

## **The Transport Plan**

*“The road to ultimate success is moving from failure to failure without loss of enthusiasm.”*

- *Winston Churchill*

### **8.1 Introduction:**

**T**here is an on-going endeavor to update the Comprehensive Land Use Plan (CLUP) of the City of San Fernando. Transportation plays a big role in the attainment of the development plans as stated in the CLUP. It is acknowledged that the development of the transportation system is necessary in achieving the targets. Also, a well-developed transport system would hasten the attainment of the general development targets of the city. Hence, this transportation plan is formulated.

### **8.2 Goal:**

The formulation of the transportation development plan of the City of San Fernando is guided a primary goal, to wit:

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*“To ensure that the TRANSPORT SYSTEM  
grows hand in hand with the development of the  
municipality, acting both as a support  
mechanism and as a catalyst for development”*

The transport system is given a dual role by the goal defined above. First, it serves as a support mechanism for any development taking place in the municipality. And second, it serves as a catalyst for future developments to be fast tracked or to even take off. These dual roles underlie the importance of having a development plan for the transport sector in consonance with the over-all development plans of the city.

### **8.3 Objectives:**

In order to attain the goal stated in the preceding section, several objectives are set. And in as much as the development of the city is not expected to be achieved overnight, the objectives of the transportation development plans are set in phases. These are classified as (1) short – term, (2) medium – term, and (3) long – term.

The short – term objectives, which are geared towards immediate implementation, are focused on traffic demand management measures. These are:

1. To achieve smooth vehicular and pedestrian flow within the municipality especially in the poblacion and other commercial areas.
2. To maximize the capacity of major corridors such as the Mc Arthur Highway, Gapan – San Fernando – Olongapo (GSO) Road and the internal roads within the Poblacion.

The medium – term objectives, on the other hand, are focused on increasing the supply capacity through infrastructure rehabilitation and widening. These are:

1. To increase infrastructure capacity through rehabilitation, upgrading and widening of the current corridors.

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2. To develop alternative routes to decongest the primary arteries.

Finally, the long – term objectives are focused on the development of massive infrastructure development. However, most of these types of development are being carried out by the national government and not directly by the municipality. Hence, the objectives for the long – term is:

1. To take into consideration the impacts of major national government – initiated projects (i.e. Subic – Clark Expressway, Northrail) and using the same to the advantage of the municipality.

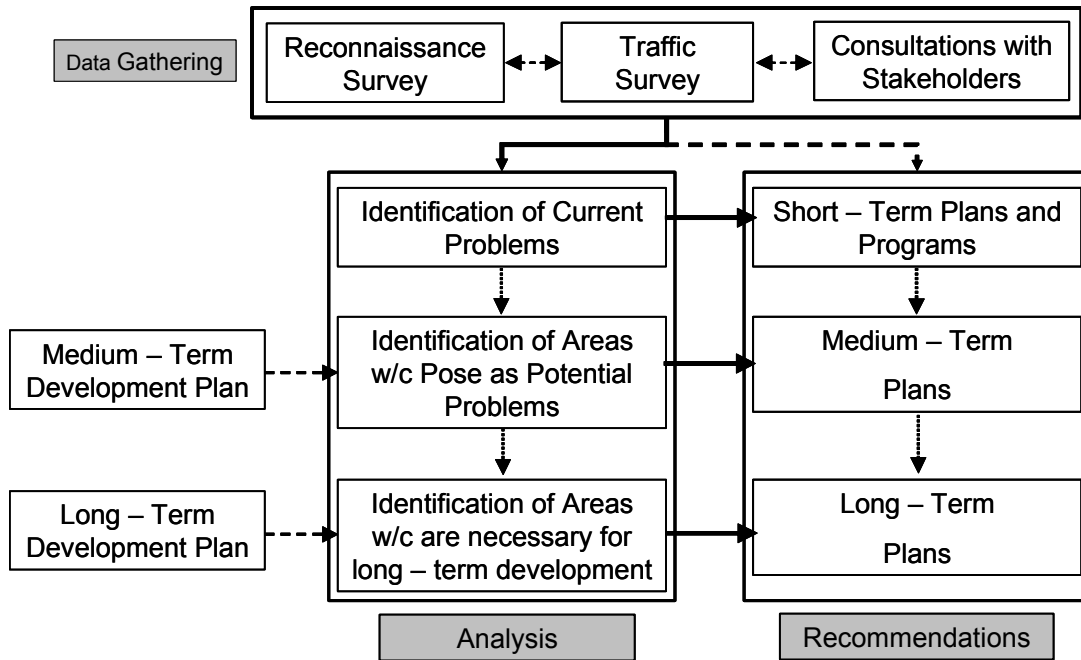
## **8.4 General Approach and Methodology:**

### **8.4.1 General Framework:**

In doing the development plan for the transport sector, the following approach as shown in Figure 8.1 was utilized. There are 3 basic phases in the formulation of the plan. These are (1) Data Gathering, (2) Analysis, and (3) Formulation of Recommendations. Data gathering methods include the conduct of a classified vehicular volume count along selected points within the city, a reconnaissance survey as well as inputting information from available secondary data. The analysis and the recommendations were formulated based on the 3 – stage development phasing.

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Figure 8.1 – General Framework in the Formulation of the Transport Development Plan



## 8.5 Traffic Surveys:

The primary data used for the formulation of the transportation development plan were gathered through a traffic survey. Specifically, a classified directional traffic volume count was conducted. The said survey was done for two (2) days, 11 and 12 August 2006, Friday and Saturday. There were a total of twelve (12) stations all over the city. These are:

- Intersection of Mc Arthur Highway and GSO Road (Mc Donalds)
- Intersection of GSO Road and Lazatin Blvd (Patria's)
- Mc Arthur Mid-block (Telebastagan Section)
- Mc Arthur – Sindalan Intersection
- NLEX In – Out Counts (Northbound and Southbound)
- San Fernando – Bacolor Boundary (along GSO)
- San Fernando – Mexico Boundary (along GSO, near SM)
- San Fernando – Mexico Boundary (road approaching San Jose)
- San Fernando – Sto. Tomas Boundary (along Mc Arthur Highway, Camp Olivas)

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- Intersection near Allied Bank (Going to Del Pilar and the other arm going Makabali Hospital)
- Intersection of Lazatin Blvd and old National Road (near Sto. Nino Church)
- And several points within the Poblacion

During the surveys, vehicles were counted and classified. The following classifications were used:

- Light Cars
- Medium Sized Vehicles
- Heavy Vehicles
- Public Utility Jeepneys
- Motorcycles
- Bicycles
- Tri-wheelers
- Others

The traffic surveys were conducted for 8 hours for each survey day. The surveys started at 6:00 am and were closed at 2:00 pm. However, during the second day, the survey at the first station i.e. at the intersection of Mc Arthur Highway and the GSO Road was conducted for 24 hours. This served as the control station used in the traffic demand forecasting.

The results of the survey are presented in the latter part of this report.

## **8.6 The Present Situation:**

### **8.6.1 Transport Supply:**

- a. Land Based Transportation – The physical transport supply consists of roads and bridges. There are three (3) major roads that cut across the city. These are the North Luzon Expressway (NLEX), the Mc Arthur Highway, and the Gapan – San Fernando – Olongapo Road (GSO). The first 2 traverse the city from north to

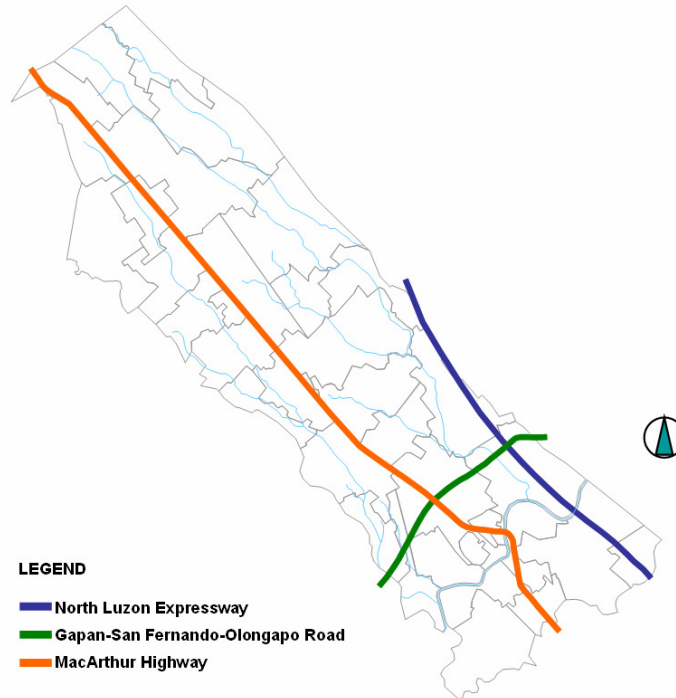
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south while the last one from east to west. The NLEX is the primary access highway of motorists from Metro Manila and other provinces in the south. Also, motorists from the other northern provinces often pass by the NLEX in going to San Fernando. The strategic location of the city makes the NLEX's San Fernando Toll Plaza the primary gateway to other provinces in the region such as Bataan and Zambales. The Mc Arthur Highway, on the other hand, is the primary north – south corridor catering to local and inter – city / municipality traffic. It is the primary access point of motorists from nearby towns and cities such as Angeles and Sto Tomas. Finally, the GSO is the primary access point of intra – city and intra – provincial traffic. Among those passing through the GSO in going to San Fernando are those coming from Lubao, Mexico, Guagua and other towns and areas of nearby provinces Bataan, Zambales, and Nueva Ecija, just to name a few.

Recently, these major highways have been improved by the national government to increase their capacity. The newly – rehabilitated NLEX began its operation only in February 2005. This lowered travel time from San Fernando to Metro Manila to as low as 45 minutes. There is a current endeavor by the Department of Public Works and Highways (DPWH) to increase the capacity of the Mc Arthur Highway. This is being done through widening and rehabilitation of dilapidated sections of the said highway. On the other hand, the current flyover along the GSO is also being improved. There has been an observed continuous widening of the GSO in recent years. Currently, the section of the GSO between NLEX and Mc Arthur Highway has 8 lanes, which makes it arguably one of the widest urban highways in the country. These 3 major highways are shown in Figure 8.2.

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Figure 8.2 – Major Highways Traversing the City of San Fernando



The 2001 – 2006 CLUP of the City of San Fernando shows that there is an aggregate length of 238.1 kilometers of roads in the city. Almost 75 % of these are barangay roads. Some of these barangay roads are still to be paved. Table 8.1 below shows the breakdown of the aggregate road length as to the type of administration.

Table 8.1 – Road Inventory by Administration

Road Classification	Length (km)	Share to Total (%)
National	34.4	14.4
Provincial	9.3	3.9
Municipal	17.4	7.3
Barangay	177.0	74.3
<b>TOTAL</b>	<b>238.1</b>	<b>100.00</b>

There are also 7 national bridges within the city. These bridges are all concrete and permanent. They have an aggregate length of 100.3 lineal meters. Table 8.2 shows the list of national bridges in the country as well as their corresponding length.

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Table 8.2 – List of National Bridges

Name of Bridge	Type of Structure	Length (meters)
1. Baluyut bridge	Concrete	24.4
2. Tinajero bridge	Steel	19.0
3. Del Pilar bridge	Concrete	30.0
4. San Isidro bridge	Concrete	6.5
5. San Juan Bridge	Concrete	6.4
6. Palawe bridge	Concrete	8.0
7. Panlumacan Bridge	Concrete	6.0
	TOTAL	100.3

In terms of conveyances, different forms ply the streets of the city. These include private cars, buses, jeepneys, and even para-transits such as the calesa and the tri-wheeler.

Buses provide inter – regional and inter – provincial public transportation. Among these are the Genesis Bus Line, Bataan Transit, and Victory Liner. Jeepneys are the primary mode of inter – city and intra – city public transport. One of the primary jeepney routes is the Angeles – San Fernando with approximately 1000 units in operation. Local traffic, especially within the poblacion and the Pampanga Provincial Capitol is catered by jeepneys plying the San Fernando – Palawe Route. Intra – barangay public transport, on the other hand, is being offered by tri – wheelers and the calesa.

Other major traffic generators in the city are the two (2) supra – regional malls located at the boundary of the City of San Fernando and the Municipality of Mexico. These are SM and Robinson’s Mall. From these malls, there are available intra – regional and inter – municipality public transport modes.

b. Rail Transport – The City of San Fernando is also being traversed by the right – of – way of the Philippine National Railway (PNR). The rail service is currently non-operational. However, with the current North Rail project<sup>1</sup> of the national government, rail service in the city could be revived in the years to come.

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<sup>1</sup> – a more detailed discussion regarding the North Rail Project is given in the Socio – Economic Profile.

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8.6.2 Traffic Flow:

In looking at the traffic flow and traffic congestion levels around the city, the data from the classified traffic volume counts served as the primary inputs. The data gathered from the survey counted each vehicle per unit. The data were converted to PCU<sup>2</sup> in order to normalize them for the analysis. Then the level of service ratings used by the Department of Public Works and Highways were used to assess the flow and congestion levels at critical sections of the city. Table 8.3 shows the level of service ratings used by the DPWH as well as their corresponding descriptions and expected average speed of vehicles.

**Table 8.3 – Level of Ratings, DPWH**

LOS Rating	Volume – Capacity Ratio	Traffic Condition	Description	Average Speed of Vehicles
A	0 – 0.19	Very Light	Free flow, Low Volume and Densities; Drivers can maintain their desired speeds with little or no delay and are unaffected by other vehicles	95 – 110 kph
B	0.20 - 0.44	Light	Reasonably free flow, operating speeds beginning to be restricted somewhat by traffic conditions. Drivers still have some reasonable freedom to select their speeds.	80 - 95 kph
C	0.45 - 0.69	Moderate	Speeds remain near free flow speeds, but freedom to maneuver is noticeably restricted	64 - 80 kph
D	0.70 - 0.84	Moderately Heavy	Speeds begin to decline with increasing volume. Freedom to maneuver is further reduced and traffic stream has little space to absorb disruptions	56 - 64 kph
E	0.85 - 1.00	Heavy	Unstable flow, with volume at or near capacity. Freedom to maneuver is extremely limited and level of comfort afforded the driver is poor.	45 - 56 kph
F	> 1.00	Very Heavy	Breakdown in flow. Both speeds and volume can drop to zero.	0 - 45 kph

Based on the Table 8.3, it is always desirable to attain level of service (LOS) “A”, where traffic flows freely and the driver has the discretion regarding speed. The lowest LOS rating indicates that the capacity of the road network has been reached and, hence, at that level widening of the road or a new road is necessary.

**Poblacion**

Congestion is often experienced when going to and from the Poblacion. This is especially true during the so-called peak hour. Hence, it is worthy to look into the traffic volume levels during the peak hour.

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<sup>2</sup> – PCU – Passenger Car Unit. It is a method of converting individual vehicle units to the size and operational characteristics of a typical sedan.

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Five (5) sections around and within the Poblacion were used as observation points. These are:

- Consunji St.;
- At the Section near SFELAPCO going to the provincial capitol;
- At the side of the Cathedral;
- Near Virgen delos Remedios; and
- Along the San Fernando Elementary School

The first four exhibit single direction traffic flow while the fifth is bi-directional. The peak hour traffic volume (in PCU) at each of the sections was computed using the data from the traffic surveys. Road section capacity was estimated using the standards set by the Highway Capacity Manual. Road capacity estimates takes into consideration road width, number of lanes, number of directions, etc. Subsequently, the Volume / Capacity (V/C) Ratio for each of the sections were computed and the corresponding LOS rating was determined.

Based on this type of analysis, if the level of service rating (as shown in Table 8.3) is low (i.e. “D”, “E”, or “F”), then congestion could be attributed to the volume of vehicles passing through the section. However, congestion is not expected if the LOS rating is “C” or below. If, however, congestion is experienced despite having a very low V/C Ratio (and subsequently low LOS rating), other reasons are to be cited as the cause of congestion.

Table 8.4 shows the tabulation of the V/C Ratios and LOS ratings for the five sections mentioned above:

**Table 8.4 – Level of Service Ratings for 5 Sections within the Poblacion**

Street / Section	Peak Hour PCU	Estimated Capacity	V/C Ratio	Level of Service
Consunji St	1640	3600	0.456	B
Near SFELAPCO (To Capitol)	1026	3600	0.285	B
at the Side of the Cathedral	995	3600	0.276	B
Near Virgen Delos Remedios	873	3600	0.243	B
Along Elem School (Outbound)	688	1500	0.459	B
Along Elem School (Inbound)	892	1500	0.594	C

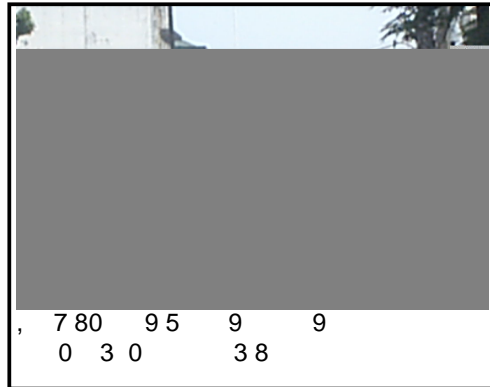
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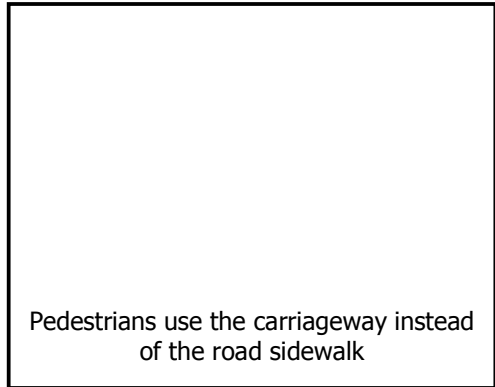


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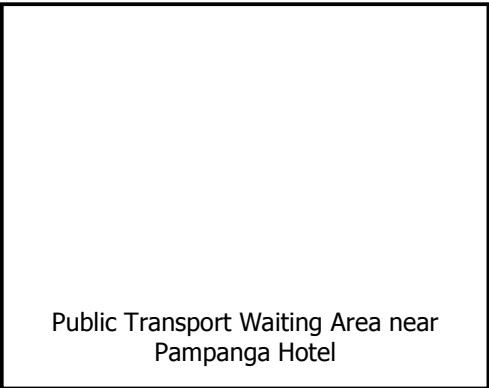


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Apart from the mixture of vehicle types, another blatant observation is the mixture of pedestrians and vehicles along the carriageway. This could be attributed to a lack of pedestrian – friendly sidewalks. This could be commonly observed near the Metropolitan Cathedral and the area near the old public market. Sidewalks, which are supposed to be for pedestrian mobility, are filled by vendors and other obstructions.

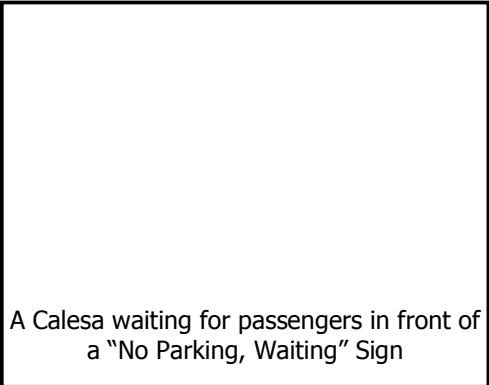


Another reason for the congestion within the Poblacion are the on – street public transport “terminals”. These were informally set and they occupy almost one whole lane of the main carriageway. These terminals, or waiting areas are being used by different public utility jeepney groups



with different routes. Even non-motorized vehicles such as tri – wheelers and calesas wait for passengers using the main carriageway. These obstructions are seen in different areas including the corner of Gen. Hizon and Consunji St. (near Pampanga Hotel), the area near Mirabes (going to the provincial capitol) and the area going to San Jose (near the Art and Queen Theater).

Other reasons for the congestion in the poblacion, due to a reduction in the road capacity are the “misplaced” signages. These signages are owned by business establishments.



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At times, even “No Parking, No Waiting, No Unloading” signs are placed along the carriageway. Hence, instead of helping maximize the use of the road by not allowing vehicles to park and stay put at a particular section, these signages act as the obstruction which they hope to avoid. And even the implementation what is supposed to be implemented by the sign is questionable.

**Access**

The City of San Fernando’s geographic location makes it easily accessible from different areas, cities, and municipalities. From the northern side, San Fernando is directly accessible from Angeles City. The four – lane Mc Arthur Highway connects the two cities. The Municipality of Sto Tomas is the city’s immediate neighbor to the South. This link is also made possible via the Mc Arthur Highway. The Gapan – San Fernando – Olongapo Road, on the other hand, is the primary access to the east and to the west. Going west from the city are the towns of Bacolor, Guagua, Lubao, and the provinces of Bataan and Zambales. There is also an alternative corridor coming in and going to these areas. This is the Old National Road which connects the City to the three western towns mentioned above. On the eastern side are the towns of Mexico, Sta Ana, Arayat, and the province of Nueva Ecija. Apart from the GSO, there is alternative corridor for motorists coming from the east. This is the road that links the Municipality of Mexico to San Fernando via Brgy San Jose.

Another important access point to the city is the North Luzon Expressway. The NLEX is the main link to Metro Manila as well as other Southern and Northern Provinces. Table 8.5 shows the level of service ratings city boundaries.

**Table 8.5 – Level of Service Ratings at the City Boundaries**

Street / Section	Peak Hour PCU	Estimated Capacity	V/C Ratio	Level of Service
Bacolor Boundary - GSO (Outbound)	1059	3600	0.294	B
Bacolor Boundary - GSO (Inbound)	1063	3600	0.295	B
Bacolor Boundary - Old National Road (Outbound)	451	1500	0.300	B
Bacolor Boundary - Old National Road (Inbound)	577	1500	0.385	B
Sto Tomas Boundary (Outbound)	1020	1500	0.680	C
Sto Tomas Boundary (Inbound)	1105	1500	0.737	D

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Mexico Boundary - GSO (Outbound)	748	3600	0.208	B
Mexico Boundary - GSO (Inbound)	1153	3600	0.320	B
Mexico Boundary - San Jose (Outbound)	416	1500	0.277	B
Mexico Boundary - San Jose (Inbound)	477	1500	0.318	B
Angeles Boundary (Outbound)	2209	3600	0.614	C
Angeles Boundary (Inbound)	1409	3600	0.391	B

As seen in Table 8.5, traffic flow at the city boundaries is still flowing smoothly. Majority of them have a level of service rating of “B”. This essentially means that travel speeds at these sections are still dictated by the motorists. However, the boundary of San Fernando and Sto Tomas, the level of service ratings are almost reaching what could be considered as critical level. The outbound direction currently has a level of service rating “C” while the inbound direction has reached a more critical level of service rating “D”. These means that “moderate” to “moderately heavy” traffic is already being felt during the peak hour. It is just noteworthy to say that of all the road sections cited in Table 8.5, the Sto Tomas – San Fernando boundary is closest to the poblacion. Hence, its already high level of service rating causes a sense of urgency to addressed as it will directly affect the traffic condition in the poblacion.

Apart from the Sto Tomas boundary, only the Angeles – San Fernando Outbound direction has gone beyond level of service rating “B”. Currently, the said direction has a level of service rating “C” which corresponds to “moderate” traffic. This is still a tolerable state. However, given the natural trend of development in that area, this could already be a cause of alarm.

**Major Intersection**

The traffic flow picture shown at the boundaries of the city gives only a tip of the true scenario in terms of congestion within the city. Other important areas to look at, when assessing congestion levels in an area, are major intersections. It is at these areas that traffic bottlenecks most often occur. The smooth flow of traffic at intersections is critical in maintaining a good level of mobility. The intersection of Mc Arthur Highway and the Gapan – San Fernando – Olongapo Road in Barangay Dolores is the most critical intersection of the city. It caters not only to local intra-

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city traffic but even to inter-regional traffic. It is at the center of the San Fernando commercial area<sup>4</sup>. The Mc Arthur Highway is the main public transport corridor. It is the main line of the 1000 – plus units strong Angeles – San Fernando public utility jeepney route. Other jeepney routes such as the San Fernando – Dolores, and the San Fernando – San Agustin routes pass through the intersection. Further, this intersection is the most common stop and loading/unloading zone of inter – provincial public utility vehicles. Also, the first flyover in the province of Pampanga is located in the intersection. It provides exclusive lanes to the east and west through traffic.

The 24 – hour volume of traffic at each of the directions of the Mc Arthur Highway – GSO Road intersection are shown in Table 8.6.

**Table 8.6 – Directional Traffic Volumes (in PCU) at the Intersection of Mc Arthur Highway and Gapan – San Fernando – Olongapo Road**

DIRECTION	DIRECTION DESCRIPTION	VOLUME
1	From Town Proper to NLEX	16,517
2	From Dolores to NLEX	9,110
3	From Dolores to Town Proper	13,190
4	From Dolores to Guagua	2,430
5	From Guagua to NLEX	12,963
6	From Guagua to Town Proper	1,932
7	From NLEX to Dolores	24,222
8	From NLEX to Guagua	11,761
9	From NLEX to Town Proper	6,950
	TOTAL	<b>99,075</b>

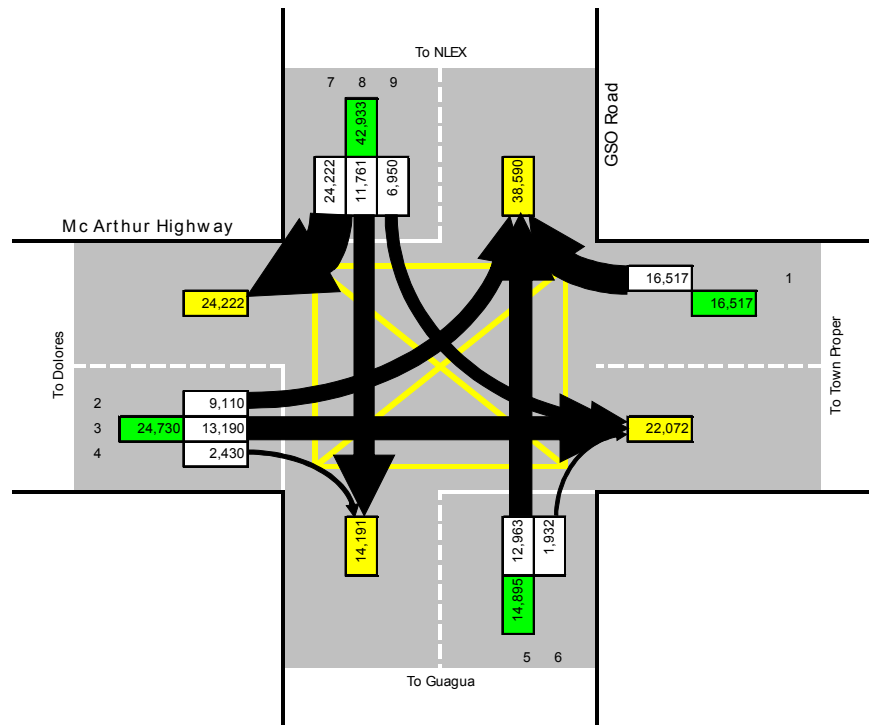
To better appreciate the traffic volumes indicated in Table 8.6, these are shown in a diagram showing their corresponding directions. Figure 8.3 shows the directional volume counts at the Mc Arthur Highway – GSO Road Intersection. The thickness of the directional arrows corresponds to the volume of vehicles (in PCU).

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<sup>4</sup> – although not located at the town proper or poblacion, the area of the Mc Arthur Highway – GSO Road intersection has become the leading center of commerce in the city since the peak days of lahar in the 90s.

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Figure 8.3 – Directional Traffic Volume (in PCU) at the Mc Arthur Highway – GSO Road Intersection



From the diagram, it could be seen that the upper leg of the intersection (i.e. with label “To NLEX”) carries the highest volume of vehicles. A total of 81,523 PCUs pass through the leg. There are a total of 38,590 PCUs passing through lanes going from the intersection to the direction of the NLEX. This volume represents a combination of vehicles turning left from Dolores, turning right from the Town Proper and the through traffic coming down from the flyover from Guagua. On the other side, there are 42,933 PCUs. These could be broken down as to the motorists turning right to Dolores, turning left to the Town Proper, and going straight up the flyover to Guagua.

The 81,523 PCUs passing through the leg “To NLEX” is far higher when compared to the volume of vehicles passing through each of the other legs. The leg “To Town Proper” carries 38,598 PCUs per day. The leg “To Dolores” carries 48,952 PCUs per day. And the leg “To Guagua” carries only 29,086 PCUs per day. What is most alarming here is the discrepancy in the volume of vehicles between the legs “To NLEX” and “To Guagua” since they are opposite legs of the intersection. This means that the traffic between them should at least be close since they carry

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the same through traffic. Also, these legs are connected by the flyover. The discrepancy in volume, therefore, could be attributed to the unusually high left and right turning vehicles especially those going to and from the “To NLEX” leg.

A deeper look into the traffic management measures currently implemented in the area would show that vehicles going from the Town Proper to Angeles (i.e. or to the “To Dolores” leg) are made to turn right and then making a “U-Turn” and then turn right again. These accounts for double counting of these vehicles instead of simply allowing them go straight through “under” the flyover. This would allow a better distribution of vehicles among the four legs of the intersection. Further, there has been an observed abnormal level of congestion at the east bound direction of the leg “To NLEX”. This congestion is often attributed to buses coming off the flyover and then swerving right to load and unload passengers. However, even if these bus loading and unloading zones are removed the same congestion will be felt. This is due to the fact that the conflict points created by the “right turn – U-Turn – right turn” traffic management scheme will not be mitigated by removing the loading and unloading areas. If in case these will be removed, the conflict points will just be moved a few more meters away from the intersection. The vehicles coming from the town proper going to Angeles will still swerve to the left after making the right turn since they need to make the U-turn to get to their destination. On the other hand, the vehicles including buses, coming from the flyover will still swerve to the left since they are going to the NLEX and need to avoid the U-turn slot. Hence, the same conflict point will exist albeit at a slightly different location.

8.6.3 Pedestrian Flow and Facilities:

When looking into the mobility of people, it is important not only to look into the movement and volume of vehicles. It is also important to consider the movement of pedestrian taking into special consideration their safety.

Within the poblacion, there are no special pedestrian infrastructure such as overpasses and underpasses. Along the major roads of the city, on the other

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hand, there are only two pedestrian overpasses. One is located in front of SM and Robinson's Department Stores near the boundary of San Fernando and Mexico along GSO Road. The other is in front of New Era University along Mc Arthur Highway. Apart from these, there is noticeably a lack of pedestrian facilities within the city. There are only "zebra" markings designating specific sections of the carriageway as pedestrian lanes.

The designation of pedestrian lanes should be sufficient if there is strict implementation on their usage. However, it is observable that pedestrians cross the streets as they wish and almost any point. This is alarming especially at the Mc Arthur Highway – GSO Road intersection since the implemented traffic scheme allows continuous flow of vehicles. Hence, there is a mixture of pedestrians and vehicles along the carriageways.

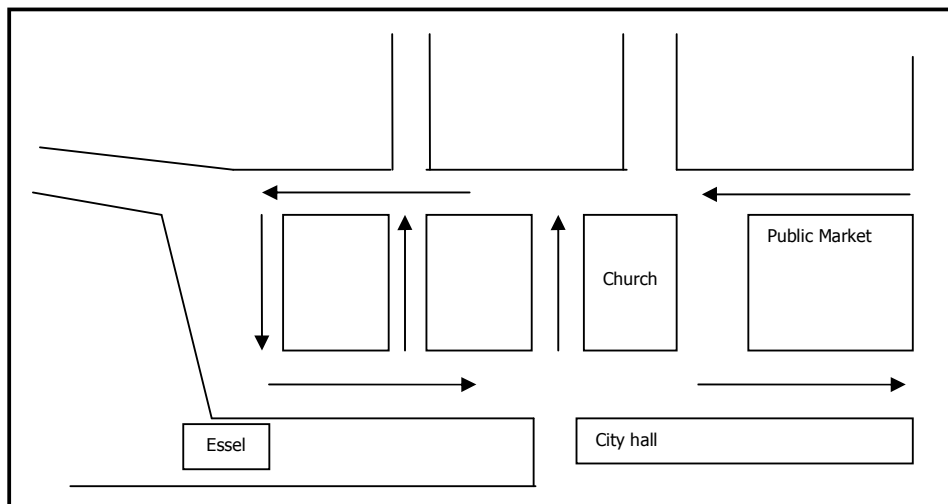
## 8.7 Recommendations:

### 8.7.1 Short-Term:

In order to alleviate the congestion within the Poblacion, traffic demand management measures are recommended. These are:

- a. Implementing uni-directional traffic flow along major streets and allowing bi-directional traffic flow along the secondary streets.

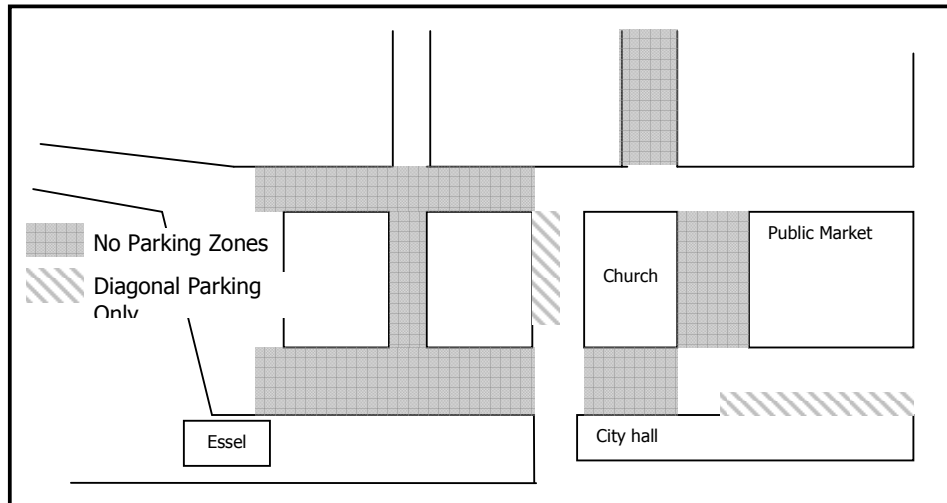
The recommended traffic flow scheme is given in the diagram below:



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Although this type of traffic flow scheme is already being practiced, strict implementation should be made. And it should cover all modes and not just motorized vehicles.

- b. Implementation of “No Parking Zones” along the major streets of the Poblacion. However, since parking is also a necessary facility, limited on – street parking may be allowed especially during special occasions. The on – street parking, however, should be limited to one side of the road and diagonal parking be strictly observed. Diagonal parking allows faster ingress and egress time and causes minimal interference to the traffic flow compared to parallel or perpendicular parking. The diagram below shows the areas to be designated as strictly “No Parking Zones” and those areas where diagonal, one – side parking could be allowed.



- c. Strict implementation of “No Entry Policy” for tri – wheelers and calesas especially during the peak hour. The operation of calesas and tri – wheelers should be limited to the confines of their defined service areas (if any). If none yet, service areas for individual tri – wheeler groups should be explicitly defined. Ideally, these service areas should be limited to one barangay or area. Also, they should not be allowed to ply along the major roads within the city.

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**Other Areas**

Although congestion is not yet severe for most of the city's road network, it would be inevitable in the near future given the natural growth in transport demand. Hence, it is much better to prepare for this as early as now. The traffic demand management measures recommended for other areas around the city are focused on maximizing the capacity of the existing road network. These recommendations are outlined below. In as much as they seem to be simple, their implementation is easier said than done.

- a. Strict implementation of "No Tricycle, No Calesa, No Tri – wheeler" policy on all major roads in the city. This pertains to such roads sections as the entire stretch of Mc Arthur Highway, Gapan – San Fernando – Olongapo Road, Lazatin Boulevard, and the Old National Road as well as major entry points to the Poblacion (i.e. Road in front of the Catholic Cemetery and the Road in front of Makabali Hospital). The mixture of vehicular traffic brought about by the existence of Calesas, Tricycles, and Tri – wheelers along these major road sections brings their effective level of service down. Also, there is an issue of safety to consider when these types of vehicles mix with "typical" motor vehicles such as private cars, jeepneys, and trucks.
  
- b. The carriageway must be utilized as a carriageway. This is more of a guiding principle rather than an actual traffic demand management measure. The City of San Fernando has rather wide national, provincial, and municipal roads. Some of these roads are as wide as 6 lanes (or even more). Other sections, on the other hand, have a wide paved shoulder in spite having only a 2-lane carriageway. This type of shoulder gives a higher capacity than a similar 2-lane road which has a lower quality shoulder. However, it is quite noticeable that in several sections, part of the carriageway is being used for other purposes such as for on-street parking and even an "extension" of business establishments. Also, there are business establishments which practice the habit of placing signages (i.e. for advertisement, "no parking" signs, etc) in front of their spaces. However, some of the signages encroach over the

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carriageway. The utilization of the carriageway for its real purpose that is as the passageway of vehicular traffic would maximize the existing capacity of the road network. This is an important measure to bring the necessity to widen roads or the need to develop new road infrastructure further into the future.

- c. Designation of specific Public Utility Jeepney (PUJs) Loading, Unloading, and Waiting Areas. Jeepneys are the primary mode of public transport in the city. There is a relatively large fleet size of public utility jeepneys. The 16 kilometer Angeles – San Fernando Route alone has approximately 1,000 jeepney units. This large fleet size ultimately brings down load factor and makes travel time longer. Jeepneys tend to wait for passengers at almost all possible points within their routes and especially at the vicinity of busy streets and intersections. This adds to the congestion levels of the areas. Hence, it is recommended that specific jeepney waiting, loading and unloading areas be designated especially along major highways such as the Mc Arthur Highway. The said areas should be located at points where there is ample space for jeepneys to get off the road to wait, load, and unload passengers. However, given that there are areas of high passenger demand but there is no space for jeepneys to get off the road, it is best to limit the stay of each jeepney. Also, the jeepney waiting, loading, and unloading areas should be placed before an intersection and not after it. This would prevent the raffle-effect of a stopping jeepney to block the vehicular movement in the so-called “yellow-box” of the intersection.

**Mc Arthur Highway – GSO Road Intersection**

The Mc Arthur Highway – GSO Road intersection is the busiest intersection in the city. Currently, the intersection has a flyover following the east – west alignment (i.e. along the GSO Road). Hence, the through traffic along the GSO Road passes continuously across the intersection. Traffic management measures (TMM) have also been implemented affecting primarily the north – south vehicular traffic flow. The TMM follows the “U – turn” scheme and aims for continuous traffic flow.

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The southbound through traffic (i.e. Angeles to San Fernando Town Proper) is allowed to pass through directly beneath the flyover. The opposite direction that which goes from San Fernando to Angeles, however, is made to turn right upon reaching the GSO Road then make a U-turn and turn right again at Mc Arthur Highway. The left turning direction from Guagua going to Angeles is also forbidden from using the at-grade. They are made to pass through the east bound flyover, then make a u-turn and turn right at Mc Arthur Highway going to Angeles. All other traffic movements pass through the at-grade and supposed to flow continuously.

However, this traffic scheme contains too many conflict points which are the causes of bottlenecks and hence traffic congestion. It is desirable to minimize the number of conflict points within the intersection. A way of doing this is to bring back the traffic signals for the for at-grade traffic. The south – north through traffic should be made to pass through the at-grade beneath the flyover. It should be noted that the south – north through traffic is heaviest in terms of volume and is especially loaded with public utility jeepneys. U – turning vehicles from and going to Guagua should be allotted a slot beneath the flyover for continuous flow. The same is true for those making a U –turn from and to Mexico.

And in order to maximize the efficiency of the traffic signals, the cycle time of each direction should be set accordingly. It is recommended that the north – south (i.e. Angeles – San Fernando) and the north – east (i.e. Angeles – Mexico) directions should coincide with each other. The same is true for the south – north (i.e. San Fernando – Angeles) and the south – west (i.e. San Fernando – Guagua) directions shall be set simultaneously. The last two directions, Mexico – San Fernando Town Proper and Guagua – Angeles which are left turning movement would be set simultaneously and with lower cycle time. The recommended cycle times for the at-grade directional movements controlled by traffic signals are as follows:

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Direction	Descriptions	Set	“Go” Time
Angeles – San Fernando	Through	A	1.5 minutes
Angeles - Mexico	Left Turn	A	1.5 minutes
San Fernando - Angeles	Through	B	1.5 minutes
San Fernando - Guagua	Left Turn	B	1.5 minutes
Guagua - Angeles	Left Turn	C	0.5 minute
Mexico – San Fernando	Left Turn	C	0.5 minute

The length of “go” time could be adjusted during the peak hour in order to absorb abnormal distribution of traffic. In addition to these, additional TMM should be implemented at the vicinity of the intersection. Public Utility Jeepneys should only be allowed to unload passengers before crossing the intersection. The area of not less than 500 meters after the intersection should be designated as a no loading and unloading zone for all legs of the intersections. This shall not only cover public utility vehicles but even private vehicles.

Even pedestrian movement around the intersection should be controlled. Pedestrians should only be allowed to cross when the vehicular traffic in the direction of their cross is at a stop. Lane markings for pedestrian movements should be made clear.

**8.7.2 Medium-Term:**

The next 3 to 5 years are critical in the realization of the long – term development plans of the city. These years are what link the short and the long term. In terms of transportation, it is recommended that the traffic management measures implemented in the short term be re-assessed and the necessary adjustments be made.

Also, it is important for the city government to require all major developments to conduct traffic impact studies before they are given the necessary permits to proceed. This would ensure that whatever negative impacts they would cause to the congestion issues be mitigated accordingly.

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Also, during this time, all existing roads should be improved. This pertains to paving and widening of barangay and city roads in anticipation of the higher volume to be generated once the long term spatial land use plan materializes. Special focus should be given to the roads that are perpendicular to Mc Arthur Highway as they would be utilized as major connecting links between the primary north – south corridor and possible alternate corridors. Also, current roads which are parallel to Mc Arthur should be improved. This pertains to the road from Barangay Dolores going to Sindalan via Bulaon Resettlement. This area is one of the focal points of the long-term spatial land use strategy.

8.7.3 Long-Term:

The preferred spatial strategy for the City of San Fernando relies heavily on the development of the transport sector. The development of the transport sector would act both as a support for the realization of the preferred spatial strategy and as a catalyst for it to materialize.

The Grid Iron – Multi Axis development needs an efficient road network to prosper and to fully utilize its potential. The different centers defined in “Multi – Axis Development” option needs an efficient inter-connectivity between them. As stated in Section 4.3.3, the primary center is the poblacion, the secondary centers are the Bulaon residential community and the emerging Central Business District of the Dolores – San Agustin – San Jose triad, and the tertiary centers include urbanizing areas of Sindalan-Calulut tandem, San Isidro-Maimpis duo, and Telabastagan-Baliti-Malino triad. The grid iron development pattern, on the other hand seems to be an off-shoot of the multi-axis. The road network to be developed for the Multi – Axis development pattern would ultimately form a grid iron pattern.

The connection between the primary, secondary, and tertiary centers is mainly centered on the Mc Arthur Highway, the major north – south corridor of the city. Currently, the said highway comfortably carries the vehicular flow between the proposed centers. However, if further development is to be pushed especially in

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the northern part, the capacity of the Mc Arthur Highway may reach saturation point. And given that the management of the Mc Arthur Highway is not within the jurisdiction of the city government, it is best to prepare for the additional volume by developing alternate routes. These alternate routes do not necessarily mean that they be totally parallel with Mc Arthur Highway. What is important is that they serve at least some sectional demand catered by Mc Arthur Highway.

Some of these types of parallel roads are already present. Among these is the Dolores – Bulaon – Sindalan Road which could connect two of the primary centers. Another is the road in Barangay Baliti which actually links all the way to Pandan in Angeles City. Both these roads are located on the eastern side of the Mc Arthur Highway. However, by their current state, they do not possess much glitter for motorists to use. Their widths are relatively narrow especially when compared to the four-lane Mc Arthur. What is necessary is to make them “competitive”. Widening is necessary into cater to higher demand. Also, the road shoulder should be defined. This could be achieved by imposing the required setback from lots at the vicinity of the roads.

What is missing is a parallel road on the western end. Hence, it is recommended is a road that would connect Barangay San Isidro to Telabastagan. This is somehow served by the megadike since its paving and hence converting into a north – south road. If the megadike road dike is utilized as an alternate road to the Mc Arthur Highway, collector roads connecting the two roads are necessary. These roads should be placed strategically, i.e. at sections where development is targeted to flourish. Also, their widths should be enough to cater to the projected demand.