys’ illegal parking, narrow roads, and so on. Since the area is high density, there is not enough open spaces for playground and green, and crimes occur easily.

Table 4.1.21 Satisfaction on the Living Conditions

Greenery	No.	%
Very bad	61	12.2
Bad	195	39.0
So-so	169	33.8
Good	69	13.8
Very good	4	0.8
No answer	2	0.4
Total	500	100

Shade of side walk	No.	%
Very bad	73	14.6
Bad	118	23.6
So-so	166	33.2
Good	127	25.4
Very good	8	1.6
No answer	8	1.6
Total	500	100

Playground Space	No.	%
Very bad	153	30.6
Bad	151	30.2
So-so	126	25.2
Good	61	12.2
Very good	8	1.6
No answer	1	0.2
Total	500	100

Pickpocket	No.	%
Very bad	158	31.6
Bad	147	29.4
So-so	88	17.6
Good	98	19.6
Very good	9	1.8
Total	500	100

Other Crimes	No.	%
Very bad	109	21.8
Bad	149	29.8
So-so	116	23.2
Good	113	22.6
Very good	12	2.4
No answer	1	0.2
Total	500	100

Source: JICA Study Team.

4.49 There are several countermeasures to improve the current living environment. Decongestion of the traffic by the access improvement such as expanding the roads, constructing new roads, and setting the jeepney bays on TOD is worthy. Expanding existing roads or constructing new roads should be implemented by improving the drainage system, planting roadside trees to provide shades, and increasing the vegetation. In addition, it is suggested to locate the playground and greenery at the Tutuban PNR property as part of the development. To improve the safety / security situation, reducing a dead angle, and putting some open spaces for neighbors to gather and talk are suggested at the redevelopment around the Tutuban Station in the future. The reason for the latter is that it becomes a deterrent to crime when some people are outside and can see the surroundings. Solving the safety problem is effective for residents and will also improve the image of the area.

4.50 **Opinion for Relocation:** As mentioned earlier, some households may need to be relocated in accordance with redevelopment project. Some 30% of households are interested to move to the NSCR because they are unsatisfied with the limited space, high density and high rent at their current locations. On the other hand, 70% are not interested in moving because they are satisfied with their current place. Other reasons cited are no money to move, difficulty of commuting, and they like the current good access to everywhere (see Table 4.1.22).

Table 4.1.22 Reasons for Households Interested or Not Interested in Moving

Reasons for Moving (multiple answers are allowed)	No.	%
The current place is small living space	51	28.8
Desire to own a house	25	14.1
The current place has high rental fee	13	7.3
The current place is dense / crowded	25	14.1
The current place is polluted	11	6.2
No better choice	11	6.2
To be close to the relevant services	8	4.5
The current place is noisy	7	4.0
The current place is not accessible	3	1.7
The current place has no sufficient greenery	4	2.3
Others	17	9.6
No answer	2	1.1
Total	177	100.0

Reasons for Not Moving (multiple answers are allowed)	No.	%
Satisfied with current place	200	48.2
No money to move	59	14.2
Business / work place is close to the current place	49	32.7
The current place is accessible to the establishments	29	19.3
Own house	27	18.0
Grew up in the current area	11	7.3
The current place is comfortable	8	5.3
Others	26	6.3
No answer	3	0.7
Total	412	100.0

Source: JICA Study Team.

4.51 It is expected that each NSCR station area will be developed and improved together with the NSCR project, specifically access and job opportunity. These improvements, however, are not enough to convince people to relocate along the NSCR in Bulacan. To persuade them to move, aside from paying the usual compensation, it is advisable for the developer to provide NSCR fare for people who need it to keep on commuting.

(2) Tutuban Mall Tenants Interview Survey

4.52 Tutuban Mall will be redeveloped as a part of the Tutuban TOD project sooner or later. In order to increase customers and sales, it is necessary to find out the current status of each mall and reconsider the tenants. In addition, the vacant area inside the malls has the potential to be used for street vendors' relocation site.

4.53 For this purpose, the interview survey was implemented for all tenants in the Tutuban Mall which includes Center Mall 1, Center Mall 2, Cluster Building, and Parking Tower. There are 728 tenants and 355 vacant rooms in these buildings (see Table 4.1.23). The significant number of vacant rooms in Cluster Building 2 is notable. Prime Block has many vacant rooms as well. The Cluster Building will be demolished and the Prime Block should be planned to be redeveloped in the future. However, as a short-term plan for the efficient use of vacant rooms and increasing the total sale in the Prime Block, it can be used as the outside vendors' relocation site.

Table 4.1.23 No. of Tenants and Vacant Room by Malls

		No. of Tenants	No. of Vacant Rooms	Total	Vacant Rate (%) [1)]
Center Mall 1	Ground Floor	60	5	65	7.7
	2nd Floor	178	21	199	10.6
	Total	238	26	264	9.8
Center Mall 2	Ground Floor	51	8	59	13.6
	2nd Floor	34	12	46	26.1
	3rd Floor	18	13	31	41.9
	Total	103	33	136	24.3
Cluster Building 2	Ground Floor	55	20	75	26.7
	2nd Floor	67	177	244	72.5
	Total	122	197	319	61.8
Prime Block	Ground Floor	84	22	106	20.8
	2nd Floor	74	39	113	34.5
	Podium	99	36	135	26.7
	Total	257	97	354	27.4
Parking Tower (Ground Floor only)		8	2	10	20.0
Total		728	355	1,083	32.8

Source: JICA Study Team, Tutuban Mall Tenant Interview.
Note: [1)] Vacant Rate is calculated based only on the number of tenants and the number of vacant rooms. (no consideration on booth size)

4.54 About half of the tenants are selling daily apparel items. However, it is noted that Center Mall 1 has a high share of electric appliances and gadgets. Other main items are food, accessories, textile, etc. These categories of selling items are not much different with those of outside vendors, therefore, there is a possibility for outside vendors to transfer inside the mall if they could afford to pay the proper rent.

4.55 While the average monthly sales of each mall building range from about PHP40,000–160,000 (except vendor), most of the tenants' average monthly sales fall in the PHP10,001–50,000 bracket (see Table 4.1.24). This means that only a few tenants have a large income, while most of the other tenants have quite low sales. Comparing the sales per building, except the night market and vendor, Cluster building 2 has the lowest average sales, followed by Prime Block. On the other hand, the average sales of Center Malls 1 and 2 are comparatively high.

Table 4.1.24 Monthly Sales of Each Mall, Night Market and Vendors

Monthly Sales (PHP)	Share (%)								
	Center Mall 1	Center Mall 2	Cluster Building 2	Prime Block	Parking Tower	Sub-total	Night Market	Vendor	Total
0-10,000	10.5	10.7	25.9	25.9	0.0	18.0	20.5	36.3	21.4
10,001-50,000	40.4	33.9	39.7	31.8	16.7	35.2	61.5	47.6	45.6
50,001-100,000	21.9	27.7	24.1	22.9	0.0	23.7	13.5	10.5	18.5
100,001-200,000	17.5	16.1	8.6	12.4	16.7	14.1	2.8	4.0	8.9
20,0001-300,000	2.6	4.5	1.7	4.1	16.7	3.7	0.7	1.6	2.4
300,001-500,000	0.0	0.9	0.0	1.8	33.3	1.3	0.7	0.0	0.9
500,000-	7.0	6.3	0.0	1.2	16.7	3.9	0.3	0.0	2.2
Average (PHP/month)	160,545	131,724	47,707	76,711	411,677	-	39,475	34,072	-

Source: JICA Study Team.

4.56 Unlike general shopping malls have more daily customers during weekends, Tutuban mall's average number of daily customers on weekends is less than that during weekdays at the whole building (about 65% of the weekday customers). It is important for

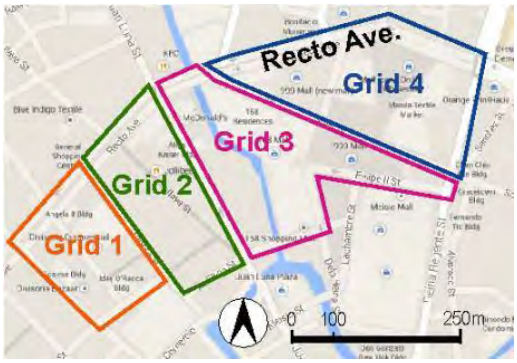
the Tutuban malls to try increasing their customer patronage through more attractive tenants and/or crowd-drawing events and promotions during weekends.

4.57 As to their future plans, about 40% of tenants plan to expand their sales areas. However, a substantial 70% of them disagree or are not willing to pay additional rent for improvements made for the Tutuban Mall redevelopment. The remaining 30% are willing to pay up to PHP500/sq.m/month. In case of redevelopment, it will be difficult for the current tenants to continue doing business within the mall since the fare is supposed to be increased. One potential for the redevelopment scenario is to either maintain the same rent or set a transitional period with certain subsidy prior to the period with full payment.

(3) Street Vendors Survey

4.58 The Divisoria area, south of Tutuban area, has a lot of street vendors. Vendors along to C.M. Recto Ave. cause serious traffic congestion, making it difficult for both vehicles and passengers to travel. The business operations of these vendors are unstable. Temporal business permits and are subject to giving informal fees to the police to ply their trade. To improve the situation, one option proposed by the TOD is to potentially use the NSCR viaduct as the vendors' new business area. This option also provides a solution for the affected vendors by the LRT 2 West Extension project through the expansion of their business opportunity. To propose improvement plans for street vendors, street vendors survey which inquired their social and economic profiles, and opinions regarding the development of the NSCR was conducted.

4.59 The inventory survey was implemented in four areas, or grids, of Divisoria (see Figure 4.1.8) to count the number of vendors and categorize the products they sell. Among the total of 3,436 surveyed street vendors, almost half vendors (1,626 vendors) are located along C.M. Recto Ave. (see Figure 4.1.9). They sell quite a variety of merchandise (see Table 4.1.25). The major category is dry goods (e.g., fabric, clothing, thread), followed by food items such as street food, refreshments, vegetable and fruits. Grid 1 has many vendors selling food and grocery items instead of less dry goods. Grid 2 has relatively many vendors selling seasonal items. Grid 3 has many vendors targeting female customers by selling more jewelry/accessories and beauty/health products compared to other areas. Most (74%) of vendors in Grid 4 sell dry goods.



Source: JICA Study Team.

Figure 4.1.8 Street Venedors Survey Area

Source: JICA Study Team.

Figure 4.1.9 No. of Vendors per Road

Table 4.1.25 Categorized Number of Street Vendors

Category	No. of Street Vendors									
	Grid1		Grid2		Grid3		Grid4		Sub-Total	
	No	%	No	%	No	%	No	%	No	%
Dry goods (fabric, clothing, thread)	67	10.1	600	53.8	266	37.6	708	74.4	1,641	47.8
Street food/refreshments	55	8.3	40	3.6	61	8.6	43	4.5	199	5.8
Vegetables/Fruits	141	21.3	114	10.2	79	11.2	38	4.0	372	10.8
Meat/Fish	17	2.6	0	-	0	-	5	0.5	22	0.6
Grocery items	104	15.7	71	6.4	48	6.8	59	6.2	282	8.2
Toys	68	10.3	26	2.3	7	1.0	8	0.8	69	2.0
Office/School supplies	14	2.1	10	0.9	8	1.1	1	0.1	33	1.0
Electronics / Gadgets / Accessories	4	0.6	16	1.4	10	1.4	16	1.7	46	1.3
Beauty/Health products	2	0.3	2	0.2	20	2.8	0	-	24	0.7
Construction items (safety gear, hardware)	13	2.0	3	0.3	14	2.0	3	0.3	33	1.0
Seasonal items (X' mas, New Year, Halloween)	22	3.3	65	5.8	6	0.8	9	0.9	102	3.0
Gift/Souvenir	33	5.0	54	4.8	3	0.4	0	-	90	2.6
Jewelry/Accessories	7	1.1	23	2.1	87	12.3	27	2.8	144	4.2
Kitchenware / Kitchen items	53	8.0	15	1.3	10	1.4	11	1.2	89	2.6
Houseware / Household items	28	4.2	20	1.8	22	3.1	16	1.7	86	2.5
Entertainment (VCD / DVD / CD / tapes)	3	0.5	16	1.4	10	1.4	2	0.2	31	0.9
Native products (raw materials)	6	0.9	12	1.1	1	0.1	0	-	19	0.6
Mixed items	22	3.3	23	2.1	49	6.9	6	0.6	100	2.9
Others	2	0.3	4	0.4	7	1.0	0	-	13	0.4
Total	661	100.0	1,115	100.0	708	100.0	952	100.0	3,436	100.0

Source: JICA Study Team.

4.60 The interview survey was conducted with 241 randomly selected vendors to keep a variety of selling goods categories. Some 60 street vendors, or about a fourth of the total surveyed, do not have business permits from the Manila City Government (see Table 4.1.26). Many vendors with light structure by metal pole with roof have business permits. However, there is no clear indication of the direct relationship between the type of structure and status of permits as there are also many vendors with permits who use mobile structures with roofs or no roof at all. Having business permits does not always guarantee the vendors secure business operations either. According to some vendors, even if they have the necessary business permits from the city, they still have to pay the police some illegal fees to be able to conduct their business.

Table 4.1.26 Business Permission Status by Structure Types

Permission	Structure									
	No Roof		Mobile Structure with Roof		Light Structure by Metal Pole with Roof		Others		Total	
	No	%	No	%	No	%	No	%	No	%
From City Hall	35	43.8	37	67.3	56	78.9	26	74.3	154	63.9
None	35	43.8	14	25.5	9	12.7	2	5.7	60	24.9
Others	8	10.0	3	5.5	6	8.5	7	20.0	24	10.0
-	2	2.5	1	1.8	0	-	0	-	3	1.2
Total	80	100.0	55	100.0	71	100.0	35	100.0	241	100.0

Source: JICA Study Team.

4.61 Location is cited by most vendors as their biggest problem. Following closely are cleanliness, rent, competition, size of store place, number of customers, and safety/security (see Table 4.1.27).Thus, the problems are multiple and complicated. Only 10% of respondent vendors said that they do not have any problems.

Table 4.1.27 Current Problems of Vendors

Problems (Multiple answers are allowed)	No.	%
Location	68	14.4
Cleanliness	59	12.5
Rent	57	12.1
Competition	49	10.4
Size of store place	48	10.2
Number of customers	45	9.6
Safety/Security	40	8.5
Lighting	26	5.5
Image	13	2.8
Others	18	3.7
No problem	48	10.2
Total	471	100.0

Source: JICA Study Team.

4.62 The results of the survey indicates the necessity for the relocation. Also, as the vendors along to C.M. Recto Ave. deprive the function of the roadway, the analysis for relocation is conducted for 100 vendors along this road. Results show that 64% of the vendors agree to be relocated, while the rest do not. For those who agree with moving, their condition for relocation is to be moved to an open space or to an alternative vending zone inside the mall (see Table 4.1.28). It is difficult to find places with a affordable price near the current place. However, it is possible to use temporary spaces for the vendors who will be affected by the LRT 2 extension. One option is the vacant space inside the Prime Block building. Another option is using the outside open space of the PNR property. In both cases, the cooperation of the PNR and Prime Orion is necessary.

4.63 Although there is not much demand to use the under part of the NSCR viaduct as an alternative vending zone, there is a high potential for using it as alternative space for the street vendors for a long term. These days, other countries use such spaces under the viaducts for commercial, public, healthcare facilities and so on. Due to the lack of good practices of utilization under the viaduct in Philippines, this option provides a good opportunity to confirm the viability of utilization of the space for improvements on vendors' business and welfare.

Table 4.1.28 Required Conditions for Relocation

Condition for Relocation (for vendors who agree to relocate)	No.	%
Compensation	4	6.3
Alternative vending zone inside the mall	24	37.5
Alternative vending zone under the viaduct	8	12.5
Open space	26	40.6
Alternative vending zone where can be commutable	1	1.6
Others	1	1.6
Total	64	100

Source: JICA Study Team.

4.64 The following strategies are suggested to maximize the effect of relocating the vendors to under the NSCR viaduct:

(i) The rent range should be varied depending on the vending space area. Vendors who has small income rent smaller shop area than others with lower rent. For reference,

the vendors' current rental rates are shown in Table 4.1.29.

(ii) Needs to be established a Vendors' committee. There are only two official vendors' association. However the number of vendors is too big to be managed by just two associations. There is no enough cooperation system between each vendor. Thus, they should form a committee by themselves and elect committee members who each will be assigned his/her own section. This will be effective in collecting the rent, dealing with troubles, and cooperating with each other.

(iii) Layout of vendors' stalls needs to be re-arranged. The current unorganized layout of vendors makes difficult for visitors to do shopping. To improve the situation, placement of the vendors should be arranged by the categories of sales product. With this arrangement, vendors would try to improve their sales by way of quality and competitive pricing of their products.

Table 4.1.29 Monthly Rental Rates of Vendors

Rent/month	Not Agree to Relocation		Agree to Relocation		Total	
	No.	%	No.	%	No.	%
0	9	25.0	15	23.4	24	24.0
1–199	4	11.1	3	4.7	7	7.0
200–499	1	2.8	2	3.1	3	3.0
500–999	1	2.8	13	20.3	14	14.0
1,000–1,999	1	2.8	3	4.7	4	4.0
2,000–2,999	0	0	1	1.6	1	1.0
3,000–3,999	2	5.6	2	3.1	4	4.0
4,000–4,999	9	25.0	19	29.7	28	28.0
5,000–9,999	5	13.9	3	4.7	8	8.0
10,000–14,999	2	5.6	1	1.6	3	3.0
15,000–19,999	2	5.6	1	1.6	3	3.0
20,000–50,000	0	0	1	1.6	1	1.0
Total	36	100	64	100	100	100

Source: JICA Study Team

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4.2 Concept Design for Station Area Development

4.65 The concept design for the PNR Tutuban property (the project area) was developed based on the concept plan, access improvement plan, and detailed access improvement plan. The concept plan highlights the importance of analyzing the current transportation and urban development issues in the project area and addressing these issues under a TOD approach. The access improvement plan offers the solutions for the transportation issues in the walkable area (1 km from the stations). The detailed access improvement plan was prepared for developing the areas within and adjacent to the project area to maximize the benefits of the concept design as shown in ***Figure 3.10.24 in Chapter 3***. The concept design aims to specify the proposed facilities, including their layout, based on the design guidelines. As shown in Figure 4.2.1, three zones were proposed in the concept plan, namely: Zone1 with public transportation facilities, commercial/mixed-use facilities and park; Zone 2 with landmark facility, commercial facility and park; and Zone 3 with public transportation facilities, mixed-use facilities and park.

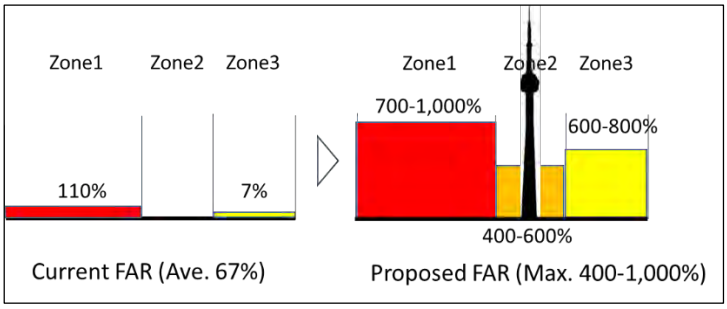
1) Proposed Land Use

4.66 Based on the prepared plans, the scope and scale of the proposed facilities were studied to determine the intensity of land use by taking the current zoning ordinance into consideration. Since the lack of open space is the major issue of the Tutuban area, a consolidated park (minimum of 0.3 hectare) is proposed for each zone (see Figure 4.2.2). To secure the sufficient open space, the percentage of land occupancy (PLO) is proposed to be below the maximum percentage specified in the zoning ordinance as shown in Table 4.2.1. On the other hand, floor area ratio (FAR) is proposed to have certain flexibility to promote intensification of land use. Although all FARs of proposed concept design are in accordance with the current zoning ordinance, further possibility to stretch the limits can be explored during the detailed design as long as it benefits more to the public than the proposal under the current ordinance. Certain criteria needs to be established by Design Guideline Committee introduced in ***Chapter 5*** to approve some exceptions.

Table 4.2.1 Summary of Land Use Intensity

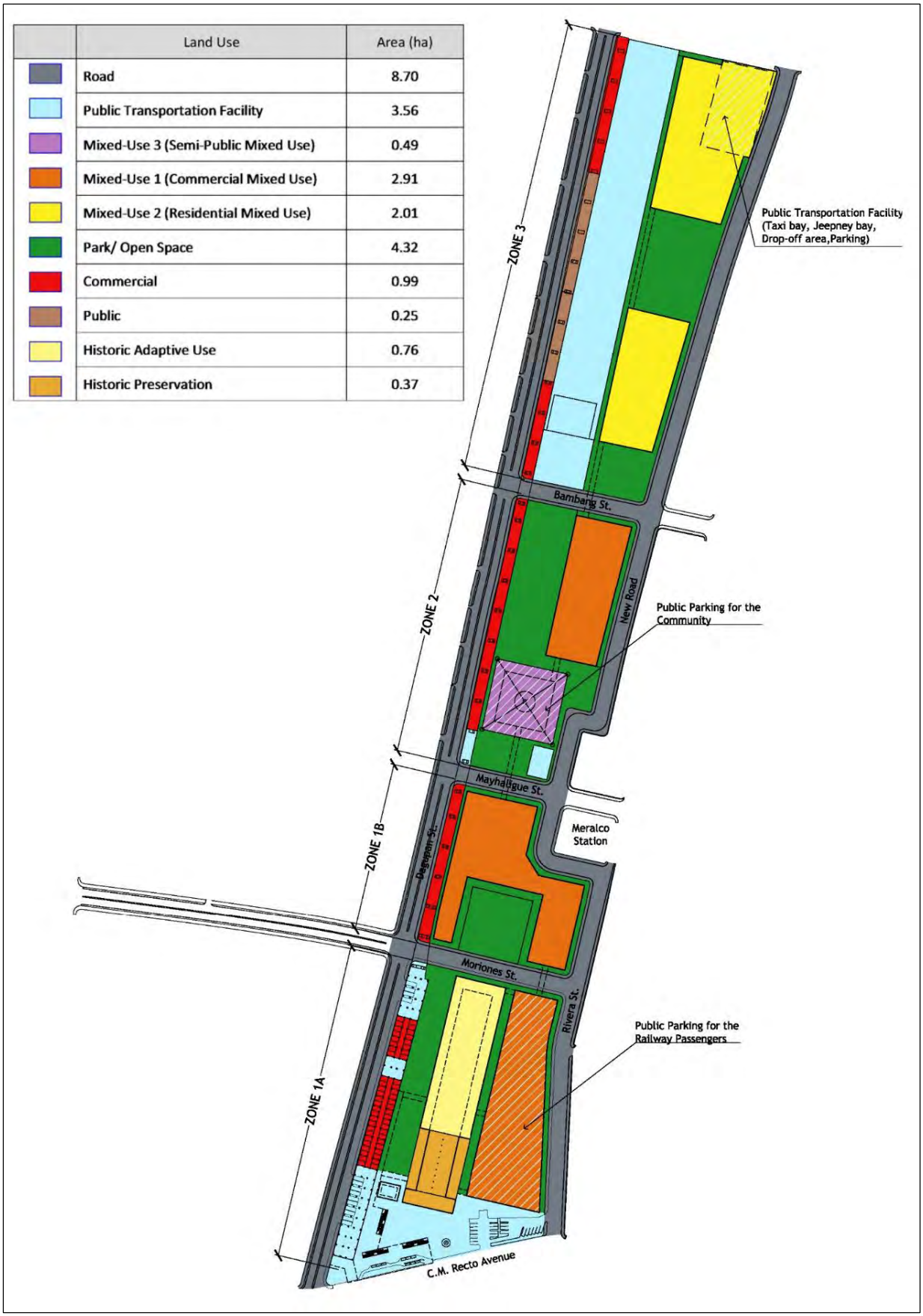
Area	Maximum No. by City Ordinance		Maximum No. by Study Team Proposal (Specific No. for Concept Design)	
	PLO	FAR	PLO	FAR
Zone 1	0.8	7	0.5 (0.48)	7-10 (3.98)
Zone 2	0.6	4	0.5 (0.42)	4-6 (2.69)
Zone 3	0.8	6	0.4 (0.32)	6-8 (5.59*)

Source: CLUP of Manila City, JICA Study Team.
Note: PLO - Percentage of Land Occupancy; FAR - Floor Area Ratio, *taking air rights of the area for PNR railway facilities into consideration.



Source: JICA Study Team.

Figure 4.2.1 Intensification of Land Use



Source: JICA Study Team.

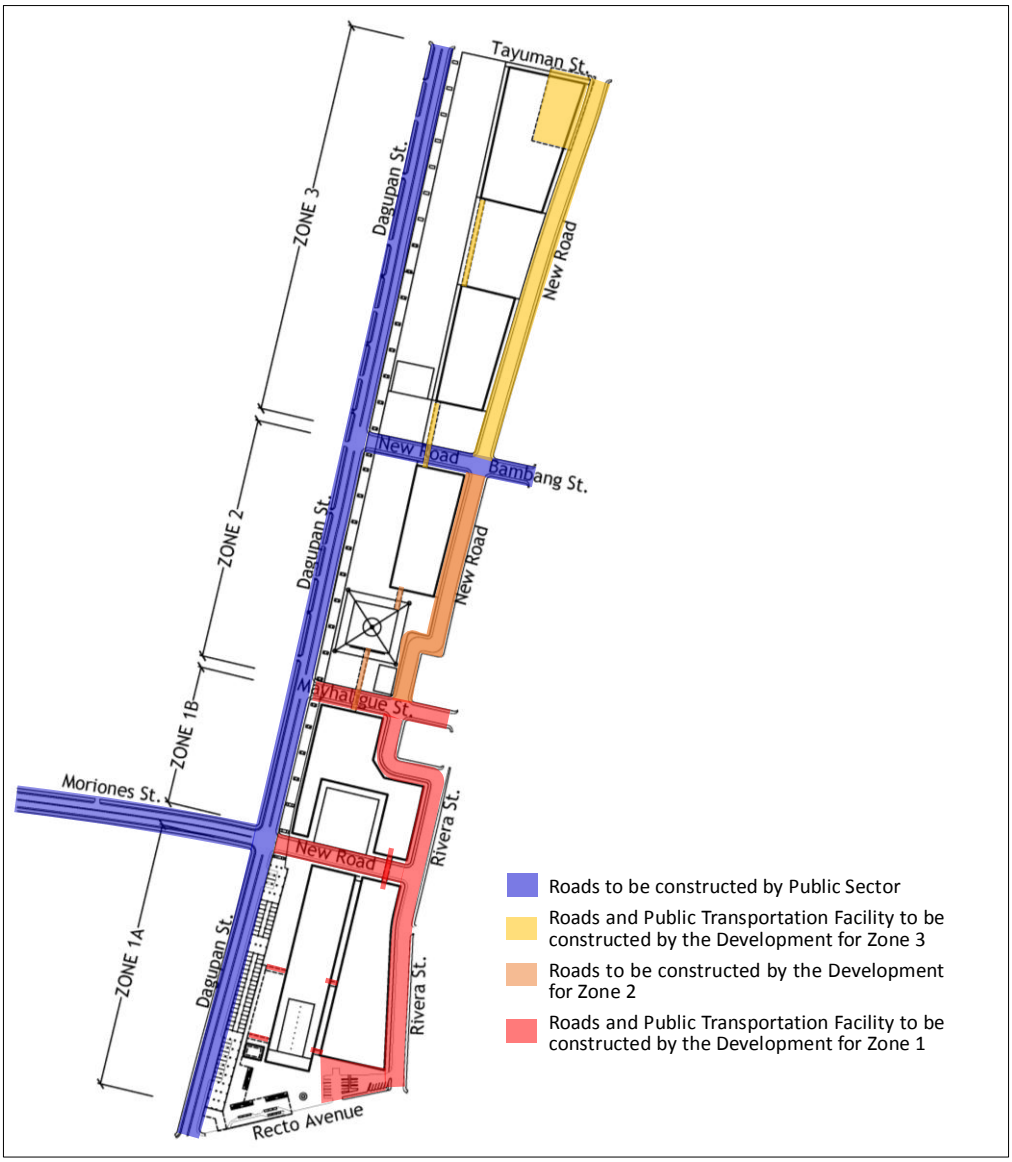
Figure 4.2.2 Proposed Land Use Plan

2) General Design Guidelines

4.67 While each zone has distinct characters and conditions that need to be considered, certain principles apply to all zones. Therefore, the design guidelines that were prepared to implement the concept design include both general ones applicable to all zones and specific ones applicable to each zone. These are discussed below.

(1) Public Facilities and Infrastructures

4.68 Among the public transportation facilities in the project area, several facilities are planned to be implemented by the private sector as part of the development for each zone (see Figure 4.2.3). Other infrastructures such as electricity, sewer and water facilities are planned to be constructed by the private developer for each zone. Since the development of infrastructures need to be coordinated throughout Zones 1-3, it needs to be managed by a Project Steering Committee proposed in ***Chapter 5***.

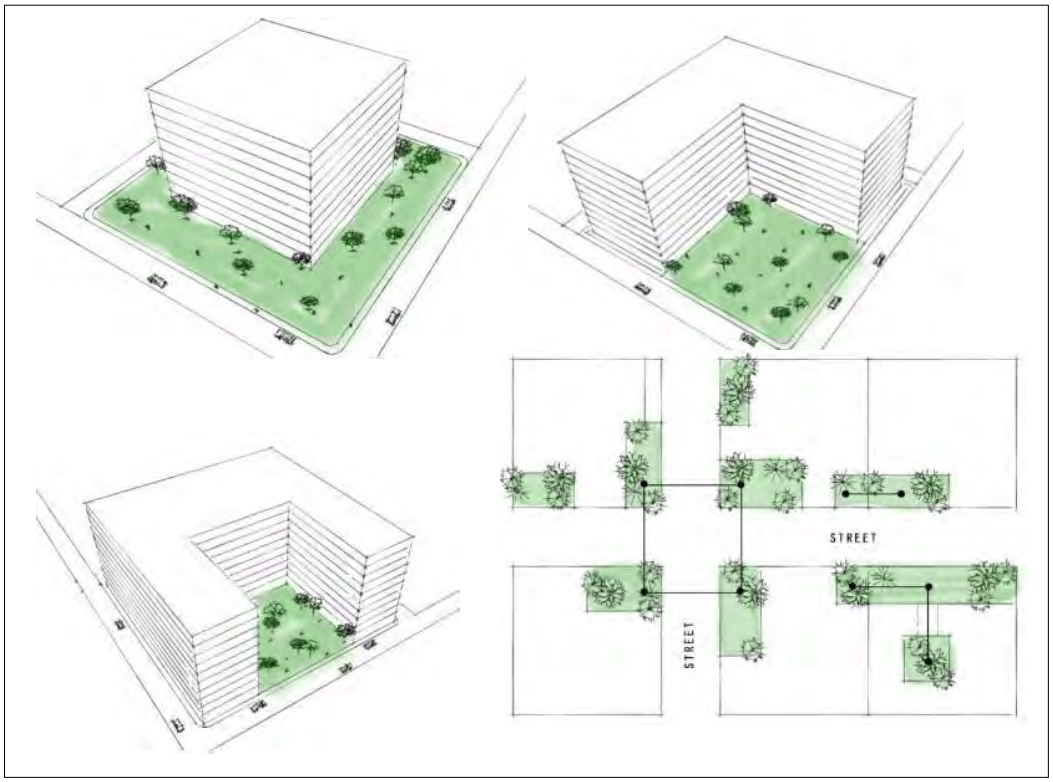


Source: JICA Study Team.

Figure 4.2.3 Public Transportation Facilities to be Constructed by Private Sector

(2) Open Space

4.69 Open spaces around the stations need to be planned in sufficient scale and a minimum of 0.3 hectare of consolidated open space is required for all zones, as previously described. In addition, a minimum of 1.4 hectare of open space is required for Zone 2 and 1.0 hectare for Zone 3 in total. All open spaces need to have a direct access to the roads in terms of pedestrians' convenience as well as disaster management. Planting of greenery is encouraged for all open spaces, including the installation of bio-retention facilities to intercept storm water runoff to prevent road flooding. As Figure 4.2.4 shows, open spaces need to be linked to promote social interaction, provide visual relief, and enhance environmental integrity. These open spaces need to be developed by the private sector as an integral part of the development of adjacent commercial or mixed-use facilities.



Source: JICA Study Team.

Figure 4.2.4 Examples of Configuration of Open Spaces

(3) Pedestrian and Vehicular Circulation

4.70 Since vehicular access is limited to the roads surrounding each zone, all zones should allow pedestrians to move freely without any intrusion of vehicles. To secure a safe and convenient access for pedestrians, pedestrian decks connecting the facilities in the different zones are proposed (see Figure 4.2.3). They need to be integrated into the development in each zone by the private sector. Due to its vulnerability to flooding, the finished floor elevation for the ground floor of the building including the NSCR station will be around 1.0 m higher than at-grade elevation. Therefore, universal access, such as installation of slopes with an appropriate gradient (1/8 maximum for inside, 1/20 maximum for outside), needs to be considered and provided.

(4) Parking

4.71 Parking lots are recommended to be located underground to maximize the limited

space on or above ground as well as to ensure the vibrant atmosphere on the ground level. Underground parking should not exceed a maximum of three basement floors, and needs to be equipped with appropriate mechanical equipment in case of emergency such as flooding and fire. The minimum parking requirements should comply with Rule VII of the National Building Code. Details of the parking requirements are described in the Design Guidelines in ***Appendix 4.1***.

3) Concept Design of Zone 1

4.72 As Figure 4.2.2 shows, Zone 1 is divided into two zones: Zone 1-A and Zone 1-B. While Zone 1-A is expected to be a prime area for the entire redevelopment in the project area as a gateway of Divisoria with two major terminal stations, Zone 1-B inherits the current character of vibrant commercial activities.

4.73 As previously introduced in ***Chapter 4.1***, the current location of Tutuban Center Mall 1 has a historic marker by the NHCP attesting to its preservation of the original façade (see Figure 4.1.3 in the previous section) as well as columns, beams and roof trusses (see Figure 4.2.5). It follows that the preservation of these structures needs to be included in the concept design as well. In this study, two alternatives were studied for Zone 1-A to analyze the optimal way to preserve these structures and integrate into the development concept of “Old and New Heart of Manila”.”

Source: JICA Study Team.

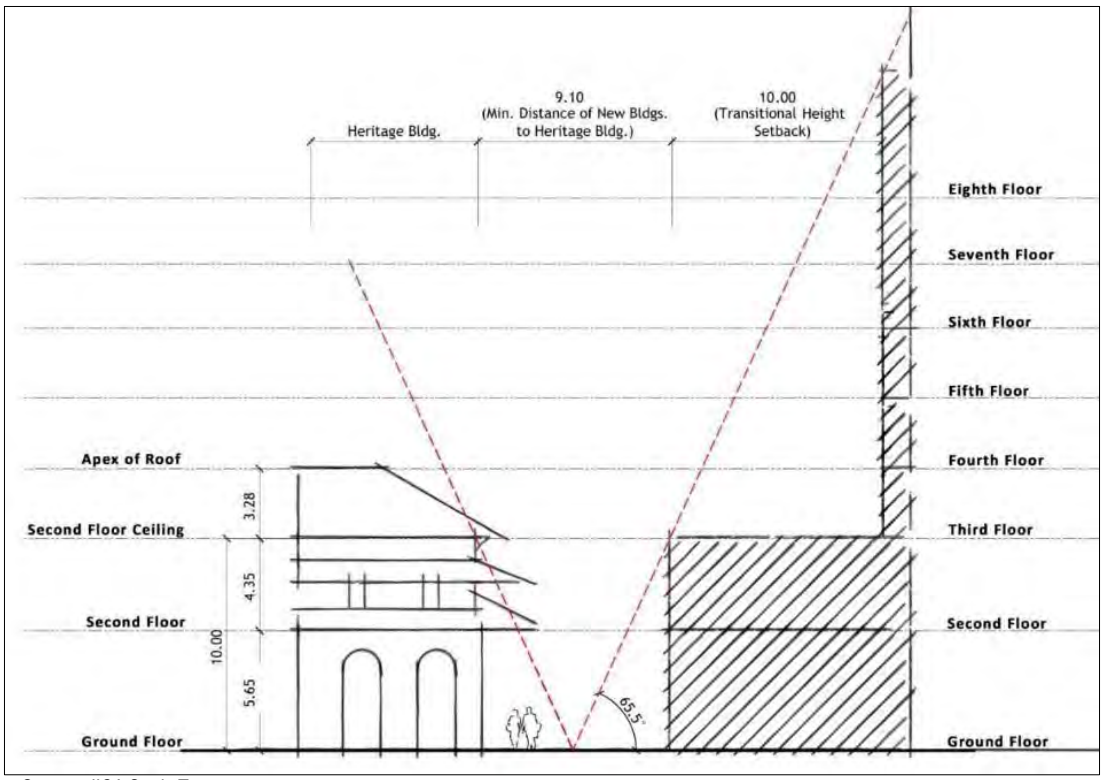
Figure 4.2.5 Original Cast-Iron Columns, Roof Trusses, Beam and Historical Marker

4.74 Alternative 1 represents a conventional conservation approach which preserves the existing height and 28 bays of original steel columns and trusses. The area is categorized as a high-intensity commercial/mixed-use zone (C-3/MXD) according to the 2006 Zoning Ordinance of Manila. Due to the low FAR of the heritage building (current Tutuban Center Mall 1), two mixed-use buildings (commercial/office buildings) are proposed on both sides of the heritage building (see Figure 4.2.6). Since the space between the NSCR Tutuban Station and the heritage building is limited, only a 5 m distance can be secured to locate a building with a minimum width of 15 m. As Figure 4.2.7 indicates, a minimum distance of 9.1m is recommended to maximize the benefits of

natural lighting and ventilation according to the National Building Code, considering a 65.5 degree Philippine solar angle and line of angular plane to establish incremental setbacks and the outermost façade of the building. While city authorities usually approve the minimum of 8 m distance between the buildings in a practical manner, this option can secure 8 m only in the east side of the heritage building.

Source: JICA Study Team.

Figure 4.2.6 Concept Design for Zone 1-A (Alternative 1)

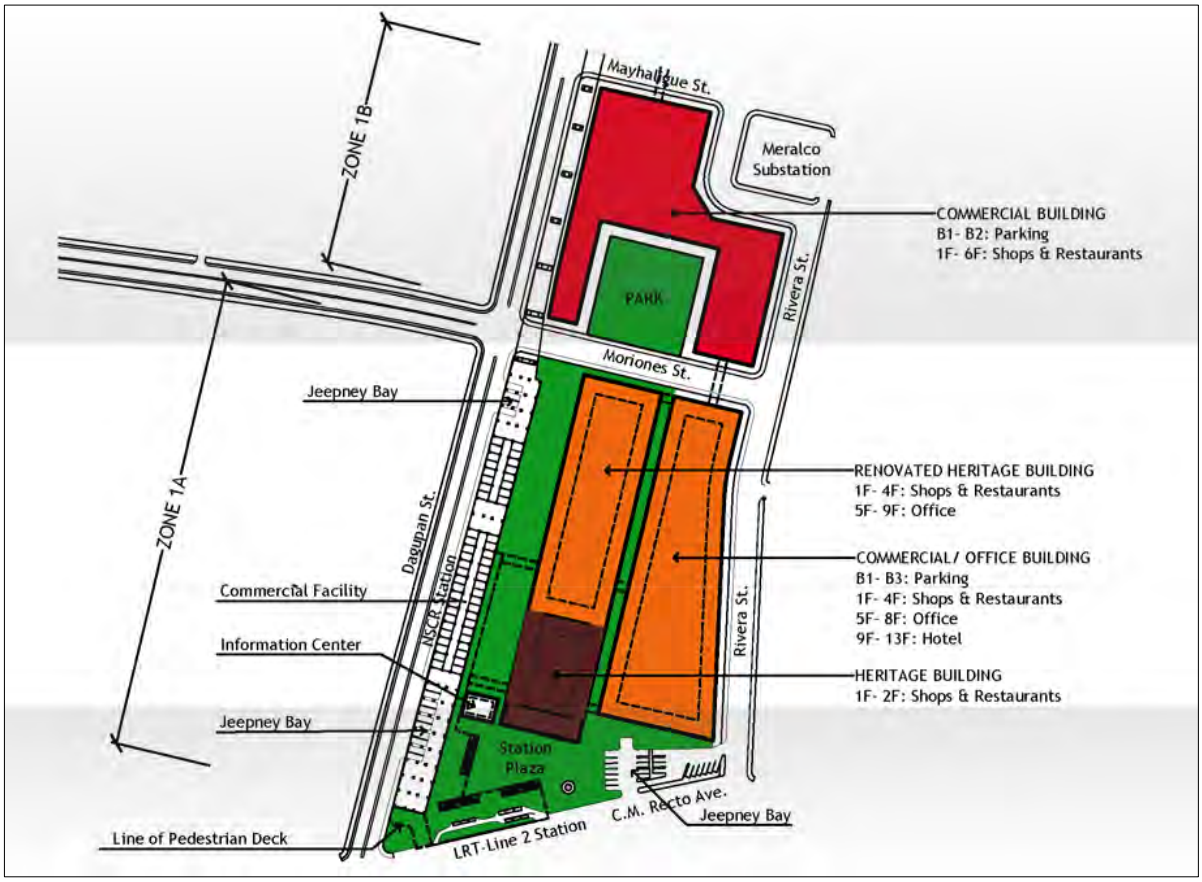


Source: JICA Study Team.

Figure 4.2.7 Approach to Secure Recommended Distance Between the Buildings

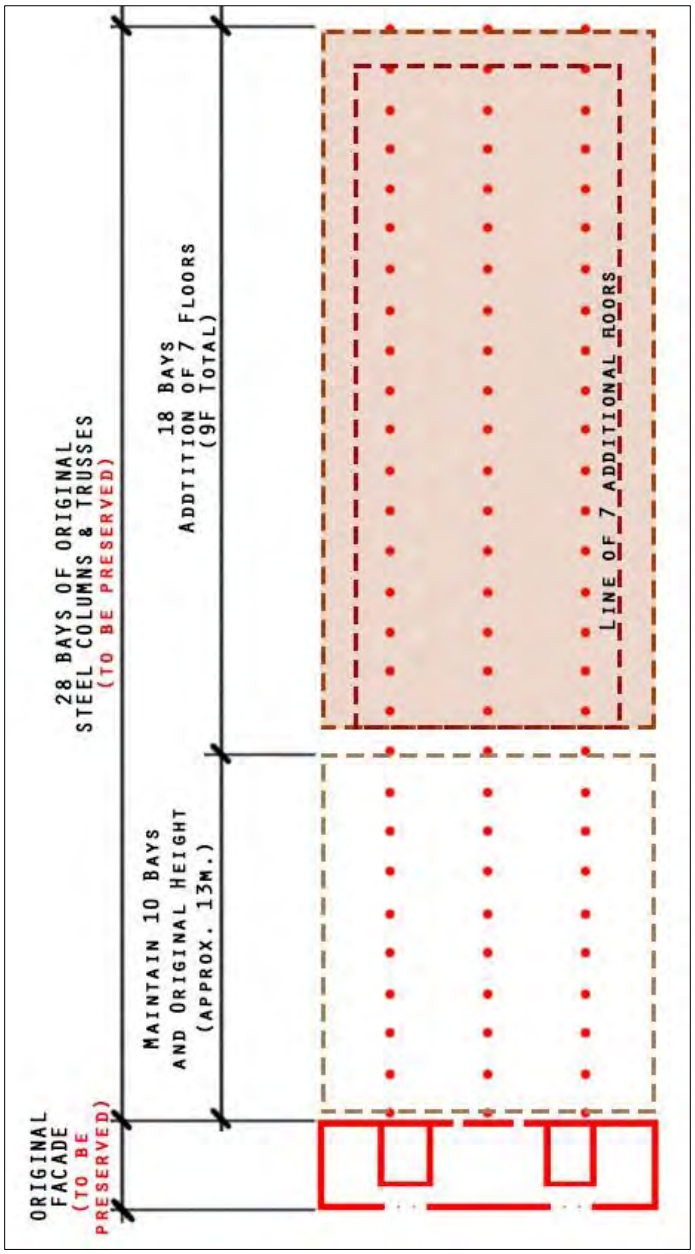
4.75 Alternative 2 (see Figure 4.2.8) introduces a strategic adaptive re-use approach that will still retain the basic elements of the heritage building (original front facade, height and 28 bays of steel columns and trusses) but will allow the use of the air space of the heritage building. A maximum of seven floors can be added to the original height of the heritage building, to a total of nine floors, with a 10 m setback from the façade of the lower sections (first and second floors). These additional floors can only be built after the 10th bay of the original steel columns by securing a sufficient setback of approximately 60 m (see Figure 4.2.9). This alternative was developed based on the analysis by local specialists on historic architecture preservation.

4.76 Alternative 2 is the preferred option because the practical minimum requirement of 8 m distance will be secured for the heritage building and it will allow not only natural light and ventilation but also emphasize the significance of the building. In terms of intensity of land use, this option is superior and close to the requirements of the zoning code of the City of Manila (C-3/MXD).



Source: JICA Study Team.

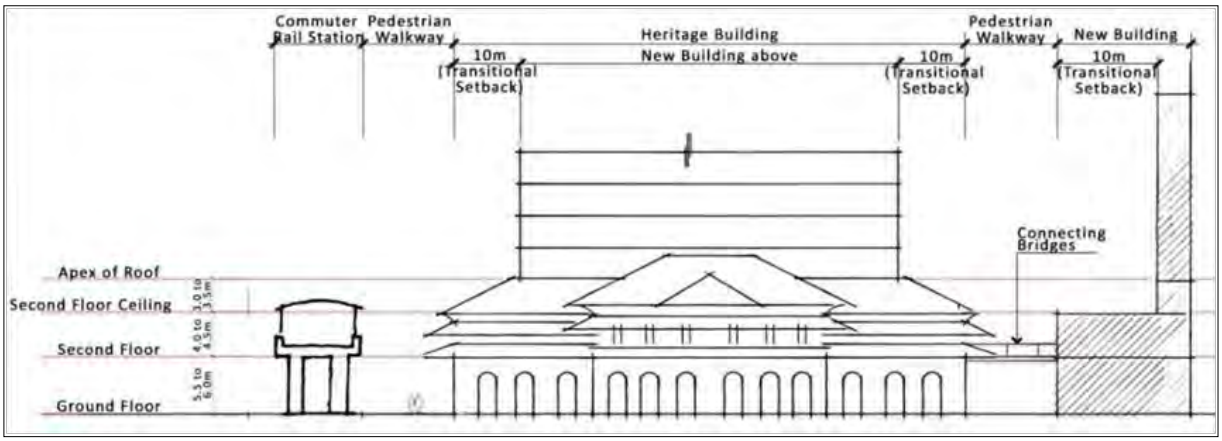
Figure 4.2.8 Concept Design of Zones 1-A and 1-B under Alternative 2 (Preferred Option)



Source: JICA Study Team.

Figure 4.2.9 Proposed Approach for Preservation of the Heritage Building

4.77 In order to highlight the excellence of the original structures including the front facade, height, color, materials and fixtures of the heritage building, the adjacent mixed-use building needs to harmonize with the historic context of the former (see Figures 4.2.10 to 4.2.12). Modern materials can be used for the upper floors with a 10 m setback based on the consideration for the integration of historic and modern context. Details of these design guidelines are described in ***Appendix 4.1***.



Source: JICA Study Team.

Figure 4.2.10 Spatial Relationship in Zone 1-A

Source: http://malatumbaga.blogspot.com/;
http://2.bp.blogspot.com/-7nJmO8NWnTE/UvpVz0aalqI/AAAAAAAAJZA/bYbYryxTRLE/s1600/vig89.jpg

Figure 4.2.11 Image of Façade Design Representing Historical Context

Source: JICA Study Team.

Figure 4.2.12 Image of Harmonization of Historic Façade

4.78 Zone 1-A includes a station plaza for both the NSCR and LRT 2. Similar to the concept of securing a sufficient distance between the buildings, the station plaza needs to be kept open and free from visual and physical obstructions to allow for a full appreciation of the aesthetics of the façade of the original station (see Figure 4.2.13). Such openness enables to create pedestrian-friendly space as well as to emphasize the significance of the existing statue of Jose Rizal, which is also registered as a historical monument with the NHCP and is required to be preserved.

Source: JICA Study Team.

Figure 4.2.13 Image of Station Plaza of Tutuban Station

4.79 The space under the viaduct needs to be utilized and integrated to take advantage of the open space between the NSCR station and the heritage building. Commercial and public transportation facilities (jeepney bays) were proposed for the space in Zone 1-A. Two types of commercial facilities were proposed, namely: (1) Pre-fabricated structural shops and restaurants (typical size is 20-40 sq.m.), and (2) Non-structural semi-open stalls (typical size is 2-4 sq.m.). Since this area has been proposed as an alternative relocation site for the vendors to be affected by the LRT 2 West Extension project, provision of a variety of future locations for their business becomes important. In terms of operation and management of these facilities, case studies discussed in ***Chapter 2*** are good references for DOTC to establish an appropriate PPP scheme since it has significant potential to generate revenues to support a sustainable railway operation.

4.80 While the mixed-use facilities in Zone 1-A are expected to include high-end commercial facilities, offices and hotels, the facilities of Zone 1-B are planned to be solely commercial, inheriting the character of the existing Tutuban Mall as it is designed to be a relocation site for the current shops in the mall.

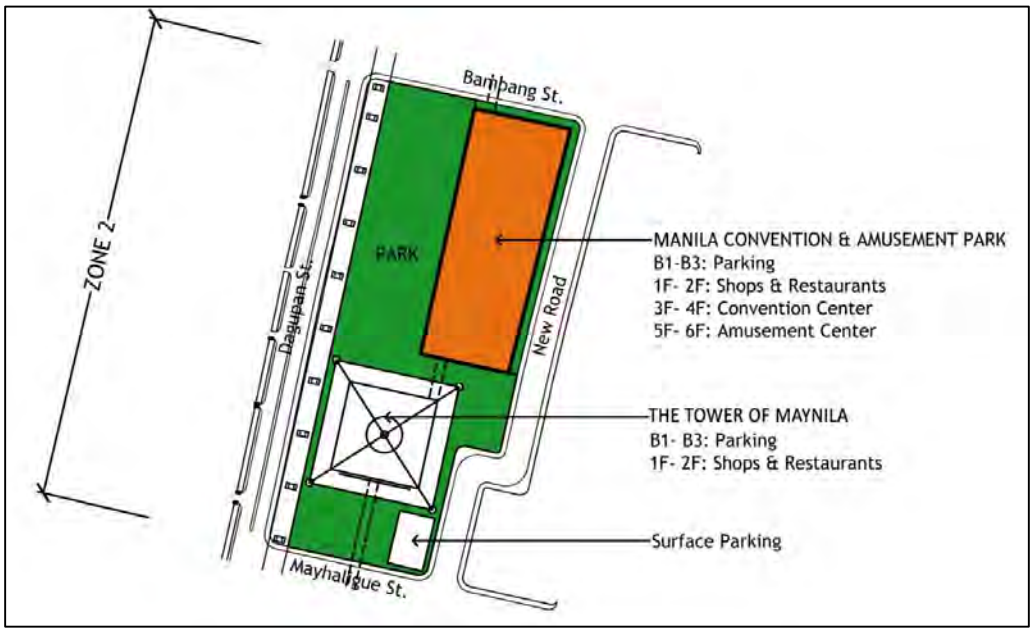
4.81 Since Zone 1 needs to be completed by the time the NSCR operation starts in order to fully enjoy the benefits of the railway development, phased planning has to be done in a strategic manner. Therefore, the commercial facility in Zone 1-B is planned to be constructed at the existing open space (current surface parking) to commence its construction at the earliest opportunity and secure sufficient time for the relocation. To implement the necessary relocation in a timely manner, coordination with TPI is necessary since TPI is the current lessee of the PNR Tutuban property and the developer of the current Tutuban Mall.

4.82 Since Zone 1-B includes part of the existing Center Mall 2, the area is proposed to have a park after demolition of Tutuban Mall in order to meet the requirement of the minimum open space for Zone 1. The space under the NSCR viaduct in Zone 1-B should be utilized as a commercial area to be integrated into the vibrant commercial activities in the proposed commercial building. This space is also an alternative relocation site for the street vendors affected by the LRT 2 project.

4) Concept Design of Zone 2

4.83 Zone 2 is planned to be a landmark area since the Tower of Maynila (Manila in Tagalog, former official name of Manila) with a height of about 300 m, is expected to attract visitors worldwide together with a convention center which is also planned to create

multiplier effects by the integration with commercial facilities in Zones 1 and 3 (hotels, offices, shops and restaurants) (see Figures 4.2.14 and 4.2.15).



Source: JICA Study Team.

Figure 4.2.14 Concept Design of Zone 2

4.84 As previously discussed, ample open space is proposed in this zone to provide an urban oasis as well as a seasonal event venue which can accommodate civic and cultural festivals.

4.85 As in the other zones, the space under the NSCR viaduct in this zone is planned to be utilized for both commercial and public transportation facilities (jeepney terminal). This space is also an alternative relocation site for the street vendors affected by the LRT 2 West Extension project.

Source: JICA Study Team.

Figure 4.2.15 Image of The Tower of Maynila

5) Concept Design of Zone 3

4.86 Zone 3 will offer a new urban lifestyle by providing two 26-storey (including a 3-level ground floor parking) mixed-use buildings that consist of residential, office and public facilities such as clinic, schools and city offices (see Figure 4.2.16). Both buildings will be facing the large parks as a total of 1.0 hectare of open space is required in this zone.

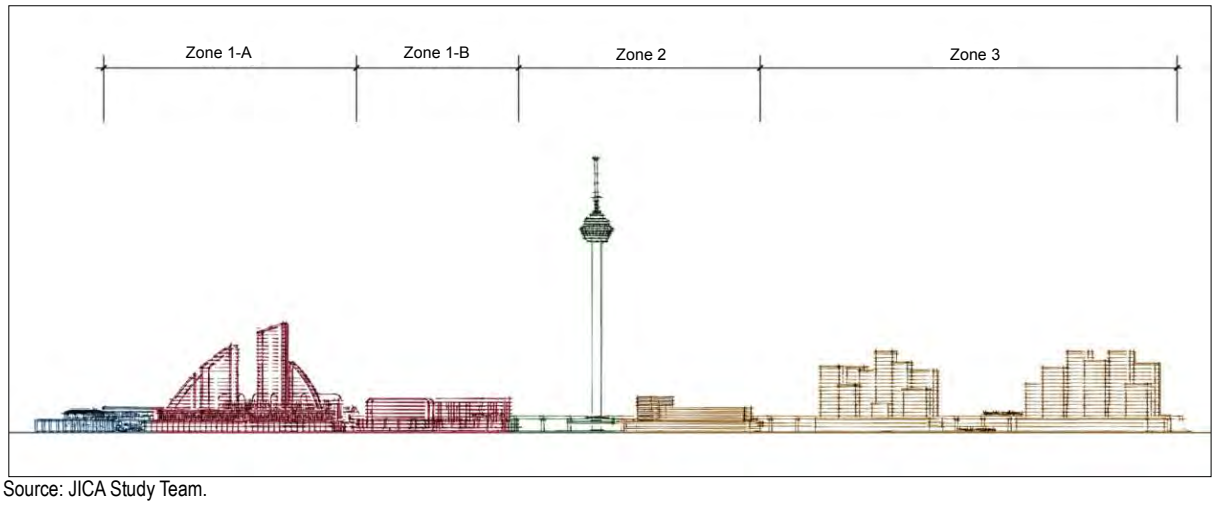
4.87 As previously described, the utilization of air rights of the PNR railway facility on the west side of Zone 3 will allow these buildings to be built to their planned heights by maintaining a FAR still below 6 in accordance with the city zoning ordinance. Such strategy for the intensification of land use also creates a desirable urban skyline with ample open space at the foot of the high-rise buildings (see Figures 4.2.17 and 4.2.18).

4.88 A public transportation facility is proposed at the ground floor of the mixed-use building facing Tayuman St. due to its major role as the arterial road for the public transportation network including jeepney routes. This facility is planned to include drop-off area, jeepney bays and parking.

Source: JICA Study Team.

Figure 4.2.16 Concept Design of Zone 3

4.89 Similar to the other zones, the space under the NSCR viaduct in this zone will be utilized for both commercial and public facilities such as barangay hall, barangay office, and daycare center. At present, these public facilities are located at the east side of Dagupan St. but they will be demolished during the widening of Dagupan St. as part of immediate-term project by DOTC. As these existing facilities are currently encroaching on the PNR Tutuban property and on the right of way (ROW) of Dagupan St., it is recommended, for social considerations, to secure the space for these facilities at a similar location after the redevelopment project.



Source: JICA Study Team.

Figure 4.2.17 Image of Skyline of Tutuban Redevelopment

Source: JICA Study Team.

Figure 4.2.18 Image of Aerial View of Tutuban Redevelopment

5 PROJECT IMPLEMENTATION PLANNING FOR TUTUBAN REDEVELOPMENT AREA

5.1 Identification of Key Stakeholders and Their Roles

1) Philippine National Railways (PNR)

5.1 PNR began its operations in 1892 as Ferrocaril de Manila-Dagupan. This corporation was officially renamed PNR on June 20, 1964 by virtue of Republic Act (RA) No. 4156. PNR operates commuter services between Metro Manila, Laguna, Quezon and Bicol. The Metro Commuter serves mainly the Manila metropolitan area, extending up to Biñan, Laguna. It used to operate long-distance trains to Naga City, Camarines Sur but in October 2012 the train was derailed in Quezon Province. The provincial service has not resumed yet as the damaged sections of the line has not yet been repaired. PNR is an attached agency of DOTC. It also owns several landholdings along the PNR alignment including Tutuban and Caloocan and currently leases to TPI some of its properties in the Tutuban area.

5.2 In this Study, PNR is one of the counterpart agencies as well as the lessor of the property for Tutuban and Caloocan.

2) Department of Transportation and Communications (DOTC)

5.3 DOTC is the primary policy, planning, programming, coordinating, implementing and administrative entity of the executive branch of the government for the promotion, development and regulation of a dependable and coordinated network of transportation and communications systems, as well as fast, efficient and reliable transportation and communications services. Its three major functions are in policy formulation, regulatory and enforcement, and infrastructure development.

5.4 There are several railway agencies under DOTC. These are PNR, Light Rail Transit Authority (LRTA), and DOTC's project management arm for MRT3.

5.5 DOTC will be the implementing agency, or can opt to delegate this role to PNR, for the relevant projects on TOD. It will remain as a regulatory agency in the implementation of transport-related projects within the area of influence of the stations.

3) Department of Public Works and Highways (DPWH)

5.6 DPWH is mandated to undertake planning, design, construction and maintenance of infrastructure such as national roads and bridges, and flood control systems.

5.7 In this Study, since access improvement projects are proposed for several national roads including the Dagupan St. widening in the Tutuban station area, coordination with DPWH will be necessary throughout the planning, design and construction phase.

4) Department of Finance (DOF)

5.8 DOF is responsible for the management and operation of financial resources including formulation, institutionalization and administration of fiscal policies as well as review, approval and management of all public sector debt, both domestic and foreign.

5.9 DOF has also been playing a major role in the government's PPP program and is a project implementer for some PPP projects such as the Manila Heritage Urban Renewal

Project. Therefore, DOF is expected to be part of the Tutuban Redevelopment Project as it is proposed to be implemented by PPP in this Study.

5) Metro Manila Development Authority (MMDA)

5.10 The role of MMDA is to assist the 17 political units in Metro Manila in the implementation of integrated development. The services of MMDA include (a) transport and traffic management, (b) solid waste disposal and management, (c) flood control and sewage management, (d) urban renewal, zoning and land use planning, and shelter services, and (e) health and sanitation, urban protection and pollution control.

5.11 Since traffic management is equally important as the physical improvements in the TOD projects and some improvements on traffic management are proposed by the Study, coordination with MMDA will be needed towards the detailed planning and implementation phase of the projects.

6) City of Manila

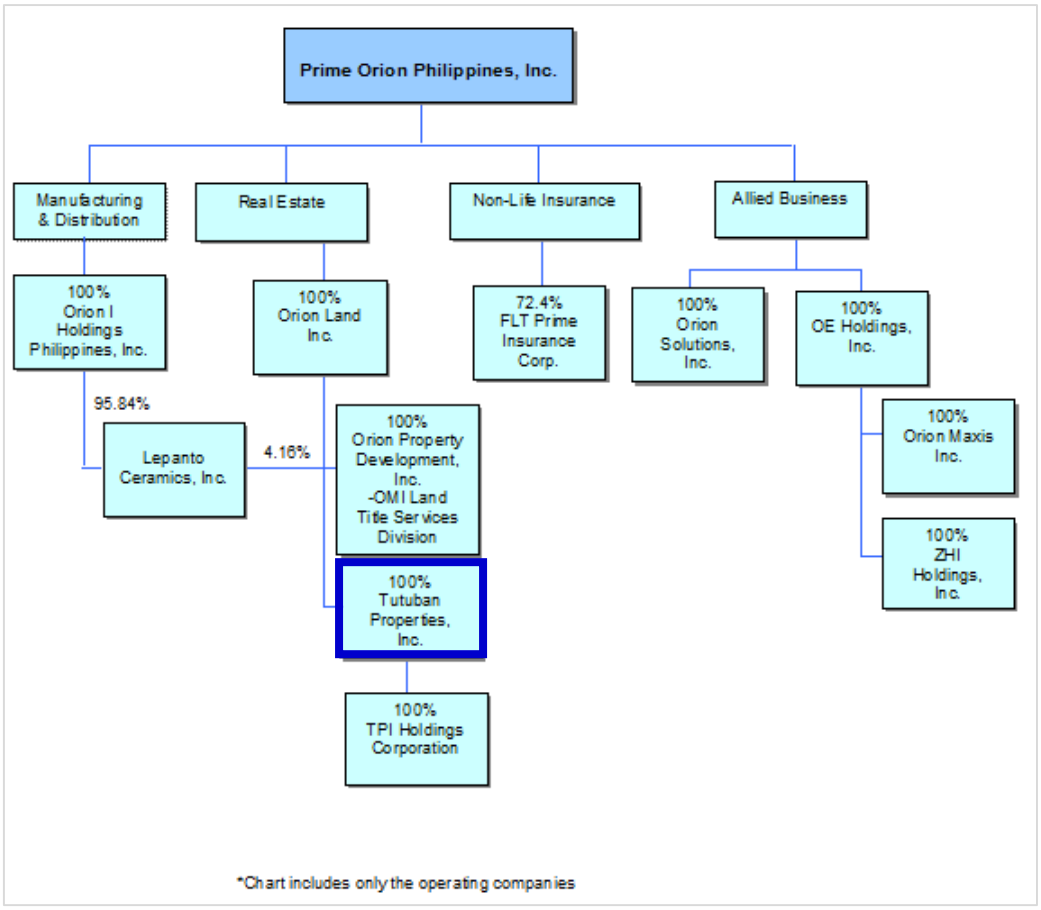
5.12 The City Government of Manila is the LGU that serves as the administrative body governing the city. The current mayor of the city is former President Joseph Ejercito Estrada. The City of Manila is handling the traffic management and enforcement in the Tutuban area.

5.13 As discussed in ***Chapter 4,*** the City of Manila also currently issues the business permits for the street vendors along C.M. Recto Avenue. Retrieval of the transportation function of C.M. Recto Avenue is critical in mitigating the traffic congestion in the area. Thus, coordination with the City is essential in the implementation of TOD.

5.14 The other important role of the City in the implementation of TOD is to update its CLUP to reflect the TOD-related projects. The CLUP's approval by HLURB and the issuance of zoning ordinances is the responsibility of this LGU. Issuance of various permits and licenses, such as building permits, is also under this LGU. Local road projects, sidewalk improvement projects, and other various transport infrastructure-related projects inside the identified TOD area can also be implemented by the City Government. Although certain intensification of land use can be implemented in accordance with the current city ordinance, further intensification can be explored as long as it provides more benefits to the local community and to the city. Several precedent projects approved by the City Government, such as high-rise condominiums, are identified in Binondo adjacent to the Tutuban area. Therefore, the involvement of the City in the Project Steering Committee is important in securing approval for the appropriate land use in a flexible and practical manner.

7) Prime Orion Philippines, Inc./Tutuban Properties, Inc. (TPI)

5.15 Prime Orion is an investment holding company which was incorporated in 1989. It has interests in various industries including non-life insurance, real estate/property management, manufacturing, distribution, land titling, and Information Technology (IT) consultancy services. It has several subsidiaries, including TPI which is the company that has managed for more than a decade the Tutuban Mall in Divisoria (see Figure 5.1.1). Tutuban Mall was developed by TPI, which has been the lessee of the Tutuban PNR property since 1990.



Source: Prime Orion Website.

Figure 5.1.1 Organizational Chart of Prime Orion Philippines, Inc.

8) Local Business Associations

5.16 In addition to the major stakeholders at the national, regional and LGU levels, some local business associations are also identified as stakeholders since their activities are closely related to the components of the Tutuban area redevelopment. These include the following:

(a) **United Sidewalk Vendors of Divisoria Association, Inc. (USVDAI):** This organization represents the sidewalk vendors located in the Divisoria area. USVDAI presently has some 1,500 members. They are the owners of the stalls located in the streets of C.M. Recto to Asuncion to Dagupan, Ylaya, Azcarraga, Sta. Elena and Juan Luna. According to Task Force Divisoria of the City Government of Manila, there are, on the average, some 5,000 to 6,000 vendors in Divisoria but these figures double during the months of September to December (which is the Christmas season in the Philippines). The USVDAI will have to be consulted during the detailed design stage for clearing of the streets and the dismantling of the stalls of vendors in the Tutuban area.

(b) **Prime Block Traders Association of Tutuban, Inc. and Cluster Building Tenant Association:** These are two voluntary associations representing the tenants of two retail blocks of Tutuban Mall. These associations need to be consulted especially for implementation of the relocation to confirm their expected terms and conditions for the proposed Tutuban Redevelopment Project.

(c) **Federation of Filipino Chinese Chambers of Commerce and Industry (FFCCCI):** FFCCCI is the country's prime organization for Filipino-Chinese businessmen. It is a non-stock, non-profit organization that brings together under one roof the chambers of commerce and business and trade associations from different parts of the country. Filipino-Chinese businessmen are very active in the retail industry in the Tondo area where the main terminal of the PNR is located. The Tutuban district is also near Binondo, which is commonly referred to as Manila's Chinatown. Since FFCCCI is renowned for its long history in business, it is desirable to get their inputs in the detailed planning phase to make the Tutuban Redevelopment Project more practical and tailored for local business situations.

(d) **Manila Chamber of Commerce and Industry (MCCI):** This is a voluntary organization comprised of business owners in the City of Manila. Local chambers of commerce advocate on behalf of the community for ordinances, plans and development programs that will be beneficial for the business sector. It is desirable to get inputs from MCCI in the detailed planning phase to clarify the expectations of the local business owners from the Tutuban area redevelopment.

(e) **Rotary Club of Tondo:** This is a service organization whose stated purpose is to bring together business and professional leaders in the local community to provide humanitarian services and encourage high ethical standards in all vocations. It is also desirable to get inputs from this Rotary Club regarding the approach to upgrade some businesses by the redevelopment project in its detailed planning phase.

(f) **Bagsakan Traders Association and Philippines Retailers Association (PRA):** These are two industry associations representing the retail sector (retailers, wholesalers, distributors, suppliers and manufacturers). PRA, for instance, has been in the forefront of major issues and concerns that impact the retail sector. Divisoria is a well-known retail shopping hub where customers can enjoy big bargains and discounts for a wide variety of goods and services. Since TOD is a fairly new concept in the Philippines, it is desirable to explore the possibility to integrate the existing businesses based on local characteristics with new businesses introduced in the Tutuban Redevelopment Project by sharing the concept of TOD in the detailed planning phase.

(g) **Escolta Commercial Association, Inc., Escolta Redevelopment Association, and Escolta Heritage Association:** These three associations were authorized by MMDA to take the lead in the revival and redevelopment of Escolta, the country's first historic business capital. Since their bottom-up approach to improve the local community by private initiatives should be adopted in the management strategy for the Tutuban area redevelopment, it is desirable to obtain their inputs during the detailed planning phase.

5.2 Proposed Project Implementation Schedule

5.17 As described in ***Chapter 4***, the projects listed in Table 5.2.1 have been identified to implement TOD in the Tutuban PNR property. Access improvement projects, such as the Moriones St. widening, include the areas surrounding the property.

5.18 These projects are categorized into five major public projects as well as development projects for each zone by the private sector (see Table 5.2.2).

Table 5.2.1 Projects in the Tutuban Station Area by Zone

Zone	Category	Project Name	Year of Completion
Zones 1-3	Pb2	Dagupan St. Widening	2016
	Pb4	Commercial Facility under Viaduct	2020
Zones 1-2	Pb4	Jeepney Bay under Viaduct	2020
Zone 1	Pb1	Station Plaza Phase 1	2016
	Pb2/3	Pedestrian Deck of NSCR and LRT2 Tutuban Station	2018–2020
Zone 1-A	Pv1-1	Renovated Heritage Building; 9F (above GF) + 3F (underground)	2020
		Commercial/Office Building 1-A; 13F (above GF) + 3F (underground) - Jeepney Bay (Station Plaza Extension)	2020
		Access Road for Zone 1 (New road construction and Rivera St. Widening)	2020
		Pedestrian Deck	2020
Zone 1-B	Pv1-2	Commercial Building 1-B; 6F (above GF) + 2F (underground)	2018
		Park	2020
Zone 2	Pv2	The Tower of Maynila (300 m)/Building (2F; above GF, 3F; underground)	2025
		Manila Convention and Amusement Center (6F:above GF, 3F; underground)	2025
		Park	2025
		Surface Parking	2025
		Pedestrian Deck	2020
		Access Road for Zone 2 (New road construction)	2025
Zone 3	Pb2	PNR New Railway Facilities (including new access road)	2018
	Pb4	Public Facility under Viaduct	2020–2030
	Pv3	Mixed Use Building 3-1 (23F; above GF, 3F; underground)	2030
		Mixed Use Building 3-2 (23F; above GF, 3F; underground) - Public Transportation Facility (1F)	2030
		Park	2030
		Pedestrian Deck	2030
		Access Road for Zone 3 (New road construction)	2030
Other	Pb5	Moriones St. Widening	2025

Source: JICA Study Team.

5.19 Immediate-term project (Pb1) aims to establish a solid backbone for the future redevelopment by the Dagupan St. widening and secure the current vacant space (former Cluster Mall 1) as the station plaza to mitigate traffic congestion during construction of the NSCR and LRT2. The existing PNR station including the PNR headquarters need to be relocated at the earliest opportunity (Pb2) since it will be affected by the construction of the NSCR viaduct and needs to be relocated by the time construction starts. Early implementation of the relocation makes the land in Zone 2 ready for the redevelopment and construction of The Tower of Maynila can commence accordingly.

5.20 In terms of the projects by the private sector, Zone 1-B needs to be developed (Pv1-2) prior to the construction of Zone 1-A (Pv1-2) since the existing shops in the Tutuban Mall will be relocated to the new commercial facility in Zone 1-B. To maximize the benefits from the NSCR project, development in Zone 1 needs to be completed by the

time the NSCR starts its operation in 2020. While development in Zones 2 and 3 can start as the late short-term or mid-term projects (see Table 5.2.2), all other projects are expected to be completed by 2020.

Table 5.2.2 Implementation Schedule

No		Name	Short-term					Mid-term		
			2015	2016	2017	2018	2019	2020	2025	2030
Public	Pb1	Immediate-term Projects[1)]								
	Pb2	PNR New Station Project[2)]								
	Pb3	LRT2 West Extension[3)]								
	Pb4	NSCR Project[4)]								
	Pb5	Moriones St. Widening[5)]								
Private	Pv1-1	Zone 1-A								
	Pv1-2	Zone 1-B								
	Pv2	Zone 2								
	Pv3	Zone 3								

Source: JICA Study Team.
Notes:
1) Dagupan St. widening, Station Plaza including Information Center
2) New station and station plaza, New access road, Bambang St. widening (optional)
3) Station and viaduct, pedestrian deck
4) Station and viaduct, pedestrian deck, facilities under viaduct
5) Moriones St. widening including bridge restoration

5.3 Proposed Project Implementation Plan and Scheme

5.21 As previously described, the concept design of the Tutuban Redevelopment Project includes public projects to be implemented by DOTC, DPWH and the City of Manila as well as the projects to be developed by private entities. However, as shown in Table 5.2.1, each zone has certain public facilities that need to be developed and maintained in coordination with the relevant public agencies. As the inclusion of social and environmental aspects is the key to successful TOD, certain involvement and management by the public sector will be required under the current legal framework.

5.22 The basic legal framework for PPP is provided by RA 6957, as amended by RA 7718, or the BOT Law and its revised implementing rules and regulations (IRR). The BOT Law allows DOTC to enter into a contractual agreement with a project proponent for providing an infrastructure facility or service, in which the project proponent bears significant risk and/or management responsibility. For the project proponent to recover its investment and to realize a reasonable rate of return, it may be allowed to collect tolls, fees, rentals and/or charges; engage in commercial development; and receive subsidy, viability gap funding and direct government payments, among others. These may be in the form of concession fees or availability payments.

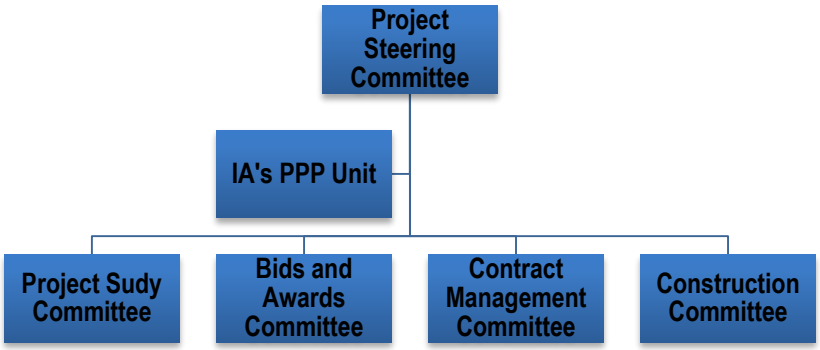
5.23 The BOT Law enumerates a list of eligible projects that may be undertaken through a PPP arrangement. Among these are the railways or rail-based projects that may or may not be packaged with commercial development opportunities. The key stages in the PPP project process are summarized in Table 5.3.1.

Table 5.3.1 Stages of the PPP Project Process

Stage 1	Stage 2	Stage 3	Stage 4
Identification, Selection and Prioritization	Preparation, Evaluation and Approval	Tendering and Negotiation	Implementation, Operations and Handover
• Multi-Criteria Analysis Screening • Pre-Feasibility Study	• Feasibility Study • Independent Evaluation • NEDA ICC/NEDA Board Approval	• Request for Bids, Bidder Pre-qualification, Bid Evaluation • Contract Negotiation and Award • Signing of Contract	• Conditions Precedent • Construction • Contract Administration • Monitoring and Evaluation

Source: National Government Agency Public-Private Partnership Manual, Volume 1, PPP Center.

5.24 The TOD project is currently in the project identification stage. Once Stage 1 is completed, the next step will be for DOTC to set up the project team and governance structure, and to commission the services of a team of transaction advisers. The typical governance structure for a PPP project is shown in Figure 5.3.1.



Source: National Government Agency Public-Private Partnership Manual, Volume 1, PPP Center.

Figure 5.3.1 Typical PPP Project Governance Structure

5.25 The Project Steering Committee will be headed by the DOTC Secretary or his nominee. The PPP Center will also play a major role in the project implementation process by providing technical assistance in the areas of project packaging and feasibility studies, among others. Oversight agencies such as NEDA, DOF and PNR will also be members of the Project Steering Committee. The Study Team is proposing that other major stakeholders such as DPWH, MMDA, City of Manila, and TPI/Prime Orion be appointed as members of the Project Steering Committee.

5.26 The Project Study Committee is composed of the implementing agency's PPP Unit and the PPP Center. Considering the major role that the City of Manila will play in the implementation of the Tutuban Redevelopment Project, it is recommended that its representatives be designated also as members of the Project Study Committee. The City Government has a huge stake in the success or failure of the redevelopment project. The Project Study Committee may be the proper venue for the City Government to express opinions, suggestions and recommendations on the proposed project. Due to the involvement of the City Government, the Project Study Committee is able to discuss and authorize the appropriate land use including its land use intensity (PLO and FAR). As described in ***Chapter 4***, the Study proposes a certain flexibility in FAR as long as the proposed land use follows the required PLO and secures public benefits including sufficient open space. In order to approve such flexibility, the appropriate guidelines and certification authority will be needed. Since the design guidelines prepared by the Study covers solely fundamental design principles, it needs to be elaborated in the detailed design phase to include such criteria to authorize the specific design elements. Therefore, it is desirable to establish under the Project Study Committee a Design Guidelines Committee which will finalize the design guidelines and authorize the proposed design by private developers of each zone. As a project implementer, DOTC needs to commission the necessary consulting services to support the Project Study Committee including the Design Guidelines Committee at the earliest opportunity to finalize the Tutuban area redevelopment plan.

5.27 In November 2013, the City Government formed Task Force Divisoria to stamp out rampant extortion activities in the area and with the hope of transforming Divisoria into a shopping district similar to MongKok in Hong Kong.[1] The City Government will also play a crucial role in clearing the streets of illegal vendors and in relocating legal street vendors that may displaced with the widening of the existing roads and the construction of new roads. Once the project is completed, the benefits that City of Manila will realize include, among others, an increase in real property tax and local business tax, redevelopment of underutilized land, and economic revitalization of the area.

5.28 DOTC will likewise engage the services of a team of advisers to assist the project management team in different phases of the preparation process until the financial close of the project is reached. Since the Tutuban area redevelopment encompasses a variety of stakeholders as well as planning and design elements, the scope of work for the advisory team needs to be considered in a careful manner. The required tasks of the advisory team include, among others, the following:[2]

(i) Prepare the feasibility study and transaction documents and provide assistance in bid evaluation and award of the project;

[1] "Erap turning Divisoria into int'l shopping hub," Manila Bulletin. January 12, 2014.
[2] National Government Agency Public-Private Partnership Manual, Volume 1, PPP Center.

(ii) Provide advice on the technical aspects of the feasibility study, design guidelines, draft the design as well as appropriate minimum performance standards and specifications, and evaluate technical components of bids;

(iii) Assess requisite powers and legal feasibility of the project, develop legal aspects of a contract, undertake legal due diligence on bids, provide legal advice on processes throughout the procurement stage to safeguard the integrity of the procurement process;

(iv) Develop financial aspects of the project including project payment mechanisms, undertake financial due diligence of financial bids, evaluate and advise on the financial proposal throughout the procurement stage, and clarify financial and commercial issues;

(v) Identify project impact on environment/vulnerable groups, ensure gender equality, and recommend mitigating measures to minimize adverse impacts; and

(vi) Provide advice on the communications strategy of the project, stakeholder management and the consultation process.

5.29 Under the BOT Law, national projects costing more than PHP300 million will be submitted to the NEDA Board for approval upon the recommendation of the Investment Coordination Committee (ICC). The team of advisers is expected to assist the project management team in preparing the documents required by the ICC and securing approval by the NEDA Board of the project.

5.30 The scope of work of the team of advisers will also include the recommendation of the appropriate PPP modality for the proposed TOD project. The modes of implementation for PPP projects under the BOT Law are summarized in Table 5.3.2.

Table 5.3.2 PPP Arrangements under the BOT Law

PPP Modality	Role of Private Sector	Role of Government	Notes
Build-Operate-and-Transfer (BOT)	Finances and constructs; operates and maintains facility for a fixed term; collects fees and charges to recover investments plus profit; transfers facility at the end of cooperation period (maximum of 50 years).	Provides franchise (if required) and regulates activities of BOT contractor; acquires ownership of the facility at the end of cooperation period.	Includes a supply-and-cooperate scheme, a contractual arrangement whereby the supplier of equipment and machinery for a given infrastructure facility, if the interest of the government so requires, operates the facility.
Build-and-Transfer (BT)	Finances and constructs; turns over ownership of the facility to the government after project completion.	Acquires ownership of the facility after construction; compensates proponent at agreed amortization schedule.	May be employed in any project, including critical facilities which, for security or strategic reasons, must be operated by the government.
Build-Own-and Operate (BOO)	Finances, constructs and owns the facility; operates and maintains the facility in perpetuity (facility operator may be assigned); collects fees and charges to recover investment and profits.	Provides authorization and assistance in securing approval of BOO contract; possesses the option to buy the output/service provided by the BOO operator.	All BOO projects upon recommendation of the NEDA-Investment Coordination Committee (ICC) shall be approved by the President of the Philippines.
Build-Lease-and-Transfer	Finances and constructs; turns over the project after completion; transfers ownership of the facility after cooperation/ lease period.	Compensates proponent by way of lease of the facility at agreed terms and schedule; owns the facility after cooperation/lease period.	
Build-Transfer-Operate	Finances and constructs on a turnkey basis; transfer title of	Owns the facility after commissioning.	

PPP Modality	Role of Private Sector	Role of Government	Notes
	the facility after commissioning; operates the facility under an agreement.		
Contract-Add-and-Operate	Adds to an existing facility; operates the expanded project for an agreed franchise period.	Collects rental payment under agreed terms and schedule; regains control at the end of lease term.	There may or may not be a transfer arrangement with regard to the added facility provided by the project proponent.
Develop-Operate-and-Transfer	Builds and operates a new infrastructure; transfers the property/ facility at the end of the cooperation period.	Regains possession of property turned over to investor after cooperation period.	Project proponent enjoys some benefits the initial investment creates such as high property or rent values; akin to BOT with the option to develop adjoining property.
Rehabilitate-Operate-and-Transfer	Refurbishes, operates, and maintains the facility which is turned over after the franchise period.	Provides franchise to ROT company; regains legal title of the property/facility after franchise period.	Also used to describe the purchase of the facility from abroad, importing, refurbishing, erecting and consuming it within the host country.
Rehabilitate-Own-and-Operate	Refurbishes and owns the facility; operates the facility in perpetuity as long as there is no franchise violation.	Turns over the facility and provides franchise to operate; may opt to share in the income of ROO company.	Period to operate is dependent on franchise agreement.

Source: Table 1.2: RA 7718 PPP Variants from Developing Public-Private Partnerships in Local Infrastructure and Developing Projects, A PPP Manual for LGUs Volume 1, PPP Center.

5.31 Among various PPP projects being implemented by DOTC, the TOD project comes closest to the integrated transport system (ITS) in terms of structure and components. The ITS will connect passengers coming from the provinces to other transport systems such as the LRT/MRT, city bus, taxi and other public utility vehicles that are serving inner Metro Manila.[3] The project will also include passenger terminal buildings, arrival and departure bays, public information systems, ticketing and baggage handling facilities, and park-and-ride facilities. Moreover, the project proponent will be entitled to construct commercial assets or carry out commercial businesses on the project site and to collect and retain the revenues from these commercial business undertakings for so long as such construction and businesses do not interfere with the project.[4] The ITS will be implemented under a build-transfer-and-operate (BTO) scheme and will have a concession period of 35 years inclusive of the construction period.

5.32 The BTO scheme is a contractual arrangement whereby the public sector contracts out the building of an infrastructure facility to a private entity such that the contractor builds the facility on a turnkey basis, assuming cost overrun, delay and specified performance risks. Once the facility is commissioned satisfactorily, the title is transferred to the implementing agency. The private entity, however, operates the facility on behalf of the implementing agency under an agreement.[5] The main advantage of the BTO scheme is that by vesting the legal title of the facility to the implementing agency, it will ensure that the concessionaire will be prevented from creating any liens or securities over the physical project assets which may otherwise result in the loss of such assets to the concessionaire's lenders. The DOTC should consider this option in the implementation

[3] www.ppp.gov.ph.
[4] Project Implementation Memorandum: Southwest Integrated Transport System Project, DOTC, 10 January 2014.
[5] The description of the BTO scheme is based on Section 2 (f) of Republic Act No. 7718 or An Act Amending Certain Sections of Republic Act No. 6957 Entitled "An Act Authorizing The Financing, Construction, Operation and Maintenance of Infrastructure Projects By the Private Sector, And For Other Purposes."

of the Tutuban area redevelopment to secure the public benefits during the operation and maintenance phase. Early consideration of the PPP modality allows DOTC to establish the Project Steering Committee in an appropriate timing and manner as well as to clarify the necessary consulting services to be commissioned.

5.33 Once the project reaches the operations phase, the Contract Management Committee will need to closely monitor and report on ongoing operations to ensure that management challenges are recognized early on and managed effectively. The committee may undertake periodic inspections to examine any defects or damages, or signs thereof, to be reflected in the maintenance plan, and regularly check asset conditions, and any improvements that can be introduced.[6] Aside from minimum performance standards and specifications (MPSS), the concession agreement will include key performance indicators (KPIs) and performance standards for operations and management that must be complied with during the entire life of the project. These documents will be prepared by DOTC in consultation with major stakeholders such as DPWH, MMDA, City of Manila, and TPI/Prime Orion.

5.34 The Tutuban area redevelopment plan prepared by the Study is targeted to be approved by the PNR Board to serve as the master plan for the Tutuban PNR property. Since the plan describes the public facilities that need to be constructed in the Tutuban PNR property, a Design Guidelines Committee under the Project Study Committee needs to confirm the private concessionaire that would be implementing the proposed project to follow the guidelines to provide sufficient benefits for the public.

5.35 The Tutuban Redevelopment Project intends to maximize the benefits of railway projects to be constructed by DOTC (i.e., NSCR and LRT2 West Extension). The details of the project are discussed in ***Chapter 4.***

5.36 The proposed redevelopment project will also require the private concessionaire to put up public transportation facilities and to construct new roads to improve access to the mixed-use property development project. All of these aspects should be properly incorporated into the bidding documents and the draft contracts to be prepared by the Transaction Adviser. The roles of the LGU and other national government agencies in the redevelopment plan may be formalized through a Memorandum of Agreement (MOA) with the implementing agency or through ancillary agreements to the PPP contract.

5.37 Since TOD is a new concept in the Philippines, DOTC has limited knowledge of its basic principles and processes. Therefore, aspects of capacity building also needs to be considered to establish an implementation scheme. A study tour for representatives of the implementing agency where they can observe the best practices of TOD as well as a training course on property management will be helpful. The curriculum may include, among others, the property manager's roles and responsibilities for commercial complexes, real estate transaction process, tenant relationship, building maintenance, and basic operational practices of community associations.

[6] National Government Agency Public-Private Partnership Manual, Volume 3, PPP Center.

5.4 Necessary Consulting Services for Project Implementation

1) Projects implemented by the Public Sector

5.38 Adequate support infrastructure is very crucial in setting off economic development in a promising location. In the Philippines, whenever the adequate road network is established, development almost always follows. Therefore, widening of existing roads as well as construction of new roads are proposed in the Access Improvement Plan and Detailed Access Improvement Plan. Many studies have proven that the lack of adequate infrastructure hinders the establishment of businesses; more so expansion of existing ones as investors usually look for better investing environment, if not the best, and this can only be found in a place where adequate infrastructure is existent or future provisions are properly planned and in place just waiting for implementation.

5.39 Responsibility for such plans and provisions usually rests on the public sector, unless the project is part of the package with promise of financial returns similar to those being offered to the private sector. The public sector treats such provisions as part of public service and whether it likes or not, those projects should be provided, otherwise the envisioned economic benefits and returns for progress will not be realized.

5.40 Development projects normally are accompanied by preparation of documents or blueprints for implementation, which, if the public sector lacks the manpower resources, would outsource the required services to qualified and well experienced experts, whether individual or firms. It takes a long process though before the project structure is created. Nevertheless, learning from previous experience, the public sector was able to formulate policies to facilitate the implementation process not only for the preparation of implementation plans and documents but also for the actual construction, all completed on time and as scheduled.

5.41 The Tutuban Redevelopment Project aims to be a catalyst for the entire redevelopment in the Tutuban PNR property as well as in the surrounding areas. Immediate-term projects to be implemented by DOTC are considered as pilot projects of the NSCR and consist of the following components:

(i) Dagupan St. Widening and Station Plaza Development;

(ii) Taxi Loading and Unloading Bay; and

(iii) Information Center.

2) TOR for the Projects by the Public Sector

5.42 The Terms of Reference (TOR) for the procurement of consultancy services contract for the preparation of contract design and bidding documents for the construction of the projects under the immediate implementation term was prepared to support the bid process by DOTC. The TOR for the immediate-term projects provide information on the background of the project resulting from the Study of existing conditions of the project area, objectives of the project and consultancy services, scope of work and of the consulting services, detailed tasks and activities to be performed, duration required to complete the services, required composition of the experts to perform the services, and the expected output . Details of the TOR including its annex are included in ***Appendix 5.1***.

5.43 In addition to the immediate-term projects, the following projects are proposed to be implemented by the public sector (see Table 5.2.1 in the previous section):

(i) Construction of pedestrian deck connecting the NSCR and LRT2;

(ii) Development of facilities under the viaduct;

(iii) Construction of new PNR station and relevant facilities (including demolition of the existing facilities, construction of new access road, and widening of Bambang St.); and

(iv) Moriones St. widening.

5.44 While projects (i) to (iii) are planned to be implemented by DOTC, project (iv) needs to be implemented based on the coordination among DOTC, DPWH, and the City of Manila.

3) Projects Implemented by the Private Sector or PPP

5.45 The concept design aims to serve as a master plan of the Tutuban PNR property. Hence, to the extent possible, the private concessionaire that would be implementing the proposed project should adopt it. As described in ***Chapter 5.3***, the Design Guidelines Committee is proposed to serve as an authorization agency to approve projects by the private sector to confirm their benefits for the public.

5.46 Some public facilities such as parks and public transportation facilities are included in the projects by the private sector. While the Design Guidelines Committee ensures the planning and design of such facilities, another other organization to control construction, operation and management needs to be established.

4) Necessary Consulting Services for the Projects by the Private Sector or PPP

(1) Scope of Work for Transaction Adviser[7]

5.47 If the development of the station area of Tutuban and the station plaza is undertaken under a PPP arrangement, the project sponsor will need to commission the services of a team of transaction advisers until it reaches financial close. The transaction adviser will develop the business case for the proposed commercial development packaged with the railway project. The services required from the transaction adviser will include the following:

(i) Preparation of a detailed feasibility study including assessment of the PPP option, environmental and gender safeguards considerations, economic and financial analysis, and project restructuring;

(ii) Conduct of consultations with concerned stakeholders;

(iii) Preparation of bidding documents and draft contracts; and

(iv) Provision of support to the sponsor during the bidding process until the financial close of the project.

5.48 The scope of work will be divided into three phases. The specific tasks and activities are as follows:

(a) **Phase I: Project Feasibility Study and PPP Project Restructuring**

(i) **Task 1:** Develop the Feasibility Study

- Task 1.1: Project Development and Market Research

[7] Based on the Terms of Reference for the Engagement of Transaction Adviser for the Integrated Transport System Project prepared by the Public-Private Partnership Center of the Philippines.

- Prepare a design and monitoring framework (DMF) for the project which includes, among others, the monitoring requirements for DOTC in terms of contract implementation and management;
- Prepare the project implementation schedule, which will define and set timelines of the major phases of project work to fulfill the desired objectives and achieve the expected deliverables from time of award to completion. The project implementation schedule should include the deliverables being set, major activities for each deliverable, and key milestones, among others, as well as the schedule for procuring an Independent Consultant (IC);
- Prepare a detailed project rationale, including the potential economic benefits resulting from the project;
- Identify the necessary infrastructure facilities, including the capacity requirements to absorb the volume of people movements, needed to establish such intermodal/interconnection/interconnectivity between the urban railway station and other modes of transport;
- Carry out market research covering, among others, details on the methods and parameters to be used in the project, and the need for the project;
- Carry out a detailed assessment/demand study of related businesses/ services (e.g., retail, office, and commercial space);
- Carry out a detailed assessment and document the operations, practices and requirements of related projects/businesses/services, including regulatory requirements and local government permits for the construction, operations and maintenance;
- Prepare a comprehensive communications campaign plan, including public consultations/disclosure plan to cover all stakeholders;
- Assess possible land acquisition and right-of-way issues;
- Provide a likely list of investors to bid for the project; and
- Review the experiences of other countries in the financing, construction, operations and maintenance of TOD projects under a PPP arrangement and recommend appropriate arrangements for the project.

- Task 1.2: Design, Technical Requirements, and Minimum Performance Specifications and Standards
  - Formulate a detailed plan of the Tutuban Redevelopment Project in accordance with the master plan of the Tutuban PNR property prepared by the Study;
  - Conduct engineering surveys necessary in the design of the TOD project for an urban railway system;
  - Conduct a technical assessment of the project requirements and recommend optimal sizing and capacity, land use and environmental impact mitigation measures, climate change resiliency and disaster risk mitigation (i.e., flooding), gender-responsive performance standards and gender-balanced management and staffing, the types of facilities and infrastructure required, and the indicative project costs, among others;
  - Determine optimum timing and phasing of development, and construction and rollout of facilities taking into account the relevant technical, economic

and financial factors, as well as relevant transport plans within Metro Manila;

- Carry out a preliminary design of structures and layout of the facilities that are cost-efficient and climate change resilient, among others, and the cost of preliminary layout; and
- Prepare gender-sensitive, measurable indicators for a gender-responsive minimum performance specifications and standards (MPSS) in the construction, supply, installation, operation and maintenance of the project taking into consideration global best practices.

- Task 1.3: Legal and Institutional Assessment
  - Assess current laws, policies and institutional assessment to ascertain the validity and viability of the proposed PPP structure for the project, including DOTC's capacity to manage and monitor implementation of the project once operational and recommend required changes to improve the governance of the same;
  - Develop "bankability" measures for the proposed PPP project structure, such as fee payment mechanisms, performance guarantees, preconditions for a private operator to fulfill in meeting service obligations, default and risk clauses, and step-in rights of government;
  - Formulate the appropriate institutional arrangements for the project taking into consideration the roles and responsibilities of all stakeholders;
  - Review all legal requirements relating to project implementation (compliance with related laws), including review of the relevant jurisprudence, regulatory framework and previous rulings, including Commission on Audit (COA) issuances that might have an impact on the project, and suggest appropriate legal approaches to be undertaken in the implementation of the project;
  - Assess government's role/participation in the proposed PPP project whether the role corresponds with the government's legal obligations, and maintains sufficient power to protect government's interest;
  - Develop and provide detail to the legal architecture and design of the transaction, such as the: (i) type of PPP contractual arrangement to be used (e.g., BT, BOT, BTO, etc.); (ii) investment commitments to be required, their nature and management; (iii) investment plan on how, where and when investments will be made; and (iv) type of public sector support required, including terms and conditions; and
  - Review and assess legal issues associated with the management of the social, economic and environmental impacts of the project in a manner consistent with local laws, rules and regulations, international best practices, including among others issues on resettlement, and environmental consequences of the project.
- Task 1.4: Environment, Gender and Social Safeguards
  - Conduct a comprehensive environment impact assessment and social risk/ resettlement assessment and analysis. The transaction adviser will make sure that all aspects related to environmental and social safeguards and necessary mitigation measures are integrated into the project's design and

costs;

- Conduct a comprehensive climate change and disaster risk vulnerability assessment of the project sites, identify key geo-hazard and climate risks, and recommend appropriate remedial and mitigating measures in the technical design and infrastructure/facilities construction, and other climate resiliency adaptation and disaster risk mitigating measures in the overall project design;
- Prepare an appropriate poverty reduction and social development strategy framework (e.g., gender action plans, resettlement plans and indigenous peoples' development plan) with recommendations for involuntary resettlement, indigenous peoples and other gender safeguards, in accordance with the requirements in the Philippines; and
- Conduct a gender analysis in the identification of gender issues and gender gaps that the project must address through a holistic strategy using NEDA's Harmonized Gender and Development Guidelines.

- Task 1.5: Risk Assessment
  - Conduct a project risk analysis to determine, assess, allocate and manage risks (such as, but not limited to project construction, commercial such as market risk, financial, political, economic, force majeure, and legal risks) during all project stages. The risk analysis should cover valuation, allocation and mitigation measures; and
  - Based on the risk analysis, prepare a contingent liability model for DOTC and DOF that quantifies the contingent liabilities, how the same shall be managed and the funding requirements. The transaction adviser should recommend mitigation mechanisms that may be adopted by the party identified risks. In doing so, assessment and applicability of various risk mitigation mechanisms should be carried out, including a review of the extent to which the risks of the project can be underwritten by commercial insurance cover and likely cost of such cover.
- Task 1.6: Economic and Financial Analysis
  - Prepare the base case project cost estimates covering capital expenditures, operations and maintenance, taxes and required contingencies, etc.; and prepare the project's financing and procurement plans;
  - Develop cost recovery options (and alternative revenue generation, including any viability gap funding required from the government) to ensure that the project is sustainable;
  - Carry out value for money analysis;
  - Conduct an independent market assessment of potential local and foreign investors' interest in the project
  - Conduct an economic analysis – estimation of the economic costs and benefits of the project; and calculation of the economic internal rate of return (EIRR), including sensitivity analysis as required for obtaining ICC approval;
  - Conduct a financial analysis – determination of the financial internal rate of return (FIRR), net present value, debt service coverage ratio and other ratios. The financial model should have capabilities to perform sensitivity

analysis for the purpose of quantifying the financial impacts of different structuring options; and

- Develop a full financial model and financing plan including timelines for implementation and funds flow requirements. The financial model should include, but not limited to, shadow bid model and bid pricing analysis, etc., financial models for achieving financial close, financial model for implementation, based on the capital structure, project implementation schedule and funding structure, etc.

(ii) **Task 2:** PPP Options Development

5.49 The transaction adviser shall evaluate various PPP options where funding sources and mix, cost recovery mechanisms, among others, should be considered. Options will be ranked based on pre-determined criteria with the end in view of recommending the optimal PPP modality to be followed. The transaction adviser will provide clear details of the proposed structure/s along with a risk assessment matrix and likely impacts on DOTC, the private investors and other stakeholders. The transaction adviser shall identify licensing, permitting and other legal risks that need to be addressed and allocated for each PPP option.

5.50 To facilitate the conduct of the aforementioned tasks, the transaction adviser shall organize consultation meetings with concerned stakeholders, including but not limited to potential equity partners, investors, lenders and guarantors. The conclusion drawn from said consultation meetings shall be taken into account in the preparation of the feasibility report and project structuring.

5.51 The transaction adviser shall likewise organize a one-day investors' conference in Manila. The participants will include representatives of concerned government agencies, financial institutions, prospective private sector proponents and consulting firms.

(iii) **Task 3:** Final Financial Analysis and Project Structuring of the Recommended Option

5.52 Depending on the optimal PPP modality, the transaction adviser will assess and recommend the most suitable structure for the project. The transaction adviser shall finalize, among others, the following:

- Cost estimates;
- Financial and economic model and sensitivity analysis;
- Legal and institutional requirements and processes, contract structure and monitoring and management systems;
- Financing plan, risk allocation and mitigation measures;
- Default mechanisms and arbitration procedures;
- Social/Resettlement/Gender and environmental impacts and mitigation measures;
- Project implementation schedule;
- Stakeholders consultations, particularly with potential private sector investors and involved local communities;
- Development of the final PPP structure;

- Detailed timelines for the bid process until contract award; and
- Post-bid and contract management frameworks.

(b) **Phase II: Management of the PPP Bidding Process, and Preparation of Contractual Documentation**

5.53 The transaction adviser shall prepare all the necessary documents to undertake a competitive and transparent bidding process, and provide support during the entire bidding process until the award of the contract to a successful bidder, including drafting of the TOR for the IC. The responsibilities of the transaction adviser shall include, among others, the following:

(i) **Task 1:** Bid Process Design and Bid Documents

5.54 The transaction adviser shall recommend an appropriate bid strategy in accordance with the BOT Law (i.e., develop a blueprint of the bid process and appropriate governance for the project). Bid process design and the choice between a single-stage process vis-à-vis a two-stage process will be evaluated. The transaction adviser shall provide advice and justification on the best-value bidding parameters, including, but not limited to least viability gap funding for the government or highest revenue share to the government.

5.55 Furthermore, the transaction adviser shall prepare all necessary bid/ tender documents, including the draft contractual agreements, information memorandum, MPSS, request for qualification, request for proposals, bid bulletins, qualification and evaluation criteria, invitation for prequalification and to bid notice, including all appropriate bid forms such as bid letter, statement of bid, technical bid proposal, financial bid proposal, etc.

5.56 PPP Agreement: The transaction adviser shall prepare a draft PPP agreement in close coordination with DOTC and PPP Center. The said draft agreement must take into account the agreed risk allocation regime and use best practice to maximize competition and ensure optimal pricing while protecting DOTC's and relevant stakeholders' interests with a view to facilitate project implementation and manageability over the project term.

(ii) **Task 2:** Support during Bidding Process and Evaluation

5.57 The transaction adviser shall assist DOTC in the following activities:

- Issuance of all bidding notices/requests and supplemental notices;
- Conduct of the pre-bid conference/s;
- Conduct of bidding;
- Responding to the queries upon proper consultation with DOTC and PPP Center;
- Evaluation of bids; and
- Contract finalization and award.

(c) **Phase III: Assistance until Financial Close of the Project**

5.58 The transaction adviser shall provide all the required assistance and advisory support until the financial close of the project. The transaction adviser must assist DOTC will all functions relating to grant of approval on any issue to the private sector proponent or signing any agreement of any other document with the private sector

proponent or assisting in providing interpretations relating to any matter until financial close. The transaction adviser must also compile a comprehensive close-out report and case study, and must incorporate any additional factors that may be required by DOTC and PPP Center. The close-out report will be a confidential document of DOTC and PPP Center. The case study will become a public document and will be made available on various government websites.

5.59 The transaction adviser must, in close liaison with DOTC, draft a comprehensive PPP management plan for DOTC, in accordance with the provisions of the PPP agreement, to help DOTC in the management of the project and its risks, rights and obligations after financial close.

5.60 The Transaction Advisory Team will be composed of international and local experts. The advisory team may be composed of the following:

(i) Experts with International Expertise

- PPP Specialist/Team Leader;
- Project Finance Specialist; and
- Transport Planner.

(ii) Experts with National Expertise

- Project Finance Legal Specialist;
- Project Finance Specialist;
- Economic Specialist;
- Social Development Specialist;
- Gender Specialist;
- Environmental Specialist;
- Land Acquisition and Resettlement Specialist;
- Urban Planner;
- Public Relations/Communications Specialist; and
- Architect/Civil Engineer.

5.5 Preliminary Financial and Economic Analysis of Concept Design

1) Preliminary Cost Estimate/Cost Sharing

5.61 Preliminary costs were estimated for all projects listed by the Study. Among them, several public projects to be implemented by DOTC were packaged as one immediate-term project and two new PNR station projects for further analysis of cost estimate in order to support the securing of the necessary budget and procurement process for detailed design as well as construction. The detailed cost estimates for these projects are included in ***Appendix 5.2***.

5.62 The estimated total construction cost for the Tutuban Redevelopment Project is PHP33 billion (see Table 5.5.1). This amount includes the preparatory works of DOTC and DPWH such as the widening of the streets of Dagupan and Moriones. Pedestrian decks will likewise be constructed to integrate the mixed-use facilities with the planned NSCR system and the LRT2 west extension.

5.63 As previously described, the public projects are categorized into five major projects/project packages, namely: Pb1-Immediate-term Project, Pb2-New PNR Station Project, Pb3-LRT2 West Extension, Pb4-NSCR Project, and Pb5-Moriones St. Widening. All these projects are planned to be implemented by DOTC, except the Dagupan St. widening and Moriones St. widening which will be completed through coordination among the City of Manila, DPWH, and DOTC. The total cost of these projects is estimated around PHP3.1 billion.

5.64 Although the redevelopment for each zone is planned to be implemented by the private sector, redevelopment projects include some public components such as construction of road, park and pedestrian deck.

2) Financial Evaluation

5.65 Discounted cash flow (DCF) analysis will be used to determine the financial viability of the proposed Tutuban Redevelopment Project. Free cash flows of the project will be computed on the “with-project” and “without-project” scenarios to measure the financial impact of the proposed TOD project.

5.66 Free cash flow, which is a measure of financial performance, is computed as operating income less capital expenditures. Cash inflows of the project include rental and lease charges from the usable space in the integrated property development in the Tutuban area. Cash outflows will consist of recurrent costs such as operation and maintenance (O&M) expenses, and capital expenditures.

5.67 Based on the estimated incremental cash flow of the project, the FIRR and the financial net present value (FNPV) will be computed using the relevant discount rates. The FIRR and FNPV will indicate whether the proposed Tutuban Redevelopment Project will generate sufficient cash flows to cover O&M expenses, capital expenditures, and investment cost. A hurdle rate of 15% will be used in the financial evaluation of the project.

5.68 The FIRRs and the FNPVs will be calculated using constant 2015 prices with the Philippine peso as the functional currency. In the cash flow analysis, there will be no provisions for incomes tax, value added tax and loan amortization.

Table 5.5.1 Estimated Project Cost of the Tutuban Redevelopment Project (In PHP million unless stated otherwise, constant 2015 prices)

Zone	Items	Land Area (ha.)	Floor Area (ha.)	Construction Cost (PHP million)	Year to be Completed
Zones 1-3	Dagupan St. Widening			139.3	2016
Zones 1-2	Jeepney Bay under Viaduct	0.22		6.3	2020
Zones 1-3	Commercial Facility under Viaduct	0.80		326.2	2020
Zones 1-3	Moriones St. Widening			38.6	2025
Zone 1-A	Station Plaza Phase 1	0.92		87.6	2016
	Station Plaza Phase 2	0.37		14.7	2020
	Pedestrian Deck(NSCR)		0.34	381.0	2020
	Pedestrian Deck(LRT2)		0.16	193.5	2018
	Pedestrian Deck (other)		0.05	52.2	2020
	Renovated Heritage Building	1.20	6.61	2,740.9	2020
	Mixed Use Building 1-A	2.00	12.14	5,482.9	2020
	Access Road for Zone 1 (1-A + 1-B)	1.56		72.6	2020
	Internal Path/Landscaped Area 1-A	1.35		71.6	2020
Zone 1-B	Commercial Building 1-B	1.07	8.56	2,929.7	2018
	Park 1-B	0.38		28.5	2020
	Internal Path/Landscaped Area 1-B	0.38		41.8	2020
Zone 2	The Tower of Maynila	0.49	1.25	1,094.0	2025
	Manila Convention and Amusement Center	0.73	6.57	2,581.3	2025
	Park 2	1.46		160.6	2025
	Surface Parking	0.06		2.4	2025
	Pedestrian Deck for Zone 2		0.05	55.0	2025
	Access Road for Zone 2	0.60		36.7	2025
	Internal Path/Landscaped Area 2	0.10		7.5	2025
Zone 3	Public Facility under Viaduct 3	0.25		6.7	2020-2030
	New PNR Railway Facilities	2.19		503.5	2018
	Access Road for New PNR Station	0.56		18.4	2018
	Mixed-Use Building 3-1	0.75	12.82	6,038.5	2030
	Mixed-Use Building 3-2	0.68	20.66	9,510.5	2030
	Public Transportation Facility	0.50		19.6	2030
	Park 3	1.06		116.6	2030
	Pedestrian Deck for Zone 3		0.09	99.0	2030
	Access Road for Zone 3	0.90		102.7	2030
	Internal Path/Landscaped Area 2	0.37		27.8	2030
Total		20.95	69.30	32,987.8	

Source: JICA Study Team.

(1) Estimated Project Cost

5.69 Three scenarios were considered in the financial analysis of this project that will be implemented under a PPP arrangement. Under Scenario 1, all public spaces such public transportation facilities, parks, access roads and pedestrian decks will be developed by national government agencies. Under Scenario 2, the responsibility of constructing the access roads will be given to the private proponent. Lastly, under Scenario 3, the private proponent will shoulder all construction costs including public spaces. Table 5.5.2 summarizes the allocation of construction costs between the government and the private sector under the three scenarios. The financial viability of the project will be evaluated from the perspective of the private proponent.

5.70 The project will be implemented in three phases with the last zone being completed by 2030. Among the three proposed zones, Zone 3 is the most expensive as it accounts for more than 50% of estimated construction cost. The assumed estimated

useful life of the buildings and other facilities is 30 years.

Table 5.5.2 Estimated Project Cost of the Tutuban Redevelopment Project per Scenario (In PHP million unless stated otherwise, constant 2015 prices)

Zone	Items	Scenario 1 (Public Maximum and Private)			Scenario 2 (Public and Private)			Scenario 3 (Private Only)
		Private	Public	Total	Private	Public	Total	Private
Zone 1-A	Share of Dagupan St. Widening 1-A	-	38.0	38.0	-	38.0	38.0	38.0
	Share of Moriones St. Widening 1-A	-	28.5	28.5	-	28.5	28.5	28.5
	Station Plaza Phase 1	-	87.6	87.6	-	87.6	87.6	87.6
	Station Plaza Phase 2 (Jeepney Bay)	-	14.7	14.7	14.7	-	14.7	14.7
	Pedestrian Deck (NSCR)	-	381.0	381.0	-	381.0	381.0	381.0
	Pedestrian Deck (LRT2)	-	193.5	193.5	-	193.5	193.5	193.5
	Pedestrian Deck (other)	-	52.2	52.2	52.2	-	52.2	52.2
	Jeepney Bay under Viaduct 1-A	-	5.4	5.4	-	5.4	5.4	5.4
	Commercial Facility under Viaduct 1-A	-	165.9	165.9	-	165.9	165.9	165.9
	Renovated Heritage Building	2,740.9	-	2,740.9	2,740.9	-	2,740.9	2,740.9
	Mixed Use Building 1-A	5,482.9	-	5,482.9	5,482.9	-	5,482.9	5,482.9
	Access Road for Zone 1 (1-A + 1-B)	-	72.6	72.6	72.6	-	72.6	72.6
	Internal Path/Landscaped Area 1-A	71.6	-	71.6	71.6	-	71.6	71.6
	Sub-Total	8,295.4	1,039.3	9,334.7	8,434.9	899.8	9,334.7	9,334.7
Zone 1-B	Share of Dagupan St. Widening 1-B	-	19.6	19.6	-	19.6	19.6	19.6
	Share of Moriones Street Widening 1-B	-	10.1	10.1	-	10.1	10.1	10.1
	Commercial Facility under Viaduct 1-B	-	61.6	61.6	-	61.6	61.6	61.6
	Commercial Building 1-B	2,929.7	-	2,929.7	2,929.7	-	2,929.7	2,929.7
	Park 1-B	-	28.5	28.5	28.5	-	28.5	28.5
	Internal Path/Landscaped Area 1-B	41.8	-	41.8	41.8	-	41.8	41.8
	Sub-Total	2,971.5	119.9	3,091.3	3,000.0	91.4	3,091.3	3,091.3
Zone 2	Share of Dagupan St. Widening 2	-	31.5	31.5	-	31.5	31.5	31.5
	Jeepney Bay under Viaduct 2	-	0.9	0.9	-	0.9	0.9	0.9
	Commercial Facility under Viaduct 2	-	34.3	34.3	-	34.3	34.3	34.3
	The Tower of Maynila	1,094.0	-	1,094.0	1,094.0	-	1,094.0	1,094.0
	Manila Convention and Amusement Center	2,581.3	-	2,581.3	2,581.3	-	2,581.3	2,581.3
	Park 2	-	160.6	160.6	160.6	-	160.6	160.6
	Surface Parking	2.4	-	2.4	2.4	-	2.4	2.4
	Pedestrian Deck for Zone 2	-	55.0	55.0	55.0	-	55.0	55.0
	Access Road for Zone 2	-	36.7	36.7	36.7	-	36.7	36.7
	Internal Path/Landscaped Area 2	7.5	-	7.5	7.5	-	7.5	7.5
	Sub-Total	3,685.1	319.0	4,004.1	3,937.4	66.7	4,004.1	4,004.1
Zone 3	Share of Dagupan St. Widening 3	-	50.2	50.2	-	50.2	50.2	50.2
	Commercial Facility under Viaduct 3	-	64.4	64.4	-	64.4	64.4	64.4
	Public Facility under Viaduct 3	-	6.7	6.7	-	6.7	6.7	6.7
	New PNR Railway Facilities	-	503.5	503.5	-	503.5	503.5	503.5
	Access Road for New PNR Station	-	18.4	18.4	-	18.4	18.4	18.4
	Mixed-Use Building 3-1	6,038.5	-	6,038.5	6,038.5	-	6,038.5	6,038.5
	Mixed-Use Building 3-2	9,510.5	-	9,510.5	9,510.5	-	9,510.5	9,510.5
	Public Transportation Facility	-	19.6	19.6	19.6	-	19.6	19.6
	Park 3	-	116.6	116.6	116.6	-	116.6	116.6
	Pedestrian Deck for Zone 3	-	99.0	99.0	99.0	-	99.0	99.0
	Access Road for Zone 3	-	102.7	102.7	102.7	-	102.7	102.7
	Internal Path/Landscaped Area 2	27.8	-	27.8	27.8	-	27.8	27.8
	Sub-Total	15,576.7	981.0	16,557.7	15,914.5	643.2	16,557.7	16,557.7
TOTAL		30,528.7	2,459.1	32,987.8	31,286.8	1,701.1	32,987.8	32,987.8

Source: JICA Study Team.

(2) Project Revenues

5.71 Revenues of the Tutuban Redevelopment Project will come from the following sources:

(i) Rental of commercial, office and residential space (fixed component);
(ii) Lease of hotel space in commercial building in Zone 1-A (fixed component);
(iii) Share of gross sales of commercial establishments (variable component); and
(iv) Entrance fees from The Tower of Maynila.

5.72 There were no provisions for revenues from parking and advertisements in the financial analysis. Rental and lease rates used in the financial analysis are summarized in Table 5.5.3. The rates, which were assumed to be fixed throughout the life of the project, are comparable with those in the CBDs of Makati and Ortigas. Once the construction of the Tutuban Redevelopment Project is completed, its locators will consist of retail stores and food establishments similar to those found in upscale shopping malls in the Ortigas and Makati CBDs. Moreover, the facilities and amenities the project will offer will be at par with those of the major integrated property developments in Metro Manila. Lucky Chinatown Mall, which is located in the Binondo district, currently boasts of upscale retail and food establishments, which is unusual in the area.[8] The leasing area ratio used in the analysis were 75% for hotel space, 75% to 95% for commercial space, 75% to 95% for office space, and 80% for residential space.

Table 5.5.3 Rent and Lease Rates (Pesos per square meter per month)

Type	Lower Floor (1 to 2)	Middle Floor (3 to 5)	Higher Floor (6 to 9)	Super Higher Floor (10 and up)
Residential	600	660	690	750
Hotel	900	990	1,035	1,125
Office	720	600	660	720
Commercial	1,200	1,200	1,100	1,000

Source: JICA Study Team.

5.73 Except for the hotel space, occupancy rates are assumed to reach their peak levels after three years of operations and will decline in the succeeding years. The occupancy decline rate is 0.7% per annum for commercial space, 1.0% to 1.2% per annum for office space, and 0.5% per annum for residential space. Occupancy rate for the available hotel space is assumed to be 100% throughout the life of the project since the entire space will be leased out to a reputable hotel operator.

5.74 It is common practice by major mall operators in the country to charge their tenants a fixed rate plus a percentage share of gross sales. The assumption used in the financial analysis is that commercial establishments will be able to generate gross sales amounting to 20 times their fixed rent. The share of the project proponent was set at 10% of gross sales.

5.75 An entrance fee of PHP250 per person will be charged the visitors of The Tower of Maynila. An average of 2.7 million people are projected to visit The Tower of Maynila every year throughout the life of the project. Once completed, the tower will have a height of about 300 m.

5.76 The variable component of rent of the commercial establishments will account for

[8] www.whereinmanila.com/lucky-chinatown-mall.

more than 51% of total revenues of the project. The fixed component of rent will be about 38% of total revenues. The remainder will be from the proceeds of the entrance fee to The Tower of Maynila.

(3) Operating and Maintenance Expenses

5.77 The parameters and assumptions used in the computation of project's O&M expenses are summarized in Table 5.5.4 below.

Table 5.5.4 Parameters Used to Compute Operating and Maintenance Expenses

Category		Items	Rate (%)	Base
Management Cost		Commercial/Office	35	Total Revenues
		Residential	10	Total Revenues
Maintenance Cost	First Year of Operations	Zones 1-A and 1-B	0.1	Construction Cost
		Others	0.5	Construction Cost
	Annual Escalation Rate		1.0	Previous Year's Maintenance Cost
Repairs*		Minor (every five years)	2.5	Construction Cost
		Major (every 10 years)	5.0	Construction
Tax		Local Business Tax	1.0	Previous Year's Gross Revenues
		Real Property Tax	1.5	Book Value of Fixed Assets

Source: JICA Study Team.
* Note: Major repair works will lead to a 1-percentage point improvement in occupancy rate the succeeding year.

5.78 In the computation of the book value of fixed assets, an estimated useful life of 30 years was assumed and the straight-line depreciation method was used. Minor and major repairs were considered to be capital expenditures in the financial analysis.

5.79 A rental charge of PHP440 per square meter per month was assumed for the land owned by PNR. Based on this rate, PNR will realize an average rental income of PHP200 million per annum over the 30-year life of the project. Using a discount rate of 15%, the present value of the rental incomes will be PHP525.9 million.

5.80 The largest component of O&M cost will be management cost with a 78% share of the total. The share to total real property tax and implicit land rental cost will be 7.7% and 6.7%, respectively.

(4) Results of Financial Evaluation

5.81 The results of the financial evaluation for the three scenarios show that revenues generated by the project will be enough to cover investment costs, capital expenditures, and O&M costs. Under all three scenarios, FNPV will be greater than zero using a 15% discount rate and the FIRR will exceed the hurdle rate (see Table 5.5.5). Scenario 1 will post the highest FNPV and FIRR since the government will be responsible for developing all the public spaces related to the project. Conversely, FNPV and FIRR will be lowest under Scenario 3 since the private proponent will shoulder all construction costs including those for the public spaces.

Table 5.5.5 Results of Financial Evaluation

Zone	Scenario 1: Public Max		Scenario 2: Public-Private		Scenario 3: Private Only	
	FIRR (%)	FNPV (PHP million)	FIRR (%)	FNPV (PHP million)	FIRR (%)	FNPV (PHP million)
Zone 1-A	21.4	1,891.1	21.0	1,811.4	18.5	1,215.6
Zone 1-B	26.2	1,532.2	26.0	1,515.9	25.4	1,458.1
Zone 2	26.2	710.1	24.5	638.4	22.7	586.8
Zone 3	15.2	24.2	14.8	-23.5	12.1	-509.0
Project	22.4	4,157.6	21.9	3,942.1	19.1	2,751.6

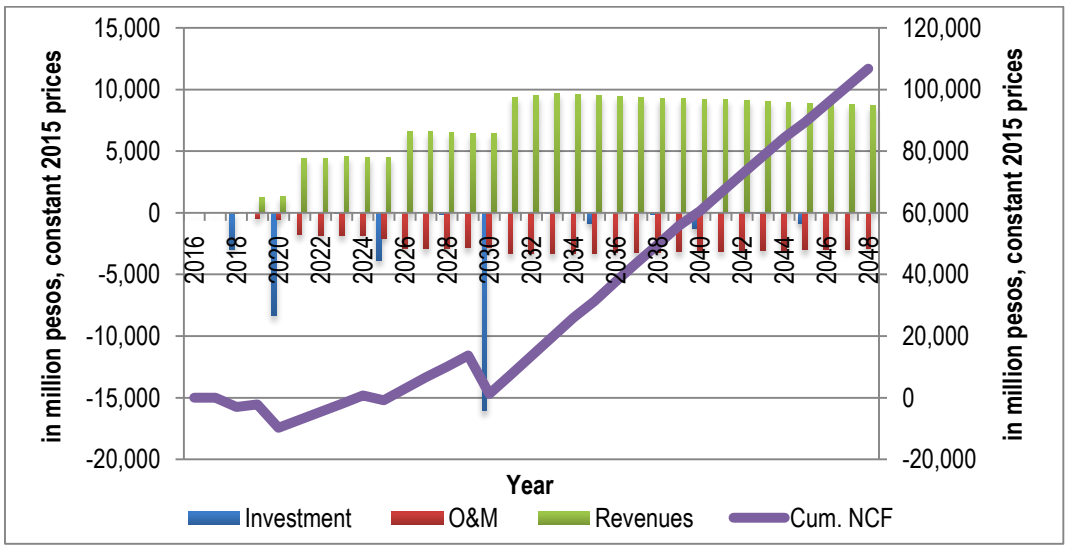
Source: JICA Study Team.

5.82 The project cash flows under the three scenarios are shown in Tables 5.5.6 to 5.5.8 and Figure 5.5.1 to 5.5.3.

Table 5.5.6 Evaluation of Financial Costs and Revenues (Scenario 1)
(In PHP million, constant 2015 prices)

Year	Investments	O&M Cost	Revenues	Net Cash Flow	Discounted Cash Flow at 15%		
					Costs	Revenues	Net
2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2018	2,929.7	8.1	0.0	-2,937.7	2,221.3	0.0	-2,221.3
2019	0.0	497.7	1,276.9	779.2	327.3	839.6	512.3
2020	8,337.2	558.5	1,352.1	-7,543.7	5,086.2	773.0	-4,313.1
2021	0.0	1,805.4	4,392.0	2,586.6	897.6	2,183.6	1,286.0
2022	0.0	1,832.1	4,393.2	2,561.1	792.1	1,899.3	1,107.2
2023	73.2	1,885.1	4,556.4	2,598.1	736.2	1,712.9	976.7
2024	0.0	1,873.0	4,526.5	2,653.5	612.3	1,479.7	867.4
2025	3,890.7	2,064.7	4,496.9	-1,458.5	1,692.9	1,278.3	-414.6
2026	0.0	2,868.0	6,559.4	3,691.4	708.9	1,621.4	912.5
2027	0.0	2,890.6	6,580.3	3,689.7	621.3	1,414.4	793.1
2028	146.5	2,857.8	6,501.4	3,497.1	561.5	1,215.2	653.6
2029	0.0	2,842.2	6,470.0	3,627.8	461.9	1,051.6	589.6
2030	16,052.4	2,840.8	6,425.2	-12,468.0	2,670.2	908.1	-1,762.1
2031	0.0	3,315.0	9,358.7	6,043.8	407.4	1,150.1	742.7
2032	0.0	3,335.3	9,501.5	6,166.3	356.4	1,015.4	659.0
2033	73.2	3,328.0	9,646.5	6,245.2	316.1	896.4	580.3
2034	0.0	3,299.8	9,572.9	6,273.1	266.6	773.5	506.9
2035	832.8	3,268.7	9,500.0	5,398.5	288.2	667.5	379.3
2036	0.0	3,247.8	9,427.8	6,180.0	198.4	576.0	377.6
2037	0.0	3,216.6	9,356.3	6,139.7	170.9	497.1	326.2
2038	146.5	3,183.4	9,285.4	5,955.5	153.8	429.0	275.1
2039	0.0	3,159.5	9,230.2	6,070.7	126.9	370.8	243.9
2040	1,253.2	3,129.4	9,164.2	4,781.6	153.1	320.1	167.0
2041	0.0	3,125.3	9,151.6	6,026.3	94.9	278.0	183.1
2042	0.0	3,094.4	9,082.7	5,988.3	81.7	239.9	158.2
2043	73.2	3,063.0	9,014.4	5,878.2	72.0	207.1	135.0
2044	0.0	3,032.7	8,946.8	5,914.1	60.6	178.7	118.1
2045	832.8	3,001.5	8,879.7	5,045.5	66.6	154.2	87.6
2046	0.0	2,980.4	8,813.3	5,832.9	45.0	133.1	88.1
2047	0.0	2,948.5	8,747.5	5,799.0	38.7	114.9	76.2
2048	0.0	2,916.1	8,682.3	5,766.2	33.3	99.2	65.9

Source: JICA Study Team.



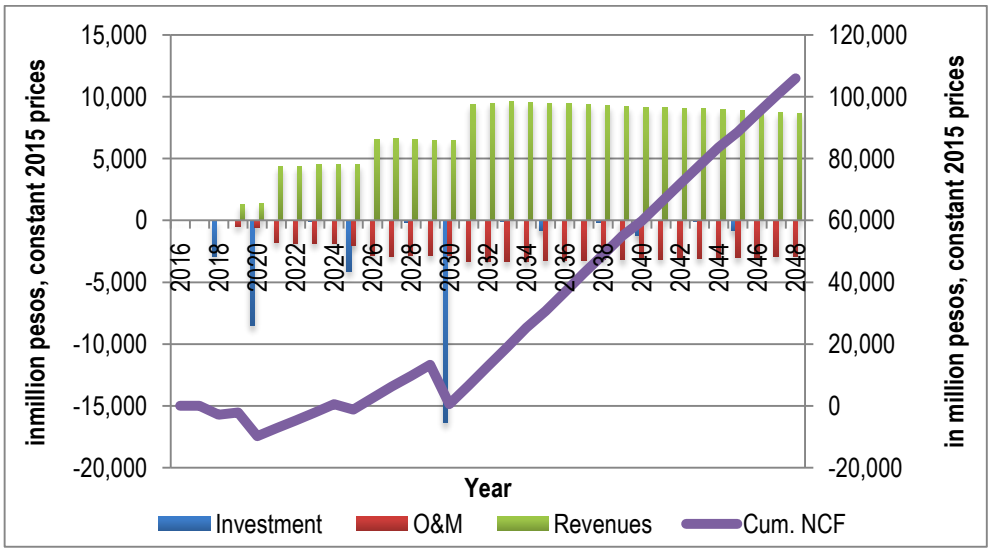
Source: JICA Study Team.

Figure 5.5.1 Revenues, Costs and Cumulative Net Cash Flow (Scenario 1)

Table 5.5.7 Evaluation of Financial Costs and Revenues (Scenario 2)
(In PHP million, constant 2015 prices)

Year	Investments	O&M Cost	Revenues	Net Cash Flow	Discounted Cash Flow at 15%		
					Costs	Revenues	Net
2016	226.9	0.0	0.0	-226.9	226.9	0.0	-226.9
2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2018	3,645.1	8.1	0.0	-3,653.1	2,762.3	0.0	-2,762.3
2019	0.0	497.7	1,276.9	779.2	327.3	839.6	512.3
2020	9,225.4	558.5	1,352.1	-8,431.8	5,594.0	773.0	-4,820.9
2021	0.0	1,805.4	4,392.0	2,586.6	897.6	2,183.6	1,286.0
2022	0.0	1,832.1	4,393.2	2,561.1	792.1	1,899.3	1,107.2
2023	73.2	1,885.1	4,556.4	2,598.1	736.2	1,712.9	976.7
2024	0.0	1,873.0	4,526.5	2,653.5	612.3	1,479.7	867.4
2025	4,181.6	2,064.7	4,496.9	-1,749.4	1,775.6	1,278.3	-497.3
2026	0.0	2,868.0	6,559.4	3,691.4	708.9	1,621.4	912.5
2027	0.0	2,890.6	6,580.3	3,689.7	621.3	1,414.4	793.1
2028	146.5	2,857.8	6,501.4	3,497.1	561.5	1,215.2	653.6
2029	0.0	2,842.2	6,470.0	3,627.8	461.9	1,051.6	589.6
2030	16,390.2	2,840.8	6,425.2	-12,805.8	2,717.9	908.1	-1,809.8
2031	0.0	3,315.0	9,358.7	6,043.8	407.4	1,150.1	742.7
2032	0.0	3,335.3	9,501.5	6,166.3	356.4	1,015.4	659.0
2033	73.2	3,328.0	9,646.5	6,245.2	316.1	896.4	580.3
2034	0.0	3,299.8	9,572.9	6,273.1	266.6	773.5	506.9
2035	832.8	3,268.7	9,500.0	5,398.5	288.2	667.5	379.3
2036	0.0	3,247.8	9,427.8	6,180.0	198.4	576.0	377.6
2037	0.0	3,216.6	9,356.3	6,139.7	170.9	497.1	326.2
2038	146.5	3,183.4	9,285.4	5,955.5	153.8	429.0	275.1
2039	0.0	3,159.5	9,230.2	6,070.7	126.9	370.8	243.9
2040	1,253.2	3,129.4	9,164.2	4,781.6	153.1	320.1	167.0
2041	0.0	3,125.3	9,151.6	6,026.3	94.9	278.0	183.1
2042	0.0	3,094.4	9,082.7	5,988.3	81.7	239.9	158.2
2043	73.2	3,063.0	9,014.4	5,878.2	72.0	207.1	135.0
2044	0.0	3,032.7	8,946.8	5,914.1	60.6	178.7	118.1
2045	832.8	3,001.5	8,879.7	5,045.5	66.6	154.2	87.6
2046	0.0	2,980.4	8,813.3	5,832.9	45.0	133.1	88.1
2047	0.0	2,948.5	8,747.5	5,799.0	38.7	114.9	76.2
2048	0.0	2,916.1	8,682.3	5,766.2	33.3	99.2	65.9

Source: JICA Study Team.



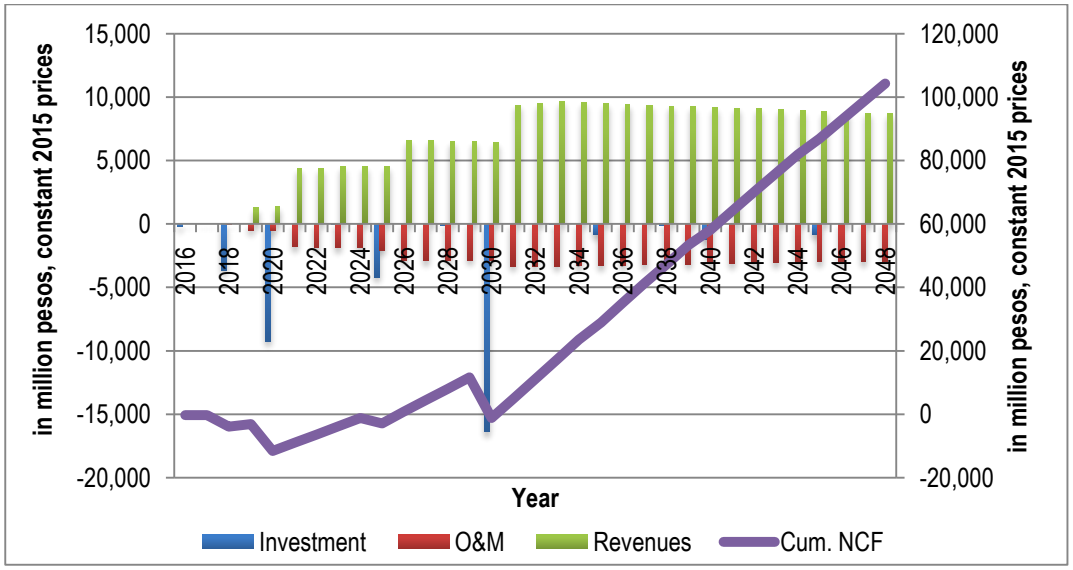
Source: JICA Study Team.

Figure 5.5.2 Revenues, Costs and Cumulative Net Cash Flow (Scenario 2)

Table 5.5.8 Evaluation of Financial Costs and Revenues (Scenario 3)
(In PHP million, constant 2015 prices)

Year	Investments	O&M Cost	Revenues	Net Cash Flow	Discounted Cash Flow at 15%		
					Costs	Revenues	Net
2016	226.9	0.0	0.0	-226.9	226.9	0.0	-226.9
2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2018	3,645.1	8.1	0.0	-3,653.1	2,762.3	0.0	-2,762.3
2019	0.0	497.7	1,276.9	779.2	327.3	839.6	512.3
2020	9,225.4	558.5	1,352.1	-8,431.8	5,594.0	773.0	-4,820.9
2021	0.0	1,805.4	4,392.0	2,586.6	897.6	2,183.6	1,286.0
2022	0.0	1,832.1	4,393.2	2,561.1	792.1	1,899.3	1,107.2
2023	73.2	1,885.1	4,556.4	2,598.1	736.2	1,712.9	976.7
2024	0.0	1,873.0	4,526.5	2,653.5	612.3	1,479.7	867.4
2025	4,181.6	2,064.7	4,496.9	-1,749.4	1,775.6	1,278.3	-497.3
2026	0.0	2,868.0	6,559.4	3,691.4	708.9	1,621.4	912.5
2027	0.0	2,890.6	6,580.3	3,689.7	621.3	1,414.4	793.1
2028	146.5	2,857.8	6,501.4	3,497.1	561.5	1,215.2	653.6
2029	0.0	2,842.2	6,470.0	3,627.8	461.9	1,051.6	589.6
2030	16,390.2	2,840.8	6,425.2	-12,805.8	2,717.9	908.1	-1,809.8
2031	0.0	3,315.0	9,358.7	6,043.8	407.4	1,150.1	742.7
2032	0.0	3,335.3	9,501.5	6,166.3	356.4	1,015.4	659.0
2033	73.2	3,328.0	9,646.5	6,245.2	316.1	896.4	580.3
2034	0.0	3,299.8	9,572.9	6,273.1	266.6	773.5	506.9
2035	832.8	3,268.7	9,500.0	5,398.5	288.2	667.5	379.3
2036	0.0	3,247.8	9,427.8	6,180.0	198.4	576.0	377.6
2037	0.0	3,216.6	9,356.3	6,139.7	170.9	497.1	326.2
2038	146.5	3,183.4	9,285.4	5,955.5	153.8	429.0	275.1
2039	0.0	3,159.5	9,230.2	6,070.7	126.9	370.8	243.9
2040	1,253.2	3,129.4	9,164.2	4,781.6	153.1	320.1	167.0
2041	0.0	3,125.3	9,151.6	6,026.3	94.9	278.0	183.1
2042	0.0	3,094.4	9,082.7	5,988.3	81.7	239.9	158.2
2043	73.2	3,063.0	9,014.4	5,878.2	72.0	207.1	135.0
2044	0.0	3,032.7	8,946.8	5,914.1	60.6	178.7	118.1
2045	832.8	3,001.5	8,879.7	5,045.5	66.6	154.2	87.6
2046	0.0	2,980.4	8,813.3	5,832.9	45.0	133.1	88.1
2047	0.0	2,948.5	8,747.5	5,799.0	38.7	114.9	76.2
2048	0.0	2,916.1	8,682.3	5,766.2	33.3	99.2	65.9

Source: JICA Study Team.



Source: JICA Study Team.

Figure 5.5.3 Revenues, Costs and Cumulative Net Cash Flow (Scenario 3)

5.83 The City of Manila will realize some PHP7,640 million in real property and local business taxes throughout the life of the project. Using a discount rate of 15%, this will have a present value of PHP750 million. Local business tax and real property tax revenues of the City of Manila in 2013 totaled to PHP578 million.

5.84 A sensitivity analysis was likewise carried out to determine the responsiveness of the FIRR to changes in the financial costs and revenues. Table 5.5.9 summarizes the results of the sensitivity analysis under Scenario 1. For the project to realize a FIRR below the 15% hurdle rate, revenues will have to drop by 17% or costs will have to increase by 20.3% relative to the base case.

Table 5.5.9 Sensitivity Analysis of Financial Evaluation (Scenario 1)

Change in Revenues	Change in Cost (%)			
	Base Cost	10% up	20% up	30% up
Base Case	22.4	18.4	15.1	12.3
10% down	18.0	14.5	11.5	8.8
20% down	13.7	10.4	7.6	5.2
30% down	9.2	6.2	3.5	1.0

Source: JICA Study Team.

5.85 Table 5.5.10 summarizes the results of the sensitivity analysis under Scenario 2. For the project to realize a FIRR below the 15% hurdle rate, revenues will have to drop by 16.1% or costs will have to increase by 19.1% relative to the base case.

Table 5.5.10 Sensitivity Analysis of Financial Evaluation (Scenario 2)

Change in Revenues	Change in Cost (%)			
	Base Cost	10% up	20% up	30% up
Base Case	21.9	18.0	14.8	12.0
10% down	17.6	14.1	11.1	8.5
20% down	13.3	10.1	7.4	4.9
30% down	8.9	5.9	3.3	0.8

Source: JICA Study Team.

5.86 Table 5.5.11 summarizes the results of the sensitivity analysis under Scenario 3. For the project to realize a FIRR below the 15% hurdle rate, revenues will have to drop by 11.0% or costs will have to increase by 12.5% relative to the base case.

Table 5.5.11 Sensitivity Analysis of Financial Evaluation (Scenario 3)

Change in Revenues	Change in Cost (%)			
	Base Cost	10% up	20% up	30% up
Base Case	19.1	15.8	13.0	10.6
10% down	15.5	12.4	9.8	7.5
20% down	11.7	8.9	6.4	4.2
30% down	7.8	5.1	2.7	0.4

Source: JICA Study Team.

3) Economic Evaluation

5.87 Benefit-cost analysis was used to evaluate the economic viability of the proposed Tutuban Redevelopment Project. The economic analysis was undertaken in accordance with the NEDA Reference Manual on Project Development and Evaluation (2005). The EIRRs and economic net present values (ENPVs) were computed based on the discounted economic costs and benefits of the proposed project. The economic analysis

focused on the assessment of the "with-project" and "without-project" scenarios to measure the incremental impact of the proposed TOD project. The social discount rate prescribed by NEDA is 15%. Sensitivity analysis was also conducted to assess the impact of changes in critical variables on the economic viability of the project.

(1) Economic Costs

5.88 As prescribed by NEDA, the economic costs will be determined by converting the financial costs into their economic equivalents using the relevant domestic price numeraire. The conversion factors that will be used are: unskilled labor, 0.6; skilled labor, 1.0; foreign exchange 1.2; and local materials, 1.0. Taxes and duties will have zero economic cost since they represent transfers to the government. Price contingencies will not be included in the analysis because costs and benefits will be expressed in terms of real prices. To simplify the process, a conversion factor of 0.95 was instead used, which is based on previous feasibility studies for relatively similar projects.

Table 5.5.12 Estimated Project Economic Cost for the Tutuban Redevelopment Project (In PHP million unless stated otherwise, constant 2015 prices)

Zone	Items	Construction Cost (PHP million)	Year to be completed
Zones 1-3	Dagupan St. Widening	132.3	2016
Zones 1-3	Commercial Facility under Viaduct	309.9	2020
Zones 1-3	Moriones St. Widening	36.7	2025
Zones 1-2	Jeepney Bay under Viaduct	6.0	2020
Zone 1-A	Station Plaza Phase 1	83.2	2016
	Station Plaza Phase 2	13.9	2020
	Pedestrian Deck (NSCR)	362.0	2020
	Pedestrian Deck (LRT2)	183.8	2018
	Pedestrian Deck (other)	49.6	2020
	Renovated Heritage Building	2,603.9	2020
	Mixed Use Building 1-A	5,208.8	2020
	Access Road for Zone 1 (1-A + 1-B)	68.9	2020
	Internal Path/Landscaped Area 1-A	68.0	2020
Zone 1-B	Commercial Building 1-B	2,783.2	2018
	Park 1-B	27.1	2020
	Internal Path/Landscaped Area 1-B	39.7	2020
Zone 2	The Tower of Maynila	1,039.3	2025
	Manila Convention and Amusement Center	2,452.2	2025
	Park 2	152.6	2025
	Surface Parking	2.2	2025
	Pedestrian Deck for Zone 2	52.3	2025
	Access Road for Zone 2	34.9	2025
	Internal Path/Landscaped Area 2	7.1	2025
Zone 3	Public Facility under Viaduct 3	6.4	2020-2030
	New PNR Railway Facilities	478.3	2018
	Access Road for New PNR Station	17.5	2018
	Mixed-Use Building 3-1	5,736.5	2030
	Mixed-Use Building 3-2	9,034.9	2030
	Public Transportation Facility	18.6	2030
	Park 3	110.8	2030
	Pedestrian Deck for Zone 3	94.1	2030
	Access Road for Zone 3	97.6	2030
	Internal Path/Landscaped Area 2	26.4	2030
Total		31,338.4	-

Source: JICA Study Team.

5.89 The proposed Tutuban Redevelopment Project has an estimated total financial cost of PHP33.0 billion. This amount includes the preparatory works that will be undertaken by DOTC and DPWH. Using the conversion factors, the resulting economic cost was computed to be PHP31.3 billion (see Table 5.5.12). This conversion factor was also used to convert the financial cost of O&M expenses into their economic equivalents (see Table 5.5.13).

Table 5.5.13 Economic Cost of Operations and Maintenance
(In PHP million, constant 2015 prices)

Items	2018	2019	2020	2021	2022
Management Cost	0.0	404.0	427.7	1,438.7	1,439.3
Maintenance Cost	0.0	27.8	27.9	108.0	108.1
Land Rental	7.7	7.7	30.6	30.6	30.6
Total Operating and Maintenance Cost	7.7	439.5	486.2	1,577.3	1,578.1

Source: JICA Study Team.

(2) Economic Benefits

5.90 TOD is a development approach primarily aimed at the promotion of public transportation in the vicinity of the mass transit station through the integration of various types of property development such as commercial, office and residential. Such integration enables to create a multi-functional, convenient and vibrant space around the stations, which attracts more passengers by multiplier effect and implement the development in an effective and efficient manner.

5.91 TOD is a fairly new concept in the Philippines. Previous railway projects of the Philippine Government have not incorporated TOD in their plans and programs. A number of property development companies have built residential condominium and commercial/ office buildings around railway stations but these developments do not fully capture the objectives of TOD.

5.92 The economic benefits of TOD projects are wide ranging and these include, among others, the following:[9]

(i) Expanded transit ridership;
(ii) Increased mobility of choices particularly for non-drivers;
(iii) Reduction in traffic congestion;
(iv) More sustainable and efficient use of land, energy and resources;
(v) Less reliance on cars, resulting in lower gas consumption and greenhouse gas emission;
(vi) Reduced household spending on transportation;
(vii) Increased foot traffic for local businesses;
(viii) Increased property values which can be leveraged for future development;

[9] The listing of the economic benefits were lifted from the following articles: (a) “Transit-Oriented Development" by Center for Neighborhood Technology; (b) “The Benefits of Transit Oriented Development,” TTF Transport Position Paper by Tourism and Transport Forum Australia; (c) “Transit-Oriented Development Basics” by Regional Transportation Authority of Chicago; (d) “What are the benefits of TOD?” by Denver Regional Council of Governments; (e) “Comprehensive Evaluation of Transit Oriented Development Benefits” by Planetizen: The Urban Planning, Design, and Development Network; and (f) “Transit Oriented Development: Moving from Rhetoric to Reality” by Dena Belzer and Gerald Autler, A Discussion Paper prepared for The Brookings Institution Center for Urban and Metropolitan Policy and The Great American Station Foundation, June 2002.

(ix) Improved public health through increased walking and biking by residents of TOD communities;

(x) Improved safety of residents of TOD communities;

(xi) Savings in road and parking facility costs; and

(xii) Faster and more efficient commute to and from work and, therefore, more time spent with the family.

5.93 The economic benefits enumerated above are interrelated and cover economic, environmental and social aspects. However, most of these projects are difficult to value due primarily to data constraints. Hence, not all of the abovementioned benefits will be included in the economic analysis. Some of the economic benefits of TOD that may be valued but are difficult to quantity are discussed below.

(a) **Reduced Household Spending on Transportation**

5.94 TOD will reduce household expenditures on fuels, parking fees, public transport fares and other related expenses. Based on the 2012 Family Income and Expenditures Survey (FIES), transportation expenses accounted for 7.5% of total family expenditures in Metro Manila. Transportation expense in the FIES includes transport fare and personal transport expenses such fuel, maintenance and repair, driver's salary and tires, batteries and accessories. Given an annual average family expenditures of PHP325,000 in Metro Manila, annual transportation expenses amount to PHP24,375 for an average family. Offhand, it will be difficult to determine how much household spending on transportation will be reduced and how families will benefit from the lower transportation. A full-blown survey may be required to arrive at these estimates.

(b) **Reduction in Carbon Dioxide Emission**

5.95 Emission levels will be lower as car and motorcycle riders shift to the railway system. The reduction in carbon emission will benefit both the Tutuban residents and the global community in terms of mitigated climate change. The European Environment Agency provides estimates of carbon dioxide emission per vehicle type. The value of carbon dioxide emission will be based on the prevailing market price of certified emission reduction (CER) certificates.

(c) **Reduction in Traffic Congestion Costs**

5.96 According to a JICA study entitled "Roadmap for Transport Infrastructure Development for Metro Manila and Its Surrounding Areas (Region III & Region IV-A)", the cost of traffic congestion in Metro Manila is currently placed at PHP2.4 billion per day. Congestion cost will increase to PHP6.0 billion per day by 2030 unless there is intervention from the relevant government agencies. With the Tutuban Redevelopment Project, residents will be encouraged to ride the railway system to go to work, instead of driving their own vehicles. This will contribute to the reduction in the cost of traffic congestion. Again, a full-blown survey will be required to arrive at these estimates.

(d) **Improved Safety of TOD Communities**

5.97 Based on the records of MMDA, there were 5,800 pedestrians run over along the streets of Metro Manila in 2013, which figure was higher than in the previous three years. Walkable designs of the TOD project will improve safety of residents and reduce pedestrian accidents. There are studies in the United States that compute the cost of

pedestrian accidents.[10]

5.98 Only two benefits will be included in the economic analysis–increased land values and job creation. The other benefits of TOD are captured in the appreciation of property values in the surrounding areas. The details and assumptions made in the computation of economic benefits used in the project evaluation are set out below.

(e) **Increased Land Values**

5.99 The proposed TOD project is located in Barangay 241, Tondo. Based on the Bureau of Internal Revenue's (BIR's) latest zonal values[11] for real properties in Zones 2 and 3 area, the value of residential land is PHP4,536 per sq.m. and for commercial land it is at a high PHP35,490 per sq.m (see Table 5.5.14). However, in the barangay where the Tutuban Center (or Zones 1-A and 1-B) is located, the zonal values are significantly higher at PHP81,900 per sq.m. for commercial land and PHP13,125 per sq.m. for residential land.

Table 5.5.14 Zonal Values of Real Properties in Tondo and San Nicolas, Manila

Barangay	Street/Subdivision	Vicinity	Classification	Zonal Value per sq.m.
Barangay 236	A. Rivera	Narra - Railroad	RR	4,536
	A. Villegas (Tayuman)	Narra - Railroad	CR	35,490
			RR	6,006
	Narra	Tayuman - Quiricada	CR	10,500
	Railroad	Tayuman	RR	4,536
	Villaruel	Tayuman - Quiricada	RR	4,536
	All Other Streets		CR	10,500
Barangay 247	A. Rivera	C.M. Recto–P. Algue	CR	13,125
			RR	7,812
	C. M. Recto	A. Rivera–Narra	CR	81,900
	P. Algue	A. Rivera–Narra	RR	5,544
	All Other Streets		CR	13,125
			RR	4,816

Source: Bureau of Internal Revenue.
Note: RR = Residential Regular, CR = Commercial Regular

5.100 Zonal values are often used as proxy variables for the fair market value of real properties. Once the proposed TOD project in the PNR complex is completed, its land value is expected to approximate that of Tutuban Center. The appreciation in land value will spill over to the TOD project's neighboring areas.

5.101 In the computation of the land value appreciation, it was assumed that for Zones 1-A and 1-B it will take about 10 years to reach Fort Bonifacio's[12] levels of PHP200,000 per sq.m and another 5 years to hit Makati CBD's[13] levels of PHP290,000 per sq.m (see Table 5.5.15). For Zones 2 and 3, land values will increase to PHP100,000 per sq.m. after 10 years and to PHP150,000 per sq.m. after another 5 years. Land values will appreciate at a steady rate of 5% per year after the 15th year of operations of the project.

[10] www.gmanetwork.com/news/story/366133/news/metromanila/16-pedestrians-are-run-over-every-day-in-metro-manila.

[11] DOF Department Order No. 14-2011 dated March 4, 2011, Implementation of the Revised Zonal Values and Real Properties in Tondo-San Nicolas, Manila Under the Jurisdiction of Revenue District Office No. 29 – Tondo/ San Nicolas, Manila for Internal Revenue Tax Purposes.

[12] Based on the latest BIR figures, zonal values in Fort Bonifacio area, depending on the floor area ratio, ranges from PHP200,000 to PHP270,000 per square meter.

[13] Based on the latest BIR figures, zonal value is PHP290,000 per square meter for the Makati Avenue area (from Paseo de Roxas to Ayala Avenue) and PHP318,500 per square meter for the Paseo de Roxas area (from Makati Avenue to Sen. Gil Puyat (former Mandarin Hotel site).

5.102 The land value appreciation is expected to spill over to 2.5 times the land area of the Tutuban Redevelopment Project or a total area of 35.1 ha.

Table 5.5.15 Projected Increases in Land Values

Zone	Land Area (sq. m.)	Current Land Values (PHP/sq.m)	Projected Land Values in 10 Years (PHP /sq.m)	Projected Land Values in 15 Years (PHP/sq.m)	Annual Increase from Years 16 to 30 (%)
Zone 1A	54,900	81,900	200,000	290,000	5
Zone 1B	18,300	81,900	200,000	290,000	5
Zone 2	27,400	35,490	100,000	150,000	5
Zone 3	38,100	35,490	100,000	150,000	5
TOTAL	138,700				

Source: JICA Study Team.

(f) **Job Creation**

5.103 The TOD project is expected to generate jobs in the near future. Assuming sales to employment ratio of PHP50 million-to-one in the retail trade sector, the project will generate some 171 jobs in its first year of operations. The number of jobs generated will reach its peak of 1,079 by 2033. Their average salary was assumed to be PHP15,000 per month.

5.104 In order to calculate the economic benefits, these factors need to be quantified. However, some of the factors are closely related and under the influence of multiplier effect. Therefore, it is difficult to clarify the benefits solely by TOD.

(g) **Reduction in Travel Time Due to the TOD Facilities**

5.105 The new TOD access facilities will reduce travel time for commuters in the Tutuban area by an estimated two minutes. The total number of passengers using the NSCR and the LRT2 Tutuban Stations is projected to reach 416,300 in 2020 and 377,300 in 2030 (see Table 5.5.16). The value of time is based on the NCR daily minimum wage of PHP466.

Table 5.5.16 Projected Number of Passengers at Tutuban Station for Benchmark Years

Particulars	2020		2030	
	Boarding	Alighting	Boarding	Alighting
NSCR	113,800	112,500	109,200	109,100
LRT2	97,000	93,000	82,000	77,000
Total	416,300		377,300	

Source: JICA Study Team.
Note: The number of passengers will increase further with better TOD implementation.

(3) Results of Economic Evaluation

5.106 The economic evaluation for the base case yields an EIRR of 35.5% and an ENPV of PHP1,768.8 million relative to a social discount rate of 15%, and given a project life of 30 years. These indicate that the proposed Tutuban Redevelopment Project is economically viable. The results of the economic evaluation are shown in Tables 5.5.17 and 5.5.18, and Figure 5.5.4.

Table 5.5.17 Evaluation of Economic Costs and Benefits
(In PHP million, constant 2015 prices)

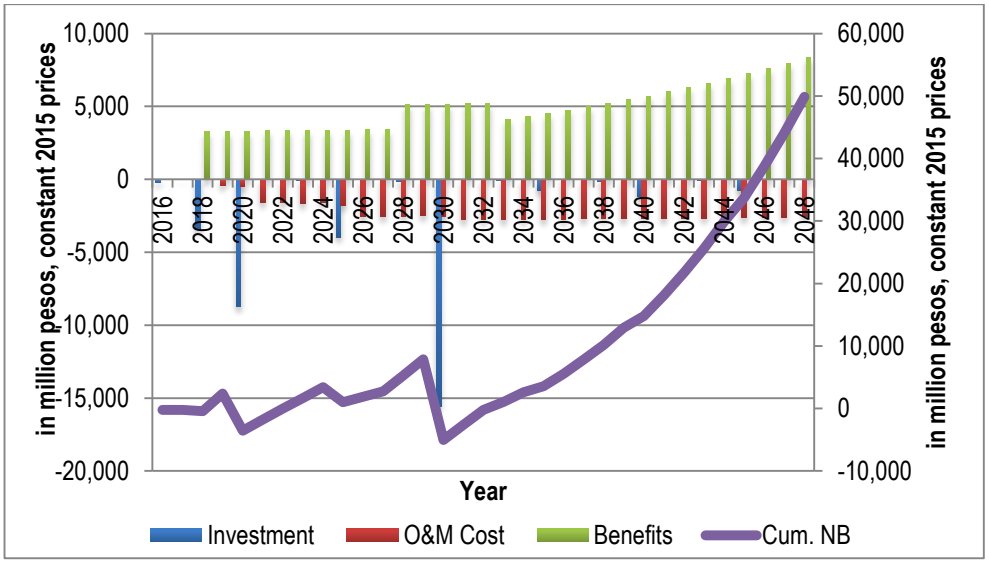
Year	Investments	O&M Cost	Benefits	Net Benefits	Discounted Cash Flow at 15%		
					Costs	Benefits	Net Benefits
2016	215.5	0.0	0.0	-215.5	215.5	0.0	-215.5
2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2018	3,462.8	7.7	3,250.1	-220.4	2,624.2	2,457.5	-166.7
2019	0.0	439.5	3,283.4	2,844.0	289.0	2,158.9	1,869.9
2020	8,764.1	486.2	3,286.2	-5,964.1	5,288.9	1,878.9	-3,410.0
2021	0.0	1,577.3	3,358.3	1,781.0	784.2	1,669.7	885.5
2022	0.0	1,578.1	3,357.9	1,779.9	682.2	1,451.7	769.5
2023	69.6	1,632.7	3,361.8	1,659.6	639.9	1,263.8	623.9
2024	0.0	1,623.0	3,361.2	1,738.2	530.6	1,098.8	568.2
2025	3,972.5	1,809.7	3,360.4	-2,421.8	1,643.7	955.2	-688.4
2026	0.0	2,533.2	3,419.7	886.5	626.2	845.3	219.1
2027	0.0	2,540.6	3,421.1	880.4	546.1	735.3	189.2
2028	139.2	2,514.9	5,149.5	2,495.5	496.1	962.5	466.4
2029	0.0	2,504.7	5,148.8	2,644.1	407.1	836.8	429.7
2030	15,570.7	2,509.4	5,147.6	-12,932.5	2,555.2	727.5	-1,827.7
2031	0.0	2,783.2	5,190.1	2,406.9	342.0	637.8	295.8
2032	0.0	2,786.5	5,191.3	2,404.8	297.8	554.8	257.0
2033	69.6	2,790.1	4,131.9	1,272.3	265.7	384.0	118.2
2034	0.0	2,773.0	4,326.4	1,553.4	224.1	349.6	125.5
2035	791.1	2,756.0	4,530.5	983.3	249.2	318.3	69.1
2036	0.0	2,739.3	4,745.1	2,005.8	167.4	289.9	122.6
2037	0.0	2,722.7	4,970.5	2,247.8	144.7	264.1	119.4
2038	139.2	2,706.2	5,207.0	2,361.6	131.5	240.6	109.1
2039	0.0	2,694.6	5,456.0	2,761.4	108.3	219.2	110.9
2040	1,190.5	2,679.0	5,717.2	1,847.7	135.2	199.7	64.5
2041	0.0	2,673.8	5,992.4	3,318.6	81.2	182.0	100.8
2042	0.0	2,657.8	6,280.5	3,622.7	70.2	165.9	95.7
2043	69.6	2,642.0	6,583.3	3,871.7	62.3	151.2	88.9
2044	0.0	2,626.3	6,901.0	4,274.7	52.5	137.8	85.4
2045	791.1	2,610.8	7,234.8	3,832.9	59.1	125.7	66.6
2046	0.0	2,595.4	7,585.3	4,989.9	39.2	114.6	75.4
2047	0.0	2,580.1	7,953.6	5,373.5	33.9	104.5	70.6
2048	0.0	2,565.0	8,340.2	5,775.1	29.3	95.2	66.0

Source: JICA Study Team.

Table 5.5.18 Results of the Economic Evaluation

Indicator	Value
EIRR	35.4%
ENPV	PHP1,754.7 million
Benefit-Cost Ratio	1.09

Source: JICA Study Team.



Source: JICA Study Team.

Figure 5.5.4 Economic Benefits, Costs and Cumulative Net Cash Flow

5.107 A sensitivity analysis was likewise carried out to determine the responsiveness of the EIRR to changes in the economic costs and benefits. Table 5.5.19 summarizes the results of the sensitivity analysis. For the project to realize an EIRR below the 15% hurdle rate, benefits will have to drop by 8.1% or costs will have to increase by 8.8% relative to the base case.

Table 5.5.19 Sensitivity Analysis of Financial Evaluation

		Change in Cost (%)				
		Base Cost	5% up	10% up	15% up	20% up
Change in Revenues	Base Case	35.4	20.2	13.9	10.3	7.8
	5% down	19.8	13.4	9.9	7.4	5.4
	10% down	13.0	9.4	6.9	4.9	3.3
	15% down	8.9	6.4	4.4	2.8	1.3

Source: JICA Study Team.

6 CONCLUSION AND RECOMMENDATIONS

6.1 Overall Conclusion

6.1 Transit-Oriented Development (TOD) is a development approach to promote sustainable urban development in synergy with competitive public transport and associated urban development. Its benefits extend widely not only to public transport users and operators but also to communities, developers and local authorities in different ways, depending on how the TOD plan is designed, implemented and managed.

6.2 TOD along the planned North-South Commuter Rail (NSCR) project entails three expected outcomes, namely: (i) contribution to mitigating Metro Manila's fundamental issues such as traffic congestion, lack of access to affordable housing, and resettlement from high hazard-risk areas, (ii) contribution to the improvement of living conditions/ environment in the influence areas of the NSCR in relevant Local Government Units (LGUs) through provision of TOD and its related infrastructure, and (iii) promotion of local economic development in the project's influence area, especially at and around the NSCR stations.

6.3 Ample opportunities have been identified to implement TOD along the NSCR. However, the benefits of TOD cannot be captured automatically. While TOD involves a wide spectrum of stakeholders, especially including the poor who are often neglected, how to distribute its tangible and intangible benefits equitably among the affected families always becomes a critical issue in the TOD implementation process (planning, design, construction, operation and management). At present, the practice of TOD in Metro Manila is limited and lacks a shared understanding on TOD concept among institutions and capable players.

(a) **Suburban Areas in Bulacan Province including Malolos, Guiguinto, Balagtas and Bocaue:** These areas are relatively less developed than the rest of the NSCR area and southern Metro Manila. The NSCR, the first modern and high quality commuter rail system is expected to bring about significant impacts on accessibility and socioeconomic development in its influence areas, as follows:

(i) **Improvement/Development of access facilities/services of the NSCR stations:** The areas will be directly and indirectly connected with urban centers in Metro Manila. Travel becomes shorter in time, safe, comfortable, stable and free from congestions on the roads. This will also attract people from Metro Manila to visit Bulacan and find new business opportunities. To realize the benefits of the NCSR stations located in Bulacan Province, access roads and transport services must be improved in a way that they contribute to increased ridership of the NSCR and improvement of local traffic conditions.

(ii) **Integrated urban development at/around the NSCR stations:** Various types of urban development occur at and around stations for both private and public sectors. Improved accessibility and concentration of public transport users enhance locations of commercial/business facilities. Stations become key transport nodes in the LGUs and can also offer opportunities to locate sub-centers for community services.

(iii) **Integrated development of medium- to large-scale mixed-use New Towns in Bulacan Province:** An important role expected of the NSCR is to encourage the

relocation of population and activities presently concentrated in the city center to the outer areas while accessibility to the city center is ensured. Once Bulacan is provided with the NSCR, connectivity between the NSCR stations and the new town developments must be properly provided.

(b) **Peri-urban areas of Metro Manila including Marilao and Meycauayan in Bulacan Province and Valenzuela of Metro Manila:** These areas form an integral part of Metro Manila and different scales and types of developments have taken place around the planned stations. While there are still vacant and unused lands in the areas, introduction of the TOD concept can contribute to organizing the land use and improving the road network in these influence areas.

(c) **Urban areas in Metro Manila including Caloocan, Solis and Tutuban:** These areas can generate significant positive impacts in terms of transport and socioeconomic development when the Philippine National Railways (PNR)-owned properties are properly developed. The impacts will not only be limited to the project areas but will also extend farther to adjoining urban areas. TOD will improve heavily congested and degrading urban areas of Metro Manila.

6.4 TOD integrated with the NSCR will bring about a wide range of benefits at and around the stations as well as along the NSCR corridor, as follows:

(i) TOD will further improve transport accessibility between origin and destination of NSCR users through its improved access transport service and mode interchange facilities at the respective NSCR stations;

(ii) TOD will contribute to improvement of local traffic circulation through reorganization and improvement of local public transport services, which will benefit non-users of the NSCR as well; and,

(iii) TOD will create additional and enhanced opportunities of different scales for commercial and business development at and around the NSCR stations, both for existing and new investors. TOD will also provide local communities and entities with investment opportunities.

6.5 To maximize and fairly distribute the TOD benefits, participation of relevant stakeholders throughout the process of planning, implementation and operation is the key to success. This process must be supported with the clear policy commitment of both central and local governments, an effective institutional framework that controls and guides the activities of the different players, and the active involvement of private sector and local communities.

6.2 Overall Recommendations

6.6 To achieve the expected outcomes of TOD along the NSCR, the following are recommended;

(i) **Shared understanding and consensus-building on the proposed TOD concept:** TOD is a relatively new concept and rarely practiced in the past experience with the LRT, MRT and PNR, though a handful of studies and proposals exist. After the completion and operation of LRT 1 and 2 as well as MRT 3, TOD was attempted and realized at various stations, but only on a limited scale. Implementation timing is critical for successful TOD as major access improvements need to be completed prior to the commencement of mass transit operation to maximize its benefits for all stakeholders and residents in the local community. Participatory approach in planning from the initial phase is also required to maximize the benefits. Since TOD encompasses a variety of stakeholders, it is essential to identify them and encourage their involvement at the early stage of planning. The TOD concept prepared in this study provides a useful basis for the further collaboration among stakeholders to elaborate the plan towards implementation.

(ii) **Provision of the necessary institutional framework:** TOD is a typical area for policy attention that requires partnership between the public and private sectors. The public sector must ensure the realization of public benefits and the provision of a platform where private sector investment is attracted without spoiling public benefits. For this purpose, the overall TOD plan must be translated into a legally binding urban plan or equivalent document at the Central Government and LGU levels. It is necessary to prepare TOD guidelines for each station area which specify the roles and responsibilities of relevant stakeholders including both the public and private sectors. In TOD, the private sector should not free-ride on investment by the public sector which provides the NSCR, intermodal facilities such as parking station plaza, access roads, etc. The expected benefits from the development of the NSCR and related facilities should also be shared by public sector to cross-subsidize expensive investment. The TOD guidelines will include: (i) designation of the TOD area for plan formulation and approval by related authorities; (ii) identification of TOD projects, especially public infrastructure; and (iii) identification of TOD projects and conditions for private sector investment and participation, among others.

(iii) **Extending the service of the NSCR towards Central and Northern Luzon:** Since the Municipality of Balagtas is expected to play a major role as a multi-modal gateway in Bulacan Province considering its proximity to both the NSCR and the NLEx mainline, consultation between Department of Transportation and Communications (DOTC) and the LGUs is recommended at the earliest opportunity to take advantage of the current availability of the land. This will further expand the benefits to the people living in Central and Northern Luzon for their access to Metro Manila without worrying about traffic congestions in the vicinity of the metropolis.

6.3 Conclusions and Recommendations for Tutuban Area Redevelopment

6.7 The Tutuban Station area has exceptional potential among the 10 target NSCR stations in the Study area to play a major role in transportation and urban development. Currently, the overcrowded population, traffic congestion and deterioration of environmental integrity hinder vibrant socioeconomic activities and cause significant losses in the economy as well as in cultural attractiveness not only in the City of Manila but also in Metro Manila. Results of the study clarify the possibility to revitalize the Tutuban area dramatically by the integrated and strategic redevelopment of the Tutuban PNR property including the NSCR and LRT2 stations. Since the Tutuban PNR property is approximately 20 ha of precious consolidated land in central Manila, Tutuban redevelopment will be a catalyst for the entire urban renewal throughout the City of Manila.

6.8 To maximize the positive impact of the Tutuban area redevelopment, the following actions are highlighted to be implemented in a timely manner:

(a) **Planning and implementation of the schedule by taking the construction and operation of the NSCR into consideration:** Redevelopment of Zone 1-A where two Tutuban stations are located is essential as it establishes a gateway to be a catalyst for the redevelopment of the entire Tutuban PNR property and adjacent communities by its multiplier effects. In order to take advantage of such opportunity and maximize the benefits of the NSCR, the redevelopment project needs to be completed prior to the operation of the NSCR. Therefore, the following projects need to be implemented in a timely manner:

  (i) Construction of the commercial facilities in Zone 1-B is proposed to be completed by 2018 by utilizing the current surface parking lot in order to secure sufficient time to relocate the existing shops in the Tutuban Mall.

  (ii) Relocation of the existing PNR railway facilities including the station and PNR headquarters to Zone 3 is proposed to be completed by 2018. Since the current station has conflict with the proposed viaduct of the NSCR, it needs to be relocated prior to the construction of the NSCR. Early implementation of the relocation allows for the moving of the completion of the redevelopment in Zone 2 close to 2020 when the NSCR starts its operation. Since Zone 2 has a landmark facility expected to attract visitors locally and globally, early implementation of the redevelopment in Zone 2 is desirable to maximize the attractiveness of the entire redevelopment of the Tutuban PNR property in an effective and timely manner.

  (iii) Since deterioration of traffic congestion is expected during construction of the NSCR, the Dagupan St. widening is proposed to be completed by 2016 as an immediate-term project by DOTC.

(b) **Establishment of implementation structure to accomplish TOD:** As discussed in ***Chapter 6.2***, TOD encompasses a variety of stakeholders and, specifically, the stakeholders of the Tutuban area redevelopment include both the public sector such as DOTC, PNR, DPWH, MMDA and the City of Manila as well as the private sector such as TPI (the developer of Tutuban mall) and Prime Orion (parent company of TPI). In order to coordinate these stakeholders, the following actions are required:

  (i) As described in ***Chapter 5***, a Project Steering Committee needs to be established by DOTC through the invitation of all major stakeholders. Since the Project Steering Committee needs to take care of various tasks such as planning,

construction, financing, and legal aspects to coordinate among stakeholders, DOTC has to commission the necessary advisory services and establish a transaction advisory team at the earliest opportunity to support the Project Steering Committee in an effective and efficient manner.

(ii) Once project planning is completed, necessary implementing bodies need to be established such as an operation and management company for the facilities under the NSCR viaduct to maximize the multiplier effects of the NSCR and the Tutuban area redevelopment.

(c) **Coordination with NSRP South Line:** The study area of the NSCR between Malolos and Tutuban was approved by the NEDA Board in February 2015 as the North-South Railway Project (NSRP) together with the south line connecting to Calamba, Laguna Province. The construction schedule and contents of the south line will affect the NSCR in the study area, in particular the relocation of the Tutuban PNR station. Since not only the scale of the relocated railway facility but also the necessity of the relocation itself might be changed due to the contents and schedule of the south line, continuous information sharing and coordination will be needed.

6.9 Based on these recommendations, the following steps need to be made for the implementation of the Tutuban area redevelopment:

(a) **Finalization of Tutuban area redevelopment plan:** While the Tutuban area redevelopment plan proposed by this study is planned to be adopted as a master plan by PNR, a Memorandum of Understanding (MOU) for cooperation in the planning of the NSCR and LRT2 Tutuban Station is about to be signed by DOTC, PNR, LRTA, and TPI as of March 2015. Since the MOU clearly states that an agreeable station plan needs to be prepared within six months after signing of the MOU, DOTC has to take the initiative to reach a consensus among all parties and has to prepare the detailed plan in accordance with the master plan. The following aspects need to be considered in the preparation of the detailed plan:

(i) Since detailed planning of Zone 1-A where two Tutuban stations are located relates to the historic preservation of the original PNR Tutuban station structure as well as all other facilities in the Tutuban PNR property due to its characteristics as a gateway of the entire redevelopment site, a holistic approach needs to be taken by sharing the common future vision for the entire Tutuban PNR property among stakeholders.

(ii) DOTC has to take the initiative not only for the railway projects (NSCR, LRT-2) but also for the Tutuban Redevelopment Project since it provides significant opportunities to generate sufficient revenue to sustain the railway operation. Therefore, as described in ***Chapter 5***, DOTC needs to commission the necessary consulting services for planning as part of the required consulting services for public-private partnership (PPP) formulation.

(b) **Implementation of immediate-term projects:** In addition to the formulation of the PPP arrangements for the Tutuban area redevelopment, DOTC also needs to implement the immediate-term projects (i.e., Dagupan St. widening and development of the station plaza) that are planned to commence construction in the first quarter of 2016. To implement the immediate-term projects in a timely manner, the following actions will be needed:

(i) Consensus-building for the demolition of affected structures for the Dagupan St. widening is required among the stakeholders. In particular, agreement of TPI on the demolition of Cluster Building 2 is important as it is the largest structure located in the area of the proposed widening section.

(ii) Since the immediate-term project includes the construction of an information center in the station plaza, it needs to be designed to widely disseminate the relevant information on the Tutuban area redevelopment not only among the stakeholders but also for the local residents and visitors to share the common future vision of the area in an effective manner.

(c) **Establishment of necessary redevelopment implementation agencies:** In order to implement the Tutuban area redevelopment by TOD, the following agencies need to be established in a timely manner, in addition to the Project Steering Committee and Transaction Advisory Team**:**

(i) Development, operation and management agency for the facilities under the viaduct: Although the space under the viaduct at the Tutuban station area is considered as a potential relocation site for the street vendors affected by the LRT2 West Extension project, it seems to have an extra space that can be leased out to other tenants, considering the number of affected vendors and the other alternative relocation sites in the Tutuban PNR property. The space under the viaduct near the station has a high potential for commercial use and there are many successful examples of such development in many countries including Japan. Therefore, if DOTC takes the initiative to develop the space and attracts tenants as PPP prior to the operation of the NSCR based on these good practices, the benefits would be maximized for the entire redevelopment project. Once the agency is established as the project implementer, it will enable to expand the opportunity not only in the Tutuban station area but also in the other station areas and generate sufficient revenues for the sustainable railway operation.

(ii) Development, operation and management agency for the public transportation facilities: Since the Tutuban area redevelopment plan proposes the public transportation facilities located in the structures to be developed by the private sector, a development, operation and management agency will be needed to maintain their appropriate functions as public facilities.

APPENDICES

APPENDIX 3.1 ROAD INVENTORY WITHIN 1 KM FROM CALOOCAN STATION

Appendix 3.1 Road Inventory within 1 km from Caloocan Station

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
5th Avenue	J.P.Rizal-Baltazar	National Highway	616	8	Commercial
A. Mabini	Samson Road - 5th Ave.	National Highway	1503	4	Residential; Commercial
C-4	Dagat-Dagatan - Gen. San Miguel	National Highway	604	7	Industrial
Dagat-Dagatan Avenue	5th Avenue-C4	National Highway	1596	6	Institutional
Gen. San Miguel (C-4 ext.)	C-4 - M.H. Del Pilar	National Highway	449	4	Commercial, Residential
Gov. Pascual	M.H. del Pilar - Pinagtapunan	National Highway	2328	2	Residential
J.P.Rizal Avenue Ext.	Rotonda-5th Avenue	National Highway	1383	8	Commercial
M.H. Del Pilar	Gov. Pascual Ave. - Samson Road	National Highway	1425	4	Commercial
MacArthur Highway	Monumento - Pinagtipunan	National Highway	671	4	Commercial
10th Avenue	Rizal Avenue - 3rd Street	City Road	308	4	Commercial; Institutional
11th Avenue	Rizal Avenue - Bulacan	City Road	458	2	Residential
1st	Lakas ng Mahihirap-Gen. Luna	City Road	121	2	Residential
2nd	Lakas ng Mahihirap-Gen. Luna	City Road	195	2	Residential
3rd	Lakas ng Mahihirap-Gen. Luna	City Road	160	2	Residential
4th	Gen. Luna - Lakas ng Mahihirap	City Road	179	2	Residential
5th	Gen. Luna - J. Ramos	City Road	307	2	Residential
7th Ave.	J.P.Rizal-Baltazar	City Road	624	2	Residential
8th Ave.	Rizal Ave.- End	City Road	846	2	Residential
9th Ave.	Rizal Ave.- P. Santiago	City Road	771	2	Residential
A. Bato	A. Mabini-T. Bugallion	City Road	132	2	Residential; Institutional
A. Bonifacio	Baltazar - A. Mabini	City Road	308	4	Commercial; Institutional
A. De Leon	D. Aquino-Galauran	City Road	235	2	Residential
A. Del Mundo	11th Ave. - 5th Ave.	City Road	950	2	Residential; Commercial
A. Palon	Baltazar 1 - Stotsenberg	City Road	292	2	Residential
Aglipay	Apostol - Plaridel	City Road	168	2	Residential
Alamang Ext.	Lapu-lapu - End	City Road	364	1	Residential
Alimasag Alley	Lapu-Lapu Ext. - Kapak Alley	City Road	281	2	Residential
Alley 1	Francisco - End	City Road	28	1	Residential
Alley 2	Francisco - End	City Road	30	2	Residential
Aluminio	Plata - Paz	City Road	244	2	Residential
Alvarez	Apostol - End	City Road	409	2	Residential
Asero	Dr.Lascano(Paz Ext.) - Plata	City Road	252	2	Residential
Asogue	Mercurio - Paz	City Road	129	2	Residential; Institutional
B. Baltazar	G. Aglipay - Baltazar 1	City Road	137	1	Residential
B. Victorio	10th Avenue - End	City Road	75	1	Residential
Balong Bato	Talakitok-Gen. Luna	City Road	134	1	Residential
Baltazar	5th Avenue-M.Asistio (10th ave.)	City Road	759	2	Residential
Baltazar Bukid	A. Palon - Stosenberg	City Road	174	2	Residential
Baltazar I	A. Palon - Baltazar III	City Road	129	2	Residential
Baltazar II	A. Palon - M. Asistio (10th Ave.)	City Road	412	2	Residential
Baltazar III	Plaridel - Baltazar I	City Road	176	2	Residential
Baltazar IV	A. Palon - Stosenberg	City Road	173	2	Residential
Bangayngay	Kapak - End	City Road	304	2	Residential
Bernadette	D. Aquino - Galauran	City Road	272	2	Residential
Bisig ng Kabataan	Samson Road - End	City Road	479	1	Residential
Block 36	Hipon - Kapak	City Road	386	2	Residential
Block 5	J.P. Rizal - End	City Road	194	1	Residential
Brillantes	Baltazar - End	City Road	182	2	Residential
Briones	V. Sevilla - End	City Road	144	2	Residential
Bronze	Paz - Zinc	City Road	630	2	Residential
Bukid ng Nayon	San Miguel (Letre Road) - End	City Road	182	2	Residential
Buklod ng Nayon	San Miguel (Letre Road) - End	City Road	191	2	Residential
Bulacan	M. Asistio 10th Ave. - End	City Road	89	1	Residential
C. Apostol	Alvarez - Hizon	City Road	254	2	Residential

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
C. Cordero	9th Ave.-5th Ave.	City Road	620	2	Residential; Institutional
C. Corderro	9th Avenue-5th Avenue	City Road	685	2	Residential; Institutional
Caimito	Samson Road - Mc Arthur	City Road	807	2	Residential; Institutional
Calaanan	Heroes del 96-Gonzales	City Road	113	2	Residential
Camelot	Lakas ng Mahihirap - Velasco	City Road	131	2	Residential
Canduli	Dagat-Dagatan - End	City Road	91	1	Residential
Capas	D. Aquino-Centro	City Road	279	2	Residential
Caridad	Innocencia de Vatchan - End	City Road	158	2	Residential
Centro	9th Ave. 10th Ave.	City Road	161	2	Residential
Constancia	M.H. del Pilar - Prosperidad	City Road	294	2	Residential
Corrigedor	D. Aquino-Gen. Del Pilar	City Road	337	2	Residential
D. Aquino	M. Asistio (10thave.) - 5th Ave.	City Road	783	2	Residential
Dagohoy	Samson Road - End	City Road	361	2	Commercial; Industrial
Delas Alas	Heroes del 96-Gonzales	City Road	96	2	Residential
Delmonte	Samson Road - Gov. Pascual	City Road	978	2	Residential
Dona Consuelo	P.Zamora Dona Rita	City Road	413	2	Residential
Dona Rita	Don Antonio-5th Ave.	City Road	215	2	Residential
Dr. Lascano (Paz)	Dr.Lascano(Paz Ext.)-Prosperidad	City Road	644	2	Residential
Dr. Lascano (Paz Ext.)	C4-Paz	City Road	330	2	Residential
Esperanza	Gen. Luna-End	City Road	65	2	Residential
Espiña	Tamban-A. Mabini	City Road	310	2	Residential
Estanio	Dr.Lascano(Paz Ext.) - End	City Road	223	2	Residential
F. Roxas	9th Ave.-7th Ave.	City Road	310	2	Residential; Industrial
F. Sevilla	12th Ave.-5th Ave.	City Road	962	2	Residential; Institutional
F.Roxas	7th Avenue-5th Avenue	City Road	310	2	Residential; Industrial
Fajan	Bisig ng Kabataan - End	City Road	28	1	Residential
Farely	Heroes del 96-Gonzales	City Road	102	2	Residential
Fili	J. Felipe	City Road	243	2	Residential
Filomena	Ezperanza-Espina	City Road	76	2	Residential
Flolrencia	11th Ave. - Francisco	City Road	318	2	Residential
Francisco	Samson Road - W 12th Ave.	City Road	465	2	Residential; Commercial
G. Aglipay	Apostol - Plaridel	City Road	168	2	Commercial
G. del Pilar	Apostol - 9th Ave.	City Road	404	2	Residential
G. del Pilar Ext.	P. Burgos-End	City Road	990	2	Residential
Galauran	A. Bonifacio - Ipil	City Road	424	2	Residential
Gen. del Pilar	Apostol - 9th Ave.	City Road	404	2	Residential
Gen. Luis	A. Mabini-Gen. Luna	City Road	90	2	Residential
Gen. Luna	5th Street - J. Rodriguez	City Road	731	2	Residential
Gen. P. Villanueva	Reparo - Samson Road	City Road	393	2	Residential
Gonzales	Bugallon - New Abbey	City Road	478	2	Residential
Gozon	Heroes del 96-Gonzales	City Road	108	2	Residential
Heroes del 96	SamsonRoad - New Abbey	City Road	460	2	Residential
Hippon Alley	Kapak - Dagat-dagatan	City Road	473	1	Residential
Honradez	Inocencia - Lingkod ng Nayon	City Road	512	2	Residential
Inocencia de Vatchan	M.H. del Pilar - End	City Road	285	2	Residential
Ipil	Baltazar-Galauran	City Road	81	2	Residential
J. Ramos	Lakas ng Mahihirap - End	City Road	202	2	Residential
J. Rodriguez	Gen. Luna - End	City Road	277	2	Residential
J. Teodoro	11th Avenue - 5th Ave.	City Road	978	2	Residential; Institutional
J.Felipe	Lakas ng Mahihirap - Gen. San Mig.	City Road	281	2	Residential
Kabulusan	A. Mabini - Orkana	City Road	77	2	Residential
Kapak Alley	Dagat-Dagatan - Alley	City Road	94	2	Residential; Commercial
Kapak Alley	Sabalo - Alley	City Road	314	2	Residential; Commercial
L. Roque	M.H. Del Pilar - End	City Road	187	1	Residential
Lakas ng Mahihirap	A. Mabini	City Road	140	2	Residential
Lakas ng Marami	M. H. del Pilar	City Road	150	2	Residential
Langaray Street	Langaray-Bangayngay	City Road	386	2	Residential

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
Lapu-Lapu	Samson Road - Reparo	City Road	369	2	Residential
Lapu-Lapu Ext.	Dagat Dagatan	City Road	419	2	Residential
Libertad	M.H. del Pilar - Prosperidad	City Road	303	2	Residential
Libis Espina	Daang Baka - Espina	City Road	149	2	Residential
Libis Talisay	2nd Street - Libis Espina	City Road	185	2	Residential
Lucia	Florencia - 12th Ave.	City Road	150	2	Residential
Luis De Leon	Peralta - A. Bonifacio	City Road	131	2	Residential
M. Arce	Heroes del 96-Gonzales	City Road	118	2	Residential
M. Hizon	10th Ave.-Apostol	City Road	188	2	Residential
M. Hizon (A&B)	P. Burgos - P. Purgos (U-shape)	City Road	246	2	Residential
M. Hizon 1	M. Asistio - End (Parallel)	City Road	347	2	Residential; Institutional
M. Hizon 2	P. Burgos-C. Apostol	City Road	198	2	Residential
M.L. Quezon	Sisa - Nirvana	City Road	254	2	Residential
Macario Asistio Sr. (10th Ave.)	Rizal Ave. Ext. - Baltazar	City Road	614	4	Residential; Institutional
Malonzo	Masagana - End	City Road	156	2	Residential
Mango Road	Pinagtipunan - Dunywood	City Road	589	2	Commercial; Institutional
Manuel Peralta	A. Boifacio(10th Ave.) - End	City Road	108	2	Residential
Marcos	Bisig ng Kabataan-End	City Road	39	1	Residential
Masabielle	D. Aquino-Galauran	City Road	236	2	Residential
Masagana	Samson Road - Heroes Del 96	City Road	91	1	Residential
Maysan	Pusit - Sapsap	City Road	135	1	Residential
Mt. Samat (Villarosa)	Heroes del 96-Gonzales	City Road	135	1	Residential
Nadurata	Lerma - End	City Road	384	2	Residential
New Abbey	Samson Road - A. Bonifacio	City Road	648	2	Residential
Noli	J. Felipe	City Road	213	2	Residential
Orkana	Kabulusan - Talakitok	City Road	122	1	Residential
P. Bonifacio	Gov. Pacual - Caimito	City Road	689	2	Residential
P. Burgos	A. Mabini -10th	City Road	60	4	Commercial
P. Galauran	Ipil - M. Asistio (10th Ave.)	City Road	449	2	Residential; Institutional
P. Garcia	New Abey - Alvarez	City Road	204	2	Residential
P. Gomez	P. Sevilla - End	City Road	96	2	Residential
P. Gomez 2	A. Mabini - T. Bugallon	City Road	110	2	Residential
P. Pablo	M. Asistio (10th Ave.) - End	City Road	124	2	Residential
P. Santiago	9th Ave.-A. Bonifacio	City Road	155	2	Residential
P. Sevilla	W 12th Ave. - 9th Ave.	City Road	333	2	Residential
P. Zamora	P. Burgos - M. Francisco	City Road	584	2	Residential; Commercial
Paz	Prosperidad - Paz Ext.	City Road	795	2	Residential
Paz Extension	C4 - Paz	City Road	179	2	Residential
Perpetua	C-3 - Martinez	City Road	363	2	Residential
Plaridel	A. Mabini - T. Bugallon	City Road	130	1	Residential
Prelaya	M.H. del Pilar - Sisa	City Road	369	2	Residential
Prosperidad	Industria - Sisa	City Road	378	2	Residential
Pureza	M.H. del Pilar - Prosperidad	City Road	313	2	Residential
Pusit Alley	Dagat-Dagatan-Sabalo	City Road	233	2	Residential
R. Candido	D. Aquino-P. Santiago	City Road	304	2	Residential
Sabalo	Tanigue - C4	City Road	978	2	Residential
Salaysalay	Sabalo - End	City Road	205	2	Residential
Samson Road	Monumento-J.P. Bautista	City Road	162	4	Commercial
Samson Road	J.P. Bautista - A. Mabini	City Road	1173	4	Institutional
Sgt. Esguera	Baltazar Bukid - Francisco	City Road	343	2	Residential
Silinyasi	Lapu-Lapu Ext. - Samaral	City Road	368	2	Residential
Silinyasi Ext.	Silinyasi - Dagat-dagatan	City Road	183	1	Residential
Sisa Street	Gov. Pascual Ave. - J.P. Rizal	City Road	662	2	Residential
Sitio Uno	M.H. Del Pilar - End	City Road	94	1	Residential
Solis	J. Felipe	City Road	76	2	Residential
Stosenberg	Francisco - Baltazar Bukid	City Road	327	1	Residential
Sunflower	Tatampal - Talaba	City Road	149	1	Residential

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
Tahong	Dagat-dagatan - End	City Road	412	2	Residential
Tajan	Bisig ng Kabataan-End	City Road	39	1	Residential
Talakitok	Libis Espina - End	City Road	334	2	Residential
Talangka	Tanigue - Tilapia	City Road	259	2	Residential
Talimusak	Tilapia-Tanigue	City Road	242	2	Institutional
Tamban Street	C-3-Tanigue	City Road	639	2	Residential
Tanigue	Dagat-Dagatan - End	City Road	379	1	Residential
Tatampal	Tulingan - Tanigue	City Road	276	2	Residential
Tatampal Alley	Tulingan - Tanigue	City Road	317	2	Residential
Torres	Samson Road - Gonzales	City Road	119	2	Residential
Torres Bugallon	Samson Rd. - A. Bonifacio (10th ave.)	City Road	762	2	Residential
Tulingan	Tamban - Dagat -Dagatan	City Road	250	2	Commercial
Tulya	Tamban - Dagat -Dagatan	City Road	218	2	Residential
Tupda ViLlage	Lakas ng Mahihirap - End	City Road	193	1	Residential
Ursua	Bisig ng Kabataan - End	City Road	33	1	Residential
V. Sevilla (Gaularan)	Brilliantes-Yabut	City Road	280	2	Residential
Velasco	Lakas ng Mahihirap - End	City Road	130	2	Residential
Vibora	Aglipay - A. Bonifacio (10th Ave.)	City Road	176	2	Residential
Villa Maria	M.H. Del Pilar - end	City Road	208	1	Residential
Virata	Heroes del 96-Gonzales	City Road	127	2	Residential
W 12 Ave.	Rizal Ave. Ext. - P. Sevilla	City Road	411	2	Residential
Yabut	V. Sevilla	City Road	200	2	Residential

APPENDIX 3.2 ROAD INVENTORY WITHIN 1 KM FROM TUTUBAN STATION

Appendix 3.2 Road Inventory within 1 km from Tutuban Station

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
Antonio Rivera	Tayuman - C.M. Recto	National Highway	1.167	2	Commercial
Bambang	Antonio Rivera - A. Mendoza	National Highway	1.255	2	Commercial
C. M. Recto with median	From C.M. Recto - Oroquieta St	National Highway	2.027	2	Commercial
C. M. Recto without median	From R-10 to Median	National Highway	0.231	2	Commercial
Dagupan	C.M. Recto - Raxabago	National Highway	1.773	1	Commercial
Delpan	Zaragosa - Muelle dela Industria	National Highway	0.835	2	Residential; Institutional
Delpan	Zaragosa - R-10	National Highway	0.337	2	Residential; Commercial
Escolta	Quintin Paredes - Plaza Sta Cruz	National Highway	0.458	1	Residential; Commercial
G. Masangkay	Bambang - Salazar	National Highway	1.155	1	Commercial
Jose Abad Santos Ave.	C.M. Recto - Old Antipolo	National Highway	1.921	2	Commercial
Masanggkay	Bambang - End	National Highway	1.154	6	Commercial
Mayhaligue	Dagupan - End	National Highway	0.549	1	Residential; Commercial
Mayhaligue	Felix Huertas - End	National Highway	0.686	2	Residential; Commercial
Moriones	R10-Juan Luna	National Highway	0.879	2	Residential
Moriones	Bonifacio Drive -Juan Luna	National Highway	0.37	5	Commercial
Ongpin	Juan Luna - Ronquillo	National Highway	0.838	2	Residential; Commercial
Roman	C.M. Recto - Soler	National Highway	0.12	4	Commercial
Soler	C.M. Recto - Evangelista	National Highway	1.392	1	Commercial
Abad Santos	Moriones-Ibarra	City Road	0.377	2	Residential
Abad Santos	Delpan Ext.- San Antonio	City Road	0.09	2	residential
Aguila	Sta.Maria-N. Zamora	City Road	0.18	2	Residential
Aguilar	Luzon - Tronque	City Road	0.184	2	Residential
Alcalcera St.	San Fernando-jaboneros	City Road	0.077	1	Residential; Commercial
Alinan	Moriones - Cristobal	City Road	0.112	1	Residential
Almario	Dagupan - End	City Road	0.19	1	Residential
Almeda	Quiricada - Old Antipolo	City Road	1.042	2	Residential
Alvarado	Mayhaligue - Padre Algue	City Road	0.4	4	Residential; Institutional
Alvarado	Soler - Veronica	City Road	0.333	1	Commercial
Alvarez	Alfonso Mendoza - Ipil	City Road	0.657	1	Residential; Commercial
Anacleto	Alvarez - Lope de Vega	City Road	0.619	2	Residential
Anacleto	Old Antipolo - Tayuman	City Road	0.639	2	Residential
Arqueros	Capulong - Dagupan	City Road	0.302	1	Residential
Asuncion	Morga - C.M. Recto	City Road	0.749	1	Commercial
Asuncion Ext.	C.M. Recto - San Fernando	City Road	0.621	1	Residential
Bahama st.	Ongpin - Espelita	City Road	0.11	4	Residential; Commercial
Balagtas	Sto Cristo - Mabuhay	City Road	0.524	1	Residential
Balaya	G. Perfecto - Dagupan	City Road	0.155	2	Residential
Baltazar	Nicolas Zamora-Velasquez	City Road	0.389	2	Residential
Banquero	Escolta -Dasmarinas	City Road	0.169	6	Residential; Commercial
Baraca	Orbiztondo-Dasmarinas	City Road	0.22	4	Residential; Commercial
Barcelona	M. De Santos -Muelle de Industria	City Road	0.535	2	Residential
Benavidez	Soler - Salazar	City Road	0.25	2	Commercial; Industrial
Benavidez	Soler - End	City Road	0.587	2	Residential; Commercial
Between Ilang Ilang and Sto Cristo	Sto cristo-Ilang Ilang	City Road	0.5	2	Residential; Commercial
Biak Na Bato	Yakal - San Nicolas	City Road	0.262	1	Residential
Bougainvilla	Kagitingan-Mabuhay	City Road	0.105	2	residential
Bucaneg	G. Perfecto – Dagupan	City Road	0.309	2	Residential
Burke St.	T. Pinpin - Muelle Del Banco Nacional	City Road	0.302	2	Residential; Commercial
Bustos St	Plaza Sta Cruz-Rizal ave.	City Road	0.179	2	Residential; Commercial
C. La Torre	A. Rivera - N. Rizal	City Road	0.344	2	Intitutional
C.P.Garcia	Herbosa - Pacheco	City Road	0.359	2	Residential
Cabezas	G. Perfecto - Dagupan	City Road	0.154	4	Residential
Camba	C.M. Recto-Jaboneros	City Road	0.533	2	Commercial

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
Carmen Planas	M. De Santos - Lakandula	City Road	0.553	2	Commercial
Carnation	Kagitingan-R10	City Road	0.104	1	Residential
Chesa	R10-Quezon	City Road	0.245	2	Residential
Clavel	Sto. Cristo - End	City Road	0.466	2	Residential; Commercial
Claveria St	S. Padilla - Poblete	City Road	0.087	2	Residential; Commercial
Concha	N. Zamora - Sta Fe	City Road	0.717	4	Residential; Institutional
Coral	Juan Luna-Sta.Maria	City Road	0.16	2	Residential
Coral	G. Perfecto - Dagupan	City Road	0.151	1	Residential
Coral	Varona-Madrid Ext.	City Road	0.836	1	Residential
Corcuera	Sta.Maria - N. Zamora	City Road	0.289	1	Residential
Cristobal	Masinop-CP Garcia	City Road	0.118	2	Residential; Institutional
Dalanghita	Cristobal-Chesca	City Road	0.183	2	Residential; Institutional
Dandan	Nicolas Zamora-F. Valora	City Road	0.478	2	Residential
Dapdap	Tayuman - End	City Road	0.113	2	Residential
Dasmariñas	Tetuan - End	City Road	0.726	3	Residential; Commercial
De Santos	Ylaya-Barcelona	City Road	0.569	2	Commercial
De Vera	Moriones-Morga	City Road	0.082	1	Residential
Deodato	G. Perfecto - Dagupan	City Road	0.154	2	Residential
Dizon	Ipil - Bambang	City Road	0.085	1	Residential
Dona Aurora	Kagitingan-R10	City Road	0.105	2	Residential
Doroteo Jose	Luzon - Oroquieta	City Road	0.46	2	Commercial
E. Manalo/ Apitong	Tayuman - End	City Road	0.13	4	Residential
Elcano	C.M. Recto - Urbiztondo	City Road	0.716	1	Commercial
Elena	Moriones-Ricafort	City Road	0.054	1	Commercial; Institutional
Endaya	G. Perfecto - Dagupan	City Road	0.264	2	Residential
Esguerra	Nicolas Zamora-Velasquez	City Road	0.453	2	Residential
Esmeralda	Kagitingan-R10	City Road	0.105	2	Residential
Espelita St.	Thomas Mapua-Sabino Padilla	City Road	0.27	2	Residential; Commercial
F.Torres St.	Ronquillo-CM Recto	City Road	0.412	1	Residential; Commercial
Fajardo	Juan Luna-Reyes	City Road	0.127	2	Residential
Fernandez st	Ongpin- End	City Road	0.079	1	Residential; Commercial
Francisco	Nicolas Zamora-F. Varona	City Road	0.523	1	Residential
Franco	Moriones - End	City Road	1.244	1	Residential
Fugoso	Alfonso Mendoza - End	City Road	0.728	2	Residential
Fullon	G. Perfecto - Dagupan	City Road	0.252	2	Residential
Fundador	Santo Cristo-Lavezares	City Road	0.195	1	Residential; Commercial
G. Perfecto	Pilapil - End	City Road	1.222	2	Residential
Gabriela	Dagupan - End	City Road	0.243	2	Residential
Gerona	Nicolas Zamora-Velasquez	City Road	0.501	2	Residential
Gonzalo St	Bilibid Viejo - Ongpin	City Road	0.702	4	Residential; Commercial
Hamabar	G. Perfecto - Dagupan	City Road	0.232	6	Residential
Herbosa	R-10 - Juan Luna	City Road	1.18	1	Commercial
Hernandez	Moriones-Concha	City Road	0.151	4	Residential
Herrera	Felix Huertas - End	City Road	0.659	4	Residential
Hinahon	Kagitingan-Wagas	City Road	0.236	2	Residential
Hormiga	Juan Luna-Quintin Paredes	City Road	0.097	1	Residential; Commercial
Ilang Ilang	Jaboneros-Lavezares	City Road	0.254	1	Residential; Commercial
Ipil	Old Antipolo - Tayuman	City Road	0.687	1	Residential
Ipil	Quiricada - Bambang	City Road	0.26	1	Residential
J. Nolasco	Concha-Pavia	City Road	0.099	2	Residential; Institutional
J. Nolasco	Moriones-Concha	City Road	0.099	1	Residential
Jaboneros	Mulle dela Industria - Sto. Cristo	City Road	0.599	2	Residential; Commercial
Jones Bridge	Muelle del Banco Nacional - P. Burgos	City Road	0.175	1	
Jose Basa	G. Perfecto - Dagupan	City Road	0.19	2	Residential
Juan Luna	Reina Regente-Muelle dela Industria	City Road	0.601	2	Commercial; Industrial
Juan Luna	Reina Regente-Honorio Lopez Blvd.	City Road	2.478	2	Commercial
Kagitingan	Moriones - R-10	City Road	0.955	1	Residential

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
Kasipagan	Moriones-P. Ortega	City Road	283.75	2	Residential; Commercial
Kasipagan		City Road	0.197	2	Residential; Commercial
Kepuja St	Alonzno - Ongpin	City Road	0.127	1	Residential; Commercial
Kusang Loob	Old Antipolo - Tayuman	City Road	0.679	8	Commercial
L. Chacon	N. Zamora - Juan Luna	City Road	0.196	4	Residential
Lachambre	Meisic - End	City Road	0.175	2	Residential
Lacson	Pacheco-Herbosa	City Road	0.465	2	Residential
Lakandula	Ylaya-R10	City Road	0.69	1	Residential
Lara	Delpan - Camba	City Road	0.279	1	Residential; Commercial
Laurel	Concha - Liwayway	City Road	0.63	2	Residential
Lavezares	Sevilla-Mulle de Binondo	City Road	0.727	2	Residential; Commercial
Lemonada	Concha-Chesca	City Road	0.153	1	Residential; Commercial
Linampas	G. Perfecto - Dagupan	City Road	0.188	2	Residential
Lope De Vega	Pedro Gevara - Oroquieta	City Road	0.19	2	Residential
Luzon	D. Jose - End	City Road	0.202	1	Commercial
M. Natividad	Tayuman - Lope de Vega	City Road	1.149	1	Residential
Mabuhay	Moriones-Zaragoza	City Road	0.747	1	Residential
Madrid	M. De Santos - Muelle dela Industria	City Road	0.592	4	Residential
Magsaysay	Chesa-Herbosa	City Road	0.252	4	Residential
Makata	Alvarez - Lope de Vega	City Road	0.619	2	Residential
Makata	Old Antipolo - Tayuman	City Road	0.662	2	Residential
Malabon	Rizal Ave. - Alfonso Mendoza	City Road	0.415	2	Residential
Malong	g. Perfecto - Dagupan	City Road	0.151	1	Residential
Marquina	San Vicente - Poblete	City Road	0.09	1	Residential; Commercial
Masinop	Cristobal - Ortega	City Road	0.395	2	Residential; Commercial
Meisic	Juan Luna - La Chambre	City Road	0.1	1	Commercial
Mejorada	Sta.Maria - N. Zamora	City Road	0.199	2	Residential
Mercado	G. Perfecto - Dagupan	City Road	0.221	2	Residential
Mithi	Moriones-Zaragoza	City Road	0.486	2	Residential
Morga	Juan Luna-R10	City Road	0.868	2	Residential
Morga Ext.	Luwalhati - End	City Road	0.201	4	Residential
Muelle Dela Industria	Numancia - Estero de binondo	City Road	0.97	2	Residential; Commercial
N. Rizal	Padre Algue - Mayhaligue	City Road	0.21	1	Institutional
Nicodemus	N. Zamora - Velasquez	City Road	0.278	2	Residential
Nicodemus	G. Perfecto - Dagupan	City Road	0.151	1	Residential
Nicolas Zamora	Moriones - Juan Luna	City Road	0.871	2	Residential; Commercial
Nimfa	Juan Luna-Muelle de Benondo	City Road	0.06	2	Residential; Commercial
No St.Name	Madrid - Muelle de Industria	City Road	0.115	2	Residential; Commercial
Norberto Ty	Plaza Ruiz -Yuchenco	City Road	0.136	2	Residential; Commercial
Numancia	San Fernando-Muelle Dela Industria	City Road	0.239	2	Residential; Commercial
Oroquieta	C.M. Recto - Pampanga	City Road	2.762	2	Commercial
Osmeña	Coral-Herbosa	City Road	0.428	2	Residential
P. Rada	Juan Luna-Mabuhay	City Road	0.949	2	Commercial
Pacheco	Nicolas Zamora-R-10	City Road	0.979	2	Residential
Paghanapin	Mabuhay - Asuncion	City Road	0.458	1	Residential
Panday Pira	Nicolas Zamora-Lacson	City Road	0.523	2	Residential
Panday Pira Ext.	Lacson - Quirino	City Road	0.207	4	Residential
Pavia	Juan Luna-Nolasco	City Road	0.171	5	Residential
Pavia	Sta.Maria-Juan Luna	City Road	0.402	2	Residential
Peñalosa	Velasquez - End	City Road	0.514	2	Residential
Penaranda	San Fernando-jaboneros	City Road	0.06	2	Residential; Institutional
Penarubia	Camba - Delpan Road	City Road	0.272	5	Residential; Commercial
Perfecto	Dagupan - Pilapil	City Road	1.222	3	Residential; Institutional
Perla	Juan Luna-Quezon	City Road	0.745	2	Residential
Perla	Nicolas Zamora - End	City Road	0.114	2	Residential
Pilapil	N. Zamora - Lacson	City Road	0.481	4	Residential
Pilapil	g. Perfecto - Dagupan	City Road	0.137	6	Residential

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
Pitimini	Kagitingan-Tagumpay	City Road	0.068	2	Residential
Pitong Gatang	N. Zamora-Sta.Maria	City Road	0.277	1	Residential; Commercial
Plaza Cervantes	J.Luna - Quintin Paredes	City Road	0.094	4	Residential; Commercial
Plaza Sta Cruz	Ronquillo-Carlos Palanca	City Road	0.171	2	Residential; Commercial
Poblete St	Marquina-T.Pinpin	City Road	0.094	2	Residential; Commercial
Prudencia	Justia - Don Pedro	City Road	0.388	4	Residential
Quezon	Cristobal - Herbosa	City Road	0.805	2	Residential
Quintin Paredes	Dasmarinas - Jones Bridge	City Road	0.153	2	Commercial; Institutional
Quintin Paredes	Dasmarinas-Ongpin	City Road	0.318	5	Residential; Commercial
Quiricada	Alfonso Mendoza - J. Abad Santos	City Road	1.063	5	Residential; Commercial
Quirino	Perla - Sto Nino	City Road	0.772	2	Residential
R. Regente	Juan Luna - C.M. Recto	City Road	0.635	1	Commercial
R10	Herbosa - C.M. Recto	City Road	2.175	2	Residential; Commercial
Raja Matanda	Ylaya - Juan Luna	City Road	0.195	1	Residential
Recuerdo	Sevilla - End	City Road	0.117	2	Residential; Commercial
Remegio	Severino Reyes - Alfonso Mendoza	City Road	0.584	2	Commercial
Rentas	Juan Luna-Muelle de Benondo	City Road	0.59	2	Residential; Commercial
Ricafort	Sta.Maria-Juan Luna	City Road	0.24	4	Residential
Rizal Ave.	Carriedo - Tayuman	City Road	1.984	1	Commercial
Romualdez	Osmeña-Lacson	City Road	0.144	1	Residential
Ronquillo	Plaza Sta Cruz-Evangelista	City Road	0.423	2	Residential; Commercial
Ruiz Plaza	Ongpin-Veronica St.	City Road	0.155	2	Residential; Commercial
S. Padilla	Soler - Yuchengco	City Road	0.544	2	Residential; Commercial
Salvacion	Kagitingan-Mabuhay	City Road	0.069	2	Residential
San Bernando(Soler)	Soler-CM Recto	City Road	0.116	1	Residential; Commercial
San Damian	Kagitingan Ext.-San Damian	City Road	0.088	2	Residential
San Damian	Kagitingan Ext.-R10	City Road	0.087	1	Residential
San Dionisio	Kagitingan Ext.-San Damian	City Road	0.09	2	Residential
San Fermin	San Dionisio - Delpan	City Road	0.134	2	Residential
San Fernando	Madrid - Juan Luna	City Road	0.478	1	Commercial; Institutional
San Gregorio	Delpan Ext.-San Antonio	City Road	0.105	1	Residential
San Lazaro	Alfonso Mendoza - Rizal Ave.	City Road	0.427	4	Residential; Commercial
San Nicolas	Biak na Bato - End	City Road	0.267	1	Residential
San Nicolas	Muelle de Benondo-Delpan	City Road	0.643	1	Residential; Commercial
San Patricio	San Damian.-Sta. Rosa	City Road	0.109	1	Residential
San Simon	Tahimik - Sta Rosa	City Road	0.119	1	Residential
San Vicente	Quintin Paredes-T.pinpin	City Road	0.278	1	Residential; Commercial
Sanchez	Padre Algue - Mayhaligue	City Road	0.387	1	Residential
Sandico	Mabuhay-Asuncion	City Road	0.425	1	Residential
Santiago	San Nicolas - Villaruel	City Road	0.15	1	Residential
Severino Reyes	Tayuman - Lincoln	City Road	0.988	2	Residential
Sevilla	C.M. Recto-Muelle dela Industria	City Road	0.605	1	Residential; Commercial
Sgt. Mabagos	Mabuhay-Asuncion	City Road	0.464	2	Residential
Soda	Ongpin - Muelle de industria	City Road	0.058	2	Residential; Commercial
St James	Kagitingan-R10	City Road	0.065	2	Residential
St Joseph	Kagitingan-Katatagan	City Road	0.05	2	Residential
St Jude	Kagitingan-Katatagan	City Road	0.05	2	Residential
St Mathew	Kagitingan-Katatagan	City Road	0.05	2	Residential
St.Anthony	Kagitingan-Katatagan	City Road	0.05	2	Residential
St.Martin	Kagitingan-Katatagan	City Road	0.05	4	Residential
St.Peter	Kagitingan-Mabuhay	City Road	0.104	1	Residential
Sta Barbara	Kagitingan Ext.-San Damian	City Road	0.278	2	Residential
Sta. Maria	Moriones-Herbosa	City Road	0.908	1	Residential; Institutional
Sto Nino	Moriones-Morga	City Road	0.166	2	Residential; Commercial
Sto Nino	Herbosa - End	City Road	0.167	4	Residential
Sto. Cristo	San Fernando-Morga	City Road	1.308	2	Residential
Sun Flower	Primerose - Primerose	City Road	0.105	1	Residential

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
T. Alonzo	Tetuan - V. Fugoso	City Road	0.901	2	Residential; Commercial
Tabora	C.M. Recto - M. De Santos	City Road	0.187	2	Commercial
Tahimik	Recto-Delpan	City Road	0.174	2	Residential
Tahimik	Delpan Ext.-End	City Road	0.084	2	Residential
Tambakan St	Ongpin-Tetuan	City Road	0.162	2	Residential; Commercial
Tayuman	A.H. Lacson - Juan Luna	City Road	1.579	2	Commercial
Tecson	Yakal - San Nicolas	City Road	0.261	2	Residential
Tetuan	Ronquillo-Sabino Padilla	City Road	0.291	1	Residential; Commercial
Tindalo	San Nicolas - Yakal	City Road	0.275	2	Residential
Tomas Mapua	C.M. Recto - Tetuan	City Road	0.479	1	Residential; Commercial
Tomas Mapua	C.M. Recto - Alvarez	City Road	0.93	2	Residential; Commercial
Tomas Pinpin	Escolta-Mulle de Banco Nacional	City Road	0.536	2	Residential; Commercial
Tonelero St	Baraca-Muelle de Benondo	City Road	0.062	2	Residential; Commercial
Tuazon	Kagitingan-R10	City Road	0.603	2	Residential
Tytana	Plaza Ruiz -Yuchenco	City Road	0.136	1	Residential; Commercial
Urbiztondo	Numancia-Baraca	City Road	0.19	2	Residential; Commercial
Valderama (Solana de Intramuros)	Delpan-San Nicolas	City Road	0.203	4	Residential; Commercial
Varona	Perla - Herbosa	City Road	0.668	2	Residential
Velasquez	Capulong - Perla	City Road	0.892	2	Residential
Veronica st.	R. Regente - Alvarado	City Road	0.111	2	Residential; Commercial
Villaruel	Abad Santos - Yakal	City Road	0.222	2	Residential
Wagas	Moriones-Zaragoza	City Road	0.721	1	Residential; Commercial
Yakal		City Road	0.694	1	Residential
Yangco/Sta. Maria	Herbosa - Moriones	City Road	0.908	1	Residential
Ylaya	Lakandula - Sta Elena	City Road	0.632	2	Commercial
Ylaya	Lakandula - Juan Luna	City Road	0.632	4	Commercial
Yuchengco	Veronica - Muelle Del Banco Nacional	City Road	0.643	1	Residential; Commercial
Zabala	Mabuhay - Bilbao	City Road	0.608	1	Residential
Zacateros St	Phil. Sun Yat Sen School- End	City Road	0.156	2	Residential; Commercial
Zaragoza	Delpan-R10	City Road	0.322	2	Residential
Yuchengco	Veronica - Muelle Del Banco Nacional	City Road	0.643	2	Residential; Commercial
Zabala	Mabuhay - Bilbao	City Road	0.608	1	Residential
Zacateros St	Phil. Sun Yat Sen School- End	City Road	0.156	1	Residential; Commercial
Zaragoza	Delpan-R10	City Road	0.322	1	Residential
Maria Payo	Lakandula-Wagas	Barangay Road	0.169	1	Residential
Masikap	Lakandula-Wagas	Barangay Road	0.328	4	Institutional
Matiisin	Mabuhay - Asuncion	Barangay Road	0.491	2	Residential
Matimtiman	Mabuhay - End	Barangay Road	0.423	1	Residential
Bonifacio Drv. (Tutuban Center)	Around Tutuban Mall	Private Road	1.38	2	Commercial
M.Roxas	R-10 - Bonifacio	Bridge	0.352	1	Residential; Industrial

APPENDIX 4.1 DESIGN GUIDELINE FOR TUTUBAN AREA REDEVELOPMENT

Appendix 4.1 Design Guideline for Tutuban Area Redevelopment

Tutuban Station used to be a main hub of the Philippine railway system. Located in a nationally protected historic area in the center of Manila, the station and its surrounding areas evolved into an important urban, social and business center. At present, Tutuban Station area is one of Manila's major commercial centers where economic activity and foot traffic are dense. The area is the heart of mass transportation in Manila as well, accessible to the entire city transportation network including provincial buses and PNR commuter trains.

Such character of the area provides a unique opportunity to preserve and enhance the historic spirit of Tutuban as a place to live, work and play. Livability and quality of life are improved when an area offers a rich diversity of experiences, including spaces and buildings with various ages, uses and stories to tell. This kind of environment also presents opportunities for social interaction and strengthens the area's sense of place, identity, and pride.

This Design Guideline provides direction for the Tutuban area redevelopment. The principles embodied in these Guidelines encourage creative solutions to enhance the distinct character of zones, reinforce property values and spur economic development. It is important to note that this guideline is basically in accordance with the latest Comprehensive Land Use Plan (CLUP) and Zoning Ordinance of City of Manila, and do not necessarily supersede local regulations. Some exceptions may be approved by the Design Guideline Committee which City of Manila will be involved. All designs shall also be subject to further review by the Design Guideline Committee.

GENERAL DESIGN GUIDELINE

1. Open Space

- Open space needs to be planned in sufficient scale and the minimum of consolidate 0.3 hectare of open space is required for all zones. In addition, minimum of 1.4 hectare of open space is required for Zone 2 and 1.0 hectare for Zone 3 in total.
- All open spaces need to have a direct access to the roads in terms of pedestrian's convenience as well as disaster management. These areas must be easy to walk around in, incorporate shade, landscaping and attractive lighting.
- Planting is encouraged for all open spaces including the installation of bio-retention to intercept storm water runoff to prevent road flooding.
- Open spaces need to be linked to promote social interaction, to provide visual relief and to enhance environmental integrity. These open spaces need to be developed by the private sector integrated with the development of adjacent commercial or mixed-use facility.
- Pedestrian walkways require accessible surfaces that are firm, stable and slip-resistant in both wet and dry conditions. When small paving bricks are used, care should be taken to ensure that they are evenly laid. Uneven surfaces or gaps between paving slabs can cause problems for people using sticks and crutches, visually impaired cane users and wheelchair users. For such reasons, cobblestones should not be used.
- Pavement materials may include the following: Concrete and concrete blocks, stamped concrete, brick tiles, clay pavers (see Figure 1).

Source: http://www.externalworksindex.co.uk/entry/33489/Marshalls/Priora-permeable-concrete-block-paving-system/,
http://www.diytrade.com/china/pd/6883658/pacific_brick_pavement_brick.html

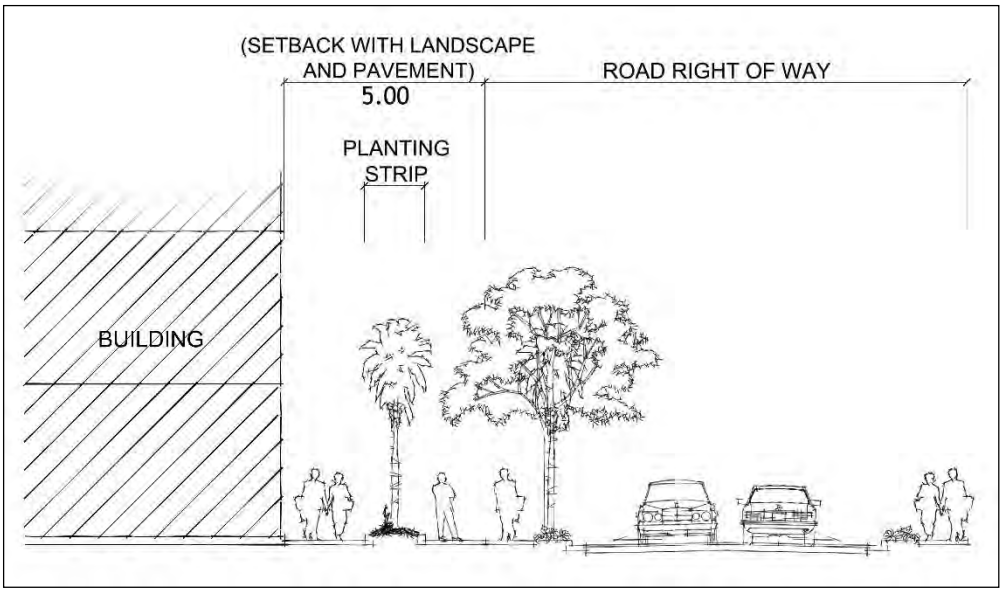
Figure 1 Sample of Pavement Materials

- Unpaved areas must be planted and maintained with vegetation, i.e. trees, shrubs and grass. Care should be taken to avoid the growing of trees and/or shrubs that obscure the visibility of signs, lights, and sight-lines of pedestrians. They must be kept clean and pleasant to look at.
- Proper landscaping analysis and design must be strictly considered not only for aesthetics but more so for the prevention of erosion, and for ecological balance. For landscaping, the use of fragrant, lush, tropical vegetation and native plant species are encouraged. All landscaped areas must also be provided with an adequate irrigation system.
- Open space should be pedestrian-friendly and welcoming to transit riders, residents and other visitors. This should provide visual relief and create places for social interaction. To maximize benefit and enjoyment with these spaces, open space and yard configurations should be integrated with and complement open space and yards on adjoining lots.

2. Building Setback

Subject to the provisions of PD 1096 or the National Building Code of the Philippines (Rule VIII), every building must be designed, constructed and equipped to provide adequate light and ventilation. Their location and orientation should maximize the use of natural ventilation and lighting and minimize energy consumption.

- The required minimum setback for new buildings from the road is 5 m (see Figure 2).
- These setbacks may also be landscaped or paved walkways to make the area feel welcoming and safe for people who work at the station and transit riders who come in off the street.
- Both public and private walkways and sidewalk paving materials should be patterned and featured to provide a sense of scale and rhythm appropriate to surrounding buildings. Smooth, monotonous concrete surfaces should be avoided.



Source: JICA Study Team.

Figure 2 Setbacks for Other Buildings with Landscape or Pavement

3. Facade Design and Color

- The facade of lower levels need to take historic context into consideration as described in the design guideline for Zone 1.
- The design of new buildings of upper floors can utilize modern architecture. It is important that building designs for complement and harmonize with the building designs of other zones.
- Developers may opt to integrate sustainable green architecture features, such as: green wall, sun breakers, solar panel on walls, use of high emissivity glass for curtain walls and windows etc. (see Figure 3).
- Reflective or iridescent colors should not be used.

Source: http://www.archdaily.com/283839/zuellig-building-som/, http://architizer.com/projects/psslai-corporate-headquarters/media/757318/, http://www.greentechmedia.com/articles/read/konarka-runs-solar-curtain-wall-pilot

Figure 3 Use of Energy Efficient Curtain Glass Wall, Green Wall, and Solar Panels

4. Signage

Signs identify or advertise a place of business and function as attention-getting devices. They must be created not only to provide a significant visual impact on the character of the area, but also be carefully designed to aid people with disabilities. In compliance to the provisions of BP 344 (The Philippine Law to Enhance Mobility of Disabled Persons), the following must be observed:

- Directional and informational sign should be located at points conveniently seen even by a person on a wheelchair.
- Signs should be kept simple and easy to understand; signage should be made of contrasting colors and gray values to make detection and reading easy.
- International symbols for access should be used to designate routes and facilities that are accessible.
- Signage labelling in public rooms and places should have raised symbols, letters or numbers with a minimum height of 1 mm; Braille symbols should be included in signs indicating public places and safety routes (see Figure 4).

Directional Signage for PWDs

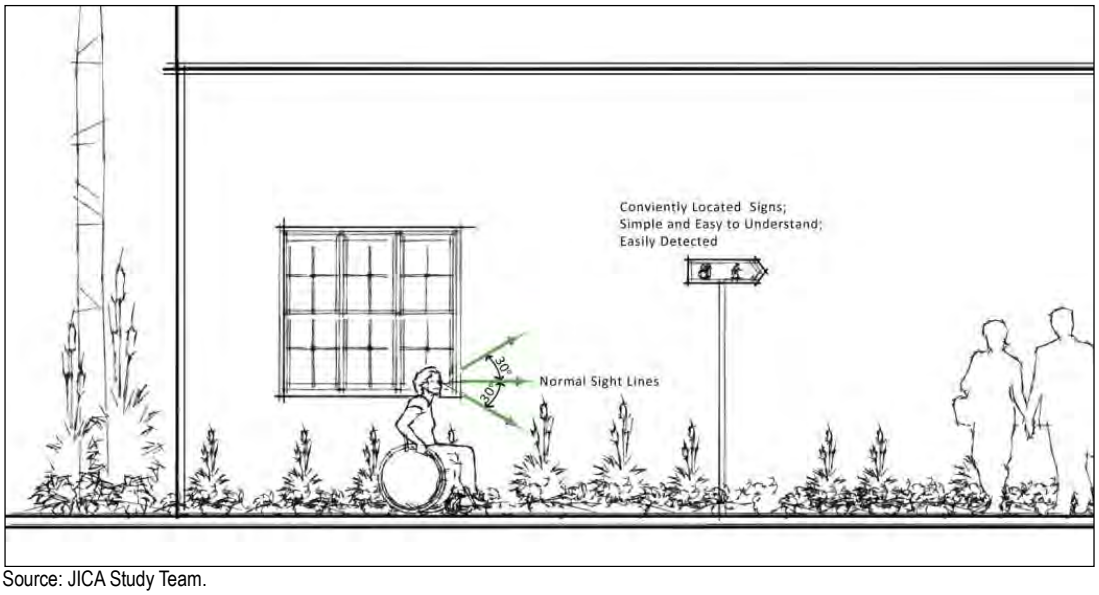
Stand-alone Directional Signage

Street Signage

Hanging Directional Signage

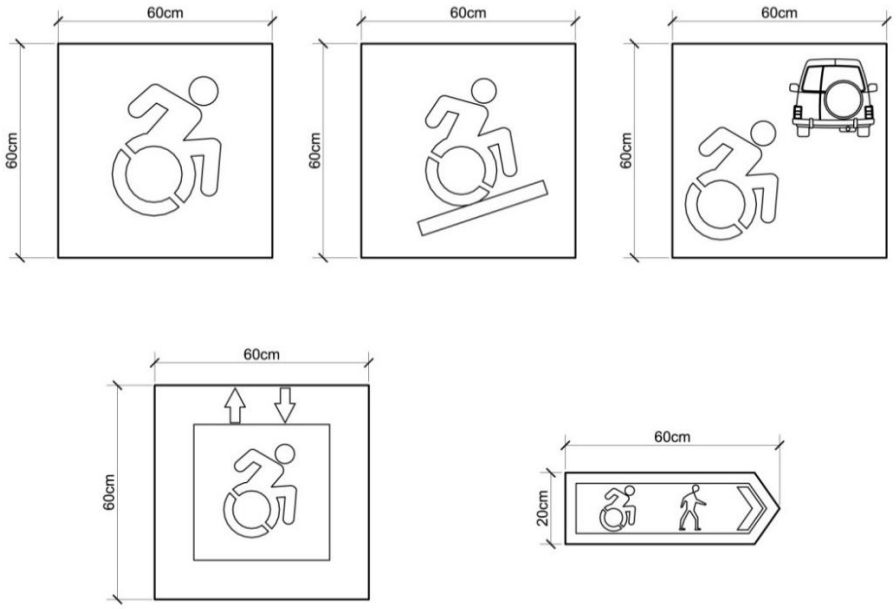
Source: JICA Study Team.

Figure 4 Samples of Signage



Source: JICA Study Team.

Figure 5 Conveniently Located Signs: Simple, Easy to Understand, Easily Detected



Source: JICA Study Team.

Figure 6 International symbols for access; (Top L-R): Access Symbol, Ramp, Parking; (Bottom L-R): Elevator, Direction Sign for Disabled Pedestrians

5. Lighting

- Since green development will be a theme for the redevelopment site, new buildings are encouraged to use energy efficient lighting and/or renewable energy.

6. Internal Vehicular and Pedestrian Circulation

- The area within each zone should be a pedestrian-free zone.
- Building designs by developers are encouraged to prioritize the safety and mobility of pedestrians and persons with disability. Refer to BP 344.

- Parking lots are generally recommended to be located underground to maximize the use of limited space and ensure a more vibrant atmosphere. These should not interrupt pedestrian routes or dominate street frontages.
- Underground parking shall have a maximum of three levels (basement) and will require mechanical equipment in cases of flood and for ventilation.
- Pursuant to Rule VII of the National Building Code, the minimum requirements for parking slots are as shown in Table 1.

Table 1 Minimum Requirements for Parking Slots

Reference Use/Character of Occupancy/ Type of Building or Structure	Minimum Required Parking Slot, Parking Area and Loading Space Requirements
Hotels	– One (1) car parking slot for every three (3) rooms or a fraction thereof for highly urbanized areas – Two (2) tourist bus parking slots for each hotel – One (1) loading slot for each articulated truck or vehicle
Bowling alleys	– One (1) car slot for every four (4) alleys
Private elementary, secondary, vocational and trade school	– One (1) car slot for every five (5) classrooms and – One (1) school bus slot for every one hundred (100) students
Neighborhood shopping center/supermarket	– One (1) car slot for every 100 square m of shopping floor area
Restaurants, fast-food centers, bars and beerhouses	– One (1) car slot for every 30 sq.m of customer area
Units located in office, commercial or mixed-use condominium buildings/structures regardless of number of storeys	– Units with a gross floor area of from 18 to 40 sq.m: provide one (1) pooled parking slot for every two (2) units or for a fraction thereof – Units with a gross floor area of from 41 to 70 sq.m: provide one (1) parking slot for each unit and – Units with a gross floor area of more than 70 sq.m: provide one (1) parking slot for every 70 sq.m and for a fraction thereof
Recreational or similar public assembly buildings such as stadia, sports complexes, convention centers, etc.	– One (1) car slot and one (1) shuttle slot for every 50 sq.m of spectator area and – One (1) bus parking slot for every two hundred (200) spectators

Source: National Building Code

- All Streets in/surrounding the redevelopment site must adapt traffic calming elements to ensure safety of pedestrians. These may be through rumble strips or speed tables (see Figure 7) to oblige drivers/vehicles to slow down.

Source: JICA Study Team

Figure 7 Rumble Strips (left) and Speed Tables (right)

7. Height Regulations for New Buildings

- Height regulations shall generally comply the City of Manila's Zoning Ordinance 2006 unless approved by Design Guideline Committee.
- Based on the National Building Code, habitable rooms with artificial ventilation must have ceiling heights not less than 2.4 m measured from floor to the ceiling. Rooms with natural ventilation must have ceiling heights of not less than 2.7 m. Mezzanine floors must have a clear ceiling height not less than 1.8m above and below it.

8. Commercial Spaces under the Viaduct

- Entries should be designed according to simple and harmonious proportions in relationship to the overall size and scale of the building.
- Main entrance and entry approach must accommodate persons of all mobility levels.
- Commercial area at the ground floor must provide clear and unobstructed windows, free of reflective coatings and exterior mounted gates and security grills.
- Structures for commercial stalls may be one or two-story pre-fabricated shops or "tiangge" type.
- Corridors between stalls must have a minimum width distance of three meters. See Figure 8.
- Individual lighting for commercial properties shall be designed to provide the minimum level of illumination necessary for security, safety and visual appeal for customers.
- Signage shall be attractive and should provide basic, clear information about commercial businesses with visually respectful, highly legible signage.
- Utility lines (electrical, plumbing, etc.) must be provided for each stall.

Source: JICA Study Team.

Figure 8 Image of One-story Prefabricated Commercial Shops below the Viaduct

GUIDELINE FOR ZONE 1

Zone 1 consists of two areas, namely Zone 1-A and Zone 1-B. While Zone 1-A is expected to be a prime area for the entire redevelopment in the project area as a gateway of Divisoria with two major terminal stations, Zone 1-B inherits the current character of vibrant commercial activities. Historic preservation is one of the most important aspects need to be considered in Zone 1-A since the Heritage Building with the structures of the original Tutuban Station as well as Andres Bonifacio statue are located. Both structures are registered by the National Historical Commission of the Philippines (NHCP).

APPROACH FOR HISTORIC PRESERVATION

The Design Guideline for Tutuban area redevelopment suggests techniques to preserve and enhance historic qualities in Tutuban while blending it with modern and innovative standards. It is not the intention of the guidelines to freeze time and make new buildings appear as though they are from a historic period. The historic building can continue to incorporate transition, but new construction or modification to existing buildings should not impede the developer's ability to interpret the historic character of the district.

Demolition of the original Tutuban Station in 1993 seriously compromised the authenticity of the structure, changing its significance from tangible to intangible. A small part of its original architectural heritage, the structures of the original station and the central portion of the original façade are all that remains today. Demanding faithful reconstruction of the original Tutuban structure poses serious financial and programmatic constraints. Thus, establishment of the minimum requirements for preservation is necessary.

According to the detailed assessment of the existing conditions and expected impacts, the areas of preservation according to level of significance (see Figure 9) are identified as follows:

1. Level 1 - Most significant

The front side of Heritage Building

The heritage building structure façade design shall be restored as faithfully as possible. Existing heritage features shall be retained. Alternative building materials necessary for the exterior restoration work are acceptable as long as they closely approximate the original materials, convey the image of the colonial period and invoke to the public the required spirit for the restoration project.

Adaptive reuse processes for the building interior is allowed. Allowable uses are exhibit and display concourse, food station, toilets, and selected commercial stores.

2. Level 2 - Significant

The back side of Heritage Building

The heritage building mainframe structure set up (the first 10 bay of columns in front and roof truss system) is existing and shall be restored as faithfully as possible. The surviving cast iron columns shall be integrated into a new design setting reminiscent of the original sky lit warehouse-type train shed whose interior is to be repurposed for modern retail shops. As long as climate control (air conditioning) of the whole building area is acceptable, the building's exterior may be encased in a transparent glass wall. The type of glass wall shall be a frameless system to allow the best vista of the heritage structure within for the public outside.

The heritage columns and trusses shall be clear of any store structures to be built. The provision

of utilities (lighting, sprinkler systems etc.) shall be exceptions and may be integrated within the heritage structure for as long as the outcome does not distract from the impact of the concerned heritage materials.

3. Level 3 - Less significant

The new structures fronting/overlooking the restored heritage structures

The new structures around the heritage structures are two blocks with a commercial land use. New building structures can be erected on these two blocks which are located at the immediate right side and back side of the heritage structures.

New architecture shall be in harmonious with design and volume of the original Tutuban Station. The appearance of the development will evoke, but not duplicate or mimic the original architecture in a sympathetic, contemporary manner.

(1) Level 3a

The 18 remaining cast iron columns and trusses must also be retained, but do not have to necessarily reminisce the old sky lit warehouse feel of the structure. They do not have to serve as structural components of the building, but may be re-used as decorative interior elements.

Although they are temporary structures by nature, commercial kiosks on the plaza immediately around the Heritage Buildings shall also be subject to Level 3 heritage significance. These kiosks shall adopt prescribed heritage color hues and shall consist of external shapes and forms that are sympathetic to the look of the heritage building.

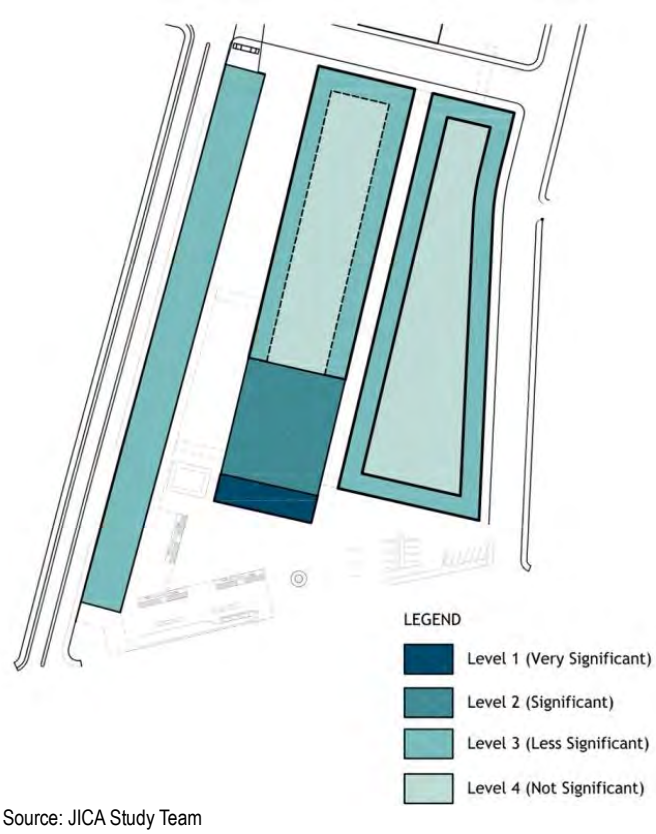
(2) Level 3b

For the first two floors of the commercial buildings, adoption of architectural features that are evident in the existing heritage structures is recommended. The features may be in neo-classic (modernized) form provided that the spirit of the colonial period architecture is invoked and promoted. The selective 2 floor parameter of the building is in line with being true to the prevailing skyline of the district at that heritage period in time.

4. Level 4 (not significant)

Level 4 is not very significant in terms of heritage value. The buildings in these areas may adopt a heritage style for their buildings but which is optional. Mostly, an eclectic array of modern buildings are acceptable for areas in Level 4. However, new buildings in these areas should utilize “background architecture” that does not compete with the heritage building. Therefore, massing, volumes and height of new buildings must not overpower the heritage building but must be designed visually and volumetrically proportional to the heritage building.

Higher floors for the structures near the heritage building (set on the roof of the second floor which is tantamount to a podium) are allowed as long as their façade is setback and kept inconspicuous and not distracting to the architecture being displayed by the area heritage ‘centerpiece’ i.e. sky-reflecting glass curtain walls that clad a conventional building mass form. Glass curtain walls in themselves can still distract if the massing form of the building is too modernistic.



Source: JICA Study Team

Figure 9 Level of Historic Significance

GUIDELINE FOR ZONE 1

1. Open Space

i. General

- Minimum of consolidate 0.3 hectares of open space is required.

ii. Clearance around Heritage building

- Unobstructed sight lines to the Heritage building must be maintained from all angles
- Ample space for ground level pedestrian walk must be provided around the Heritage building. The pedestrian walk should provide public gathering place and introduce feeling of Tutuban as an urban oasis.
- Glass-covered roofing must be provided for pedestrian walkways between the Heritage Building and new buildings.
- The open space around the heritage building must be paved with materials reminiscent of Old Manila. This area must be easy to walk around in, incorporate shade, landscaping and attractive lighting (see Figure 10).

Source: JICA Study Team

Figure 10 Image of Open Space around the Heritage Building

iii. Clearance around Andres Bonifacio statue and within Station Plaza/Pedestrian Deck

- Plaza around the statue must be kept open, pedestrian-friendly, and free from visual and physical obstruction.
- Clearly designated walkways and waiting areas for the passengers in the station plaza and the pedestrian deck must be provided.

2. Building Setback

- Following the National Building Code for C-3 development and in consideration of maximum natural lighting and ventilation (65.5 degree Philippine solar angle and line of angular plane to establish incremental setbacks and outermost face of the building), the minimum distance of new buildings from the Heritage building must be approximately 9.1 m. However, in practice, many existing developments use 8.0 m distance between buildings which have been approved by city authorities.
- Buildings with a series of graduated and stepped forms must be applied for new projects along the Heritage building. Transitional height setbacks are required to provide visual break.

3. Facade Design

Identified architectural elements with the historic significance in the original Tutuban station include the following: pediment, some repetitive elements in the upper portion, rectangular silhouette of openings, possible louvers, slender segmental arc on ground floor, and curved brackets. Also important aspect is the emphasis on a straight horizontal line on the lower level and the irregular play of levels on the upper floors.

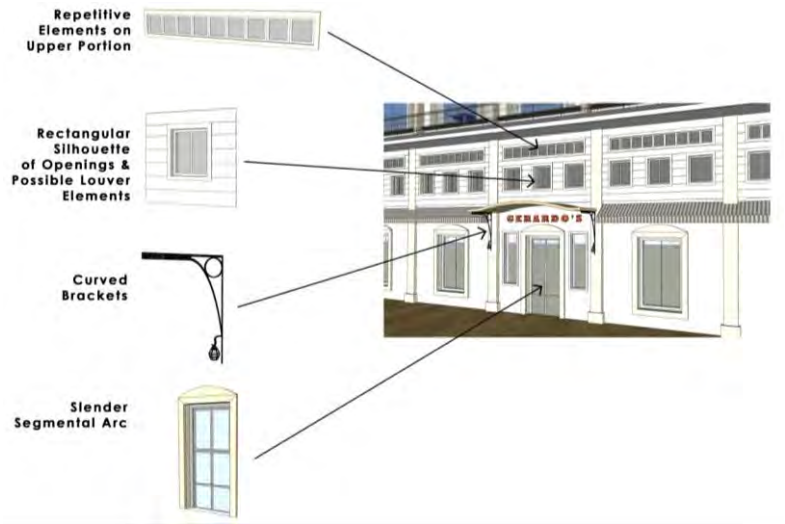
i. Heritage building:

- While the structures of the original Tutuban station (28 bay of cast iron columns, truss work etc.) must be preserved, partial reconstruction of the building needs to be considered. Reconstruction must be integrated with compatible modern structures that do not reproduce or mimic heritage architecture.
- The demolished Tutuban exterior must be reconstructed as much as practically possible to be integrated with modern, compatibly designed buildings surrounding the reconstructed heritage structure.

- For the interior, remaining original elements and surviving architectural features of the original building must be re-used in the contemporary design for the efficient retail space.
- Pre-painted long span steel roofing with brick red color is recommended for the roofing.

ii. New buildings:

- Modern architecture must be sympathetic with the historic architecture.
- New buildings should be blended with the adjacent architecture that does not compete for attention with the heritage building. Therefore massing, volumes, and height of new buildings must not overpower the heritage building but must be designed visually and volumetrically proportional to the heritage building.
- New buildings should be designed in contemporary architectural vocabulary and in should not duplicate or mimic the heritage building.
- Heritage-influenced architecture must be maintained at eye level height. Use consistent eye level massing and detailing to establish visual compatibility between old and new as shown in ***Figure 4.2.10*** in the main text.
- Building finishes should be blended with Tutuban Heritage structure. Textured concrete, stone, terra cotta and plaster may be used. Glass surfaces should be clear, or of light, warm-colored tints.
- New buildings in Zone 1-A should incorporate the distinctive architectural details to relate to the existing Heritage structure. Facade treatment for new buildings should be contextual to these elements, especially when adjoining the Heritage structure (see Figure 11). These details include:
  a. Horizontality of façade lines and volumes to evoke heritage Tutuban architecture
  b. Deep eaves supported by iron brackets
  c. Pattern of fenestration, doors, and other openings
  d. Echo but not necessarily replicate original ceiling and wall details, paving patterns, and other identifying designs.



Source: JICA Study Team

Figure 11 Modern Interpretation of Identified Architectural Elements

- While lower levels (ground and second level) reflect historic context, architecture at the upper levels can be modern with minimal detailing. However, installation of transitional section at the mid-levels is recommended to avoid the drastic change and establish certain unity as one building (see Figure 12).

Source: JICA Study Team.

Figure 12 Sample Image of New Building with Transitional Section

iii. NSCR and LRT Tutuban Stations

- Since the NSCR station is very visible from the Heritage Building, it shall be required to likewise adopt architectural features that are evident in the existing heritage structures.
- Facade treatment for the ground floor should also conform to the existing elements of the heritage structure (horizontality of façade lines, deep eaves, pattern of openings, etc.).
- Upper floors must be covered with glass walls to adopt sympathetic modern architecture.
- Roofing shall follow the materials used for the Heritage Building (pre-painted long span steel roofing with brick red color is recommended).

4. Color

Colors should be selected to harmonize with the warm, earth-tone, masonry color of the existing Heritage structure (see Figure 13).

Source: JICA Study Team

Figure 13 Prospective Color Palettes for the Building

5. Lighting

- Lighting fixtures should be appropriate to the architecture of the building it serves. Lighting should be generally subdued and shielded so as not to ruin the ambiance of the Heritage Building.
- Original lamp at the facade of the Heritage building may be replicated (see Figure 14).

Source: JICA Study Team

Figure 14 Original Lamp at the Facade Internal Vehicular and Pedestrian Circulation

6. Interval Vehicular and Pedestrian Circulation

- Since the area facing C.M. Recto Ave. needs to be served for public transportation facility, part of the setback area of the new mixed-use building needs to be integrated into the station plaza and include jeepney bays as shown in the Concept Design.

7. Height Regulations for New Buildings

- Based on the Cultural Heritage Impact Assessment, new buildings must harmonize with the image of the heritage building. Recommended height of the heritage building are as follows:
  - 1st level – 5.5 to 6.0 m
  - 2nd level – 4.0 to 4.5 m
  - 3rd level – 3.0 to 3.5 m

8. Space Under NSCR Viaduct

- The space under the NSCR viaduct in Zone 1 needs to be served as a public transportation facility (jeepney bay) as well as a commercial facility due to the expectation to be a potential relocation site for the affected street vendors by LRT 2 West Extension project.

GUIDELINE FOR ZONE 2

1. Open space

Minimum of 1.4ha of open space is required. Open space should be consolidated to the maximum extent and minimum of 0.3 hectare of consolidate open space is required.

2. Space under NSCR Viaduct

The space under the NSCR viaduct in Zone 2 needs to be served as commercial facility due to the expectation to be a potential relocation site for affected street vendors by LRT 2 West Extension project.

GUIDELINE FOR ZONE 3

1. Open Space

Minimum of 1.0 hectare of open space is required. Open space should be consolidated to the maximum extent and minimum of 0.3 hectare of consolidate open space is required.

2. Height Regulations for New Buildings

Limits of height of the new building will be increased by the utilization of air-rights of railway facility to the extent in accordance with 2006 Zoning Ordinance of Manila. Some exceptions may be proposed for approval by the Design Guideline Committee as long as the proposal provides more benefit to the public than the plan comply with the current ordinance.

3. Public Transportation Facility

Public transportation facility (approximately 5,000sq.m.) should be developed at the corner of Tayuman St. and new access road. It needs to include jeepney bay, taxi bay, drop off area, parking stalls for people with disabilities by being integrated into the proposed mixed-use facility.

4. Space under NSCR Viaduct

The space under the NSCR viaduct in Zone 3 needs to be served as the commercial facilities as well as the public facilities such as barangay office/hall, day-care center.

STRATEGIES FOR SUSTAINABLE DEVELOPMENT

In addition to the environmental consideration by introducing high technology such as smart metering system, grey water recycling, utilization of renewable energy, Low Impact Development (LID) approach is also recommended. Major LID measures should be applied to Tutuban redevelopment are follows;

1. Bioretention

Natural type depression storage, infiltration, and evapotranspiration. This design option is typically the least costly and easiest to accomplish if site availability, soils, water table, etc. are conducive. Other site treatments such as swales, rain gardens, open space, etc. fall under this general category and are advisable due to lower initial costs.

2. Permeable Pavements

Provide infiltration and prevent concentrated flow. Permeable pavements (including pavers) are the next most cost effective method of meeting the design goals. Limitations on the use of these design options are wheel loading, traffic, ability to maintain, etc.

3. Cisterns/Recycling

Re-use systems that store and re-use stormwater. This design option is preferable if adequate demands for reuse water exist. Many facilities do not have the potential for reuse to make this option cost effective.

4. Green Roofs

A green roof, or rooftop garden, is a vegetative layer grown on a rooftop. Green roofs provide shade and remove heat from the air through evapotranspiration, reducing temperatures of the roof surface and the surrounding air.

5. Rain Gardens

Rain gardens are a depressed vegetated area that use rainfall and stormwater runoff as irrigation. Rain gardens capture and hold water, usually through the use of native plants. By using highly porous plant materials, rainfall and stormwater runoff can drain more effectively.

6. Rainwater Harvesting

Rainwater harvesting is a system that collects, diverts, and stores rain in a catchment tank. Rainwater can be successfully used for landscape irrigation because rainwater is collected directly from the sky, and avoids many pollutants water collects by flowing through streets. The harvested rainwater can also be used for car washing and toilet flushing.

Sources of LID measures :

- American Society of Landscaped Architects. Retrieved from Sustainable Residential Design: Improving Water Efficiency: http://www.asla.org
- United States Environmental Protection Agency. (2013, November 23). Retrieved from Green Roofs: http://www.epa.gov/heatisland/mitigation/greenroofs.html
- 2010, November 15. Retrieved from: http://www.wbdg.org/ccb/DOD/UFC/ufc_3_210_10.pdf

APPENDIX 5.1

TERMS OF REFERENCE FOR PROJECT OF TUTUBAN STATION INTERMODAL FACILITY

Appendix 5.1 Terms of Reference for Project of Tutuban Station Intermodal Facility

TERMS OF REFERENCE

(DRAFT)

FOR

Consultancy Services to undertake the Detailed Architectural and Engineering Design and the Preparation of Bidding Documents
for
Transit Oriented Development for North-South Commuter Rail and LRT-Line2 West Extension

(Tutuban Station Intermodal Facility)

I. INTRODUCTION

A. BACKGROUND

1.1 The population of Metro Manila has increased dramatically due to the rapid urbanization and current reached approximately 12 million (as of 2010, which is about 1.5 times from 7.95 million in 1990. Furthermore, Metro Manila generates 37% of GDP and became the largest economic center in the country. Even though the transportation network in metro manila has been gradually improved by the ring/radial roads, expressway, LRT, etc., serious traffic congestion has not been solved yet. Such serious congestion prevents smooth logistics as well as human mobility and results in significant economic loss and crisis of environmental sustainability.

1.2 Although the Philippine Government has promoted the development of transportation network based on the urban development plan and the transportation network plan (target year of both plans; 2015) that were formulated through ODA by the government of Japan (The Study on Metro Manila Urban Transport Integration in the Republic of the Philippines, 1999), the transportation capacity is not sufficient to accommodate the drastic population increase in Metro Manila. Consequently, development of mass transit system in north-south direction is absolutely essential to cover expanding commuting area as a core infrastructure axis. Currently, Philippine National Railways (PNR) operates the commuter line in the southern part of Metro Manila, between Manila City and Binan City in Laguna Province, which is the non-electrified section with low traffic density and frequency. On the contrary, railway operation has not been started in the north part of Metro Manila, Particularly, residential areas between Caloocan and Malolos have been expanded without sufficient mode of public transportation. The residents living in the area commutes to the central Metro Manila by bus, car, etc. via highway. As a result, traffic congestion form the exit of highway to the central Metro Manila has become major issue and affected their commute. Therefore, the development of mass transit system in the section has been urgently required.

1.3 In response to the conditions previously described, currently JICA is implementing various cooperation projects associated with the commuter rail between the suburbs and Metro Manila. In order to enhance the outcome of these projects, JICA has decided to provide technical assistance for the planning of transportation facilities and relevant facilities of these projects through implementation of the Preparatory Survey on Promotion of TOD for Urban Railway in the Republic of the Philippines. Initial results of the Study suggest the development of the **Tutuban Station Intermodal Facilities; Station Plaza and Widening of Dagupan St.**

B. OBJECTIVE

1.4 The objective of the services is to prepare detailed engineering designs, procurement and implementation plans, and bidding documents, for the construction of the different components of the intermodal facilities.

C. THE PROJECT

1.5 The Tutuban Intermodal Facilities, Station Plaza in Zone 1A will integrate the operation of both the proposed NSCR Station and LRT 2 Station in one location, i.e., southern area of 1the PNR Property in Tutuban, which will facilitate passenger access between

the two (2) railway facilities. The proposed intermodal facility consists of the following structures:

a. Common Station Plaza, 9,200 square meters including Information Center (150 square meters)

b. Widening of Dagupan St.,

1.6 The structures will be constructed adjacent to the southern boundary of the historic building, Tutuban Center Mall. The detailed description of the scope of work for the Project is further presented in ***Annex A***. The location of the Project Area is presented in Figure 1.

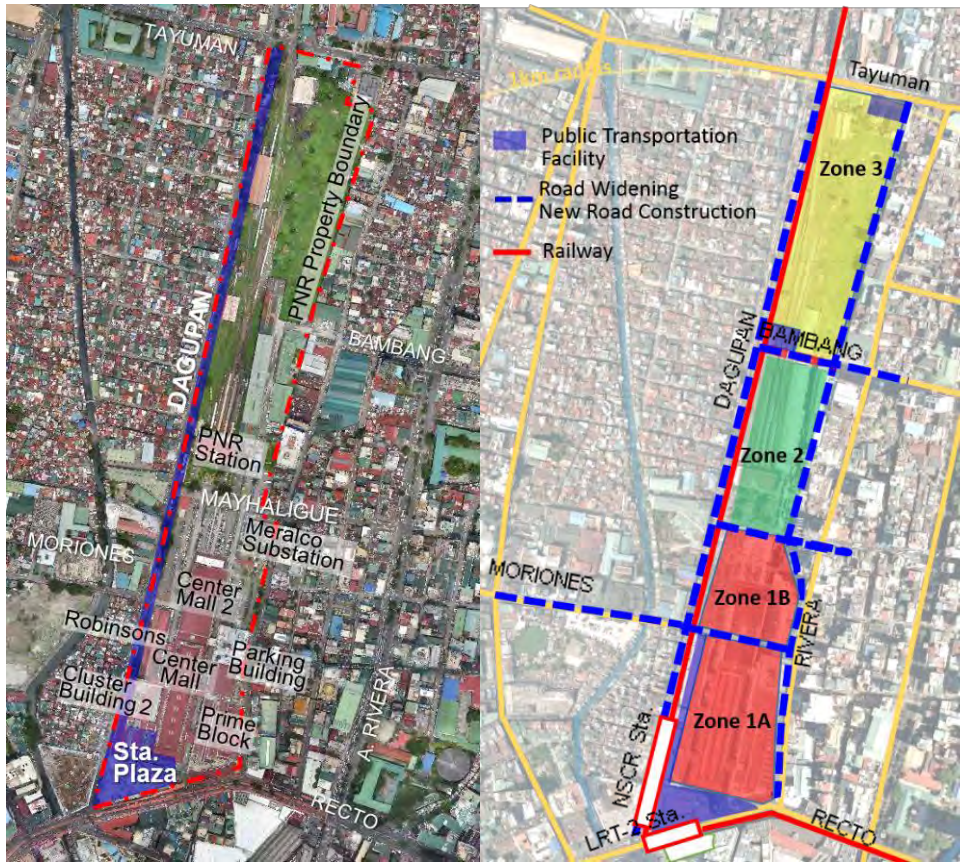


Figure 1 Project Area

II. SCOPE OF SERVICES

A. GENERAL

2.1 The Consultant shall be responsible for carrying out the necessary detailed architectural and engineering design and the preparation of bidding documents in respect of the above-cited project with a view to having the works implemented by suitably prequalified contractors.

2.2 During the design stage, the Consultant shall coordinate with the Department of Transportation (DOTC) and the Department's Consultant to delineate the actual area and location of the Project to ensure accuracy of the different project components and eliminate conflicts with the ongoing and previous plans along the project area.

2.3 The Consultant shall be responsible in coordinating and integrating the results of the EIS (if available) for this Project in the final design and bidding documents.

2.4 The Consultant shall provide assistance during the tendering of the Works for the intermodal project.

B. THE SERVICES

2.5 Detailed Investigation and Design

The Consultant shall carry out the necessary engineering investigations and detailed engineering design, which include but are not necessarily limited to the following items:

(i) Site Survey

The Consultant shall conduct preliminary studies to verify and validate the recommendations of the previous Feasibility Studies on the intermodal facility project. The Consultant shall gather and review all the necessary pertinent data about the project particularly the physical topography, which often impose limitations upon location and design, and also conduct site inspection on foot jointly with the DOTC and its Consultant.

Any deviations or modifications proposed on the recommended solutions shall be presented with the corresponding justifications and estimates of costs.

(ii) Field Survey

Carry out the necessary field surveys consisting mainly of reconnaissance, relocation, subdivision and topographic surveys, to confirm and establish accurate reference of the boundaries of the project location.

Structure surveys will be undertaken to record all existing utilities and buildings that will be affected by the proposed road widening as well as the development of the station plaza.

All surveys shall be performed with a precision, which ensures that the design accuracy is attained according to the departmental guidelines and the Consultant is confident that the quantity/work estimation is within the stipulated limits of ±10%. A survey of a given order of accuracy shall conform to all standards of that Order of Accuracy.

The Consultant shall conduct topographic surveys to determine existing ground features and existing physical limitations and developments specially those that are intended to remain.

(iii) Soils and Materials Investigations

Carry out detailed soil investigations along the project area to identify the soil type(s) necessary for the design of the foundation of the facility, both for horizontal and vertical structures.

At least four (4) test pits shall be made/excavated along the corners of the proposed driveway and parking area. The exploration shall extend to a maximum depth of 1.5 meters below the proposed subgrade.

The Consultant shall conduct soil borings (minimum of four (4) boreholes to prescribed depth to determine ground and subsurface conditions at the project site. Disturbed and undisturbed soil and rock samples obtained shall be subjected to physical and mechanical tests and soil mechanics analysis.

All pits and bore holes shall be properly logged showing the thickness of each layer, the color, the type and visual description of each layer, depth below the surface, water levels (if any), etc. These samples will be subjected to the following tests: Mechanical Analysis, Specific Gravity, Atterberg Limits, Moisture-Density Relationship, CBR and Natural Moisture Content. Classification of soils shall be made in accordance with AASHTO M145.

(iv) Drainage/Hydrology

A proper assessment of the existing drainage facilities i.e. pipe and box culverts and ditches will be made to determine capacity and adequacy to accommodate discharge from the proposed development. A complete inventory of all the existing drainage structures together with remarks with respect to their current condition will be prepared on a format acceptable to the DOTC.

With respect to hydraulic design of new drainage system, the Consultant shall carry out hydrological studies with careful analysis of meteorological data and other data such as rainfall, atmospheric temperature, flood records, environmental condition and monthly number of dry weather days, supplemented with preparation of rainfall intensity, duration, and frequency (RIDF) curves for relevant locations/areas and detailed inspection.

(v) Site Development Design

The Consultant shall prepare site development plan for the facility to include proper orientation of pedestrian and vehicular access to eliminate pedestrian and vehicular conflict and accidents.

The Architectural Design shall be perform in accordance with the National Building Code and Batas Pambansa, B.P. No. 344, An Act to Enhance the Mobility of Disabled Persons by Requiring Certain Buildings, Institutions, Establishments and Public Utilities to Install Facilities and Other Devices, and its latest IRR.

i. Sites/ Grounds

- Land and site sustainability considerations during construction activities i.e., plans and documentation needed for site excavation, sedimentation and erosion control, air pollution control, etc.
- Use of organic soil treatment products.
- Management of shadows cast by the proposed buildings on adjacent lots and buildings/ structures.
- Miscellaneous considerations, i.e., rainfall information and hydrologic (and flooding) characteristics of the site including flood risk assessment mitigation studies; public passageways, i.e., secure pathwalks and; waiting sheds and other key street furniture; vehicle use, maneuver and parking plans (open and covered); landscaping plans (hard and soft scapes); green roofs and heat insulated areas.

ii. Buildings/Structures

- Energy conservation and management, i.e., compliance with the latest Department of Energy (DoE) guidelines on energy conservation and management. i.e., lighting and power design, use of light-emitting diodes (LEDs), compact fluorescent lamps (CFLs), etc.; extensive use of natural lighting and ventilation with sun-shading devices; use of renewable (non-fossil) energy sources where applicable (sun, wind, wave, current, hydro, dendro), hot springs, animal, biogas/compost, solid waste.
- Correct wall to window ratio (WWR) for natural light and ventilation purposes, if applicable.
- Construction waste management program, i.e., material collection/ storage/ reuse/recycling/ disposal; waste diversion/reduction.
- Considerations of embodied energy in the construction and finishing materials specified for use in the building/structure/project;
- Compliances with valid and subsisting laws, rules, regulations, guidelines, standards and procedural manuals pertaining to building design e.g. NBCP, Fire Code, Water Code, Sanitation Code, etc.
- Fire and life safety considerations (including flame retardation and flame spread characteristics of materials specified for the building/structure/project).
- Correct building orientation, material, texture and color selection to manage reflected light and heat caused by the building/structure/project and light and heat absorptions by the same.
- Carbon foot-printing of the building/structure/project and all its end-users.

(vi) Roads, Driveway and Parking Area Design

The Consultant shall perform road, driveway and parking design in accordance with the latest versions of the AASHTO's A Policy in Geometric Design of Highway and Streets and of the DPWH's Design Guidelines, Criteria and Standards.

(vii) Pavement Evaluation and Design

Conduct complete studies and evaluation of the existing pavement structure to determine the appropriate upgrading and pavement strengthening treatments that are technically and economically justified.

Utilize axle-loading data for design, which are representative of actual traffic on the specific site, by undertaking axle loading surveys on sites where recent axle-load survey data are not available.

The durability of the existing pavement will be surveyed by a thorough visual examination for cracks, pumping and drainage and a field check of the pavement layers and their in-situ properties. The field checks will be carried out by: 1) test pits through or immediately adjacent to the pavement; 2) by coring through the pavement layers. Coring shall be made alternately at each lane of the carriageway at 500 meters interval or at suitable lesser intervals if required in the judgment of the Consultant to insure accuracy of design estimate.

The existing pavement is to be redesigned, if necessary taking into account in-situ CBR or resilient modulus (Mr) values of the subgrade, actual strengths of the existing sub-base and base courses for future traffic volumes and axle loading for a 20-year design life. Traffic axle load data will be taken from the DPWH records, if available. The existing pavement structure should be salvaged and incorporated into the final detailed engineering to the maximum extent feasible. Pavement evaluation and design shall be in accordance with the AASHTO Interim Guide for Pavement Design Method, with a Performance rating of 2.0 or the British TRL Report LR 444, Strengthening of Flexible Roads in the Tropics: The use of deflection Measurements.

Pavement evaluation and design shall take into consideration the following standards:

Design Elements	Minimum Values
Pavement Width	6.70 m
Shoulder / Sidewalk Width	3.00 m
Planting Strip Width	1.00-1.50 m
Right of way Width (minimum)	20.00 m
Pavement Cross Slope (ACP)	2.00%
(PCCP)	1.50%

Other pavement cross sectional and geometric requirements shall be based on the DPWH Design Guidelines, Criteria and Standards.

(viii) Structural Design

The Consultant shall perform structural design in accordance with the latest version of the National Structural Code of the Philippines.

(ix) Electrical Design

For power and lighting system requirement of the Project, the Consultant shall perform electrical design in accordance with Latest version of the Philippine Electrical Code and its DRs

2.6 Preparation of Procurement

(i) Contract Packaging:

The Consultant shall study packaging schemes appropriate for the different components of the Project considering scope of work, time frame and the normal periodic project accomplishment of contractors with experience on projects similar in nature.

All plans, quantity and cost estimates, unit price analyses and tender documents shall be consistent with this packaging requirement.

(ii) Contract Plans

The Consultant shall prepare the following plans for each contract:

1. Cover Sheet
2. General Index
3. Vicinity and Key Map
4. Location Plan/layout
5. Legend, Abbreviation and Symbols
6. General Notes
7. Topographic Survey Plan
8. Demolition Plan
9. Site Development Plans
10. Civil (Road and Drainage) Design Plans
11. Structural Plans
12. Architectural Plans
13. Electrical Plans (Power and Lighting)
14. Electrical Plan for Street Lighting.
15. Boring Logs and Location of Boreholes
16. Relocation and Subdivision Plans
17. Other plans and drawings as required

Whenever there is a need for the relocation of utilities such as telephone, telegraph and electricity poles, etc. as well as buildings, fences and major trees to be removed, such details shall be indicated in the drawings and a separate list shall be prepared.

(iii) Quantities

Compute all quantities for each contract to an accuracy of ±10 percent and prepare Bill of Quantities.

(iv) Special Provisions

Prepare and submit for approval to the Department of Transportation and Communication, specifications for the environmental mitigation measures, for a specific item of work or methods of construction, measurement and payment under each contract which are not covered by the Technical Specifications and Special Conditions and not covered by the FIDIC Standard Conditions of Contract.

(v) Unit Price Analysis

Prepare a detailed analysis of all applicable unit prices for each contract using current cost indices, rates, etc., including analysis of recent ICB bid prices in the country.

(vi) Government Estimates

Base the Agency's cost estimate on the above unit prices, ensuring that the unit prices reflect current actual market conditions.

(vii) Tender Documents

The Standard Bidding Documents of the Department of Transportation and Communication covering the following shall be adopted and will be made available to the selected Consultant: Instruction to Bidders, Bidding Data; General Conditions of Contract – Part I – FIDIC 4th Edition (1987); Conditions of Particular Application – Part II; Technical Specifications – DPWH Standard Specifications (1995); Volume II – Highways Bridges and Airports, Forms of Tender, Appendix to Tender and Tender Securities, Sample Form of Agreement, Sample Form of Securities, Instructions on submitting Prequalification data to the DOTC Contractor's Prequalification Registry. The Consultant shall prepare all necessary supplementary and/or special technical specifications for the items of work determined for each work contract.

The Consultant shall assist the Department of Transportation and Communication in defining the Contract Profile Criteria for contractor eligibility screening, conducting pre-bid conferences and pre-bid site inspection for interested contractors, and furnish any other information or assistance, which they may need. The Consultant shall assist the DOTC in the evaluation of bids and preparation of bid evaluation reports.

III. IMPLEMENTATION

A. STAFFING

3.1 The Consultant shall provide professional specialist skills and a project team organization that optimizes the use of specialists, for example a core team and separate design teams for each area to carry out the above services. The following skills are anticipated and will be evaluated from the proposals, i.e.:

Core skills – team leadership and project management;

– Geotechnical engineering

Design skills – Architectural and allied engineering such as civil engineering (including hydrology and hydraulics), structural engineering, electrical engineering, technical specifications, quantity and cost estimation.

The assignment is estimated to require about **22** key professional person-months. However, the Consultant may have some flexibility in the constitution of his design team and could propose a team based on his assessment of the projects and his experience in executing similar projects.

The selected Consultant shall report and coordinate all his activities on the project to the Project Director for _____.

3.2 Report Requirements

The Consultant shall submit the following reports in five (5) copies each for the project.

Report		Submission Date
a. Inception Report	-	To be submitted within 15 days of the actual starting date of the services.
b. Soils and Materials Investigation Report	-	To be submitted not more than 30 days after the completion of the services
c. Hydrological Report and Hydraulic Design	-	To be submitted not more than 30 days after the completion of the services.
d. Topographical Survey Report	-	To be submitted not more than 30 days after the completion of the services.
e. Architectural Design Report	-	To be submitted not more than 30 days after the completion of the services.
f. Structural Design Report and Calculations	-	To be submitted not more than 30 days after the completion of the services.
g. Electrical Design Report	-	To be submitted not more than 30 days after the completion of the services.
h. Geo-Technical Reports	-	To be submitted not more than 30 days after the completion of the services.
i. Quantity Calculations and Price Analysis	-	To be submitted not more than 30 days after the completion of the services.
j. Preliminary Draft of Tender Documents		Two (2) copies for each works contract package to be submitted 30 days before the completion of the services.
k. Relocation Plans and Report		Three (3) printed copies to be submitted together with the Final Construction Drawings.

Report		Submission Date
l. Final Construction Drawings		Original drawings together with the check print are to be submitted to DOTC at the end of the duration of the Services.
m. Tender Documents (in Final Form)		Thirty (30) copies to be submitted not more than 30 days after the completion of the services, together with 8 copies of the Unit Price Analysis and two (2) copies of the Government cost Estimates under confidential cover.
n. Monthly Progress Report	-	To be submitted monthly before the 5th of the next month. The 25th of the month is reckoned as the cut-off date for the reporting month.
o. Final Design Report	-	To be submitted not more than 30 days after the completion of the services.
p. Other Reports	-	To be submitted as required by the Client

The Consultant shall submit promptly all documents for design and field survey data under a standard electronic format in CDs and in hard copies.

B. CONTRACT PERIOD

3.3 The Consultant's contract period for undertaking the detailed engineering and the preparation of bidding documents shall be six (6) months and the Consultant shall commence work within fifteen (15) days after receipt of Notice to Proceed.

C. ASSISTANCE TO BE PROVIDED BY THE CLIENT

3.4 In connection with the tasks of the Consultant that requires inputs from other government agencies (e.g.. PNR, DPWH, DENR, etc.), the DOTC shall provide assistance in liaising with those agencies. The DOTC shall ensure that the Consultant have access to all relevant information, which are deemed necessary to the performance of the above services.

3.5 The Consultant is expected to provide all office space and equipment, and all other resources necessary for completing the services.

D. Expertise and Qualification of the Consultant

3.6 The Consultant shall have extensive experience in the preparation and development of design for similar and related facilities.

Prepared by:

ANNEX A

A. GENERAL INFORMATION OF TUTUBAN STATION AREA REDEVELOPMENT

1. Transport Oriented Development (TOD) is a development approach primarily aiming for promotion of public transportation in the vicinity of the mass transit stations through the integration of transportation development and other types of development such as commercial, office, and residential development. Tutuban station area redevelopment is a typical TOD to maximize the benefits by North-South Commuter Rail (NSCR) and LRT-Line 2 west extension. Therefore, Tutuban Redevelopment includes the considerations for both access improvement and urban development.

2. Figure A-1 illustrates the existing conditions as well as proposed access improvements for Tutuban station area. These improvements aim at enhancement of intermodal connectivity as well as safety and convenience for pedestrians. They contributes to the improvement on local traffic circulation and as a results, increase of ridership of railway as well.

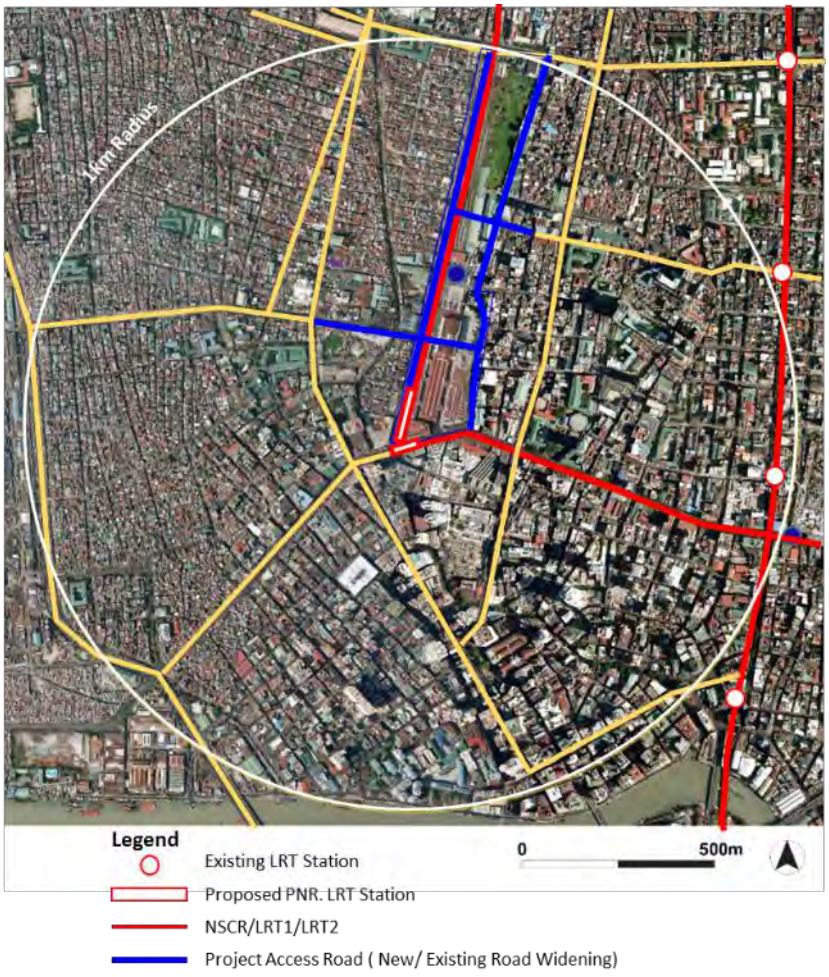


Figure A-1 Access Improvement Plan for Tutuban Station Area

3. Access improvements include the following key interventions;

   - Revive transport functions of C.M. Recto
   - Integrate NSCR and LRT-Line 2 stations
   - Restructure road network and improvement of traffic management in the area
   - Integrate public transport routes and provide proper inter-modal facilities and operation/ management
   - Establish pedestrian network and enhance walking environment

   Based on these key interventions, proposed projects are formulated as shown in Table A-1. Projects included in this TOR are introduced as the immediate-term projects (1.1, 1.2, 2.1, 2.2).

Table A-1 List of Access Improvement Projects and Implementation Schedule

Project Name	Purpose	Components/Contents of the Project	Implementation Period
1. Development of Station Plaza and Public Transportation Facilities in Zone 1	• Mitigate the traffic congestion along CM Recto Ave. • Improve safety, comfort and convenience for the users of NSCR, LRT and adjacent commercial facilities	1.1 Development of Station Plaza	Immediate-term (2015-)
		1.2 Development of Pedestrian Deck (NSCR, LRT2)	Short-term (2016-)
		1.3 Public transportation facilities (parking etc.) in commercial facilities near the stations (NSCR, LRT2)	Short to Mid-term
2. Dagupan St. Widning Improvements	• Secure the land for road widening and viaduct • Mitigate traffic congestion along Dagupan St. • Eliminate illegal on-street parking (jeepneys, cars, trucks). • Secure the alternative business location for the current legal vendors along Recto Ave. and shop owners of night market in Tutuban Mall.	2.1 Demolition and relocation of the affected facilitates	Immediate-term (2015-)
		2.2 Street widening	
		2.3 Development of facility/space under viaduct	Short to Mid-term
3. New Road Construction (N-S, E-W)	• Improve access by enhancement of north-south and east-west axis.	3.1 Demolition and relocation of the relevant facilities (public and commercial) as well as land acquisition (PLDT; for north-south new road)	Short to Mid-term
		3.2 Development of new roads	
4. Rivera St. Widening	• Improve access by enhancement of north-south axis.	4.1 Demolition and relocation of commercial facilities.	Short to Mid-term
		4.2 Street widening	
5. Development of Public Transportation Facility in Zone 3	• Improve safety, comfort and convenience for the users of adjacent commercial facilities and residents of the local community. • Mitigate the traffic congestion along Tayuman St.	5.1 Land acquisition (PLDT) and relocation of the relevant facilities (Missionaries of Charity and Congressman Lopez Building)	Short to Mid-term
		5.2 Development of Public Transportation Facility	

4. Urban development concept was studied to establish a competitive and distinguished new urban core. It aims to enhance and expand local economic and commercial activities as well as to facilitate urban renewal/redevelopment in the adjacent areas. In order to implement the sustainable urban growth, social issues are also considered to provide supports for socially handicapped people affected by the urban development projects.

5. Tutuban station area redevelopment consists of three zones as illustrated in Figure A-2. Zone 1 includes the upgraded multi-story commercial/business complex integrated with NSCR and Line 2 stations and multi-modal transport facilities. Zone 2 has a symbolic public space with landmark facility and commercial/amusement complex surrounded by the green space. Zone 3 encompasses the mixed use multi-story residential/commercial/ business facilities provided with intermodal facilities. In order to implement the development of each zone, projects are formulated as shown in Table A-2.

Figure A-2 Zones of Tutuban Station Area Redevelopment

Table A-2 List of Urban Development Projects and Implementation Schedule

Project Name	Purpose	Components/Contents of the Project	Implementation Period
1. Zone 1 Urban Development	• Establish a new competitive and distinguished facilities as a gateway of the redevelopment site as well as the community. • Provide a relocation site for the existing shops in Tutuban Mall.	1.1 Development of Upgraded High-rise Commercial, Business facility in Zone 1A	Short to Mid-term
		1.2 Development of Temporal and/or Permanent Commercial Facility in Zone 1B to accommodate existing shops in Tutuban Mall	Short term
2. Zone 2 Urban Development	• Improve urban amenity and environment • Secure the open space for disaster prevention /management • Attract visitors to the entire PNR property as a drawing card.	2.1 Development of Park	Short to Mid-term
		2.2 Development of Landmark Facility	Short to Mid-term
3. Zone 3 Urban Development	• Improve convenience for the residents in Zone 3 and local community. • Provide a relocation site for the public and private facilities (e.g. Congressman Building (library, TESDA etc.), Missionary of Charity, PLDT, PNR staff hosing etc.) • Improve urban amenity and environment • Secure the open space for disaster prevention /management • Stimulate multiplier effects by providing residence and business (e.g. BPO) close to each other	3.1 Development of Mixed-use Commercial Facility (Commercial / Office / Public)	Short to Mid-term
		3.2 Development of Park for the residents and nearby communities	Mid to Long-term
		3.3 Development of Mixed-use Residential Facility (Residential / Commercial / Office)	Mid to Long-term

B. CONSTRUCTION SCHEDULE

6. Both Dagupan widening and development of station plaza are considered as a preparatory phase of NSCR construction and closely related to NSCR and LRT-Line 2. Figure B-1 illustrates the construction sequence of the relevant projects. In order to implement this process, schedule has been planned as shown in Table B-1.

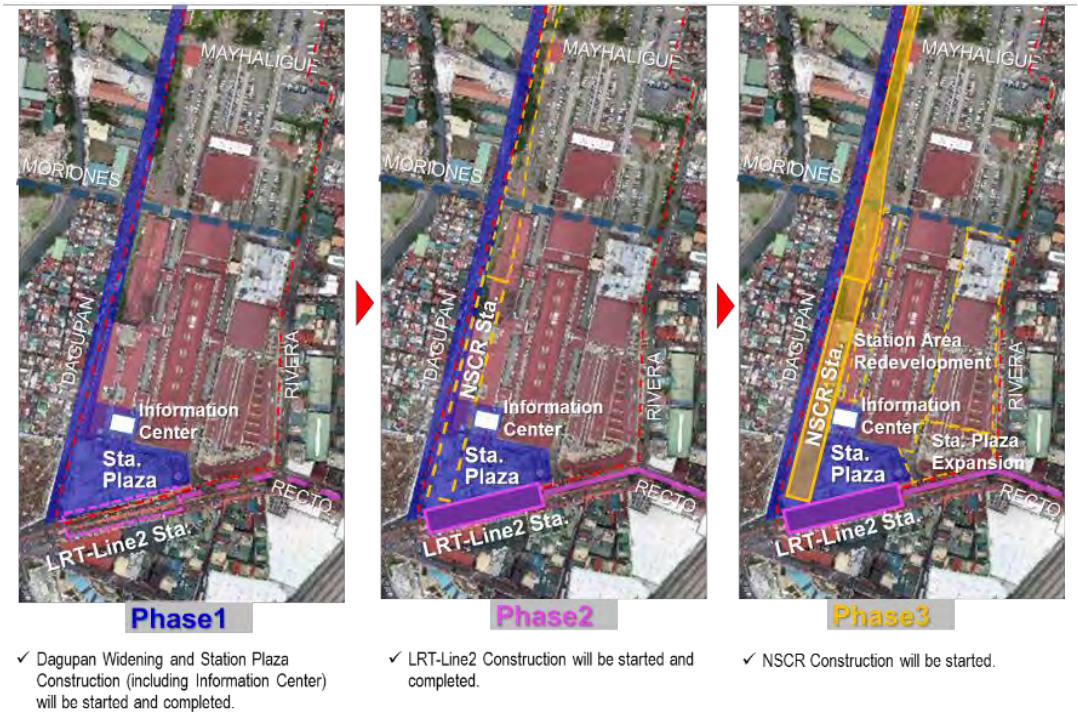


Figure B-1 Construction Sequence of Tutuban Station Area

Table B-1 Construction Schedule

	Contents	2015	2016	2017	2018	2019	2020
Phase1	Dagupan Widening						
	Station Plaza Construction (including Information Center)						
Phase2	LRT-Line2 Construction (station, viaduct, ped. deck)						
Phase3	NSCR Construction (station, viaduct, ped. deck)						

Schedule of Phase 1

	2014	2015				2016			
	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Conduct F/S									
Presentation to DOTC and Review									
Procurement of Consultant									
Notice of Award									
Detailed Engineering Design (by Phase)									
Procurement of Contractor									
Notice of Award									
Construction (by Phase)									

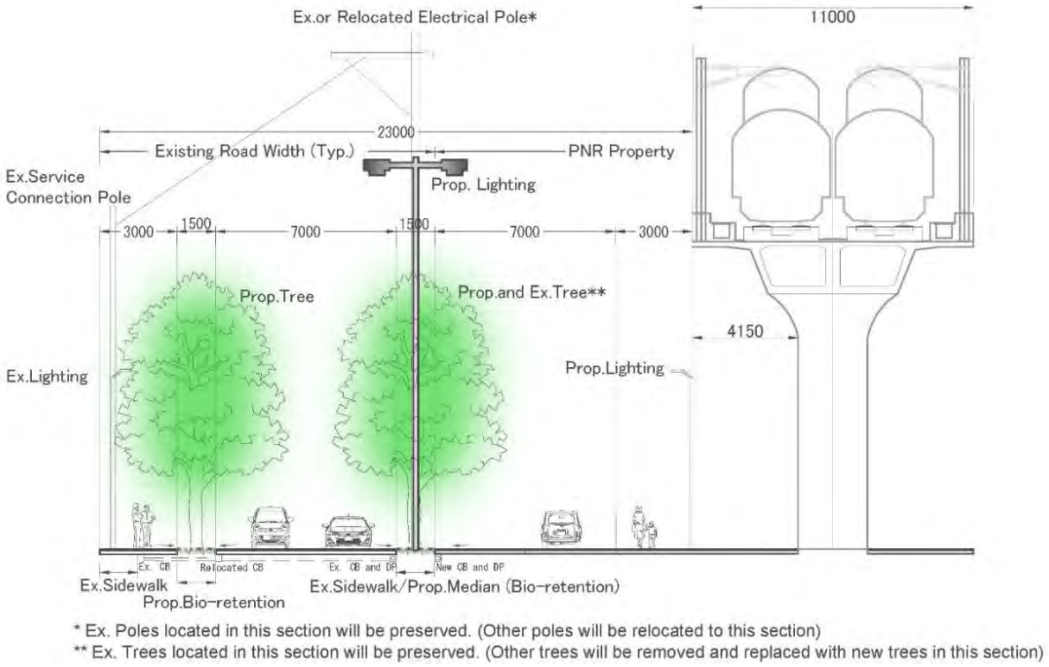
C. TYPICAL SECTIONS OF DAGUPAN STREET WIDENING

7. According to the results of topographic survey, current location of the existing sidewalk will be verified. As Figure C-1 illustrates, if the current sidewalk exists within the proposed median section, existing trees and lighting poles will be preserved. Trees and lighting poles will be placed out according to the following minimum spacing;

   Trees: 10 m, Lighting Poles: 25 m

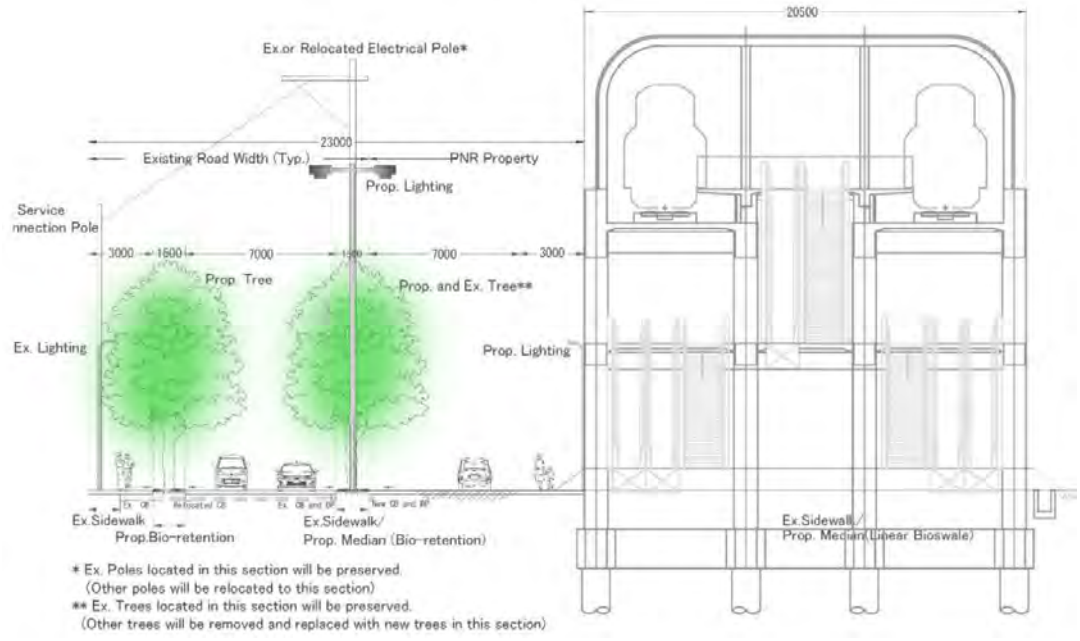
   Trees in the median will be medium size while those adjacent to the sidewalk will be medium to large to provide sufficient shade for the pedestrian. Planting strip will be linear with curb-cuts to intercept storm water as a bio-retention (see Figure C-2).

Section of Dagupan Widening at NSCR Viaduct



* Ex. Poles located in this section will be preserved. (Other poles will be relocated to this section)
** Ex. Trees located in this section will be preserved. (Other trees will be removed and replaced with new trees in this section)

Section of Dagupan Widening at NSCR Tutuban Station



* Ex. Poles located in this section will be preserved.
(Other poles will be relocated to this section)
** Ex. Trees located in this section will be preserved.
(Other trees will be removed and replaced with new trees in this section)

Figure C-1 Typical Sections of Dagupan Street Widening

Figure C-2 Example of Bio-retention Planting Strip

D. PLAN OF STATION PLAZA

8. The proposed Station Plaza will be developed at the immediate term (phase 1) with the following components:

   a. Drop off Area for Rail Passengers transported to the Station by taxis or private vehicles;

      This will reduce pedestrian and vehicle conflicts since passengers will be walking in safer area away from main thoroughfare where undisciplined public vehicle drivers would just maneuver wherever they please.

      The Taxi Drop off area integrates a space for taxis to pick up waiting passengers bound to their next destination.

   b. Information Center to assist rail passengers facilitate their access and boarding process;

      Information center plays a role to disseminate the relevant information by various devices such audio visual equipment, which will feature proposed development plan of the Railway and Tutuban Station, Miniature Model of the Railway and Tutuban Development Site, and different exhibits presenting the history of Tutuban Station and how it will be transformed into a modern facility with sufficient amenities for rail passengers.

      Paving material will be in accordance with design guideline of Tutuban Re-development Plan.

      Figure D-1 presents the concept of the development for the Tutuban Station Plaza.

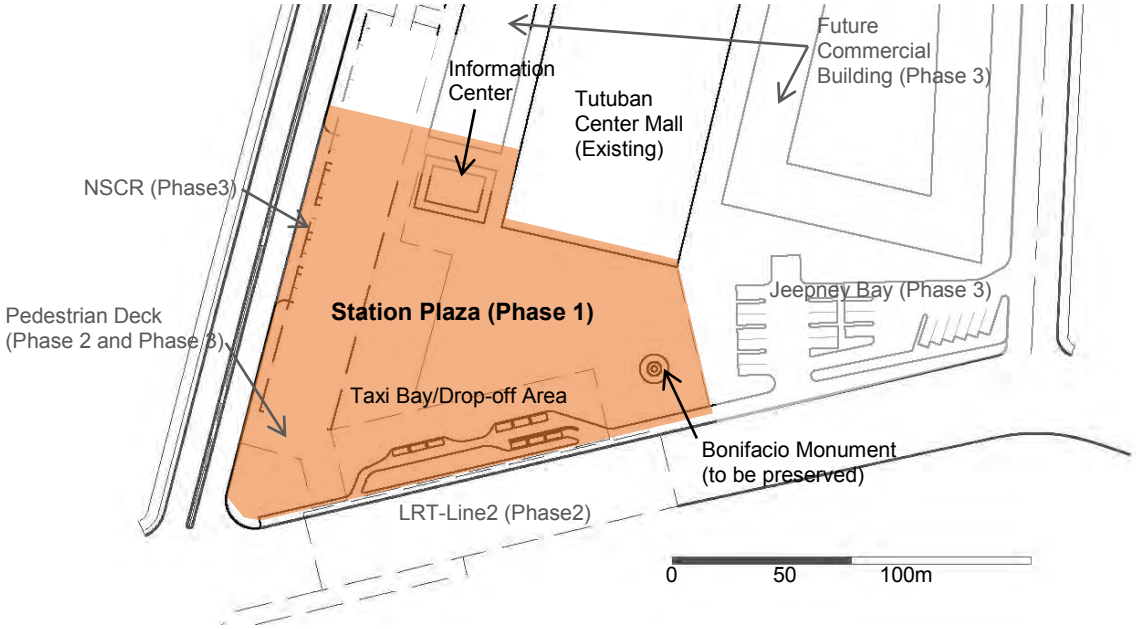


Figure D-1 Tutuban Station Plaza

E. PLAN OF INFORMATION CENTER

9. Since Tutuban station development will be implemented by phases, it is essential to share the future vision of the development among stakeholders as well as visitors of Tutuban area. Information center plays a role to disseminate the relevant information by various devices as shown in Figure E-2. Information center is currently planned between the station and the existing Tutuban Center Mall as illustrated in Figure E-1.

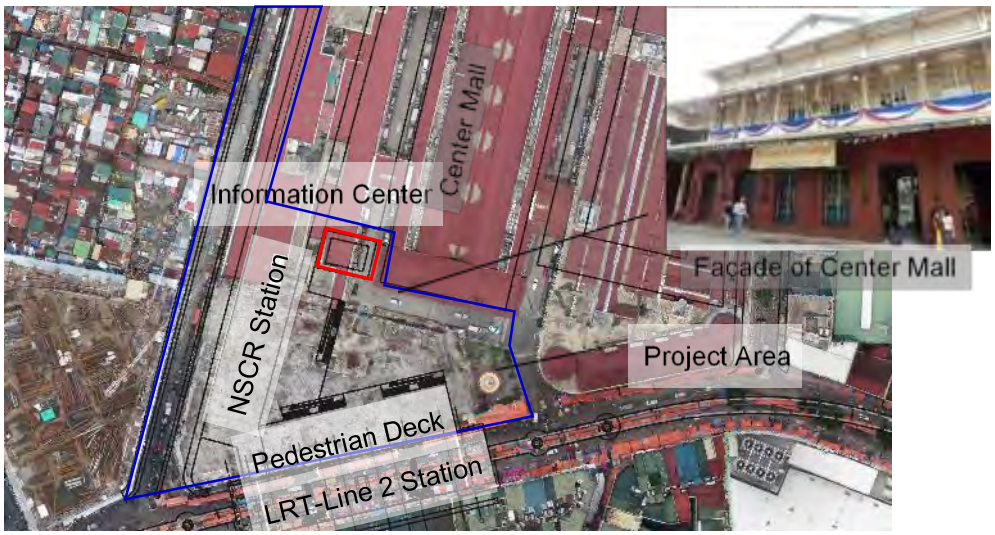


Figure E-1 Location of Information Center

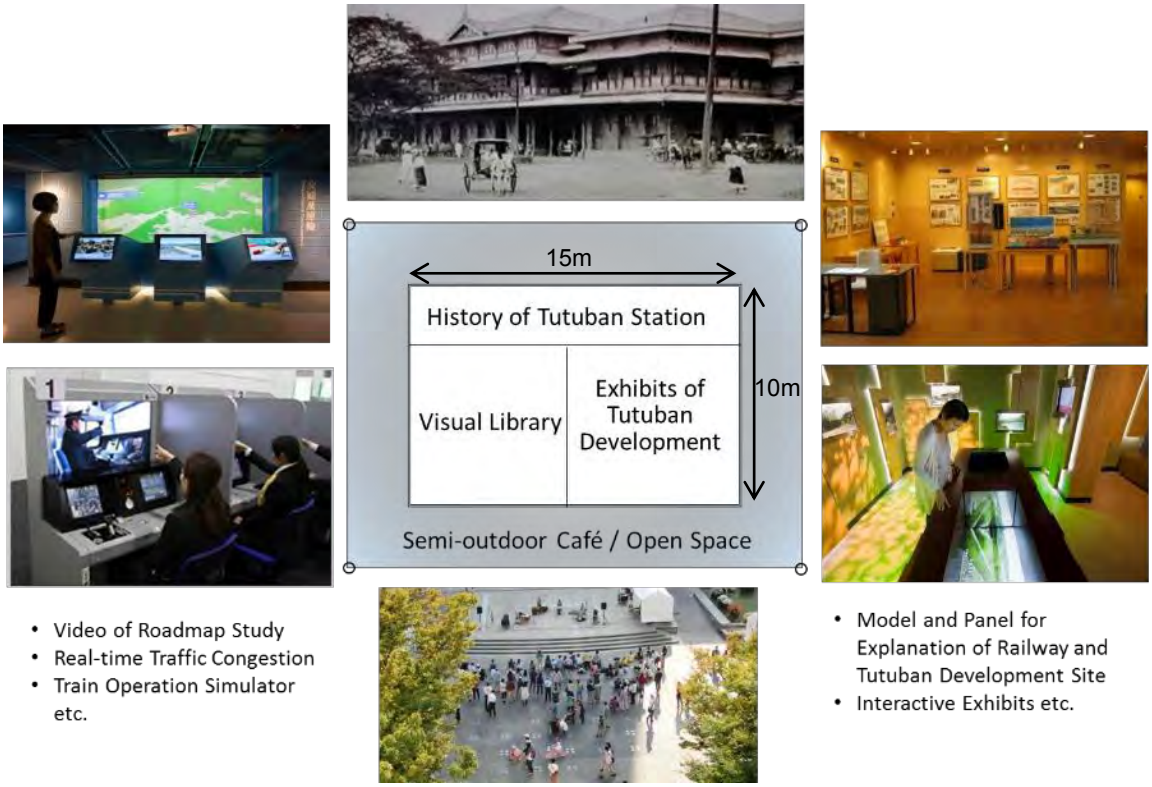


Figure E-2 Exhibit Contents of Information Center

Figure E-3 Images of Information Center

10. As Information Center will be constructed prior to NSCR station and pedestrian deck, location needs to be confirmed with the latest design by NSCR study team. Facade of Information Center will be aligned with the historic façade of Tutuban Center Mall as shown in Figure E-1. The walls need to be transparent to the maximum extent to create interactions between inside and outside spaces.

APPENDIX 5.2 COST ESTIMATION

Appendix 5.2 Cost Estimation

1) Preliminary Project Cost Estimation

Table 1 Preliminary Cost Estimate of Phase 1 Projects from Malolos to Valenzuela

Category	Item		Unit	Unit Cost (PHP)	Malolos		Guiguinto		Balagtas		Bocaue	
					QTY.	Cost (PHP) (000)	QTY.	Cost (PHP) (000)	QTY.	Cost (PHP) (000)	QTY.	Cost (PHP) (000)
Pavement Work	Access Road within 200 m	Carriage Way	sq.m	6,611	5,600	42,702	5,600	42,702	7,000	53,378	8,400	64,054
		Side Walk	sq.m	2,367	2,400		2,400		3,000		3,600	
	Access Road within 1 km	Carriage Way	sq.m	6,611	18,200	138,783	70,140	534,848	50,820	387,524	88,200	672,563
		Side Walk	sq.m	2,367	7,800		30,060		21,780		37,800	
	Pedestrian Walk Way		sq.m	2,367	23,958	56,709	25,560	60,501				
	Transport Facility Under Viaduct		sq.m	1,755	4,000	7,020						
	Parking		sq.m	3,387	4,614	15,628	5,000	16,935	10,000	33,870	5,000	16,935
PC Pedestrian Deck			sq.m	60,000	900	54,000						
Total			-	-	-	314,841	-	654,985	-	474,772	-	753,551

Category	Item		Unit	Unit Cost	Marilao		Meycauayan		Valenzuela	
					QTY.	Cost (PHP) (000)	QTY.	Cost (PHP) (000)	QTY.	Cost (PHP) (000)
Pavement Work	Access Road within 200 m	Carriage Way	sq.m	6,611	45,570	347,491	26,390	201,235	69,370	528,976
		Side Walk	sq.m	2,367	19,530		11,310		29,730	
	Access Road within 1 km	Carriage Way	sq.m	6,611						
		Side Walk	sq.m	2,367						
	Pedestrian Walk Way		sq.m	2,367	12,624	29,881	20,040	47,435		
	Transport Facility Under Viaduct		sq.m	1,755						
	Parking		sq.m	3,387	2,000	6,774	7,000	23,709	4,000	13,548
Total			-	-	-	384,146	-	272,379	-	542,524

Table 2 Preliminary Cost Estimate of Projects at Tutuban (by Public Sector)

Project	Item	Unit	Unit Cost (PHP)	QTY.	Cost (PHP 000)	Total (PHP 000)
Pedestrian Deck	Steel Pedestrian Deck (to be constructed by NSCR project)	sq.m	110,000	3,400	374,000	574,500
	Steel Pedestrian Deck (to be constructed by NSCR and LRT-2 project.)	sq.m	110,000	1,600	176,000	
	Escalator	each	7,000,000	3	21,000	
	Elevator	each	3,500,000	1	3,500	
Commercial & Public Facilities Under Viaduct	Transport Facility under Viaduct	sq.m	2,732	2,459	6,717	338,935
	Jeepney Bay under Viaduct	sq.m	2,732	2,207	6,030	
	Commercial Facility under Viaduct	sq.m	33,000	9,884	326,186	
Moriones Road Widening	Carriage Way	sq.m	7,631	2,242	17,108	151,316
	Side Walk	sq.m	2,732	757	2,068	
	Carriage Way Overlay	sq.m	3,533	363	1,282	
	PNR Headquarter / Station	sq.m	20,200	4,410	89,082	
	Station Plaza Parking	sq.m	3,910	2,500	9,775	
	Railway Facilities	L.S	-	-	32,000	

Table 3 Preliminary Cost Estimate of Projects at Tutuban (by Private Sector)

Zone	Implementator	Item	Unit	Unit Cost (PHP)	QTY.	Cost (PHP 000)	Total Cost (PHP million)
Zone 1	Private	Shop / Restaurant (1- 2F) Renovated Heritage Building; 9F (above GF)+3F (underground)	sq.m	37,300	24,000	895,200	8,366
		Shop / Restaurant (3- 4F), Renovated Heritage Building	sq.m	39,500	8,428	332,906	
		Office (5-9F), Renovated Heritage Building	sq.m	56,800	21,070	1,196,776	
		Underground Parking, Renovated Heritage Building	sq.m	25,000	12,642	316,050	
		Shop / Restaurant (1- 2F), Commercial/Office Building 1A-2	sq.m	37,300	20,000	746,000	
		Shop / Restaurant (3- 4F), Commercial/Office Building 1A-2;	sq.m	39,500	12,972	512,394	
		Office (5F-8F), Commercial/Office Building 1A-2	sq.m	56,800	25,944	1,473,619	
		Hotel	sq.m	61,700	32,430	2,000,931	
		Underground Parking, Commercial/Office Building 1A-2	sq.m	25,000	30,000	750,000	
		Landscape	sq.m	11,000	3,800	41,800	
		80%Paved+20%Landscape	sq.m	5,300	13,500	71,550	
		50%Paved+50Landscape	sq.m	7,500	3,800	28,500	
	Public	Carriage Way	sq.m	7,631	5,116	39,039	3,069
		Side Walk	sq.m	2,732	4,479	12,237	
		Carriage Way Overlay	sq.m	3,533	6,021	21,271	
		Jeepney Bay	sq.m	3,910	3,746	14,647	
		Steel Pedestrian deck	sq.m	110,000	475	52,239	
		Shop / Restaurant (1- 2F), Commercial Building 1B	sq.m	37,300	64,200	2,394,660	
		Underground Parking, Commercial Building 1B	sq.m	25,000	21,400	535,000	
Zone 2	Private	Parking	sq.m	3,910	600	2,346	3,678
		Shop / Restaurant (1- 2F), The Tower of Maynila	sq.m	37,300	5,000	186,500	
		Underground Parking, The Tower of Maynila	sq.m	25,000	7,500	187,500	
		Shop / Restaurant (1- 2F)	sq.m	37,300	14,600	544,580	
		Underground Parking, Convention Center	sq.m	25,000	21,900	547,500	
		The Tower of Maynila	ton	200,000	3,600	720,000	
		Convention Center (3- 4F)	sq.m	49,000	14,600	715,400	
		Amusement Center	sq.m	53,000	14,600	773,800	
	Public	Carriage Way	sq.m	7,631	4,148	31,652	168
		Side Walk	sq.m	2,732	1,843	5,035	
		Steel Pedestrian deck	sq.m	110,000	500	55,000	
		Landscape	sq.m	11,000	14,600	160,600	
		50%Paved+50Landscape	sq.m	7,500	1,000	7,500	
Zone 3	Private	Shops/Restraints	sq.m	37,300	15,060	561,738	15,624
		Clinic/School	sq.m	33,000	7,530	248,490	
		Office	sq.m	56,800	20,745	1,178,316	
		Underground Parking, Mixed-use Building 3-1	sq.m	25,000	22,590	564,750	
		Shop/Restaurant (1-2F)	sq.m	37,300	6,800	253,640	
		Shop/Restaurant, (3-4F)	sq.m	39,500	35,481	1,401,500	
		Office	sq.m	56,800	32,500	1,846,000	
		Underground Parking, Mixed-use Building 3-2	sq.m	25,000	35,481	887,025	
		Clinic/School	sq.m	33,000	11,827	390,291	
		Residential (9F-23F), Mixed-use Building 3-1	sq.m	56,000	62,235	3,485,160	
		Residential (11F-25F), Mixed-use Building 3-2	sq.m	56,000	84,500	4,732,000	
		50%Paved+50Landscape	sq.m	7,500	3,700	27,750	
		Land Acquisition	sq.m	15,750	3,000	47,250	
	Public	Carriage Way	sq.m	20,200	6,300	48,074	291
		Side Walk	sq.m	3,910	2,698	7,371	
		Parking	sq.m	3,910	5,000	19,548	
		Steel Pedestrian deck	sq.m	110,000	900	99,000	
		Landscape	sq.m	11,000	10,600	116,600	

Table 4 Estimated Project Cost of Immediate Term Project (Information Center)

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART A – General Requirements	A.1	Building Facilities for the Engineer				
	A(1)a1	Temporary Offices/ Laboratories and Engineer's Quarters	2	mo	100,000	200,000
	A(1)a2	Construction of Combined Engineer's Field Office, and Laboratory Building and Compound	-	lot	500,000	-
	A(1)b	Construction of Engineer's Living Quarters	-	lot	2,500,000	-
	A.2	Furniture, Fixtures and Appliances				
	A(2)a	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Field Office and Laboratory Building f (Schedule A)	1	lot	250,000	250,000
	A(2)b	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Living Quarters (Schedule B)	1	lot	200,000	200,000
	A.3	Maintenance of Engineer's Facilities				
	A(3)	Operate and Maintenance of Combined Field Office, Laboratory and Quarters Building and Compound including Consumable (Schedule C and D)	1	lot	100,000	100,000
	A.4	Service Vehicles for the Engineer				
	A(4)a	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 SUV Nissan Patrol or Equivalent(Rental), One (1) unit	2	veh-mo	80,000	160,000
	A(4)b	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 Pick-up Isuzu Fuego or Equivalent(Rental), One (1) unit	2	veh-mo	75,000	150,000
	A(4)c	Provide, Operate and Maintain Service Vehicle for the Engineer, 2 x 4 Pick-up Isuzu Fuego or Equivalent (Rental), One (1) unit1	-	veh-mo	70,000	-
	A.5	Communication Facilities for the Engineer				
	A(5)a	Provide Communication Equipment for the Engineer, UHF Two-way Radio Base Transceiver including six (6) unit Radio handheld Transceiver and Accessories including Operator	2	mo	290,000	580,000
	A(5)b	Operate and Maintain Communication Equipment for the Engineer	2	mo	15,000	30,000
	A.6	Progress Photographs				
	A(6)	Provision of Progress Photographs, One(1)Set = One Negative and Ten Proof Prints at Single Shot Ten (10) Set Per Month	-	mo	75,000	-
	A.7 Assistance to the Engineer					
	A(7)a	Provision of Survey Personnel for the Assistance to the Engineer	2	mo	75,000	150,000
	A(7)b	Provision and Maintenance for Survey Equipment and Apparatus for the Assistance to the Engineer	2	mo	125,000	250,000
	A.8 Laboratory Equipment, Apparatus and Publications					
	A(8)	Furnish Laboratory Equipment, Apparatus and Publications (Schedule E)	1	lot	2,500,000	2,500,000
	SUB-TOTAL (PART A)					2,470,000
PART B – Other General	SPL B.2.1	Construction Health and Safety	1	l.s.	350,000	350,000
	SPL B.2.2	Mobilization/Demobilization (1.5% of Civil	1	l.s.	204,011	204,011

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
Requirements		Works)				
	SPL B.3.1	Maintenance of Project Road and Traffic Control	-	l.s.	1,209,600	-
	SUB-TOTAL (PART B)					554,011
PART C – Earthworks	Information Center		150	sq.m.		
	100(1)	Clearing and Grubbing	-	ha.	500,000	-
	102(1)	Fill and Disposal	-	cu.m.	200	-
	103(1)	Structure Excavation, Common Material	-	cu.m.	245	-
	103(3)	Foundation Fill (Granular Bedding)	15	cu.m.	884	13,265
	SUB-TOTAL (PART C)					13,265
PART D – Sub-base and Base course	200	Aggregate Sub-base Course	-	cu.m.	600	-
	202	Crushed Aggregate Base Course	-	cu.m.	800	-
	SUB-TOTAL (PART D)					-
PART E – Surface Courses	311 (1)	300 mm Portland Cement Concrete Pavement	-	sq.m.	1,500	-
	311 (2)	150 mm Portland Cement Concrete Pavement	-	sq.m.	575	-
	311 (3)	Overlay, 150 mm Portland Cement Concrete Pavement	-	sq.m.	750	-
	SUB-TOTAL (PART E)					-
PART G - Drainage and Slope Protection Structures	500(1)e	RCPC, 1070 mm dia.	-	L.m.	7,500	-
	500(1)g	RCPC, 460 mm dia.	-	L.m.	5,250	-
	502(2)	Curb Inlet Manhole	-	ea.	250,000	-
	SUB-TOTAL (PART G)					-
PART H – Miscellaneous Structures	Information Center		150	sq.m.		
	700 (1)	Flooring System (slab & tiles)	150	sq.m.	5,000	750,000
	700 (2)	Wall System including Doors/Windows	145	sq.m.	7,500	1,087,500
	700 (3)	Roof System	300	sq.m.	10,000	3,000,000
	700 (4)	Finishing (Architectural & Electrical)	150	sq.m.	5,000	750,000
	700 (5)	Audio Visual Equipmenmt	1	lot	6,000,000	6,000,000
		Furnitures	1	lot	2,000,000	2,000,000
	SUB-TOTAL (PART H)					13,587,500
		SUBTOTAL				**16,624,776**
		Engineering Cost (8%)				1,329,982
		Project Management Cost (2.0%)				332,496
		Contingencies (20%)				3,324,955
		Miscellaneous (5%)				831,239
		TOTAL PROJECT COST			**PHP**	**22,443,448**

Table 5 Estimated Project Cost of Immediate Term Project (Station Plaza)

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART A – General Requirements integrated with Dagupan St. Widening	A.1	Building Facilities for the Engineer				
	A(1)a1	Temporary Offices/ Laboratories and Engineer's Quarters	-	mo	100,000	-
	A(1)a2	Construction of Combined Engineer's Field Office, and Laboratory Building and Compound	-	lot	500,000	-
	A(1)b	Construction of Engineer's Living Quarters	-	lot	2,500,000	-
	A.2	Furniture, Fixtures and Appliances				
	A(2)a	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Field Office and Laboratory Building f (Schedule A)	-	lot	550,000	-
	A(2)b	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Living Quarters (Schedule B)	-	lot	550,000	-
	A.3	Maintenance of Engineer's Facilities				
	A(3)	Operate and Maintenance of Combined Field Office, Laboratory and Quarters Building and Compound including Consumable (Schedule C and D)	-	lot	250,000	-
	A.4	Service Vehicles for the Engineer				
	A(4)a	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 SUV Nissan Patrol or Equivalent(Rental), One (1) unit	-	veh-mo	80,000	-
	A(4)b	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 Pick-up Isuzu Fuego or Equivalent(Rental), One (1) unit	-	veh-mo	75,000	-
	A(4)c	Provide, Operate and Maintain Service Vehicle for the Engineer, 2 x 4 Pick-up Isuzu Fuego or Equivalent (Rental), One (1) unit1	-	veh-mo	70,000	-
	A.5	Communication Facilities for the Engineer				
	A(5)a	Provide Communication Equipment for the Engineer, UHF Two-way Radio Base Transceiver including six (6) unit Radio handheld Transceiver and Accessories including Operator		mo	290,000	
	A(5)b	Operate and Maintain Communication Equipment for the Engineer		mo	15,000	
	A.6	Progress Photographs				
	A(6)	Provision of Progress Photographs, One(1)Set = One Negative and Ten Proof Prints at Single Shot Ten (10) Set Per Month	-	mo	75,000	-
	A.7 Assistance to the Engineer					
	A(7)a	Provision of Survey Personnel for the Assistance to the Engineer	-	mo	75,000	-
	A(7)b	Provision and Maintenance for Survey Equipment and Apparatus for the Assistance to the Engineer		mo	270,000	-
	A.8 Laboratory Equipment, Apparatus and Publications					
	A(8)	Furnish Laboratory Equipment, Apparatus and Publications (Schedule E)	-	lot	2,250,000	
	SUB-TOTAL (PART A)					-
PART B – Other General	SPL B.2.1	Construction Health and Safety	-	l.s.	1,046,062	-
	SPL B.2.2	Mobilization/Demobilization (1.5% of Civil	-	l.s.	724,111	-

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
Requirements		Works)				
	SPL B.3.1	Maintenance of Project Road and Traffic Control	-	l.s.	1,209,600	-
	SUB-TOTAL (PART B)					-
PART C – Earthworks	Station Plaza		9,200	sq.m.		
	100(1)	Clearing and Grubbing	-	cu.m.	500,000	-
	102(1)	Disposal of Debris	36,800	cu.m.	300	11,040,000
	103(1)	Structure Excavation, Common Material	-	cu.m.	245	-
	103(2)	Foundation Fill (Granular Bedding)	920	cu.m.	884	813,579
	103(3)	Demolition of Existing Concrete Structure	36,800	sq.m.	650	23,920,000
	SUB-TOTAL (PART C)					35,773,579
PART D – Sub-base and Base course	200	Aggregate Sub-base Course	-	cu.m.	600	-
	202	Crushed Aggregate Base Course	-	cu.m.	800	-
	SUB-TOTAL (PART D)					-
PART E – Surface Courses	311 (1)	300 mm Portland Cement Concrete Pavement	600	sq.m.	1,150	690,000
	311 (2)	150 mm Portland Cement Concrete Pavement	9,050	sq.m.	575	5,203,750
	311 (3)	Overlay, 150 mm Portland Cement Concrete Pavement	-	sq.m.	750	-
	SUB-TOTAL (PART E)					5,893,750
PART G - Drainage and Slope Protection Structures	500(1)e	RCPC, 1070 mm dia.	-	L.m.	7,500	-
	500(1)g	RCPC, 460 mm dia.	360	L.m.	5,250	1,890,000
	502(2)	Curb Inlet Manhole	18	ea.	250,000	4,500,000
	SUB-TOTAL (PART G)					6,390,000
PART H – Miscellaneous Structures	600 (3)	Curb and Gutter	250	lm	550	137,500
	605(1)a	Warning Signs - Triangular	5	ea.	11,614	58,068
	605(2)a	Regulatory Signs	-	ea.	12,805	-
	612(1)	Reflectorized Thermoplastic Pavement Markings (White)	30	sq.m.	705	21,160
	612(2)	Reflectorized Thermoplastic Pavement Markings (Yellow)	-	sq.m.	708	-
	SUB-TOTAL (PART H)					216,728
		SUBTOTAL				**48,274,057**
		Engineering Cost (8%)				3,861,925
		Project Management Cost (2.0%)				965,481
		Contingencies (20%)				9,654,811
		Miscellaneous (5%)				2,413,703
		TOTAL PROJECT COST			**PHP**	**65,169,978**

Table 6 Estimated Project Cost of Immediate Term Project (Dagupan St. Widening)

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART A – General Requirements	A.1	Building Facilities for the Engineer				
	A(1)a1	Temporary Offices/ Laboratories and Engineer's Quarters	6	mo	100,000	600,000
	A(1)a2	Construction of Combined Engineer's Field Office, and Laboratory Building and Compound	-	lot	500,000	-
	A(1)b	Construction of Engineer's Living Quarters	-	lot	2,500,000	-
	A.2	Furniture, Fixtures and Appliances				
	A(2)a	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Field Office and Laboratory Building f (Schedule A)	1	lot	550,000	550,000
	A(2)b	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Living Quarters (Schedule B)	1	lot	550,000	550,000
	A.3	Maintenance of Engineer's Facilities				
	A(3)	Operate and Maintenance of Combined Field Office, Laboratory and Quarters Building and Compound including Consumable (Schedule C and D)	1	lot	250,000	250,000
	A.4	Service Vehicles for the Engineer				
	A(4)a	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 SUV Nissan Patrol or Equivalent(Rental), One (1) unit	6	veh-mo	80,000	480,000
	A(4)b	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 Pick-up Isuzu Fuego or Equivalent(Rental), One (1) unit	6	veh-mo	75,000	450,000
	A(4)c	Provide, Operate and Maintain Service Vehicle for the Engineer, 2 x 4 Pick-up Isuzu Fuego or Equivalent (Rental), One (1) unit1	6	veh-mo	70,000	420,000
	A.5	Communication Facilities for the Engineer				
	A(5)a	Provide Communication Equipment for the Engineer, UHF Two-way Radio Base Transceiver including six (6) unit Radio handheld Transceiver and Accessories including Operator	6	mo	290,000	1,740,000
	A(5)b	Operate and Maintain Communication Equipment for the Engineer	6	mo	15,000	90,000
	A.6	Progress Photographs				
	A(6)	Provision of Progress Photographs, One(1)Set = One Negative and Ten Proof Prints at Single Shot Ten (10) Set Per Month	6	mo	75,000	450,000
	A.7 Assistance to the Engineer					
	A(7)a	Provision of Survey Personnel for the Assistance to the Engineer	6	mo	75,000	450,000
	A(7)b	Provision and Maintenance for Survey Equipment and Apparatus for the Assistance to the Engineer	6	mo	270,000	1,620,000
	A.8 Laboratory Equipment, Apparatus and Publications					
	A(8)	Furnish Laboratory Equipment, Apparatus and Publications (Schedule E)	1	lot	2,250,000	2,250,000
	SUB-TOTAL (PART A)					9,900,000
PART B – Other General Requirements	SPL B.2.1	Construction Health and Safety	1	l.s.	1,046,062	1,046,062
	SPL B.2.2	Mobilization/Demobilization (1.5% of Civil Works)	1	l.s.	1,344,679	1,344,679
	SPL	Maintenance of Project Road and Traffic Control	1	l.s.	1,209,600	1,209,600

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
	B.3.1					
	SUB-TOTAL (PART B)					3,600,342
PART C – Earthworks	100(1)	Clearing and Grubbing	1.27	ha.	500,000	635,000
	102(1)	Fill and Disposal	624	cu.m.	200	124,609
	103(1)	Structure Excavation, Common Material	624	cu.m.	245	152,994
	103(2)	Foundation Fill (Granular Bedding)	31.2	cu.m.	884	27,591
	103(3)	Removal of Existing Trees	45	each	2,500	112,500
	103(4)	Removal of Existing Structures	8,620	sq.m.	1,500	12,930,000
	SUB-TOTAL (PART C)					13,982,695
PART D – Sub-base and Base course	200	Aggregate Sub-base Course	3,810	cu.m.	600	2,286,000
	202	Crushed Aggregate Base Course	3,175	cu.m.	800	2,540,000
	SUB-TOTAL (PART D)					4,826,000
PART E – Surface Courses	311 (1)	300 mm Portland Cement Concrete Pavement	8.890	sq.m.	1,500	13,335,000
	311 (2)	150 mm Portland Cement Concrete Pavement	7,620	sq.m.	750	5,715,000
	311 (3)	Overlay, 150 mm Portland Cement Concrete Pavement	8,890	sq.m.	750	6,667,000
		SUB-TOTAL (PART E)				25,717,500
PART G - Drainage and Slope Protection Structures	500(1)e	RCPC, 1070 mm dia.	1,270	L.m.	7,500	9,525,000
	500(1)g	RCPC, 460 mm dia.	208	L.m.	5,250	1,092,000
	502(2)	Curb Inlet Manhole	52	ea.	250,000	13,000,000
	SUB-TOTAL (PART G)					23,617,000
PART H – Miscellaneous Structures	600 (3)	Curb and Gutter	2,540	lm	550	1,397,000
	605(1)a	Warning Signs - Triangular	10	ea.	11,614	116,140
	605(2)a	Regulatory Signs	10	ea.	12,805	128,050
	612(1)	Reflectorized Thermoplastic Pavement Markings (White)	476.25	sq.m.	705	335,914
	612(2)	Reflectorized Thermoplastic Pavement Markings (Yellow)	-	sq.m.	708	-
	613(1)	Electrical Poles including Foundation	1,270	lm	5,500	6,985,000
	613(2)	Traffic Signal	5	sets	2,000,000	10,000,000
	613(3)	Trees (Large)	254	each	10,000	2,540,000
	SUB-TOTAL (PART H)					21,502,100
		SUBTOTAL				**103,145,637**
		Engineering Cost (8%)				8,251,651
		Project Management Cost (2.0%)				2,062,913
		Contingencies (20%)				20,629,127
		Miscellaneous (5%)				5,157,281
		TOTAL PROJECT COST			**PHP**	**139,246,609**

Table 7 Estimated Project Cost of New PNR Facilities (Station, Station Plaza/Parking, Railway Facilities including Demolition of the Existing Facilities)

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART A - General Requirements	A.1	Building Facilities for the Engineer				
	A(1)a1	Temporary Offices/ Laboratories and Engineer's Quarters	12	mo	100,000	1,200,000
	A(1)a2	Construction of Combined Engineer's Field Office, and Laboratory Building and Compound	1	lot	500,000	500,000
	A(1)b	Construction of Engineer's Living Quarters	1	lot	2,500,000	2,500,000
	A.2	Furniture, Fixtures and Appliances				
	A(2)a	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Field Office and Laboratory Building (Schedule A)	1	lot	550,000	550,000
	A(2)b	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Living Quarters (Schedule B)	1	lot	550,000	550,000
	A.3	Maintenance of Engineer's Facilities				
	A(3)	Operate and Maintenance of Combined Field Office, Laboratory and Quarters Building and Compound including Consumable (Schedule C and D)	1	lot	250,000	250,000
	A.4	Service Vehicles for the Engineer				
	A(4)a	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 SUV Nissan Patrol or Equivalent (Rental), One (1) unit	12	veh-mo	80,000	960,000
	A(4)b	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 Pick-up Isuzu Fuego or Equivalent (Rental), One (1) unit	12	veh-mo	75,000	900,000
	A(4)c	Provide, Operate and Maintain Service Vehicle for the Engineer, 2 x 4 Pick-up Isuzu Fuego or Equivalent (Rental), One (1) unit1	12	veh-mo	70,000	840,000
	A.5	Communication Facilities for the Engineer				
	A(5)a	Provide Communication Equipment for the Engineer, UHF Two-way Radio Base Transceiver including six (6) unit Radio handheld Transceiver and Accessories including Operator	12	mo	290,000	3,480,000
	A(5)b	Operate and Maintain Communication Equipment for the Engineer	12	mo	15,000	180,000
	A.6	Progress Photographs				
	A(6)	Provision of Progress Photographs, One(1 and Ten Proof Prints at Single Shot Ten (10) Set Per Month)Set = One Negative	12	mo	75,000	900,000
	A.7	Assistance to the Engineer				
	A(7)a	Provision of Survey Personnel for the Assistance to the Engineer	12	mo	75,000	900,000
	A(7)b	Provision and Maintenance for Survey Equipment and Apparatus for the Assistance to the Engineer	12	mo	270,000	3,240,000
	A.8	Laboratory Equipment, Apparatus and Publications				
	A(8)	Furnish Laboratory Equipment, Apparatus and Publications (Schedule E)	12	lot	2,250,000	27,000,000
	SUB-TOTAL (PART A)					43,950,000
PART B –	SPL B.2.1	Construction Health and Safety	1	l.s.	1,046,062	1,046,062

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
Other General Requirements	SPL B.2.2	Mobilization/Demobilization (1.5% of Civil Works)	1	l.s.	4,828,370	4,828,370
	SPL B.3.1	Maintenance of Project Road and Traffic Control	1	l.s.	1,209,600	1,209,600
	SUB-TOTAL (PART B)					7,084,032
PART C – Earthworks	100(1)	Clearing and Grubbing	-	ha.	500,000	-
	102(1)	Fill and Disposal	-	cu.m.	200	-
	103(1)	Structure Excavation, Common Material	-	cu.m.	245	-
	103(2)	Foundation Fill (Granular Bedding)	-	cu.m.	884	-
	103(3)	Removal of Existing Trees	-	ea	2,500	-
	103(4)	Removal of Existing Structures	-			-
	103(4)a	PNR Headquarter and Station	8,680	sq.m.	813	7,052,500
	103(4)b	Motor car shed	2,080	sq.m.	438	910,000
	103(4)c	Control Tower	1,000	sq.m.	438	437,500
	SUB-TOTAL (PART C)					8,4000,000
PART D – Sub-base and Base Course	Parking Area		825	sq.m.		
	200	Aggregate Sub-base Course	247.50	cu.m.	600	148,500
	202	Crushed Aggregate Base Course	206.25	cu.m.	800	165,000
	SUB-TOTAL (PART D)					313,500
PART E – Surface Courses	311 (1)	300 mm Portland Cement Concrete Pavement	-	sq.m.	1,500	
	311 (2)	150 mm Portland Cement Concrete Pavement	825.00	sq.m.	750	618,750
	311 (3)	PCC Overlay, 150 mm	-	sq.m.	750	
	SUB-TOTAL (PART E)					618,715
PART G - Drainage and Slope Protection Structures	500(1)e	RCPC, 1070 mm dia.	-	l.m.	7,500	-
	500(1)g	RCPC, 460 mm dia.	-	l.m.	5,250	-
	502(2)	Curb Inlet Manhole	-	ea.	250,000	-
	SUB-TOTAL (PART G)					-
PART H - Miscellaneous Structures	600 (3)	Curb and Gutter	149.50	lm	550	82,225
	605(1)a	Warning Signs - Triangular	2.00	ea.	11,613	23,227
	605(2)a	Regulatory Signs		ea.	12,804	
	612(1)	Reflectorized Thermoplastic Pavement Markings (White)	44.10	sq.m.	705	31,105
	612(2)	Reflectorized Thermoplastic Pavement Markings (Yellow)	-	sq.m.	708	-
	613 (1)	Electrical Poles including Foundation Electrical Wiring	-	lm	5,500	-
	613 (2)	Traffic Signal	-	sets	2,000,000	-
	613(3)	Trees (Large)	-	ea.	10,000	-
	614	Building Structures				
	614 (1)	PNR New Headquarter and Station	4,410	sq.m.	31,250	137,813
	614 (2)	New Control Tower	1,000	sq.m.	18,750	18,750
	614 (3)	New Station Plaza/Parking	2,500	sq.m.	18,750	46,875
	614 (4)	Restoration of Railway Facilities (Rails and Platforms)	1,000	lm	108,895	108,985,000
	SUB-TOTAL (PART H)					312,559,057
		SUBTOTAL				**372,925,339**
		Engineering Cost (8%)				29,834,027
		Project Management Cost (2.0%)				7,458,507
		Contingencies (20%)				74,585,068

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
		Miscellaneous (5%)				18,646,267
		TOTAL PROJECT COST			**PHP**	**503,449,208**

Table 8 Estimated Project Cost of New PNR Facilities (New Access Road; Bambang St. Extension)

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART A – General Requirements	A.1	Building Facilities for the Engineer				
	A(1)a1	Temporary Offices/ Laboratories and Engineer's Quarters	-	mo	100,000	-
	A(1)a2	Construction of Combined Engineer's Field Office, and Laboratory Building and Compound	-	lot	500,000	-
	A(1)b	Construction of Engineer's Living Quarters	-	lot	2,500,000	-
	A.2	Furniture, Fixtures and Appliances				
	A(2)a	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Field Office and Laboratory Building f (Schedule A)	-	lot	550,000	-
	A(2)b	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Living Quarters (Schedule B)	-	lot	550,000	-
	A.3	Maintenance of Engineer's Facilities				
	A(3)	Operate and Maintenance of Combined Field Office, Laboratory and Quarters Building and Compound including Consumable (Schedule C and D)	-	lot	250,000	-
	A.4	Service Vehicles for the Engineer				
	A(4)a	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 SUV Nissan Patrol or Equivalent(Rental), One (1) unit	-	veh-mo	80,000	-
	A(4)b	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 Pick-up Isuzu Fuego or Equivalent(Rental), One (1) unit	-	veh-mo	75,000	-
	A(4)c	Provide, Operate and Maintain Service Vehicle for the Engineer, 2 x 4 Pick-up Isuzu Fuego or Equivalent (Rental), One (1) unit1	-	veh-mo	70,000	-
	A.5	Communication Facilities for the Engineer				
	A(5)a	Provide Communication Equipment for the Engineer, UHF Two-way Radio Base Transceiver including six (6) unit Radio handheld Transceiver and Accessories including Operator	-	mo	290,000	-
	A(5)b	Operate and Maintain Communication Equipment for the Engineer	-	mo	15,000	-
	A.6	Progress Photographs				
	A(6)	Provision of Progress Photographs, One(1)Set = One Negative and Ten Proof Prints at Single Shot Ten (10) Set Per Month	-	mo	75,000	-
	A.7	Assistance to the Engineer	-			-
	A(7)a	Provision of Survey Personnel for the Assistance to the Engineer	-	mo	75,000	-
	A(7)b	Provision and Maintenance for Survey Equipment and Apparatus for the Assistance to the Engineer	--	mo	270,000	-
	A.8 Laboratory Equipment, Apparatus and Publications					
	A(8)	Furnish Laboratory Equipment, Apparatus and Publications (Schedule E)	-	lot	2,250,000	-
	SUB-TOTAL (PART A)					-

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART B – Other General Requirements	SPL B.2.1	Construction Health and Safety	-	l.s.	1,046,062	-
	SPL B.2.2	Mobilization/Demobilization (1.5% of Civil Works)	-	l.s.	171,757	-
	SPL B.3.1	Maintenance of Project Road and Traffic Control	-	l.s.	1,209,600	-
	SUB-TOTAL (PART B)					-
PART C – Earthworks	Main Roadway					
	100(1)	Clearing and Grubbing	0.43	ha.	500,000	215,000
	102(1)	Fill and Disposal	103	cu.m.	200	20,608
	103(1)	Structure Excavation, Common Material	103	cu.m.	245	25,303
	103(2)	Foundation Fill (Granular Bedding)	5	cu.m.	884	4,563
	103(3)	Demolition of Existing Concrete Structure	36,800	sm	650	23,920
	SUB-TOTAL (PART C)					265,475
PART D – Sub-base and Base course	200	Aggregate Subbase Course	1,290	cu.m.	600	774,000
	202	Crushed Aggregate Base Course	1,075	cu.m.	800	860,000
	SUB-TOTAL (PART D)					1,634,000
PART E – Surface Courses	311 (1)	230 mm Portland Cement Concrete Pavement	600	sq.m.	1,150	690
	311 (2)	150 mm Portland Cement Concrete Pavement	9,050	sq.m.	575	5,204
	311 (3)	PCC Overlay, 150 mm	-	sq.m.	750	-
	SUB-TOTAL (PART E)					5,160,000
PART G - Drainage and Slope Protection Structures	500(1)e	RCPC, 1070 mm dia.	215	L.m.	7,500	1,612,500
	500(1)g	RCPC, 460 mm dia.	34	L.m.	5,250	180,600
	502(2)	Curb Inlet Manhole	18	ea.	250,000	2,150,000
	SUB-TOTAL (PART G)					3,943,100
PART H – Miscellaneous Structures	600 (3)	Curb and Gutter	430	lm	550	236,500
	605(1)a	Warning Signs - Triangular	4	ea.	11,614	46,455
	605(2)a	Regulatory Signs	4	ea.	12,804	51,220
	612(1)	Reflectorized Thermoplastic Pavement Markings (White)	161	sq.m.	705	113,735
	612(2)	Reflectorized Thermoplastic Pavement Markings (Yellow)	-	sq.m.	708	
	SUB-TOTAL (PART H)					447,909
		SUBTOTAL				**11,450,484**
		Engineering Cost (8%)				916,039
		Project Management Cost (2.0%)				229,010
		Contingencies (20%)				2,290,097
		Miscellaneous (5%)				572,524
		TOTAL PROJECT COST			**PHP**	**15,458,153**

Table 9 Estimated Project Cost of New PNR Facilities (Optional Road Improvement; Bambang Widening)

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART A – General Requirements integrated with PNR Restoration	A.1	Building Facilities for the Engineer				
	A(1)a1	Temporary Offices/ Laboratories and Engineer's Quarters	-	mo	100,000	-
	A(1)a2	Construction of Combined Engineer's Field Office, and Laboratory Building and Compound	-	lot	500,000	-
	A(1)b	Construction of Engineer's Living Quarters	-	lot	2,500,000	-
	A.2	Furnitures, Fixtures and Appliances				
	A(2)a	Provide Furnitures, Fixtures, Equipment and Appliances for the Engineer's Field Office and LaboratoryBuilding f (Schedule A)	-	lot	550,000	-
	A(2)b	Provide Furnitures, Fixtures, Equipment and Appliances for the Engineer's Living Quarters (Schedule B)	-	lot	550,000	-
	A.3	Maintenance of Engineer's Facilities				
	A(3)	Operate and Maintenance of Combined Field Office, Laboratory and Quarters Building and Compound including Consumable (Schedule C and D)	-	lot	250,000	-
	A.4	Service Vehicles for the Engineer				
	A(4)a	Provide,Operate and Maintain Service Vehicle for the Engineer, 4 x 4 SUV Nissan Patrol or Equivalent(Rental), One (1) unit	-	veh-mo	80,000	-
	A(4)b	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 Pick-up Isuzu Fuego or Equivalent(Rental), One (1) unit	-	veh-mo	75,000	-
	A(4)c	Provide, Operate and Maintain Service Vehicle for the Engineer, 2 x 4 Pick-up Isuzu Fuego or Equivalent (Rental), One (1) unit1	-	veh-mo	70,000	-
	A.5	Communication Facilities for the Engineer				
	A(5)a	Provide Communication Equipment for the Engineer, UHF Two-way Radio Base Transceiver including six (6) unit Radio handheld Transceiver and Accessories including Operator	-	mo	290,000	-
	A(5)b	Operate and Maintain Communication Equipment for the Engineer	-	mo	15,000	-
	A.6	Progress Photographs				
	A(6)	Provision of Progress Photographs, One(1)Set = One Negative and Ten Proof Prints at Single Shot Ten (10) Set Per Month	-	mo	75,000	-
	A.7	Assistance to the Engineer	-			-
	A(7)a	Provision of Survey Personnel for the Assistance to the Engineer	-	mo	75,000	-
	A(7)b	Provision and Maintenance for Survey Equipment and Apparatus for the Assistance to the Engineer	--	mo	270,000	-
	A.8 Laboratory Equipment, Apparatus and Publications					
	A(8)	Furnish Laboratory Equipment, Apparatus and Publications (Schedule E)	-	lot	2,250,000	-
	SUB-TOTAL (PART A)					-
PART B – Other General Requirements	SPL B.2.1	Construction Health and Safety	-	l.s.	1,046,062	-
	SPL B.2.2	Mobilization/Demobilization (1.5% of Civil Works)	-	l.s.	33,147	-
	SPL B.3.1	Maintenance of Project Road and Traffic Control	-	l.s.	1,209,600	-
	SUB-TOTAL (PART B)					-

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART C – Earthworks	Main Roadway					
	100(1)	Clearing and Grubbing	0.3	ha.	500,000	65,000
	102(1)	Fill and Disposal	31.2	cu.m.	200	6,230
	103(1)	Structure Excavation, Common Material	31.2	cu.m.	245	7,650
	103(2)	Foundation Fill (Granular Bedding)	1.56	cu.m.	884	1,380
	SUB-TOTAL (PART C)					80,260
PART D – Sub-base and Base course	200	Aggregate Subbase Course	156	cu.m.	600	93,600
	202	Crushed Aggregate Base Course	130	cu.m.	800	104,000
	SUB-TOTAL (PART D)					197,600
PART E – Surface Courses	311 (1)	230 mm Portland Cement Concrete Pavement	-	sq.m.	1,500	-
	311 (2)	150 mm Portland Cement Concrete Pavement	260	sq.m.	750	195,000
	311 (3)	PCC Overlay, 150 mm	455	sq.m.	750	341,250
	SUB-TOTAL (PART E)					536,250
PART G - Drainage and Slope Protection Structures	500(1)e	RCPC, 1070 mm dia.	65	L.m.	7,500	487,500
	500(1)g	RCPC, 460 mm dia.	10	L.m.	5,250	54,600
	502(2)	Curb Inlet Manhole	3	ea.	250,000	650,000
	SUB-TOTAL (PART G)					1,192,100
PART H – Miscellaneous Structures	600 (3)	Curb and Gutter	130	lm	550	71,500
	605(1)a	Warning Signs - Triangular	4	ea.	11,614	46,4545
	605(2)a	Regulatory Signs	4	ea.	12,805	51,220
	612(1)	Reflectorized Thermoplastic Pavement Markings (White)	49	sq.m.	705	34,385
	612(2)	Reflectorized Thermoplastic Pavement Markings (Yellow))	-	sq.m.	708	-
	SUB-TOTAL (PART H)					203,559
		SUBTOTAL				**2,209,769**
		Engineering Cost (8%)				176,782
		Project Management Cost (2.0%)				44,195
		Contingencies (20%)				441,954
		Miscellaneous (5%)				110,488
		TOTAL PROJECT COST			**PHP**	**2,983,188**

2) Cost Estimate Conditions

(1) Project Cost

1. Cost estimation of projects proposed by TOD study is made based on several references as shown in Table 10 and Table 11.

Table 10 Basic Data

	Category	Title	Publisher	Year
1	Basic Specifications for Cost Estimate	Standard Specifications for Highways, bridges and airports	Department of Public Works and Highways (DPWH)	2014
2	Material	Construction Cost Handbook Philippines 2014	Langdon & Search Philippines	2014
3	Equipment Cost	ACEL Equipment Guide Book	Association of Construction Equipment Lessors Inc. (ACEL)	2014
4	Labor Cost	Summary of Current regional Daily Minimum Wage Rates by Department of Labor and Employment National Wages and Productivity Commission	Department of Labor and Employment (DOLE)	2014

Table 11 Implemented Project and Data

	Data Source	Organization/Agency	Implemented/Issued
1	Arterial Road Bypass Project Phase-1	DPWH	2012
2	Japanese Cost Estimate Manual	Construction Research Institute.	2012
3	Construction Cost Handbook	Langdon Seah Philippines Inc.	2014
4	Through Interview	1) Mitsubishi Electric Corporation 2) Grandspan Development Corporation	2014
5	Others		

(2) Project Cost Composition

2. Project cost is essentially divided into direct cost and indirect cost as shown in Figure 1. And direct cost is composed four factors as shown in Table 12.

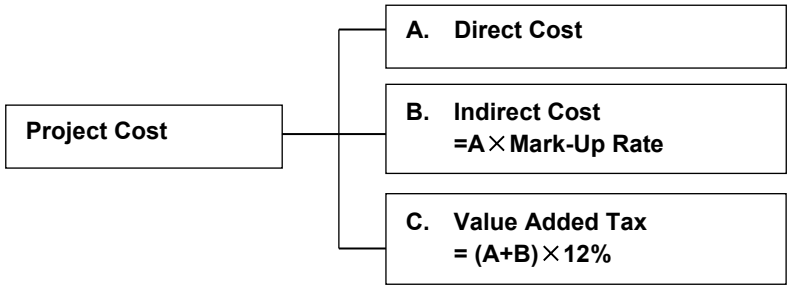


Figure 1 Project Cost Composition

Table 12 Direct Cost Composition

	Direct Cost Composition
1	General Requirement
2	Other General Requirement
3	Works Including Labor, Material and Equipment Cost
4	Miscellaneous

(3) Indirect Cost

3. According to the Department Order No. 29/2011 of DPWH, the indirect cost composition is defined as following (see Table 13), and the rate of each composition is determined by the range of total project costs. Since this project total cost is above PHP5 million and below PHP50 million, the rate as followed can be used.

Table 13 Indirect Cost Rate

	Indirect Cost Composition	Rate (%)
Mark-up Rate	OCM (overhead + contingency + miscellaneous)	9
	Profit	8
VAT (on the direct cost and indirect cost)		12

Source: Department Order No. 29 (2011), DPWH

(4) Philippines Consumer Price Index (CPI) Forecast

4. According to the report of National Statistics Office of Philippines (NSO), Consumer Price Index (CPI) increased to 140.65 Index Points in January of 2015 from 140.50 Index Points in December of 2014 (see Figure 2). In 2016, the CPI is expected to increase to 144.08 Index Points (see Table 14). In the long-term, the CPI is projected to reach around 165.10, 205.96 and 283.19 Index Points in the years of 2020, 2030 and 2050 respectively.

Source: National Statics Office pf Philippines (NSO), 2015

Figure 2 Philippines Consumer Price Index

Table 14 CPI Forecast

Year	CPI
2014	140.50
2015	140.65
2016	144.08
2017	149.34
2018	154.59
2019	159.84
2020	165.10

Source: NSO, 2015

3) Cost Analysis for the Project

5. Preliminary cost estimate is expected on this TOD project. Accordingly, the project cost estimate should be made by based on the similar projects' cost as shown in Table 11.

(1) Unit Cost

6. On the Civil works for the road construction, unit cost (including labor cost, material cost and equipment cost) was estimated as shown in Table 15 as below:

Table 15 Unit Cost/sq.m

Item	Material	Designation (mm)	Cost (PHP)	Unit cost (PHP/sq. m)
Carriageway	Concrete	300	1,500	1620
	Base Corse	150	120	
Sidewalk	Concrete	100	500	580
	Base Corse	100	80	
Pedestrian	Concrete	100	500	580
	Base Corse	100	80	
Facility Under Viaduct	Concrete	100	500	580
	Base Corse	100	80	
Parking	Concrete	150	750	830
	Base Corse	100	80	
Overlay of Carriage Way	Concrete	150mm	750	750
Overlay of Sidewalk	Concrete	100mm	500	500

(2) Indirect Cost

7. Indirect cost is composed of total mark-up and VAT (see Table 16).

Table 16 Indirect Cost

	Unit Cost (PHP/sq. m)	Total Mark-up (17%)	Total (PHP/sq. m)	VAT (12%)	Unit Cost Added Indirect Cost (PHP/sq. m)
Carriageway	1,620	275.4	1,895.4	227.448	2,122
Sidewalk	580	98.6	678.6	81.432	760
Pedestrian	580	98.6	678.6	81.432	760
Facility Under Viaduct	580	98.6	678.6	81.432	*760*
Parking	830	141.1	971.1	116.532	1,087
Overlay Carriageway	750	127.5	877.5	105.30	982
Overlay Sidewalk	500	85.0	585.0	70.20	655

(3) Total Unit Cost

8. Total unit cost includes indirect cost, general requirement, other general requirement, earth works, drainage works and miscellaneous works. These unit costs is assumed by the rate from experimental data and other data by similar projects and other data which is described in 2) (1) Project cost.

9. Unit cost of the road in section from Malolos to Valenzuela is shown in Table 17, Tutuban area in Table 18.

Table 17 Total Unit Cost of the Road from Malolos to Valenzuela

		Unit cost plus indirect cost (PHP/sq.m)	Sharing Rate (%)	Total Rate Project Cost	Total Unit Cost (PHP/sq.m)	Remarks
General Cost			75.52	311.4 %		
Other General requirement			22.13			
Earth Works			4.43			
Pavement Works	Carriageway	2122.85	100		6,611	1) ×3.1144
	Sidewalk	760.032			2,367	2)×3.1144
	Pedestrian	760.032			2,367	3)×3.1144
	Facility Under Viaduct	760.032			2,367	4)×3.1144
	Parking	1087.63			3,387	5)×3.1144
	Overlay of Carriageway	982.80			3,061	6)×3.1144
	Overlay of Sidewalk	655.20			2,041	7)×3.1144
Drainage Works			99.62			
Miscellaneous			9.74			

Table 18 Total Unit Cost for Tutuban Area

		Unit Cost added Indirect Cost (PHP/sq. m)	Sharing Rate (%)	Total Rate (Project Cost)	Total Unit Cost (PHP/sq. m)	Remarks
General Cost			87.16	359.46 %		
Other General requirement			25.54			
Earth Works			10.00			
Pavement Works	Carriageway	2122.85	100		7,631	1)×3.5946
	Sidewalk	760.032			2,732	2)×3.5946
	Pedestrian	760.032			2,732	3)×3.5946
	Facility Under Viaduct	760.032			2,732	4)×3.5946
	Parking	1087.63			3,910	5)×3.5946
	Overlay of Carriageway	982.80			3,533	6)×3.5946
	Overlay of Sidewalk	655.20			2,355	7)×3.5946
Drainage Works			121.23			
Miscellaneous			15.53			

(4) Other Total Unit Cost

10. Unit cost of pedestrian and buildings such as commercial building, office building, residential building and hotel are estimated per sq.m or lump sum. These unit costs are including all cost described in 2).

Appendix 3.1 Road Inventory within 1 km from Caloocan Station

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
5th Avenue	J.P.Rizal-Baltazar	National Highway	616	8	Commercial
A. Mabini	Samson Road - 5th Ave.	National Highway	1503	4	Residential; Commercial
C-4	Dagat-Dagatan - Gen. San Miguel	National Highway	604	7	Industrial
Dagat-Dagatan Avenue	5th Avenue-C4	National Highway	1596	6	Institutional
Gen. San Miguel (C-4 ext.)	C-4 - M.H. Del Pilar	National Highway	449	4	Commercial, Residential
Gov. Pascual	M.H. del Pilar - Pinagtapunan	National Highway	2328	2	Residential
J.P.Rizal Avenue Ext.	Rotonda-5th Avenue	National Highway	1383	8	Commercial
M.H. Del Pilar	Gov. Pascual Ave. - Samson Road	National Highway	1425	4	Commercial
MacArthur Highway	Monumento - Pinagtipunan	National Highway	671	4	Commercial
10th Avenue	Rizal Avenue - 3rd Street	City Road	308	4	Commercial; Institutional
11th Avenue	Rizal Avenue - Bulacan	City Road	458	2	Residential
1st	Lakas ng Mahihirap-Gen. Luna	City Road	121	2	Residential
2nd	Lakas ng Mahihirap-Gen. Luna	City Road	195	2	Residential
3rd	Lakas ng Mahihirap-Gen. Luna	City Road	160	2	Residential
4th	Gen. Luna - Lakas ng Mahihirap	City Road	179	2	Residential
5th	Gen. Luna - J. Ramos	City Road	307	2	Residential
7th Ave.	J.P.Rizal-Baltazar	City Road	624	2	Residential
8th Ave.	Rizal Ave.- End	City Road	846	2	Residential
9th Ave.	Rizal Ave.- P. Santiago	City Road	771	2	Residential
A. Bato	A. Mabini-T. Bugallion	City Road	132	2	Residential; Institutional
A. Bonifacio	Baltazar - A. Mabini	City Road	308	4	Commercial; Institutional
A. De Leon	D. Aquino-Galauran	City Road	235	2	Residential
A. Del Mundo	11th Ave. - 5th Ave.	City Road	950	2	Residential; Commercial
A. Palon	Baltazar 1 - Stotsenberg	City Road	292	2	Residential
Aglipay	Apostol - Plaridel	City Road	168	2	Residential
Alamang Ext.	Lapu-lapu - End	City Road	364	1	Residential
Alimasag Alley	Lapu-Lapu Ext. - Kapak Alley	City Road	281	2	Residential
Alley 1	Francisco - End	City Road	28	1	Residential
Alley 2	Francisco - End	City Road	30	2	Residential
Aluminio	Plata - Paz	City Road	244	2	Residential
Alvarez	Apostol - End	City Road	409	2	Residential
Asero	Dr.Lascano(Paz Ext.) - Plata	City Road	252	2	Residential
Asogue	Mercurio - Paz	City Road	129	2	Residential; Institutional
B. Baltazar	G. Aglipay - Baltazar 1	City Road	137	1	Residential
B. Victorio	10th Avenue - End	City Road	75	1	Residential
Balong Bato	Talakitok-Gen. Luna	City Road	134	1	Residential
Baltazar	5th Avenue-M.Asistio (10th ave.)	City Road	759	2	Residential
Baltazar Bukid	A. Palon - Stosenberg	City Road	174	2	Residential
Baltazar I	A. Palon - Baltazar III	City Road	129	2	Residential
Baltazar II	A. Palon - M. Asistio (10th Ave.)	City Road	412	2	Residential
Baltazar III	Plaridel - Baltazar I	City Road	176	2	Residential
Baltazar IV	A. Palon - Stosenberg	City Road	173	2	Residential
Bangayngay	Kapak - End	City Road	304	2	Residential
Bernadette	D. Aquino - Galauran	City Road	272	2	Residential
Bisig ng Kabataan	Samson Road - End	City Road	479	1	Residential
Block 36	Hipon - Kapak	City Road	386	2	Residential
Block 5	J.P. Rizal - End	City Road	194	1	Residential
Brillantes	Baltazar - End	City Road	182	2	Residential
Briones	V. Sevilla - End	City Road	144	2	Residential
Bronze	Paz - Zinc	City Road	630	2	Residential
Bukid ng Nayon	San Miguel (Letre Road) - End	City Road	182	2	Residential
Buklod ng Nayon	San Miguel (Letre Road) - End	City Road	191	2	Residential
Bulacan	M. Asistio 10th Ave. - End	City Road	89	1	Residential
C. Apostol	Alvarez - Hizon	City Road	254	2	Residential

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
C. Cordero	9th Ave.-5th Ave.	City Road	620	2	Residential; Institutional
C. Corderro	9th Avenue-5th Avenue	City Road	685	2	Residential; Institutional
Caimito	Samson Road - Mc Arthur	City Road	807	2	Residential; Institutional
Calaanan	Heroes del 96-Gonzales	City Road	113	2	Residential
Camelot	Lakas ng Mahihirap - Velasco	City Road	131	2	Residential
Canduli	Dagat-Dagatan - End	City Road	91	1	Residential
Capas	D. Aquino-Centro	City Road	279	2	Residential
Caridad	Innocencia de Vatchan - End	City Road	158	2	Residential
Centro	9th Ave. 10th Ave.	City Road	161	2	Residential
Constancia	M.H. del Pilar - Prosperidad	City Road	294	2	Residential
Corrigedor	D. Aquino-Gen. Del Pilar	City Road	337	2	Residential
D. Aquino	M. Asistio (10thave.) - 5th Ave.	City Road	783	2	Residential
Dagohoy	Samson Road - End	City Road	361	2	Commercial; Industrial
Delas Alas	Heroes del 96-Gonzales	City Road	96	2	Residential
Delmonte	Samson Road - Gov. Pascual	City Road	978	2	Residential
Dona Consuelo	P.Zamora Dona Rita	City Road	413	2	Residential
Dona Rita	Don Antonio-5th Ave.	City Road	215	2	Residential
Dr. Lascano (Paz)	Dr.Lascano(Paz Ext.)-Prosperidad	City Road	644	2	Residential
Dr. Lascano (Paz Ext.)	C4-Paz	City Road	330	2	Residential
Esperanza	Gen. Luna-End	City Road	65	2	Residential
Espiña	Tamban-A. Mabini	City Road	310	2	Residential
Estanio	Dr.Lascano(Paz Ext.) - End	City Road	223	2	Residential
F. Roxas	9th Ave.-7th Ave.	City Road	310	2	Residential; Industrial
F. Sevilla	12th Ave.-5th Ave.	City Road	962	2	Residential; Institutional
F.Roxas	7th Avenue-5th Avenue	City Road	310	2	Residential; Industrial
Fajan	Bisig ng Kabataan - End	City Road	28	1	Residential
Farely	Heroes del 96-Gonzales	City Road	102	2	Residential
Fili	J. Felipe	City Road	243	2	Residential
Filomena	Ezperanza-Espina	City Road	76	2	Residential
Flolrencia	11th Ave. - Francisco	City Road	318	2	Residential
Francisco	Samson Road - W 12th Ave.	City Road	465	2	Residential; Commercial
G. Aglipay	Apostol - Plaridel	City Road	168	2	Commercial
G. del Pilar	Apostol - 9th Ave.	City Road	404	2	Residential
G. del Pilar Ext.	P. Burgos-End	City Road	990	2	Residential
Galauran	A. Bonifacio - Ipil	City Road	424	2	Residential
Gen. del Pilar	Apostol - 9th Ave.	City Road	404	2	Residential
Gen. Luis	A. Mabini-Gen. Luna	City Road	90	2	Residential
Gen. Luna	5th Street - J. Rodriguez	City Road	731	2	Residential
Gen. P. Villanueva	Reparo - Samson Road	City Road	393	2	Residential
Gonzales	Bugallon - New Abbey	City Road	478	2	Residential
Gozon	Heroes del 96-Gonzales	City Road	108	2	Residential
Heroes del 96	SamsonRoad - New Abbey	City Road	460	2	Residential
Hippon Alley	Kapak - Dagat-dagatan	City Road	473	1	Residential
Honradez	Inocencia - Lingkod ng Nayon	City Road	512	2	Residential
Inocencia de Vatchan	M.H. del Pilar - End	City Road	285	2	Residential
Ipil	Baltazar-Galauran	City Road	81	2	Residential
J. Ramos	Lakas ng Mahihirap - End	City Road	202	2	Residential
J. Rodriguez	Gen. Luna - End	City Road	277	2	Residential
J. Teodoro	11th Avenue - 5th Ave.	City Road	978	2	Residential; Institutional
J.Felipe	Lakas ng Mahihirap - Gen. San Mig.	City Road	281	2	Residential
Kabulusan	A. Mabini - Orkana	City Road	77	2	Residential
Kapak Alley	Dagat-Dagatan - Alley	City Road	94	2	Residential; Commercial
Kapak Alley	Sabalo - Alley	City Road	314	2	Residential; Commercial
L. Roque	M.H. Del Pilar - End	City Road	187	1	Residential
Lakas ng Mahihirap	A. Mabini	City Road	140	2	Residential
Lakas ng Marami	M. H. del Pilar	City Road	150	2	Residential
Langaray Street	Langaray-Bangayngay	City Road	386	2	Residential

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
Lapu-Lapu	Samson Road - Reparo	City Road	369	2	Residential
Lapu-Lapu Ext.	Dagat Dagatan	City Road	419	2	Residential
Libertad	M.H. del Pilar - Prosperidad	City Road	303	2	Residential
Libis Espina	Daang Baka - Espina	City Road	149	2	Residential
Libis Talisay	2nd Street - Libis Espina	City Road	185	2	Residential
Lucia	Florencia - 12th Ave.	City Road	150	2	Residential
Luis De Leon	Peralta - A. Bonifacio	City Road	131	2	Residential
M. Arce	Heroes del 96-Gonzales	City Road	118	2	Residential
M. Hizon	10th Ave.-Apostol	City Road	188	2	Residential
M. Hizon (A&B)	P. Burgos - P. Purgos (U-shape)	City Road	246	2	Residential
M. Hizon 1	M. Asistio - End (Parallel)	City Road	347	2	Residential; Institutional
M. Hizon 2	P. Burgos-C. Apostol	City Road	198	2	Residential
M.L. Quezon	Sisa - Nirvana	City Road	254	2	Residential
Macario Asistio Sr. (10th Ave.)	Rizal Ave. Ext. - Baltazar	City Road	614	4	Residential; Institutional
Malonzo	Masagana - End	City Road	156	2	Residential
Mango Road	Pinagtipunan - Dunywood	City Road	589	2	Commercial; Institutional
Manuel Peralta	A. Boifacio(10th Ave.) - End	City Road	108	2	Residential
Marcos	Bisig ng Kabataan-End	City Road	39	1	Residential
Masabielle	D. Aquino-Galauran	City Road	236	2	Residential
Masagana	Samson Road - Heroes Del 96	City Road	91	1	Residential
Maysan	Pusit - Sapsap	City Road	135	1	Residential
Mt. Samat (Villarosa)	Heroes del 96-Gonzales	City Road	135	1	Residential
Nadurata	Lerma - End	City Road	384	2	Residential
New Abbey	Samson Road - A. Bonifacio	City Road	648	2	Residential
Noli	J. Felipe	City Road	213	2	Residential
Orkana	Kabulusan - Talakitok	City Road	122	1	Residential
P. Bonifacio	Gov. Pacual - Caimito	City Road	689	2	Residential
P. Burgos	A. Mabini -10th	City Road	60	4	Commercial
P. Galauran	Ipil - M. Asistio (10th Ave.)	City Road	449	2	Residential; Institutional
P. Garcia	New Abey - Alvarez	City Road	204	2	Residential
P. Gomez	P. Sevilla - End	City Road	96	2	Residential
P. Gomez 2	A. Mabini - T. Bugallon	City Road	110	2	Residential
P. Pablo	M. Asistio (10th Ave.) - End	City Road	124	2	Residential
P. Santiago	9th Ave.-A. Bonifacio	City Road	155	2	Residential
P. Sevilla	W 12th Ave. - 9th Ave.	City Road	333	2	Residential
P. Zamora	P. Burgos - M. Francisco	City Road	584	2	Residential; Commercial
Paz	Prosperidad - Paz Ext.	City Road	795	2	Residential
Paz Extension	C4 - Paz	City Road	179	2	Residential
Perpetua	C-3 - Martinez	City Road	363	2	Residential
Plaridel	A. Mabini - T. Bugallon	City Road	130	1	Residential
Prelaya	M.H. del Pilar - Sisa	City Road	369	2	Residential
Prosperidad	Industria - Sisa	City Road	378	2	Residential
Pureza	M.H. del Pilar - Prosperidad	City Road	313	2	Residential
Pusit Alley	Dagat-Dagatan-Sabalo	City Road	233	2	Residential
R. Candido	D. Aquino-P. Santiago	City Road	304	2	Residential
Sabalo	Tanigue - C4	City Road	978	2	Residential
Salaysalay	Sabalo - End	City Road	205	2	Residential
Samson Road	Monumento-J.P. Bautista	City Road	162	4	Commercial
Samson Road	J.P. Bautista - A. Mabini	City Road	1173	4	Institutional
Sgt. Esguera	Baltazar Bukid - Francisco	City Road	343	2	Residential
Silinyasi	Lapu-Lapu Ext. - Samaral	City Road	368	2	Residential
Silinyasi Ext.	Silinyasi - Dagat-dagatan	City Road	183	1	Residential
Sisa Street	Gov. Pascual Ave. - J.P. Rizal	City Road	662	2	Residential
Sitio Uno	M.H. Del Pilar - End	City Road	94	1	Residential
Solis	J. Felipe	City Road	76	2	Residential
Stosenberg	Francisco - Baltazar Bukid	City Road	327	1	Residential
Sunflower	Tatampal - Talaba	City Road	149	1	Residential

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
Tahong	Dagat-dagatan - End	City Road	412	2	Residential
Tajan	Bisig ng Kabataan-End	City Road	39	1	Residential
Talakitok	Libis Espina - End	City Road	334	2	Residential
Talangka	Tanigue - Tilapia	City Road	259	2	Residential
Talimusak	Tilapia-Tanigue	City Road	242	2	Institutional
Tamban Street	C-3-Tanigue	City Road	639	2	Residential
Tanigue	Dagat-Dagatan - End	City Road	379	1	Residential
Tatampal	Tulingan - Tanigue	City Road	276	2	Residential
Tatampal Alley	Tulingan - Tanigue	City Road	317	2	Residential
Torres	Samson Road - Gonzales	City Road	119	2	Residential
Torres Bugallon	Samson Rd. - A. Bonifacio (10th ave.)	City Road	762	2	Residential
Tulingan	Tamban - Dagat -Dagatan	City Road	250	2	Commercial
Tulya	Tamban - Dagat -Dagatan	City Road	218	2	Residential
Tupda ViLlage	Lakas ng Mahihirap - End	City Road	193	1	Residential
Ursua	Bisig ng Kabataan - End	City Road	33	1	Residential
V. Sevilla (Gaularan)	Brilliantes-Yabut	City Road	280	2	Residential
Velasco	Lakas ng Mahihirap - End	City Road	130	2	Residential
Vibora	Aglipay - A. Bonifacio (10th Ave.)	City Road	176	2	Residential
Villa Maria	M.H. Del Pilar - end	City Road	208	1	Residential
Virata	Heroes del 96-Gonzales	City Road	127	2	Residential
W 12 Ave.	Rizal Ave. Ext. - P. Sevilla	City Road	411	2	Residential
Yabut	V. Sevilla	City Road	200	2	Residential

Appendix 3.2 Road Inventory within 1 km from Tutuban Station

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
Antonio Rivera	Tayuman - C.M. Recto	National Highway	1.167	2	Commercial
Bambang	Antonio Rivera - A. Mendoza	National Highway	1.255	2	Commercial
C. M. Recto with median	From C.M. Recto - Oroquieta St	National Highway	2.027	2	Commercial
C. M. Recto without median	From R-10 to Median	National Highway	0.231	2	Commercial
Dagupan	C.M. Recto - Raxabago	National Highway	1.773	1	Commercial
Delpan	Zaragosa - Muelle dela Industria	National Highway	0.835	2	Residential; Institutional
Delpan	Zaragosa - R-10	National Highway	0.337	2	Residential; Commercial
Escolta	Quintin Paredes - Plaza Sta Cruz	National Highway	0.458	1	Residential; Commercial
G. Masangkay	Bambang - Salazar	National Highway	1.155	1	Commercial
Jose Abad Santos Ave.	C.M. Recto - Old Antipolo	National Highway	1.921	2	Commercial
Masanggkay	Bambang - End	National Highway	1.154	6	Commercial
Mayhaligue	Dagupan - End	National Highway	0.549	1	Residential; Commercial
Mayhaligue	Felix Huertas - End	National Highway	0.686	2	Residential; Commercial
Moriones	R10-Juan Luna	National Highway	0.879	2	Residential
Moriones	Bonifacio Drive -Juan Luna	National Highway	0.37	5	Commercial
Ongpin	Juan Luna - Ronquillo	National Highway	0.838	2	Residential; Commercial
Roman	C.M. Recto - Soler	National Highway	0.12	4	Commercial
Soler	C.M. Recto - Evangelista	National Highway	1.392	1	Commercial
Abad Santos	Moriones-Ibarra	City Road	0.377	2	Residential
Abad Santos	Delpan Ext.- San Antonio	City Road	0.09	2	residential
Aguila	Sta.Maria-N. Zamora	City Road	0.18	2	Residential
Aguilar	Luzon - Tronque	City Road	0.184	2	Residential
Alcalcera St.	San Fernando-jaboneros	City Road	0.077	1	Residential; Commercial
Alinan	Moriones - Cristobal	City Road	0.112	1	Residential
Almario	Dagupan - End	City Road	0.19	1	Residential
Almeda	Quiricada - Old Antipolo	City Road	1.042	2	Residential
Alvarado	Mayhaligue - Padre Algue	City Road	0.4	4	Residential; Institutional
Alvarado	Soler - Veronica	City Road	0.333	1	Commercial
Alvarez	Alfonso Mendoza - Ipil	City Road	0.657	1	Residential; Commercial
Anacleto	Alvarez - Lope de Vega	City Road	0.619	2	Residential
Anacleto	Old Antipolo - Tayuman	City Road	0.639	2	Residential
Arqueros	Capulong - Dagupan	City Road	0.302	1	Residential
Asuncion	Morga - C.M. Recto	City Road	0.749	1	Commercial
Asuncion Ext.	C.M. Recto - San Fernando	City Road	0.621	1	Residential
Bahama st.	Ongpin - Espelita	City Road	0.11	4	Residential; Commercial
Balagtas	Sto Cristo - Mabuhay	City Road	0.524	1	Residential
Balaya	G. Perfecto - Dagupan	City Road	0.155	2	Residential
Baltazar	Nicolas Zamora-Velasquez	City Road	0.389	2	Residential
Banquero	Escolta -Dasmarinas	City Road	0.169	6	Residential; Commercial
Baraca	Orbiztondo-Dasmarinas	City Road	0.22	4	Residential; Commercial
Barcelona	M. De Santos -Muelle de Industria	City Road	0.535	2	Residential
Benavidez	Soler - Salazar	City Road	0.25	2	Commercial; Industrial
Benavidez	Soler - End	City Road	0.587	2	Residential; Commercial
Between Ilang Ilang and Sto Cristo	Sto cristo-Ilang Ilang	City Road	0.5	2	Residential; Commercial
Biak Na Bato	Yakal - San Nicolas	City Road	0.262	1	Residential
Bougainvilla	Kagitingan-Mabuhay	City Road	0.105	2	residential
Bucaneg	G. Perfecto – Dagupan	City Road	0.309	2	Residential
Burke St.	T. Pinpin - Muelle Del Banco Nacional	City Road	0.302	2	Residential; Commercial
Bustos St	Plaza Sta Cruz-Rizal ave.	City Road	0.179	2	Residential; Commercial
C. La Torre	A. Rivera - N. Rizal	City Road	0.344	2	Intitutional
C.P.Garcia	Herbosa - Pacheco	City Road	0.359	2	Residential
Cabezas	G. Perfecto - Dagupan	City Road	0.154	4	Residential
Camba	C.M. Recto-Jaboneros	City Road	0.533	2	Commercial

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
Carmen Planas	M. De Santos - Lakandula	City Road	0.553	2	Commercial
Carnation	Kagitingan-R10	City Road	0.104	1	Residential
Chesa	R10-Quezon	City Road	0.245	2	Residential
Clavel	Sto. Cristo - End	City Road	0.466	2	Residential; Commercial
Claveria St	S. Padilla - Poblete	City Road	0.087	2	Residential; Commercial
Concha	N. Zamora - Sta Fe	City Road	0.717	4	Residential; Institutional
Coral	Juan Luna-Sta.Maria	City Road	0.16	2	Residential
Coral	G. Perfecto - Dagupan	City Road	0.151	1	Residential
Coral	Varona-Madrid Ext.	City Road	0.836	1	Residential
Corcuera	Sta.Maria - N. Zamora	City Road	0.289	1	Residential
Cristobal	Masinop-CP Garcia	City Road	0.118	2	Residential; Institutional
Dalanghita	Cristobal-Chesca	City Road	0.183	2	Residential; Institutional
Dandan	Nicolas Zamora-F. Valora	City Road	0.478	2	Residential
Dapdap	Tayuman - End	City Road	0.113	2	Residential
Dasmariñas	Tetuan - End	City Road	0.726	3	Residential; Commercial
De Santos	Ylaya-Barcelona	City Road	0.569	2	Commercial
De Vera	Moriones-Morga	City Road	0.082	1	Residential
Deodato	G. Perfecto - Dagupan	City Road	0.154	2	Residential
Dizon	Ipil - Bambang	City Road	0.085	1	Residential
Dona Aurora	Kagitingan-R10	City Road	0.105	2	Residential
Doroteo Jose	Luzon - Oroquieta	City Road	0.46	2	Commercial
E. Manalo/ Apitong	Tayuman - End	City Road	0.13	4	Residential
Elcano	C.M. Recto - Urbiztondo	City Road	0.716	1	Commercial
Elena	Moriones-Ricafort	City Road	0.054	1	Commercial; Institutional
Endaya	G. Perfecto - Dagupan	City Road	0.264	2	Residential
Esguerra	Nicolas Zamora-Velasquez	City Road	0.453	2	Residential
Esmeralda	Kagitingan-R10	City Road	0.105	2	Residential
Espelita St.	Thomas Mapua-Sabino Padilla	City Road	0.27	2	Residential; Commercial
F.Torres St.	Ronquillo-CM Recto	City Road	0.412	1	Residential; Commercial
Fajardo	Juan Luna-Reyes	City Road	0.127	2	Residential
Fernandez st	Ongpin- End	City Road	0.079	1	Residential; Commercial
Francisco	Nicolas Zamora-F. Varona	City Road	0.523	1	Residential
Franco	Moriones - End	City Road	1.244	1	Residential
Fugoso	Alfonso Mendoza - End	City Road	0.728	2	Residential
Fullon	G. Perfecto - Dagupan	City Road	0.252	2	Residential
Fundador	Santo Cristo-Lavezares	City Road	0.195	1	Residential; Commercial
G. Perfecto	Pilapil - End	City Road	1.222	2	Residential
Gabriela	Dagupan - End	City Road	0.243	2	Residential
Gerona	Nicolas Zamora-Velasquez	City Road	0.501	2	Residential
Gonzalo St	Bilibid Viejo - Ongpin	City Road	0.702	4	Residential; Commercial
Hamabar	G. Perfecto - Dagupan	City Road	0.232	6	Residential
Herbosa	R-10 - Juan Luna	City Road	1.18	1	Commercial
Hernandez	Moriones-Concha	City Road	0.151	4	Residential
Herrera	Felix Huertas - End	City Road	0.659	4	Residential
Hinahon	Kagitingan-Wagas	City Road	0.236	2	Residential
Hormiga	Juan Luna-Quintin Paredes	City Road	0.097	1	Residential; Commercial
Ilang Ilang	Jaboneros-Lavezares	City Road	0.254	1	Residential; Commercial
Ipil	Old Antipolo - Tayuman	City Road	0.687	1	Residential
Ipil	Quiricada - Bambang	City Road	0.26	1	Residential
J. Nolasco	Concha-Pavia	City Road	0.099	2	Residential; Institutional
J. Nolasco	Moriones-Concha	City Road	0.099	1	Residential
Jaboneros	Mulle dela Industria - Sto. Cristo	City Road	0.599	2	Residential; Commercial
Jones Bridge	Muelle del Banco Nacional - P. Burgos	City Road	0.175	1	
Jose Basa	G. Perfecto - Dagupan	City Road	0.19	2	Residential
Juan Luna	Reina Regente-Muelle dela Industria	City Road	0.601	2	Commercial; Industrial
Juan Luna	Reina Regente-Honorio Lopez Blvd.	City Road	2.478	2	Commercial
Kagitingan	Moriones - R-10	City Road	0.955	1	Residential

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
Kasipagan	Moriones-P. Ortega	City Road	283.75	2	Residential; Commercial
Kasipagan		City Road	0.197	2	Residential; Commercial
Kepuja St	Alonzno - Ongpin	City Road	0.127	1	Residential; Commercial
Kusang Loob	Old Antipolo - Tayuman	City Road	0.679	8	Commercial
L. Chacon	N. Zamora - Juan Luna	City Road	0.196	4	Residential
Lachambre	Meisic - End	City Road	0.175	2	Residential
Lacson	Pacheco-Herbosa	City Road	0.465	2	Residential
Lakandula	Ylaya-R10	City Road	0.69	1	Residential
Lara	Delpan - Camba	City Road	0.279	1	Residential; Commercial
Laurel	Concha - Liwayway	City Road	0.63	2	Residential
Lavezares	Sevilla-Mulle de Binondo	City Road	0.727	2	Residential; Commercial
Lemonada	Concha-Chesca	City Road	0.153	1	Residential; Commercial
Linampas	G. Perfecto - Dagupan	City Road	0.188	2	Residential
Lope De Vega	Pedro Gevara - Oroquieta	City Road	0.19	2	Residential
Luzon	D. Jose - End	City Road	0.202	1	Commercial
M. Natividad	Tayuman - Lope de Vega	City Road	1.149	1	Residential
Mabuhay	Moriones-Zaragoza	City Road	0.747	1	Residential
Madrid	M. De Santos - Muelle dela Industria	City Road	0.592	4	Residential
Magsaysay	Chesa-Herbosa	City Road	0.252	4	Residential
Makata	Alvarez - Lope de Vega	City Road	0.619	2	Residential
Makata	Old Antipolo - Tayuman	City Road	0.662	2	Residential
Malabon	Rizal Ave. - Alfonso Mendoza	City Road	0.415	2	Residential
Malong	g. Perfecto - Dagupan	City Road	0.151	1	Residential
Marquina	San Vicente - Poblete	City Road	0.09	1	Residential; Commercial
Masinop	Cristobal - Ortega	City Road	0.395	2	Residential; Commercial
Meisic	Juan Luna - La Chambre	City Road	0.1	1	Commercial
Mejorada	Sta.Maria - N. Zamora	City Road	0.199	2	Residential
Mercado	G. Perfecto - Dagupan	City Road	0.221	2	Residential
Mithi	Moriones-Zaragoza	City Road	0.486	2	Residential
Morga	Juan Luna-R10	City Road	0.868	2	Residential
Morga Ext.	Luwalhati - End	City Road	0.201	4	Residential
Muelle Dela Industria	Numancia - Estero de binondo	City Road	0.97	2	Residential; Commercial
N. Rizal	Padre Algue - Mayhaligue	City Road	0.21	1	Institutional
Nicodemus	N. Zamora - Velasquez	City Road	0.278	2	Residential
Nicodemus	G. Perfecto - Dagupan	City Road	0.151	1	Residential
Nicolas Zamora	Moriones - Juan Luna	City Road	0.871	2	Residential; Commercial
Nimfa	Juan Luna-Muelle de Benondo	City Road	0.06	2	Residential; Commercial
No St.Name	Madrid - Muelle de Industria	City Road	0.115	2	Residential; Commercial
Norberto Ty	Plaza Ruiz -Yuchenco	City Road	0.136	2	Residential; Commercial
Numancia	San Fernando-Muelle Dela Industria	City Road	0.239	2	Residential; Commercial
Oroquieta	C.M. Recto - Pampanga	City Road	2.762	2	Commercial
Osmeña	Coral-Herbosa	City Road	0.428	2	Residential
P. Rada	Juan Luna-Mabuhay	City Road	0.949	2	Commercial
Pacheco	Nicolas Zamora-R-10	City Road	0.979	2	Residential
Paghanapin	Mabuhay - Asuncion	City Road	0.458	1	Residential
Panday Pira	Nicolas Zamora-Lacson	City Road	0.523	2	Residential
Panday Pira Ext.	Lacson - Quirino	City Road	0.207	4	Residential
Pavia	Juan Luna-Nolasco	City Road	0.171	5	Residential
Pavia	Sta.Maria-Juan Luna	City Road	0.402	2	Residential
Peñalosa	Velasquez - End	City Road	0.514	2	Residential
Penaranda	San Fernando-jaboneros	City Road	0.06	2	Residential; Institutional
Penarubia	Camba - Delpan Road	City Road	0.272	5	Residential; Commercial
Perfecto	Dagupan - Pilapil	City Road	1.222	3	Residential; Institutional
Perla	Juan Luna-Quezon	City Road	0.745	2	Residential
Perla	Nicolas Zamora - End	City Road	0.114	2	Residential
Pilapil	N. Zamora - Lacson	City Road	0.481	4	Residential
Pilapil	g. Perfecto - Dagupan	City Road	0.137	6	Residential

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
Pitimini	Kagitingan-Tagumpay	City Road	0.068	2	Residential
Pitong Gatang	N. Zamora-Sta.Maria	City Road	0.277	1	Residential; Commercial
Plaza Cervantes	J.Luna - Quintin Paredes	City Road	0.094	4	Residential; Commercial
Plaza Sta Cruz	Ronquillo-Carlos Palanca	City Road	0.171	2	Residential; Commercial
Poblete St	Marquina-T.Pinpin	City Road	0.094	2	Residential; Commercial
Prudencia	Justia - Don Pedro	City Road	0.388	4	Residential
Quezon	Cristobal - Herbosa	City Road	0.805	2	Residential
Quintin Paredes	Dasmarinas - Jones Bridge	City Road	0.153	2	Commercial; Institutional
Quintin Paredes	Dasmarinas-Ongpin	City Road	0.318	5	Residential; Commercial
Quiricada	Alfonso Mendoza - J. Abad Santos	City Road	1.063	5	Residential; Commercial
Quirino	Perla - Sto Nino	City Road	0.772	2	Residential
R. Regente	Juan Luna - C.M. Recto	City Road	0.635	1	Commercial
R10	Herbosa - C.M. Recto	City Road	2.175	2	Residential; Commercial
Raja Matanda	Ylaya - Juan Luna	City Road	0.195	1	Residential
Recuerdo	Sevilla - End	City Road	0.117	2	Residential; Commercial
Remegio	Severino Reyes - Alfonso Mendoza	City Road	0.584	2	Commercial
Rentas	Juan Luna-Muelle de Benondo	City Road	0.59	2	Residential; Commercial
Ricafort	Sta.Maria-Juan Luna	City Road	0.24	4	Residential
Rizal Ave.	Carriedo - Tayuman	City Road	1.984	1	Commercial
Romualdez	Osmeña-Lacson	City Road	0.144	1	Residential
Ronquillo	Plaza Sta Cruz-Evangelista	City Road	0.423	2	Residential; Commercial
Ruiz Plaza	Ongpin-Veronica St.	City Road	0.155	2	Residential; Commercial
S. Padilla	Soler - Yuchengco	City Road	0.544	2	Residential; Commercial
Salvacion	Kagitingan-Mabuhay	City Road	0.069	2	Residential
San Bernando(Soler)	Soler-CM Recto	City Road	0.116	1	Residential; Commercial
San Damian	Kagitingan Ext.-San Damian	City Road	0.088	2	Residential
San Damian	Kagitingan Ext.-R10	City Road	0.087	1	Residential
San Dionisio	Kagitingan Ext.-San Damian	City Road	0.09	2	Residential
San Fermin	San Dionisio - Delpan	City Road	0.134	2	Residential
San Fernando	Madrid - Juan Luna	City Road	0.478	1	Commercial; Institutional
San Gregorio	Delpan Ext.-San Antonio	City Road	0.105	1	Residential
San Lazaro	Alfonso Mendoza - Rizal Ave.	City Road	0.427	4	Residential; Commercial
San Nicolas	Biak na Bato - End	City Road	0.267	1	Residential
San Nicolas	Muelle de Benondo-Delpan	City Road	0.643	1	Residential; Commercial
San Patricio	San Damian.-Sta. Rosa	City Road	0.109	1	Residential
San Simon	Tahimik - Sta Rosa	City Road	0.119	1	Residential
San Vicente	Quintin Paredes-T.pinpin	City Road	0.278	1	Residential; Commercial
Sanchez	Padre Algue - Mayhaligue	City Road	0.387	1	Residential
Sandico	Mabuhay-Asuncion	City Road	0.425	1	Residential
Santiago	San Nicolas - Villaruel	City Road	0.15	1	Residential
Severino Reyes	Tayuman - Lincoln	City Road	0.988	2	Residential
Sevilla	C.M. Recto-Muelle dela Industria	City Road	0.605	1	Residential; Commercial
Sgt. Mabagos	Mabuhay-Asuncion	City Road	0.464	2	Residential
Soda	Ongpin - Muelle de industria	City Road	0.058	2	Residential; Commercial
St James	Kagitingan-R10	City Road	0.065	2	Residential
St Joseph	Kagitingan-Katatagan	City Road	0.05	2	Residential
St Jude	Kagitingan-Katatagan	City Road	0.05	2	Residential
St Mathew	Kagitingan-Katatagan	City Road	0.05	2	Residential
St.Anthony	Kagitingan-Katatagan	City Road	0.05	2	Residential
St.Martin	Kagitingan-Katatagan	City Road	0.05	4	Residential
St.Peter	Kagitingan-Mabuhay	City Road	0.104	1	Residential
Sta Barbara	Kagitingan Ext.-San Damian	City Road	0.278	2	Residential
Sta. Maria	Moriones-Herbosa	City Road	0.908	1	Residential; Institutional
Sto Nino	Moriones-Morga	City Road	0.166	2	Residential; Commercial
Sto Nino	Herbosa - End	City Road	0.167	4	Residential
Sto. Cristo	San Fernando-Morga	City Road	1.308	2	Residential
Sun Flower	Primerose - Primerose	City Road	0.105	1	Residential

Road Name	Section	Road Class	Length (km)	No. of Lanes	Land Use
T. Alonzo	Tetuan - V. Fugoso	City Road	0.901	2	Residential; Commercial
Tabora	C.M. Recto - M. De Santos	City Road	0.187	2	Commercial
Tahimik	Recto-Delpan	City Road	0.174	2	Residential
Tahimik	Delpan Ext.-End	City Road	0.084	2	Residential
Tambakan St	Ongpin-Tetuan	City Road	0.162	2	Residential; Commercial
Tayuman	A.H. Lacson - Juan Luna	City Road	1.579	2	Commercial
Tecson	Yakal - San Nicolas	City Road	0.261	2	Residential
Tetuan	Ronquillo-Sabino Padilla	City Road	0.291	1	Residential; Commercial
Tindalo	San Nicolas - Yakal	City Road	0.275	2	Residential
Tomas Mapua	C.M. Recto - Tetuan	City Road	0.479	1	Residential; Commercial
Tomas Mapua	C.M. Recto - Alvarez	City Road	0.93	2	Residential; Commercial
Tomas Pinpin	Escolta-Mulle de Banco Nacional	City Road	0.536	2	Residential; Commercial
Tonelero St	Baraca-Muelle de Benondo	City Road	0.062	2	Residential; Commercial
Tuazon	Kagitingan-R10	City Road	0.603	2	Residential
Tytana	Plaza Ruiz -Yuchenco	City Road	0.136	1	Residential; Commercial
Urbiztondo	Numancia-Baraca	City Road	0.19	2	Residential; Commercial
Valderama (Solana de Intramuros)	Delpan-San Nicolas	City Road	0.203	4	Residential; Commercial
Varona	Perla - Herbosa	City Road	0.668	2	Residential
Velasquez	Capulong - Perla	City Road	0.892	2	Residential
Veronica st.	R. Regente - Alvarado	City Road	0.111	2	Residential; Commercial
Villaruel	Abad Santos - Yakal	City Road	0.222	2	Residential
Wagas	Moriones-Zaragoza	City Road	0.721	1	Residential; Commercial
Yakal		City Road	0.694	1	Residential
Yangco/Sta. Maria	Herbosa - Moriones	City Road	0.908	1	Residential
Ylaya	Lakandula - Sta Elena	City Road	0.632	2	Commercial
Ylaya	Lakandula - Juan Luna	City Road	0.632	4	Commercial
Yuchengco	Veronica - Muelle Del Banco Nacional	City Road	0.643	1	Residential; Commercial
Zabala	Mabuhay - Bilbao	City Road	0.608	1	Residential
Zacateros St	Phil. Sun Yat Sen School- End	City Road	0.156	2	Residential; Commercial
Zaragoza	Delpan-R10	City Road	0.322	2	Residential
Yuchengco	Veronica - Muelle Del Banco Nacional	City Road	0.643	2	Residential; Commercial
Zabala	Mabuhay - Bilbao	City Road	0.608	1	Residential
Zacateros St	Phil. Sun Yat Sen School- End	City Road	0.156	1	Residential; Commercial
Zaragoza	Delpan-R10	City Road	0.322	1	Residential
Maria Payo	Lakandula-Wagas	Barangay Road	0.169	1	Residential
Masikap	Lakandula-Wagas	Barangay Road	0.328	4	Institutional
Matiisin	Mabuhay - Asuncion	Barangay Road	0.491	2	Residential
Matimtiman	Mabuhay - End	Barangay Road	0.423	1	Residential
Bonifacio Drv. (Tutuban Center)	Around Tutuban Mall	Private Road	1.38	2	Commercial
M.Roxas	R-10 - Bonifacio	Bridge	0.352	1	Residential; Industrial

Appendix 4.1 Design Guideline for Tutuban Area Redevelopment

Tutuban Station used to be a main hub of the Philippine railway system. Located in a nationally protected historic area in the center of Manila, the station and its surrounding areas evolved into an important urban, social and business center. At present, Tutuban Station area is one of Manila's major commercial centers where economic activity and foot traffic are dense. The area is the heart of mass transportation in Manila as well, accessible to the entire city transportation network including provincial buses and PNR commuter trains.

Such character of the area provides a unique opportunity to preserve and enhance the historic spirit of Tutuban as a place to live, work and play. Livability and quality of life are improved when an area offers a rich diversity of experiences, including spaces and buildings with various ages, uses and stories to tell. This kind of environment also presents opportunities for social interaction and strengthens the area's sense of place, identity, and pride.

This Design Guideline provides direction for the Tutuban area redevelopment. The principles embodied in these Guidelines encourage creative solutions to enhance the distinct character of zones, reinforce property values and spur economic development. It is important to note that this guideline is basically in accordance with the latest Comprehensive Land Use Plan (CLUP) and Zoning Ordinance of City of Manila, and do not necessarily supersede local regulations. Some exceptions may be approved by the Design Guideline Committee which City of Manila will be involved. All designs shall also be subject to further review by the Design Guideline Committee.

GENERAL DESIGN GUIDELINE

1. Open Space

- Open space needs to be planned in sufficient scale and the minimum of consolidate 0.3 hectare of open space is required for all zones. In addition, minimum of 1.4 hectare of open space is required for Zone 2 and 1.0 hectare for Zone 3 in total.
- All open spaces need to have a direct access to the roads in terms of pedestrian's convenience as well as disaster management. These areas must be easy to walk around in, incorporate shade, landscaping and attractive lighting.
- Planting is encouraged for all open spaces including the installation of bio-retention to intercept storm water runoff to prevent road flooding.
- Open spaces need to be linked to promote social interaction, to provide visual relief and to enhance environmental integrity. These open spaces need to be developed by the private sector integrated with the development of adjacent commercial or mixed-use facility.
- Pedestrian walkways require accessible surfaces that are firm, stable and slip-resistant in both wet and dry conditions. When small paving bricks are used, care should be taken to ensure that they are evenly laid. Uneven surfaces or gaps between paving slabs can cause problems for people using sticks and crutches, visually impaired cane users and wheelchair users. For such reasons, cobblestones should not be used.
- Pavement materials may include the following: Concrete and concrete blocks, stamped concrete, brick tiles, clay pavers (see Figure 1).

Source: http://www.externalworksindex.co.uk/entry/33489/Marshalls/Priora-permeable-concrete-block-paving-system/,
http://www.diytrade.com/china/pd/6883658/pacific_brick_pavement_brick.html

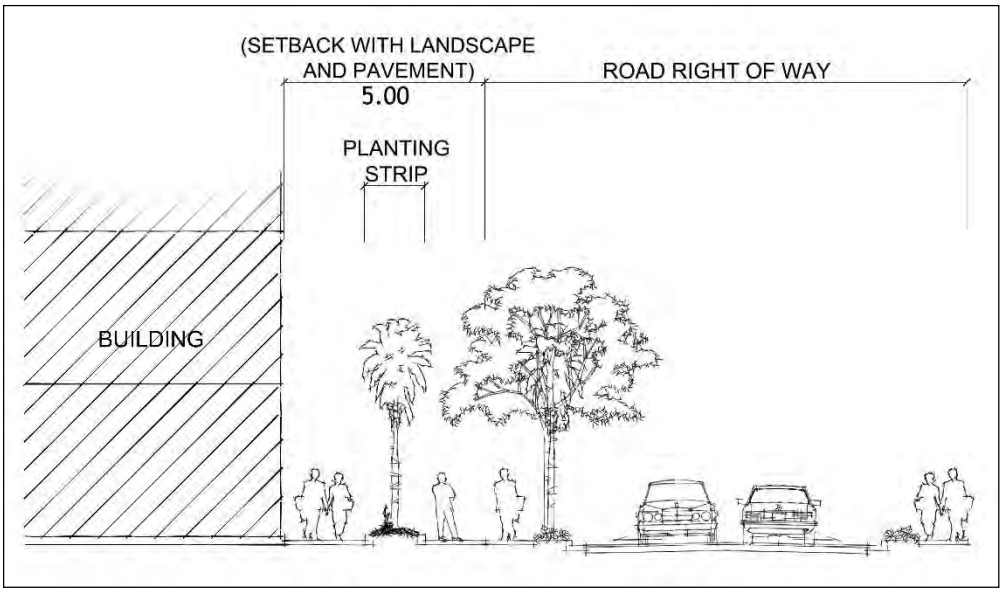
Figure 1 Sample of Pavement Materials

- Unpaved areas must be planted and maintained with vegetation, i.e. trees, shrubs and grass. Care should be taken to avoid the growing of trees and/or shrubs that obscure the visibility of signs, lights, and sight-lines of pedestrians. They must be kept clean and pleasant to look at.
- Proper landscaping analysis and design must be strictly considered not only for aesthetics but more so for the prevention of erosion, and for ecological balance. For landscaping, the use of fragrant, lush, tropical vegetation and native plant species are encouraged. All landscaped areas must also be provided with an adequate irrigation system.
- Open space should be pedestrian-friendly and welcoming to transit riders, residents and other visitors. This should provide visual relief and create places for social interaction. To maximize benefit and enjoyment with these spaces, open space and yard configurations should be integrated with and complement open space and yards on adjoining lots.

2. Building Setback

Subject to the provisions of PD 1096 or the National Building Code of the Philippines (Rule VIII), every building must be designed, constructed and equipped to provide adequate light and ventilation. Their location and orientation should maximize the use of natural ventilation and lighting and minimize energy consumption.

- The required minimum setback for new buildings from the road is 5 m (see Figure 2).
- These setbacks may also be landscaped or paved walkways to make the area feel welcoming and safe for people who work at the station and transit riders who come in off the street.
- Both public and private walkways and sidewalk paving materials should be patterned and featured to provide a sense of scale and rhythm appropriate to surrounding buildings. Smooth, monotonous concrete surfaces should be avoided.



Source: JICA Study Team.

Figure 2 Setbacks for Other Buildings with Landscape or Pavement

3. Facade Design and Color

- The facade of lower levels need to take historic context into consideration as described in the design guideline for Zone 1.
- The design of new buildings of upper floors can utilize modern architecture. It is important that building designs for complement and harmonize with the building designs of other zones.
- Developers may opt to integrate sustainable green architecture features, such as: green wall, sun breakers, solar panel on walls, use of high emissivity glass for curtain walls and windows etc. (see Figure 3).
- Reflective or iridescent colors should not be used.

Source: http://www.archdaily.com/283839/zuellig-building-som/, http://architizer.com/projects/psslai-corporate-headquarters/media/757318/, http://www.greentechmedia.com/articles/read/konarka-runs-solar-curtain-wall-pilot

Figure 3 Use of Energy Efficient Curtain Glass Wall, Green Wall, and Solar Panels

4. Signage

Signs identify or advertise a place of business and function as attention-getting devices. They must be created not only to provide a significant visual impact on the character of the area, but also be carefully designed to aid people with disabilities. In compliance to the provisions of BP 344 (The Philippine Law to Enhance Mobility of Disabled Persons), the following must be observed:

- Directional and informational sign should be located at points conveniently seen even by a person on a wheelchair.
- Signs should be kept simple and easy to understand; signage should be made of contrasting colors and gray values to make detection and reading easy.
- International symbols for access should be used to designate routes and facilities that are accessible.
- Signage labelling in public rooms and places should have raised symbols, letters or numbers with a minimum height of 1 mm; Braille symbols should be included in signs indicating public places and safety routes (see Figure 4).

Directional Signage for PWDs

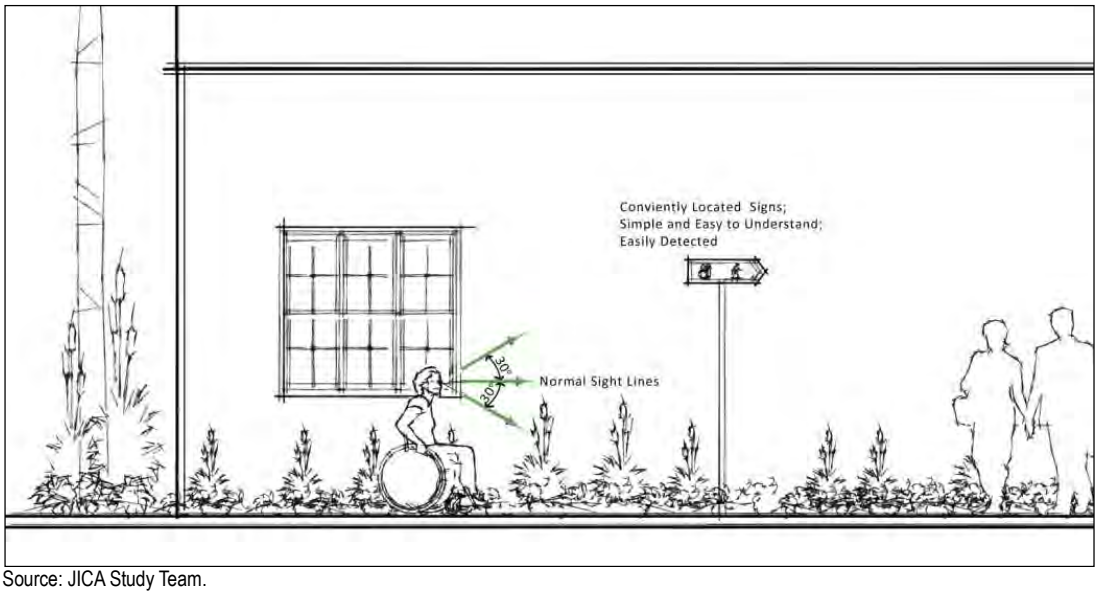
Stand-alone Directional Signage

Street Signage

Hanging Directional Signage

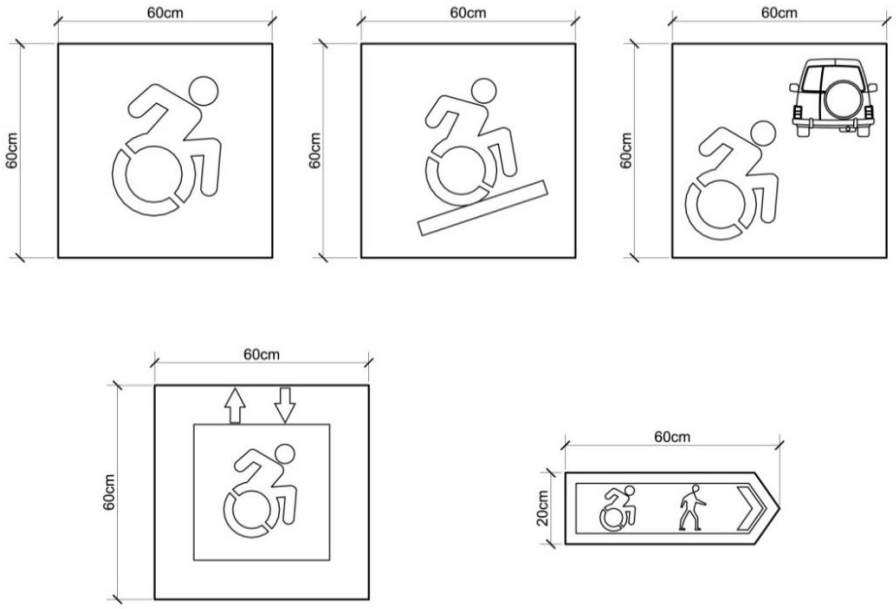
Source: JICA Study Team.

Figure 4 Samples of Signage



Source: JICA Study Team.

Figure 5 Conveniently Located Signs: Simple, Easy to Understand, Easily Detected



Source: JICA Study Team.

Figure 6 International symbols for access; (Top L-R): Access Symbol, Ramp, Parking; (Bottom L-R): Elevator, Direction Sign for Disabled Pedestrians

5. Lighting

- Since green development will be a theme for the redevelopment site, new buildings are encouraged to use energy efficient lighting and/or renewable energy.

6. Internal Vehicular and Pedestrian Circulation

- The area within each zone should be a pedestrian-free zone.
- Building designs by developers are encouraged to prioritize the safety and mobility of pedestrians and persons with disability. Refer to BP 344.

- Parking lots are generally recommended to be located underground to maximize the use of limited space and ensure a more vibrant atmosphere. These should not interrupt pedestrian routes or dominate street frontages.
- Underground parking shall have a maximum of three levels (basement) and will require mechanical equipment in cases of flood and for ventilation.
- Pursuant to Rule VII of the National Building Code, the minimum requirements for parking slots are as shown in Table 1.

Table 1 Minimum Requirements for Parking Slots

Reference Use/Character of Occupancy/ Type of Building or Structure	Minimum Required Parking Slot, Parking Area and Loading Space Requirements
Hotels	– One (1) car parking slot for every three (3) rooms or a fraction thereof for highly urbanized areas – Two (2) tourist bus parking slots for each hotel – One (1) loading slot for each articulated truck or vehicle
Bowling alleys	– One (1) car slot for every four (4) alleys
Private elementary, secondary, vocational and trade school	– One (1) car slot for every five (5) classrooms and – One (1) school bus slot for every one hundred (100) students
Neighborhood shopping center/supermarket	– One (1) car slot for every 100 square m of shopping floor area
Restaurants, fast-food centers, bars and beerhouses	– One (1) car slot for every 30 sq.m of customer area
Units located in office, commercial or mixed-use condominium buildings/structures regardless of number of storeys	– Units with a gross floor area of from 18 to 40 sq.m: provide one (1) pooled parking slot for every two (2) units or for a fraction thereof – Units with a gross floor area of from 41 to 70 sq.m: provide one (1) parking slot for each unit and – Units with a gross floor area of more than 70 sq.m: provide one (1) parking slot for every 70 sq.m and for a fraction thereof
Recreational or similar public assembly buildings such as stadia, sports complexes, convention centers, etc.	– One (1) car slot and one (1) shuttle slot for every 50 sq.m of spectator area and – One (1) bus parking slot for every two hundred (200) spectators

Source: National Building Code

- All Streets in/surrounding the redevelopment site must adapt traffic calming elements to ensure safety of pedestrians. These may be through rumble strips or speed tables (see Figure 7) to oblige drivers/vehicles to slow down.

Source: JICA Study Team

Figure 7 Rumble Strips (left) and Speed Tables (right)

7. Height Regulations for New Buildings

- Height regulations shall generally comply the City of Manila's Zoning Ordinance 2006 unless approved by Design Guideline Committee.
- Based on the National Building Code, habitable rooms with artificial ventilation must have ceiling heights not less than 2.4 m measured from floor to the ceiling. Rooms with natural ventilation must have ceiling heights of not less than 2.7 m. Mezzanine floors must have a clear ceiling height not less than 1.8m above and below it.

8. Commercial Spaces under the Viaduct

- Entries should be designed according to simple and harmonious proportions in relationship to the overall size and scale of the building.
- Main entrance and entry approach must accommodate persons of all mobility levels.
- Commercial area at the ground floor must provide clear and unobstructed windows, free of reflective coatings and exterior mounted gates and security grills.
- Structures for commercial stalls may be one or two-story pre-fabricated shops or "tiangge" type.
- Corridors between stalls must have a minimum width distance of three meters. See Figure 8.
- Individual lighting for commercial properties shall be designed to provide the minimum level of illumination necessary for security, safety and visual appeal for customers.
- Signage shall be attractive and should provide basic, clear information about commercial businesses with visually respectful, highly legible signage.
- Utility lines (electrical, plumbing, etc.) must be provided for each stall.

Source: JICA Study Team.

Figure 8 Image of One-story Prefabricated Commercial Shops below the Viaduct

GUIDELINE FOR ZONE 1

Zone 1 consists of two areas, namely Zone 1-A and Zone 1-B. While Zone 1-A is expected to be a prime area for the entire redevelopment in the project area as a gateway of Divisoria with two major terminal stations, Zone 1-B inherits the current character of vibrant commercial activities. Historic preservation is one of the most important aspects need to be considered in Zone 1-A since the Heritage Building with the structures of the original Tutuban Station as well as Andres Bonifacio statue are located. Both structures are registered by the National Historical Commission of the Philippines (NHCP).

APPROACH FOR HISTORIC PRESERVATION

The Design Guideline for Tutuban area redevelopment suggests techniques to preserve and enhance historic qualities in Tutuban while blending it with modern and innovative standards. It is not the intention of the guidelines to freeze time and make new buildings appear as though they are from a historic period. The historic building can continue to incorporate transition, but new construction or modification to existing buildings should not impede the developer's ability to interpret the historic character of the district.

Demolition of the original Tutuban Station in 1993 seriously compromised the authenticity of the structure, changing its significance from tangible to intangible. A small part of its original architectural heritage, the structures of the original station and the central portion of the original façade are all that remains today. Demanding faithful reconstruction of the original Tutuban structure poses serious financial and programmatic constraints. Thus, establishment of the minimum requirements for preservation is necessary.

According to the detailed assessment of the existing conditions and expected impacts, the areas of preservation according to level of significance (see Figure 9) are identified as follows:

1. Level 1 - Most significant

The front side of Heritage Building

The heritage building structure façade design shall be restored as faithfully as possible. Existing heritage features shall be retained. Alternative building materials necessary for the exterior restoration work are acceptable as long as they closely approximate the original materials, convey the image of the colonial period and invoke to the public the required spirit for the restoration project.

Adaptive reuse processes for the building interior is allowed. Allowable uses are exhibit and display concourse, food station, toilets, and selected commercial stores.

2. Level 2 - Significant

The back side of Heritage Building

The heritage building mainframe structure set up (the first 10 bay of columns in front and roof truss system) is existing and shall be restored as faithfully as possible. The surviving cast iron columns shall be integrated into a new design setting reminiscent of the original sky lit warehouse-type train shed whose interior is to be repurposed for modern retail shops. As long as climate control (air conditioning) of the whole building area is acceptable, the building's exterior may be encased in a transparent glass wall. The type of glass wall shall be a frameless system to allow the best vista of the heritage structure within for the public outside.

The heritage columns and trusses shall be clear of any store structures to be built. The provision

of utilities (lighting, sprinkler systems etc.) shall be exceptions and may be integrated within the heritage structure for as long as the outcome does not distract from the impact of the concerned heritage materials.

3. Level 3 - Less significant

The new structures fronting/overlooking the restored heritage structures

The new structures around the heritage structures are two blocks with a commercial land use. New building structures can be erected on these two blocks which are located at the immediate right side and back side of the heritage structures.

New architecture shall be in harmonious with design and volume of the original Tutuban Station. The appearance of the development will evoke, but not duplicate or mimic the original architecture in a sympathetic, contemporary manner.

(1) Level 3a

The 18 remaining cast iron columns and trusses must also be retained, but do not have to necessarily reminisce the old sky lit warehouse feel of the structure. They do not have to serve as structural components of the building, but may be re-used as decorative interior elements.

Although they are temporary structures by nature, commercial kiosks on the plaza immediately around the Heritage Buildings shall also be subject to Level 3 heritage significance. These kiosks shall adopt prescribed heritage color hues and shall consist of external shapes and forms that are sympathetic to the look of the heritage building.

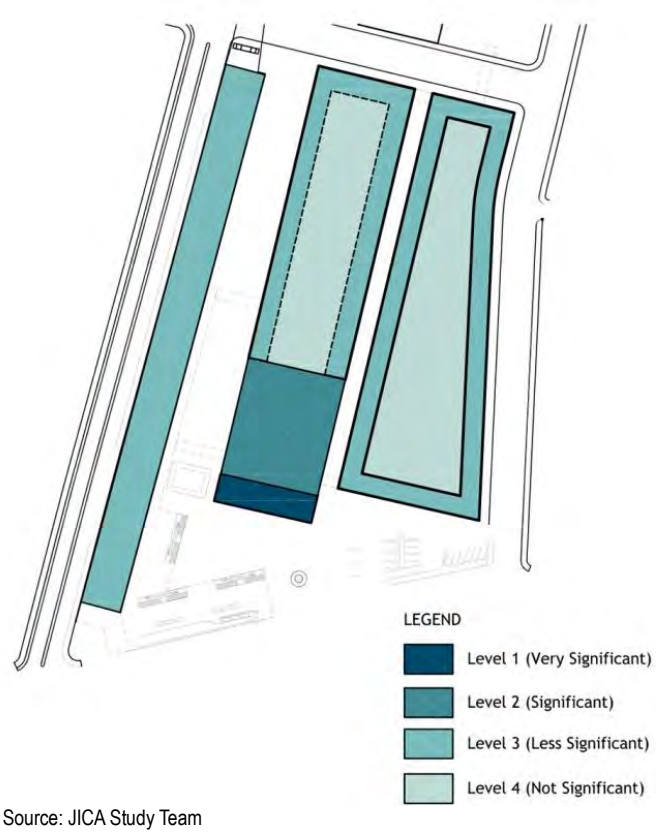
(2) Level 3b

For the first two floors of the commercial buildings, adoption of architectural features that are evident in the existing heritage structures is recommended. The features may be in neo-classic (modernized) form provided that the spirit of the colonial period architecture is invoked and promoted. The selective 2 floor parameter of the building is in line with being true to the prevailing skyline of the district at that heritage period in time.

4. Level 4 (not significant)

Level 4 is not very significant in terms of heritage value. The buildings in these areas may adopt a heritage style for their buildings but which is optional. Mostly, an eclectic array of modern buildings are acceptable for areas in Level 4. However, new buildings in these areas should utilize “background architecture” that does not compete with the heritage building. Therefore, massing, volumes and height of new buildings must not overpower the heritage building but must be designed visually and volumetrically proportional to the heritage building.

Higher floors for the structures near the heritage building (set on the roof of the second floor which is tantamount to a podium) are allowed as long as their façade is setback and kept inconspicuous and not distracting to the architecture being displayed by the area heritage ‘centerpiece’ i.e. sky-reflecting glass curtain walls that clad a conventional building mass form. Glass curtain walls in themselves can still distract if the massing form of the building is too modernistic.



Source: JICA Study Team

Figure 9 Level of Historic Significance

GUIDELINE FOR ZONE 1

1. Open Space

i. General

- Minimum of consolidate 0.3 hectares of open space is required.

ii. Clearance around Heritage building

- Unobstructed sight lines to the Heritage building must be maintained from all angles
- Ample space for ground level pedestrian walk must be provided around the Heritage building. The pedestrian walk should provide public gathering place and introduce feeling of Tutuban as an urban oasis.
- Glass-covered roofing must be provided for pedestrian walkways between the Heritage Building and new buildings.
- The open space around the heritage building must be paved with materials reminiscent of Old Manila. This area must be easy to walk around in, incorporate shade, landscaping and attractive lighting (see Figure 10).

Source: JICA Study Team

Figure 10 Image of Open Space around the Heritage Building

iii. Clearance around Andres Bonifacio statue and within Station Plaza/Pedestrian Deck

- Plaza around the statue must be kept open, pedestrian-friendly, and free from visual and physical obstruction.
- Clearly designated walkways and waiting areas for the passengers in the station plaza and the pedestrian deck must be provided.

2. Building Setback

- Following the National Building Code for C-3 development and in consideration of maximum natural lighting and ventilation (65.5 degree Philippine solar angle and line of angular plane to establish incremental setbacks and outermost face of the building), the minimum distance of new buildings from the Heritage building must be approximately 9.1 m. However, in practice, many existing developments use 8.0 m distance between buildings which have been approved by city authorities.
- Buildings with a series of graduated and stepped forms must be applied for new projects along the Heritage building. Transitional height setbacks are required to provide visual break.

3. Facade Design

Identified architectural elements with the historic significance in the original Tutuban station include the following: pediment, some repetitive elements in the upper portion, rectangular silhouette of openings, possible louvers, slender segmental arc on ground floor, and curved brackets. Also important aspect is the emphasis on a straight horizontal line on the lower level and the irregular play of levels on the upper floors.

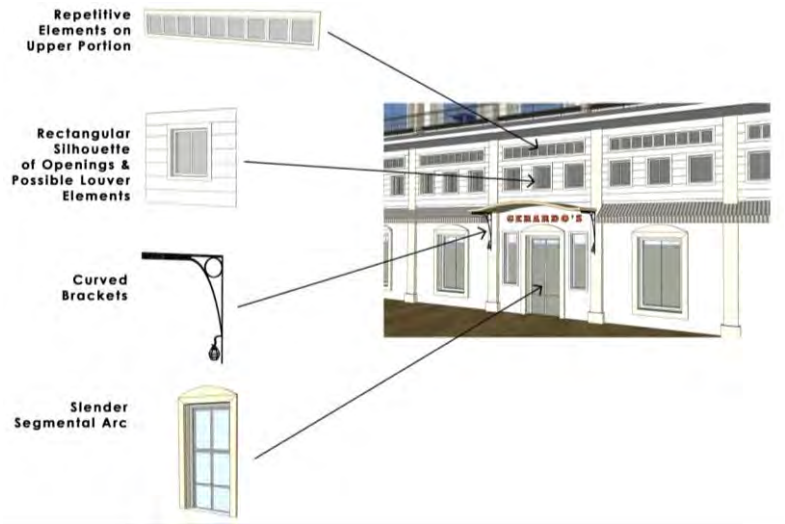
i. Heritage building:

- While the structures of the original Tutuban station (28 bay of cast iron columns, truss work etc.) must be preserved, partial reconstruction of the building needs to be considered. Reconstruction must be integrated with compatible modern structures that do not reproduce or mimic heritage architecture.
- The demolished Tutuban exterior must be reconstructed as much as practically possible to be integrated with modern, compatibly designed buildings surrounding the reconstructed heritage structure.

- For the interior, remaining original elements and surviving architectural features of the original building must be re-used in the contemporary design for the efficient retail space.
- Pre-painted long span steel roofing with brick red color is recommended for the roofing.

ii. New buildings:

- Modern architecture must be sympathetic with the historic architecture.
- New buildings should be blended with the adjacent architecture that does not compete for attention with the heritage building. Therefore massing, volumes, and height of new buildings must not overpower the heritage building but must be designed visually and volumetrically proportional to the heritage building.
- New buildings should be designed in contemporary architectural vocabulary and in should not duplicate or mimic the heritage building.
- Heritage-influenced architecture must be maintained at eye level height. Use consistent eye level massing and detailing to establish visual compatibility between old and new as shown in ***Figure 4.2.10*** in the main text.
- Building finishes should be blended with Tutuban Heritage structure. Textured concrete, stone, terra cotta and plaster may be used. Glass surfaces should be clear, or of light, warm-colored tints.
- New buildings in Zone 1-A should incorporate the distinctive architectural details to relate to the existing Heritage structure. Facade treatment for new buildings should be contextual to these elements, especially when adjoining the Heritage structure (see Figure 11). These details include:
  a. Horizontality of façade lines and volumes to evoke heritage Tutuban architecture
  b. Deep eaves supported by iron brackets
  c. Pattern of fenestration, doors, and other openings
  d. Echo but not necessarily replicate original ceiling and wall details, paving patterns, and other identifying designs.



Source: JICA Study Team

Figure 11 Modern Interpretation of Identified Architectural Elements

- While lower levels (ground and second level) reflect historic context, architecture at the upper levels can be modern with minimal detailing. However, installation of transitional section at the mid-levels is recommended to avoid the drastic change and establish certain unity as one building (see Figure 12).

Source: JICA Study Team.

Figure 12 Sample Image of New Building with Transitional Section

iii. NSCR and LRT Tutuban Stations

- Since the NSCR station is very visible from the Heritage Building, it shall be required to likewise adopt architectural features that are evident in the existing heritage structures.
- Facade treatment for the ground floor should also conform to the existing elements of the heritage structure (horizontality of façade lines, deep eaves, pattern of openings, etc.).
- Upper floors must be covered with glass walls to adopt sympathetic modern architecture.
- Roofing shall follow the materials used for the Heritage Building (pre-painted long span steel roofing with brick red color is recommended).

4. Color

Colors should be selected to harmonize with the warm, earth-tone, masonry color of the existing Heritage structure (see Figure 13).

Source: JICA Study Team

Figure 13 Prospective Color Palettes for the Building

5. Lighting

- Lighting fixtures should be appropriate to the architecture of the building it serves. Lighting should be generally subdued and shielded so as not to ruin the ambiance of the Heritage Building.
- Original lamp at the facade of the Heritage building may be replicated (see Figure 14).

Source: JICA Study Team

Figure 14 Original Lamp at the Facade Internal Vehicular and Pedestrian Circulation

6. Interval Vehicular and Pedestrian Circulation

- Since the area facing C.M. Recto Ave. needs to be served for public transportation facility, part of the setback area of the new mixed-use building needs to be integrated into the station plaza and include jeepney bays as shown in the Concept Design.

7. Height Regulations for New Buildings

- Based on the Cultural Heritage Impact Assessment, new buildings must harmonize with the image of the heritage building. Recommended height of the heritage building are as follows:
  - 1st level – 5.5 to 6.0 m
  - 2nd level – 4.0 to 4.5 m
  - 3rd level – 3.0 to 3.5 m

8. Space Under NSCR Viaduct

- The space under the NSCR viaduct in Zone 1 needs to be served as a public transportation facility (jeepney bay) as well as a commercial facility due to the expectation to be a potential relocation site for the affected street vendors by LRT 2 West Extension project.

GUIDELINE FOR ZONE 2

1. Open space

Minimum of 1.4ha of open space is required. Open space should be consolidated to the maximum extent and minimum of 0.3 hectare of consolidate open space is required.

2. Space under NSCR Viaduct

The space under the NSCR viaduct in Zone 2 needs to be served as commercial facility due to the expectation to be a potential relocation site for affected street vendors by LRT 2 West Extension project.

GUIDELINE FOR ZONE 3

1. Open Space

Minimum of 1.0 hectare of open space is required. Open space should be consolidated to the maximum extent and minimum of 0.3 hectare of consolidate open space is required.

2. Height Regulations for New Buildings

Limits of height of the new building will be increased by the utilization of air-rights of railway facility to the extent in accordance with 2006 Zoning Ordinance of Manila. Some exceptions may be proposed for approval by the Design Guideline Committee as long as the proposal provides more benefit to the public than the plan comply with the current ordinance.

3. Public Transportation Facility

Public transportation facility (approximately 5,000sq.m.) should be developed at the corner of Tayuman St. and new access road. It needs to include jeepney bay, taxi bay, drop off area, parking stalls for people with disabilities by being integrated into the proposed mixed-use facility.

4. Space under NSCR Viaduct

The space under the NSCR viaduct in Zone 3 needs to be served as the commercial facilities as well as the public facilities such as barangay office/hall, day-care center.

STRATEGIES FOR SUSTAINABLE DEVELOPMENT

In addition to the environmental consideration by introducing high technology such as smart metering system, grey water recycling, utilization of renewable energy, Low Impact Development (LID) approach is also recommended. Major LID measures should be applied to Tutuban redevelopment are follows;

1. Bioretention

Natural type depression storage, infiltration, and evapotranspiration. This design option is typically the least costly and easiest to accomplish if site availability, soils, water table, etc. are conducive. Other site treatments such as swales, rain gardens, open space, etc. fall under this general category and are advisable due to lower initial costs.

2. Permeable Pavements

Provide infiltration and prevent concentrated flow. Permeable pavements (including pavers) are the next most cost effective method of meeting the design goals. Limitations on the use of these design options are wheel loading, traffic, ability to maintain, etc.

3. Cisterns/Recycling

Re-use systems that store and re-use stormwater. This design option is preferable if adequate demands for reuse water exist. Many facilities do not have the potential for reuse to make this option cost effective.

4. Green Roofs

A green roof, or rooftop garden, is a vegetative layer grown on a rooftop. Green roofs provide shade and remove heat from the air through evapotranspiration, reducing temperatures of the roof surface and the surrounding air.

5. Rain Gardens

Rain gardens are a depressed vegetated area that use rainfall and stormwater runoff as irrigation. Rain gardens capture and hold water, usually through the use of native plants. By using highly porous plant materials, rainfall and stormwater runoff can drain more effectively.

6. Rainwater Harvesting

Rainwater harvesting is a system that collects, diverts, and stores rain in a catchment tank. Rainwater can be successfully used for landscape irrigation because rainwater is collected directly from the sky, and avoids many pollutants water collects by flowing through streets. The harvested rainwater can also be used for car washing and toilet flushing.

Sources of LID measures :

- American Society of Landscaped Architects. Retrieved from Sustainable Residential Design: Improving Water Efficiency: http://www.asla.org
- United States Environmental Protection Agency. (2013, November 23). Retrieved from Green Roofs: http://www.epa.gov/heatisland/mitigation/greenroofs.html
- 2010, November 15. Retrieved from: http://www.wbdg.org/ccb/DOD/UFC/ufc_3_210_10.pdf

Appendix 5.1 Terms of Reference for Project of Tutuban Station Intermodal Facility

TERMS OF REFERENCE

(DRAFT)

FOR

Consultancy Services to undertake the Detailed Architectural and Engineering Design and the Preparation of Bidding Documents
for
Transit Oriented Development for North-South Commuter Rail and LRT-Line2 West Extension

(Tutuban Station Intermodal Facility)

I. INTRODUCTION

A. BACKGROUND

1.1 The population of Metro Manila has increased dramatically due to the rapid urbanization and current reached approximately 12 million (as of 2010, which is about 1.5 times from 7.95 million in 1990. Furthermore, Metro Manila generates 37% of GDP and became the largest economic center in the country. Even though the transportation network in metro manila has been gradually improved by the ring/radial roads, expressway, LRT, etc., serious traffic congestion has not been solved yet. Such serious congestion prevents smooth logistics as well as human mobility and results in significant economic loss and crisis of environmental sustainability.

1.2 Although the Philippine Government has promoted the development of transportation network based on the urban development plan and the transportation network plan (target year of both plans; 2015) that were formulated through ODA by the government of Japan (The Study on Metro Manila Urban Transport Integration in the Republic of the Philippines, 1999), the transportation capacity is not sufficient to accommodate the drastic population increase in Metro Manila. Consequently, development of mass transit system in north-south direction is absolutely essential to cover expanding commuting area as a core infrastructure axis. Currently, Philippine National Railways (PNR) operates the commuter line in the southern part of Metro Manila, between Manila City and Binan City in Laguna Province, which is the non-electrified section with low traffic density and frequency. On the contrary, railway operation has not been started in the north part of Metro Manila, Particularly, residential areas between Caloocan and Malolos have been expanded without sufficient mode of public transportation. The residents living in the area commutes to the central Metro Manila by bus, car, etc. via highway. As a result, traffic congestion form the exit of highway to the central Metro Manila has become major issue and affected their commute. Therefore, the development of mass transit system in the section has been urgently required.

1.3 In response to the conditions previously described, currently JICA is implementing various cooperation projects associated with the commuter rail between the suburbs and Metro Manila. In order to enhance the outcome of these projects, JICA has decided to provide technical assistance for the planning of transportation facilities and relevant facilities of these projects through implementation of the Preparatory Survey on Promotion of TOD for Urban Railway in the Republic of the Philippines. Initial results of the Study suggest the development of the **Tutuban Station Intermodal Facilities; Station Plaza and Widening of Dagupan St.**

B. OBJECTIVE

1.4 The objective of the services is to prepare detailed engineering designs, procurement and implementation plans, and bidding documents, for the construction of the different components of the intermodal facilities.

C. THE PROJECT

1.5 The Tutuban Intermodal Facilities, Station Plaza in Zone 1A will integrate the operation of both the proposed NSCR Station and LRT 2 Station in one location, i.e., southern area of 1the PNR Property in Tutuban, which will facilitate passenger access between

the two (2) railway facilities. The proposed intermodal facility consists of the following structures:

a. Common Station Plaza, 9,200 square meters including Information Center (150 square meters)

b. Widening of Dagupan St.,

1.6 The structures will be constructed adjacent to the southern boundary of the historic building, Tutuban Center Mall. The detailed description of the scope of work for the Project is further presented in ***Annex A***. The location of the Project Area is presented in Figure 1.

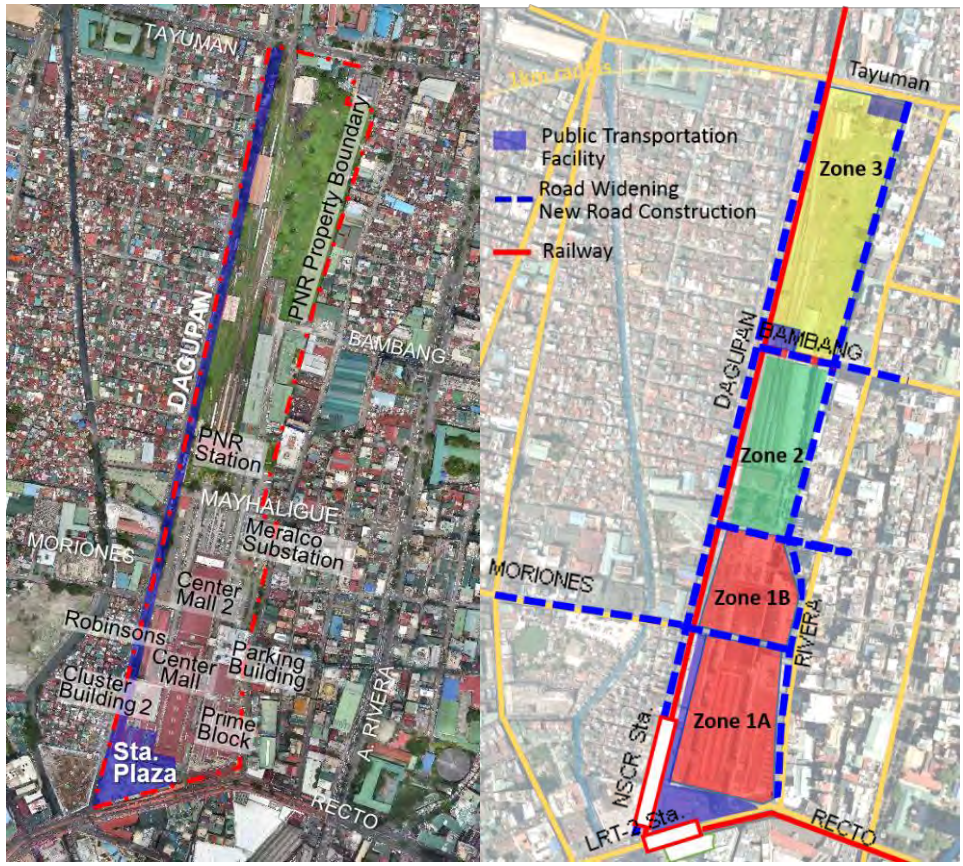


Figure 1 Project Area

II. SCOPE OF SERVICES

A. GENERAL

2.1 The Consultant shall be responsible for carrying out the necessary detailed architectural and engineering design and the preparation of bidding documents in respect of the above-cited project with a view to having the works implemented by suitably prequalified contractors.

2.2 During the design stage, the Consultant shall coordinate with the Department of Transportation (DOTC) and the Department's Consultant to delineate the actual area and location of the Project to ensure accuracy of the different project components and eliminate conflicts with the ongoing and previous plans along the project area.

2.3 The Consultant shall be responsible in coordinating and integrating the results of the EIS (if available) for this Project in the final design and bidding documents.

2.4 The Consultant shall provide assistance during the tendering of the Works for the intermodal project.

B. THE SERVICES

2.5 Detailed Investigation and Design

The Consultant shall carry out the necessary engineering investigations and detailed engineering design, which include but are not necessarily limited to the following items:

(i) Site Survey

The Consultant shall conduct preliminary studies to verify and validate the recommendations of the previous Feasibility Studies on the intermodal facility project. The Consultant shall gather and review all the necessary pertinent data about the project particularly the physical topography, which often impose limitations upon location and design, and also conduct site inspection on foot jointly with the DOTC and its Consultant.

Any deviations or modifications proposed on the recommended solutions shall be presented with the corresponding justifications and estimates of costs.

(ii) Field Survey

Carry out the necessary field surveys consisting mainly of reconnaissance, relocation, subdivision and topographic surveys, to confirm and establish accurate reference of the boundaries of the project location.

Structure surveys will be undertaken to record all existing utilities and buildings that will be affected by the proposed road widening as well as the development of the station plaza.

All surveys shall be performed with a precision, which ensures that the design accuracy is attained according to the departmental guidelines and the Consultant is confident that the quantity/work estimation is within the stipulated limits of ±10%. A survey of a given order of accuracy shall conform to all standards of that Order of Accuracy.

The Consultant shall conduct topographic surveys to determine existing ground features and existing physical limitations and developments specially those that are intended to remain.

(iii) Soils and Materials Investigations

Carry out detailed soil investigations along the project area to identify the soil type(s) necessary for the design of the foundation of the facility, both for horizontal and vertical structures.

At least four (4) test pits shall be made/excavated along the corners of the proposed driveway and parking area. The exploration shall extend to a maximum depth of 1.5 meters below the proposed subgrade.

The Consultant shall conduct soil borings (minimum of four (4) boreholes to prescribed depth to determine ground and subsurface conditions at the project site. Disturbed and undisturbed soil and rock samples obtained shall be subjected to physical and mechanical tests and soil mechanics analysis.

All pits and bore holes shall be properly logged showing the thickness of each layer, the color, the type and visual description of each layer, depth below the surface, water levels (if any), etc. These samples will be subjected to the following tests: Mechanical Analysis, Specific Gravity, Atterberg Limits, Moisture-Density Relationship, CBR and Natural Moisture Content. Classification of soils shall be made in accordance with AASHTO M145.

(iv) Drainage/Hydrology

A proper assessment of the existing drainage facilities i.e. pipe and box culverts and ditches will be made to determine capacity and adequacy to accommodate discharge from the proposed development. A complete inventory of all the existing drainage structures together with remarks with respect to their current condition will be prepared on a format acceptable to the DOTC.

With respect to hydraulic design of new drainage system, the Consultant shall carry out hydrological studies with careful analysis of meteorological data and other data such as rainfall, atmospheric temperature, flood records, environmental condition and monthly number of dry weather days, supplemented with preparation of rainfall intensity, duration, and frequency (RIDF) curves for relevant locations/areas and detailed inspection.

(v) Site Development Design

The Consultant shall prepare site development plan for the facility to include proper orientation of pedestrian and vehicular access to eliminate pedestrian and vehicular conflict and accidents.

The Architectural Design shall be perform in accordance with the National Building Code and Batas Pambansa, B.P. No. 344, An Act to Enhance the Mobility of Disabled Persons by Requiring Certain Buildings, Institutions, Establishments and Public Utilities to Install Facilities and Other Devices, and its latest IRR.

i. Sites/ Grounds

- Land and site sustainability considerations during construction activities i.e., plans and documentation needed for site excavation, sedimentation and erosion control, air pollution control, etc.
- Use of organic soil treatment products.
- Management of shadows cast by the proposed buildings on adjacent lots and buildings/ structures.
- Miscellaneous considerations, i.e., rainfall information and hydrologic (and flooding) characteristics of the site including flood risk assessment mitigation studies; public passageways, i.e., secure pathwalks and; waiting sheds and other key street furniture; vehicle use, maneuver and parking plans (open and covered); landscaping plans (hard and soft scapes); green roofs and heat insulated areas.

ii. Buildings/Structures

- Energy conservation and management, i.e., compliance with the latest Department of Energy (DoE) guidelines on energy conservation and management. i.e., lighting and power design, use of light-emitting diodes (LEDs), compact fluorescent lamps (CFLs), etc.; extensive use of natural lighting and ventilation with sun-shading devices; use of renewable (non-fossil) energy sources where applicable (sun, wind, wave, current, hydro, dendro), hot springs, animal, biogas/compost, solid waste.
- Correct wall to window ratio (WWR) for natural light and ventilation purposes, if applicable.
- Construction waste management program, i.e., material collection/ storage/ reuse/recycling/ disposal; waste diversion/reduction.
- Considerations of embodied energy in the construction and finishing materials specified for use in the building/structure/project;
- Compliances with valid and subsisting laws, rules, regulations, guidelines, standards and procedural manuals pertaining to building design e.g. NBCP, Fire Code, Water Code, Sanitation Code, etc.
- Fire and life safety considerations (including flame retardation and flame spread characteristics of materials specified for the building/structure/project).
- Correct building orientation, material, texture and color selection to manage reflected light and heat caused by the building/structure/project and light and heat absorptions by the same.
- Carbon foot-printing of the building/structure/project and all its end-users.

(vi) Roads, Driveway and Parking Area Design

The Consultant shall perform road, driveway and parking design in accordance with the latest versions of the AASHTO's A Policy in Geometric Design of Highway and Streets and of the DPWH's Design Guidelines, Criteria and Standards.

(vii) Pavement Evaluation and Design

Conduct complete studies and evaluation of the existing pavement structure to determine the appropriate upgrading and pavement strengthening treatments that are technically and economically justified.

Utilize axle-loading data for design, which are representative of actual traffic on the specific site, by undertaking axle loading surveys on sites where recent axle-load survey data are not available.

The durability of the existing pavement will be surveyed by a thorough visual examination for cracks, pumping and drainage and a field check of the pavement layers and their in-situ properties. The field checks will be carried out by: 1) test pits through or immediately adjacent to the pavement; 2) by coring through the pavement layers. Coring shall be made alternately at each lane of the carriageway at 500 meters interval or at suitable lesser intervals if required in the judgment of the Consultant to insure accuracy of design estimate.

The existing pavement is to be redesigned, if necessary taking into account in-situ CBR or resilient modulus (Mr) values of the subgrade, actual strengths of the existing sub-base and base courses for future traffic volumes and axle loading for a 20-year design life. Traffic axle load data will be taken from the DPWH records, if available. The existing pavement structure should be salvaged and incorporated into the final detailed engineering to the maximum extent feasible. Pavement evaluation and design shall be in accordance with the AASHTO Interim Guide for Pavement Design Method, with a Performance rating of 2.0 or the British TRL Report LR 444, Strengthening of Flexible Roads in the Tropics: The use of deflection Measurements.

Pavement evaluation and design shall take into consideration the following standards:

Design Elements	Minimum Values
Pavement Width	6.70 m
Shoulder / Sidewalk Width	3.00 m
Planting Strip Width	1.00-1.50 m
Right of way Width (minimum)	20.00 m
Pavement Cross Slope (ACP)	2.00%
(PCCP)	1.50%

Other pavement cross sectional and geometric requirements shall be based on the DPWH Design Guidelines, Criteria and Standards.

(viii) Structural Design

The Consultant shall perform structural design in accordance with the latest version of the National Structural Code of the Philippines.

(ix) Electrical Design

For power and lighting system requirement of the Project, the Consultant shall perform electrical design in accordance with Latest version of the Philippine Electrical Code and its DRs

2.6 Preparation of Procurement

(i) Contract Packaging:

The Consultant shall study packaging schemes appropriate for the different components of the Project considering scope of work, time frame and the normal periodic project accomplishment of contractors with experience on projects similar in nature.

All plans, quantity and cost estimates, unit price analyses and tender documents shall be consistent with this packaging requirement.

(ii) Contract Plans

The Consultant shall prepare the following plans for each contract:

1. Cover Sheet
2. General Index
3. Vicinity and Key Map
4. Location Plan/layout
5. Legend, Abbreviation and Symbols
6. General Notes
7. Topographic Survey Plan
8. Demolition Plan
9. Site Development Plans
10. Civil (Road and Drainage) Design Plans
11. Structural Plans
12. Architectural Plans
13. Electrical Plans (Power and Lighting)
14. Electrical Plan for Street Lighting.
15. Boring Logs and Location of Boreholes
16. Relocation and Subdivision Plans
17. Other plans and drawings as required

Whenever there is a need for the relocation of utilities such as telephone, telegraph and electricity poles, etc. as well as buildings, fences and major trees to be removed, such details shall be indicated in the drawings and a separate list shall be prepared.

(iii) Quantities

Compute all quantities for each contract to an accuracy of ±10 percent and prepare Bill of Quantities.

(iv) Special Provisions

Prepare and submit for approval to the Department of Transportation and Communication, specifications for the environmental mitigation measures, for a specific item of work or methods of construction, measurement and payment under each contract which are not covered by the Technical Specifications and Special Conditions and not covered by the FIDIC Standard Conditions of Contract.

(v) Unit Price Analysis

Prepare a detailed analysis of all applicable unit prices for each contract using current cost indices, rates, etc., including analysis of recent ICB bid prices in the country.

(vi) Government Estimates

Base the Agency's cost estimate on the above unit prices, ensuring that the unit prices reflect current actual market conditions.

(vii) Tender Documents

The Standard Bidding Documents of the Department of Transportation and Communication covering the following shall be adopted and will be made available to the selected Consultant: Instruction to Bidders, Bidding Data; General Conditions of Contract – Part I – FIDIC 4th Edition (1987); Conditions of Particular Application – Part II; Technical Specifications – DPWH Standard Specifications (1995); Volume II – Highways Bridges and Airports, Forms of Tender, Appendix to Tender and Tender Securities, Sample Form of Agreement, Sample Form of Securities, Instructions on submitting Prequalification data to the DOTC Contractor's Prequalification Registry. The Consultant shall prepare all necessary supplementary and/or special technical specifications for the items of work determined for each work contract.

The Consultant shall assist the Department of Transportation and Communication in defining the Contract Profile Criteria for contractor eligibility screening, conducting pre-bid conferences and pre-bid site inspection for interested contractors, and furnish any other information or assistance, which they may need. The Consultant shall assist the DOTC in the evaluation of bids and preparation of bid evaluation reports.

III. IMPLEMENTATION

A. STAFFING

3.1 The Consultant shall provide professional specialist skills and a project team organization that optimizes the use of specialists, for example a core team and separate design teams for each area to carry out the above services. The following skills are anticipated and will be evaluated from the proposals, i.e.:

Core skills – team leadership and project management;

– Geotechnical engineering

Design skills – Architectural and allied engineering such as civil engineering (including hydrology and hydraulics), structural engineering, electrical engineering, technical specifications, quantity and cost estimation.

The assignment is estimated to require about **22** key professional person-months. However, the Consultant may have some flexibility in the constitution of his design team and could propose a team based on his assessment of the projects and his experience in executing similar projects.

The selected Consultant shall report and coordinate all his activities on the project to the Project Director for _____.

3.2 Report Requirements

The Consultant shall submit the following reports in five (5) copies each for the project.

Report		Submission Date
a. Inception Report	-	To be submitted within 15 days of the actual starting date of the services.
b. Soils and Materials Investigation Report	-	To be submitted not more than 30 days after the completion of the services
c. Hydrological Report and Hydraulic Design	-	To be submitted not more than 30 days after the completion of the services.
d. Topographical Survey Report	-	To be submitted not more than 30 days after the completion of the services.
e. Architectural Design Report	-	To be submitted not more than 30 days after the completion of the services.
f. Structural Design Report and Calculations	-	To be submitted not more than 30 days after the completion of the services.
g. Electrical Design Report	-	To be submitted not more than 30 days after the completion of the services.
h. Geo-Technical Reports	-	To be submitted not more than 30 days after the completion of the services.
i. Quantity Calculations and Price Analysis	-	To be submitted not more than 30 days after the completion of the services.
j. Preliminary Draft of Tender Documents		Two (2) copies for each works contract package to be submitted 30 days before the completion of the services.
k. Relocation Plans and Report		Three (3) printed copies to be submitted together with the Final Construction Drawings.

Report		Submission Date
l. Final Construction Drawings		Original drawings together with the check print are to be submitted to DOTC at the end of the duration of the Services.
m. Tender Documents (in Final Form)		Thirty (30) copies to be submitted not more than 30 days after the completion of the services, together with 8 copies of the Unit Price Analysis and two (2) copies of the Government cost Estimates under confidential cover.
n. Monthly Progress Report	-	To be submitted monthly before the 5th of the next month. The 25th of the month is reckoned as the cut-off date for the reporting month.
o. Final Design Report	-	To be submitted not more than 30 days after the completion of the services.
p. Other Reports	-	To be submitted as required by the Client

The Consultant shall submit promptly all documents for design and field survey data under a standard electronic format in CDs and in hard copies.

B. CONTRACT PERIOD

3.3 The Consultant's contract period for undertaking the detailed engineering and the preparation of bidding documents shall be six (6) months and the Consultant shall commence work within fifteen (15) days after receipt of Notice to Proceed.

C. ASSISTANCE TO BE PROVIDED BY THE CLIENT

3.4 In connection with the tasks of the Consultant that requires inputs from other government agencies (e.g.. PNR, DPWH, DENR, etc.), the DOTC shall provide assistance in liaising with those agencies. The DOTC shall ensure that the Consultant have access to all relevant information, which are deemed necessary to the performance of the above services.

3.5 The Consultant is expected to provide all office space and equipment, and all other resources necessary for completing the services.

D. Expertise and Qualification of the Consultant

3.6 The Consultant shall have extensive experience in the preparation and development of design for similar and related facilities.

Prepared by:

ANNEX A

A. GENERAL INFORMATION OF TUTUBAN STATION AREA REDEVELOPMENT

1. Transport Oriented Development (TOD) is a development approach primarily aiming for promotion of public transportation in the vicinity of the mass transit stations through the integration of transportation development and other types of development such as commercial, office, and residential development. Tutuban station area redevelopment is a typical TOD to maximize the benefits by North-South Commuter Rail (NSCR) and LRT-Line 2 west extension. Therefore, Tutuban Redevelopment includes the considerations for both access improvement and urban development.

2. Figure A-1 illustrates the existing conditions as well as proposed access improvements for Tutuban station area. These improvements aim at enhancement of intermodal connectivity as well as safety and convenience for pedestrians. They contributes to the improvement on local traffic circulation and as a results, increase of ridership of railway as well.

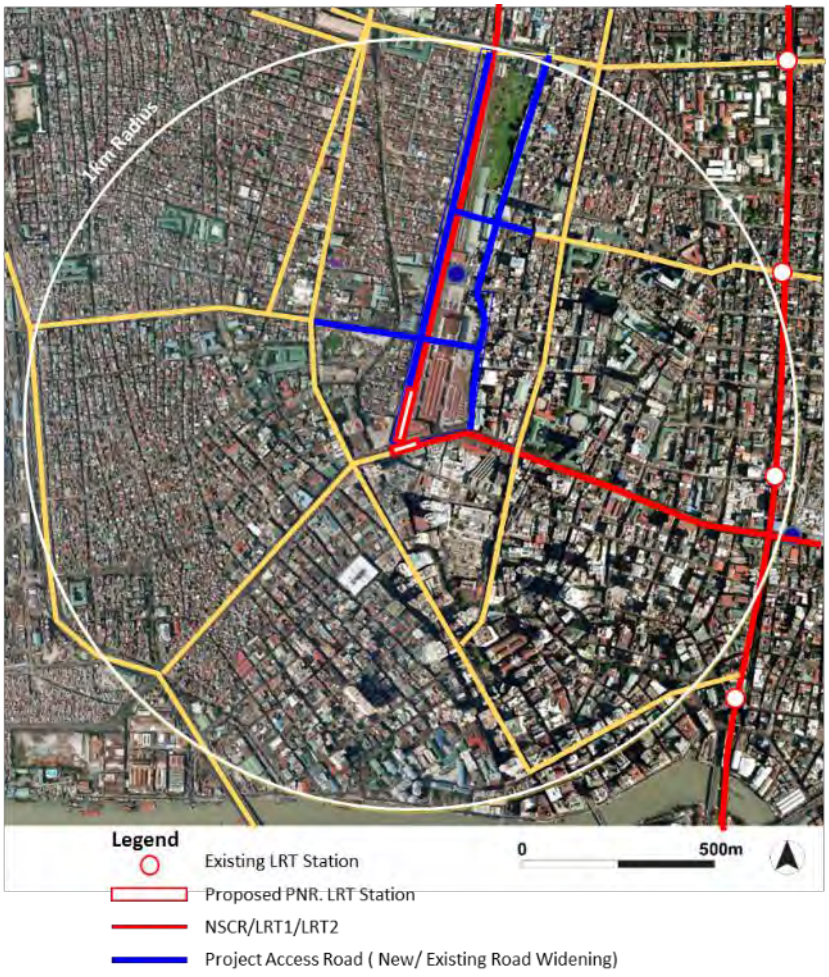


Figure A-1 Access Improvement Plan for Tutuban Station Area

3. Access improvements include the following key interventions;

   - Revive transport functions of C.M. Recto
   - Integrate NSCR and LRT-Line 2 stations
   - Restructure road network and improvement of traffic management in the area
   - Integrate public transport routes and provide proper inter-modal facilities and operation/ management
   - Establish pedestrian network and enhance walking environment

   Based on these key interventions, proposed projects are formulated as shown in Table A-1. Projects included in this TOR are introduced as the immediate-term projects (1.1, 1.2, 2.1, 2.2).

Table A-1 List of Access Improvement Projects and Implementation Schedule

Project Name	Purpose	Components/Contents of the Project	Implementation Period
1. Development of Station Plaza and Public Transportation Facilities in Zone 1	• Mitigate the traffic congestion along CM Recto Ave. • Improve safety, comfort and convenience for the users of NSCR, LRT and adjacent commercial facilities	1.1 Development of Station Plaza	Immediate-term (2015-)
		1.2 Development of Pedestrian Deck (NSCR, LRT2)	Short-term (2016-)
		1.3 Public transportation facilities (parking etc.) in commercial facilities near the stations (NSCR, LRT2)	Short to Mid-term
2. Dagupan St. Widning Improvements	• Secure the land for road widening and viaduct • Mitigate traffic congestion along Dagupan St. • Eliminate illegal on-street parking (jeepneys, cars, trucks). • Secure the alternative business location for the current legal vendors along Recto Ave. and shop owners of night market in Tutuban Mall.	2.1 Demolition and relocation of the affected facilitates	Immediate-term (2015-)
		2.2 Street widening	
		2.3 Development of facility/space under viaduct	Short to Mid-term
3. New Road Construction (N-S, E-W)	• Improve access by enhancement of north-south and east-west axis.	3.1 Demolition and relocation of the relevant facilities (public and commercial) as well as land acquisition (PLDT; for north-south new road)	Short to Mid-term
		3.2 Development of new roads	
4. Rivera St. Widening	• Improve access by enhancement of north-south axis.	4.1 Demolition and relocation of commercial facilities.	Short to Mid-term
		4.2 Street widening	
5. Development of Public Transportation Facility in Zone 3	• Improve safety, comfort and convenience for the users of adjacent commercial facilities and residents of the local community. • Mitigate the traffic congestion along Tayuman St.	5.1 Land acquisition (PLDT) and relocation of the relevant facilities (Missionaries of Charity and Congressman Lopez Building)	Short to Mid-term
		5.2 Development of Public Transportation Facility	

4. Urban development concept was studied to establish a competitive and distinguished new urban core. It aims to enhance and expand local economic and commercial activities as well as to facilitate urban renewal/redevelopment in the adjacent areas. In order to implement the sustainable urban growth, social issues are also considered to provide supports for socially handicapped people affected by the urban development projects.

5. Tutuban station area redevelopment consists of three zones as illustrated in Figure A-2. Zone 1 includes the upgraded multi-story commercial/business complex integrated with NSCR and Line 2 stations and multi-modal transport facilities. Zone 2 has a symbolic public space with landmark facility and commercial/amusement complex surrounded by the green space. Zone 3 encompasses the mixed use multi-story residential/commercial/ business facilities provided with intermodal facilities. In order to implement the development of each zone, projects are formulated as shown in Table A-2.

Figure A-2 Zones of Tutuban Station Area Redevelopment

Table A-2 List of Urban Development Projects and Implementation Schedule

Project Name	Purpose	Components/Contents of the Project	Implementation Period
1. Zone 1 Urban Development	• Establish a new competitive and distinguished facilities as a gateway of the redevelopment site as well as the community. • Provide a relocation site for the existing shops in Tutuban Mall.	1.1 Development of Upgraded High-rise Commercial, Business facility in Zone 1A	Short to Mid-term
		1.2 Development of Temporal and/or Permanent Commercial Facility in Zone 1B to accommodate existing shops in Tutuban Mall	Short term
2. Zone 2 Urban Development	• Improve urban amenity and environment • Secure the open space for disaster prevention /management • Attract visitors to the entire PNR property as a drawing card.	2.1 Development of Park	Short to Mid-term
		2.2 Development of Landmark Facility	Short to Mid-term
3. Zone 3 Urban Development	• Improve convenience for the residents in Zone 3 and local community. • Provide a relocation site for the public and private facilities (e.g. Congressman Building (library, TESDA etc.), Missionary of Charity, PLDT, PNR staff hosing etc.) • Improve urban amenity and environment • Secure the open space for disaster prevention /management • Stimulate multiplier effects by providing residence and business (e.g. BPO) close to each other	3.1 Development of Mixed-use Commercial Facility (Commercial / Office / Public)	Short to Mid-term
		3.2 Development of Park for the residents and nearby communities	Mid to Long-term
		3.3 Development of Mixed-use Residential Facility (Residential / Commercial / Office)	Mid to Long-term

B. CONSTRUCTION SCHEDULE

6. Both Dagupan widening and development of station plaza are considered as a preparatory phase of NSCR construction and closely related to NSCR and LRT-Line 2. Figure B-1 illustrates the construction sequence of the relevant projects. In order to implement this process, schedule has been planned as shown in Table B-1.

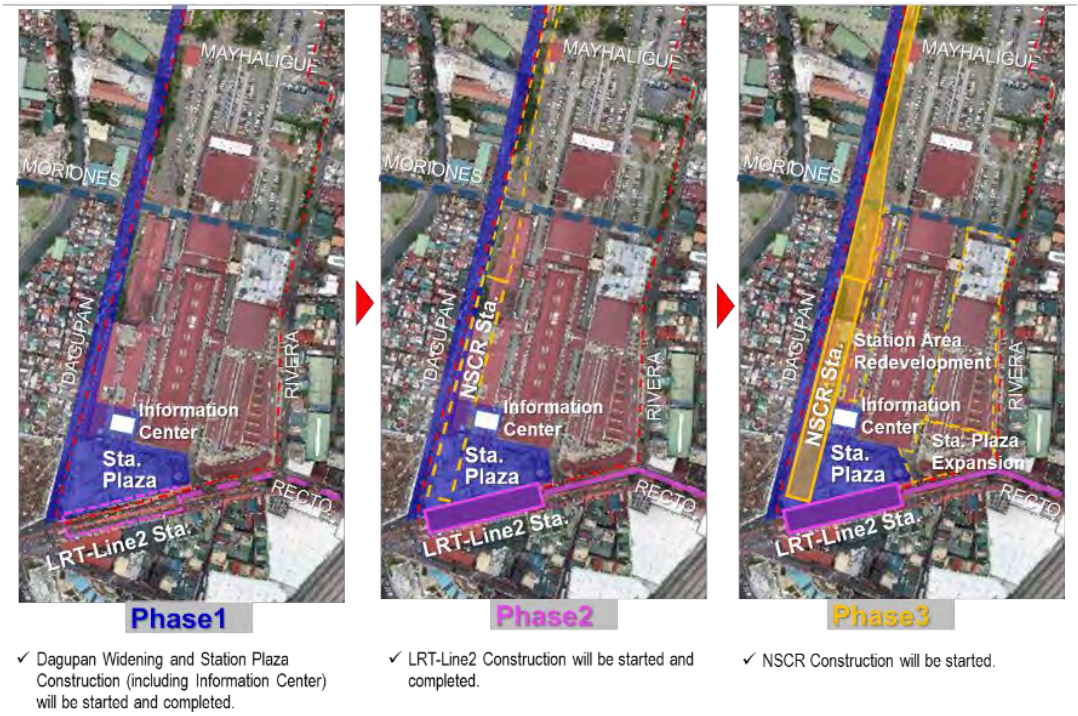


Figure B-1 Construction Sequence of Tutuban Station Area

Table B-1 Construction Schedule

	Contents	2015	2016	2017	2018	2019	2020
Phase1	Dagupan Widening						
	Station Plaza Construction (including Information Center)						
Phase2	LRT-Line2 Construction (station, viaduct, ped. deck)						
Phase3	NSCR Construction (station, viaduct, ped. deck)						

Schedule of Phase 1

	2014	2015				2016			
	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Conduct F/S									
Presentation to DOTC and Review									
Procurement of Consultant									
Notice of Award									
Detailed Engineering Design (by Phase)									
Procurement of Contractor									
Notice of Award									
Construction (by Phase)									

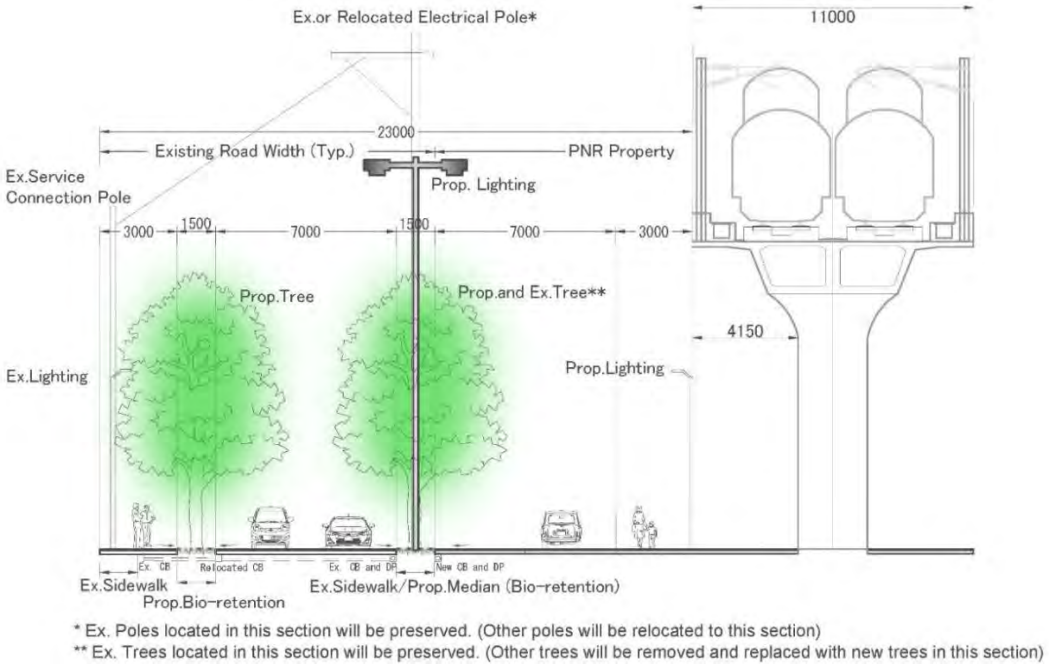
C. TYPICAL SECTIONS OF DAGUPAN STREET WIDENING

7. According to the results of topographic survey, current location of the existing sidewalk will be verified. As Figure C-1 illustrates, if the current sidewalk exists within the proposed median section, existing trees and lighting poles will be preserved. Trees and lighting poles will be placed out according to the following minimum spacing;

   Trees: 10 m, Lighting Poles: 25 m

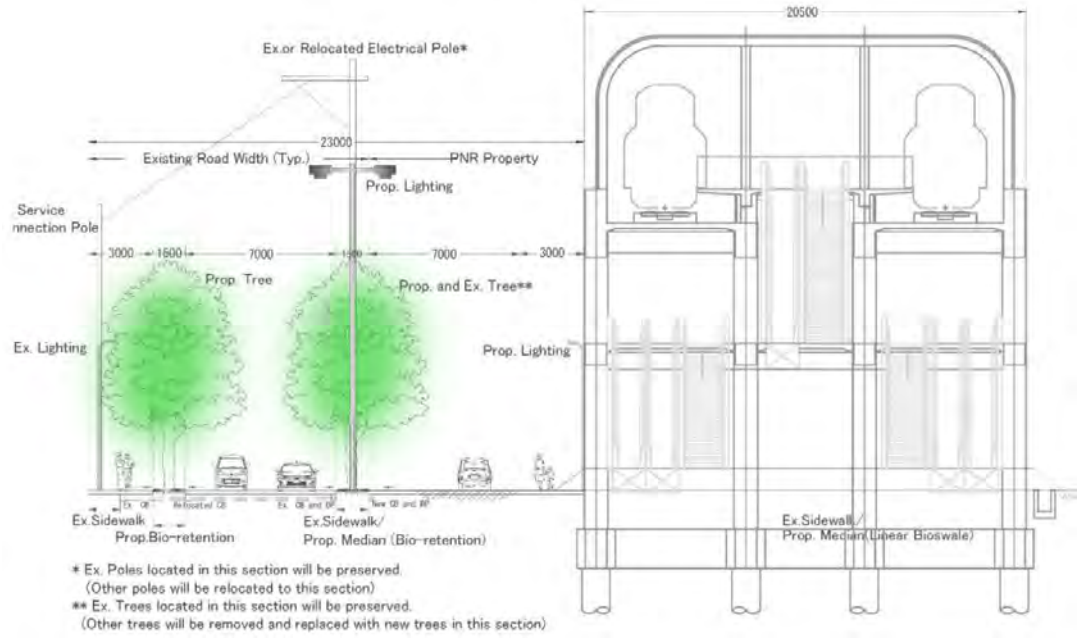
   Trees in the median will be medium size while those adjacent to the sidewalk will be medium to large to provide sufficient shade for the pedestrian. Planting strip will be linear with curb-cuts to intercept storm water as a bio-retention (see Figure C-2).

Section of Dagupan Widening at NSCR Viaduct



* Ex. Poles located in this section will be preserved. (Other poles will be relocated to this section)
** Ex. Trees located in this section will be preserved. (Other trees will be removed and replaced with new trees in this section)

Section of Dagupan Widening at NSCR Tutuban Station



* Ex. Poles located in this section will be preserved.
(Other poles will be relocated to this section)
** Ex. Trees located in this section will be preserved.
(Other trees will be removed and replaced with new trees in this section)

Figure C-1 Typical Sections of Dagupan Street Widening

Figure C-2 Example of Bio-retention Planting Strip

D. PLAN OF STATION PLAZA

8. The proposed Station Plaza will be developed at the immediate term (phase 1) with the following components:

   a. Drop off Area for Rail Passengers transported to the Station by taxis or private vehicles;

      This will reduce pedestrian and vehicle conflicts since passengers will be walking in safer area away from main thoroughfare where undisciplined public vehicle drivers would just maneuver wherever they please.

      The Taxi Drop off area integrates a space for taxis to pick up waiting passengers bound to their next destination.

   b. Information Center to assist rail passengers facilitate their access and boarding process;

      Information center plays a role to disseminate the relevant information by various devices such audio visual equipment, which will feature proposed development plan of the Railway and Tutuban Station, Miniature Model of the Railway and Tutuban Development Site, and different exhibits presenting the history of Tutuban Station and how it will be transformed into a modern facility with sufficient amenities for rail passengers.

      Paving material will be in accordance with design guideline of Tutuban Re-development Plan.

      Figure D-1 presents the concept of the development for the Tutuban Station Plaza.

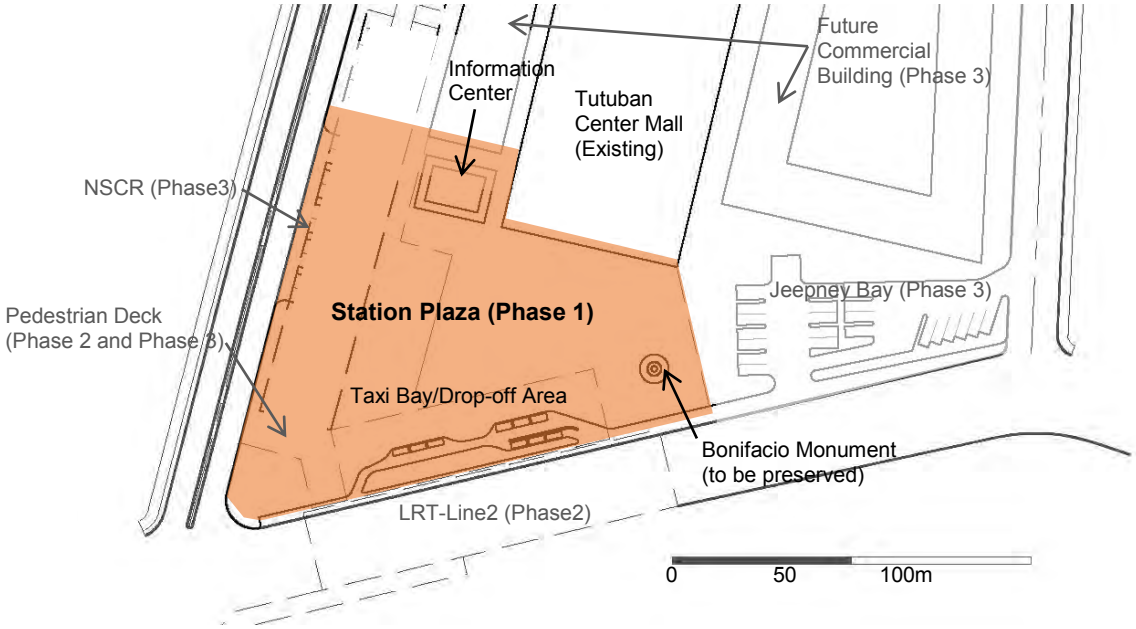


Figure D-1 Tutuban Station Plaza

E. PLAN OF INFORMATION CENTER

9. Since Tutuban station development will be implemented by phases, it is essential to share the future vision of the development among stakeholders as well as visitors of Tutuban area. Information center plays a role to disseminate the relevant information by various devices as shown in Figure E-2. Information center is currently planned between the station and the existing Tutuban Center Mall as illustrated in Figure E-1.

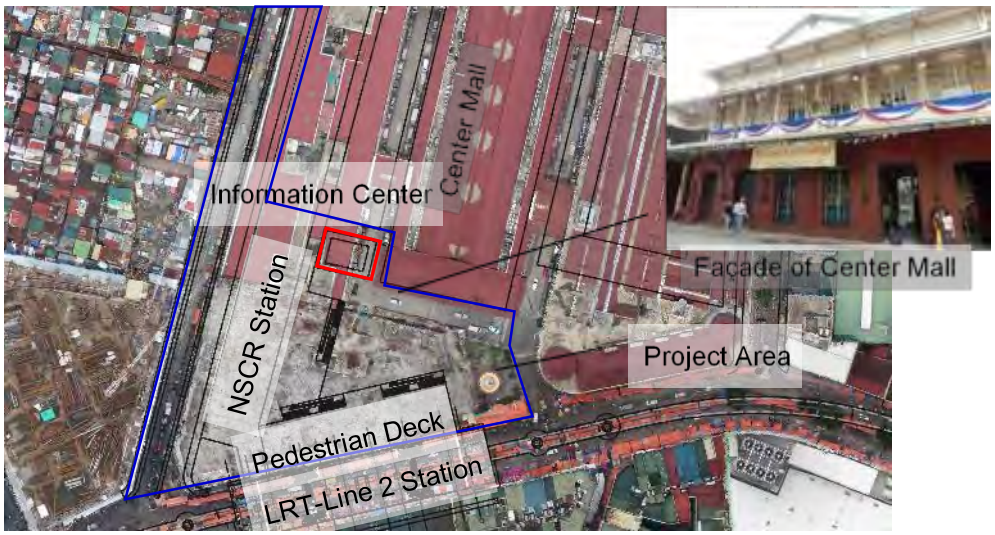


Figure E-1 Location of Information Center

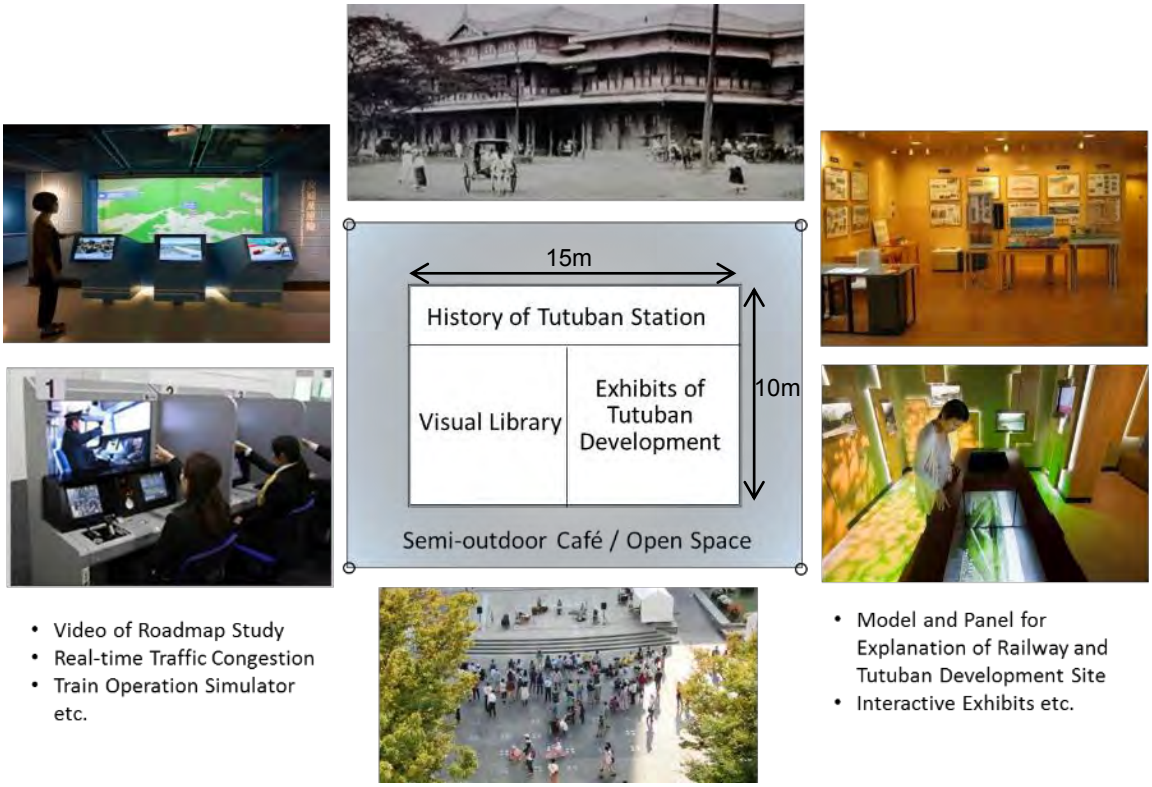


Figure E-2 Exhibit Contents of Information Center

Figure E-3 Images of Information Center

10. As Information Center will be constructed prior to NSCR station and pedestrian deck, location needs to be confirmed with the latest design by NSCR study team. Facade of Information Center will be aligned with the historic façade of Tutuban Center Mall as shown in Figure E-1. The walls need to be transparent to the maximum extent to create interactions between inside and outside spaces.

Appendix 5.2 Cost Estimation

1) Preliminary Project Cost Estimation

Table 1 Preliminary Cost Estimate of Phase 1 Projects from Malolos to Valenzuela

Category	Item		Unit	Unit Cost (PHP)	Malolos		Guiguinto		Balagtas		Bocaue	
					QTY.	Cost (PHP) (000)	QTY.	Cost (PHP) (000)	QTY.	Cost (PHP) (000)	QTY.	Cost (PHP) (000)
Pavement Work	Access Road within 200 m	Carriage Way	sq.m	6,611	5,600	42,702	5,600	42,702	7,000	53,378	8,400	64,054
		Side Walk	sq.m	2,367	2,400		2,400		3,000		3,600	
	Access Road within 1 km	Carriage Way	sq.m	6,611	18,200	138,783	70,140	534,848	50,820	387,524	88,200	672,563
		Side Walk	sq.m	2,367	7,800		30,060		21,780		37,800	
	Pedestrian Walk Way		sq.m	2,367	23,958	56,709	25,560	60,501				
	Transport Facility Under Viaduct		sq.m	1,755	4,000	7,020						
	Parking		sq.m	3,387	4,614	15,628	5,000	16,935	10,000	33,870	5,000	16,935
PC Pedestrian Deck			sq.m	60,000	900	54,000						
Total			-	-	-	314,841	-	654,985	-	474,772	-	753,551

Category	Item		Unit	Unit Cost	Marilao		Meycauayan		Valenzuela	
					QTY.	Cost (PHP) (000)	QTY.	Cost (PHP) (000)	QTY.	Cost (PHP) (000)
Pavement Work	Access Road within 200 m	Carriage Way	sq.m	6,611	45,570	347,491	26,390	201,235	69,370	528,976
		Side Walk	sq.m	2,367	19,530		11,310		29,730	
	Access Road within 1 km	Carriage Way	sq.m	6,611						
		Side Walk	sq.m	2,367						
	Pedestrian Walk Way		sq.m	2,367	12,624	29,881	20,040	47,435		
	Transport Facility Under Viaduct		sq.m	1,755						
	Parking		sq.m	3,387	2,000	6,774	7,000	23,709	4,000	13,548
Total			-	-	-	384,146	-	272,379	-	542,524

Table 2 Preliminary Cost Estimate of Projects at Tutuban (by Public Sector)

Project	Item	Unit	Unit Cost (PHP)	QTY.	Cost (PHP 000)	Total (PHP 000)
Pedestrian Deck	Steel Pedestrian Deck (to be constructed by NSCR project)	sq.m	110,000	3,400	374,000	574,500
	Steel Pedestrian Deck (to be constructed by NSCR and LRT-2 project.)	sq.m	110,000	1,600	176,000	
	Escalator	each	7,000,000	3	21,000	
	Elevator	each	3,500,000	1	3,500	
Commercial & Public Facilities Under Viaduct	Transport Facility under Viaduct	sq.m	2,732	2,459	6,717	338,935
	Jeepney Bay under Viaduct	sq.m	2,732	2,207	6,030	
	Commercial Facility under Viaduct	sq.m	33,000	9,884	326,186	
Moriones Road Widening	Carriage Way	sq.m	7,631	2,242	17,108	151,316
	Side Walk	sq.m	2,732	757	2,068	
	Carriage Way Overlay	sq.m	3,533	363	1,282	
	PNR Headquarter / Station	sq.m	20,200	4,410	89,082	
	Station Plaza Parking	sq.m	3,910	2,500	9,775	
	Railway Facilities	L.S	-	-	32,000	

Table 3 Preliminary Cost Estimate of Projects at Tutuban (by Private Sector)

Zone	Implementator	Item	Unit	Unit Cost (PHP)	QTY.	Cost (PHP 000)	Total Cost (PHP million)
Zone 1	Private	Shop / Restaurant (1- 2F) Renovated Heritage Building; 9F (above GF)+3F (underground)	sq.m	37,300	24,000	895,200	8,366
		Shop / Restaurant (3- 4F), Renovated Heritage Building	sq.m	39,500	8,428	332,906	
		Office (5-9F), Renovated Heritage Building	sq.m	56,800	21,070	1,196,776	
		Underground Parking, Renovated Heritage Building	sq.m	25,000	12,642	316,050	
		Shop / Restaurant (1- 2F), Commercial/Office Building 1A-2	sq.m	37,300	20,000	746,000	
		Shop / Restaurant (3- 4F), Commercial/Office Building 1A-2;	sq.m	39,500	12,972	512,394	
		Office (5F-8F), Commercial/Office Building 1A-2	sq.m	56,800	25,944	1,473,619	
		Hotel	sq.m	61,700	32,430	2,000,931	
		Underground Parking, Commercial/Office Building 1A-2	sq.m	25,000	30,000	750,000	
		Landscape	sq.m	11,000	3,800	41,800	
		80%Paved+20%Landscape	sq.m	5,300	13,500	71,550	
		50%Paved+50Landscape	sq.m	7,500	3,800	28,500	
	Public	Carriage Way	sq.m	7,631	5,116	39,039	3,069
		Side Walk	sq.m	2,732	4,479	12,237	
		Carriage Way Overlay	sq.m	3,533	6,021	21,271	
		Jeepney Bay	sq.m	3,910	3,746	14,647	
		Steel Pedestrian deck	sq.m	110,000	475	52,239	
		Shop / Restaurant (1- 2F), Commercial Building 1B	sq.m	37,300	64,200	2,394,660	
		Underground Parking, Commercial Building 1B	sq.m	25,000	21,400	535,000	
Zone 2	Private	Parking	sq.m	3,910	600	2,346	3,678
		Shop / Restaurant (1- 2F), The Tower of Maynila	sq.m	37,300	5,000	186,500	
		Underground Parking, The Tower of Maynila	sq.m	25,000	7,500	187,500	
		Shop / Restaurant (1- 2F)	sq.m	37,300	14,600	544,580	
		Underground Parking, Convention Center	sq.m	25,000	21,900	547,500	
		The Tower of Maynila	ton	200,000	3,600	720,000	
		Convention Center (3- 4F)	sq.m	49,000	14,600	715,400	
		Amusement Center	sq.m	53,000	14,600	773,800	
	Public	Carriage Way	sq.m	7,631	4,148	31,652	168
		Side Walk	sq.m	2,732	1,843	5,035	
		Steel Pedestrian deck	sq.m	110,000	500	55,000	
		Landscape	sq.m	11,000	14,600	160,600	
		50%Paved+50Landscape	sq.m	7,500	1,000	7,500	
Zone 3	Private	Shops/Restraints	sq.m	37,300	15,060	561,738	15,624
		Clinic/School	sq.m	33,000	7,530	248,490	
		Office	sq.m	56,800	20,745	1,178,316	
		Underground Parking, Mixed-use Building 3-1	sq.m	25,000	22,590	564,750	
		Shop/Restaurant (1-2F)	sq.m	37,300	6,800	253,640	
		Shop/Restaurant, (3-4F)	sq.m	39,500	35,481	1,401,500	
		Office	sq.m	56,800	32,500	1,846,000	
		Underground Parking, Mixed-use Building 3-2	sq.m	25,000	35,481	887,025	
		Clinic/School	sq.m	33,000	11,827	390,291	
		Residential (9F-23F), Mixed-use Building 3-1	sq.m	56,000	62,235	3,485,160	
		Residential (11F-25F), Mixed-use Building 3-2	sq.m	56,000	84,500	4,732,000	
		50%Paved+50Landscape	sq.m	7,500	3,700	27,750	
		Land Acquisition	sq.m	15,750	3,000	47,250	
	Public	Carriage Way	sq.m	20,200	6,300	48,074	291
		Side Walk	sq.m	3,910	2,698	7,371	
		Parking	sq.m	3,910	5,000	19,548	
		Steel Pedestrian deck	sq.m	110,000	900	99,000	
		Landscape	sq.m	11,000	10,600	116,600	

Table 4 Estimated Project Cost of Immediate Term Project (Information Center)

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART A – General Requirements	A.1	Building Facilities for the Engineer				
	A(1)a1	Temporary Offices/ Laboratories and Engineer's Quarters	2	mo	100,000	200,000
	A(1)a2	Construction of Combined Engineer's Field Office, and Laboratory Building and Compound	-	lot	500,000	-
	A(1)b	Construction of Engineer's Living Quarters	-	lot	2,500,000	-
	A.2	Furniture, Fixtures and Appliances				
	A(2)a	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Field Office and Laboratory Building f (Schedule A)	1	lot	250,000	250,000
	A(2)b	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Living Quarters (Schedule B)	1	lot	200,000	200,000
	A.3	Maintenance of Engineer's Facilities				
	A(3)	Operate and Maintenance of Combined Field Office, Laboratory and Quarters Building and Compound including Consumable (Schedule C and D)	1	lot	100,000	100,000
	A.4	Service Vehicles for the Engineer				
	A(4)a	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 SUV Nissan Patrol or Equivalent(Rental), One (1) unit	2	veh-mo	80,000	160,000
	A(4)b	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 Pick-up Isuzu Fuego or Equivalent(Rental), One (1) unit	2	veh-mo	75,000	150,000
	A(4)c	Provide, Operate and Maintain Service Vehicle for the Engineer, 2 x 4 Pick-up Isuzu Fuego or Equivalent (Rental), One (1) unit1	-	veh-mo	70,000	-
	A.5	Communication Facilities for the Engineer				
	A(5)a	Provide Communication Equipment for the Engineer, UHF Two-way Radio Base Transceiver including six (6) unit Radio handheld Transceiver and Accessories including Operator	2	mo	290,000	580,000
	A(5)b	Operate and Maintain Communication Equipment for the Engineer	2	mo	15,000	30,000
	A.6	Progress Photographs				
	A(6)	Provision of Progress Photographs, One(1)Set = One Negative and Ten Proof Prints at Single Shot Ten (10) Set Per Month	-	mo	75,000	-
	A.7 Assistance to the Engineer					
	A(7)a	Provision of Survey Personnel for the Assistance to the Engineer	2	mo	75,000	150,000
	A(7)b	Provision and Maintenance for Survey Equipment and Apparatus for the Assistance to the Engineer	2	mo	125,000	250,000
	A.8 Laboratory Equipment, Apparatus and Publications					
	A(8)	Furnish Laboratory Equipment, Apparatus and Publications (Schedule E)	1	lot	2,500,000	2,500,000
	SUB-TOTAL (PART A)					2,470,000
PART B – Other General	SPL B.2.1	Construction Health and Safety	1	l.s.	350,000	350,000
	SPL B.2.2	Mobilization/Demobilization (1.5% of Civil	1	l.s.	204,011	204,011

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
Requirements		Works)				
	SPL B.3.1	Maintenance of Project Road and Traffic Control	-	l.s.	1,209,600	-
	SUB-TOTAL (PART B)					554,011
PART C – Earthworks	Information Center		150	sq.m.		
	100(1)	Clearing and Grubbing	-	ha.	500,000	-
	102(1)	Fill and Disposal	-	cu.m.	200	-
	103(1)	Structure Excavation, Common Material	-	cu.m.	245	-
	103(3)	Foundation Fill (Granular Bedding)	15	cu.m.	884	13,265
	SUB-TOTAL (PART C)					13,265
PART D – Sub-base and Base course	200	Aggregate Sub-base Course	-	cu.m.	600	-
	202	Crushed Aggregate Base Course	-	cu.m.	800	-
	SUB-TOTAL (PART D)					-
PART E – Surface Courses	311 (1)	300 mm Portland Cement Concrete Pavement	-	sq.m.	1,500	-
	311 (2)	150 mm Portland Cement Concrete Pavement	-	sq.m.	575	-
	311 (3)	Overlay, 150 mm Portland Cement Concrete Pavement	-	sq.m.	750	-
	SUB-TOTAL (PART E)					-
PART G - Drainage and Slope Protection Structures	500(1)e	RCPC, 1070 mm dia.	-	L.m.	7,500	-
	500(1)g	RCPC, 460 mm dia.	-	L.m.	5,250	-
	502(2)	Curb Inlet Manhole	-	ea.	250,000	-
	SUB-TOTAL (PART G)					-
PART H – Miscellaneous Structures	Information Center		150	sq.m.		
	700 (1)	Flooring System (slab & tiles)	150	sq.m.	5,000	750,000
	700 (2)	Wall System including Doors/Windows	145	sq.m.	7,500	1,087,500
	700 (3)	Roof System	300	sq.m.	10,000	3,000,000
	700 (4)	Finishing (Architectural & Electrical)	150	sq.m.	5,000	750,000
	700 (5)	Audio Visual Equipmenmt	1	lot	6,000,000	6,000,000
		Furnitures	1	lot	2,000,000	2,000,000
	SUB-TOTAL (PART H)					13,587,500
		SUBTOTAL				**16,624,776**
		Engineering Cost (8%)				1,329,982
		Project Management Cost (2.0%)				332,496
		Contingencies (20%)				3,324,955
		Miscellaneous (5%)				831,239
		TOTAL PROJECT COST			**PHP**	**22,443,448**

Table 5 Estimated Project Cost of Immediate Term Project (Station Plaza)

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART A – General Requirements integrated with Dagupan St. Widening	A.1	Building Facilities for the Engineer				
	A(1)a1	Temporary Offices/ Laboratories and Engineer's Quarters	-	mo	100,000	-
	A(1)a2	Construction of Combined Engineer's Field Office, and Laboratory Building and Compound	-	lot	500,000	-
	A(1)b	Construction of Engineer's Living Quarters	-	lot	2,500,000	-
	A.2	Furniture, Fixtures and Appliances				
	A(2)a	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Field Office and Laboratory Building f (Schedule A)	-	lot	550,000	-
	A(2)b	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Living Quarters (Schedule B)	-	lot	550,000	-
	A.3	Maintenance of Engineer's Facilities				
	A(3)	Operate and Maintenance of Combined Field Office, Laboratory and Quarters Building and Compound including Consumable (Schedule C and D)	-	lot	250,000	-
	A.4	Service Vehicles for the Engineer				
	A(4)a	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 SUV Nissan Patrol or Equivalent(Rental), One (1) unit	-	veh-mo	80,000	-
	A(4)b	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 Pick-up Isuzu Fuego or Equivalent(Rental), One (1) unit	-	veh-mo	75,000	-
	A(4)c	Provide, Operate and Maintain Service Vehicle for the Engineer, 2 x 4 Pick-up Isuzu Fuego or Equivalent (Rental), One (1) unit1	-	veh-mo	70,000	-
	A.5	Communication Facilities for the Engineer				
	A(5)a	Provide Communication Equipment for the Engineer, UHF Two-way Radio Base Transceiver including six (6) unit Radio handheld Transceiver and Accessories including Operator		mo	290,000	
	A(5)b	Operate and Maintain Communication Equipment for the Engineer		mo	15,000	
	A.6	Progress Photographs				
	A(6)	Provision of Progress Photographs, One(1)Set = One Negative and Ten Proof Prints at Single Shot Ten (10) Set Per Month	-	mo	75,000	-
	A.7 Assistance to the Engineer					
	A(7)a	Provision of Survey Personnel for the Assistance to the Engineer	-	mo	75,000	-
	A(7)b	Provision and Maintenance for Survey Equipment and Apparatus for the Assistance to the Engineer		mo	270,000	-
	A.8 Laboratory Equipment, Apparatus and Publications					
	A(8)	Furnish Laboratory Equipment, Apparatus and Publications (Schedule E)	-	lot	2,250,000	
	SUB-TOTAL (PART A)					-
PART B – Other General	SPL B.2.1	Construction Health and Safety	-	l.s.	1,046,062	-
	SPL B.2.2	Mobilization/Demobilization (1.5% of Civil	-	l.s.	724,111	-

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
Requirements		Works)				
	SPL B.3.1	Maintenance of Project Road and Traffic Control	-	l.s.	1,209,600	-
	SUB-TOTAL (PART B)					-
PART C – Earthworks	Station Plaza		9,200	sq.m.		
	100(1)	Clearing and Grubbing	-	cu.m.	500,000	-
	102(1)	Disposal of Debris	36,800	cu.m.	300	11,040,000
	103(1)	Structure Excavation, Common Material	-	cu.m.	245	-
	103(2)	Foundation Fill (Granular Bedding)	920	cu.m.	884	813,579
	103(3)	Demolition of Existing Concrete Structure	36,800	sq.m.	650	23,920,000
	SUB-TOTAL (PART C)					35,773,579
PART D – Sub-base and Base course	200	Aggregate Sub-base Course	-	cu.m.	600	-
	202	Crushed Aggregate Base Course	-	cu.m.	800	-
	SUB-TOTAL (PART D)					-
PART E – Surface Courses	311 (1)	300 mm Portland Cement Concrete Pavement	600	sq.m.	1,150	690,000
	311 (2)	150 mm Portland Cement Concrete Pavement	9,050	sq.m.	575	5,203,750
	311 (3)	Overlay, 150 mm Portland Cement Concrete Pavement	-	sq.m.	750	-
	SUB-TOTAL (PART E)					5,893,750
PART G - Drainage and Slope Protection Structures	500(1)e	RCPC, 1070 mm dia.	-	L.m.	7,500	-
	500(1)g	RCPC, 460 mm dia.	360	L.m.	5,250	1,890,000
	502(2)	Curb Inlet Manhole	18	ea.	250,000	4,500,000
	SUB-TOTAL (PART G)					6,390,000
PART H – Miscellaneous Structures	600 (3)	Curb and Gutter	250	lm	550	137,500
	605(1)a	Warning Signs - Triangular	5	ea.	11,614	58,068
	605(2)a	Regulatory Signs	-	ea.	12,805	-
	612(1)	Reflectorized Thermoplastic Pavement Markings (White)	30	sq.m.	705	21,160
	612(2)	Reflectorized Thermoplastic Pavement Markings (Yellow)	-	sq.m.	708	-
	SUB-TOTAL (PART H)					216,728
		SUBTOTAL				**48,274,057**
		Engineering Cost (8%)				3,861,925
		Project Management Cost (2.0%)				965,481
		Contingencies (20%)				9,654,811
		Miscellaneous (5%)				2,413,703
		TOTAL PROJECT COST			**PHP**	**65,169,978**

Table 6 Estimated Project Cost of Immediate Term Project (Dagupan St. Widening)

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART A – General Requirements	A.1	Building Facilities for the Engineer				
	A(1)a1	Temporary Offices/ Laboratories and Engineer's Quarters	6	mo	100,000	600,000
	A(1)a2	Construction of Combined Engineer's Field Office, and Laboratory Building and Compound	-	lot	500,000	-
	A(1)b	Construction of Engineer's Living Quarters	-	lot	2,500,000	-
	A.2	Furniture, Fixtures and Appliances				
	A(2)a	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Field Office and Laboratory Building f (Schedule A)	1	lot	550,000	550,000
	A(2)b	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Living Quarters (Schedule B)	1	lot	550,000	550,000
	A.3	Maintenance of Engineer's Facilities				
	A(3)	Operate and Maintenance of Combined Field Office, Laboratory and Quarters Building and Compound including Consumable (Schedule C and D)	1	lot	250,000	250,000
	A.4	Service Vehicles for the Engineer				
	A(4)a	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 SUV Nissan Patrol or Equivalent(Rental), One (1) unit	6	veh-mo	80,000	480,000
	A(4)b	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 Pick-up Isuzu Fuego or Equivalent(Rental), One (1) unit	6	veh-mo	75,000	450,000
	A(4)c	Provide, Operate and Maintain Service Vehicle for the Engineer, 2 x 4 Pick-up Isuzu Fuego or Equivalent (Rental), One (1) unit1	6	veh-mo	70,000	420,000
	A.5	Communication Facilities for the Engineer				
	A(5)a	Provide Communication Equipment for the Engineer, UHF Two-way Radio Base Transceiver including six (6) unit Radio handheld Transceiver and Accessories including Operator	6	mo	290,000	1,740,000
	A(5)b	Operate and Maintain Communication Equipment for the Engineer	6	mo	15,000	90,000
	A.6	Progress Photographs				
	A(6)	Provision of Progress Photographs, One(1)Set = One Negative and Ten Proof Prints at Single Shot Ten (10) Set Per Month	6	mo	75,000	450,000
	A.7 Assistance to the Engineer					
	A(7)a	Provision of Survey Personnel for the Assistance to the Engineer	6	mo	75,000	450,000
	A(7)b	Provision and Maintenance for Survey Equipment and Apparatus for the Assistance to the Engineer	6	mo	270,000	1,620,000
	A.8 Laboratory Equipment, Apparatus and Publications					
	A(8)	Furnish Laboratory Equipment, Apparatus and Publications (Schedule E)	1	lot	2,250,000	2,250,000
	SUB-TOTAL (PART A)					9,900,000
PART B – Other General Requirements	SPL B.2.1	Construction Health and Safety	1	l.s.	1,046,062	1,046,062
	SPL B.2.2	Mobilization/Demobilization (1.5% of Civil Works)	1	l.s.	1,344,679	1,344,679
	SPL	Maintenance of Project Road and Traffic Control	1	l.s.	1,209,600	1,209,600

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
	B.3.1					
	SUB-TOTAL (PART B)					3,600,342
PART C – Earthworks	100(1)	Clearing and Grubbing	1.27	ha.	500,000	635,000
	102(1)	Fill and Disposal	624	cu.m.	200	124,609
	103(1)	Structure Excavation, Common Material	624	cu.m.	245	152,994
	103(2)	Foundation Fill (Granular Bedding)	31.2	cu.m.	884	27,591
	103(3)	Removal of Existing Trees	45	each	2,500	112,500
	103(4)	Removal of Existing Structures	8,620	sq.m.	1,500	12,930,000
	SUB-TOTAL (PART C)					13,982,695
PART D – Sub-base and Base course	200	Aggregate Sub-base Course	3,810	cu.m.	600	2,286,000
	202	Crushed Aggregate Base Course	3,175	cu.m.	800	2,540,000
	SUB-TOTAL (PART D)					4,826,000
PART E – Surface Courses	311 (1)	300 mm Portland Cement Concrete Pavement	8.890	sq.m.	1,500	13,335,000
	311 (2)	150 mm Portland Cement Concrete Pavement	7,620	sq.m.	750	5,715,000
	311 (3)	Overlay, 150 mm Portland Cement Concrete Pavement	8,890	sq.m.	750	6,667,000
		SUB-TOTAL (PART E)				25,717,500
PART G - Drainage and Slope Protection Structures	500(1)e	RCPC, 1070 mm dia.	1,270	L.m.	7,500	9,525,000
	500(1)g	RCPC, 460 mm dia.	208	L.m.	5,250	1,092,000
	502(2)	Curb Inlet Manhole	52	ea.	250,000	13,000,000
	SUB-TOTAL (PART G)					23,617,000
PART H – Miscellaneous Structures	600 (3)	Curb and Gutter	2,540	lm	550	1,397,000
	605(1)a	Warning Signs - Triangular	10	ea.	11,614	116,140
	605(2)a	Regulatory Signs	10	ea.	12,805	128,050
	612(1)	Reflectorized Thermoplastic Pavement Markings (White)	476.25	sq.m.	705	335,914
	612(2)	Reflectorized Thermoplastic Pavement Markings (Yellow)	-	sq.m.	708	-
	613(1)	Electrical Poles including Foundation	1,270	lm	5,500	6,985,000
	613(2)	Traffic Signal	5	sets	2,000,000	10,000,000
	613(3)	Trees (Large)	254	each	10,000	2,540,000
	SUB-TOTAL (PART H)					21,502,100
		SUBTOTAL				**103,145,637**
		Engineering Cost (8%)				8,251,651
		Project Management Cost (2.0%)				2,062,913
		Contingencies (20%)				20,629,127
		Miscellaneous (5%)				5,157,281
		TOTAL PROJECT COST			**PHP**	**139,246,609**

Table 7 Estimated Project Cost of New PNR Facilities (Station, Station Plaza/Parking, Railway Facilities including Demolition of the Existing Facilities)

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART A - General Requirements	A.1	Building Facilities for the Engineer				
	A(1)a1	Temporary Offices/ Laboratories and Engineer's Quarters	12	mo	100,000	1,200,000
	A(1)a2	Construction of Combined Engineer's Field Office, and Laboratory Building and Compound	1	lot	500,000	500,000
	A(1)b	Construction of Engineer's Living Quarters	1	lot	2,500,000	2,500,000
	A.2	Furniture, Fixtures and Appliances				
	A(2)a	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Field Office and Laboratory Building (Schedule A)	1	lot	550,000	550,000
	A(2)b	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Living Quarters (Schedule B)	1	lot	550,000	550,000
	A.3	Maintenance of Engineer's Facilities				
	A(3)	Operate and Maintenance of Combined Field Office, Laboratory and Quarters Building and Compound including Consumable (Schedule C and D)	1	lot	250,000	250,000
	A.4	Service Vehicles for the Engineer				
	A(4)a	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 SUV Nissan Patrol or Equivalent (Rental), One (1) unit	12	veh-mo	80,000	960,000
	A(4)b	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 Pick-up Isuzu Fuego or Equivalent (Rental), One (1) unit	12	veh-mo	75,000	900,000
	A(4)c	Provide, Operate and Maintain Service Vehicle for the Engineer, 2 x 4 Pick-up Isuzu Fuego or Equivalent (Rental), One (1) unit1	12	veh-mo	70,000	840,000
	A.5	Communication Facilities for the Engineer				
	A(5)a	Provide Communication Equipment for the Engineer, UHF Two-way Radio Base Transceiver including six (6) unit Radio handheld Transceiver and Accessories including Operator	12	mo	290,000	3,480,000
	A(5)b	Operate and Maintain Communication Equipment for the Engineer	12	mo	15,000	180,000
	A.6	Progress Photographs				
	A(6)	Provision of Progress Photographs, One(1 and Ten Proof Prints at Single Shot Ten (10) Set Per Month)Set = One Negative	12	mo	75,000	900,000
	A.7	Assistance to the Engineer				
	A(7)a	Provision of Survey Personnel for the Assistance to the Engineer	12	mo	75,000	900,000
	A(7)b	Provision and Maintenance for Survey Equipment and Apparatus for the Assistance to the Engineer	12	mo	270,000	3,240,000
	A.8	Laboratory Equipment, Apparatus and Publications				
	A(8)	Furnish Laboratory Equipment, Apparatus and Publications (Schedule E)	12	lot	2,250,000	27,000,000
	SUB-TOTAL (PART A)					43,950,000
PART B –	SPL B.2.1	Construction Health and Safety	1	l.s.	1,046,062	1,046,062

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
Other General Requirements	SPL B.2.2	Mobilization/Demobilization (1.5% of Civil Works)	1	l.s.	4,828,370	4,828,370
	SPL B.3.1	Maintenance of Project Road and Traffic Control	1	l.s.	1,209,600	1,209,600
	SUB-TOTAL (PART B)					7,084,032
PART C – Earthworks	100(1)	Clearing and Grubbing	-	ha.	500,000	-
	102(1)	Fill and Disposal	-	cu.m.	200	-
	103(1)	Structure Excavation, Common Material	-	cu.m.	245	-
	103(2)	Foundation Fill (Granular Bedding)	-	cu.m.	884	-
	103(3)	Removal of Existing Trees	-	ea	2,500	-
	103(4)	Removal of Existing Structures	-			-
	103(4)a	PNR Headquarter and Station	8,680	sq.m.	813	7,052,500
	103(4)b	Motor car shed	2,080	sq.m.	438	910,000
	103(4)c	Control Tower	1,000	sq.m.	438	437,500
	SUB-TOTAL (PART C)					8,4000,000
PART D – Sub-base and Base Course	Parking Area		825	sq.m.		
	200	Aggregate Sub-base Course	247.50	cu.m.	600	148,500
	202	Crushed Aggregate Base Course	206.25	cu.m.	800	165,000
	SUB-TOTAL (PART D)					313,500
PART E – Surface Courses	311 (1)	300 mm Portland Cement Concrete Pavement	-	sq.m.	1,500	
	311 (2)	150 mm Portland Cement Concrete Pavement	825.00	sq.m.	750	618,750
	311 (3)	PCC Overlay, 150 mm	-	sq.m.	750	
	SUB-TOTAL (PART E)					618,715
PART G - Drainage and Slope Protection Structures	500(1)e	RCPC, 1070 mm dia.	-	l.m.	7,500	-
	500(1)g	RCPC, 460 mm dia.	-	l.m.	5,250	-
	502(2)	Curb Inlet Manhole	-	ea.	250,000	-
	SUB-TOTAL (PART G)					-
PART H - Miscellaneous Structures	600 (3)	Curb and Gutter	149.50	lm	550	82,225
	605(1)a	Warning Signs - Triangular	2.00	ea.	11,613	23,227
	605(2)a	Regulatory Signs		ea.	12,804	
	612(1)	Reflectorized Thermoplastic Pavement Markings (White)	44.10	sq.m.	705	31,105
	612(2)	Reflectorized Thermoplastic Pavement Markings (Yellow)	-	sq.m.	708	-
	613 (1)	Electrical Poles including Foundation Electrical Wiring	-	lm	5,500	-
	613 (2)	Traffic Signal	-	sets	2,000,000	-
	613(3)	Trees (Large)	-	ea.	10,000	-
	614	Building Structures				
	614 (1)	PNR New Headquarter and Station	4,410	sq.m.	31,250	137,813
	614 (2)	New Control Tower	1,000	sq.m.	18,750	18,750
	614 (3)	New Station Plaza/Parking	2,500	sq.m.	18,750	46,875
	614 (4)	Restoration of Railway Facilities (Rails and Platforms)	1,000	lm	108,895	108,985,000
	SUB-TOTAL (PART H)					312,559,057
		SUBTOTAL				**372,925,339**
		Engineering Cost (8%)				29,834,027
		Project Management Cost (2.0%)				7,458,507
		Contingencies (20%)				74,585,068

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
		Miscellaneous (5%)				18,646,267
		TOTAL PROJECT COST			**PHP**	**503,449,208**

Table 8 Estimated Project Cost of New PNR Facilities (New Access Road; Bambang St. Extension)

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART A – General Requirements	A.1	Building Facilities for the Engineer				
	A(1)a1	Temporary Offices/ Laboratories and Engineer's Quarters	-	mo	100,000	-
	A(1)a2	Construction of Combined Engineer's Field Office, and Laboratory Building and Compound	-	lot	500,000	-
	A(1)b	Construction of Engineer's Living Quarters	-	lot	2,500,000	-
	A.2	Furniture, Fixtures and Appliances				
	A(2)a	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Field Office and Laboratory Building f (Schedule A)	-	lot	550,000	-
	A(2)b	Provide Furniture, Fixtures, Equipment and Appliances for the Engineer's Living Quarters (Schedule B)	-	lot	550,000	-
	A.3	Maintenance of Engineer's Facilities				
	A(3)	Operate and Maintenance of Combined Field Office, Laboratory and Quarters Building and Compound including Consumable (Schedule C and D)	-	lot	250,000	-
	A.4	Service Vehicles for the Engineer				
	A(4)a	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 SUV Nissan Patrol or Equivalent(Rental), One (1) unit	-	veh-mo	80,000	-
	A(4)b	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 Pick-up Isuzu Fuego or Equivalent(Rental), One (1) unit	-	veh-mo	75,000	-
	A(4)c	Provide, Operate and Maintain Service Vehicle for the Engineer, 2 x 4 Pick-up Isuzu Fuego or Equivalent (Rental), One (1) unit1	-	veh-mo	70,000	-
	A.5	Communication Facilities for the Engineer				
	A(5)a	Provide Communication Equipment for the Engineer, UHF Two-way Radio Base Transceiver including six (6) unit Radio handheld Transceiver and Accessories including Operator	-	mo	290,000	-
	A(5)b	Operate and Maintain Communication Equipment for the Engineer	-	mo	15,000	-
	A.6	Progress Photographs				
	A(6)	Provision of Progress Photographs, One(1)Set = One Negative and Ten Proof Prints at Single Shot Ten (10) Set Per Month	-	mo	75,000	-
	A.7	Assistance to the Engineer	-			-
	A(7)a	Provision of Survey Personnel for the Assistance to the Engineer	-	mo	75,000	-
	A(7)b	Provision and Maintenance for Survey Equipment and Apparatus for the Assistance to the Engineer	--	mo	270,000	-
	A.8 Laboratory Equipment, Apparatus and Publications					
	A(8)	Furnish Laboratory Equipment, Apparatus and Publications (Schedule E)	-	lot	2,250,000	-
	SUB-TOTAL (PART A)					-

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART B – Other General Requirements	SPL B.2.1	Construction Health and Safety	-	l.s.	1,046,062	-
	SPL B.2.2	Mobilization/Demobilization (1.5% of Civil Works)	-	l.s.	171,757	-
	SPL B.3.1	Maintenance of Project Road and Traffic Control	-	l.s.	1,209,600	-
	SUB-TOTAL (PART B)					-
PART C – Earthworks	Main Roadway					
	100(1)	Clearing and Grubbing	0.43	ha.	500,000	215,000
	102(1)	Fill and Disposal	103	cu.m.	200	20,608
	103(1)	Structure Excavation, Common Material	103	cu.m.	245	25,303
	103(2)	Foundation Fill (Granular Bedding)	5	cu.m.	884	4,563
	103(3)	Demolition of Existing Concrete Structure	36,800	sm	650	23,920
	SUB-TOTAL (PART C)					265,475
PART D – Sub-base and Base course	200	Aggregate Subbase Course	1,290	cu.m.	600	774,000
	202	Crushed Aggregate Base Course	1,075	cu.m.	800	860,000
	SUB-TOTAL (PART D)					1,634,000
PART E – Surface Courses	311 (1)	230 mm Portland Cement Concrete Pavement	600	sq.m.	1,150	690
	311 (2)	150 mm Portland Cement Concrete Pavement	9,050	sq.m.	575	5,204
	311 (3)	PCC Overlay, 150 mm	-	sq.m.	750	-
	SUB-TOTAL (PART E)					5,160,000
PART G - Drainage and Slope Protection Structures	500(1)e	RCPC, 1070 mm dia.	215	L.m.	7,500	1,612,500
	500(1)g	RCPC, 460 mm dia.	34	L.m.	5,250	180,600
	502(2)	Curb Inlet Manhole	18	ea.	250,000	2,150,000
	SUB-TOTAL (PART G)					3,943,100
PART H – Miscellaneous Structures	600 (3)	Curb and Gutter	430	lm	550	236,500
	605(1)a	Warning Signs - Triangular	4	ea.	11,614	46,455
	605(2)a	Regulatory Signs	4	ea.	12,804	51,220
	612(1)	Reflectorized Thermoplastic Pavement Markings (White)	161	sq.m.	705	113,735
	612(2)	Reflectorized Thermoplastic Pavement Markings (Yellow)	-	sq.m.	708	
	SUB-TOTAL (PART H)					447,909
		SUBTOTAL				**11,450,484**
		Engineering Cost (8%)				916,039
		Project Management Cost (2.0%)				229,010
		Contingencies (20%)				2,290,097
		Miscellaneous (5%)				572,524
		TOTAL PROJECT COST			**PHP**	**15,458,153**

Table 9 Estimated Project Cost of New PNR Facilities (Optional Road Improvement; Bambang Widening)

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART A – General Requirements integrated with PNR Restoration	A.1	Building Facilities for the Engineer				
	A(1)a1	Temporary Offices/ Laboratories and Engineer's Quarters	-	mo	100,000	-
	A(1)a2	Construction of Combined Engineer's Field Office, and Laboratory Building and Compound	-	lot	500,000	-
	A(1)b	Construction of Engineer's Living Quarters	-	lot	2,500,000	-
	A.2	Furnitures, Fixtures and Appliances				
	A(2)a	Provide Furnitures, Fixtures, Equipment and Appliances for the Engineer's Field Office and LaboratoryBuilding f (Schedule A)	-	lot	550,000	-
	A(2)b	Provide Furnitures, Fixtures, Equipment and Appliances for the Engineer's Living Quarters (Schedule B)	-	lot	550,000	-
	A.3	Maintenance of Engineer's Facilities				
	A(3)	Operate and Maintenance of Combined Field Office, Laboratory and Quarters Building and Compound including Consumable (Schedule C and D)	-	lot	250,000	-
	A.4	Service Vehicles for the Engineer				
	A(4)a	Provide,Operate and Maintain Service Vehicle for the Engineer, 4 x 4 SUV Nissan Patrol or Equivalent(Rental), One (1) unit	-	veh-mo	80,000	-
	A(4)b	Provide, Operate and Maintain Service Vehicle for the Engineer, 4 x 4 Pick-up Isuzu Fuego or Equivalent(Rental), One (1) unit	-	veh-mo	75,000	-
	A(4)c	Provide, Operate and Maintain Service Vehicle for the Engineer, 2 x 4 Pick-up Isuzu Fuego or Equivalent (Rental), One (1) unit1	-	veh-mo	70,000	-
	A.5	Communication Facilities for the Engineer				
	A(5)a	Provide Communication Equipment for the Engineer, UHF Two-way Radio Base Transceiver including six (6) unit Radio handheld Transceiver and Accessories including Operator	-	mo	290,000	-
	A(5)b	Operate and Maintain Communication Equipment for the Engineer	-	mo	15,000	-
	A.6	Progress Photographs				
	A(6)	Provision of Progress Photographs, One(1)Set = One Negative and Ten Proof Prints at Single Shot Ten (10) Set Per Month	-	mo	75,000	-
	A.7	Assistance to the Engineer	-			-
	A(7)a	Provision of Survey Personnel for the Assistance to the Engineer	-	mo	75,000	-
	A(7)b	Provision and Maintenance for Survey Equipment and Apparatus for the Assistance to the Engineer	--	mo	270,000	-
	A.8 Laboratory Equipment, Apparatus and Publications					
	A(8)	Furnish Laboratory Equipment, Apparatus and Publications (Schedule E)	-	lot	2,250,000	-
	SUB-TOTAL (PART A)					-
PART B – Other General Requirements	SPL B.2.1	Construction Health and Safety	-	l.s.	1,046,062	-
	SPL B.2.2	Mobilization/Demobilization (1.5% of Civil Works)	-	l.s.	33,147	-
	SPL B.3.1	Maintenance of Project Road and Traffic Control	-	l.s.	1,209,600	-
	SUB-TOTAL (PART B)					-

Project	Item No.	Description	Quantity	Unit	Unit Cost (PHP)	Total Cost (PHP)
PART C – Earthworks	Main Roadway					
	100(1)	Clearing and Grubbing	0.3	ha.	500,000	65,000
	102(1)	Fill and Disposal	31.2	cu.m.	200	6,230
	103(1)	Structure Excavation, Common Material	31.2	cu.m.	245	7,650
	103(2)	Foundation Fill (Granular Bedding)	1.56	cu.m.	884	1,380
	SUB-TOTAL (PART C)					80,260
PART D – Sub-base and Base course	200	Aggregate Subbase Course	156	cu.m.	600	93,600
	202	Crushed Aggregate Base Course	130	cu.m.	800	104,000
	SUB-TOTAL (PART D)					197,600
PART E – Surface Courses	311 (1)	230 mm Portland Cement Concrete Pavement	-	sq.m.	1,500	-
	311 (2)	150 mm Portland Cement Concrete Pavement	260	sq.m.	750	195,000
	311 (3)	PCC Overlay, 150 mm	455	sq.m.	750	341,250
	SUB-TOTAL (PART E)					536,250
PART G - Drainage and Slope Protection Structures	500(1)e	RCPC, 1070 mm dia.	65	L.m.	7,500	487,500
	500(1)g	RCPC, 460 mm dia.	10	L.m.	5,250	54,600
	502(2)	Curb Inlet Manhole	3	ea.	250,000	650,000
	SUB-TOTAL (PART G)					1,192,100
PART H – Miscellaneous Structures	600 (3)	Curb and Gutter	130	lm	550	71,500
	605(1)a	Warning Signs - Triangular	4	ea.	11,614	46,4545
	605(2)a	Regulatory Signs	4	ea.	12,805	51,220
	612(1)	Reflectorized Thermoplastic Pavement Markings (White)	49	sq.m.	705	34,385
	612(2)	Reflectorized Thermoplastic Pavement Markings (Yellow))	-	sq.m.	708	-
	SUB-TOTAL (PART H)					203,559
		SUBTOTAL				**2,209,769**
		Engineering Cost (8%)				176,782
		Project Management Cost (2.0%)				44,195
		Contingencies (20%)				441,954
		Miscellaneous (5%)				110,488
		TOTAL PROJECT COST			**PHP**	**2,983,188**

2) Cost Estimate Conditions

(1) Project Cost

1. Cost estimation of projects proposed by TOD study is made based on several references as shown in Table 10 and Table 11.

Table 10 Basic Data

	Category	Title	Publisher	Year
1	Basic Specifications for Cost Estimate	Standard Specifications for Highways, bridges and airports	Department of Public Works and Highways (DPWH)	2014
2	Material	Construction Cost Handbook Philippines 2014	Langdon & Search Philippines	2014
3	Equipment Cost	ACEL Equipment Guide Book	Association of Construction Equipment Lessors Inc. (ACEL)	2014
4	Labor Cost	Summary of Current regional Daily Minimum Wage Rates by Department of Labor and Employment National Wages and Productivity Commission	Department of Labor and Employment (DOLE)	2014

Table 11 Implemented Project and Data

	Data Source	Organization/Agency	Implemented/Issued
1	Arterial Road Bypass Project Phase-1	DPWH	2012
2	Japanese Cost Estimate Manual	Construction Research Institute.	2012
3	Construction Cost Handbook	Langdon Seah Philippines Inc.	2014
4	Through Interview	1) Mitsubishi Electric Corporation 2) Grandspan Development Corporation	2014
5	Others		

(2) Project Cost Composition

2. Project cost is essentially divided into direct cost and indirect cost as shown in Figure 1. And direct cost is composed four factors as shown in Table 12.

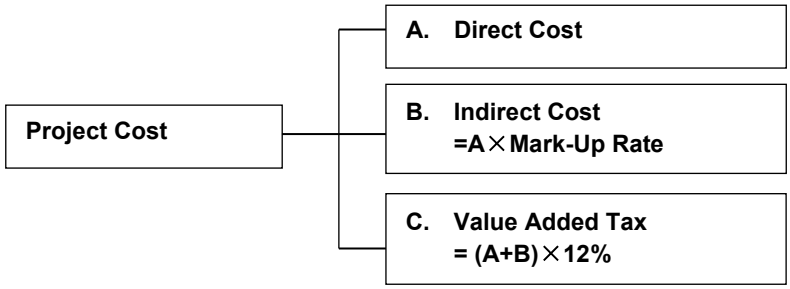


Figure 1 Project Cost Composition

Table 12 Direct Cost Composition

	Direct Cost Composition
1	General Requirement
2	Other General Requirement
3	Works Including Labor, Material and Equipment Cost
4	Miscellaneous

(3) Indirect Cost

3. According to the Department Order No. 29/2011 of DPWH, the indirect cost composition is defined as following (see Table 13), and the rate of each composition is determined by the range of total project costs. Since this project total cost is above PHP5 million and below PHP50 million, the rate as followed can be used.

Table 13 Indirect Cost Rate

	Indirect Cost Composition	Rate (%)
Mark-up Rate	OCM (overhead + contingency + miscellaneous)	9
	Profit	8
VAT (on the direct cost and indirect cost)		12

Source: Department Order No. 29 (2011), DPWH

(4) Philippines Consumer Price Index (CPI) Forecast

4. According to the report of National Statistics Office of Philippines (NSO), Consumer Price Index (CPI) increased to 140.65 Index Points in January of 2015 from 140.50 Index Points in December of 2014 (see Figure 2). In 2016, the CPI is expected to increase to 144.08 Index Points (see Table 14). In the long-term, the CPI is projected to reach around 165.10, 205.96 and 283.19 Index Points in the years of 2020, 2030 and 2050 respectively.

Source: National Statics Office pf Philippines (NSO), 2015

Figure 2 Philippines Consumer Price Index

Table 14 CPI Forecast

Year	CPI
2014	140.50
2015	140.65
2016	144.08
2017	149.34
2018	154.59
2019	159.84
2020	165.10

Source: NSO, 2015

3) Cost Analysis for the Project

5. Preliminary cost estimate is expected on this TOD project. Accordingly, the project cost estimate should be made by based on the similar projects' cost as shown in Table 11.

(1) Unit Cost

6. On the Civil works for the road construction, unit cost (including labor cost, material cost and equipment cost) was estimated as shown in Table 15 as below:

Table 15 Unit Cost/sq.m

Item	Material	Designation (mm)	Cost (PHP)	Unit cost (PHP/sq. m)
Carriageway	Concrete	300	1,500	1620
	Base Corse	150	120	
Sidewalk	Concrete	100	500	580
	Base Corse	100	80	
Pedestrian	Concrete	100	500	580
	Base Corse	100	80	
Facility Under Viaduct	Concrete	100	500	580
	Base Corse	100	80	
Parking	Concrete	150	750	830
	Base Corse	100	80	
Overlay of Carriage Way	Concrete	150mm	750	750
Overlay of Sidewalk	Concrete	100mm	500	500

(2) Indirect Cost

7. Indirect cost is composed of total mark-up and VAT (see Table 16).

Table 16 Indirect Cost

	Unit Cost (PHP/sq. m)	Total Mark-up (17%)	Total (PHP/sq. m)	VAT (12%)	Unit Cost Added Indirect Cost (PHP/sq. m)
Carriageway	1,620	275.4	1,895.4	227.448	2,122
Sidewalk	580	98.6	678.6	81.432	760
Pedestrian	580	98.6	678.6	81.432	760
Facility Under Viaduct	580	98.6	678.6	81.432	*760*
Parking	830	141.1	971.1	116.532	1,087
Overlay Carriageway	750	127.5	877.5	105.30	982
Overlay Sidewalk	500	85.0	585.0	70.20	655

(3) Total Unit Cost

8. Total unit cost includes indirect cost, general requirement, other general requirement, earth works, drainage works and miscellaneous works. These unit costs is assumed by the rate from experimental data and other data by similar projects and other data which is described in 2) (1) Project cost.

9. Unit cost of the road in section from Malolos to Valenzuela is shown in Table 17, Tutuban area in Table 18.

Table 17 Total Unit Cost of the Road from Malolos to Valenzuela

		Unit cost plus indirect cost (PHP/sq.m)	Sharing Rate (%)	Total Rate Project Cost	Total Unit Cost (PHP/sq.m)	Remarks
General Cost			75.52	311.4 %		
Other General requirement			22.13			
Earth Works			4.43			
Pavement Works	Carriageway	2122.85	100		6,611	1) ×3.1144
	Sidewalk	760.032			2,367	2)×3.1144
	Pedestrian	760.032			2,367	3)×3.1144
	Facility Under Viaduct	760.032			2,367	4)×3.1144
	Parking	1087.63			3,387	5)×3.1144
	Overlay of Carriageway	982.80			3,061	6)×3.1144
	Overlay of Sidewalk	655.20			2,041	7)×3.1144
Drainage Works			99.62			
Miscellaneous			9.74			

Table 18 Total Unit Cost for Tutuban Area

		Unit Cost added Indirect Cost (PHP/sq. m)	Sharing Rate (%)	Total Rate (Project Cost)	Total Unit Cost (PHP/sq. m)	Remarks
General Cost			87.16	359.46 %		
Other General requirement			25.54			
Earth Works			10.00			
Pavement Works	Carriageway	2122.85	100		7,631	1)×3.5946
	Sidewalk	760.032			2,732	2)×3.5946
	Pedestrian	760.032			2,732	3)×3.5946
	Facility Under Viaduct	760.032			2,732	4)×3.5946
	Parking	1087.63			3,910	5)×3.5946
	Overlay of Carriageway	982.80			3,533	6)×3.5946
	Overlay of Sidewalk	655.20			2,355	7)×3.5946
Drainage Works			121.23			
Miscellaneous			15.53			

(4) Other Total Unit Cost

10. Unit cost of pedestrian and buildings such as commercial building, office building, residential building and hotel are estimated per sq.m or lump sum. These unit costs are including all cost described in 2).