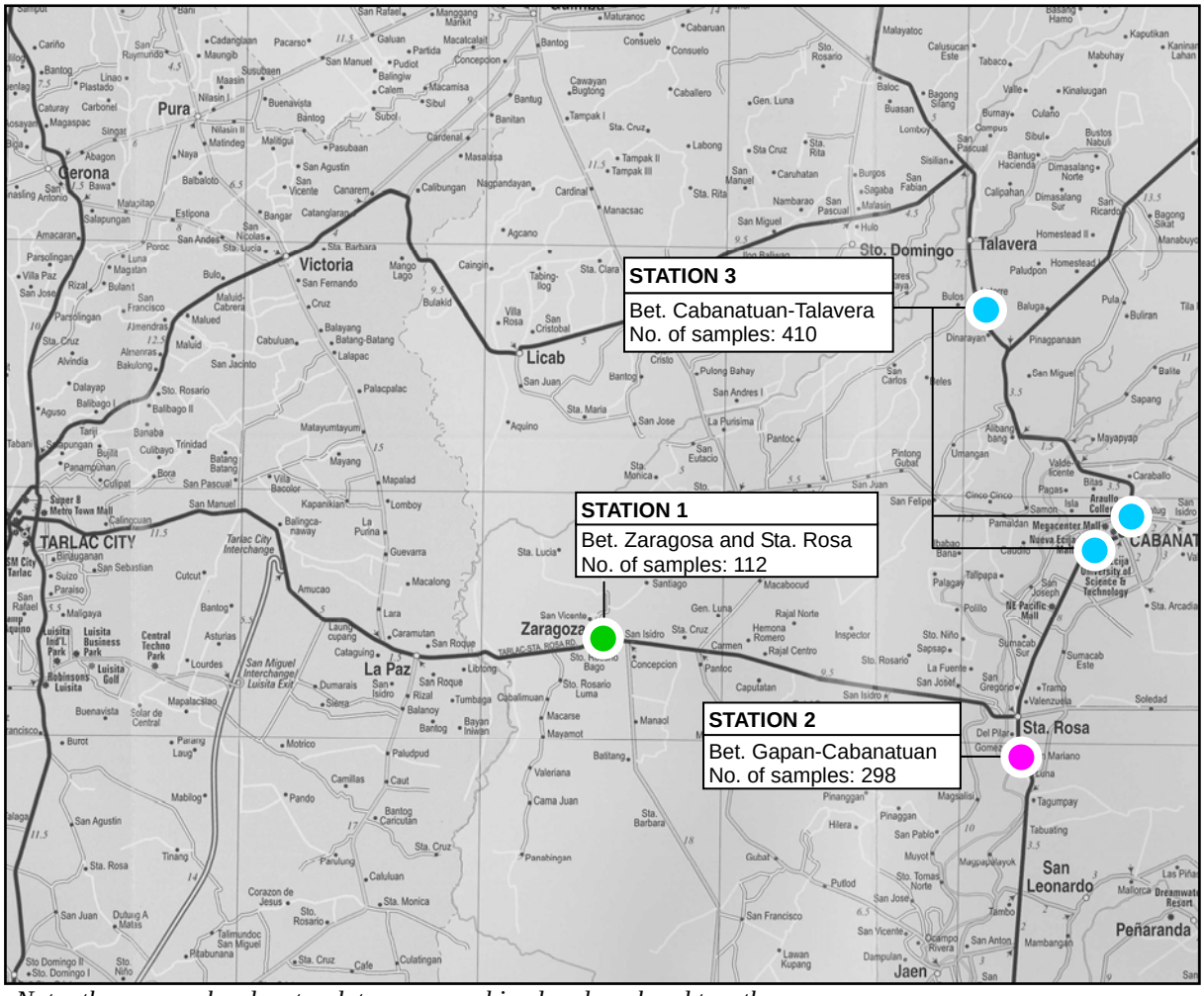
### 4.1.6 Willingness-To-Pay Survey For Use of CLLEX (Private Car Users)

#### *a. Survey Locations and Hypothetical Question for Willingness-to-pay Survey*

**Figure 4.1.6-1** shows the survey locations where the willingness-to-pay survey was carried-out. Samples collected from each site were treated differently to know car users' response depending on their location in relation to CLLEX. This process allows us to determine areas where high shift to expressway can be expected and areas where shift cannot be expected.

CLLEX can provide congestion-free travel to residents of Tarlac City and Cabanatuan City and neighboring municipalities. For those living in Cabanatuan side, the expressway can be used for their trips to Subic or to Baguio or to Metro Manila. See **Figure 4.1.6-2** for the survey questionnaire which also presents a map showing the possible routes that can be served by the CLLEX.




*Note: the same color denotes data were combined and analyzed together*

**FIGURE 4.1.6-1 LOCATION FOR WILLINGNESS-TO-PAY SURVEY**

**Expressway Projects in Mega Manila Region in the Republic of the Philippines**

## WILLINGNESS TO PAY SURVEY (FORM 3)

**FOR STUDY PURPOSE ONLY**

### General Info.

Sample ID No: ☐☐☐☐☐☐☐☐ Date (month/day) ☐☐/☐☐

Location:
- ☐ Sta. Rosa-Tarlac Road
- ☐ Maharlika Highway (bet. Cabanatun & Gapan)
- ☐ Maharlika Highway (bet. Cabanatun & Talavera)

Time ☐☐:☐☐

### Personal Information

**1-Sex** ☐ 1-Male 2-Female

**2-Age** 1)20-29 2)30-39 3)40-49 4)50-59 5)>60 ☐

**3-Occupation** ☐☐

1- Admin. 2- Professional 3- Tech./assist. 4- Clerk 5- Sale/Services 6- Farmer/fisher
7- Craftman 8- Production 9- Unskilled 10- Student 11- House wife 12- Retired
13- Jobless 14- Other (specify):

**4-Monthly Income (Pesos)**

1) None 4) 10,000 - 14,999 7) 30,000-39,999 10) 100,000-149,000
2) Under 5,000 5) 15,000 - 19,999 8) 40,000-59,999 11) 150,000 and above
3) 5,000-9,999 6) 20,000 - 29,999 9) 60,000-99,9999

### Trip Information

**5- Trip OD**

Where did you start this trip? _____ ☐☐☐☐☐☐
*(City/Municipality)*

Where do you end this trip? _____ ☐☐☐☐☐☐
*(City/Municipality)*

**6- Trip purpose** ☐☐

1.Work 4.Selling/Delivering 7.Shopping/Eating 10.Medical treatment
2.Education 5.Meeting/business 8.Sending/ Fetching 11.Social
3.Home 6.Return to work place 9.Recreation 12.Other

**7- Current Route** ☐

Which route do you usually take going to Metro Manila and back?

1. Route 1 (Maharlika Highway - NLEX)
2. Route 2 (Sta. Rosa Road - SCTEX - NLEX)
3. Others: _____

### Willingness to Pay

**Hypothetical Question**

The government is planning to construct the Central Luzon Link Expressway (CLLEX) to link Cabanatuan City to SCTEX. Like other expressways in the country, certain amount will be collected to use the expressway.

**8 - If you go to Tarlac or Subic, will you use CLLEX for your travel?**

**[via Sta. Rosa Road = 70 min]**
**[CLLEX = 20 min]**

**Time Saved is about 40 min!**

☐

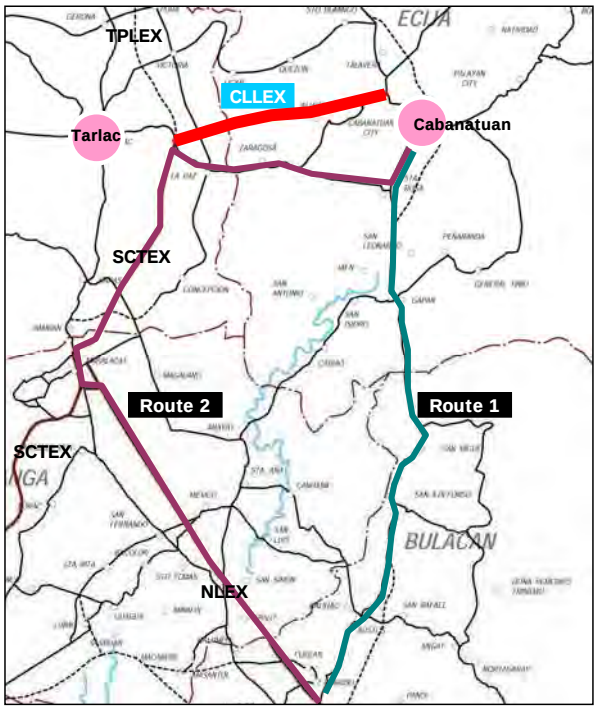
1) Yes → How much you are willing to pay?
a) 50 b) 70 c) 100
2) No, I will take ordinary road
why _____

**9 - If you go to Manila, will you use CLLEX for your travel?**

- Cabanatuan-NLEX via Maharlika Highway (166 min)
- Cabanatuan-Sta.Rosa Rd-SCTEX-NLEX (130 min)
- Cabanatuan-CLLEX-SCTEX-NLEX (90 min)

☐

1) Yes → How much you are willing to pay?
a) 50 b) 70 c) 100
2) No, I will take ordinary road
why _____

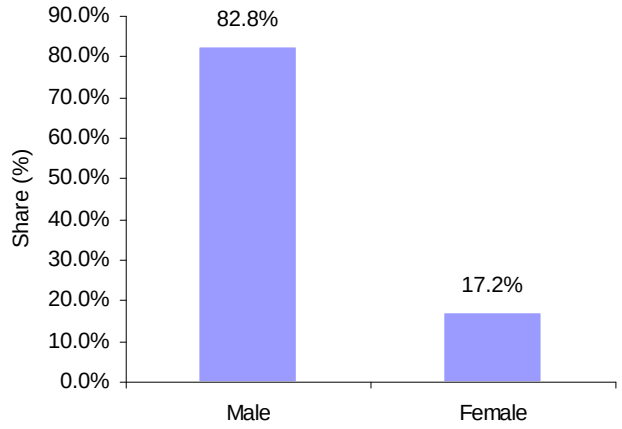



**That's All. Thank You Very Much for Your Cooperation.**

**FIGURE 4.1.6-2 WILLINGNESS-TO-PAY SURVEY FORM**

### *b. Sex Distribution*

For sex distribution, most of the car users captured in the survey are male (82.8%) and the remaining 17.2% are female. See **Figure 4.1.6-3**.

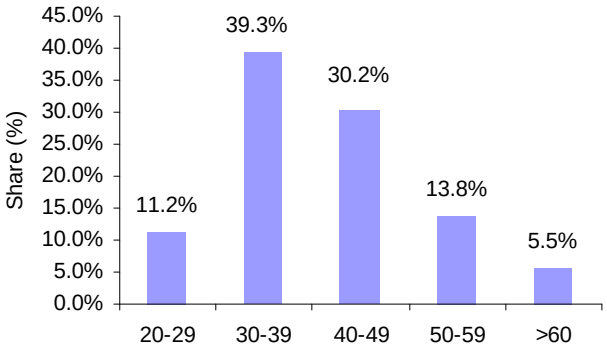



*Number of sample = 820*

**FIGURE 4.1.6-3 SEX DISTRIBUTION**

### *c. Age Distribution*

For age distribution, more than half of the respondents (69.5%) are between the age range of 30 to 49. See **Figure 4.1.6-4**.

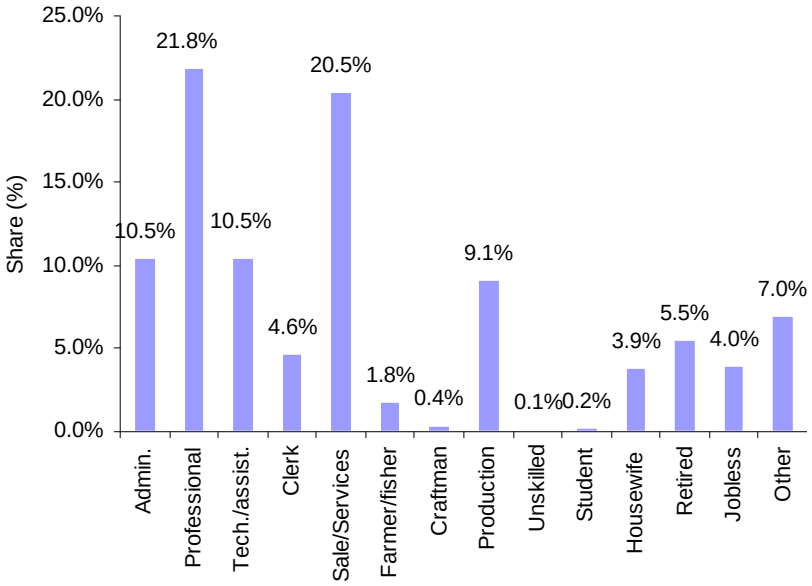



*Number of sample = 820*

**FIGURE 4.1.6-4 AGE DISTRIBUTION**

### *d. Occupation Distribution*

For occupation of the captured respondents, most of them are engaged in professional work (21.8%) and sales/services (20.5%). See **Figure 4.1.6-5**.

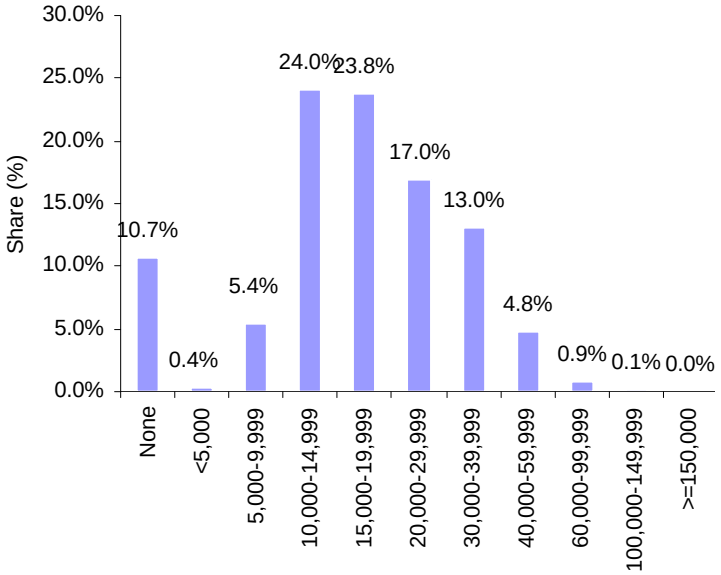



*Number of sample = 820*

**FIGURE 4.1.6-5 OCCUPATION DISTRIBUTION**

### *e. Monthly Income Distribution*

For monthly income, notable income brackets which the respondents belong are: 10,000-14,999 (24.0%) and 15,000-19,999 (23.8%). For respondents which declared 'none' or lack of income, they are normally students or housewives. See **Figure 4.1.6-6**.




*Number of sample = 820*

**FIGURE 4.1.6-6 MONTHLY INCOME DISTRIBUTION**

### *f. OD Distribution*

The captured OD trips at Station 1 (Tarlac – Sta. Rosa Road) are discussed below.

- 36.6% of trips come from municipalities of Nueva Ecija such as Zaragosa, San Leonardo, Munoz, Jaen, San Antonio, etc. Although Cabanatuan City is under Nueva Ecija, trip from this city is separated to distinguish the number of trips coming from this city. As shown in the figure below, 18.8% of trips originate from Cabanatuan city. Other notable origin of trips is Tarlac 17.9% and Metro Manila 14.3%. See **Figure 4.1.6-7.**
- For destination, major destinations are municipalities of Nueve Ecija such as Gapan, Zaragosa, Sta. Rosa (29.5%), Cabanatuan City (21.4%), and Tarlac (21.4%). See **Figure 4.1.6-8.**

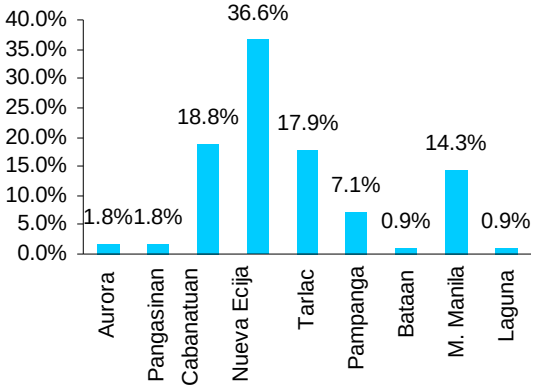



**FIGURE 4.1.6-7 ORIGIN OF TRIPS AT STATION 1 (TARLAC – STA. ROSA ROAD)**

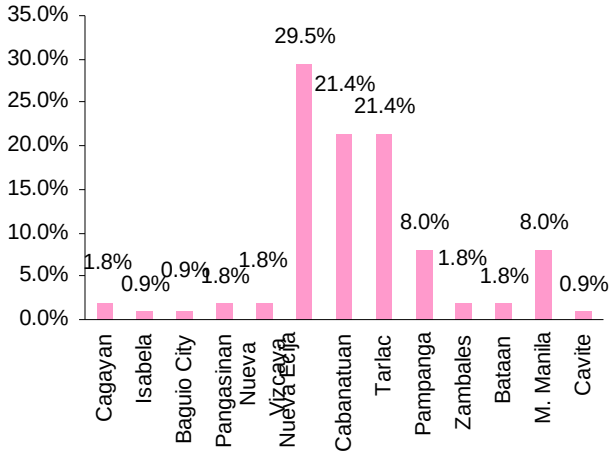



**FIGURE 4.1.6-8 DESTINATION OF TRIPS AT STATION 1 (TARLAC – STA. ROSA ROAD)**

For the captured OD trips at Station 2 (Cabanatuan – Gapan), this has the following features:

- Places with substantial trips originated are: Cabanatuan (30.9%), other cities/municipalities of Nueva Ecija (34.2%), and Tarlac (14.8%).
- For destinations, places which have major share are: other cities/municipalities of Nueva Ecija (21.8%), Tarlac (21.5%) and Cabanatuan City (20.8).

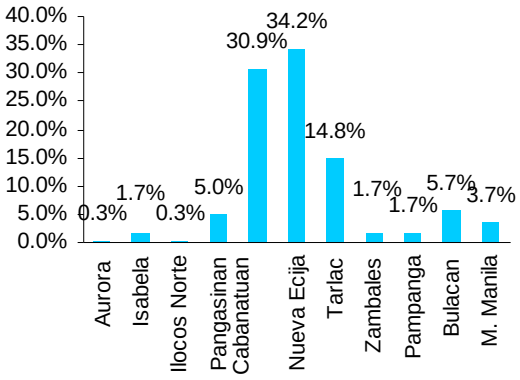



**FIGURE 4.1.6-9 ORIGIN OF TRIPS AT STATION 2 (PAN PHILIPPINE HIGHWAY AT CABANATUAN - GAPAN)**

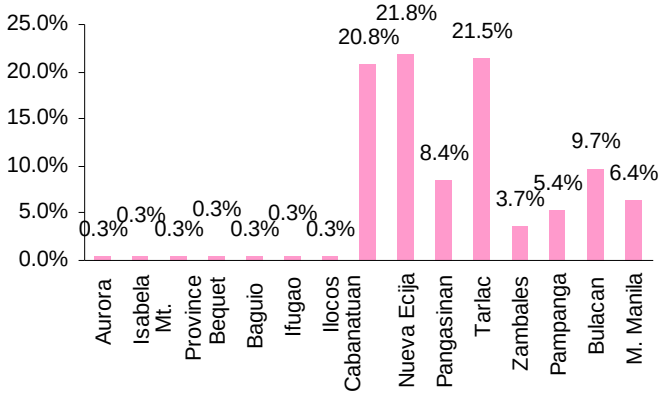



**FIGURE 4.1.6-10 DESTINATION OF TRIPS AT STATION 2 (PAN PHILIPPINE HIGHWAY AT CABANATUAN - GAPAN)**

For the captured OD trips at Station 3, this has the following features:

- Most trips come from other cities/municipalities of Nueva Ecija (36.6%), Cabanatuan City (26.8%) and Tarlac (17.2%).
- For destinations, places which have major share are: Tarlac (31.9%), Metro Manila (18.4%), other cities/municipalities of Nueva Ecija (15.7%) and Cabanatuan city (7.9%).

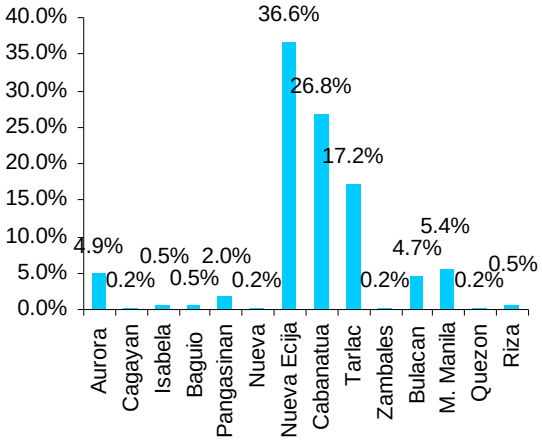



**FIGURE 4.1.6-11 ORIGIN OF TRIPS AT STATION 3 (PAN PHILIPPINE HIGHWAY AT CABANATUAN - TALAVERA)**

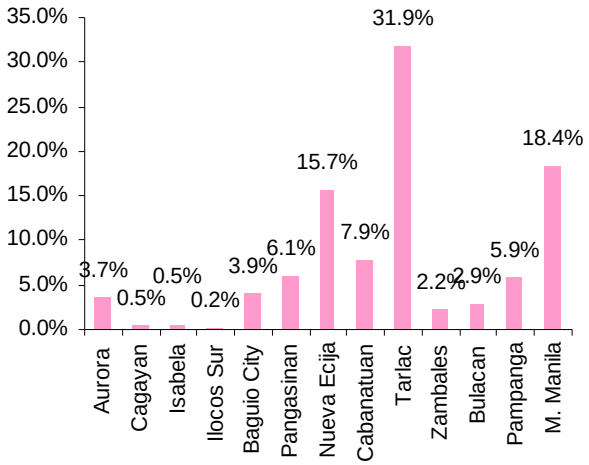



**FIGURE 4.1.6-12 DESTINATION OF TRIPS AT STATION 2 (PAN PHILIPPINE HIGHWAY AT CABANATUAN - TALAVERA)**

### *g. Trip Purpose Distribution*

For trip distribution, most of the respondents have the following trip purpose: social (19.6%), selling/delivering (13.7%), going home (13.5%) and meeting/business (11.5%). See **Figure 4.1.6-13.**

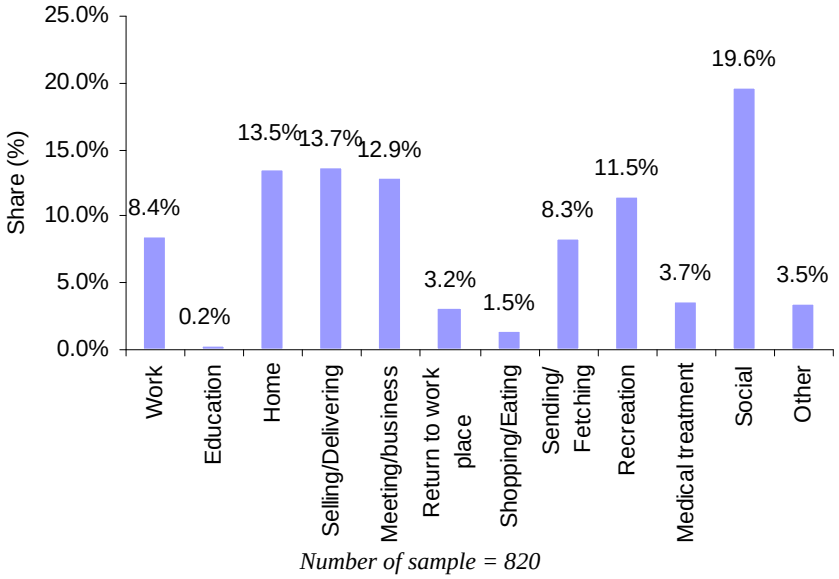



**FIGURE 4.1.6-13 TRIP PURPOSE DISTRIBUTION**

### *h. Current Route Choice to/from Manila*

The respondents were asked of their current route choice in going/from Metro Manila. There were three locations where the surveys were conducted: (i) Station 1 - Along Sta Rosa-Tarlac Road, (ii) Station 2 - Pan Philippine Highway between Gapan-Cabanatuan section, and (iii) Station 3 - Pan Philippine Highway Cabanatuan – Talavera section (See **Figure 4.1.6-1**). **Figure 4.1.6-14** illustrates the route choice per location.

**Station 1 (Sta. Rosa – Tarlac Road at Zaragosa Municipality)**
89% of interviewed respondents are using Route 2 (Sta. Rosa – SCTEX – NLEX route) when they travel to/from Manila and the remaining 11% still uses the direct but congested route (Pan Philippine Highway – NLEX route).

**Station 2 (Gapan – Cabanatuan near Sta. Rosa Municipality)**
65 % of respondents are travelling to/from Manila via Route 2 (Sta. Rosa – SCTEX – NLEX route) and substantial number (35%) still uses the shorter but congested route of Pan Philippine Highway – NLEX.

**Station 3 (Cabanatuan – Talavera)**
64 % of respondents are travelling to/from Manila via Route 2 (Sta. Rosa – SCTEX – NLEX route) and the remaining 36% still uses the direct Pan Philippine Highway – NLEX.

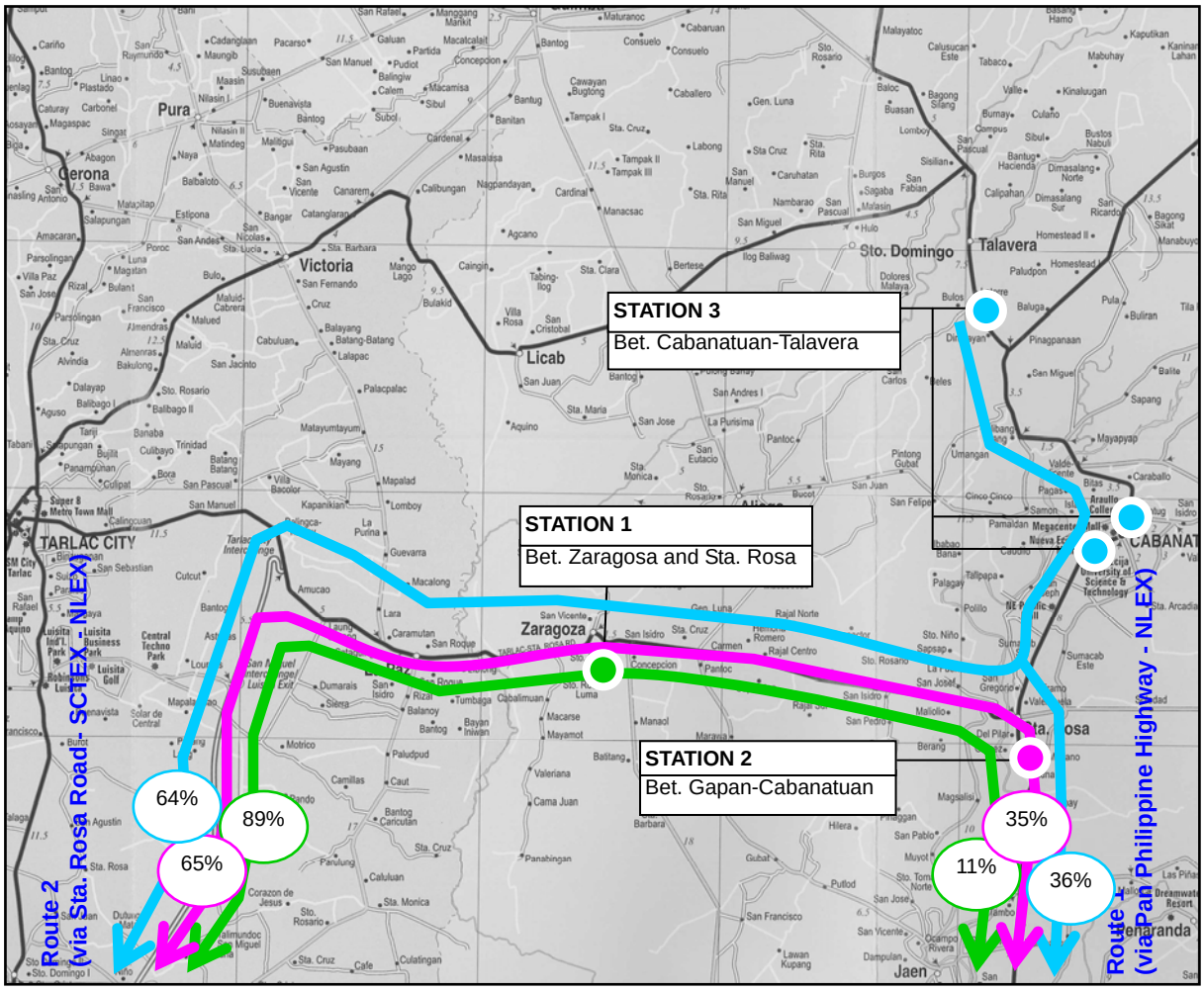
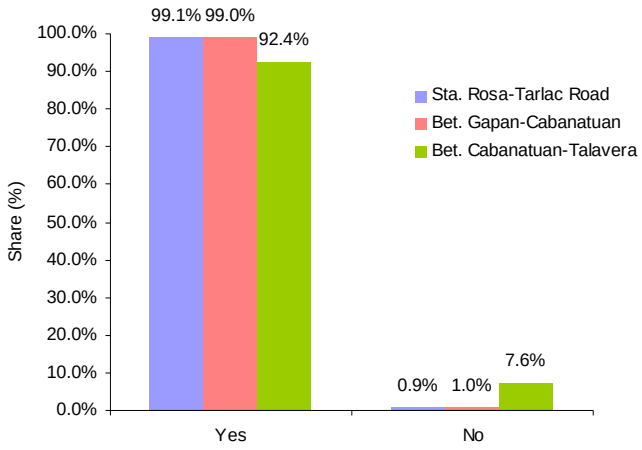



**FIGURE 4.1.6-14 CURRENT ROUTE CHOICE TO/FROM MANILA**

### *i. Will they Use CLEX to/from Tarlac/Subic (Time saved is 40 min)*

As mentioned, aside from going to Metro Manila, motorists making trips between the two towns of Cabanatuan City and Tarlac City might use the expressway for their daily trips. Thus, such question was asked for car users. And as can be seen in the figure below, at all survey stations, car users' willingness to use CLLEX is very high which is above 90%. See **Figure 4.1.6-15**.

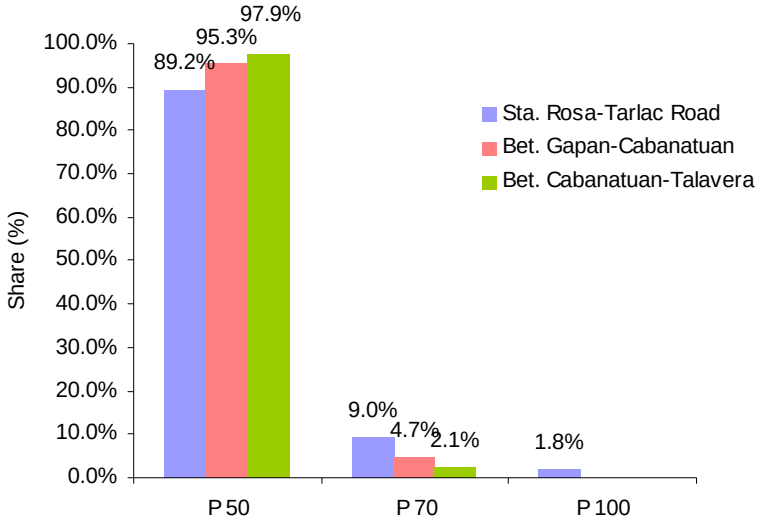



*Sample size (Sta. Rosa-Tarlac = 112; Gapan-Cabanatuan = 298; Cabanatuan-Talavera = 410)*

**FIGURE 4.1.6-15 WILL THEY USE CLEX TO/FROM TARLAC/SUBIC**

### *j. How much they are willing to pay to use CLEX to/from Tarlac/Subic?*

As for the amount they are willing to pay to use the expressway for their trip between Tarlac/Subic and Cabanatuan City, most of the respondents is willing to pay 50 pesos. See **Figure 4.1.6-16**.

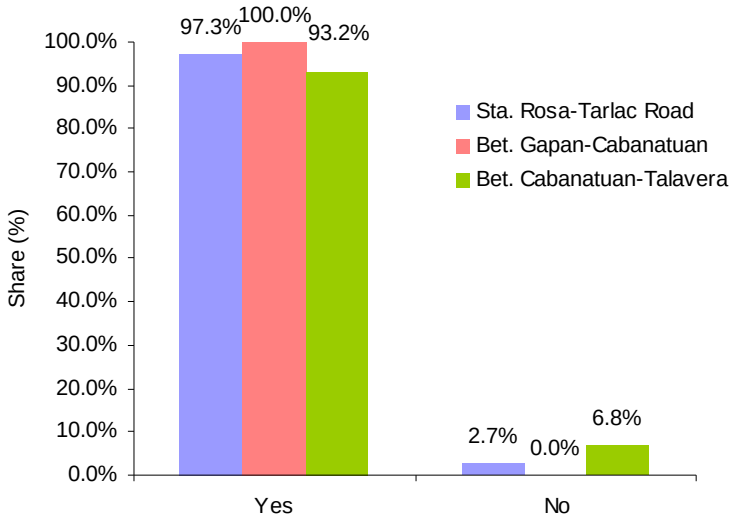



*Sample size (Sta. Rosa-Tarlac = 112; Gapan-Cabanatuan = 298; Cabanatuan-Talavera = 410)*

**FIGURE 4.1.6-16 AMOUNT THEY ARE WILLING TO PAY TO/FROM TARLAC/SUBIC**

### *k. Will they Use CLEX to/from Metro Manila (Time saved is 40 min)*

When respondents were asked if they would also use the expressway when they travel to/from Metro Manila, motorists interviewed at Pan Philippine Highway (between Gapan – Cabanatuan) all indicated their willingness to use the expressway. Majority of respondents from other two survey stations expressed also their willingness to use the expressway (97.3% at Sta. Rosa- Tarlac Road and 93.2% at Pan Philippine Highway, Cabanatuan-Talavera Section). See **Figure 4.1.6-17**.

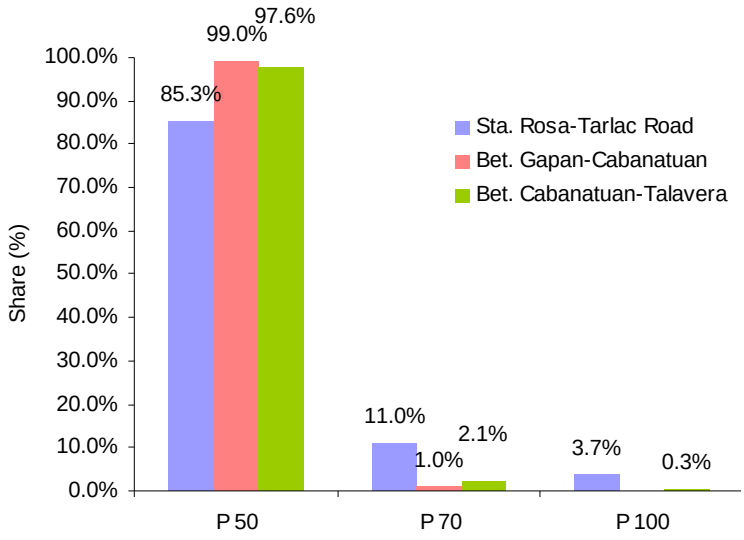



*Sample size (Sta. Rosa-Tarlac = 112; Gapan-Cabanatuan = 298; Cabanatuan-Talavera = 410)*

**FIGURE 4.1.6-17 WILL THEY USE EXPRESSWAY TO/FROM METRO MANILA**

### *l. How much they are willing to pay to use CLEX from/to Manila?*

For the amount of money they are willing to pay for the use of CLLEX, majority of the respondents revealed that they are willing to pay 50 pesos. See **Figure 4.1.6-18**.




*Sample size (Sta. Rosa-Tarlac = 112; Gapan-Cabanatuan = 298; Cabanatuan-Talavera = 410)*

**FIGURE 4.1.6-18 AMOUNT THEY ARE WILLING TO PAY TO/FROM METRO MANILA**

### 4.1.7 Willingness-To-Pay Survey For Use of CLLEX (Bus Operators)

#### *a. How many buses you owned? (Q5)*

The number of bus owned and used for operation by the nine (9) bus companies interviewed is presented in **Table 4.1.7-1**. The total number of bus used by these companies is 1,587 bus unit or an average of 176 buses per company. Taking into account the share of each type of bus, 64% are composed of two-seater air-conditioned bus and this followed by ordinary bus (24%) and others (most of buses refer as others are 2x3 bus which means five seats in one row all together and normally 'ordinary bus' without air-conditioned) with a share of 9.0%. See survey form in Appendix 4-1.

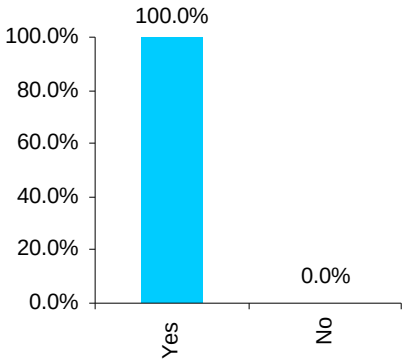
**TABLE 4.1.7-1 NUMBER OF BUS OWNED BY BUS COMPANIES**

| Bus Type | BC 1 | BC 2 | BC 3 | BC 4 | BC 5 | BC 6 | BC 7 | BC 8 | BC 9 | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Mini-bus | | | | | | | | | | 0 |
| Ordinary bus | | | 20 | | 100 | | | 19 | 247 | 386 |
| Air-conditioned bus (single-seater) | | | | | | 15 | | | 29 | 44 |
| Air-conditioned bus (two-seater) | 10 | 42 | 45 | 3 | 200 | 115 | 10 | | 590 | 1,015 |
| Others (2x3 bus) | | | | 57 | | 4 | | 15 | 66 | 142 |
| **Total** | **10** | **42** | **65** | **60** | **300** | **134** | **10** | **34** | **932** | **1,587** |

*Note: BC = Bus Company; Number of sample = 9*

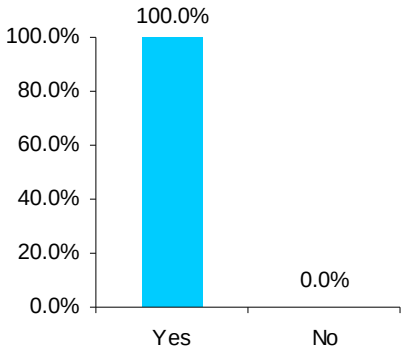
#### *b. Do you allow your driver to use expressways? (Q7)*

Interviewed bus managers revealed that they allow their drivers to use expressway both for single-seater (special bus) and double-seater bus (regular bus). Refer to the two figures below.




*Number of sample = 9 (note that only 4 companies have single-seater bus)*

**FIGURE 4.1.7-1 SINGLE-SEATER BUS**

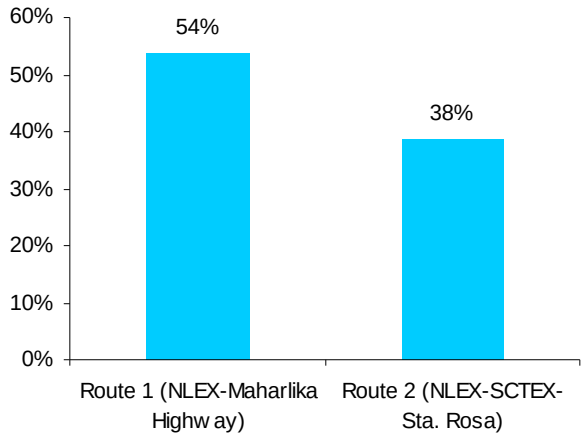



*Number of sample = 9*

**FIGURE 4.1.7-2 TWO-SEATER BUS**

### *c. Bus Route - Cabanatuan to/from Manila? (Q8)*

The bus managers were also queried regarding the route used by their drivers for Manila – Cabanatuan (and neighboring municipalities) route. Seven managers (54%) said that they are still using the NLEX-Pan Philippine highway which passes medium size towns like Bustos, San Miguel, Gapan, etc. The others revealed that they are using the NLEX - SCTEX - Sta. Rosa route which is longer but faster. See **Figure 4.1.7-3**.

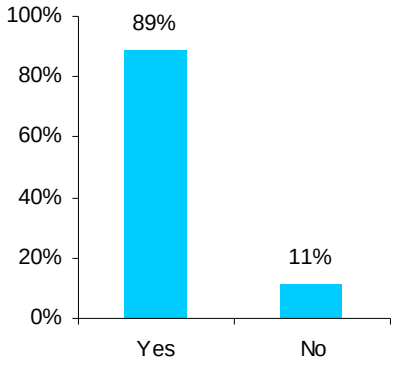



*Number of sample = 9; the missing 8% are not using both route (destination is Pangasinan)*

**FIGURE 4.1.7-3 BUS ROUTE FOR MANILA - CABANATUAN**

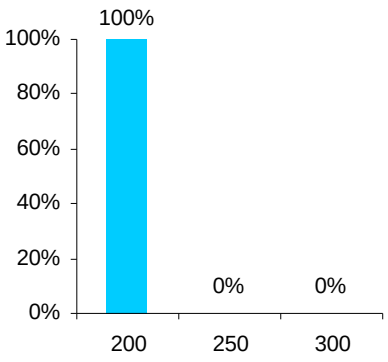
### *d. Willingness-to-pay to Use CLLEX - from SCTEX to Cabanatuan? (Q10)*

All of the interviewed managers except one revealed that they will allow their bus drivers to use the expressway if it served their route. The amount of toll they are willing to pay for the expressway is 200 pesos. See the two figures below.




*Number of sample = 9*

**FIGURE 4.1.7-4 WILL THEY ALLOW THEIR BUS DRIVERS TO USE CLLEX?**

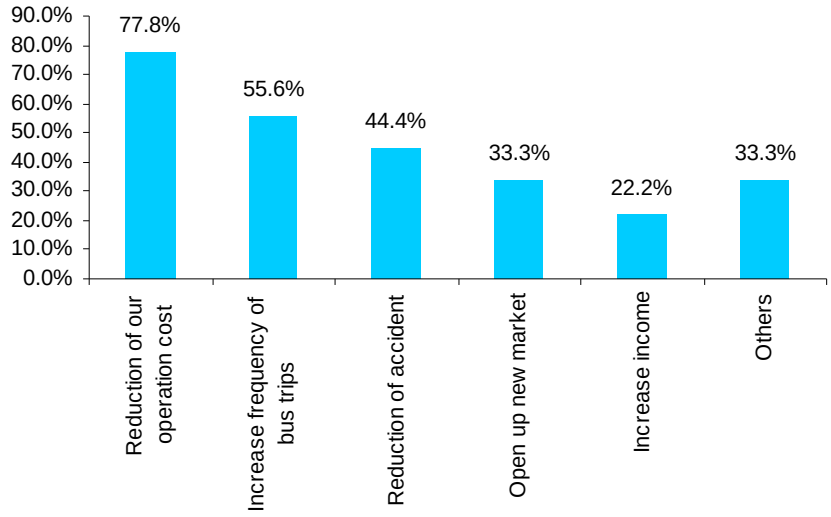



*Number of sample = 9*

**FIGURE 4.1.7-5 AMOUNT THEY ARE WILLING TO PAY?**

### *e. Perceived Benefits by Bus Managers from CLLEX? (Q14)*

If the Central Luzon Link Expressway is constructed in the future, managers of bus companies were asked if what kind of benefits that this new infrastructure can bring to their business. Most managers believed that the new expressway would reduce their operation cost (29.2%), increase frequency of trips (28.8%), and would help in reduction of accident (12.5%). Others which have a share of 12.5% refer to shortening of travel time. See **Figure 4.1.7-6**.




*Number of sample = 9; Note: Respondents were allowed for multiple answers*

**FIGURE 4.1.7-6 PERCEIVED BENEFITS BY BUS OPERATORS OF CLLEX**

### *f. Problems Encountered by Bus Company in their daily operations. (Q12)*

Interviewed operation managers of nine (9) bus companies reveal the following as the problems they encountered in their daily operation:

- Traffic congestion along town/city center
- High maintenance cost due to poor road condition
- High operation cost due to poor road condition
- High cost of fuel
- Bad road condition of road
- Road accidents

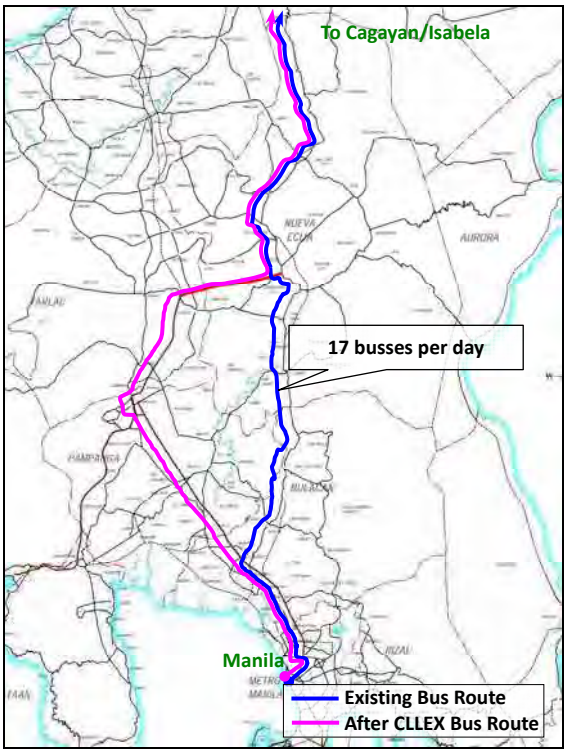
### *g. Comments and Suggestions to Improve Business Operation of Bus Industry. (Q13)*

The following were the comments and suggestions expressed by the interviewed bus managers' which could help improve their operation.

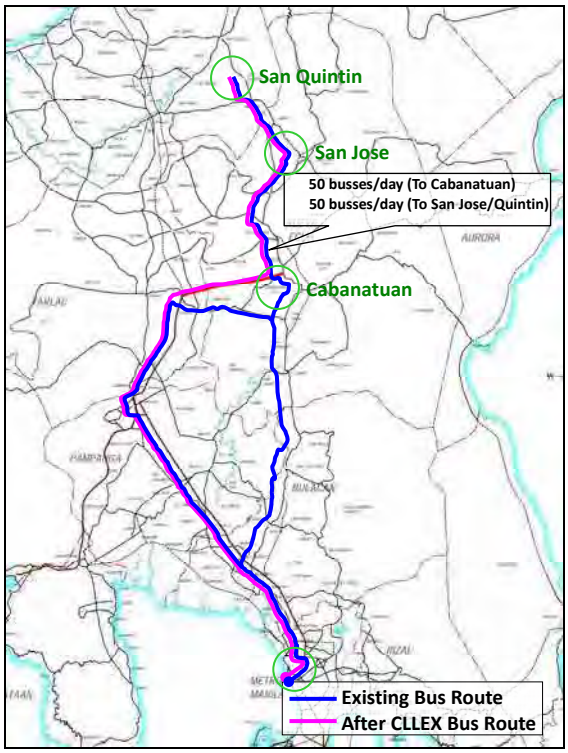
- Expedite repairs of damage roads and highways
- Construction of more durable and accessible roads
- To have continuous education process with our drivers on how to prevent accident and how to use expressway.
- Full implementation of traffic rules and regulations like in Subic.
- Evaluation of franchise given to bus companies

### *h. Bus Routes Before and After Construction of CLLEX*

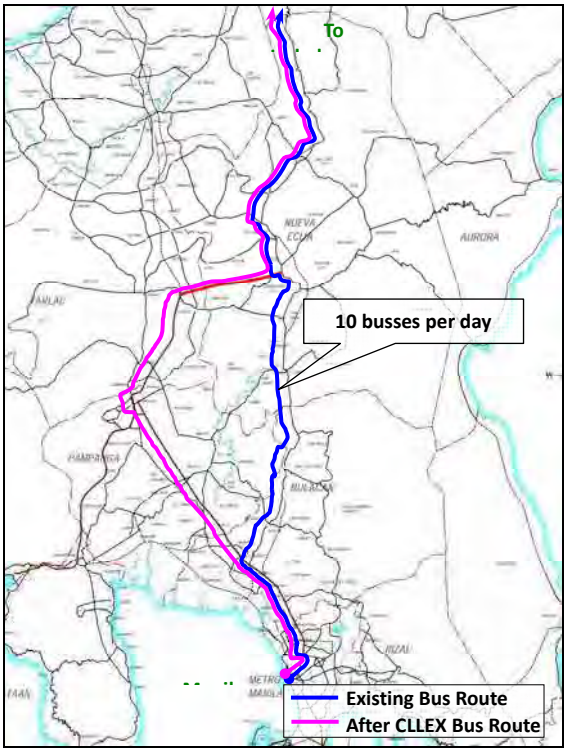
The current routes and number of buses that is likely to use the CLLEX if constructed in the future is shown in **Figure 4.1.7-7**. Most of these buses have their destination in Cagayan Valley which is further north from Cabanatuan City. These buses are utilizing the heavily congested Pan Philippine Highway with the exception of few which are plying through NLEX, SCTEX, Tarlac-Sta. Rosa road. The total number of buses that would utilize the CLLEX from these six (6) companies is 282 per day.



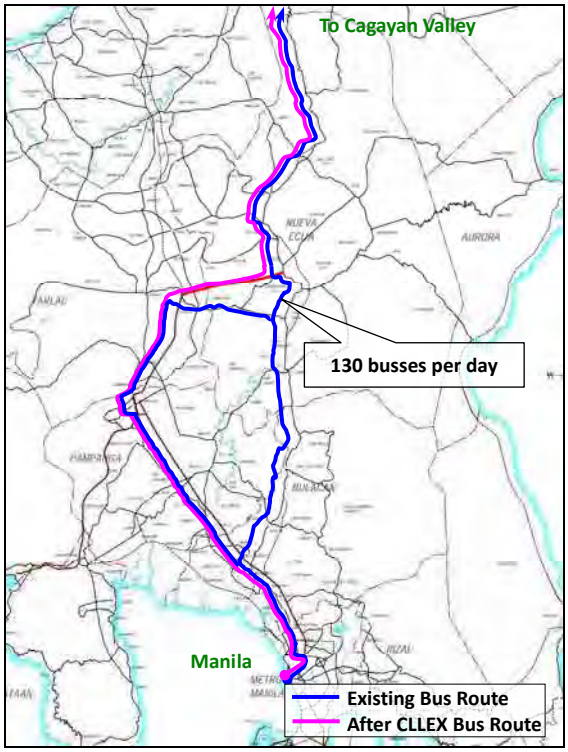

**Bus Company 1**



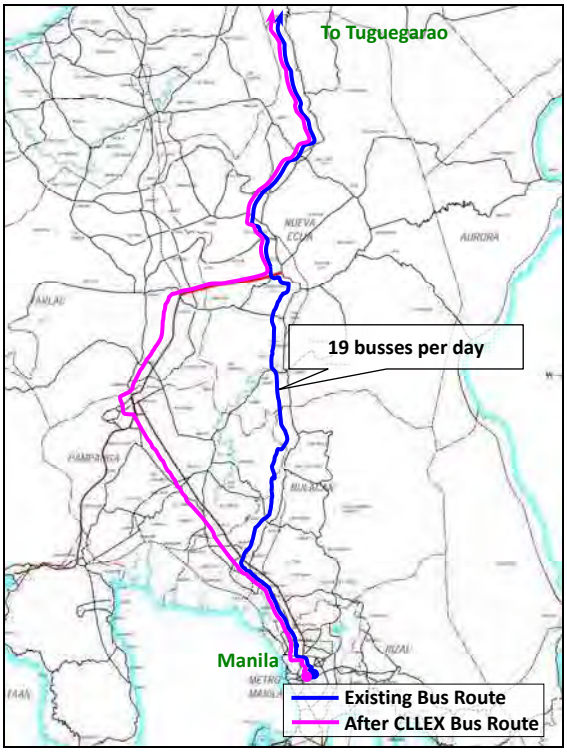

**Bus Company 2**



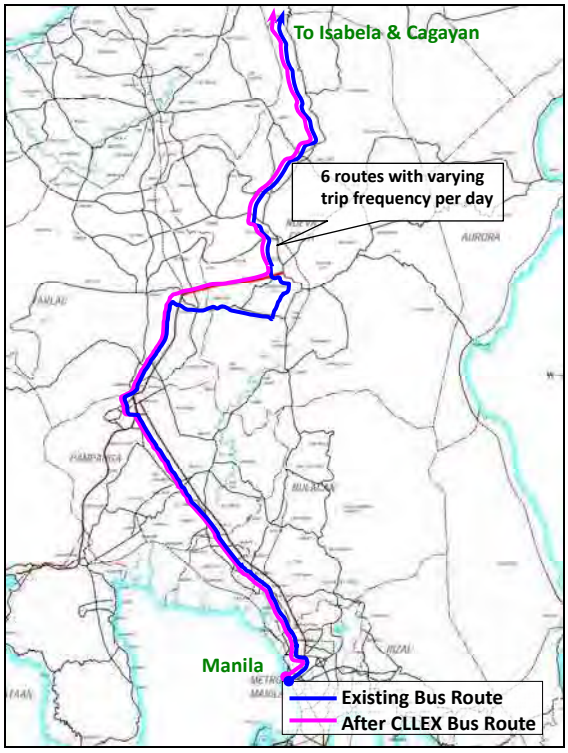

Bus Company 3




Bus Company 4




Bus Company 5




Bus Company 6

**FIGURE 4.1.7-7 EXISTING BUS ROUTE AND AFTER CLLEX BUS ROUTE (WILLINGNESS TO USE)**

### 4.1.8 Willingness-To-Pay Survey For Use of CLLEX (Truck Operators)

#### *a. How many vehicles used for operation? (Q5)*

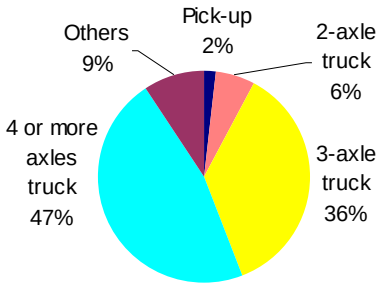
The number of trucks used for operation by the interviewed trucking companies is shown in **Table 4.1.8-1**. The total number of trucks used for operation and owned by these ten (10) companies is 282 while the number of rented trucks reaches 444.

**TABLE 4.1.8-1 NUMBER OF TRUCKS OWNED BY TRUCK COMPANIES**

| Type | T-1 | T- 2 | T- 3 | T- 4 | T- 5 | T- 6 | T- 7 | T- 8 | T- 9 | T- 10 | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pick-up | | 2 | | | 1 | 1 | 4 | | | 6 | 14 | |
| 2-axle truck | | 2 | 3 | 9 | 4 | 6 | 2 | | (8) | 8 | 34 | (8) |
| 3-axle truck | 10 | | | 6 | 2 | 10 (10) | 2 | (160) | (20) | 40 | 70 | (190) |
| 4 or more axles truck | | | | | | 15 | | (240) | (6) | 73 | 88 | (246) |
| Others | | | | | 3 | | | | | 63 | 66 | |
| Total | 10 | 4 | 3 | 15 | 10 | 42 (10) | 8 | (400) | (34) | 190 | 282 | (444) |

*Note: T= Truck Company; ( ) rented trucks used for operation*

The average number of trucks per company used for operation is around 73 trucks (owned and rented). For type of trucks used by these companies, the dominant types are: 4-axle trucks (47%), 3-axle trucks (36%), and others (e.g. vans, pick-up, canter) with 9% share. See **Figure 4.1.8-1.**

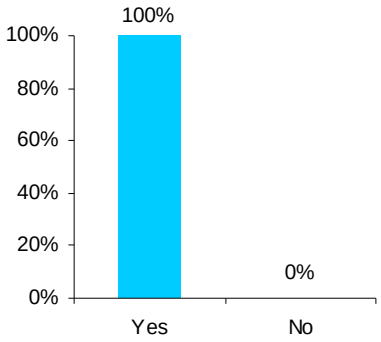



*No. of sample = 10*

**FIGURE 4.1.8-1 DISTRIBUTION OF TRUCK TYPES**

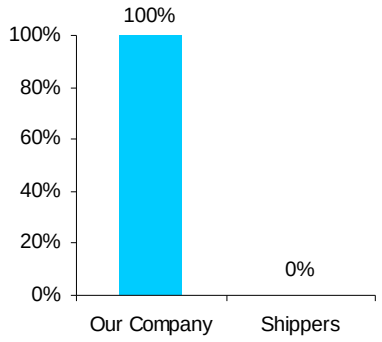
#### *b. Do you allow your truck drivers to use expressways? (Q6)*

When the truck company managers were asked if they allow their drivers to use expressway in their trips, all of them revealed that they allow them to use expressway. For the issue of toll fee, all interviewed managers said that their company is the one shouldering the toll fee. See **Figure 4.1.8-2** and **Figure 4.1.8-3**.




*No. of sample = 10*

**FIGURE 4.1.8-2 DO YOU ALLOW YOUR TRUCK DRIVERS TO USE EXPRESSWAY (YES OR NO)**

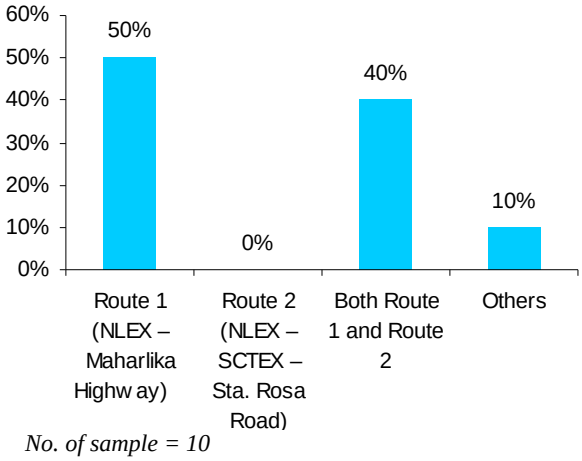



*No. of sample = 10*

**FIGURE 4.1.8-3 WHO SHOULDER THE TOLL FEE**

***c. Which route do you take in delivering goods from Manila to Cabanatuan and neighboring municipalities? (Q7)***

Five (5) of the ten (10) managers reveals that their drivers still uses NLEX-Pan Philippine Highway when they have delivery from Manila to Cabanatuan or at neighboring municipalities. Four managers said that their drivers are using both Route 1 (NLEX-Pan Philippine) and Route 2 (NLEX-SCTEX-Sta. Rosa). One manager said that their delivery is mostly in the Pangasinan area thus their route is via NLEX-SCTEX most of the time. See **Figure 4.1.8-4**.

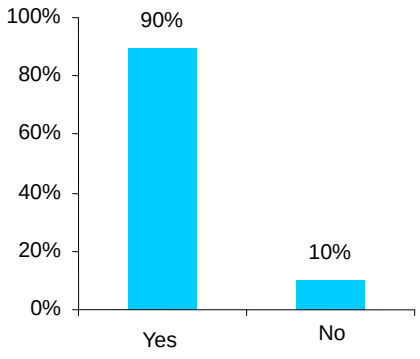



*No. of sample = 10*

**FIGURE 4.1.8-4 TRUCK ROUTES FOR MANILA – CABANATUAN DELIVERY**

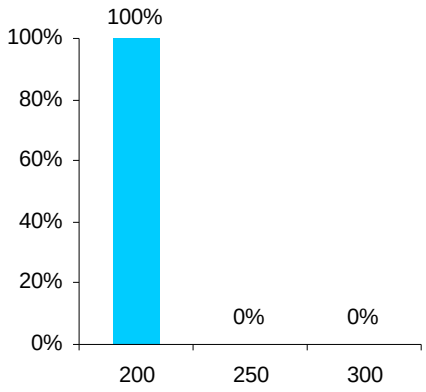
***d. Will they allow their truck drivers to use CLLEX in delivering their goods? (Q10)***

Only one manager expressed his intention not to allow their drivers to use CLLEX. The other nine (9) managers revealed that they will allow their drivers to use the CLLEX if it serves their route. For the amount of toll fee they are willing to pay, all of them said 200 pesos. See **Figure 4.1.8-5** and **Figure 4.1.8-6**.




*No. of sample = 10*

**FIGURE 4.1.8-5 WILL YOU ALLOW YOUR TRUCK DRIVERS TO USE CLLEX (YES OR NO)**

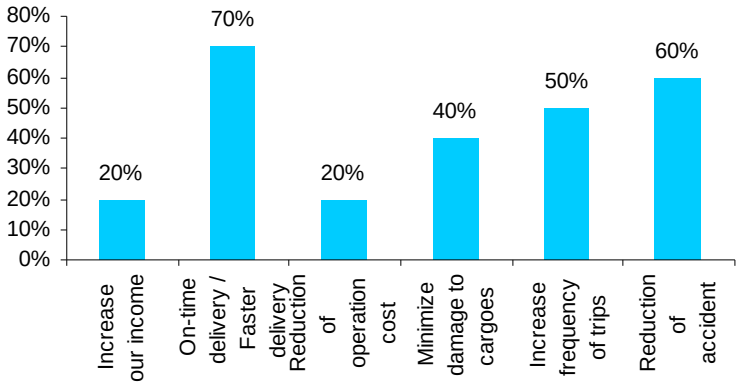



*No. of sample = 10*

**FIGURE 4.1.8-6 HOW MUCH ARE YOU WILLING TO PAY FOR USE CLLEX**

### *e. Perceived Benefits by Truck Managers from CLLEX (Q11)*

Truck managers were also asked if what kind of benefits the Central Luzon Link Expressway can bring to their business. Most managers believed that it would help them to deliver their cargo on time (27%) and it could also help in reduction of road accidents (23%). Some believed it would increase their frequency of trips (19%) and minimize damage to cargoes (15%). See **Figure 4.1.8-7**.




*No. of sample = 10; Note: Respondents were allowed for multiple answers*

**FIGURE 4.1.8-7 PERCEIVED BENEFITS BY TRUCK OPERATORS FROM CLLEX**

### *f. Problems Encountered in their operations? (Q12)*

The most common problems mentioned by the twenty (20) managers of trucking companies are:

- Heavy traffic at main arterials roads (Pan Philippine Highway going Cagayan Valley)
- Problem at ports and shipping lines
- Traffic congestion at roads going to client's place
- Overweight limit
- Overloading causes accidents
- Corrupt traffic enforcers
- LTO/MMDA are more interested of finding violations of trucks that enforcing traffic rules during night time
- Traffic congestion at inner roads of small towns

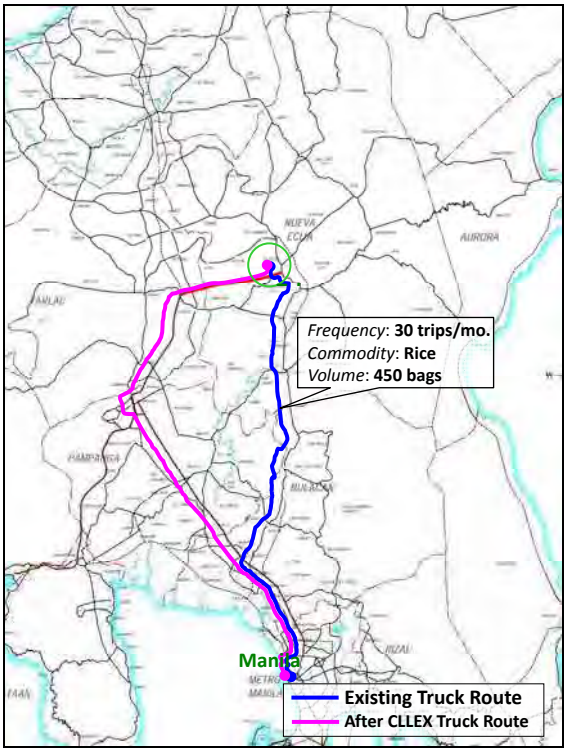
### *g. Comments that could improve their business operations? (Q13)*

The following were comments made by the managers of trucking companies:

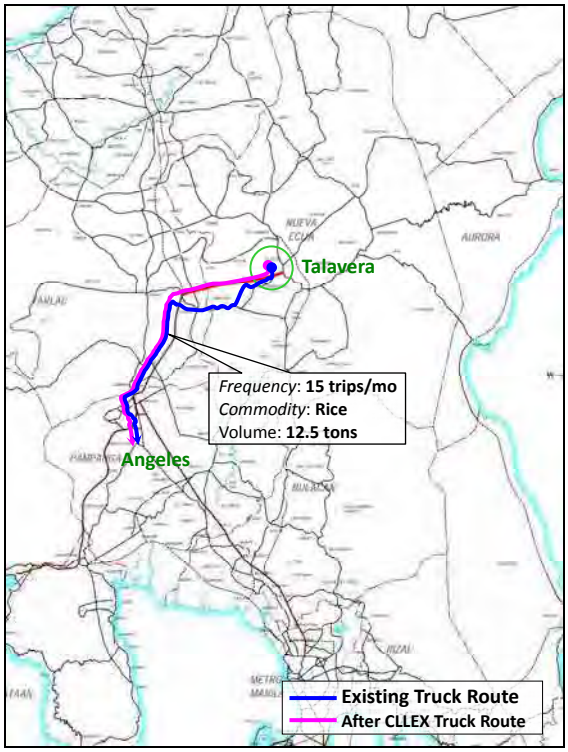
- Open new alternative routes, example Baloc - Sto. Domingo
- No truck overloading
- Government plans should be acceptable to manufacturers/trucking companies
- Fuel increase should be controlled
- Traffic enforcer should follow the government's rules and regulations
- Provisions for motorcycle lane

### *h. Truck Routes Before and After Construction of CLLEX*

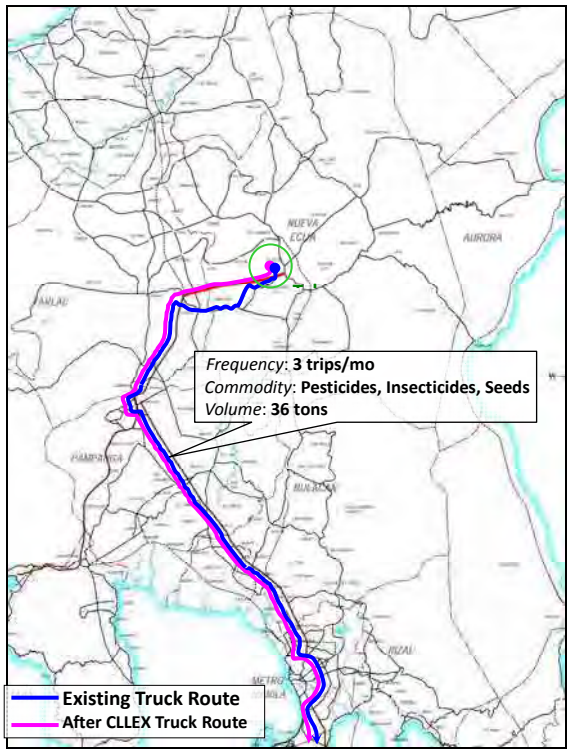
Of the ten (10) interviewed companies, nine (9) companies found the CLLEX to be useful to their current operation. As a result, at least 852 trips per month (28 trips/day) will be attracted to the CLLEX from these companies. Current routes of their trucks as well as possible routes after the construction of CLLEX are shown in **Figure 4.1.8-8**.



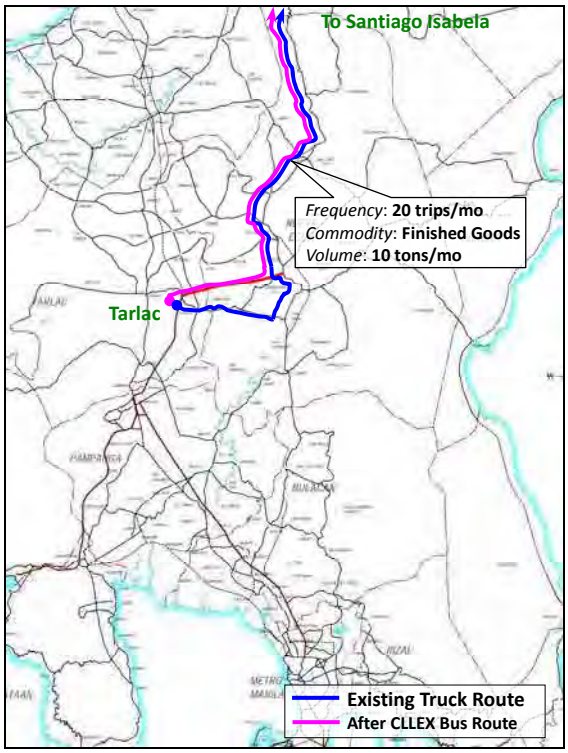

Truck Company 1




Truck Company 2

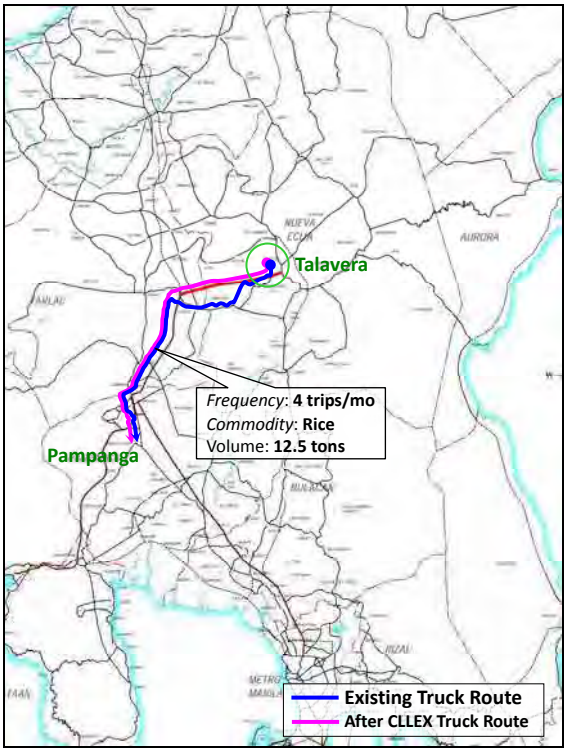



Truck Company 3

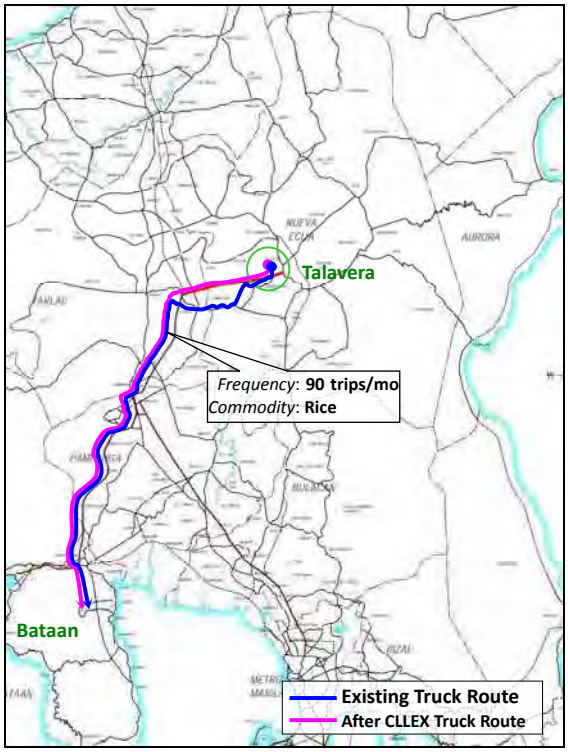



Truck Company 4

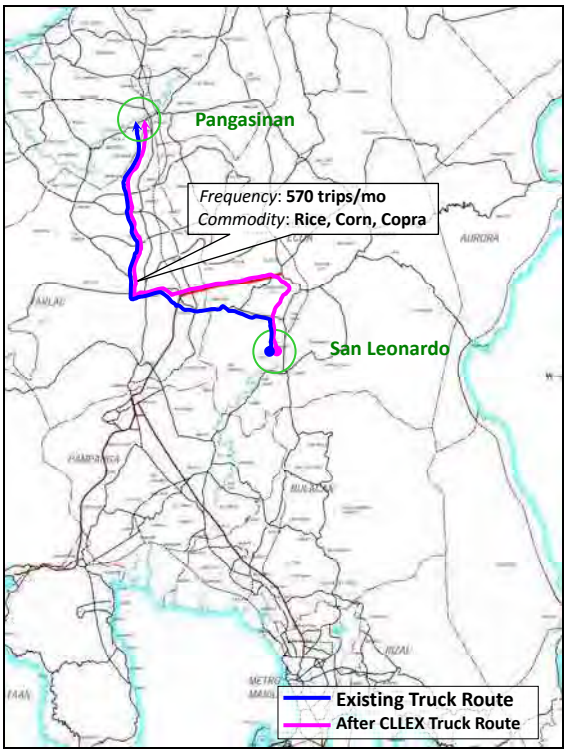
**FIGURE 4.1.8-8 (1/2) EXISTING TRUCK ROUTE AND AFTER CLLEX BUS ROUTE**



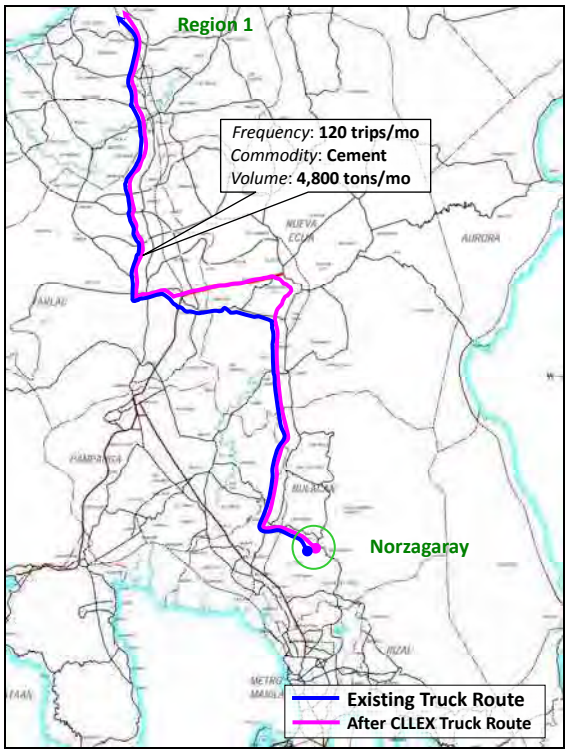

Truck Company 5




Truck Company 6




Truck Company 7



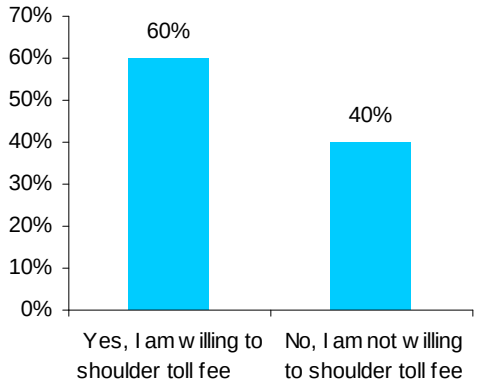

Truck Company 8

**FIGURE 4.1.8-8 (2/2) EXISTING TRUCK ROUTE AND AFTER CLLEX BUS ROUTE**

### 4.1.9 Willingness-To-Pay Survey For Use of CLLEX (Manufacturing Companies)

#### *a. Are you willing to shoulder the toll fee to be paid by trucking companies?(Q7)*

The five (5) officials of manufacturing companies interviewed revealed different opinions. Three (3) of them agreed to shoulder toll fee of expressway if this can help for speedy delivery of their cargoes. On the other hand, the two (2) other interviewed officials representing two manufacturing companies said that they are not willing to pay for toll fee because this should be paid by trucking companies (See **Figure 4.1.9-1**). It should be noted that for the case of CALAX, all interviewed officials of manufacturing companies in Cavite Province expressed their willingness to shoulder toll fee.

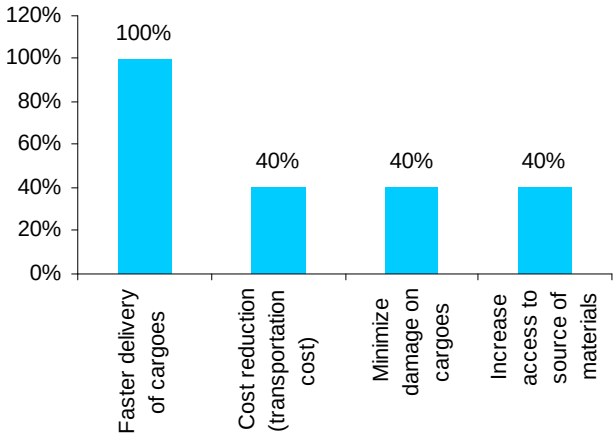



*No. of sample = 5*

**FIGURE 4.1.9-1 PERCENTAGE OF WILLING AND NOT WILLING TO SHOULDER TOLL FEE**

#### *b. Perceived Benefits by Manufacturing Companies from CLLEX?(Q8)*

For the benefits they are hoping to get after the construction of expressway, these are: faster delivery of cargoes (46%), cost reduction (18%), minimize damage on cargoes (18%) and increase access to source of raw materials (18%). See **Figure 4.1.9-2**.




*No. of sample = 5; Note: Respondents were allowed for multiple answers*

**FIGURE 4.1.9-2 PERCEIVED BENEFITS BY MANUFACTURING COMPANIES FROM CLLEX**

### *c. Plans by Manufacturing Companies after construction of CLLEX?(Q9)*

The plans after the construction of CLLEX revealed by interviewed officials of manufacturing companies are:

- Better scheduling of delivery of raw materials
- Better scheduling of delivery of finished goods
- Try to realize cost reduction

### *d. Problems Encountered by Manufacturing Companies?(Q10)*

The problems mentioned by the officials of manufacturing companies are:

- Late arrival of raw materials which affect our operations
- Difficulty in maintaining huge inventory levels of stock
- High cost of expressway toll fees

### *e. Comments and Suggestions by Manufacturing Companies?(Q11)*

The following were comments made by officials of manufacturing companies:

- Roll back of diesel price
- Continuous implementation of government rules and regulations

### *f. Summary of Transportation Routes of Manufacturing Companies*

A mentioned, five manufacturing companies were interviewed to understand their freight movement among others. Three (3) were Japanese-affiliated companies and two (2) were locally owned and some of the biggest companies in the country. Three of five (5) interviewed manufacturing companies have their factory in Tarlac. These three companies have very simple transportation routes – i.e. Tarlac via SCTEX and NLEX to Manila port or Cavite and Batangas area. Therefore, these companies have no opportunity to use CLLEX.

Two other companies are located in Nueva Ecija. CLLEX is useful to both these companies but only one company reveals their intention to use CLLEX. Another company has no plan to use the expressway because their product is not time sensitive (rice distribution). Below is the discussion for the company that had expressed intention to use CLLEX. See **Figure 4.1.9-3** for the summary of transportation routes.

#### 1. Manufacturing Company A (Local Company)

Location : San Leonardo, Nueva Ecija
Products : Line of business is poultry and livestock feeds

- The company is getting its supplies from Tarlac City, municipalities of Ibaan and Mariveles (Batangas), and other cities/municipalities of the country via ports of Manila.
- They are currently using the Tarlac – Sta. Rosa Road in getting raw materials from Tarlac to their factory in San Leonardo and it takes them almost one hour.
- For other supplies, they are using the heavily congested Pan Philippine Highway (from Manila ports to San Leonardo and from Ibaan, Mariveles (Batangas) to San Leonardo).
- They are hoping for early construction of CLLEX which will help realize faster delivery of supplies and it will also increase their access to source of materials.
- ***If CLLEX is constructed, they intend to use the expressway instead of Tarlac – Sta. Rosa Road to avoid heavy traffic congestion which causes late arrival of raw materials.***

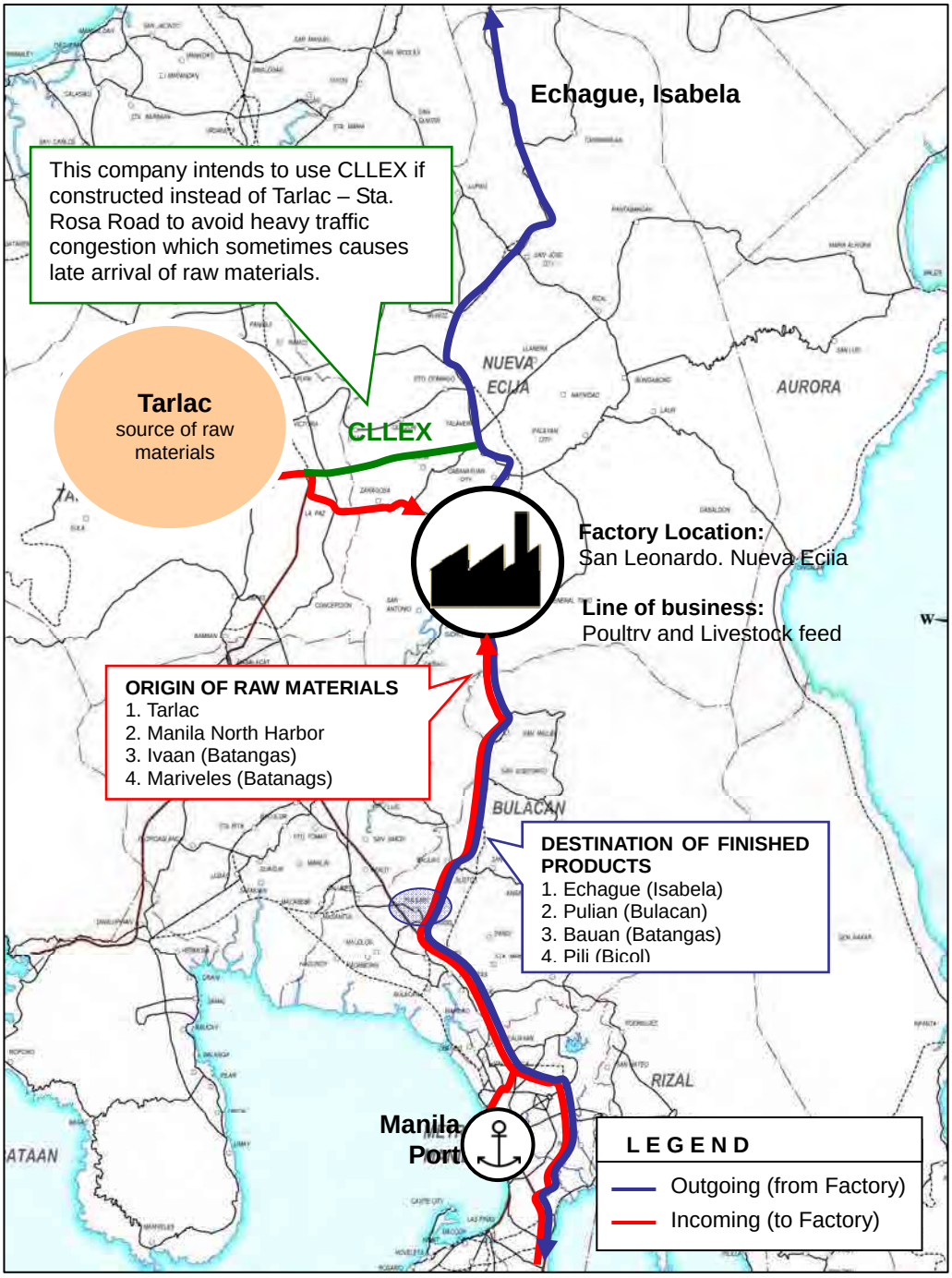



**FIGURE 4.1.9-3 TRUCK ROUTES OF MANUFACTURING INDUSTRY IN CLLEX**

### 4.1.10 Summary

Based on the results of the survey carried out on private car users, bus companies, trucking companies, and manufacturing companies, the following are the noted findings:

- PRIVATE CARS: Private car users captured at all stations revealed that they intend to use CLLEX if constructed in the future (more than 90%) for their trips to/from Manila or other regular trips that would be served by the said expressway.

- The dominant amount (85% to 97% depending on interview sites) of toll they are willing to pay to use CLLEX is 50 pesos.

- BUS COMPANY: Eight (8) out of nine (9) bus managers interviewed (89%) disclosed that if CLLEX is constructed in the future, they will allow their bus drivers to use it.

- All eight (8) bus managers revealed that the amount of toll they are willing to pay for the use of CLLEX is 200 pesos.

- TRUCKING COMPANY: Out of ten (10) interviewed managers, nine (9) affirmed their intention to allow their truck drivers to use CLLEX if it serves their delivery route.

- All nine (9) managers pointed out that the amount of toll they are willing to pay for the use of CLLEX is 200 pesos.

- MANUFACTURING COMPANIES: Of the five (5) managers interviewed, only two manufacturing companies found the CLLEX useful for their operations. However, only one company will utilize the expressway in getting their material supply. Another company is rice distributor and they don't intend to use CLLEX since their products are not time sensitive. The three (3) other companies have found CLLEX not useful to their current routes thus they could not use it.

## 4.2 FUTURE TRAFFIC DEMAND

### 4.2.1 Approach

To estimate the traffic volumes on CLLEX, traffic demand system data developed on the Study of Master plan on High Standard Highway Network Development funded by Japan International Cooperation Agency (hereinafter HSH), was used.

The overall flow diagram of the methodology used in forecasting the traffic volumes on CLLEX, and the present road network in the two cased of “Without Project” and ”With Project ”, is shown in **Figure 4.2.1-1**.

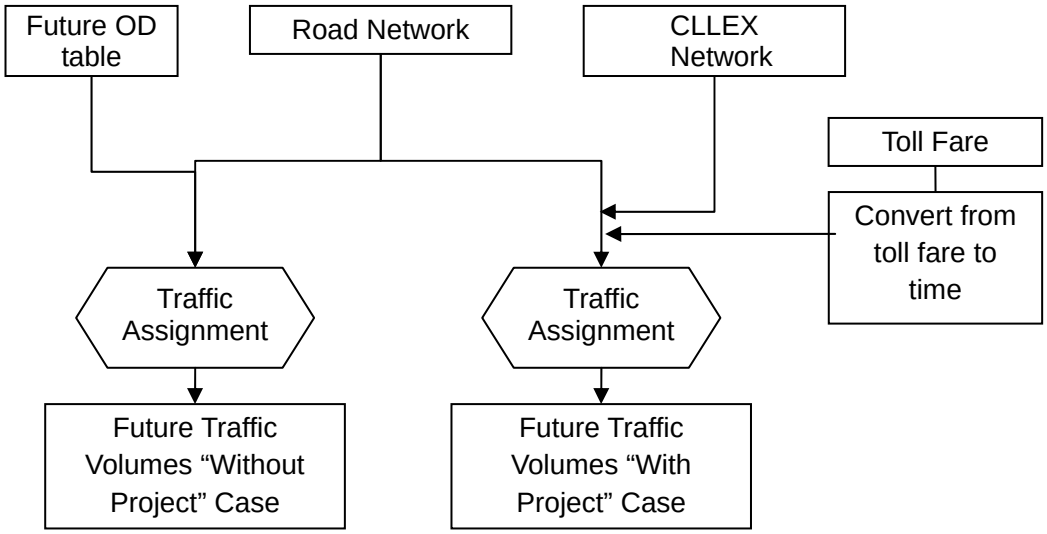



**FIGURE 4.2.1-1 FORECAST OF TRAFFIC VOLUMES ON ROAD NETWORK**

Traffic volumes are assigned first on the existing road network without CLLEX, which is the case of “Without Project”. Next, volume of traffic which will be handled in the future on CLLEX network are determined, which is the case of “With Project”.

In the Study, the zone system comprised of Region III (Nueva Ecija, Tarlac, Pampanga, Bulacan and etc.), NCR, Region IV-A and Region I. The total zoning number is 320 zones, presented in **Figure 4.2.1-2~3** and **Table 4.2.1-1**.

## TABLE 4.2.1-1 (1) TRAFFIC ZONING SYSTEM

| Small Zone | Barangay | Medium Zone | City/Municipality | Large Zone | Province | Region |
|---|---|---|---|---|---|---|
| 1 | City of Manila 1 - Barangay 20 | 1 | City of Manila | 1 | Metro Manila | NCR |
| 2 | City of Manila 2 - Barangay 105 | | | | | |
| 3 | City of Manila 3 - Barangay 375 | | | | | |
| 4 | City of Manila 4 - Barangay 48 | | | | | |
| 5 | City of Manila 5 - San Nicolas | | | | | |
| 6 | City of Manila 6 - Binondo | | | | | |
| 7 | City of Manila 7 - Barangay 310 | | | | | |
| 8 | City of Manila 8 - Quiapo | | | | | |
| 9 | City of Manila 9 - Barangay 413 | | | | | |
| 10 | City of Manila 10 - San Miguel | | | | | |
| 11 | City of Manila 11 - Barangay 570 | | | | | |
| 12 | City of Manila 12 - Barangay 450 | | | | | |
| 13 | City of Manila 13 - Port Area | | | | | |
| 14 | City of Manila 14 - Intramuros, Ermita | | | | | |
| 15 | City of Manila 15 - Paco | | | | | |
| 16 | City of Manila 16 - Malate | | | | | |
| 17 | City of Manila 17 - Santa Ana | | | | | |
| 18 | City of Manila 18 - Barangay 601 | | | | | |
| 19 | City of Manila 19 - Pandacan | | | | | |
| 20 | Pasay City 1 - Barangay 46 | 2 | Pasay City | | | |
| 21 | Pasay City 2 - Barangay 132 | | | | | |
| 22 | Pasay City 3 - Barangay 183 | | | | | |
| 24 | Pasay City 4 - Barangay 1 | | | | | |
| 82 | Pasay City 5 - Barangay 76 | | | | | |
| 23 | Parañaque City 1 - Don Bosco | 3 | Parañaque City | | | |
| 25 | Paranaque City 2 - Baclaran | | | | | |
| 84 | Parañaque City 2 - Sun Valley, San Martin De Porr | | | | | |
| 85 | Parañaque City 3 - Marcelo Green Village | | | | | |
| 86 | Parañaque City 4 - B.F. Homes | | | | | |
| 92 | Parañaque City 5 - San Isidro | | | | | |
| 93 | Parañaque City 6 - San Dionisio | | | | | |
| 26 | Makati City 1 - Bangkal, San Lorenzo | 4 | Makati City | | | |
| 27 | Makati City 2 - Palanan | | | | | |
| 28 | Makati City 3 - Olympia | | | | | |
| 29 | Makati City 4 - Guadalupe Viejo | | | | | |
| 30 | Makati City 5 - Bel-Air | | | | | |
| 31 | Makati City 6 - Rizal, Pembo | | | | | |
| 34 | Makati City 7 - Magallanes | | | | | |
| 32 | Santa Ana | | Pateros | | | |
| 33 | Taguig 1 - Western Bicutan | 5 | Taguig | | | |
| 81 | Taguig 2 - Upper Bicutan | | | | | |
| 83 | Taguig 3 - Signal Village, Lower Bicutan | | | | | |
| 35 | Mandaluyong City 1 - Poblacion | 6 | Mandaluyong City | | | |
| 36 | Mandaluyong City 2 - Plainview | | | | | |
| 37 | Mandaluyong City 3 - Mauway | | | | | |
| 39 | Mandaluyong City 4 - Wack-wack Greenhills | | | | | |
| 40 | San Juan 1 - West Crame | | San Juan | | | |
| 41 | San Juan 2 - Corazon de Jesus | | | | | |
| 38 | Pasig City 1 - Ugong | 7 | Pasig City | | | |
| 78 | Pasig City 2 - Santolan | | | | | |
| 79 | Pasig City 3 - Santa Lucia | | | | | |
| 80 | Pasig City 4 - Pinagbuhatan | | | | | |
| 42 | Quezon City 1 - Tatalon, Damayang Lagi | 8 | Quezon City | | | |
| 43 | Quezon City 2 - Santo Domingo (Matalahib) | | | | | |
| 44 | Quezon City 3 - Baesa, Sangandaan | | | | | |
| 45 | Quezon City 4 - Bagong Pag-asa | | | | | |
| 46 | Quezon City 5 - Pinyahan, (Trinoma/SM West) | | | | | |
| 47 | Quezon City 6 - Paltok, Del Monte | | | | | |
| 48 | Quezon City 7 - Kamuning | | | | | |
| 49 | Quezon City 8 - E. Rodriguez, Crame | | | | | |
| 50 | Quezon City 9 - Camp Aguinaldo | | | | | |
| 51 | Quezon City 10 - Kamias (East/West) | | | | | |
| 52 | Quezon City 11 - U.P. Campus | | | | | |
| 53 | Quezon City 12 - Pasong Tamo | | | | | |
| 54 | Quezon City 13 - Batasan Hills | | | | | |
| 55 | Quezon City 14 - Commonwealth | | | | | |
| 56 | Quezon City 15 - Payatas | | | | | |
| 57 | Quezon City 16 - North Fairview | | | | | |
| 61 | Quezon City 17 - Greater Lagro, Novaliches Proper | | | | | |
| 62 | Quezon City 18 - Tandang Sora | | | | | |
| 75 | Quezon City 19 - Pansol, Loyola Heights | | | | | |
| 77 | Quezon City 20 - White Plains, Libis (Eastwood) | | | | | |
| 58 | Kalookan City (North) 1 - Barangay 178 | 9 | Kalookan City (North) | | | |
| 59 | Kalookan City (North) 2 - Barangay 176 | | | | | |
| 60 | Kalookan City (North) 3 - Barangay 171 | | | | | |
| 63 | Valenzuela City 1 - Ugong | 10 | Valenzuela City | | | |
| 64 | Valenzuela City 2 - Canumay, Maysan | | | | | |
| 65 | Valenzuela City 3 - Malinta | | | | | |
| 66 | Valenzuela City 4 - Malanday | | | | | |
| 71 | Valenzuela City 5 - Marulas | | | | | |

## TABLE 4.2.1-1 (2) TRAFFIC ZONING SYSTEM

| Small Zone | Barangay | Medium Zone | City/Municipality | Large Zone | Province | Region |
|---|---|---|---|---|---|---|
| 67 | Malabon 1 - Concepcion | 11 | Malabon | 1 | Metro Manila | NCR |
| 70 | Malabon 2 - Potrero | | | | | |
| 68 | Navotas - North Bay Blvd South | | Navotas | | | |
| 69 | Kalookan City (South) 1 - Barangay 12 | | Kalookan City (South) | | | |
| 72 | Kalookan City (South) 2 - Baranagay 132 | | | | | |
| 73 | Kalookan City (South) 3 - Barangay 120 | | | | | |
| 74 | Marikina City 1 - Concepcion Uno, Parang | 12 | Marikina City | | | |
| 76 | Marikina City 2 - Malanday | | | | | |
| 87 | Muntinlupa City 1 - Sucat | | Muntinlupa City | | | |
| 88 | Muntinlupa City 2 - Alabang | | | | | |
| 89 | Muntinlupa City 3 - Putatan | | | | | |
| 90 | Las Pinas City 1 - Almanza (Uno, Dos) | 13 | Las Pinas City | | | |
| 91 | Las Pinas City 2 - B.F. International Village | | | | | |
| 94 | Las Pinas City 3 - Zapote | | | | | |
| 320 | Manila Port | - | - | 1 | Metro Manila | NCR |
| 133 | | 24 | BACOOR | 2 | CAVITE | Region IV-A |
| 134 | | | IMUS | | | |
| 135 | | | CAVITE CITY | | | |
| 136 | | | KAWIT | | | |
| 137 | | | NOVELETA | | | |
| 138 | | 25 | ROSARIO | | | |
| 139 | Tejero | | GENERAL TRIAS | | | |
| 140 | Pasong Camachile II | | | | | |
| 141 | | | | | | |
| 142 | Amaya | | TANZA | | | |
| 143 | Halayhay | | | | | |
| 144 | Bagtas | | | | | |
| 146 | Ibayo Silangan | 26 | NAIC | | | |
| 147 | Palangue 2 & 3 | | | | | |
| 161 | | | GENERAL EMILIO AGUINALDO | | | |
| 145 | | 27 | TRECE MARTIRES CITY (Capital) | | | |
| 148 | Datu Esmael (Bago-a-ingud) | | DASMARIÑAS | | | |
| 149 | Paliparan III | | | | | |
| 150 | Langkaan II | | | | | |
| 151 | | 28 | SILANG | | | |
| 153 | | | GEN. MARIANO ALVAREZ | | | |
| 154 | | | CARMONA | | | |
| 162 | | | AMADEO | | | |
| 163 | | | ALFONSO | | | |
| 164 | | | TAGAYTAY CITY | | | |
| 152 | | 29 | SAN PEDRO | 3 | LAGUNA | |
| 155 | | | BIÑAN | | | |
| 156 | | | CITY OF SANTA ROSA | | | |
| 157 | | 30 | CABUYAO | | | |
| 158 | Pansol, Parian | | CITY OF CALAMBA | | | |
| 159 | Canlubang | | | | | |
| 160 | | | BAY | | | |
| 165 | | 31 | SANTA MARIA | | | |
| 166 | | | MABITAC | | | |
| 167 | | | FAMY | | | |
| 168 | | 32 | KALAYAAN | | | |
| 169 | | | CAVINTI | | | |
| 170 | | 33 | LILIW | | | |
| 171 | | | PAGSANJAN | | | |
| 172 | | 34 | ALAMINOS | | | |
| 173 | Del Remedio | | SAN PABLO CITY | | | |
| 174 | Santisimo Rosario | | | | | |
| 175 | San Francisco | | | | | |
| 176 | Santo Angel | | | | | |
| 116 | San Jose | 19 | RODRIGUEZ (MONTALBAN) | 4 | RIZAL | |
| 117 | Burgos | | | | | |
| 118 | | 20 | SAN MATEO | | | |
| 119 | Cupang | | CITY OF ANTIPOLO (Capital) | | | |
| 120 | San Jose (Pob.) | | | | | |
| 121 | Inarawan | | | | | |
| 122 | | 21 | CAINTA | | | |
| 123 | | | TAYTAY | | | |
| 124 | | | ANGONO | | | |
| 125 | | 22 | BINANGONAN | | | |
| 126 | | | TERESA | | | |
| 127 | | | MORONG | | | |
| 128 | | | CARDONA | | | |
| 129 | | 23 | BARAS | | | |
| 130 | | | TANAY | | | |
| 131 | | | PILILLA | | | |
| 132 | | | JALA-JALA | | | |
| 95 | | 14 | CITY OF MEYCAUAYAN | 5 | BULACAN | Region III |
| 96 | | | MARILAO | | | |
| 97 | | | OBANDO | | | |
| 98 | | 15 | BULACAN | | | |
| 99 | | | BOCAUE | | | |

## TABLE 4.2.1-1 (3) TRAFFIC ZONING SYSTEM

| Small Zone | Barangay | Medium Zone | City/Municipality | Large Zone | Province | Region |
|---|---|---|---|---|---|---|
| 100 | | 15 | BALAGTAS (BIGAA) | 5 | BULACAN | Region III |
| 101 | | | GUIGUINTO | | | |
| 102 | | | CITY OF MALOLOS (Capital) 1 | | | |
| 103 | | 16 | PAOMBONG | | | |
| 104 | | | HAGONOY | | | |
| 105 | | | CALUMPIT | | | |
| 106 | | | PULILAN | | | |
| 107 | | | PLARIDEL | | | |
| 108 | | 17 | PANDI | | | |
| 109 | Poblacion, Guyong | | SANTA MARIA | | | |
| 110 | Pulong Buhangin | | | | | |
| 111 | Muzon | 18 | SAN JOSE DEL MONTE | | | |
| 112 | Gumaoc | | | | | |
| 113 | Kaypian | | | | | |
| 114 | Tigbe | | NORZAGARAY | | | |
| 115 | San Mateo | | | | | |
| 205 | | 43 | BALIUAG | | | |
| 206 | | | BUSTOS | | | |
| 207 | | | ANGAT | | | |
| 208 | | 44 | SAN ILDEFONSO | | | |
| 209 | | | DOÑA REMEDIOS TRINIDAD | | | |
| 214 | | 46 | APALIT | 6 | PAMPANGA | |
| 220 | | | CANDABA | | | |
| 215 | | 47 | MINALIN | | | |
| 219 | | | BACOLOR | | | |
| 224 | Dolores | | CITY OF SAN FERNANDO | | | |
| 225 | Bulaon | | | | | |
| 216 | | 48 | MASANTOL | | | |
| 217 | | | LUBAO | | | |
| 218 | | | FLORIDABLANCA | | | |
| 221 | | 49 | ARAYAT | | | |
| 222 | | | MAGALANG | | | |
| 223 | | 50 | PORAC | | | |
| 226 | Dau | | MABALACAT | | | |
| 227 | Mabiga, Calumpang | | | | | |
| 228 | Cutcut | | ANGELES CITY | | | |
| 229 | Santo Domingo | | | | | |
| 230 | Balibago | | | | | |
| 231 | Malabanias | | | | | |
| 177 | | 35 | BALAYAN | 7 | BATANGAS | Region IV-A |
| 178 | | | AGONCILLO | | | |
| 179 | | | LAUREL | | | |
| 180 | | 36 | CITY OF TANAUAN | | | |
| 181 | | | SANTO TOMAS | | | |
| 182 | | | BALETE | | | |
| 188 | Marauoy | | LIPA CITY | | | |
| 189 | Antipolo Del Norte | | | | | |
| 190 | Lodlod | | | | | |
| 191 | San Jose | | | | | |
| 183 | | 37 | CUENCA | | | |
| 187 | | | ALITAGTAG | | | |
| 184 | | 38 | PADRE GARCIA | | | |
| 185 | | | SAN JUAN | | | |
| 186 | | | LOBO | | | |
| 192 | Santa Rita Karsada | 39 | BATANGAS CITY (Capital) | | | |
| 193 | Gulod Itaas | | | | | |
| 194 | Libjo | | | | | |
| 195 | Pinamucan | | | | | |
| 196 | | 40 | GENERAL NAKAR | 8 | QUEZON | |
| 197 | | | LUCBAN | | | |
| 198 | | 41 | CITY OF TAYABAS | | | |
| 203 | | | LUCENA CITY (Capital) | | | |
| 204 | | | AGDANGAN | | | |
| 199 | | 42 | SARIAYA | | | |
| 200 | | | CANDELARIA | | | |
| 201 | | | DOLORES | | | |
| 202 | | | SAN ANTONIO | | | |
| 210 | | 45 | LIMAY | 9 | BATAAN | Region III |
| 211 | | | ABUCAY | | | |
| 212 | | | BAGAC | | | |
| 213 | | | DINALUPIHAN | | | |
| 249 | Barreto | 56 | OLONGAPO CITY | 10 | ZAMBALES | |
| 250 | East Bajac-bajac | | | | | |
| 251 | Santa Rita | | | | | |
| 252 | New Cabalan | | | | | |
| 253 | Calapacuan | 57 | SUBIC | | | |
| 254 | Cawag | | | | | |
| 255 | Pamatawan | | | | | |
| 256 | Naugsol | | | | | |
| 257 | | 58 | CASTILLEJOS | | | |

## TABLE 4.2.1-1 (4) TRAFFIC ZONING SYSTEM

| Small Zone | Barangay | Medium Zone | City/Municipality | Large Zone | Province | Region |
|---|---|---|---|---|---|---|
| 258 | | 59 | BOTOLAN | 10 | ZAMBALES | |
| 259 | | 60 | CANDELARIA | | | |
| 232 | | 51 | BAMBAN | | | |
| 234 | | | CAPAS | | | |
| 233 | | 52 | CONCEPCION | | | |
| 236 | | | LA PAZ | | | |
| 246 | Matatalaib | | CITY OF TARLAC | | | |
| 247 | San Rafael | | | | | |
| 248 | Maliwalo | | | | | |
| 235 | | 53 | SAN JOSE | | | |
| 240 | | | CAMILING | 11 | TARLAC | |
| 237 | | 54 | VICTORIA | | | |
| 238 | | | PURA | | | |
| 239 | | | GERONA | | | |
| 241 | | 55 | RAMOS | | | |
| 242 | | | ANAO | | | |
| 243 | | | SAN MANUEL | | | |
| 244 | Poblacion Norte | | PANIQUI | | | |
| 245 | Balaoang | | | | | |
| 260 | San Nicolas | 61 | CITY OF GAPAN | | | Region III |
| 261 | San Roque | | | | | |
| 262 | | | CABIAO | | | |
| 263 | | | JAEN | | | |
| 264 | | | SAN LEONARDO | | | |
| 265 | | | GENERAL TINIO (PAPAYA) | | | |
| 266 | | | SANTA ROSA | | | |
| 267 | | 62 | GABALDON (BITULOK & SABANI) | | | |
| 268 | | | BONGABON | | | |
| 282 | | | CARRANGLAN | | | |
| 269 | | 63 | GENERAL MAMERTO NATIVIDAD | | | |
| 270 | | | SANTO DOMINGO | 12 | NUEVA ECIJA | |
| 275 | | | SCIENCE CITY OF MUÑOZ | | | |
| 276 | | | LUPAO | | | |
| 281 | | | SAN JOSE CITY | | | |
| 271 | | 64 | ALIAGA | | | |
| 272 | | | LICAB | | | |
| 277 | Bantug Norte | 65 | CABANATUAN CITY | | | |
| 278 | Caalibangbangan | | | | | |
| 279 | San Josef Norte | | | | | |
| 280 | Campo Tinio | | | | | |
| 273 | | 66 | GUIMBA | | | |
| 274 | | | CUYAPO | | | |
| 284 | | 68 | UMINGAN | | | |
| 285 | | | NATIVIDAD | | | |
| 286 | | | ASINGAN | | | |
| 287 | | | SAN MANUEL | | | |
| 298 | | | BALUNGAO | | | |
| 288 | | 69 | POZZORUBIO | | | |
| 289 | | | BUGALLON | | | |
| 290 | | | CALASIAO | | | |
| 291 | | | BINMALEY | 13 | PANGASINAN | Region I |
| 294 | | 70 | AGUILAR | | | |
| 295 | | | BASISTA | | | |
| 296 | | | BAUTISTA | | | |
| 297 | | | VILLASIS | | | |
| 299 | Bayaoas | | CITY OF URDANETA | | | |
| 300 | Pinmaludpod | | | | | |
| 301 | Palina East | | | | | |
| 292 | | 71 | CITY OF ALAMINOS | | | |
| 293 | | | AGNO | | | |
| 283 | | 67 | All Municipalities | 14 | AURORA | Region III |
| 302 | Zone 302-319 Out of Study Area. | 72 | | 15 | Benguet | CAR |
| 303 | | | | | | |
| 308 | | | | | Ifugao | |
| 309 | | | | | | |
| 312 | | | | | Mt. Province | |
| 313 | | | | | Kalinga | |
| 314 | | | | | Abra | |
| 316 | | | | | Apayao | |
| 304 | | | | | Nueva Vizcaya | Region II |
| 305 | | | | | | |
| 306 | | | | | Quirino | |
| 307 | | | | | Isabela | |
| 317 | | | | | CAGAYAN | |
| 310 | | | | | LA UNION | Region I |
| 311 | | | | | ILOCOS SUR | |
| 315 | | | | | ILOCOS NORTE | |
| 318 | | | | | All Provinces | Region IV-B |
| 319 | | | | | All Provinces | Region V |

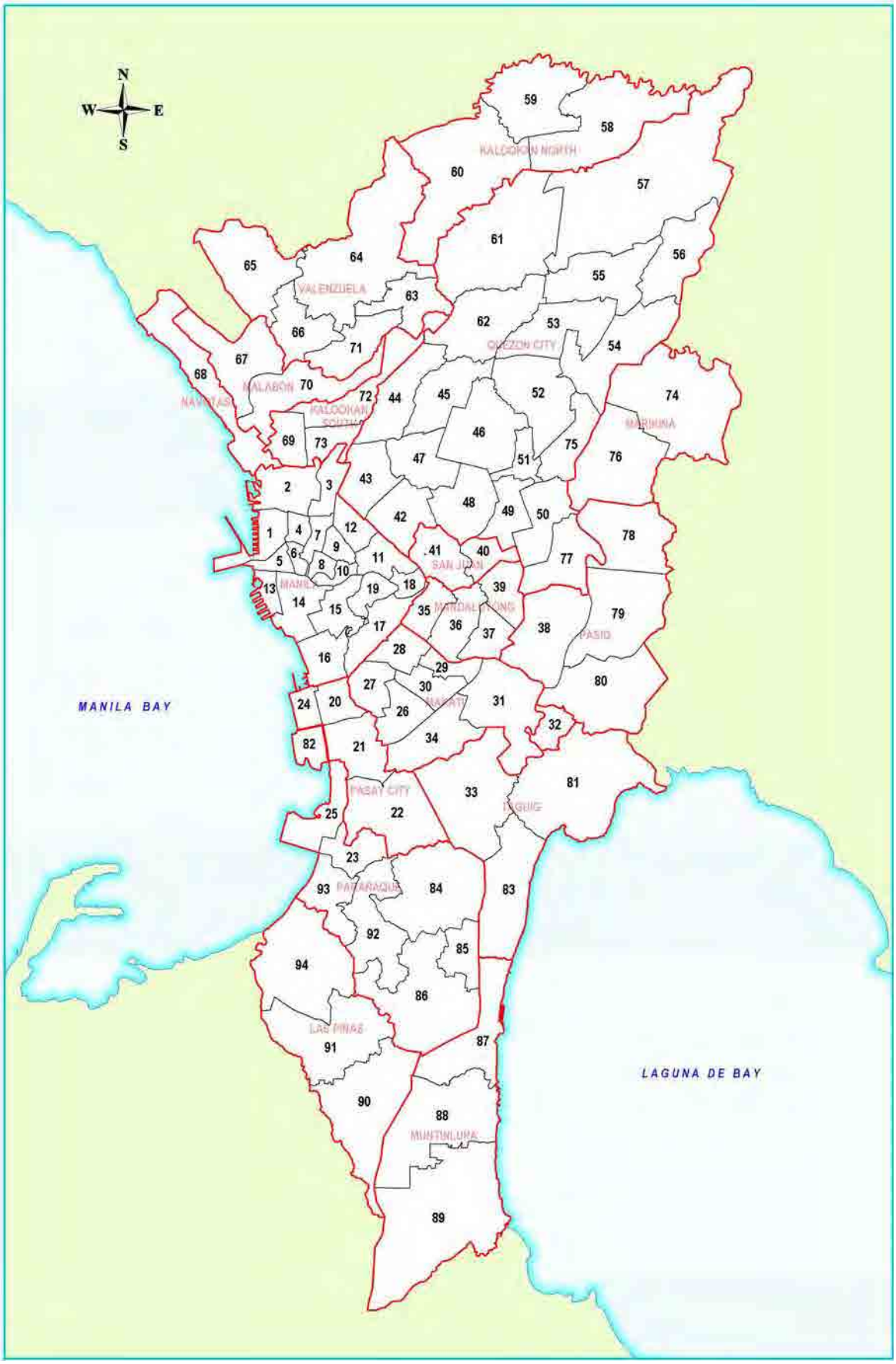



**FIGURE 4.2.1-2 ZONING MAP – METRO MANILA**

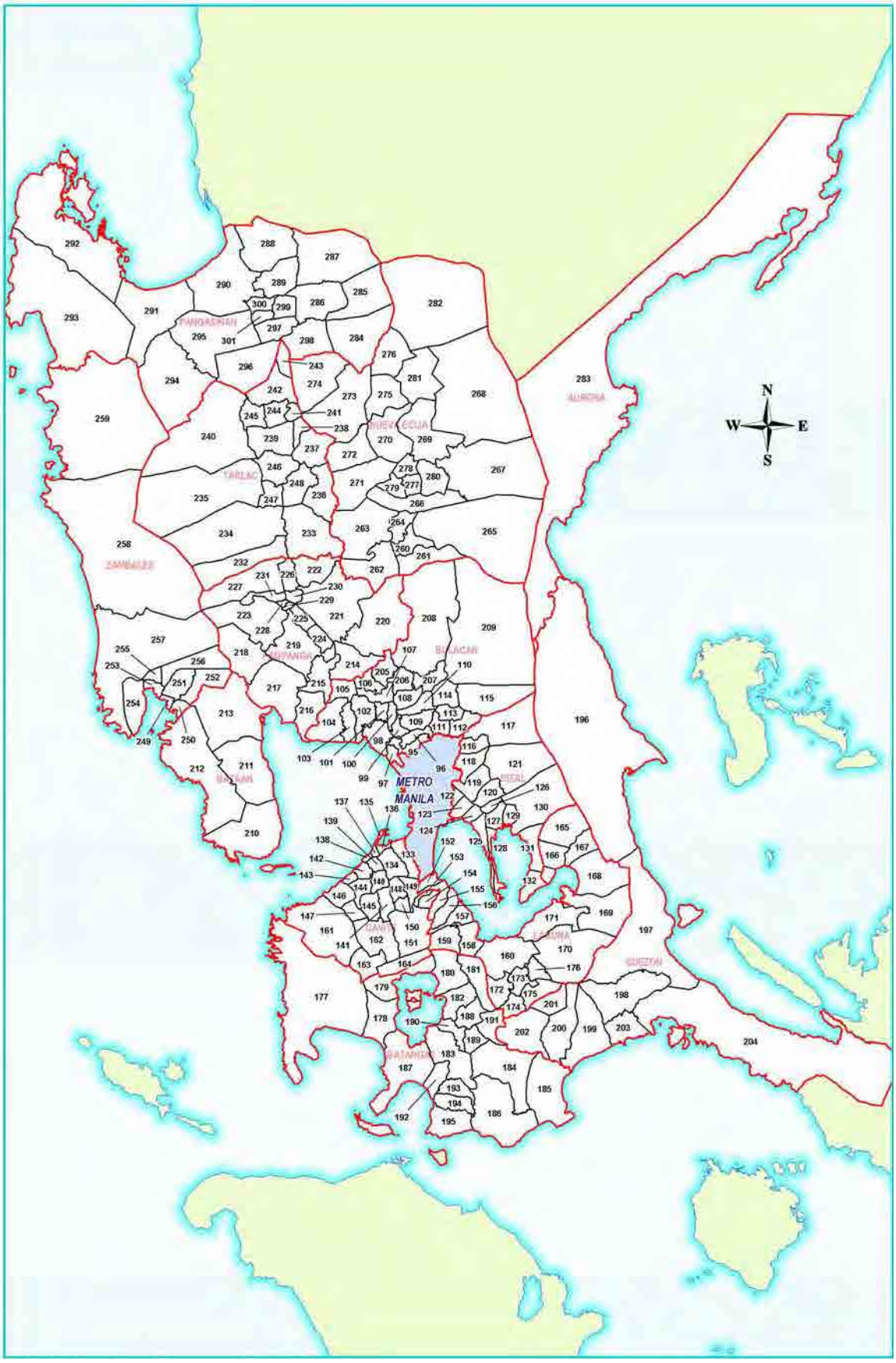



**FIGURE 4.2.1-3 ZONING MAP – OUTSIDE METRO MANILA**

### 4.2.2 Future Socio-Economic Framework

The future socio-economic indicators were formulated by the Study of Master Plan on High Standard Highway Network Development based on the past trend.

The socio-economic profile is summarized below.

#### (1) Population projection

The population annual growth rate of HSH Study is 2.3% up to 2020 and 1.8% from 2021 to 2030.

Tarlac and Nueva Ecija is the almost same growth rate.

**TABLE 4.2.2-1 FUTURE POPULATION**

| | Population(thousand) | | | AAGR | |
|---|---|---|---|---|---|
| | Y2009 | Y2020 | Y2030 | 09-20(%) | 21-30(%) |
| Metro Manila | 11,962 | 14,511 | 15,942 | 1.8% | 0.9% |
| Cavite | 3,242 | 5,154 | 7,102 | 4.3% | 3.3% |
| Laguna | 2,625 | 3,511 | 4,194 | 2.7% | 1.8% |
| Rizal | 2,481 | 3,535 | 4,419 | 3.3% | 2.3% |
| Bulacan | 3,020 | 4,199 | 5,300 | 3.0% | 2.4% |
| Pampanga | 2,336 | 3,000 | 3,676 | 2.3% | 2.1% |
| Batangas | 2,347 | 3,050 | 3,843 | 2.4% | 2.3% |
| Quezon | 1,792 | 2,143 | 2,496 | 1.6% | 1.5% |
| Bataan | 694 | 895 | 1,114 | 2.3% | 2.2% |
| Zambales | 749 | 921 | 1,101 | 1.9% | 1.8% |
| Tarlac | 1,297 | 1,627 | 1,950 | 2.1% | 1.8% |
| Nueva Ecija | 1,914 | 2,400 | 2,870 | 2.1% | 1.8% |
| Pangasinan | 2,705 | 3,046 | 3,356 | 1.1% | 1.0% |
| Aurora | 192 | 216 | 241 | 1.1% | 1.1% |
| Total | 37,356 | 48,041 | 57,214 | 2.3% | 1.8% |

Source: HSH (JICA 2010)

#### (2) GRDP projection

The estimated GRDP growth rate of Region III (Central Luzon) is between 6.0 ~ 6.5% .

**TABLE 4.2.2-2 GDP AND GRDP GROWTH RATE**

| | | | 2012-2014 | 2015-2020 | 2021-2025 | 2026-2030 |
|---|---|---|---|---|---|---|
| GDP | | | 5.0% | 5.5% | 5.5% | 5.0% |
| GRDP | NCR | National Capital Region | 6.5% | 6.5% | 6.5% | 6.0% |
| | III | Central Luzon | 6.0% | 6.5% | 6.5% | 6.5% |
| | IV-A | CARABARZON | 6.5% | 7.0% | 7.0% | 6.5% |

Source: HSH (JICA 2010)

#### (3) Employment projection

The number of employment is estimated on population and GRDP in HSH Study.

The employment annual growth rate of HSH Study is higher than that of population. The growth rate of employment is 2.8% up to 2020 and 2.0% from 2021 to 2030.

The growth rate of Tarlac and Nueva Ecija is a little higher than the rate of study area.

**TABLE 4.2.2-3 FUTURE EMPLOYMENT**

| | Employment(thousand) | | | AAGR | |
|---|---|---|---|---|---|
| | Y2009 | Y2020 | Y2030 | 09-20(%) | 21-30(%) |
| Metro Manila | 4,575 | 6,103 | 7,378 | 2.7% | 1.9% |
| Cavite | 1,092 | 1,583 | 2,058 | 3.4% | 2.7% |
| Laguna | 1,371 | 1,807 | 2,214 | 2.5% | 2.1% |
| Rizal | 454 | 654 | 821 | 3.4% | 2.3% |
| Bulacan | 675 | 976 | 1,240 | 3.4% | 2.4% |
| Pampanga | 800 | 1,124 | 1,427 | 3.1% | 2.4% |
| Batangas | 485 | 683 | 872 | 3.2% | 2.5% |
| Quezon | 218 | 283 | 344 | 2.4% | 2.0% |
| Bataan | 227 | 297 | 357 | 2.5% | 1.9% |
| Zambales | 339 | 478 | 604 | 3.2% | 2.4% |
| Tarlac | 282 | 398 | 506 | 3.2% | 2.4% |
| Nueva Ecija | 293 | 409 | 520 | 3.1% | 2.4% |
| Pangasinan | 651 | 739 | 798 | 1.2% | 0.8% |
| Aurora | 21 | 26 | 33 | 2.0% | 2.4% |
| Total | 11,483 | 15,560 | 19,172 | 2.8% | 2.1% |

Source: HSH (JICA 2010)

### 4.2.3 Present and Future OD Matrix

Traffic demand forecast was conducted in HSH Study. Annual growth rate in study area is 2.8 %( 2009-2017) and 2.0 %( 2021-2030). The growth rate of Tarlac and Nueva Ecija is the same rate of study area.

**TABLE 4.2.3-1 ESTIMATED GENERATION TRIP AND ANNUAL GROWTH RATE**

| | Generation Trip(Vehicle/day) | | | Annual Growth Rate | |
|---|---|---|---|---|---|
| | Y2009 | Y2020 | Y2030 | 2009-2017 | 2021-2030 |
| Metro Manila | 3,539,909 | 4,496,863 | 5,173,752 | 2.2% | 1.4% |
| Cavite | 570,765 | 838,206 | 1,159,496 | 3.6% | 3.3% |
| Laguna | 400,087 | 619,695 | 811,382 | 4.1% | 2.7% |
| Rizal | 303,205 | 431,995 | 544,728 | 3.3% | 2.3% |
| Bulacan | 509,021 | 811,307 | 1,050,340 | 4.3% | 2.6% |
| Pampanga | 31,055 | 44,979 | 52,820 | 3.4% | 1.6% |
| Batangas | 38,817 | 51,355 | 59,416 | 2.6% | 1.5% |
| Quezon | 17,390 | 23,253 | 26,719 | 2.7% | 1.4% |
| Bataan | 14,690 | 18,468 | 20,446 | 2.1% | 1.0% |
| Zambales | 4,563 | 6,253 | 7,805 | 2.9% | 2.2% |
| Tarlac | 12,552 | 16,970 | 21,177 | 2.8% | 2.2% |
| Nueva Ecija | 20,484 | 28,016 | 35,037 | 2.9% | 2.3% |
| Pangasinan | 12,908 | 17,868 | 19,666 | 3.0% | 1.0% |
| Aurora | 430 | 562 | 687 | 2.5% | 2.0% |
| Out of study area | 11,322 | 14,941 | 18,665 | 2.6% | 2.3% |
| Total | 5,487,198 | 7,420,728 | 9,002,132 | 2.8% | 2.0% |

Source: HSH (JICA 2010)

Future OD was prepared in Year 2017, 2020 and 2030. Year 2017 is the opening year of CLLEx.

**Table 4.2.3-2** to **4.2.3-3** shows the Vehicle OD Table.

## TABLE 4.2.3-2 FUTURE VEHICLE OD TABLE (YEAR 2020)

| | Metro Manila | Cavite | Laguna | Rizal | Bulacan | Pampanga | Batangas | Quezon | Bataan | Zambales | Tarlac | Nueva Ecija | Pangasinan | Aurora | Out of study area | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metro Manila | 4,122,744 | 95,382 | 66,285 | 115,250 | 65,312 | 3,538 | 12,042 | 3,292 | 1,514 | 1,456 | 848 | 2,401 | 2,145 | 315 | 4,340 | 4,496,863 |
| Cavite | 95,382 | 706,597 | 26,667 | 1,804 | 2,908 | 201 | 2,929 | 1,052 | 42 | 57 | 14 | 26 | 53 | 0 | 477 | 838,206 |
| Laguna | 115,250 | 1,804 | 8,977 | 489,063 | 3,016 | 56 | 269 | 791 | 31 | 25 | 0 | 32 | 44 | 108 | 231 | 619,695 |
| Rizal | 66,285 | 26,667 | 320,055 | 8,977 | 1,922 | 157 | 6,331 | 856 | 67 | 38 | 83 | 32 | 79 | 0 | 449 | 431,995 |
| Bulacan | 65,312 | 2,908 | 1,922 | 3,016 | 718,670 | 9,343 | 390 | 33 | 692 | 946 | 307 | 6,200 | 484 | 7 | 1,079 | 811,307 |
| Pampanga | 3,538 | 201 | 157 | 56 | 9,343 | 24,266 | 52 | 20 | 1,453 | 1,660 | 1,085 | 558 | 2,025 | 1 | 566 | 44,979 |
| Batangas | 12,042 | 2,929 | 6,331 | 269 | 390 | 52 | 25,891 | 2,730 | 101 | 27 | 2 | 106 | 36 | 0 | 451 | 51,355 |
| Quezon | 3,292 | 1,052 | 856 | 791 | 33 | 20 | 2,730 | 14,200 | 0 | 14 | 129 | 0 | 20 | 0 | 118 | 23,253 |
| Bataan | 1,514 | 42 | 67 | 31 | 692 | 1,453 | 101 | 0 | 12,455 | 1,118 | 416 | 328 | 112 | 2 | 140 | 18,468 |
| Zambales | 1,456 | 57 | 38 | 25 | 946 | 1,660 | 27 | 14 | 1,118 | 98 | 212 | 188 | 82 | 120 | 214 | 6,253 |
| Tarlac | 848 | 14 | 83 | 0 | 307 | 1,085 | 2 | 129 | 416 | 212 | 12,016 | 940 | 604 | 1 | 316 | 16,970 |
| Nueva Ecija | 2,401 | 26 | 32 | 32 | 6,200 | 558 | 106 | 0 | 328 | 188 | 940 | 14,467 | 1,423 | 1 | 1,315 | 28,016 |
| Pangasinan | 2,145 | 53 | 79 | 44 | 484 | 2,025 | 36 | 20 | 112 | 82 | 604 | 1,423 | 5,977 | 0 | 4,787 | 17,868 |
| Aurora | 315 | 0 | 0 | 108 | 7 | 1 | 0 | 0 | 2 | 120 | 1 | 1 | 0 | 0 | 8 | 562 |
| Out of study area | 4,340 | 477 | 449 | 231 | 1,079 | 566 | 451 | 118 | 140 | 214 | 316 | 1,315 | 4,787 | 8 | 453 | 14,941 |
| Total | 4,496,863 | 838,206 | 431,995 | 619,695 | 811,307 | 44,979 | 51,355 | 23,253 | 18,468 | 6,253 | 16,970 | 28,016 | 17,868 | 562 | 14,941 | 7,420,728 |

Source: HSH (JICA 2010)



## TABLE 4.2.3-3 FUTURE VEHICLE OD TABLE (YEAR 2030)

| | Metro Manila | Cavite | Laguna | Rizal | Bulacan | Pampanga | Batangas | Quezon | Bataan | Zambales | Tarlac | Nueva Ecija | Pangasinan | Aurora | Out of study area | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metro Manila | 4,710,201 | 119,731 | 81,228 | 144,569 | 80,310 | 4,061 | 14,268 | 3,853 | 1,718 | 1,768 | 1,386 | 2,862 | 2,285 | 374 | 5,142 | 5,173,752 |
| Cavite | 119,731 | 992,007 | 35,395 | 2,540 | 3,808 | 266 | 3,708 | 1,188 | 52 | 75 | 21 | 34 | 64 | 0 | 610 | 1,159,496 |
| Laguna | 81,228 | 35,395 | 403,660 | 12,149 | 2,492 | 182 | 7,722 | 1,000 | 77 | 54 | 118 | 42 | 86 | 0 | 526 | 544,728 |
| Rizal | 144,569 | 2,540 | 12,149 | 645,949 | 4,152 | 90 | 332 | 1,006 | 44 | 37 | 0 | 41 | 49 | 141 | 286 | 811,382 |
| Bulacan | 80,310 | 3,808 | 2,492 | 4,152 | 935,477 | 11,422 | 464 | 42 | 886 | 1,199 | 434 | 7,647 | 548 | 9 | 1,455 | 1,050,340 |
| Pampanga | 4,061 | 266 | 182 | 90 | 11,422 | 28,144 | 57 | 23 | 1,601 | 2,026 | 1,251 | 715 | 2,314 | 2 | 669 | 52,820 |
| Batangas | 14,268 | 3,708 | 7,722 | 332 | 464 | 57 | 28,945 | 3,089 | 128 | 33 | 2 | 130 | 38 | 0 | 502 | 59,416 |
| Quezon | 3,853 | 1,188 | 1,000 | 1,006 | 42 | 23 | 3,089 | 16,191 | 0 | 16 | 147 | 0 | 23 | 0 | 142 | 26,719 |
| Bataan | 1,718 | 52 | 77 | 44 | 886 | 1,601 | 128 | 0 | 13,315 | 1,376 | 543 | 409 | 117 | 2 | 181 | 20,446 |
| Zambales | 1,768 | 75 | 54 | 37 | 1,199 | 2,026 | 33 | 16 | 1,376 | 133 | 326 | 261 | 93 | 146 | 264 | 7,805 |
| Tarlac | 1,386 | 21 | 118 | 0 | 434 | 1,251 | 2 | 147 | 543 | 326 | 14,677 | 1,172 | 739 | 2 | 362 | 21,177 |
| Nueva Ecija | 2,862 | 34 | 42 | 41 | 7,647 | 715 | 130 | 0 | 409 | 261 | 1,172 | 17,270 | 1,670 | 2 | 2,785 | 35,037 |
| Pangasinan | 2,285 | 64 | 86 | 49 | 548 | 2,314 | 38 | 23 | 117 | 93 | 739 | 1,670 | 6,486 | 0 | 5,158 | 19,666 |
| Aurora | 374 | 0 | 0 | 141 | 9 | 2 | 0 | 0 | 2 | 146 | 2 | 2 | 0 | 0 | 12 | 687 |
| Out of study area | 5,142 | 610 | 526 | 286 | 1,455 | 669 | 502 | 142 | 181 | 264 | 362 | 2,785 | 5,158 | 12 | 574 | 18,665 |
| Total | 5,173,752 | 1,159,496 | 544,728 | 811,382 | 1,050,340 | 52,820 | 59,416 | 26,719 | 20,446 | 7,805 | 21,177 | 35,037 | 19,666 | 687 | 18,665 | 9,002,132 |

Source: HSH (JICA 2010)

### 4.2.4 Traffic Assignment Model

The traffic assignment procedure allocates vehicle traffic into individual road links. This step uses as input the matrix of flows (vehicles) that indicate the volume of traffic between origin and destination pairs.

#### 1) Assignment Method

There are many assignment techniques that can be used to estimate traffic volume ranging from manual methods to complex iterative procedures by computer programs. In this study, the capacity restraint assignment which is the most straightforward for use in network models was applied. This assignment technique is based on the speed – flow relationship. Flowchart of the applied methodology is presented in **Figure 4.2.4-1**.

In this assignment technique, and by calculating the required travel time for each link according to its travel speed and road conditions, the program determines the fastest routes between each origin and destination by evaluating the consuming time on links, and assigns the trips between the given origin and destination. As congestion increases until a certain level, alternative routes are introduced to handle the unassigned traffic. Zone-to-zone routing is built, which is the fastest path from each zone to any other, and all trips are assigned to these optimum routes.

Regarding tolled expressway, travel time adds the sum up of travel time conversion from toll fee (= toll fee divided by time evaluation value) and time calculation from travel speed.

Since the link-travel time varies with the traffic volume of vehicles using that link, which can be explained as a degree of link congestion, the OD tables are divided to apply an iteration procedure on ten stages. At each iteration, and depending upon the current link loadings, the flows are divided between all the shortest routes generated and a new travel time is computed for the average assigned link flow at each pass. The iteration continues to re-estimate the speed on that links considering the assigned traffic on links, and to produce alternative routes so that more accurate allocation can be achieved. The accumulated assigned traffic volume from each OD pair on the links composes the total assigned traffic volumes per direction for the network. JICA STRADA is used to estimate traffic volumes.

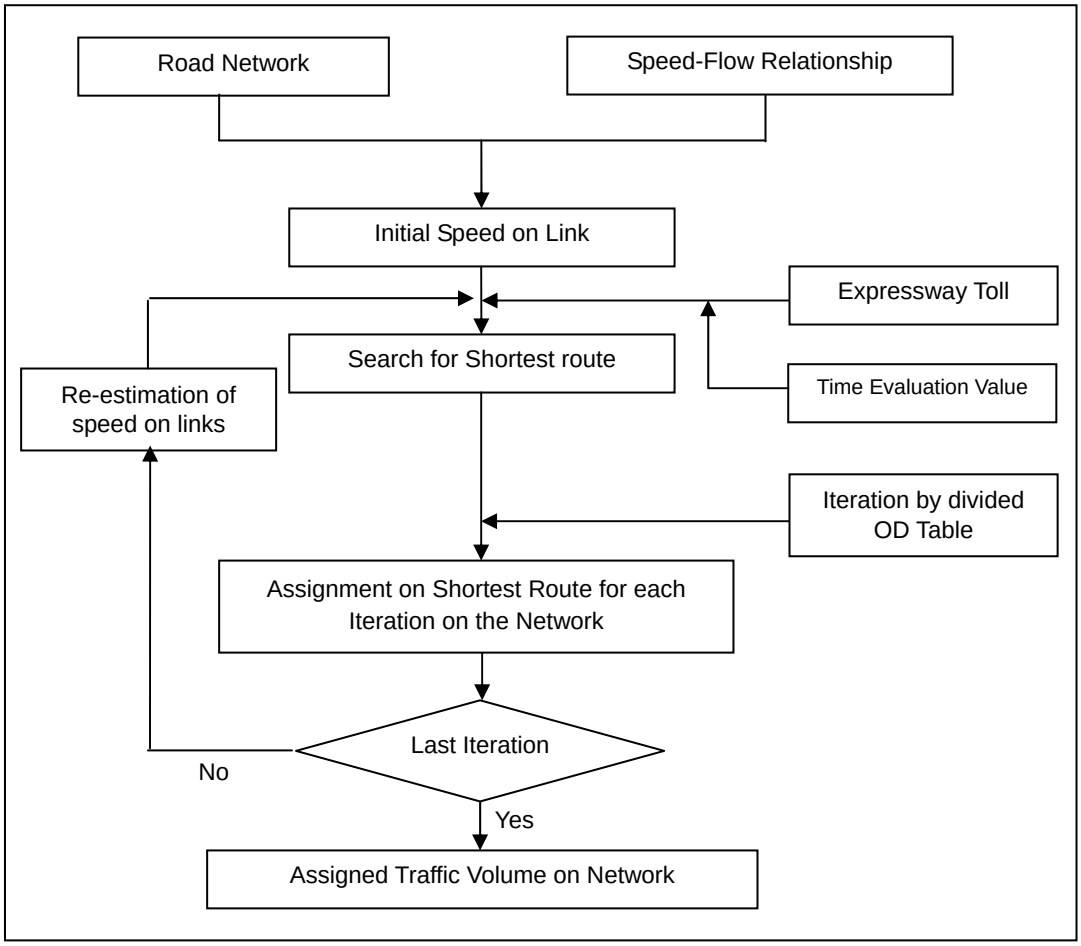



**FIGURE 4.2.4-1 TRAFFIC ASSIGNMENT PROCEDURE**

**2) Speed Flow Relationship**

The speed-flow relationship used in the traffic assignment procedure is shown in **Figure 4.2.4-2**. When the traffic volumes are over the maximum capacity 0.3*Qmax, it is assumed that vehicle speed drastically reduces. The basic free flow and capacity is shown in **Table 4.2.4-1**.

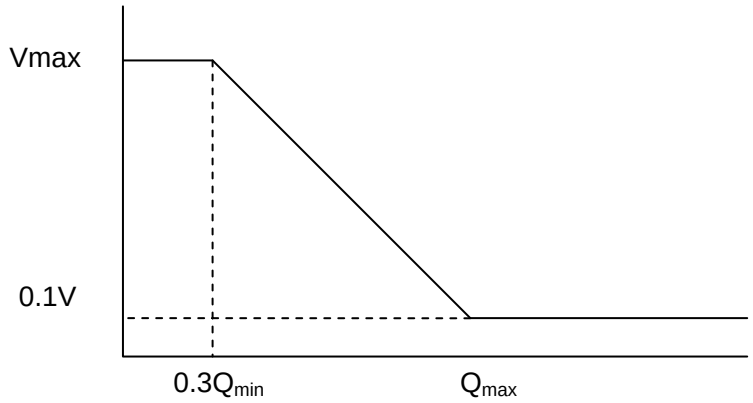



**FIGURE 4.2.4-2 SPEED – FLOW RELATIONSHIP**

**TABLE 4.2.4-1 FREE SPEED AND CAPACITY BY ROAD TYPE**

| QV Type | Pavement | Road Class | Topography | Lane | Vmax | Qmax |
|---|---|---|---|---|---|---|
| 1 | Paved | Inter-Urban Expressway | Plain | 4 | 100 | 80,000 |
| 2 | | | | 3 | 100 | 60,000 |
| 3 | | | | 2 | 100 | 40,000 |
| 4 | | | | 1 | 70 | 20,000 |
| 5 | | | Mountains | 2 | 70 | 28,000 |
| 6 | | | | 1 | 60 | 10,500 |
| 7 | | Intra-Urban Expressway | Plain | 3 | 80 | 60,000 |
| 8 | | | | 2 | 60-80 | 40,000 |
| 9 | | | | 1 | 60 | 15,000 |
| 10 | | Interstate Highway | Plain | 4 | 40 | 60,000 |
| 11 | | | | 2 | 30 | 18,000 |
| 12 | | | Mountains | 4 | 30 | 42,000 |
| 13 | | | | 2 | 25 | 12,600 |
| 14 | | Urban Arterial | Mountains | 10 | 60 | 120,000 |
| 15 | | | | 8 | 60 | 96,000 |
| 16 | | | | 6 | 50 | 72,000 |
| 17 | | | | 4 | 40 | 48,000 |
| 18 | | | | 2 | 30 | 14,400 |
| 19 | | Local | Plain | 4 | 40 | 40,000 |
| 20 | | | | 2 | 30 | 12,000 |
| 21 | | | Mountains | 2 | 30 | 8,400 |
| 22 | Unpaved | | Plain | 2 | 20 | 6,000 |
| 23 | | | Mountains | 2 | 10 | 4,200 |

### 3) Passenger Car Unit

**Table 4.2.4-2** shows the Passenger Car Unit (PCU) used in vehicle traffic conversion. This value is the same used by the DPWH.

**TABLE 4.2.4-2 PASSENGER CAR UNIT (PCU)**

| Vehicle Type | Passenger Car Unit |
|---|---|
| Passenger Car | 1.0 |
| Jeepney | 1.5 |
| Bus | 2.2 |
| Truck | 2.5 |

### 4) Time Evaluation Value

An important input for the demand forecast is the trip maker's time value. This time value is the basis for a trip maker to decide whether to use toll expressway or not. The time values were derived from MMUEN (JICA, The Development of the Public –Private Partnership Technique for the Metro Manila Urban Expressway Network) survey results. Though MMUEN data is based on the Metro Manila and surrounding area, Time Evaluation Value in Region III is lower than that of MMUEN. Based on the rate of GRDP per capita (GRDP per capita of Region III / that of NCR and Region IV-4A = 50,176 peso / 96,505 peso = 0.52), Time Evaluation Value in Region III is set.

Supposing time value will increase in accordance with inflation rate of 5% per year, the figures in **Table 4.2.4-3** will be the time value.

**TABLE 4.2.4-3 TIME EVALUATION VALUE BY VEHICLE TYPE**

Unit: Peso/hour

| Area | MMUEN (Metro Manila and surrounding Area) | Region III (Study Area) | | |
|---|---|---|---|---|
| Year | Y2009 | Y2009 | Y2020 | Y2030 |
| | ( a ) | (b=a*0.52) | ($c=b*1.05^{11}$ ) | ($d=c*1.05^{10}$ ) |
| Car | 331.4 | 172.4 | 294.8 | 480.2 |
| Jeepney | 465.9 | 242.3 | 414.4 | 675.0 |
| Bus | 1,524.2 | 792.8 | 1,355.9 | 2,208.7 |
| Truck | 873.2 | 454.1 | 776.6 | 1,265.0 |

### 4.2.5 Assignment Validation

The procedure of model validation entails two steps: first, the current OD matrix is assigned on an existing network. Second, the assigned traffic volume is compared with the result of the traffic count surveys at each corresponding location. This verification aims to check the accuracy of both the current OD matrix and an existing network model representing the existing transport situation.

**Table 4.2.5-1** presents traffic volumes generated from traffic assignment and observed traffic (traffic count survey). **Figure 4.2.5-2** shows the result of comparison between the assigned traffic volumes and observed traffic volume. This comparison between observed traffic count and assigned traffic flow at individual sites is done via the Mean Absolute Difference (MAD)[1] Ratio. For daily traffic counts, the value of the MAD ratio is 0.21 which is considered to reflect a good calibration.

**TABLE 4.2.5-1 COMPARISON OF OBSERVED AND ASSIGNED TRAFFIC VOLUME (Veh/day)**

| Road Name, Site | Observed Traffic Volume | Assigned Traffic Volume | Difference | Rate |
|---|---|---|---|---|
| 1.SCTEX (Between Luisita IC and Capas IC) | 8,790 | 10,432 | -1,642 | 16% |
| 2.SCTEX (Between Floridablanca and Porac IC) | 9,039 | 8,564 | 475 | -6% |
| 3.Pan-Philippine HWY, Sto. Domingo | 7,950 | 6,242 | 1,708 | -27% |
| 4.Pan-Philippine HWY, San Jose City | 8,048 | 9,417 | -1,369 | 15% |
| 5.Pan-Philippine HWY, Zaragosa | 14,246 | 12,089 | 2,157 | -18% |
| 6.Pan-Philippine HWY, Gapan | 19,657 | 19,864 | -207 | 1% |
| 7.Pan-Philippine HWY, Plaridel | 8,043 | 8,359 | -316 | 4% |
| 8.Sta Rosa-Tarlac Rd-1 | 5,124 | 5,422 | -298 | 5% |
| 9.Sta Rosa-Tarlac Rd-2 | 4,431 | 3,658 | 773 | -21% |
| 10.Caalibangbangan - Aliaga Rd-1 | 3,225 | 1,835 | 1,390 | -76% |
| 11.Caalibangbangan - Aliaga Rd-2 | 2,848 | 1,777 | 1,071 | -60% |
| 12.Nueve Ecija-Aurora Rd | 1,273 | 2,092 | -819 | 39% |
| 13.Pinagpanaan-Rizal-Pantabangan Rd | 2,179 | 2,990 | -811 | 27% |
| 14.MacArthur Hwy, Paniqui | 5,635 | 6,409 | -774 | 12% |
| 15.NLEX-Dau Exit, National Hwy | 13,516 | 14,536 | -1,020 | 7% |

[1] MAD Ratio is defined by the following formula: MAD Ratio = $\sum \left| \frac{Count - assignment}{assignment} \right| / n$ where n is the number of observations.

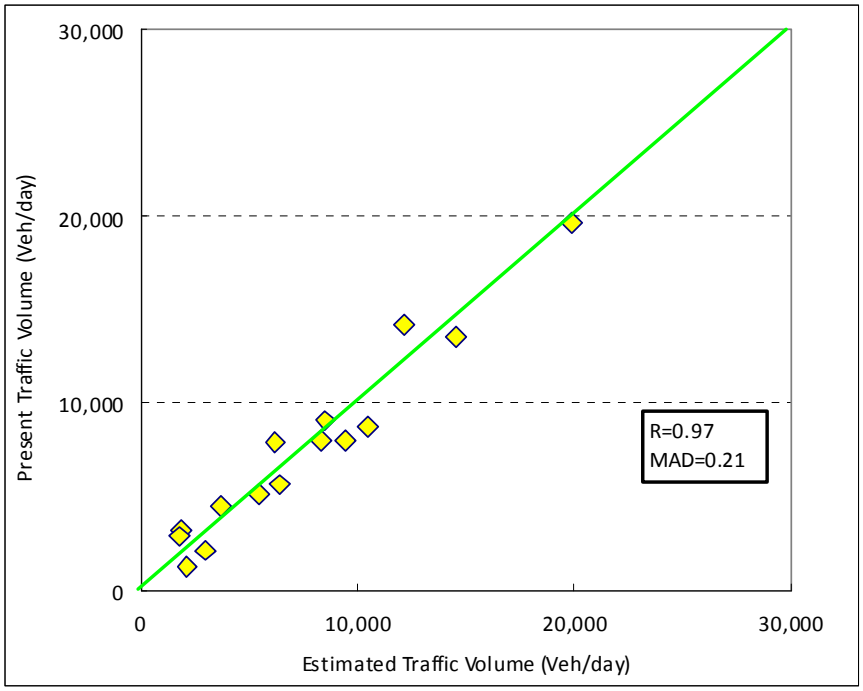



**FIGURE 4.2.5-2 COMPARISON OF OBSERVED AND ASSIGNED TRAFFIC VOLUME (Veh/day)**

### 4.2.6 Toll Rate vs. Revenue

In order to set the proper toll rate of CLLEX, the traffic volume and the amount of revenue are estimated by traffic assignment model. **Figure 4.2.6-1** shows the result of traffic assignment of toll rate.

- In case of toll free, total traffic volume to enter CLLEX is 16,197 vehicles/day

- The toll rate for getting higher revenue is about 3.0 to 4.5 Peso/km and the amount of revenue is about 1.14 and 1.18 million Peso/day. Although maximum amount of revenue is 4.0 peso case, traffic volume to enter CLLEX is only 8,628 vehicle /day which is about half of toll free case.

- The desirable toll rate for attractive to motorist and higher revenue is **3.0 Peso/km**. total traffic volume to enter CLLEX is 11,236 vehicle/day (70% of toll free case) and estimated toll revenue 1.14 million Peso/day. 3.0 Peso/km in year 2017 converts about 2.2 Peso /km in year 2011. This toll rate is the almost same as that of NLEX and other present interurban expressway (see **Table 4.2.6-1**). Most motorists may accept the 3.0 peso/km in year 2017.

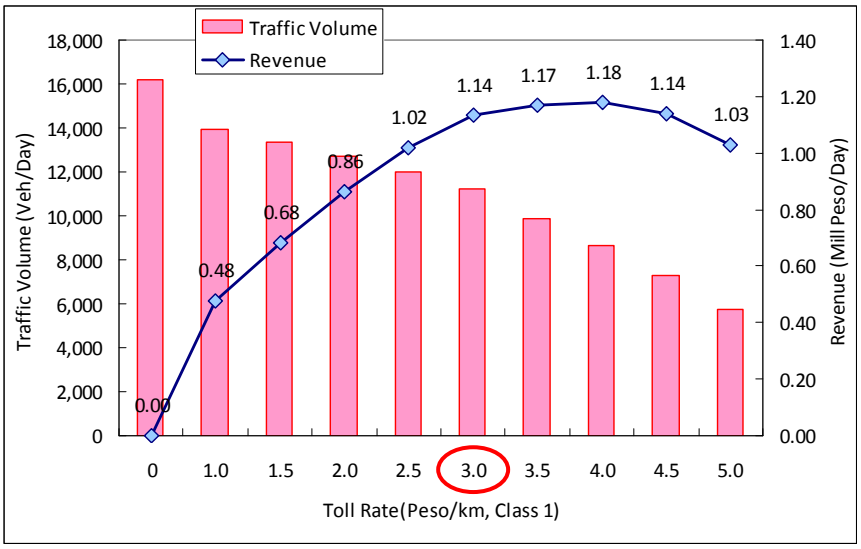



**FIGURE 4.2.6-1 TOLL RATE VS REVENUE (YEAR 2017)**

## TABLE 4.2.6-1 PRESENT TOLL RATE

(Peso/km)

| Toll Road | | Class 1 *Car, Jeep, Pick-up* | Class 2 *Light Truck* | Class 3 *Heavy Truck, Trailer* | Remarks |
|---|---|---|---|---|---|
| Metro Manila Skyway (MMS) | Elevated Phase 1 | 6.84 | 13.68 | 20.53 | Skyway/Buendia - Bicutan (9.50 km) |
| | Elevated Phase 2 | 11.92 | 23.84 | 35.76 | Alabang - Bicutan (6.88 km) |
| | At grade | 7.85 | 15.70 | 23.56 | Magallanes - Alabang (13.50 km) |
| North Luzon Expressway (NLEX) | | 2.38 | 5.92 | 7.08 | |
| South Luzon Expressway (SLEX) | | 3.02 | 6.04 | 9.10 | |
| Manila Cavite Toll Expressway (MCTE) | Phase 1 | 3.33 | 6.82 | 9.85 | R-1 Extension to Bacoor (6.6 km) |
| | Phase 2 | 8.96 | 17.92 | 26.87 | Bacoor Bay to Kawit (6.475 km) |
| Southern Tagalog Arterial Road (STAR) | | 1.43 | 2.86 | 4.26 | |
| Subic-Clark-Tarlac Expressway (SCTEX) | | 2.68 | 5.36 | 8.04 | |

Source: TRB, 2011 May

### 4.2.7 Traffic Assignment Result

#### 1) Case-1 CLLEX (Phase-1) Initial Stage 2 lane

***a) Total Traffic Efficiency***

**Table 4.2.7-1** shows the traffic assignment of without CLLEX (Phase-1) case and with case.

This study area is Tarlac, Nueva Ecija, Bulacan, Pampanga,

**TABLE 4.2.7-1 TRAFFIC INDICATORS OF W/O CLLEX CASE AND WITH CASE**

| Year | Case | Total Travel Time (PCU*hr) | Total Vehicle Km (PCU*km) | Average Travel Speed (km/hr) |
|---|---|---|---|---|
| 2017 | With | 922,689 | 27,459,992 | 29.8 |
| | W/O | 933,781 | 27,351,557 | 29.3 |
| | With-W/O | -11,092 | 108,435 | 0.5 |
| 2020 | With | 1,036,424 | 29,758,637 | 28.7 |
| | W/O | 1,053,098 | 29,710,937 | 28.2 |
| | With-W/O | -16,674 | 47,700 | 0.5 |
| 2030 | With | 1,452,642 | 37,346,746 | 25.7 |
| | W/O | 1,474,010 | 37,219,691 | 25.3 |
| | With-W/O | -21,368 | 127,055 | 0.4 |

*Source JICA Study Team*
Note: PCU: Passenger Car Unit

- If CLLEX were constructed, many motorists may use this expressway even though their trips become longer. Total PCU*km of with case will be higher than that of without case.

- Total travel time will be decrease if CLLEX were constructed. The difference of total travel time is 11,092 hours/day in year 2017 which much traffic time can be saved by CLLEX.

***b) Traffic Assignment***

**Figure 4.2.7-1** to **4.2.7-3** shows the estimated traffic volume of CLLEX (Phase-1) 2lane.

- The highest IC section is between Tarlac IC and Aliaga IC, which number of traffic are 11,222 (vehicle/day) in year 2017, 12,966 (vehicle/day) in year 2020 and 17,118 (vehicle/day) in year 2030.

**Figure 4.2.7-4 to 4.2.7-6** shows the traffic assignment result with CLLEX (Phase-1) and **Figure 4.2.7-7 to 4.2.7-9** shows the difference of traffic volume with case and without case.

**Figure 4.2.7-10 to 4.2.7-12** shows the number of traffic CLLEX (Phase-1) destination.

- About 60% of CLLEX traffic from west side to east are going to Cabanatuan City.

- The major destinations of CLLEX traffic from east to west are Bulacan or Metro Manila…

**Table 4.2.7-2** shows the total traffic volume to enter CLLEX and total vehicle km of CLLEX

**TABLE 4.2.7-2 TOTAL TRAFFIC VOLUME AND TOTAL VEHICLE KM (CLLEX PHASE-1, 2LANE)**

| Year | Traffic Volume (Veh/day) | | | | Total vehicle*km | | | |
|---|---|---|---|---|---|---|---|---|
| | Class1 | Class2 | Class3 | Total | Class1 | Class2 | Class3 | Total |
| 2017 | 8,427 | 2,576 | 219 | 11,222 | 222,318 | 69,635 | 5,722 | 297,675 |
| 2018 | 8,931 | 2,618 | 223 | 11,772 | 237,330 | 70,581 | 5,823 | 313,735 |
| 2019 | 9,464 | 2,661 | 227 | 12,352 | 253,356 | 71,541 | 5,927 | 330,823 |
| 2020 | 10,030 | 2,705 | 232 | 12,966 | 270,463 | 72,513 | 6,032 | 349,009 |
| 2021 | 10,268 | 2,818 | 242 | 13,328 | 276,853 | 75,721 | 6,332 | 358,906 |
| 2022 | 10,512 | 2,936 | 253 | 13,700 | 283,393 | 79,070 | 6,647 | 369,110 |
| 2023 | 10,761 | 3,058 | 264 | 14,084 | 290,088 | 82,568 | 6,977 | 379,633 |
| 2024 | 11,017 | 3,186 | 276 | 14,480 | 296,942 | 86,220 | 7,324 | 390,486 |
| 2025 | 11,279 | 3,320 | 289 | 14,887 | 303,957 | 90,034 | 7,688 | 401,679 |
| 2026 | 11,546 | 3,459 | 302 | 15,307 | 311,137 | 94,016 | 8,071 | 413,224 |
| 2027 | 11,821 | 3,603 | 316 | 15,740 | 318,488 | 98,175 | 8,472 | 425,135 |
| 2028 | 12,101 | 3,754 | 330 | 16,185 | 326,012 | 102,517 | 8,893 | 437,422 |
| 2029 | 12,389 | 3,911 | 345 | 16,645 | 333,714 | 107,052 | 9,335 | 450,101 |
| 2030 | 12,683 | 4,074 | 361 | 17,118 | 341,597 | 111,787 | 9,800 | 463,184 |
| 2031 | 12,984 | 4,245 | 377 | 17,606 | 349,667 | 116,732 | 10,287 | 476,686 |
| 2032 | 13,293 | 4,422 | 394 | 18,109 | 357,928 | 121,895 | 10,798 | 490,622 |
| 2033 | 13,608 | 4,607 | 412 | 18,627 | 366,384 | 127,287 | 11,335 | 505,006 |
| 2034 | 13,931 | 4,800 | 430 | 19,162 | 375,040 | 132,918 | 11,899 | 519,856 |
| 2035 | 14,262 | 5,001 | 450 | 19,713 | 383,900 | 138,797 | 12,490 | 535,187 |
| 2036 | 14,601 | 5,210 | 470 | 20,281 | 392,969 | 144,936 | 13,111 | 551,017 |
| 2037 | 14,948 | 5,428 | 492 | 20,867 | 402,253 | 151,347 | 13,763 | 567,363 |
| 2038 | 15,303 | 5,655 | 514 | 21,472 | 411,756 | 158,042 | 14,448 | 584,245 |
| 2039 | 15,666 | 5,891 | 537 | 22,095 | 421,483 | 165,033 | 15,166 | 601,682 |
| 2040 | 16,038 | 6,138 | 561 | 22,738 | 431,440 | 172,333 | 15,920 | 619,693 |
| 2041 | 16,419 | 6,395 | 587 | 23,401 | 441,633 | 179,956 | 16,712 | 638,300 |
| 2042 | 16,809 | 6,662 | 614 | 24,085 | 452,066 | 187,916 | 17,542 | 657,524 |
| 2043 | 17,208 | 6,941 | 641 | 24,790 | 462,746 | 196,228 | 18,415 | 677,388 |
| 2044 | 17,617 | 7,231 | 670 | 25,518 | 473,678 | 204,908 | 19,330 | 697,916 |
| 2045 | 18,035 | 7,533 | 701 | 26,270 | 484,868 | 213,971 | 20,291 | 719,131 |
| 2046 | 18,464 | 7,849 | 732 | 27,045 | 496,323 | 223,436 | 21,300 | 741,059 |

## 2-LANE

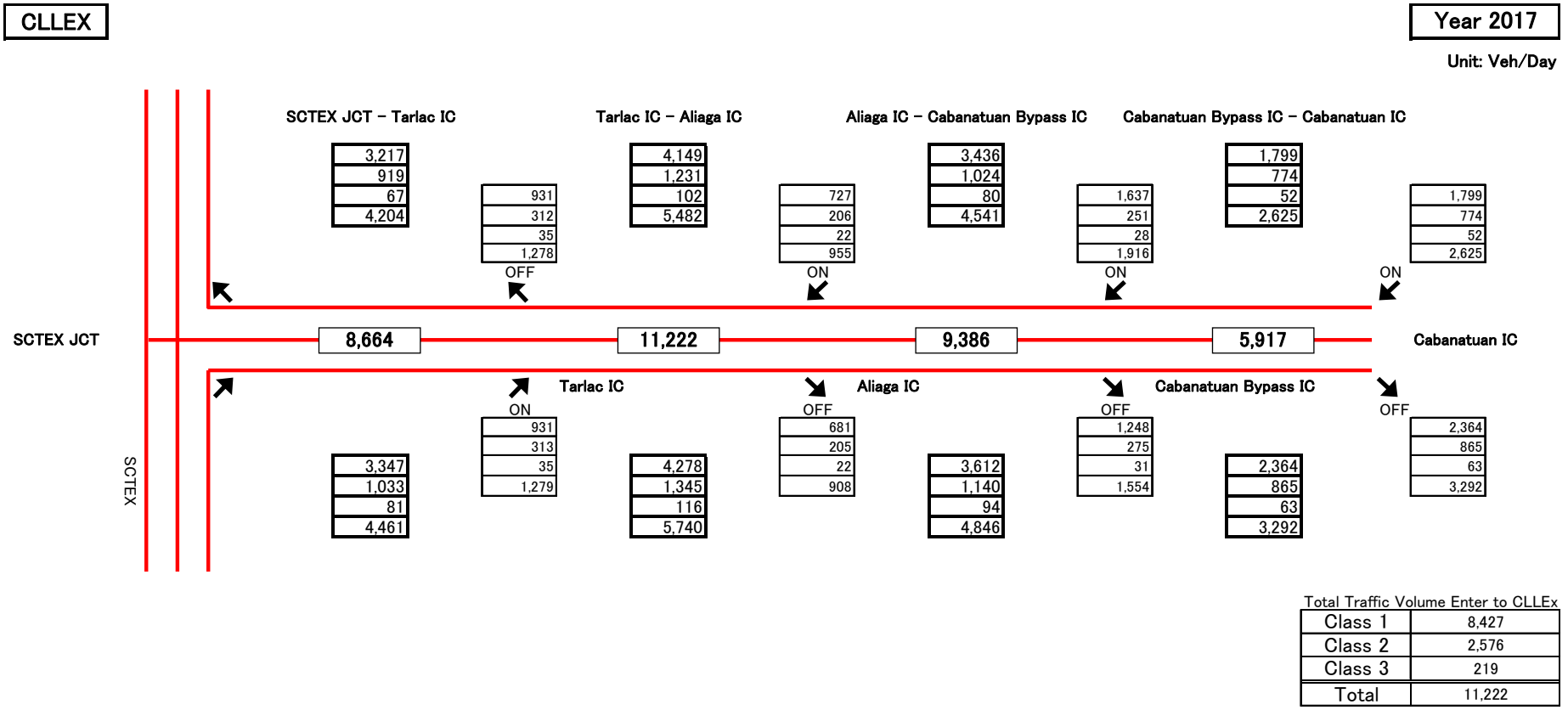



**FIGURE 4.2.7-1 TRAFFIC PROJECTION (YEAR 2017) OF CLLEX (PHASE-1) 2-LANE CASE**

## 2-LANE

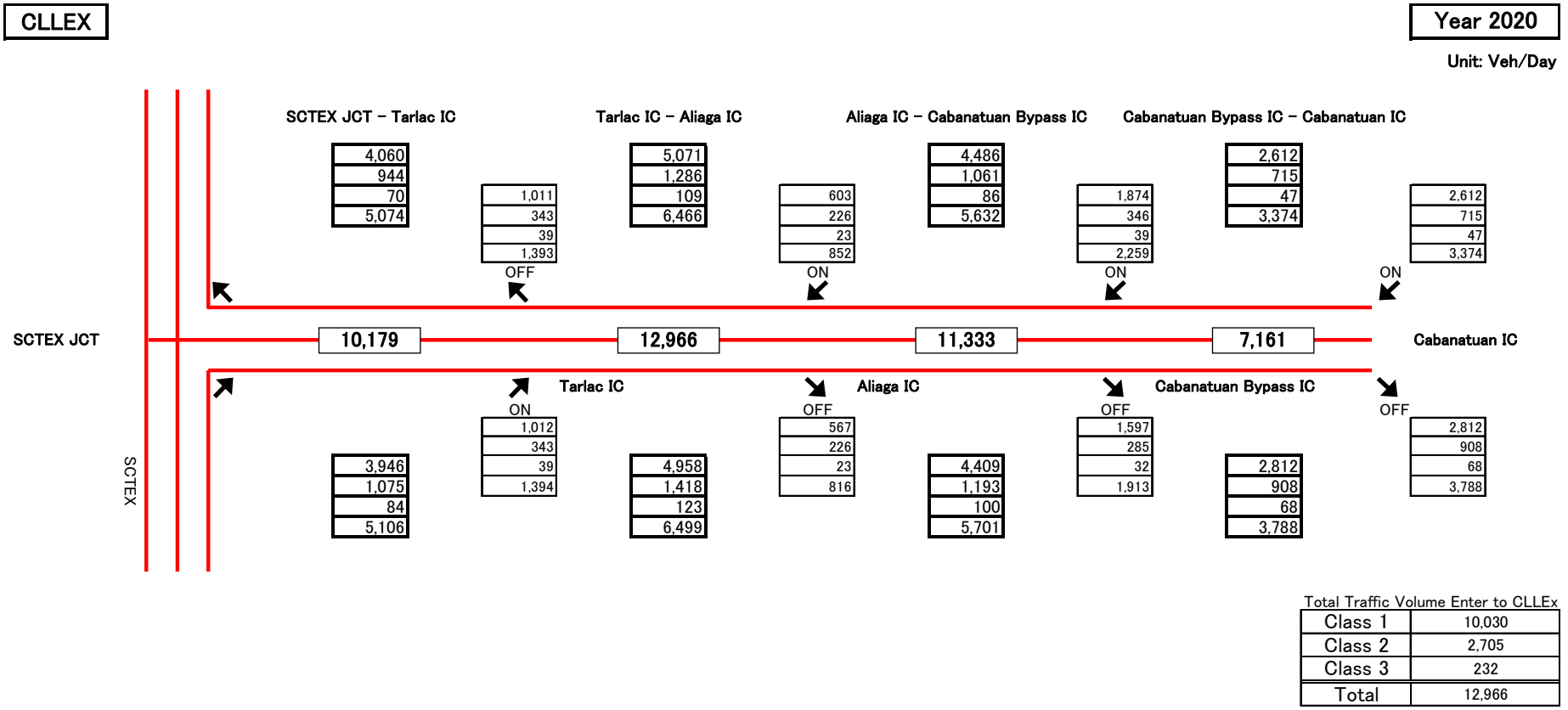



**FIGURE 4.2.7-2 TRAFFIC PROJECTION (YEAR 2020) OF CLLEX (PHASE-1) 2-LANE CASE**

## 2-LANE

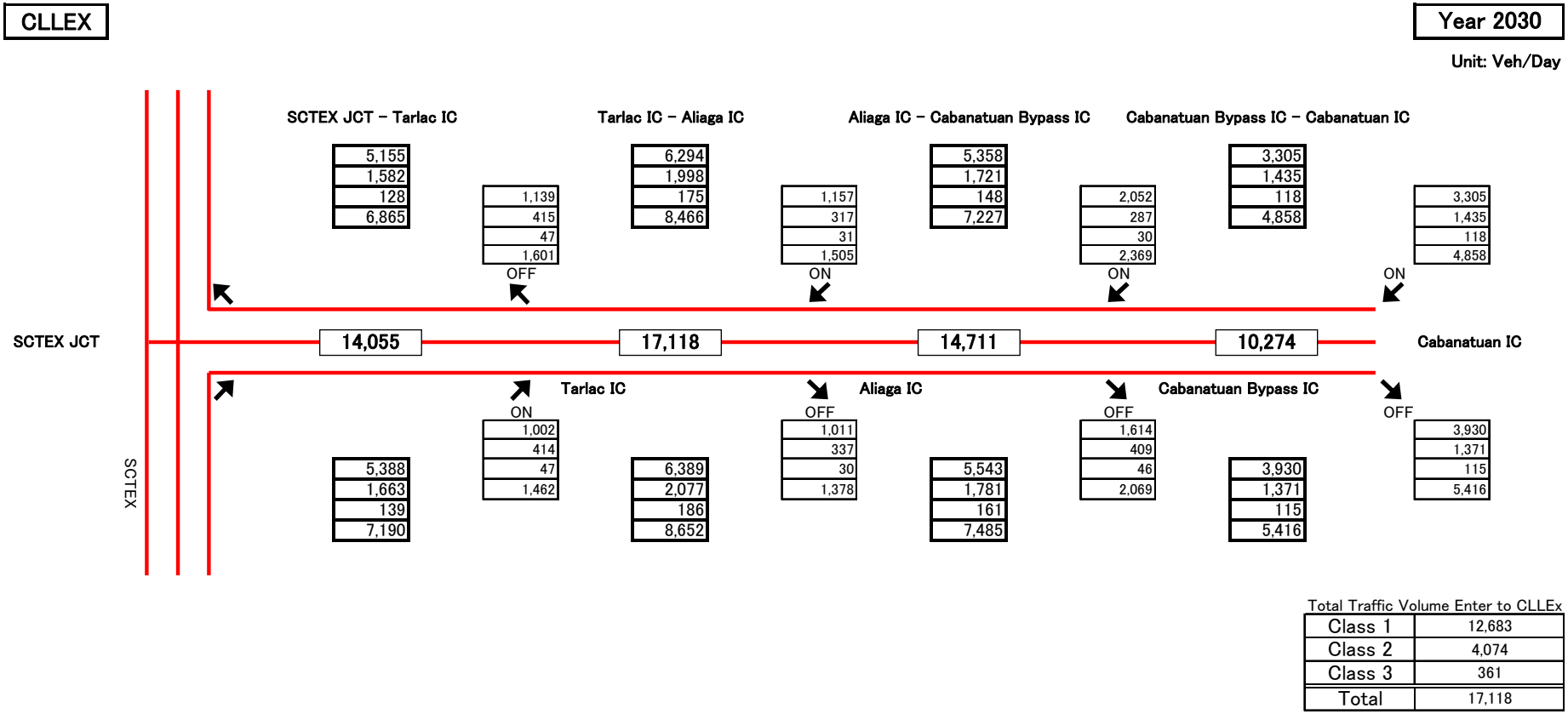



**FIGURE 4.2.7-3 TRAFFIC PROJECTION (YEAR 2030) OF CLLEX (PHASE-1) 2-LANE CASE**

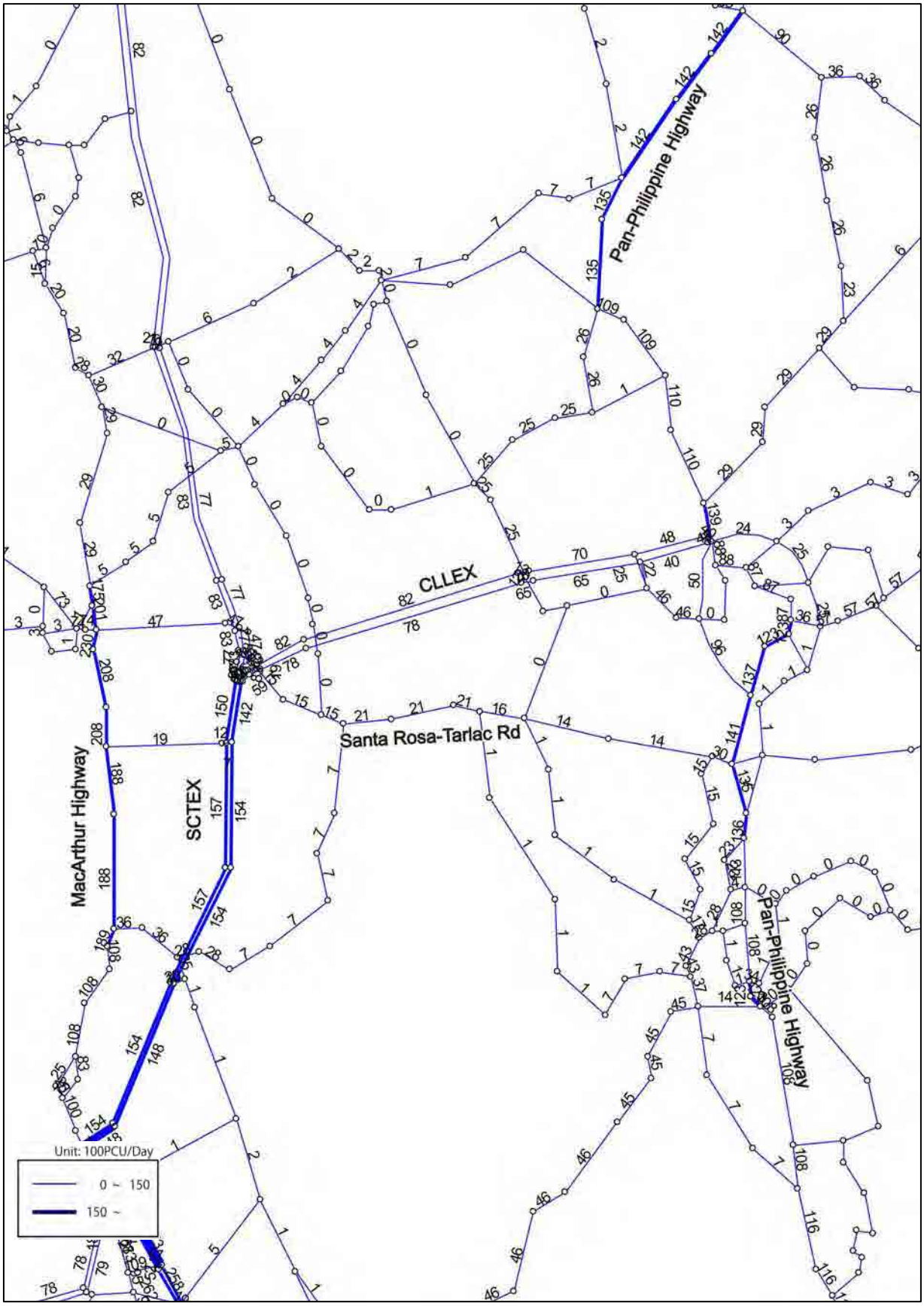



**FIGURE 4.2.7-4 RESULT OF TRAFFIC ASSIGNMENT IN YEAR 2017 (PHASE-1, 2-LANE)**

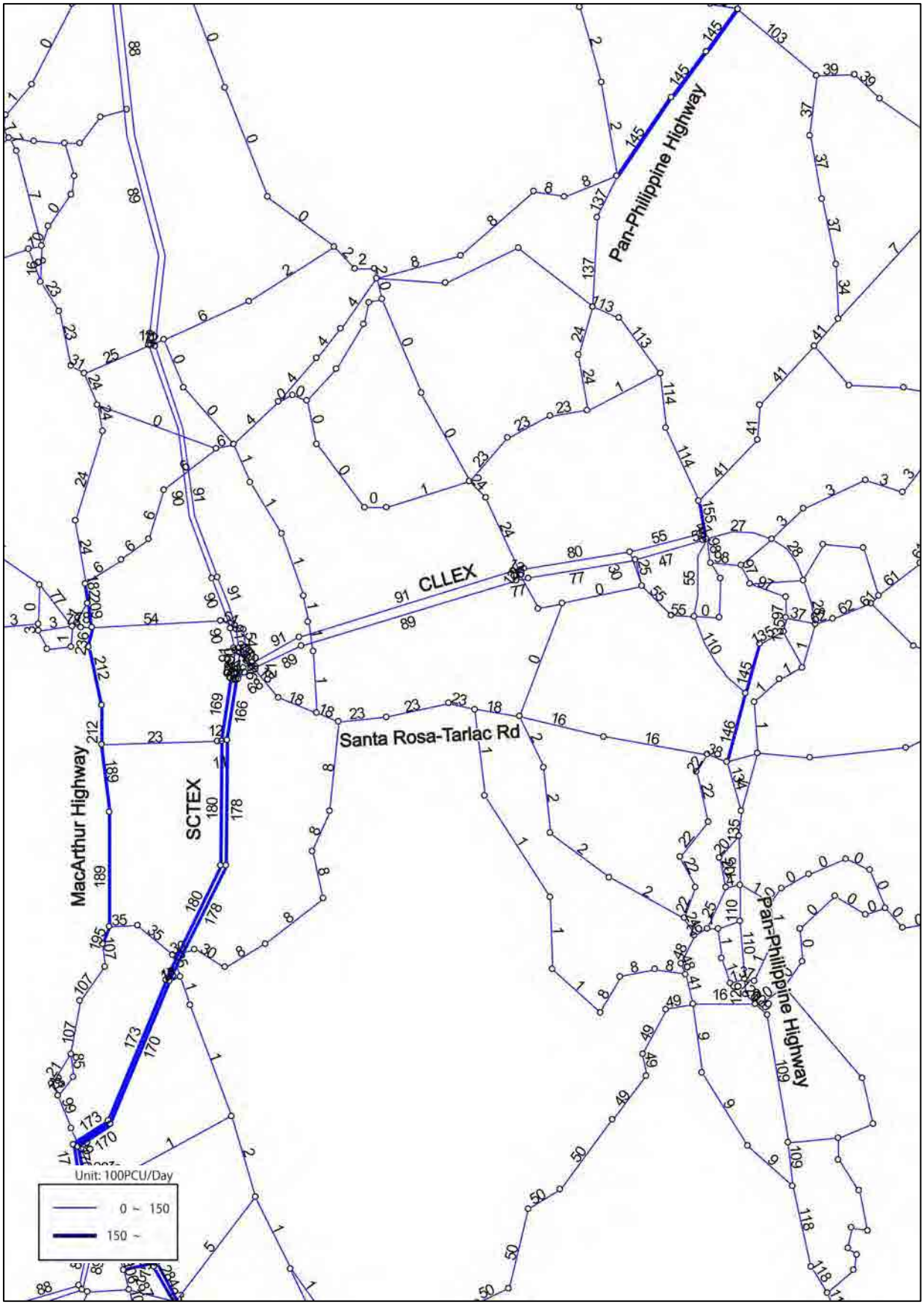



**FIGURE 4.2.7-5 RESULT OF TRAFFIC ASSIGNMENT IN YEAR 2020 (PHASE-1, 2-LANE)**

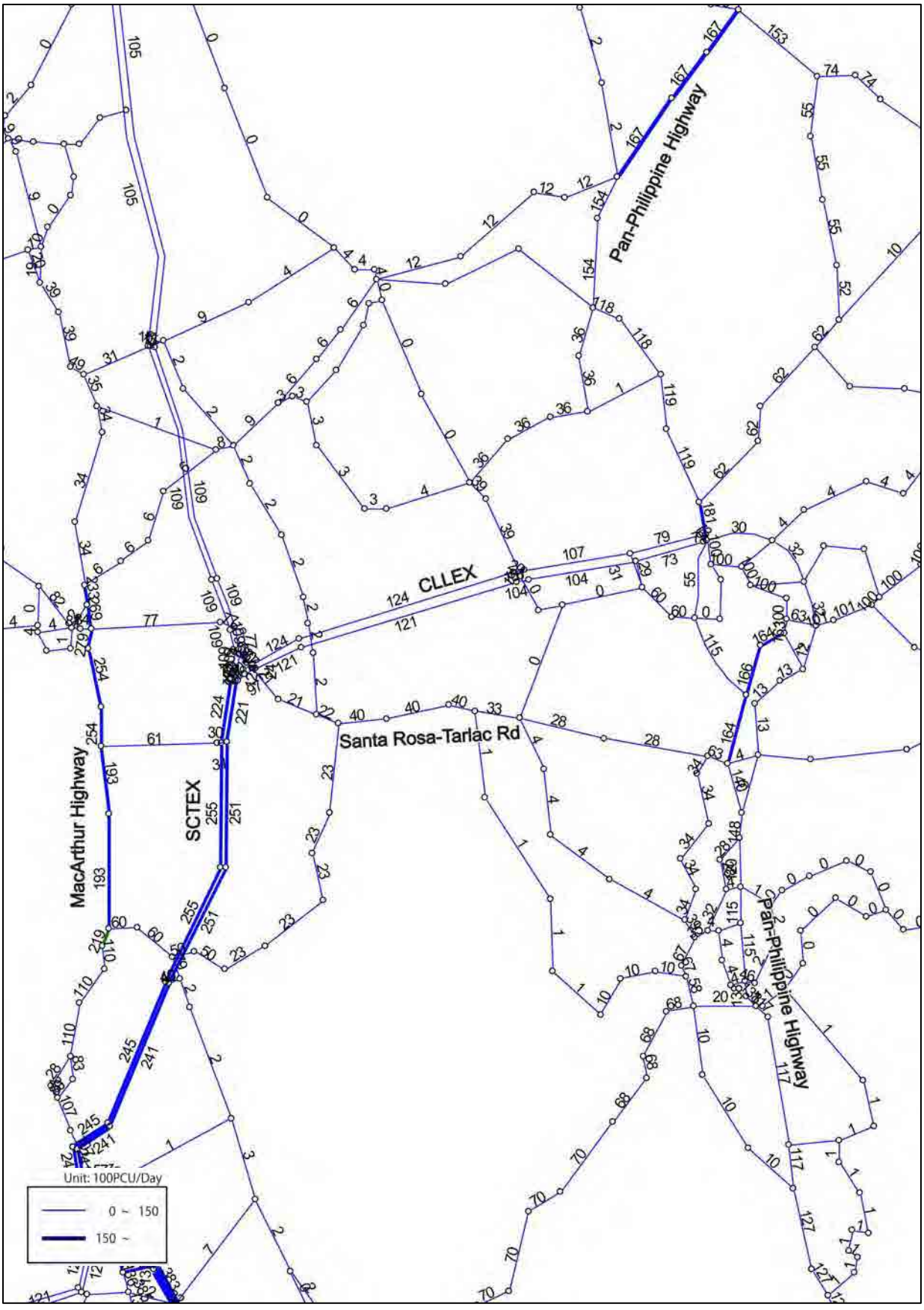



**FIGURE 4.2.7-6 RESULT OF TRAFFIC ASSIGNMENT IN YEAR 2030 (PHASE-1, 2-LANE)**

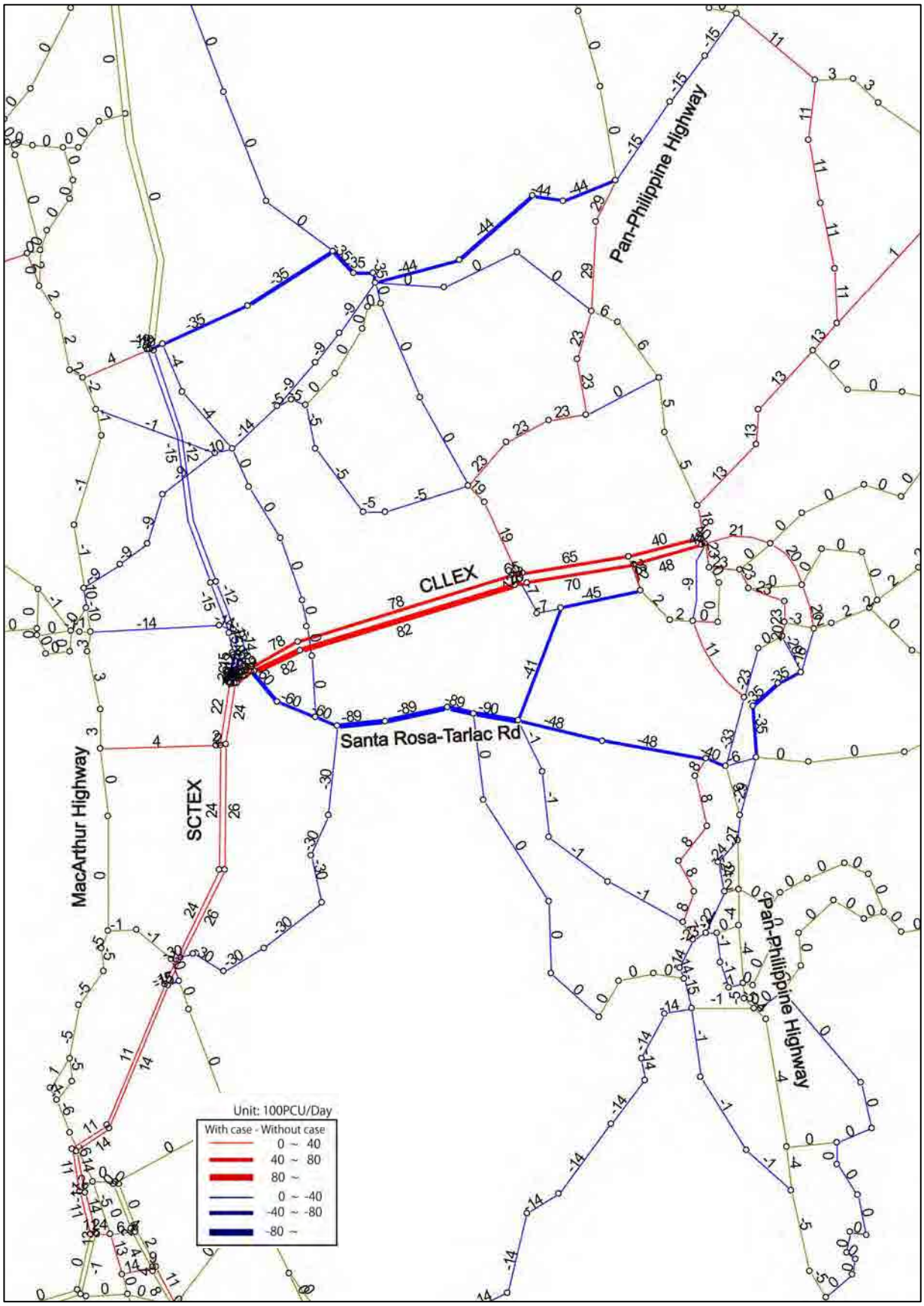



**FIGURE 4.2.7-7 COMPARISON OF WITH CASE AND WITHOUT CASE IN YEAR 2017 (PHASE-1, 2-LANE)**

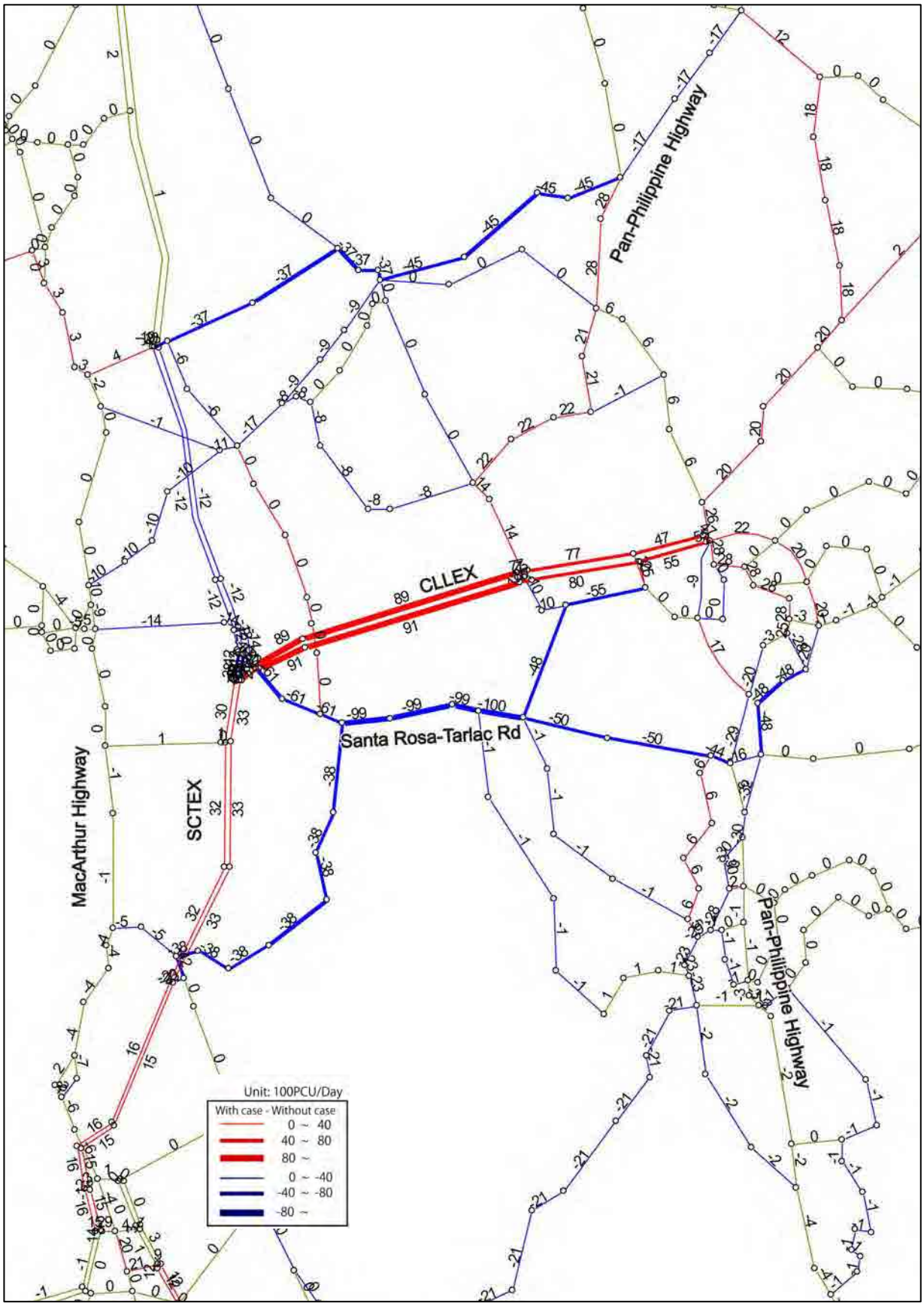



**FIGURE 4.2.7-8 COMPARISON OF WITH CASE AND WITHOUT CASE IN YEAR 2020 (PHASE-1, 2-LANE)**

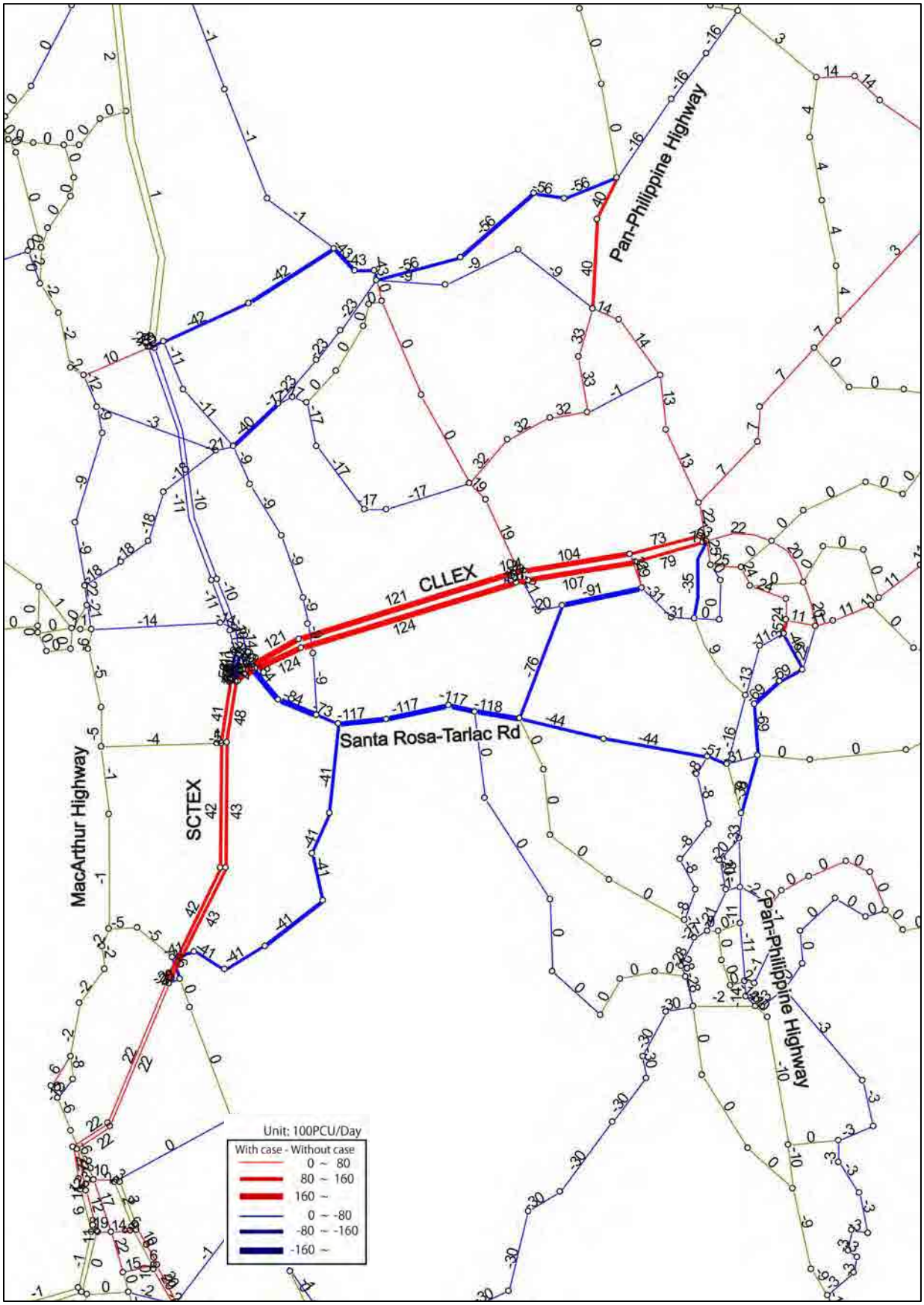
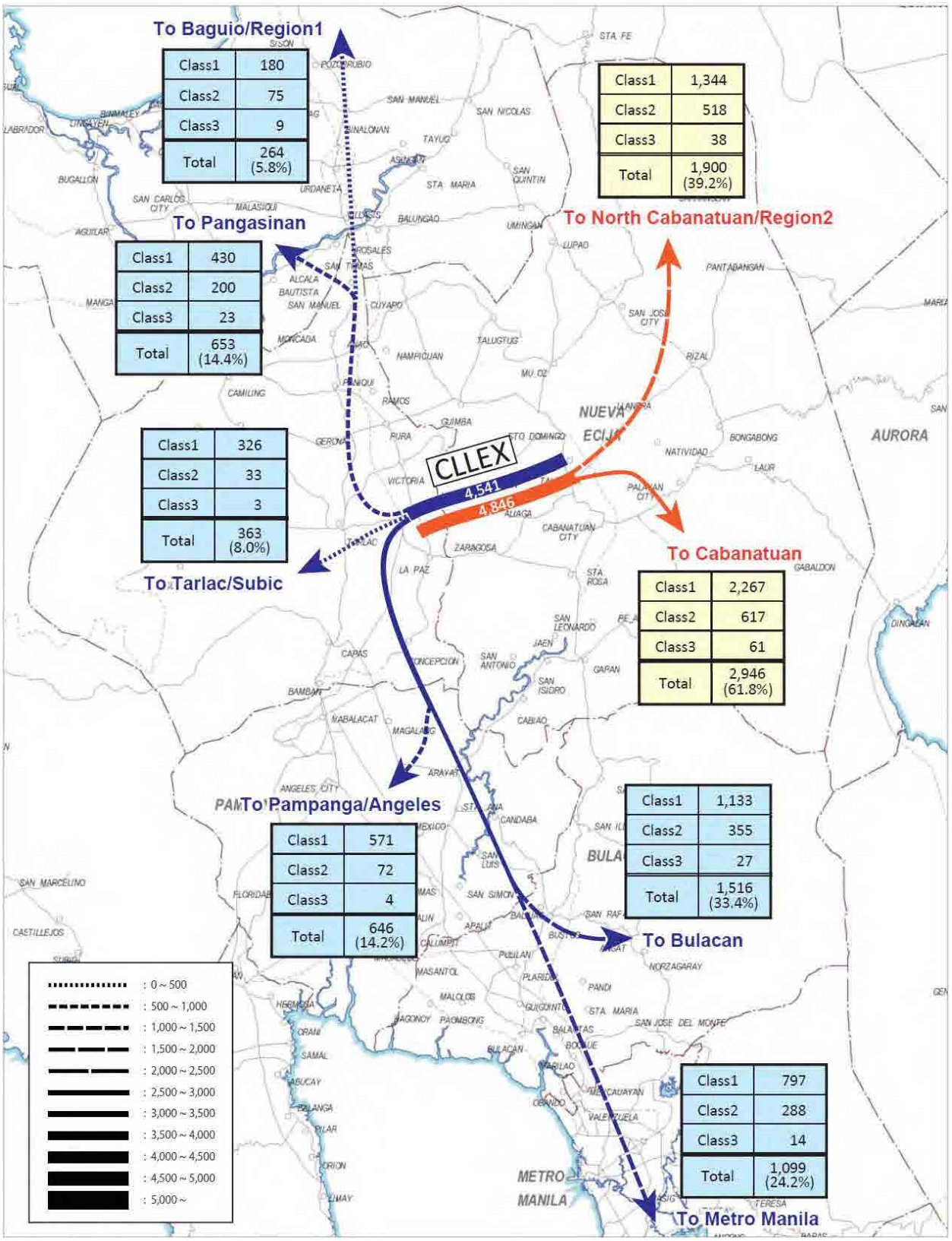
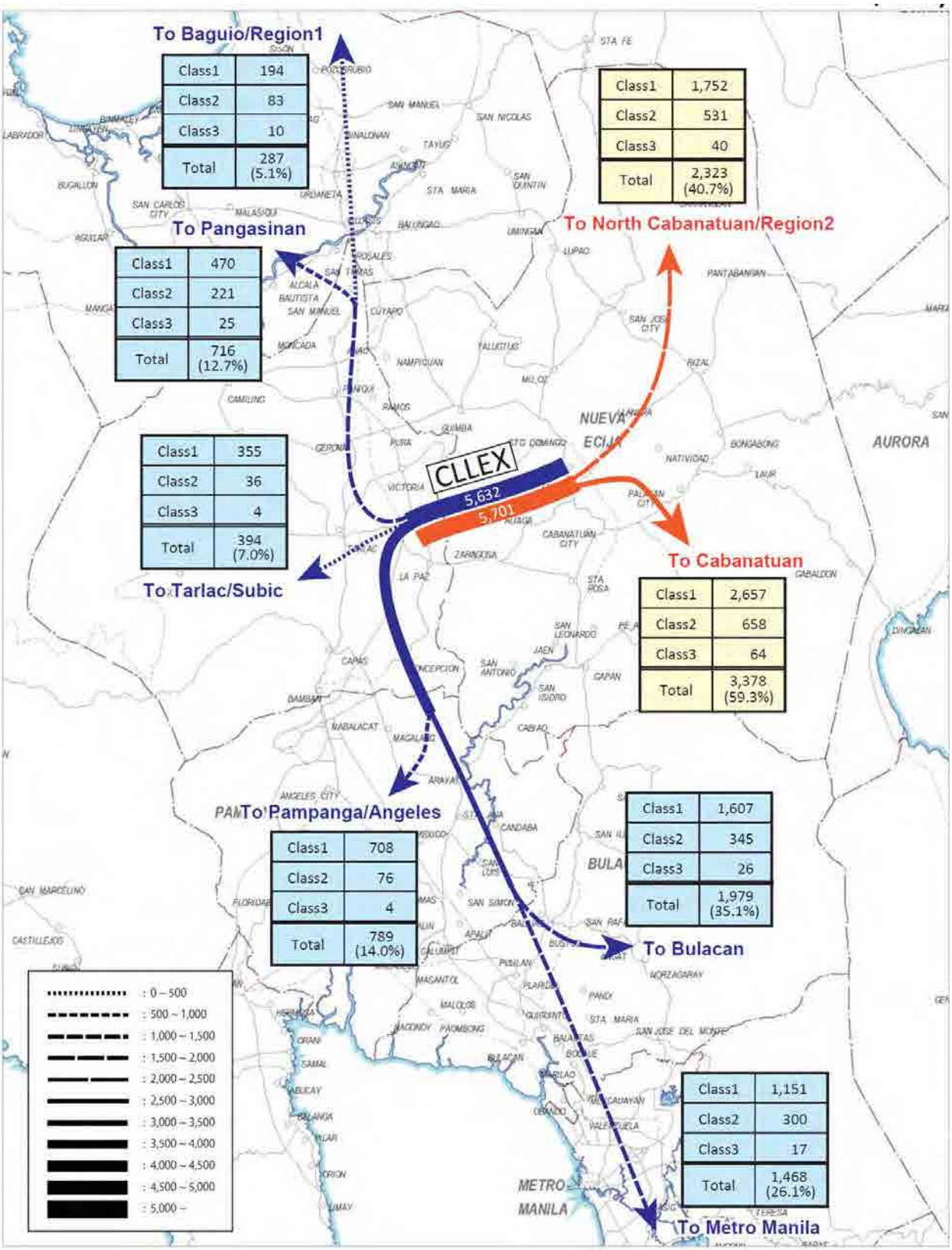



**FIGURE 4.2.7-9 COMPARISON OF WITH CASE AND WITHOUT CASE IN YEAR 2030 (PHASE-1, 2-LANE)**



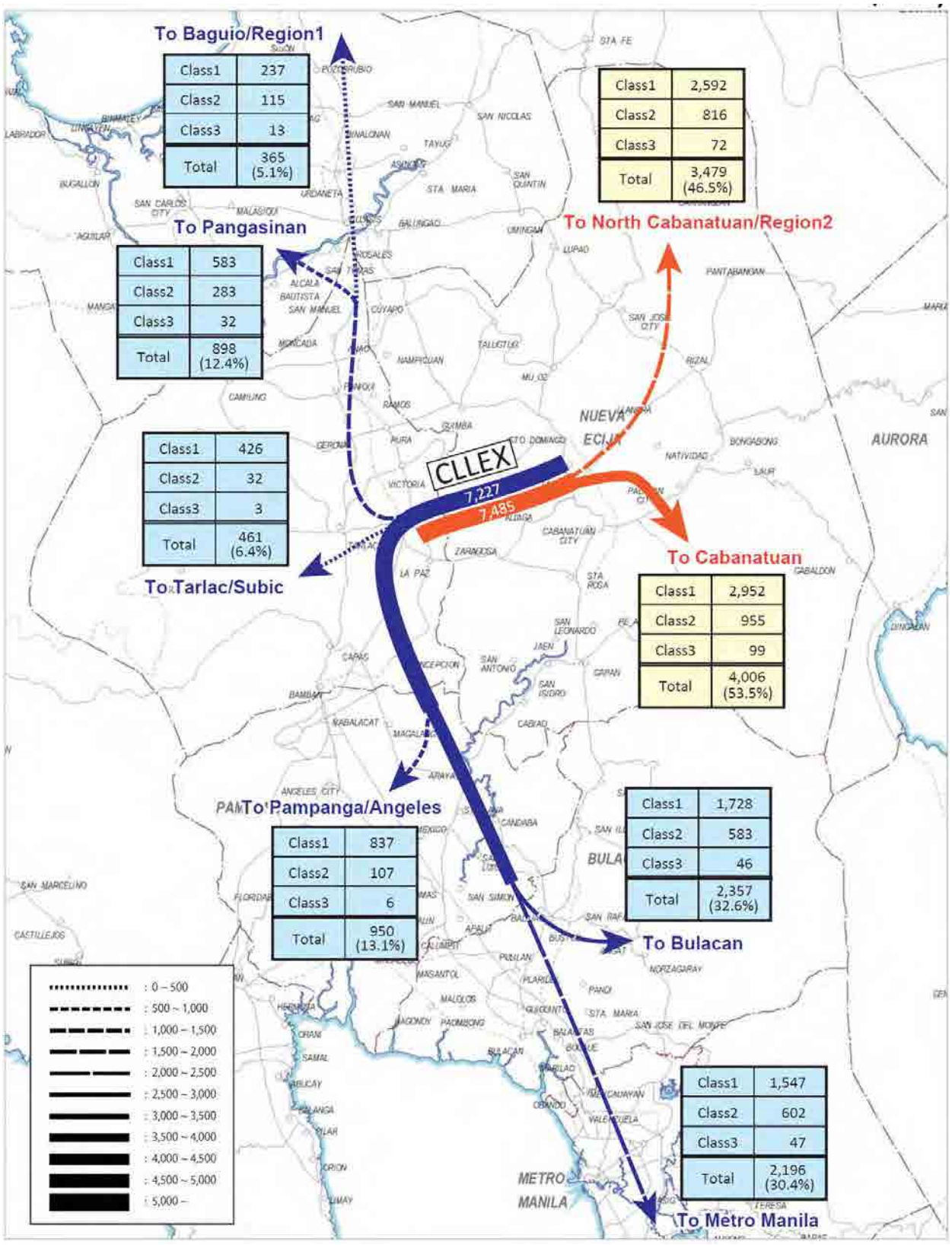

Unit: Vehicle/day

**FIGURE 4.2.7-10 TRAFFIC VOLUME OF CLLEX DESTINATION (YEAR 2017) (PHASE 1, 2 LANES)**




Unit: Vehicle/day

**FIGURE 4.2.7-11 TRAFFIC VOLUME OF CLLEX DESTINATION (YEAR 2020) (PHASE 1, 2 LANES)**




Unit: Vehicle/day

**FIGURE 4.2.7-12 TRAFFIC VOLUME OF CLLEX DESTINATION (YEAR 2030) (PHASE 1, 2 LANES)**

**2) Case-2 CLLEX (Phase-1) 4 lane**

**Figures 4.2.7-13** to **4.2.7-15** shows the estimated traffic volume of CLLEX (Phase-1).

- Traffic assignment of CLLEX (Phase-1) 4lane case is a little higher than that of 2lane case. Traffic volume between Tarlac IC and Aliaga IC are 12,630 (vehicle/day) in year 2017, 14,255 (vehicle/day) in year 2020 and 20,177 (vehicle/day) in year 2030.

**Table 4.2.7-3** shows the total traffic volume to enter CLLEX (Phase-1) and total vehicle km of CLLEX(Phase-1).

**3) Case-3 CLLEX (Phase-2) 2 lane**

Traffic assignment of CLLEX (Phase-2) was estimated based on the assumption of CLLEX (Phase-1) also 2-lane.

**Figures 4.2.7-16** to **4.2.7-18** shows the estimated traffic volume of CLLEX (Phase-2).

- Traffic assignment of CLLEX (Phase-2) case is lower than phase-1 traffic. Traffic volume between Cabanatuan IC and Llanera IC are 7,402(vehicle/day) in year 2017, 8,402 (vehicle/day) in year 2020 and 12,984 (vehicle/day) in year 2030.

**Figures 4.2.7-19** to **4.2.7-21** shows the number of traffic CLLEX (Phase-1) destination.

**Table 4.2.7-4** shows the total traffic volume to enter CLLEX (Phase-2) and total vehicle km of CLLEX (Phase-2).

**TABLE 4.2.7-3 TOTAL TRAFFIC VOLUME AND TOTAL VEHICLE KM (CLLEX PHASE-1, 4-LANE)**

| Year | Traffic Volume (Veh/day) | | | | Total vehicle*km | | | |
|---|---|---|---|---|---|---|---|---|
| | Class1 | Class2 | Class3 | Total | Class1 | Class2 | Class3 | Total |
| 2017 | 9,502 | 2,886 | 241 | 12,629 | 256,672 | 78,158 | 6,321 | 341,151 |
| 2018 | 9,967 | 2,933 | 246 | 13,147 | 267,212 | 79,654 | 6,489 | 353,355 |
| 2019 | 10,455 | 2,981 | 252 | 13,688 | 278,185 | 81,179 | 6,660 | 366,025 |
| 2020 | 10,967 | 3,030 | 257 | 14,254 | 289,609 | 82,733 | 6,837 | 379,179 |
| 2021 | 11,349 | 3,141 | 267 | 14,758 | 299,881 | 85,845 | 7,134 | 392,859 |
| 2022 | 11,745 | 3,257 | 278 | 15,280 | 310,517 | 89,073 | 7,443 | 407,034 |
| 2023 | 12,155 | 3,376 | 289 | 15,820 | 321,530 | 92,423 | 7,767 | 421,720 |
| 2024 | 12,578 | 3,500 | 301 | 16,379 | 332,934 | 95,899 | 8,104 | 436,937 |
| 2025 | 13,017 | 3,629 | 313 | 16,959 | 344,743 | 99,506 | 8,455 | 452,704 |
| 2026 | 13,471 | 3,762 | 325 | 17,558 | 356,970 | 103,249 | 8,822 | 469,041 |
| 2027 | 13,940 | 3,900 | 339 | 18,179 | 369,631 | 107,132 | 9,205 | 485,968 |
| 2028 | 14,426 | 4,044 | 352 | 18,822 | 382,741 | 111,161 | 9,605 | 503,507 |
| 2029 | 14,929 | 4,192 | 366 | 19,488 | 396,316 | 115,342 | 10,022 | 521,680 |
| 2030 | 15,450 | 4,346 | 381 | 20,177 | 410,372 | 119,680 | 10,457 | 540,509 |
| 2031 | 15,989 | 4,506 | 396 | 20,891 | 424,927 | 124,181 | 10,911 | 560,019 |
| 2032 | 16,546 | 4,671 | 412 | 21,629 | 439,998 | 128,852 | 11,385 | 580,234 |
| 2033 | 17,123 | 4,843 | 429 | 22,394 | 455,604 | 133,698 | 11,879 | 601,180 |
| 2034 | 17,720 | 5,021 | 446 | 23,187 | 471,763 | 138,726 | 12,394 | 622,884 |
| 2035 | 18,338 | 5,205 | 464 | 24,007 | 488,495 | 143,944 | 12,932 | 645,372 |
| 2036 | 18,977 | 5,396 | 483 | 24,856 | 505,821 | 149,358 | 13,494 | 668,673 |
| 2037 | 19,639 | 5,594 | 502 | 25,735 | 523,762 | 154,975 | 14,079 | 692,816 |
| 2038 | 20,324 | 5,800 | 522 | 26,645 | 542,338 | 160,804 | 14,691 | 717,833 |
| 2039 | 21,032 | 6,013 | 543 | 27,588 | 561,574 | 166,851 | 15,328 | 743,754 |
| 2040 | 21,766 | 6,234 | 565 | 28,564 | 581,492 | 173,127 | 15,994 | 770,612 |
| 2041 | 22,524 | 6,463 | 588 | 29,574 | 602,116 | 179,638 | 16,688 | 798,442 |
| 2042 | 23,310 | 6,700 | 611 | 30,621 | 623,471 | 186,394 | 17,412 | 827,278 |
| 2043 | 24,122 | 6,946 | 636 | 31,704 | 645,584 | 193,405 | 18,168 | 857,157 |
| 2044 | 24,963 | 7,201 | 661 | 32,826 | 668,482 | 200,679 | 18,957 | 888,118 |
| 2045 | 25,834 | 7,466 | 688 | 33,987 | 692,191 | 208,226 | 19,780 | 920,198 |
| 2046 | 26,735 | 7,740 | 715 | 35,190 | 716,742 | 216,058 | 20,638 | 953,438 |

## 4-LANE

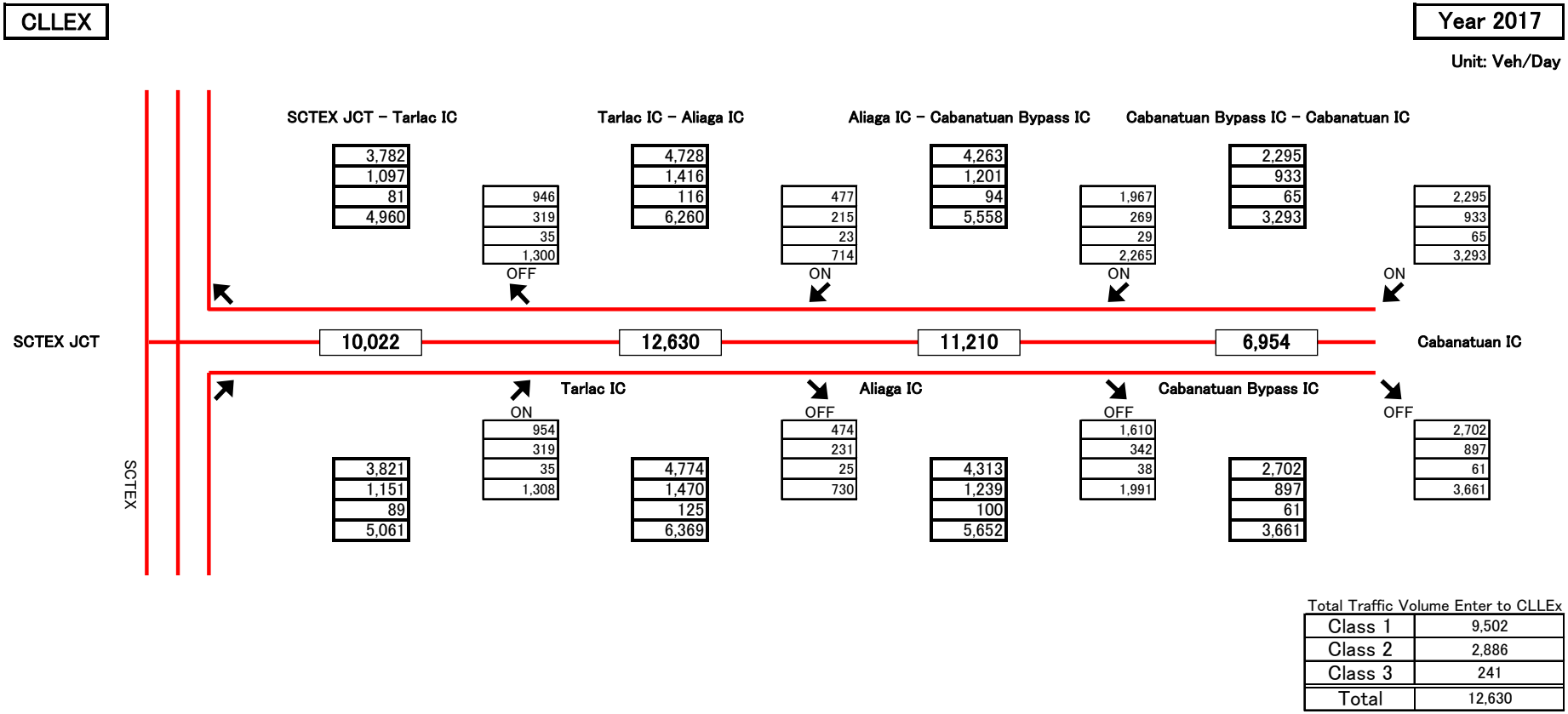
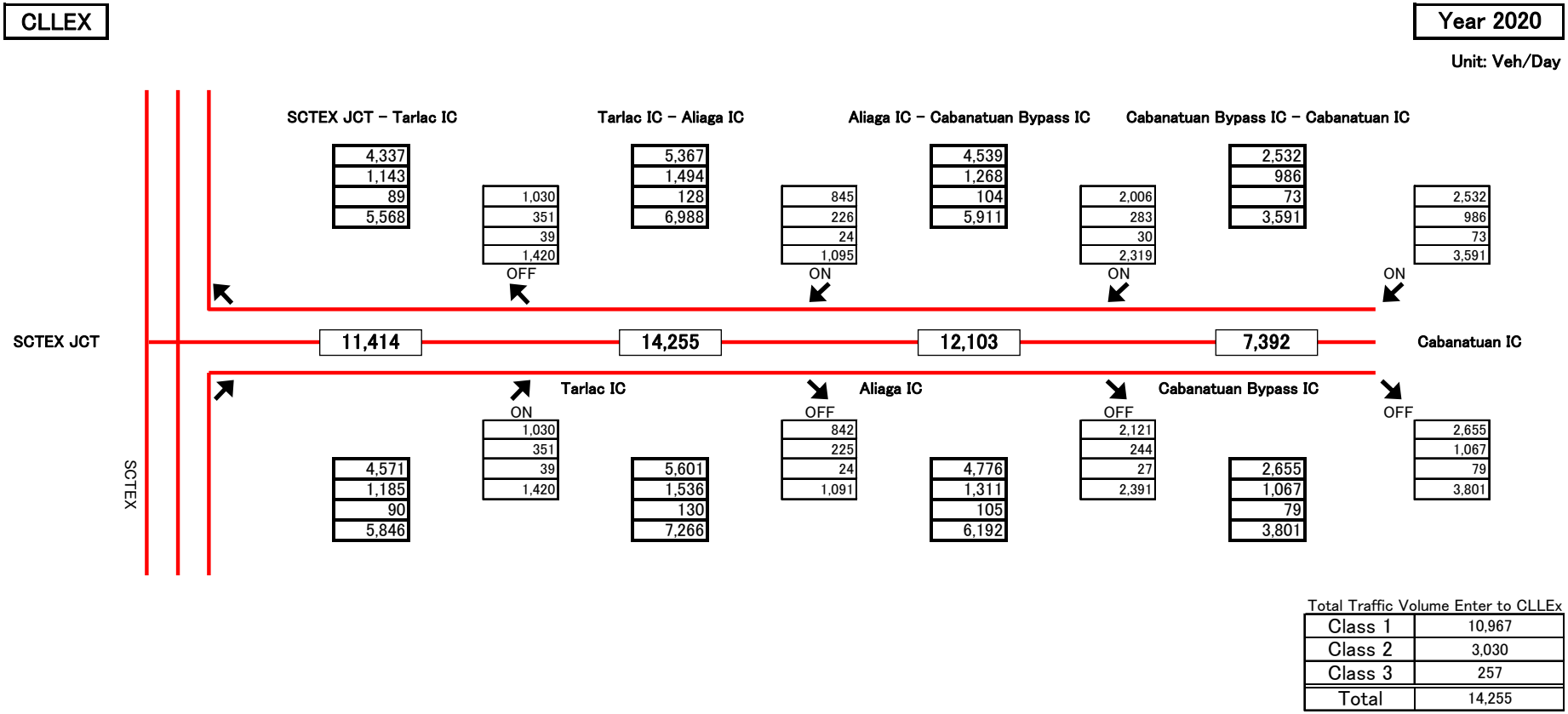



**FIGURE 4.2.7-13 TRAFFIC PROJECTION (YEAR 2017) OF CLLEX (PHASE-1) 4-LANE CASE**

## 4-LANE

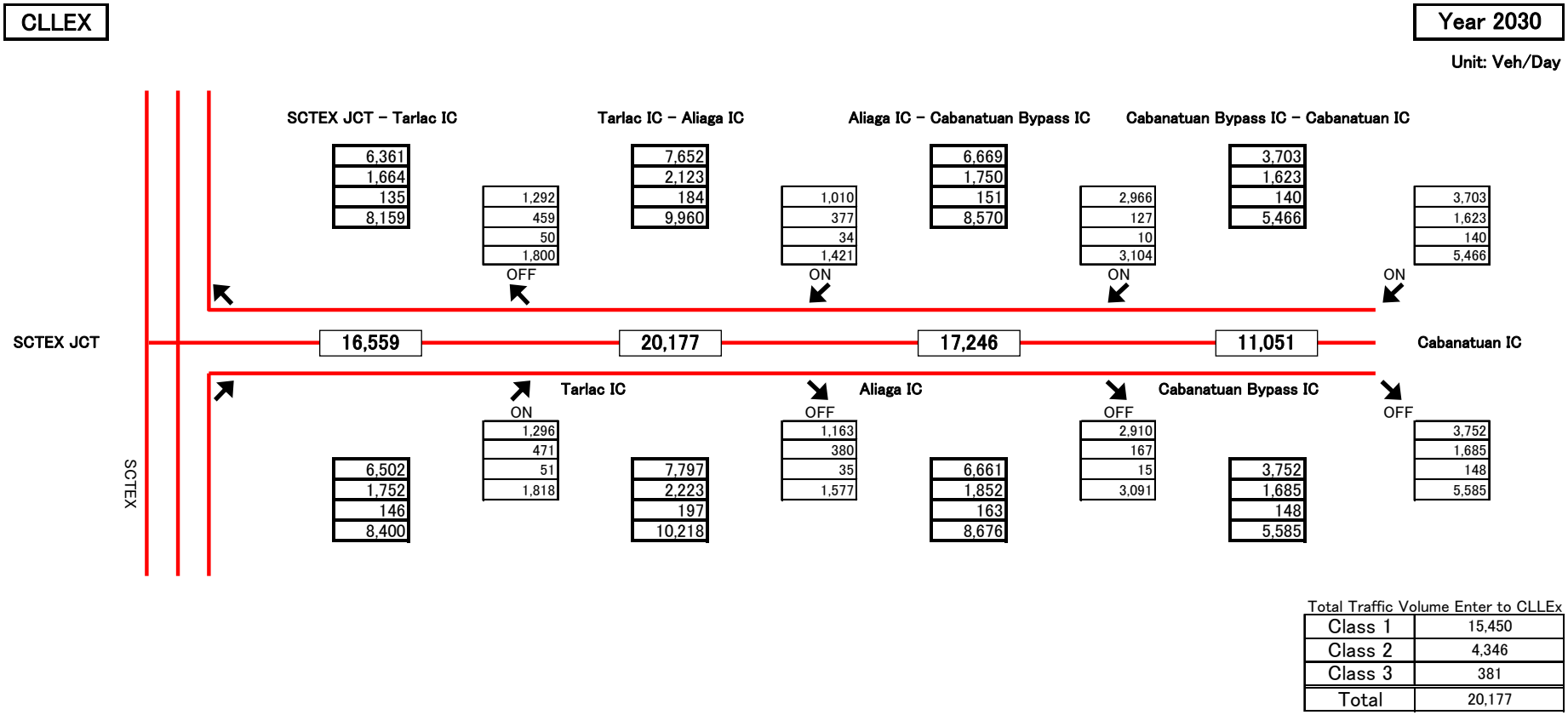



Total Traffic Volume Enter to CLLEx

| | |
|---|---|
| Class 1 | 10,967 |
| Class 2 | 3,030 |
| Class 3 | 257 |
| Total | 14,255 |

**FIGURE 4.2.7-14 TRAFFIC PROJECTION (YEAR 2020) OF CLLEX (PHASE-1) 4-LANE CASE**

# 4-LANE




Total Traffic Volume Enter to CLLEx

| | |
|---|---|
| Class 1 | 15,450 |
| Class 2 | 4,346 |
| Class 3 | 381 |
| Total | 20,177 |

**FIGURE 4.2.7-15 TRAFFIC PROJECTION (YEAR 2030) OF CLLEX (PHASE-1) 4-LANE CASE**

**TABLE 4.2.7-4 TOTAL TRAFFIC VOLUME AND TOTAL VEHICLE KM (CLLEX PHASE-2, 2-LANE)**

| Year | Traffic Volume (Veh/day) | | | | Total vehicle*km | | | |
|---|---|---|---|---|---|---|---|---|
| | Class1 | Class2 | Class3 | Total | Class1 | Class2 | Class3 | Total |
| 2017 | 5,583 | 1,875 | 159 | 7,617 | 190,890 | 66,585 | 5,667 | 263,142 |
| 2018 | 5,865 | 1,915 | 163 | 7,944 | 200,733 | 68,020 | 5,793 | 274,547 |
| 2019 | 6,162 | 1,957 | 166 | 8,285 | 211,084 | 69,487 | 5,922 | 286,493 |
| 2020 | 6,474 | 1,999 | 170 | 8,643 | 221,968 | 70,985 | 6,054 | 299,007 |
| 2021 | 6,769 | 2,077 | 177 | 9,023 | 232,266 | 73,744 | 6,302 | 312,312 |
| 2022 | 7,077 | 2,158 | 184 | 9,419 | 243,042 | 76,609 | 6,561 | 326,213 |
| 2023 | 7,399 | 2,242 | 192 | 9,833 | 254,318 | 79,587 | 6,830 | 340,735 |
| 2024 | 7,736 | 2,329 | 200 | 10,265 | 266,117 | 82,680 | 7,111 | 355,907 |
| 2025 | 8,088 | 2,420 | 208 | 10,716 | 278,464 | 85,893 | 7,402 | 371,759 |
| 2026 | 8,457 | 2,514 | 217 | 11,187 | 291,383 | 89,231 | 7,706 | 388,320 |
| 2027 | 8,842 | 2,612 | 226 | 11,679 | 304,902 | 92,698 | 8,022 | 405,622 |
| 2028 | 9,244 | 2,714 | 235 | 12,193 | 319,048 | 96,301 | 8,352 | 423,700 |
| 2029 | 9,665 | 2,819 | 245 | 12,729 | 333,850 | 100,043 | 8,694 | 442,587 |
| 2030 | 10,105 | 2,929 | 255 | 13,289 | 349,339 | 103,931 | 9,051 | 462,321 |
| 2031 | 10,565 | 3,043 | 266 | 13,874 | 365,547 | 107,970 | 9,422 | 482,939 |
| 2032 | 11,046 | 3,162 | 277 | 14,484 | 382,506 | 112,166 | 9,809 | 504,481 |
| 2033 | 11,549 | 3,285 | 288 | 15,122 | 400,253 | 116,525 | 10,212 | 526,989 |
| 2034 | 12,075 | 3,413 | 300 | 15,787 | 418,822 | 121,053 | 10,631 | 550,506 |
| 2035 | 12,625 | 3,545 | 312 | 16,482 | 438,254 | 125,758 | 11,067 | 575,078 |
| 2036 | 13,199 | 3,684 | 325 | 17,208 | 458,586 | 130,645 | 11,521 | 600,752 |
| 2037 | 13,800 | 3,827 | 339 | 17,966 | 479,862 | 135,722 | 11,994 | 627,578 |
| 2038 | 14,429 | 3,976 | 353 | 18,757 | 502,126 | 140,996 | 12,486 | 655,608 |
| 2039 | 15,086 | 4,131 | 367 | 19,584 | 525,422 | 146,476 | 12,998 | 684,896 |
| 2040 | 15,772 | 4,292 | 383 | 20,447 | 549,799 | 152,168 | 13,532 | 715,499 |
| 2041 | 16,491 | 4,459 | 398 | 21,348 | 575,307 | 158,082 | 14,087 | 747,475 |
| 2042 | 17,241 | 4,632 | 415 | 22,289 | 601,998 | 164,225 | 14,665 | 780,888 |
| 2043 | 18,026 | 4,813 | 432 | 23,271 | 629,928 | 170,607 | 15,267 | 815,802 |
| 2044 | 18,847 | 5,000 | 450 | 24,297 | 659,153 | 177,237 | 15,893 | 852,284 |
| 2045 | 19,705 | 5,195 | 468 | 25,369 | 689,735 | 184,125 | 16,545 | 890,405 |
| 2046 | 20,602 | 5,397 | 488 | 26,487 | 721,735 | 191,281 | 17,224 | 930,240 |

## 2-LANE

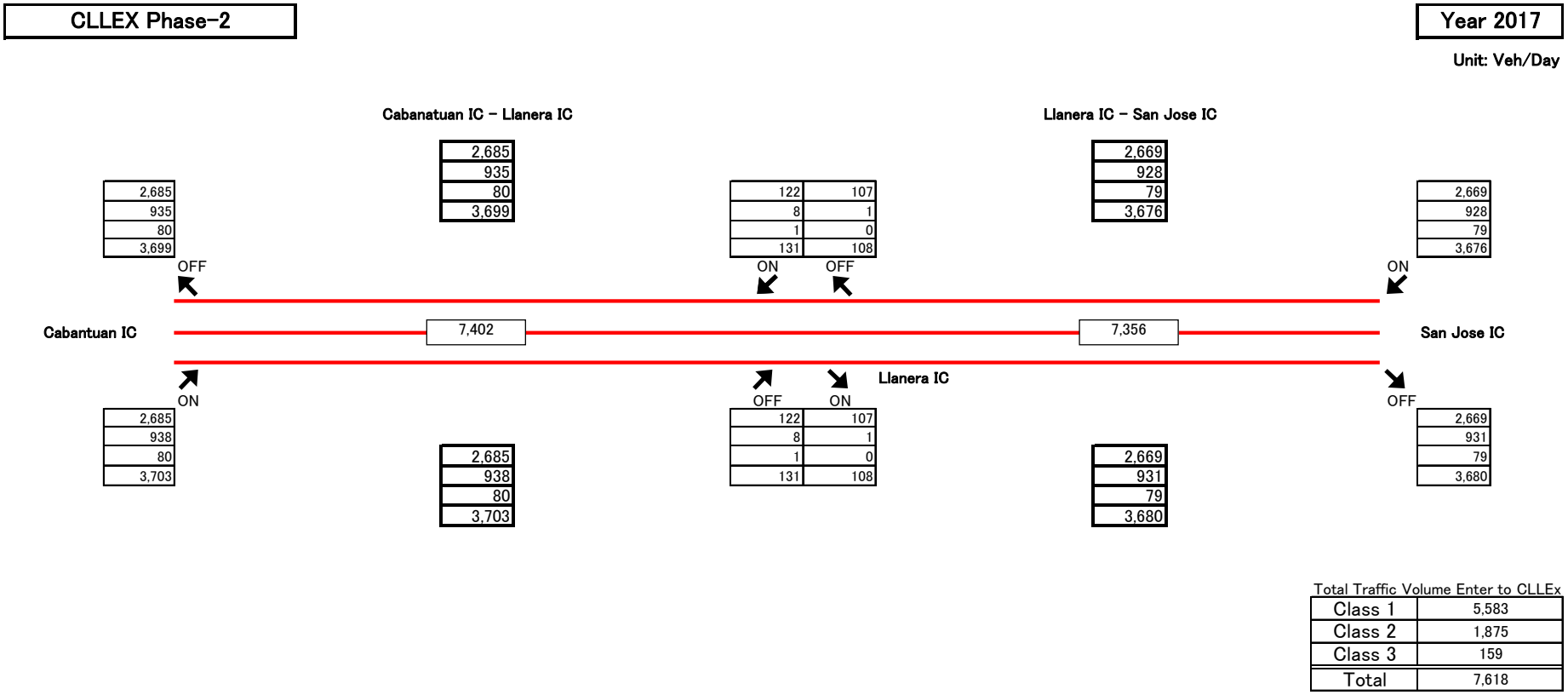



**FIGURE 4.2.7-16 TRAFFIC PROJECTION (YEAR 2017) OF CLLEX (PHASE-2) 2-LANE CASE**

## 2-LANE

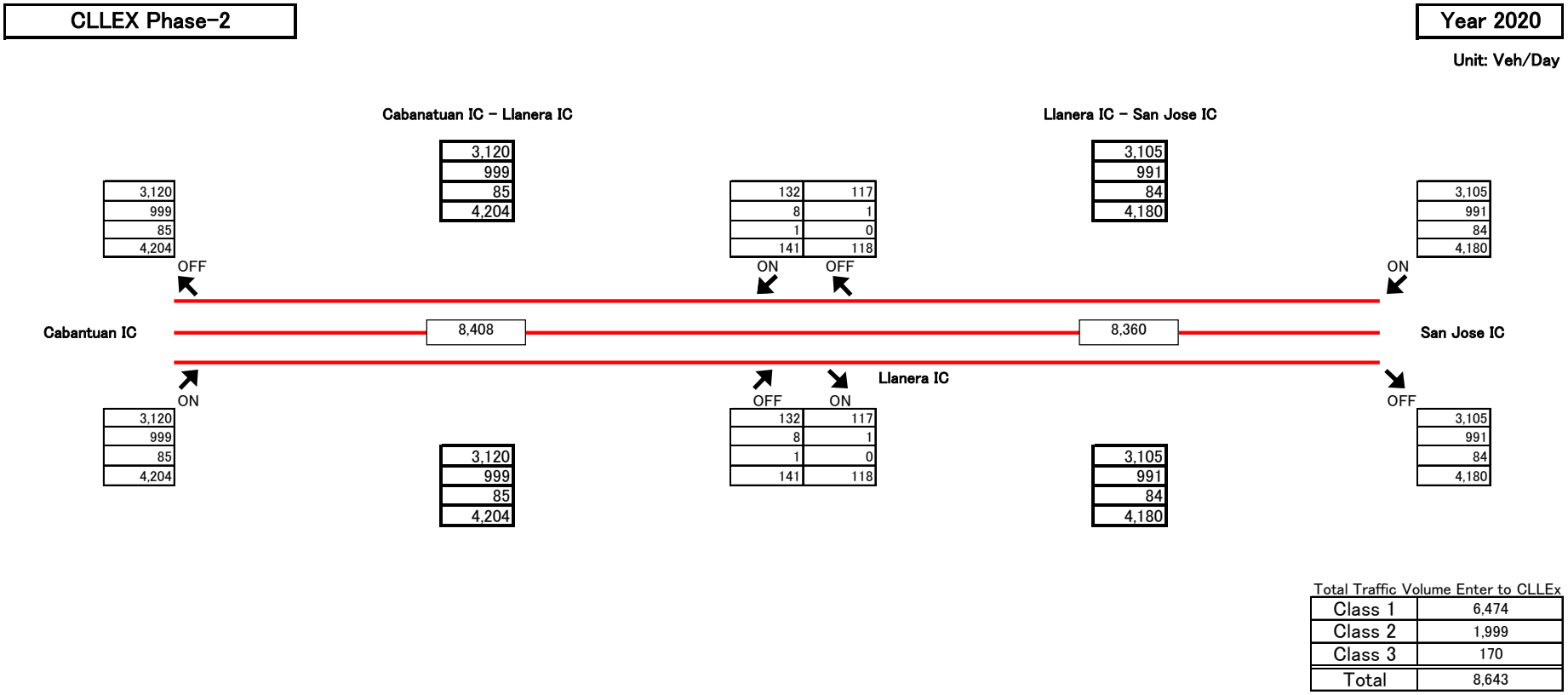



**FIGURE 4.2.7-17 TRAFFIC PROJECTION (YEAR 2020) OF CLLEX (PHASE-2) 2-LANE CASE**

## 2-LANE

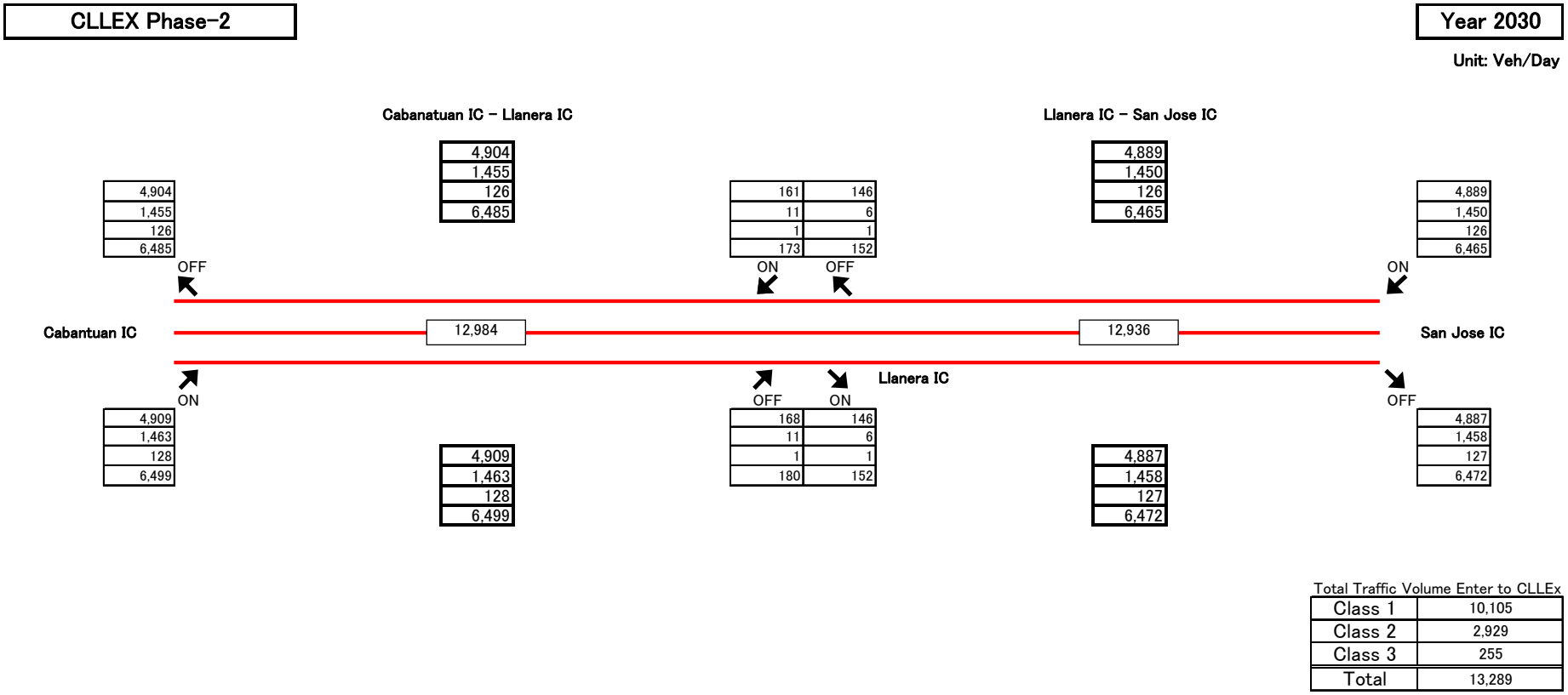



**FIGURE 4.2.7-18 TRAFFIC PROJECTION (YEAR 2030) OF CLLEX (PHASE-2) 2-LANE CASE**

**Year 2017** **Unit: Veh/Day**

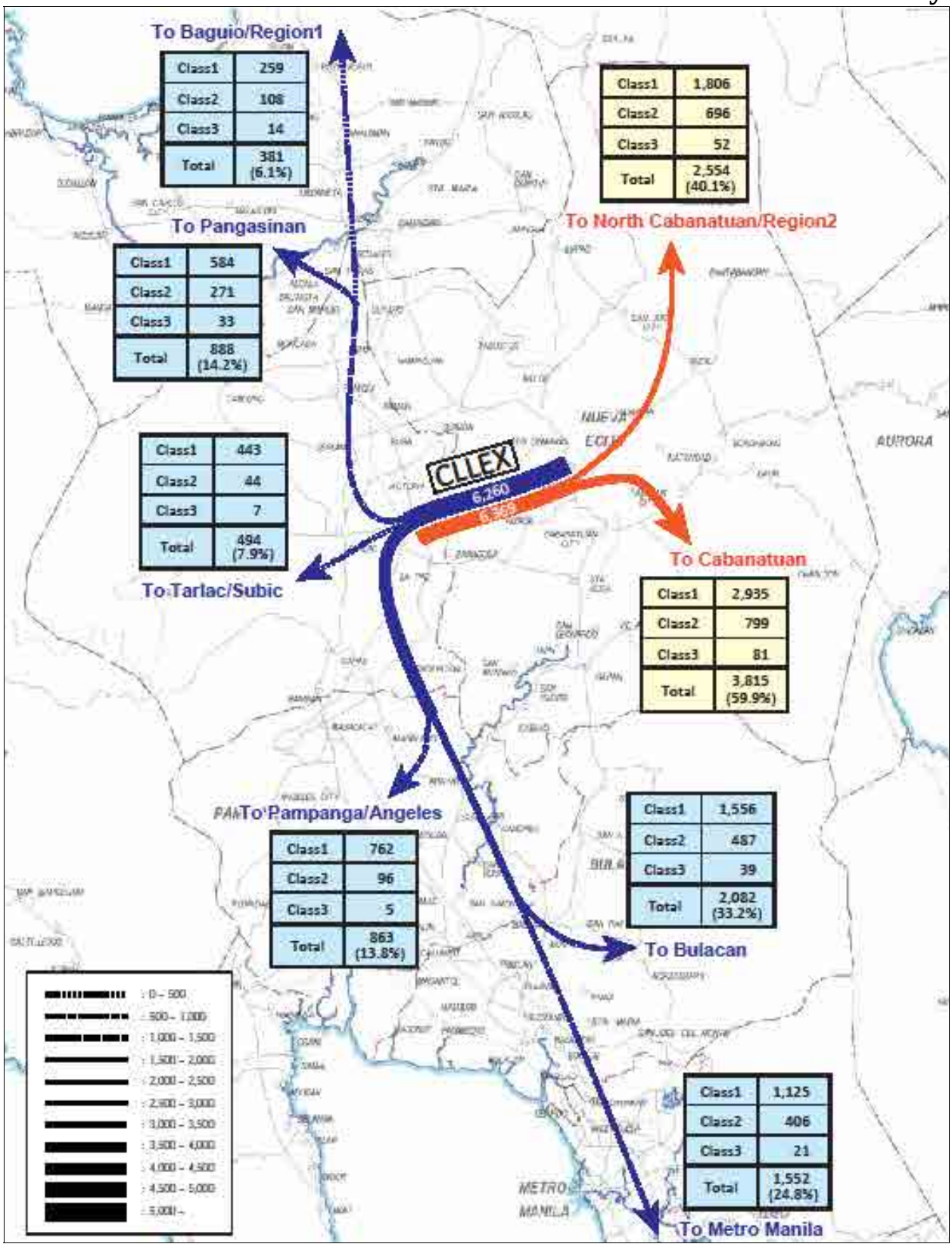



**FIGURE 4.2.7-19 TRAFFIC FLOW OF CLLEX PHASE-1 BY DESTINATION (YEAR 2017) 4 LANES**

**Year 2020** **Unit: Veh/Day**

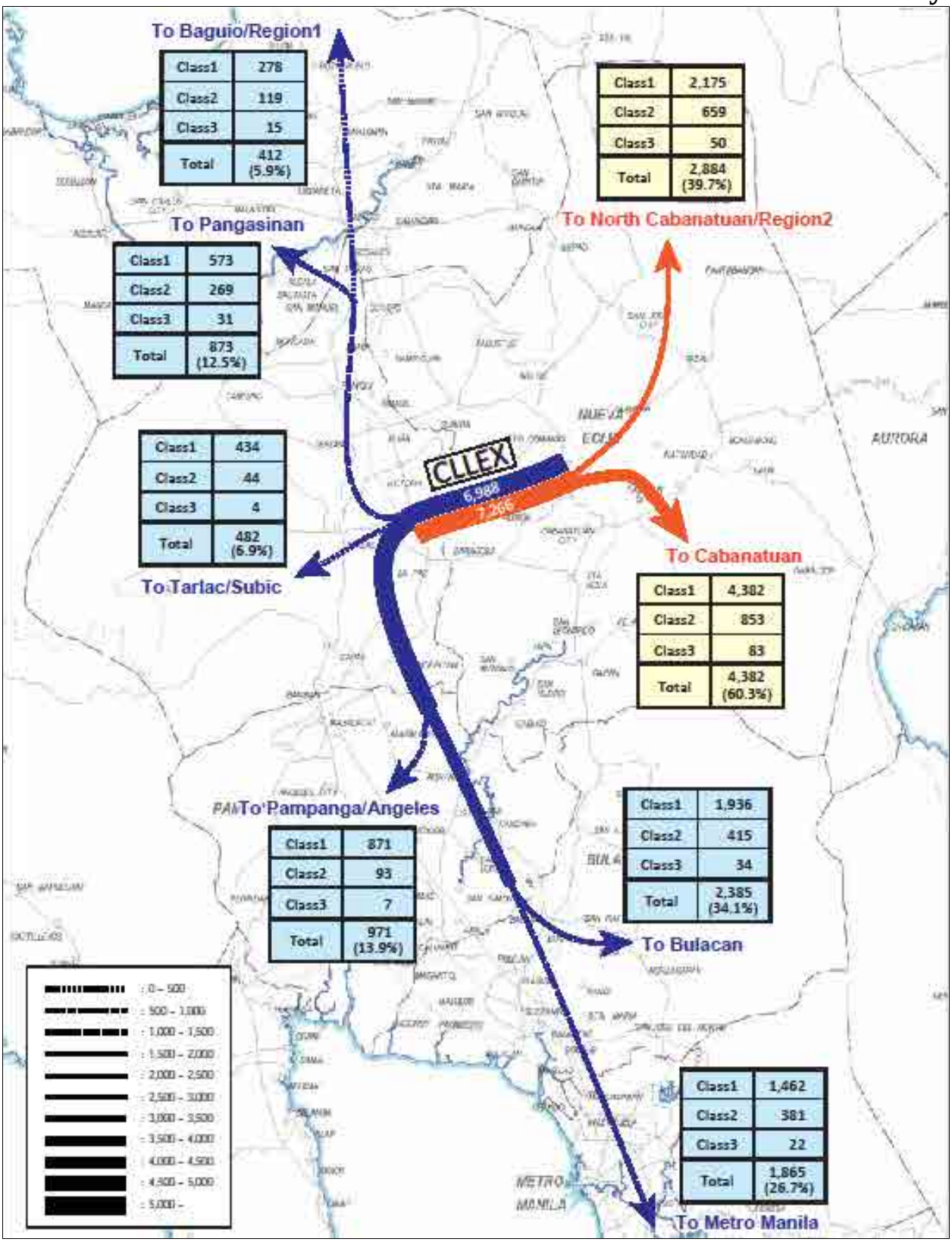



**FIGURE 4.2.7-20 TRAFFIC FLOW OF CLLEX PHASE-1 BY DESTINATION (YEAR 2020) 4 LANES**

**Year 2030** **Unit: Veh/Day**

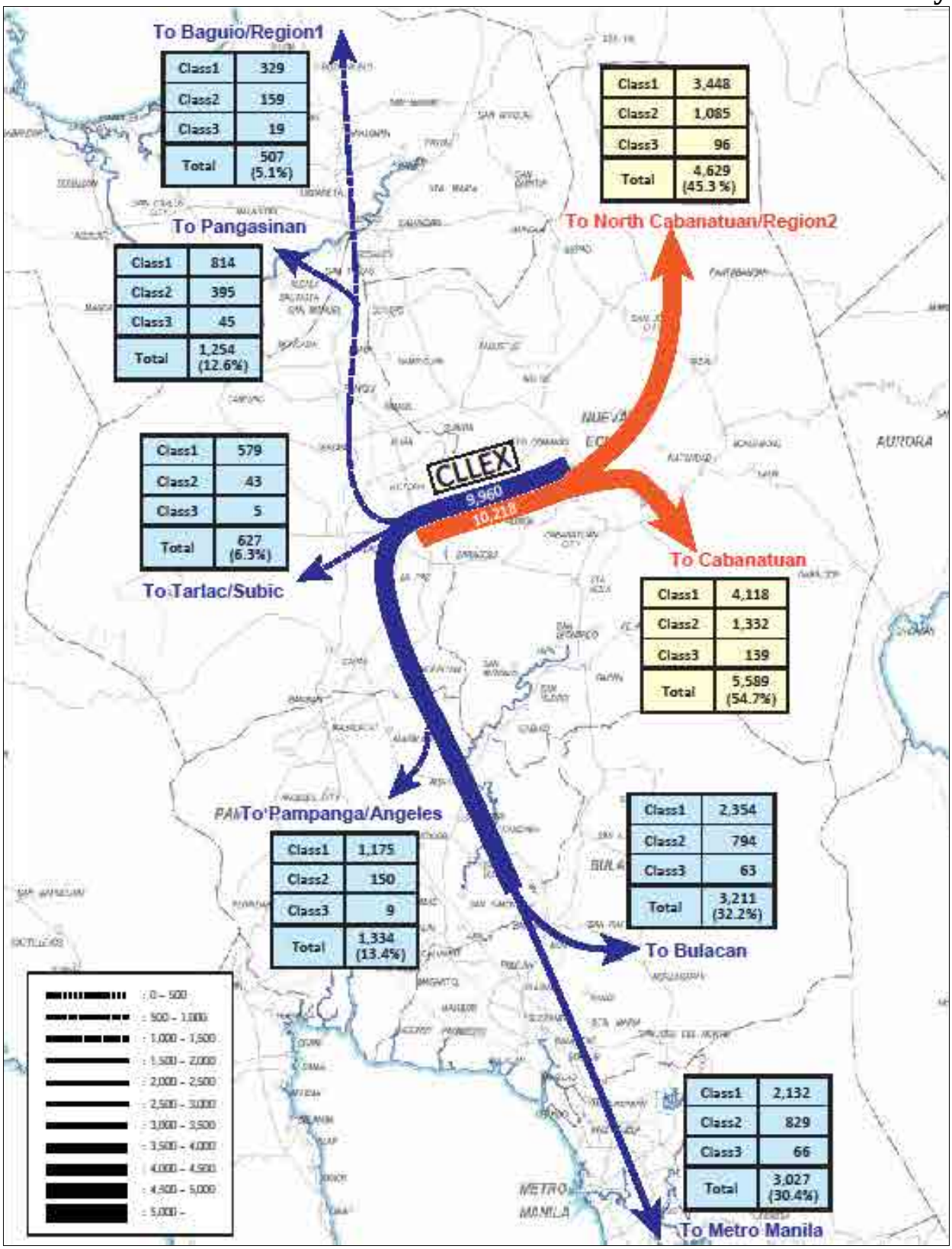



**FIGURE 4.2.7-21 TRAFFIC FLOW OF CLLEX PHASE-1 BY DESTINATION (YEAR 2030) 4 LANES**

# CHAPTER 5

# REVIEW OF 2010 FEASIBILITY STUDY

# CHAPTER 5
# REVIEW OF 2010 FEASIBILITY STUDY

## 5.1 NECESSITY OF THE PROJECT

### 1) Traffic Congestion on Pan Philippine Highway

Eastern areas of Region III and whole Region II are served by Pan Philippine Highway, which passes through urban areas at 5-10 km interval. Urban sections of Pan Philippine Highway suffer chronic traffic congestions due to sharp increase of local traffic such as jeepneys and tricycles, and travel speed becomes less than 20 km/hr.

With the completion of SCTEx, some traffic of long distance trips, such as between Metro Manila and Cabanatuan City or Region II, are already diverting to the route of NLEx-SCTEx-Tarlac-Sta. Rosa Road from Pan Philippine Highway. When Tarlac-Sta. Rosa Road is replaced by CLLEx, more traffic will be diverted to this route from Pan Philippine Highway, thus traffic congestion of Pan Philippine Highway will be mitigated.

### 2) Need of Strengthening of Lateral (East-West) Road Network

**Figure 5.1-1** shows the distribution of population in Region III and road network. For north-south direction, traffic is served by NLEx-SCTEx-TPLEx, Manila North Road and Pan Philippine Highway along which major urban centers are distributed. However, road network in the east-west direction is still weak and needs to be strengthened, thereby socio-economic inter-action in that direction is stimulated and overall socio-economic activities will be activated for socio-economic development of the Region and the country as a whole.

### 3) Need to Develop Regional Growth Pole Cities

Overconcentration of socio-economic activities in Metro Manila has been one of the critical issues of the country. To mitigate such conditions, Regional Gorwth Pole Cities must be developed, so that socio-economic activities of Metro Manila can be shared with such Regional Growth Pole Cities as Tarlac City and Cabanatuan City.

### 4) Need to Develop Impoverish Area

Pacific Ocean Coastal area in Region III is one of the impoverished areas of the country. Cabanatuan City is the base city (or hub city) for the development of Pacific Ocean Coastal area. If accessibility to Cabanatuan City is improved, the impact will be extended to Pacific Ocean Coastal area.

### 5) Need to Develop Integrated Multi-modal Logistics/Transport System

In order to achieve faster, safer, more cost effective and reliable logistics/transport system, an expressway network development in the Region is vitally needed.

Approach sections of Rio Chico River Bridge along Tarlac-Sta. Rosa Road which is currently an important to provide transport services in the east-west direction is often flooded and traffic is interrupted. More reliable transport facility is needed.

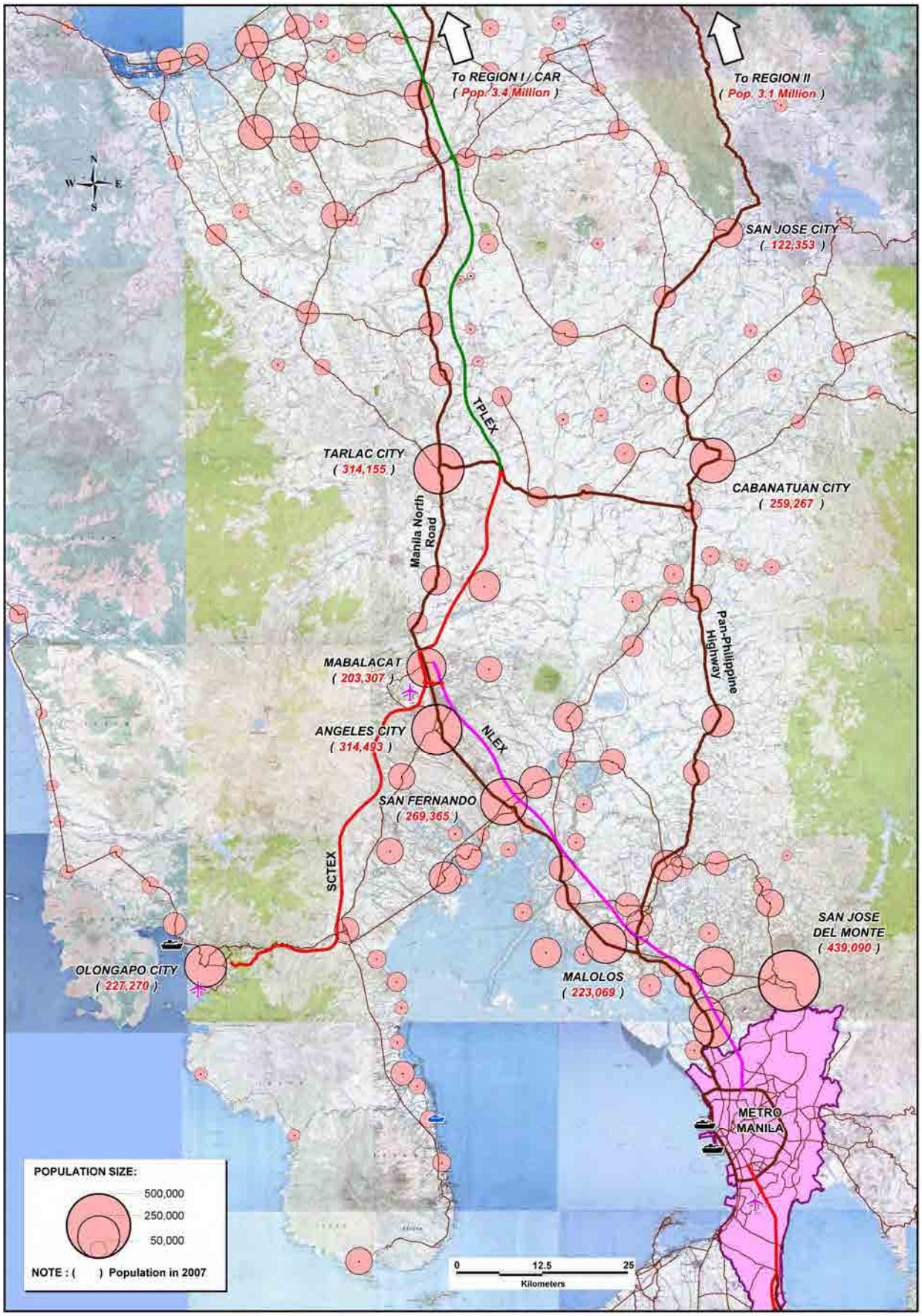



**FIGURE 5.1-1 DISTRIBUTION OF POPULATION IN REGION 3 AND ROAD NETWORK**

## 5.2 TECHNICAL ISSUES

### 5.2.1 Summary of Technical Issues

After thorough review of 2010 FS, the following technical issues were identified (see **Figure 5.2.1-1**);

**TECHNICAL ISSUES**

- How to connect with SCTEx or TPLEx
- Needs additional interchange at Aliaga Municipality
- Cabanatuan IC location and how to attract more traffic from/to Cabanatuan City
- Appropriate Location of Alignment in the Flood-prone Area
- Toll Collection System
- Need to Study Stage Construction

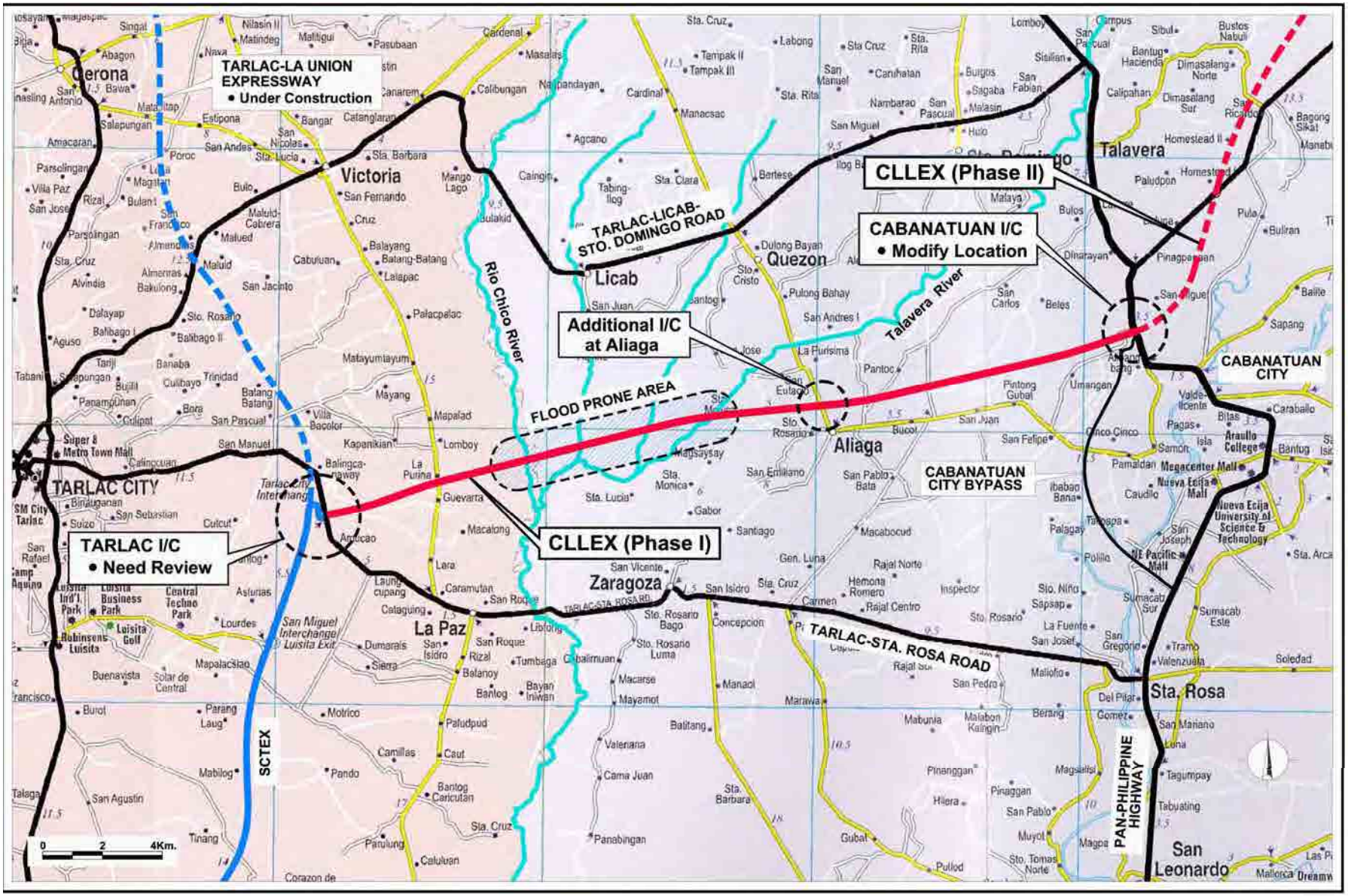



**FIGURE 5.2.1-1 TECHNICAL ISSUES OF CLLEX PHASE I**

### 5.2.2 How to connect with SCTEx or TPLEx

2010 FS proposed that CLLEx is to be connected with the existing SCTEx Tarlac Interchange exit/entrance, thus, CLLEx is not directly connected with SCTEx, but is connected via the national road of Tarlac – Sta. Rosa Road. Another new development is that the type of Tarlac Interchange was changed. According to the latest plan of SCTEx and TPLEx, Tarlac Interchange is a half interchange at CLEx and another half interchange at TPLEx as shown in **Figure 5.2.2-1.**

To maintain efficient traffic flow on the expressways, two expressways should be directly connected, but not via national or provincial road. Three (3) alternative connection options were studied (see **Table 5.2.2-1**);

**ALTERNATIVES OF CONNECTION POINT**

| | | |
|---|---|---|
| Alternative-1 | : | 2010 FS Option Proposed by 2010 FS |
| Alternative-2 | : | Direct connection with SCTEx |
| Alternative-3 | : | Direct connection with TPLEx |

Traffic volume attracted to CLLEx is about 11,000 veh./day in the proposed opening year of 2017 and approximately composed of the following;

| | | |
|---|---|---|
| • Traffic between Manila side and Cabanatuan City | : | 70% |
| • Traffic between Pangasinan side and Cabanatuan City | : | 20% |
| • Traffic between Tarlac side and Cabanatuan City | : | 10% |

As shown above, traffic between Manila side and Cabanatuan City is predominant. Connection point between CLLEx and SCTEx/TPLEx should be selected giving primary consideration of traffic between Manila side and Cabanatuan City.

Evaluation of 3 alternatives is shown in **Table 5.2.2-2**, and Alternative-2 (connected with SCTEx) was recommended due to the following reasons;

- Alternative-2 provides direct connection between 2 expressways.
- Most preferred alternative for traffic between Manila side and Cabanatuan City, which is the predominant traffic flow.

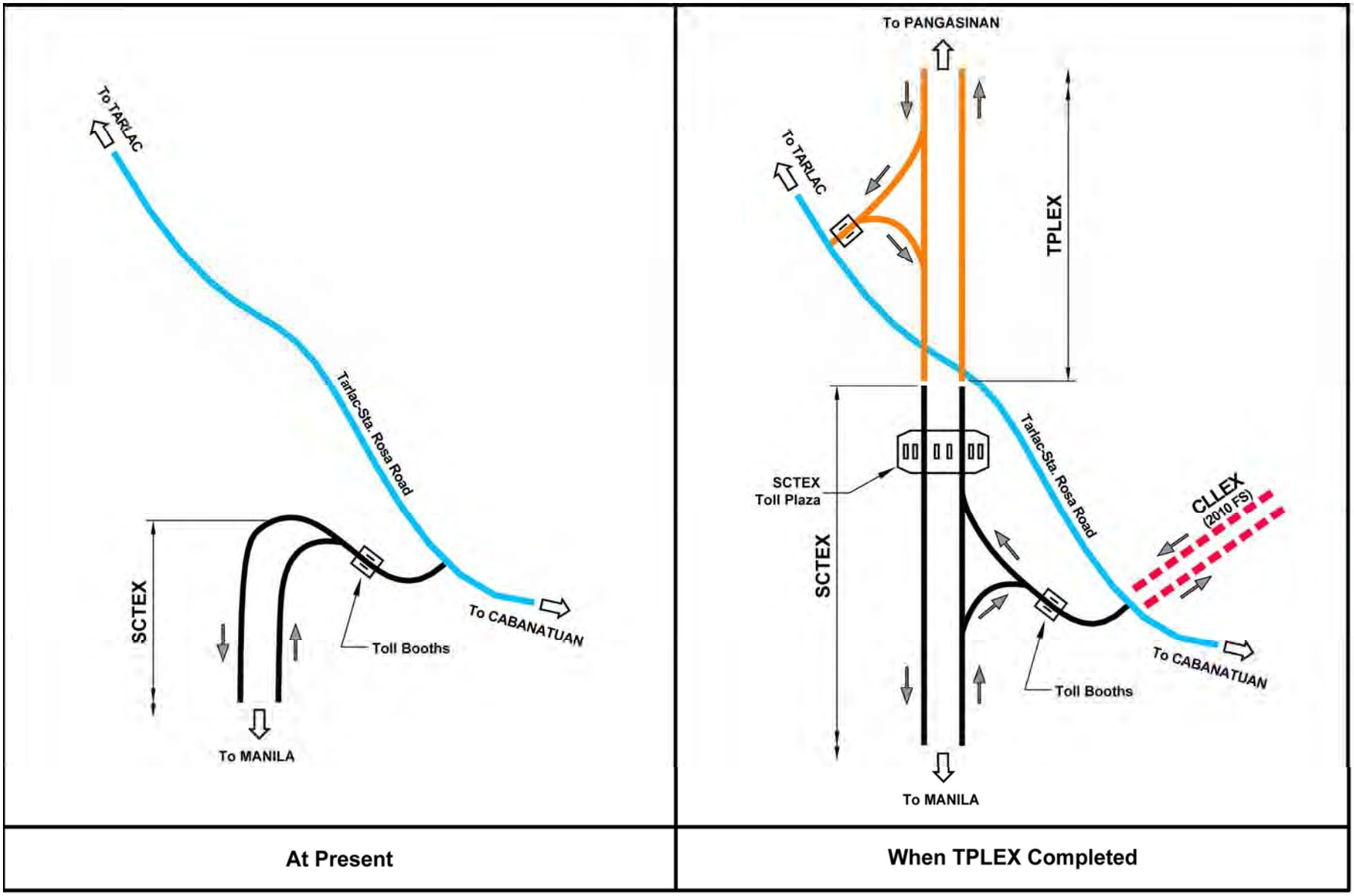



**FIGURE 5.2.2-1 CONNECTION BETWEEN SCTEX AND TPLEX**

## TABLE 5.2.2-1 ALTERNATIVES OF CONNECTION BETWEEN CLLEX AND SCTEX/TPLEX

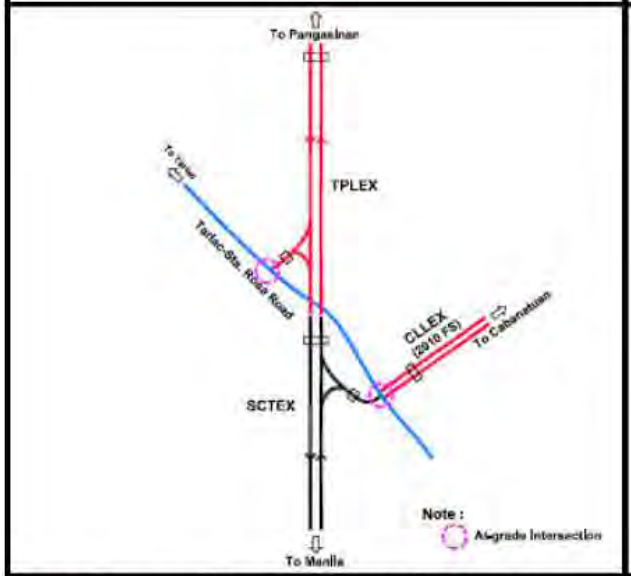
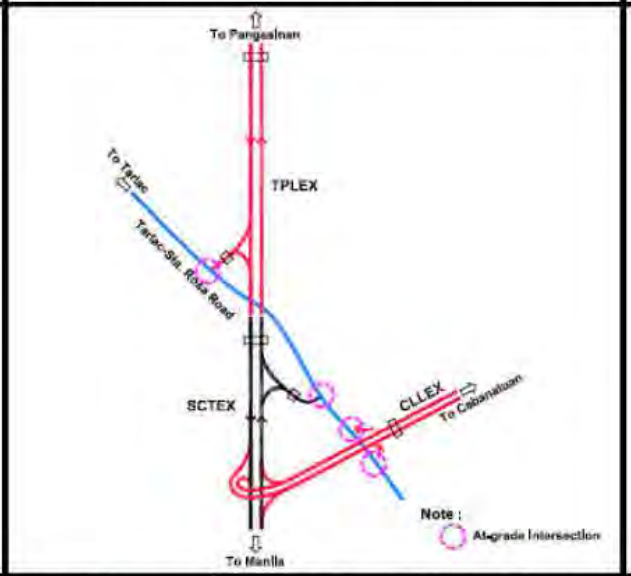
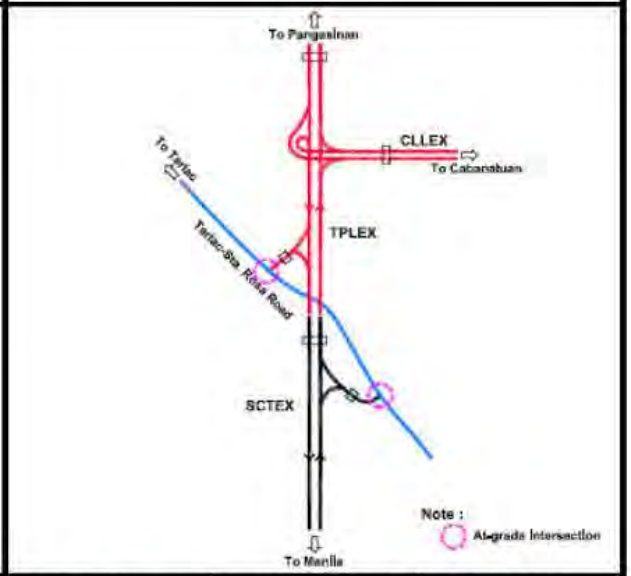
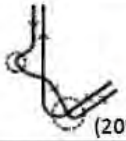
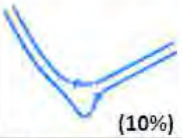
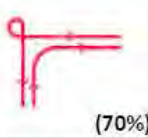
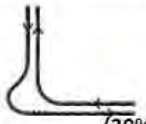
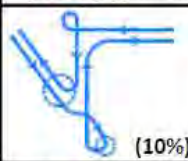
| ALTERNATIVE - 1 | ALTERNATIVE - 2 | ALTERNATIVE - 3 |
|---|---|---|
| **Concept :**<br>• Proposed plan by 2010 FS.<br>• CLLEx is connected with SCTEx via Intersection. | **Concept :**<br>• CLLEx is directly connected with SCTEx.<br>• On and off ramps is provided from/to Tarlac-Sta. Rosa Road for better linkage between Tarlac and Cabanatuan. | **Concept :**<br>• CLLEx is directly connected with TPLEx. |
|  |  |  |
| Manila ⇆ Cabanatuan | Pangasinan ⇆ Cabanatuan | Tarlac ⇆ Cabanatuan | Manila ⇆ Cabanatuan | Pangasinan ⇆ Cabanatuan | Tarlac ⇆ Cabanatuan | Manila ⇆ Cabanatuan | Pangasinan ⇆ Cabanatuan | Tarlac ⇆ Cabanatuan |
|  (70%) |  (20%) |  (10%) |  (70%) |  (20%) |  (10%) |  (70%) |  (20%) |  (10%) |
| • All via national road<br>• Longer than Alternative-2 | • All via national road | • All via national road<br>• Shortest connection | • Shortest connection<br>• Best linkage | • Longer than Alternative-3, but traffic is not so high | • Good connection<br>• Longer than Alternative-1 | • Longest connection | • Shortest connection | • Complicated |
| X | X | O | O | △ | O | △ | O | X |
| Not Recommended | | | Recommended | | | Not Recommended | | |

**TABLE 5.2.2-2 EVALUATION OF ALTERNATIVES**

| Traffic Between | Alternative-1 | Alternative-2 | Alternative-3 |
|---|---|---|---|
| From Manila side to Cabanatuan City | • SCTEx off-ramp ⟶ Intersection with National Road ⟶ CLLEx (Travel distance is longer by 2 km than Alternative-2)<br>• Passes 2 toll booths (or 2 stops) | • SCTEx ⟶ CLLEx (Direct), Shortest distance<br>• Passes 1 toll booth (or 1 stop only) | • TPLEx ⟶ CLLEx (Direct), Longer by 7.1 km than Alternative-2.<br>• Passes 2 toll booths (or 2 stops) |
| | X | ◎ | △ |
| From Cabanatuan City to Manila side | • CLLEx ⟶ National Road (2.2 km ) ⟶ TPLEx IC<br>• Longer by 8.2 km. than Alternative-2.<br>• Passes 3 toll booths (or 3 stops) | • CLLEx ⟶ SCTEx (Direct), shortest distance.<br>• Passes 1 toll booth (or 1 stop only) | • CLLEx ⟶ TPLEx (Direct), Longer by 7.1 km.<br>• Passes 2 toll booths (or 2 stops) |
| | X | ◎ | △ |
| From Pangasinan side to Cabanatuan City | • TPLEx off-ramp ⟶ National Road (2.2 km.) ⟶ CLLEx.<br>• Passes 2 toll booths (or 2 stops) | • TPLEx ⟶ SCTEx ⟶ CLLEx (Direct), Longer by 7.1km than Alternative-3. | • TPLEx ⟶ CLLEx (Direct), Shortest<br>• Passes 1 toll booth (or only 1 stop) |
| | X | △ | ◎ |
| From Cabanatuan City to Pangasinan side | • CLLEx ⟶ Intersection with National Road ⟶ TPLEx<br>• Passes 2 toll booths (or 2 stops) | • CLLEx ⟶ TPLEx (Direct), Longer by 7.1 km than Alternative-3.<br>• Passes 2 toll booths (or 2 stops) | • CLLEx ⟶ TPLEx (Direct), Shortest<br>• Passes 1 toll booth (or 1 stop only) |
| | X | △ | ◎ |
| From Tarlac side to Cabanatuan City | • National Road ⟶ CLLEx<br>• Passes 1 toll booths (or 1 stop only) | • National Road ⟶ CLLEx<br>• Passes 1 toll booth (or 1 stop only) | • National Road ⟶ SCTEx ⟶ TPLEx ⟶CLLEx<br>• Passes 2 toll booths (or 2 stops) |
| | ○ | ○ | X |
| From Cabanatuan City to Tarlac side | • CLLEx ⟶ National Road<br>• Passes 1 toll booths (or 1 stop only) | • CLLEx ⟶ National Road<br>• Passes 1 toll booth (or 1 stop only) | • CLLEx ⟶ TPLEx ⟶ National Road<br>• Passes 2 toll booths (or 2 stops) |
| | ○ | ○ | X |
| Overall Evaluation | X Not Recommended | ◎ **Recommended** | △ Not Recommended |

### 5.2.3 Needs of Additional Interchange at Aliaga Municipality

2010 FS proposed no interchange between Tarlac and Cabanatuan City for the extension of 28 km. In Japan, the longest interval of interchanges is set at 15 to 25 kms. as follows;

- Maximum Interval : 30 km
- Standard Interval
  - Mega City, Major Industrial Area : 5 ~ 10 km
  - Rural Area with Small to Medium Cities : 15 ~ 25 km
  - Rural Area and Mountainous Area : 20 ~ 30 km

An interval of 28 km is too long and additional exits should be needed during emergency cases.

There is also strong request from the Municipal Government of Aliaga to provide an interchange within the municipality.

In view of the above, it is necessary to add an interchange in the Municipality of Aliaga. Urbanization condition of Aliaga town proper and its vicinity is shown in **Figure 5.2.3-1**. Aliaga Town Proper is traversed by Quezon-Aliaga-Cabanatuan Road. New development site is being developed at the north-west area of Aliaga Town Proper, the Health Center was already built and Aliaga Trading Center and Bus Terminal are currently under construction. CLLEx passes northern periphery of Aliaga Town Proper. Location of Aliaga Interchange was so selected that it is not so far from Aliaga Town Proper and efficient access can be provided to new development site.

Three (3) interchange alternatives were prepared for comparison as shown in **Table 5.2.3-1**, which also shows evaluation of alternatives. Alternative-2 was recommended due to the following reasons;

- It provides efficient access to New Development Site.
- Least construction cost.
- Although two houses are affected, it achieves the minimum ROW acquisition or land take.

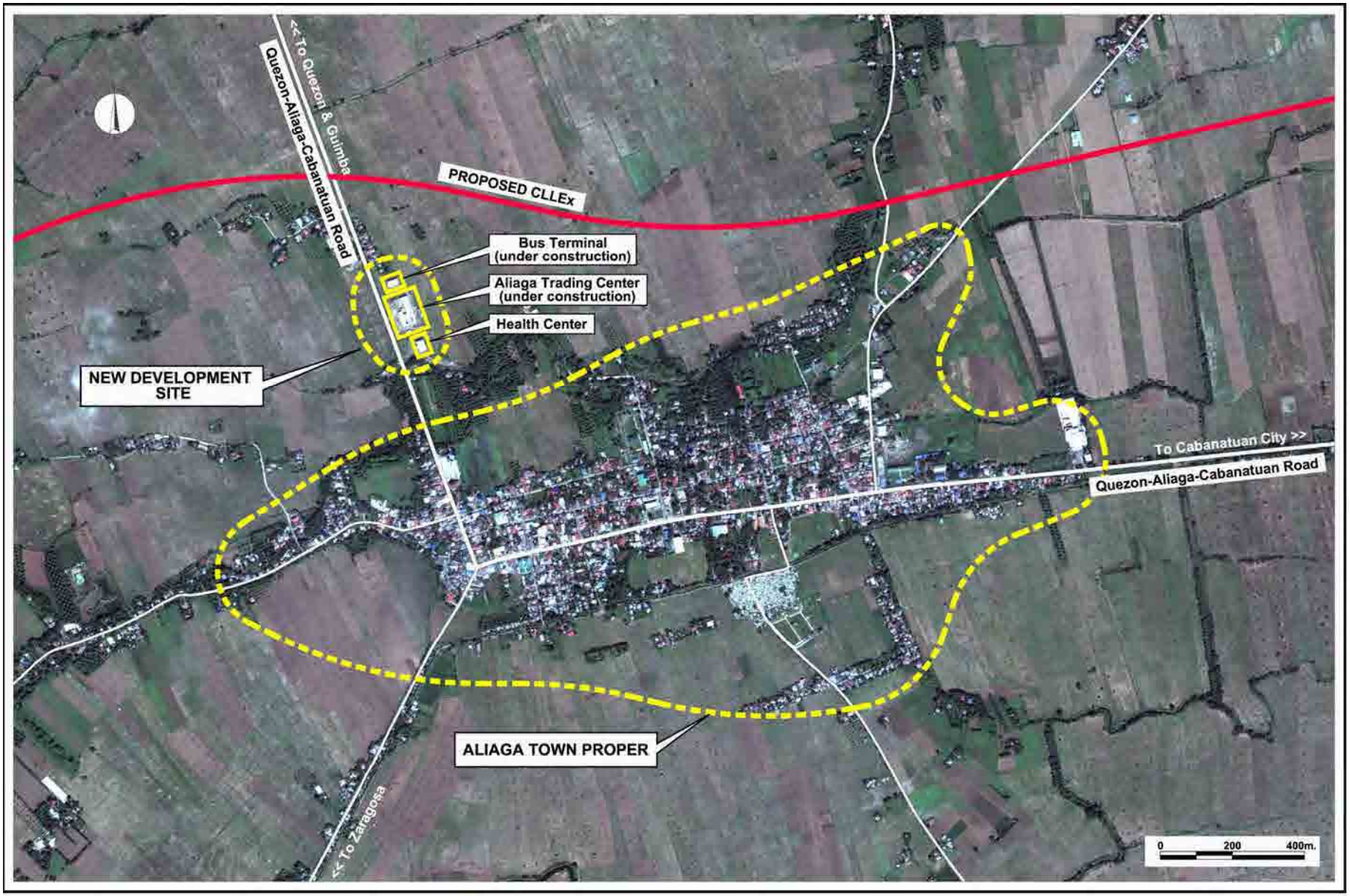
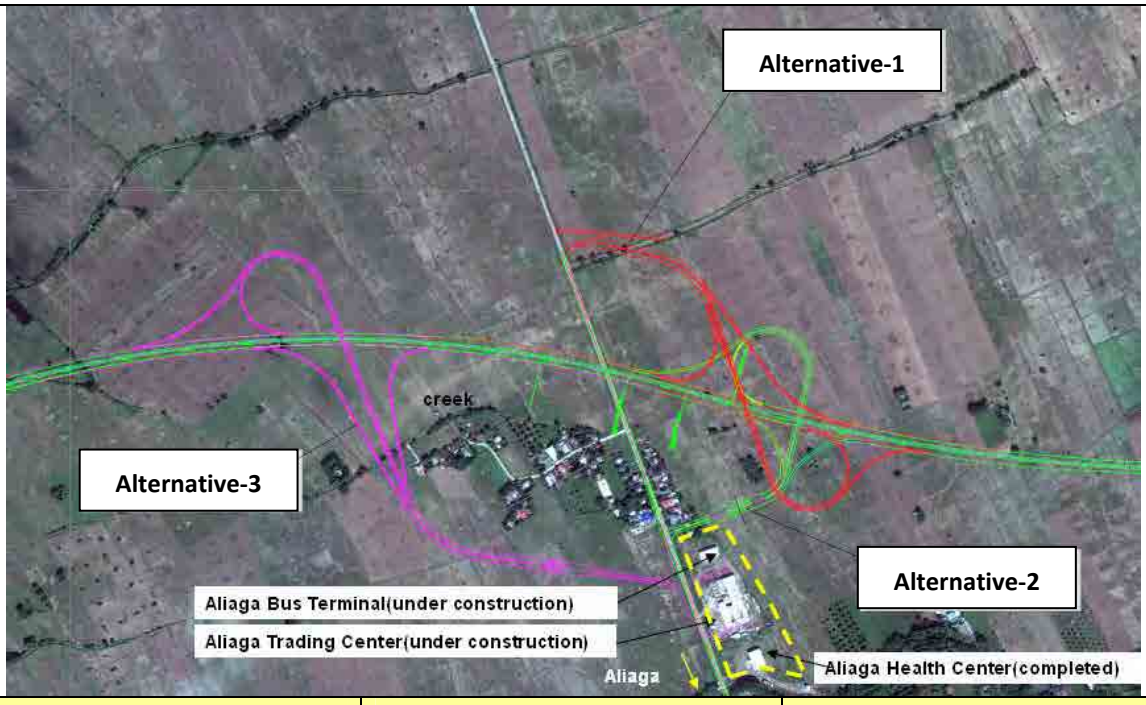



**FIGURE 5.2.3-1 ALIAGA TOWN PROPER AND ITS VICINITY**

**TABLE 5.2.3-1 ALIAGA INTERCHANGE OF COMPARATIVE STUDY**

| | | | | | | |
|---|---|---|---|---|---|---|
| Plan |  | | | | | |
| | **Alternative 1** | | **Alternative 2** | | **Alternative 3** | |
| Concept | Indirect connection with Aliaga Trading Center | | Direct connection with Aliaga Trading Center | | Direct connection with Aliaga Trading Center | |
| Ramp length | 1,581m | | 1,204m | | 2,081m | |
| Relocation | 0 | | 2 houses | | 0 | |
| Construction Cost | △ | Middle | ○ | Least | X | Highest |
| Social Environment | ○ | No relocation | △ | 2 houses of relocation | ○ | No relocation |
| Natural Environment | △ | Medium land take of Agri-land. | ○ | Smallest land take of Agri-land. | X | Largest land take of Agri-land. |
| Construction Cost | △ | Higher than Alt. 2 | ○ | Lowest | X | Highest |
| Accessibility to Aliaga Trading Center and Bus Terminal | X | Poor | ○ | Good | ○ | Good |
| Rank | 2 | | **1** | **Recommended** | 3 | |

### 5.2.4 Cabanatuan IC Location and How to Attract More Traffic To/From Cabanatuan City

#### 1) Cabanatuan IC Location

At the location of Cabanatuan Interchange proposed by 2010 FS, new church was built, thus IC location is required to be re-planned.

The Cabanatuan City Government recommended the following;

- CLLEx center line alignment be shifted to avoid affecting the new church.
- Interchange location be almost at the same location selected by 2010 FS.
- An alignment of the proposed Cabanatuan Ring Road will be selected by the City Government with due consideration of new interchange location.

2010 FS proposed two (2) stages development of the interchange for CLLEx Phase I and Phase II, and ramps constructed during Phase I are proposed to be abandoned during Phase II. The stage development of the interchange is necessary, however, it should be planned to avoid useless investment during Phase-II. Two alternatives were studied and evaluated as shown in **Table 5.2.4-1**. Alternative-2 was recommended, since it can avoid useless investment during Phase-I.

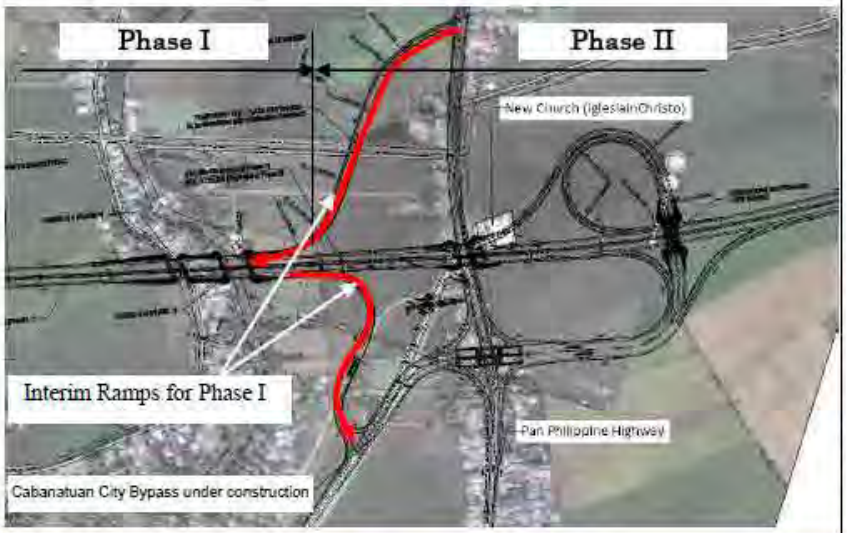
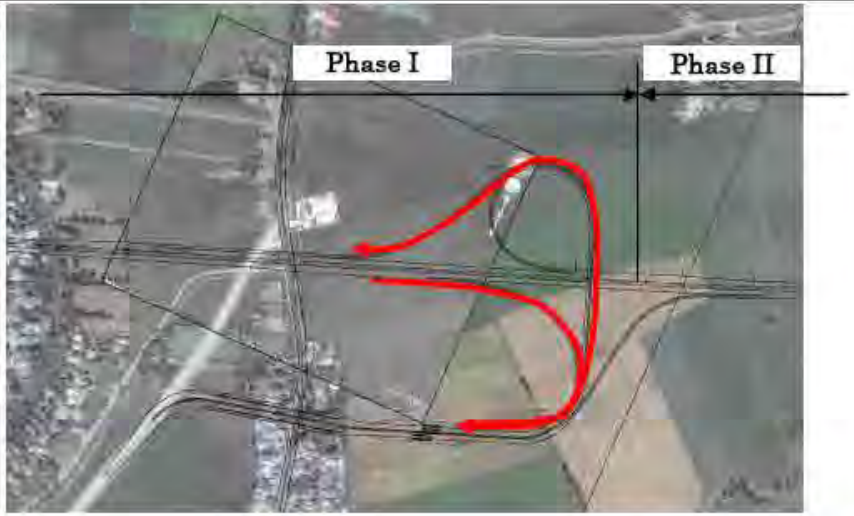
#### 2) How to Attract More Traffic To/From Cabanatuan City

The only road traversing Cabanatuan City in the north-south direction is the Pan-Philippine Highway (or Daang Maharlika) which is heavily congested due to huge number of slow moving vehicles such as tricycles and jeepneys (see **Figure 5.2.4-1**). Travel speed on this road within Cabanatuan City is very slow with less than 15km/hour.

Cabanatuan IC of CLLEx is located at northern periphery of Cabanatuan City, which will attract traffic to/from northern area of Cabanatuan City. Traffic from southern area will rarely utilize Cabanatuan IC, thus some measures is required for traffic generated in southern areas of Cabanatuan City.

It is recommended that another half interchange (only on-ramp and off-ramp from/to southern Cabanatuan City) should be constructed. Traffic generated from southern Cabanatuan City will use City Bypass and Quezon-Aliaga-Cabanatuan Road to access to CLLEx. This Cabanatuan City Bypass Interchange is proposed to be located at about 4 km west of Cabanatuan City Bypass.

## TABLE 5.2.4-1 CABANATUAN INTERCHANGE COMPARATIVE STUDY

| | | | | | |
|---|---|---|---|---|---|
| Plan |  | | |  | |
| | **Alternative 1** | | | **Alternative 2** | |
| Concept | • Recommended by FS 2010<br>• To construct interim ramp for Phase I and to construct trumpet type of IC for Phase II<br>• To demolish interim ramp when extension of Phase II is implemented. | | | • To construct trumpet type of IC with stage development. Two ramps (in red color) is constructed at the initial stage. Remaining two ramps (in black color) is constructed when Phase II is implemented. | |
| Road Length (Main) | +0m | | | +200m | |
| Ramp Length (Phase I) | 820m | | | 1,413m | |
| Relocation | Phase I: 3 houses, Phase II : 12 houses (including new church) | | | Phase I: 12 houses, Phase II: 0 house | |
| Social Environment | X | • Relocation of a new church is practically impossible.<br>• Relocation of 3 houses along interim ramps during Phase 1 becomes useless (unnecessary relocation is required). | | ○ | • Unnecessary relocation can be avoided. |
| Natural Environment | △ | • Land acquired for the interim ramps during Phase I becomes useless during Phase II. (Unnecessary land take of agri-land.) | | ○ | • Unnecessary ROW acquisition can be avoided. |
| Traffic flow of expressway and ordinal road | △ | • Phase I: 2 at-grade intersection required. Traffic flow is disturbed at these intersections.<br>• Phase II: 1 at-grade intersection required. | | ○ | • Phase I and II: 1 at-grade intersection. Traffic is less disturbed than Alternative-I. |
| Phase I Construction Cost | X | • Phase I: Construction cost for interim ramps wasted since these are not used in Phase II. | | ○ | • Unnecessary investment can be avoided. |
| Rank | 2 | | | 1 | **Recommended** |

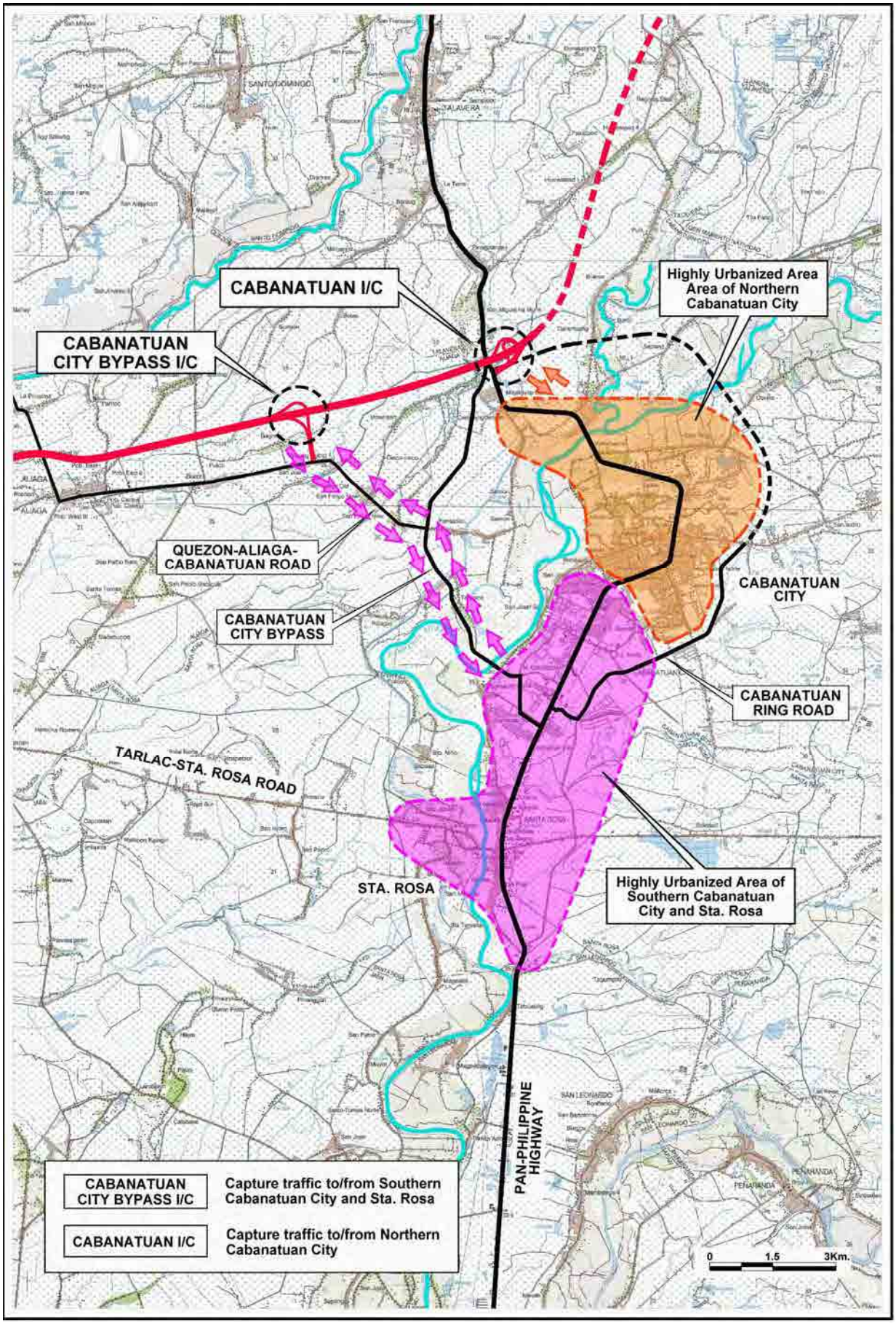



**FIGURE 5.2.4-1 NEED OF CABANATUAN CITY BYPASS IC**

### 5.2.5 Appropriate Location of Alignment in the Flood-prone Area

#### 1) Condition of Flood-prone Area

The project has to traverse the flood-prone area. There are two (2) big rivers, namely Rio Chico River and Talavera River. There are other four (4) small rivers. All of these rivers join into one river, and then it is called as Rio Chico River (see **Figure 5.2.5-1**).

- Rio Chico River has a west bank but no east bank at the up-stream side of the confluence point. West bank has damage at the upstream side and the river water flows outside the bank when medium to heavy rainfall occurs.

- The downstream side of Rio Chico River from the confluence point has both west and east banks.

- Talavera River has both west and east banks until near the confluence point, however, west bank ends before it reaches to the confluence point. West bank has damage at Aliaga Municipality and Water flows outside the west bank.

- After the confluence point, Rio Chico River has both west and east banks.

- Discharge of 50-year return period estimated by Feasibility Study on Pampanga Delta Development Project (1982) is as follows;
    - Rio Chico River before the confluence point : 1,260 $m^3$/sec
    - Talavera River : 1,203 $m^3$/sec
    - Rio Chico River after the confluence point : 2,463 $m^3$/sec

- River bed longitudinal slope is very flat at about 1/3,000 (or 0.03%), therefore, velocity of the flood water is estimated as not so fast.

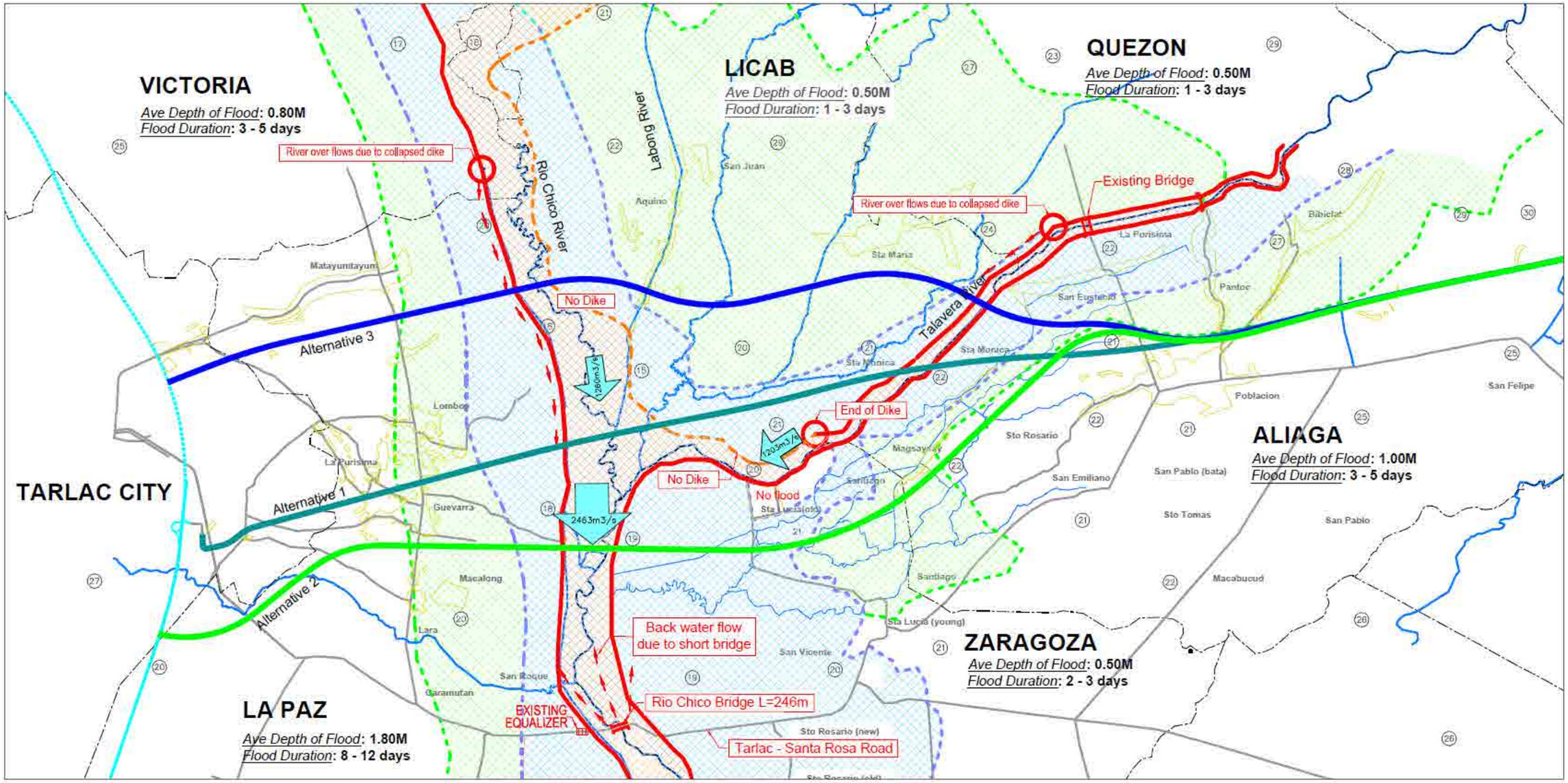
- All rivers overflow the banks and flood area extends for quite wide area.

- At downstream side of Rio Chico River, Tarlac – Sta. Rosa Road crosses this river with the 246 m bridge. West approach of the bridge is provided with the equalizer (or series of box-culverts). The bridge constricts the flood water due to insufficient bridge length, flood water back flows towards upstream side until near the confluence point.

- Flood areas were identified by interviews to municipality officials is shown in **Figure 5.2.5-1**.
    - Ordinary river flow area in orange color
    - Frequent flood area (average 1 time/1-2 years)
    - Past maximum flood area by Typhoon Ondoy/Pepeng in 2009) in green color

- Water velocity in the frequent flood areas (blue area) is very slow except the vicinity of the ordinary river flow area.

- Water velocity in the area (green area) between the frequent flood area and the past maximum flood area is minimal and almost dead water.




Note 1: The flood area was identified by interview to the municipality by the Study Team.
Note 2: The Discharge of 50-year return period is from Feasibility Report on the Pampanga Delta Development Project Feb 1982

**FIGURE 5.2.5-1 FLOOD CONDITION AT RIO CHICO AND TALAVERA RIVER CONFLUENCE POINT**

**2) CLLEx Alignment Selection**

Three (3) alternative alignments were studied.

**Alternative-1:** Alignment recommended by 2010 FS.
The alignment starts at SCTEx Tarlac Interchange entrance/exit point. It traverses at slightly upstream side of confluence point of Rio Chico River and Talavera River.

**Alternative-2:** This alignment starts at SCTEx and traverses at the downstream side of confluence point.

**Alternative-3:** This alignment starts at TPLEx and passes through the upstream side of confluence point.

**TABLE 5.2.5-1 OUTLINE OF ALTERNATIVE ALIGNMENTS**

| | | Alternative-1 | Alternative-2 | Alternative-3 |
|---|---|---|---|---|
| Starting Point | | Existing SCTEx Tarlac Interchange | About 2 km south of SCTEx Tarlac Interchange | About 5.1 km north of SCTEx Tarlac Interchange |
| Crossing Point in Flood-prone area | | About 1.2 km upstream side of confluence point | About 1.2 km downstream side of confluence point | About 4.5 km upstream side of confluence point |
| Bank Condition | Rio Chico River (upstream) | No east bank | – | No east bank |
| | Talavera River | East and west banks | – | East and west bank |
| | Rio Chico River (after 2 rivers merged) | – | East and west banks | – |
| Bridge Crossing | Rio Chico River (upstream) | Skewed crossing | – | Crossing perpendicular to water flow |
| | Talavera River | Skewed crossing | – | Crossing perpendicular to water flow |
| | Rio Chico River (after 2 rivers merged) | – | Crossing perpendicular to water flow | – |

Evaluation of alternative alignments is shown in **Table 5.2.5-2**. Alternative-2 was recommended due to the following;

- The most preferred alignment for traffic between Manila side and Cabanatuan City which is dominant traffic on CLLEx.

- The alignment passes through the area where there are banks on both sides of the river; therefore water course is controlled and stable. Flood water overflows the banks, thus enough bridge length needs to be provided.

- Number of affected houses is the least.

- Construction cost is the least, although it is almost the same as Alternative-3.

- Alternative-1 passes through the confluent points of two rivers, not appropriate for the alignment to pass.

- From the view point of river crossing location, Alternative-3 is also appropriate, however, from the view points of traffic efficiency, Alternative-3 is not recommended.

**TABLE 5.2.5-2 EVALUATION OF ALIGNMENT ALTERNATIVES**

(Confidential)

### 5.2.6 Proposed CLLEx Alignment and Interchange Layout

Proposed CLLEx alignment and interchange layout is shown in **Figure 5.2.6-1**.

**OUTLINE OF CLLEX**

| | |
|---|---|
| Expressway Length | 30.7 km |
| Number of Bridges | 7 |
| Bridge Length | 1,886 m |
| Equalizing Zone Length | 3.78 km |
| Number of Overpass or Underpass for Intersecting Roads including underpasses for farm roads | Overpass : 1<br>Underpass : 37<br>Total : 38 |
| Number of Interchanges:<br>• Between expressways (SCTEx and CLLEx)<br>• Between CLLEx and intersecting roads | 5<br>1<br>4 |

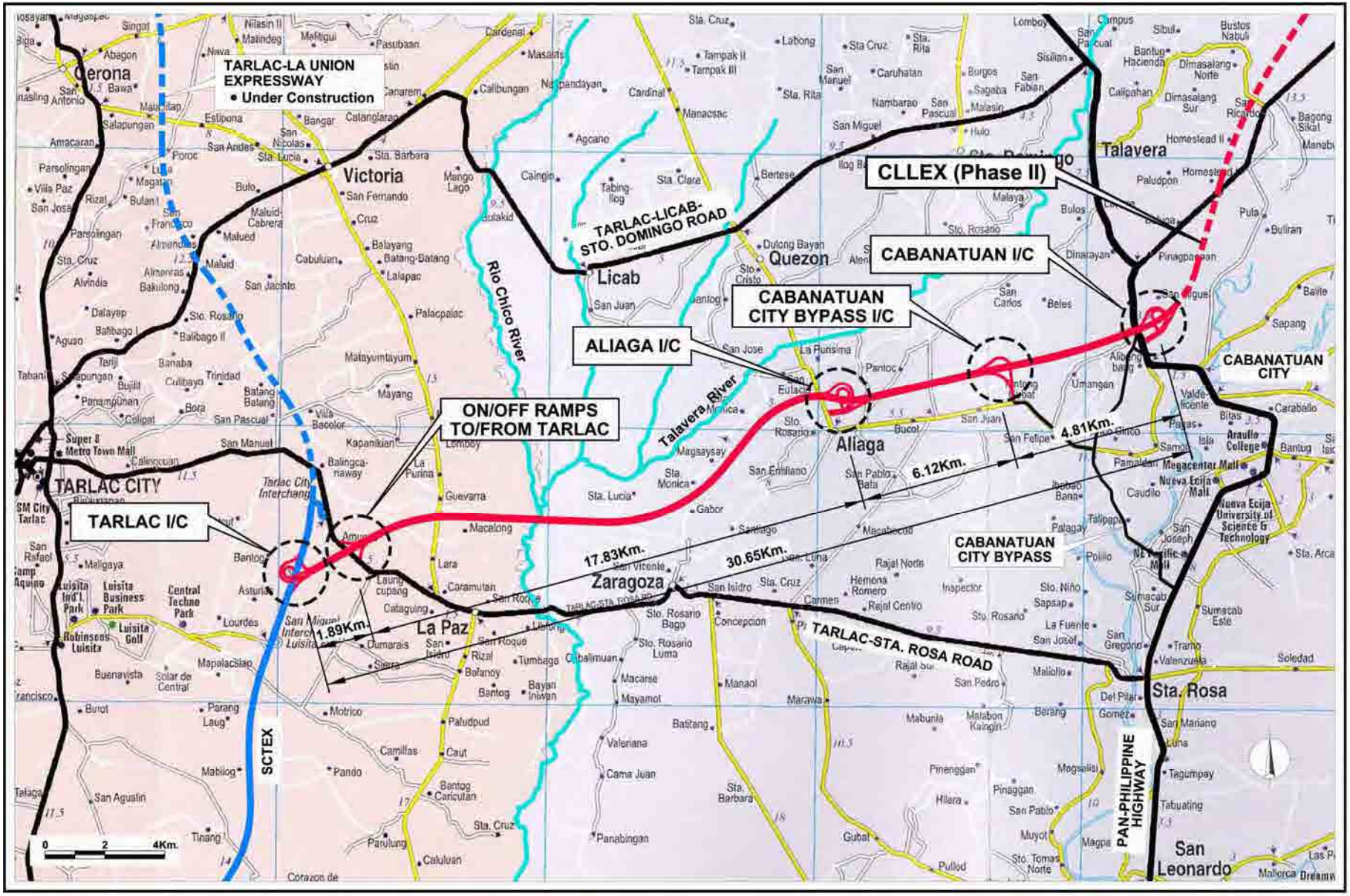



**FIGURE 5.2.6-1 PROPOSED CLLEX ALIGNMENT AND LAYOUT OF INTERCHANGES**

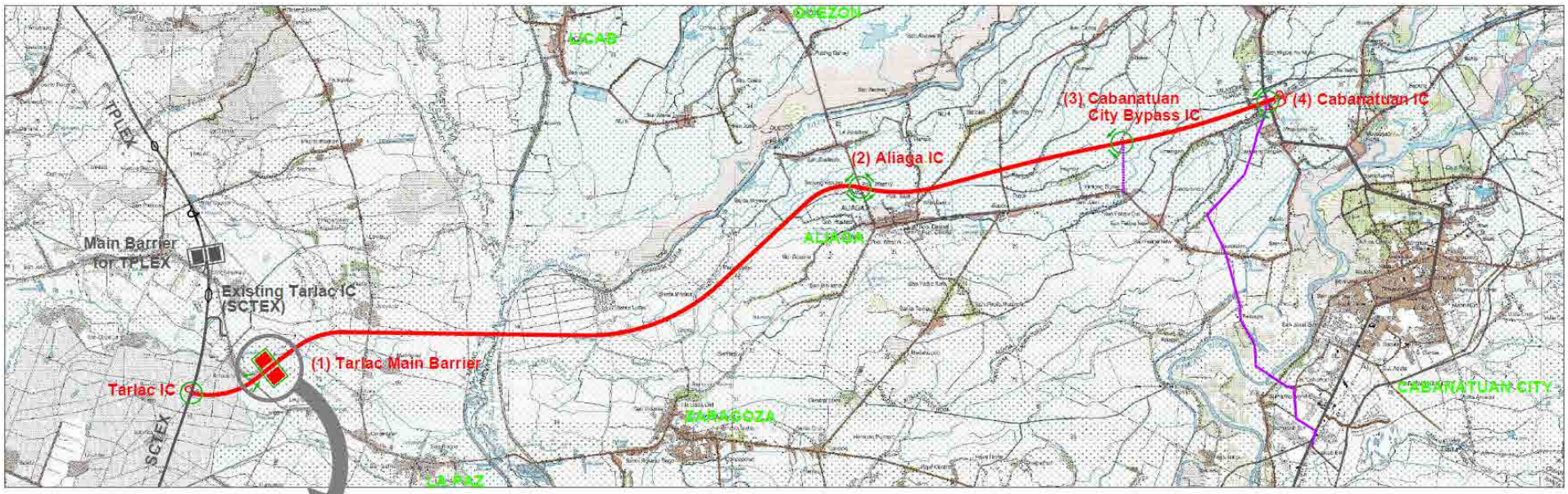
### 5.2.7 Toll Collection System

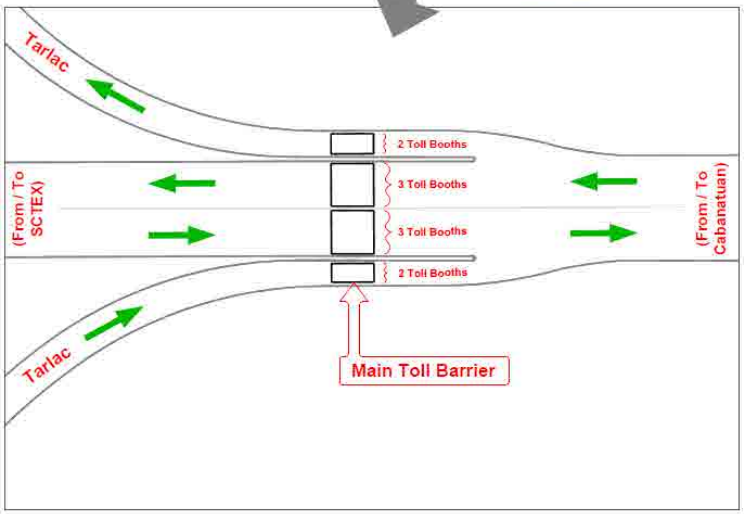
Toll fee should be imposed based on travel distance based toll to assure fairness to expressway users, hence the closed toll collection system should be established which is shown in **Table 5.2.7-1.**

Number of toll booth was computed on the assumption that toll collection would be done manually and is shown in **Table 5.2.7-2.** Actual toll collection shall be partially done by the electronic toll collection system.

Weigh-in-motion equipment for overloaded truck control, administrative maintenance office, and toll houses are planned at the strategic locations as shown in **Table 5.2.7-3.**

## TABLE 5.2.7-1 PROPOSED TOLL COLLECTION SYSTEM OF CLLEX




Tarlac Main Barrier Schematic Map

**Toll Collection System Is Proposed As CLOSED SYSTEM**

| NAME | DESCRIPTION | NO. OF TOLL BOOTH * |
|---|---|---|
| (1) Tarlac Main Barrier | From SCTEX : Pay SCTEX Toll And Get Ticket For CLLEX | 3 |
| | From Tarlac IC : Get Ticket For CLLEX | 2 |
| | To SCTEX : Pay CLLEX Toll And Get Ticket For SCTEX | 3 |
| | To Tarlac IC : Pay CLLEX Toll | 2 |
| (2) Aliaga IC | Entrance : Get Ticket | 2 |
| | Exit : Pay CLLEX Toll | 2 |
| (3) Cabanatuan City Bypass IC | Entrance : Get Ticket | 2 |
| | Exit : Pay CLLEX Toll | 2 |
| (4) Cabanatuan IC | Entrance : Get Ticket | 2 |
| | Exit : Pay CLLEX Toll | 3 |
| | TOTAL | 23 |

Note: * Number of Toll Booth is estimated by future traffic volume and service time (entrance - 6 sec/veh., exit 14 sec/veh.)

## TABLE 5.2.7-2 NUMBER OF TOLL BOOTH REQUIRED

**Assumption : All Manual Toll Collection**

Year 2017

| No. | Interchange | | AADT (2017) | Peak (%) | Peak Hr. Traffic Total | Toll Collection | Toll Capacity (Manual) | Necessary Toll Booth (Manual) | Necessary Toll Booth (Add.) | Necessary Toll Booth (Total) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | (a) | (b) | ( c=a*b) | | (d) | ( e=c/d) | (f) | ( g=e+f ) |
| 1 | Tarlac | Main --> | 4,461 | 8% | 357 | Pay | 255 | 1.4 | | 2 |
| 2 | Tarlac | Main <-- | 4,204 | 8% | 336 | Pay | 255 | 1.3 | | 2 |
| 3 | Tarlac | Entrance | 1,279 | 8% | 102 | Ticket | 600 | 0.2 | 1 | 2 |
| 4 | Tarlac | Exit | 1,278 | 8% | 102 | Pay | 255 | 0.4 | 1 | 2 |
| 5 | Aliaga | Entrance | 955 | 8% | 76 | Ticket | 600 | 0.1 | 1 | 2 |
| 6 | Aliaga | Exit | 908 | 8% | 73 | Pay | 255 | 0.3 | 1 | 2 |
| 7 | Cabana. By | Entrance | 1,916 | 8% | 153 | Ticket | 600 | 0.3 | 1 | 2 |
| 8 | Cabana. By | Exit | 1,554 | 8% | 124 | Pay | 255 | 0.5 | 1 | 2 |
| 9 | Cabanatuan | Entrance | 2,625 | 8% | 210 | Ticket | 600 | 0.4 | 1 | 2 |
| 10 | Cabanatuan | Exit | 3,292 | 8% | 263 | Pay | 255 | 1.0 | | 2 |
| | | | | | | | | **Total** | | **20** |

| | | |
|---|---|---|
| Exit | 255 | 14 sec/veh |
| Entry | 600 | 6 sec/veh |
| Flat | 450 | 8 sec/veh |

Year 2020

| No. | Interchange | | AADT (2020) | Peak (%) | Peak Hr. Traffic Total | Toll Collection | Toll Capacity (Manual) | Necessary Toll Booth (Manual) | Necessary Toll Booth (Add.) | Necessary Toll Booth (Total) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | (a) | (b) | ( c=a*b) | | (d) | ( e=c/d) | (f) | ( g=e+f ) |
| 1 | Tarlac | Main --> | 5,106 | 8% | 408 | Pay | 255 | 1.6 | | 2 |
| 2 | Tarlac | Main <-- | 5,074 | 8% | 406 | Pay | 255 | 1.6 | | 2 |
| 3 | Tarlac | Entrance | 1,394 | 8% | 112 | Ticket | 600 | 0.2 | 1 | 2 |
| 4 | Tarlac | Exit | 1,393 | 8% | 111 | Pay | 255 | 0.4 | 1 | 2 |
| 5 | Aliaga | Entrance | 852 | 8% | 68 | Ticket | 600 | 0.1 | 1 | 2 |
| 6 | Aliaga | Exit | 816 | 8% | 65 | Pay | 255 | 0.3 | 1 | 2 |
| 7 | Cabana. By | Entrance | 2,259 | 8% | 181 | Ticket | 600 | 0.3 | 1 | 2 |
| 8 | Cabana. By | Exit | 1,913 | 8% | 153 | Pay | 255 | 0.6 | 1 | 2 |
| 9 | Cabanatuan | Entrance | 3,374 | 8% | 270 | Ticket | 600 | 0.4 | 1 | 2 |
| 10 | Cabanatuan | Exit | 3,788 | 8% | 303 | Pay | 255 | 1.2 | | 2 |
| | | | | | | | | **Total** | | **20** |

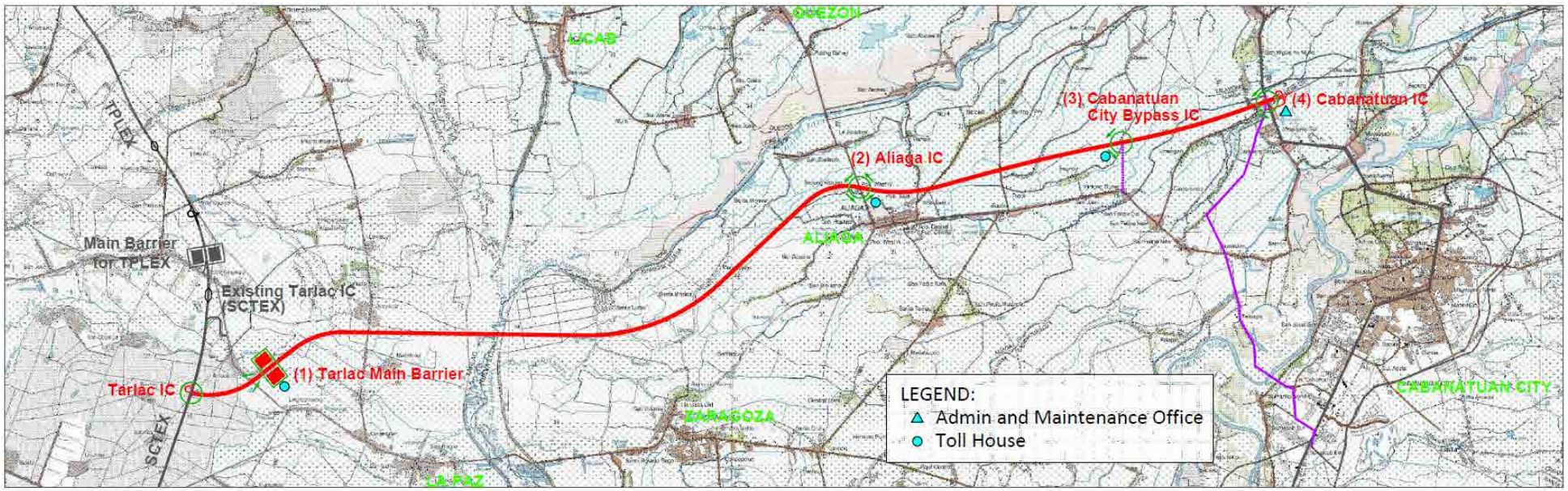
| | | |
|---|---|---|
| Exit | 255 | 14 sec/veh |
| Entry | 600 | 6 sec/veh |
| Flat | 450 | 8 sec/veh |

Year 2030

| No. | Interchange | | AADT (2030) | Peak (%) | Peak Hr. Traffic Total | Toll Collection | Toll Capacity (Manual) | Necessary Toll Booth (Manual) | Necessary Toll Booth (Add.) | Necessary Toll Booth (Total) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | (a) | (b) | ( c=a*b) | | (d) | ( e=c/d) | (f) | ( g=e+f ) |
| 1 | Tarlac | Main --> | 7,568 | 8% | 605 | Pay | 255 | 2.4 | | 3 |
| 2 | Tarlac | Main <-- | 5,185 | 8% | 415 | Pay | 255 | 1.6 | 1 | 3 |
| 3 | Tarlac | Entrance | 2,375 | 8% | 190 | Ticket | 600 | 0.3 | 1 | 2 |
| 4 | Tarlac | Exit | 2,373 | 8% | 190 | Pay | 255 | 0.7 | 1 | 2 |
| 5 | Aliaga | Entrance | 1,524 | 8% | 122 | Ticket | 600 | 0.2 | 1 | 2 |
| 6 | Aliaga | Exit | 1,497 | 8% | 120 | Pay | 255 | 0.5 | 1 | 2 |
| 7 | Cabana. By | Entrance | 2,309 | 8% | 185 | Ticket | 600 | 0.3 | 1 | 2 |
| 8 | Cabana. By | Exit | 2,899 | 8% | 232 | Pay | 255 | 0.9 | 1 | 2 |
| 9 | Cabanatuan | Entrance | 3,906 | 8% | 312 | Ticket | 600 | 0.5 | 1 | 2 |
| 10 | Cabanatuan | Exit | 6,328 | 8% | 506 | Pay | 255 | 2.0 | 1 | 3 |
| | | | | | | | | **Total** | | **23** |

| | | |
|---|---|---|
| Exit | 255 | 14 sec/veh |
| Entry | 600 | 6 sec/veh |
| Flat | 450 | 8 sec/veh |

## TABLE 5.2.7-3 LOCATION FOR TRAFFIC AND MAINTENANCE OFFICE




| INTERCHANGE | DESCRIPTION | NO. OF TOLL BOOTH * | WEIGHT IN MOTION | ADMIN/MAINT. OFFICE | TOLL HOUSE |
|---|---|---|---|---|---|
| (1) Tarlac Main Barrier | From SCTEX : Pay SCTEX Toll And Get Ticket For CLLEX | 3 | - | - | 1 |
| | From Tarlac IC : Get Ticket For CLLEX | 2 | 1 | | |
| | To SCTEX : Pay CLLEX Toll And Get Ticket For SCTEX | 3 | - | - | - |
| | To Tarlac IC : Pay CLLEX Toll | 2 | - | | |
| (2) Aliaga IC | Entrance : Get Ticket | 2 | 1 | - | 1 |
| | Exit : Pay CLLEX Toll | 2 | - | | |
| (3) Cabanatuan City Bypass IC | Entrance : Get Ticket | 2 | 1 | - | 1 |
| | Exit : Pay CLLEX Toll | 2 | - | | |
| (4) Cabanatuan IC | Entrance : Get Ticket | 2 | 1 | 1 | - |
| | Exit : Pay CLLEX Toll | 3 | - | | |
| | TOTAL | 23 | 4 | 1 | 3 |

Note: * Number of Toll Booth is estimated by future traffic volume and service time (entrance - 6 sec/veh., exit 14 sec/veh.)

### 5.2.8 Study on Stage Construction

Traffic volume attracted to CLLEx was estimated in Section 4.2.7 of this report. Traffic volume in 2017, 2020, 2030 was estimated at 11,221, 12,967, 17,340 veh./day, respectively. For this level of traffic volume, there is a need to study the options; one is the stage construction, and the other is on full development from the initial stage;

**Option-1: Stage Construction**
Initial Stage – 2-lane (1-lane by direction) with overtaking lane at strategic location
Second Stage – Widening to 4-lane

**Option-2: Full Development**
4-lane from the initial stage

**1) <u>2-lane Expressway in the Philippines and Japan</u>**

In the Philippines, there are two (2) existing 2-lane expressways and one (1) 2-lane expressway under construction as follows;

- Section between Lipa City and Batangas City of STAR *(existing)*
  - Traffic Volume in 2009 : **9,181 veh/day**
  - No overtaking lanes, thus fatal traffic accidents are being experienced.

- Subic-Tipo Expressway (existing)
  - Traffic Volume in 2009 : **6,798 veh/day**
  - Climbing lane is provided.

- Tarlac-Pangasinan-La Union Expressway (TPLEx) *(under construction)*
  - Estimated traffic volume is as follows;

**TRAFFIC FORECAST OF TPLEX**

| Section | 2015 | 2020 | 2030 |
|---|---|---|---|
| Tarlac – Victoria | 14,595 | 19,196 | 34,167 |
| Victoria – Gerona | 14,824 | 19,653 | 35,559 |
| Gerona – Paniqui | 12,822 | 16,940 | 30,428 |
| Paniqui – Moncada | 11,471 | 15,105 | 26,952 |
| Moncada – Carmen | 9,138 | 12,033 | 21,467 |
| Carmen – Urdaneta | 4,281 | 5,656 | 10,155 |
| Urdaneta – Pozorrubio | 8,270 | 10,969 | 19,847 |
| Pozorrubio – Rosario | 7,501 | 9,956 | 18,040 |

***Source**: Terms of Reference for Tarlac-La Union Toll Expressway Phase I, August 2007*

- 2-lane Expressway in Japan

  There are thirty one (31) 2-lane expressways in Japan, of which traffic volume in April, 2011 is shown in **Table 5.2.8-1**.

  - Traffic volume more than 10,000 veh./day – 20 expressways
  - Traffic volume more than 20,000 veh./day – 3 expressways

  Expressways with traffic volume of 10,000 ~ 20,000 veh./day are built and operated as a 2-lane expressway.

**TABLE 5.2.8-1 DAILY TRAFFIC VOLUME OF TWO-LANE EXPRESSWAY IN JAPAN (2011 APRIL)**

Unit: Vehicle/day

| | Expressway name | Min. Section. (vehicle/day) | Max. Section. (vehicle/day) | Average (vehicle/day) |
|---|---|---|---|---|
| 1 | Do-ou Expressway | 2,549 | 11,575 | 5,073 |
| 2 | Do-tou Expressway | 2,046 | 8,034 | 6,110 |
| 3 | Aomori Expressway | 5,399 | 6,443 | 5,807 |
| 4 | Hachinohe Expressway | 7,277 | 10,253 | 7,310 |
| 5 | Kamaishi Expressway | 2,429 | 2,894 | 2,579 |
| 6 | Akita Expressway | 5,636 | 11,626 | 7,694 |
| 7 | Yamagata Expressway | 4,919 | 14,799 | 7,102 |
| 8 | Tohoku Chuo Expressway | 8,876 | 18,040 | 11,885 |
| 9 | Nihonkai Tohoku Expressway | 18,095 | 23,143 | 20,619 |
| 10 | Ban'etsu Expressway | 6,961 | 7,776 | 7,446 |
| 11 | Jyoban Expressway | 902 | 4,206 | 4,206 |
| 12 | Higashi Kanto Expressway | 1,655 | 1,655 | 1,655 |
| 13 | Tateyama Expressway | 10,420 | 11,482 | 11,400 |
| 14 | Jo-Shin'etsu Expressway | 10,896 | 12,103 | 11,517 |
| 15 | Chubu Transversal Expressway | 5,391 | 7,615 | 6,290 |
| 16 | Tokai Hokuriku Expressway | 6,034 | 11,647 | 8,864 |
| 17 | Kise Expressway | 9,431 | 12,256 | 11,021 |
| 18 | Maizuru Wakasa Expressway | 6,700 | 16,709 | 12,469 |
| 19 | Hanwa Expressway | 12,179 | 13,428 | 12,947 |
| 20 | Harima Expressway | 1,367 | 1,367 | 1,367 |
| 21 | Tottori Expressway | 6,066 | 9,818 | 8,152 |
| 22 | Okayama Expressway | 12,441 | 13,135 | 12,788 |
| 23 | Yonago Expressway | 8,496 | 12,135 | 9,913 |
| 24 | Hamada Expressway | 5,648 | 13,220 | 6,552 |
| 25 | Sanyo Expressway | 5,283 | 6,281 | 5,849 |
| 26 | Takamatsu Expressway | 16,671 | 19,324 | 17,988 |
| 27 | Matsuyama Expressway | 15,542 | 20,136 | 18,240 |
| 28 | Tokushima Expressway | 6,066 | 9,818 | 8,152 |
| 29 | Kochi Expressway | 17,959 | 21,476 | 18,352 |
| 30 | Nagasaki Expressway | 9,845 | 11,574 | 10,709 |
| 31 | Higashi Kyushu Expressway | 7,010 | 16,149 | 11,303 |

**Note:**
Traffic Volume more than 10,000 veh./day
Traffic Volume more than 20,000 veh./day

**2) Level of Service (LOS) Analysis**

Definition of Level of Service (LOS) by Highway Capacity Manual (HCM) 2000 of USA for the 2-lane highway and for the multi-lane highway is shown in **Table 5.2.8-2** and **5.2.8-3**, respectively.

**TABLE 5.2.8-2 DEFINITION OF LOS FOR TWO-LANE HIGHWAY**

| | |
|---|---|
| LOS A | The highest quality of traffic service, when motorists are able to travel at their desired speed. Without strict enforcement, this highest quality would result in average speeds of 90 km/h or more on two-lane highways. |
| LOS B | Traffic flow with speeds of 80 km/h or slightly higher on level terrain. The demand for passing to maintain desired speeds becomes significant and approximates the passing capacity at the lower boundary of LOS B. |
| LOS C | Further increases in flow, resulting in noticeable increases in platoon formation, platoon size, and frequency of passing impediments. The average speed still exceeds 70 km/h on level-terrain. |
| LOS D | Unstable traffic flow. The two opposing traffic streams begin to operate separately at higher volume levels, as passing becomes extremely difficult.<br>Speeds of 60 km/h still can be maintained under base conditions. |
| LOS E | Even under base conditions, speeds may drop below 60 km/h. Average travel speeds on highways with less than base conditions will be slower, even down to 40 km/h on sustained upgrades.<br>The capacity of the highway, generally 3,200 pc/h total in both directions. Operating conditions at capacity are unstable and difficult to predict. |
| LOS F | Heavily congested flow with traffic demand exceeding capacity.<br>Volumes are lower than capacity and speeds are highly variable. |

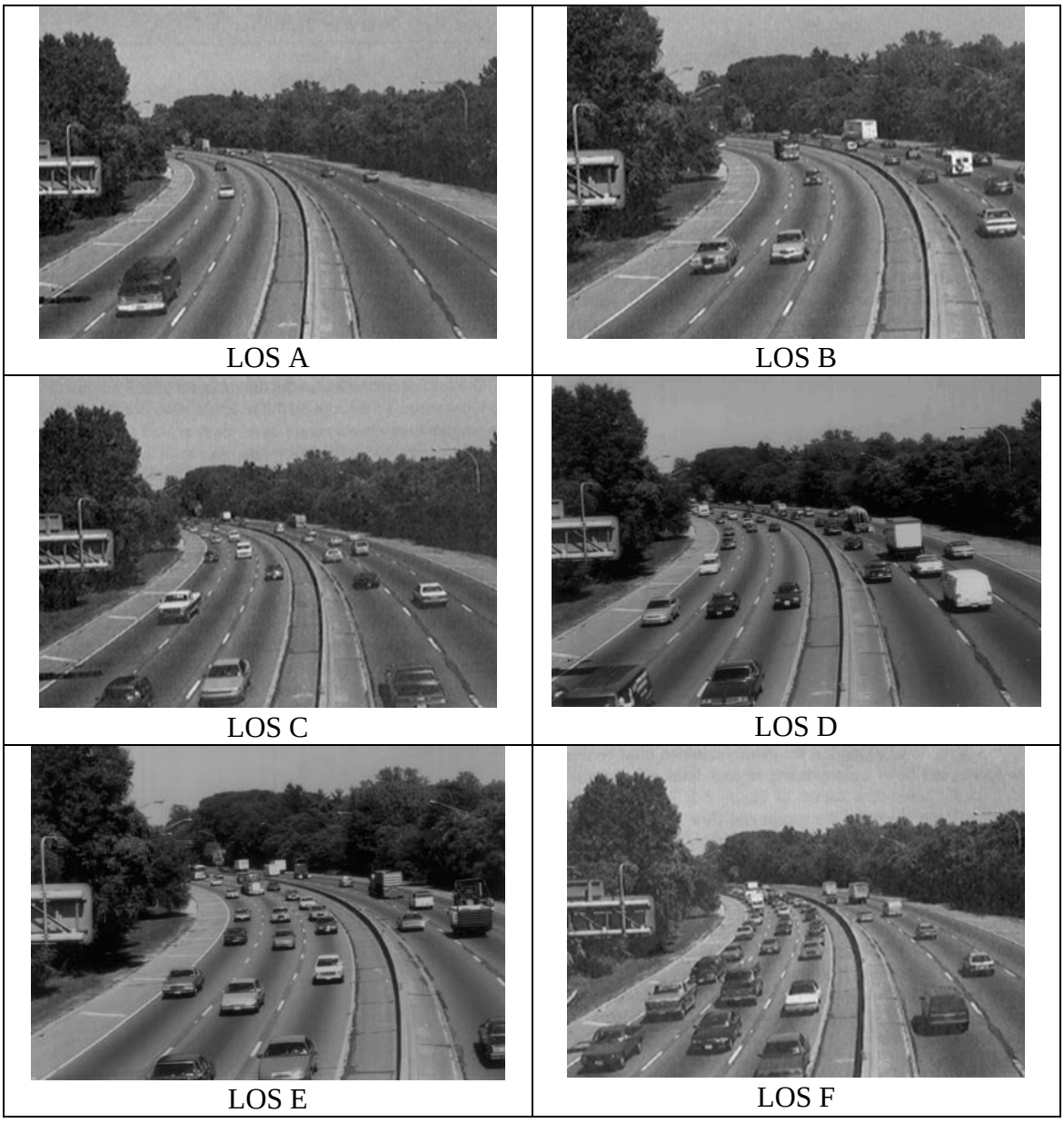
***Source:*** *HCM 2000*

**TABLE 5.2.8-3 DEFINITION OF LOS FOR MULTI-LANE HIGHWAY**

| | |
|---|---|
| LOS A | Free-flow operations. Free-flow speeds prevail. Vehicles are almost completely unimpeded in their ability to maneuver within the traffic stream. |
| LOS B | Reasonably free flow. Free-flow speeds are maintained. The ability to maneuver within the traffic stream is only slightly restricted, and the general level of physical and psychological comfort provided to drivers is still high. |
| LOS C | Flow with speeds at or near the Free Flow Speed of the freeway. Freedom to maneuver within the traffic stream is noticeably restricted, and lane changes require more care and vigilance on the part of the driver. |
| LOS D | The level at which speeds begin to decline slightly with increasing flows and density begins to increase somewhat more quickly. Freedom to maneuver within the traffic stream is more noticeably limited, and the driver experiences reduced physical and psychological comfort levels. |
| LOS E | Operation at capacity. Operations at this level are volatile, because there are virtually no usable gaps in the traffic stream. Vehicles are closely spaced leaving little room to maneuver within the traffic stream at speeds that still exceed 80 km/h. Maneuverability within the traffic stream is extremely limited, and the level of physical and psychological comfort afforded the driver is poor |

| | |
|---|---|
| LOS F | Breakdowns in vehicular flow. Such conditions generally exist within queues forming behind breakdown points. Breakdowns occur for a number of reasons:<br>• Traffic incidents can cause a temporary reduction in the capacity of a short segment, so that the number of vehicles arriving at the point is greater than the number of vehicles that can move through it.<br>• Points of recurring congestion, such as merge or weaving segments and lane drops, experience very high demand in which the number of vehicles arriving is greater than the number of vehicles discharged.<br>• In forecasting situations, the projected peak-hour (or other) flow rate can exceed the estimated capacity of the location. |

***Source:*** *HCM 2000*




***Source:*** *HCM 2000*

**FIGURE 5.2.8-1 LEVEL OF SERVICE FOR MULTI-LANE HIGHWAY**

**Appropriate Level of Service by AASHTO**

A Policy on Geometric Design of Highways and Streets, 2004 (AASHTO) suggests the appropriate level of service for each functional class of road as follows;

**GUIDELINES FOR SELECTION OF DESIGN LEVEL OF SERVICE**

| Functional class | Appropriate level of service for specified combinations of area and terrain type | | | |
|---|---|---|---|---|
| | Rural level | Rural rolling | Rural mountainous | Urban and suburban |
| Freeway | B | B | C | C |
| Arterial | B | B | C | C |
| Collector | C | C | D | D |
| Local | D | D | D | D |

*Source: A Policy on Geometric Design of Highways and Streets, 2004, AASHTO*

According to the above guidelines, expressways are recommended that LOS be "B" or "C", however, the guideline seems to be aiming quite high LOS. LOS may be lowered by one rank, say from "B" to "C".

**Service Traffic Volume of Two-lane CLLEx**

In accordance with HCM formula, the service traffic volume of two-lane CLLEx was estimated as shown in **Table 5.2.8-4**. Estimated traffic volume and LOS is shown in **Table 5.2.8-5**. The LOS of the 2-lane CLLLEx at the opening year will be "D" and it will be "E" in year 2029. The widening to a 4-lane expressway should be made before LOS reaches to "E". In consideration of some allowance, CLLEx needs to be widened by the end of 2025. Development scenario of Option-1 will be as follows;

| | | |
|---|---|---|
| Initial Stage (2-lane) | : | 2017 – 2024 (8 years) |
| Second Stage (4-lane) | : | 2025 - |

**TABLE 5.2.8-4 SERVICE TRAFFIC VOLUME OF TWO-LANE CLLEX**

| LOS | Service volume for LOS | |
|---|---|---|
| | Veh/Hour (both directions) | Veh/Day (both directions) |
| A | Less than 110 | Less than 1,375 |
| B | Less than 320 | Less than 4,000 |
| C | Less than 700 | Less than 8,750 |
| D | Less than 1,310 | Less than 16,375 |
| E | Less than 2,430 | Less than 30,375 |
| F | More than 2,430 | More than 30,375 |

Consultant's estimate based on Highway Capacity Manual 2000 (HCM2000)

***Note:***

***Assumptions:*** *60/40 directional split: 80-percent no-passing zones for level, 23 percent truck and bus; free flow speed; 100km/hr.*

**TABLE 5.2.8-5 ESTIMATED 2-LANE CLLEX TRAFFIC VOLUME**

| Year | Daily Traffic Assignment (Veh./day) | Peak Hour Traffic Volume (Veh./hour) | LOS | Volume/Capacity Ratio |
|---|---|---|---|---|
| 2017 | 11,221 | 898 | D | 0.37 |
| 2018 | 11,771 | 942 | | 0.39 |
| 2019 | 12,352 | 988 | | 0.41 |
| 2020 | 12,967 | 1,037 | | 0.43 |
| 2021 | 13,344 | 1,068 | | 0.43 |
| 2022 | 13,733 | 1,099 | | 0.45 |
| 2023 | 14,135 | 1,131 | | 0.47 |
| 2024 | 14,550 | 1,164 | | 0.48 |
| 2025 | 14,979 | 1,198 | | 0.49 |
| 2026 | 15,421 | 1,234 | | 0.51 |
| 2027 | 15,878 | 1,270 | | 0.52 |
| 2028 | 16,349 | 1,308 | | 0.54 |
| 2029 | 16,836 | 1,347 | E | 0.55 |
| 2030 | 17,340 | 1,387 | | 0.57 |
| 2031 | 17,859 | 1,429 | | 0.59 |
| 2032 | 18,396 | 1,472 | | 0.61 |
| 2033 | 18,951 | 1,516 | | 0.62 |
| 2034 | 19,524 | 1,562 | | 0.64 |
| 2035 | 20,116 | 1,609 | | 0.66 |
| 2036 | 20,728 | 1,658 | | 0.68 |
| 2037 | 21,360 | 1,709 | | 0.70 |
| 2038 | 22,013 | 1,761 | | 0.72 |
| 2039 | 22,688 | 1,815 | | 0.75 |
| 2040 | 23,386 | 1,871 | | 0.77 |

***Assumption:*** *Peak hour rate: 8 percent*

**Service Traffic Volume of Four-Lane CLLEx**

Service traffic volume of four-lane CLLEx is shown in **Table 5.2.8-6**. Estimated traffic volume and LOS of four-lane CLLEx is shown in **Table 5.2.8-7**. The LOS of the 4-lane CLLEx will be "A" from the opening year of 2017 until 2035 and "B" thereafter until 2040, which suggests that a 4-lane CLLEx is too much ideal.

Which option to be selected, namely Option-1: Stage Construction or Option-2: Full Development should be determined based on the economic viability of the option.

**Service Traffic Volume of CLLEx Phase-II: Cabanatuan – San Jose Section**

Estimated 2-lane Phase-II (Cabanatuan – San Jose Section) of CLLEx traffic volume and LOS is shown in **Table 5.2.8-8**.

LOS of Phase-II section will be as follows;

2017 - 2022 : LOS C
2023 - 2040 : LOS D

LOS of the Phase II section will not reach to "E" before 2040, thus 2-lane will be enough for Phase-II.

**TABLE 5.2.8-6 SERVICE TRAFFIC VOLUME OF FOUR-LANE CLLEX**

| LOS | Service volume for LOS | |
|---|---|---|
| | Veh/Hour (2-lane) | Veh/Day (4-lane) |
| A | Less than 1,170 | Less than 24,374 |
| B | Less than 1,850 | Less than 38,541 |
| C | Less than 2,660 | Less than 55,415 |
| D | Less than 3,260 | Less than 67,915 |
| E | Less than 3,590 | Less than 74,790 |
| F | More than 3,590 | More than 74,790 |

Consultant's estimate based on Highway Capacity Manual 2000 (HCM2000)

***Note:***

***Assumptions:*** *Rural Area, 23 percent truck and bus; free flow speed; 100km/hr.*

**TABLE 5.2.8-7 ESTIMATED 4-LANE CLLEX TRAFFIC VOLUME (TARLAC IC – ALIAGA IC SECTION)**

| Year | Daily Traffic Assignment (Veh./day) **(both directions)** | Daily Traffic Assignment (Veh./day) **(one direction)** | Peak Hour Traffic Volume (Veh./hour) **(one direction)** | LOS | Volume/Capacity Ratio |
|---|---|---|---|---|---|
| | (a) | (b = a * 0.6) | (c = b * 0.08) | | |
| 2017 | 12,630 | 7,578 | 606 | A | 0.17 |
| 2018 | 13,150 | 7,890 | 631 | | 0.18 |
| 2019 | 13,691 | 8,215 | 657 | | 0.18 |
| 2020 | 14,255 | 8,553 | 684 | | 0.19 |
| 2021 | 14,759 | 8,855 | 708 | | 0.20 |
| 2022 | 15,281 | 9,168 | 733 | | 0.20 |
| 2023 | 15,821 | 9,493 | 759 | | 0.21 |
| 2024 | 16,380 | 9,828 | 786 | | 0.22 |
| 2025 | 16,959 | 10,176 | 814 | | 0.23 |
| 2026 | 17,559 | 10,535 | 843 | | 0.23 |
| 2027 | 18,180 | 10,908 | 873 | A | 0.24 |
| 2028 | 18,823 | 11,294 | 903 | | 0.25 |
| 2029 | 19,488 | 11,693 | 935 | | 0.26 |
| 2030 | 20,177 | 12,106 | 968 | | 0.27 |
| 2031 | 20,890 | 12,534 | 1,003 | | 0.28 |
| 2032 | 21,629 | 12,977 | 1,038 | | 0.29 |
| 2033 | 22,394 | 13,436 | 1,075 | | 0.30 |
| 2034 | 23,185 | 13,911 | 1,113 | | 0.31 |
| 2035 | 24,005 | 14,403 | 1,152 | | 0.32 |
| 2036 | 24,854 | 14,912 | 1,193 | B | 0.33 |
| 2037 | 25,732 | 15,439 | 1,235 | | 0.34 |
| 2038 | 26,642 | 15,985 | 1,279 | | 0.36 |
| 2039 | 27,584 | 16,550 | 1,324 | | 0.37 |
| 2040 | 28,559 | 17,136 | 1,371 | | 0.38 |

***Assumptions:*** *60/40 directional split, Peak hour rate : 8 percent*

**TABLE 5.2.8-8 ESTIMATED 2-LANE CLLEX PHASE-II TRAFFIC VOLUME AND LOS (CABANATUAN – SAN JOSE SECTION)**

| Year | Daily Traffic Assignment (Veh./day) | Peak Hour Traffic Volume (Veh./hour) | LOS | Volume/Capacity Ratio |
|---|---|---|---|---|
| 2017 | 7,288 | 583 | C | 0.24 |
| 2018 | 7,556 | 604 | | 0.25 |
| 2019 | 7,834 | 627 | | 0.26 |
| 2020 | 8,122 | 650 | | 0.27 |
| 2021 | 8,372 | 670 | | 0.28 |
| 2022 | 8,630 | 690 | | 0.28 |
| 2023 | 8,896 | 712 | D | 0.29 |
| 2024 | 9,170 | 734 | | 0.30 |
| 2025 | 9,452 | 756 | | 0.31 |
| 2026 | 9,743 | 779 | | 0.32 |
| 2027 | 10,043 | 803 | | 0.33 |
| 2028 | 10,353 | 828 | | 0.34 |
| 2029 | 10,671 | 854 | | 0.35 |
| 2030 | 11,000 | 880 | | 0.36 |
| 2031 | 11,339 | 907 | | 0.37 |
| 2032 | 11,688 | 935 | | 0.38 |
| 2033 | 12,048 | 964 | | 0.40 |
| 2034 | 12,419 | 994 | | 0.41 |
| 2035 | 12,801 | 1,024 | | 0.42 |
| 2036 | 13,196 | 1,056 | | 0.43 |
| 2037 | 13,602 | 1,088 | | 0.45 |
| 2038 | 14,021 | 1,122 | | 0.46 |
| 2039 | 14,453 | 1,156 | | 0.48 |
| 2040 | 14,898 | 1,192 | | 0.49 |

***Assumption:*** *Peak hour rate: 8 percent*