3.3 ALTERNATIVES AT PARK 'N FLY BUILDING AREA

3.3.1 Park 'n Fly Building

- The land is owned by MIAA.
- The land is leased to Park 'n Fly, of which the lease contract will be expired in the near future.
- Park 'n Fly is requesting extension of the lease contract for another 50 years.
- Approximate building size is 84 m x 20 m and 26 m x 17 m. The building is a RC structure with 3 to 4 stories (floor area is about 8,000 sq. m.)
- Area at the backside of Park 'n Fly is still vacant and the land is owned by MIA.

3.3.2 Expressway Alignment Alternatives

Alternative-1: Expressway Alignment affects Park 'n Fly Building (see **Figure 3.3.2-1**)
Alternative-2: Expressway Alignment does not affect Park 'n Fly Building (see **Figure 3.3.2-2**)

TABLE 3.3.2-1 COMPARISON OF TWO ALTERNATIVES

	Alternative-1	**Alternative-2**
Park 'n Fly Building	Affected	Not Affected
Ramp B Length	708 m	886 m (+14.9 Million Php)
Ramp C Length	372 m	467 m (+ 8.0 Million Php)
ROW Acquisition and Compensation of Building	• Land Acquisition from MIAA • Negotiation with Park 'n Fly Building owner needed. (a) Replacement cost (b) Business compensation cost (c) Demolition cost	• Land acquisition from MIAA • Negotiation only with MIAA is needed. • Relocation of informal settlers (about 50 households) is required.
Recommendation	• It is expected that negotiation with Park 'n Fly Building owner will take a long time and ROW delivery will be delayed. • Park 'n Fly Building is quite useful for Terminal-s and 2 passengers. • Alternative-2 was recommended, provided that resettlement sites for informal settlers be provided. (MIAA has designated resettlement site.)	

FIGURE 3.3.2-1 ALTERNATIVE-1 MAIN ALIGNMENT TO AFFECT THE PARK 'N FLY BUILDING

FIGURE 3.3.2-2 ALTERNATIVE-2 MAIN ALIGNMENT TO AVOID THE PARK N' FLY BUILDING

3.4 ALTERNATIVES AT INTERFACE BETWEEN PHASE-1 AND PHASE-2

3.4.1 NAIA Expressway Phase I

NAIA Expressway Phase I was completed in 2010 as shown in **Figure 3.4.1-1.** The Phase II must be extended from this condition. Available space is 19.0 m at Section A and 18.78 m at Section B. Profile of existing ramps is shown in **Figure 3.4.1-2**.

3.4.2 Phase I and Phase II Connection Alternatives

Phase I and Phase II connection alternatives are schematically shown in **Figure 3.4.2-1**.

Alternative-1: Recommended plan by FS in 2010

Alternative-2(A): Improved Plan of Alternative-1 (see **Figure 3.4.2-2**)

Alternative-2(B): Modification of Alternative-2(B) (see **Figure 3.4.2-3** and **Figure 3.4.2-4 (A)** and **(B)**)

Alternative-3: To utilize Existing On-ramp (see **Figure 3.4.2-5** and **Figure 3.4.2-6**)

The comparison table for Alternatives 1 to 3, is shown in **Table 3.4.2-1.**

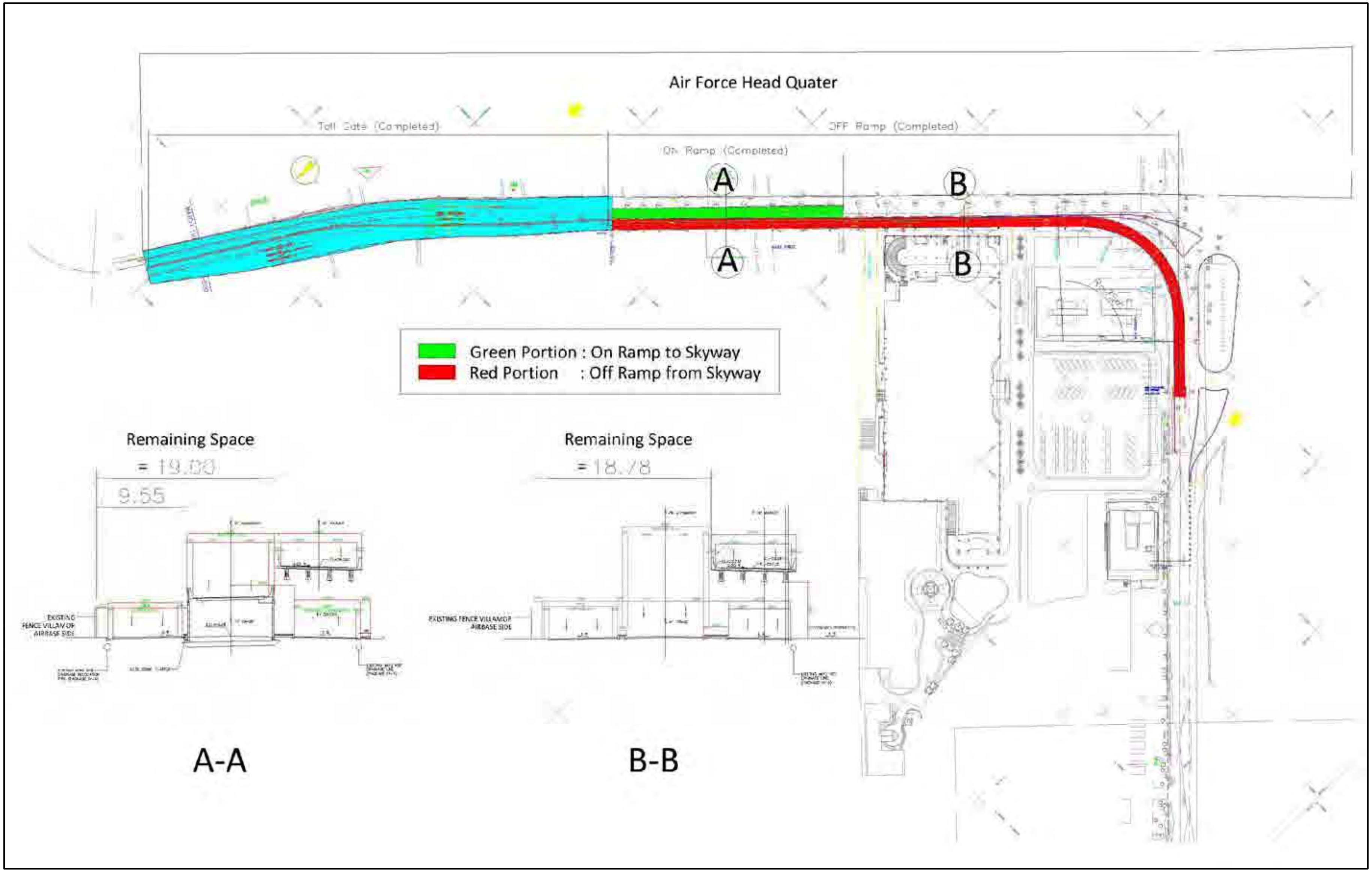


FIGURE 3.4.1-1 CURRENT CONDITION AT PHASE I AND PHASE II CONNECTION

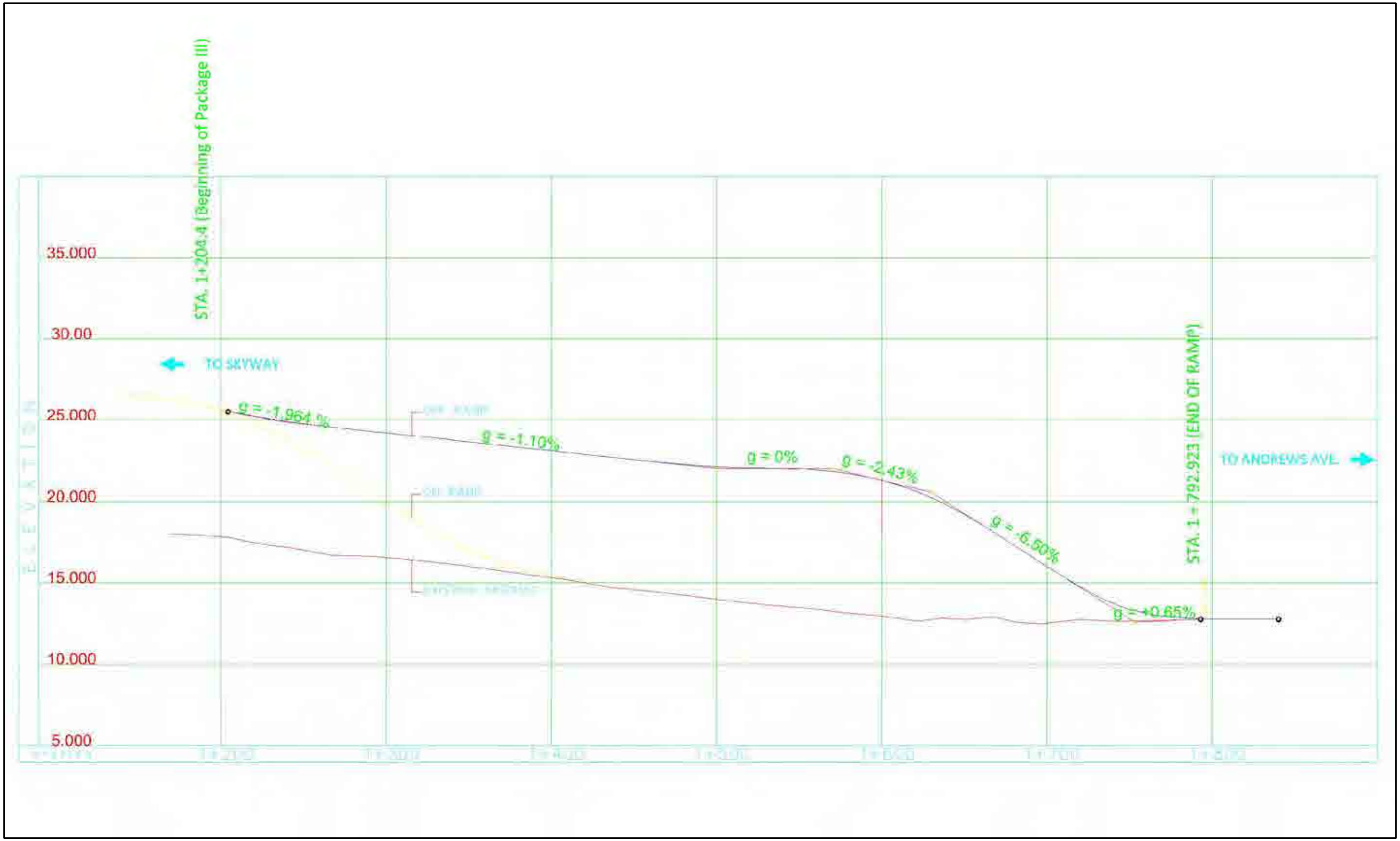


FIGURE 3.4.1-2 PROFILE OF EXISTING MAP

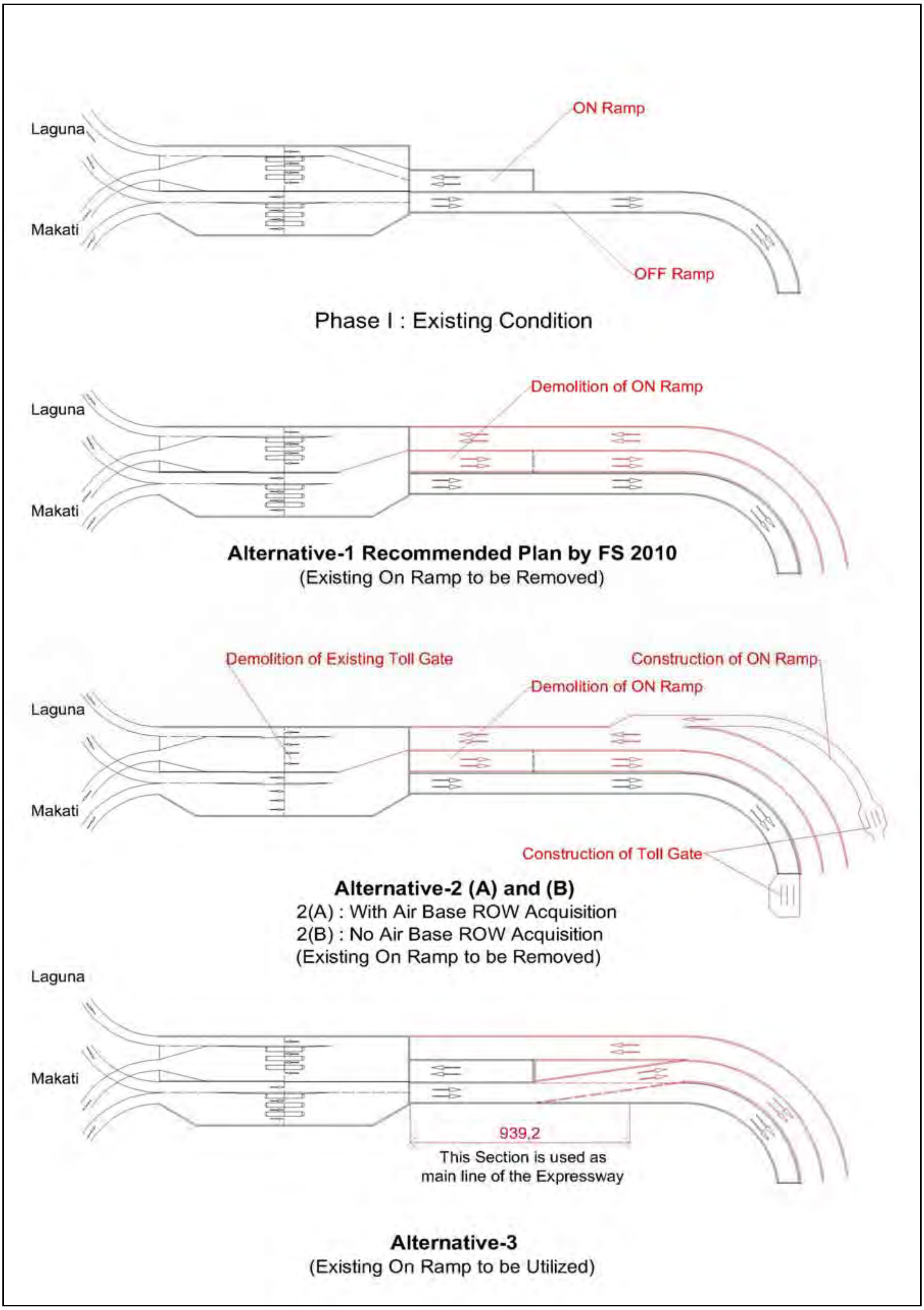


FIGURE 3.4.2-1 PHASE I AND PHASE II CONNECTION ALTERNATIVES

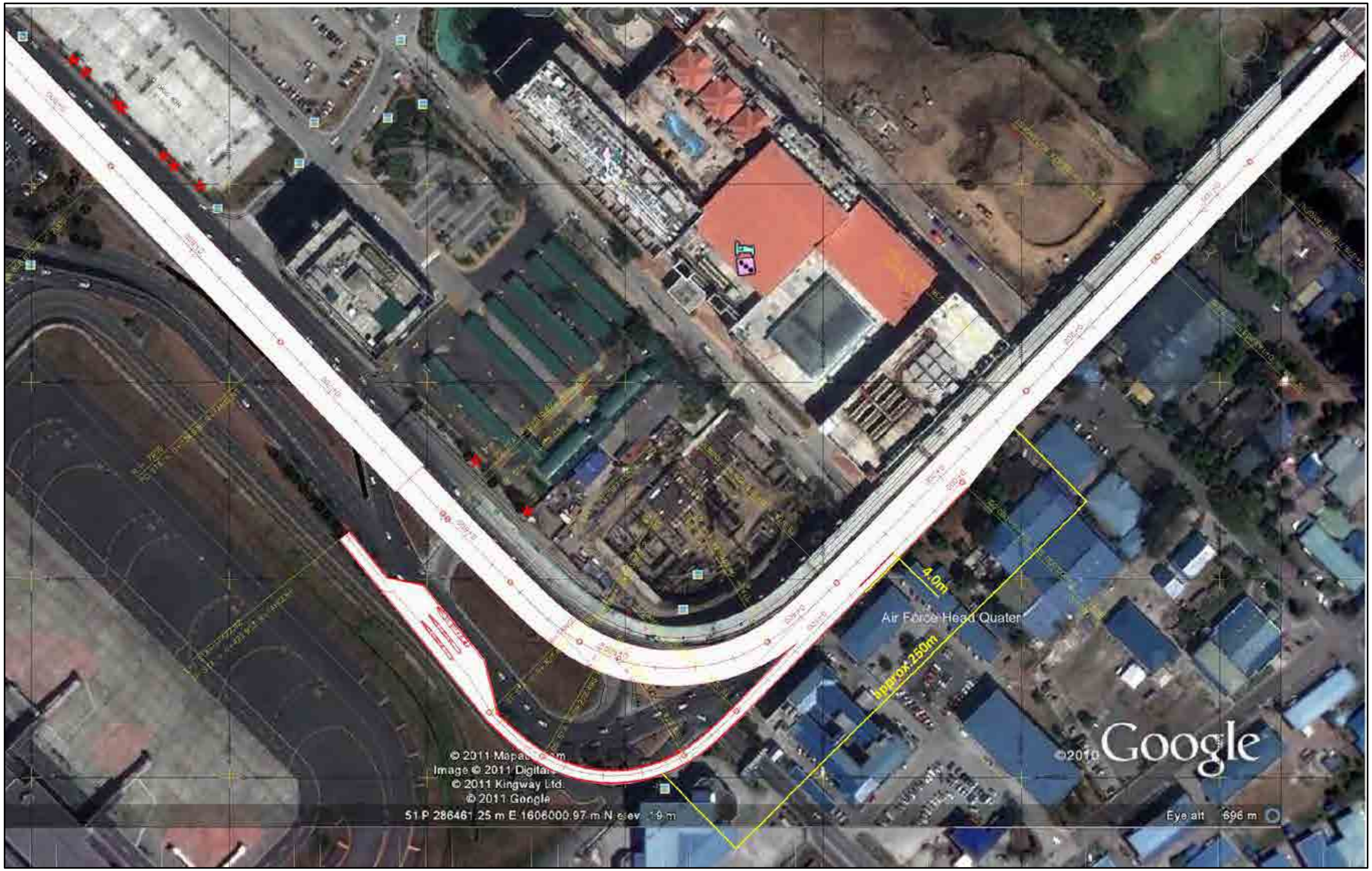


FIGURE 3.4.2-2 ALTERNATIVE-2(A) ON-RAMP FROM TERMINAL 3

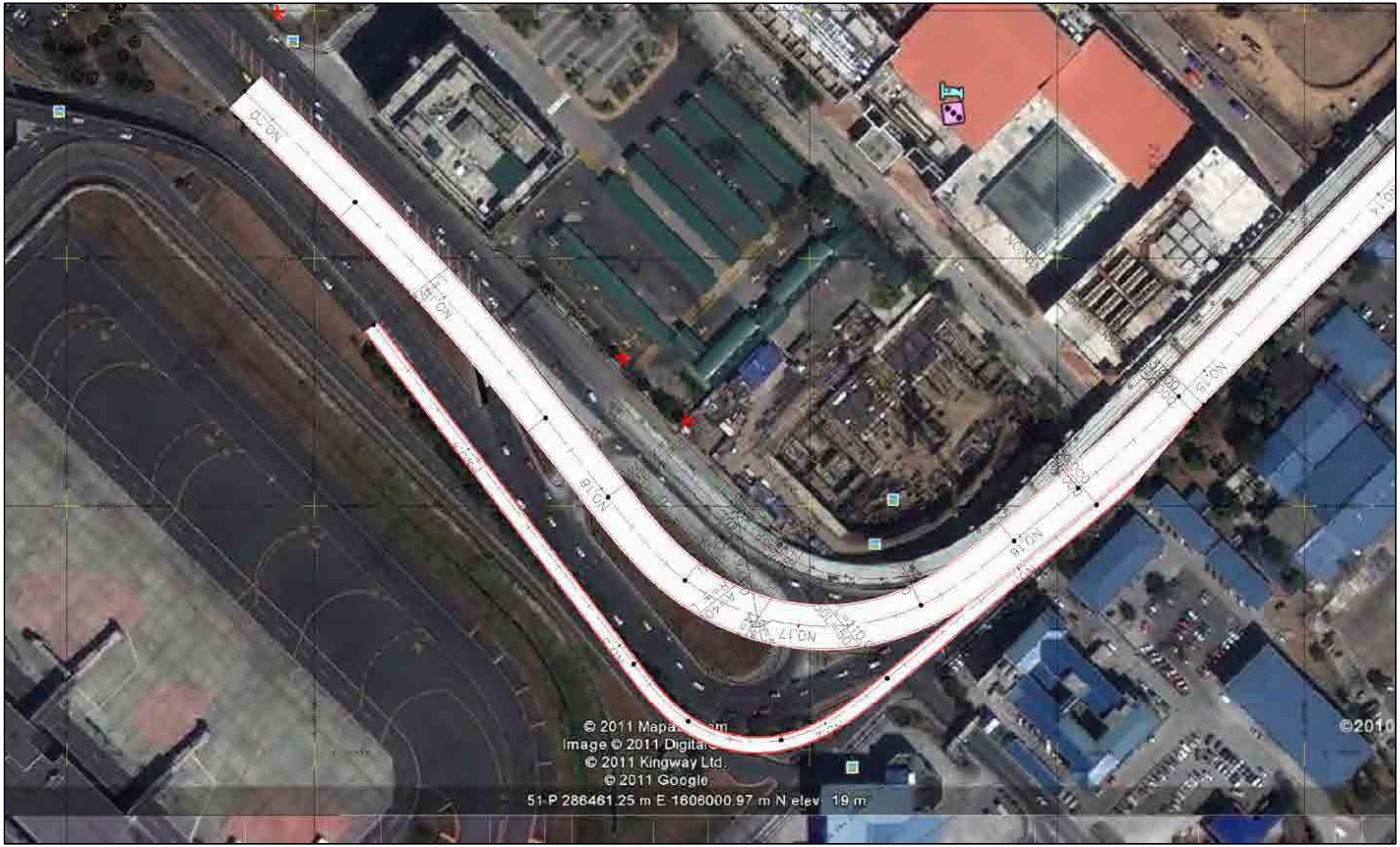


FIGURE 3.4.2-3 ALTERNATIVE-2 (B) AVOID AIRFORCE HEADQUARTER

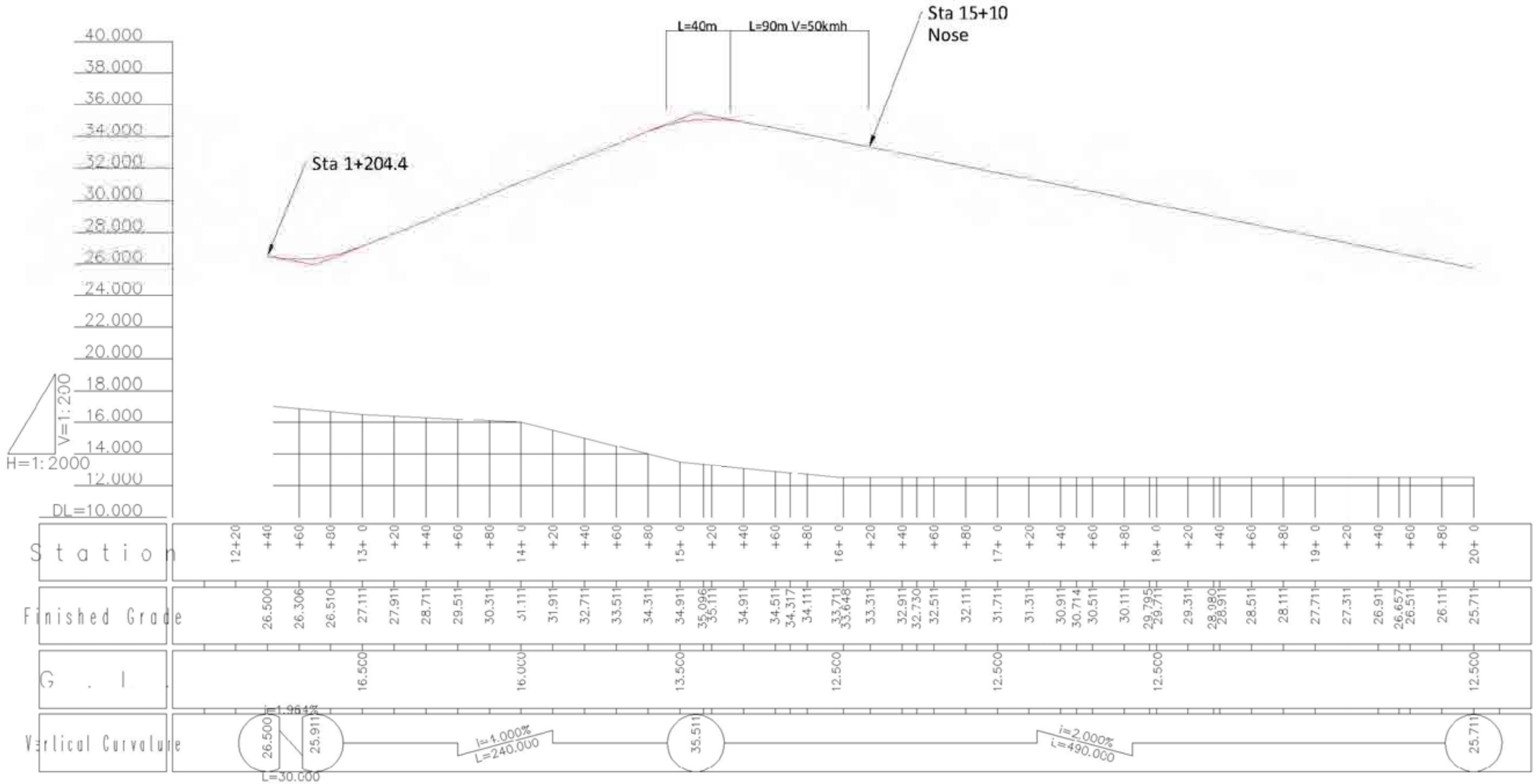


FIGURE 3.4.2-4 (1) ALTERNATIVE-2 (B) AVOID AIRFORCE HEADQUARTER (PROFILE MAIN ALIGNMENT)

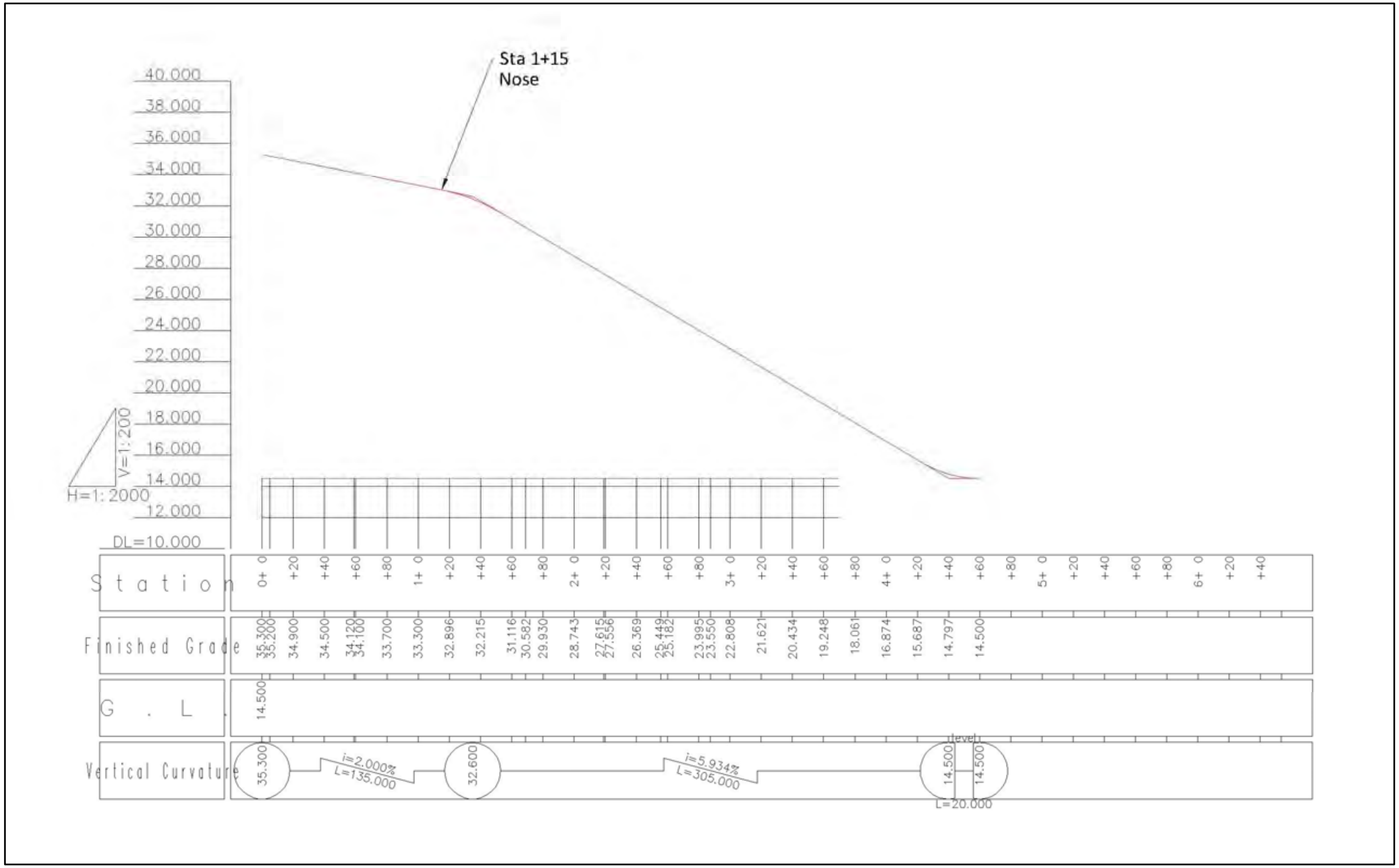


FIGURE 3.4.2-4 (2) ALTERNATIVE-2 (B) AVOID AIRFORCE HEADQUARTER (PROFILE RAMP)

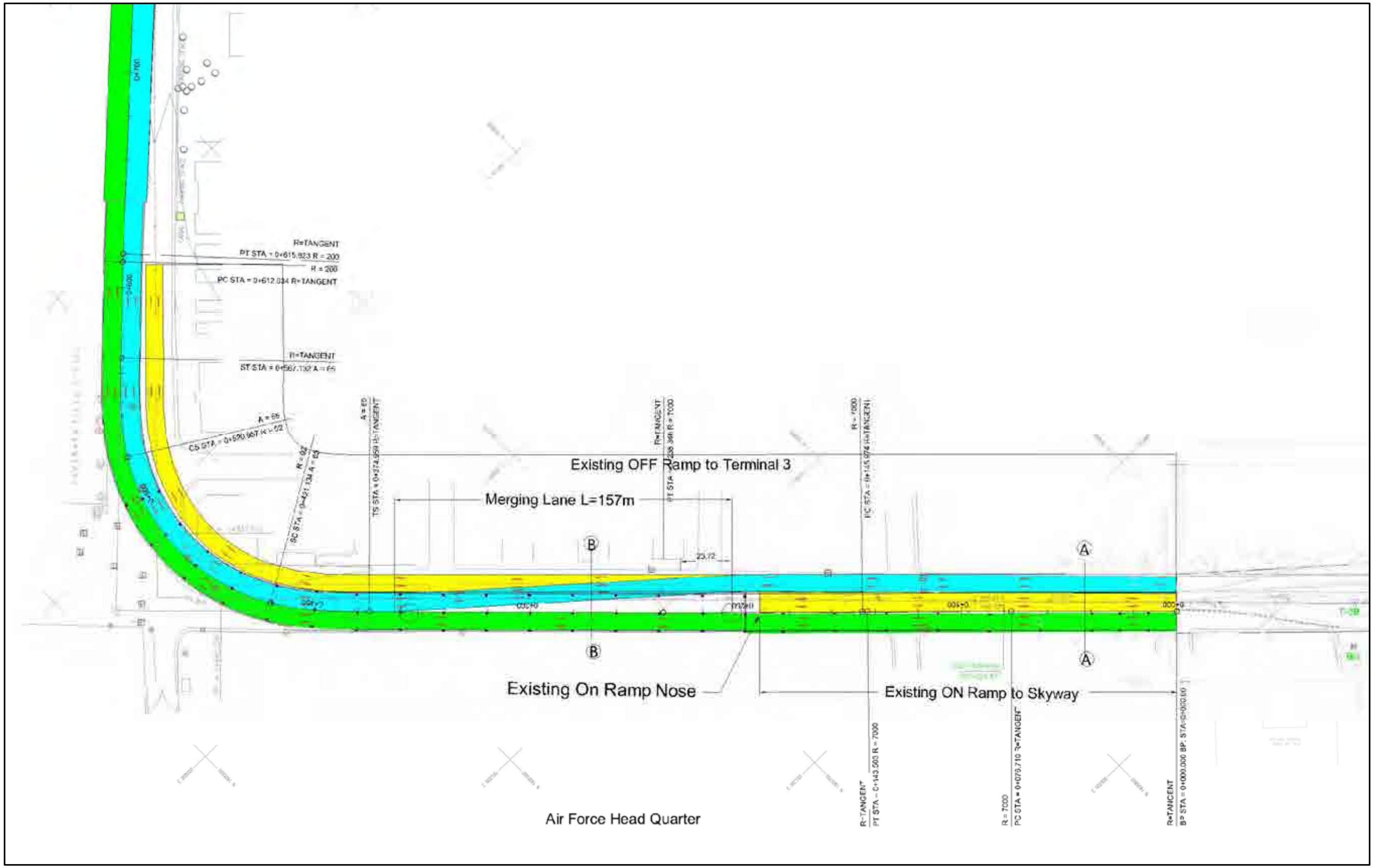


FIGURE 3.4.2-5 ALTERNATIVE-3 USE OF EXISTING ON-RAMP

FIGURE 3.4.2-6 ALTERNATIVE-3 USE OF EXISTING ON-RAMP (TYPICAL CROSS SECTION)

3.4.3 Evaluation of Alternatives

Evaluation of alternatives is shown in **Table 3.4.3-1.** Alternative-2(A) was recommended.

TABLE 3.4.3-1 COMPARISON OF ALTERNATIVES 1 TO 3

	Alternative-1 Recommended plan by FS in 2010	Alternative-2(A) Improved Plan of Alternative-1	Alternative-2(B) Modification of Alternative-2(B)	Alternative-3 To utilize Existing On-ramp
Feature	• Existing on-ramp to be removed. • Available space is used for the expressway (2-lane x 2 direction = 4-lane)	• Existing on-ramp to be removed. • Available space is used for the expressway (2-lane x 2 direction = 4-lane) • Removed on-ramp is constructed at the NAIA Terminal III exit.	• In order to avoid acquisition of Villamor Air Base Headquarter, the expressway alignment partly utilizes the space over the existing off-ramp. Thus, the expressway has to go up and shifted toward the existing off-ramp, then go down again.	• A part of the existing off-ramp (2-lane, 6 m) is used as the main carriageway of the expressway. • Number of existing toll booths will not be enough to accommodate the expressway traffic. • Distance from toll booths to on-ramp is too short to maneuver main traffic and on-ramp traffic
On-ramp location and Accessibility	**Poor** • Removed on-ramp is constructed along Andrews Ave. Exit traffic from Terminal III needs to go around the at-grade road and make a U-turn at the round-about with the monument to enter the expressway.	**Good** • Traffic from NAIA Terminal III can enter directly to the on-ramp.	**Fair** • Traffic from NAIA Terminal III can enter directly to the on-ramp. • Removed on-ramp is constructed at the NAIA Terminal III. Since the expressway is located at high elevation, this ramp needs to be long which makes it difficult to get traffic from NAIA Terminal III.	**Good** • Traffic from NAIA Terminal III can enter directly to the on-ramp.
Main Route Alignment	**Good** • Vertical alignment is the same as the Phase-1 section.	**Good** • Vertical alignment is the same as the Phase-1 section.	**Poor** • The expressway has to go up and shifted toward the existing off-ramp, then go down again.	**Fair** • Horizontal alignment for main traffic is not so well.
Land Acquisition	**Good** • No land acquisition	**Fair** • Villamor Air Base Headquarter land is affected (width = 4 m, Length = 250 m). No building affected.	**Good** • No land acquisition	**Good** • No land acquisition
Environment	**Poor** Exit traffic from Terminal III needs to go around the at-grade road and make a U-turn at the round-about with the monument to enter the expressway. Traffic must take long trip compared with other alternatives.	**Good** • Traffic from NAIA Terminal III can directly enter the on-ramp	**Good** • Traffic from NAIA Terminal III can directly enter the on-ramp	**Good** • Traffic from NAIA Terminal III can go directly enter the on-ramp
Cost	• Cheapest	• Almost Same as Alternative-1	**Expensive** • Complicated substructure is required resulting in high cost.	**Expensive** • Though off-ramp will not be removed, the complicated structure will be required, resulting in high cost.
Recommendation	Not recommended.	**Recommended**	Not recommended	Not recommended

3.5 ALIGNMENT AT MMDA MONUMENT

3.5.1 Monument at Circulo del Mundo

A monument was built by MMDA at Circulo del Mundo along Andrews Ave. (see **Figure 3.5.1-1**).

3.5.2 Alternative Alignment at Monument Section

Two (2) alternative alignments are shown:
Alternative-1 is shown in **Figure 3.5.2-1** which is the plan of two-direction combined expressway. DPWH is communicating with MMDA on this alternative.

Alternative-2 is shown in **Figure 3.5.2-2**, which is the plan of expressway splited by direction. This alternative is recommended by MMDA.

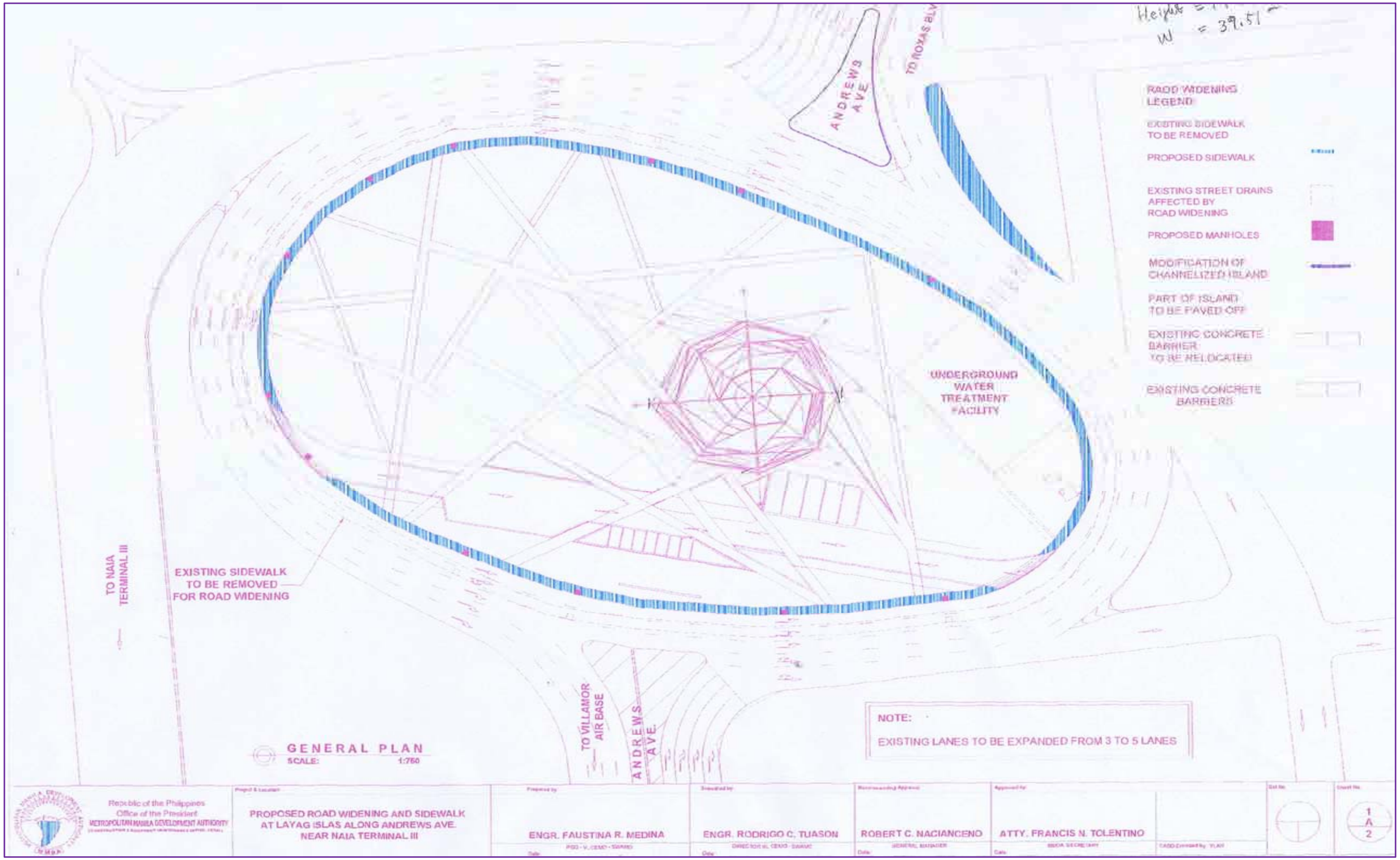


FIGURE 3.5.1-1 MONUMENT AT CIRCULO DEL MUNDO

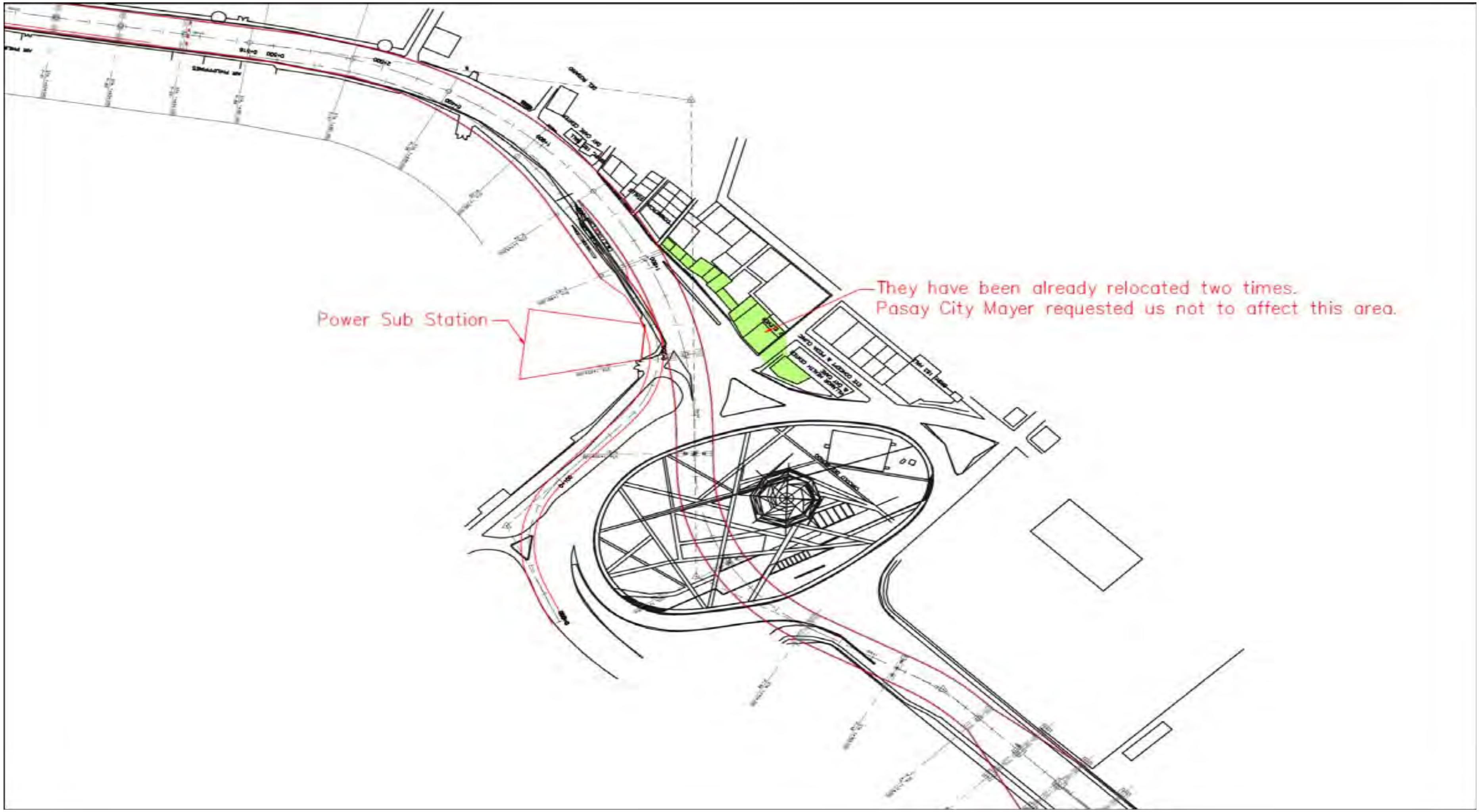


FIGURE 3.5.2-1 ALTERNATIVE-1: TWO-DIRECTION COMBINED EXPRESSWAY

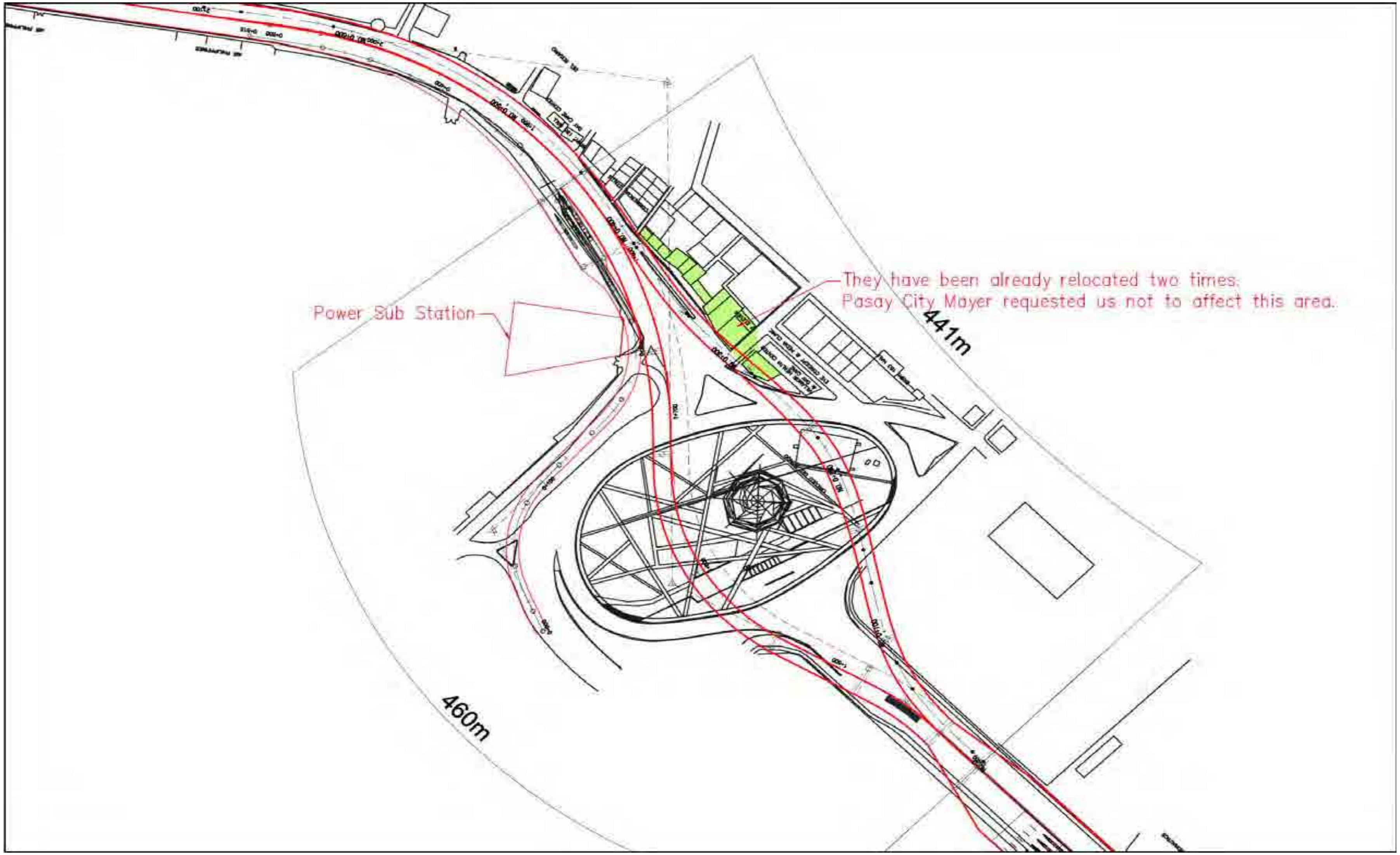


FIGURE 3.5.2-2 ALTERNATIVE-2: EXPRESSWAY SPLITED BY DIRECTION

TABLE 3.5.2-1 ALTERNATIVE STUDY AT MMDA LANDMARK

(Confidential)

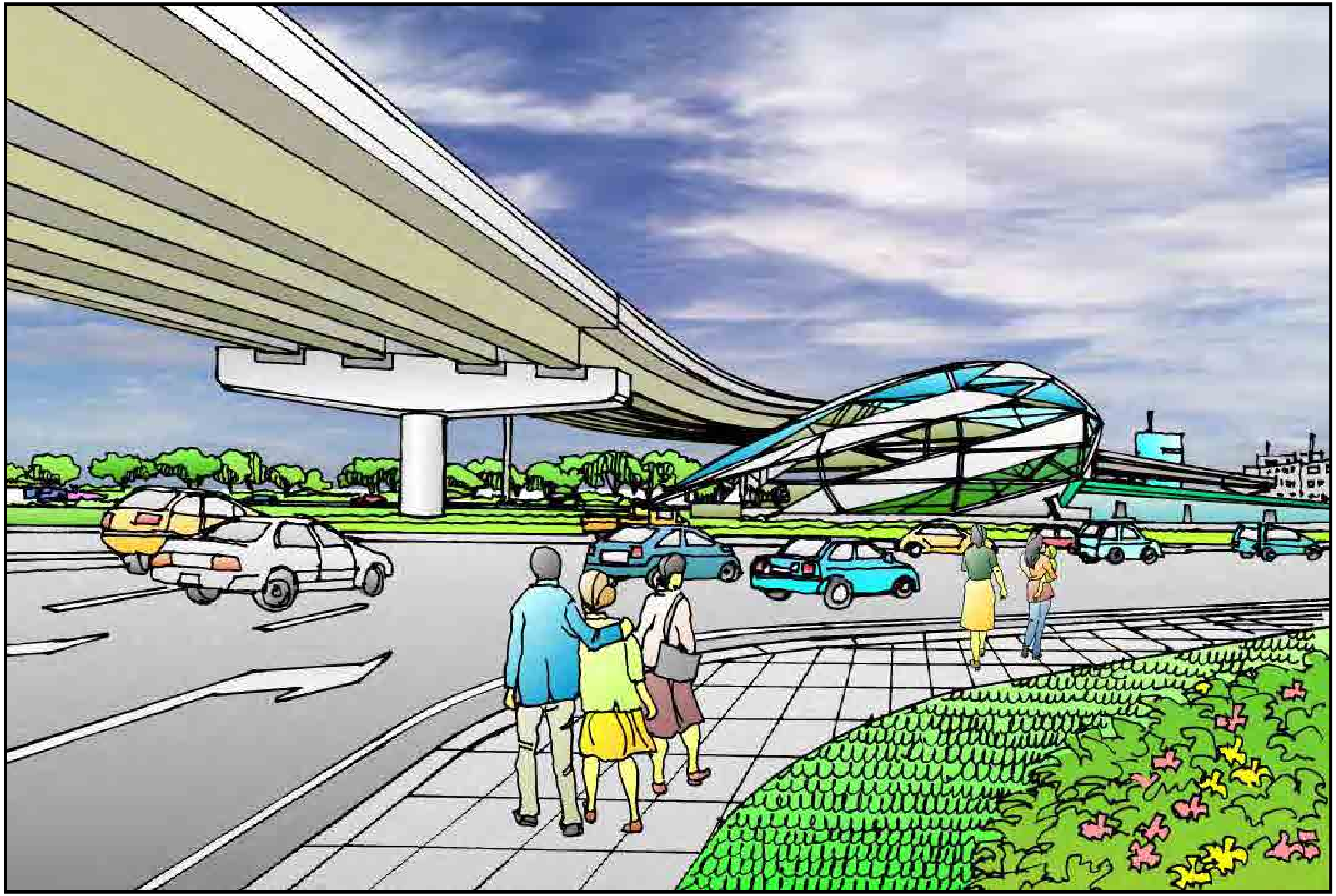


FIGURE 3.5.2-3 IMAGE OF ALTERNATIVE-1

3.6 RAMP LAYOUT

3.6.1 2010 FS Ramp Layout

2010 FS Ramp Layout is shown in **Figure 3.6.1-1.**

- Seven (7) on (entrance)-ramps and seven (7) off (exit)-ramps were proposed.

ISSUES OF RAMP LAYOUT

<table>
<tr><th>Ramp Number</th><th>Issues</th></tr>
<tr><td>(1) Ramp No. 10 (off-ramp from 3rd level to the ground level) (see Figure 3.6.1-2, B-ramp in the figure)</td><td>• End of ramp is located too close to the intersection (only 65 m).
• Intersection traffic queue will be extended to up to the end of the ramp, thus free exit of traffic on this ramp will be affected.
• There will be definitely conflict of traffic (through traffic and left-turn traffic as shown in Figure 3.6.1-3), which will cause traffic congestion and traffic accidents.
• Recommended to extend this ramp towards NAIA Terminal 1 and 2. See Figure 3.6.1-4.</td></tr>
<tr><td>(2) Ramp No. 11 (off-ramp from 2nd level to the ground level) (see Figure 3.6.1-2, A-ramp in the figure) Is this ramp needed?</td><td>• This ramp ends within the intersection.
• Since traffic which utilize this ramp has very short travel distance, resulting in low traffic demand, recommended to be removed. Travel distance which utilizes this ramp;
Ramp (3) to Ramp (11) = 1.4 km.
Ramp (4) to Ramp (11) = 1.2 km.</td></tr>
<tr><td>(3) Ramp No. 2 (on-ramp from Aurora Blvd.) Is this ramp needed?</td><td>• Travel distance and traffic demand which utilizes this ramp is;<table><tr><th></th><th>Travel Distance</th><th>Traffic Demand (2015)</th></tr><tr><td>Ramp (2) ~ Ramp (10)</td><td>1.9 km.</td><td>1,761</td></tr><tr><td>Ramp (2) ~ Ramp (12) & (13)</td><td>2.6 km.</td><td>53</td></tr></table>• Traffic demand is not so high, and ROW acquisition is required, thus recommended to be removed.</td></tr>
<tr><td>(4) Ramp No. 6 (on-ramp from Terminal 3)</td><td>• To utilize this ramp from Terminal 3 to Skyway, traffic must go around the at-grade road as shown in Figure 3.6.1-5, since the existing on-ramp is proposed to be removed.
• Under the above condition, exit traffic from Terminal 3 will be discouraged to utilize this ramp.
• It is recommended that this ramp should be located at the exit of Terminal 3. (This is studied in section 3.4. Alternatives at Connection Point of Phase-1 and Phase-2.)</td></tr>
</table>

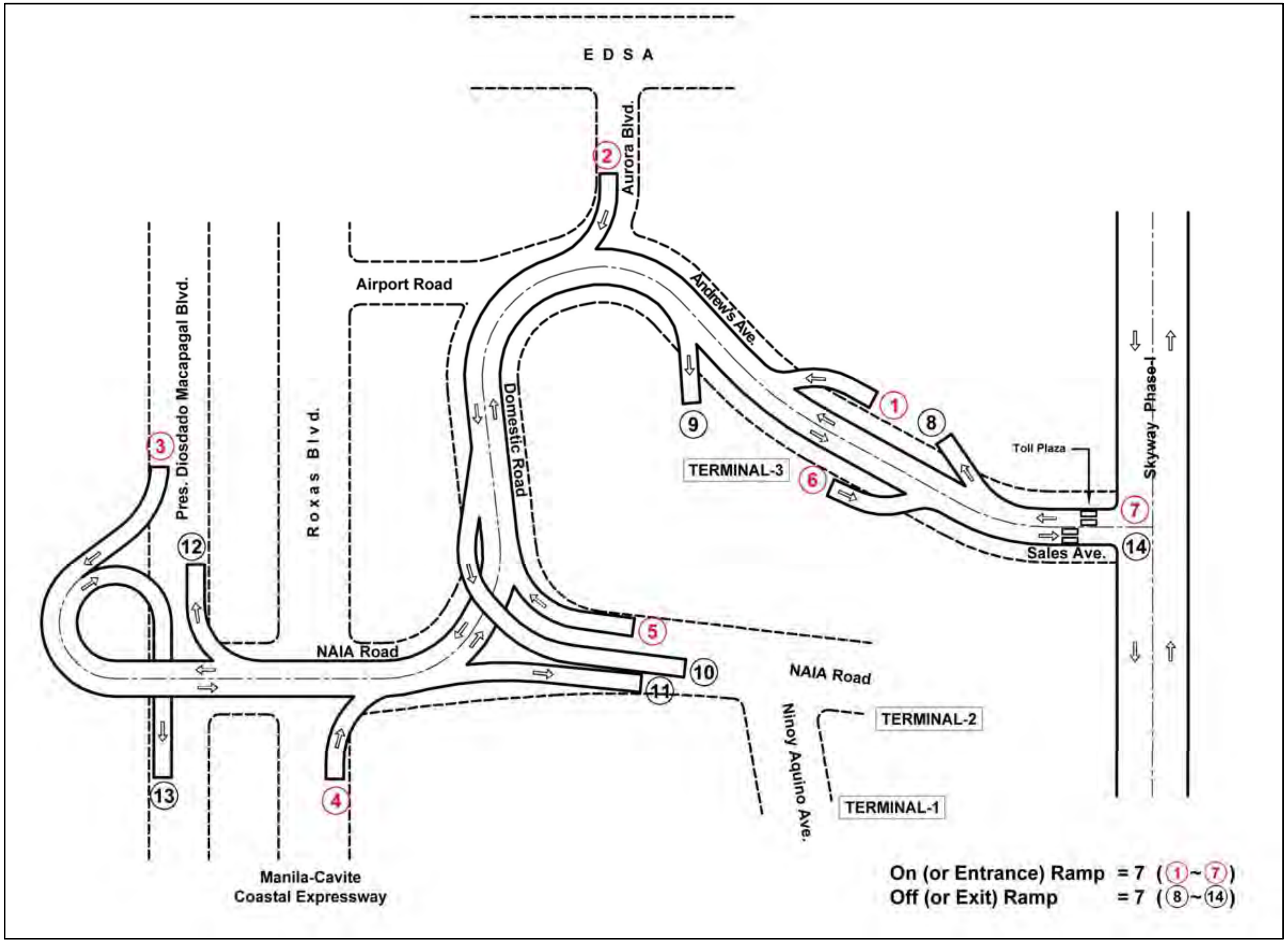


FIGURE 3.6.1-1 SCHEMATIC NAIAX RAMP LAYOUT (2010 FS)

FIGURE 3.6.1-2 ISSUE OF OFF RAMP TO NAIA TERMINAL 1 AND 2 (2010 FS)

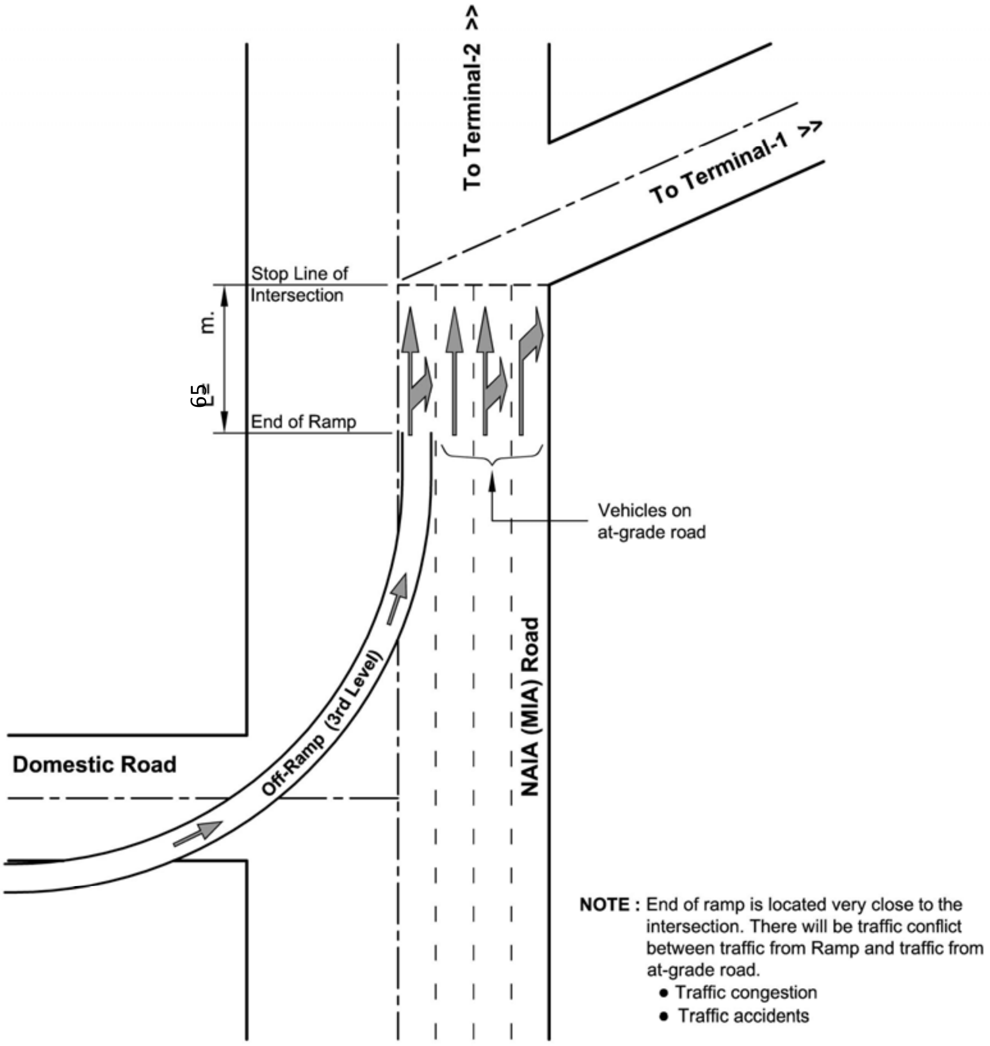


FIGURE 3.6.1-3 SCHEMATIC DRAWING AT 3RD LEVEL OFF-RAMP AND THE INTERSECTION

FIGURE 3.6.1-4 ALTERNATIIVE -2 RAMP LAYOUT (ALIGNMENT TO AVOID THE PARK 'N FLY

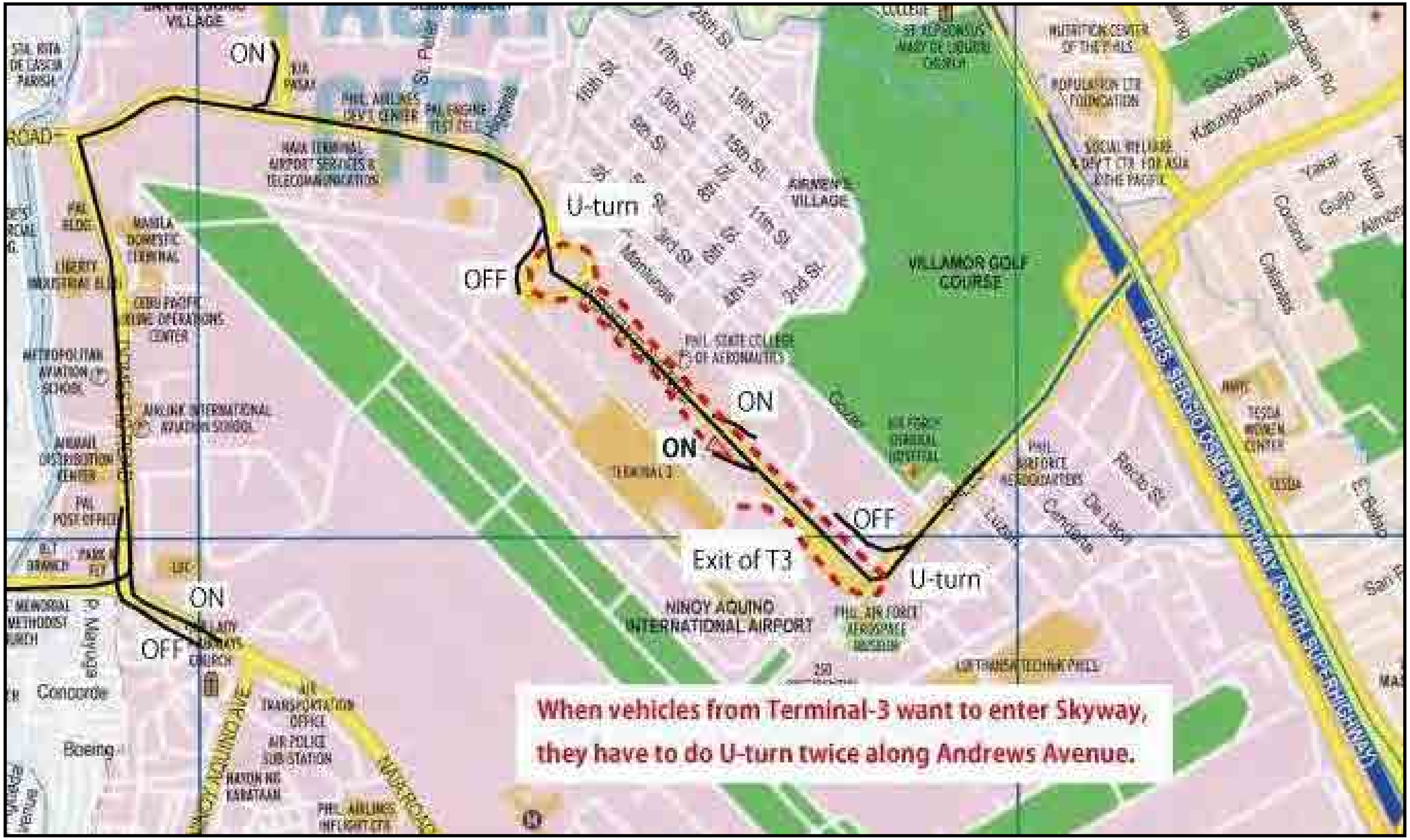


FIGURE 3.6.1-5 ISSUE OF OFF RAMP TO NAIA TERMINAL 3 (2010 FS)

3.6.2 Estimated Ramp Traffic

Estimated ramp traffic volume based on 2010 FS ramp layout is shown in **Figure 3.6.2-1.** Estimated ramp traffic volume based on the revised ramp lay out (ramp (5) and ramp (8) are removed) is shown in **Figure 3.6.2-2.** Future demand forecast is described in Chapter 4.3.

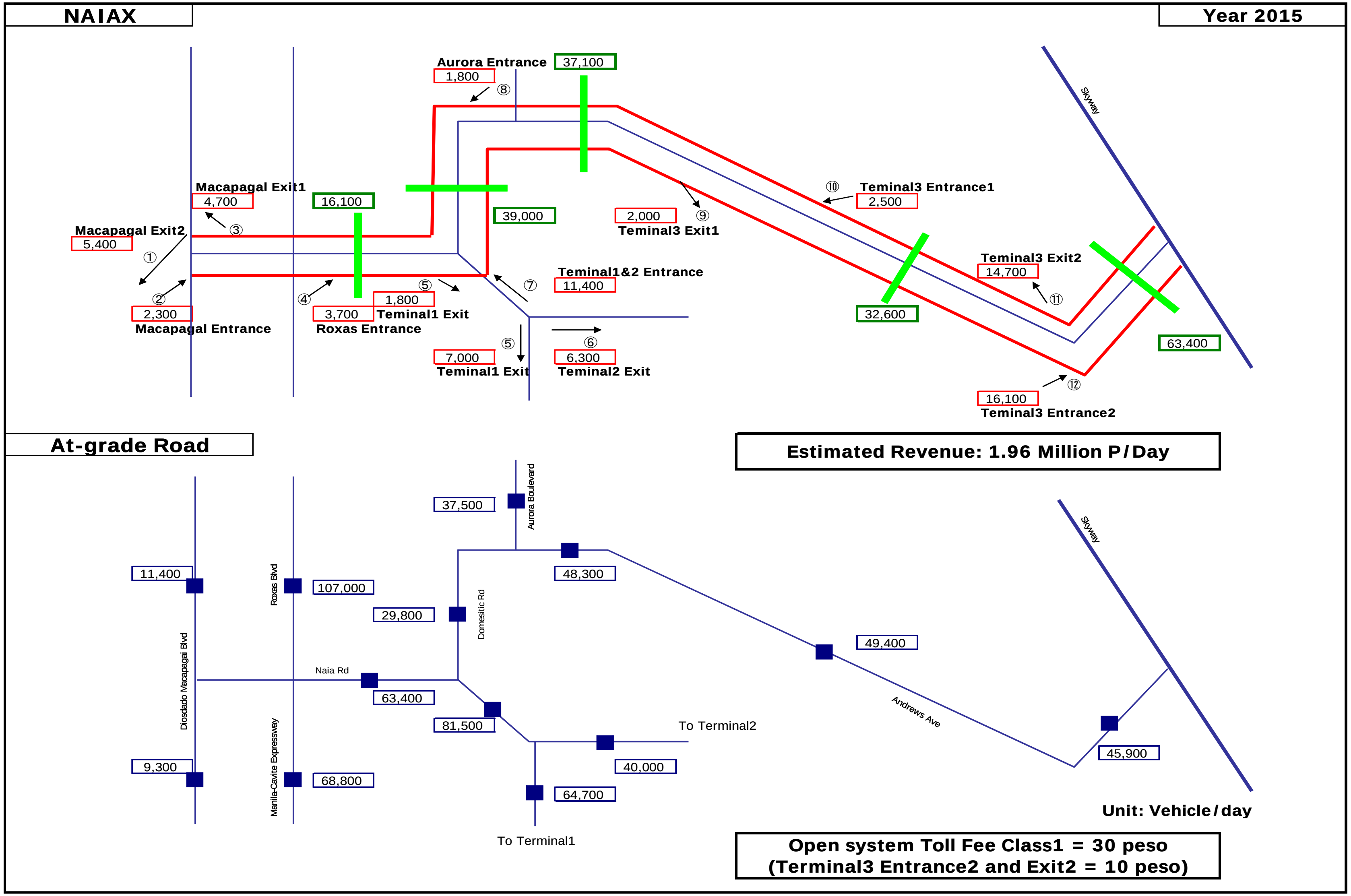


FIGURE 3.6.2-1 TRAFFIC PROJECTION (2010 FS RAMP LAYOUT)

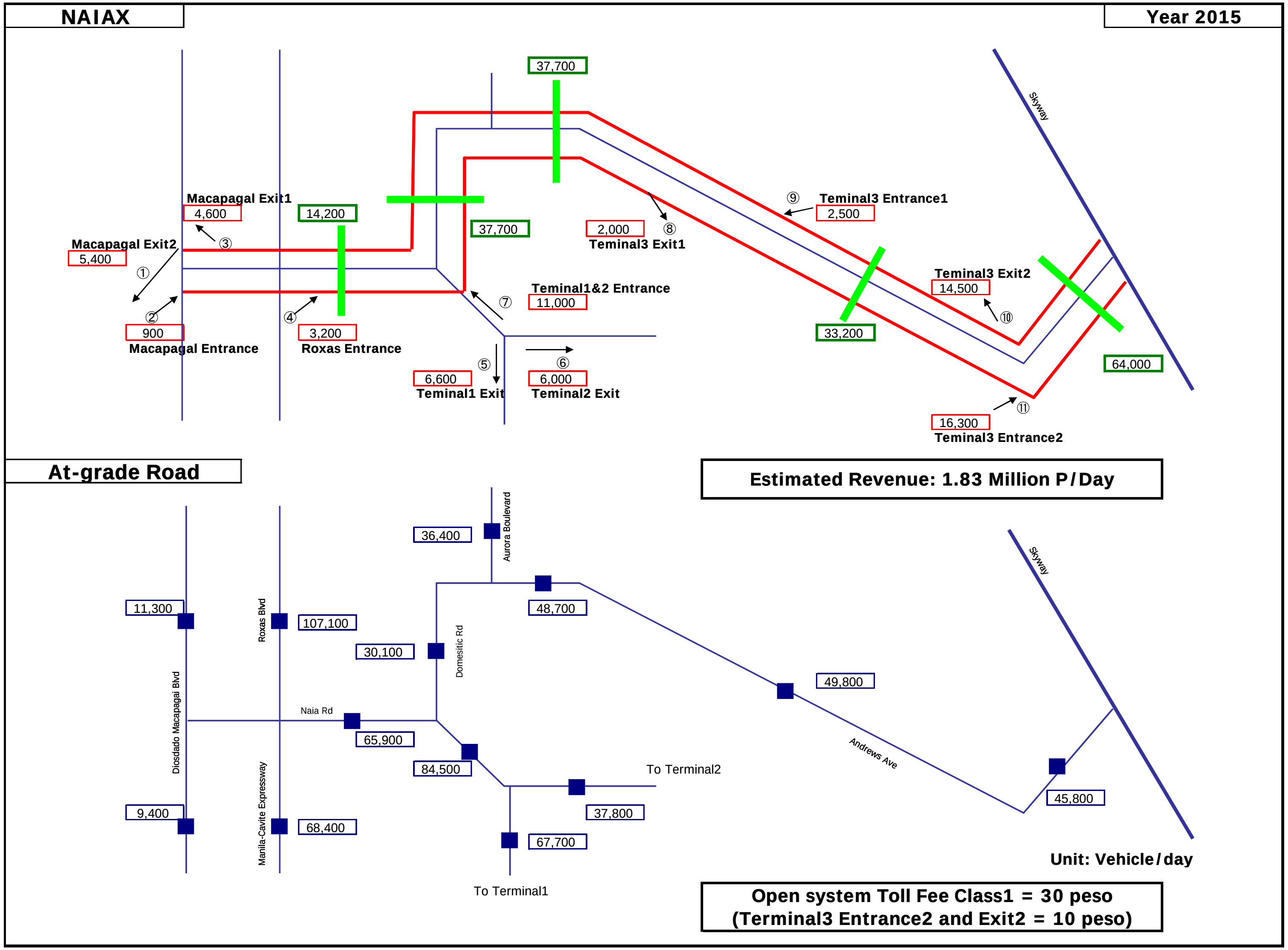


FIGURE 3.6.2-2 TRAFFIC PROJECTION (WITHOUT AURORA ON-RAMP AND OFF-RAMP NEAR PARK 'N FLY BLDG

3.7 DESIGN STANDARDS

3.7.1 Design Speed

In case of urban expressways, design speed is greatly controlled by the availability of ROW. When higher design speed is selected, bigger radius is required, thus new ROW acquisition is required.

In case of the NAIA Expressway, Phase-1 was completed, thus design speed is rather controlled by Phase-1 design.

Horizontal radius adopted by Phase-1 and 2010 FS for Phase-2 is shown in **Figure 3.7.1-1.**

	Expressway Main Alignment (Minimum Radius Adopted)	Ramp Section
Phase 1	R_{min} = 91.5 m ⇨ Design Speed = 50 km/hr	R_{min} = 50 m ⇨ Design Speed = 40 km/hr
2010 FS	R_{min} = 125 m ⇨ Design Speed = 60 km/hr	R_{min} = 50 m ⇨ Design Speed = 40 km/hr

DESIGN SPEED OF OTHER STANDARD

	AASHTO (Urban Freeway)	Japan (Urban Expressway)	
Expressway Main Alignment	100 km/hr	80 km/hr	60 km/hr
Ramp	-	40 km/hr	40 km/hr

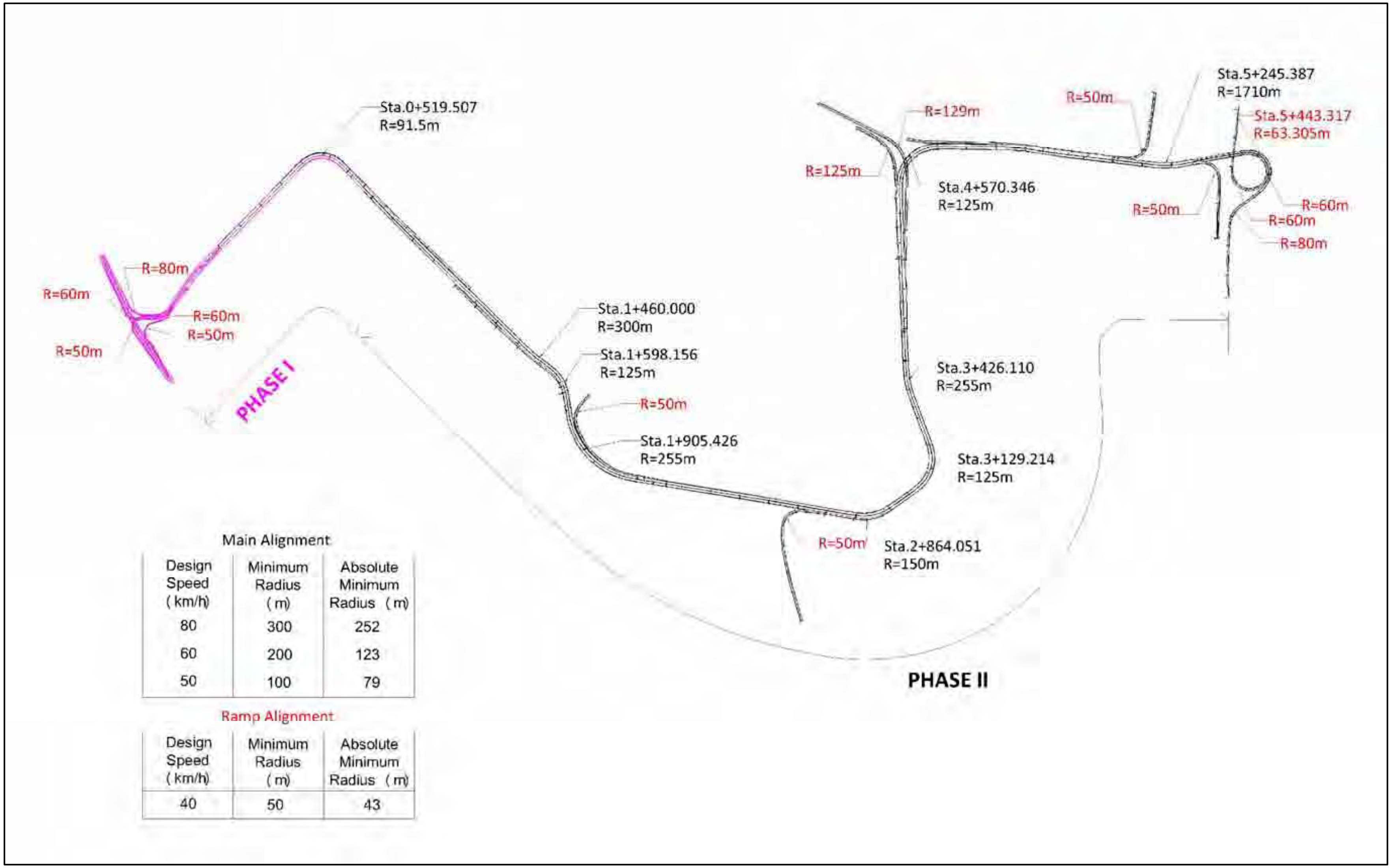
Design speed is recommended as follows;

- Expressway Main Alignment: Phase I = 50 km/hr.; Phase II = 60 km/hr.
- Ramp: 40 km/hr.

3.7.2 Typical Cross Section

Typical cross sections adopted by 2010 FS and those recommended by the JICA Study Team is shown in **Table 3.7.2-1.**

Recommended typical cross sections are also shown in **Figure 3.7.2-1.**



Main Alignment

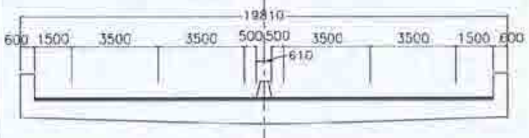
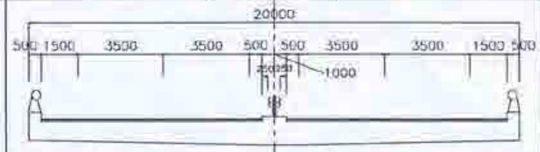
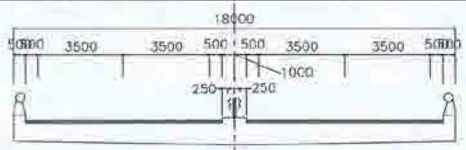
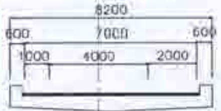
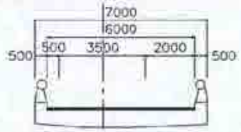
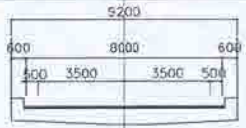
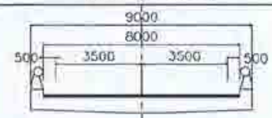
Design Speed (km/h)	Minimum Radius (m)	Absolute Minimum Radius (m)
80	300	252
60	200	123
50	100	79

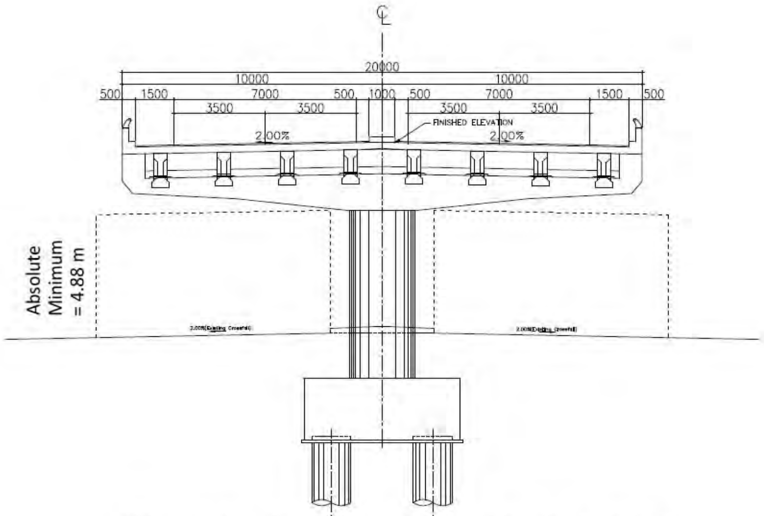
Ramp Alignment

Design Speed (km/h)	Minimum Radius (m)	Absolute Minimum Radius (m)
40	50	43

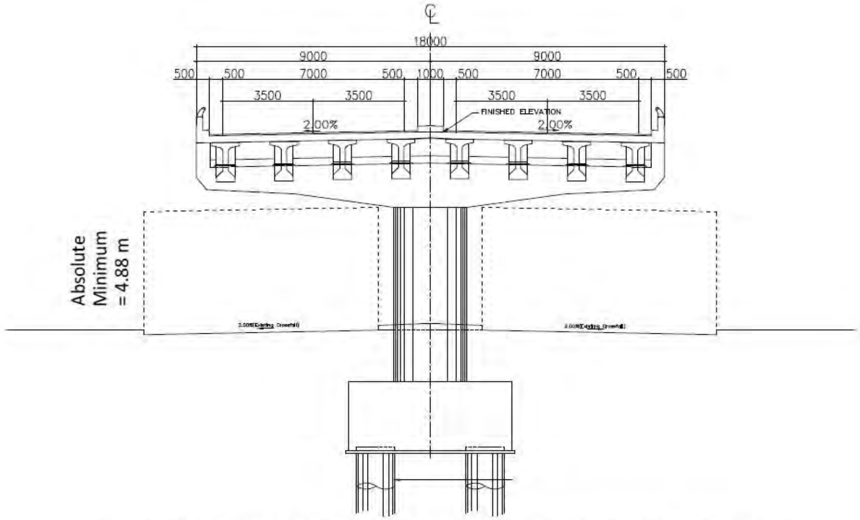
FIGURE 3.7.1-1 HORIZONTAL RADIUS ADOPTED BY PHASE-1 AND 2010 FS

TABLE 3.7.2-1 NAIA EXPRESSWAY PHASE II – TYPICAL CROSS SECTION

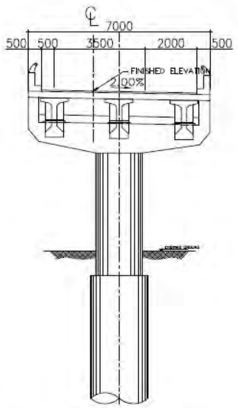
Section	NAIA Expressway Phase II Project (2010 Feasibility Study)	Original Design and Engineering Issues	NAIA Expressway Phase II Project (Recommended)	Solution
Main (Standard)	 Typical Section for 4 Lanes (W = 19.81 m)	Median: New Jersey Type W = 610 mm Shoulder: New Jersey Type W = 600 mm Obstacle for Stopping Sight Distance (75m (at V=60km/h)) Needs widening of shoulder	 Typical Section for 4 Lanes (Standard Section) (W = 20.0 m)	Median: Guard Rail Post Type W = 1000 mm Shoulder: Metal Railing Type W = 500 mm Keep Stopping Sight Distance No need widening of shoulder
Main (Narrow Section)		Preferable to minimize land acquisition at Domestic Road due to NAIA Navigation Clearance and Existing ramp from Phase I	 Typical Section for 4 Lanes (Sub Standard Section) (W = 18.0 m)	Reduce outer shoulder to 0.5m for specific distance
Ramp (1 lane)	 Typical Section for Ramp (1 lane)	Enough to apply same cross sectional configuration as Phase I	 Typical Section for Ramp (1 lane) (W = 7.0 m) (same as Phase I)	Reduce inner shoulder to 0.5 m Carriage way to 3.5 m (same as main alignment) Total width 7.0 m to 6.0 m 6.0m allows to pass two cars (0.25+2.75+2.75+0.25)
Ramp (2 lanes)	 Typical Section for Ramp (2 lanes)	Enough to apply same cross sectional configuration as Phase I	 Typical Section for Ramp (2 lanes) (W = 9.0 m) (same as Phase I)	No change



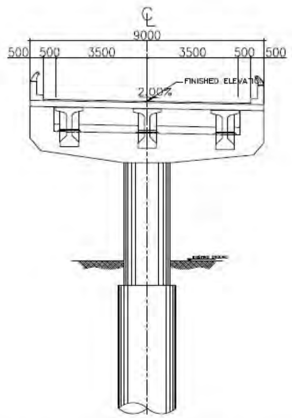
TYPICAL CROSS SECTION FOR 4 LANES(W=20M) NORMAL SECTION



TYPICAL CROSS SECTION FOR 4 LANES(W=18M) NAIA HEIGHT RESTRICTION SECTION



TYPICAL CROSS SECTION OF RAMPS FOR 1 LANE (W=7M)



TYPICAL CROSS SECTION OF RAMPS FOR 2 LANES (W=9M)

FIGURE 3.7.2-1 NAIA EXPRESSWAY PHASE II – TYPICAL CROSS SECTION

3.8 VERTICAL CLEARANCE FOR AT-GRADE ROADS AND EXPRESSWAY

3.8.1 Vertical Clearance Standards of Various Countries

VERTICAL CLEARANCE STANDARDS

Philippines	USA (AASHTO)	Japan	Asian Highway
Desirable: 5.2 m (considering future overlay) Standard: 5.0 m (considering future overlay) If vertical clearance of less than 5.0 m is adopted, traffic control measures must be proposed. *Source: BOD*	Arterial Street and Freeway: 4.88 m Local and Collector Streets: 4.27 m In highly developed urban areas, a minimum clearance of 4.27 m of arterial street may be allowed, provided that an alternative route with 4.88 m clearance is available.	4.5 m	4.5 m

Existing Vertical Clearances;

LRT Line-1: EDSA/Taft Ave. = 4.70 m., Recto/Rizal = 4.27 m.

Delpan Bridge: 4.60 m.

3.8.2 Recommendation

Since the project has to cope up with NAIA navigational height limit, vertical clearance of 4.88 m is recommended for both at grade roads and the expressway, provided that pavement overlay shall be prohibited.

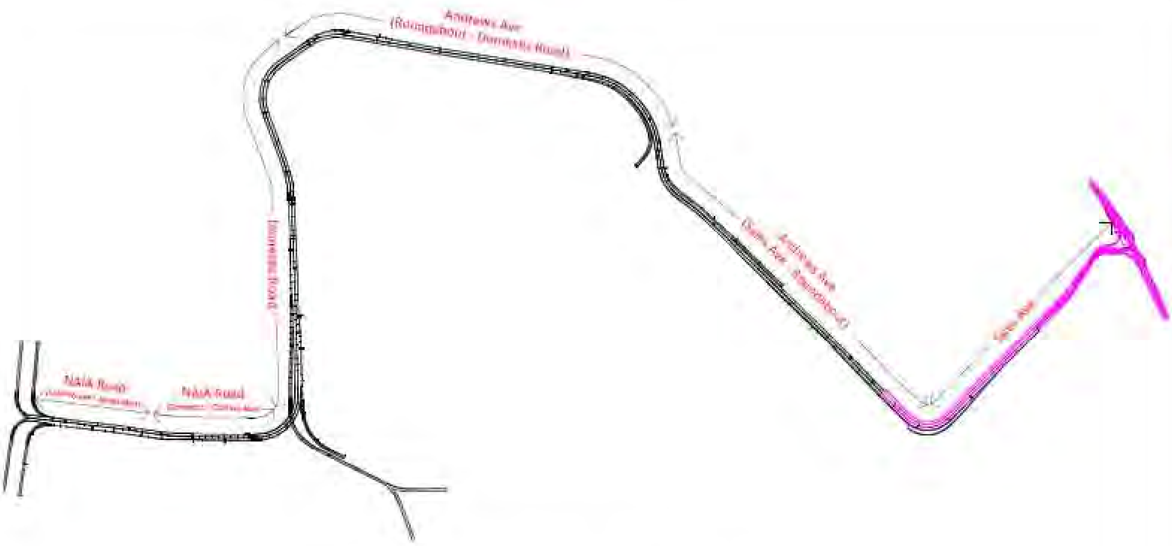
3.9 NUMBER OF TRAFFIC LANES OF AT-GRADE ROADS

Table 3.9-1 shows the number of traffic lanes of at-grade roads after completion of the Expressway. The same number of traffic lanes as the existing condition shall be provided for the at-grade roads even after the Expressway is completed.

TABLE 3.9-1 NUMBER OF TRAFFIC LANES OF AT-GRADE ROADS

At-grade Road		Existing No. of Traffic Lanes	No. of Traffic Lanes During Construction	No. of Traffic Lanes After Construction
Sales Avenue	East Bound	3 (Before on-ramp) 2 (After on-ramp)	2	3
	West Bound	3 (Under off-ramp) 2 (Under off-ramp)	2	3
Andrews Avenue (Sales Ave. – Roundabout)	East Bound	3-4	3	3-4
	West Bound	3	3	3
Andrews Avenue (Roundabout – Domestic Road)	East Bound	3	2	3
	West Bound	3	2	3
Domestic Road	North Bound	3	2	3
	South Bound	3	2	3
NAIA (MIA) Road (Domestic Road – Quirino Avenue)	East Bound	4	2	4
	West Bound	4	2	4
NAIA (MIA) Road (Quirino Avenue – Roxas Boulevard)	East Bound	4	2	4
	West Bound	3	2	3

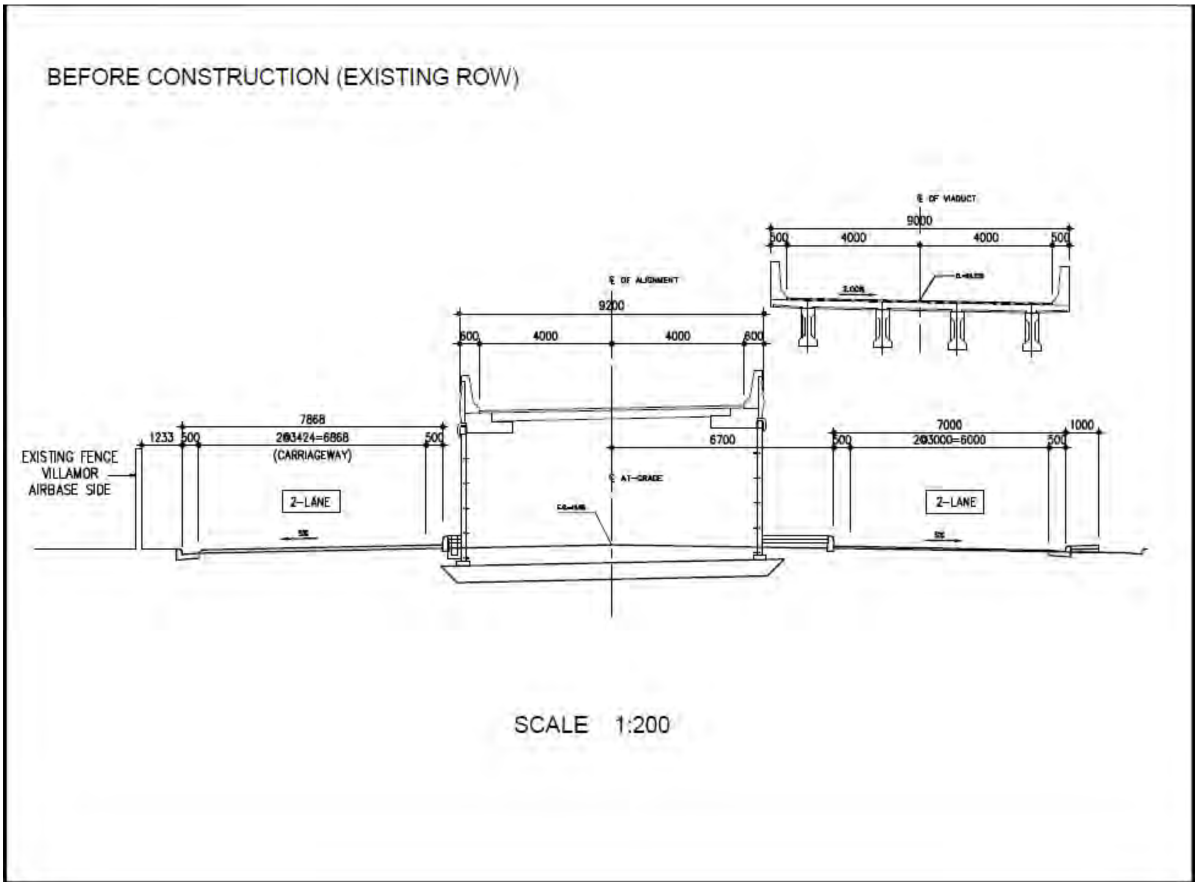
Figure 3.9-1 shows the number of traffic lanes required for at-grade roads.



Number of Lane of At-grade Road NAIA Expressway (Phase II)

At-grade Road Name	Existing	During Const.	After Const.
Sales Ave	4 - 6	4	6
Andrews Ave (Sales Ave to Roundabout)	6 - 7	6	6 - 7
Andrews Ave (Roundabout to Domestic Rd)	6	4	6
Domestic Road	6	4	6
NAIA Road (Domestic Rd - Quirino Ave)	8	4	8
NAIA Road (Quirino Ave - Roxas Blvd)	7	4	7

FIGURE 3.9-1 NUMBER OF TRAFFIC LANES AT-GRADE ROADS



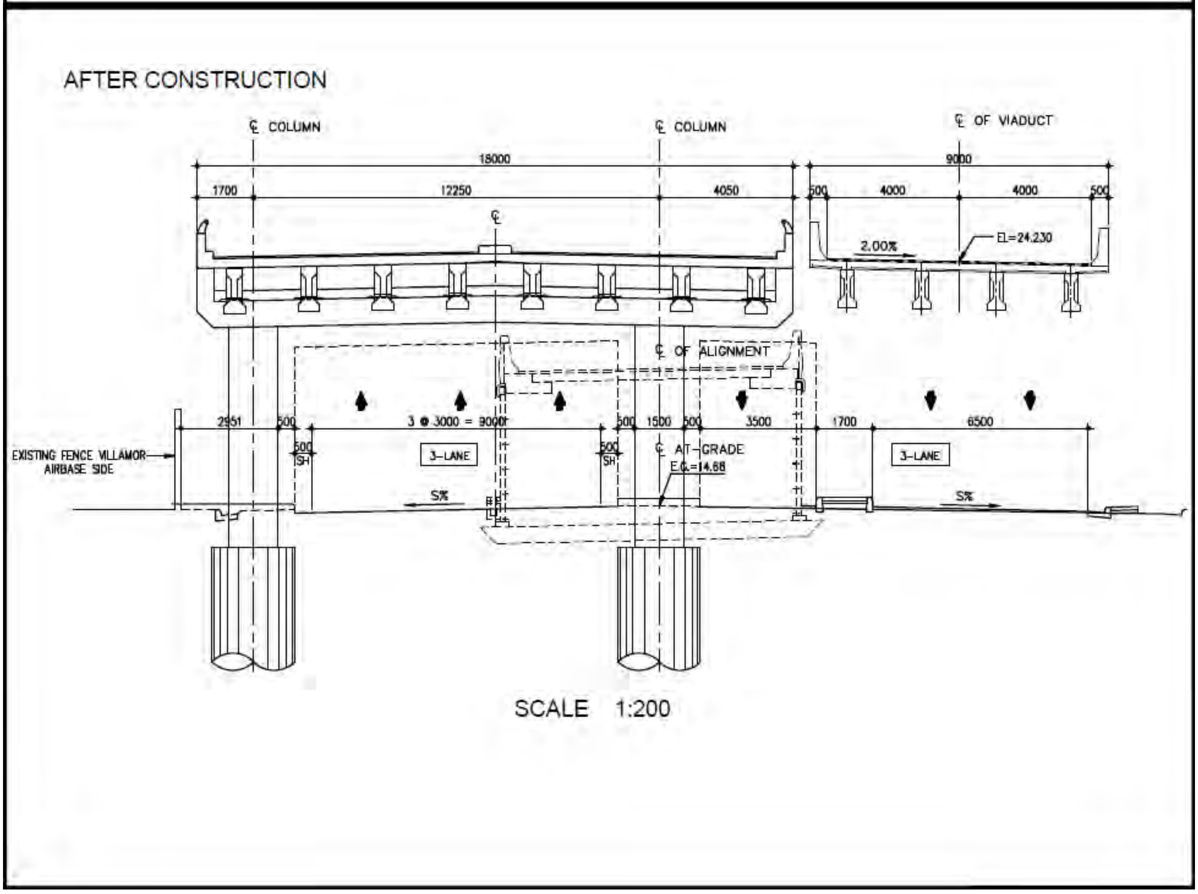


FIGURE 3.9-2 (1) CROSS SECTION OF SALES STREET

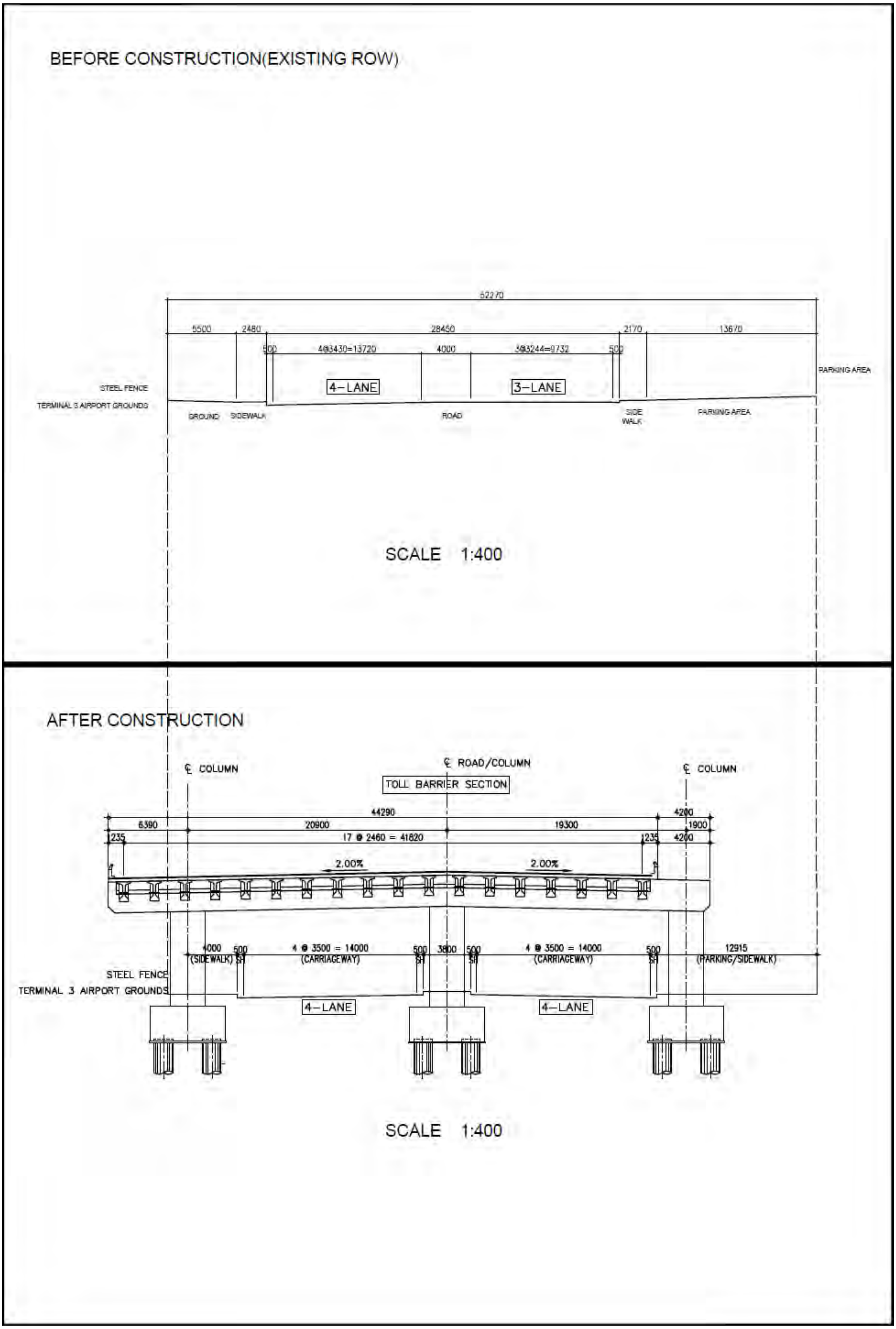


FIGURE 3.9-2 (2) CROSS SECTION OF ANDREWS AVENUE-2 (TERMINAL 3)

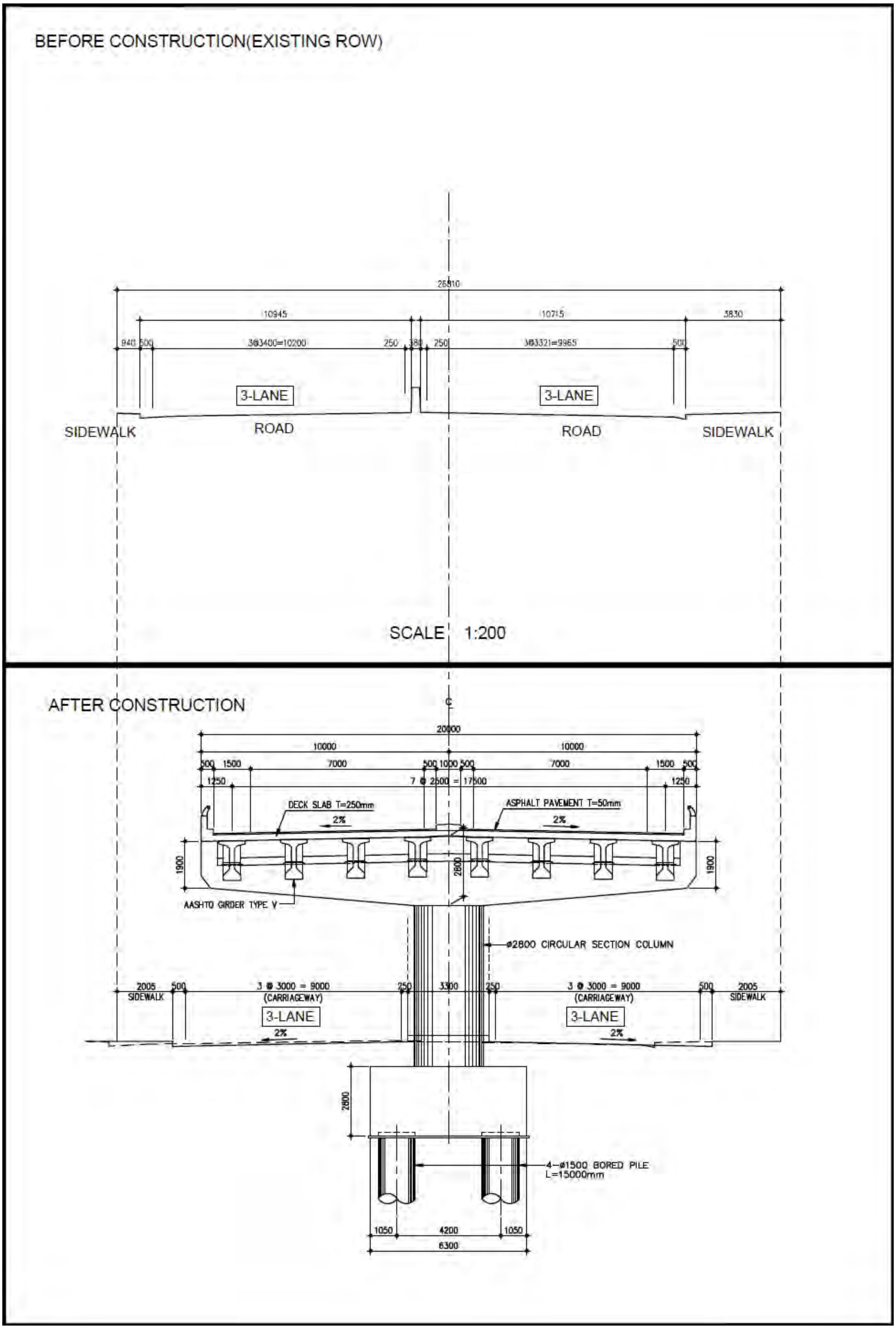


FIGURE 3.9-2 (3) CROSS SECTION OF ANDREWS AVENUE-1

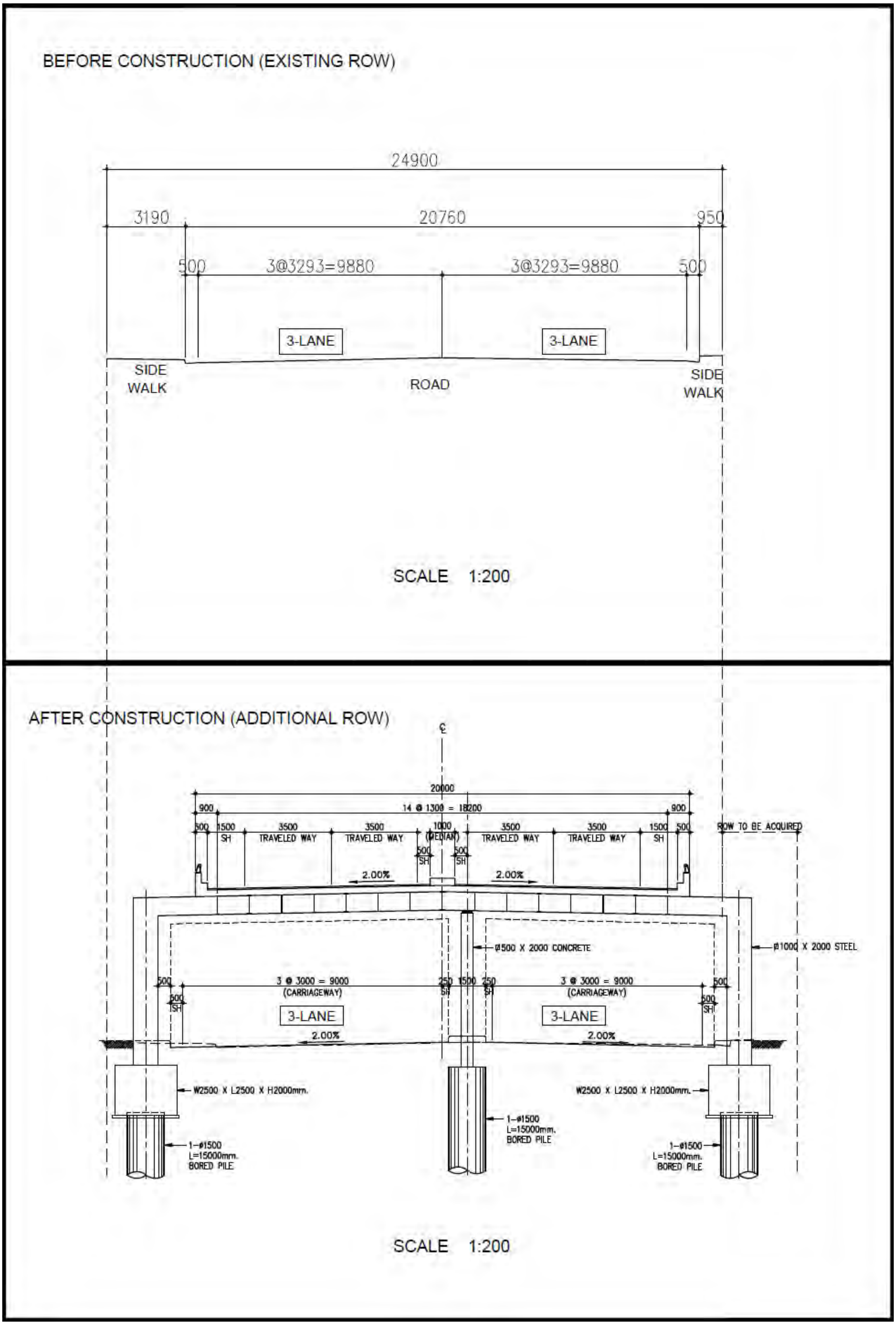
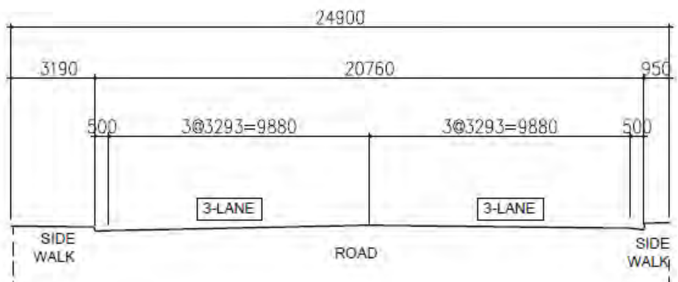


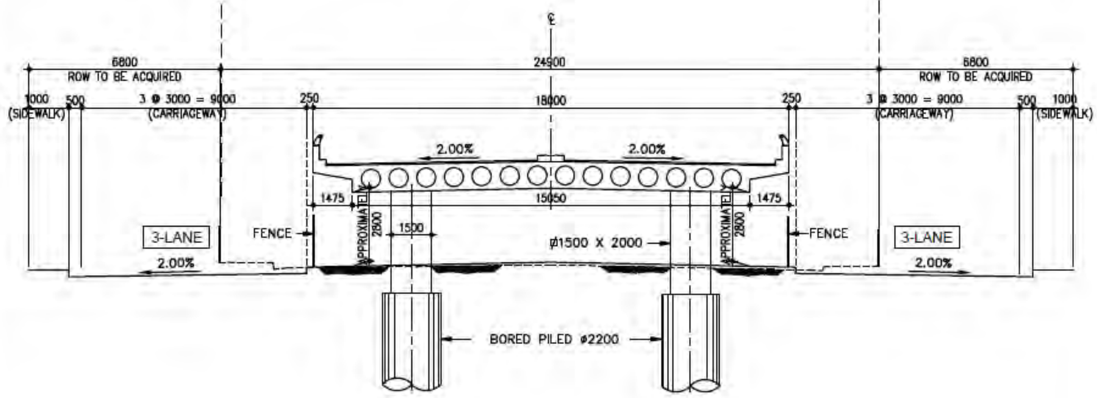
FIGURE 3.9-2 (4) CROSS SECTION OF DOMESTIC ROAD-1

BEFORE CONSTRUCTION (EXISTING ROW)



SCALE 1:250

AFTER CONSTRUCTION (ADDITIONAL ROW)



SCALE 1:250

FIGURE 3.9-2 (5) CROSS SECTION OF DOMESTIC ROAD-2

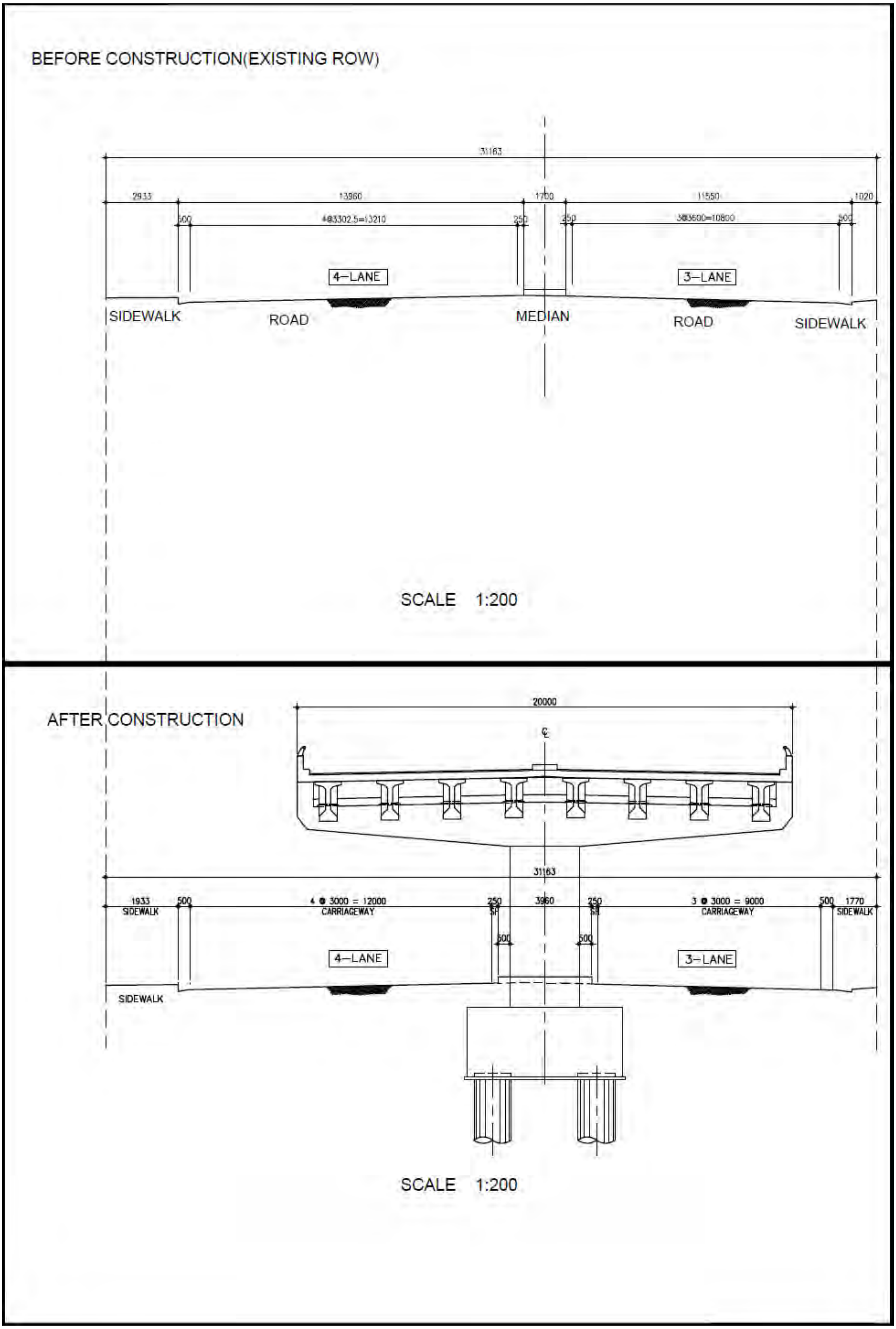


FIGURE 3.9-2 (6) CROSS SECTION OF NAIA ROAD

3.10 TOLL COLLECTION SYSTEM

3.10.1 Closed System (2010 FS)

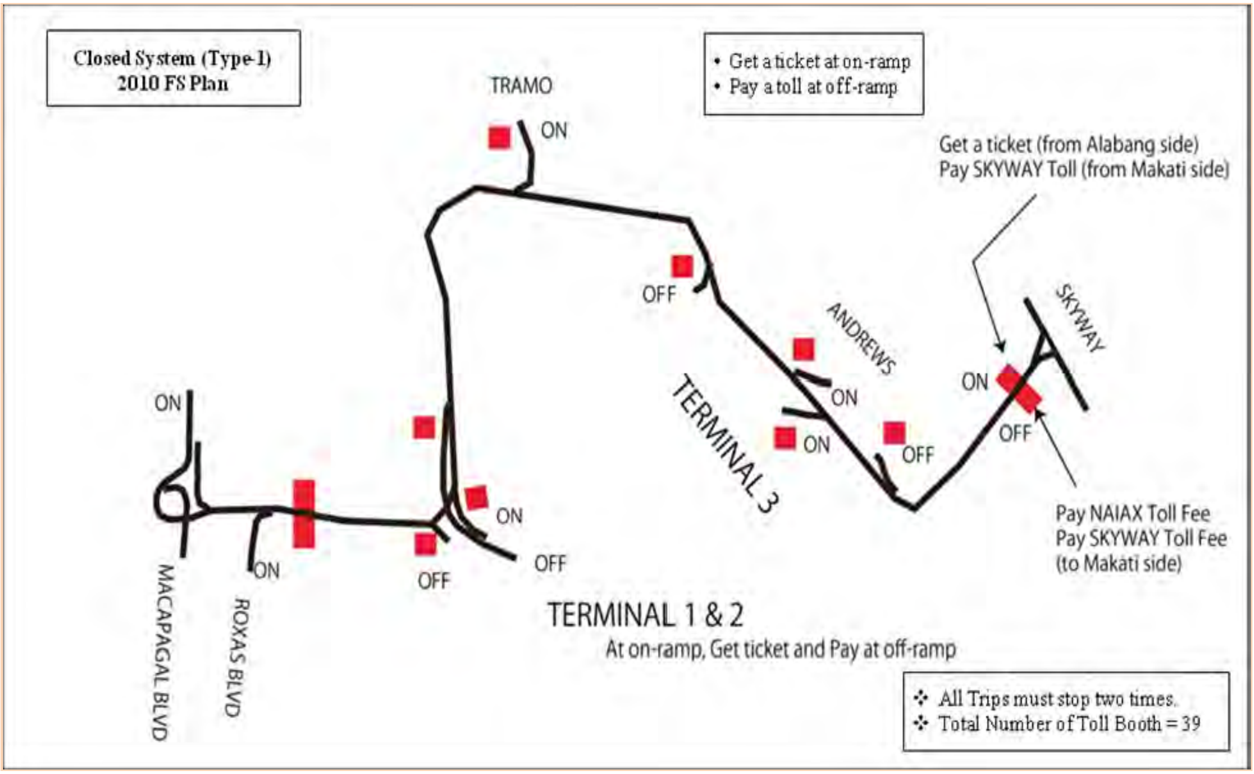


FIGURE 3.10.1-1 CLOSED SYSTEM PROPOSED BY 2010 FS

TABLE 3.10.1-1 NUMBER OF TOLL BOOTH PROPOSED BY 2010 FS

Ramp Name	No. of Toll Booth
1 Andrews 1 On	1
2.Andrews 2 On	1
3.Andrews 2 Off	1
4.Tramo On	1
5. Domestic Rd 1. Off	1
6. Domestic Rd 2. Off	1
7. NAIA Off	1
8. Roxas Blvd.(On & Off)	2+2
Total	11

Based on the analysis of projected traffic and booth capacity, total 39 booths will be needed in case closed system.

3.10.2 Open System

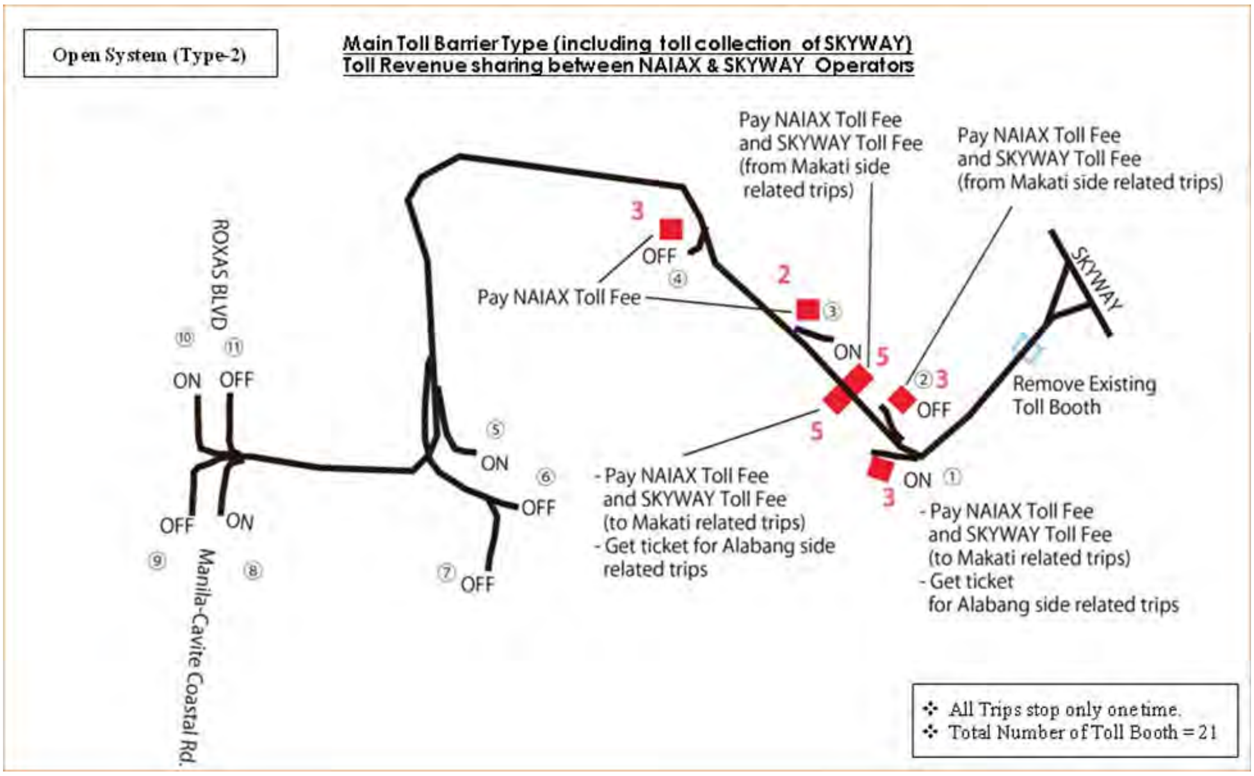


FIGURE 3.10.2-1 OPEN SYSTEM TYPE-2

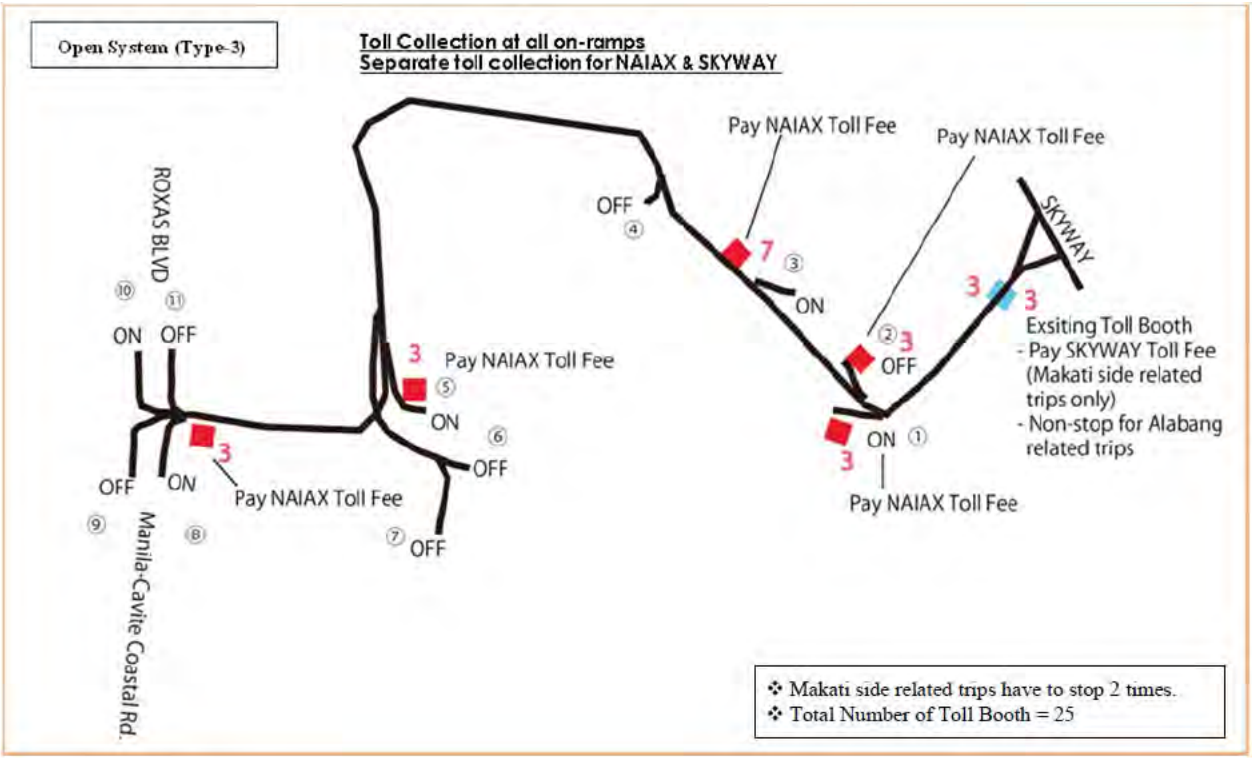


FIGURE 3.10.2-2 OPEN SYSTEM TYPE-3

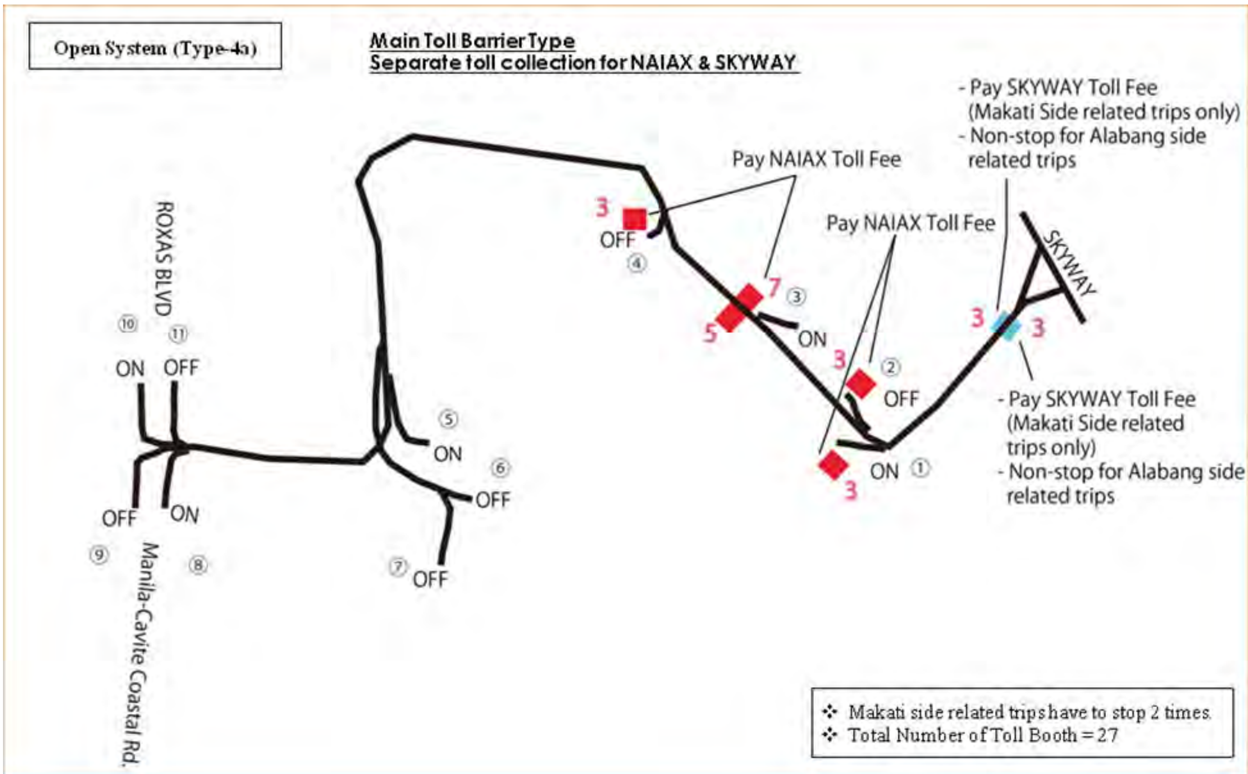


FIGURE 3.10.2-3 OPEN SYSTEM TYPE-4A

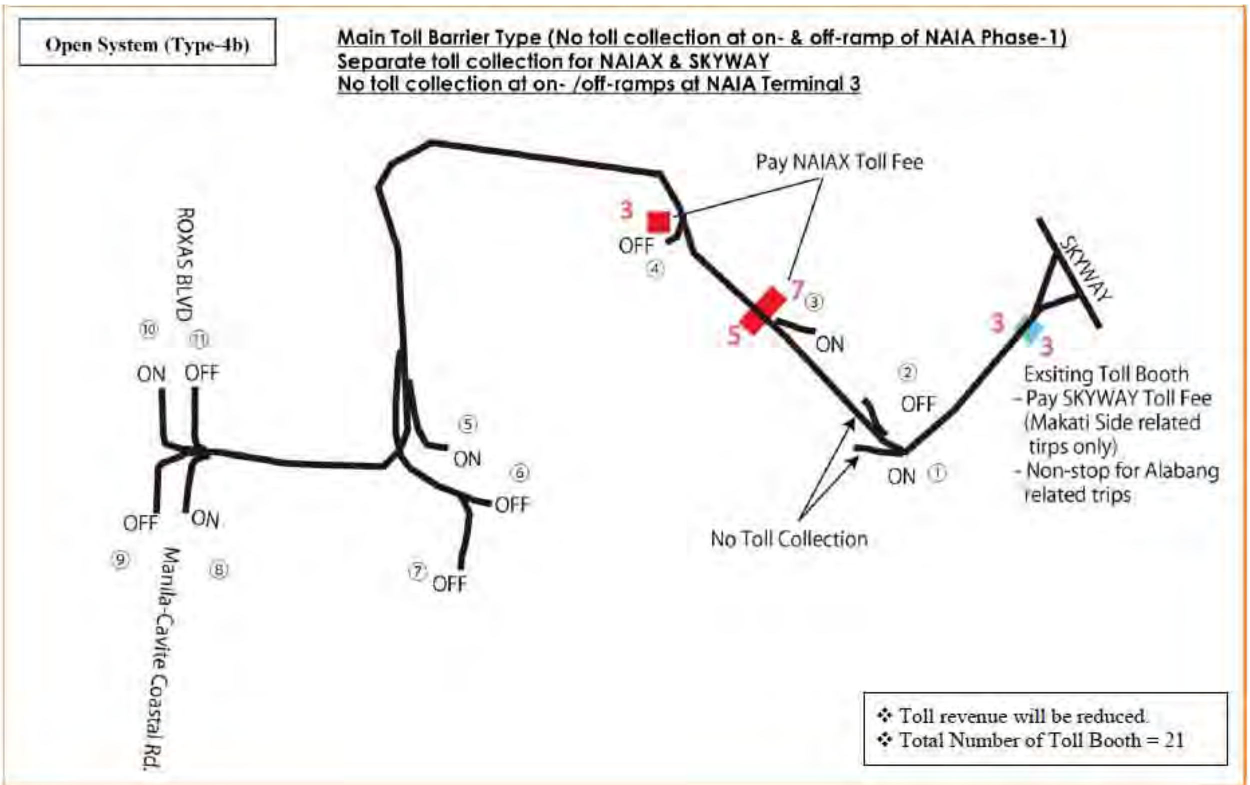


FIGURE 3.10.2-4 OPEN SYSTEM TYPE-4B

3.10.3 Comparison of Toll Collection System

Comparison of toll collection system is shown in **Table 3.10.3-1.**

TABLE 3.10.3-1 COMPARISON OF TOLL COLLECTION SYSTEM

Toll Collection System	No. of Toll Booth	Characteristics of the System	Recommendation
Type-1: Closed System (2010 FS Plan)	39	• Toll fee in proportion to travel distance can be applied. • All trips must stop 2 times, which discourages usage of expressway. • Control of overloaded trucks is practically difficult. • Toll collection transaction time is longer. • Higher operation cost.	Not Recommended
Type-2: Open System	21	• Flat toll rate • Toll collection of both NAIAX and Skyway, thus toll revenue sharing between NAIAX and Skyway Operators need to be agreed. • All trips stop only 1 time, thus convenient for expressway users. • Facility of toll booths of NAIAX Phase-1 can be transferred to other toll booths. • Toll collection transaction time at main toll barrier and NAIA Terminal 3 related toll booths is longer. • Control of overloaded trucks is difficult. • Least ROW acquisition. • Least operation cost.	Recommended, if both operators of NAIAX and Skyway agree on revenue sharing system.
Type-3: Open System	25	• Flat toll rate. • Separate toll collection for NAIAX and Skyway. • All trips stop 1 time except Makati-side related traffic. • Toll booth location for No. 8 & 10 and for No. 5 requires additional ROW acquisition. • Control of overloaded trucks is practically difficult. • Second least operation cost.	Not recommended, because of toll booth location for No. 8 and 10 and for No. 5 which requires additional ROW acquisition.
Type-4a: Open System	27	• Similar to Type-2 • Separate toll collection for NAIAX and Skyway. • All trips stop 1 time except Makati-side related traffic.	Recommended, when toll revenue sharing between operators of NAIAX and Skyway cannot be reached.
Type-4b: Open System	21	• Similar to Type-4a • No toll collection at No.1 and No. 2 (or NAIA Terminal 3 related traffic)	Not recommended, since this reduces toll revenue.

3.11 PEDESTRIAN OVERPASS BRIDGES

There are five (5) pedestrian overpass bridges along NAIAX.

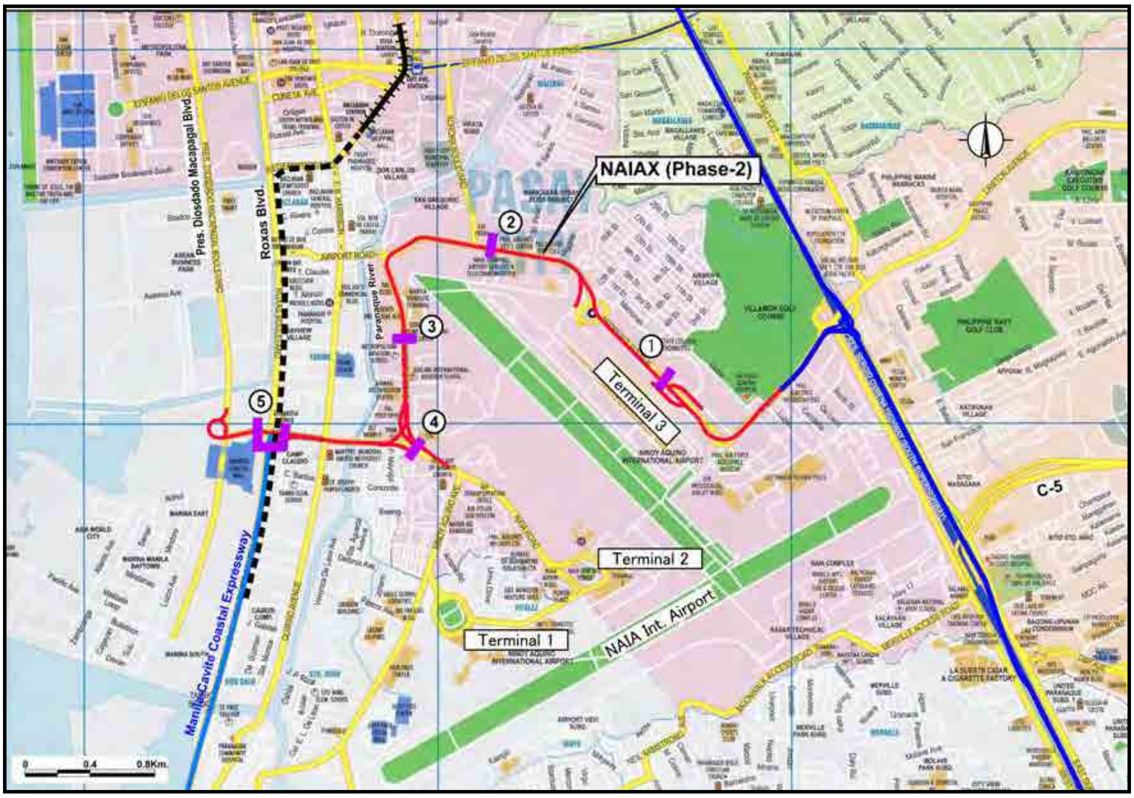


FIGURE 3.11-1 LOCATION MAP OF PEDESTRIAN OVERPASS BRIDGE

1. Pedestrian Overpass Bridge near Terminal 3

- Megaworld started construction without permit.
- MIAA objected the construction of this pedestrian bridge.
- This pedestrian overpass bridge was already removed.

2. Pedestrian Overpass Bridge along Andrew Road

- Constructed by PAL to connect two offices of PAL with the approval of MMDA.
- Recommended to remain.

3. Pedestrian Overpass Bridge along Domestic Road

- Constructed by MMDA.
- Recommended to remove and convert it to pedestrian crossing due to NAIA navigational clearance

4. Pedestrian Overpass Bridge at intersecting NAIA Road and Domestic Road

- Constructed by NCR, DPWH.
- Recommended to remove and replaced at another location nearby the intersection.

5. Pedestrian Overpass Bridge at Costal Mall (Roxas Blvd.)

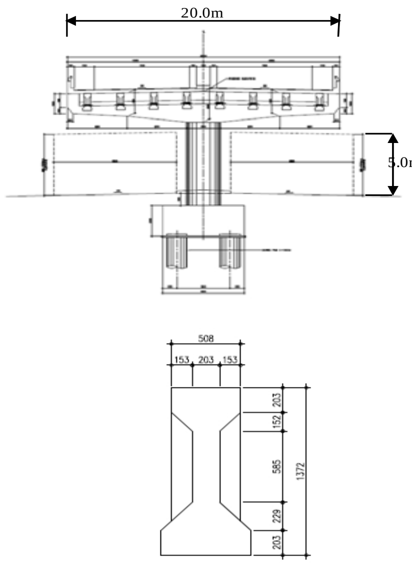
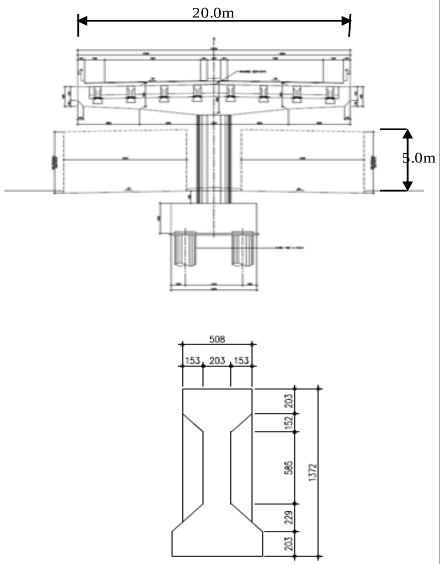
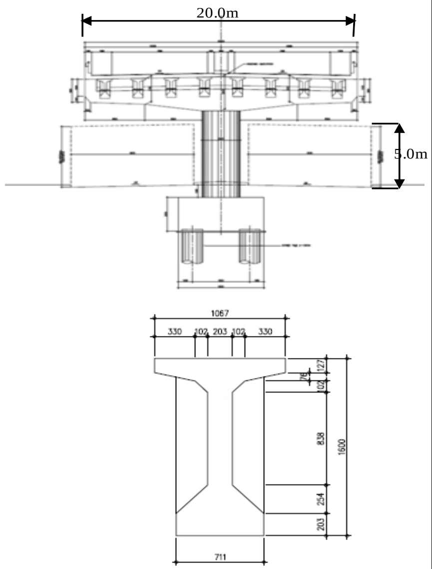
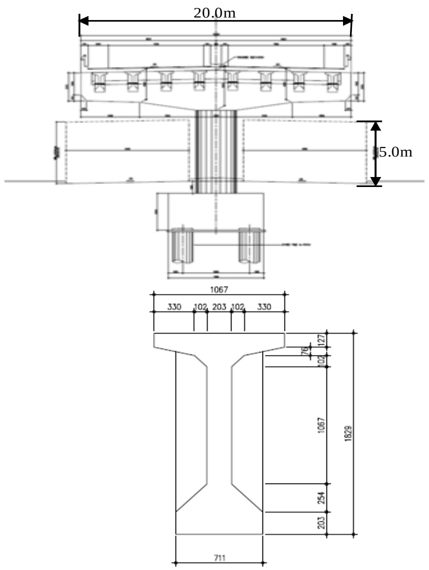
- Constructed by MMDA.
- Recommended to remain.

3.12 ECONOMICAL SPAN LENGTH FOR THE STANDARD EXPRESSWAY SECTION

When a span length is longer, construction cost becomes higher unless deep foundation (say more than 30 m) is required. 2010 FS is adopting AASHTO PC Girder of 40 m span length for the standard (or straight) viaduct section, which seems to be an expensive solution. Cost comparison for various span lengths was made as shown in **Table 3.12-1.**

The most economical span is 35 m, thus this study adopts 35 m AASHTO PC Girder for the construction cost estimate.

TABLE 3.12-1 COST COMPARISON OF SPAN LENGTH FOR PC GIRDER

Description	Alternative-1	Alternative-2	Alternative-3	Alternative-4
	L=28m	L=30m	L=35m	L=40m
Section	 Girder Section	 Girder Section	 Girder Section	 Girder Section
Structural Features	- AASHTO Type-IV Girder (H=1,372mm) - Superstructure depth: minimum 1,882mm - Pierhead height: 2.8m - Circular section column ϕ2.5m - Four (4) ϕ 1,500 bored piles foundation	- AASHTO Type-IV Girder (H=1,372mm) - Superstructure depth: minimum 1,882mm - Pierhead height: 2.8m - Circular section column ϕ2.5m - Four (4) φ1,500 bored piles foundation	- AASHTO Type-V Girder (H=1,600mm) - Superstructure depth: minimum 2,110mm - Pierhead height: 3.2m - Circular section column ϕ2.8m - Four (4) φ1,500 bored piles foundation	- AASHTO Type-VI Girder (H=1,829mm) - Superstructure depth: minimum 2,339mm - Pierhead height: 3.5m - Circular section column ϕ3.0m - Four (4) φ1,800 bored piles foundation
Cost per 1,000m (per sq.m) <Rate>	P 920,950,827 (P 51,164) <1.050>	P 906,186,554 (P 50,344) <1.033>	P 877,404,163 (P 48,745) <1.000>	P 982,795,854 (P 54,600) <1.120>
Recommendation	3	2	1	4

3.13 REGULATION OF OVER-LOADING

(1) Vehicle Regulation

Vehicle regulation shall be conducted in accordance with the country's rules (including Laws and Acts), and following standard procedures. As necessary, it shall be taken actions co-operating with Police, Fire or other organizations. The highest concern about highways in Philippines (especially at NAIAX) is over-loading vehicle. This section states that examples and proposal of over-loading regulation.

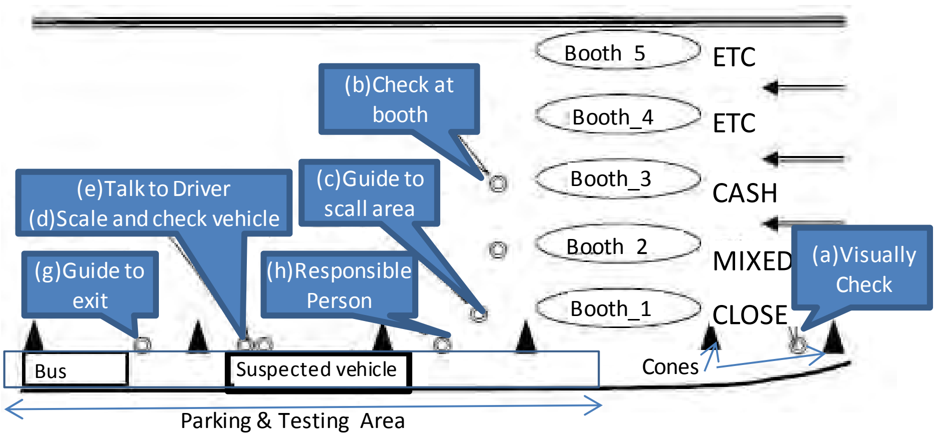
The most common and simplest method of regulation of over-loading is taking actions at toll plazas. Vehicles should stop at toll booths. This time vehicle weight can be easily scaled, and prohibit entering the highway. However, when "open system" or aggregation of toll plaza are adopted for highway, entrances do not always have toll plaza. In addition, ETC vehicles which do not need to stop at toll plaza for payment can easily pass through toll plaza without stopping.

In Japan, enforcement of over-loading is conducted with Police regularly twice or third per month at the large toll barriers. The example is shown in **Figure 3.13-1**. In order to conduct enforcement, large spaces ARE required (parking and scaling area). In preparation for enforcement, procedures and alignment of traffic control officers are defined in details as shown in **Figure 3.13-2** as well. At ETC lanes, motorists basically do not stop, thus enforcement is not conducted at ETC lanes.

In the Philippines, Tollways Management Corporation (TMC) (operating company of NLEX) conducts inspection of over-loading vehicles. They limit lane for large vehicles. The right end lane only (which is the most far from median), NLEX has also been successful EC-tag for class 1 vehicles only (i.e. class3 vehicles cannot use ETC). If EC-tag is installed in NAIAX, the similar method can be used.

However, E-pass system which is used in SKYWAY allowed all classes for ETC usage. There are two large differences from Japanese ETC situation; 1) ETC usage is not so high still 20-30%, and 2) even at ETC lane, motorists have to stop if their accounts are less than minimum (red light flashes on toll booth). These differences indicate that it could be relatively easy to stop traffic even at ETC lane, at least by posting temporary notice sign boards upstream toll booths (such as "ALL VEHICLE STOP AT BOOTH" or so on). Taking into account the second difference it is estimated that capacity at ETC lane could be quite low. From TMC's experience they observe ETC lane hourly capacity to be around 600vehicles (comparing with Japanese case which is 800-1000 vehicles/hour at ETC lane).

Therefore, in this report, to conduct regular enforcement actions, to control large vehicle lane upstream of toll plaza when enforcement actions are on-going, and to stop each vehicle at a toll plaza are recommended.



[EXAMPLE assigning tasks for each role]
(a)Visually check: find suspected vehicles, and report (b)
(b)Check at Booth: pass warning brochure (within a certain limits)
or Guide to scale & testing area (over a certain limits)
or Stop traffic when suspected vehicle is guided to scale area
(c) Guide to scale and check area
(d) Scale a suspected vehicle and ※ create survey sheet.
(e) Check the permission with driver, question and interview with driver
(g) Guide to exit from scale & testing area
(h) Responsibile person: overview the whole enforcement, order promptly each staff as necessary, and check the safety

FIGURE 3.13-1 ONE EXAMPLE OF OVER-LOADING REGULATION AT TOLL BARRIERS (MEX IN JAPAN)

※In Japan, the road company issue permission with conditions even though a vehicle is over regulation length, width, weight, or height, when there is some special reason for the issued vehicle. However, if the issued vehicle is over the permission sizes, or permission conditions, the vehicle should be apprehended.

The other option for over-loading regulation is automatic weigh in motion scale (WIM), which can scale vehicle axle weight with slow speed at toll booths. One example of WIM facilities at toll plaza and recorded image of over-loading vehicles are shown in **Figure 3.13-2**, which is Tokyo Metropolitan Expressway's (MEX) example. Almost 80% of toll booths are installed at MEX, because it has a significant large number of trucks or large vehicles (eg. 2.5 times number of vehicles of other highways and 10 times of general national roads). WIM scales all vehicles passing toll booths and record number plates and drivers' figures if over-loaded vehicles are detected. In case of that drivers have broken this law three times, the operating company send warning letter and at the same time send the District Transport Bureau (similar organization to Land Transportation Office) requesting for administrative penalties. Total cost for one lane including cameras and recording system is approximately 50M yen (i.e. Php25M). It is very expensive, but it might be one option for over-load vehicle regulation. If lanes are limited for large vehicles, it might reduce the number of lane for installation.

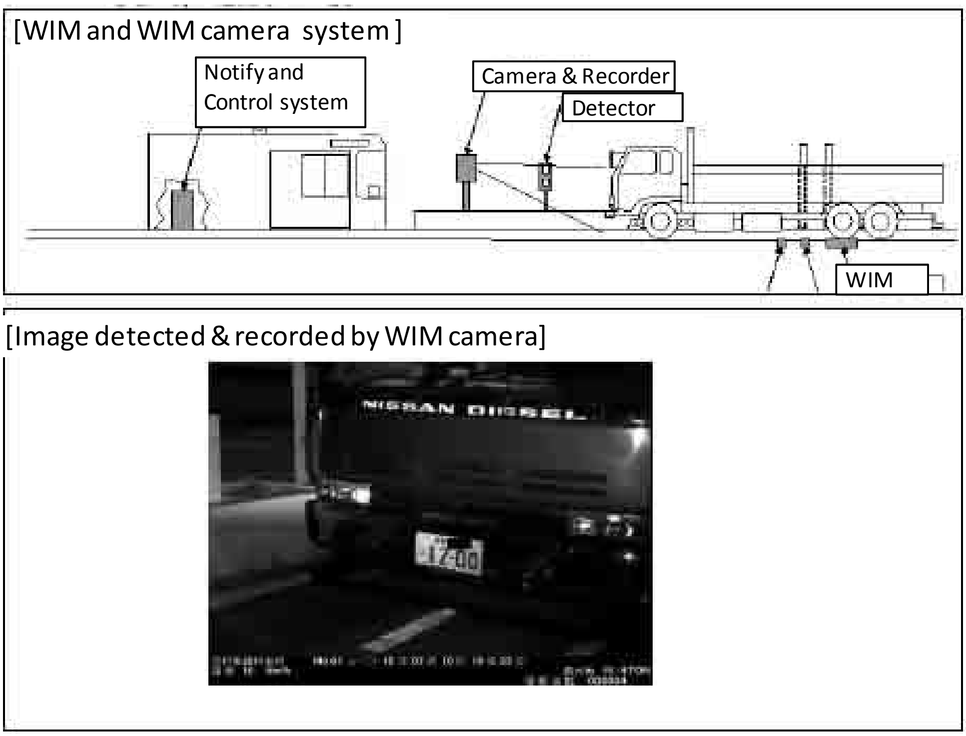


FIGURE 3.13-2 ONE EXAMPLE OF WIM AND IMAGES RECORDED BY WIN SYSTEM (MEX IN JAPAN)

CHAPTER 4

TRAFFIC STUDY

CHAPTER 4
TRAFFIC STUDY

4.1 PRESENT TRAFFIC CONDITION

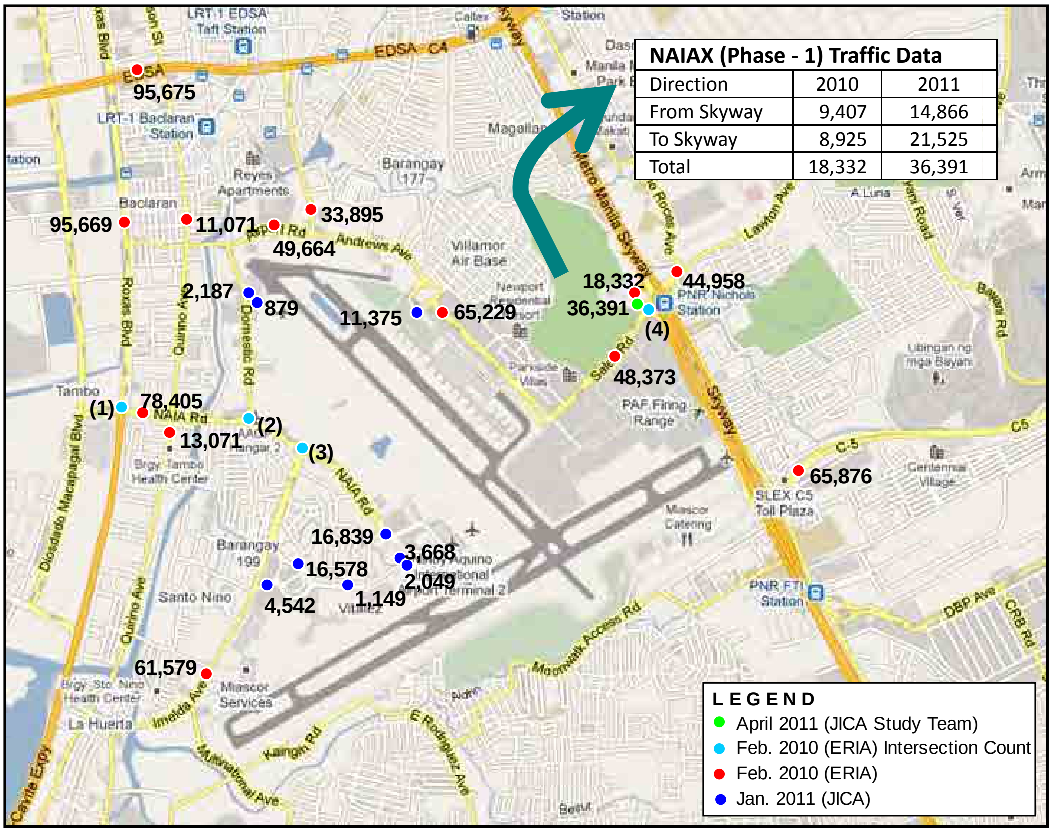
4.1.1 Traffic Count

a. Traffic Volume

Traffic volume of roads surrounding the NAIA airport is shown in **Figure 4.1.1-1**. As seen in the figure, there is high number of vehicles to the corridor where the future expressway runs over – 48,373 at Sales Road, 65,229 at Andrew's Avenue, 78,405 at NAIA Road (Seaside Drive). Data denotes the number of vehicles.

Recorded traffic at NAIA Expressway (Phase - 1) in 2010 is 18,332 vehicles in both directions. This number increases to 36,391 this year with 60% of traffic moving in the direction of Skyway. Most of these vehicles entering Skyway are exiting to Makati exits of Skyway (Magallanes exit and Osmena exit). At present, use of the entire stretch of NAIA expressway is free of charge as well as use of portion of Skyway (from NAIA Expressway to Skyway Makati exits) is also free of charge. However, a 50 pesos fee might be collected by Skyway management in future if their request is approved by the Toll Regulatory Board (TRB). Skyway management said that the fee is for the use of Skyway's portion and not intended for the use of NAIA Expressway.

Number of vehicles recorded at the main entrance of terminals of the airport is also significant: 16,578 (Terminal 1), 16,839 (Terminal 2) and 11,375 (Terminal 3). Likewise, traffic recorded at the gate of Cargo Terminal (at Terminal 1) is 1,149 vehicles. Meanwhile, observed traffic volume at the major corridors in vicinity of the airport is high: 95,669 in Roxas Boulevard and 95,675 in EDSA. The traffic volumes in the four intersections are shown from **Figure 4.1-2** to **4.1-5**.



*Note: Feb 2010 data (NAIA - FS by ERIA), Jan. 2011(Study on Airport Strategy for Greater Capital Region by JICA). **Both data are in ADT (Average Daily Traffic)**.*

FIGURE 4.1.1-1 TRAFFIC VOLUME OF ROADS SURROUNDING NAIA AIRPORT

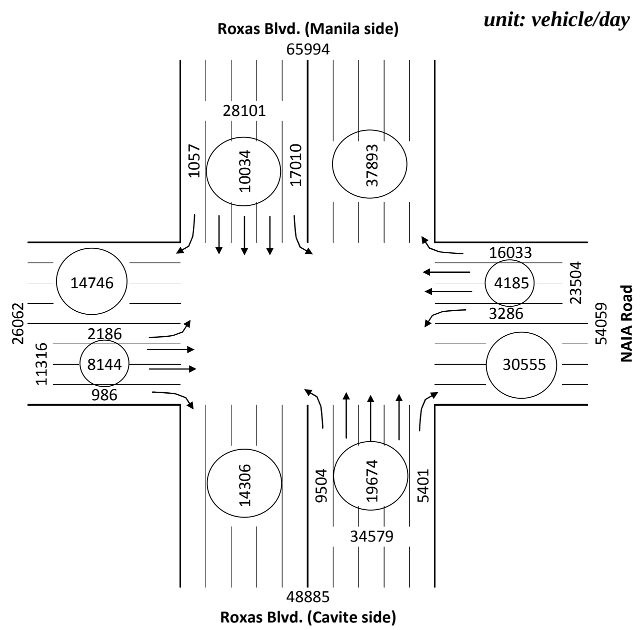
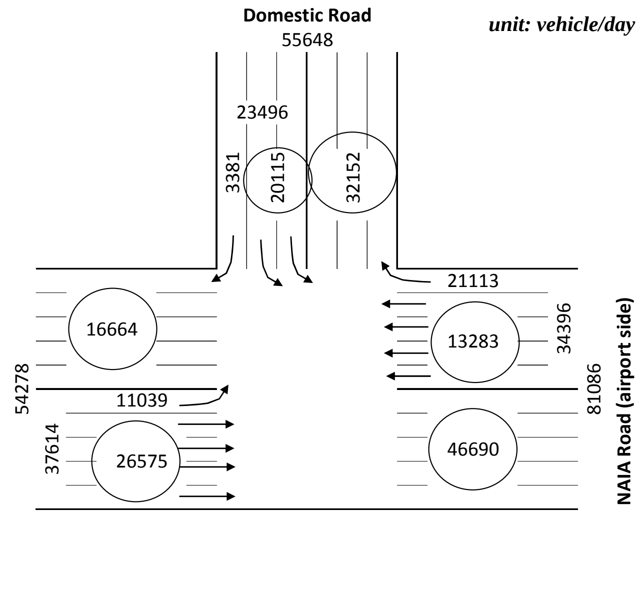
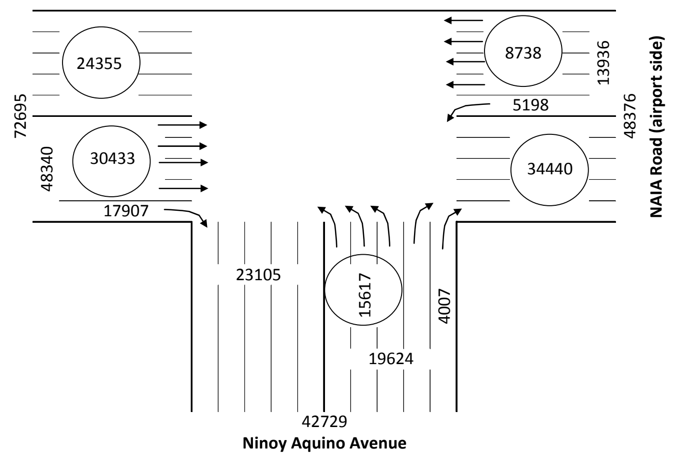


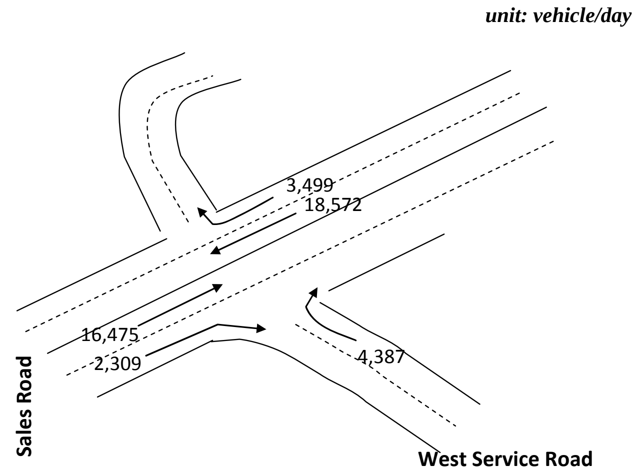
FIGURE 4.1.1-2 ROXAS -NAIA INTERSECTION



Note: All counts are expanded 24-hr from 16-hr count

FIGURE 4.1.1-3 NAIA-DOMESTIC INTERSECTION





unit: vehicle/day

FIGURE 4.1.1-4 NAIA-NINOY AQUINO AVE. INTERSECTION

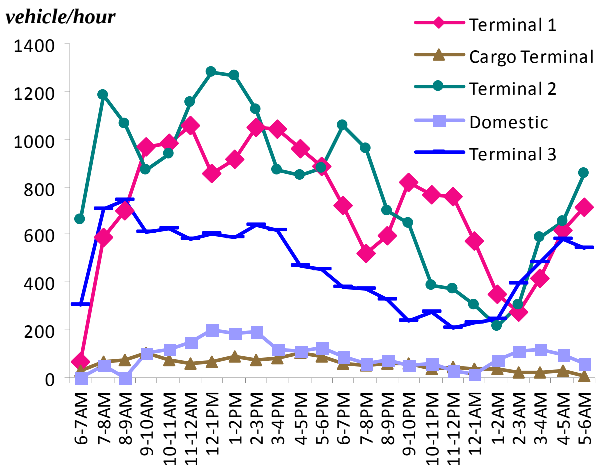
FIGURE 4.1.1-5 SALES ROAD-WEST SERVICE ROAD INTERSECTION

b. Hourly Variation of Traffic

The hourly variation of traffic accessing terminals of the NAIA airport is shown in **Figure 4.1.1-6** and **Figure 4.1.1-7**. Peak hours to almost all terminals are noon time (11:00AM to 3:00PM) and traffic drastically decreases at midnight (1:00AM to 3:00AM). The highest number of vehicles recorded in an hour is 1,283 at Terminal 2. There is no observed difference of traffic characteristics between weekday and weekend day.

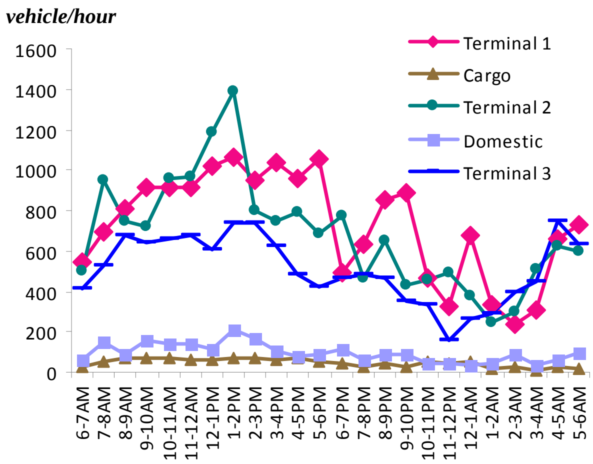
The variations of traffic on the road where the expressway will run over are shown in the **Figure 4.1.1-8** and **Figure 4.1.1-9**. At Sales Road, peak hours of traffic are between 8:00AM to 11:00AM during weekday. On weekend day however, there is an observed very high volume of vehicles from 5:00PM onwards moving in the direction of Andrew's Avenue.

At Andrew's Avenue (near Aurora Road), both on weekday and weekend day, there is a constant high volume of vehicles from 6:00AM to 7:00PM with each direction has more than 1000 vehicles per hour as presented in **Figure 4.1.1-10** and **Figure 4.1.1-11**. Highest recorded number of vehicles in an hour is 2,119 on weekday and 2,862 on weekend.



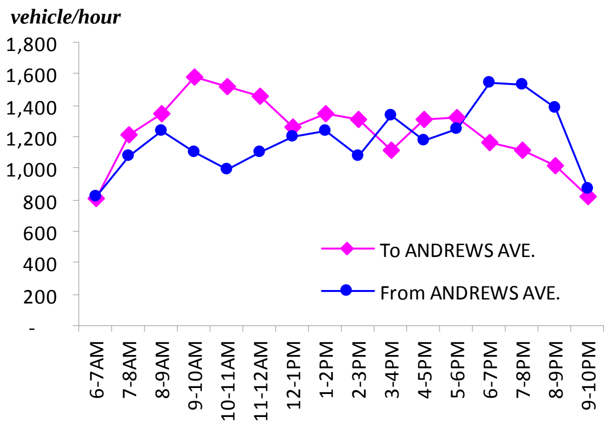
(Week day)

FIGURE 4.1.1-6 HOURLY VARIATION OF TRAFFIC AT AIRPORT TERMINALS



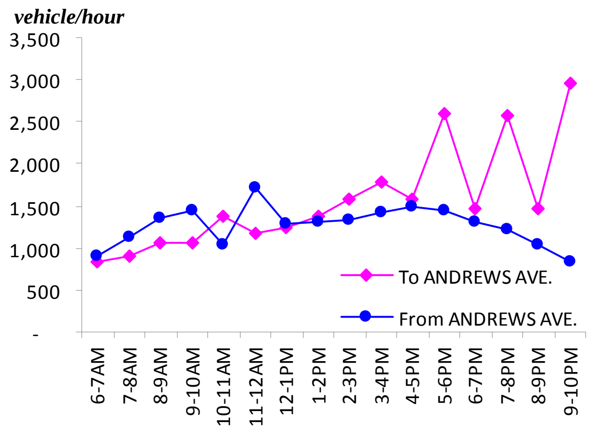
(Weekend day)

FIGURE 4.1.1-7 HOURLY VARIATION OF TRAFFIC AT AIRPORT TERMINALS



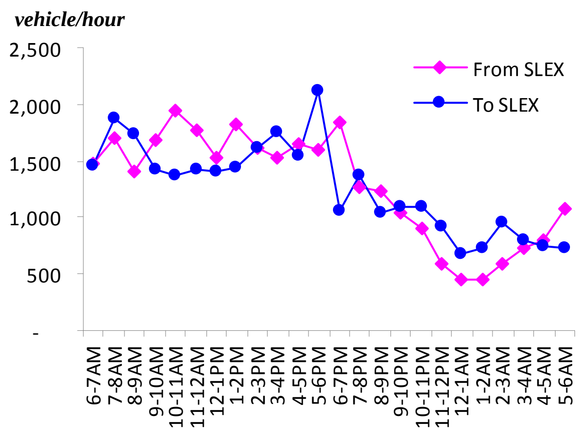
(Week day)

FIGURE 4.1.1-8 HOURLY VARIATION OF TRAFFIC AT SALES ROAD



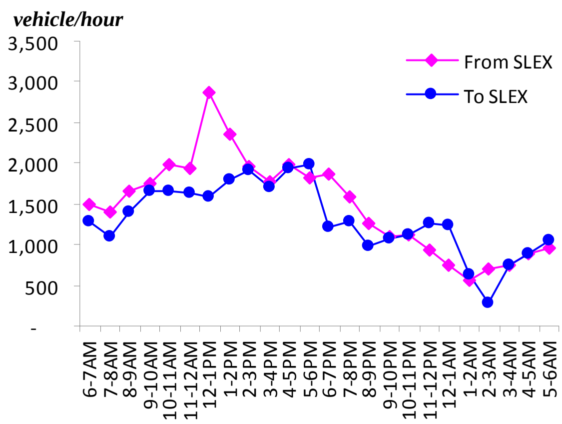
(Weekend day)

FIGURE 4.1.1-9 HOURLY VARIATION OF TRAFFIC AT SALES ROAD



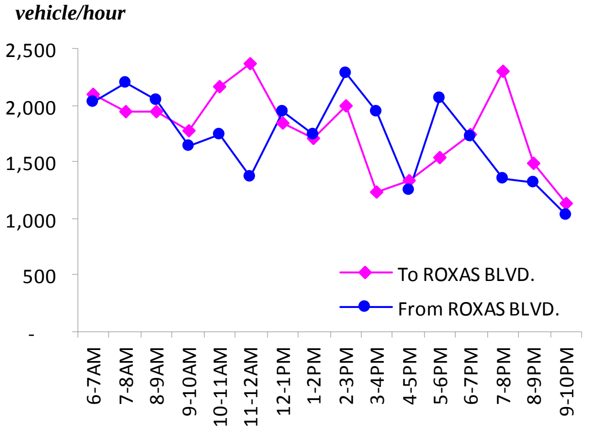
(Week day)

FIGURE 4.1.1-10 HOURLY VARIATION OF TRAFFIC AT ANDREW'S AVENUE (NEAR AURORA ROAD)



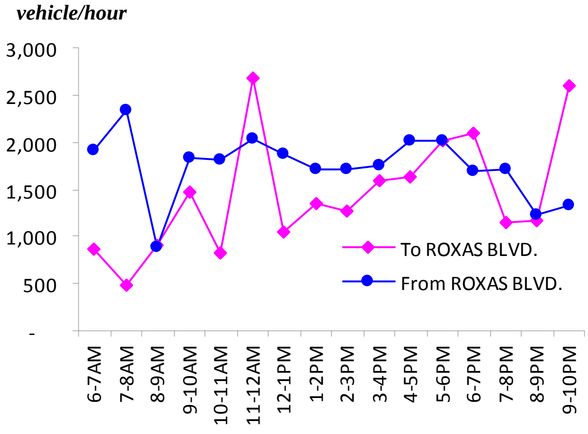
(Weekend day)

FIGURE 4.1.1-11 HOURLY VARIATION OF TRAFFIC AT ANDREW'S AVENUE (NEAR AURORA ROAD)



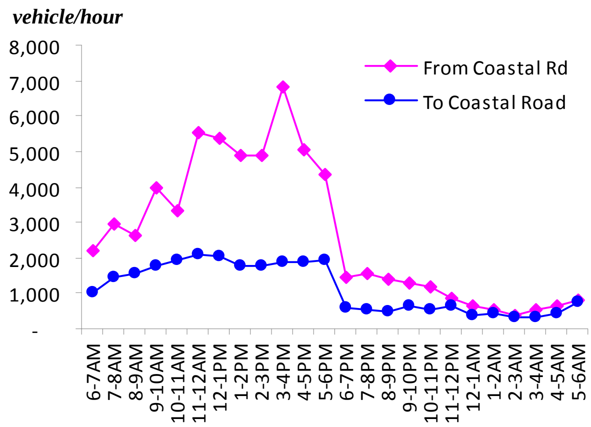
(Week day)

FIGURE 4.1.1-12 HOURLY VARIATION OF TRAFFIC AT ANDREW'S AVENUE (NEAR DOMESTIC ROAD)



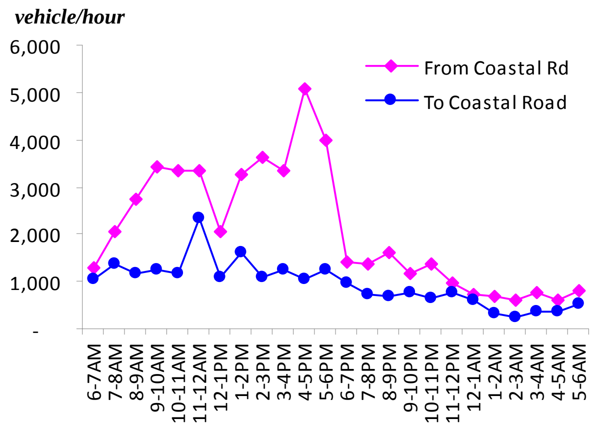
(Weekend day)

FIGURE 4.1.1-13 HOURLY VARIATION OF TRAFFIC AT ANDREW'S AVENUE (NEAR DOMESTIC ROAD)



(Week day)

FIGURE 4.1.1-14 HOURLY VARIATION OF TRAFFIC AT NAIA ROAD



(Weekend day)

FIGURE 4.1.1-15 HOURLY VARIATION OF TRAFFIC AT NAIA ROAD

Traffic volume at Andrew's Avenue near Domestic Road is also very high and number of vehicles recorded constantly exceeded 1,000 vehicles an hour from 6:00AM to 9:00PM on weekdays as shown in **Figure 4.1.1-12** and **Figure 4.1.1-13**. On weekend day however, traffic characteristics changes and there is a very high peak of traffic at noon time in the direction of Roxas Boulevard. Traffic's peak hour is again observed at 9:00PM to 10:00PM in the same direction. This peak hour might have something to do with airlines schedule.

At NAIA Road (Seaside Drive), both weekday and weekend day have the same traffic characteristics, i.e. flow in the direction of coastal road is higher than the opposite traffic and traffic volume substantially decreases from 6:00PM onwards. Peak hours of traffic however are different – peak hours on weekday are from 11:00AM to 5:00PM and from 9:00AM to 5:00PM on weekend day. See **Figure 4.1.1-15** and **Figure 4.1.1-16**.

c. Vehicle Composition

Most of the vehicles recorded at the main gates of airport terminals were composed of private cars. At Terminal 1, 99% were cars and the remaining 1% is composed of buses. At Cargo Terminal, cars share is 70% and truck's share is 30%. It should be noted that car, van and jeep were categorized under car. And under the category of cars, vans and private jeeps have the highest share (80%). These vans and jeeps were used to transport small volume of cargoes. See **Figure 4.1.1-17**.

At Terminal 2, share of cars is 86%, jeepneys is 7%, buses is 4% and trucks is 3%. At Domestic Airport, 99% of the traffic is cars. At Terminal 3, share of car is about 98% and the remaining 2% is shared by bus and truck.

The main users of the corridor where the future NAIA expressway runs above are cars as shown in **Figure 4.1.1-18**. Share of cars at Sales Road is 69%, 67% at Andrew's Ave. (near Aurora St.), 58% at section of Andrew's Ave. near Domestic Road, and 66% at NAIA Road (Seaside Drive).

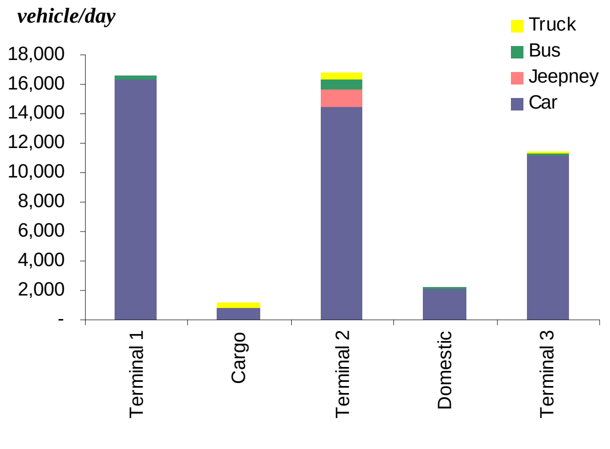


FIGURE 4.1.1-16 TRAFFIC COMPOSITION AT NAIA TERMINALS' MAIN GATES

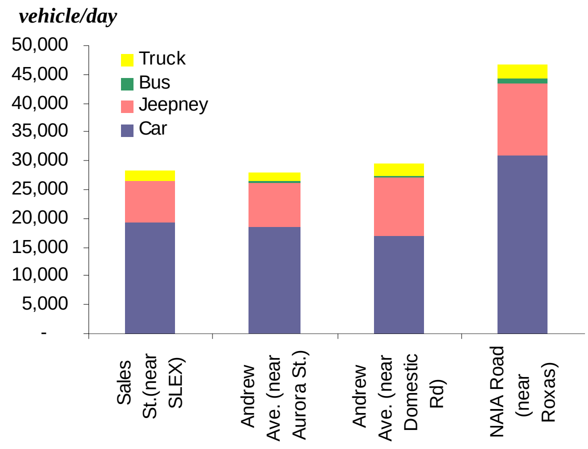


FIGURE 4.1.1-17 TRAFFIC COMPOSITION AT ROADS WHERE THE FUTURE NAIA EXPRESSWAY RUNS OVER

4.1.2 Travel Time Survey

Travel time survey was conducted in April 15, 2011 (Friday) from 7:00AM to 9:00PM. A single run every hour was carried out to determine the most congested period. **Figure 4.1.2-1** shows the 5:00PM travel speed of roads where the future NAIA Expressway runs over.

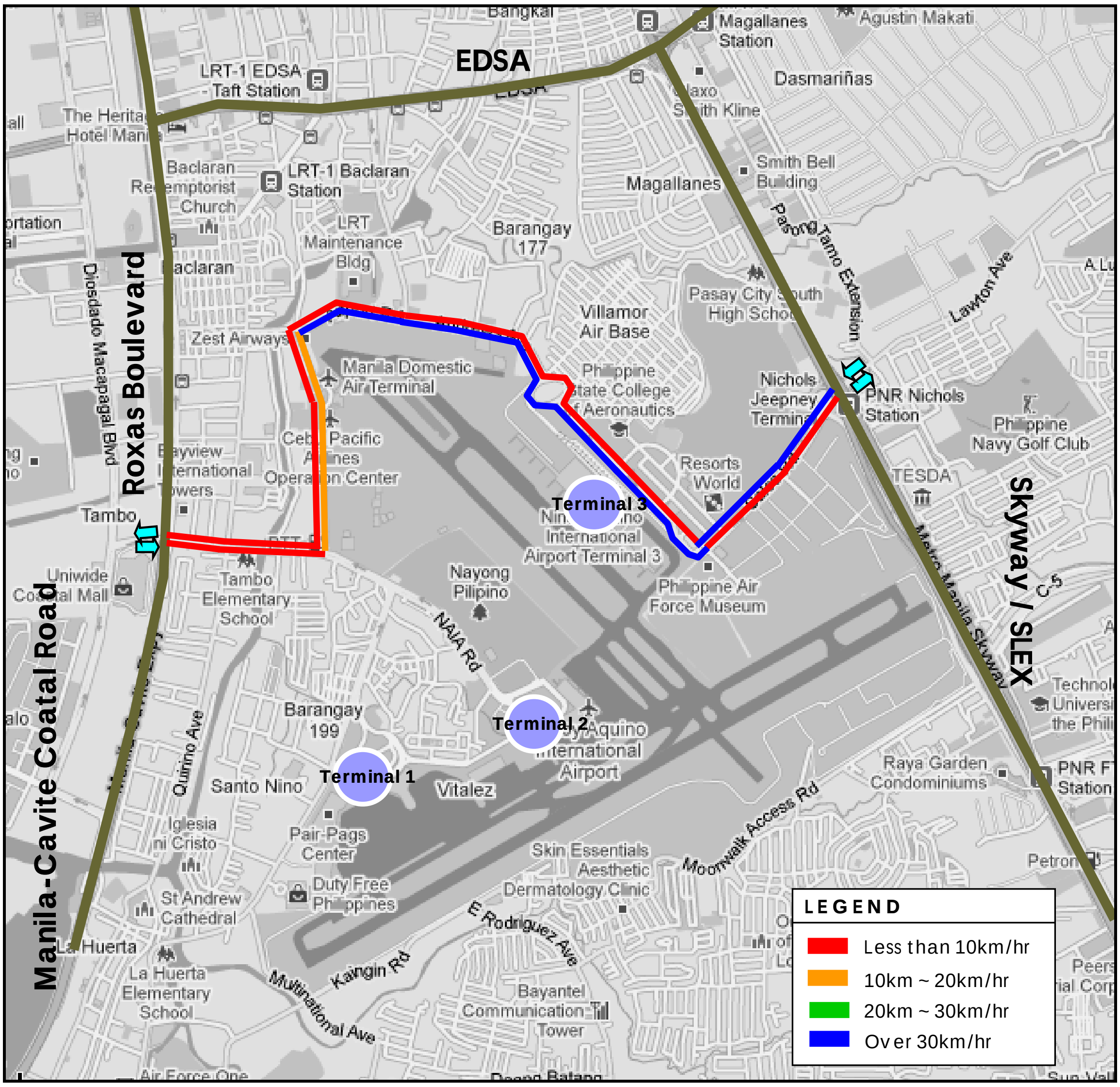
a. Travel Time Survey Results

Roxas Boulevard to SLEX

This road (MIA/NAIA Road) serves as main access road to Terminal 1 and Terminal 2 of passengers coming from Roxas Boulevard and Cavite Coastal Road. Recorded traffic reaches almost 80,000 a day. Motorists using this road had travel time speed of barely over 5 km/hr which indicates that the road is very congested. Turning into Domestic Road, the travel speed improved to 15.5 km/hr and accelerated to over 30 km/hr at some portion of Domestic Road and Andrew's Avenue. However, serious traffic congestion is again experienced before traffic merges with SLEX.

SLEX to Roxas Boulevard

Motorists departing from SLEX to Roxas Boulevard have to endure heavy traffic congestion where the average travel speed of the entire stretch is just 9.9 km/hr. Since the figure reflects travel speed between 5:00PM to 6:00PM, perhaps the road network is absorbing substantial number of commuters on their way home after work.



Source: JICA Study Team; Note: Travel speed above is from 5:00pm to 6:00pm period

FIGURE 4.1.2-1 TRAVEL SPEED FROM ROXAS BOULEVARD TO SLEX

b. Comparison of Travel Time and Travel Speed between Ordinary Road and NAIA Expressway

As mentioned, a single run was carried out from 7:00AM to 9:00PM to observe the changes of travel speed along the alignment of the NAIA Expressway and identify the peak hours of congestion (**Figure 4.1.2-2**). The following were the main findings of the survey:

- The longest travel time spent in the section is 36.7 minutes (5:00 PM) and the direction is from SLEX to Roxas Boulevard. This means travel speed is just 9.9 km/hr for the entire 5.8 km stretch (See **Figure 4.1.2-3**).
- The shortest travel time is just 11.4 minutes (12:00PM) in the direction of Roxas Boulevard to SLEX. Average travel speed is 30.9 km/hr.
- If NAIA expressway is built expected travel time is just 7.5 minutes (without stop time at toll both) from Roxas Boulevard to Skyway. The travel speed is about 45 km/hr for the entire 5.6 km expressway stretch.

Figure 4.1.2-3 shows the travel speed of ordinary road and expressway. The compared section is from SLEX to Off-ram at Terminal 1. The second section compared is from On-ramp of Terminals 1 and 2 to SLEX. From the figure, the following were observed:

- From SLEX exit to NAIA Road (at the location of Off-ram for Terminal 1) using ordinary road, the most congested period is 5:00PM where it took almost 40 minutes to traverse the entire section. Travel speed is merely 8.8 km/hr (See **Figure 4.1.2-4**).
- If expressway is built, travel time is about 8.0 minutes (without the stop time at toll both) which means motorists will save about 32 minutes during this peak period.
- From NAIA Road (at the location of On-ramp for Terminal 1 and 2) to SLEX using ordinary road, the longest travel time is 21.7 minutes (5:00PM) and the shortest travel time is 9.5 minutes. Travel speed is about 15.0 km/hr.
- If expressway is used, the travel time is around 7 minutes (without the stop time at toll both). Motorists will save around 14 minutes during this peak hour.

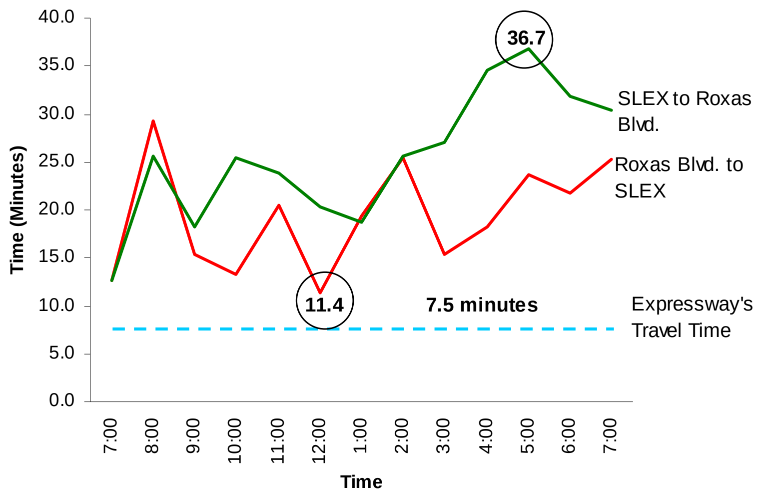
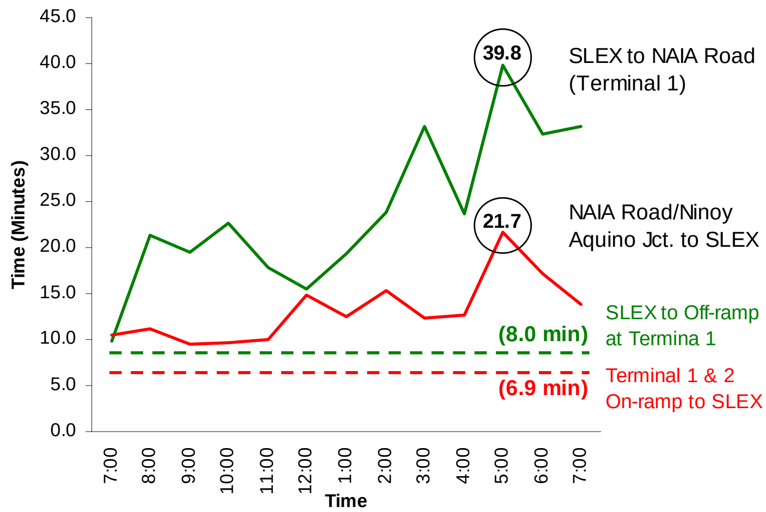


FIGURE 4.1.2-2 TRAVEL TIME FROM ROXAS BLVD. TO SLEX



Note: SLEX to Off-ram has higher travel time (8 minutes) than SLEX to Roxas (7.5 minutes) due to long down-ramp (1.18 km) which only have 35 km/hr allowable travel speed

FIGURE 4.1.2-3 TRAVEL TIME FROM SLEX TO ON-RAMP AND OFF-RAMP
(TERMINAL 1 AND 2)

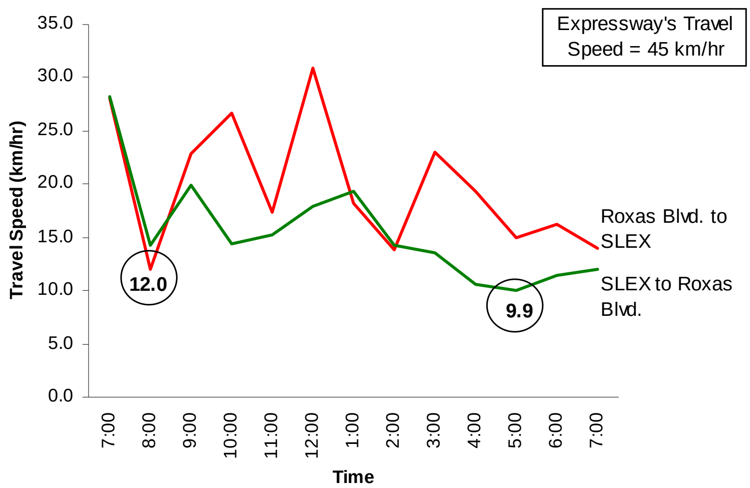
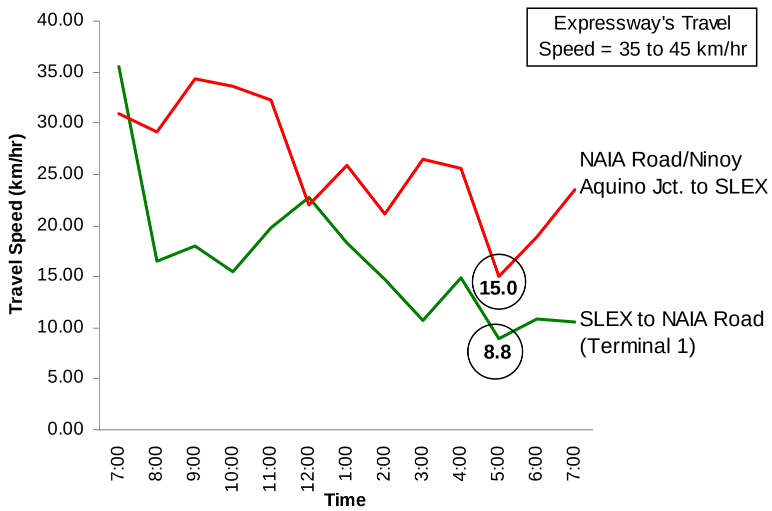


FIGURE 4.1.2-4 TRAVEL SPEED FROM ROXAS BLVD. TO SLEX

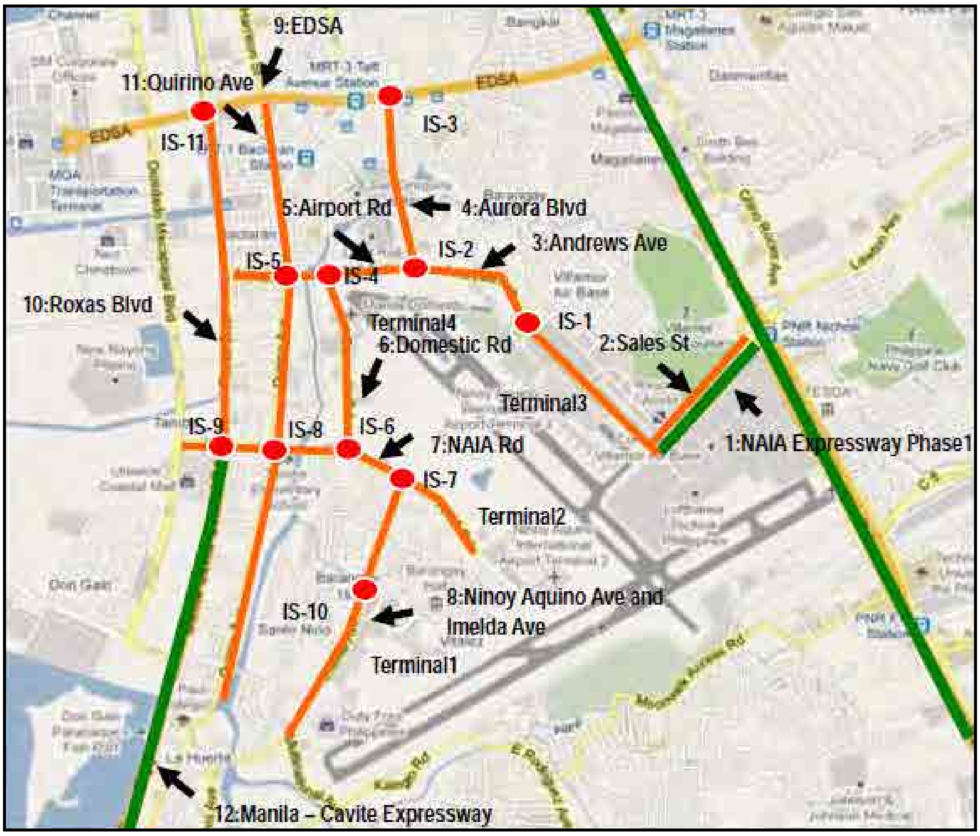


Note: 35 km/hr speed is at the branch section to Terminal 1 and 2

FIGURE 4.1.2-5 TRAVEL SPEED FROM SLEX TO ON-RAMP AND OFF-RAMP (TERMINAL 1 AND 2)

c. Current Condition of Airport Access Road

The on-going JICA study entitled "The Study on Airport Strategy for Greater Capital Region in the Republic of the Philippines" carried out analysis of the current condition of access road to NAIA airport. As seen from **Table 4.1.2-1**, there are several roads where volume of traffic has almost reached the road's capacity. These roads are: Sales Street (0.84), Andrews Avenue (0.91), Domestic Road (0.86), NAIA Road (0.82) and Imelda Avenue and Ninoy Aquino Road (0.81). Likewise, arterial roads for access such as EDSA (1.00) and Roxas Boulevard (1.00) have almost reached their capacity.



Source: The Study on Airport Strategy for Greater Capital Region in the Republic of the Philippines, JICA (2011)

FIGURE 4.1.2-6 ROAD NETWORK OF NAIA AIPORT

TABLE 4.1.2-1 CURRENT CONDITION OF MAJOR ACCESS ROADS TO NAIA

No	Name of access road	Lanes	Width (m)	Volume/Capacity		Ratio
				Volume	Capacity	
1	NAIA Expressway	4	3.50	18,332	72,000	0.25
2	Sales St.	6	3.25	48,373	57,600	0.84
3	Andrews Ave	6	3.25	65,229	72,000	0.91
4	Aurora Blvd	6	3.25	33,895	57,600	0.59
5	Airport Road	4	3.25	N.A.	38,400	N.A.
6	Domestic Road	6	3.25	49,664	57,600	0.86
7	NAIA Road	10	3.25	78,405	96,000	0.82
8	Imelda Ave & Ninoy Aquino Ave	8	3.25	61,579	76,400	0.81
9	EDSA	10	3.25	95,675	96,000	1.00
10	Roxas Blvd	10	3.25	95,669	96,000	1.00
11	Quirino Ave	6	3.00	11,071	57,600	0.19
12	Manila-Cavite Expressway	6	3.50	62,856*	86,400	0.73

Source: Adapted from "Study on Airport Strategy for Greater Capital Region in the Republic of the Philippines, JICA (2011)".

Note:

1) Data is daily basis. "No. of vehicle" is based on traffic survey conducted under "Feasibility Study Report NAIA Expressway (Phase2)-2010" and "Capacity" is calculated based on no. of lanes and "Road construction ordinance (Japanese standard)". For Expressway, classification 2-1(expressway in urban area) is applied (18,000 veh/lane/day) while, for other roads, classification 4-1(urban road with more than 10,000 veh/day) is applied (12,000 veh/lane/day). In case of there is/are intersection(s) with signal(s) within 1km to 2km distance, the estimated capacity is deducted by 20%.

*2) * Data taken from High Standard Highway Study, JICA (2010)*

4.2 PREPARATION OF PRESENT OD MATRIX

In order to estimate accurate traffic volume of roads surrounding NAIA airport, the following were carried out:

a. Procedure in Preparation of Present OD Matrix

The process applied in establishing current origin and destination (OD) matrix involves the following:

- Present OD matrix was prepared by combination of (i) High Standard Highway Study's OD and (ii) Airport Strategy for Greater Capital Region's NAIA related OD (on-going study assisted by JICA).
- The OD matrix is then updated using the NAIA related OD of Airport Strategy for Greater Capital Region.
- The adjusted OD matrix is assigned on the network and the assigned traffic volume is compared with the result of the traffic count survey - recorded in the Feasibility Study Report NAIA Expressway (Phase-II), 2010 by ERIA - so that the adequacy for traffic assignment simulation can be justified.

Figure 4.2-1 illustrates the process of preparing present OD Matrix. Summary of present OD table is presented in **Table 4.2-1**.

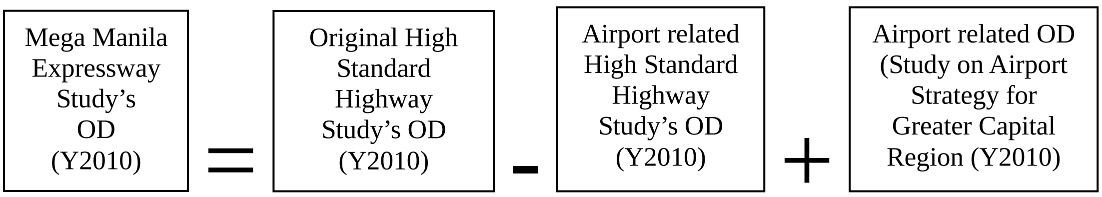


FIGURE 4.1.2-1 PROCESS OF PREPARATION OF PRESENT OD MATRIX

Procedure for the preparation of present traffic assignment and future traffic assignment is presented in **Figure 4.2-2**. After obtaining the accuracy of present traffic assignment, future traffic assignment is estimated as illustrated in **Figure 4.2-2**. In estimating the future traffic volume, traffic growth as well future road network development was taken into account. Likewise, since the project is a toll expressway, the results of willingness-to-pay survey were accounted to ensure that the survey result is replicated in the model.

TABLE 4.1.2-1 SUMMARY OF OD TABLE (2010)

Unit: '000 veh/day

	City of Manila	Quezon City	Makati City	Taguig	Las Pinas City	Pasay City	Tarlac	Bulacan	Rizal	Cavite	Laguna	Total
City of Manila	523	104	74	30	11	17	6	26	23	8	16	836
Quezon City	87	848	140	24	10	16	2	21	28	6	8	1,189
Makati City	100	92	281	43	18	40	0	6	30	8	9	628
Taguig	54	20	46	153	32	34	0	1	3	11	16	370
Las Pinas City	8	9	13	32	249	6	0	0	2	30	10	360
Pasay City	17	16	21	9	9	55	9	3	3	8	6	155
Tarlac	6	2	0	0	0	9	74	14	0	1	0	106
Bulacan	24	22	3	1	1	3	14	518	2	2	2	590
Rizal	21	28	32	4	2	3	0	2	331	2	4	428
Cavite	9	7	6	12	33	7	1	2	1	446	25	548
Laguna	7	7	5	9	7	6	1	1	7	28	292	369
Total	855	1,154	622	317	371	196	107	594	429	549	387	5,580

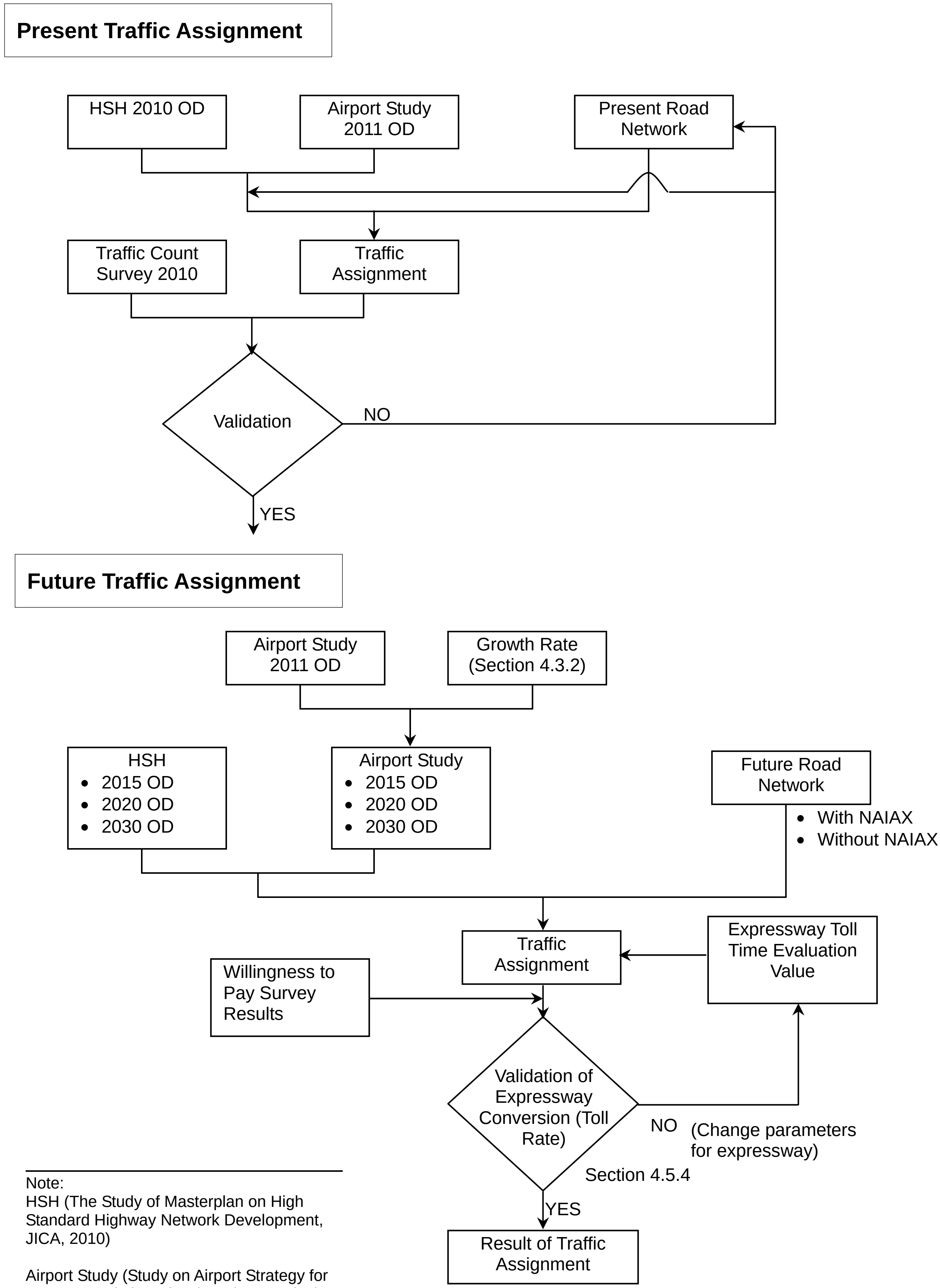


FIGURE 4.1.2-2 PROCEDURE FOR PREPARATION OF PRESENT AND FUTURE TRAFFIC ASSIGNMENT

b. Traffic Model 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 4.2-2 presents traffic volumes generated from traffic assignment and observed traffic (traffic count survey). **Figure 4.2-3** 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 0.12 which is considered to reflect a good calibration. By all indicators, the assignment is acceptable level to replicate year 2010.

TABLE 4.1.2-2 COMPARISON OF OBSERVED (SURVEY DATA) AND ASSIGNED TRAFFIC VOLUME (Veh/day)

Road Name	Observed Traffic Volume	Assigned Traffic Volume	Difference	Rate
Roxas Blvd	95,700	96,905	1,205	1%
NAIA Road	78,400	81,297	2,897	4%
Ninoy Aquino Ave	37,200	35,950	(1,250)	-3%
Airport Road	70,400	61,331	(9,069)	-15%
Aurora Road	33,900	43,430	9,530	22%
Andrews Ave	65,200	55,578	(9,622)	-17%
Total	**380,800**	**374,490**	**(6,310)**	**-2%**

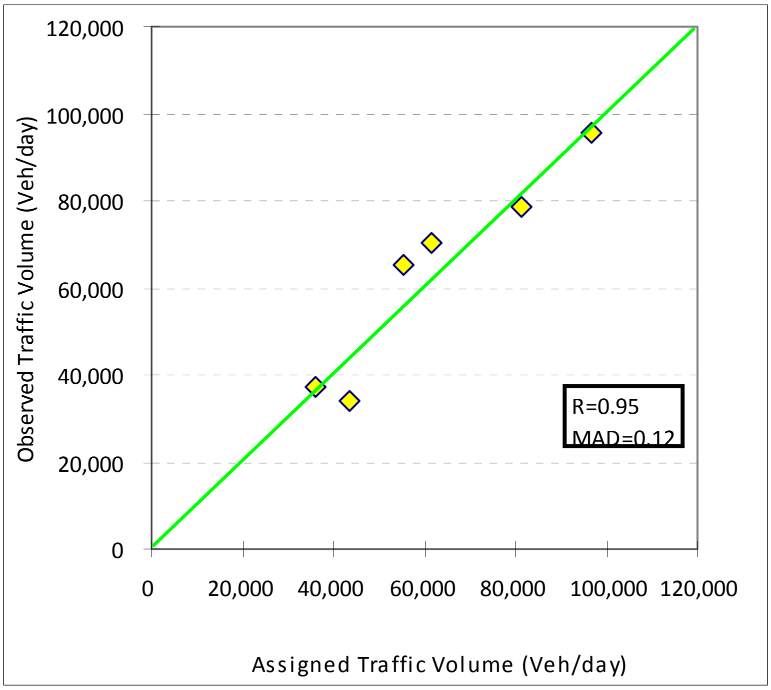


FIGURE 4.1.2-3 COMPARISON OF OBSERVED AND ASSIGNED TRAFFIC VOLUME (Veh/day)

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[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.

4.3 Future Traffic Demand Forecast

As mentioned in the previous sections, the present OD matrix is a combination of the OD of High Standard Highway Study and the OD of Airport Strategy for Greater Capital Region' OD (or NAIA related traffic). Likewise, future traffic OD is also a combination of future OD of High Standard Highway Study and OD of Airport Strategy for Greater Capital Region's Study.

The OD matrix of High Standard Highway Study has already been prepared in the 2010 report. The future OD estimation of High Standard Highway Study is described in the succeeding section for reference.

4.3.1 Future OD Estimation by High-standard Highway Study

(1) Future OD Estimation Approach

The future OD Matrix was prepared by the following steps/procedure as shown in **Figure 4.3.1-1**.

- Trip Generation and Attraction – the prediction of trips produced and attracted to each zone;
- Trip Distribution – the prediction of origin-destination flows, the linking of trip ends predicted by trip generation;
- Modal Split – the estimation of percentages of trip flows made by each transportation mode in the model.

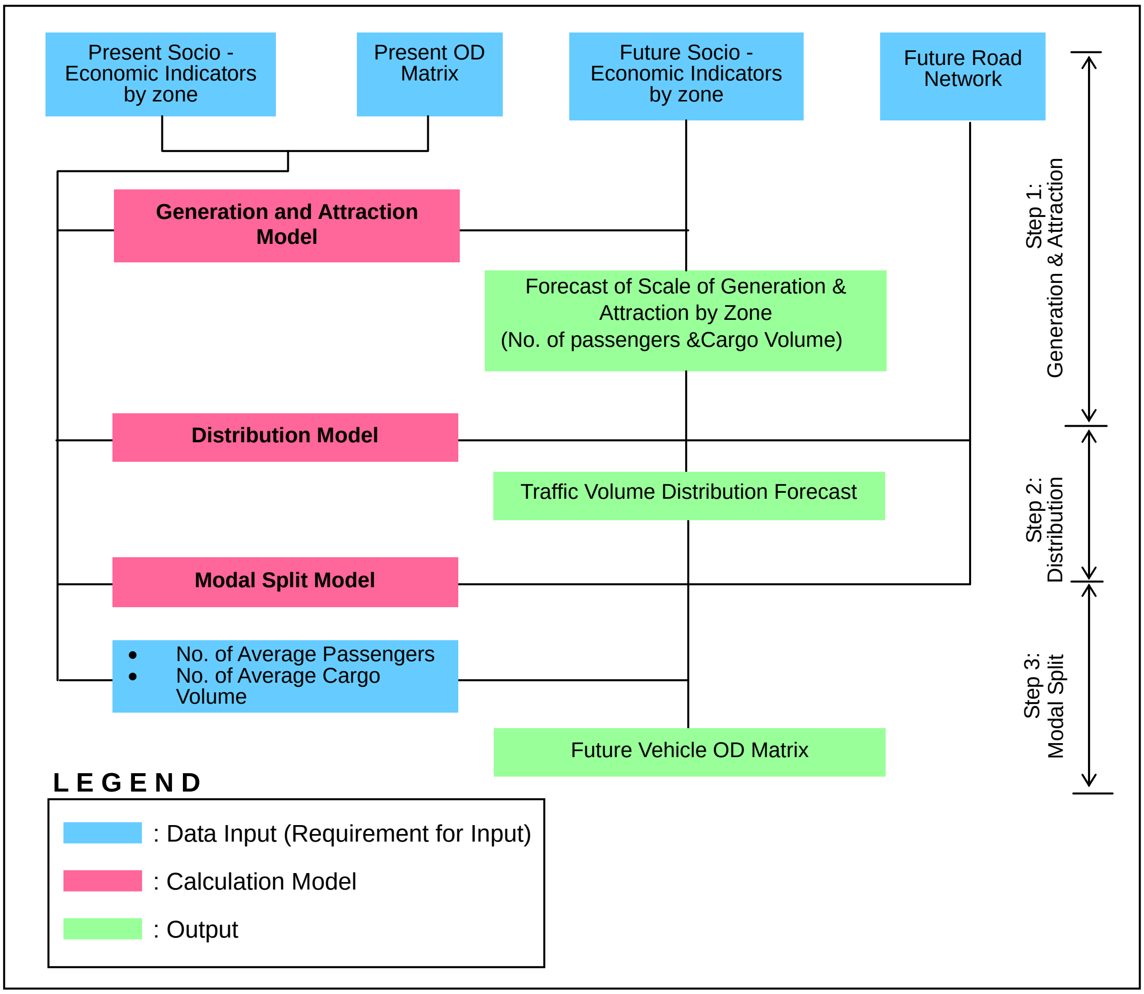


FIGURE 4.3.1-1 FUTURE OD MATRIX ESTIMATION PROCEDURE

(2) Modeling and Forecasting tolls

In all steps of travel model calibrations and demand forecast, JICA STRADA system was employed. JICA STRADA is a software tool for planning, managing, and analyzing of transportation systems. The software provides a set of tools for traffic demand modeling as well as capabilities for presentation graphics and transportation models. Modeling and forecasting in trip generation, trip distribution and traffic assignment was computed by JICA STRADA system.

(3) Traffic Demand Forecast Modeling

1) Trip Generation and Attraction Model

The objective of trip generation and attraction model is to forecast the number of trips that will start and arrive in each traffic zone within the study area. The linear regression models were adopted in the HSH Study. The model parameters are calibrated shown in **Table 4.3.1-1** and **Table 4.3.1-2**.

$Gi = ai * X1i + bi * X2i + ci * Di + C$
$Aj = aj * X1j + bj * X2j + cj * Dj + C$

Where,

Gi – Trip Generation in zone i
Aj – Trip Attraction in zone j
$X1i$, $X2j$ – Attributes in zone i,j
Di, Dj – Dummy Variables
ai, aj, bi, bj – Coefficients
C – Constant

TABLE 4.3.1-1 GENERATION/ATTRACTION MODELS (PASSENGER TRIPS)

Model Type	Subject Area	Attributes		Dummy Variable	Constant	R^2 Multiple Correlation Coefficient
		Population	Employment			
Trip Generation	Metro Manila (MM)	2.0928	1.0289	-1,005,653	-206,717	0.9860
	Neighboring Province of MM (Cavite, Rizal, Laguna, Bulacan)	1.3837	-	619,554	-164,274	0.9378
	Other Areas	0.0680	-	47,542	-6,448	0.9013
Trip Attraction	Metro Manila (MM)	1.9863	1.0075	-835,149	-238,716	0.9829
	Neighboring Province of MM (Cavite, Rizal, Laguna, Bulacan)	1.3981	-	612,567	-168,183	0.9375
	Other Areas	0.0616	-	55,612	-4,920	0.9117

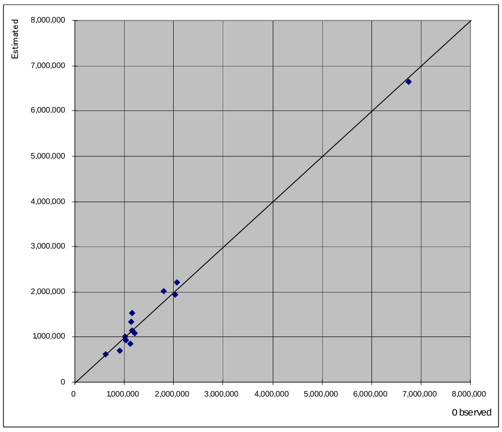
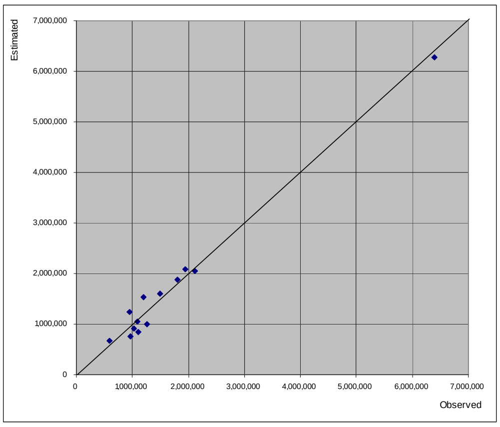
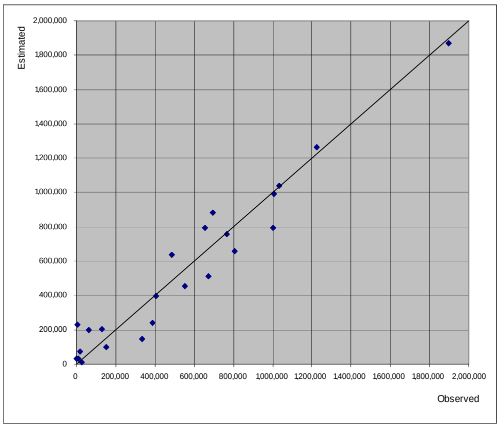
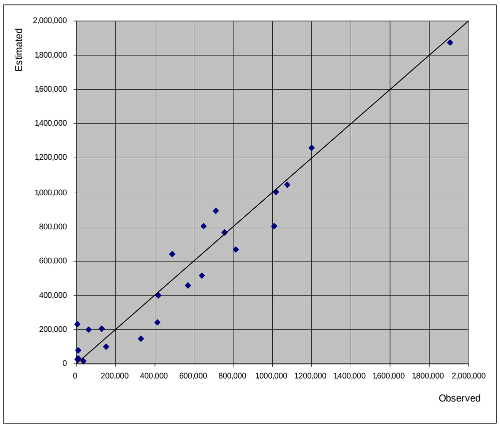
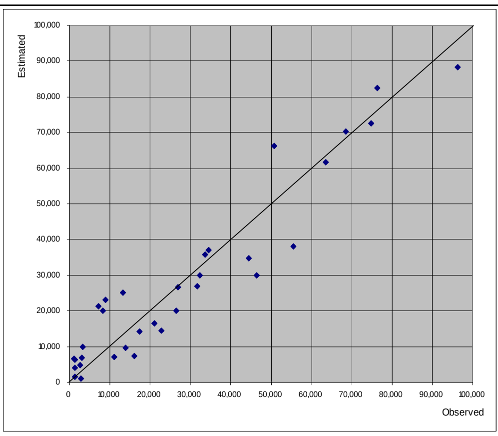
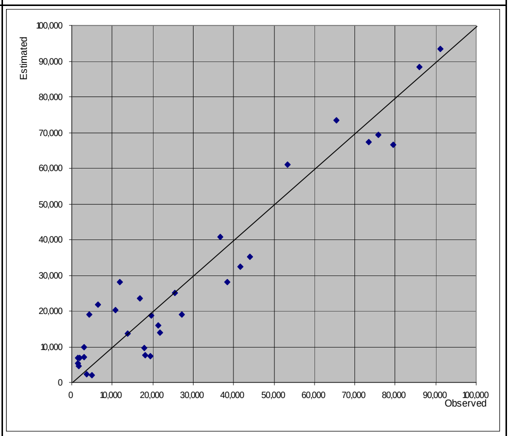
Source: JICA HSH Study (2010)

TABLE 4.3.1-2 GENERATION/ATTRACTION MODELS (CARGO MOVEMENT)

Model Type	Subject Area	Attributes		Dummy Variable	Constant	R^2 Multiple Correlation Coefficient
		Population	Employment			
Trip Generation	Metro Manila (MM)	-	271.5	201,652	-206,717	0.9808
	Neighboring Province of MM (Cavite, Rizal, Laguna, Bulacan)	-	135.9	66,565	-164,274	0.8267
	Other Areas	-	17.2	5,910	-6,448	0.7675
Trip Attraction	Metro Manila (MM)	-	241.4	-835,149	195,530	0.9638
	Neighboring Province of MM (Cavite, Rizal, Laguna, Bulacan)	-	156.8	612,567	66,185	0.8171
	Other Areas	-	19.7	55,612	6,269	0.7934

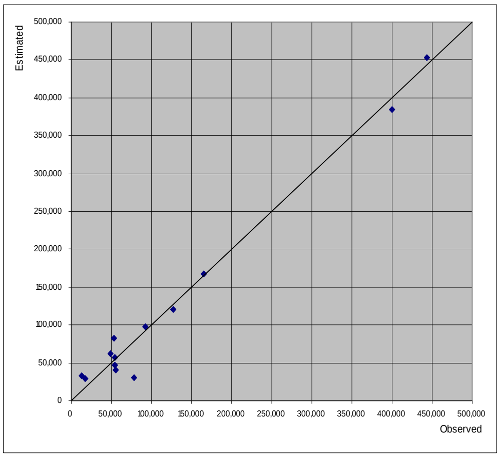
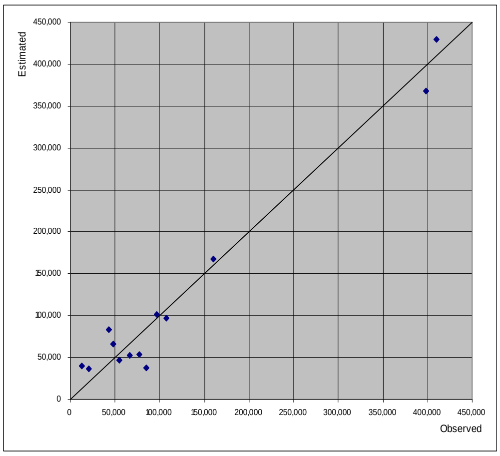
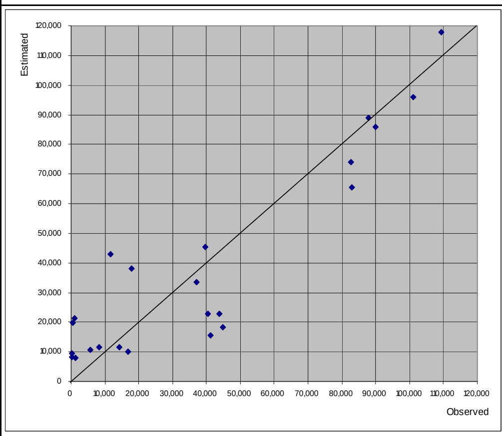
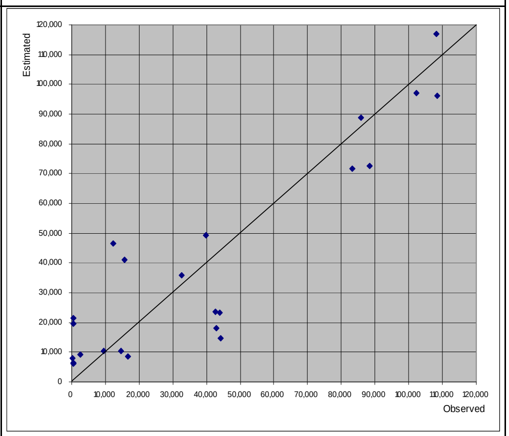
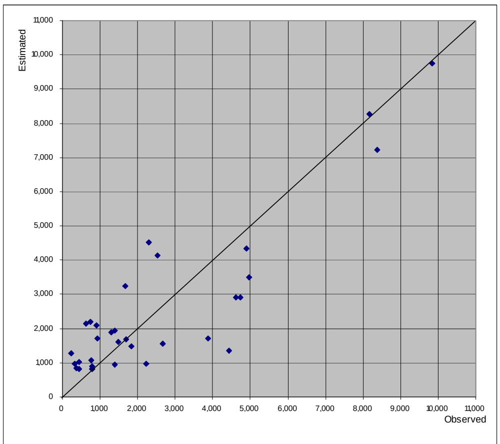
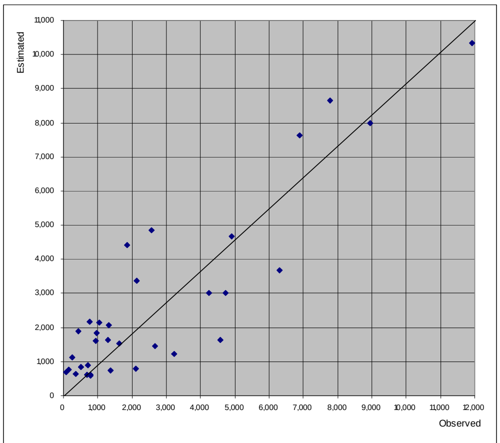
Source: JICA HSH Study (2010)

Figure 4.3.1-2 shows the verification results between observed and estimated trips for passenger trips. Likewise, **Figure 4.3.1-3** shows the verification results between observed and estimated trips for cargo movement.

		Trip Generation Model	Trip Attraction Model
Passenger Trips	Metro Manila (MM)	 R^2 = 0.9860	 R^2 = 0.9829
	Neighbo-ring Province of MM	 R^2 = 0.9378	 R^2 = 0.9375
	Other Areas	 R^2 = 0.9013	 R^2 = 0.9117

Source: JICA HSH Study (2010)

FIGURE 4.3.1-2 VERIFICATION OF TRIP GENERATION AND ATTRACTION MODEL (PASSENGER TRIPS)

		Trip Generation Model	Trip Attraction Model
Cargo Movement	Metro Manila (MM)	 $R^2 = 0.9808$	 $R^2 = 0.9638$
	Neighbo-ring Province of MM	 $R^2 = 0.8267$	 $R^2 = 0.8171$
	Other Areas	 $R^2 = 0.7675$	 $R^2 = 0.7934$

Source: JICA HSH Study (2010)

FIGURE 4.3.1-3 VERIFICATION OF TRIP GENERATION AND ATTRACTION MODEL (CARGO MOVEMENT)

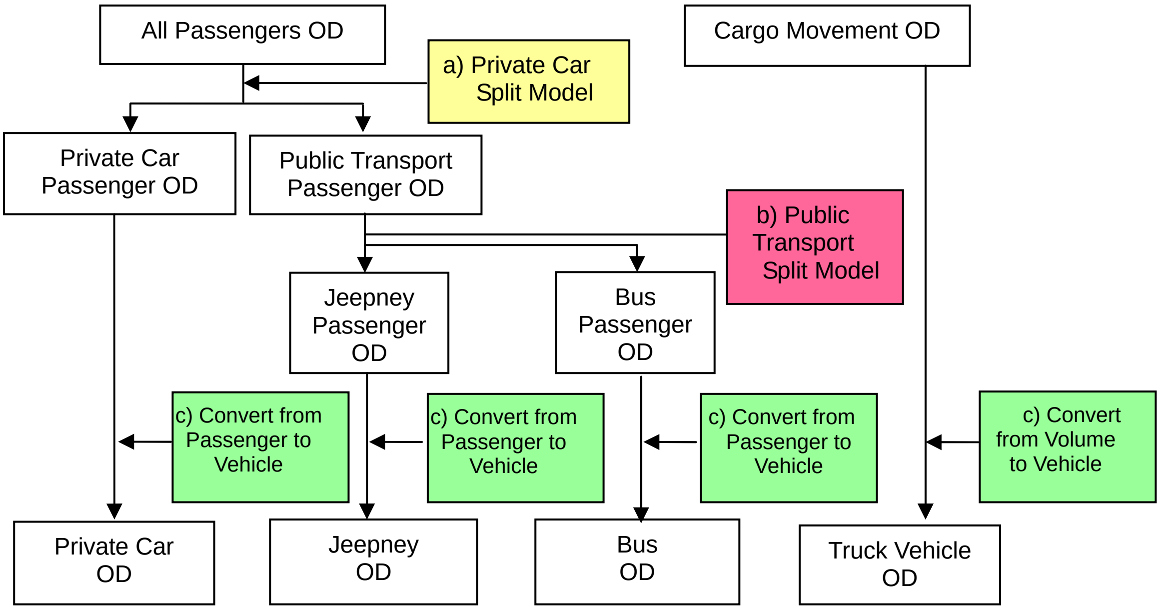
2) Forecasting Trip Distribution Model

Trip distribution is the second major step in the traffic demand modeling process. Trip production (the first major step) provided methodology for estimating trip generations and attractions within each zone. Trip distribution is the process that links the generations and attractions with each zone.

The distribution model was applied using the present pattern to estimate the future trip distribution.

3) Modal Split Model

Figure 4.3.1-4 shows the procedure of Modal Split Model.



Source: JICA HSH Study (2010)

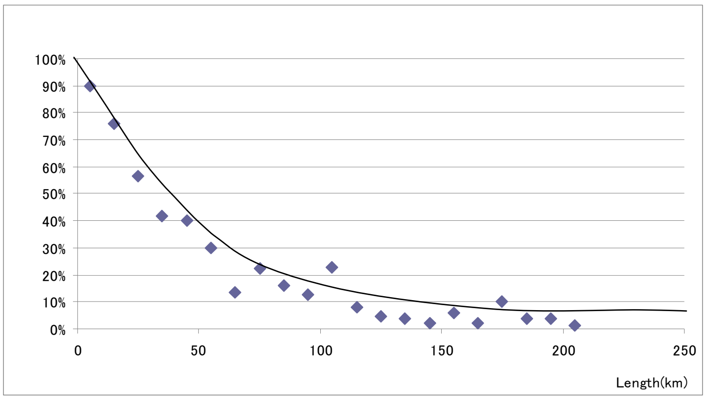
FIGURE 4.3.1-4 STRUCTURE OF MODAL SPLIT MODEL

a) Private Car Split Model

Based on the trend of vehicle registration, the number of private car passenger was estimated. Number of public transport passenger was estimated by subtracting number of private car passenger from all passengers.

b) Public Transport Split Model

The modal split between bus and jeepney was estimated by using the relationship between zone *i* and zone *j* in distance calculated on the basis of Present OD matrix. **Figure 4.3.1-5** shows the modal share of jeepney to the public transport trips.



Source: JICA HSH Study (2010); Note: Year 2009, Roadside OD Survey Result.

FIGURE 4.3.1-5 MODAL SHARES OF JEEPNEY TRIPS TO TOTAL PUBLIC TRANSPORT TRIPS

c) Convert from Passenger, Cargo Movement to Vehicle

The vehicle trips are estimated by converting passenger trips and cargo movement into equivalent number of vehicle traffic. Conversion rate is presented in **Table 4.3.1-3**.

TABLE 4.3.1-3 CONVERSION RATE

Vehicle Type	Conversion Rate
Private Car	3.5 person/vehicle
Jeepney	9.3 person/vehicle
Bus	30.8 person/vehicle
Truck	4,008 kg/vehicle

Source: JICA HSH Study (2010)

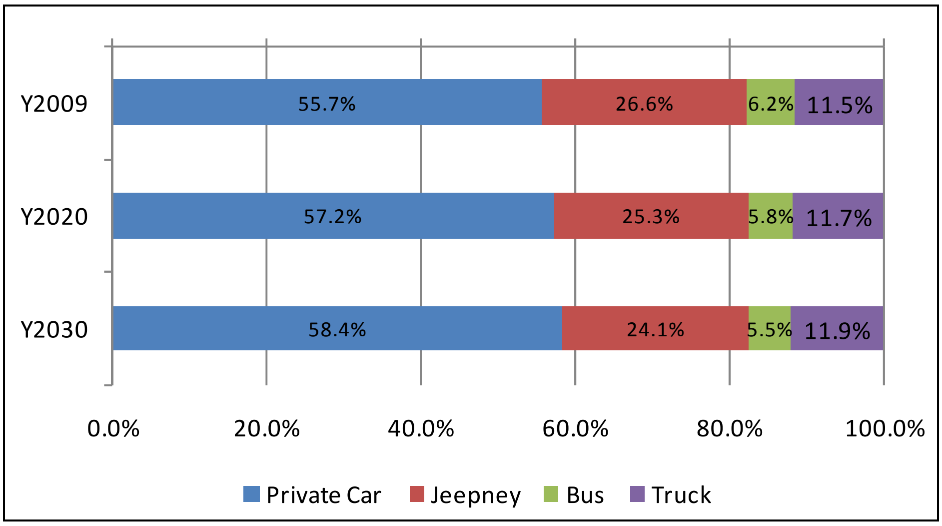
Future Vehicle OD Trips of HSH

As shown in **Table 4.3.1-4**, the total vehicle trips by applying average passenger occupancy and loading weight are estimated to be 9 million trips per day in 2030, which will be about 1.62 times of the current demand. Of these, growth rate of private cart trips will be high, thus, modal share of private car to the total vehicle will increase from 55.7% at present to 58.4% in 2030 as exhibited in **Figure 4.3.1-6**. Modal share by zone is shown in **Figure 4.3.1-7**.

TABLE 4.3.1-4 TOTAL VEHICLE TRIPS

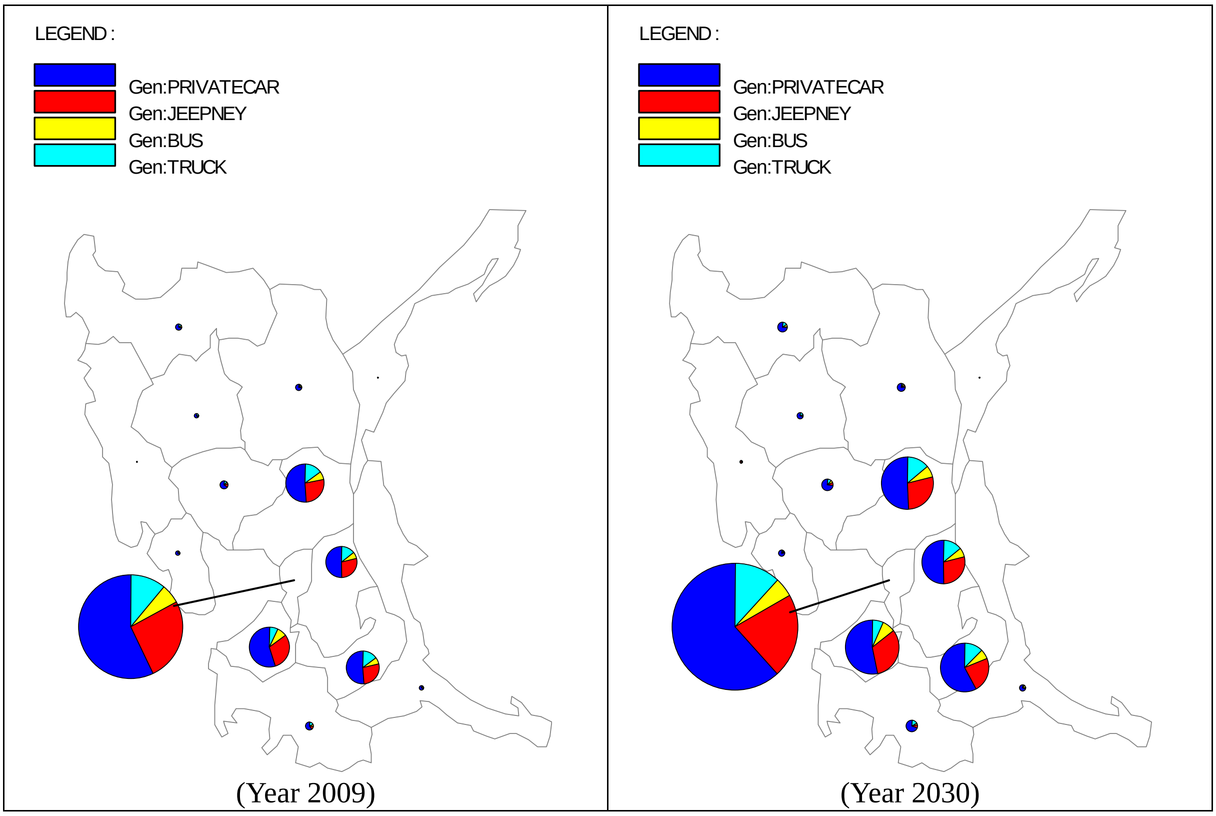
Vehicle Type	Y2009		Y2020		Y2030		Increased Ratio	
	Trips	Share	Trips	Share	Trips	Share	20/09	30/09
	1000 veh/day	%	1000 veh/day	%	1000 veh/day	%		
Private Car	3,095	55.7	4,243	57.2	5,248	58.4	1.37	1.70
Jeepney	1,476	26.6	1,873	25.3	2,170	24.1	1.27	1.47
Bus	347	6.2	431	5.8	498	5.5	1.24	1.44
Truck	641	11.5	868	11.7	1,074	11.9	1.35	1.68
Total	**5,559**	**100.0**	**7,415**	**100.0**	**8,990**	**100.0**	**1.33**	**1.62**

Source: JICA HSH Study (2010)



Source: JICA HSH Study (2010)

FIGURE 4.3.1-6 MODAL SHARE IN 2009, 2020 AND 2030 (VEHICLE BASE)



Source: JICA HSH Study (2010)

FIGURE 4.3.1-7 MODAL SHARES BY ZONE (GENERATION BASE) IN 2009 AND 2030

4.3.2 Future OD Estimation of related NAIA Traffic

Based on the present OD of related NAIA Traffic (**Table 4.2-2**), future OD was prepared by multiplying it to vehicle's growth rate as shown in **Table 4.3.2-1**.

TABLE 4.3.2-1 ANNUAL GROWTH RATE OF NAIA RELATED TRAFFIC

	2010 - 2020	2021 - 2030
Private Car	2.9%	2.1%
Jeepney	2.0%	1.5%
Bus	2.0%	1.5%
Truck	2.8%	2.2%

4.3.3 Future OD of Related NAIA Traffic

Future OD of related NAIA traffic is shown in **Table 4.3.3-1** (2015), **Table 4.3.3-2** (2020) and **Table 4.3.3-3** (2030).

TABLE 4.3.3-1 SUMMARY OF OD TABLE (2015)

Unit: '000 veh/day

	City of Manila	Quezon City	Makati City	Taguig	Las Pinas City	Pasay City	Tarlac	Bulacan	Rizal	Cavite	Laguna	Total
City of Manila	682	117	75	24	9	14	7	32	24	9	15	1,009
Quezon City	100	1,045	133	26	8	18	4	38	31	7	15	1,424
Makati City	89	84	358	47	15	37	0	5	27	11	9	681
Taguig	42	24	56	219	32	26	0	2	4	11	21	436
Las Pinas City	8	10	17	36	248	8	0	1	2	41	10	380
Pasay City	17	19	26	11	10	63	10	4	6	10	7	182
Tarlac	7	4	1	1	0	10	73	18	0	1	1	115
Bulacan	30	35	3	2	2	4	18	583	1	3	2	683
Rizal	22	27	32	4	1	2	0	2	361	3	15	470
Cavite	12	14	8	11	37	9	1	2	1	601	39	736
Laguna	7	12	7	13	6	6	1	1	13	48	357	471
Total	1,016	1,391	715	392	370	197	115	687	469	744	490	6,587

TABLE 4.3.3-2 SUMMARY OF OD TABLE (2020)

Unit: '000 veh/day

	City of Manila	Quezon City	Makati City	Taguig	Las Pinas City	Pasay City	Tarlac	Bulacan	Rizal	Cavite	Laguna	Total
City of Manila	825	126	75	18	7	13	8	38	24	10	14	1,158
Quezon City	110	1,216	122	27	7	24	6	54	32	9	21	1,627
Makati City	75	73	426	50	12	35	0	3	24	13	9	720
Taguig	28	27	66	279	32	18	1	2	5	11	25	494
Las Pinas City	7	11	20	38	241	10	0	1	2	50	9	390
Pasay City	18	26	33	14	12	70	15	5	8	14	9	224
Tarlac	8	6	1	1	0	15	69	21	0	1	1	124
Bulacan	36	47	3	3	3	5	21	635	1	3	2	760
Rizal	23	26	32	3	1	2	0	3	382	3	25	500
Cavite	15	21	10	10	41	12	1	2	1	743	53	908
Laguna	7	18	8	16	6	9	2	1	18	67	413	563
Total	1,152	1,597	794	460	360	213	123	764	499	923	582	7,468

TABLE 4.3.3-3 SUMMARY OF OD TABLE (2030)

Unit: '000 veh/day

	City of Manila	Quezon City	Makati City	Taguig	Las Pinas City	Pasay City	Tarlac	Bulacan	Rizal	Cavite	Laguna	Total
City of Manila	968	146	88	21	8	15	10	47	29	12	18	1,364
Quezon City	128	1,424	144	32	8	30	7	66	39	10	25	1,913
Makati City	88	86	501	60	14	41	0	4	30	16	11	852
Taguig	33	31	79	336	38	22	1	3	6	14	32	595
Las Pinas City	8	12	23	46	277	11	0	2	3	62	12	456
Pasay City	21	30	38	16	14	81	18	6	10	16	11	261
Tarlac	10	8	1	1	1	18	89	27	0	1	2	159
Bulacan	44	58	4	4	3	6	26	824	1	4	3	978
Rizal	27	32	38	4	1	2	0	3	497	5	34	644
Cavite	19	26	13	12	50	14	1	2	2	962	72	1,173
Laguna	8	21	10	19	7	10	2	1	24	89	549	741
Total	1,356	1,874	939	553	419	251	155	985	642	1,191	769	9,135

4.4 WILLINGNESS-TO-PAY (WTP) SURVEY

This survey is carried out to passengers inside the terminals of NAIA. Only passengers who have declared to own a car is considered as respondents. The idea is to solicit their opinion as future expressway users. The plan of the government to build an expressway is explained to respondents by showing a large map shown in the figure below. Likewise, they were also informed that the expressway is assumed to open in 2015 and that certain amount has to be paid for its use. See figure below for the hypothetical questions on willingness to pay.

The survey's purpose is to gauge the public's acceptance of toll rate applied at the NAIA Expressway. **Figure 4.4-1** shows the NAIAX Willingness to pay Survey Questionnaire Form.

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

WILLINGNESS TO PAY SURVEY (FORM 4) — **FOR STUDY PURPOSE ONLY**

General Info.

Sample ID No: | | | | — Date (month/day) | | | | |

Location (1) Terminal I (2) Terminal II (Dom) (3) Terminal II (Intn'l) (4) Terminal III (Dom) (5) Terminal III (Intn'l) — Time | | | | |

Personal Information and Trip Characteristics

1- How did you come to airport?
1) Car 2) Taxi

2-Sex
1-Male 2-Female

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

4-Total number of cars your family has

5-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):

6-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

7- What time did you arrive in the airport? | | Hour | | Minutes

8- Trip OD Where did you start this trip? ____________________
(City/Municipality)

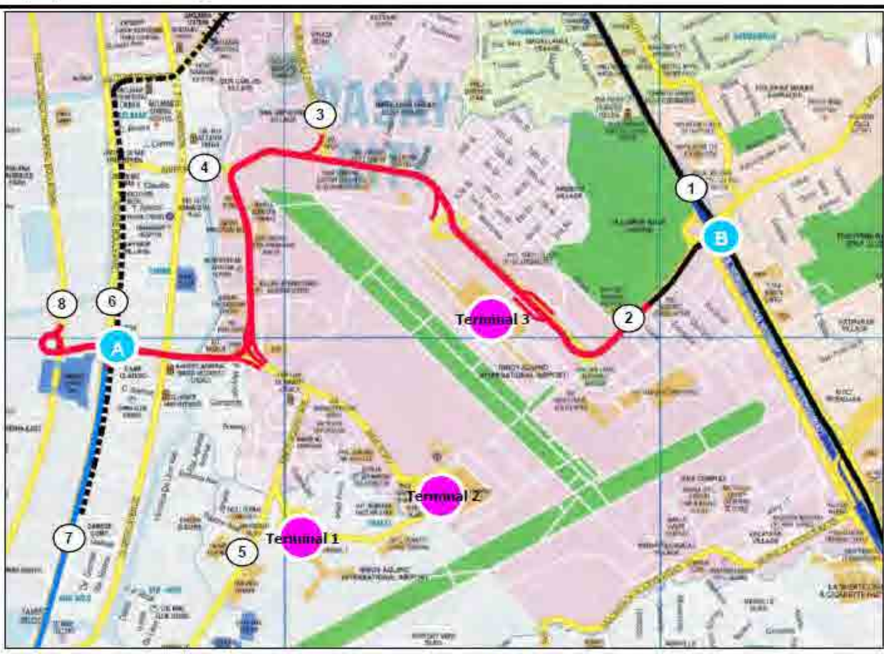
9-Travel Time
How long did it take from your origin to this airport? | | Hour | | Minutes

10- Which road did you take to get into airport? see Map below
1) Skyway 3) Aurora Road 5) Ninoy Aquino Ave. 7) Coastal Road 9) Others, specifiy: ______
2) Sales Road 4) Airport Road 6) Roxas Blvd 8) Macapagal Blvd

11- If expressway is built as shown in the map, will you use it getting into airport instead of the road you used today ?
1) Yes ——→ If Yes, how much are you willing to pay: Pesos ________
2) No, I will take the same road (ordinary road)

Willingness to Pay

12- Hypothetical Question
The government is planning to construct the NAIA Expressway (Phase 2) to link Skyway to Cavite Coastal Expressway and to connect Terminals 1, 2 and 3 to an expressway. This will reduce travel time getting into the airport. For instance, from Coastal Road (A) to Skyway (B), travel time will be reduced to just 10 minutes or so. If you travel from A to B, will you use the expressway? **And how much you are willing to pay to use the expressway?**
A) Yes 1) 20 2) 30 3) 50 4) 80
B) No, I will take ordinary road



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

FIGURE 4.3.3.4-1 NAIAX WILLINGNESS TO PAY SURVEY QUESTIONNAIRE

a. Sample Size

The sample size is shown in the **Table 4.4-1**. Terminal 2 has the highest number of sample (301), followed by Terminal 3 (250) and the remaining samples come from Terminal 1.

TABLE 4.3.3.4-1 SAMPLE SIZE

Terminal	International / Domestic	Sample	Share (%)
Terminal 1	International	200	26.6%
Terminal 2	Domestic	150	20.0%
	International	151	20.1%
Terminal 3	Domestic	150	20.0%
	International	100	13.3%
	Total	751	100.0%

b. Mode to Airport (Q.1)

Since the idea is to capture car users, most of the respondents arrived to the airport by car and followed by those used taxi as shown in **Table 4.4-2**.

TABLE 4.3.3.4-2 TRANSPORT MODE TO AIRPORT

Mode	Sample	Share (%)
Car	467	62.2%
Taxi	284	37.8%
Total	751	100.0%

c. Sex Distribution (Q.2)

For sex distribution of the respondents, more than half are male (52.3%) and the remaining are female. See **Table 4.4-3**.

TABLE 4.3.3.4-3 SEX DISTRIBUTION

Sex	Sample	Share (%)
Male	393	52.3%
Female	358	47.7%
Total	751	100.0%

d. Age Distribution (Q.3)

As shown in the table below, the highest number of respondents belongs to 30 to 39 years old (35.75%). This is followed by those belonging to age group of 20-29 years old and closely followed by those in 40-49 years old. See **Table 4.4-4**.

TABLE 4.3.3.4-4 AGE DISTRIBUTION

Age Range	Sample	Share (%)
20-29	180	24.0%
30-39	268	35.7%
40-49	174	23.2%
50-59	88	11.7%
>60	41	5.5%
Total	751	100.0%

e. Car Ownership Distribution (Q.4)

As mentioned, since car owning individual is expected as one of the main users of the expressway, only passengers with car were interviewed. As shown in the figure below, more than half of the respondents owned a car followed by the respondents with two cars. Individuals with more than three cars are quite significant (9.1%). Refer to **Figure 4.4-2**.

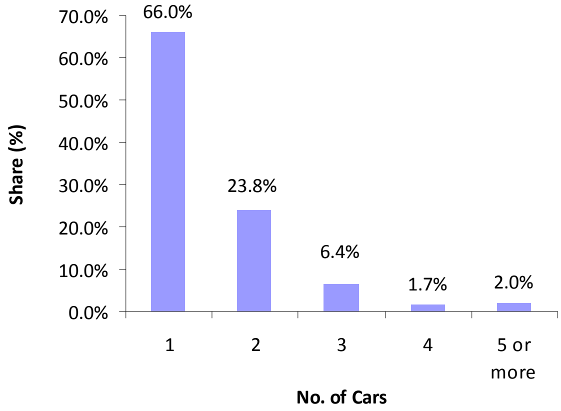


FIGURE 4.3.3.4-2 CAR OWNERSHIP DISTRIBUTION

f. Occupation Distribution (Q.5)

For occupation of respondents, most of them are professional (40.9%). Other notable professions by the respondents are sales/services, technical works/assistant, and administrative works. See **Figure 4.4-3**.

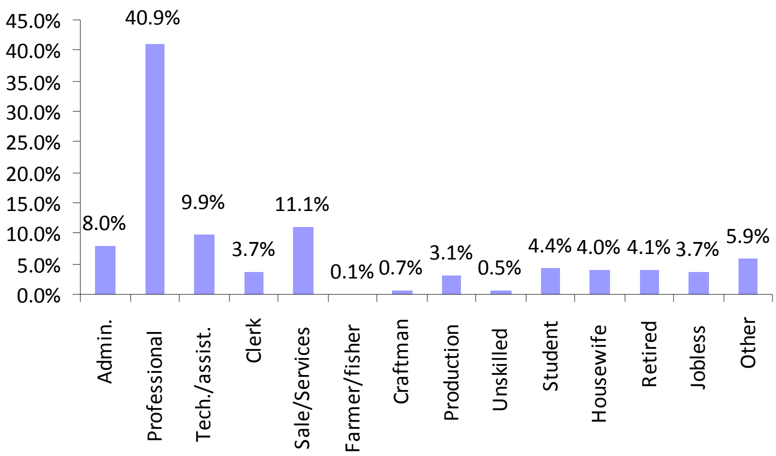


FIGURE 4.3.3.4-3 OCCUPATION OF RESPONDENTS

g. Monthly Income Distribution (Q.6)

The highest share of respondents has a monthly income between 40,000 to 59,999 pesos. Combining the share of respondents with monthly income of 30,000 pesos or more, their share is about 56% to the total samples. Respondents without income (none) are mostly students, retirees, and housewives. See **Figure 4.4.-4.**

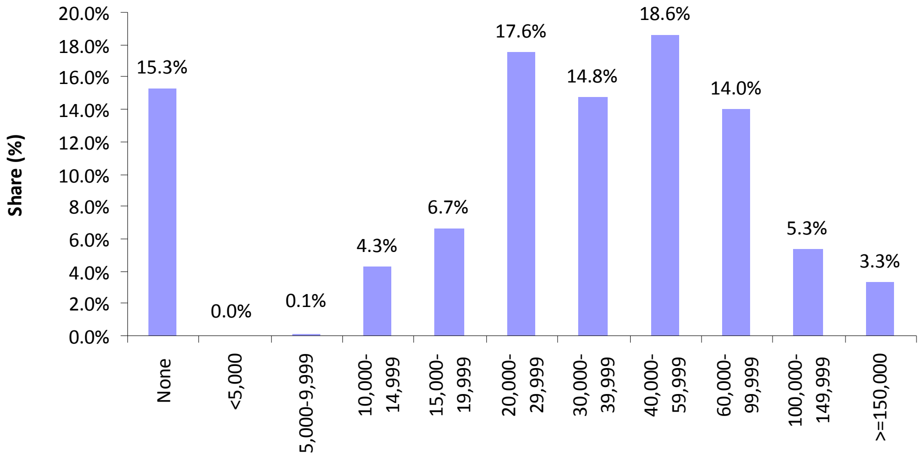


FIGURE 4.3.3.4-4 MONTHLY INCOME

h. Places of Origin (Q.8)

More than half of the respondents have their origin within Metro Manila (66.6%) while the rest comes from the neighboring provinces in Region I, Region II, Region III, Region IV, Region V and CAR. Within Metro Manila, notable cities with high number of respondents are Manila City, Makati City and Quezon City. On the other hand, provinces with high number of respondents in Region IV-A comes from Cavite and Laguna.

It is interesting to note that air passengers coming from neighboring provinces as far as Baguio City (CAR), Albay and Batangas were travelling directly to the airport without spending a night in Metro Manila. This change in travel behavior of commuters might be due to the speedy travel provided by the expressways. Refer to **Figure 4.4-5**.

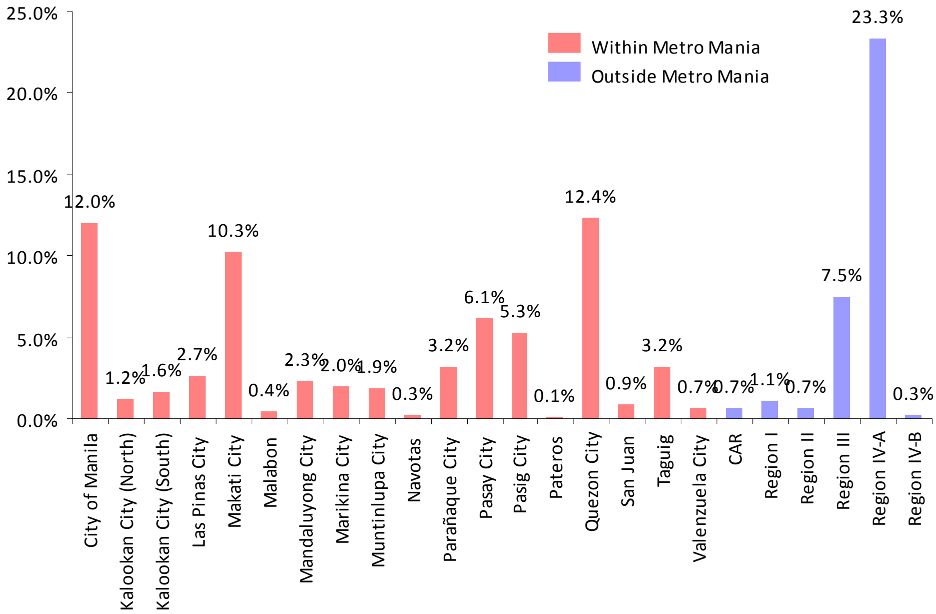


FIGURE 4.3.3.4-5 ORIGIN OF RESPONDENTS

i. Travel Time to Airport (Q.9)

More than half of respondents have travel time of one (1) hour or less from origin to NAIA. Most of these respondents had their origin from Metro Manila and a few came from Imus, Kawit, Dasmarinas, Bacoor (Cavite), Cabuyao (Laguna), and Cainta (Rizal). See **Figure 4.4-6**.

The average travel time of respondents coming from Metro Manila is 1.1 hour. Air passengers coming from nearby provinces of Cavite, Laguna and Rizal were also able to get into the airport terminals with an hour or so. The recorded highest average travel time is more than 10 hours which comes from provinces of Ilocos Sur, Isabela and some provinces in Region IV-B. See **Figure 4.4-7**.

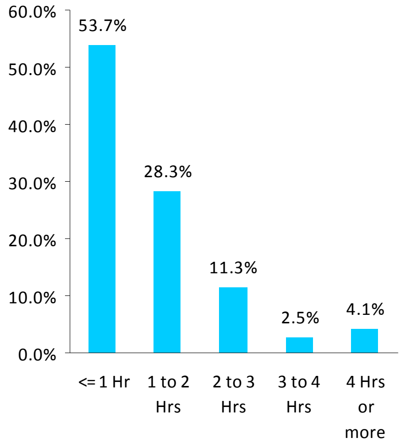


FIGURE 4.3.3.4-6 TRAVEL TIME TO NAIA

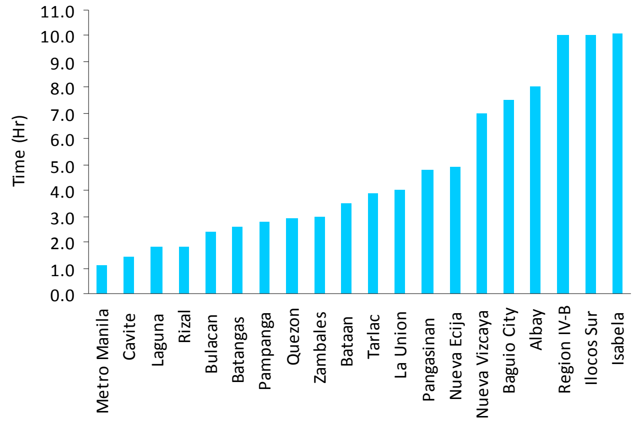


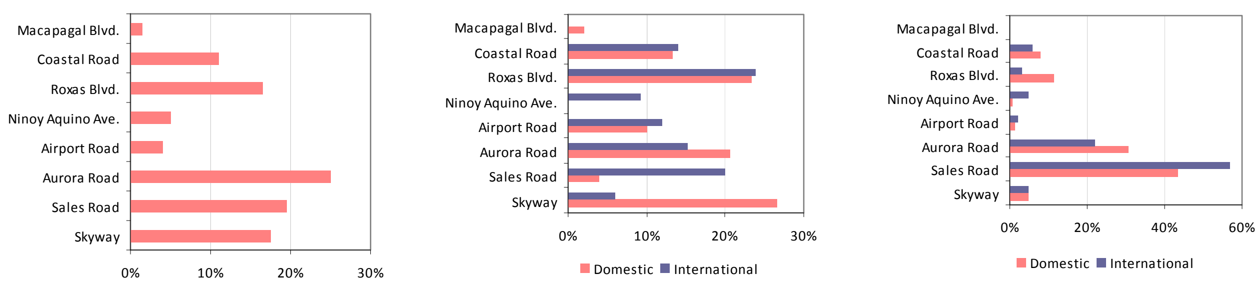
FIGURE 4.3.3.4-7 TRAVEL TIME TO NAIA BY ORIGIN

Note: Region IV-A, province and city or municipality name were not captured but only the Region's name

j. Access Road to Airport (Q.10)

For road access to airport, the following were observed (See **Figure 4.4-8**):

- Terminal 1 – main access roads were Aurora Road (25%); Sales Road (20%), and Skyway via NAIA Expressway (Phase I).
- Terminal 2 (Domestic) – main access roads were Skyway (27%), Roxas Boulevard via MIA Road (23%), and Aurora Road (21%).
- Terminal 2 (International) – main access roads were Roxas Boulevard via MIA Road (24%), Sales Road (20%), and Aurora Road (15%).
- Terminal 3 (Domestic) – main access roads were Sales Road (43%), Aurora Road (31%), and Roxas Boulevard via MIA Road (11%).
- Terminal 3 (International) – main access roads were Sales Road (57%), Aurora Road (22%), and Coastal Road via MIA Road (6%).



Terminal 1 *Terminal 2* *Terminal 3*

FIGURE 4.3.3.4-8 ACCESS ROAD USED TO AIRPORT

k. Will they Use NAIA Expressway Going to Airport? (Q.11)

When the respondents were asked if they would use the expressway to be built in future in going to airport terminals, **almost 92%** expressed their willingness to use the expressway in their future travel to airport terminals (**Figure 4.4-9**).

l. How Much They Are Willing to Pay Until Airport? (Q.11)

Those willing to pay to use the expressway were further given a follow-up question which is how much they are willing to pay to use the expressway until to airport's terminals. Eighty five percent (85%) are willing to pay 20 pesos as shown in the table and figure below. At 22 pesos, the number shrinks to only 49%. The lowest amount given by respondents is five (5) pesos and the highest is two hundred (200) pesos as shown in **Figure 4.4-10** and **Table 4.4-5**. Taking into account the terminal location of respondents, the intersecting point is at 21 pesos as presented in **Figure 4.4-11**. Note that in this question, respondents were not given an amount to choose from but asked instead an open question of how much they are willing to pay.

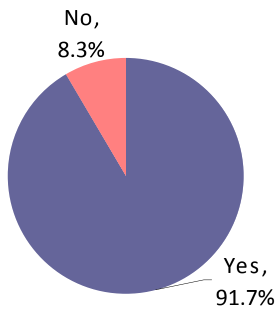


FIGURE 4.3.3.4-9 PERCENTAGE OF WILLING AND NOT WILLING TO PAY

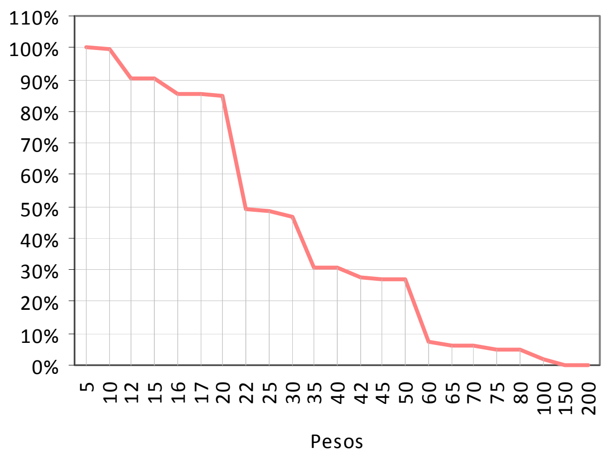


FIGURE 4.3.3.4-10 AMOUNT OF TOLL FEE MOTORIST WILLING TO PAY UNTIL NAIA

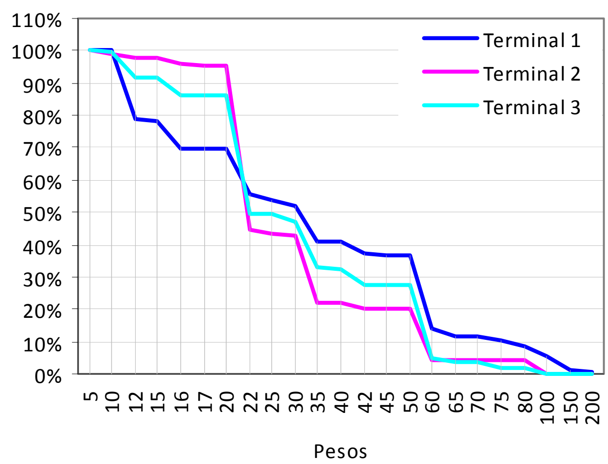


FIGURE 4.3.3.4-11 AMOUNT OF TOLL FEE MOTORIST WILLING TO PAY UNTIL NAIA PER TERMINAL

TABLE 4.3.3.4-5 AMOUNT OF TOLL FEE MOTORISTS ARE WILLING TO PAY UNTIL NAIA EXPRESSWAY

(₱)	Sample	Share (%)	Amount (%)
5	4	0.6%	100%
10	62	9.0%	99%
12	1	0.1%	90%
15	34	4.9%	90%
16	1	0.1%	85%
17	1	0.1%	85%
20	245	35.6%	85%
22	7	1.0%	49%
25	12	1.7%	48%
30	108	15.7%	47%
35	1	0.1%	31%
40	23	3.3%	31%
42	1	0.1%	27%
45	1	0.1%	27%
50	138	20.1%	27%
60	6	0.9%	7%
65	1	0.1%	6%
70	7	1.0%	6%
75	3	0.4%	5%
80	21	3.1%	5%
100	9	1.3%	2%
150	1	0.1%	0%
200	1	0.1%	0%
Total	688	100.0%	

m. Will they Use Entire NAIA Expressway in their Other Trips, say exiting from Coastal Road going to Skyway? (Q.12)

Respondents were also asked if they would use the expressway in their regular or daily trips aside from going to airport say exiting from Skyway and going to Mall of Asia in Manila. Again, **a high positive response (91.6%)** is obtained indicating the readiness of car users to spend some amount to enjoy comfort of an expressway. See **Figure 4.4-12**.

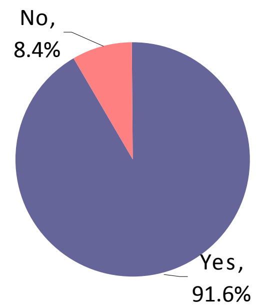


FIGURE 4.3.3.4-12 PERCENTAGE OF WILLING AND NOT WILLING TO PAY

n. How Much They Are Willing to Pay to Use Entire NAIA Expressway for Other Trips?

Those willing to pay to use the expressway have the following preference: 27.2% are willing to pay 20 pesos; 40.4% are willing to pay 30 pesos; 26.2% are willing to pay 50 pesos; 6.2% are willing to pay 80 pesos. Refer to **Table 4.4-6** and **Figure 4.4-13**.

By plotting the amount of fee motorists willing to pay, it is easy to understand the total percentage of those willing to pay at certain amount. For instance, at 20 pesos, all the 91.6% who have declared their intention to use expressway are expected to pay the said amount. So in the figure, at 20 pesos, 100% are expected willing to pay. As the amount of toll fee increases, the number of those willing to use expressway for a fee also decreases. **At 30 pesos, 73% are still expected to use the expressway and at 41 pesos, only 50% are expected to use the expressway at that amount of fee.** This number is further reduced to around 32% when toll fee is 50 pesos.

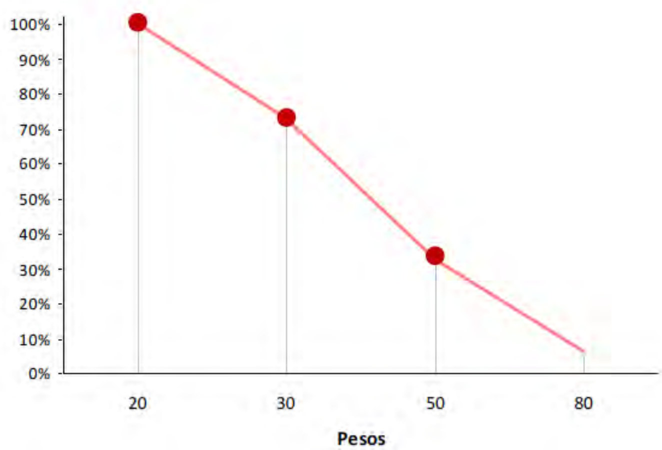


FIGURE 4.3.3.4-13 AMOUNTS OF TOLL MOTORISTS WILLING TO PAY TO USE ENTIRE EXPRESSWAY FOR THEIR OTHER TRIPS

TABLE 4.3.3.4-6 AMOUNT OF TOLL MOTORISTS WILLING TO PAY/ TO USE ENTIRE NAIA EXPRESSWAY

(₱)	Sample	Share (%)	Amount (%
20	180	27.1%	100.0%
30	268	40.4%	72.9%
50	174	26.2%	32.4%
80	41	6.2%	
Total	663	100.0%	6.2%

o. Income vs Average Amount of Willing to Pay per Income Group

It is interesting to note the valuation of interviewed motorists to the expressway is closely similar irrespective of income bracket - the average amount fee they are willing to pay is 31.6 pesos. This is the average amount they are willing to pay to use NAIA expressway on their way to airport terminals.

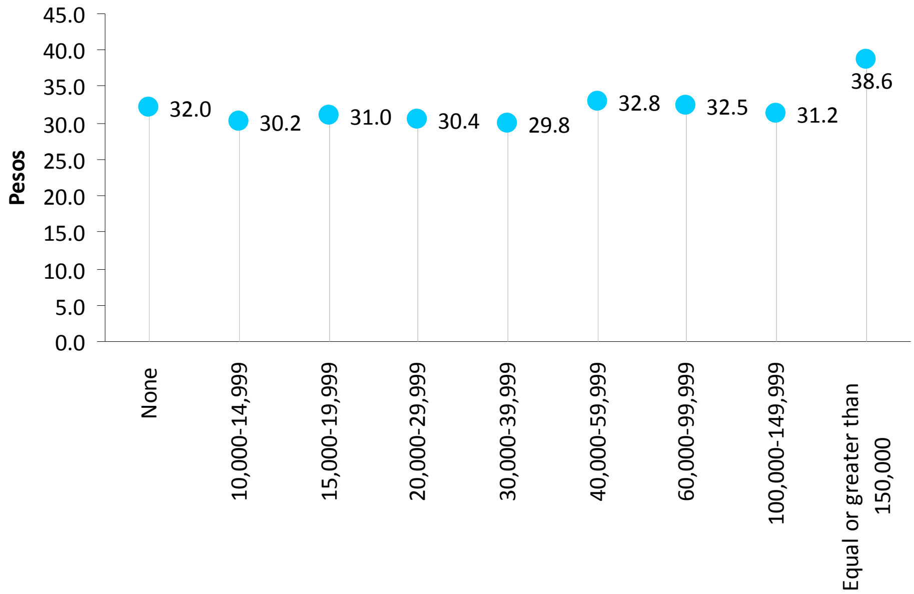


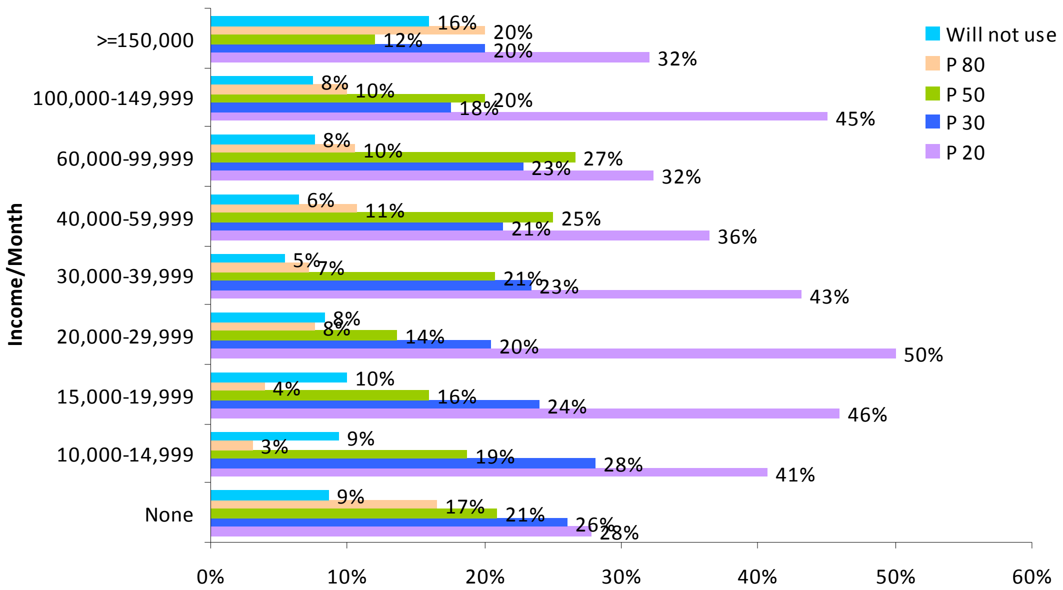
FIGURE 4.3.3.4-14 AVERAGE FEES WILLING TO PAY PER INCOME GROUP

When the average amount of toll fee respondents willing to pay is segregated based on individual's income, the lowest average comes from those earning from the range of 30,000-39,999 pesos which is 29.8 pesos. The highest average of amount willing to pay comes from individuals with monthly income of equal or higher than 150,000 pesos (38.6 pesos). It should be noted that individuals composing the 'none' income group are mostly students, retirees and housewives. Most retirees and housewives have financial resources which could explain their ability to declare such amount to pay for the use of NAIA expressway. See **Figure 4.4-14**.

p. Amount of Toll Fee Willing to Pay per Income Group

The figure below shows response of respondents based on their income. By looking at **Figure 4.4-15**, the following were observed:

- As expected, twenty (20) pesos is the most popular choice among the respondents.
- Respondents with income of up to 39,999 pesos per month follow the order of lowest to highest in toll fee preference. However, when respondents' income is above 39,999 pesos per month, preference for 50 pesos as toll fee overtook preference for 30 pesos. Perhaps as the income increases, valuation of time also increases.
- When the toll fee is at 80 pesos, respondents belong to lower income bracket's (10,000 to 14,999) share shrinks to 3%. However share of respondents with monthly income of higher than 40,000 pesos is still notable. In particular, 20% of individual with monthly income of higher than 150,000 pesos signified their willingness to pay 80 pesos.



Note: None = composed mostly of students, retirees, housewives

FIGURE 4.3.3.4-15 DISTRIBUTION OF TOLL FEE PREFERENCE PER INCOME GROUP

4.5 ESTIMATION OF TRAFFIC ON EXPRESSWAY

4.5.1 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. Refer to sections 4.2 and 4.3 for overall procedure of preparation of traffic assignment.

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 4.5.1-1**.

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. As mentioned in section 4. 2, JICA STRADA is used to estimate traffic volumes.

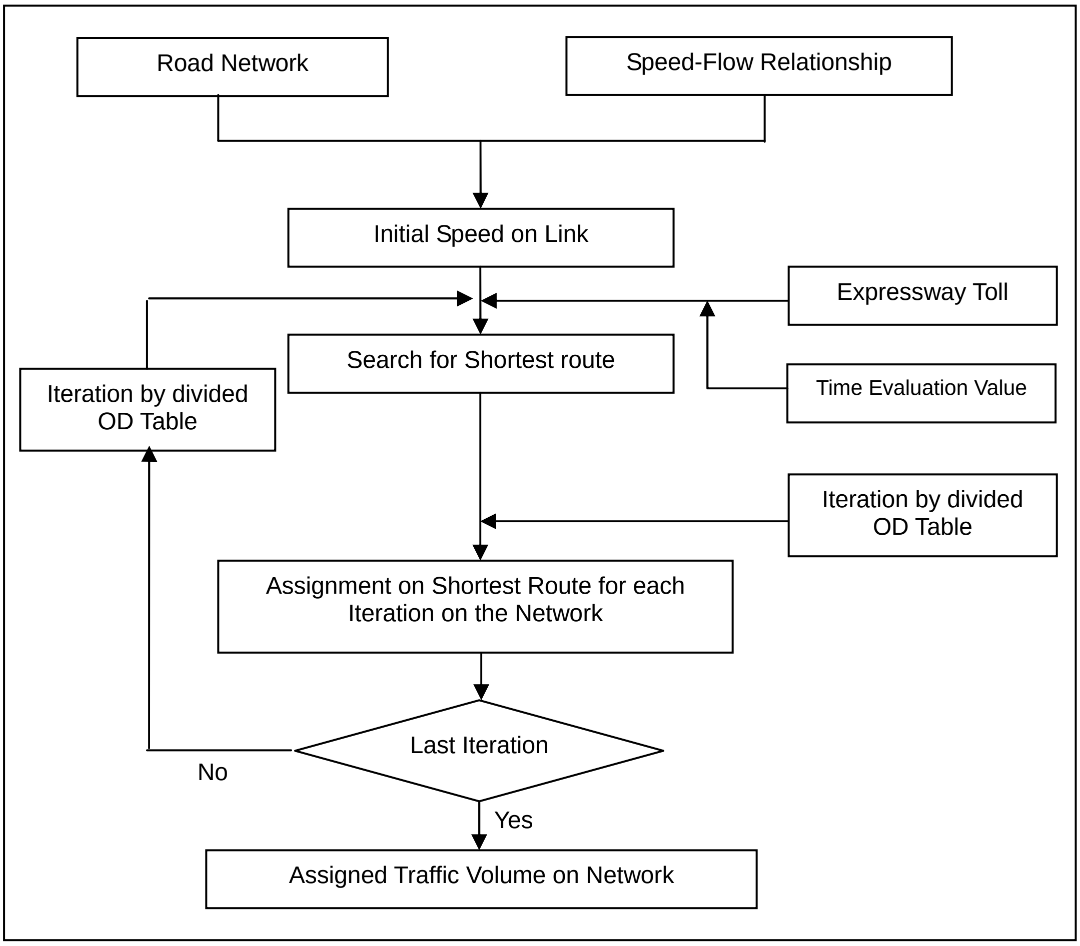


FIGURE 4.5.1-1 TRAFFIC ASSIGNMENT PROCEDURE

2.) Speed Flow Relationship

The speed-flow relationship used in the traffic assignment procedure is shown in **Figure 4.5.1-2**. 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 4.5.1-1**.

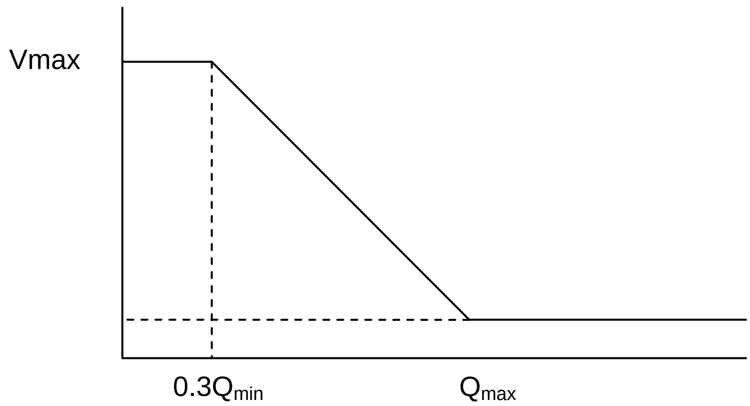


FIGURE 4.5.1-2 SPEED – FLOW RELATIONSHIP

TABLE 4.5.1-1 FREE SPEED AND CAPACITY BY ROAD TYPE

QV Type	Pavement	Road Class	Topography	Lane	Vmax	Qmax
1	Paved	Center Expressway	Plain	4	100	80,000
2				3	100	60,000
3				2	100	40,000
4				1	70	15,000
5			Mountains	2	70	28,000
6				1	60	10,500
7		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 4.5.1-2 shows the Passenger Car Unit (PCU) used in vehicle traffic conversion. This value is the same used by the DPWH.

TABLE 4.5.1-2 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) data. Supposing time value will increase in accordance with inflation rate of 5% per year, the figures in **Table 4.5.1-3** will be the time value.

TABLE 4.5.1-3 TIME EVALUATION VALUE BY VEHICLE TYPE

Unit: Peso/hour

Mode	Y2015	Y2020	Y2030
Car	428.4	566.8	923.3
Jeepney	600.0	796.9	1,298.1
Bus	1999.9	2,606.9	4,246.4
Truck	1200.0	1,493.5	2,432.7

4.5.2 Toll Rate vs. Revenue

1.) Toll Expressway Conversion Model Validation

In order to estimate the accurate traffic of NAIAX, conversion rate to NAIAX were validated. **Figure 4.5.2-1** presents conversion rate from traffic assignment result and the willingness to pay (WTP) survey result. Conversion rate is calculated the rate of NAIAX traffic volume when toll is imposed and NAIAX traffic volume when toll is free.

This graph proves the assignment model has accurately replicated the WTP result.

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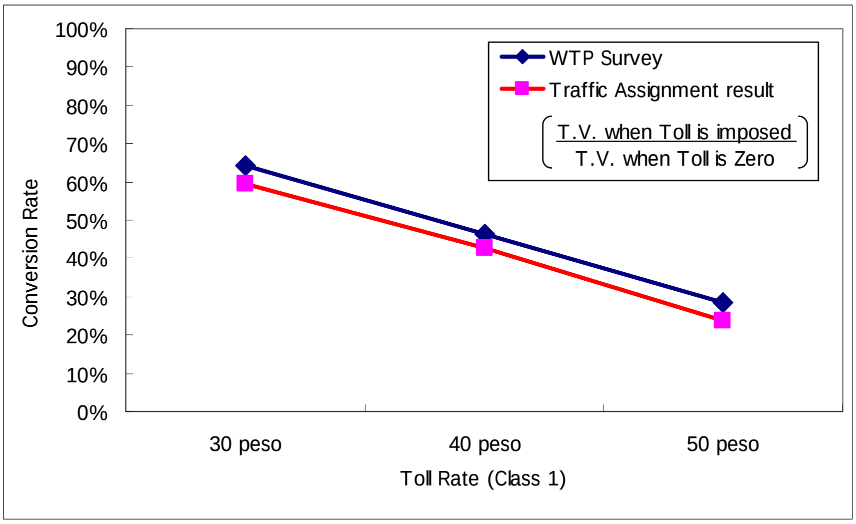

FIGURE 4.5.2-1 NAIAX CONVERSION RATE COMPARISON OF ASSIGNMENT AND WTP SURVEY

2.) Toll Rate vs. Revenue

The estimated traffic volume and expected amount of revenue generated from the expressway is shown in **Figure 4.5.2-2**. Amount of revenue per day will be 1.75 million for 30 pesos toll fee, 1.79 million for 40 pesos toll fee, and 1.54 million for 50 pesos toll fee.

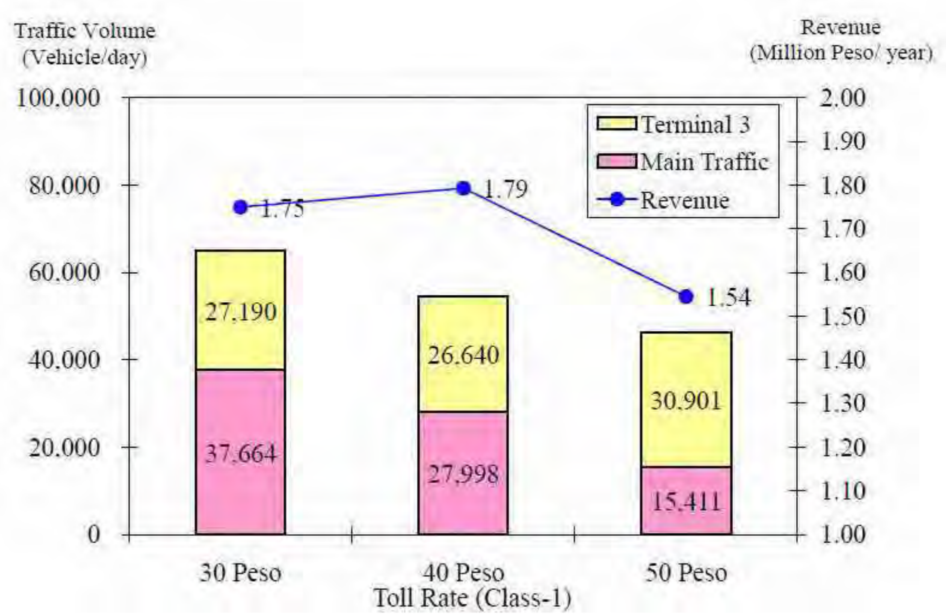

FIGURE 4.5.2-2 TOLL RATE VS. REVENUE (2015)

3.) Conclusion

Traffic assignment will conduct the condition of toll rate 30 and 40 peso of Class -1

- Average willingness to pay for NAIAX is 31.6 peso and 70% of respondent pay for more than 30 peso (see **Figure 4.4-13**).
- Though maximum amount of revenue is 40 peso case, it was not so different with 30 peso case.
- Toll rate of NAIAX (P6/km = 30peso/5km, 40 Peso case is P8/km, is the almost same as that of present Skyway and it will be acceptable rate.(see **Table 4.5.2-1**)
- In order to maximize the revenue, 40 peso case is desirable. In order to be more attractive for NAIAX, 30 peso case is desirable.

TABLE 4.5.2-1 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

4.5.3 Impact of other Road Projects

The estimated traffic of NAIAX may change the related other road development. Therefore in order to impact by other road projects, traffic assignment with/without other project case was conducted.

Table 4.5.3-1 shows the difference revenue of with or without other project case.

If NLEx-SLEx connector expressway is open, the traffic volume and revenue of NAIAX will increase. On the other hand, the traffic and revenue of NAIAX will decrease if C-5 extension road is open.

TABLE 4.5.3-1 IMPACT OF OTHER ROAD PROJECTS

Project Case	Revenue of NAIAX (Million Peso/day)	Difference of Revenue [W-WO] (Million Peso/day)	Impact for NAIAX
Without other road projects	*3.09*		
FTI Connector	3.11	+0.02	Very Minor Positive Impact
C-6 Exp(South Section)	3.05	-0.04	Very Minor Negative Impact
CALAX (Cavite Section)	3.26	+0.17	Positive Impact
CALAX (Whole Section)	3.35	+0.26	High Positive Impact
N-S Connector Exp.	3.38	+0.29	High Positive Impact
C-5 Extension	2.94	-0.15	Negative Impact

Note: Estimated by traffic assignment in base case of road network (year 2015) and OD table (year 2020).

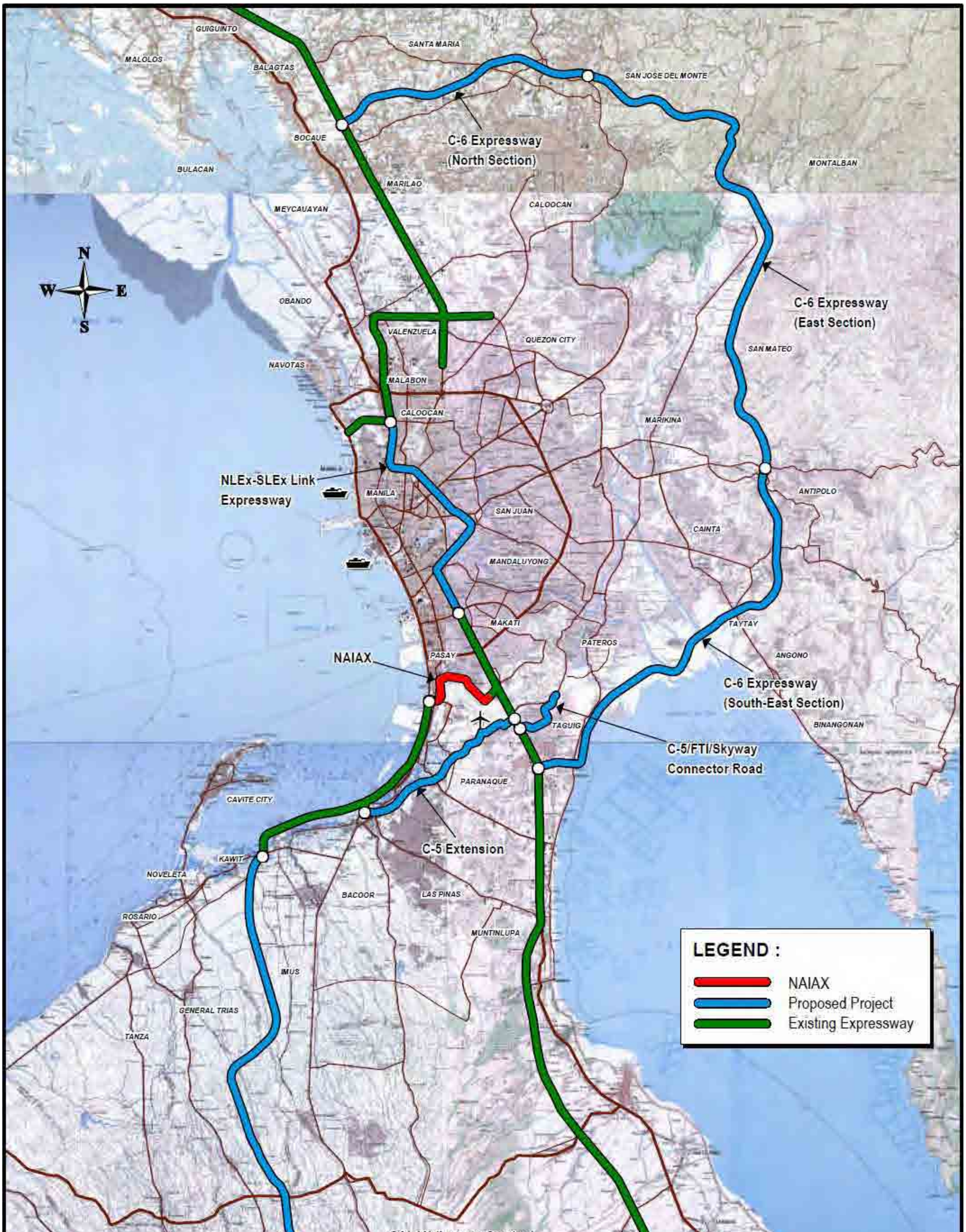

FIGURE 4.5.3-1 LOCATION MAP OF OTHER ROAD PROJECTS

4.5.4 Road Network Assumptions

Based on the other road project maturity and the degree of impact for NAIAX, road network assumptions are prepared.

Open Year	Road Project
Year 2015	NAIAX
Year 2017	C-5 Extension NLEx SLEx Connector CALAX (Cavite section)
Year 2020	FTI connector CALAX(Laguna section) C-6 Expressway(South Section)

4.5.5 Traffic Assignment Result and Toll Revenue

(1) 30 Peso Case

Table 4.5.5-1 shows the estimated traffic volume and toll revenue of 30 Peso Case. **Figure 4.5.5-1** to **4.5.5-3** shows the estimated traffic volume of NAIAX.
It is assumed to estimate toll revenue that toll fee will increase 10% per 2 years.

(2) 40 Peso Case

Table 4.5.5-2 shows the estimated traffic volume and toll revenue of 40 Peso Case. **Figure 4.5.5-4** to **4.5.5-6** shows the estimated traffic volume of NAIAX.

TABLE 4.5.5-1 ESTIMATED VOLUME AND REVENUE (30 PESO CASE) (CLASS 1)

Traffic Voulme of NAIA Phase 2

Year	Volume (vehicle per day)												Revenue (Million Peso/
	Class 1			Class 2			Class 3			Total			
	Main	Terminal 3	Total	Main	Terminal 3	Total	Main	Terminal 3	Total	Main	Terminal 3	Total	
2015	29,183	22,695	51,878	7,183	3,547	10,730	1,298	948	2,246	37,664	27,190	64,854	**1.75**
2016	30,730	22,052	52,782	7,946	3,573	11,519	1,576	971	2,547	40,253	26,596	66,849	**1.86**
2017	30,143	23,981	54,124	10,325	5,403	15,728	2,559	1,793	4,352	43,027	31,177	74,204	**2.37**
2018	31,369	23,038	54,408	10,721	5,717	16,438	2,755	1,933	4,688	44,845	30,689	75,534	**2.46**
2019	32,646	22,132	54,778	11,146	6,054	17,200	2,967	2,085	5,051	46,758	30,271	77,029	**2.81**
2020	33,974	20,369	54,343	11,603	5,613	17,216	3,194	1,926	5,121	48,771	27,909	76,680	**2.88**
2021	34,597	20,704	55,301	12,054	5,724	17,778	3,327	1,954	5,281	49,978	28,382	78,360	**3.25**
2022	35,231	21,045	56,276	12,523	5,836	18,359	3,465	1,983	5,448	51,219	28,865	80,084	**3.34**
2023	35,877	21,392	57,269	13,010	5,952	18,962	3,609	2,012	5,621	52,496	29,355	81,852	**3.77**
2024	36,535	21,744	58,279	13,516	6,070	19,586	3,759	2,041	5,800	53,810	29,855	83,665	**3.87**
2025	37,205	22,102	59,307	14,042	6,190	20,232	3,916	2,071	5,986	55,162	30,363	85,525	**4.38**
2026	37,887	22,466	60,353	14,589	6,313	20,902	4,078	2,101	6,179	56,554	30,880	87,434	**4.50**
2027	38,582	22,836	61,417	15,157	6,439	21,596	4,248	2,132	6,379	57,986	31,407	89,393	**5.08**
2028	39,289	23,211	62,501	15,747	6,568	22,315	4,424	2,163	6,587	59,460	31,943	91,403	**5.23**
2029	40,009	23,594	63,603	16,360	6,700	23,060	4,608	2,194	6,802	60,978	32,488	93,466	**5.91**
2030	40,743	23,982	64,725	16,997	6,835	23,832	4,799	2,226	7,026	62,540	33,043	95,583	**6.07**
2031	41,490	24,377	65,867	17,660	6,973	24,632	4,999	2,259	7,258	64,149	33,608	97,757	**6.87**
2032	42,251	24,778	67,029	18,348	7,114	25,462	5,207	2,292	7,498	65,805	34,184	99,989	**7.06**
2033	43,025	25,186	68,211	19,063	7,258	26,321	5,423	2,325	7,748	67,512	34,769	102,281	**7.99**
2034	43,814	25,601	69,415	19,806	7,405	27,212	5,648	2,359	8,007	69,269	35,365	104,634	**8.22**
2035	44,618	26,022	70,640	20,579	7,556	28,135	5,883	2,393	8,276	71,079	35,972	107,051	**9.30**
2036	45,436	26,451	71,886	21,381	7,711	29,092	6,127	2,428	8,556	72,944	36,590	109,534	**9.57**
2037	46,269	26,886	73,155	22,216	7,869	30,084	6,382	2,464	8,846	74,866	37,218	112,085	**10.83**
2038	47,117	27,329	74,446	23,082	8,030	31,113	6,647	2,500	9,147	76,847	37,859	114,705	**11.14**
2039	47,981	27,779	75,759	23,983	8,196	32,179	6,923	2,536	9,459	78,888	38,510	117,398	**12.61**
2040	48,861	27,779	76,639	24,919	8,196	33,115	7,211	2,536	9,747	80,991	38,510	119,501	**12.95**
2041	49,757	27,779	77,535	25,892	8,196	34,088	7,511	2,536	10,047	83,159	38,510	121,670	**14.64**
2042	50,669	27,779	78,447	26,903	8,196	35,099	7,823	2,536	10,359	85,395	38,510	123,905	**15.04**
2043	51,598	27,779	79,376	27,954	8,196	36,150	8,148	2,536	10,684	87,700	38,510	126,210	**17.00**
2044	52,544	27,779	80,322	29,046	8,196	37,242	8,486	2,536	11,022	90,076	38,510	128,587	**17.47**
2045	53,507	27,779	81,286	30,181	8,196	38,377	8,839	2,536	11,375	92,527	38,510	131,038	**19.76**
2046	54,488	27,779	82,267	31,361	8,196	39,556	9,206	2,536	11,742	95,055	38,510	133,566	**20.31**

Note: Main = Traffic on Main Expressway
Terminal 3 = Terminal 3 related ramps (1 on-ramp and 1 off-ramp)

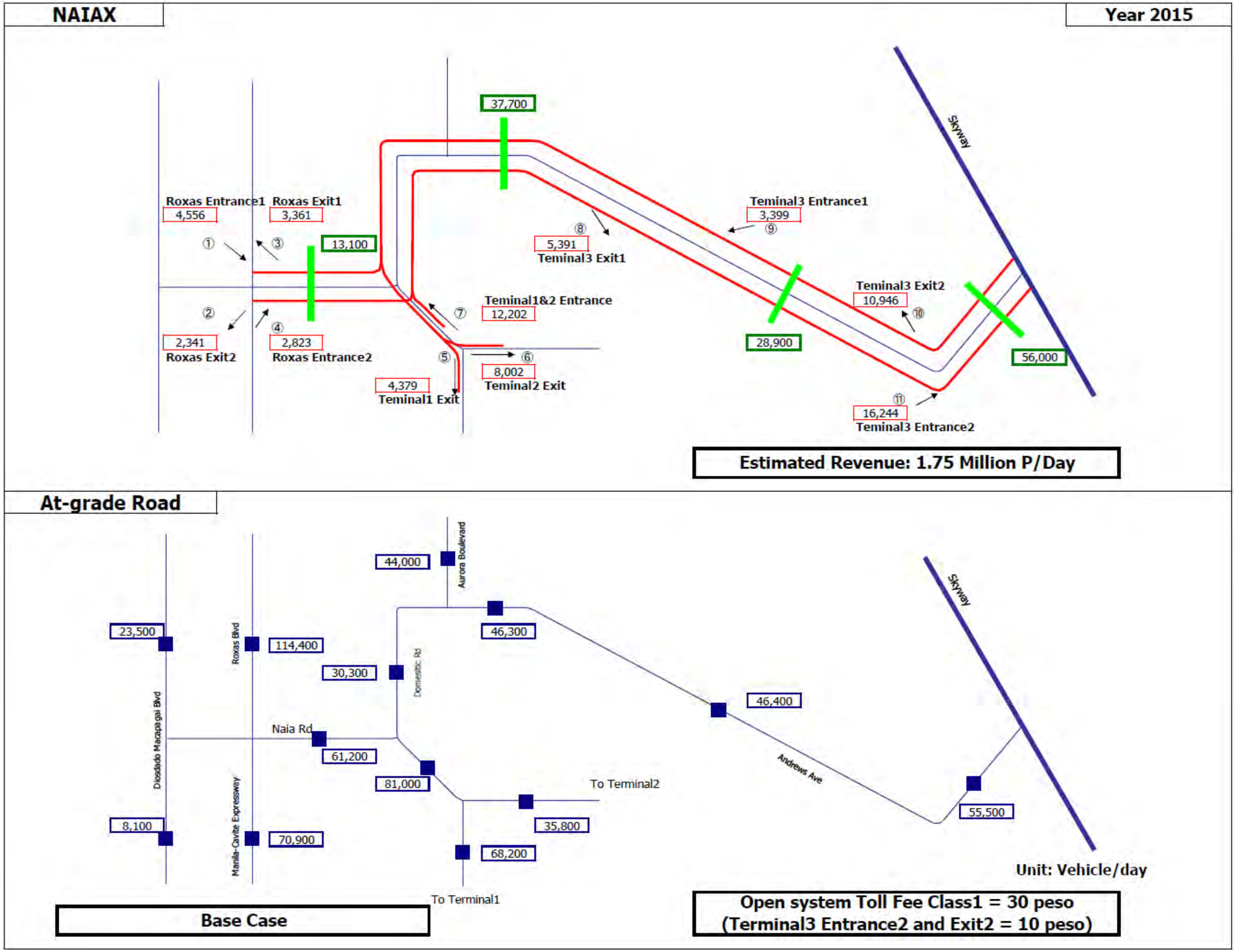

FIGURE 4.5.5-1 TRAFFIC PROJECTION (30 PESO CASE) (YEAR 2015)

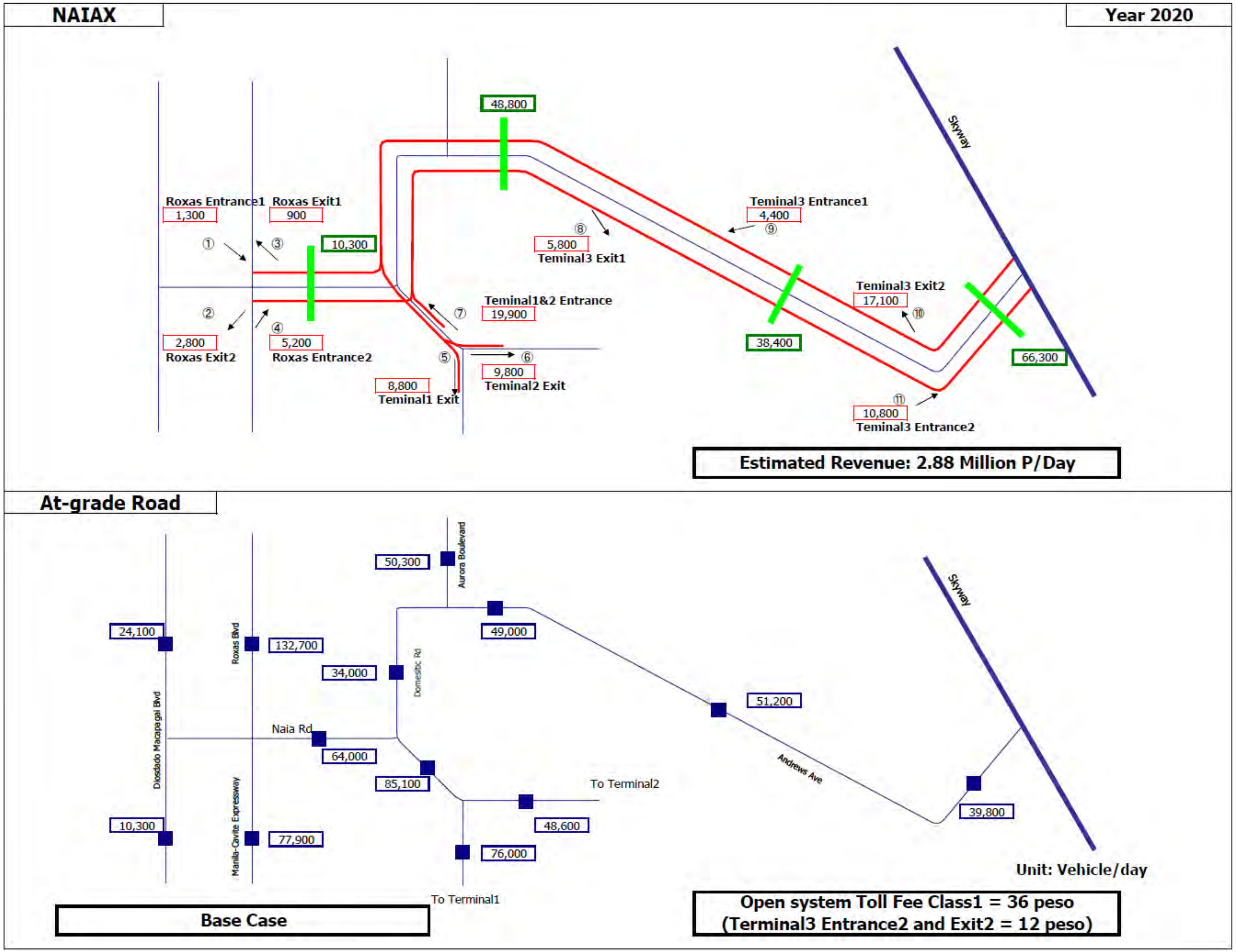

FIGURE 4.5.5-2 TRAFFIC PROJECTION (30 PESO CASE) (YEAR 2020)

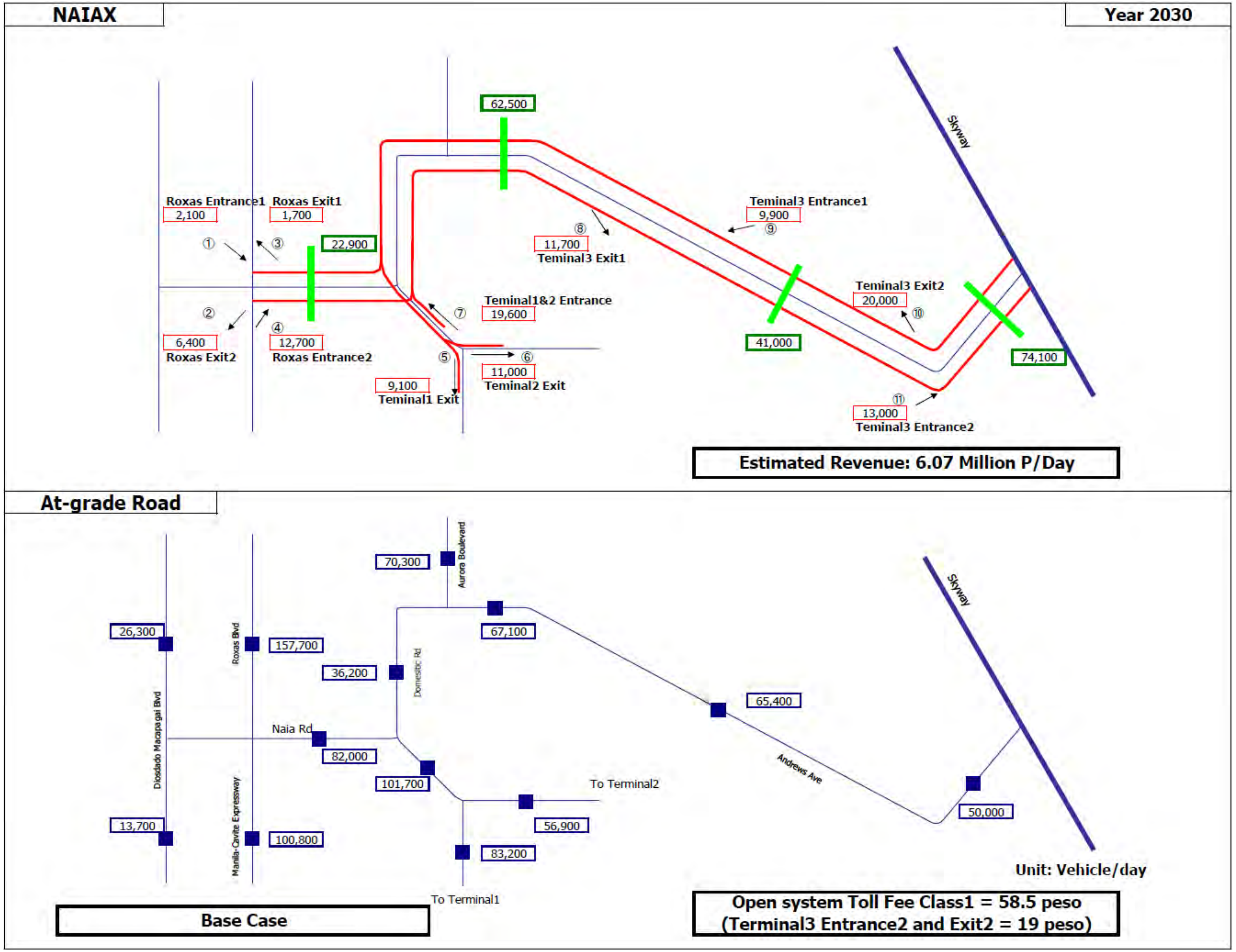

FIGURE 4.5.5-3 TRAFFIC PROJECTION (30 PESO CASE) (YEAR 2030)

TABLE 4.5.5-2 ESTIMATED VOLUME AND REVENUE (40 PESO CASE) (CLASS 1)

Traffic Voulme of NAIA Phase 2

Year	Volume (vehicle per day)												Revenue (Million Peso/
	Class 1			Class 2			Class 3			Total			
	Main	Terminal 3	Total	Main	Terminal 3	Total	Main	Terminal 3	Total	Main	Terminal 3	Total	
2015	20,258	23,192	43,450	6,380	2,776	9,156	1,361	672	2,032	27,998	26,640	54,638	**1.79**
2016	22,185	22,020	44,206	7,253	2,758	10,012	1,428	680	2,108	30,867	25,459	56,326	**1.93**
2017	17,937	25,407	43,344	11,562	4,077	15,639	3,102	1,271	4,373	32,601	30,755	63,356	**2.63**
2018	20,142	22,844	42,986	12,983	4,337	17,320	3,483	1,420	4,903	36,607	28,602	65,209	**2.88**
2019	22,617	20,540	43,156	14,578	4,632	19,210	3,911	1,587	5,498	41,106	26,759	67,865	**3.49**
2020	26,884	16,182	43,066	10,685	7,217	17,902	2,537	2,663	5,200	40,106	26,061	66,168	**3.17**
2021	27,379	16,303	43,682	11,171	7,063	18,234	2,698	2,590	5,287	41,247	25,956	67,203	**3.59**
2022	27,882	16,425	44,308	11,681	6,914	18,595	2,868	2,519	5,387	42,432	25,858	68,290	**3.69**
2023	28,395	16,548	44,944	12,218	6,768	18,986	3,050	2,450	5,499	43,663	25,766	69,429	**4.18**
2024	28,918	16,672	45,590	12,783	6,626	19,409	3,242	2,382	5,625	44,943	25,681	70,624	**4.30**
2025	29,450	16,797	46,247	13,377	6,488	19,865	3,448	2,317	5,765	46,274	25,602	71,877	**4.88**
2026	29,992	16,923	46,915	14,002	6,353	20,355	3,666	2,253	5,919	47,660	25,530	73,189	**5.03**
2027	30,544	17,050	47,594	14,660	6,222	20,882	3,897	2,192	6,089	49,101	25,463	74,565	**5.71**
2028	31,106	17,178	48,283	15,353	6,094	21,447	4,144	2,131	6,275	50,603	25,403	76,006	**5.89**
2029	31,678	17,306	48,984	16,082	5,970	22,052	4,406	2,073	6,479	52,167	25,349	77,515	**6.70**
2030	32,261	17,436	49,697	16,851	5,848	22,699	4,685	2,016	6,701	53,797	25,300	79,097	**6.92**
2031	33,222	17,567	50,789	17,353	5,730	23,083	4,824	1,961	6,785	55,400	25,257	80,657	**7.81**
2032	34,213	17,698	51,911	17,870	5,614	23,485	4,968	1,907	6,875	57,051	25,220	82,271	**8.02**
2033	35,232	17,831	53,063	18,403	5,502	23,905	5,116	1,855	6,971	58,751	25,187	83,939	**9.05**
2034	36,282	17,964	54,247	18,951	5,392	24,344	5,269	1,804	7,072	60,502	25,161	85,663	**9.29**
2035	37,364	18,099	55,463	19,516	5,286	24,802	5,426	1,754	7,180	62,305	25,139	87,444	**10.49**
2036	38,477	18,235	56,712	20,098	5,182	25,279	5,587	1,706	7,294	64,162	25,122	89,284	**10.78**
2037	39,624	18,371	57,995	20,697	5,080	25,777	5,754	1,659	7,413	66,074	25,111	91,185	**12.17**
2038	40,805	18,509	59,314	21,313	4,981	26,295	5,925	1,614	7,539	68,044	25,104	93,147	**12.50**
2039	42,021	18,647	60,668	21,949	4,885	26,833	6,102	1,570	7,672	70,072	25,102	95,173	**14.12**
2040	43,273	18,787	62,060	22,603	4,791	27,393	6,284	1,526	7,810	72,160	25,104	97,264	**14.51**
2041	44,563	18,928	63,491	23,276	4,699	27,975	6,471	1,485	7,956	74,310	25,112	99,422	**16.39**
2042	45,891	19,070	64,961	23,970	4,610	28,580	6,664	1,444	8,108	76,525	25,123	101,648	**16.84**
2043	47,259	19,213	66,471	24,684	4,523	29,207	6,863	1,404	8,267	78,806	25,139	103,945	**19.04**
2044	48,667	19,357	68,024	25,420	4,438	29,858	7,067	1,366	8,433	81,154	25,160	106,314	**19.56**
2045	50,117	19,502	69,619	26,178	4,355	30,532	7,278	1,328	8,606	83,573	25,184	108,757	**22.12**
2046	51,611	19,648	71,259	26,958	4,274	31,232	7,495	1,292	8,786	86,064	25,213	111,277	**22.73**

Note: Main = Traffic on Main Expressway

Terminal 3 = Terminal 3 related ramps (1 on-ramp and 1 off-ramp)

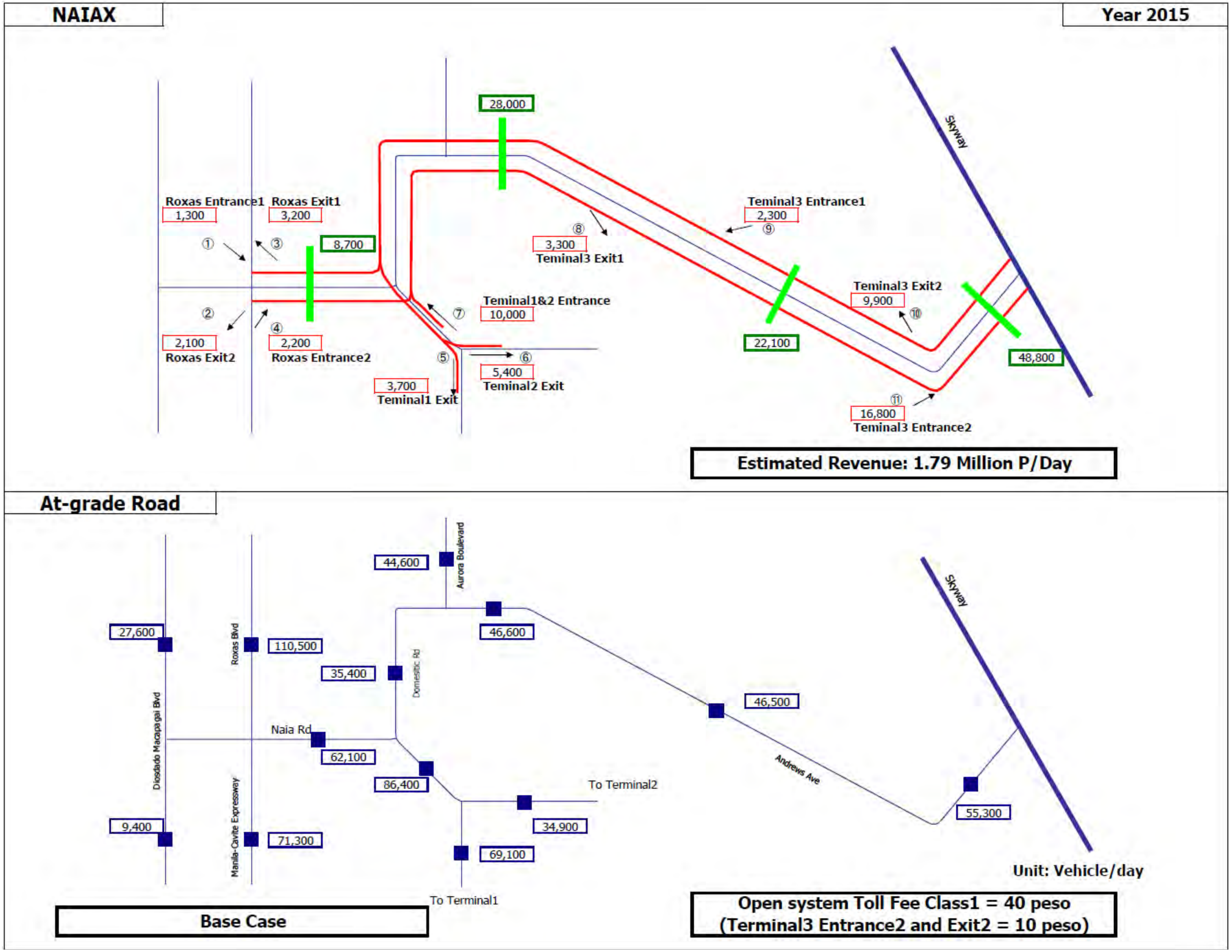

FIGURE 4.5.5-4 TRAFFIC PROJECTION (40 PESO CASE) (YEAR 2015)

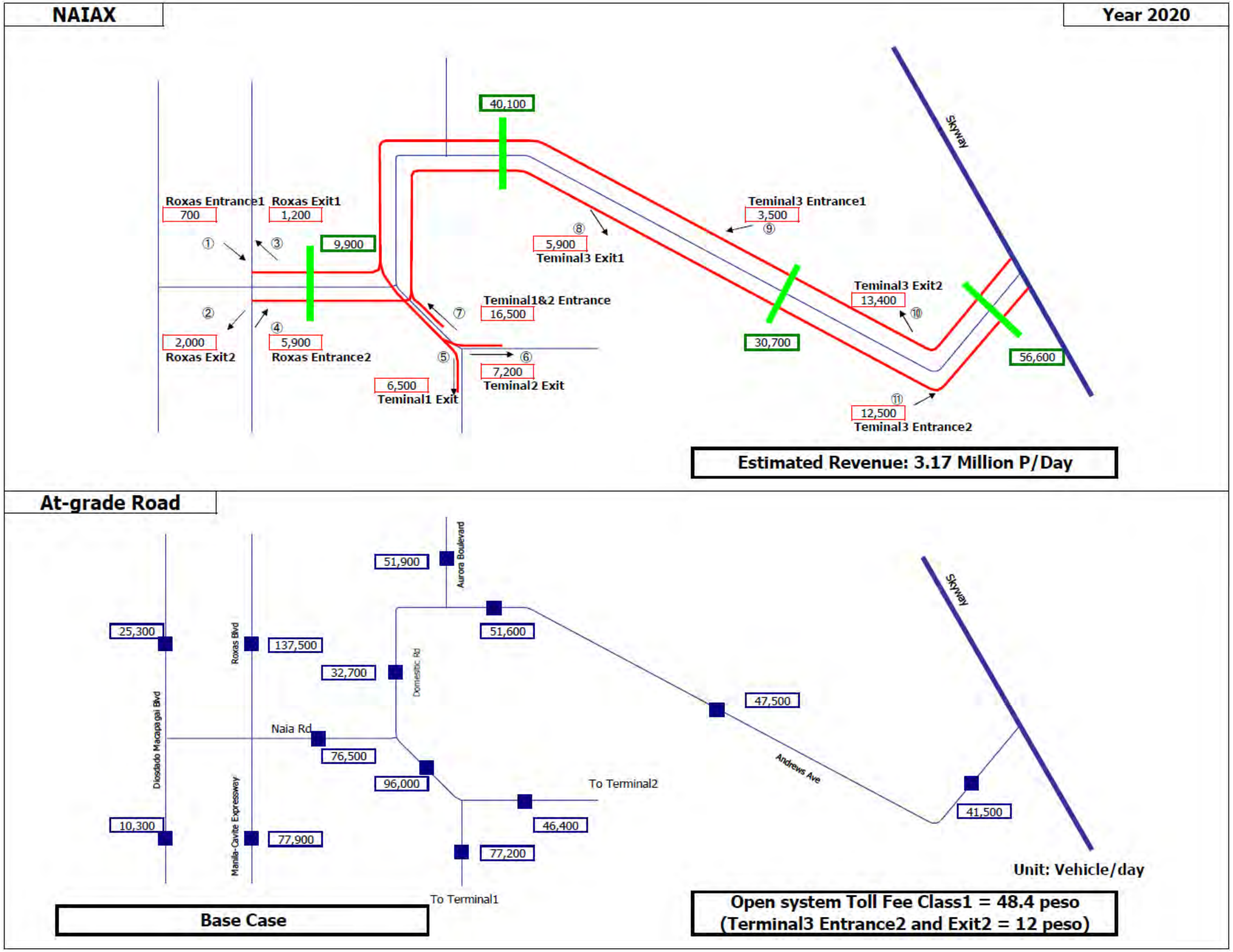

FIGURE 4.5.5-5 TRAFFIC PROJECTION (40 PESO CASE) (YEAR 2020)

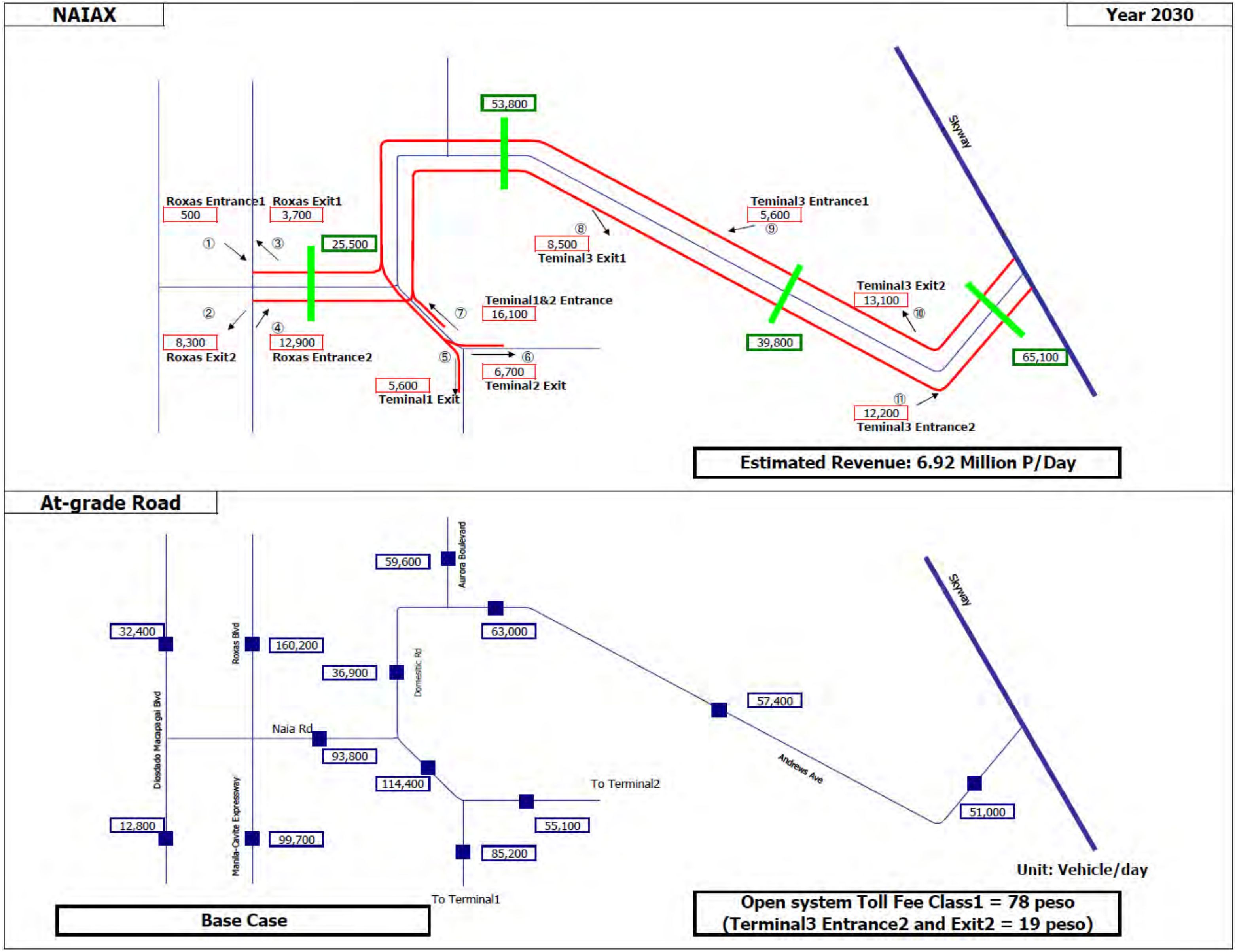

FIGURE 4.5.5-6 TRAFFIC PROJECTION (40 PESO CASE) (YEAR 2030)