CHAPTER 6

TRAFFIC DEMAND FORECAST

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6.1 Objective and Outline of Analysis

Traffic demand forecast was conducted to support the formation of HSH network. The output was used to justify the necessity of road projects and evaluate the proposed HSH network. The input data and results of traffic demand forecast could be utilized by DPWH in the planning and evaluation of future projects.

Specifically, the allocation of HSH network and class of HSH were determined based on the results of the traffic demand forecast in the first phase of the study (formulation of in 2040 HSH network).

In the second phase (formulation of priority projects), the output of traffic demand forecast was utilized for evaluation and prioritization of projects based on various indicators such as EIRR.

In the analysis of regional road traffic, which relates to inter-zonal traffic, traffic zones were established as discussed in the succeeding Sections. As for the road network, expressways and major national roads were considered. Nationwide vehicle OD traffic volumes were estimated and assigned to the HSH network to calculate future road traffic volume.

The pre-condition of traffic demand forecast is shown in **Table 6.1-1**.

Table 6.1-1 Pre-Condition of Traffic Demand Forecast

Items	Description
Target Area	Entire Philippines (nationwide)
Year of Forecast	Base year: 2019 Target year: 2025, 2030 and 2040
Classification of vehicle	Motor Vehicle (total traffic is divided into four types) ✓ Car: individual car, taxi ✓ Jeepney ✓ Bus: HOV, Mini-Bus, Large Bus ✓ Truck: all types of trucks and trailers
Method	Method based on the four-step travel demand model ✓ Demand forecast of production traffic ✓ Demand forecast of generation/attraction traffic ✓ Demand forecast of distribution traffic ✓ Traffic assignment
Network	✓ All Expressways ✓ All National Primary Roads ✓ All National Secondary Roads ✓ Major Tertiary National roads and major urban roads
Zoning	Total number of zones: 920 zones ✓ Other: 388 zones ✓ Metro Manila: 289 zones ✓ Metro Cebu: 194 zones ✓ Metro Davao: 49 zones

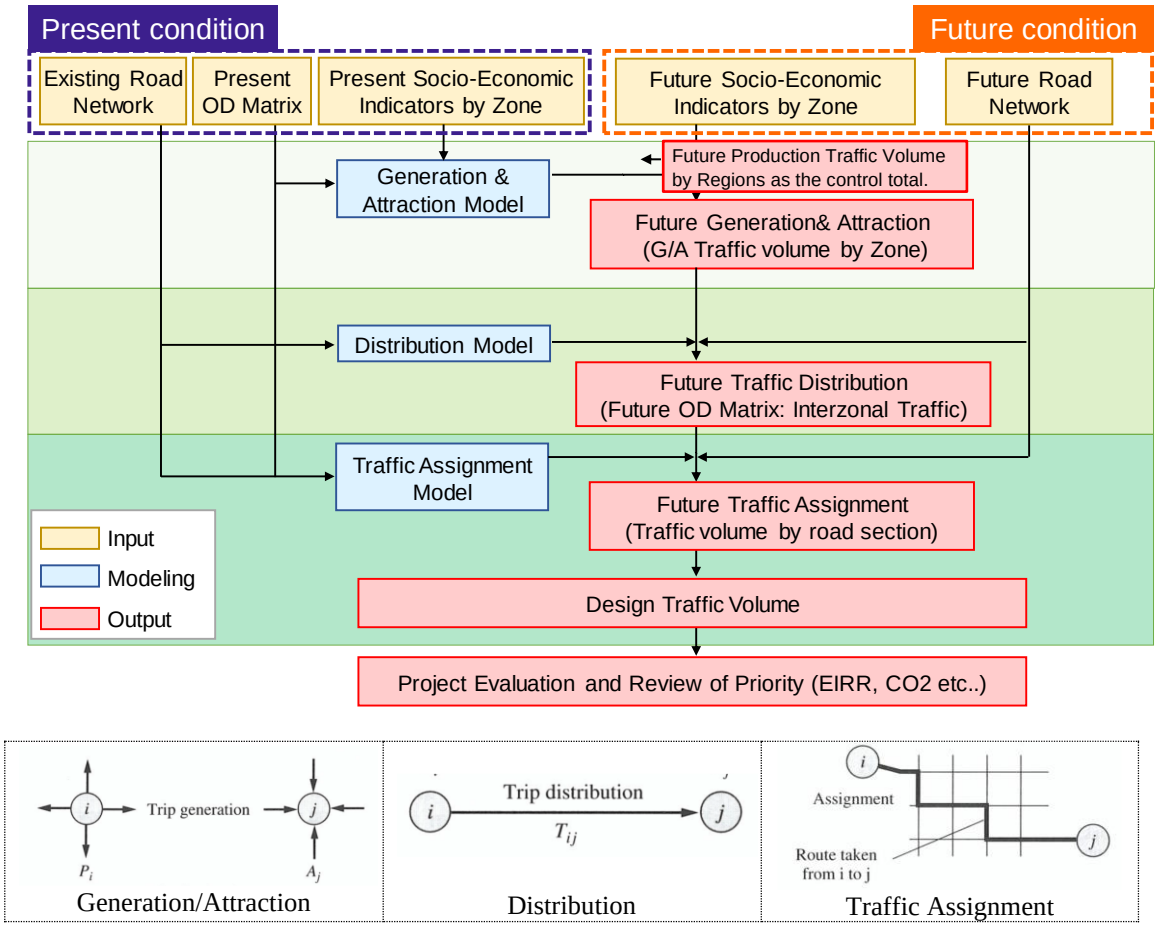
Source: JICA Study Team

The workflow of the traffic demand analysis is shown in **Figure 6.1-1**.

The method adopted by the study is based on the classical four-step travel demand model. The models used in each step were the following: traffic generation/attraction (G/A) model, traffic distribution model and traffic assignment model. The existing road network, present OD matrix, and present socio-economic indicators were used as input data. In all steps, the analysis was conducted on a per vehicle basis (unit is vehicle per day). The future traffic demand in each step was estimated by inputting future condition data (future road network and future socio-economic framework).

In the first step, the growth rate of production traffic volume from 2019 to 2040 is estimated based on the trend of traffic volume from 2007 until 2018 by regions. The production traffic volume of each region is found as the average of the attraction traffic volume and the generation traffic volume of each region. The growth rate is multiplied by the production traffic volume by region in the present OD matrix to estimate the future production traffic volume. The result is used as the control total of Generation/Attraction traffic volume by regions. In the following step, the future generation and attraction traffic by zone was estimated based on the built G/A model. The control total was adjusted by total production traffic volume by regions, as set in the previous step.

In the next step, the distribution traffic was estimated. This step was necessary to produce the future OD matrix and estimate all inter-zonal traffic. The future G/A traffic volume was used as control total value. The traffic volume of vehicle/day basis by each road section was then calculated.



Source: JICA Study Team

Figure 6.1-1 Road Traffic Demand Forecast Procedure

6.2 Establishment of Present Condition

Prior to the conduct of the traffic demand forecast, data reflecting the existing situation in the study area will be created as input data. The data prepared include the following: road network, current OD matrix and socio-economic indicators by zone.

6.2.1 Zoning System

The creation of traffic zones is necessary to study the HSH network that handles regional traffic. The size of the zone varies depending on the socio-economic data attributed.

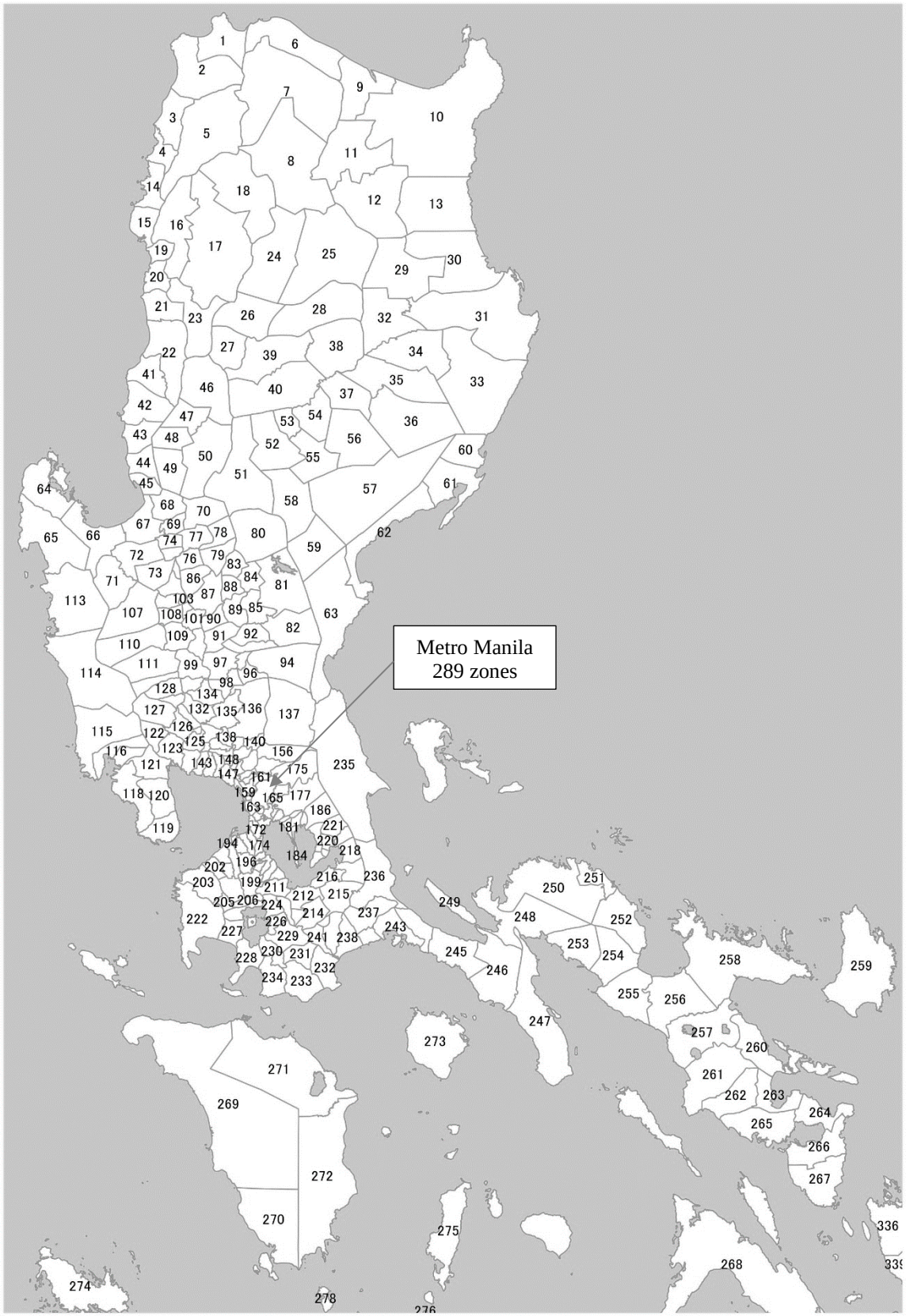
In the present situation, cities and municipalities were assigned as the smallest unit of traffic zone to areas where road network is dense and generates significant traffic.

However, for the three major metropolitan areas (Metro Manila, Metro Cebu and Metro Davao), cities and municipalities were further subdivided into different zones, depending on the traffic projects implemented in the existing urban areas.

Table 6.2-1 Zoning System for Traffic Demand Forecast

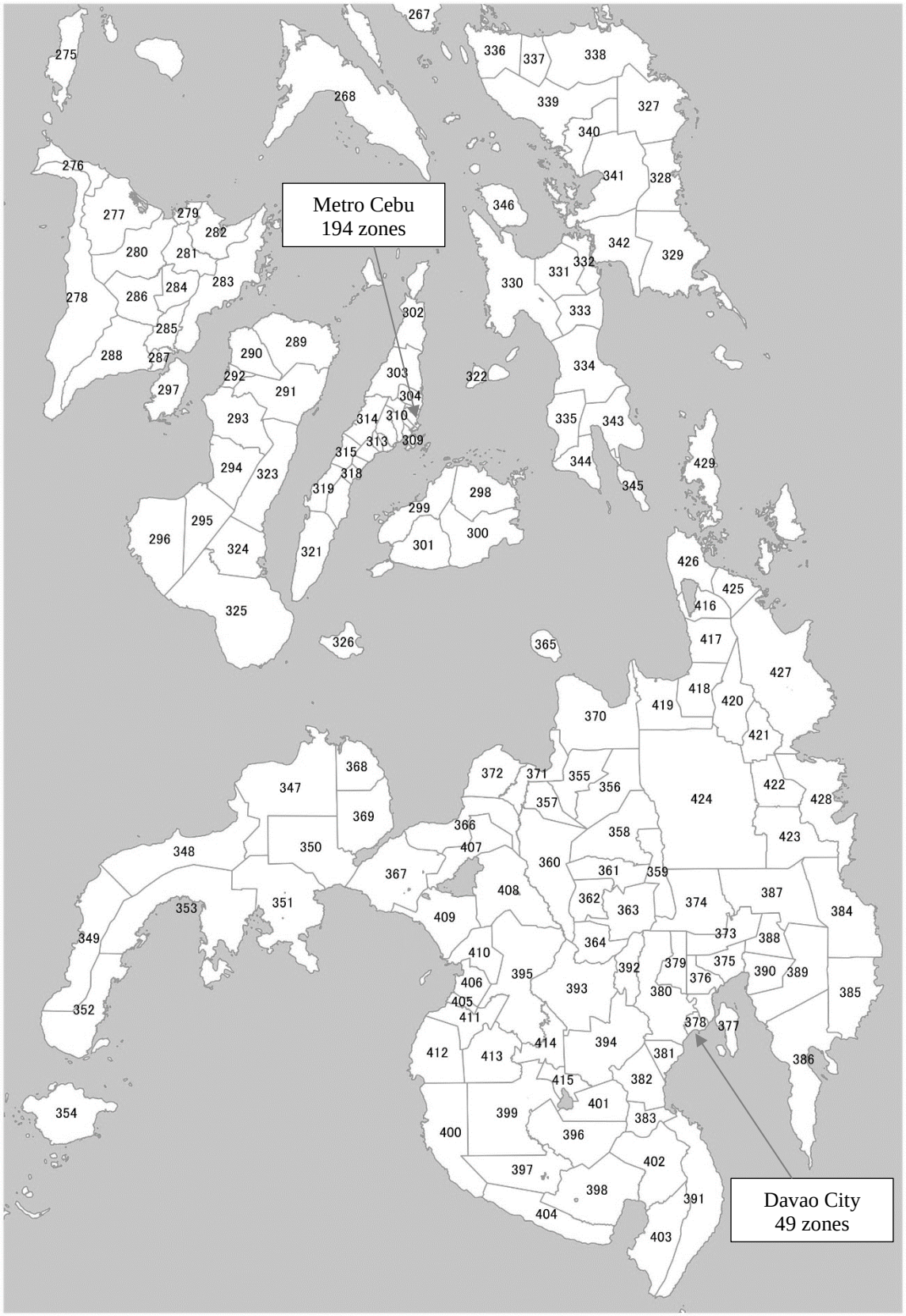
Region	Number of Zones	Number of Municipalities/Cities
Region I	33	125
Region II	24	93
Region III	82	130
NCR	289	17
Region IV-A	75	142
Region IV-B	7	73
Region V	19	114
Region VI	22	133
Region VII	210	132
(Metro Cebu)	(194)	(13)
Region VIII	20	143
Region IX	7	72
Region X	18	93
Region XI	57	49
(Davao City)	(49)	(11)
Region XII	14	50
Region XIII	14	73
ARMM	11	118
CAR	18	77
Total	920	1,634

Source: JICA Study Team



Source: JICA Study Team

Figure 6.2-1 Zoning System in Luzon



Source: JICA Study Team

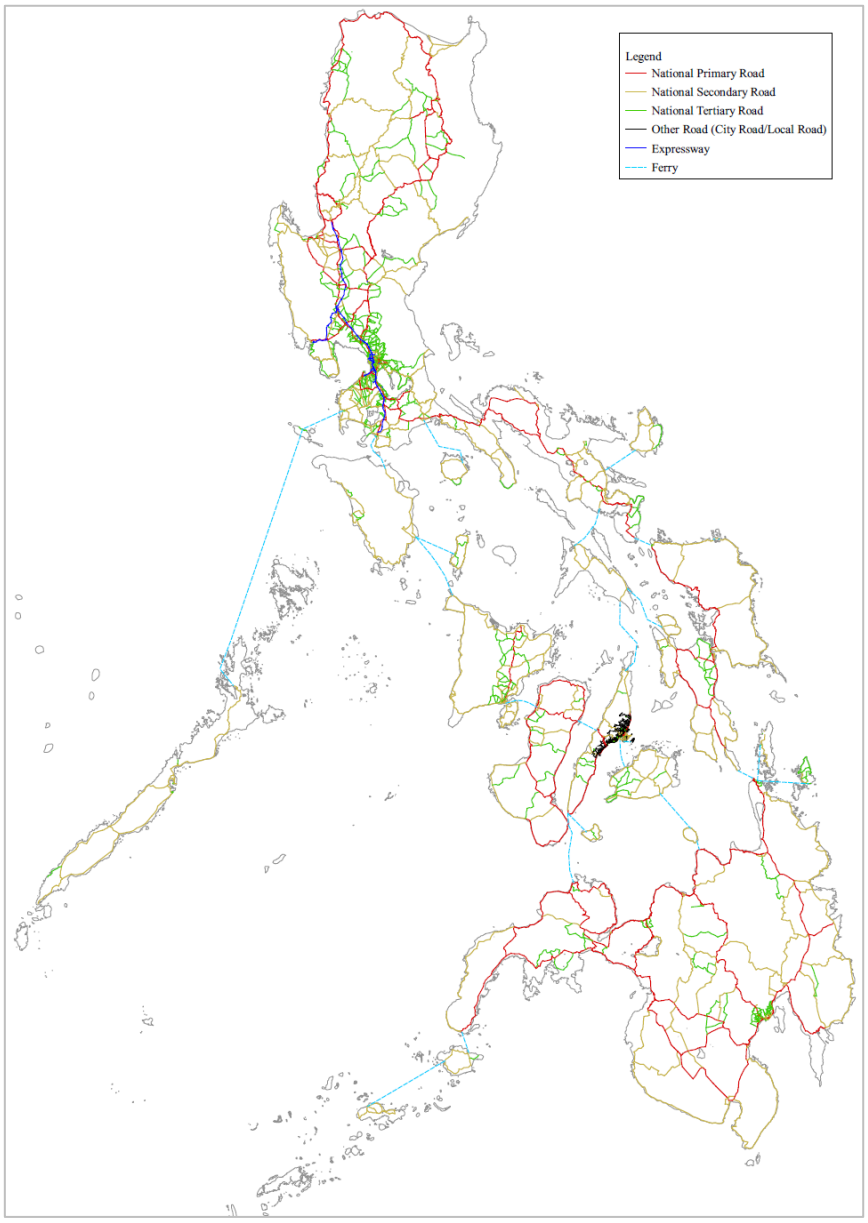
Figure 6.2-2 Zoning System in Visayas and Mindanao

6.2.2 Road Network for Traffic Assignment

The road category shown in **Table 6.2-2** was utilized for the creation of road network for traffic assignment. The road conditions were linked with specifications such as free flow velocity and road capacity, as shown in **Table 6.6-3** in **Section 6.6.3**. The fare specifications for expressways were based on actual toll fees acquired from TRB. More detailed discussions can be found in **Section 6.6.3**.

Table 6.2-2 Road Network for Traffic Assignment

Area	Road Category
Entire country	All Expressways All National Primary Roads (NPR) and National Secondary Roads (NSR) Major National Tertiary Roads (NTR)
Metropolitan centers	All types of roads shown above and major city roads
Inter islands	Ferry



Source: JICA Study Team

Figure 6.2-3 Road Network for Present Traffic Assignment

6.2.3 Preparation of Present OD Matrix

In the first step, a present OD matrix was created as basic data for traffic demand forecasting. The base year for the present OD matrix is 2019. The type of OD matrix is an automobile OD matrix (unit is vehicle / day). Aggregate analysis of OD survey data and application of reverse OD traffic volume estimation method were applied for the reason given below.

The OD creation conducted in Japan is based on the results of large-scale surveys such as nationwide car owner interview surveys, roadside OD surveys, urban area traffic surveys (PT surveys), and mainstream flow surveys. However, it will require a large budget and time, and applying the Japanese method to this project is problematic in terms of efficiency and immediacy.

On the other hand, in the Philippines, DPWH conducts traffic surveys at some locations throughout the country, and there is a stock of valid cross-sectional traffic data. In metropolitan areas, traffic data for urban traffic studies exist. In this project, the OD reverse estimation method was applied to estimate the current OD matrix while using the stock data and the roadside OD survey results at 65 locations nationwide. The current OD matrix was created according to the following procedures:

- Tentative OD matrix creation based on roadside OD survey results of 65 stations,
- Complementary OD creation above OD matrix based on the distribution OD model,
- Creation of OD matrix for the three major metropolitan areas and surrounding areas based on existing OD data (MUCEP project, Cebu Urban Transport M/P, Davao Bypass Project),
- Preparation of provisional OD matrix integrating above OD matrix,
- Provisional OD matrix adjustment by applying OD reverse estimation method (see **Figure 6.2-4**) and balance check with zone indicators,

  OD reverse estimation method is explained in below;

  i. First, the traffic volume for each link is calculated by assignment of existing OD table to the network.
  ii. The difference is recorded by comparing the observed traffic volume and the results of assignment for the corresponding link.
  iii. Calculate the correction factors for each OD pair, modify the OD table, and return to the assignment calculation step to estimate the traffic volume again.
  iv. These steps are iteratively carried out to modify the OD table so that the traffic volumes are distributed close to the observed traffic volumes.
  v. Finally, the calculation is completed after confirming that the average error and maximum error have been reduced.

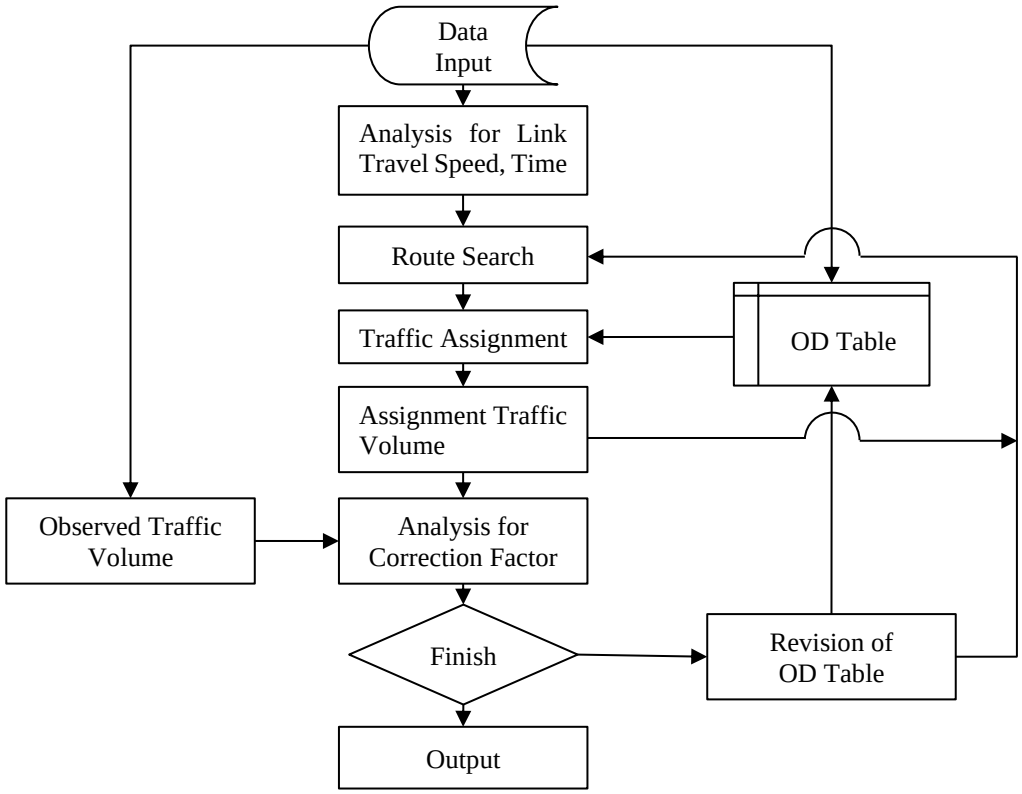
- Confirmation of validation based on the reproducibility of the current traffic by checking the correlation between the observed traffic volume and the estimated traffic volume by the traffic assignment method described in the **section 6.6**.

  The correlation between the observed traffic volume and the estimated traffic volume is checked for the AADT which is Average Annual Daily Traffic on 120 traffic volume survey stations.

  The correlation analysis here is a comparison of daily traffic volume as AADT, not the result of correlation analysis of OD patterns.

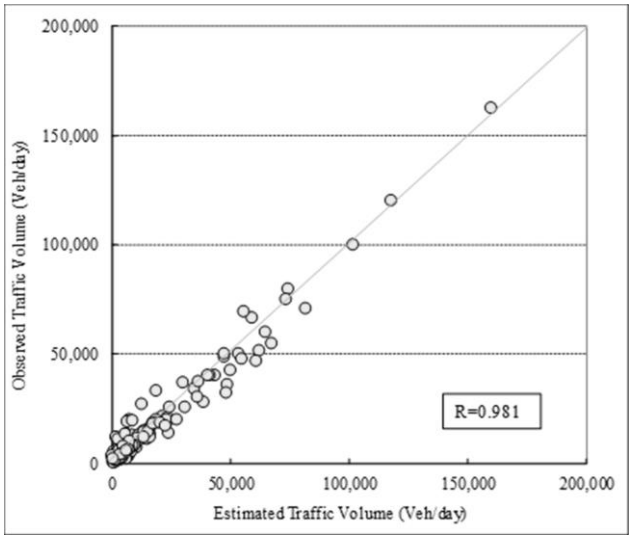
  The observed traffic volume is the traffic survey results by JST or DPWH. The estimated traffic volume is the calculated value by the traffic assignment method.

As a result of the validation of the present OD matrix using the procedure above, **Figure 6.2-5** shows the result of correlation analysis. The correlation coefficient is 0.98, it was confirmed that the estimated OD has high accuracy.



Source: JICA Study Team

Figure 6.2-4 Flow of OD Reverse Estimation Method



Source: JICA Study Team

Figure 6.2-5 Validation Result for Present OD Matrix

6.3 Traffic Demand Forecast

6.3.1 Perspective of Traffic Demand Increase

(1) Analysis of Growth Rate

In this section, the growth rates of traffic volume in the medium-term and long-term period are discussed. The growth rate of road traffic volume per region from 2019 until 2040 is estimated based on the model below. Two types of models were assumed, and the one with the best fit was adopted per region.

The dependent variable is the traffic volume by region that was traffic trend data from 2007 until 2018 provided by DPWH and MMDA for data in Metro Manila. The average traffic volume was calculated from these data. The explanatory variable is the population and GRDP per region.

<Precondition of analysis>

Area: Region basis,15-4 regions

Traffic Volume Data: 340 stations in Philippines, 2007- 2018

20 stations in Metro Manila, 2007- 2018

Explanatory variable: GRDP per capita (=GRDP/Population), 2007-2018

Model function:

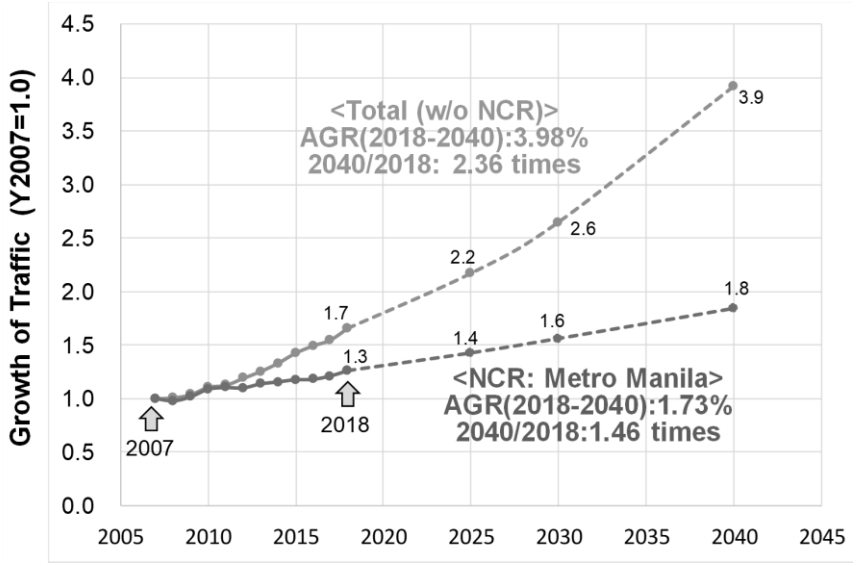
Linear function model

$Qt(\text{Traffic Volume}) = \alpha \cdot X(\text{GRDP per Capita}) + \varepsilon$

Logarithmic function model

$Qt(\text{Traffic Volume}) = \alpha \cdot \ln(\text{GRDP per Capita}) + \varepsilon$

The results of the forecast, as shown in **Figure 6.3-1,** indicate that the traffic volume in Metro Manila is expected to increase by a factor of 1.46 from 2018 to 2040. The annual growth rate in this case is 1.73%. In other areas outside of Metro Manila, the traffic volume in 2040 is expected to increase by a factor of 2.36 times the volume in 2018. The estimated annual growth rate is 3.98% from 2018 to 2040.



Source: JICA Study Team

Figure 6.3-1 Estimated Growth Trend of Traffic Volume

Annual Growth Rate of Traffic Volume by Region

Traffic Growth	NCR	CAR	Region I	Region II	Region III	Region IV-A	Region V	Region VI	Region VII	Region IX	Region X	Region XI	Region XII	Region XIII	Total (w/o NCR)
2018-2030	1.79%	4.07%	2.75%	5.54%	5.10%	3.97%	2.73%	3.54%	4.00%	3.39%	2.68%	4.79%	4.59%	2.38%	3.97%
2030-2040	1.67%	3.15%	2.56%	3.61%	5.55%	5.35%	2.25%	2.47%	4.81%	2.89%	2.69%	5.49%	3.13%	2.62%	3.99%
2018-2040	1.73%	3.65%	2.67%	4.66%	5.31%	4.60%	2.51%	3.06%	4.36%	3.16%	2.68%	5.10%	3.93%	2.49%	3.98%
2040/2018	1.46	2.20	1.78	2.72	3.12	2.69	1.73	1.94	2.56	1.98	1.79	2.99	2.33	1.72	2.36

Reference data
(Growth rate of population per region)

Population	NCR	CAR	Region I	Region II	Region III	Region IV-A	Region V	Region VI	Region VII	Region IX	Region X	Region XI	Region XII	Region XIII	Total (w/o NCR)
2018-2030	1.05%	1.07%	0.82%	0.93%	1.49%	1.78%	0.97%	1.13%	1.46%	1.40%	1.51%	1.79%	1.71%	1.20%	1.41%
2030-2040	0.68%	0.72%	0.53%	0.62%	1.07%	1.24%	0.65%	0.73%	0.98%	0.93%	1.02%	1.28%	1.16%	0.78%	0.97%
2018-2040	0.88%	0.91%	0.69%	0.79%	1.30%	1.54%	0.82%	0.95%	1.24%	1.19%	1.29%	1.56%	1.46%	1.01%	1.21%
2040/2018	1.21	1.22	1.16	1.19	1.33	1.40	1.20	1.23	1.31	1.30	1.33	1.41	1.38	1.25	1.30

(Growth rate of GRDP per region)

GRDP	NCR	CAR	Region I	Region II	Region III	Region IV-A	Region V	Region VI	Region VII	Region IX	Region X	Region XI	Region XII	Region XIII	Total (w/o NCR)
2018-2030	6.64%	5.82%	6.53%	6.00%	6.94%	6.16%	6.44%	6.51%	6.60%	6.01%	6.43%	7.37%	6.17%	5.95%	6.46%
2030-2040	6.52%	6.29%	6.51%	6.21%	6.72%	6.37%	6.51%	6.53%	6.56%	6.24%	6.48%	6.92%	6.38%	6.13%	6.51%
2018-2040	6.59%	6.03%	6.52%	6.10%	6.84%	6.26%	6.47%	6.52%	6.58%	6.11%	6.46%	7.16%	6.27%	6.03%	6.48%
2040/2018	4.07	3.63	4.01	3.68	4.29	3.80	3.97	4.01	4.06	3.69	3.96	4.58	3.81	3.63	3.98

Source: JICA Study Team

Figure 6.3-2 Estimated Growth Rate of Traffic Volume by Region

(2) Future Production Traffic Volume

The future production traffic volume by region is estimated by multiplying the growth rate by the existing production traffic volume in the present OD matrix. Originally, this is the basic method of calculating the nationwide generated traffic volume by conducting a national owner interview and calculating the trip basic unit. However, since there are limitations on the survey budget, the survey period, and available data in this time, we will base the production traffic volume on the estimated present OD matrix. The production traffic volume here is only inter-zonal traffic without internal traffic. The production traffic volume by region become the control total for Generation/Attraction traffic volume.

Table 6.3-1 Estimation result of Production Traffic Volume

Unit: 1,000 veh.

Area	Year	CAR	JEEPNEY	BUS	TRUCK	TOTAL
Metro Manila	2019	3,164,630	448,084	58,109	139,666	3,810,489
		83%	*12%*	*2%*	*4%*	*100%*
	2040	4,767,661	453,821	84,790	203,793	5,510,065
		87%	*8%*	*2%*	*4%*	*100%*
	2040/2019	1.51	1.01	1.46	1.46	1.45
Other Area	2019	1,478,415	312,838	146,723	279,558	2,217,534
		67%	*14%*	*7%*	*13%*	*100%*
	2040	3,507,914	546,205	326,495	656,447	5,037,061
		70%	*11%*	*6%*	*13%*	*100%*
	2040/2019	2.37	1.75	2.23	2.35	2.27

Source: JICA Study Team

6.4 Forecasting Generation and Attraction Traffic Volume

(1) Outline

The first stage of model building and demand forecast deals with traffic generation and attraction. The generated / attracted traffic models were built to forecast the generated and the attracted trips per traffic zone. Basically, the model was built based on a linear function using explanatory variables consisting of the socio-economic framework per traffic zone. Nighttime population and GRDP were considered as explanatory variables. The estimated G/A traffic per zone was finally adjusted using the total production traffic volume by region. In case a significant large-scale development was expected within the area, additional development traffic was considered.

(2) Building Model of G/A Traffic

The G/A model was built to calculate the total generation and attraction traffic by type of vehicle. The applied function is a linear model, as shown in Formula (1). Population and GRDP were adopted as explanatory variables. Three types of G/A model were built – one for Metro Manila, one for other major cities and one for other areas. **Table 6.4-1**, **Table 6.4-2** and **Table 6.4-3** show the parameter estimation result.

$$GA_i = a_i x1_i + b_i x2_i + C \qquad \text{Formula (1)}$$

Where;

GA_i: Total of Generation and Attraction traffic in Zone *i*
$x1_i$: Population in Zone *i*
$x2_i$: GRDP in Zone *i*
a_i, b_i : Coefficients
C: Constants
i: Zone

Table 6.4-1 Model building Result: Region Model

Type		POP(000')	GDP(million)	ε	*R*	*R2*
Car	coef.	6.51	480.41	-1165.60	0.83	0.69
	t value	*1.87*	*8.92*	*-3.44*		
Jeepeny	coef.	2.52	128.57	-371.23	0.81	0.66
	t value	*1.89*	*5.39*	*-2.55*		
Bus	coef.	5.43	20.36	-184.54	0.83	0.69
	t value	*7.45*	*2.45*	*-3.26*		
Truck	coef.	7.09	18.23	-184.54	0.84	0.71
	t value	*4.56*	*0.75*	*-1.78*		

Source: JICA Study Team

Table 6.4-2 Model building Result: Metro Manila Model

Type		POP(000')	GDP(million)	ε	*R*	*R2*
Car	coef.	16.32	908.62	6757.56	0.86	0.73
	t value	*1.68*	*4.81*	*0.66*		
Jeepeny	coef.	5.22	81.83	1473.37	0.95	0.90
	t value	*1.59*	*6.40*	*2.14*		
Bus	coef.	5.43	15.23	-184.54	0.75	0.56
	t value	*2.81*	*1.13*	*-0.17*		
Truck	coef.	4.69	36.52	717.81	0.73	0.54
	t value	*0.98*	*1.95*	*0.71*		

Source: JICA Study Team

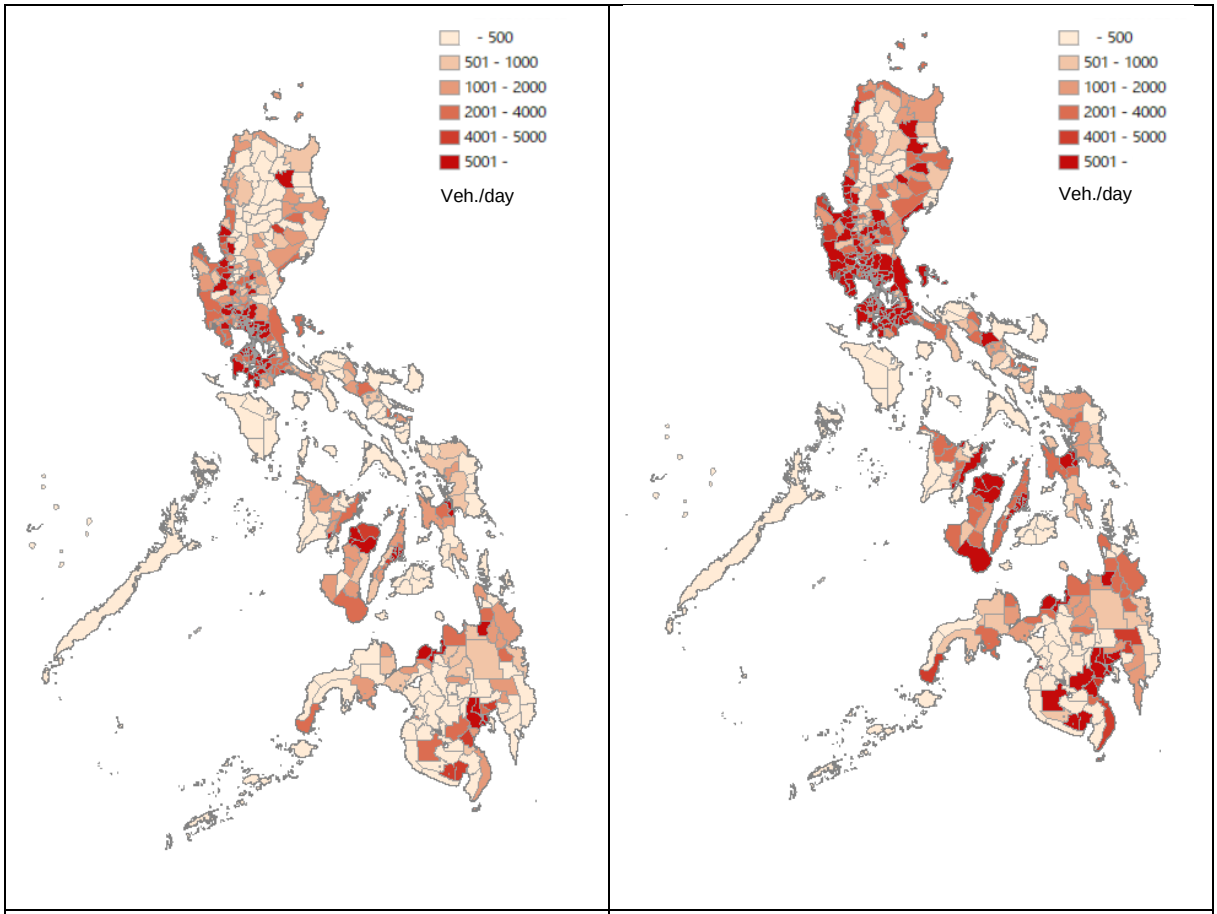
Table 6.4-3 Model building Result: Major City Model (Cebu, Davao, CDO)

Type		POP(000')	GDP(million)	ε	*R*	*R2*
Car	coef.	20.10	705.23	5523.20	0.87	0.76
	t value	*2.10*	*3.24*	*1.97*		
Jeepeny	coef.	4.23	78.10	1236.36	0.86	0.74
	t value	*1.89*	*5.20*	*2.17*		
Bus	coef.	6.30	21.00	150.00	0.74	0.55
	t value	*2.12*	*2.36*	*1.80*		
Truck	coef.	5.36	38.25	805.25	0.76	0.58
	t value	*1.98*	*2.10*	*3.50*		

Source: JICA Study Team

(3) Future Generation and Attraction Traffic Volume

The G/A traffic volume (2040) was estimated based on the model and future zone indicators: population and GRDP. The results of G/A forecast per zone are shown in **Figure 6.4-1**.



Present G/A traffic volume (2019) | Future G/A traffic volume (2040)

Source: JICA Study Team

Figure 6.4-1 Estimated Result of Future G/A Traffic Volume

6.5 Forecasting Traffic Distribution

(1) Outline

The second stage of model building and demand forecast deals with traffic distribution. The commonly used models for the estimation of OD trip distribution include the present pattern method and model method such as gravity model. The modeling method was applied in this study. It is rational to apply the modeling method in study areas like the Philippines, where significant changes in traffic situation could be expected. Although other alternative functions could be considered such as basic gravity model, BPR gravity model, etc.., the final model applied was chosen depending on the model accuracy based on iteration calculations.

(2) Building Gravity Model

Trip distribution is the second step in the travel demand modeling process. Trip production (the first major step) facilitates the methodology for estimating trip generations and attractions for each purpose within each zone. Trip distribution is the process of linking these trip generations and attractions as each zone pair. The Gravity Model was applied linking the trip production and attractions to form the trip matrix. Gravity Model is expressed, as shown in Formula (2).

$$T_{ij} = k \times \frac{G_i^{\alpha} A_j^{\beta}}{d_{ij}^{\gamma}} \qquad \text{Formula (2)}$$

Where;

T_{ij}: Traffic Distribution from Zone *i* to *j*

G_i : Traffic Generation in Zone *i*

A_j : Traffic Attraction in Zone *j*

d_{ij}: Travel Time Distance from Zone *i* to *j*

*Travel Time Distance is the travel time based on traffic assignment result by the future network and OD traffic zero.

k, α, β, γ: Parameter

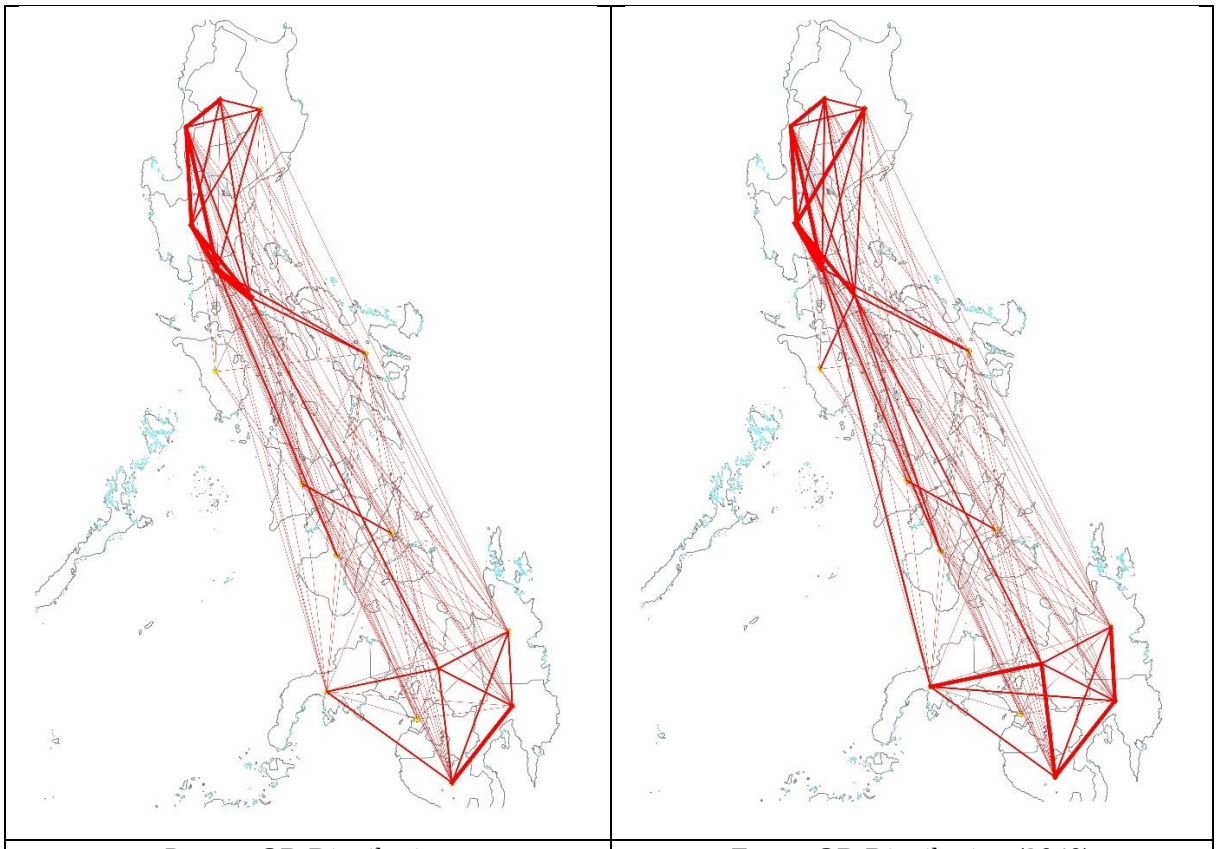
Table 6.5-1 Model building Result of Gravity Model

		Traffic Generation	Traffic Attraction	Time Distance	Constant	Correlation Coefficient
CAR	Par.	0.29	0.29	-0.98	0.97	0.75
	t Value	*1.19*	*1.21*	*-2.26*		
JEEPENY	Par.	0.33	0.41	-0.86	0.84	0.85
	t Value	*4.40*	*5.60*	*-4.53*		
BUS	Par.	0.85	0.39	-0.58	0.64	0.63
	t Value	*6.95*	*8.50*	*-7.27*		
TRUCK	Par.	0.30	0.30	-0.59	0.64	0.68
	t Value	*1.15*	*1.48*	*-1.79*		

Source: JICA Study Team

(3) Future Distribution Traffic Volume

The distribution traffic volume was estimated based on the model and future OD matrix (2040) and future road network. The result of forecast of inter-zonal traffic is shown in **Figure 6.5-1**.



Present OD Distribution	Future OD Distribution (2040)

Source: JICA Study Team

Figure 6.5-1 Estimated Result of Future OD Distribution

6.6 Traffic Assignment

6.6.1 Outline

Traffic assignment is the last step for traffic demand forecast. In this step, the future OD matrix, which is expressed on a per vehicle basis, was allocated on individual road links of the future road network. The traffic volume per link served as output. For traffic assignment, the user equilibrium assignment method was applied.

6.6.2 Assignment Method and Parameter

(1) Assignment Method

The user equilibrium assignment method was applied in this study. This method was based on Wardrop's first principle of equal travel time for traffic assignment. The calculation program was built on the mathematical problem of optimization with the Frank-Wolfe algorithm. This assignment method can provide high accuracy compared with other methods like the incremental assignment.

In applying the equilibrium assignment method in the study, a type of BPR function for daily traffic assignment is utilized as link performance function shown in Formula (3). For this function, the standard parameter α=0.48, β=2.82, which are developed by the Japan Society of Civil Engineers is applied. As for the traffic assignment for toll roads, the toll fee was converted to travel time using the equation relating toll fee and time value. This relationship is explained in Formula (3) below.

$$T_i = T_0\left(1 + \alpha\left(\frac{Q_i}{C_i}\right)^{\beta}\right) + \frac{F}{TV} \qquad \text{Formula (3)}$$

Where;

T_i: Travel Time of Link *i*

T_0: Zero Flow Travel Time of Link 0

Q: Daily Traffic Volume of Link *i*

C: Daily Road Traffic Capacity of Link *i*

F: Toll Fee (peso)

TV: Time value (peso/veh.min)

α, β: Parameter (α=0.48, β=2.82)

(2) Parameter

1) Passenger Car Unit

Table 6.6-1 shows the values for the Passenger Car Unit (PCU) per type of vehicle, which are adopted by DPWH.

Table 6.6-1 Passenger Car Unit

Vehicle Type	Passenger Car Unit
Passenger Car	1.0
Jeepney	1.5
Bus	2.0
Truck	2.5

Source: DPWH

(3) Time Evaluation Value

Value of time was established based on "Procedure Manual for Updating Vehicle Costs and User Cost, Work Unit Cost, Asset Values, Traffic Growth Rates in 2014" by DPWH.

Current value of time was calculated using an AGR of 2.60%, which was estimated using Inflation Rate from 2012 to 2018.

Table 6.6-2 Value of Time

Unit: Peso/min

Vehicle Type	Y2015	Y2019
Passenger Car	6.68	7.40
Jeepney	7.37	8.17
Bus	27.54	30.52
Truck	7.75	8.59

Source: DPWH

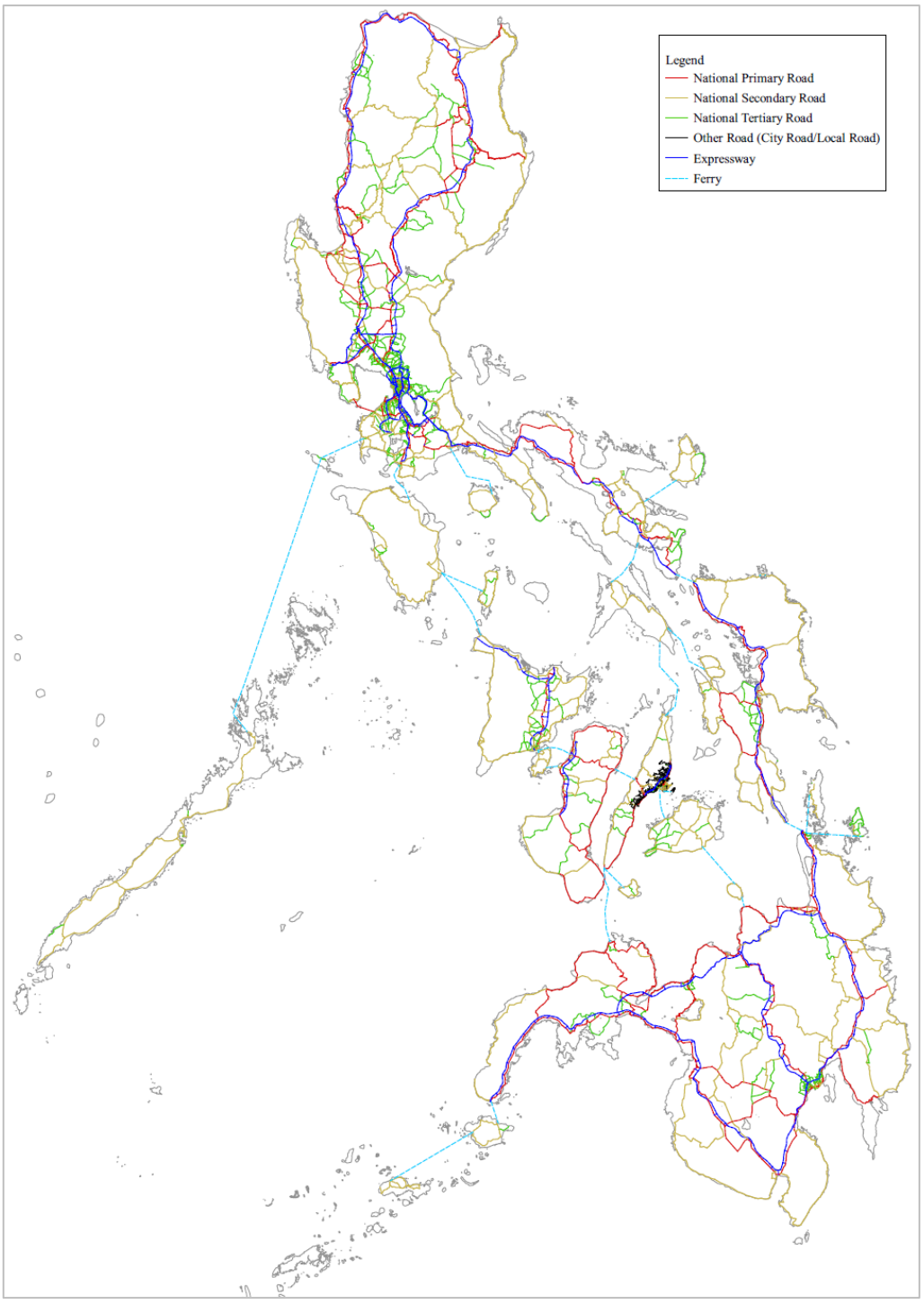
6.6.3 Preparation of Input Data

(1) Future OD Matrix

The future OD matrix (2040) made in the previous Section is utilized as input data for future traffic assignment.

(2) Future Road Assignment

The future assignment road network was developed based on the present assignment road network. In this part, the proposed HSH network in Chapter 12 was considered.



Source: JICA Study Team

Figure 6.6-1 Road Network for Future Traffic Assignment

1) Link Cost Specification

The link specification consisting of the velocity at zero flow and road capacity is shown in **Table 6.6-3** below.

Table 6.6-3 Link Specification: Free Flow Speed and Road Capacity

Type	Road Class	Topography	Lane	Free flow velocity (km/h)	Road Capacity (PCU/day)
1	HSH Class1 (Expressway)	Plain	10	100	200,000
2			8	100	160,000
3			6	100	120,000
4			4	100	80,000
5	HSH Class1 (Urban Area)	Plain	6	80	120,000
6			4	80	80,000
7	HSH Class 2 (Access Controlled National Road)	Plain	6	60	72,000
8			4	60	48,000
9			2	60	24,000
10	National Road (Primary)	Plain	8	50	96,000
11			6	50	72,000
12			5	50	60,000
13			4	50	48,000
14			2	40	10,000
15	National Road (Secondary)	Plain	6	40	60,000
16			4	40	40,000
17			2	30	8,000
18	National Road (Tertiary)	Plain	6	40	48,000
19			4	40	32,000
20			2	30	6,000
21	HSH Class1	Mountainous	6	80	84,000
22			4	80	56,000
23	HSH Class 2	Mountainous	4	60	48,000
24			2	50	24,000
25	National Road (Primary)	Mountainous	8	40	67,200
26			6	40	50,400
27			4	40	33,600
28			2	30	7,000
29	National Road (Secondary)	Mountainous	6	30	42,000
30			4	30	28,000
31			2	20	5,600
32	National Road (Tertiary)	Mountainous	4	30	22,400
33			2	20	4,200
34	Ferry	-	-	5	1,000

Source: JICA Study Team

2) Expressway Toll Fee

Using data from the TRB website, the toll rates for existing expressways under the open and closed systems are shown in **Table 6.6-4**.

Table 6.6-4 Expressway Toll Fee

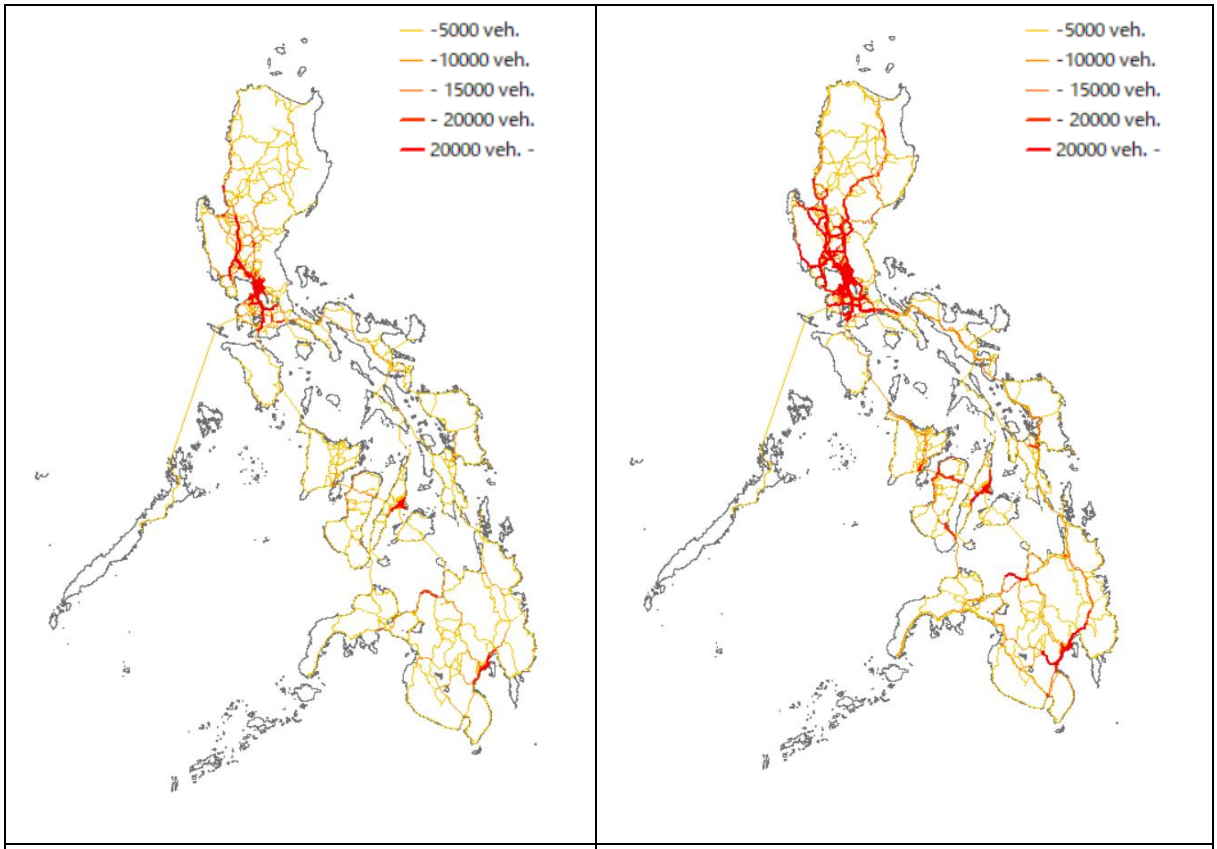
Unit: Peso/km (Closed System), Pesos (Open System)

No.	Expressway		System	Class1	Class2	Class3
1	Tarlac–Pangasinan–La Union Expressway	TPLEx	Closed	3.5	8.7	10.5
2	North Luzon Expressway (Outside Metro Manila)	NLEX	Closed	3.2	8.0	9.6
	North Luzon Expressway (Inside Metro Manila)		Open	55	137	165
	Segment 8.1, 9					
3	Subic–Clark–Tarlac Expressway	SCTEX	Closed	3.7	7.6	11.2
4	Muntinlupa–Cavite Expressway	MCX	Open	17	34	51
5	Metro Manila Skyway	SKYWAY	Closed	9.9	19.9	29.9
6	South Luzon Expressway	SLEX	Closed	3.5	7.0	10.6
7	Southern Tagalog Arterial Road (Calabarzon Expressway)	STAR	Closed	2.3	4.5	6.8
8	Manila-Cavite Expressway	CAVITEX	Open	24	48	72
	Manila-Cavite Expressway (Extension)			64	129	194
9	NAIA Expressway (Full)	NAIAX	Open	45	90	134
	NAIA Expressway (Short Segment)			35	69	104

Source: TRB

6.6.4 Result of Future Road Traffic Assignment

The results of traffic assignment are shown in **Figure 6.6-2**.



Traffic Volume in 2019 (veh./day) | Traffic Volume in 2040 (veh./day) Full net of HSH network

Source: JICA Study Team

Figure 6.6-2 Result of Future Traffic Assignment

Table 6.6-5 Comparison of Evaluation Indicator

Total PCU-hour in case of Do nothing case	Total PCU-hour in case of Propose of HSH Network Plan	Reduction
63,600,000	48,000,000	15,600,000 (25 % reduction)

Source: JICA Study Team

Table 6.6-6 Future Traffic Volume on Major Road Section

Road Section	2019	2040	
	National Road	National Road	HSH
1. Vigan City – San Fernando City	8,000	5,200	9,900
2. Naga City – Legaspi City	7,100	5,300	11,800
3. Leyte Island – Samar Island (San Juanico)	7,600	6,100	11,300
4. Bacolod City - Kabankalan	8,600	7,900	8,300
5. Iligan City – Cagayan de Oro City	7,000	5,400	13,600

Source: JICA Study Team

PART D

ASSESSMENT OF PRESENT ROAD

CHAPTER 7

PRESENT AND FUTURE NATIONAL ROAD AND EXPRESSWAY NETWORK AND OTHER TRANSPORT FACILITIES

CHAPTER 7
PRESENT AND FUTURE NATIONAL ROAD AND EXPRESSWAY NETWORK AND OTHER TRANSPORT FACILITIES

7.1 Review of Existing Road Development Studies

7.1.1 DPWH's Investment Project for Road Development

(1) DPWH Strategic Policies and Programs

DPWH formulated the Strategic Policies and Programs based on the Philippine Development Plan (PDP) 2017-2022 Framework and National Physical Framework Plan 2016-2045 which takes off from the Duterte Administration's 0 - 10 Point Socioeconomic Agenda.

Table 7.1-1 DPWH Strategic Policies and Programs

<DPWH STRATEGIC POLICIES AND PROGRAMS>
1. Traffic Decongestion Program
2. Integrated and Seamless Transport System
3. Public-Private Partnership Program
4. Convergence and Rural Road Development Program
5. Integrated Water Resource Management Program
6. Livable, Sustainable and Resilient Communities
7. Participatory Governance and Citizens' Engagement Program
8. Clean and Efficient Government
9. Improve Expenditure Performance

Source: DPWH Strategic Policies and Programs 2017 February 2, presented by the Division Chief - DPD, PS, DPWH

Table 7.1-2 Outline of DPWH Strategic Policies and Programs

Program	Contents
1. Traffic Decongestion Program	• Construct/Improve/Widen national roads and bridges. • Construct By-passes and Diversion roads. • Construct Flyovers, Interchanges and Underpasses. • Expand and Construct **High-Standard Highway Network** based on Masterplan and Technical Studies. • Use new construction methodology to accelerate project implementation. • Recover Road Right-of-Way and clear obstructions on carriageway.
2. Integrated and Seamless Transport System	• Construct/improve logistics infrastructure network in Northern Mindanao, Davao, SOCSARGEN and CARAGA • Construct/improve roads leading to growth corridors in Western Mindanao • Study and implement **Inter-island Linkage Projects** through long-span bridges. • Connect gaps along national roads. • Construct/replace bridges. • Upgrade, improve and rehabilitate/reconstruct national roads. • Initiate studies on **tunneling technology.**
3. Public-Private Partnership Program	• Augment and complement Locally-Funded and Foreign-Assisted projects. • Construct **High Standard Highway Network** based on Masterplan and Technical Studies.
4. Convergence and Rural Road Development Program	• Enhance access to tourism gateways, service centers and tourism sites in support of the development of the Tourism Clusters in the National Tourism Development Plan (NTDP). • Construct/upgrade access roads to RORO ports/seaports and airports in coordination with the Department of Transportation (DOTr)**.** • Construct/improve roads leading to manufacturing, industries & trade corridors under the Roads Leveraging Linkages of Industry and Trade (ROLL IT) Program in coordination with the Department of Trade and Industry (DTI).

Program	Contents
	• Construct Farm to Market Roads in support to the Agri-Infrastructure program of the Department of Agriculture (DA). • Implement school building program of the Department of Education (DepED).
5. Integrated Water Resource Management Program	**Structural Measures:** • Construct/rehabilitate Flood Mitigation Structures along Major River Basins and Principal Rivers. • Construct water impounding projects to optimize use of water resources. • Construct Water Supply/Septage & Sewerage/Rain Collectors. • Upgrade/Improve drainage capacity. **Non-Structural Measures:** • Complete and update the flood control and drainage master plans and feasibility studies of Major River Basins and Principal Rivers. • Clear waterway easements in coordination with LGUs and MMDA. • Pursue accreditation of flood control engineers through capacity building and transfer of technology.
6. Livable, Sustainable and Resilient Communities	• Rehabilitate, retrofit and strengthen existing bridges. • Provide safe access to highly vulnerable areas. • Improve national roads vulnerable to flooding, landslide and slope failure. • Build evacuation centers incorporating requirements prescribed by NDRRMC. • Upgrade quality standards based on Design Guidelines, Criteria & Standards (DGCS) 2015 which incorporates resilient design to address climate change impacts to all infrastructures. • Deploy equipment and manpower within 24 hours from the first advisory of NDRRMC, PAGASA and PHIVOLCS. **Create Environment-Friendly Communities:** • Promote Safe and Clean Transportation System thru the construction of Bike Lanes • Provide safe and unimpeded access for pedestrians **Infrastructure Support for Marginalized Sectors** • Construct support facilities for marginalized sectors (senior citizens, physically challenged persons, women sector, etc.). • The budget for the accessibility facilities for physically challenged persons significantly increased by 2033% from P15 Million in 2016 to P320 Million in 2017
7. Participatory Governance and Citizens' Engagement Program	• Create a multi-media citizens feedback mechanism including a 24/7 Secretary's hotline • Engage private sector in project identification, prioritization and monitoring. • Improve dissemination of road works information through traffic navigation application like Waze. • Initiate creation of the Infrastructure Monitoring and Advisory Group (IMAG).
8. Clean and Efficient Government	• Sustain DPWH Quality Management System ISO 9001:2008 Certification and skills • Enhancement of technical manpower. • Impose sanctions to erring DPWH officials and employees. • Conduct random lifestyle check of persons of interest. • Subject 100% of DPWH employees to drug testing. • Include Drug testing in the medical exam as pre-employment requirement. • Create new permanent positions to adopt to the increasing annual budget for infrastructure.
9. Improve Expenditure Performance	• Revised PREXC Budget Structure

Source: DPWH Strategic Policies and Programs 2017 February 2, presented by the Division Chief - DPD, PS, DPWH

(2) DPWH Medium Term Public Investment Program

DPWH has formulated its Medium Term Public Investment Program 2017-2022 and updated it last June 2019. This contains the priority programs, activities and projects to be implemented by DPWH.

PIP consists mainly of three (3) programs: 1) Asset Preservation Program, 2) Network Development Program, and 3) Bridge Program

Table 7.1-3 Contents of Public Investment Program 2017-2022

Main Program	1) Asset Preservation Program	2) Network Development Program	3) Bridge Program
Sub-Program	• Construction/upgrading/rehabilitation of Drainage along National Roads • Preventive Maintenance • Rehabilitation/ Reconstruction of Road with Slips, Slope Collapse and Landslide • Rehabilitation/ Reconstruction/ Upgrading of Damaged Paved Roads	• Construction of Bypass and Diversion Road • Construction of Flyovers/ Interchanges/ Underpasses/ Long Span Bridges • Construction of Missing Links/ New Roads • Off Carriageway Improvement • Paving of Unpaved Roads • Road Widening	• Construction of New Permanent Bridges • Rehabilitation/ Major Repair of Permanent Bridges • Replacement of Bridges (Temporary to Permanent) • Replacement of permanent Weak Bridges • Retrofitting/ Strengthening of Permanent Bridges • Widening of Permanent Bridges

Source: DPWH Strategic Policies and Programs 2017 February 2, presented by the Division Chief - DPD, PS, DPWH

The PIP sub-program was arranged corresponding to the Strategic Policies shown in **Table 7.1-4**.

Table 7.1-4 PIP Sub-Program Corresponding to the Strategic Policies

Strategic Policies	PIP Sub-Program
Traffic Decongestion Program	• Road Widening • Widening of Permanent Bridges • Construction of By-pass and Diversion Roads • Construction of Flyovers/ Interchanges/ Underpasses • Off-Carriageway Improvement
Integrated and Seamless Transport System	• Construction of Missing Links/New Roads • Construction of New Permanent Bridges • Paving of Unpaved Roads • Preventive Maintenance • Rehabilitation/Reconstruction/Upgrading of Damaged Paved Roads • National Bridge Construction/Replacement Program (Design and Build Bridges)
Convergence and Rural Road Development Program	• Construction/Improvement of Access Roads leading to Airports • Construction/Improvement of Access Roads leading to Seaports • Construction/Improvement of Access Roads leading to Declared Tourists Destinations • Construction/Improvement of Access Roads leading to Trades, Industries and Economic Zones • Construction/Improvement of Various Infrastructures in Support of National Security • Others (Restoration and Rehabilitation of the Banaue Rice Terraces, South East ASEAN Games and Para-Games Related Infrastructure and Pasig River Ferry Convergence Program) • Rehabilitation of Disaster-related Infrastructure and Other Facilities
Livable, Sustainable and Resilient Communities	• Construction/Maintenance of Flood Mitigation Structure and Drainage Systems • Construction/Rehabilitation of Flood Mitigation Facilities with Major River Basin and Principal Rivers • Construction/Rehabilitation of Water Supply/Septage and Sewerage/Rain Water Collectors

Strategic Policies	PIP Sub-Program
	• Rehabilitation/Reconstruction of Roads with Slips, Slope Collapse and Landslide • Construction/Upgrading/Rehabilitation of Drainage along National Roads • Replacement of Bridges (Temporary to Permanent) • Replacement of Permanent Weak Bridges • Retrofitting/Strengthening of Permanent Bridges • Rehabilitation/ Major Repair of Permanent Bridges

Source: DPWH Strategic Policies and Programs 2017 February 2, presented by the Division Chief - DPD, PS, DPWH

Table 7.1-5 shows the PIP received from DPWH on 2019 May 16. Since there are on-going projects and proposed projects (2020-2022), a combined table was prepared by JST.

- In 2016, total budget for PIP was 364 Billion PhP and drastically increased to 430 Billion PhP in 2017 and 613 Billion PhP in 2018.
- In 2019, total budget for PIP is 447 Billion PhP due to delay of budget approval. But after 2020, budget for PIP is estimated to increase.

Figure 7.1-1 illustrates the share of PIP in 2018.

- Network development has the highest share of 30% at 182 Billion PhP in 2018. It involves Construction of Bypass and Diversion Roads, Construction of Flyovers, Paving of Unpaved Roads, Road Widening, and so on.
- Next higher share was Flood Management Program (20%), Local Program (19%), Asset Preservation Program (10%) and Bridge Program (6%).

Figure 7.1-2 illustrates the trend of PIP 2016-2022.

After 2021, PIP has increased its budget for the Foreign-assisted programs. The following major projects are considered after 2020 (see **Table 7.1-6**).

It is noted, however, that the actual disbursement rates of DPWH, as a percentage of the annual infrastructure budgets, were only 34.2% in 2016, 33.6% in 2017, and 39.7% in 2018, based on data from the Commission on Audit and DPWH. These disbursement rates indicate the absorptive capacity of DPWH and should be considered in determining realistic levels of future infrastructure expenditures of the Department.

Table 7.1-5 PIP 2017-2022 (2019 May 16 base) On-going and Proposed Projects

On-going and Proposed Projects (1+2) (Million Php)

	2016	2017	2018	2019	2020	2021	2022
1.LOCALLY FUNDED PROJECTS	333,947	393,184	573,344	383,344	587,473	603,368	570,613
1.1 ORGANIZATIONAL OUTCOME1 : NATIONAL ROAD	162,565	216,892	280,678	199,598	373,879	379,037	328,783
1.1.1 ASSET PRESERVATION PROGRAM	33,849	41,414	63,825	56,647	62,312	68,543	75,397
1.1.2 NETWORK DEVELOPMENT PROGRAM	103,247	140,935	182,007	113,290	278,940	274,604	213,907
1.1.3 BRIDGE PROGRAM	25,469	34,543	34,845	29,661	32,627	35,890	39,479
1.2 ORGANIZATIONAL OUTCOME2 : FLOOD MANAGEMENT PROGRAM	58,960	72,926	122,742	101,910	112,101	123,311	135,642
1.3 CONVERGENCE AND SPECIAL SUPPORT PROGRAM	30,978	19,731	50,963	34,256	58,044	55,154	56,856
1.4 LOCAL PROGRAM	81,445	83,635	118,960	47,580	43,449	45,865	49,332
2.FOREIGN-ASSISTED PROJECTS	15,739	9,974	10,538	25,198	56,097	719,703	774,945
2.1 NATIONAL ROADS AND BRIDGES	10,503	7,747	5,596	15,437	30,416	387,767	475,048
2.2 FLOOD CONTROL	5,236	2,227	4,942	9,761	25,681	331,936	299,897
3.SUPPORT TO OPERATION	13,858	25,244	27,888	37,178	41,666	46,758	52,544
4.GENERAL ADMINISTRATION AND SUPPORT	1,238	1,862	1,419	1,783	1,753	1,897	2,276
TOTAL	**364,783**	**430,264**	**613,189**	**447,502**	**686,990**	**1,371,726**	**1,400,378**

(1) On-going Projects (Million Php)

	2016	2017	2018	2019	2020	2021	2022
1.LOCALLY FUNDED PROJECTS	333,947	393,184	573,344	383,344	428,588	481,438	483,535
1.1 ORGANIZATIONAL OUTCOME1 : NATIONAL ROAD	162,565	216,892	280,678	199,598	214,994	257,107	241,705
1.1.1 ASSET PRESERVATION PROGRAM	33,849	41,414	63,825	56,647	62,312	68,543	75,397
1.1.2 NETWORK DEVELOPMENT PROGRAM	103,247	140,935	182,007	113,290	120,055	152,674	126,829
1.1.3 BRIDGE PROGRAM	25,469	34,543	34,845	29,661	32,627	35,890	39,479
1.2 ORGANIZATIONAL OUTCOME2 : FLOOD MANAGEMENT PROGRAM	58,960	72,926	122,742	101,910	112,101	123,311	135,642
1.3 CONVERGENCE AND SPECIAL SUPPORT PROGRAM	30,978	19,731	50,963	34,256	58,044	55,154	56,856
1.4 LOCAL PROGRAM	81,445	83,635	118,960	47,580	43,449	45,865	49,332
2.FOREIGN-ASSISTED PROJECTS	15,739	9,974	10,538	25,198	53,879	378,730	433,996
2.1 NATIONAL ROADS AND BRIDGES	10,503	7,747	5,596	15,437	28,198	324,044	411,349
2.2 FLOOD CONTROL	5,236	2,227	4,942	9,761	25,681	54,686	22,647
	2016	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**
3.SUPPORT TO OPERATION	13,858	25,244	27,888	37,178	41,666	46,758	52,544
4.GENERAL ADMINISTRATION AND SUPPORT	1,238	1,862	1,419	1,783	1,753	1,897	2,276
TOTAL	**364,783**	**430,264**	**613,189**	**447,502**	**525,887**	**908,823**	**972,352**

(2) Proposed Projects (Million Php)

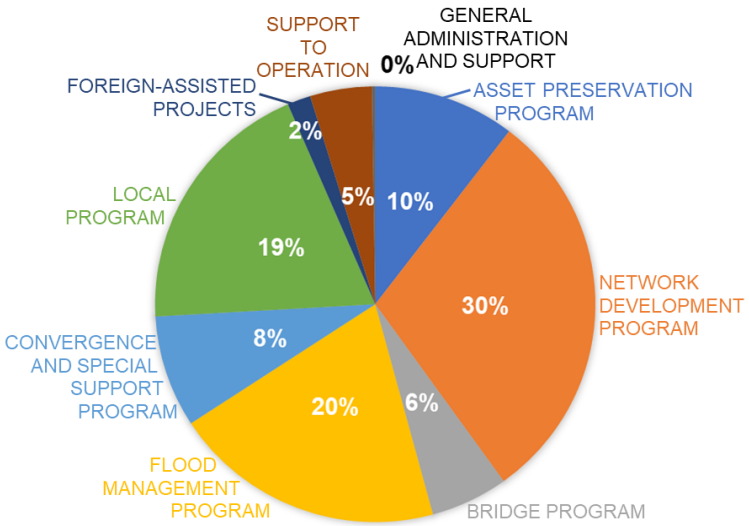
	2016	2017	2018	2019	2020	2021	2022
1.LOCALLY FUNDED PROJECTS	0	0	0	0	158,885	121,930	87,078
1.1 ORGANIZATIONAL OUTCOME1 : NATIONAL ROAD	0	0	0	0	158,885	121,930	87,078
1.1.1 ASSET PRESERVATION PROGRAM	0	0	0	0	0	0	0
1.1.2 NETWORK DEVELOPMENT PROGRAM	0	0	0	0	158,885	121,930	87,078
1.1.3 BRIDGE PROGRAM	0	0	0	0	0	0	0
1.2 ORGANIZATIONAL OUTCOME2 : FLOOD MANAGEMENT PROGRAM	0	0	0	0	0	0	0
1.3 CONVERGENCE AND SPECIAL SUPPORT PROGRAM	0	0	0	0	0	0	0
1.4 LOCAL PROGRAM	0	0	0	0	0	0	0
2.FOREIGN-ASSISTED PROJECTS	0	0	0	0	2,218	340,973	340,948
2.1 NATIONAL ROADS AND BRIDGES	0	0	0	0	2,218	63,723	63,699
2.2 FLOOD CONTROL	0	0	0	0	0	277,250	277,250
3.SUPPORT TO OPERATION	0	0	0	0	0	0	0
4.GENERAL ADMINISTRATION AND SUPPORT	0	0	0	0	0	0	0
TOTAL	**0**	**0**	**0**	**0**	**161,103**	**462,903**	**428,026**

Source: DPWH Strategic Policies and Programs 2017 February 2, presented by the Division Chief - DPD, PS, DPWH

Table 7.1-6 Major Foreign-assisted Project in PIP 2016-2022 (more than 20 Billion Project)

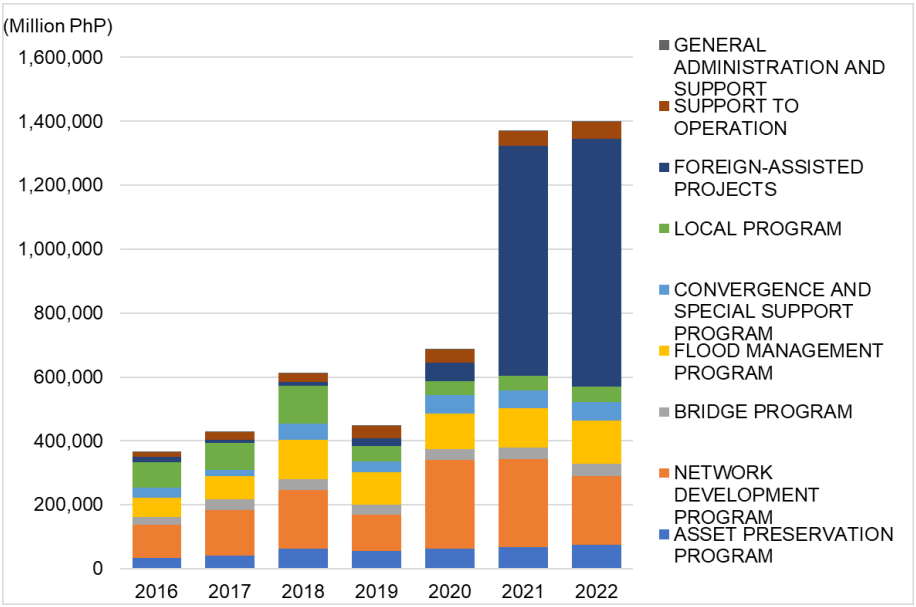
Proposed Project Name	Estimate Expenditure (Million Php)
Panay-Guimaras-Negros Inter-island Link Bridge (China)	97,300
Master Plan Study and Institutional Development on Urban Transport System - Mandaue-Lapu-Lapu Link Bridge and Mandaue Coastal Road - Metro Cebu Circumferential Road (Metro Cebu Ring Road)	58,419
Davao City Expressway Project (China)	24,500
Pasacao - Balatan Tourism Coastal Development Program (China)	24,000
New Mactan Bridge Construction Project (JICA)	26,000
Paranaque Spillway/Tunnel Project (JICA)	45,876

Source: DPWH Strategic Policies and Programs 2017 February 2, presented by the Division Chief - DPD, PS, DPWH



Source: DPWH Strategic Policies and Programs 2017 February 2, presented by the Division Chief - DPD, PS, DPWH

Figure 7.1-1 Share of PIP in Year 2018



Source: DPWH Strategic Policies and Programs 2017 February 2, presented by the Division Chief - DPD, PS, DPWH

Figure 7.1-2 Public Investment Program

7.1.2 HSH Network Development M/P (Phase-1)

This Study is a JICA-assisted Masterplan undertaken in July 2010 at DPWH.

(1) Results

The objectives of the Study were as follows:

1) Formulation of Development Strategy for the High Standard Highway Network

2) Development strategy was formulated defining the concept of the high standard highways required for the study areas through the following studies;

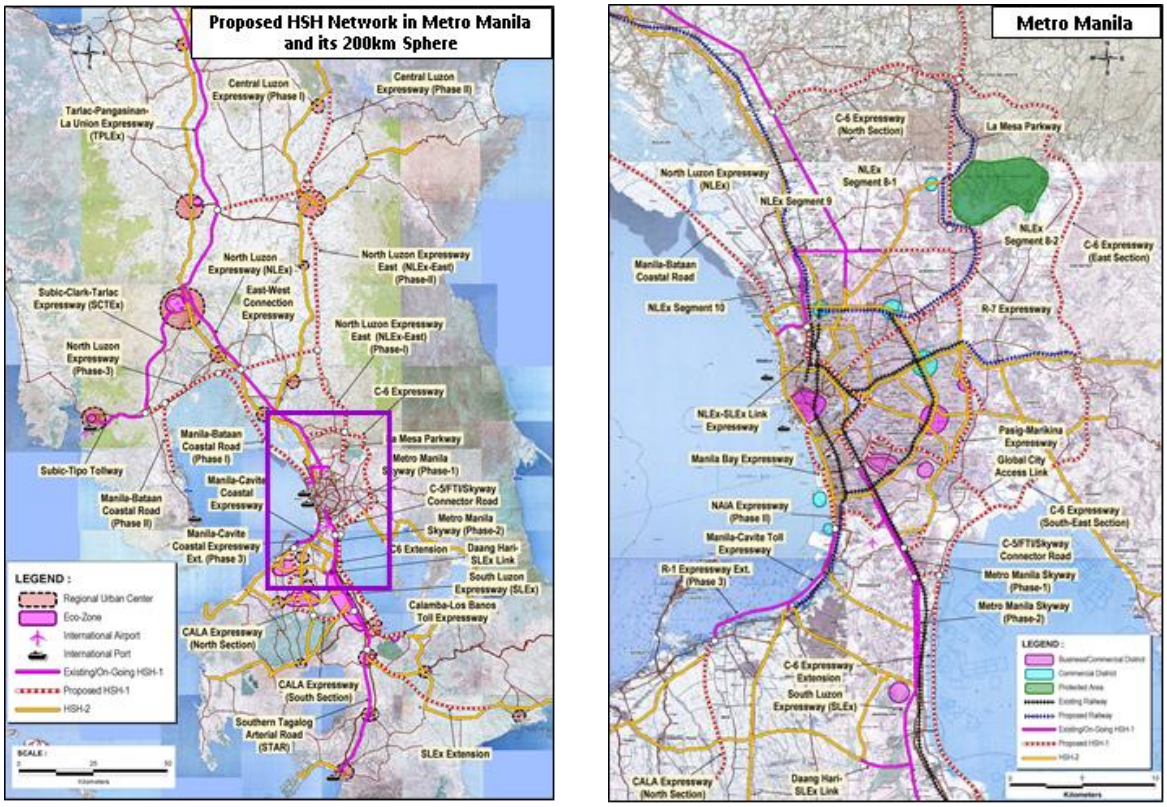
- Review of current overall conditions and problems
- Formulation of socio-economic framework for the target years of 2030
- Present and future land use plans
- Traffic demand forecast

3) Formulation of the High Standard Highway Master Plan

The master plan on the high standard highway network within the area of 200 km radius from Metro Manila was formulated identifying road network and routes for the high standard highways to meet future traffic demand.

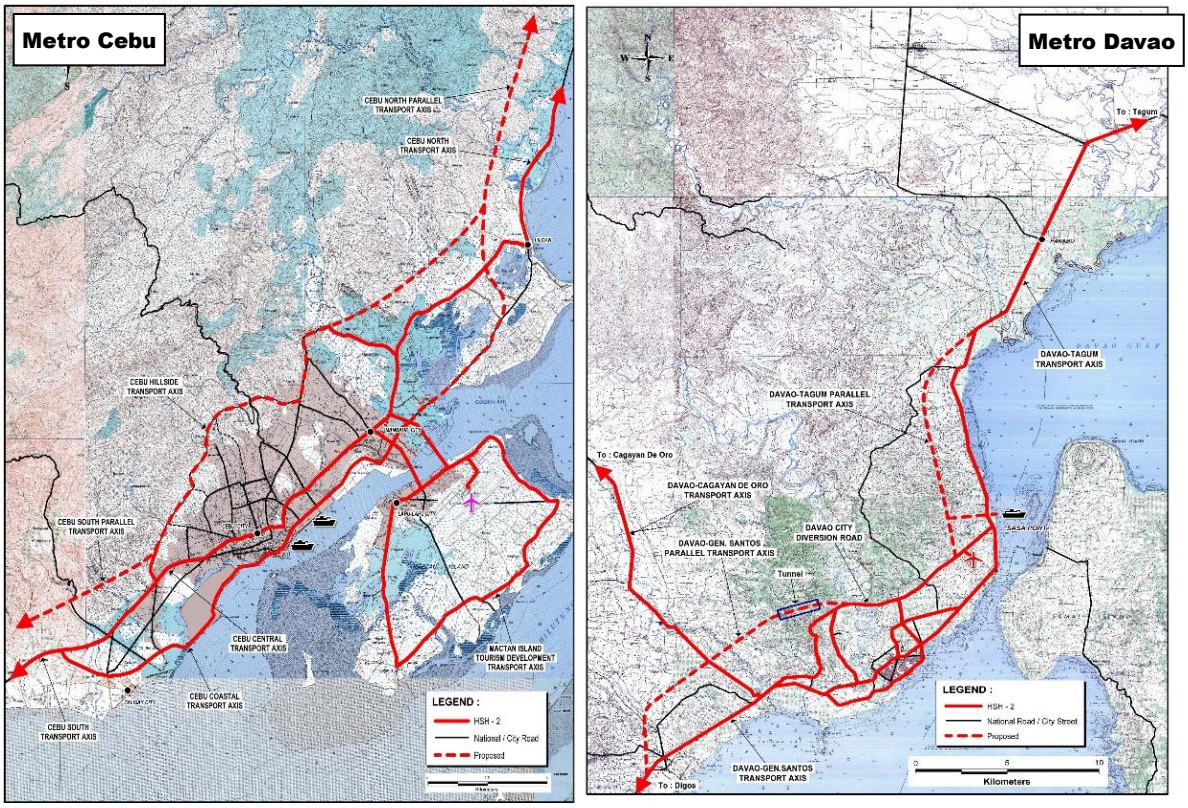
The following projects were proposed as shown in **Figure 7.1-3**, **Figure 7.1-4** and **Figure 7.1-5**. The Study covered the following Areas;

- Area within the sphere of 200km radius from Metro Manila
- Metro Cebu
- Tagum – Davao - Gen. Santos Corridor



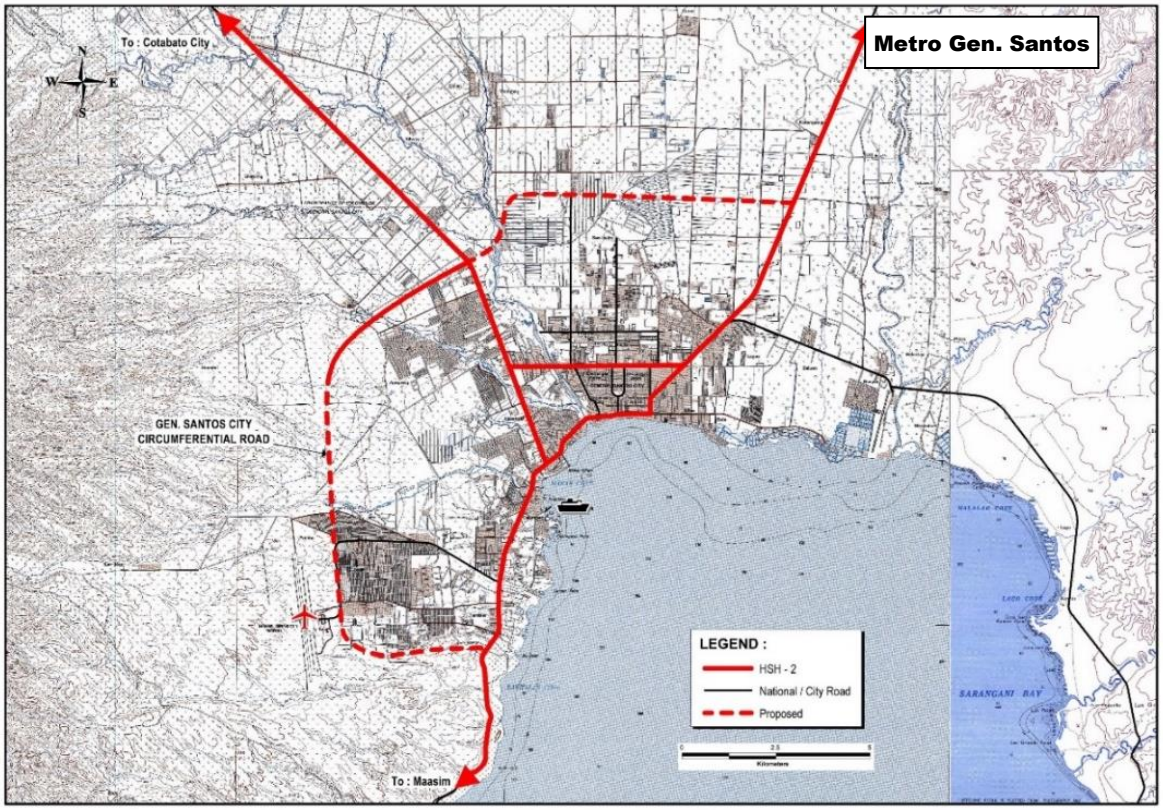
Source: High Standard Highway Master Plan (2010)

Figure 7.1-3 Proposed HSH in Area within the Sphere of 200km Radius from Metro Manila



Source: High Standard Highway Master Plan (2010)

Figure 7.1-4 Proposed HSH in Metro Cebu and Metro Davao



Source: High Standard Highway Master Plan (2010)

Figure 7.1-5 Proposed HSH in Metro Gen. Santos Corridor

Table 7.1-7 shows the proposed projects and current status.

- Most HSH projects among in the 1st Priority Group are currently implemented by DPWH or the concerned TRB concessionaires. So, it is high time to update the masterplan.
- In Metro Cebu and Davao- General Santos Corridor, the widening project has been implemented. In Davao, the Davao City Bypass is ongoing. It is necessary to implement a newer construction projects in Metro Cebu and Davao General Santos Corridor.

Table 7.1-7 Proposed HSH Projects in Area within the 200 km Sphere Radius from Metro Manila

	Name of HSH	Length (km)	Status (as of August in 2021)
1st Priority Group	NLEX-SLEX Connector Road	13.4	Ongoing Construction
	CALA Expressway	41.8	Ongoing Construction
	C-5/FTI/SKYWAY Connector Rd.	3.0	Ongoing ROW Acquisition
	NAIA Expressway (Phase 2)	4.9	Operational
	C-6 Expressway/Global City Link	66.5	Ongoing ROW Acquisition
	Central Luzon Expressway	63.9	Business Case Study Conducted Phase 1: Ongoing Construction Phase 2: For Feasibility Study
	SLEx Extension (to Lucena)	47.8	Ongoing Construction and Design
	Calamba-Los Banos Expressway	15.5	Business Case Study Conducted
	Sub-Total	**256.8**	
2nd Priority Group	R-7 Expressway	16.1	Business Case Study Conducted
	NLEX East	103.0	Business Case Study Conducted
	La Mesa Parkway		Submitted to NEDA ICC
	Manila – Bataan Coastal Road	70.3	Part of Unsolicited Proposal
	NLEX (Phase 3)	36.2	For TRB Approval
	East-West Con. Expressway	26.6	For Feasibility Study
	C-6 Extension	43.6	Business Case Study Conducted
	Manila Bay Expressway	8.0	With existing Unsolicited Proposal
	Pasig Marikina Expressway	15.7	For Feasibility Study
	Sub-Total	**319.5**	
TOTAL		**576.3**	

Source: High Standard Highway Master Plan (2010)

Table 7.1-8 Proposed HSH Projects in Metro Cebu

	Project Name	Status
Highly Urbanized	1. Extension of Cebu Coastal Road up to Liloan	Construction of 4-lane road
	2. Construction of Cebu Hillside Road and its Connector Roads	Widening to a 4-lane road in 2030
	3. Flyover construction along North Rd., South Rd. and Coastal Road	Construction of 5 flyovers in 2030
Northern Area	4. Widening of Cebu North Road	
	5. Construction of Cebu North Parallel Road	Construction of a 2-lane road in 2030
Southern Area	6. Widening of Cebu South Road from Naga to Carcar	Widening to a 4-lane road from Naga to San Fernando
	7. Construction of Cebu South Parallel Road	Widening to a 4-lane road in 2030
Mactan Island	8. Improvement of Mactan Circumferential Road	Improved
	9. Widening of First Mandaue-Mactan Bridge and its Approach Roads	Widening to 4-lane bridge including approach roads in 2030
	10. Construction of 3rd Bridge and its Approach Road	Construction of 4-lane bridge and its Approach Road in 2030

Source: High Standard Highway Master Plan (2010)

Table 7.1-9 Proposed HSH in Davao - Gen. Santos Corridor

	Project Name	Status
Inter-City HSH	1. Widening to 4-lane divided Road for Davao-Tagum Road	Convert to a 4-lane divided Road
	2. Prov. frontage Roads for urban sections of Panabo and Tagum	Provide Frontage Roads to separate mix traffic in 2030
	3. Cons. of Davao-Tagum Parallel Road including Sasa Port access Road	Widening to a 4-lane Road in 2030
	4. Widening of Davao City Diversion Road from Sasa to Davao River Bridge	Widening to 6-lane Road
	5. Construction of Davao-Gen. Santos Parallel Road	Widening to a 4-lane Road in 2030
	6. Widening of Davao and Digos section	Widening to 4-lane Road (Digos-Bato Section and Toril-Davao section completed)
	7. Widening of Digos and General Santos section	Widening to a 4-lane Road
Intra-City HSH	8. Flyover construction for HSH within Davao City	3 Flyovers in 2030
	9. Construction of Second Diversion Road (Davao City Bypass)	Ongoing Detailed Engineering Design
	10. Cons. of Gen. Santos City Circumferential Road	Construction of 2-lane Road Widening to a 4-lane Road in 2030

Source: High Standard Highway Master Plan (2010) and DPWH

(2) Lesson from HSH M/P Phase-1

Based on the review of HSH M/P Phase-1, the issues are summarized below.

Issues under the M/P Formulation:

- M/P Phase-1 was formulated in detail based on the existing proposed expressway projects, distribution of urban city, major transportation facilities, industrial development areas, tourism attraction spots, etc. But the quantitative evaluation indices, such as achievement requirements and the economic effect, were not indicated for the HSH Network Strategy, thus it is difficult to assess the M/P achievement.
- Though the M/P was studied well in the expressway project (HSH-1), the regional high standard highway (HSH-2) network was not studied well. Since the image of regional high standard highway (HSH-2) was not clear then, not many HSH-2 projects were implemented.

Issues under HSH Project Implementation:

- Most proposed projects were PPP projects, and it took much time to select PPP bidders. Many PPP projects are behind their original schedules.
- Concessionaires generally do not implement and construct the BOT projects until significant profits are anticipated. This leads to delays in project implementation based on the original DPWH/TRB schedules.

7.1.3 Preparatory Survey for Public – Private Partnership (PPP) Infrastructure Development Project

This Study was undertaken in December 2010 at DPWH after the HSH M/P (Phase-1).

(1) Results

This Study aims to identify all bottlenecks in the process of implementation of PPP projects, to select priority infrastructure development projects to be implemented by PPP scheme with ODA funding, and to prepare a draft road map for each project to realize its implementation to promote PPP infrastructure development projects in the Philippines.

Three (3) projects: CALA Expressway, NAIA Expressway Phase II and CLLEx Phase I were recommended as priority projects for possible ODA funding.

NAIA Expressway Phase II was constructed and was opened in 2016. CALA Expressway is under construction by a private firm under PPP, and CLLEx Phase I is being constructed by DPWH.

7.1.4 Other Transport Plan

(1) Philippine Superhighway Project

DPWH prepared a concept paper on the proposed Philippine Superhighway Project, a 1,625 km expressway that will run from Apayao Province in the CAR of Luzon up to General Santos City in Mindanao. The project aims to provide a direct and fast route to motorists traveling to and from Luzon and Mindanao. Since expressways are described as highways with limited access and levying tolls for passage in an open or closed system, the project will offer a non-stop route between the two points.

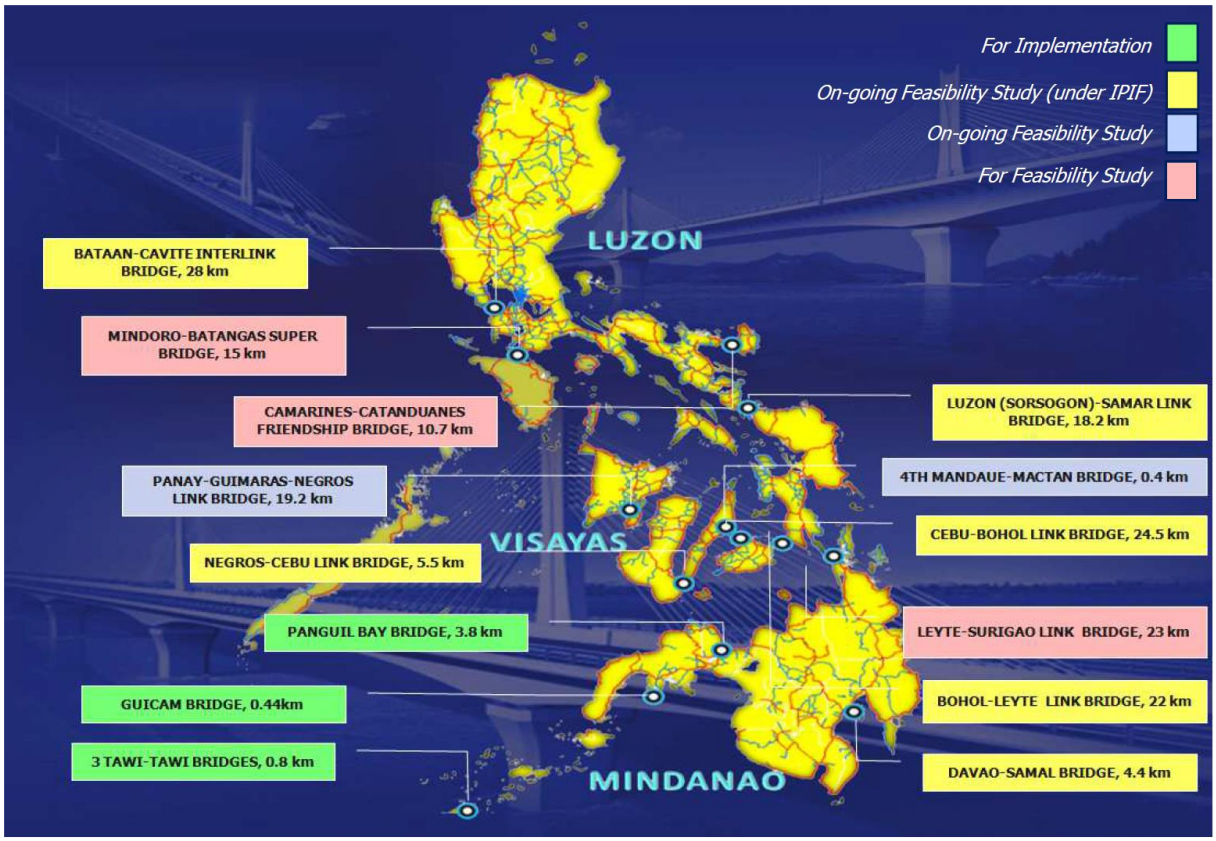
Source DPWH, 2016 December

Figure 7.1-6 Alignment Map of the Philippine Superhighway Project

(2) Inter-Island Linkage / Mega Bridge Program

A series of 16 short and long span bridges linking island provinces to eventually connect Luzon, Visayas and Mindanao via land travel has been proposed by DPWH.

As of now, three (3) bridges are for implementation, eight (8) bridges are under On-going Feasibility Study, and the remaining three (3) bridges are for Feasibility Study.



Source DPWH, September 2018

Figure 7.1-7 Inter-Island linkage / Mega Bridge Program

7.2 Present Road Network

The Philippine National Road Network is an essential component of the transportation system of the country. At present, the total road system is 211,183 km, of which 33,587 km is the total national road length as of August 2019 as per DPWH RBIA.

7.2.1 DPWH Functional Road Classification

On December 2013, a Road Reclassification and Route Numbering System was applied to the top layers of the national network new classification. The DPWH Road Classification relates to the function[1] or purpose of the road in a strategic and interregional sense rather than its use in terms of traffic related to geometric features. This is important for long-term strategic planning and prioritization.

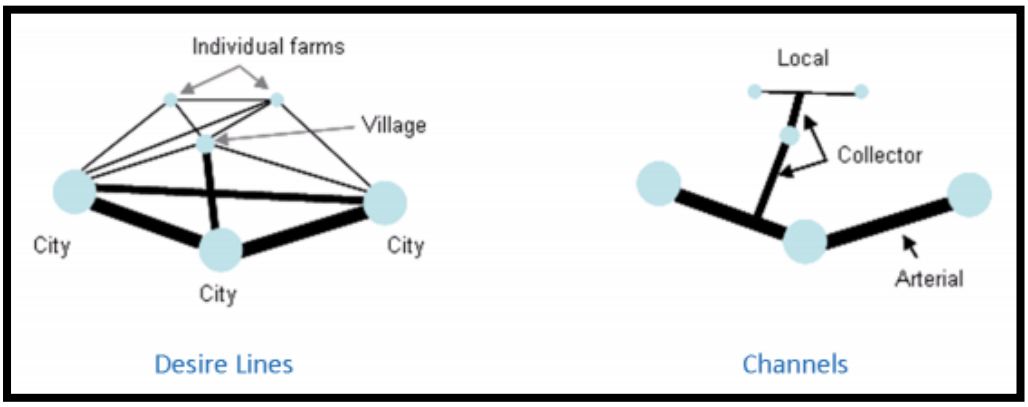
(1) Principles of Functional Classification

Road network channels traffic onto routes that should be efficient, fit for the purpose, and form part of a coherent transport network. The strategies for the road network should include looking to minimize congestion on main roads, while providing access to rural centers.

Figure 7.2-1 shows the essential principle of functional classification. In the diagram, the weight of the desire line represents the demand for number of journeys between locations; the channel lines however, indicates the functional hierarchy of roads that could be built to

[1] DPWH's Institutionalization of the New Planning Processes CS-IC-02, Road Reclassification and Road Numbering System Report version 3, May 2014

accommodate such demand, since it is not possible to build direct links between all origins and destinations.



Source: Transportation Research Board in Washington DC, 2006 (A. Talvitie)

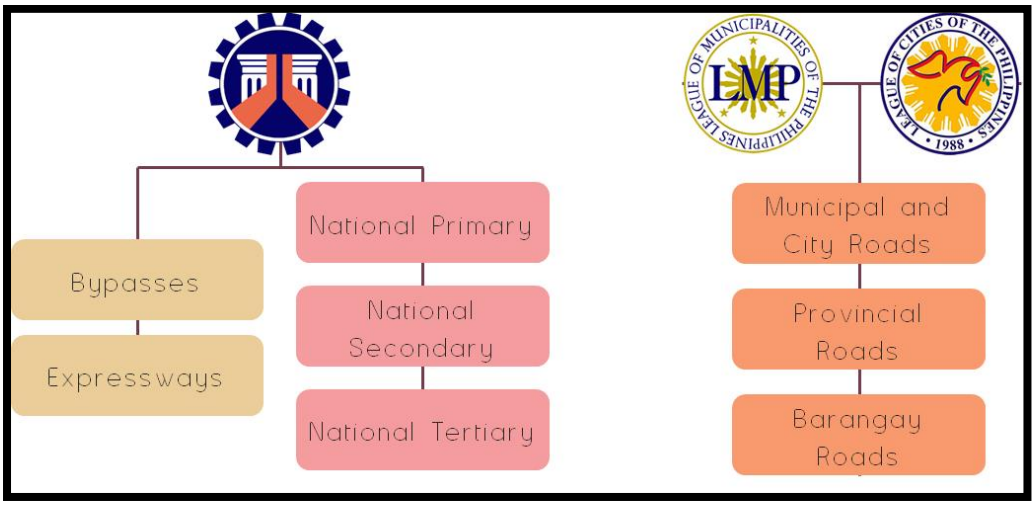
Figure 7.2-1 Principle of Functional Classification

(2) Road Function and Management

There is a direct relationship between road function and management. Ideally, the national government, through the DPWH and expressway concessionaires, manages and maintains roads of national function, and local government units (LGUs) – Provincial, City, Municipal, and Barangay Government - manage and maintain roads of local functions.

In the Philippines, however, the National Government has been given the responsibility to manage and maintain some roads of local functions through Executive and Legislative Acts.

Figure 7.2-2 shows the governing authorities of the different road classifications.



Source: http://psa.gov.ph/content/road-classification

Figure 7.2-2 Managing Authorities by Road Classification

Table 7.2-1 shows the definition for the different road classifications.

Table 7.2-1 New Road Classification System and Lengths

	Classification	Description	Total Length, km
DPWH and Expressway Operators	National Primary	• Directly connects Major Cities (at least around 100,000 people) *Cities within Metropolitan Areas are not covered by the criteria.*	7,072
	National Secondary	• Directly Connects Cities to National Primary Roads, except in Metropolitan Areas • Directly Connects Major Ports and Ferry Terminals to National Primary Roads • Directly Connects Major Airports to National Primary Roads • Directly Connects Tourist Service Centers to National Primary Roads or other National Secondary Roads • Directly Connects Cities (not included in the category of Major Cities) • Directly Connects Provincial Capitals within the same Region • Directly Connects Major National Government Infrastructure to National Primary Roads or other National Secondary Roads	14,307
	National Tertiary	• Other existing roads under DPWH which perform a local function	11,623
	Expressways	• Highways with limited access, normally with interchanges; may include facilities for levying tolls for passage in an open or closed system	406
	Bypasses	• Roads or highways that avoid a built-up area, town or city proper to let through traffic flow without interference from local traffic , reduce congestion and improve road safety where a toll for passage is levied in an open or closed system	179
DPWH and Expressway Operators: Total			**33,587**
LGUs	Provincial Roads	• Connects Cities and Municipalities without traversing National Roads • Connects National Roads to Barangays through rural areas • Connect to Major Provincial Government Infrastructure	30,151
	Municipal and City Roads	• Roads within the Poblacion • Roads that connect to Provincial and National Roads • Roads that provide inter-Barangay connections to major Municipal and City Infrastructure without traversing Provincial Roads	30,680
	Barangay Roads	• Other Public Roads (officially turned over) within the Barangay and not covered in the above definitions	116,765
LGUs Total			**177,596**
Grand Total			**211,183**

Source: http://psa.gov.ph/content/road-classification, DPWH (National), August 2019; TRB, August 2019*; DILG (Provincial and City), 2015; DILG (Municipal and Barangay), 1999*

Breakdown of the total length of all existing expressways as per Toll Regulatory Board, as of August 2019, are shown in Table 7.2-2.

Table 7.2-2 Breakdown of the Total Length of Existing Expressways

High Standard Highway	Phase/Section/Segment	From	To	Distance (km)
1) Southern Tagalog Arterial Road (STAR) Project	Stage 1	Sto. Tomas	Lipa	22.16
	Stage 2	Lipa	Batangas City	19.74
2) Subic-Clark-Tarlac Expressway (SCTEX)	Package 1	Tipo, Subic	Clark Friendship Gate	50.50
	Package 2	Clark Friendship Gate	Tarlac City	44.12
3) Southern Luzon Expressway (SLEX)	Toll Road 1	Alabang Viaduct		1.242
	Toll Road 2	Alabang	Calamba	27.10
	Toll Road 3	Calamba	Sto. Tomas	7.66
4) Muntinlupa-Cavite Expressway (MCX)	N/A	Daang Hari	SLEX, Susana Heights	4.00
5) South Metro Manila Skyway	Stage 1 (At-grade)	Magallanes	Alabang	13.43
	Stage 1 (Elevated)	Buendia	Bicutan	9.38
	Stage 2 (Elevated)	Bicutan	Alabang	6.88
	Stage 3 (Elevated)	Buendia	Balintawak	18.83
6) NAIA Expressway	Phase II (a)	Macapagal Boulevard	NAIA (MIA) Road/ NAIA Terminals 1 & 2	0.50
	Phase II (b)	Electrical Road	Sales Road	4.30
7) Manila – Cavite Toll Expressway	Segment 1	Seaside Drive	Zapote	6.48
	Segment 4	Zapote	Kawit	7.00
	C5 South Link Expressway, Segment 3A-1	C5/SLEX	Merville, Paranaque City	2.00
8) North Luzon Expressway	Segment 1	Balintawak	Tabang	27.61
	Segment 2	Burol	San Fernando	32.94
	Segment 3	San Fernando	Sta. Ines	22.20
	Segment 7	Subic, Zambales	Tipo	8.50
	Segment 8.1	Mindanao Ave.	NLEX	2.70
	Segment 9	Mindanao Ave.	McArthur Highway, Valenzuela City	2.42
	Segment 10	McArthur Highway, Valenzuela City	C3 Road, Caloocan City	5.58
9) Tarlac-Pangasinan-La Union Expressway	Section 1	Tarlac City	Rosales	46.33
	Section 2	Rosales	Urdaneta	15.57
	Section 3A	Urdaneta	Pozzorubio	15.50
	Section 3A-2	Pozzorubio	Rosario	11.81
Total Expressway Lengths (km) as of August 2021				**436.48**

Source: TRB, August 2019 and PPP Center

7.2.2 Philippine Nautical Highway System and Asian Highway

(1) Philippine Nautical Highway System

The Philippine Nautical Highway System, otherwise known as the Strong Republic Nautical Highway (SRNH), also known locally as Road Roll-On Roll-Off Terminal System (RRTS) or RORO, is a 919-km integrated network of highway and ferry vehicular routes which forms as backbone for the transport of goods and vehicles anywhere in Luzon, Visayas and Mindanao.

SRNH covers the provinces and cities of Oriental Mindoro, Tagaytay (Cavite), Marinduque, Romblon and Batangas in Luzon; Aklan, Antique, Iloilo, Capiz, Negros Oriental, Negros Occidental, Bohol, Cebu, Guimaras, and Siquijor, in the Visayas; and Misamis Occidental, Misamis Oriental, Lanao del Norte, and Dapitan City in Mindanao. These islands will be interconnected by land and sea routes using RORO passenger and cargo vessels, ferryboats, and fast crafts and other modes of land transportation. This network consists of three main nautical highways – Western, Central, and Eastern Nautical Highways.

Western Nautical Highway

Established in 2003, this serves as the primary link between Luzon and Mindanao via Visayas connecting the major islands of Mindoro, Panay, Guimaras, and Negros, with Batangas Port serving as Luzon's gateway to Visayas and Mindanao.

- Batangas City – Calapan (Mindoro)
- Roxas (Mindoro) – Caticlan (Aklan/Panay Island)
- Dumangas (Iloilo) – Bacolod (Negros)
- Dumaguete (Negros) – Pulauan (Dapitan)
- La Paz, Iloilo – Jordan, Guimaras
- Tampi – Bato
- San Carlos, Negros – Toledo
- Cebu

Central Nautical Highway

Established in 2008, the highway runs parallel to the Western Nautical Highway. It connects the mainland Luzon to Mindanao. This highway passes through Masbate and Central Visayas to get to Mindanao.

- Pilar/Bulan, Sorsogon – Masbate City, Masbate
- Cawayan/Cataingan, Masbate City – Bogo, Cebu
- Cebu City, Cebu – Tubigon, Bohol
- Jagna, Bohol – Mambajao, Camiguin
- Benoni, Camiguin – Balingoan, Misamis Oriental

Eastern Nautical Highway

Inaugurated in 2009, this nautical highway lies parallel to the other networks linking mainland Luzon to Mindanao via Masbate, Biliran, Leyte, and Southern Leyte. It provides a new network of roads and "moving bridges" as an economic and efficient means of transporting passengers and rolling cargoes.

- Pilar/Bulan, Sorsogon – Masbate City, Masbate
- Cataingan/Esperanza, Masbate, Masbate – Naval, Biliran
- San Ricardo, Southern Leyte – Surigao City, Misamis Oriental

Portions of the Eastern Nautical Highway overlap with the Central Nautical Highway, particularly those located in Masbate. The highway also uses the Pilar/Balud, Sorsogon – Masbate City, Masbate link and Cataingan Port, which also serve the Central Nautical Highway. The route further links Masbate Province with more destinations including Biliran Province in Eastern Visayas.

SRNH will enhance investment opportunities for agro-industries, commerce, trade, tourism, and also provide efficient and convenient travel movement of local and international tourist and investors through shorter travel time and lower transportation costs.

Source: DPWH Atlas

Figure 7.2-3 Philippine Nautical Highway

(2) Asian Highway

The Asian Highway is a cooperative undertaking to improve the network of about 141,000 km of standardized highway crisscrossing 32 Asian countries with linkages in Europe. The Asian Highway (AH) has been included in the national plan of many countries, including the Philippines.

On December 17, 2007[2], the Philippines signed the Inter-governmental Agreement on the Asian Highway Network developed under ESCAP (Economic and Social Commission for Asia and the Pacific) secretariat and deposited with the Secretary-General of the United Nations.

The network in the Philippines known as Asian Highway 26 (AH26) runs from Laoag to Zamboanga, linking major seaports and cities as shown in **Figure 7.2-4**.

[2] https://www.unescap.org/resources/intergovernmental-agreement-asian-highway-network, https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XI-B-34&chapter=11&clang=_en

Source: United Nations ESCAP (Economic and Social Commission for Asia and the Pacific), 2017

Figure 7.2-4 AH 26 (Asian Highway 26)

The AH network has been used as reference for the development of a sub-regional highway cooperation program. As per United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), its major effects can be summarized as follows:

- Provided basis for coordinated development of road networks at regional level;
- Generated interest in greater connectivity which subsequently led to the development of sub-regional networks;
- Developed common design and technical standards for highway development;
- Enhanced connectivity that has been supporting the growth of inter-country trade;
- Attracted greater interest of development banks in financing regional road projects.

7.3 Proposed Expressway Project

Information on existing, on-going and proposed major road projects were collected and summarized in **Table 7.3-1**, **Table 7.3-2** and **Table 7.3-3**. The road alignments of these projects are shown in **Figure 7.3-1**, **Figure 7.3-2** and **Figure 7.3-3**.

Table 7.3-1 Major Road Projects in Luzon

Proponent/ Operator	Ref No.	High Standard Highway Project	Phase/ Segment	Description	Length (km.)	Status
NLEX Corporation (subsidiary of MPTC)	1	**North Luzon Expressway (NLEX)**	Phase I	(Segment 1) 4 lane expressway from Balintawak to Tabang Intersection	27.62	Operational
				(Segment 2) 6-lane expressway from Burol to San Fernando	32.80	Operational
				(Segment 3) 4-lane expressway from San Fernando to Santa Ines	22.20	Operational
	2			(Segment 7) 2-lane expressway from Bo. Tipo to SBMA, also known as Subic Freeport Expressway (SFEX)	8.50	Operational
	3		Phase II (NLEX Harbor Link Project)	(Segment 8.1) 4-lane expressway from Mindanao Ave. to NLEX	2.70	Operational (commenced on June 2010)
	4			(Segment 8.2) 4-lane expressway from Mindanao Ave. to Commonwealth Ave.	8.35	DED approved by TRB; ongoing ROW acquisition by DPWH
	5			(Segment 9) 4-lane expressway from NLEX Mindanao Ave. Link to MacArthur Highway, Valenzuela City	2.42	Operational (commenced on March 2015)
	6			(Segment 10) 6-lane expressway fom MacArthur Highway, Valenzuela City to C-3 Road, Caloocan City	5.5	Operational (commenced on March 2019)
	7		Phase III (Subic Expressway)	(Segment 4) 4-lane expressway from San Simon to Guagua	17.0	Proposal to be submitted to TRB
				(Segment 5) 4-lane expressway from Guagua to Dinalupihan	31.0	Proposal to be submitted to TRB
				(Segment 6) 4-lane expressway from Dinalupihan to Bo. Tipo	10.5	Proposal to be submitted to TRB
NLEX Corporation (subsidiary of MPTC)	8	**Subic – Clark – Tarlac Expressway (SCTEX)**	Package 1	4-lane expressway from Tipo, Subic to Clark Friendship Gate	50.5	Operational
			Package 2	4-lane expressway from Clark Friendship Gate to Tarlac City	44.12	Operational
Private Infra Development Corp. (subsidiary of SMHC)	9	**Tarlac – Pangasinan – La Union Expressway (TPLEX)**	Phase I	4-lane expressway from La Paz, Tarlac to Rosales, Pangasinan	47	Operational
			Phase II	4-lane expressway from Rosales, Pangasinan to Urdaneta City	15	Operational
			Phase III	4-lane expressway from Urdaneta City to Rosario, La Union	27	Segment 8 (Pozorrubio – Rosario, 11.45 km.) is under construction
	10		Extension	4-lane expressway from Rosario, La Union to San Juan, La Union	59.4	The unsolicited proposal is for endorsement to NEDA.
Philippine National Construction Corp. /South Luzon Tollways Corp. (subsidiary of SMHC)	11	**South Luzon Expressway (SLEX)**	Phase I	(Toll Road 1) Alabang Viaduct	1.24	Operational
				(Toll Road 2) Toll road from Alabang to Calamba	27.3	Operational
				(Toll Road 3) 4-lane toll road from Calamba to Sto. Tomas, Batangas, connecting SLEX to STAR Tollway	7.6	Operational
	12		Phase II	(Toll Road 4) 4-lane toll road from Sto. Tomas, Batangas to Lucena, Quezon	66.74	Under construction
STAR Infrastructure Development Corporation	13	**Southern Tagalog Arterial Road (STAR)**	Stage I	2 to 4-lane expressway from Sto. Tomas to Lipa City	22.16	Operational
			Stage II	2 to 4-lane expressway from Lipa City to Batangas City	19.74	Operational
Cavitex Infrastructure Corp. (subsidiary of MPTC)	14	**Manila – Cavite Toll Expressway (CAVITEx)**	Segment 1	Toll road from R-1 Expressway Seaside Drive to Zapote	6.475	Operational
	15		Segment 2	Toll road from R-1 Interchange to Sucat Interchange	1.9	DED approved by TRB; ongoing ROW acquisition by DPWH

Proponent/ Operator	Ref No.	High Standard Highway Project	Phase/ Segment	Description	Length (km.)	Status
			Segment 3A-1	Toll road from Merville to C-5/SLEX	2.2	Operational
			Segment 3A-2	Toll road from E. Rodriguez to Merville	1.6	DED approved by TRB; ongoing ROW acquisition by DPWH
			Segment 3B	Toll road from Sucat Interchange to SLEX Interchange	5.8	DED approved by TRB; ongoing ROW acquisition by DPWH
	14		Segment 4	Toll road from R-1 Expressway Extension Zapote to Kawit	7	Operational
Ayala Corporation	16	**Muntinlupa – Cavite Expressway (MCX)**	n/a	4-lane expressway from the junction of Daang Hari and Daang Reyna to SLEX	4	Operational (commenced on July 2015)
Citra Central Expressway Corporation (subsidiary of SMHC)	17	**Metro Manila Skyway**	Stage I	6-lane elevated expressway from Buendia to Bicutan	9.4	Operational
				At-grade expressway from Magallanes to Alabang	13.43	Operational
	18		Stage II	6-lane elevated expressway from Bicutan to Alabang over the existing alignment of SLEX	6.9	Operational
	19		Stage III	6-lane elevated expressway from Buendia to NLEX Balintawak	15	Under construction
Vertex Tollway Devt. Inc. (subsidiary of SMHC)	20	**NAIA Expressway**	Phase II - A	4-lane expressway from Macapagal Blvd. to NAIA Road/NAIA Terminals 1 and 2	0.5	Operational (commenced on Sept. 2016)
			Phase II - B	4-lane expressway from Electrical Road to Andrews Ave. to Sales Road	4.3	Operational (commenced on Dec. 2016)
MPCAla Holdings Inc. (subsidiary of MPTC)	21	**Cavite – Laguna Expressway (CALAX)**	n/a	4-lane toll expressway from CAVITEX in Kawit to SLEX-Mamplasan Interchange in Binan, Laguna	45	Under construction
Citra Intercity Tollways (unit of SMHC)	22	**Southeast Metro Manila Expressway (C6 Expressway Phase 1)**	Segment 1	(Section 1) 6-lane toll road from Skyway/FTI to C-5/Diego Silang	2.387	Ongoing ROW acquisition and civil works
				(Section 2) 6-lane toll road from C-5/Diego Silang to C-6/Taguig	3.202	Ongoing pre-construction activities (realignment, DED)
				(Section 3) 6-lane toll road from C-6/Taguig to Ortigas Ave. Extension	11.783	Ongoing ROW acquisition
			Segment 2	(Section 4) 6-lane toll road from Ortigas Ave. Ext. to Marcos Highway	5.337	Ongoing pre-construction activities
				(Section 5) 6-lane toll road from Marcos Highway to Tumana Bridge	6.9	Ongoing pre-construction activities
				(Section 6) 6-lane toll road from Tumana Bridge to Batasan Complex	3.06	Ongoing pre-construction activities
NLEX Corporation (subsidiary of MPTC)	23	**NLEX – SLEX Connector Road**	n/a	4-lane elevated expressway over the Philippine National Railway (PNR) right-of-way, starting from C3 Road in Caloocan towards Sta Mesa, connecting Metro Manila Skyway Stage 3	8.0	Ongoing pre-construction activities, i.e. finalization of the updated Conceptual Engineering Design, ROW acquisition, etc.
Ausphil Tollways Corporation	24	**North Luzon Expressway East (NLEE)**	Phase I (La Mesa Parkways)	Toll road expressway from Commonwealth - La Mesa to Bigte, Norzagaray	18.0	For approval (under evaluation by NEDA – ICC)
	25		Phase II	Toll road expressway from Bigte, Norzagaray to Cabanatuan	91.1	For feasibility study/business case
Coastal Development Consortium (New San Jose Builders Inc./San Miguel Holdings Corp.)	26	**Manila Bay Integrated Flood Control, Coastal Defense (MBIFCCD) and Expressway Project**	n/a	Expressway in the northern coastline of Manila Bay that will connect Bataan with Metro Manila and provide direct access to Bulacan and Pampanga	62	For approval (under evaluation by NEDA – ICC)

Proponent/ Operator	Ref No.	High Standard Highway Project	Phase/ Segment	Description	Length (km.)	Status
MPT South Corp. (subsidiary of MPTC)	27	**Cavite – Tagaytay – Batangas Expressway (CTBEX)**	n/a	4-lane toll road expressway from CALAEx in Silang, Cavite to Ternate-Nasugbu Road in Nasugbu, Batangas	50	For approval (under evaluation by NEDA – ICC)
Cavitex Infrastructure Corp. and NLEX Corporation (MPTC)	28	**C-5 Expressway**	n/a	6-lane elevated expressway from the end of NLEX Segment 8.2 in Quezon City to CAVITEX C-5 South Link in Taguig City	20	For approval (for issuance of OPS)
Cavitex Infrastructure Corp. and NLEX Corporation (subsidiary of MPTC)	29	**NLEX – Cavitex Port Expressway Link**	Section I	Combined elevated and tunnel expressway from C3 road to Anda Circle	5.7	For approval (for issuance of OPS)
			Section II	Combined elevated and tunnel expressway from CAVITEX to Buendia Avenue	4.8	For approval (for issuance of OPS)
			Section III	Combined elevated and tunnel expressway from Buendia Avenue to Anda Circle	4.6	For approval (for issuance of OPS)
CLGP Philippine Holdings, Inc., PT Citra Persada Infrastruktur and PT Citra Marga Nusaphala Persada	30	**Manila – Taguig Expressway (MTEx)**	n/a	Elevated toll expressway to run along banks of Pasig River, connecting the province of Rizal to Pasig, Makati and Manila.	18.2	For approval (for issuance of OPS
DPWH	31	**Central Luzon Link Expressway (CLLEX)**	Phase I	4-lane expressway from La Paz, Tarlac to Cabanatuan	30	Under construction
	32		Phase II	4-lane expressway from Cabanatuan to San Jose	36	Development stage – undergoing studies
DPWH	33	**Quezon – Bicol Expressway**	n/a	Expressway from Pagbilao, Quezon to Maharlika Highway in San Fernando, Camarines Sur	220	DPWH – PPD endorsed the project to NEDA – ICC for evaluation and approval
DPWH	34	**Mindoro Batangas Super Bridge**	n/a	Pontoon bridge from Batangas City to Puerto Galera, passing through Isla Verde	15	For feasibility study/business case
DPWH	35	**Luzon Eastern Seaboard Expressway**	n/a	Expressway from Atimonan, Quezon to Dingalan, Aurora	226.5	For feasibility study/business case
Ayala Infrastructure Corp. and SM Investment Corp.	36	**C-3 Elevated Expressway (C3EX)**	n/a	Elevated toll expressway from Metro Manila Skyway Stage Stage 3 at Sta. Mesa, Manila to Diokno Boulevard in Pasay City.	8.6	For issuance of completeness of project documents in accordance with Section 10.5 of R.A. 7718
San Miguel Holdings Corp.	37	**Bataan – Bulacan Airport Expressway (BBEX)**	Segment 1	Toll road expressway from Bulacan to Lubao	37	For issuance of completeness of project documents in accordance with Section 10.5 of R.A. 7718
			Segment 2	Toll road expressway from Hagonoy to Dinalupihan	16.4	
San Miguel Holdings Corp.	38	**Bulacan – Tarlac Airport Expressway (BTEX)**	Segment 1	4-lane toll road expressway from NMIA Bulacan to Tarlac City	117	For issuance of completeness of project documents in accordance with Section 10.5 of R.A. 7718
			Segment 2	4-lane toll road expressway from Tarlac City to Macabebe	70	
San Miguel Holdings Corp.	39	**North East Airport Expressway (NEAX)**	Segment 1	Toll road expressway from San Jose Del Monte to San Miguel	43.3	For issuance of completeness of project documents in accordance with Section 10.5 of R.A. 7718
			Segment 2	Toll road expressway from San Miguel to Cabanatuan City	40.8	
			Segment 3	Toll road expressway from Cabanatuan City to San Jose City	35.6	

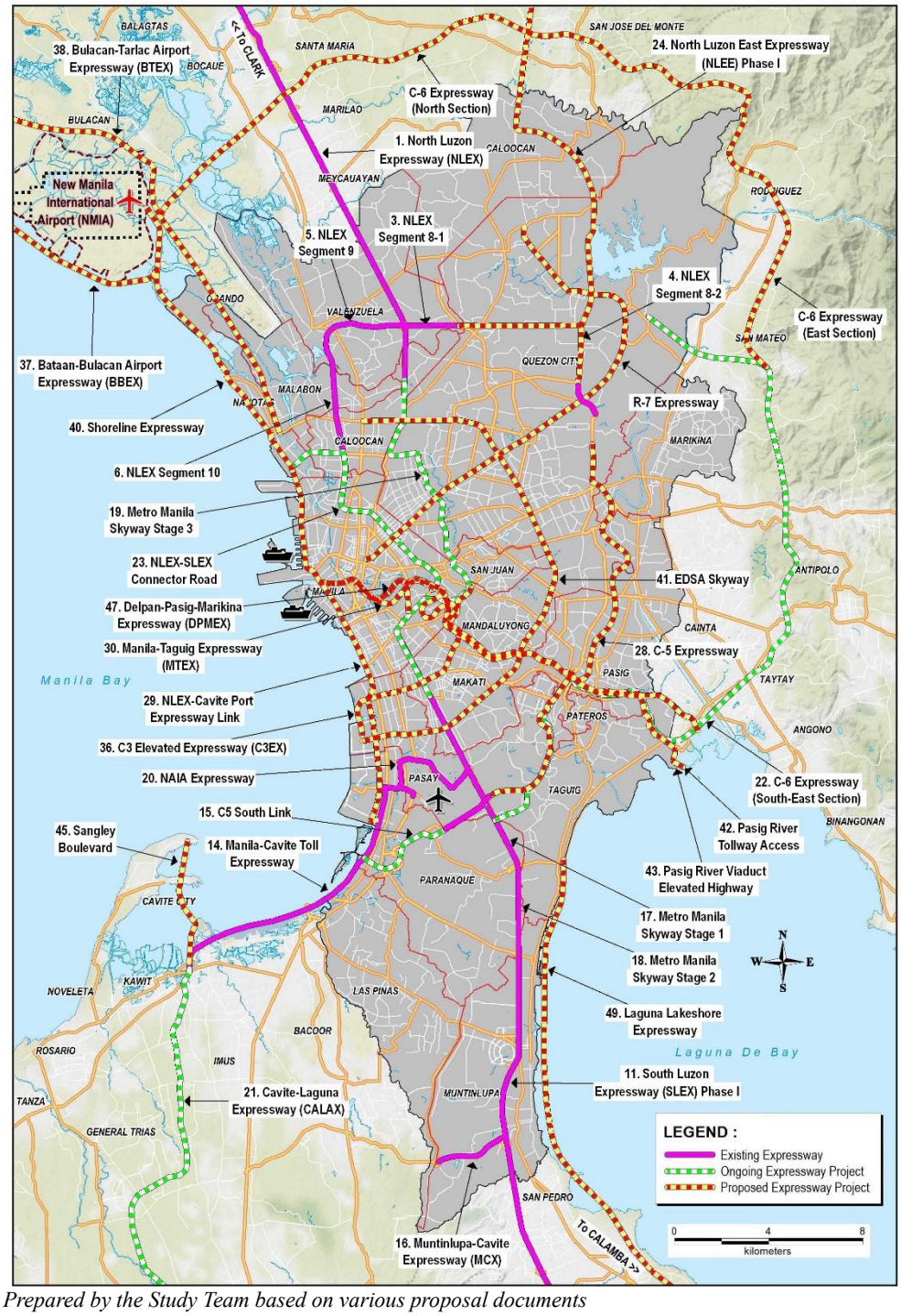
Proponent/ Operator	Ref No.	High Standard Highway Project	Phase/ Segment	Description	Length (km.)	Status
San Miguel Holdings Corp.	40	**Shoreline Expressway**	n/a	6-lane elevated toll expressway composed of viaducts located mainly along the east shoreline of Manila Bay, connecting the proposed New Manila International Airport in Bulacan to the west end point of NAIA Expressway	30.3	For issuance of completeness of project documents in accordance with Section 10.5 of R.A. 7718
San Miguel Holdings Corp.	41	**EDSA Skyway**	n/a	Elevated toll expressway that will traverse EDSA from SM Mall of Asia in Pasay to Monumento	23.8	For issuance of completeness of project documents in accordance with Section 10.5 of R.A. 7718
San Miguel Holdings Corp.	42	**Pasig River Tollway Access**	Segment 1	Elevated toll expressway from R10 to MMSS3 - Plaza Azul	5.74	For issuance of completeness of project documents in accordance with Section 10.5 of R.A. 7718
			Segment 2	Elevated toll expressway from MMSS3 - San Juan River to C-5	7.33	
			Segment 3	Elevated toll expressway from C-5 to SEMME	6.3	
Armando U Khong Hun General Contractor Inc. (AUKH)	43	**Integrated Pasig Viaduct and Personal Rapid Transit**	n/a	4-lane highway along Pasig River from Del Pan Bridge in Manila to Napindan Bridge in Taguig.	21.74	Awaiting submission of complete unsolicited proposal
Grand Metro-Manila Gateway Company, Inc. (GMMGCI)	44	**Manila - Quezon Expressway (MQX)**	n/a	Toll road from Pasig City to Candelaria, Quezon crossing Laguna de Bay	102.3	Awaiting submission of complete unsolicited proposal
CAVITEX Holdings, Inc. (subsidiary of MPTC)	45	**Sangley Boulevard**	n/a	Viaduct from Kawit Interchange of Cavitex to Sangley Point, Cavite City	4.63	Awaiting submission of complete unsolicited proposal
Mega Pacific Victory Development Corporation	46	**Quezon Coastal Toll Expressway**	n/a	Elevated expressway from Atimonan to Lopez, Quezon	37	Awaiting submission of complete unsolicited proposal
DPWH	47	**Delpan - Pasig - Marikina Expressway (DPMEX)**	n/a	Elevated expressway from Delpan, Manila to Marcos Highway in Marikina through Pasig River.	24.72	The project proposal was deferred
DPWH	48	**Batangas City - Bauan Toll Road**	n/a	Toll Road from Batangas City to Bauan, passing through the municipality of San Pascual	10	The project was pursued and implemented by DPWH Region IV-A
DPWH	49	**Laguna Lakeshore Expressway**	n/a	6-lane expressway which will sit on top of a flood control dike at the east of the shoreline, running from Bicutan to Los Banos	43.6	Failed bidding in March 2016

Table 7.3-2 Major Road Projects in Visayas

Proponent/ Operator	Ref No.	High Standard Highway Project	Phase/ Segment	Description	Length (km.)	Status
Cebu-Cordova Link Expressway Corp. (subsidiary of MPTC)	50	**Cebu-Cordova Link Expressway (CCLEX)**	n/a	Toll bridge expressway from Cebu City to Cordova	8.25	Under construction
San Miguel Holdings Corp.	51	**Boracay Bridge Project**	n/a	Limited-access toll bridge connecting the municipality of Caticlan with the Boracay Island	1.2	For approval (for issuance of OPS)
DPWH	52	**Metro Cebu Expressway (Cebu Circumferential Road)**	n/a	North-South backbone highway from Naga City to Danao City traversing along the slopes of the mountain range of Cebu province	73.75	For feasibility study/business case

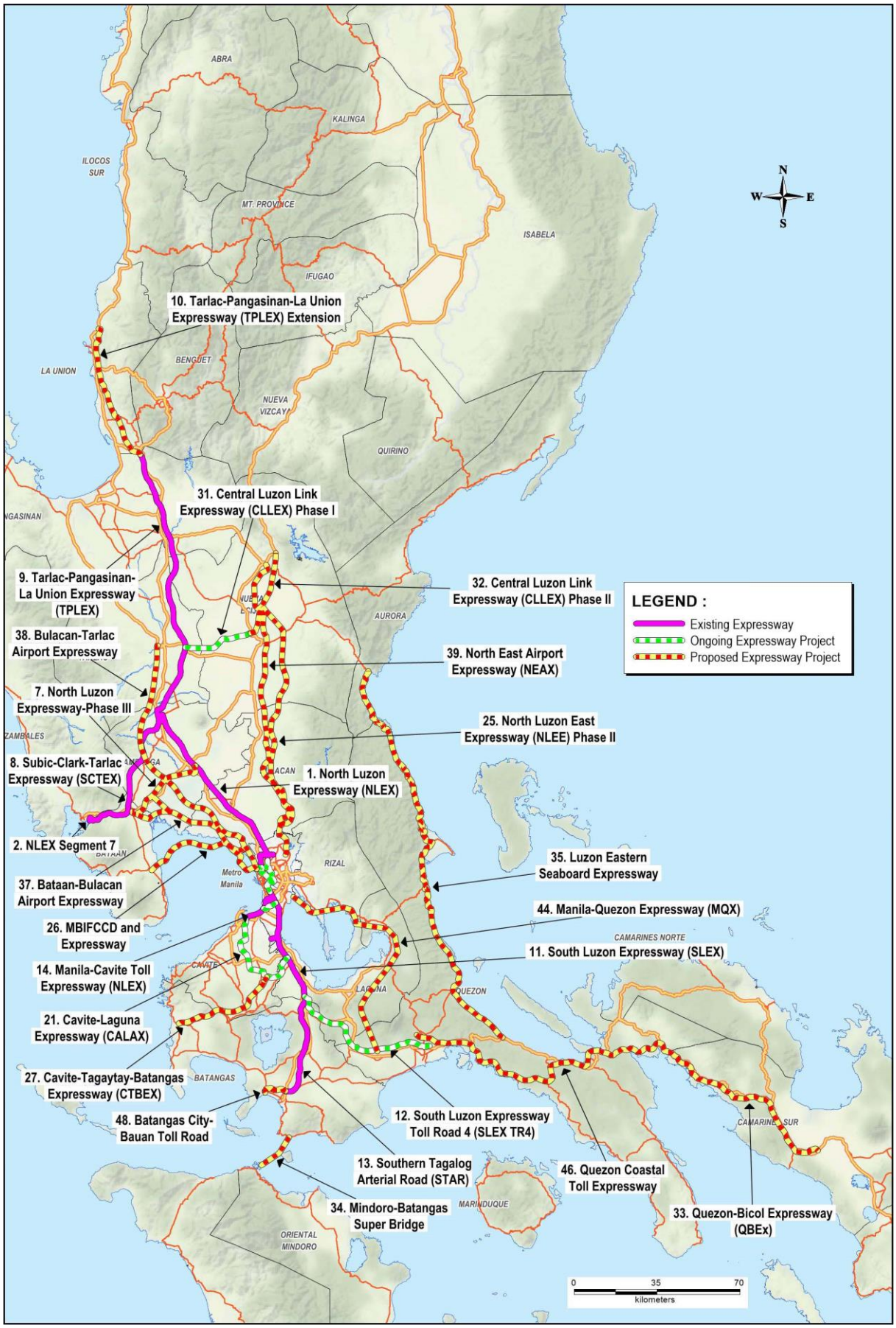
Table 7.3-3 Major Road Projects in Mindanao

Proponent/ Operator	Ref No.	High Standard Highway Project	Phase/ Segment	Description	Length (km.)	Status
DPWH	53	**Davao City Bypass Road**	n/a	Section composed of roads, bridges and a 2.3-km. tunnel starting from Davao-Digos section of the Pan-Philippine Highway in Toril, Davao City to Davao-Agusan National Highway in Panabo City	44.6	Under construction
DPWH	54	**Davao City Coastal Road**	n/a	Coastal road from Bago Aplaya to R. Castillo in Davao City	18.2	Under construction
DPWH	55	**Davao – Digos Expressway**	n/a	Toll road from Bukidnon - Davao National Highway to Digos - Sultan Kudarat Road	60	For feasibility study/business case



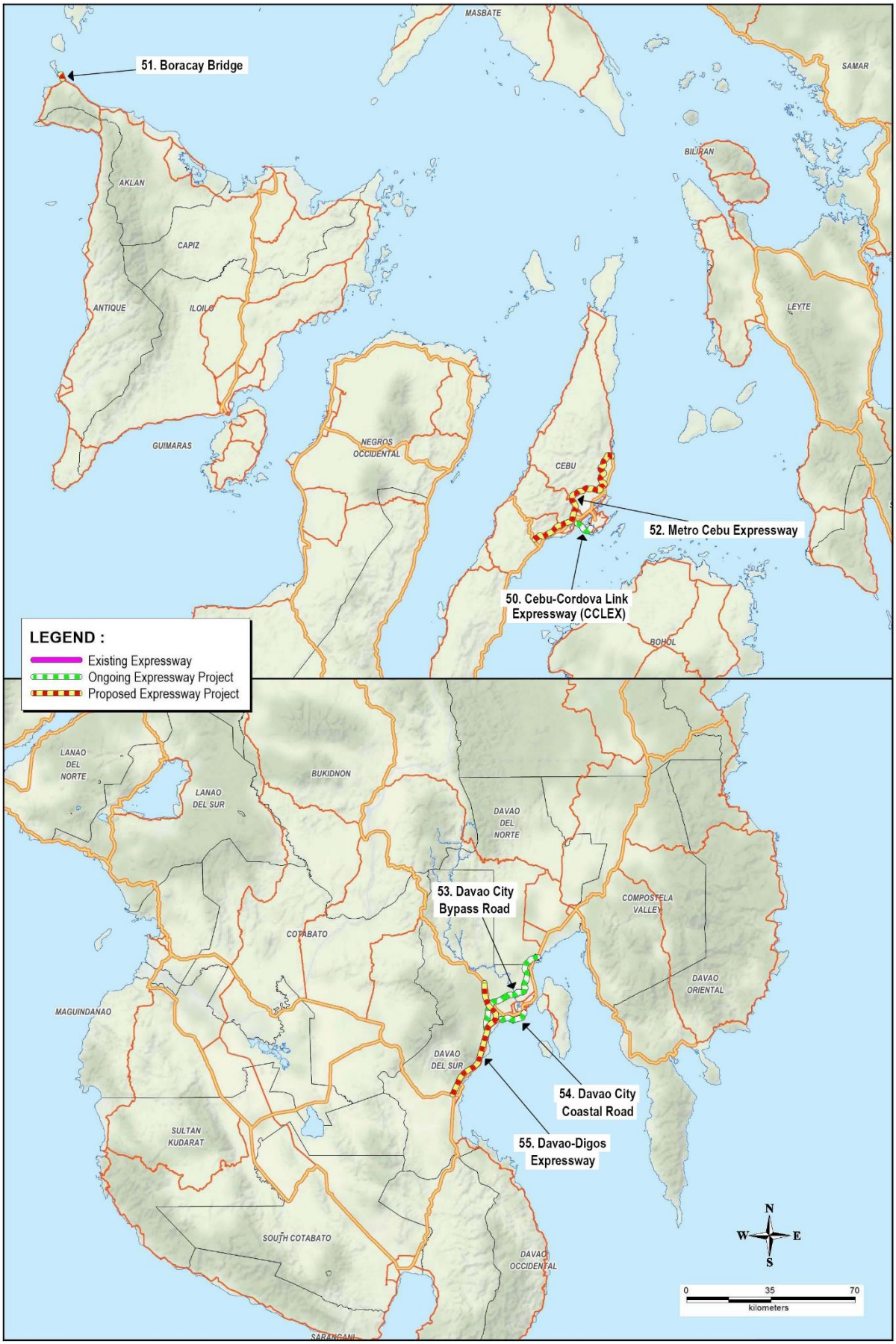
Prepared by the Study Team based on various proposal documents

Figure 7.3-1 Expressway Projects in Metro Manila



Prepared by the Study Team based on various proposal documents

Figure 7.3-2 Expressway Projects in Luzon



Prepared by the Study Team based on various proposal documents

Figure 7.3-3 Expressway Projects in Visayas and Mindanao

7.4 Other Transport Facilities

7.4.1 Airports and Seaports

The locations of airports and seaports for development in the Philippines are indicated in **Figure 7.4-1**. The list of completed, on-going and planned projects for airport and seaport development is shown in **Table 7.4-1** and **Table 7.4-2**.

Table 7.4-1 Projects for Airport Development in the Philippines (as of May 2021)

Ref No.	Project	Description	Cost (Funding source)	Schedule	Status
International Airports					
1	**Lal-lo Airport**	Upgrading of airport capacity to accommodate the heavier Airbus A320 and Boeing 737.	For validation of project cost	**End:** Mar. 2018	• Operational
2	**Bohol – Panglao International Airport**	Construction of new international airport to replace former airport in Tagbilaran. The passenger terminal building has an area of 13,884 sqm. and is designed to cater to 2 million passengers per year.	PHP 8.914B (ODA – JICA Funded)	**Start:** Jun. 2015 **End:** Nov. 2018	• Inauguration of the completed airport was conducted on November 2018
3	**Bicol International Airport**	Construction of a new international airport in Daraga, Albay to replace existing Legazpi Airport. The airport is being built on a 148-hectare lot and can accommodate 2 million passengers annually.	PHP 4.798B (LFP/GAA)	**Start:** Jul. 2009 **End:** Feb. 2021	• Ongoing construction (89.68% as of June 2021)
4	**Laoag International Airport**	Improvement of airport's landside and airside facilities	PHP 4.223B (LFP/GAA)	**Start:** 2016 **End:** 2025	• Ongoing lot acquisition
5	**Bulacan International Airport**	Construction of a new international gateway airport in Bulacan, with a design capacity of 100 million passengers per year.	PHP 735.6B (PPP)	**TBD**	• Ongoing procurement of land development design & build contractor • Ongoing procurement of DED consultant • ECC was issued by DENR EMB on 01 June 2021
6	**Puerto Princesa International Airport**	Construction of new Passenger Terminal Building, with an area of 13,000 sq.m. and improvement of airport facilities	PHP 4.4614B (ODA – Korean EDCF)	**Start:** Aug. 2014 **End:** May 2017	• Completed (inaugurated on May 2017)
7	**Mactan-Cebu International Airport**	Construction of a new international Passenger Terminal Building, which can provide an additional 8.5 million passengers per year.	PHP 17B (PPP)	**Start:** 2015 **End:** 2018	• Completed (inaugurated on June 2018) • Rehabilitation of Terminal 1 is at 97.95%, as of June 2021
8	**Clark International Airport**	Construction of a new Passenger Terminal Building, with an area of 82,600 sq. m., designed to cater to an additional 8 million passengers per year.	PHP 12.55B (PPP)	**Start:** 2018 **End:** 2020	• Groundbreaking was held on December 2017 • Ongoing implementation (81.33% as of June 2021)
9	**General Santos International Airport**	Rehabilitation and expansion of Passenger Terminal Building from 4,000 sq.m. o 12,000 sq.m. and improvement of existing airport facilities	PHP 1.096B	**Start:** 2017 **End:** 2020	• Ongoing implementation - Construction of Airside Perimeter Road & Security Fence (85.31% as of June 2021) by CAAP
10	**Davao International Airport**	Expansion of Passenger Terminal Building and improvement of existing airside facilities	PHP 1.115B (LFP/GAA)	**Start:** 2019 **End:** 2022	• Ongoing implementation - Construction of Parallel

Ref No.	Project	Description	Cost (Funding source)	Schedule	Status
					Taxiway (37.35% as of June 2021) • Under Consultancy procurement - Expansion of existing terminal building and expansion of apron and VPA by CAAP
11	**Iloilo International Airport**	Expansion and improvement of existing airport facilities	TBD (PPP)	**TBD**	• O&M and development unsolicited proposal currently in the evaluation stages of the ICC. Approval is dependent on the ICC timeline.
12	**Kalibo International Airport**	Construction of new landside facilities and air navigation facilities	PHP 4.776B (LFP/GAA)	**Start:** 2016 **End:** 2022	• Ongoing lot acquisition for airport expansion by PGU • Ongoing implementation - Site development works for new apron, taxiway and PTB area, VPA and access road (54.88% as of June 2021)
13	**New International Zamboanga Airport**	Construction of new international airport and rehabilitation and improvement of existing airport facilities	PHP 14B (GOP)	**Start:** 2017 **End:** 2021	• Ongoing lot acquisition for new site by LGU
Domestic Airports					
14	**San Vicente Airport**	Improvement of existing airport facilities and expansion of Passenger Terminal Building, which could accommodate up to 150 passengers at any given time	PHP 62.7M (LFP/GAA)	**Start:** Mar. 2013 **End:** 2021	• Inaugurated on May 2018. • Ongoing Construction of Control Tower (77.39% as of June 2021)
15	**Virac Airport**	Rehabilitation and expansion of Passenger Terminal Building, from its capacity of 100 passengers to 300 passengers	PHP 43.5M (LFP/GAA)	**Start:** Jan. 2016 **End:** Jun. 2018	• Inaugurated on Jun. 2018. • Reblocking of apron (completed)
16	**Daniel Z. Romualdez (Tacloban) Airport**	Improvement of existing landside and terminal facilities	PHP 4.776M (LFP/GAA)	**Start:** 2016 **End:** 2022	• Ongoing Construction of Control Tower (78.41% as of June 2021) • Ongoing Construction of New Passenger Terminal Building (Phase I) (5.07% as of June 2021) by CAAP
17	**Tuguegarao Airport**	Improvement and expansion of Passenger Terminal Building and other airside facilities to support night operations of the airport	PHP 0.608B (LFP/GOP)	**Start:** 2017 **End:** 2022	• Rehabilitation of existing PTB, Const. of pump house, admin bldg. and runway strip width correction and development of other airport facilities (For mobilization) • Continuation of runway strip width correction, Development of other airport facilities (92% as of June 2021)

Ref No.	Project	Description	Cost (Funding source)	Schedule	Status
					• Construction of Control Tower (Under Procurement) • Expansion of Apron (60.55% as of June 2021)
18	**Maasin Airport**	Improvement of airport's landside and airside facilities	PHP 0.522B (LFP/GOP)	**Start:** 2017 **End:** 2021	• Ongoing implementation - Extension of Runway including Slope Protection (90.41% as of June 2021) • Ongoing implementation - Runway Strip Grade Correction including Slope Protection (29.05% as of June 2021) by CAAP
19	**Calbayog Airport**	Improvement of airport's landside and airside facilities	PHP 2.123B (LFP/GOP)	**Start:** 2016 **End:** 2022	• Ongoing lot acquisition by LGU • Ongoing Construction of Admin Bldg., 2- Bay CFR with access road and Control Tower (19.67% as of June 2021) by CAAP • Ongoing DED for the Construction of Power House Building (ANS) by CAAP
20	**Ozamiz Airport**	Expansion and improvement of existing airport facilities and construction of new landside facilities to support night operations	PHP 1.609B (LFP/GOP)	**Start:** 2017 **End:** 2018	• Ongoing implementation - Grading of runway side strip (45.00% as of June 2021) by DPWH
21	**Naga Airport**	Reorientation of existing airport facilities to accommodate full jet operations	PHP 3.53B	**Start:** 2017 **End:** 2022	• Ongoing lot acquisition. • Ongoing DED (42% as of June 2021)
22	**Mati Airport**	Expansion of Passenger Terminal Building and improvement of airport facilities	PHP 0.57B	**Start:** 2017 **End:** 2019	• Ongoing site acquisition (90.00% as of June 2021) by LGU
23	**Surigao Airport**	Rehabilitation of existing runway damaged by earthquake and improvement of other airport facilities	PHP 1.255B	**Start:** 2018 **End:** 2018	• MOA Approved with CAAP (Construction of Perimeter Fence, Strip Grade Correction)
24	**Bacolod-Silay Airport**	Expansion and improvement of existing airport facilities	TBD (PPP)	**TBD**	• O&M and development unsolicited proposal currently in the evaluation stages of the ICC. Approval is dependent on the ICC timeline.
25	**Laguindingan Airport**	Expansion and improvement of existing airport facilities	TBD (PPP)	**TBD**	• O&M and development unsolicited proposal currently in the evaluation stages of the ICC. Approval is dependent on the ICC timeline.
26	**Bukidnon Airport**	Construction of new airport to support turbo propeller aircraft operations	PHP 2.948B (LFP/GOP)	**Start:** 2018 **End:** 2021	• Ongoing site acquisition (80.00% as of June 2021) by LGU

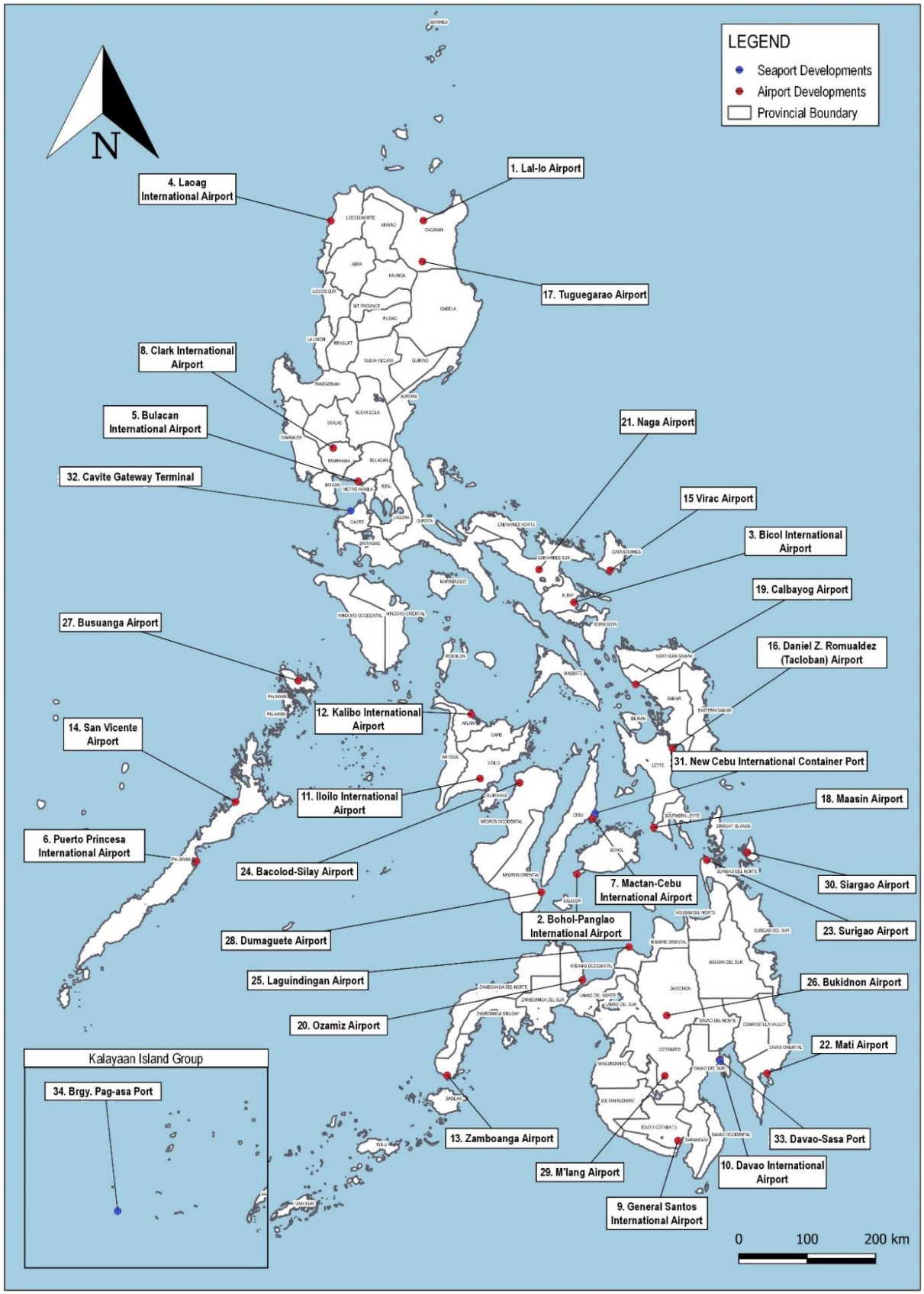
Ref No.	Project	Description	Cost (Funding source)	Schedule	Status
27	**Busuanga Airport**	Capacity improvement and expansion of existing airport facilities	PHP 2.958B	**Start:** 2017 **End:** 2022 Partial Operability of the Re-Oriented Runway	• Initial embankment for runway, runway strip embankment, crushed aggregate base course, lean concrete base course,150mm thk. (84.20% as of June 2021) • Improvement of Drainage System (80.44% as of June 2021)
28	**Dumaguete Airport**	Construction of new international airport at Bacong to replace existing Dumaguete airport	PHP 6.94B (ODA/GOP)	**Start:** 2018 **End:** 2028	• Initial lot acquisition for new site to be implemented by LGU
29	**M'lang Airport**	Upgrading and improvement of existing airport facilities to support turbo propeller aircraft operations	PHP 1.032B (LFP/GOP)	**Start:** 2019 **End:** 2022	• Ongoing site acquisition (42.50% as of June 2021) by PGU • Ongoing implementation - Construction of CHB perimeter fence (75.54% as of June 2021) • Ongoing implementation - Construction of Taxiway and Apron Expansion (56.58% as of June 2021)
30	**Siargao Airport**	Rehabilitation and improvement of existing airport facilities and construction of new airport	PHP 2.514B (LFP/GOP)	**Start:** 2019 **End:** 2022	• Ongoing implementation - Strip width correction, Expansion of Apron, Construction of Additional Taxiway (86.95% as of June 2021) by CAAP

Source: Department of Transportation, 2019

Table 7.4-2 Projects for Seaport Development in the Philippines (as of May 2019)

Ref No.	Project	Description	Cost (Funding source)	Schedule	Status
31	**New Cebu International Container Port**	Construction of a new international container port terminal in a 25-hectare reclaimed island in Brgy. Tayud, Consolacion, Cebu. It shall handle all foreign containerized cargo, complementing the Cebu Base Port.	PHP 9.96B (ODA-KEXIM Bank)	**Start:** 2019 **End:** 2022	• NEDA Board approval in November 2016. • Loan agreement signed in June 2018.
32	**Cavite Gateway Terminal**	Construction of the country's first container roll-on roll-off barge terminal	PHP 1.5B (Private sector - ICTSI)	**Start:** Oct. 2017 **End:** Nov. 2018	• Completed
33	**Davao-Sasa Port**	Upgrading of general cargo berth and construction of back-up area	Project Cost: PHP 999M Contract Amount: PHP 883M (PPA Corporate Fund)	TBD	• Notice of Award was issued in February 2019. • NTP was issued and received by the contractor in May 2019. • Launched the Passenger Terminal Building last October 2018.
34	**Brgy. Pag-asa Port**	Phase I: Construction of facilities for smaller vessels, sewerage treatment plan and provisions of water desalination	PHP 450M (GAA)	**Start:** Jun. 2018 **End:** Mar. 2020	• Notice of Award was issued on June 2018. • NTP was issued in June 2018. • On-going construction for Phase I (37.89%)
		Phase II: Construction of berthing facilities for bigger vessels, buildings, and other port facilities and structure	PHP 650M (GAA)	**Start:** Apr. 2020 **End:** Dec. 2021	

Source: Department of Transportation, 2019



Source: Department of Transportation, 2019

Figure 7.4-1 Locations of Airports and Seaports for Development in the Philippines

7.4.2 Railway

Railway projects in Metro Manila and surrounding areas are illustrated in **Figure 7.4-2**. The general profile of the existing rapid transit lines in Metro Manila is shown in **Table 7.4-3**.

Table 7.4-3 General Profile of Existing Major Railway Lines in Metro Manila

	Light Rail Transit – Line 1 (LRT Line 1)	Light Rail Transit – Line 2 (LRT Line 2)	Metro Rail Transit – Line 3 (MRT Line 3)	Metro South Commuter Train (PNR Southline)
Type	Rapid transit (light metro)	Rapid transit (heavy metro)	Rapid transit (light metro)	Commuter rail
Operator	Light Rail Manila Corporation	Light Rail Transit Authority	Department of Transportation	Philippine National Railways
Date of establishment	December 1984	April 2003	December 1999	November 1972
Distance between termini	18.07 km.	12.56 km.	16.70 km.	28.69 km.
Stations	20	11	13	17
Termini	Roosevelt Baclaran	Santolan Recto	North Avenue Taft Avenue	Tutuban Alabang (with extension to Calamba)

Source: Department of Transportation, 2019

Features of the existing rapid transit lines in Metro Manila are as follows:

(1) Light Rail Transit – Line 1

LRT Line 1 is the country's first light rail system, opened to the public in December 1984. It is a fully elevated railway line, running north to south on the west side of Metro Manila. It was first envisioned to form a circular loop with MRT Line 3. The loop was fully completed after the construction of the LRT Line 1 north extension (from Monumento to Roosevelt) in 2010.

The line passes through the cities of Quezon City, Caloocan, Manila, Pasay and Paranaque. The following stations serve as transfer points to other railway lines:

- Doroteo Jose station to transfer to the western terminus of LRT Line 2
- EDSA station to transfer to the southern terminus of MRT Line 3
- Future North Avenue station to transfer to the northern terminus of MRT Line 3

(2) Light Rail Transit – Line 2

Contrary to its name (which was derived from its operator – Light Rail Transit Authority), the LRT Line 2 (also known as Megatren) features heavy rail metro vehicles. The railway line stretches in a radial pattern from LRT Line 1, running in the east-west direction from Santolan to Recto. The rails are mostly elevated, except for sections before and after Katipunan station, which are located underground.

The line currently passes through Manila, San Juan, Quezon City, Marikina and Pasig. A 3.9-km. eastern extension from the Santolan terminus to Masinag junction is set to be completed in 2020, catering to passengers travelling to/from Rizal.

Passengers may alight at the following stations to transfer to other railway lines:

- Recto station to transfer to LRT Line 1
- Araneta Center – Cubao station to transfer to MRT Line 3

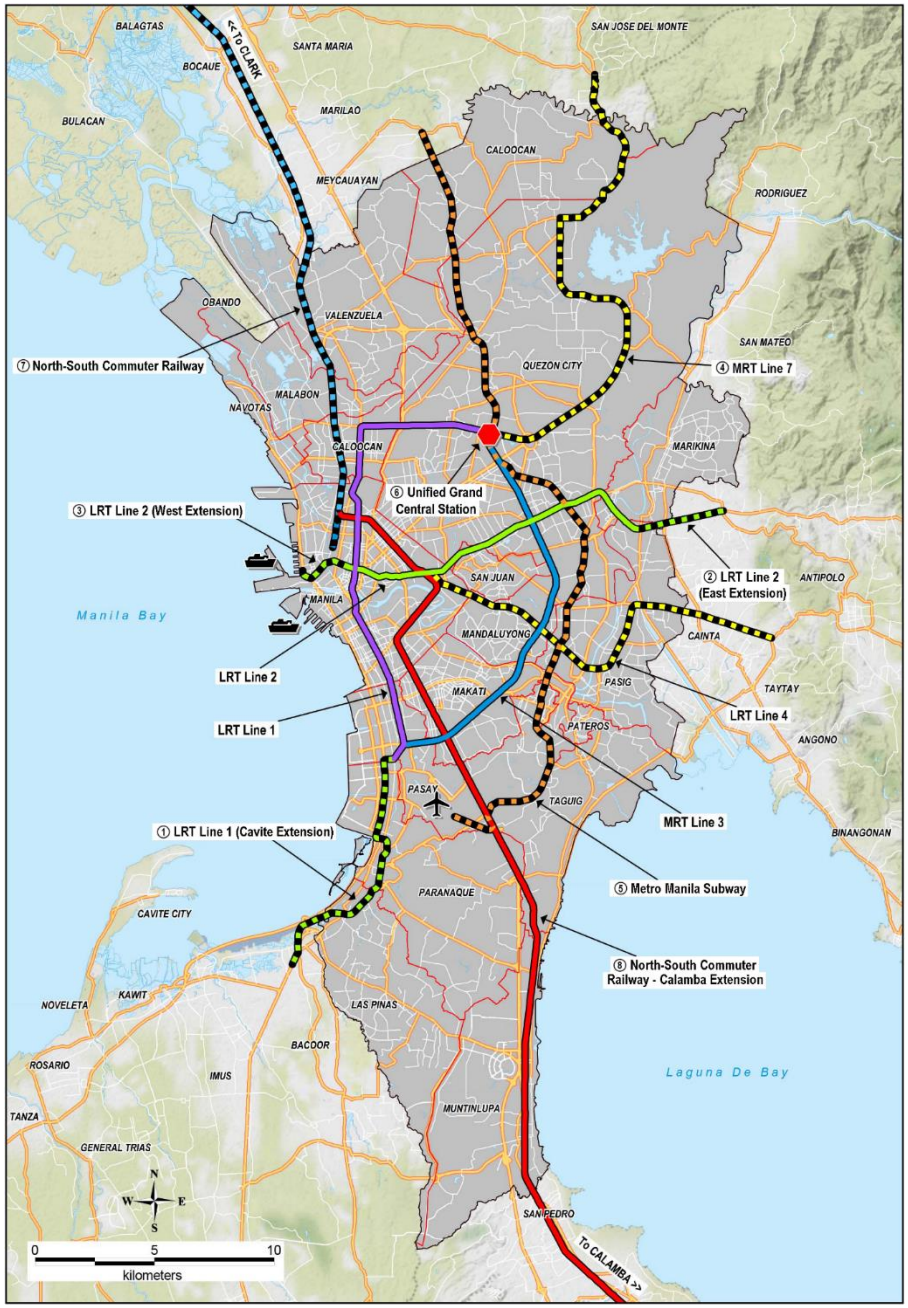
(3) Metro Rail Transit – Line 3

MRT Line 3 (formerly known as Metrostar Express) runs from north to south of Metro Manila, along the semi-circular alignment of EDSA. It is the busiest railway line in the country, with

an average daily ridership of 525,000 in 2015. The railway is currently undergoing rehabilitation, that will increase the initial design capacity of 350,000 to 650,000 passengers per day (DOTr-MRT 3, 2019).

MRT Line 3 is integrated with other railway lines through the following stations:

- Araneta Center – Cubao station to transfer to LRT Line 2
- Taft station to transfer to the southern terminus of LRT Line 1
- Future North Avenue station to transfer to the northern terminus of LRT Line 1



Source: Department of Transportation, 2019

Figure 7.4-2 Map of Existing and Proposed Railway Projects in Metro Manila

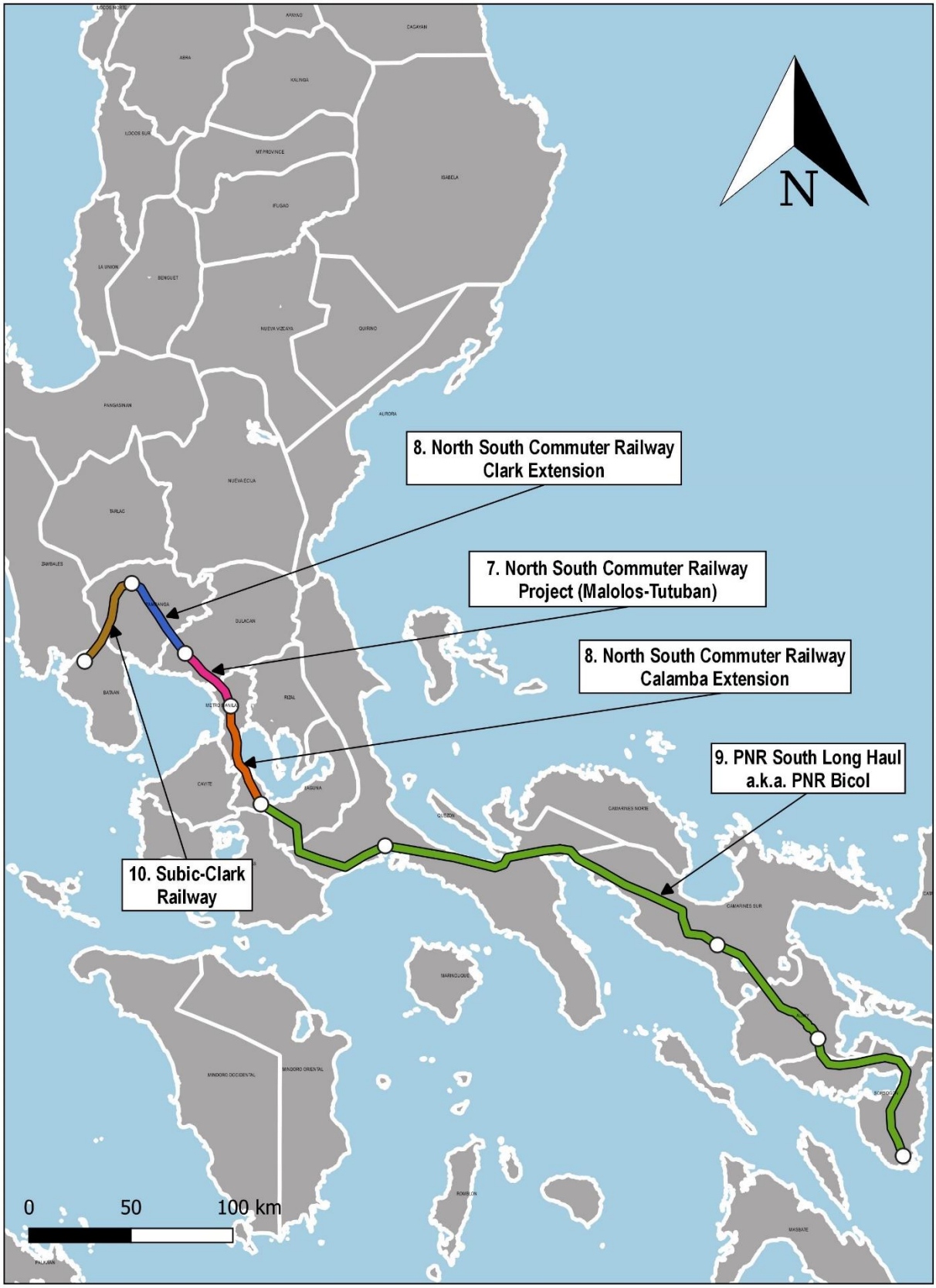
The status of the on-going and planned railway projects is stated in **Table 7.4-4** below. The map of proposed railway projects in Luzon outside Metro Manila is shown in **Figure 7.4-3**. The alignments of the proposed Cebu Metro Rail System and Mindanao Rail Network are illustrated in **Figure 7.4-4** and **Figure 7.4-5**.

Table 7.4-4 Projects for Railway Development in the Philippines (as of May 2019)

Ref No.	Project	Description	Cost (Funding source)	Schedule	Status
Metro Manila Rail Network					
1	**LRT-1 Cavite Extension**	Construction of 11.7-km. (Elevated = 10.5 km.; At-grade: 1.2 km.) railway extension from the terminus of LRT Line 1 at Baclaran Terminal to Niog Station at Bacoor, Cavite.	PHP 65B (LFP, PPP and ODA)	**Start:** April 2019 **End:** Package 1 – Aug. 2021 Package 2 & 3 – 1Q 2023	• Civil Works and E&M: ongoing DED, fencing and geotechnical investigation • LRVs (25.88%): on-going manufacturing • Depot: ongoing pre-construction works
2	**LRT-2 East (Masinag) Extension Project**	Construction of 3.9-km. eastern extension from the terminus of LRT Line 2 at Santolan Station to Masinag Junction (intersection of Marcos Highway and Sumulong Highway) Project could benefit 378,800 passengers daily	PHP 9.5B (LFP and Japan ODA)	**Start:** 2016 **End:** 4Q 2020	• Viaduct: 100% completed • Stations: 86% as of May 2019 • Electro-mechanical system: Target NTP is June 2019 • Ongoing interface review and DED
3	**LRT-2 West Extension**	Construction of 3.02-km. western extension from the terminus of LRT Line 2 at Recto Station to Pier 4 in Manila. Project could benefit an additional 32,000 passengers daily during the opening year.	PHP 10.1B (LFP)	**Start:** 2020 **End:** 2023	• Ongoing procurement of Consultancy Services Contract
4	**Metro Rail Transit Line 7**	Implementation of an integrated transport system under Build-Gradual-Transfer-Operate and Maintain (BGTOM) arrangement with the following components: • Metro Rail Transit System (MRTS) – 14 stations from North Ave. to San Jose del Monte, Bulacan • Intermodal Transport Terminal (ITT) – can accommodate 60 buses at any given time Highway Component – 6-lane 23-km. highway from ITT to Bocaue/Balagtas Interchange NLEX	PHP 75B (PPP)	**Start:** August 2016 **End:** 2020	• Ongoing construction • 23.73% progress – Civil works, rolling stock, E&M works, highway and others
5	**Metro Manila Subway Project Phase I/Line 9**	Construction of 35-km. subway with 15 stations from Quirino Highway corner Mindanao Ave. to NAIA Terminal 3, that will connect the north and south portions of Manila. The project can benefit up to 370,000 passengers daily.	PHP 356.96B (ODA)	**Start:** 4Q 2019 **Partial operation:** 2Q 2022 **Full operation:** 3Q 2025	• Ongoing finalization of DED • Ongoing clearing works and relocation of utilities for PO section
6	**Unified Grand Central Station**	Construction of a common station for seamless interconnectivity among railway lines (LRT-1, MRT-3, MRT-7, MMSP) and road-based transportation systems. The project can benefit up to 478,000 passengers per day.	PHP 2.783B (LFP)	**Start:** May 2019 **End:** Jan. 2021	• NTP issuance – May 2019 • Ongoing DED • Ongoing coordination with government agencies
PNR Luzon System					
7	**North South Commuter Railway (NSCR) Project**	Construction of a 37.6-km. commuter railway from Malolos to Tutuban with 10 stations and a depot at a 14-hectare lot of the	PHP 149.13B (Japan ODA)	**Start:** Feb. 2019 **End:** 2022	• Civil Works Package 1: Pre-construction Works • Civil Works Package 2: Ongoing construction

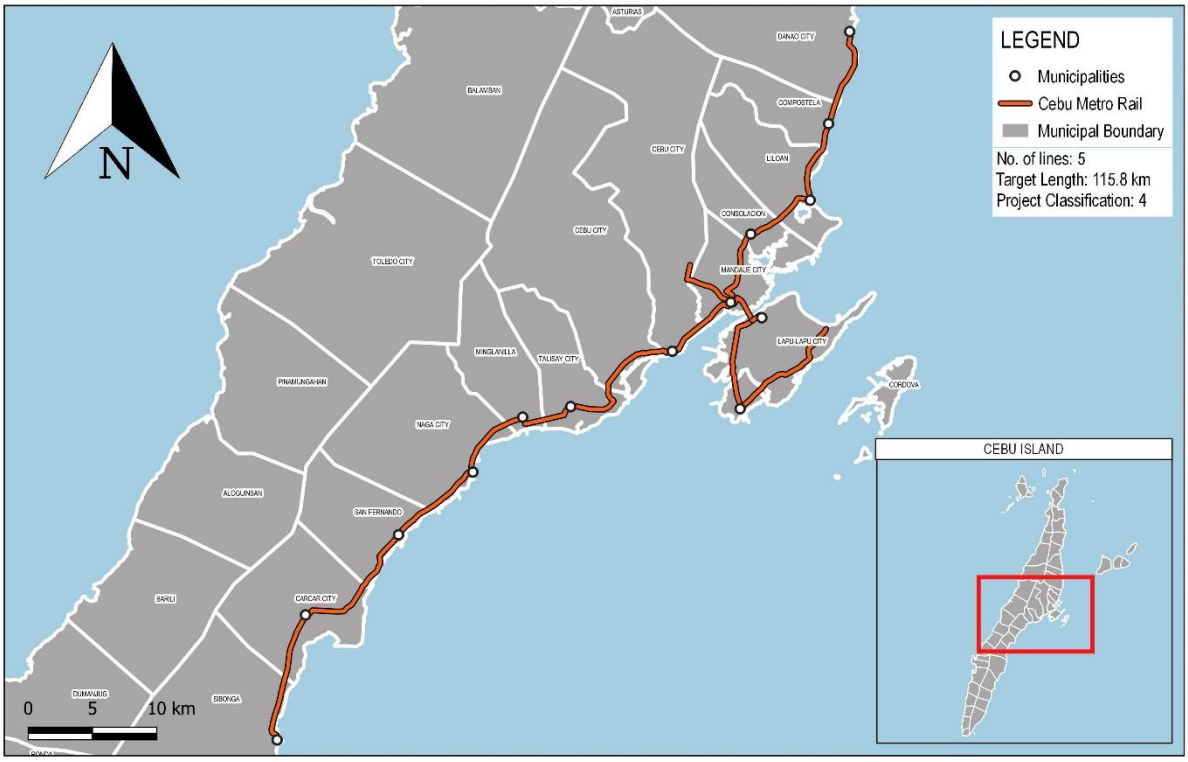
Ref No.	Project	Description	Cost (Funding source)	Schedule	Status
		National Food Authority in Valenzuela Project could benefit 750,000 – 800,000 passengers daily.			• Rolling Stock: Ongoing procurement • E&M: Ongoing design optimization
8	**NSCR Extension**	Construction of 53-km. NSCR Clark Extension with 7 stations and 56-km NSCR Calamba Extension with 18 stations Project could benefit 340,000 passengers daily.	PHP 628.42B (China ODA)	**Start:** 2020 **Partial operation:** 2Q 2022 **Full operation:** 2023	• Ongoing procurement of 6 civil works package and general consultant
9	**PNR South Long Haul**	Construction of 639-km. railway system from Manila to Legazpi, with extension to Matnog and spur line to Batangas City Project could benefit 100,000 passengers daily	PHP 175B (China ODA)	**Start:** 4Q 2019 **Partial operation:** 2Q 2022 **Full operation:** 2023	• Ongoing ROW and site acquisition • Project Management Consultant (PMC) contract signed on 17 Nov. 2018 • Ongoing processing of the loan agreement for the PMC • Ongoing Detailed Engineering Design (DED)
10	**Subic – Clark Railway**	Construction of a 71.13-km. rail, providing initial freight service between the Subic Bay Freeport Zone and the Clark Freeport and SEZ and linking Subic Bay Port with the Clark International Airport.	PHP 50.03B (China ODA)	**Start:** 4Q 2019 **End:** 2022	• Finalization of bidding documents • On-going advance works
Cebu Metro Rail System					
11	**Cebu Railway**	Construction of 5 railway lines with total length of 115.8 km.	PHP 250.3B	**Start:** TBD **End:** 2022	
Mindanao Rail Network					
12	**Mindanao Railway Project** *Tagum-Davao-Digos Segment*	Construction of 102-km. railway system linking Tagum, Davao del Norte, Davao City and Digos, Davao del Sur. The project can benefit up to 134,060 passengers per day.	PHP 97.4B (China ODA)	**Start:** Nov. 2019 **End:** 4Q 2022	• Ongoing pre-construction works • Finalization of bid documents for design and build contract • Finalization of bid documents for general consultant • For NEDA re-approval due to change in scope and cost
13	**Mindanao Railway Project** *Tagum-Butuan Segment*	Construction of 208-km. railway line that will run from Tagum to Butuan.	PHP 35.28B (LFP and ODA)	**Start:** 2020 **End:** TBD	• For detailed feasibility study
14	**Mindanao Railway Project** *Butuan-Iligan Segment*	Construction of 285-km. railway line that will run from Butuan to Iligan.	TBD (LFP and ODA)	**Start:** 2020 **Finish:** TBD	• For detailed feasibility study
15	**Mindanao Railway Project** *Iligan-Digos Segment*	Construction of 234-km. railway line that will run from Iligan to Digos.	TBD (LFP and ODA)	**Start:** 2020 **Finish:** TBD	• For detailed feasibility study

Source: Department of Transportation, 2019



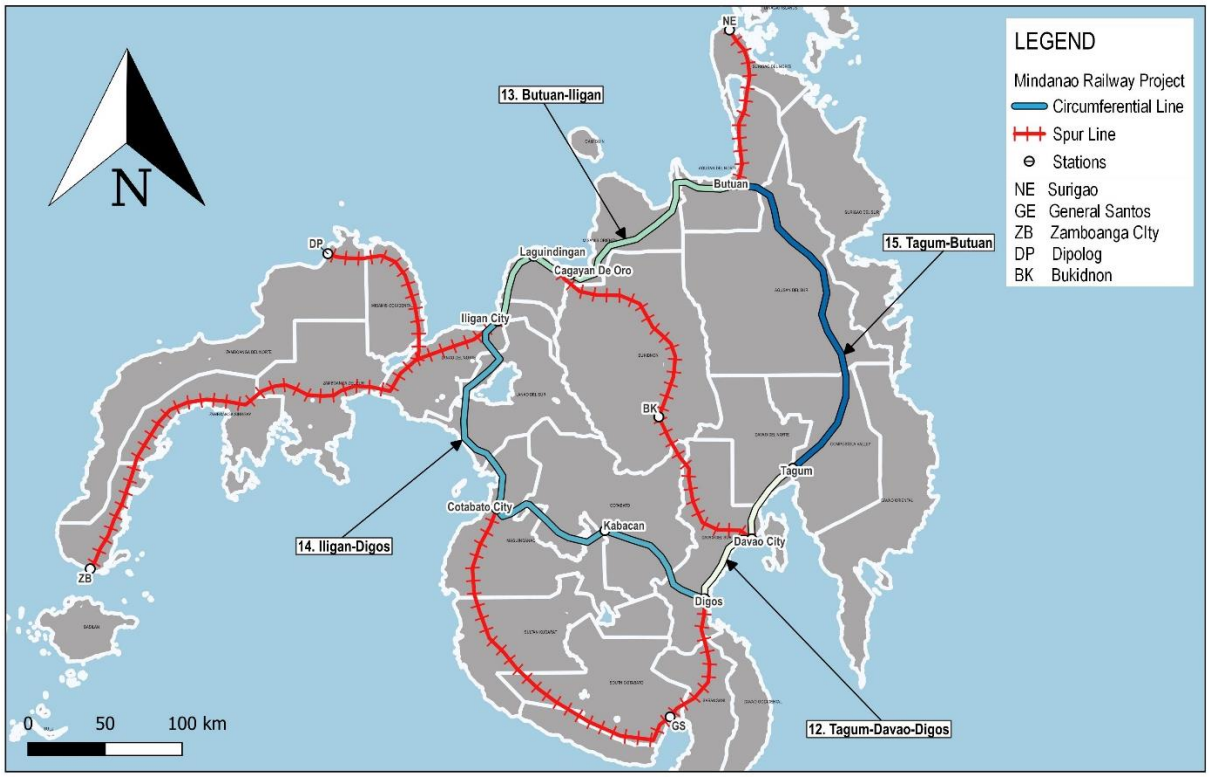
Source: Department of Transportation, 2019

Figure 7.4-3 Railway Development Projects in Luzon Outside Metro Manila (as of May 2019)



Source: Department of Transportation, 2019

Figure 7.4-4 Initial Alignment for the Proposed Cebu Metro Rail System



Source: Department of Transportation, 2019

Figure 7.4-5 Initial Alignment for the Proposed Mindanao Rail Network

7.5 Private Company Investment Plan for Transport Sectors

Many projects are carried out under the PPP system utilizing the private sector, including road development projects. PPP projects are shown on the website of PPP center. These projects do not include Joint Ventures and PPP projects prior to 2010. According to the list, there are 61 projects, which include 7 Road development projects. The summary is shown in **Table 7.5-1**.

Table 7.5-1 Summary of All PPP Projects

Stage	Mode of Procurement	Number of projects	Project Cost (PhP Billion)	Number of projects (Road development project only)	Project Cost (Road development project only) (PhP Billion)
Projects under implementation	Solicited	15	242.77	4	93.02
	Unsolicited	3	85.96	1	23.20
Sub-Total		18	328.73	5	116.22
Projects in the Pipeline	Solicited	16	0.38	1	n/a
	Unsolicited	27	3,416.27	1	22.59
Sub-Total		43	3,416.65	2	22.59
Total		61	3,745.38	7	138.81

Source: https://ppp.gov.ph/wp-content/uploads/2019/08/PPPC_REP_PPP-Projects-20190731.pdf

PPP projects involving road development, including Joint Ventures and PPP projects prior to 2010, are shown on the website of DPWH. According to it, 26 projects are listed, and they are shown **Table 7.5-2** which includes supplementary information such as contractual arrangements and private sector group.

Table 7.5-2 Private Sector Road Development Projects Based on PPP System

No.	Name of Project	Implementing Agency	Stage / Status	Mode of Procurement	Contractual arrangement	Private sector (Group)
1	Southern Tagalog Arterial Road (STAR)	DPWH	Under O&M	Solicited	BTO	San Miguel
2	Muntinlupa-Cavite Expressway (Daang Hari–SLEX Link Road)	DPWH	Under O&M	Solicited	BTO	Ayala
3	NAIA Expressway	DPWH	Under O&M	Solicited	BTO	San Miguel
4	Tarlac-Pangasinan-La Union Expressway (TPLEX)	DPWH	Under O&M	Solicited	BTO	San Miguel
5	Cavite-Laguna (CALA) Expressway	DPWH	Ongoing	Solicited	BTO	Metro Pacific
6	NLEX–SLEX Connector Road	DPWH	Ongoing	Unsolicited	BOT	Metro Pacific
7	Central Luzon Link Expressway (CLLEX) Phase 2	DPWH	For F/S	Solicited	n/a	n/a
8	Quezon–Bicol Expressway	DPWH	For F/S	Solicited	n/a	n/a
9	Davao-Digos Expressway	DPWH	For F/S	Solicited	n/a	n/a
10	North Luzon Expressway East, Phase 2	DPWH	For F/S	Solicited	n/a	n/a
11	Metro Cebu Expressway (Cebu Circumferential Road)	DPWH	For F/S	Solicited	n/a	n/a
12	Davao City Bypass Construction	DPWH	For F/S	Solicited	n/a	n/a
13	Mindoro–Batangas Super Bridge (Floating Bridge)	DPWH	For F/S	Solicited	n/a	n/a

No.	Name of Project	Implementing Agency	Stage / Status	Mode of Procurement	Contractual arrangement	Private sector (Group)
14	Manila Bay Integrated Flood Control, Coastal Defense and Expressway Project	DPWH	For F/S	Unsolicited	n/a	n/a
15	North-Luzon East Expressway, Stage 1 (La Mesa Parkways)	DPWH	For F/S	Unsolicited	n/a	n/a
16	Cavite - Tagaytay - Batangas Expressway (CTBEx)	DPWH	For F/S	Unsolicited	n/a	n/a
17	Manila-Taguig Expressway	DPWH	For F/S	Unsolicited	n/a	n/a
18	TPLEX Extension	DPWH	For F/S	Unsolicited	n/a	n/a
19	C5 Expressway	DPWH	For F/S	Unsolicited	n/a	n/a
20	NLEX-Cavitex Port Expressway Link	DPWH	For F/S	Unsolicited	n/a	n/a
21	Boracay Bridge Project	DPWH	For F/S	Unsolicited	n/a	n/a
22	NLEX Harbor Link (Segments 8.1, 8.2, 9 & 10)	TRB	Under O&M /	n/a	BOT	Metro Pacific
23	Metro Manila Expressway (C6)	TRB	Ongoing	n/a	BOT	San Miguel
24	Metro Manila Skyway (MMSS) Stage 3	TRB	Ongoing	n/a	BOT	San Miguel
25	South Luzon Expressway (SLEX) Toll Road 4 (TR-4)	TRB	Ongoing	n/a	BOT	San Miguel
26	C5 South Link Project	TRB	Ongoing	n/a	BOT	Metro Pacific

Source: DPWH Website (http://www.dpwh.gov.ph/DPWH/PPP/PPP_index)

The table lists the main conglomerate groups involved in each project. Certain conglomerates have a strong presence in the private sector. In particular, they are broadly divided into Metro Pacific and San Miguel. A conglomerate does not bid on the PPP business alone, but forms a consortium with multiple companies.

It can also be seen that the contractual arrangement of the project is currently BOT or BTO. In the future, it will be necessary to apply various contractual types in consideration of the business feasibility of each project.

Interviews with Metro Pacific were conducted for future projects under the direction of DPWH, but information on future plans could not be obtained. It seems natural that information on investments should be kept confidential based on the corporate strategy of the firm. In particular, in the PPP business, the government promotes competition among companies. In fact, in the case of private proposal projects, the Swiss Challenge system has been developed under the revised BOT law. Swiss Challenge system is a method in which competitive proposals are solicited and the better proposer becomes the contractor.

While it is necessary for the government to ensure competitiveness, the Government has a role to promote road development even if the road project is carried out by PPP. The Government must prevent irresponsible road projects and their failure by private sectors. To achieve this, it is necessary to adopt an appropriate contractual arrangement of PPP consistent with the business feasibility for each project. Also, it is necessary to take measures to encourage not only large conglomerates but also new players to participate in the PPP market.

CHAPTER 8

ASSESSMENT OF PRESENT ROAD NETWORK

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ASSESSMENT OF PRESENT ROAD NETWORK

8.1 Present Road Development Level

8.1.1 Road Density

The National Road network consists of National Primary Roads (NPRs), National Secondary Roads (NSRs) and National Tertiary Roads (NTRs), starting from Manila City where the zero-kilometer post is located, to other areas nationwide. **Table 8.1-1** shows the lengths of NPRs, NSRs and NTRs and the road density by region. Road density is calculated as the road length divided by the square root of the product of the population and the area.

The road density of NCR, where population and industry are concentrated, is the highest among the Regions. The density is around 12.9 km/1 million pop. -km^2. Next is CAR which has a road density of 12.0 km/1million pop. -km^2. On the other hand, in Region III and Region XII the road density is less than 5.0. The road network in BARRM is under development.

Table 8.1-1 Length of National Roads, Bypass and Road Density by Region

Region	Primary (km)	Secondary (km)	Tertiary (km)	Bypass (km)	Total (km)	Road Density Length (km) SQRT (1million Population *Area (km2))
CAR	91	1,013	1,154	0	2,257	12.0
NCR	170	397	591	0	1,157	12.9
Region I	591	455	633	9	1,688	6.4
Region II	623	330	1,056	12	2,021	6.2
Region III	531	747	1,067	27	2,371	4.6
Region IV-A	455	1,280	808	14	2,557	5.0
Region IV-B	0	1,805	493	0	2,298	7.5
Region V	461	1,138	790	31	2,420	7.2
Region VI	485	1,436	1,126	26	3,073	7.5
Region VII	531	1,092	706	1	2,330	6.7
Region VIII	562	1,346	655	1	2,564	7.8
Region IX	657	427	567	2	1,653	6.6
Region X	735	463	773	49	2,020	6.2
Region XI	453	870	366	3	1,691	5.2
Region XII	369	788	399	0	1,556	4.9
Region XIII	358	721	439	5	1,523	6.3
BARRM	-	-	-		993	4.1
Total	7,072	14,307	11,623	179	34,174	5.8

Note 1: Expressway is not included.

Source: JICA Study Team based on DPWH Road Inventory Data, August 2019

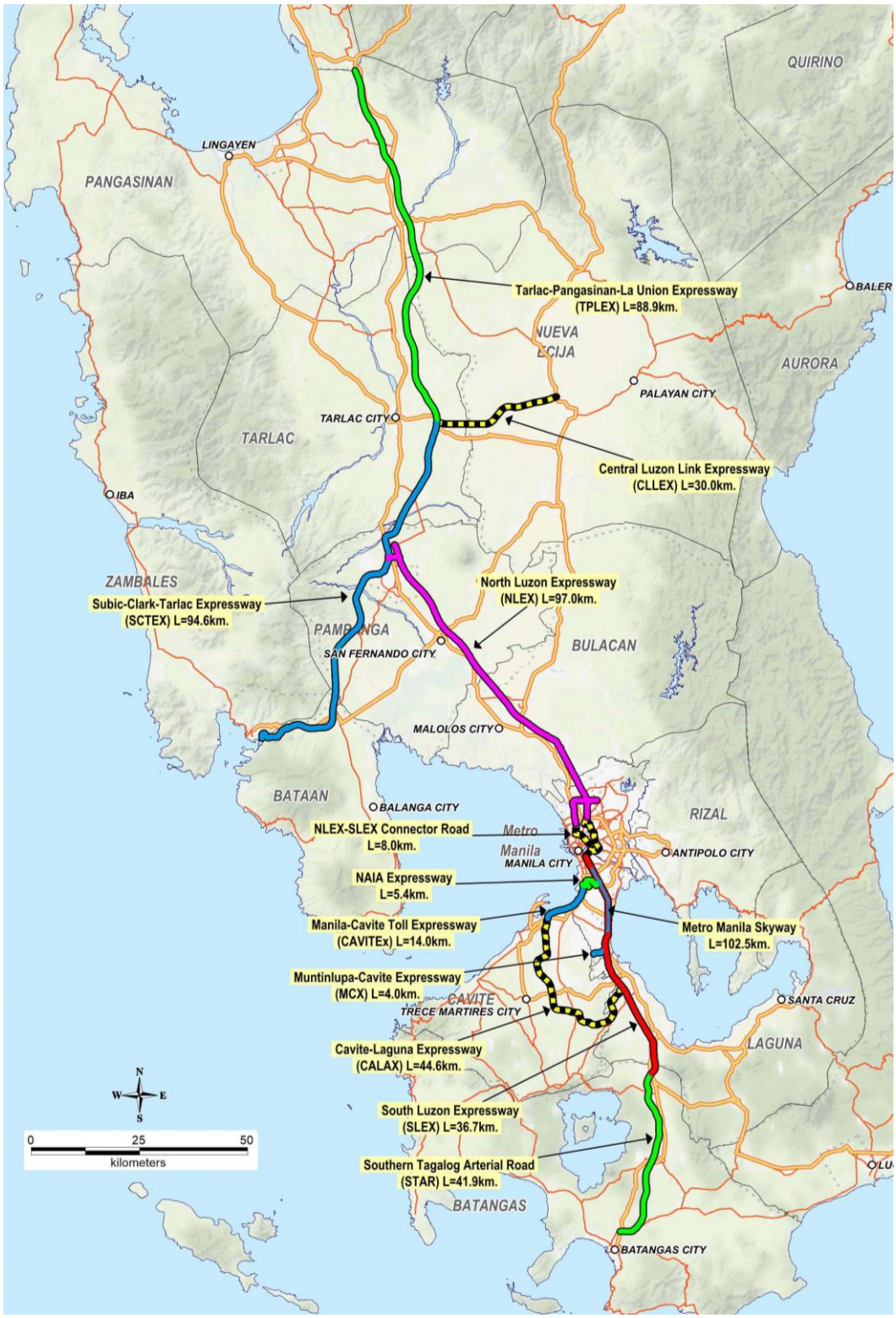
Figure 8.1-1 shows the geographical relationship between the NPR network and the city or municipality where the NPR passes. Green colored areas are cities or municipalities directly accessible through the NPR. At present, the NPR is the only road that can provide a high traffic function. However, the cities and municipalities accessible through the NPR constitute only 40% of the total number of cities and municipalities in the Philippines.

Red line: National Primary Road (NPR), Green area: Directly accessible city and municipality from NPR.
Source: JICA Study Team based on DPWH Road Inventory Data

Figure 8.1-1 Directly Accessible Areas of the National Primary Road

8.1.2 Existing and Under Construction Expressway Network

The expressway network has been developed in Metro Manila and the surrounding areas: Region III and Region IV-A only. In HSH M/P Phase 1, the total expansion of the expressway network to 862 km was planned until the year 2030. As of August 2019, the total length of the existing expressways nationwide was only 406 km.



Dot line show the road under construction
Source: JICA Study Team

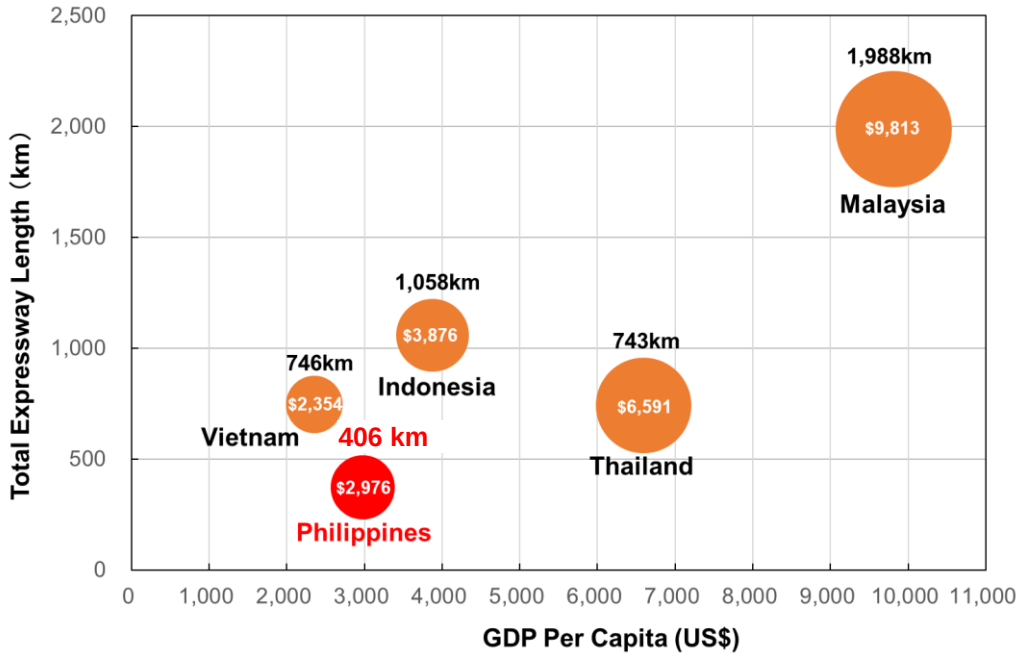
Figure 8.1-2 Existing Expressway Network in Philippines

Table 8.1-2 Lengths of Existing and Under Construction Expressways

Name of Expressway	Operator	Length (km)		
		Under Operation	Under Construction	Total
1. MCX (Muntinlupa-Cavite Expwy.)	DPWH (Grantor)	4.0	-	4.0
2. CLLEX (Central Luzon Link Expwy.)		-	66.0	66.0
3. CALAX (Cavite- Laguna Expwy.)		-	45.0	45.0
1. TPLEX (Tarlac-Pangasinan-La Union Expwy.)	San Miguel Corporation (SMC) Infrastructure	77.41	11.45	88.86
2. NAIAX (NAIA Expressway)		5.40	0	5.40
3. SMMSP (South Metro Manila Skyway Project)		29.69	18.30	47.99
4. SLEX (South Luzon Expwy.)		36.00	66.74	102.74
5. Apolinario Mabini Superhighway/STAR		41.90	0	41.90
1. SCTEX (Subic-Clark-Tarlac Expwy.)	NLEX Corporation and CAVITEX Infrastructure Corporation	94.62	0	94.62
2. MCTEX (Manila-Cavite Toll Expwy.)		15.48	0	15.48
3. NLEX (North Luzon Expwy.)		91.25	0	91.25
4. NLEX Seg 8.1, 9, 10, 8.2, R10		10.70	10.95	21.65
4. NLEX Connector		-	8.00	8.00
5. NLEX Phase 3 (Seg 4, 5, and 6)		-	32.66	32.66
6. C5 South Link Expressway Project		-	5.70	5.70
Total		**406.45**	264.81	**671.26**

Source: Toll Regulatory Board, as of August 2019

Figure 8.1-3 shows the international comparison of the length of expressway expansion in five major South East Asian countries. Unfortunately, the Philippines has 406 km only, which is the lowest among the five countries. Based on GDP capita, the length of high standard roads should be higher.

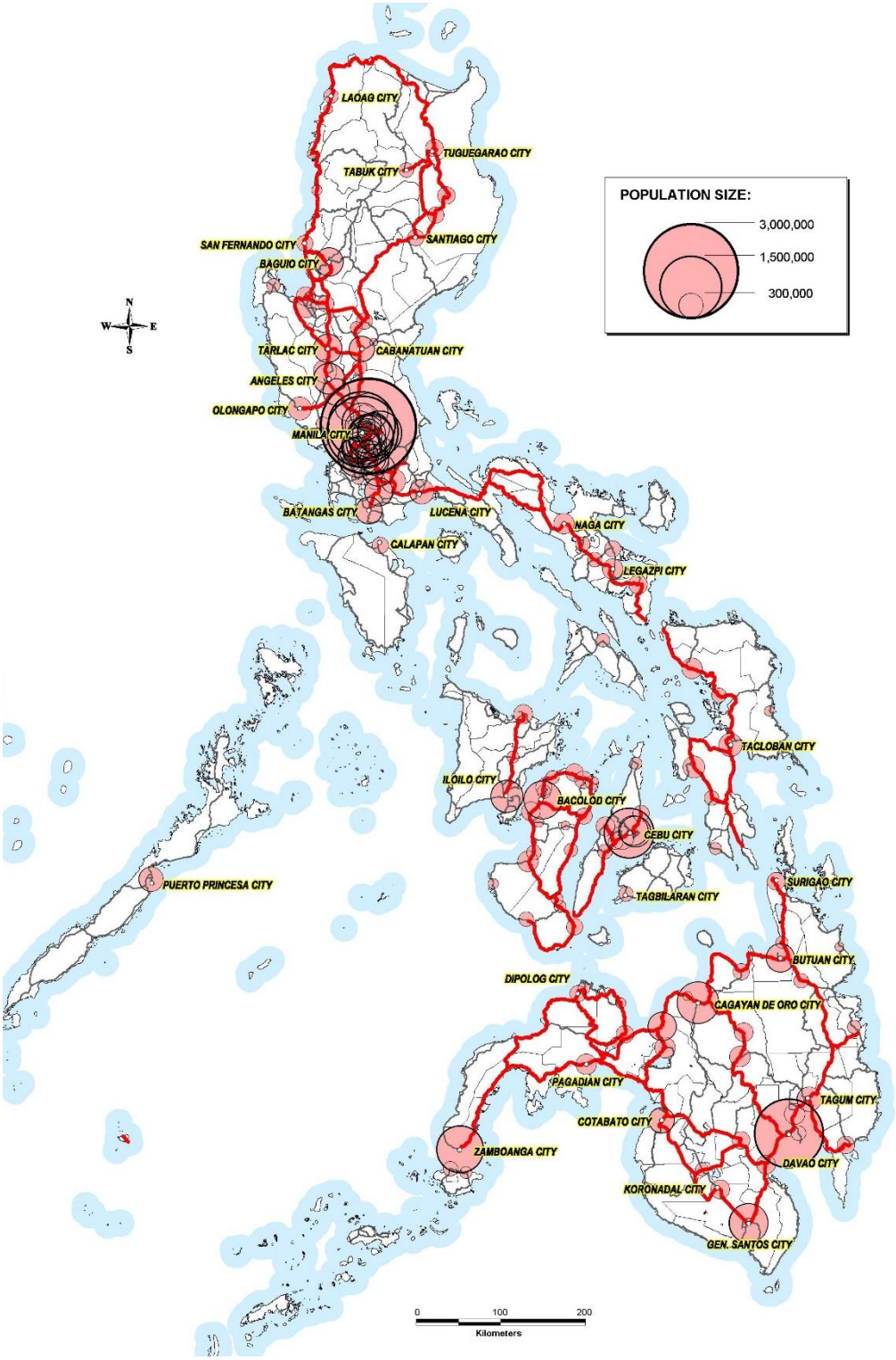


Source: JICA Study Team

Figure 8.1-3 International Comparison of Expressway Length

8.1.3 National Road Network and Location of Urban Centers

Figure 8.1-4 shows the NPR network and location of cities in the Philippines. Major urban centers are physically connected by National Roads. However, other urban areas have been developed along the NPRs and all activities generated in each of these urban areas depend on one NPR that crosses the urban center. This tendency is especially strong in rural areas where the road network has no redundancy.



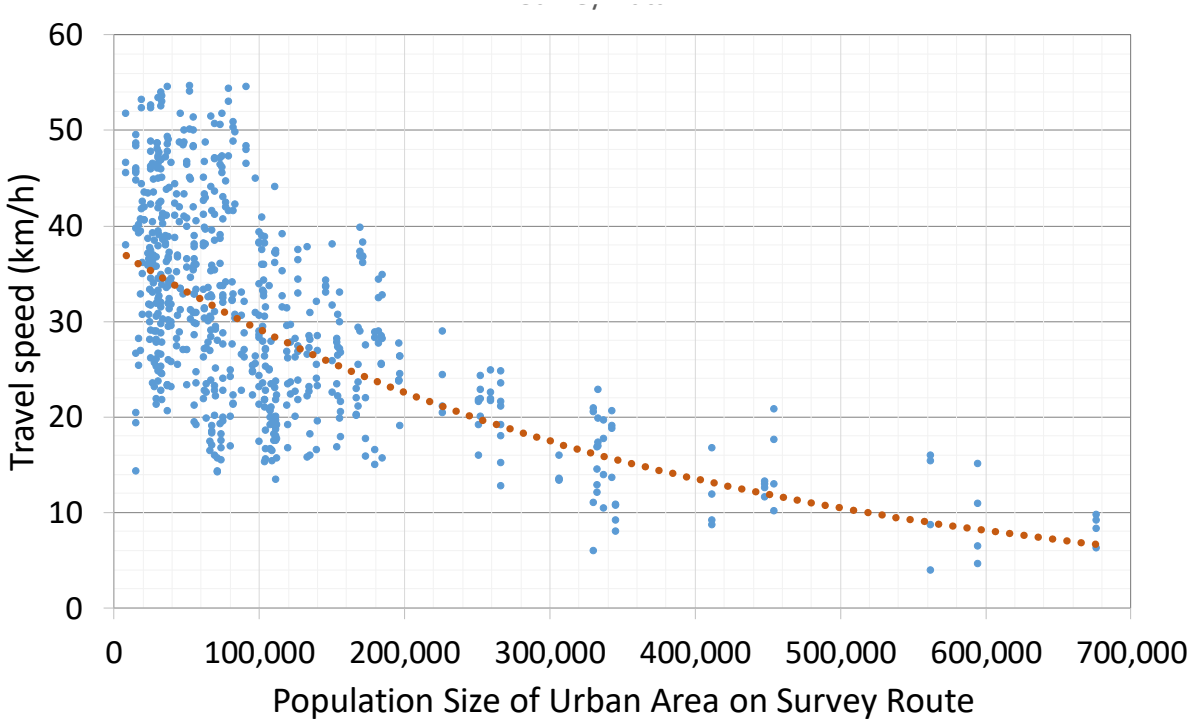
Source: JICA Study Team based on DPWH Road Inventory Data

Figure 8.1-4 Location of City with Population and NPR

As a consequence, all types of traffic, such as local traffic including tricycles or motorbikes, and regional traffic including large size trucks, are generated and are concentrated along the National Roads. Traffic function of the NPR is declining due to chronic traffic congestion. Although the bypass road is developed in some urban areas, if it is not designed as an access-controlled road, intensive development of the roadsides will take place, thereby attracting vehicles which congest the road. **Figure 8.1-6** shows the relationship between travel speed and population size at urbanized areas. The travel speed is higher at areas with smaller population. The population size is inversely proportional to the travel speed, as the population size increases, the travel speed becomes slower. This results in a weaker connection between major urban centers.

Source: JICA Study Team

Figure 8.1-5 Mixed-up of Slow Vehicle and In-transit Traffic on National Primary Road



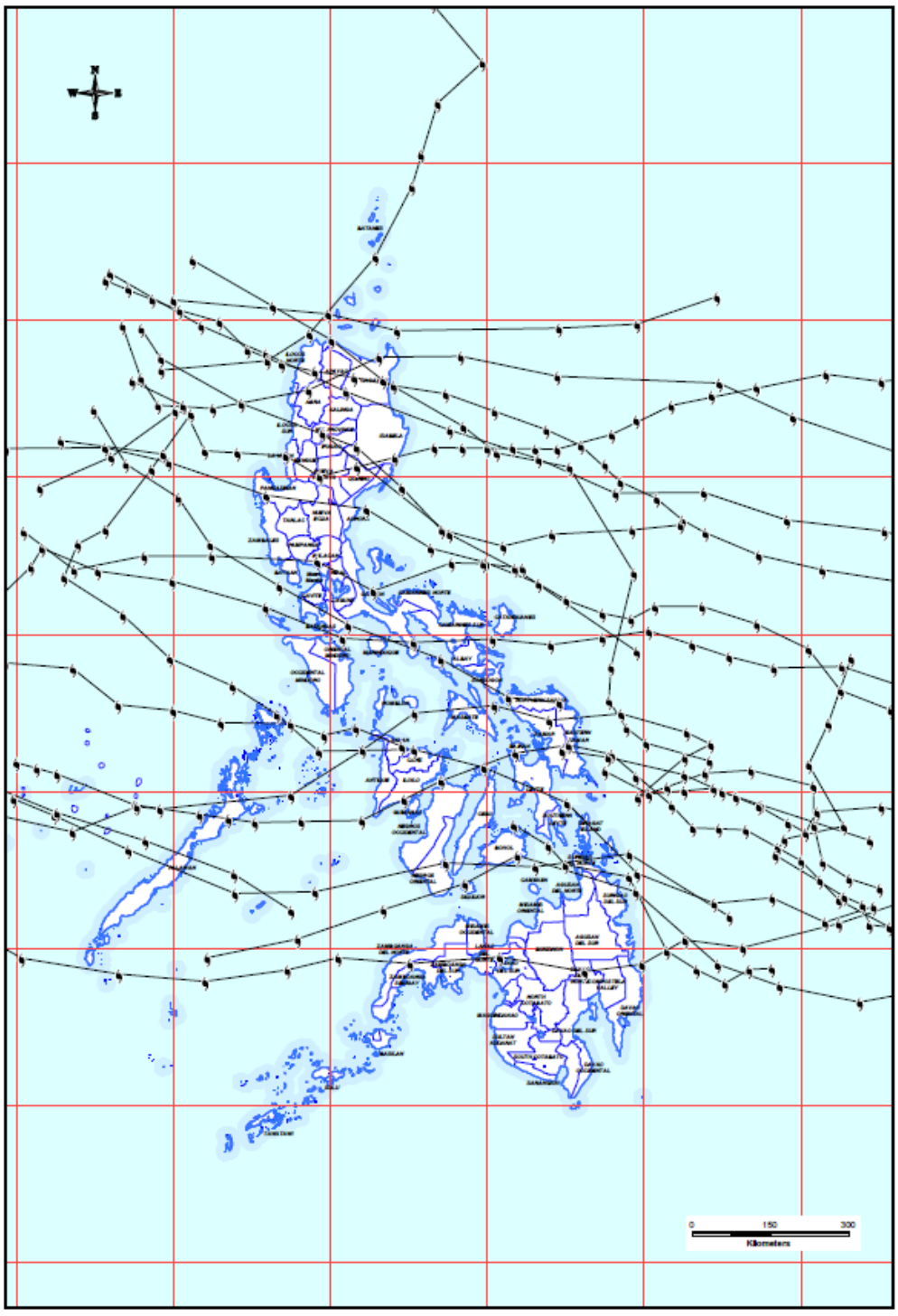
Source: JICA Study Team survey

Figure 8.1-6 Relationship between Travel Speed and Population Size at Urbanized Areas

8.2 Issues arise from Natural Condition and Geographic Condition

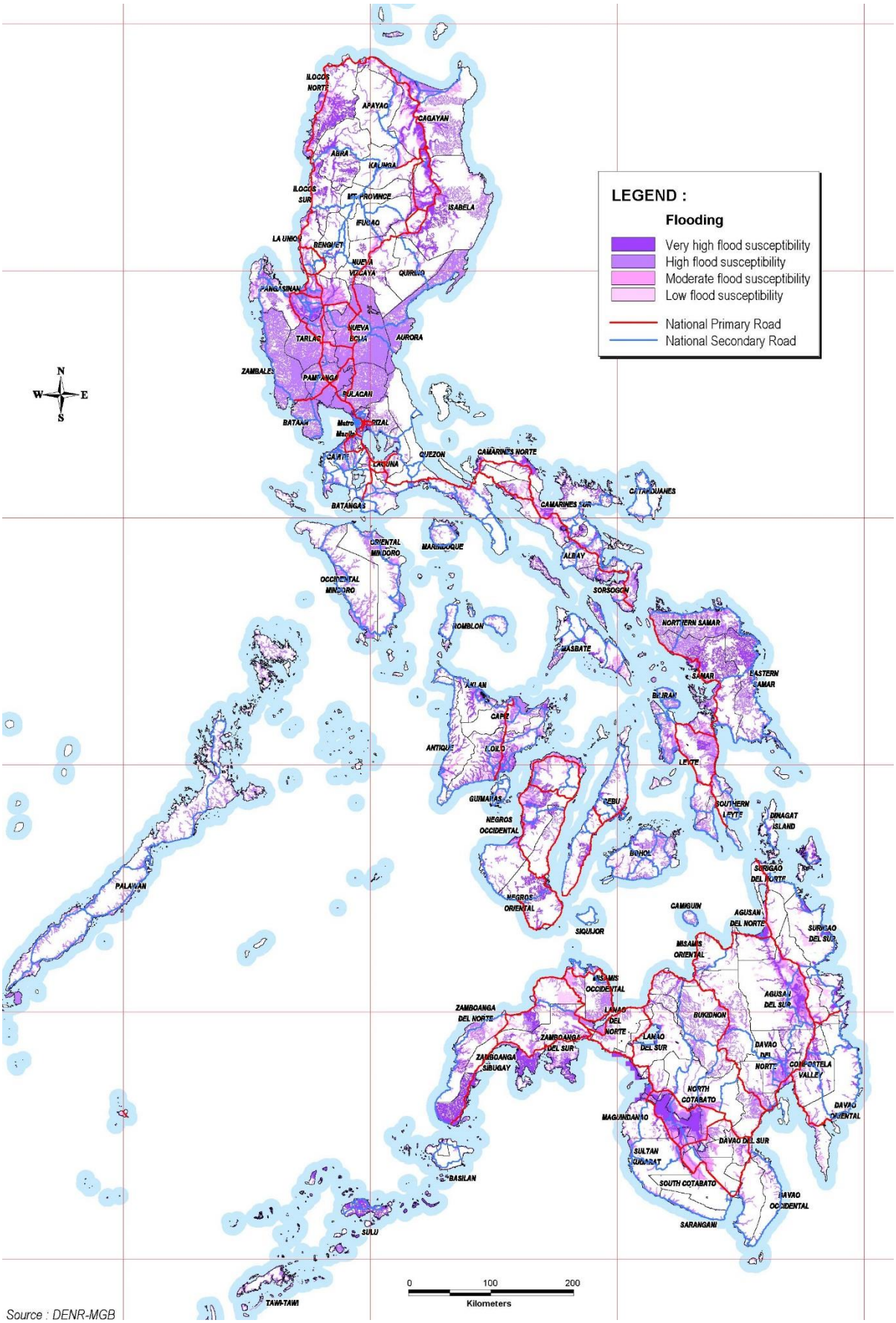
8.2.1 Identification of Disaster-Prone Area

The Philippines is an archipelago prone to an average of 21 typhoons a year. Typhoons cause landslides and floods on roads which resulted in frequent road closures. **Figure 8.2-1** shows the track of typhoons in recent years: 2016-2018. The northern part of the country is the most typhoon-prone area. **Figure 8.2-2** shows the risk area of floods. **Figure 8.2-3** shows road closures due to typhoon damage. It was observed that many roads are closed during typhoons.



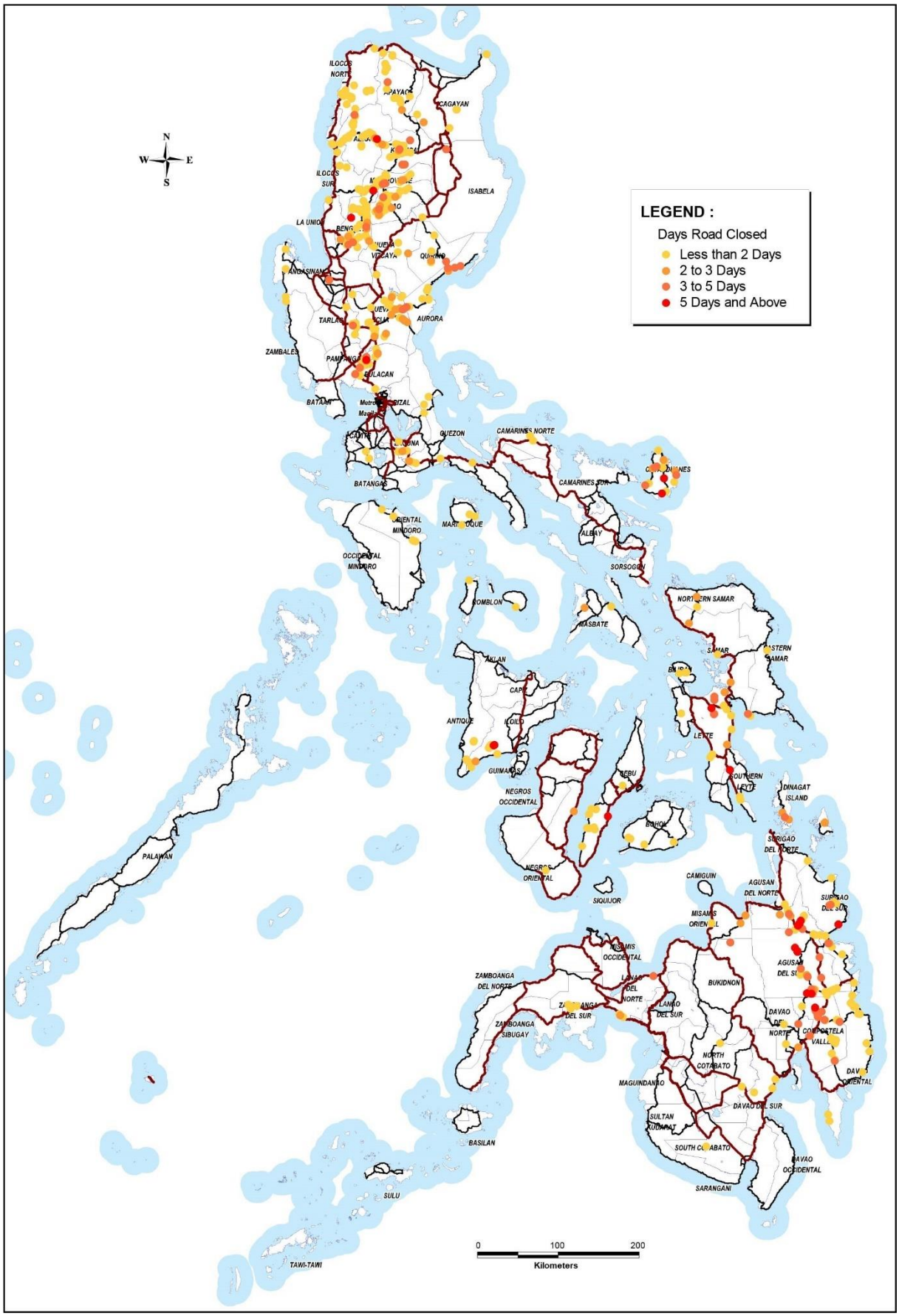
Source: PAGASA

Figure 8.2-1 Track of Major Typhoon in Recent Years in the Philippines



Source: PAGASA

Figure 8.2-2 Flood Susceptibility



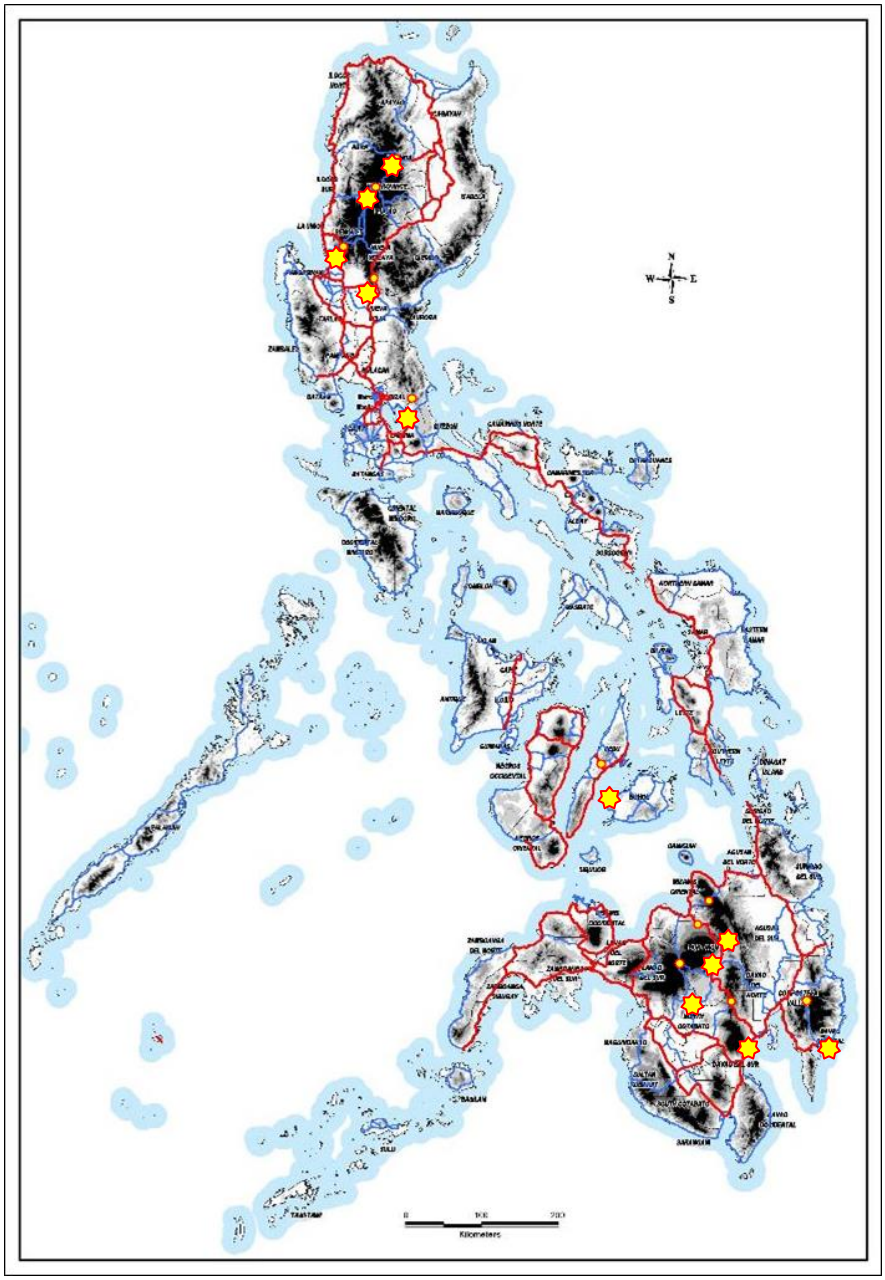
Source: JICA Study Team based on DPWH data

Figure 8.2-3 Road Closure Section due to Typhoon Damage (2014, 2015, 2018)

8.2.2 Weakness of Redundancy and Durability Against Natural Disasters

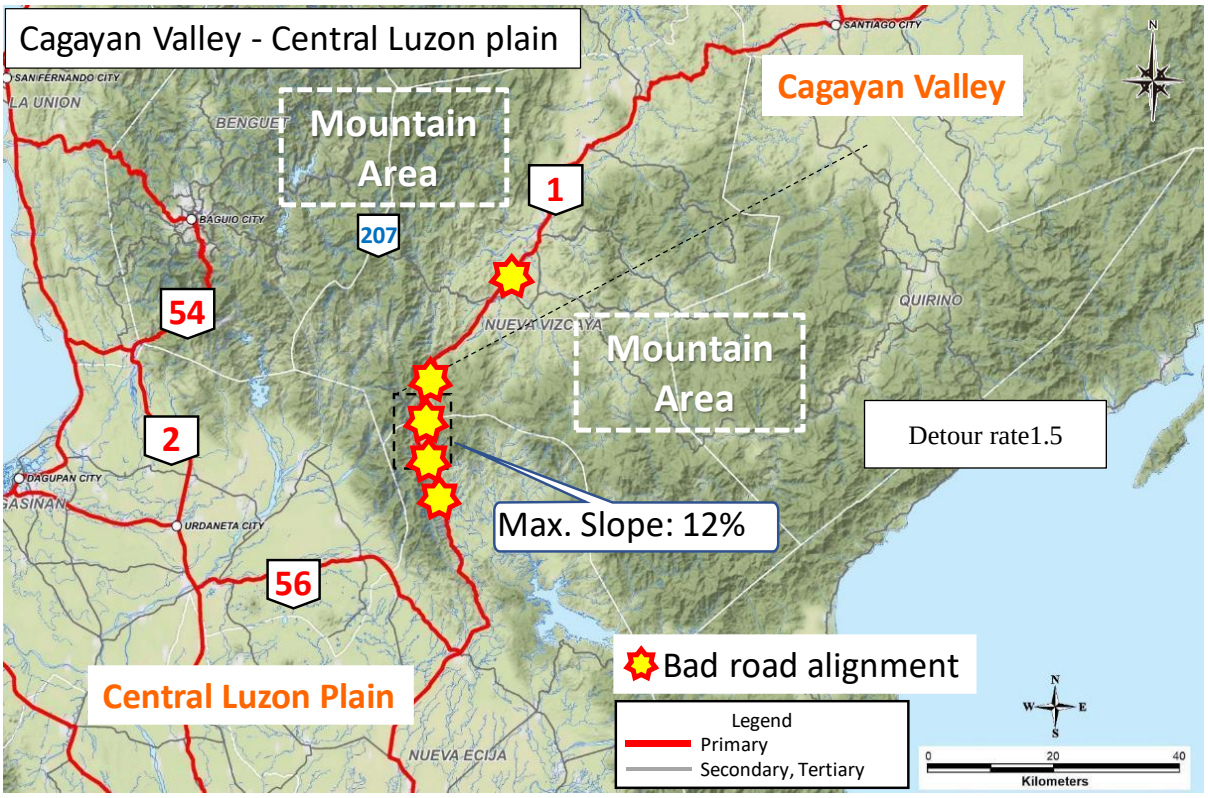
There are many mountain ranges in the Philippines, and it is not easy to develop roads that cross the mountain ranges. There are a number of roads that have to cross the mountains as the driver has to connect important regions. In many cases, this connection depends on a single national road, which has no alternate route. Moreover, these roads are vulnerable to natural disasters, such as typhoons or earthquakes.

Regional connectivity relies on the soundness of the road. When a road is closed, a major detour is a necessity, which will have a major impact on the local socio-economic activities. Typical paths are shown in the succeeding figures. The detour rate is the ratio of the travel time when the road is closed to the normal travel time. The height of the detour rate indicates the degree of poor redundancy.



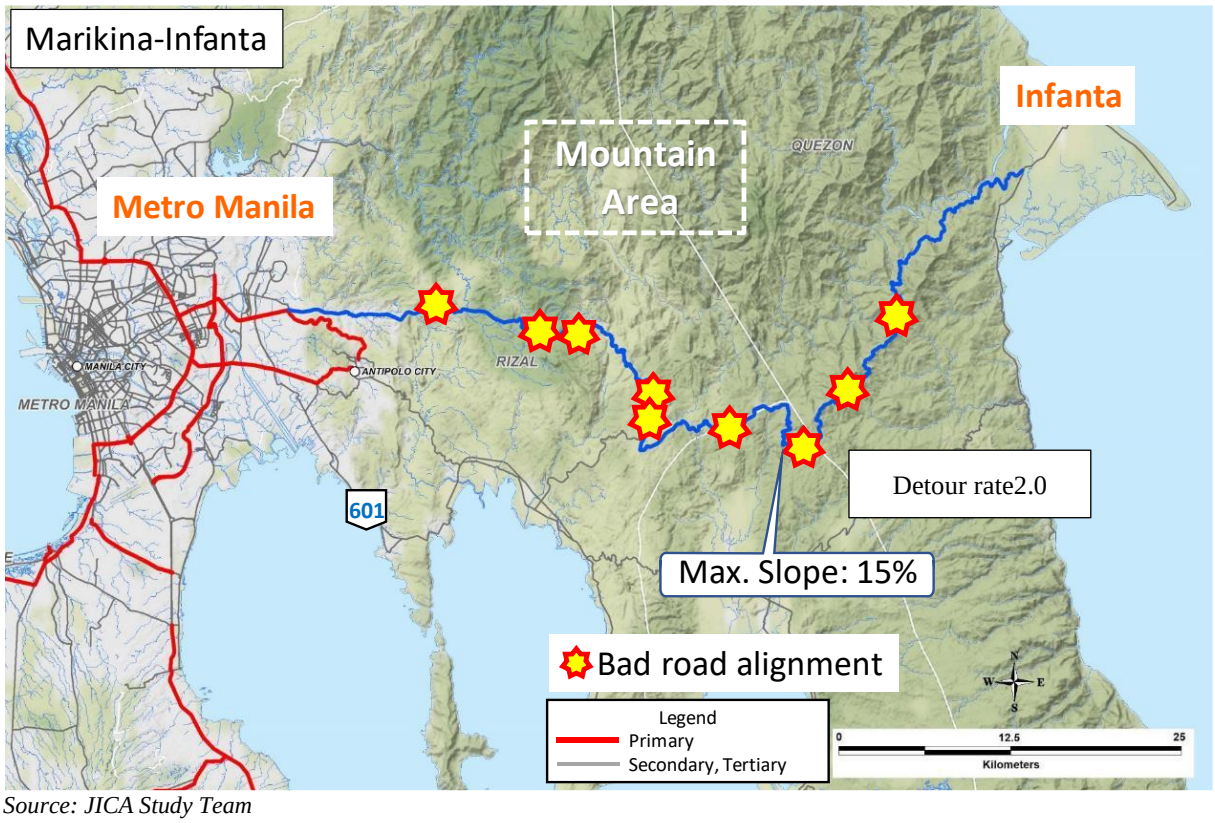
Yellow section is a road section with high risk such as slope failure
Source: JICA Study Team

Figure 8.2-4 Weak Road Section of Redundancy Function and Resiliency Against Natural Disasters



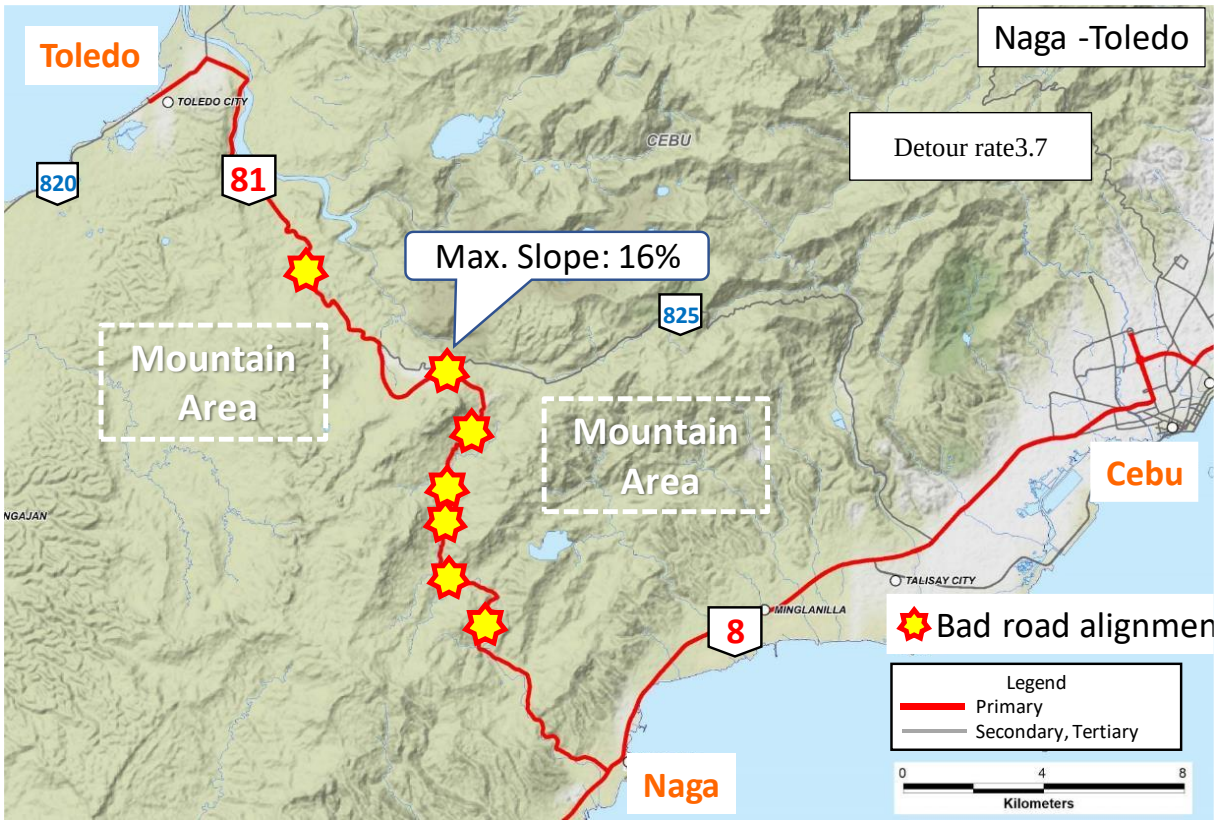
Source: JICA Study Team

Figure 8.2-5 Weak Road Section of Redundancy Function and Resiliency Against Natural Disasters: NPR No.1, Cagayan Valley - Central Luzon: Dalton Pass



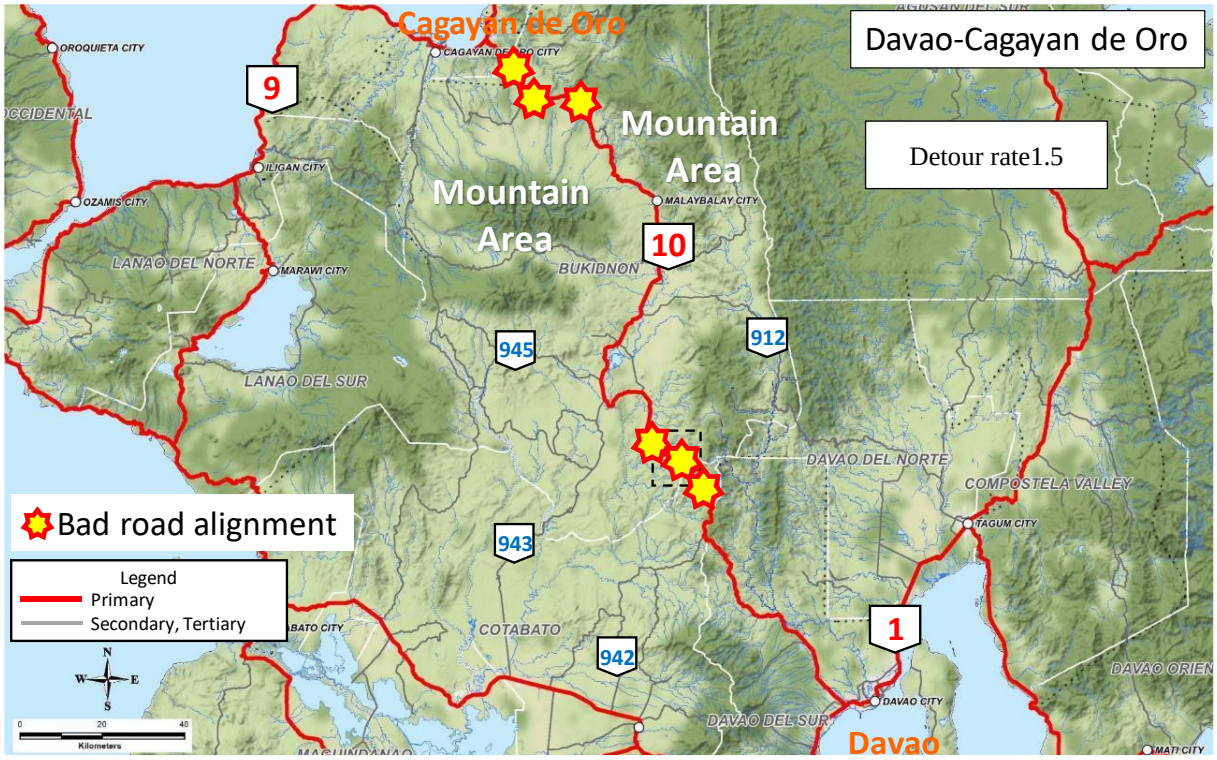
Source: JICA Study Team

Figure 8.2-6 Weak Road Section of Redundancy Function and Resiliency Against Natural Disasters: NSR between Marikina Infanta



Source: JICA Study Team

Figure 8.2-7 Weak Road Section of Redundancy Function and Resiliency Against Natural Disasters: NPR No.81 between Naga - Toledo



Source: JICA Study Team

Figure 8.2-8 Weak Road Section of Redundancy Function and Resiliency Against Natural Disasters: NPR No. 10 between Davao- Cagayan de Oro

8.2.3 Inter-Island Connection

The Philippines is an archipelagic country consisting of many islands. Its geographical characteristics make it difficult to connect regions. **Figure 8.2-9** shows the required major inter-island linkages. An effective inter-island connection is essential for an efficient land use and development.

Source: JICA Study Team

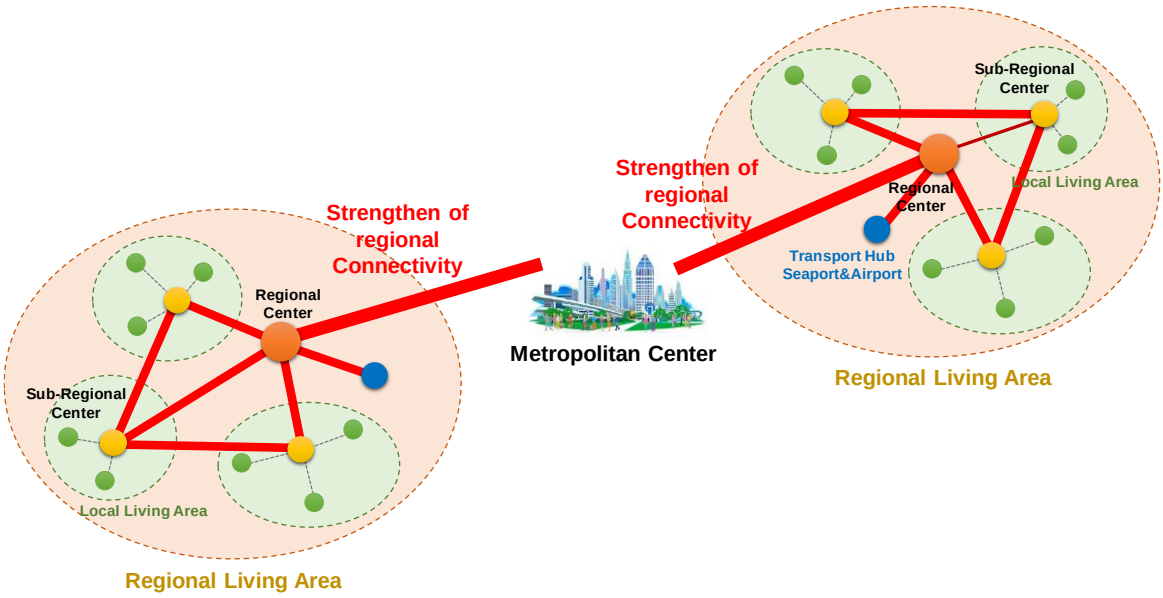
Figure 8.2-9 Important Inter-Island Linkage

8.3 Assessment of Regional Connectivity

8.3.1 Importance of Regional Connectivity by High Speed Transportation Network

Strengthening of regional connectivity is an important policy in the national ground design. The national development plan emphasizes the importance of the development of metropolitan centers and regional centers to strengthen the regional connectivity of these centers.

Specifically, regional connectivity means the accessibility between major metropolitan centers and regional centers, regional centers, connection of HSH from/to major transport hubs such as seaports and airports, and of HSH from/to major regional centers. Strengthening of regional connectivity is important to improve accessibility to higher-level urban services for inhabitants in the rural areas, achieve regional complementarity, and realize efficient logistics. Improving traffic conditions will contribute to the improvement of regional living conditions and business investments environment, and to the correction of regional disparities.



Source: JICA Study Team

Figure 8.3-1 Concept of Connectivity of Regional Centers and Sub Regional Centers

8.3.2 Present Road Network Connectivity

The HSH network will realize the high-speed road network that can connect major cities by at least 60km/hr. of travel speed. Here, the ratio of the travel time at 60 km/hr. to the current travel time between two nodes is defined as the "connection ratio by travel time." A connection ratio of 1.0 would be the benchmark to realize the HSH development.

$$\text{Connection Ratio by Travel Time} = \frac{\text{Travel Time at 60km/hr.}}{\text{Current Travel Time}}$$

Table 8.3-1 shows the present connection ratios between major regional centers defined as Administrative centers, International gateway and Tourism hub in the national development plan.

From the results, regional centers are physically linked by national highways. However, the connectivity in terms of travel time, with low travel speed, is bad. Only the links between Manila and Angeles and between Manila and Calamba, where expressways are operational, have a good connection ratio of above 1.0.

Table 8.3-1 Present Connection Ratio by Travel Time between Major Regional Centers

Pair of Regional Center		Connection Ratio: Travel Time at 60km/hr. /Current Travel Time	Evaluation
LAOAG	TUGUEGARAO	0.67	Too Bad
LAOAG	SAN FERNANDO (La Union)	0.83	Bad
SAN FERNANDO (La Union)	BAGUIO	0.53	Too Bad
TUGUEGARAO	BAGUIO	0.56	Too Bad
BAGUIO	ANGELES	0.91	Bad
ANGELES	MANILA	1.43	Good
TUGUEGARAO	MANILA	0.67	Too Bad
MANILA	CALAMBA	1.11	Good
CALAPAN	NAGA	0.50	Too Bad
NAGA	LEGAZPI	0.71	Bad
MANILA	NAGA	0.77	Bad
BUTUAN	CAGAYAN DE ORO	0.63	Too Bad
BACOLOD	CEBU	0.45	Too Bad
LEGAZPI	TACLOBAN	0.56	Too Bad
TACLOBAN	SURIGAO	0.53	Too Bad
SURIGAO	BUTUAN	0.71	Bad
BUTUAN	DAVAO	0.71	Bad
CAGAYAN DE ORO	DAVAO	0.71	Bad
CAGAYAN DE ORO	PAGADIAN	0.71	Bad
PAGADIAN	ZAMBOANGA	0.67	Too Bad
DAVAO	GEN. SANTOS	0.63	Too Bad
KORONADAL	GEN. SANTOS	0.77	Bad
COTABATO	KORONADAL	0.71	Bad
COTABATO	DAVAO	0.63	Too Bad
CAGAYAN DE ORO	COTABATO	0.67	Too Bad
ZAMBOANGA	COTABATO	0.67	Too Bad

Note: Current travel time between islands is calculated by 10 knot including transit time.
Source: JICA Study Team

Note: Current travel time between islands is calculated by 10 knot including transit time.
Source: JICA Study Team

Figure 8.3-2 Current Connection Condition between Major Regional Centers

8.3.3 Accessibility Evaluation by "Nationwide One-day Traffic Ranges"

The present exchange condition by road transport is analyzed in this Section. **Figure 8.3-3** shows the total population within "Nationwide one-day traffic ranges" from each zone. The nationwide one-day traffic range means an access area that can be reached in three hours by car. This means that people can go back and forth within the day. This value is an indicator expressing the ease of travel in each zone.

For example, in this map, the red areas indicate that more than 40 million inhabitants are within a one-day access area. On the other hand, the green areas indicate that less than 2.5 million inhabitants are within a one-day access area. From this map, it can be said that the red areas have high accessibility and the green areas have low accessibility. The accessibility for Metro Manila and surrounding areas is relatively high. This result is due to the large population in the region and the well-developed road network including high-standard highways. On the other hand, most areas in the country are green, which means low and poor accessibility.

8.3.4 Accessibility to Metropolitan Centers

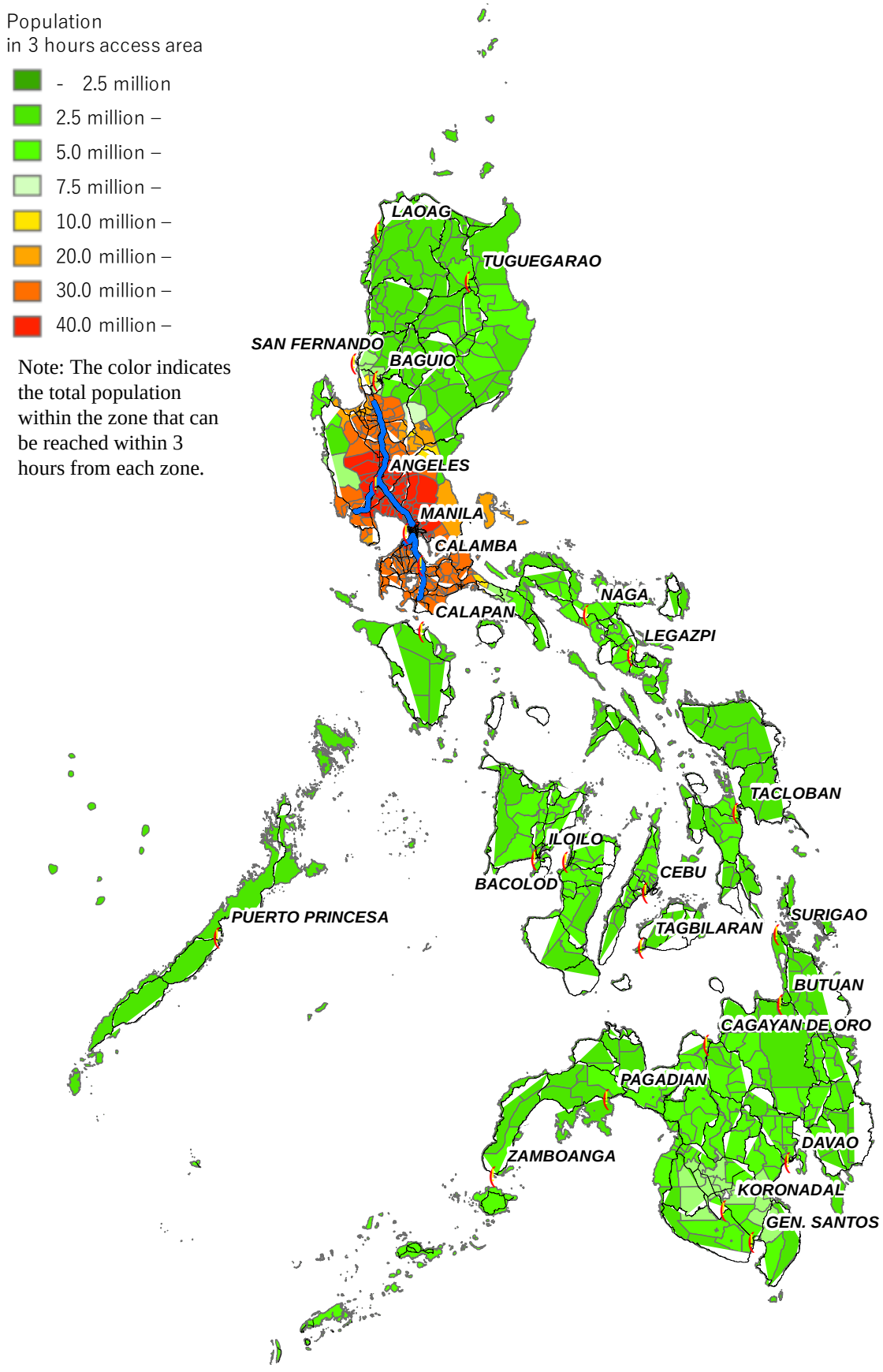
High accessibility to Metropolitan centers is essential to promote people exchange, business development and efficient logistics, etc. The desirable access time is around three hours, which means a one-day access area.

Figure 8.3-4 shows the one-day access area from Metropolitan Centers. In this map, the red colored area indicates one-day access area, 3-hour access area, from each Metropolitan center: Metro Manila, Metro Cebu and Metro Davao. The reached area is limited, and the accessible population is only 40% of the nationwide population. By expansion of HSH development, the accessible population should be upgraded to around 70% of the nationwide population until 2040.

8.3.5 Accessibility to Regional Centers

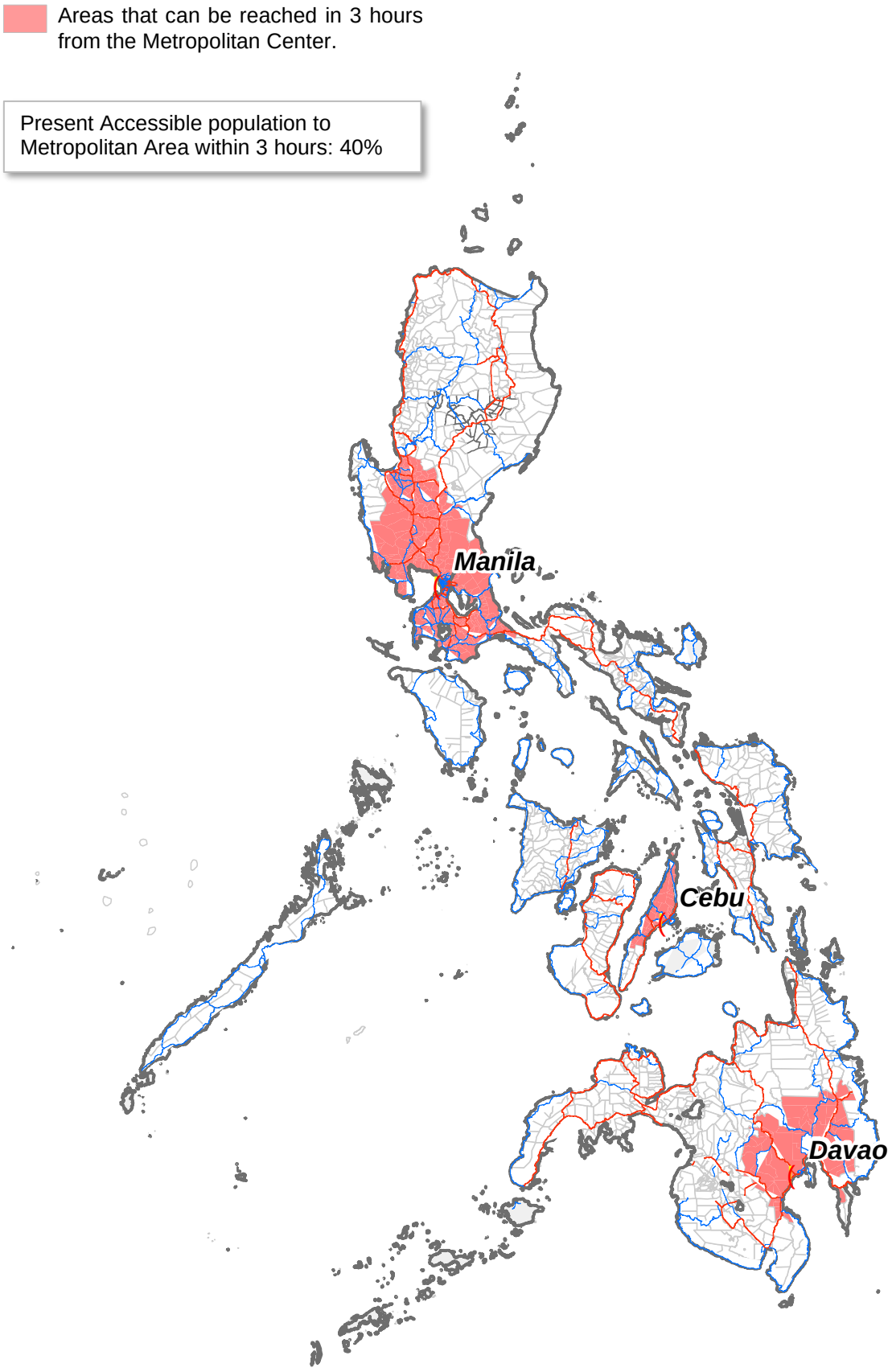
High accessibility to the regional centers, which is the core city of the regional living area, is important for improving the Quality of Life: QOL. Major regional centers are the regional cores functioning as regional markets and cities that provide various urban services: Administrative center, International gateway, and Tourism hub defined in the national development plan. The access time to the major regional center from each area is preferably 1.5 hours. This desirable time means a regional half-day accessible area.

Figure 8.3-3 shows the half-day accessible areas from major regional centers. In the map, an orange colored area indicates a half-day accessible area, which is a 1.5-hour access area, from each major regional center. The reached Area is limited, and the accessible population is only 60% of the nationwide population. In the future, the road network that most people can access to major regional centers within 1.5 hours should be developed as much as possible.



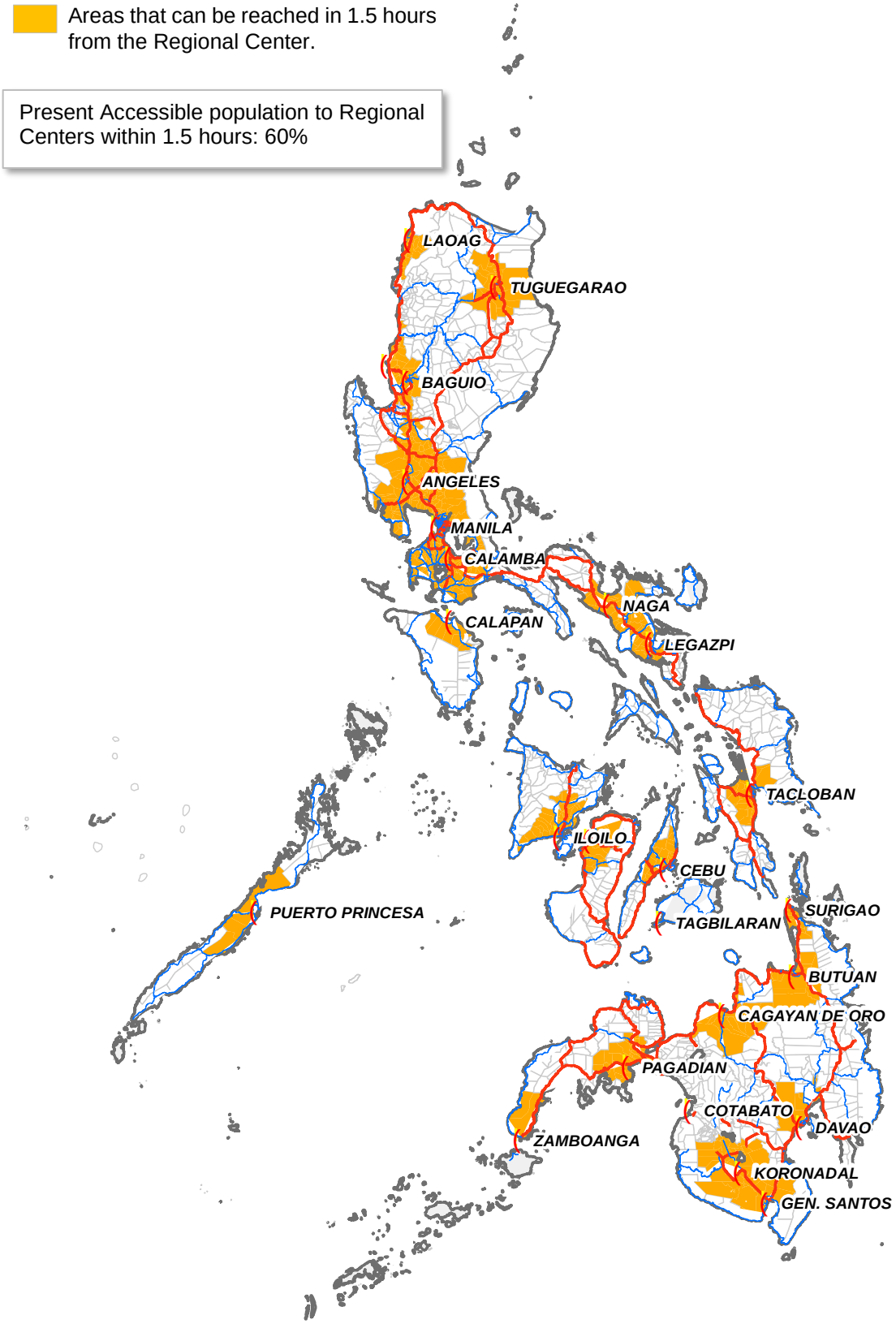
Source: Population based on 2015 Population Census, Road network condition: JICA Study Team.

Figure 8.3.3 Population of Nationwide One-day Traffic Ranges from Each Zone



Source: JICA Study Team

Figure 8.3.4 Three Hours Access Areas from Metropolitan Centers



Source: JICA Study Team

Figure 8.3-3 One and a Half Hours Access Area from Regional Centers

8.3.6 Accessibility to Important Transport Hub

The strengthening of connectivity between High Standard Highways and Ports or Airports which are important transport hubs is necessary for the realization of efficient logistics and industrial promotion such as industrial investment promotion or inbound tourists. Here, the desirable access time between the seaport and the nearest interchange of an existing expressway is recommended as 20 minutes and the maximum access time is recommended as 40 minutes in 2019. In the present road network condition, only 3 ports have access condition within 20 minutes to the existing expressway. Sixteen (16) other ports have not achieved the recommended access time. The development of HSH network and access roads is required to achieve this benchmark.

Table 8.3-2 Access Time between Major Port and Existing Expressway in 2019

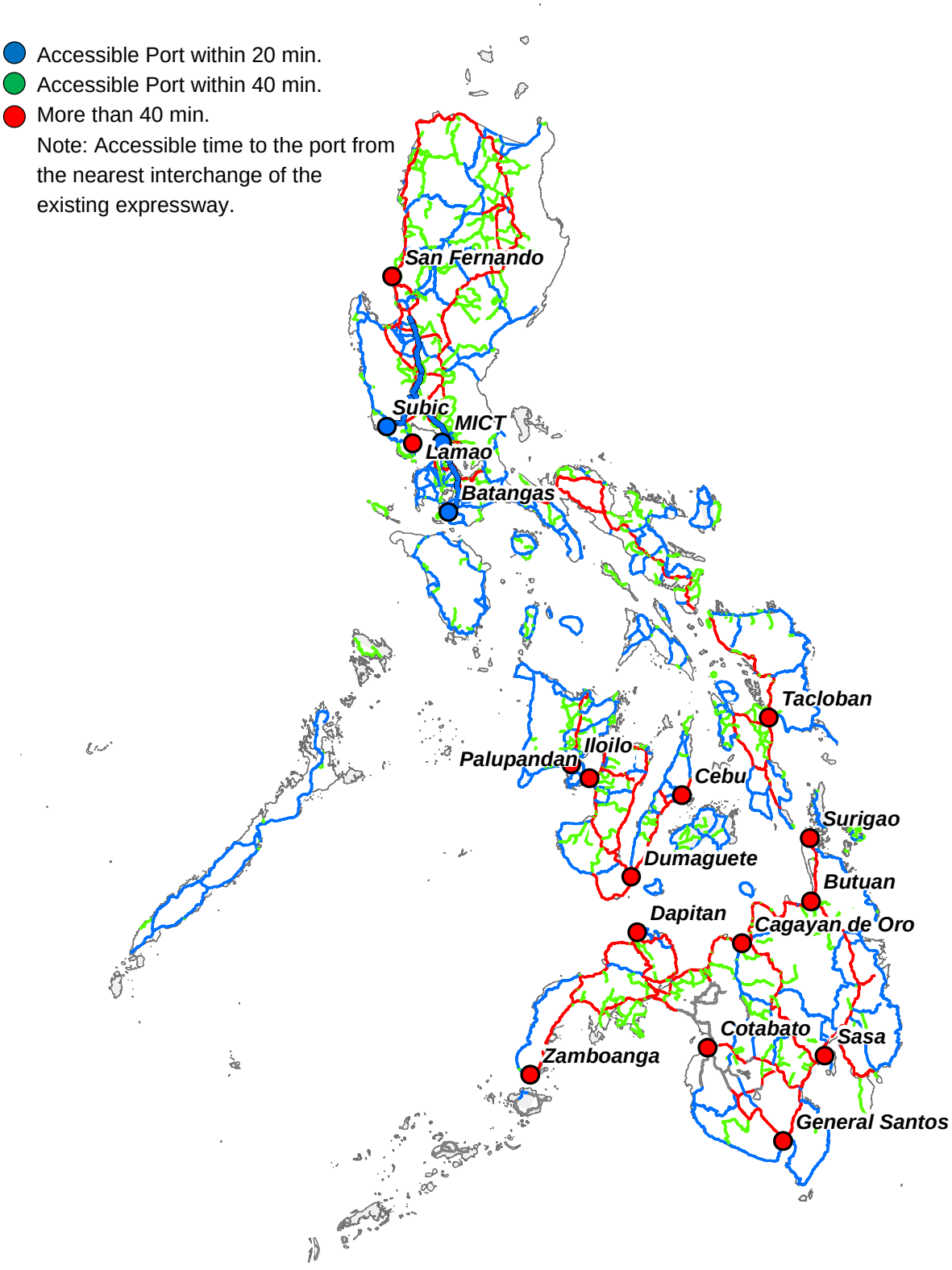
	Sea Port	Handling Volume (ton)	Handling Container (TEU)	Access Time to Existing Expressway (min.)
1	Manila	61,518,832	5,083,801	Within 20 min.
2	Bataan (Petron and gas port)	19,027,525	1,020	more than 1hr.
3	Cebu	17,980,261	919,989	more than 1hr.
4	Subic	6,852,247	212,103	Within 20 min.
5	Cagayan de Oro Container	6,395,791	226,889	more than 1hr.
6	Bacolod	4,997,138	158,446	more than 1hr.
7	Davao (Sasa)	4,328,555	289,378	more than 1hr.
8	Iloilo	3,984,649	165,759	more than 1hr.
9	Gen. Santos	3,670,553	224,623	more than 1hr.
10	Batangas	2,623,143	297,970	Within 20 min.
11	Zamboanga	2,540,177	103,080	more than 1hr.
12	Butuan (Nasipit)	1,350,446	53,983	more than 1hr.
13	San Fernando	1,037,111	-	more than 1hr.
14	Tacloban	943,499	54,087	more than 1hr.
15	Cagayan de Oro Port	848,935	52,529	more than 1hr.
16	Dumaguete	784,839	39,793	more than 1hr.
17	Surigao	530,695	5,452	more than 1hr.
18	Polloc	362,031	10,431	more than 1hr.
19	Dapitan	394,949	15,360	more than 1hr.

Note1: Manila Port including North and South Harbor and MICT
Note2: Cebu Port including Cebu International Port, Pier1, 3 and 4 and Mandaue Port
Source: Port Authority, JICA Study Team

Table 8.3-3 Summary of Access Time to Major Port from Existing Expressway in 2019

Access Time	Achieved	Not - Achieved
20 minutes access	3 ports (16%)	16 ports (84%)
40 minutes access	3 ports (16%)	16 ports (84%)

Source: JICA Study Team



Source: JICA Study Team

Figure 8.3-4 Access Condition between Major Seaport and Existing Expressways in 2019

Based on the same viewpoint as the seaport, the desirable access time between the airport and the nearest interchange of an existing expressway is recommended as 20 - 40 minutes access time. In the present road network condition, only 3 airports have access within 20 minutes to the existing expressway. Seventeen (17) other airports have not achieved the recommended access time. The development of HSH network and access roads is required to achieve this benchmark.

Table 8.3-4 Access Time between Major Airports and Existing Expressway in 2019

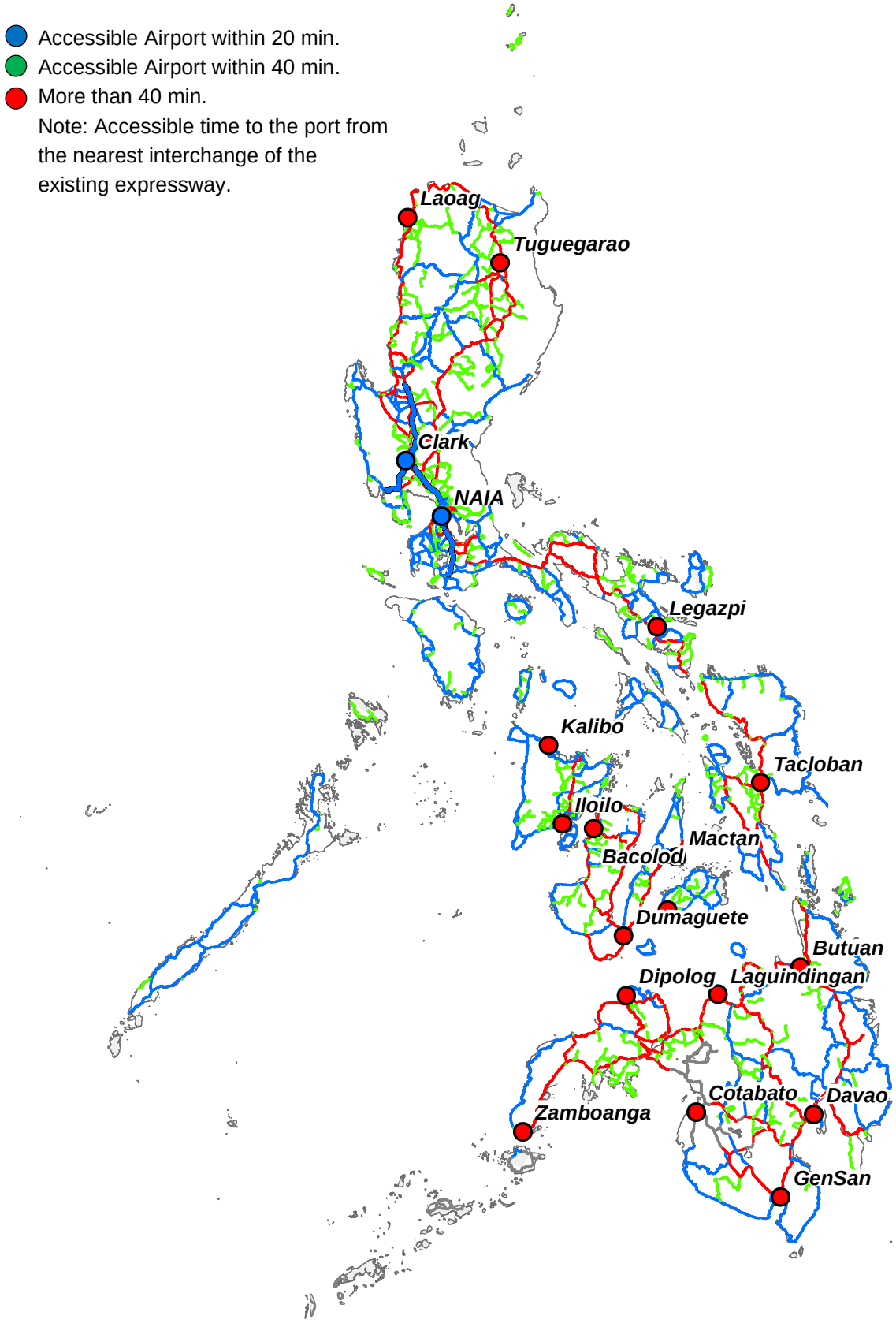
	Airport	Domestic Passenger Traffic	International Passenger Traffic	Total Passenger Traffic	Access Time to Existing expressway (min.)
1	NAIA	22,080,798	22,973,510	45,054,308	within 20 min.
2	Cebu	7,611,398	3,766,489	11,377,887	more than 1hr.
3	Davao	4,288,408	147,149	4,435,557	more than 1hr.
4	Clark	1,350,168	1,314,210	2,664,378	within 20 min.
5	Iloilo	2,215,074	80,909	2,295,983	more than 1hr.
6	Laguindingan	2,079,684	-	2,079,684	more than 1hr.
7	Bacolod	1,770,258	-	1,770,258	more than 1hr.
8	Tacloban	1,443,159	-	1,443,159	more than 1hr.
9	Kalibo	592,234	826,126	1,418,360	more than 1hr.
10	Zamboanga	1,214,078	-	1,214,078	more than 1hr.
11	Tagbilaran	889,521	99,812	989,333	more than 1hr.
12	Gen. San.Tambler	920,204	-	920,204	more than 1hr.
13	Butuan	757,639	-	757,639	more than 1hr.
14	Dumaguete	714,721	-	714,721	more than 1hr.
15	Legazpi	569,535	-	569,535	more than 1hr.
16	Tuguegarao	384,771	-	384,771	more than 1hr.
17	Cotabato	294,455	-	294,455	more than 1hr.
18	Dipolog	281,920	-	281,920	more than 1hr.
19	Laoag	150,214	1,594	151,808	more than 1hr.

Source: Airport Authorities, JICA Study Team

Table 8.3-5 Summary of Access Time to Major Airport from Existing Expressway in 2019

Access Time	Achieved	Not - Achieved
20 minutes access	2 airports (11%)	17 airports (89%)
40 minutes access	2 airports (11%)	17 airports (89%)

Source: JICA Study Team



Source: JICA Study Team

Figure 8.3-5 Access Condition between Major Airport and Existing Expressways in 2019

8.4 Logistics Value Chain and Industrial Location

8.4.1 Relationship between Expressways and Industrial Locations (Ecozones)

Data from PEZA revealed that, as of November 2017, the country has 74 manufacturing ecozones. Of these, 57 (77.0%) ecozones are located in Luzon, 9 (12.2%) ecozones are located in Visayas, and the remaining 8 (10.8%) in Mindanao. Major industrial areas like the ecozones should be connected to gateway ports, airports, and local markets to ensure the timely arrival of cargoes. Similarly, interviews with ecozone locators indicated that one of the considerations they are looking at when deciding where to locate their manufacturing plant is easy access to an expressway.

Eighty-eight (88%) or 49 out of 57 ecozones in Luzon are served or partly served by an expressway. However, there are still eight (8) ecozones which are only served by national roads. Planning of the future expressway network should take into account the location of these ecozones. In Visayas and Mindanao, all the ecozones are deprived of the services of an expressway.

In view of the issuance by the President of Administrative Order No. 18 (Acceleration Rural Interim through Robust Development of Special Economic Zones in the Countryside) last June 2019, it is expected that there will be more ecozones to be established at the countryside. The development of these new ecozones should be done in tandem with the development of an expressway.

8.4.2 Access Condition between Ecozones and Existing Expressways

Another issue which affects the logistics chain is the weak link between the ecozones and expressways. As mentioned by interviewed personnel of manufacturing companies and trucking companies, although the expressway could provide a high level of service in terms of maintaining good travel speed, the same level of service could not be achieved once the truck starts exiting the expressway and moving towards the ecozone. This lack of direct access to the expressway (meaning exclusive access without sharing with local traffic) is one of the issues that have to be considered in the future development of expressway network.

Another access problem which affects the timely delivery of cargoes is observed between the primary port (Manila ports) and expressways. The local roads of Metro Manila are experiencing chronic traffic congestion and the lack of direct access of trucks through expressways to the port have resulted in delayed delivery of cargoes and high operation cost. This increase in transport cost was captured by the Logistics Survey under this study and estimated at 5.2% over the last five (5) years or about 1.03% per annum.

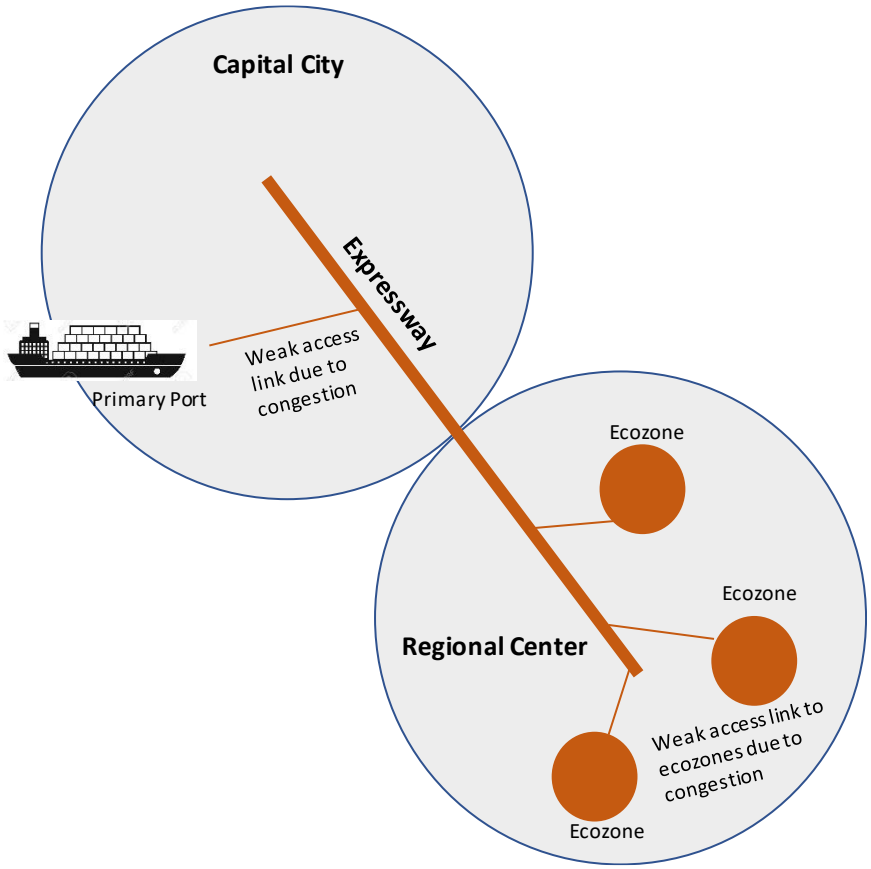


Figure 8.4-1 Weak Access between Ecozones and Expressways

8.5 Issues on Present Road Traffic and Road Network

Based on the fact-based analysis results, common issues nationwide on the present road traffic and road network were organized below.

8.5.1 Issues on Present State of Road Traffic

(1) Continuing increase in traffic demand

The traffic counting data of DPWH shows that the nationwide traffic volume is increasing at an average annual rate at 4.8%. Regarding the numbers of motor vehicles registered, it is increasing at an average annual rate at 4.4% per year. At the moment, the number of the registered vehicles is low in comparison with the size of the population in the provincial area. As the economy grows, incomes of individuals increase, and it is expected a rapid increase in the number of private vehicle and the traffic volume. From the future traffic demand analysis based on the transportation demand model, taking population and GDP as the model parameter, it is predicted that by 2040 the traffic volume will increase by 2.0 - 4.0 times of 2019 level depending on the traffic zone. In order to cope with the rapid increase in traffic volume, the expanding of road capacity is urgent issues. The road widening of the existing major national highways is not so readily in the urban section because of rapid urbanization. Under a situation above, the development of new bypass roads could be an essential measure for corresponding to the traffic demand increase in urbanized section.

(2) Aggravation of road service standards on urban road

Urbanization is progressing along existing roads, including even along the National Primary Highways that are required to have a smooth traffic flow, turning these roads into local roads; this means that there is a lot of access traffic along the road. Further, the pedestrians and slow-moving paratransit services on National highways is significantly reducing smooth traffic flow. Moreover, there are many urban areas without bypass road. As a consequence, through traffic and large trucks are entering the urban center area, leading deterioration of traffic congestion, road safety and residential environment. As a result of this, even on major national highways, the driving speed is drastically reduced to less than 20 kph on the road sections where pass urban areas. When passing through a city with a population of 100,000, travel speed is less than 30kph, and when passing through a city with a population of 300,000, travel speed is under 20 kph. When passing through urban areas, time losses due to traffic congestion are huge.

The development of a ring road or a bypass through traffic is needed where there is a significant increase in the traffic volume.

(3) Increasing longer distance travel

Roadside OD surveys result shows that some 30% of traffic volume involves long-distance trips of over 100km. People are moving over longer distances, and it is assumed that travel distances per trip will continue to grow. The provision of high-speed traffic infrastructure that can support further travel time reduction is required to cope with increasing longer distance travel.

(4) The concentration of international cargo to Manila port

The more than 80 percent of import and export cargos by maritime container are handled at Manila container terminal in Philippines. The significant concentration of containers to the Manila Container Terminal is a serious issue in transportation policy.

The large size truck traffic such as container trailers from international port causes the traffic congestion on the highway near the harbor front area and the urban center. In addition, truck traffic for logistic activities from Manila port to provincial area is also getting larger. Furthermore, as the handling volume at the port is increasing year on year, the traffic congestion is also becoming worse. Although port development is promoted in provincial areas, the amount handled is stagnant. The lack of road development connecting the port and the final destinations of the cargo such as SEZ and other logistic centers is raised as a possible issue. Especially, the high standard highway to connects port and hinterland area of port is needed.

(5) Traffic congestion in the metropolitan area and delays in the provision of trunk roads

The traffic congestion is getting serious in Metro Manila because of population and economic activities growth speed high although the development of public transportation system is being promoted. The urban sprawl in the suburbs continues, the expansion of the arterial road is an urgent issue in the transport infrastructure development strategy. Especially, planning and development of outer ring roads is needed to avoid the concentration of traffic to urban centers. Same issues same are becoming apparent in other metropolitan area such as Cebu, Davao and Cagayan de Ore.

(6) Economic losses and deterioration of the urban environment due to traffic congestion

The loss caused by traffic delays due to the inflow of through traffic into the urban areas and traffic congestion is huge and is a factor in the occurrence of traffic accidents. In addition, traffic congestion increases the risks of road accidents, the emission of exhaust gasses from vehicles and leads to the deterioration of the roadside environment.

8.5.2 Issues on Road Network and Regional Connectivity

(1) Expressway development in the Philippines has focused on only around Metro Manila and surrounding regions.

Development of expressways is limited at Metro Manila and the surrounding regions, and the total length is no more than 406 km. In other areas, a national high-speed traffic network is absent, and the national land is put to efficient use.

The extension of expressways is slow in comparison with other countries in South East Asia. With the level of the Philippine economy, in terms of per capita GDP, the highways could be developed for 800 kilometers.

The provision of an expressway network covering the whole country is required in order to promote the development of the national land.

(2) Imbalance in the development of the road network

The national road network road density (per population/land area) is extremely high in the NCR. In Region III and Region IV-A, the road development including expressway, bypass and road widening is aggressively promoted.

The other hand, the density of national highway is low in other regions and highway in other regions basically form a road network of two-lane roads or two-lane with a wide shoulder. the lack of bypass development around urban areas is also one of the issues. For balanced national development, further improvement of road development in provincial areas is required.

(3) Topographical restrictions and vulnerability to disasters

Regional highway networks lack multiplicity; Redundancy especially on inter-regional highways that pass through mountainous areas is weak. As a result, Huge detours must be made when a highway is closed due to a traffic accident or natural disaster.

The Philippines is hit frequently by large size typhoons every year; almost every year the country suffers road flooding, landslides and other disasters that close the roads to traffic.

The resiliency of highway in mountainous areas to natural disaster is low with many sections having sharp bends or running through cuts in the mountainside, making them vulnerable to landslides and other disasters.

Highways have to overcome the topographical restrictions of the mountainous areas through the provision of disaster-resilient roads using tunnels, mountain bridges, slope stabilizing works, etc. and the formation of a road network that has sufficient redundancy to cope with natural disaster.

(4) Improvement of connectivity of inter islands

The Philippines is an archipelagic country, and the travel inter-island must rely on ferries or infrequent air services, so that efficient travel between islands is limited. In order to promote efficient movement between islands and the economic development for island areas, further transport reinforcement of inter-island linkage should be promoted considering the application of advanced technology such as long-span bridges, undersea tunnel as much as possible.

(5) Weakness of accessibility to Metropolitan area

The good connectivity to Metropolitan area where population and economy are concentrated is very important in order to increase business opportunity or meeting and to enjoy high-grade urban services from regional areas. While metropolitan areas are linked physically each region by the national highway network, the service level that means travel speed is low due to lack of expressway.

The population within a 3-hour radius of one of the metropolitan centers (Manila, Cebu, and Davao) where high-grade urban services are concentrated is no more than 50% of the population of the country as a whole. (It is hoped that this will reach 75% in the future).

In terms of the accessibility index, that is, the one-day accessible population (the population of the area that can be reached within 3 hours from each zone), Metro Manila and the surrounding areas where an expressway network was developed well has a large accessible population. However, the accessible population is small in other areas due to undeveloped expressway.

(6) Weakness of accessibility to urban services and transport hubs

The good accessibility to regional centers provides urban services for daily life is very important. The accessible population within a 1.5-hour from major regional center is less than 65% of the total population of the country. It is hoped that this will reach 100% in the future by development of expressway network.

In term of accessibility to major transport hubs such as major ports and airports, ccurrently only 3 ports and 2 airports has access of expressway. In order to enhance international competitiveness and attract investment, the connectivity between the transport hubs and expressways must be strengthened to expand the service area of transport hub.

8.6 Impact of HSH development

HSH development will contribute in mitigating the present road traffic and road network issues.

The following positive impacts are expected with the HSH development:

- Smooth traffic movement (reduction of travel time), especially traffic decongestion in Metropolitan Areas
- Expansion of travel area (expansion area for one-day trip)
- Access improvement from/to Metropolitan Centers, Regional Centers and Major Traffic Facilities (Port and Airport)
- Balanced nationwide road network development
- Improvement of Economic competitive environment (Promotion of Economic Zone development by domestic and foreign investors)
- Reduction of transportation cost (improvement of logistic movement)
- Creation of new tourism spots and poverty alleviation thru income increase by increased number of tourists
- Improvement of redundancy and resiliency highway network from natural disaster (development of the emergency transport highway network)

At the same time, some negative impacts are expected with the HSH development.

- Concentration of various functions in the city center and the decrease of urban function in the rural area due to HSH development (straw effect), decline of local commercial area
- Disorderly land use by uncontrolled development by HSH development
- Environmental deterioration at specific areas. Cf. interchange areas, new development areas by new HSH construction

To minimize the negative impacts, the following measures will be undertaken.

Negative impacts	Measures to be undertaken
Concentration of various functions in the city center and the decrease of urban function in the rural area due to HSH development (straw effect), declines of local commercial areas	Promotion of the local business activity plan Creation of the new core city or SEZ in rural area Coordination of the HSH development plan and new SEZ development plan
Disorderly land use by uncontrolled development by HSH development	Revision of the comprehensive land use plan (CLUPs) harmonized with HSH development plan. The layout of large industrial park/logistic park plan near the proposed interchange location and/or new highway route must be carefully planned
Environmental deterioration at specific areas, especially proposed interchange areas. Increase of traffic congestion, traffic accidents, noise and exhaust due to increased traffic.	It is necessary to update the land use plan to fit the HSH development project.

Since the straw effect will disturb the balance of the nationwide development, the measures for protection of straw effect should be fully considered.

To consider above condition, HSH development shall be formulated in **Chapter 11** and **12**.

CHAPTER 9

INSTITUTIONAL SYSTEM AND PPP

CHAPTER 9
INSTITUTIONAL SYSTEM AND PPP

9.1 DPWH Organization

9.1.1 DPWH Mandate

The Department of Public Works and Highways (DPWH) is one of the three departments of the Government undertaking major infrastructure projects. DPWH is mandated to undertake (a) the planning of infrastructure, such as national roads and bridges, flood control, water resources projects and other public works, and (b) the design, construction, and maintenance of national roads and bridges, and major flood control systems.

In order to support the overall socioeconomic development of the Philippines, one of the major national programs being implemented by the Government is the development of the highway network in the Philippines, which is planned and implemented by DPWH.

9.1.2 DPWH Organizational Structure

By virtue of the Executive Order No. 124, series of 1987, the DPWH organization shown in **Figure 9.1-1** has eight (8) services, six (6) bureaus, sixteen (16) regional offices, one (1) Unified Project Management Office (UPMO), and one hundred eighty-three (183) district engineering offices. All of these offices are mandated to accelerate the process of nation building through infrastructure projects.

The eight (8) Services are: Planning, Public-Private Partnership, Human Resource and Administrative, Finance, Information Management, Procurement, Legal, and Stakeholders Relations.

The six (6) Bureaus are: Design, Construction, Maintenance, Equipment, Research and Standards, and Quality and Safety.

(1) Regional Office (RO)

There are sixteen (16) regional offices responsible for highways, flood control and water resource development systems, and other public works within the region. Their duties and responsibilities are as follows:

- Implement laws, policies, rules, regulations, guidelines and procedures for effective planning, design, construction and maintenance of infrastructure projects within the region;
- Coordinate the planning, design, construction and maintenance of all infrastructure projects within the region;
- Provide supervision and support to the District Engineering Offices in the exercise of its functions;
- Coordinate and provide technical assistance and support to other agencies, local government units and private institutions in the planning, implementation and maintenance of infrastructure projects within the region;
- Review and evaluate plans and programs of work for the construction and maintenance of local roads and other infrastructures receiving national government assistance;
- Conduct continuing consultations with the local communities to make the services of the Department responsive to the needs of the general public;
- Prepare, consolidate and submit all relevant information required by the Department and other national government agencies; and
- Perform such other functions and responsibilities as may be assigned by the Secretary.

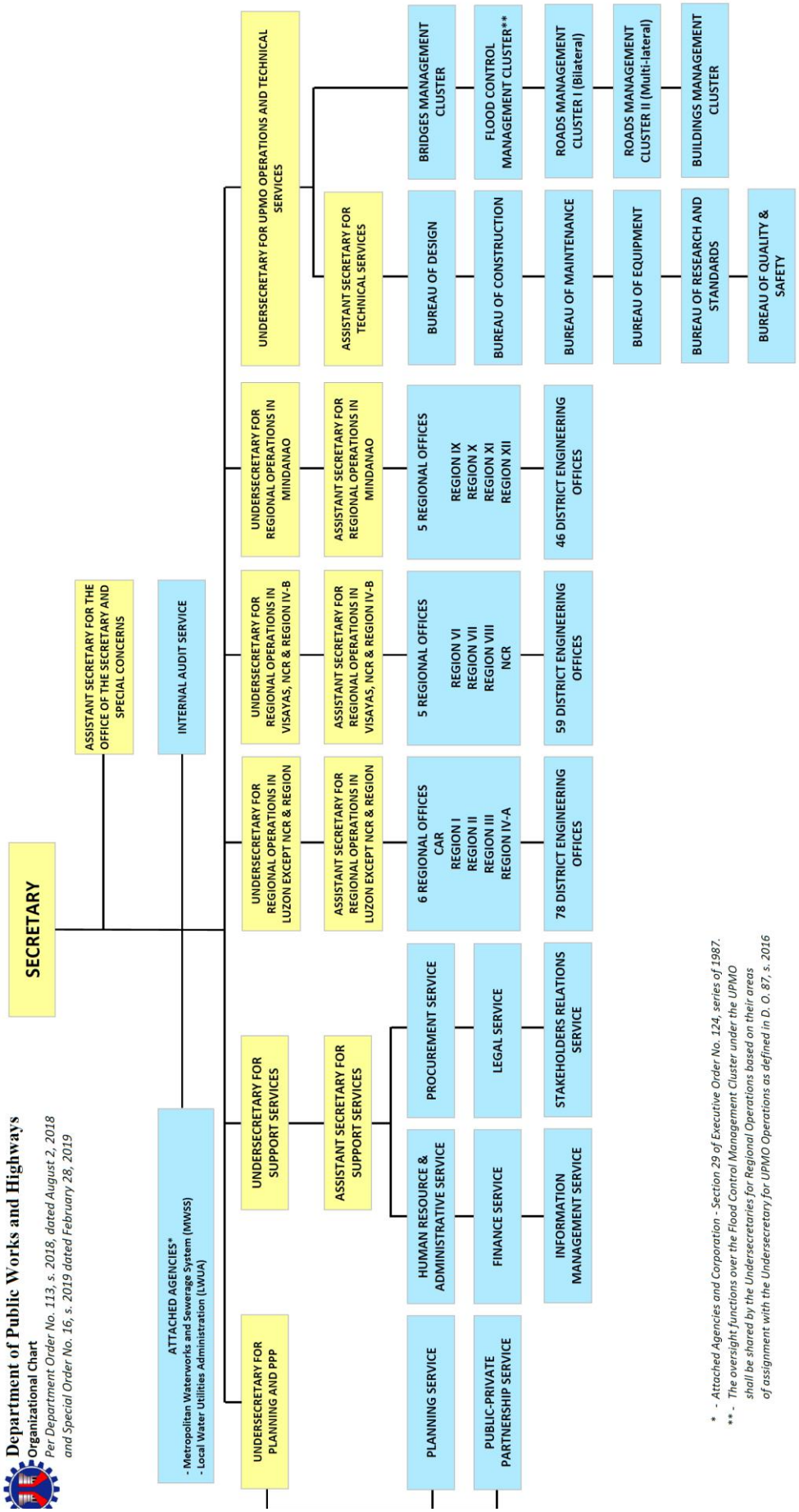


Figure 9.1-1 DPWH Organizational Chart

Source: DPWH

(2) District Engineering Office (DEO)

Section 25 of the Executive Order No. 124, series of 1987, provides for the establishment of District Engineering Office(s) in each of the provinces and cities throughout the country responsible for all highways, flood control and water resource development systems, and other public works within the district under the regional offices. Their duties and responsibilities are as follows:

- Implement laws, policies, rules, regulations, guidelines and procedures for effective planning, design, construction and maintenance of infrastructure projects within the district;
- Supervise and coordinate the planning, design, construction and maintenance of all infrastructure projects within the district;
- Undertake the maintenance of infrastructure within the District and supervise the maintenance of such local roads and other infrastructure receiving national government financial assistance as the Secretary may determine;
- Coordinate and provide technical assistance and support to other agencies, local government units and private institutions in the planning, implementation and maintenance of infrastructure projects within the district;
- Conduct continuing consultations with the local communities to make the services of the Department responsive to the need of the general public;
- Prepare and submit all relevant information required by the Regional Office, Department and other national government agencies; and
- Perform such other functions and responsibilities as may be assigned.

At present, there are 183 DEOs created and classified based on the Department Order No. 110, series of 2016.

Minimum requirements for creating a new District Engineering Office and parameters for classification and reclassification are shown in **Table 9.1-1** and **Table 9.1-2**, respectively.

Table 9.1-1 Requirement for the Creation of DEOs

Parameters	Minimum Required
National Road Length	100 kilometers
Land Area	100 sq. m.
Population	250,000 inhabitants
For Island Component Municipality	35,000 inhabitants

Source: DPWH Department Order No. 110, s. of 2016

These considerations are based on the physical features and socio-economic conditions of the province to determine the viability of the establishment of a new DEO.

Table 9.1-2 Parameter for DEO Classification

Equivalent Road Length (km)	DEO Class
250 and above	1st Class
100 up to <250	2nd Class
<100	3rd Class

Source: DPWH Department Order No. 110, s. of 2016

The classification and reclassification of the DEO determines the allocation of funds as well as the allotment of service personnel.

9.2 DPWH and TRB

9.2.1 Historical Background of TRB

The huge financial requirements of the Government's development programs have made it necessary to seek out alternatives sources of financing to ensure the prosecution of certain desirable infrastructure projects that complement the over-all national development effort.

The potential resources of the private sector could be tapped to the maximum benefit of the government dispensing to a great extent the availment of additional domestic and foreign borrowings as well as utilization of government guarantee or security.

In order to attract private sector investment in the government's infrastructure projects, the collection of toll fees for the use of certain public improvements, that would allow reasonable rate of return on investments, should be authorized; provided that, the collection of toll fees and operation of toll facilities by the private sector should be loosely supervised and regulated in the public interest. Thus, PD 1112, known as "Toll Operation Decree" was enacted on March 31, 1977.

Presidential Decree (PD) 1112 authorized the establishment of toll facilities on public improvements and created a board for its regulation and for other purposes, known as the Toll Regulatory Board (TRB or Board).

PD 1112 gave the Board the following powers:

- To enter into contracts in behalf of the Republic of the Philippines with persons, natural or juridical, for the construction, operation and maintenance of toll facilities, subject to the approval of the President of the Philippines, such as but not limited to national highways, roads, bridges, and public thoroughfares. The contract shall be open to citizens of the Philippines and/or to corporations or associations qualified under the Constitution and authorized by the law to engage in toll operations;

- To determine and decide the kind, type and nature of public improvement that will be constructed and/or operated as toll facilities;

- To condemn private property for public use subject to the previous of existing law;

- To issue, modify and proclaim from time to time the rates of toll that will be charged the direct users of toll facilities and upon notice and hearing, to approve or disapprove petitions for the increases thereof. Such appeal shall not suspend the imposition of the new rates, provided however, that pending the resolution of the appeal, the petitioner for increased rates in such case shall deposit in a trust fud such amounts as may be necessary to reimburse toll payers affected in case a reversal of the decision;

- To grant authority to operate a toll facility and to issue the necessary "Toll Operation Certificate" subject to such conditions as shall be imposed by the Board.

On October 10, 2002, Executive Order No. (EO) 133 transferred the TRB from the Office of the President (OP) to the Department of Transportation and Communications (DOTC), now known as the Department of Transportation (DOTr).

On August 29, 2006, the Supreme Court in Mirasol vs. the Department of Public Works and Highways and the Toll Regulatory Board decided that the DOTC and not DPWH has the authority to administer and enforce all laws, rules and regulation relative to transportation.

On July 30, 2007, EO 644 transferred the TRB from DOTC to the Department of Public Works and Highways. Stating that entering into contract is not a regulatory function but rather an administrative function. And that determining and deciding the kind, type and nature of public improvement that will be constructed and/or operated as toll facilities is not a regulatory function but rather a planning function.

The President of the Philippines has continuing authority to recognize the administrative structure of the OP by, among others, transferring any agency under the OP to any department of agency of the government pursuant to paragraph 3, section 31, Chapter 10, Title III, Book III of EO 292.

For purposes of rationalization, regulation should be separated from administration, planning, or implementation, thus, on December 19, 2007, EO 686, the Board (TRB) was transferred back from the Department of Public Works and Highways (DPWH) to the Department of Transportation and Communications (DOTC) (now DOTR).

9.2.2 Power Demarcation between DPWH and TRB

The demarcated powers between DPWH and TRB are as follows:

(1) Power of DPWH

1. To enter into contracts in behalf of the Republic of the Philippines for the construction, operation and maintenance of toll facilities for highways, roads, bridges and public thoroughfares;
2. To determine and decide the kind, type and nature of highways, roads, bridges and public thoroughfares;
3. To condemn private property for highways, roads, bridges and public thoroughfares.

(2) Power of TRB

1. To issue, modify and proclaim from time to time the rates of toll that will be charged the direct users of toll facilities and upon notice and hearing to approve or disapprove petitions for the increases; and
2. To grant authority to operate a toll facility and to issue the necessary "Toll Operation Certificate."

9.2.3 Existing Expressways under DPWH and/or TRB

Existing expressways and expressways undergoing construction are listed below:

Name of Expressway	Length (as of 2021)	Project Grantor	Grantee	Operator	Concession Period
Tarlac-Pangasinan-La Union Expressway (TPLEX)	104.353 km (88.853 km)	DPWH and TRB (PPP Scheme – Build-Transfer-Operate BTO)	SMC TPLEX Corp formerly Private Infra Dev Corporation (PIDC)	SMC TPLEX Corp	35 years TCA – July 2008 to July 2043
Subic-Clark-Tarlac Expressway (SCTEX)	93.77 km (94.63 km)	TRB	Bases Conversion Development Authority (BCDA)	Manila North Tollways Corporation (MNTC) now NLEX Corp.	35 years TCA April 28, 2008 to October 30, 2043
North Luzon Expressway (NLEX)	Phase 1 – 91.12 km Phase 2 – 19.5 km Phase 3 – 58.5 km	TRB	Philippine National Construction Corporation (PNCC) and Manila North Tollways Corporation (MNTC)	Tollways Management Corporation (TMC) now NLEX Corp.	April 1998 to December 31, 2030

Name of Expressway	Length (as of 2021)	Project Grantor	Grantee	Operator	Concession Period
Manila-Cavite Toll Expressway (CAVITEX)	24.975 km	TRB	Public Estates Authority (PEA) now Philippine Reclamation Authority (PRA)	PEA Tollway Corporation	30 years – October 1, 1998 to September 30, 2033
NAIA Expressway (NAIAX)	5.4 km	DPWH	Vertex Tollway Devt Inc. (VTDI)	Skyway Operations and Maintenance Corp (SOMCO)	30 years – November 2015 to November 2045
South Metro Manila Skyway Project (Skyway)	Stage 1 – 22.807km Stage 2 – 6.88km Stage 3 – 18.38km	TRB	Philippine National Construction Corporation (PNCC) and Citra Metro Manila Tollways Corp (CMMTC)	Skyway Operations and Maintenance Corp (SOMCO)	30 years from the Final Operation Date
Muntinlupa-Cavite Expressway (MCX)	4.0km	DPWH	Ayala Corporation	MCX Tollway Inc.	30 years from NTP issuance with Segment II
South Luzon Expressway (SLEX)	TR1 and TR2 – 28.531km TR3 – 7.01km TR4 – 66.74km	TRB	Philippine National Construction Corporation (PNCC) and South Luzon Tollway Corporation (SLTC)	PNCC until May 2, 2010 Manila Toll Expressway Systems (MATES) Inc. starting May 2, 2010	30 years – February 1, 2006 to February 01 2036
Apolinario Mabini Superhighway (formerly known as Southern Tagalog Arterial Road (STAR) Tollway	41.9km	DPWH and TRB	STAR Infrastructure Development Corp (SIDC)	STAR Tollway Corp (STC)	30 years – January 1, 2000 to December 31, 2029
Cavite-Laguna Expressway (CALAX)	45.29km (8.9km, open to traffic in October 30, 2019	DPWH (PPP Scheme – Build-Transfer-Operate BTO)	MPCALA Holdings Inc. (Optimal Infrastructure Development Inc.)	MPCALA Holdings Inc. (Optimal Infrastructure Development Inc.)	35 years – 2017 to 2052 (including 5 years of design and construction)
Central Luzon Link Expressway (CLLEX) Phase 1 and 2	35.70km	DPWH but funded by JICA	TBD (to be determined)	TBD	TBD

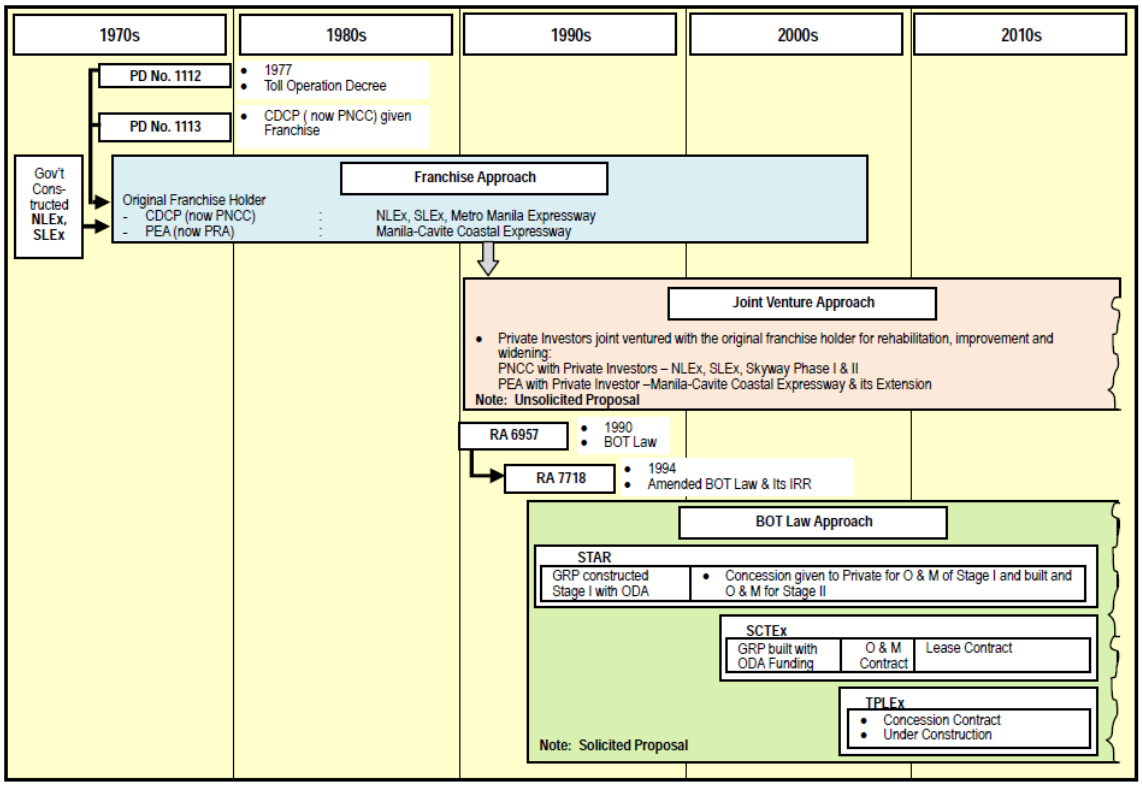
Source: Toll Regulatory Board, PPP Center, and DPWH websites

9.3 Legislative Framework on PPP

9.3.1 Laws and Regulations for Toll Road Development

(1) Brief History of PPP Projects

In the Philippines, the need for PPP has long been recognized. Therefore, the legal system was established and business has been promoted based on it. Toll road development has been carried out in three unique ways as shown in **Figure 9.3-1**.



Source: JICA "Preparatory Survey for Public-Private Partnership (PPP) Infrastructure Development Projects in the Republic of the Philippines" 2010

Figure 9.3-1 Historical Flow of Private Sector Participation in Expressway Services

(2) Current PPP Scheme

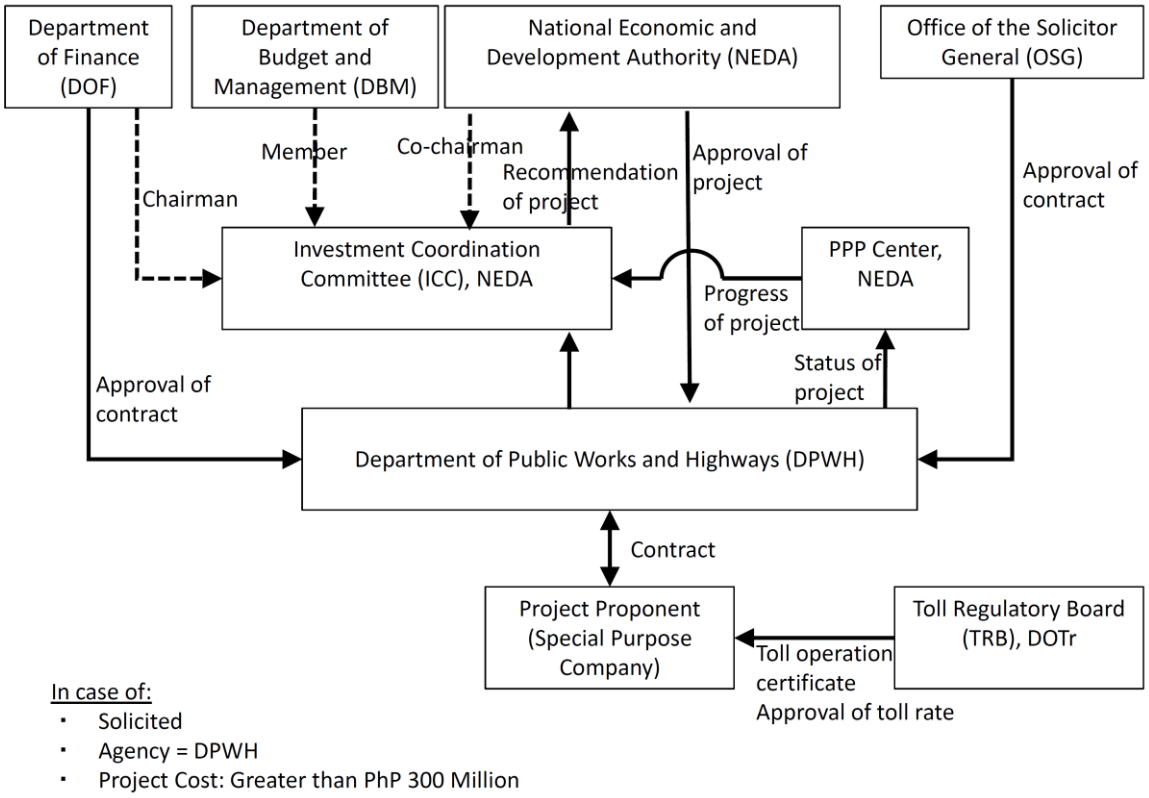
In the Philippines, the BOT law under R.A. No. 6957 was enacted in 1990, and amended by R.A. 7718 in 1994. In 2012, the latest Revised Implementing Rules and Regulations (IRR) of the BOT Law was issued. The BOT Law and its IRR serve as the basis of the current PPP system for national highways. In addition, these are supplemented by regulations such as Executive Orders and Policy Circulars of the PPP Governing Board. Some of the main features of the BOT Law and its IRR are as follows;

- Not only BOT but also other contractual arrangements or schemes are listed such as CAO (Contract-Add-and-Operate), DOT (Develop-Operate-and-Transfer). Also, other schemes are possible with Presidential approval. (Section 2 (a) to (j) on the BOT law, Section 1.3 (f) and 2.9 on the IRR)
- A contract variation may be allowed by the Head of the Agency when there is no increase in the agreed tolls or a decrease in the Agency's revenue or profit share derived from the project, except as may be allowed under a parametric formula in the contract itself. (Section 12.11 on the IRR)

- An unsolicited proposal for a PPP project may be accepted by an Agency, provided that it involves a new concept or technology and/or is not part of the List of Priority Projects, and does not require a direct Government guarantee, subsidy or equity. (Section 10.1 on the IRR)

9.3.2 Institutional Structure on Toll Road Development

Major players for a PPP project of DPWH and their roles are shown in **Figure 9.3-2**. Details of the implementation steps are shown in **Section 9.3.3**.



Source: JICA Study Team

Figure 9.3-2 Major Players for DPWH PPP Project under IRR of BOT Law

9.3.3 Implementation Framework on Toll Road Development

Implementation steps for a solicited project are shown in **Table 9.3-1.** Implementation steps for unsolicited project are shown in **Table 9.3-2.** Steps after "Recommendation to award" are the same in both the solicited and the solicited case. The steps is for the case of single qualification, and the timelines differ in case of simultaneous qualification.

Table 9.3-1 PPP Procedure for Solicited Proposal under DPWH

Subject	Content	Responsible Agency	Related clauses on the IRR
Project identification	Project identification and preparation of feasibility study	DPWH	
Satisfactory compliance with requirements	Fulfillment of the satisfactory compliance by DPWH with requirements of Approving Body	DPWH	Section 2.10
↓	30 working days		
Approval of solicited project	Approval of the solicited project	Approving Body-ICC/NEDA Board	Section 2.6 Section 2.10
Receipt of the draft contract	The OSG, and if necessary, the DOF receive the draft contract and start to review.	OSG, DOF (if necessary)	Section 2.8
↓	10 calendar days		
Review of the draft contract	The OSG, and if necessary, the DOF issue an opinion on the draft contract	OSG, DOF (if necessary)	Section 4.4
Approval of the draft contract	Review and approval of the draft contract	DPWH	Section 2.8
Publication of Invitation to pre-qualify and bid	Publication of invitation for competitive proposals	DPWH	Section 5.2
↓	21 calendar days (Publication should be at least once every week for 3 consecutive weeks)		
↓	15 calendar days from the last date of publication for prospective bidders to prepare their respective pre-qualification documents.		
Submission of prequalification documents	Preparation and submission of prequalification documents	Prospective project proponent	Section 5.3 Section 5.4
↓	20 calendar days		
Evaluation of prequalification documents	Evaluation of prequalification documents of the prospective project proponent	DPWH	Section 5.5
↓	5 calendar days		
Notification of prequalification results	Inform the Prospective Project proponents whether they are Prequalified / Disqualified	DPWH	Section 5.5
Pre-bid conference	Conduct a conference to clarify any matter that the proponent may raise.	DPWH	Section 6.3
↓	At least 60 calendar days before the deadline of the submission (30 calendar days for less than PhP 300 Million Project)		
Submission of technical and financial proposals	Submission of Bid Proposals	Prospective project proponents	Section 7.1
↓	35 calendar days (20 days for technical proposal, 15 days for financial proposal)		
Evaluation of bids	Evaluation of Bids	DPWH	Section 8.1 Section 8.2
↓	3 calendar days		
Recommendation to award	Submission by PBAC of a recommendation to award to the Head of Agency/LGU		Section 11.1
↓	3 calendar days		
Identification of winning project proponent	Decision on the award by the Head of Agency/LGU	DPWH	Section 11.2
↓	5 calendar days		
Notice of Award	Signing and Issuing of the NOA to the winning bidder	DPWH	Section 11.2
↓	20 calendar days		

Submission of necessary documents	Submission of NOA requirements by the winning bidder	Project proponent	Section 11.3
↓	5 calendar days		
Notification of the compliance of the documents	Determine and notify the winning bidder of its compliance to the NOA requirements	DPWH	Section 11.3
↓	(5 calendar days from receipt by the winning bidder of the notice from DPWH)		
Contract	Execute and sign the contract for the project	DPWH, Project proponent	Section 12.1
↓	5 calendar days		
Submission of contract copy	Submission of original signed copy of the contract to the Approving Body and PPP Center	DPWH	Section 12.1

Source: JICA Study Team

Table 9.3-2 PPP Procedure for Unsolicited Proposal for Projects under DPWH

Subject	Content	Related organizations	Related clauses on the IRR
Submission of unsolicited proposal	Submission of unsolicited proposal	Prospective project proponent	Section 10.1 Section 10.2 Section 10.3
↓	7 calendar days		
Receipt of proposal	Acknowledgement of receipt of proposal	DPWH	Section 10.5
↓	30 calendar days		
Review if the proposal is complete or not	Evaluation and advice to the proponent whether the proposal is complete / incomplete	DPWH	Section 10.5
↓	120 calendar days		
Evaluation and acceptance of the proposal	Evaluation of proposal, qualification of the proponent, and advice whether the proposal is accepted / rejected	DPWH	Section 10.7
Notification of the receipt of the project	Information to ICC and PPP Center of the its receipt of the proposal	DPWH	Section 10.7
Issuance of the letter of the acceptance	Letter of acceptance to the proponent as original proponent	DPWH	Section 10.7
↓	5 calendar days		
Endorsement and submission to the ICC	Endorsement of the proposal and all pertinent documentation to the ICC/ Approving Body	DPWH	Section 10.8
↓	30 working days		
Approval of the unsolicited project	Approval of the unsolicited project	Approving Body-ICC/NEDA Board	Section 10.8
↓	7 calendar days		
Notification of the mechanism of negotiation	Information to the proponent of the mechanics of negotiation	DPWH	Section 10.8
↓	80 calendar days		
Negotiation between Agency/LGU and the original proponent	Negotiation on the project scope, implementation arrangements, reasonable ROR, conditions of the draft contract and others	DPWH, Prospective project proponent	Section 10.8
↓	7 calendar days		
Submission to the ICC and Approving Body the result of negotiation	Report to the ICC and Approving Body of the result of negotiation	DPWH	Section 10.8
Receipt of the draft contract	The OSG, and if necessary, the DOF receive the draft contract and start to review.	OSG, DOF (if necessary)	Section 10.9
↓	10 calendar days		
Review of the draft contract	Review and opinion by OSG, and if necessary, DOF n on the draft contract	OSG, DOF (if necessary)	Section 10.9
Approval of the draft contract	Review and approval of the draft contract	DPWH	Section 10.9
↓	Within 7 calendar days upon issuance of the certification of a successful negotiation		
Invitation for comparative proposals	Publication of invitation for comparative / competitive proposals	DPWH	Section 10.11
↓	21 calendar days (Publication should be at least once every week for 3 consecutive weeks)		

↓	60 working days from date of the issuance of tender/bidding documents (pre-bid conference is conducted 30days after the issuance of tender/biding documents)		
Submission of comparative proposal (Swiss challenge)	Preparation and submission of comparative proposals	Prospective project proponents/challengers	Section 10.14
↓	55 calendar days (20 days for prequalification, 20 days for technical proposal, 15 days for financial proposal)		
Evaluation of comparative proposals	Evaluation of comparative proposals as to qualifications, technical proposal, and financial proposal	DPWH	Section 10.15
↓	30 calendar days		
Right to match by the original proponent	When the comparative proponent submits a price proposal better than that by the original proponent, the original proponent has the right to match the price proposal	Original project proponent	Section 10.1
↓	3 calendar days		
Recommendation to award	Submission by PBAC of the recommendation to award	DPWH	Section 11.1
↓	3 calendar days		
Identification of winning project proponent	Decision on the award by the Head of Agency/LGU	DPWH	Section 11.2
↓	5 calendar days		
Notice of Award	Signing and Issuing of the NOA to the winning bidder	DPWH	Section 11.2
↓	20 calendar days		
Submission of necessary documents	Submission of NOA requirements by the winning bidder	Project proponent	Section 11.3
↓	5 calendar days		
Notification of the compliance of the documents	Determine and notify the winning bidder of its compliance to the NOA requirements	DPWH	Section 11.3
↓	(5 calendar days from receipt by the winning bidder of the notice from DPWH)		
Contract	Execute and sign the contract for the project	DPWH, Project proponent	Section 12.1
↓	5 calendar days		
Submission of contract copy	Submission of original signed copy of the contract to the Approving Body and PPP Center	DPWH	Section 12.1

Source: JICA Study Team

It takes about 250 days to process a solicited proposal and 510 days to process an unsolicited proposal. According to IRR Section 5.7, in case of exigency of the service, the Agency may adopt procedures for submitting qualifications and technical / financial proposals at the same time.

Comparing the two cases, the unsolicited proposal case is longer because steps for evaluating the original proponent's proposal, and steps for negotiation regarding the scope, reasonable ROR, conditions of the draft contract and so on, are required. Although the process of the unsolicited case starts with a private proposal, in order to ensure competitiveness, the same procedures as for solicited proposals are also required, like publication and submission and evaluation of competitive proposals from other private companies. Furthermore, there is a counter-matching period for original project proponents. However, note that in the case of solicited proposals, it is necessary for the Agency to conduct project identification and feasibility studies in advance.

9.4 Issues on Road Institutional System and PPP Scheme

Currently in the Philippines, toll road development by PPP is being promoted in several places around Metro Manila, where a big traffic demand can be expected. The PPP system has responded accordingly to such situation. In the near future, road development in the Philippines is expected to reach the next stage, and the following two points will arise as challenges.

a. Strategic development of the high standard highway network all around the country

b. Implementation of seamless road management after road network formation

Regarding these two points, the PPP issues are summarized in **Table 9.4-1**.

Table 9.4-1 Issues regarding PPP for Road Development

Field	Issues	Issues regarding PPP
Strategic development of high standard highway network all around the country	Policy making for road network development plan including priority setting led by DPWH	
	Centralized management of all road development projects by DPWH	✔
	Selection of appropriate project scope and PPP scheme considering project feasibility	✔
	Securing of financial resources, e.g., utilization of government funds and donors ones such as ODA, active approach to encourage the private sector to invest in PPP	✔
Implementation of seamless road management after road network formation	Equalization of toll levels and inter-operability among adjacent toll road networks	✔
	Development of integrated traffic information system and intelligent transport system	
	Implementation of government support to achieve the above, and PPP system revision or operation	✔

Source: JICA Study Team

In the future, it is expected that there will be more projects that are desirable from the viewpoint of the national economy, but are not profitable based on their own revenues alone. In these cases, in order to continue the necessary road development, financial support of the government may be required to make the project more attractive as a business. The current PPP projects are implemented by BOT and BTO. It is necessary to consider other PPP forms, the use of Viability Gap Funding (VGF), Service Payment, and grant of regional development rights.

PART E

HSH DEVELOPMENT MASTERPLAN FORMULATION

CHAPTER 10

DEFINITIONS OF HSHs AND IDENTIFICATION CRITERIA OF HSH CORRIDORS

CHAPTER 10
DEFINITIONS OF HSHs AND IDENTIFICATION CRITERIA OF HSH CORRIDORS

The High Standard Highway (HSH) Development Master Plan aims to formulate a nationwide HSH network to be developed towards the target year 2040 selected from the Overall HSH Network which goes beyond 2040. The phases of development are Short-term until 2025, Mid-term until 2030, and Long-term until 2040. Chapters 10, 11 and 12 also contain the substantive parts of the HSH Development Master Plan formulated.

10.1 Definition of HSH

10.1.1 Necessity of HSH

The Road Network in the Philippines is composed of the following.

(1) Administrative Classification (Year 2018)

Table 10.1-1 Administrative Classification (Year 2018)

Road Classification	Length (km)	Share (%)
National Road	34,174 km	(16.1 %)
Provincial Road	30,151 km	(14.2 %)
City / Municipal Road	30,680 km	(14.5 %)
Barangay Road	116,765 km	(55.0 %)
Sub-Total	**211,770 km**	**(99.8 %)**
Toll Expressway	406 km	(0.2 %)
Grand Total	**212,176 km**	**(100 %)**

Note: Toll expressways are operated by private concessionaires. All others are administered by the National or Local Governments.
Source: DPWH

(2) Functional Classification of Roads

Roads are further classified according to their functions, as shown in **Table 10.1-2**.

Table 10.1-2 Functional Classification of Roads

Road Classification	Length (km)	Share (%)
National Road	7,072 km	20.7%
Provincial Road	14,307 km	41.9%
City / Municipal Road	11,623 km	34.0%
Barangay Road	179 km	0.5%
Sub-Total	**33,181 km**	**97.1%**
BARMM Road	993 km	2.9%
Grand Total	**34,174 km**	**100%**

Source: DPWH

(3) National road length by number of traffic lanes

The National Road length by number of traffic lanes is as shown in **Table 10.1-3**.

The majority of National Roads are still 2-lane roads.

Table 10.1-3 National Road Length by Number of Traffic Lanes

Road Classification	Length (km)	Share (%)
2-lane (1 lane by direction) or less	26, 695 km	78.1%
3-4 lanes	6,836 km	20.0%
6 lanes	586 km	1.7%
Over 8 lanes	57 km	0.2%
Total	**34,174 km**	**100%**

Source: DPWH

(4) Travel Speed Characteristics

Most National Roads (or 78%) are 2-lane roads with a narrow road Right-Of-Way (ROW) of 18 to 20 meters. Typical of such road is the Pan Philippine Highway (or Daang Maharlika). It passes through urban centers at about 10 to 20 km. interval where travel speed becomes less than 20 km/hr., although travel speed of 30-40 km/hr. is maintained in sections between urban centers (or along rural sections).

(5) Drastic Measures to Cope with Current Situations

To cope with the above traffic situations observed along the most National Roads, new road construction with high standards or High Standard Highway (HSH) is needed.

10.1.2 Definition of HSH

(1) General Definition of HSH

HSH is generally defined as follows:

"Highways which provide high level traffic services by assuring high speed mobility, safe and comfortable travel in order to vitally support socio-economic activities for sound development of strategic regions and the country as a whole."

(2) Composition of HSH

HSH is composed of HSH Class-1 and HSH Class-2.

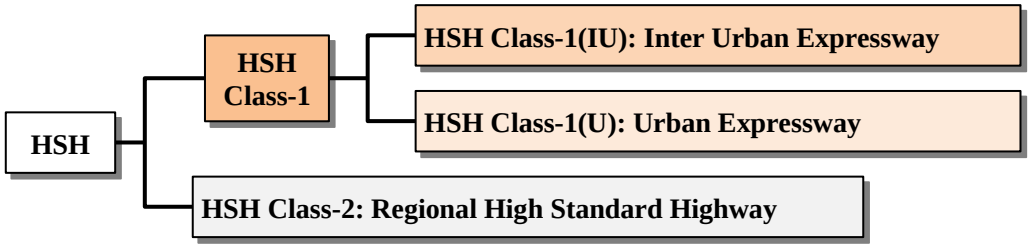


Figure 10.1-1 Composition of HSH

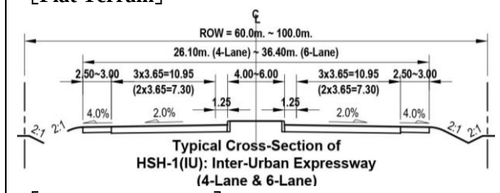
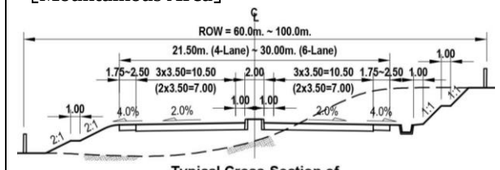
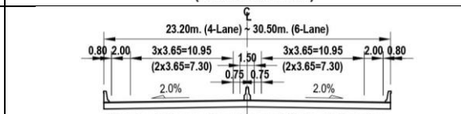
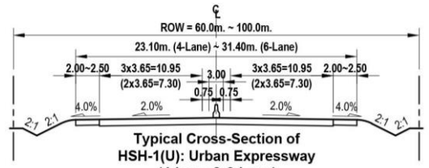
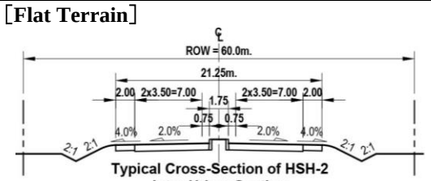
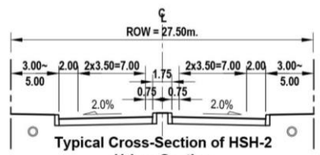
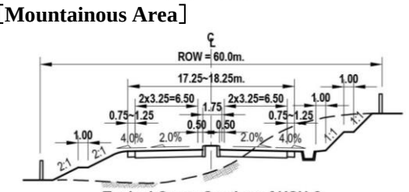
HSH Class-1 is either an Inter-Urban Expressway (HSH Class-1(IU)) which traverses two (2) or more Regions or an Urban Expressway (HSH Class-1(U)) which is in major Urban Centers such as Metro Manila.

HSH Class-2 is located within one or more regions and connects regional traffic generation sources with HSH Class-1.

(3) Development Objectives, Functions and Structural / Operational Characteristics

Development objectives, functions, and structural / operational characteristics of HSH Class-1 and HSH Class-2 are summarized in **Table 10.1-4**.

Table 10.1-4 Definition of High Standard Highway (HSH)

HSH Class		Development Objectives	Functions	Structural/ Operational Characteristics	Standard Cross Section*)	Example
HSH Class-1	**HSH Class-1 (IU): Inter-Urban Expressway**	• To achieve balanced development of the country • To mitigate over-concentration of people and economic activities in Metro Manila • To improve international competitiveness of the country	• To provide high-speed, safe, and comfortable means of transportation for medium and long-distance trips • To improve connectivity between major urban centers (Metropolitan Centers / Regional Centers) and the rest of the areas • To provide efficient access to other important transport facilities such as base ports, international airports, and principal airports – class 1. • To improve commodity transportation efficiency • To expand one-day activity area	• Access controlled. Only 4 or more-wheel vehicles can utilize this facility through an interchange. • Grade separated at all intersecting roads. • High design speed of 80-120 km/hour [Flat Terrain] and 60-80km/hour [Mountainous Area] • Jeepneys, Motorcycle (less than 400cc) and tricycles are not allowed on this road.	**[Flat Terrain]**  Typical Cross-Section of HSH-1(IU): Inter-Urban Expressway (4-Lane & 6-Lane) **[Mountainous Area]**  Typical Cross-Section of HSH-1(IU): Inter-Urban Expressway (4-Lane & 6-Lane)	• North Luzon Expressway • South Luzon Expressway
	HSH Class-1 (U): Urban Expressway	• To mitigate chronic traffic congestion in and around major urban centers • To vitally support urban socio-economic activities for development • To improve international competitiveness • To improve urban environment	• To provide reliable means of transportation in terms of travel speed • To provide smooth linkage with other transport modes and improve inter-modal linkage. • To provide efficient link between traffic generations sources	• Access controlled. Only 4 or more-wheel vehicles can utilize this facility through an interchange or an on/off ramp. • Grade separated at all intersecting roads. • High design speed of 60-80 km/hour. • Jeepneys, Motorcycle (less than 400cc) and tricycles are not allowed on this road	 Typical Cross-Section of Viaduct Section HSH-1(U): Urban Expressway (4-Lane & 6-Lane)  Typical Cross-Section of HSH-1(U): Urban Expressway (4-Lane & 6-Lane)	• Skyway • NAIAx • C-5 Expressway
HSH Class-2	**HSH Class-2: Regional High Standard Highway**	• To accelerate regional development, particularly agricultural, industrial and tourism development. • To strengthen linkage between regional urban centers and rural areas • To accelerate development of underdeveloped areas • To improve the standard of living of rural people. • To develop roads which bypass congested urban areas to assure smooth travel throughout the trip route.	• To provide reliable, safe, and comfortable means of transportation at regional level after branching off from HSH Class-1. • To strengthen linkage between major Sub-Regional Centers and between production areas and consumption areas and support development of regional industries. • To provide access to terminal ports, principal airport – class 2 and community airports.	• Partially access controlled for most of HSH Class-2, but if not feasible, non-access controlled. • Bypass or diversion roads (to be 4-lane or more roads) • Grade separated at major intersections. • At-grade intersection for minor intersecting roads. • Design speed of 60 km/hr. (mountainous area, 50km/hr.) • All vehicles can use this class of roads, including jeepneys, tricycles, bicycles, etc. • In urban areas, service road will be provided to segregate through traffic and local traffic.	**[Flat Terrain]**  Typical Cross-Section of HSH-2 Inter-Urban Section  Typical Cross-Section of HSH-2 Urban Section **[Mountainous Area]**  Typical Cross-Section of HSH-2 Inter-Urban Section	• Davao City Diversion Road • Roman Superhighway, Bataan

*) Shown above are typical cross-sectional drawing; for special cases such as bridges, tunnels and temporary two-lane highways, cross-sections shall be studied as an individual project.
Source: JICA Study Team

10.1.3 Design Standards of HSH

The design standards shown in **Table 10.1-5** provide the minimum standards for the construction, improvement, and maintenance for HSHs. Every possible effort shall be made to conform to these provisions, both in constructing new highways and in upgrading and modernizing the existing ones. The table shows the main design elements for HSHs proposed in the Study, which directly affect project costs, together with those for HSHs in Asian Highway, in U.S.A., and in Japan for reference.

Taking account of the project cost savings and mitigating negative social impacts, the main design elements should be made different between urban and rural areas. Land prices in urban areas are higher and more people shall be affected by the projects compared in rural areas. Hence, design flexibility needs to be adopted, such as, lower design speeds and narrower road widths in urban than in rural areas.

To provide smooth traffic mobility while ensuring safety of road users, focus should be given to both through traffic and local traffic, including the pedestrians in the design of HSH Class-2 in urban areas. And in addition to the road widths as shown in the table, the provision of grade separations and frontage/ service roads may also be considered in the design.

Design Speed

[Flat Terrain]
Design speeds of 80-120km/h for HSH Class-1 (IU), 60-80km/h (for urban) are recommended for HSH Class-1 (U); while a design speed of 60-80 km/h is recommended for HSH Class-2.

[Mountainous Area]
Design speed of 60-80km/h for HSH Class-1 (IU); while a design speed of 50km/h is recommended for HSH Class-2.

Number of Lanes

Though the desirable number of lanes for HSH Class-2 is four (4) or more lanes, a 2-lane HSH Class-2 is proposed as minimum, considering the situations of the arterial roads in the country.

Lane Width

[Flat Terrain]
Lane width of 3.65m for HSH Class-1(IU) and lane width of 3.50m for HSH Class-1(U) and HSH Class-2 is recommended.

[Mountainous Area]
Lane width of 3.50m for HSH Class-1 and lane width of 3.25m for HSH Class-2 is recommended.

Shoulder Width

The width of the outer shoulder should be large enough to enable emergency cars to stop and park, and to reduce traffic congestion caused by car accidents and disabled cars.

Median Strip Width

The width of the median strip should be as large as possible. The function of the median strip along the normal roadway section is to avoid head-on accidents and to beautify roadways with ornamental plants. Where the space for median strip is limited as in urban areas, dense hedges

of shrubs are recommended to filter the headlights of oncoming traffic and to provide a resilient barrier. The median strip of HSH Class-2 provides spaces to accommodate exclusive lanes for left-turn traffic at intersections and U-turn lanes by reducing the median strip widths at those locations.

Structure Loading

Increasingly heavy traffic, particularly container traffic, requires a proper design load capacity (maximum axle load). To prevent serious damage to road structures and to reduce maintenance costs, the HSHs network should have a high design load capacity. The minimum design loading of HS20-44 corresponding to a full-size trailer loading should be used for the design of structures.

Vertical Clearance

Minimum vertical clearances under overhead structures of 5.3m for HSH Class-1 and 5.0m for the regional highway, HSH Class-2 are proposed with allowance for extra layers of pavement, which follow the NLEx and DPWH requirements, respectively.

Table 10.1-5 Proposed Basic Design Elements for HSHs (Flat Terrain)

		Philippines (Proposed)			USA		Japan		Asian Highway	
		HSH Class-1		HSH Class-2	AASHTO (Interstate Highway)		NEXCO	Metropolitan Expressway Co.	AH26 (Inter-Urban Highway)	
		HSH Class-1(IU)	HSH Class-1(U)	Regional High Standard	Inter-Urban	Intra-Urban	Inter-Urban	Intra-Urban	Primary (Expressway)	Class I[*1)]
Design Speed (km/h)		80-120	60-80	60-80	121	89	100-120	60-80	120	100
No. of Lanes[*4)]		4 or more		4 or more	4 or more		4 or 6	4	4 or more	
Lane Width (m)		3.65	3.50	3.50	3.65		3.50	3.25	3.75	3.50
Shoulder Width (m)	Outer Shoulder	2.50-3.00	2.00-2.50	2.00	3.05	-	2.50	1.25	3.0	3.0
	Inner Shoulder	1.25	0.75	0.75	1.22	-	1.25	0.75	-	-
Median Strip Width (m)		4.00-6.00	3.00	1.75	11.00	3.00	4.50	1.75	4.00	3.00
Bridge	Traffic Load	HS20-44		HS20-44	HS20-44		B Live Load[*2)]		HS20-44	
	Vertical Clearance (m)	5.30	5.30	5.00	4.88	4.27	4.50[*3)]	4.50[*3)]	4.50	4.50
Note		*1) Class I may be corresponding to the Arterial Road in the Philippines. *2) Almost corresponding to (HS20-44) X1.25. *3) In case that allowance for extra layers of pavement is considered, the vertical clearance is to be 4.70m. A vertical clearance of 4.5m is the requirement for safe passage of standards ISO containers. *4) The HSH is designed to be 4-6 lanes highway, however, if the traffic demand is still low at the initial stage, a 2-lane highway will be possible.								

Table 10.1-6 Proposed Basic Design Elements for HSHs (Mountainous Area)

		Philippines (Proposed)		USA		Japan			Asian Highway	
		HSH Class-1	HSH Class-2	AASHTO (Interstate Highway)		NEXCO	Road Structure Ordinance*4)		AH26 (Inter-Urban Highway)	
		HSH Class-1(IU)	Regional High Standard	Inter-Urban	Intra-Urban	Inter-Urban, Mountainous, (Type 1 Class3, 4)	National Highway Flat Terrain (Type3 Class1)	National Highway Flat or Mountainous Area (Type3 Class2)	Primary (Expressway)	Class I*1)
Design Speed (km/h)		60-80	50	No difference in design elements in Flat Terrain and Mountainous Area		60-80	80	60	80	60
No. of Lanes*5)		4 or more	4 or more			4 or 6	4 or more	2 or 4	4 or more	
Lane Width (m)		3.50	3.25			3.50 (80kph) 3.25 (60kph)	3.50	3.25	3.75	3.50
Shoulder Width (m)	Outer Shoulder	1.75-2.50	0.75-1.25			1.75	1.25	0.75	2.50	2.50
	Inner Shoulder	1.00	0.50			1.00	0.50	0.50	-	-
Median Strip Width (m)		2.00	1.75			2.00	1.75	1.75	3.00	2.50
Bridge	Traffic Load	HS20-44	HS20-44			B Live Load*2)			HS20-44	
	Vertical Clearance (m)	5.30	5.00			4.50*3)			4.50	4.50
Note		*1) Class I may be corresponding to the Arterial Road in the Philippines. *2) Almost corresponding to (HS20-44) X1.25. *3) In case that allowance for extra layers of pavement are considered, the vertical clearance is to be 4.70m. A vertical clearance of 4.5m is the requirement for safe passage of standards ISO containers. *4) Roads shall be classified into Type1 through 4. (National Expressway and access-controlled highway is Type 1(Rural) and Type 2(Urban Area). Other Roads such as National Highway, Prefectural Roads is Type 3(Rural) and Type 4(Urban Area). *5) The HSH is designed to be 4-6 lanes highway, however, if the traffic demand is still low at the initial stage, a 2-lane highway will be possible.								

10.2 HSH Corridor Identification Criteria

10.2.1 Factors to be Considered in Selecting HSH

Factors to be considered in selecting HSH are shown below.

Factors to be Considered in Selecting HSH

- Distributions of urban centers.
- Regional/urban development policies and strategies.
- Existing road and highway network and transport access to be strengthened.
- Important airports and ports to be accessed by HSH.
- Important locations/areas for which transport linkage are to be strengthened.
- High traffic demand corridors.
- Strategic areas whose transport access are to be strengthened.

10.2.2 HSH Corridors Identification Criteria

HSH corridors identification criteria are as follows:

(1) HSH Class-1 (IU): Inter-Urban Expressway

The following conditions shall be considered:

- Metropolitan Centers and Regional Centers shall be connected.
- Base Ports, International Airports and Principal Airports shall be connected.
- Major transport generation/attraction centers shall be efficiently connected, and major transport corridors shall be strengthened in terms of their transportation capacity.
- Existing expressway network shall be further expanded.

(2) HSH Class-1 (U): Urban Expressway

The following conditions shall be considered:

- Since road right-of-way (ROW) acquisition is usually difficult and expensive in urban areas such as Metro Manila, Metro Cebu, Metro Davao, urban expressways shall be selected along existing major roads which have existing road ROW of 45 meters or more.
- Accessibility to major business commercial centers and major residential areas shall be improved.
- Major transport facilities, such as International Airports and Base Ports, shall be provided with efficient transport access.
- Urban expressway network shall be so planned that traffic congestions along major transport corridors shall be reduced.
- Existing urban expressways shall be efficiently connected and/or expanded.

(3) HSH Class-2: Regional High Standard Highway

The following conditions shall be considered:

- HSH Class-2 shall be connected to or branched off from HSH Class-1 and provide strong and efficient transport access to the areas served.
- Bypasses shall reduce inflow of through traffic into urban center and traffic congestion shall be reduced. In addition, inter- region traffic shall be improved smoothly.
- HSH Class-2 shall provide important transport access to regional political, commercial, cultural, and educational centers.
- HSH Class-2 shall provide access to sub-regional centers, local airports, and local ports.

CHAPTER 11

HSH NETWORK DEVELOPMENT PLAN

CHAPTER 11
HSH NETWORK DEVELOPMENT PLAN

11.1 Procedure to Develop HSH Network

This Chapter discusses the development of the HSH Network Plan. The flow chart of activities and measures taken to fully develop the HSH Master Plan is shown in **Figure 11.1-1.**

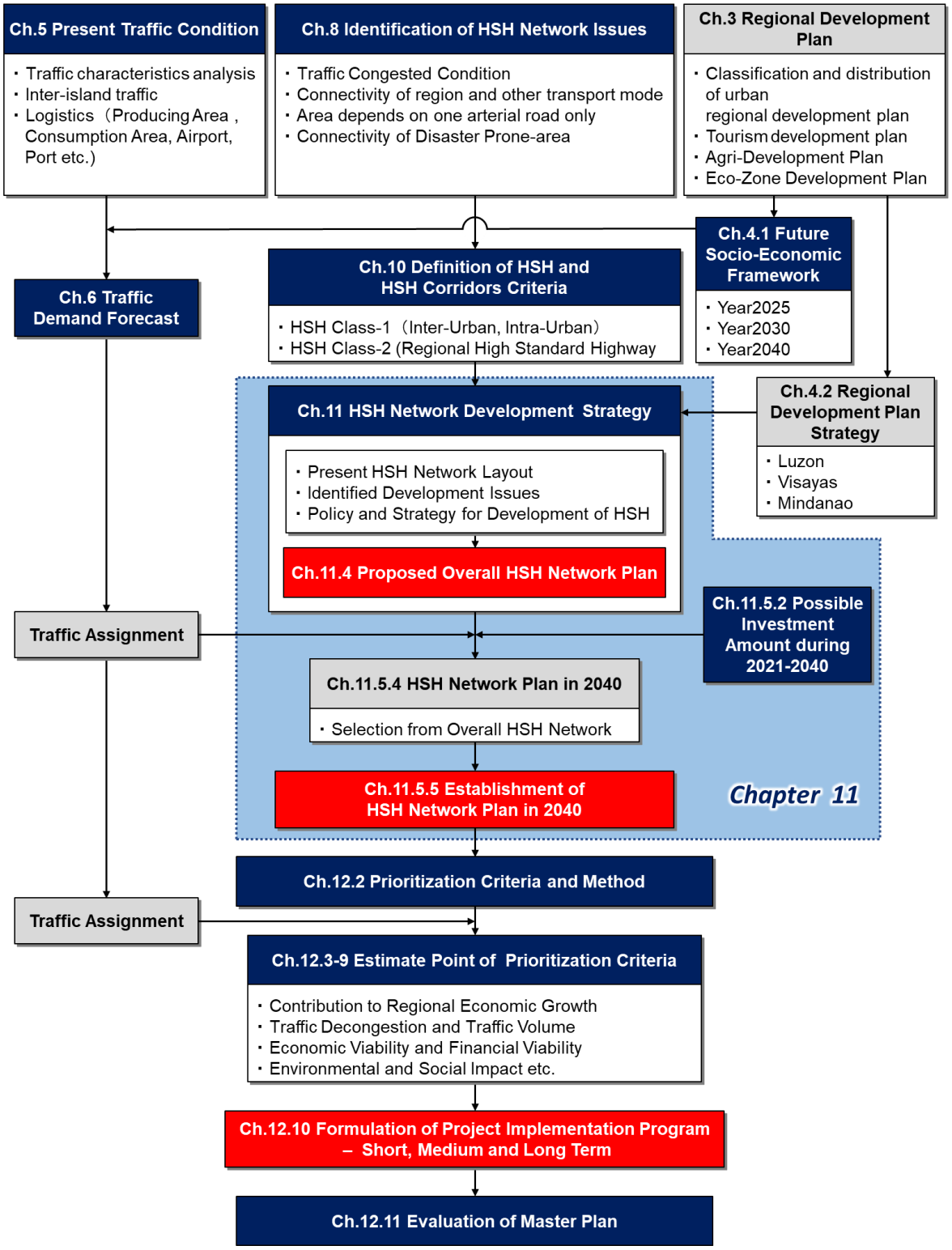


Figure 11.1-1 Procedure of HSH Road Network M/P Development

11.2 Problems and Issues Identified

Based on the study and analysis of previous chapters, especially Chapter 3 "Regional Development Plan" and Chapter 8 "Identification of HSH Network Issues", the following development issues have been identified:

Luzon

- Concentration of population and economic activities in Metro Manila should be mitigated, even as population growth in this area is not expected to be as robust in the future as it was in the past.
- Improvement of infrastructure to deal with population growth in the suburban areas of Metro Manila and regional centers, especially in CALABARZON (Region IV-A) and Region III.
- The growth of CALABARZON and Region III will continue and SEZ will be developed in these two regions.
- Region III will grow along with the development of the railway system. It is necessary to invest in urban infrastructure of the regional centers. At the same time, a balance between preservation of the agricultural land and urban development should be sought since Region III is the primary producer of agricultural products.
- Development is lagging in the northern areas (CAR and Cagayan Valley) and southern areas (Bicol and MIMAROPA).
- The poverty incidence is high in CAR, Cagayan Valley, Bicol, and MIMAROPA. A big segment of the population in these regions is engaged in the primary sector. It is necessary to promote development of economic sector by improving transport access to/from the regions.
- Disaster risks from typhoons, floods, and volcanic eruptions are high. Disaster risk reduction measures are required.

Visayas

- In the Visayas, Metro Cebu is the center of economy led by manufacturing and tourism sectors, and this trend will be maintained in the future. However, Cebu Island has limited land appropriate for development and it also has water resource issues.
- It is important to develop regional centers, such as Bacolod, Iloilo, Dumaguete, Ormoc, and Tacloban, by promoting industry and infrastructure development.
- Support for tourism and other industries development is significantly needed in areas, such as, Boracay, Bohol, etc.
- Economic development towards poverty reduction is significantly needed in Samar Island, Negros Oriental, and Southern Leyte.
- Disaster risk mitigation efforts are required, along with environmental conservation.
- Typhoon, flood, and landslide prone areas are observed in Samar, Leyte, and Cebu

Mindanao

- A large population growth is expected in Mindanao. Metropolitan areas and regional centers, such as Davao, Cagayan de Oro, General Santos, and Zamboanga, would experience rapid population growth. Some cities would have a metropolitan status in the long term. Davao and Cagayan de Oro are attracting SEZ, and other centers also try to develop special economic zones. Investment in urban infrastructure of these settlement centers is necessary to promote development of industries
- In particular, the development of the primary industry of agriculture, agro-processing industry and tourism should be promoted
- It is necessary to take account of the development potential of BIMP-EAGA. Zamboanga has strategic importance as the gateway to BIMP-EAGA
- Poverty incidence in Mindanao, BARMM Region in particular, is very high, while the infrastructure development level is very limited. This regional disparity should be addressed not only for economic development, but also for sustainable peace.
- It is necessary to mainstream Disaster Risk Reduction and Management (DRRM) in the development of Mindanao. Although Mindanao used to be typhoon-free, however, recently, typhoons are passing through Mindanao and caused substantial damage in some areas in the island. The infrastructure should be disaster-resilient, and redundancy should be achieved. Climate change can affect the productivity of the agricultural sector.

11.3 Policy and Strategy for Development of HSH

11.3.1 HSH Development Objective

HSH development objectives are established as follows.

- To achieve balanced development of the country
- To improve the international competitiveness of the country
- To mitigate chronic traffic congestion in and around major urban centers
- To vitally support urban socio-economic activities for development
- To improve the urban environment
- To accelerate regional development, particularly agricultural, industrial and tourism sectors.
- To strengthen the linkages between regional urban centers and rural areas
- To accelerate the development of underdeveloped areas
- To develop roads which bypass congested urban areas to assure smooth travel throughout the trip route.

11.3.2 HSH Development Strategy

To achieve development policies, HSH development strategies were established as follows:

Development Objectives	Development Strategies
✓ To achieve balanced development of the country ✓ To improve international competitiveness of the country ✓ To mitigate chronic traffic congestion in and around major urban centers ✓ To vitally support urban socio-economic activities for development ✓ To improve international competitiveness ✓ To improve the urban environment ✓ To accelerate regional development. ✓ To strengthen linkages between regional urban centers and rural areas ✓ To accelerate development of underdeveloped areas ✓ To develop roads which bypass congested urban area to assure smooth travel throughout the trip route.	✓ To form backbone transport axes ✓ To decongest traffic in Metropolitan centers, Regional Centers, and its suburbs ✓ To provide efficient transport facilities for logistics corridor ✓ To provide transport facilities for sound urban expansion

Strategies for development of HSH for each area are as follows:

Luzon

- ✓ Metropolitan Centers and Regional Centers shall be connected by HSH Class-1.
- ✓ Two (2) North-South development corridors shall be provided with HSH Class-1 facilities in North Luzon and Central Luzon
- ✓ One development corridor shall be provided with HSH Class-1 facilities in South Luzon (Lucena – Samar island)
- ✓ Base Ports, International Airports and Principal Airports shall be connected by HSH Class-1.
- ✓ Existing expressway network shall be further expanded.
- ✓ East-west corridor shall be provided with HSH Class-1 facilities in Central Luzon
- ✓ Sub-region Centers not covered by HSH Class-1 shall be connected by HSH Class-2.
- ✓ In North Luzon, east-west corridor shall be provided with HSH Class-2 to connect two (2) north-south corridors. It shall be supported with resiliency and redundancy to national disaster.
- ✓ East-west corridor with HSH Class-2 shall be expanded to the Pacific Ocean side to support the underdeveloped areas.

Metro Manila

- ✓ HSH Class-1 shall be placed to reduce traffic congestion in urban arterial roads.
- ✓ ROW acquisition is extremely difficult, so that existing roads, rails, and other existing ROW shall be utilized as much as possible.
- ✓ Traffic distribution road (C-5 Expressway and C-6 Expressway) shall be planned.
- ✓ Development of HSH Class-1 requires huge investment. PPP schemes suitable for the country shall be selected for projects in Metro Manila.
- ✓ HSH Class-2 shall be well connected with HSH Class-1.
- ✓ HSH Class-2 shall supplement the function of HSH Class-1.
- ✓ For designated HSH Class-2, grade separation of at-grade intersections shall be promoted to achieve smooth traffic flow.

Visayas

- ✓ Metropolitan Centers, Regional Centers and surrounding cities shall be connected by HSH Class-1.
- ✓ Roads in Large islands, such as Panay, Negros, Cebu, Samar, and Leyte, shall be connected by HSH Class-1 to achieve integration of socio-economic activities.
- ✓ Regarding inter-island connections, Panay-Guimaras-Negros will be connected by bridges. In other islands, a RORO system is recommended due to difficulty of bridge construction and insufficient traffic demand. HSH will support a seamless transport system, such as access roads between the economic centers and ports and airports.
- ✓ In Metro Cebu, bypass roads will be provided to decongest the city center, which will increase road capacity and improve redundancy and resiliency.
- ✓ HSH Class-2 shall be connected to sub-regional cities, local ports and airport or branched off from HSH Class-1.

Mindanao

- ✓ All metropolitan centers and regional centers, except Dapitan City, shall be connected by HSH Class-1 to achieve integration of socio-economic activities.
  - ➢ Surigao- Butuan – Tagum – Davao – Digos- General Santos
  - ➢ Butuan – Cagayan de Oro- Pagadian – Zamboanga
  - ➢ Cagayan de Oro – Davao
  - ➢ General Santos – Cotabato - Zamboanga
- ✓ Dapitan City shall be connected by HSH Class-2.
- ✓ Base Ports, International Airports and Principal Airports shall be connected by HSH Class-1.
- ✓ HSH Class-2 shall be connected to sub-regional cities, local ports and airport or branched off from HSH Class-1.

11.4 Proposed HSH Network

Based on both the HSH development strategy and proposed Overall HSH network (see **Figure 11.4-3** and **Figure 11.4-4** to **11**), the Overall HSH network length was established as shown in **Table 11.4-1**. Total length of HSH Class-1 is approximately 4,400 km, including 406 km of existing expressways and 265 km of expressways under construction, while HSH Class-2 is roughly 4,600 km. The total length of HSH Class-1 and Class-2 is 9,000 km.

HSH Class-1 is basically the new high standard highway development and HSH Class-2 is the mainly upgrade of existing national highway such as widening (2-lane to 4-lane or 6-lane). In case of difficulty in widening road due to bad road alignment or limited ROW width, new bypass road or new highway will be developed as HSH Class-2.

Table 11.4-1 Total Length of Overall HSH Network (km)

Area	HSH Class-1	HSH Class-2	Total
Luzon	2,100	2,500	4,600
Visayas	700	700	1,400
Mindanao	1,600	1,400	3,000
Total	**4,400**	**4,600**	**9,000**

Source: JICA Study Team

Under the possible future Philippines government budget and private investments to HSH development, the future HSH network plan in 2040 will be determined.

In order to implement the proposed HSH development, a huge investment is necessary, therefore it will be difficult to construct all HSH simultaneously. To improve the traffic flow along urban areas, bypass roads will be constructed at the initial stage. In the later phase of the HSH Class-1 implementation, some sections shall be utilized as expressway as illustrated in **Figure 11.4-1.** This kind of stage development will be necessary for the efficient establishment of the nationwide HSH.

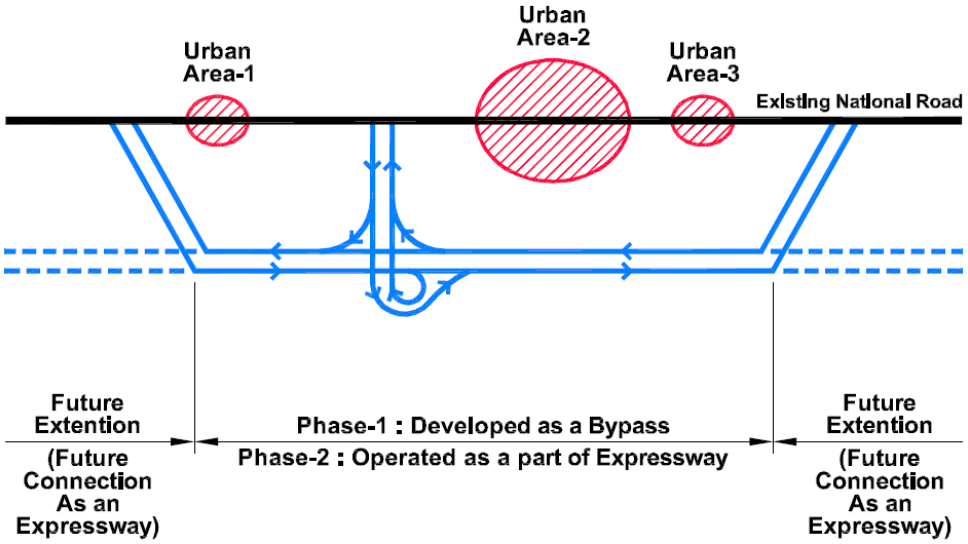


Figure 11.4-1 Image of HSH Class-1 Stage Development

HSH Class-2 will utilize the existing National Roads for road improvement (widening and geometric design for HSH) as much as possible. Furthermore, the project will develop new road infrastructure as bypass roads near urban areas and avoid bad road alignments, as illustrated in **Figure 11.4-2**.

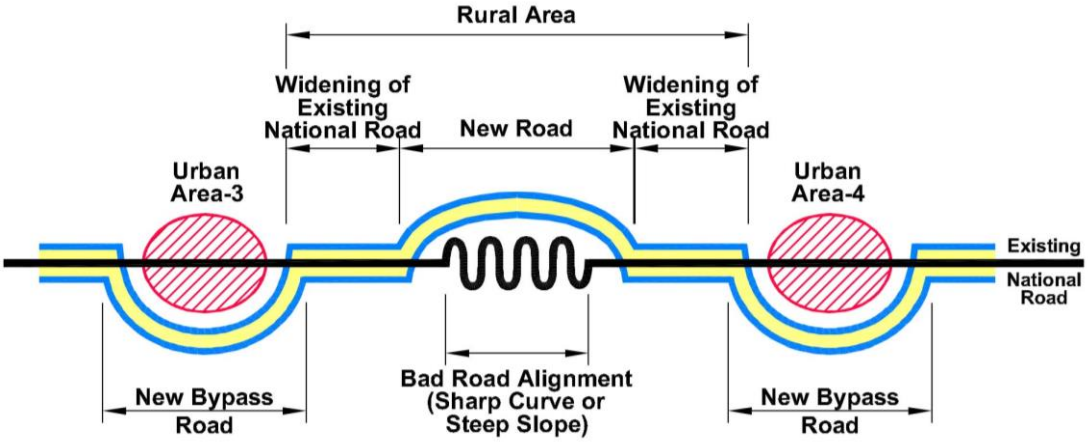
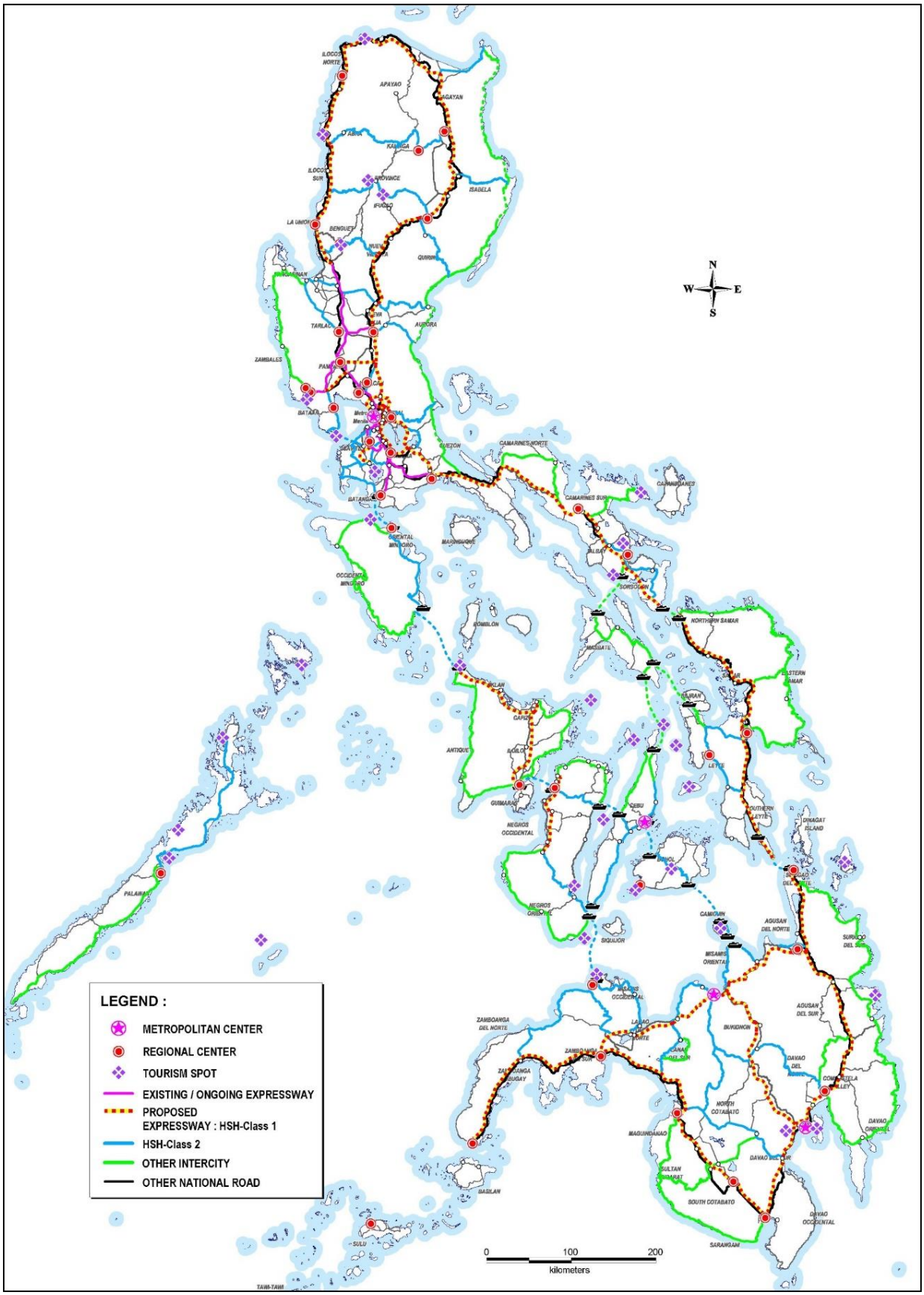
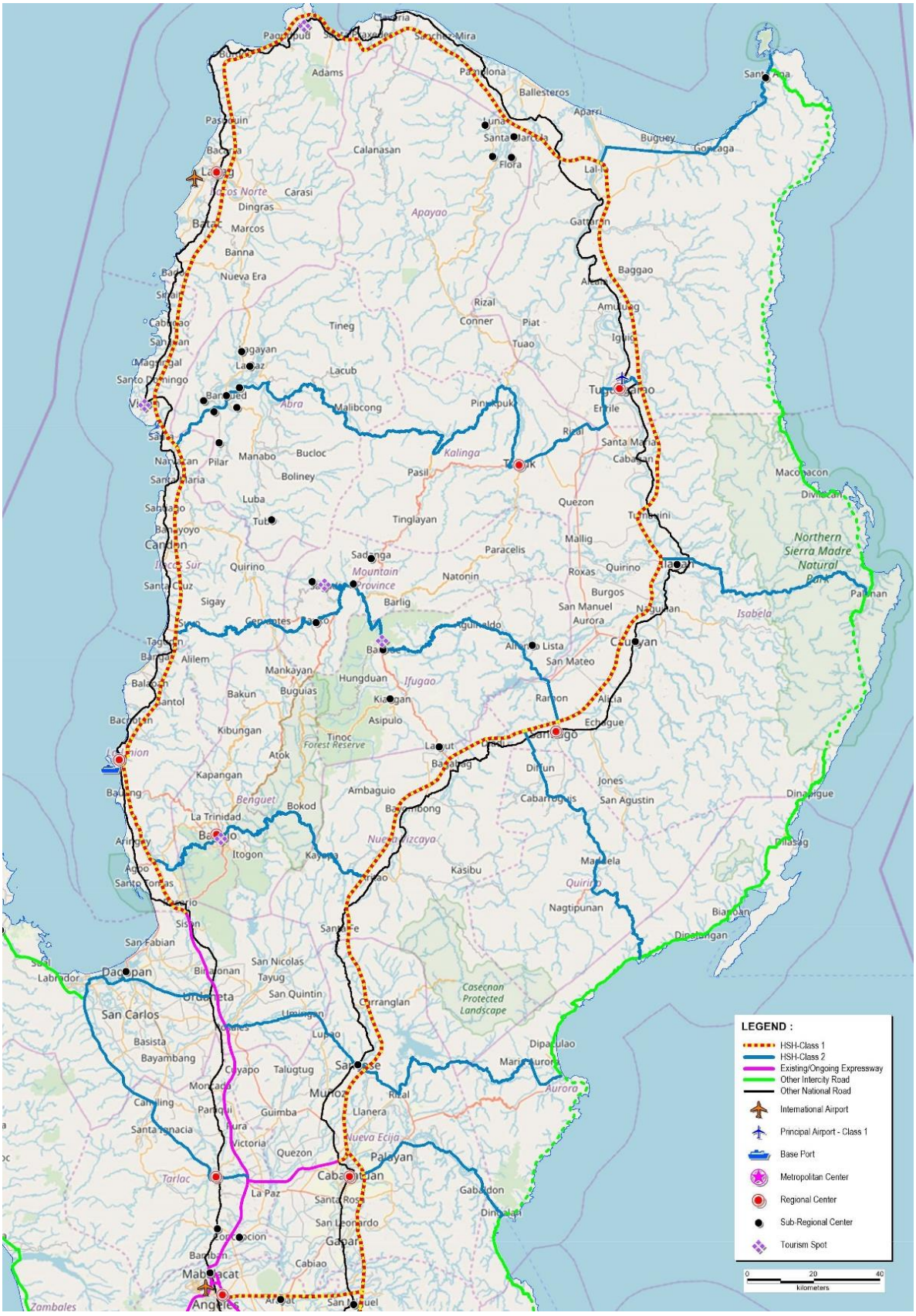


Figure 11.4-2 Image of HSH Class-2 Development



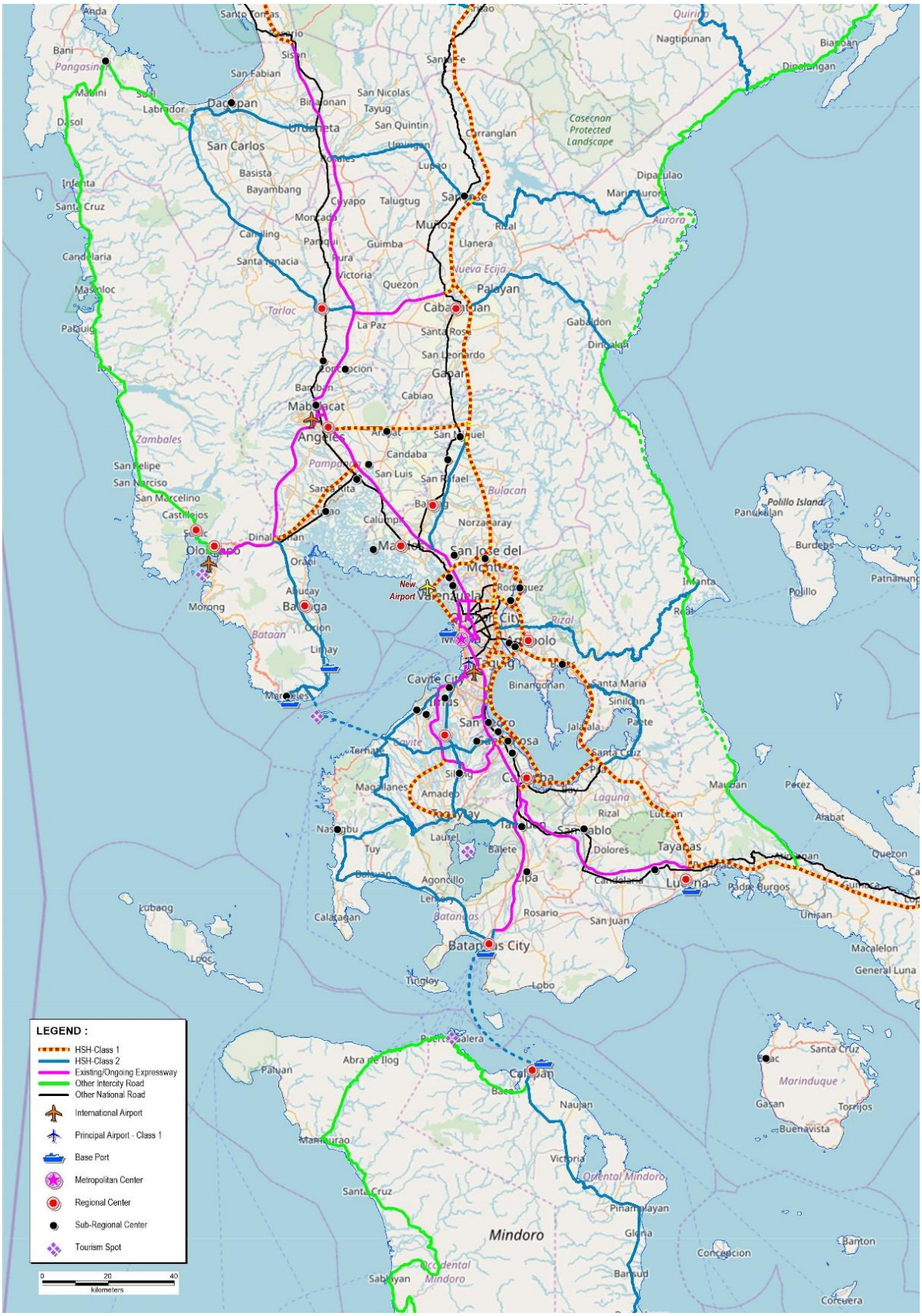
Note: Other intercity and national roads are not HSH. Just for reference

Figure 11.4-3 Proposed Overall HSH Network



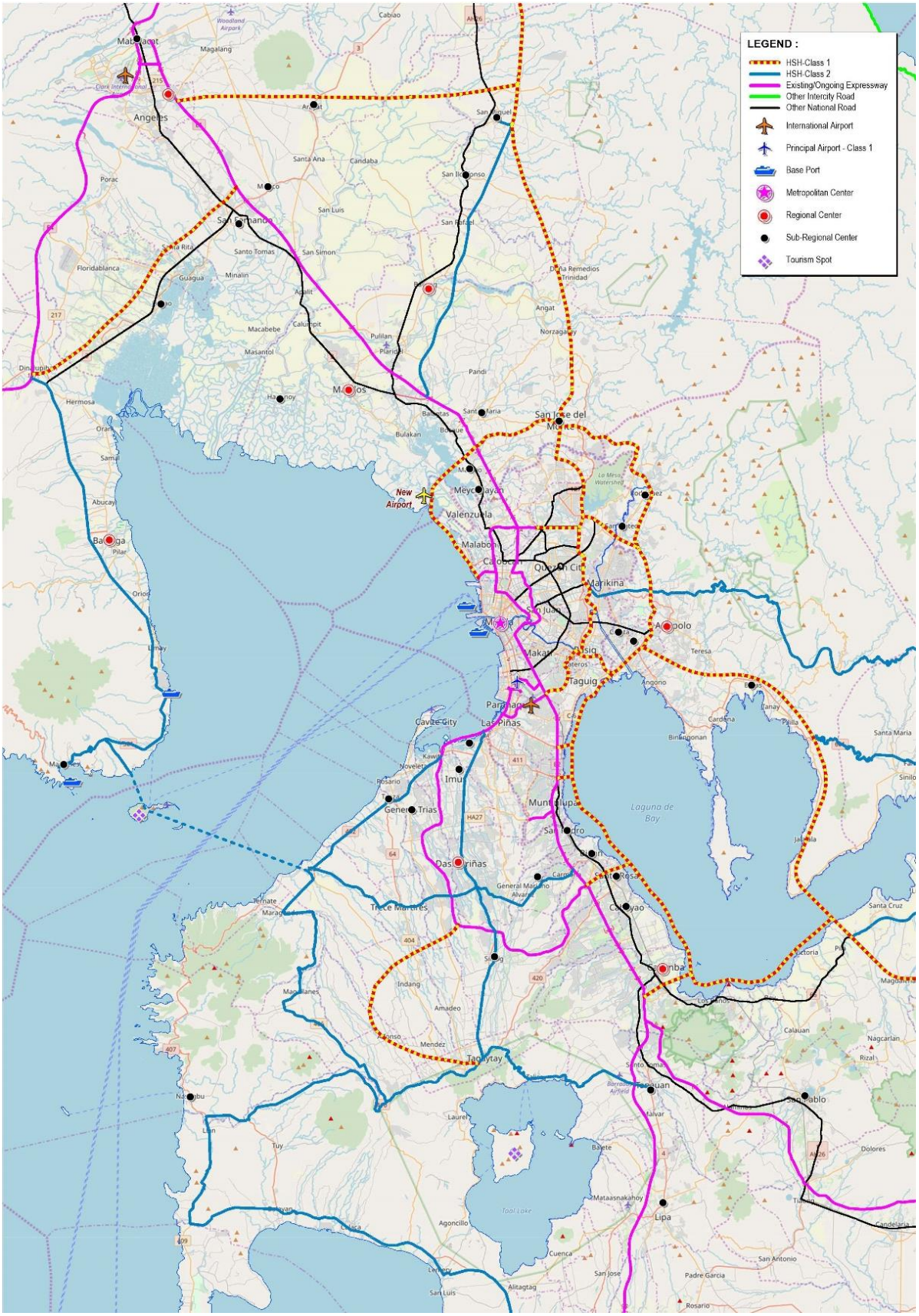
Note: The alignments of newly proposed HSHs are approximate ones because they are to be reviewed and determined according to their feasibility studies. Other intercity and national roads are not HSH. Just for reference

Figure 11.4-4 Proposed Overall HSH Network (North Luzon)



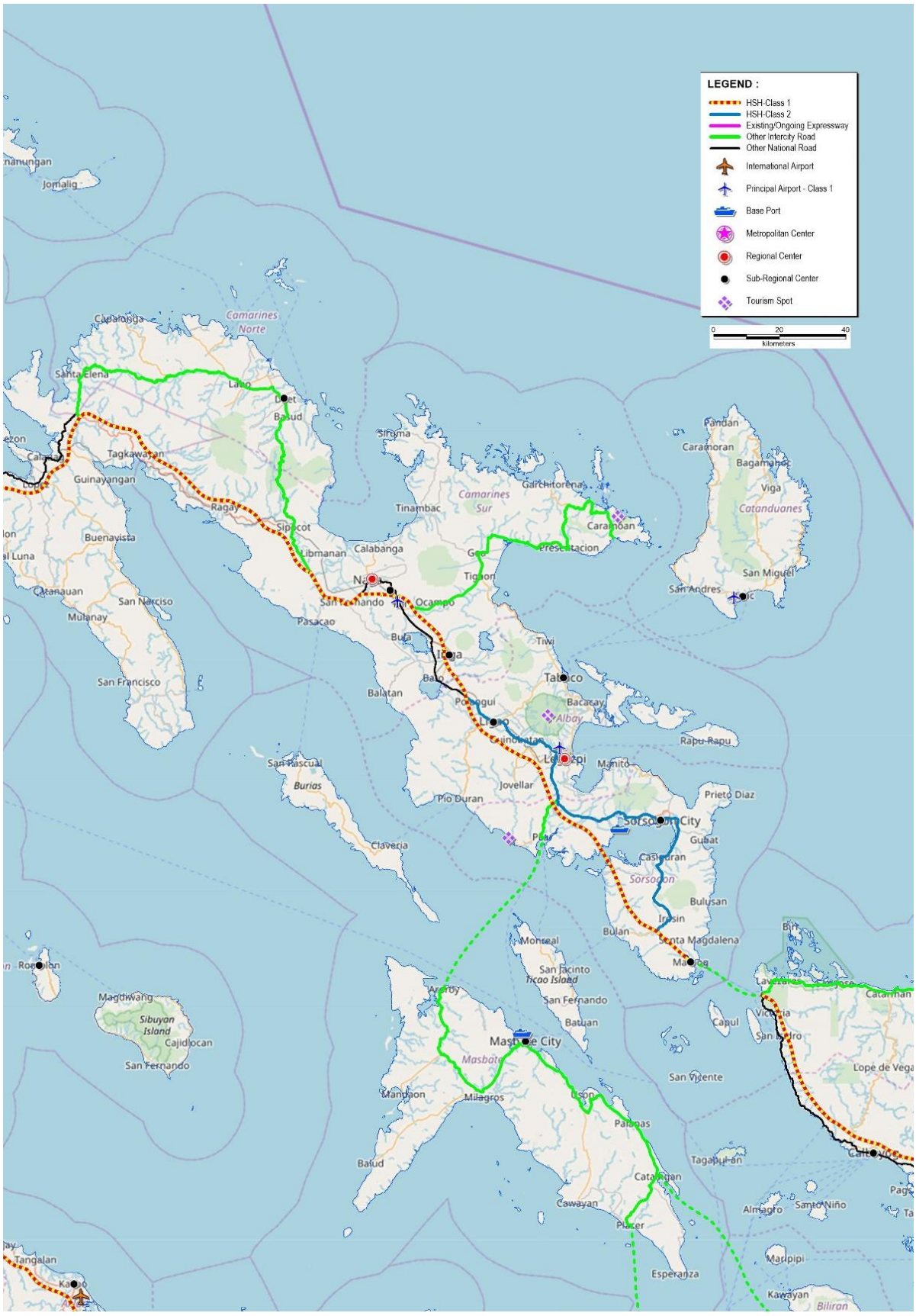
Note: The alignments of newly proposed HSHs are approximate ones because they are to be reviewed and determined according to their feasibility studies. Other intercity and national roads are not HSH. Just for reference

Figure 11.4-5 Proposed Overall HSH Network (Central Luzon)



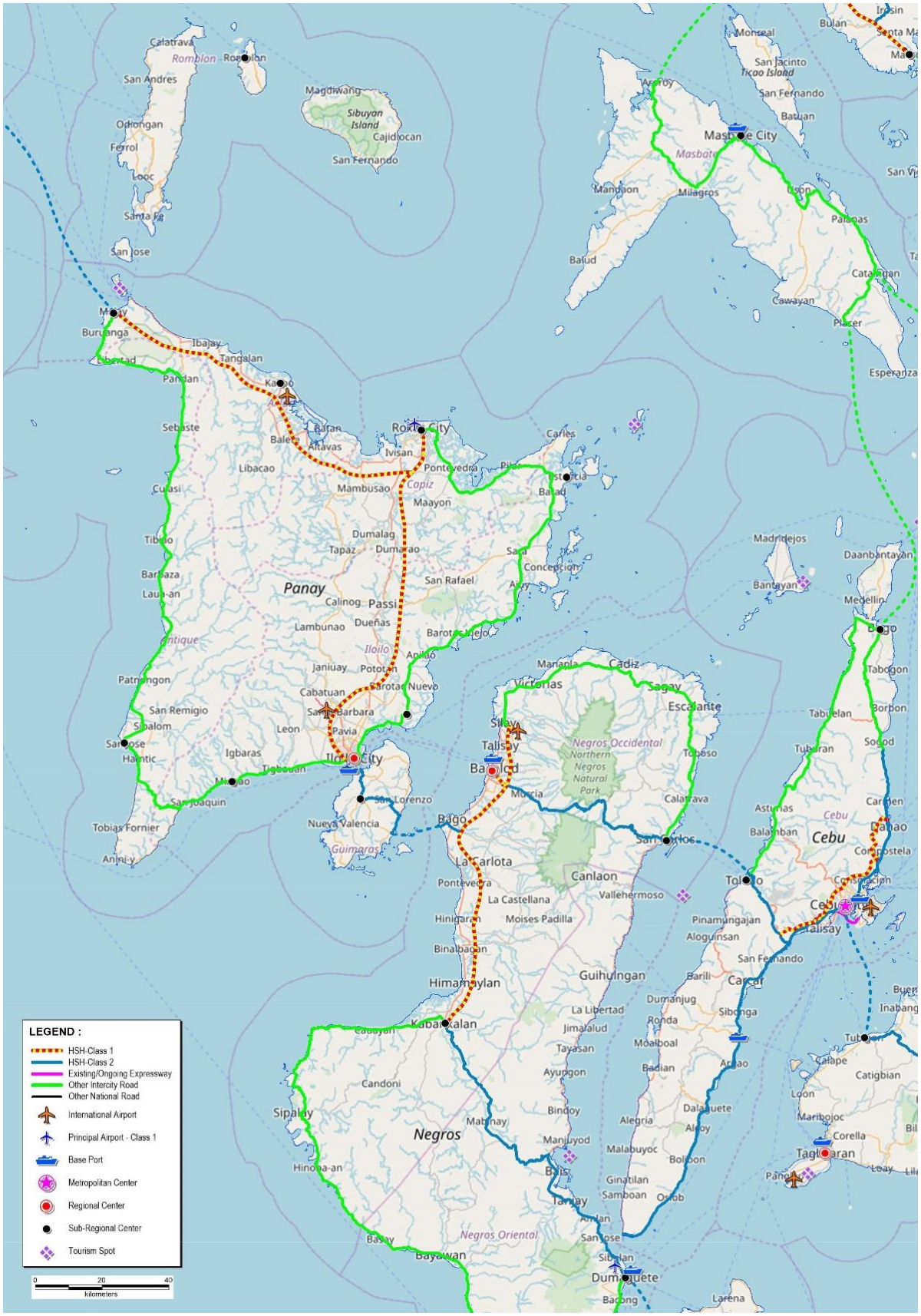
Note: The alignments of newly proposed HSHs are approximate ones because they are to be reviewed and determined according to their feasibility studies. Other intercity and national roads are not HSH. Just for reference

Figure 11.4-6 Proposed Overall HSH Network (Metro Manila)



Note: The alignments of newly proposed HSHs are approximate ones because they are to be reviewed and determined according to their feasibility studies. Other intercity and national roads are not HSH. Just for reference

Figure 11.4-7 Proposed Overall HSH Network (South Luzon)

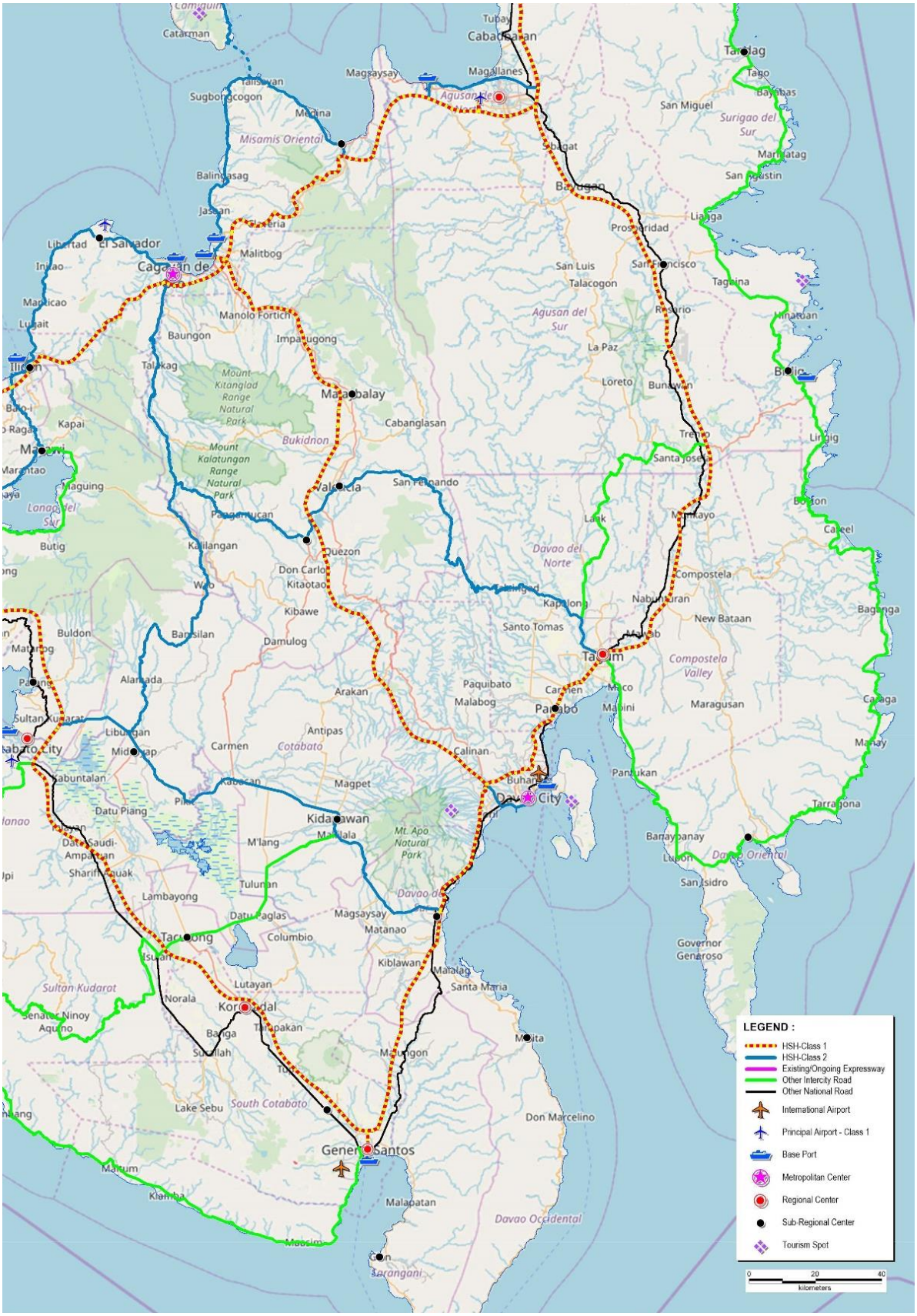


Note: The alignments of newly proposed HSHs are approximate ones because they are to be reviewed and determined according to their feasibility studies. Other intercity and national roads are not HSH. Just for reference

Figure 11.4-8 Proposed Overall HSH Network (West and Central Visayas)

Note: The alignments of newly proposed HSHs are approximate ones because they are to be reviewed and determined according to their feasibility studies. Other intercity and national roads are not HSH. Just for reference

Figure 11.4-9 Proposed Overall HSH Network (East Visayas)



Note: The alignments of newly proposed HSHs are approximate ones because they are to be reviewed and determined according to their feasibility studies. Other intercity and national roads are not HSH. Just for reference

Figure 11.4-10 Proposed Overall HSH Network (East Mindanao)

Note: The alignments of newly proposed HSHs are approximate ones because they are to be reviewed and determined according to their feasibility studies. Other intercity and national roads are not HSH. Just for reference

Figure 11.4-11 Proposed Overall HSH Network (West Mindanao)

11.5 Identification of HSH Network Plan in 2040

11.5.1 Procedure of HSH Network Plan in 2040

To select the HSH Network in 2040 from the Overall HSH Network, the following procedure was applied. The HSH Network in 2040 is selected considering the available budget.

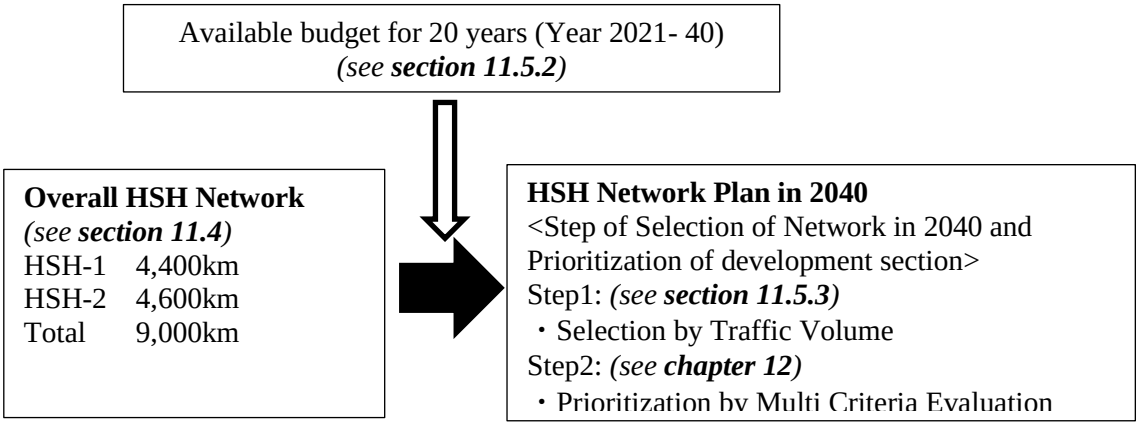


Figure 11.5-1 Procedure of Selection of HSH Network in 2040

11.5.2 Investment Framework

The total investment amount for 20 years (2021-2040) for HSH development was estimated by the following assumption.

Assumption

- Annual GDP Growth Rate is 6.5%. (see **section 4.1.2**)
- Based on the past DPWH Public Investment Program (PIP) shown in **Table 11.5-2**, the past annual capital investment for roads and bridges in the Philippines amounted to 1.6-3.3 % of GDP. It is expected that the investment for the roads and bridges amounting to 2.2% of GDP will be maintained in the future.
- The Philippine government will pursue the infrastructure development as "Build Build Build" in the future. The average investment rate for road and bridges will be expected to keep 2.2 % in the future. Applying 2.2% is not far different with other countries, like China and Indonesia as shown in **Table 11.5-1**.
- Based on the past DPWH Public Investment Program (PIP), Investment for HSH Class-1 and Class-2 is projected to reach 20% in the future.

Table 11.5-1 Capital Investment for Roads/Bridges vs. GDP (2016) in Other Countries

Japan	1.15%
China	2.49%
Indonesia	2.41%
Philippines	**1.70%**

Source: "Infrastructure Outlook," Global Infrastructure Hub, Accessed December 5, 2019. https://outlook.gihub.org/

Investment for HSH class-1 and class-2 by DPWH is calculated as follows.

HSH Investment (2021-2040) = GDP (2021-2040) * 2.2%*20%

For 20 years (2021-40), available budget for HSH class-1 and class-2 is approximately PhP 1,900Billion as shown in **Table 11.5-2**.

Table 11.5-2 Investment Framework for HSH 1 and 2

		GDP a) (Billion Php)	Capital Investment for Roads/Bridges (Billion Php)	b)	Investment for HSH I & II (Billion Php)	c)	Note
Before Master Plan Period	2016	8,123	139.22	1.7%	15.89	11.4%	DPWH PIP
	2017	8,666	184.22	2.1%	30.39	16.5%	DPWH PIP
	2018	9,207	222.46	2.4%	57.30	25.8%	DPWH PIP
	2019	9,805	158.39	1.6%	46.35	29.3%	DPWH PIP
	2020	10,443	341.99	3.3%	142.42	41.6%	DPWH PIP
Short- Term	2021	11,122	244.68	2.2%	48.94	20.0%	
	2022	11,845	260.59	2.2%	52.12	20.0%	
	2023	12,615	277.53	2.2%	55.51	20.0%	
	2024	13,435	295.57	2.2%	59.11	20.0%	
	2025	14,308	314.78	2.2%	62.96	20.0%	
	Sub-total	**63,325**	**1,393.15**	2.2%	**278.63**		
Medium -Term	2026	15,238	335.24	2.2%	67.05	20.0%	
	2027	16,229	357.03	2.2%	71.41	20.0%	
	2028	17,284	380.24	2.2%	76.05	20.0%	
	2029	18,407	404.95	2.2%	80.99	20.0%	
	2030	19,603	431.28	2.2%	86.26	20.0%	
	Sub-total	**86,761**	**1,908.74**	2.2%	**381.75**		
Long -Term	2031	20,878	459.31	2.2%	91.86	20.0%	
	2032	22,235	489.16	2.2%	97.83	20.0%	
	2033	23,680	520.96	2.2%	104.19	20.0%	
	2034	25,219	554.82	2.2%	110.96	20.0%	
	2035	26,858	590.88	2.2%	118.18	20.0%	
	2036	28,604	629.29	2.2%	125.86	20.0%	
	2037	30,463	670.20	2.2%	134.04	20.0%	
	2038	32,444	713.76	2.2%	142.75	20.0%	
	2039	34,552	760.15	2.2%	152.03	20.0%	
	2040	36,798	809.56	2.2%	161.91	20.0%	
	Sub-total	**281,732**	**6,198.10**	2.2%	**1,239.62**		
Ground Total		**431,818**	**9,499.99**		**1,900.00**		

Source: JICA Study Team

Note: a) GDP Annual Growth Rate 6.5%

b) • From DPWH PIP for 2016 to 2020
• Beyond year 2020, 2.2% of GDP.

c) • Assumed to be20% of b)

11.5.3 Total Project Cost for Development of the Overall HSH Network

Total project cost to realize the overall HSH network was estimated at PhP 2,933 billion. The cost for ROW acquisition is 20% of the total construction cost. The consultant's service cost and the physical contingency is 10% each of the total construction cost.

Table 11.5-3 Total Project Cost of Overall HSH Projects (9,000km)

Item	Cost (PhP Billion)
1. HSH Class-1 Construction Cost	1,495
2. HSH Class-2 Construction Cost	600
3. ROW Acquisition Cost (20%)	419
4. Consultant Cost (10%)	210
5. Physical Contingency (10%)	210
Total	**2,933**

Source: JICA Study Team

11.5.4 Budget Allocation to HSH Class-1 and to Class-2

(1) Basic Idea of Budget Allocation to HSH Class-1 and Class-2

Total Investable Budget for HSH Class-1 and Class-2

Based on the total investable budget of PhP1,900 billion by the public sector until 2040, approximately 65% (=PhP1,900 Billion/ PhP2,933 Billion) of the Overall HSH network could be implemented in 20 years from 2021 to 2040. In addition, 10% (=PhP293 Billion) of total cost for the Overall HSH Network development is assumed to be realized by BOT project which would be the investment by the private sector. In total, the investable budget would be expected at PhP2,200 billion which is approximately **75%** of the total required project cost for the Overall HSH Network development.

HSH Class-2

Main works for HSH Class-2 are as follows:

- Road widening (2-lane to 4-lane or 6-lane)
- New Road for bad road alignment, New Bypass for congested areas
- Road Improvement (Pavement, etc.)
- Flyover at major intersections
- Major Projects
  - i) Bataan - Cavite Bridge (187 Billion Php)
  - ii) Panay – Guimaras - Negros Link Bridges (107 Billion Php)
  - iii) Davao Coastal Road, etc.

These major projects will be implemented within 20 years since these projects were already approved by NEDA ICC and other widening works and road bypass projects will be implemented within the same span of 20 years.

The assumption is that all proposed HSH Class-2 projects will be implemented by 2040. (PhP840 billion)

HSH Class-1

The remaining investment amount of PhP1,360 billion is allocated for Class-1. This is approximately **65%** of the overall HSH Class-1 Network.

Table 11.5-4 Budget Allocation for the HSH Network in 2040

Unit: PhP Billion

	HSH Class-1	HSH Class-2	Total
The Overall HSH Network (A)	2,093	840	2,933
HSH Network in 2040 (B)	1,360	840	2,200
Proportion (B/A)	65%	100%	75%

(2) Selection of HSH Class-1 Network in 2040

1) Basic Idea

For the selection of HSH Class-1 Network in 2040 from the Overall HSH Class-1 Network, two alternatives of HSH Class-1 networks in 2040 were set up and compared. The alternatives were formulated from points of view of development policy: the perspective of investment efficiency on nationwide and the perspective of regional development balance.

For considering the alternatives, first the Overall HSH Class-1 network was divided to 53 sections as project level. Next, future traffic demand in 2040 was forecasted under the following conditions.

- Input: Overall HSH Class-1 network, Vehicle OD Table in 2040,
- Traffic Assignment,
- Future traffic volume at 53 sections.

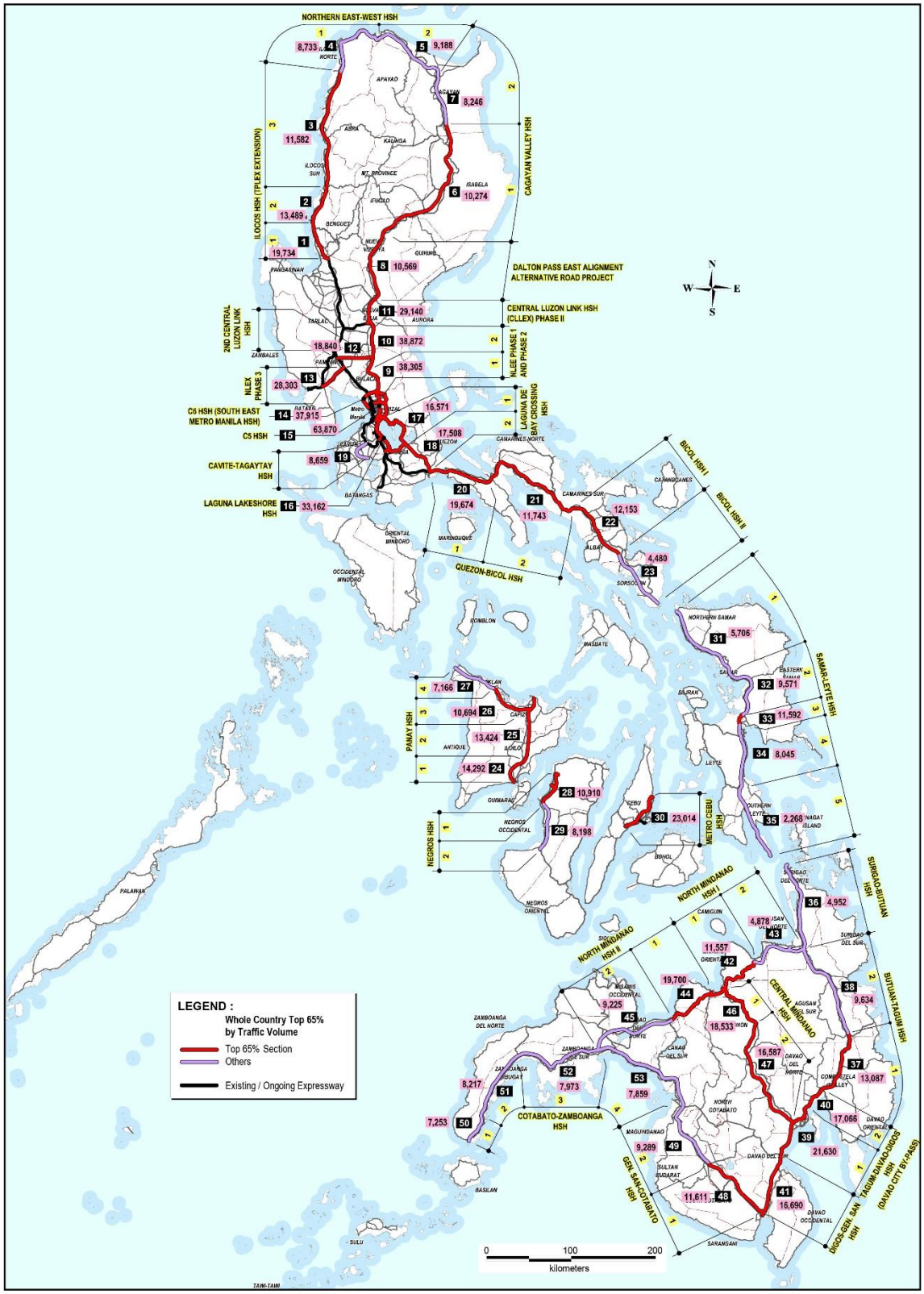
Based on the result of future traffic demand, two alternatives are formulated.

2) Alternatives for Selection of HSH Class-1 Network in 2040

For the selection of HSH Class-1 network to be developed by 2040, two (2) alternative networks were prepared.

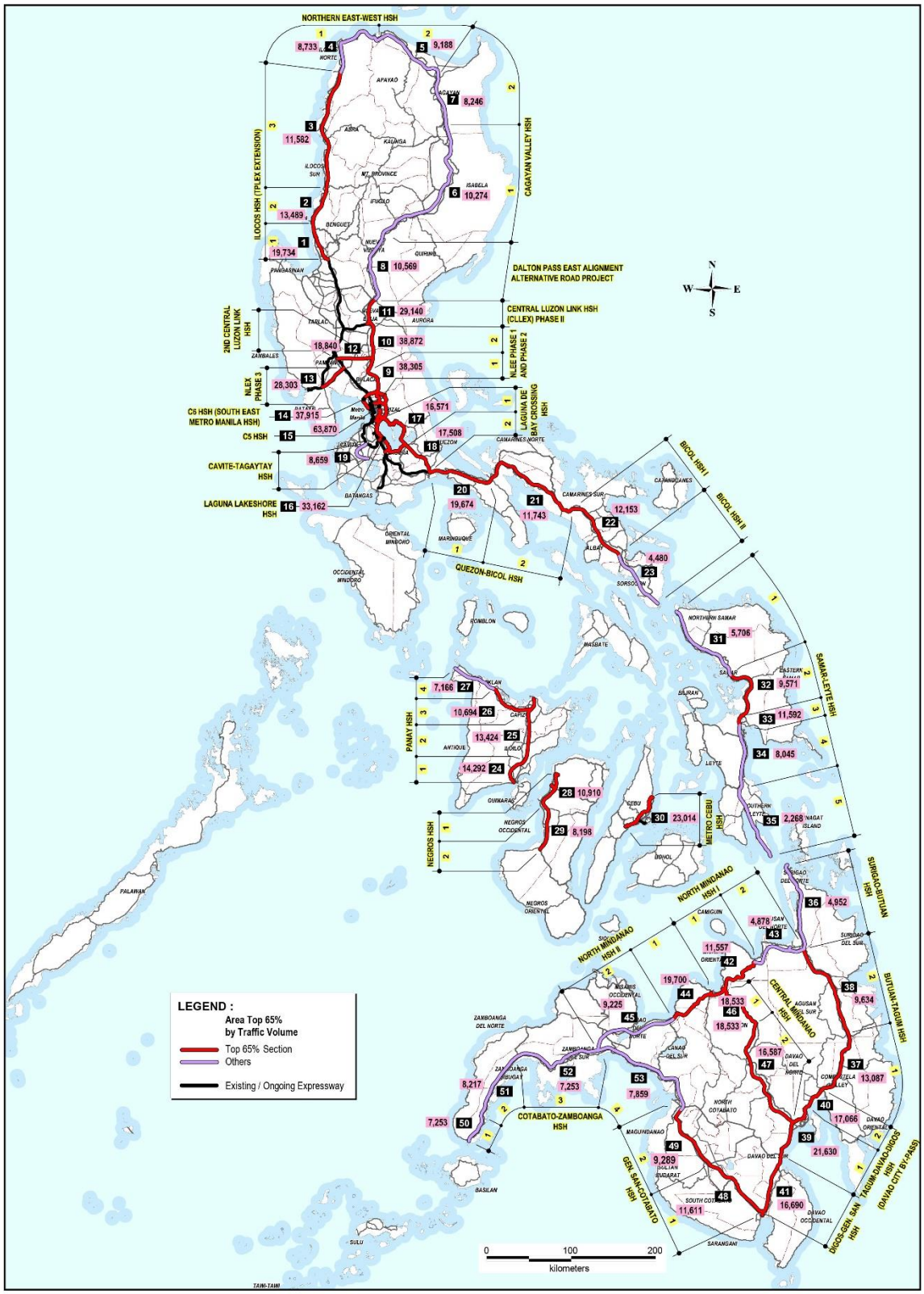
Alternative 1 : Nationwide basis - Top 65 % high traffic projects were selected among all HSH Class-1 projects.
In case of Alternative-1, 33 projects were selected as section traffic was more than 10,000 vehicle/day in 2040. **Figure 11.5-2** illustrates the traffic volume in 2040.

Alternative 2 : Regional basis - Top 65 % high traffic projects were selected in each Area (Luzon, Visayas and Mindanao) to consider the area balance development.
In case of Alternative-2, 34 projects were selected as section traffic was more than 8,000 vehicle/day in 2040. **Figure 11.5-3** illustrates the traffic volume in 2040.



Source: JICA Study Team

Figure 11.5-2 Alternative 1 of HSH Class-1 Network in 2040, Nationwide Basis



Source: JICA Study Team

Figure 11.5-3 Alternative 2 of HSH Class-1 Network in 2040, Regional Basis

Table 11.5-5 and **Table 11.5-6** show the summary of length of the selected HSH Projects.

Alternave-1 (Nationwide) has selected more projects in Luzon compared with Alternative-2 (Region base).

Table 11.5-5 Alternative-1 Nationwide HSH Class-1 Selection in 2040

	Existing HSH Class-1	On-going HSH Class-1	New HSH Class-1	Total in 2040
Luzon	406 km	265 km	1,314 km (57%)	1,985 km
Visayas	0 km	0 km	294 km (13%)	294 km
Mindanao	0 km	0 km	707 km (31%)	707 km
Total	**406 km**	**265 km**	**2,315 km (100%)**	**2,986 km**

Source: JICA Study Team

Table 11.5-6 Alternative-2 Region Base HSH Class-1 Selection in 2040

	Existing HSH Class-1	On-going HSH Class-1	New HSH Class-1	Total in 2040
Luzon	406 km	265 km	952 km (42%)	1,623 km
Visayas	0 km	0 km	424 km (19%)	424 km
Mindanao	0 km	0 km	903 km (40%)	903 km
Total	**406 km**	**265 km**	**2,279 km (100%)**	**2,950 km**

Source: JICA Study Team

3) Evaluation of Alternatives

In order to evaluate the alternatives including the without case scenario, the following items were estimated:

Evaluation Items	Remarks
1.Ecoonmic Benefit	Based on the traffic assignment result, estimated the benefit (reduction of vehicle operating cost and travel time cost) in 2040. Benefit is higher, economic impact is higher.
2.Enviromental Impact	Based on the traffic assignment result, estimated the CO2 Emission in 2040. Compared with "without case", CO2 reduction is calculated. Distance of Forest/Trees/Palm passage, Number of affected area (IPs and protected area).
3.Traffic Efficiency	Travel Time Performance.

Evaluation results are shown in **Table 11.5-7**. As a reference case for comparison, the without case scenario is presented in the Table. The proposal of the suitable without case which can be an alternative to achieve the goal of the HSH development M/P is not easy. Since the objective of HSH network development is to provide the highspeed transport service not only for person trips but also for goods transport nationwide, hence, the regional air transport development or the high-speed railway development will be included as alternatives. However, these alternatives cannot be the without case scenario because these developments are needed with large scale infrastructure development being subject to the social environmental assessment.

The proposal of a spatial framework which does not need the high-speed transport infrastructure for the upgrading of accessibility between regions might be considered. However, this kind of idea does not match the current policy of national development in the Philippines.

Table 11.5-7 Evaluation of Alternatives

		Without Case	Alternative-1 Nationwide	Alternative-2 Region Base
1.Economic Benefit (Year 2040)	Billion Peso/Year	-	400(1.00) ◎	390(0.975) ○
2. Env. Impact 2-1. CO2 Emission	Thousand Ton Year	20,643	17,160	17,332
Reduction of CO2 (Year 2040)			-3,484(1.00) ◎	-3,311(0.95) ○
2. Env. Impact 2-2. Proposed roads affected to Forest/Trees/Palm	km	-	658(1.00) ◎	742 (1.13) ○
2. Env. Impact 2-3. Proposed roads affected to Protected Area*	No. of Projects	-	20 -	20 -
2. Env. Impact 2-4. Proposed roads affected to IPs	No. of Projects	-	10 ○	9 ◎
3. Traffic Efficiency - Luzon	Km/h	20.4	24.9	24.4
- Visayas		27.8	36.7	38.3
- Mindanao		28.2	39.8	41.3
Total		22.5 (×)	28.3 (○)	28.2 (○)
Overall Evaluation			◎ Recommended	

The road for evaluations is HSH class1, HSH class2 and National highways.

* Conservation objectives of protected areas are to protect natural and social environment. Especially, conservation objectives of "Protected Landscape/ Seascape" and "Natural Biotic Area/Anthropological Reserve" are to protect sites and objects of cultural, historical, or archaeological heritage (Annex B, DENR Memorandum Circular 2004-9)

Source: JICA Study Team

4) Selection of Alternatives

Alternative 1: Nationwide is recommended due to the following reasons:

- Shown in **Table 11.5-7**, Economic Benefit and Environmental Impact of Alternative 1 are better than those of Alternative 2.
- Basically, HSH class-1 shall be selected among nationwide, although regional balance is necessary. Projects of over 10,000 vehicle/day in 2040 was selected.
- It is almost the same development scenario illustrated in **Figure 11.5-4**. This development scenario was a combination of three area's scenarios, that is discussed in "4.2.4 Development Alternatives".
- Selected section covers the Luzon Spine Expressway Network Program (see **Figure 11.5-5**) of DPWH concept. It can be harmonized with the current DPWH Plan.

Some other reasons are presented below:

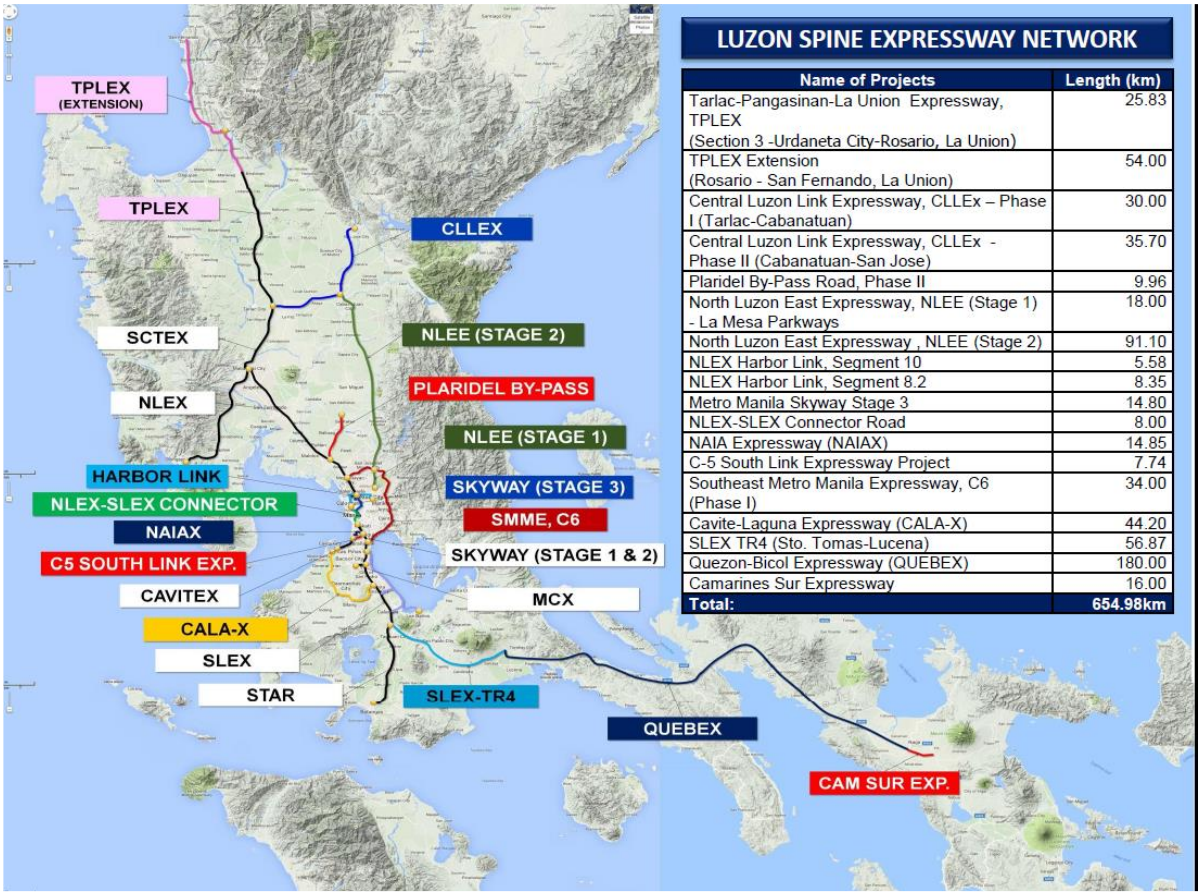
- In Luzon, national primary roads pass through the center of each city/ municipality either in urban or rural areas where the present Road ROW is narrow. Thus, road widening in urban or rural areas is difficult.
- But in Visayas and Mindanao, national primary roads have relatively wider Road ROW and it is applicable to widen 2-lane to 4- or 6-lane to achieve a smooth traffic. Alternative 1 covers major cities in Visayas and Mindanao, such as Cebu, Davao, Cagayan de Oro, General Santos, Iloilo, Bacolod, etc.
- In Visayas and Mindanao, HSH Class-2 such as road widening, and new bypass will be fully considered at an early stage.

Source: JICA Study Team

Figure 11.5-4 Proposed Development Scenario

11.5.5 Proposed HSH Class-1 Network in 2040

Figure 11.5-5 illustrates the proposed HSH Class-1 Network in 2040.

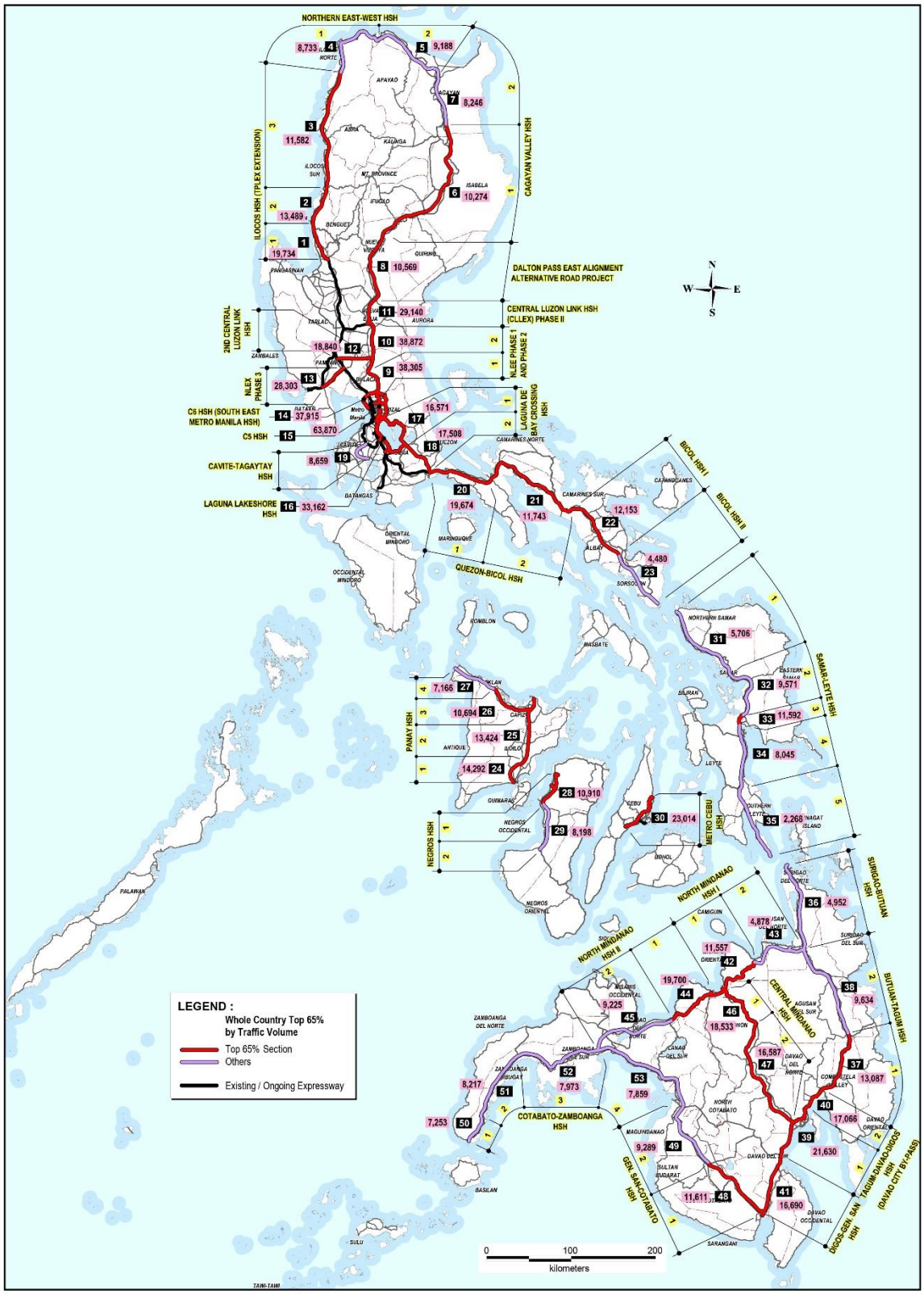


LUZON SPINE EXPRESSWAY NETWORK

Name of Projects	Length (km)
Tarlac-Pangasinan-La Union Expressway, TPLEX (Section 3 -Urdaneta City-Rosario, La Union)	25.83
TPLEX Extension (Rosario - San Fernando, La Union)	54.00
Central Luzon Link Expressway, CLLEx – Phase I (Tarlac-Cabanatuan)	30.00
Central Luzon Link Expressway, CLLEx - Phase II (Cabanatuan-San Jose)	35.70
Plaridel By-Pass Road, Phase II	9.96
North Luzon East Expressway, NLEE (Stage 1) - La Mesa Parkways	18.00
North Luzon East Expressway , NLEE (Stage 2)	91.10
NLEX Harbor Link, Segment 10	5.58
NLEX Harbor Link, Segment 8.2	8.35
Metro Manila Skyway Stage 3	14.80
NLEX-SLEX Connector Road	8.00
NAIA Expressway (NAIAX)	14.85
C-5 South Link Expressway Project	7.74
Southeast Metro Manila Expressway, C6 (Phase I)	34.00
Cavite-Laguna Expressway (CALA-X)	44.20
SLEX TR4 (Sto. Tomas-Lucena)	56.87
Quezon-Bicol Expressway (QUEBEX)	180.00
Camarines Sur Expressway	16.00
Total:	**654.98km**

Source: DPWH

Figure 11.5-5 Luzon Spine Expressway Network



Source: JICA Study Team

Figure 11.5-6 Proposed HSH Class-1 Network in 2040