Department of Civil Engineering
Talamban, Cebu City
Philippines 6000

Term/Academic Year:
First Semester/AY 2017-2018

Research Proposal Endorsement and Approval

I/we have read and agreed to the content of the research proposal entitled

AN INTERSECTION STUDY AT THE JUNCTION OF N. BACALSO AVE. – DECA ACCESS ROAD, LOWER CALAJOAN, MINGLANILLA

Prepared and submitted by:

Kevin Lorenzo L. Cubillo

Trishia Mae Y. De Claro

Charibon S. Dedicatoria

I/we affirm that the same complies with the standards prescribed for the research proposal requirement.

In view thereof, I/we hereby endorse the said research proposal for review and oral presentation.

Endorsed By:

Engr. Lynn Gloria A. Madrona, MEng	
Name and Signature of Adviser	Date Endorsed
Name and Signature of Co-Adviser	Date Endorsed

Department of Civil Engineering
Talamban, Cebu City
Philippines 6000

Term/Academic Year:
First Semester/AY 2017-2018

Research Proposal Approval

AN INTERSECTION STUDY AT THE JUNCTION OF N. BACALSO AVE. – DECA ACCESS ROAD, LOWER CALAJOAN, MINGLANILLA

Proponents:

Kevin Lorenzo L. Cubillo

Trishia Mae Y. De Claro

Charibon S. Dedicatoria

Supervisory Committee
The supervisory committee is constituted by qualified faculty members of the Department of Civil Engineering (or coming from other departments) according to *the Manual of Regulations for Private Higher Education* (*MORPHE*) who have ample track record in research. The committee includes at least two senior faculty members, the thesis adviser and the co-adviser (if there is any) and a committee chair (*Institutional Guidelines for Thesis and Dissertation 2015*).

Name and Signature of Thesis Committee Chair	Date Approved
Name and Signature of Thesis Committee Member	Date Approved
Name and Signature of Thesis Committee Member	Date Approved
Engr. Lynn Gloria A. Madrona, MEng Name and Signature of Thesis Adviser	Date Approved
Name and Signature of Thesis Co-Adviser (if applicable)	Date Approved

Department of Civil Engineering
Talamban, Cebu City
Philippines 6000

Term/Academic Year:
First Semester/AY 2017-2018

Title	An Intersection Study at the Junction N. Bacalso Ave. – Deca Access Road, Lower Calajoan, Minglanilla
Name(s) of Proponents	[1] Cubillo, Kevin L. [2] De Claro, Trishia Mae Y. [3]Dedicatoria, Charibon S.
Objectives	This research project aims to study the efficiency of traffic devices and the effectiveness of the current geometric design on the area of study by: [1] Determining the traffic volume passing through the intersection. [2] Determining the level of service (LOS) and delay at the intersection. [3] Preparing an improvement of the geometric design of the intersection to improve the level of service (LOS). [4] Providing recommendations for improvement of the current traffic devices in the area.
Project Duration	July 2017 to March 2018
Project Cost	P 4,940.00

I. Theoretical Background

Traffic congestion exists wherever demand exceeds the capacity of transportation (Lall et al. 2003). The challenge in order to solve this problem is getting worse because of the different factors that affect the situation. One possible solution is road widening but this approach is always limited by the availability of funds of the place affected (Banks, 2004). In addition, some suggested that by planning a better land use and by using automatic traffic controls, the timing and coordination of the vehicles will improve.

According to Helen Flores of The Philippine Star in her article, "Philippines has 5th worst traffic in the world-study", she stated that traffic issue in the Philippines spurred a dissatisfaction rate making it the 5th country in the world with the worst traffic condition according to the online database, Numbeo. Heavy traffic at cities is assumed because of the privileges that are found there; but now it even occurs in rural areas. The researchers will focus on investigating the issue of traffic congestion at intersection of N. Bacalso Ave. – Deca Access Road, Lower Calajoan, Minglanilla, Cebu which is not a part of urban areas, yet already experiencing heavy traffic.

General Concept of Traffic Control

The purpose of traffic control is to assign the right way to drivers in order to facilitate highway safety by ensuring orderly and predictable movement of all traffic on highways. It can be achieved by using traffic signals, signs or markings that can regulate, guide, warn and traffic and/or channel traffic (Garber et al. 2012).). According to Wright et al. (2004), traffic control devices are classified into three, namely; traffic signals, road signs and road markings. The common types of road signs are regulatory signs, informatory signs, and warning signs. Common traffic signals are usually the traffic lights and pedestrian signals that we usually see on the roads. However, the complexity of traffic control devices varies depending on the mode of transportation and the density of the traffic (Banks, 2002). According to Garber et al. (2012), a traffic control device must achieve the following for it to be effective: fulfill a need, command attention, convey a clear simple meaning, command the respect of road users and lastly, give adequate time for proper response.

Pedestrian Characteristics

According to Garber et al. (2012), pedestrian characteristics may influence the design and location of pedestrian control devices. These control devices are pedestrian signals, safety zones and islands at intersections, pedestrian underpass, walkways and crosswalks. Many considerations on the emphasis of design, different pedestrian categories, and pedestrian observation-reaction time shall be included. Walking speed of 0.9m/sec is considered in designing to accommodate slower persons to allow sufficient time in crossing. Design for space needs for pedestrians needs to be considered to avoid collision. Research has shown that pedestrians keep an average distance of 2.4 meters between other pedestrians, which correspond to 2 seconds of average time spacing in line (Wright & Dixon, 2004).

Vehicle Characteristics

Since nearly all highways carry both passenger-automobile and truck traffic, it is essential that design criteria take into account the characteristics of different types of vehicles. The characteristics of the design vehicle are then used to determine criteria for geometric design, intersection design and sight distance requirements (Hoel et al. 2003). Kinematic and dynamic characteristics of vehicles are taken into consideration on designing control on highways and so AASHTO (2001) states that it is appropriate to examine all vehicle types, establish general class groupings and selects vehicles of representative size within each class for design use. These selected vehicles, with representative weight, dimensions and operating characteristics, used to establish highway design controls for accommodating vehicles of designated classes, are known as design vehicles. There are four general classes of vehicles considered in the geometric design: passenger cars, buses, trucks and recreational vehicles (Lall et al. 2003).

Traffic Flow and Volume

According to Banks (2002), analysis of flow begins with the collection of volume counts. It can either be machine counts or hand counts. Machine counts include the use of portable counters, loop detectors and even videotape. Traffic flow data are presented in many forms of graphical formats. One possibility is a turning movement diagram showing separate volumes for different turns through movement. Traffic flows are subjected to three basic types of variations namely:

trends, peaking patterns and random variations. A major objective of the analysis is the flow of data which separates often the effects of these different types of variations. There are two ways in measuring traffic volume: annual average daily traffic (AADT) and design hourly volume (DHV). Annual average daily traffic is the total number of vehicles passed in a particular assigned point within 24 hours, consecutively averaged over a year. Considering the time and effort needed in conducting annual average daily traffic, it is not suitable to conduct this survey continuously for 365 days, so another procedure is used for statistical sampling that will have a period of less than 365 days (Wright & Dixon 2004).

Traffic Density

Traffic flow, speed and density are the different variables that form the basis of traffic analysis. Density is defined as the number of vehicles per unit distance occupying a section of roadway at a given instant in time (Banks, 2002). It can also be related to the individual spacing between successive vehicles. Direct measurement of density can be obtained through aerial photography, but it is more commonly calculated by dividing the rate of flow with the average travel speed of vehicles (Khisty et al. 2003)

Saturation Flow Rate

Mannering et al. (2013) stated that the maximum hourly volume that can pass through an intersection, from a given lane or group of lanes, if that were allocated constant green over the course of an hour is called saturation flow rate. Research has found that a typical maximum saturation flow rate 1900 passenger cars per hour per lane (pc/hr/ln) is possible at signalized intersections and this is referred to as the base saturation flow rate. However, lanes that allow left or right turns usually have lower saturation flow rates because the drivers tend to reduce their speed when turning thus making an interruption in the flow. These factors are then considered in applying adjustments to the base saturated flow rate.

Peak Hour Factor

According to Mannering and Washburn (2013), vehicle arrivals during the period of analysis for a given time will be non-uniform. To be able to arrive to more specific data, it is advised to use the peak 15 minute arrival rate within the analysis hour for practicality purposes in traffic analysis. The peak hour factor is developed for this purpose and is defined as the ratio of the hourly volume to the peak 15 minute flow rate.

Conflict Points at Intersections

Conflicts occur when traffic streams moving in different directions hinder with each other. According to Hoel et al. (2003), there are three types of conflicts: merging, diverging, and crossing. The primary objective in designing a traffic control system at an intersection is to reduce the number of significant conflict points that might occur in the intersection. Factors that might influence the significance of a conflict include the type of conflict, the number of vehicles in each conflicting stream, and the speed of the vehicles in those streams. Crossing conflicts also tend to have the most severe effect on traffic flow, thus it should be reduced to a minimum whenever possible.

Traffic Signals

Traffic signals operate by assigning the right of way successively to intersection approaches. Indication is what they call for the red, yellow and green light that is displayed to drivers in a given movement. The time required to complete signal indications is called a cycle. The discrete portion of the cycle wherein the signals do not change is termed as interval. Then, portion of the cycle in which the movement with the right-of-way do not change is called phase (Banks, 2002). According to Garber et al. (2012), a traffic signal is useful in eliminating many conflicts because different traffic streams can be assigned the use of intersection at different times. However, this can cause delay in all vehicles in all streams so it is important to use it only when necessary. The most important factor that determines the need for traffic signals at a particular intersection is the intersection's traffic volume.

Capacity of Signalized intersection

At signalized intersections, the capacity given for each lane group is defined as the maximum rate of flow for the subject lane group that can go through the intersection under prevailing traffic, roadway or signalized conditions. Capacity is presented in vehicles per hour but is based on the flow during a peak 15 minute period. It is important to remember that capacity is applied meaningfully only to major movements or approaches of the intersection. Thus, it is important to analyse separately the level of service and capacity when signalized intersections are being evaluated (Hoel & Garber 2012).

Level of Service at Signalized Intersections

Level of service is a qualitative measure used to relate the quality of traffic service. It is used in categorizing traffic flow and assigning levels of traffic according to performance. According to Khisty and Lall (2003) and Wright et al. (2004), there are six various level of service:

First is Level of service A, where the average delay per vehicle is 10.0 seconds or less and free flow speeds prevail. Vehicles are completely unrestricted to the freedom to manoeuvre within traffic stream. Also, the effects of incident are local and minimal.

Second is Level of service B, where the average delay per vehicle is not less than 10.0 seconds and does not exceed a delay of 20.0 seconds. General free flow prevails. Vehicles have the ability to manoeuvre within traffic stream slightly restricted. The effect of minor incidents is also absorbed.

Third is Level of service C, where the average delay per vehicle is not less than 20.0 seconds and does not exceed a delay of 35 seconds. Speed flow is neither still at nor near free flow speed. The freedom to manoeuvre within traffic stream noticeable restricted and lane changed requires more care and vigilance by the driver. A significant number of vehicles accumulate at intersections due to longer red phase or a longer red phase or a longer cycle length which causes more delay.

Fourth is the Level of service D, where the average delay per vehicle that will result to not less than 35.0 seconds and does not exceed a delay of 55.0 seconds wherein speeds begin to decline slightly.

Fifth Level of Service E, where the average delay per vehicle is not less than 55 seconds and does not exceed a delay of 80 seconds. The delays experienced at this level is usually set as the limit of acceptable delays. It has long cycle lengths and poor progression.

Last level is Level of Service F, which is the worst level of service, where the average delay per vehicle is greater than 80 seconds. Oversaturation is already experienced at these intersections and is already unacceptable.

Control Delay

Intersection level of service is directly related to the average control delay per vehicle (Lall et al. (2003). Once delays have been established in each lane group, they can be aggregated to arrive at the overall intersection delay. The delay level-of-service criteria for signalized intersections are specified in the Highway Capacity Manual (HCM) and are found in Table 7.4. It is then used to determine the level of service for a lane group, an approach and the intersection (Mannering et al. 2013).

Highway Alignment Adjustment

The alignments in horizontal and vertical directions for highways are one of the few elements in design. According to Banks (2002), vertical alignment which is documented by the profile, consists of tangent grades and vertical curves. On the other hand, horizontal alignment, which is a series of sections of highway joined by suitable curves, consists of horizontal tangents, circular curves, and possibly transition curves. That is why it is necessary to establish the proper relation between design speed and curvature as well as the joint relationships with super elevation and side friction (Kristy & Lall, 2003). In the case of highways, transition curves are not always used.

Heavy-Vehicle Adjustment

The Highway Capacity manual identifies two classes of heavy vehicles; trucks and buses and recreational vehicles. They differ in performance characteristics and dimensions compared to regular vehicles. Base conditions stipulate that no heavy vehicles are present in the traffic stream and since it is a situation that cannot be prevented, the adjustment factor for heavy vehicles is then considered to translate the traffic stream from base to prevailing conditions (Washburn et al. 2013). Thus, it is considered to have an equivalent of some number of passenger cars. However, this passenger car equivalent varies depending on the type of vehicle, the percentage of heavy vehicles in the traffic stream and the length and severity of grades (Banks, 2002)

II. Significance of the Research Work

This study would be beneficial to the following:

To the motorist who utilizes the area of study to provide convenience due to the improved traffic devices that can result to free flow traffic.

To the passers-by and citizens living nearby the area of the study to lessen possible accidents thus, securing their safety and providing them a convenient place to live in.

To the Municipal Engineering Office who can benefit from this study to make them aware of the current situation and to be able to use this research work as a basis upon taking actions to improve the traffic conditions in the area.

To the future researchers who can benefit from this study, to make this study a reliable reference in conducting a similar study.

III. Scope and Limitations

This study directly involves N. Bacalso Ave. – Deca Access Road, Minglanilla intersection because of the growing traffic congestion in the place despite being a part of a rural area. This covers analysis of the current traffic state, geometric design improvements and level of service for the moderation of traffic situation in the stated area. Traffic data gathering will be conducted only from 6:00 am to 8:00 pm per day on three regular non-consecutive weekdays for one week. Survey for the twenty pedestrians in each day will be conducted. This duration of data gathering is based from similar studies conducted before. Recorded video from a Close-Circuit Television (CCTV) camera will be utilized in obtaining the number and type of vehicle for the traffic volume to downgrade the workload. This study includes the economic and legal involvement about the alteration of the intersection and the road acquisition and negotiations.

IV. Research Design and Method

This study uses the quantitative style of research for its reliance on numerical data, interviews, data such as the plan of the subject intersection and its design from government organizations and traffic count. Site visit will also be conducted. The use of survey in recording the intersection will be conducted in case of absence of CCTV around the subject area for the benefit of gathering traffic information. Manual counting of categorized vehicles from the vehicles from the recordings will be performed in this study.

Research Site

The N. Bacalso Ave- Deca Access Road, Minglanilla intersection is the locale of the study. The intersection consists of the national highway which has two-way lanes and an access road to Deca Homes and to Kingswood Village. This intersecting road adds up vehicles utilizing the subject intersection, possible promoter in traffic in traffic congestion. This intersection has proven to have caused delays due to traffic congestion most especially on peak hours.

Research Site Map

Research Respondents

Since the subject area is at Minglanilla, Minglanilla Traffic Commission (MITCOM) is a vital respondent to this study. Additional respondents for this study are the following: Department of Public Works and Highways (DPWH), the citizens living on the vicinity of the subject area and the motorists who regularly utilize the subject intersection. The citizens living on the vicinity of the subject area are one of the research respondents since possible improvement of traffic control devices such as pedestrian crosswalk signs will provide them security upon crossing the road.

Research Instruments

The researchers will use the blueprint/ plan of the existing geometric design of the area of study from the DPWH and data of the latest traffic count conducted by MITCOM. In addition, the interviews that will be conducted with the respondents about their experiences with regards to the intersection and the traffic count from the recordings of the CCTV camera used in this study are included. It will be used to examine the effectiveness of the existing geometric design of the intersection, the traffic control devices and road markings.

Research Tool

Devices such as camera and laptops will serve as aids for the researchers to conduct this study. An existing CCTV camera in the area of study will be used for the traffic count. In addition, computer programs like Microsoft Office and AutoCAD will have a great role in order for this study to be completed.

Research Procedure

Gathering of Data

The researchers will gather the requisite data for this study. The complete name of the subject intersection will be asked from MITCOM. The existing plan, geometric design and road profiles of the intersection will be obtained from the DPWH. It is certain that DPWH will provide the researchers the documents stated since previous studies have already done it before. With the use of available CCTV cameras near the subject intersection, volume count of vehicles, traffic count and other required data will be collected. Vehicles will be categorized into trucks, automobiles, buses, jeepneys and motorcycles for a more organized volume count. The citizens living on the vicinity of the subjected area and motorists who regularly utilizes the subject intersection will be considered in the analysis of the study.

The traffic control devices and road markings at the subject area such as traffic lights, pedestrian signals will be identified and checked for its effectiveness and sufficiency through the results of the traffic count that will be conducted by the researchers and also the knowledge that they have learned in the lectures in the university during peak hours.

Road Survey

For road survey, it is wiser to obtain road profile from the DPWH. The DPWH is currently responsible for the planning, design, construction and maintenance of the infrastructure, especially the national highways, and other public works in accordance with national developments objectives.

Data Interpretation

Information taken from the respondents, government organizations and camera recordings will be transcribed and analysed in answer to the statement of the problem of this study. In addition, results will be presented in tables, graphs or charts showing the frequency. With the use of the camera, manual counting of categorized vehicle will be performed to have the traffic and volume count on peak hours and on off-peak hours. Microsoft Office will be used in plotting and obtaining the necessary data such as of volume count, daily traffic count and other data. The sufficiency of the documented traffic control devices and road markings will be checked in controlling a huge volume of traffic. Data obtained from different government organizations will be used for thorough explanations for this study.

Determining the Level of Service

In determining the level of service of the intersection, the obtained data will be used in analysing and comparing it to the standard requirements. This would allow the researchers to identify the flow of the design or on what factors that may have promoted traffic congestion on the subject area. This will also help in figuring out the possible remedies.

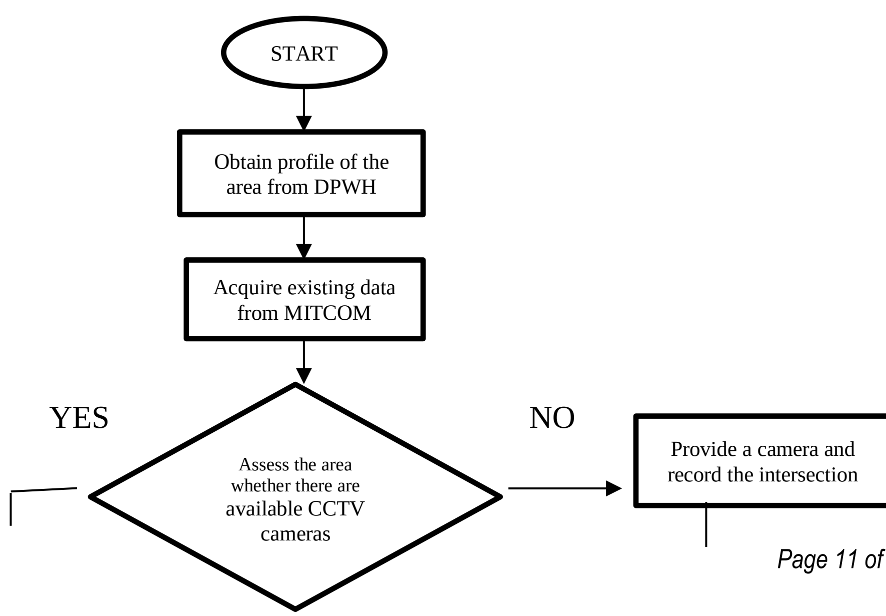
Providing an Improved Intersection Design

The deciphered data determines the problem and its possible recommendations on the intersection design itself. With this, enhancement of the level of service of the subject intersection would be possible. Computer programs will be used to project, compute and visualize a precise reconstruction of the intersection design averting traffic congestion.

Research and Interview

The researchers will be collecting essential information and data from different designated sources for the efficiency and success of the study. Site assessment and interviews from the different government organizations such as DPWH and MITCOM, Philippine National Police (PNP) and the citizens of the subject area will be performed.

Flow Chart



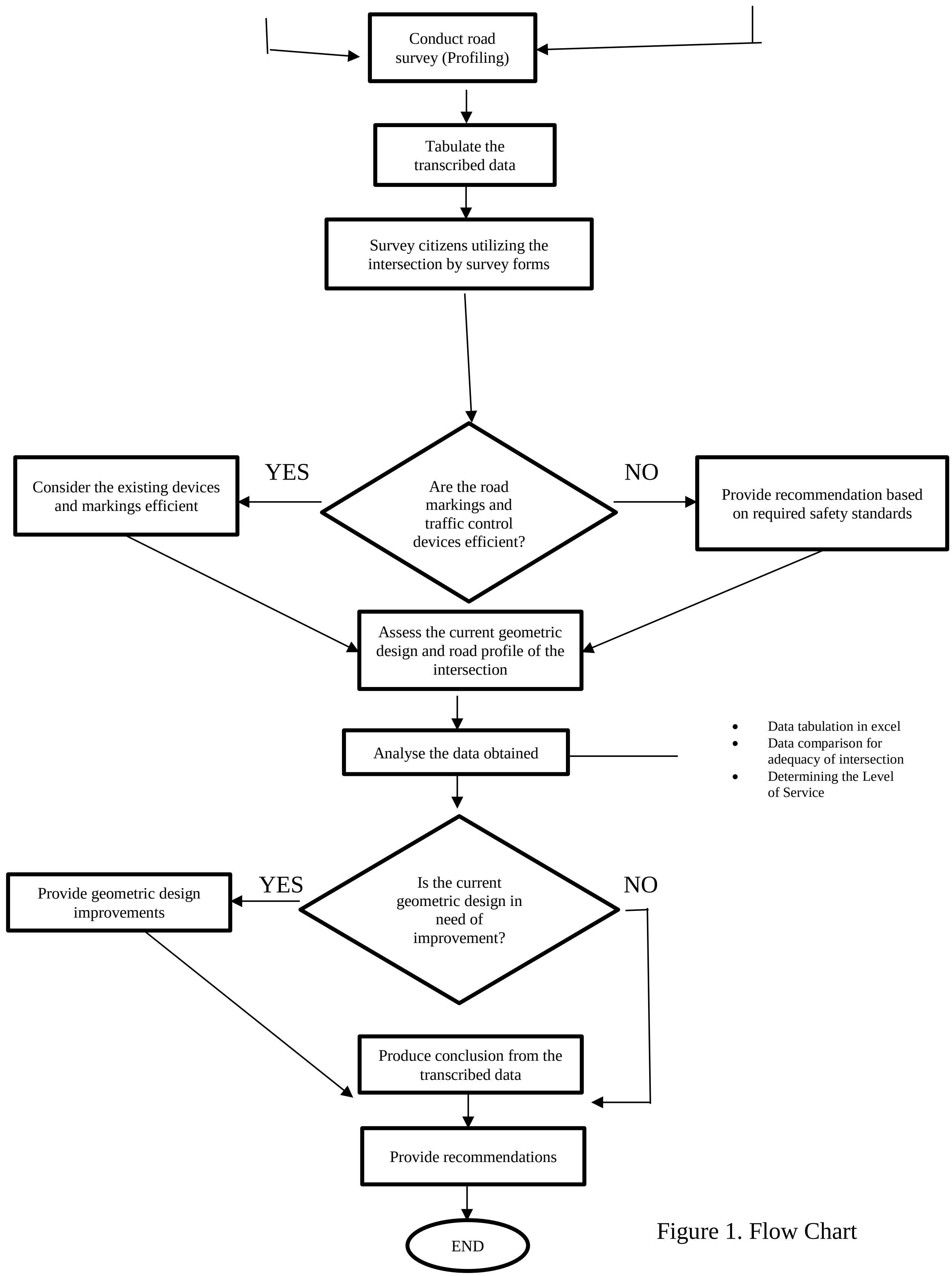


Figure 1. Flow Chart

Peak Hour Factor

The LOS is usually different during peak hour and off peak, researchers will use the peak hour factor to measure the variability of demand during the peak hour. PHF is the vehicle arrivals during the peak 15-min within the analysis hour which is usually used for practical traffic analysis purposes.(Mannering, 2009). This is developed as the ratio of the hourly volume to the maximum 15-min flow rate expanded to an hourly volume, as the following equation:

$$PHF = \frac{V}{V_{15}\ X\ 4}$$

Where

PHF= peak hour factor

V= hourly volume for hour of analysis

V_15= maximum 15-min flow rate within hour of analysis

4 = number of 15-min periods per hour

Saturation Flow Rate

This is the maximum hourly volume that can pass through and intersection, from a given lane or group of lanes, of that lane (or lanes) were allocated constant green over the course of an hour. It also implies the presence of constant vehicle demand in measuring the headway. Saturation flow rate is given by:

$$s = (s_o)(N)(f_w)(f_{HV})(f_g)(f_p)(f_a)(f_{pp})(f_{Lu})(f_{RT})(f_{LT})(f_{Lpb})(f_{Rpb})$$

where

$s =$ saturation flow rate for the subject lane group, expressed as a total for all lanes in lane group under prevailing conditions (veh/h/g)

$s_o =$ ideal saturation flow rate per lane, usually taken as 1900 (veh/h/ln)

$N\ =$ number of lanes in lane group

$f_w =$ adjustment factor for lane width

$f_{HV} =$ adjustment factor for heavy vehicles in the traffic stream

$f_g =$ adjustment factor for approach grade

f_p = adjustment factor for the existence for parking lane adjacent to the lane group and the parking activity on that lane

f_a = adjustment factor for area type (for CBD, 0.90; for all other areas, 1.00)

f_{bb} = adjustment factor for the blocking effect of local buses stopping within the intersection area

f_{Lu} = adjustment factor for lane utilization

f_{RT} = adjustment factor for right turns in the lane group

f_{LT} = adjustment factor for left turns in the lane group

f_{Lpb} = pedestrian adjustment factor for left-turn movements

f_{Rpb} = pedestrian adjustment factor for right-turn movements

An ideal saturation flow rate is adjusted for the existing conditions to obtain the saturation flow for the intersection being considered. These adjustments are made by introducing factors of the following: number of lanes, lane width, percent of heavy vehicles in the traffic, approach grade, parking activity, local buses stopping within the intersection, area type, lane utilization factor, and the right and left turns.

The concept of a saturation flow or saturation flow rate (s) is used to determine the capacity of a lane group. The capacity of an approach or lane group is given as

$$c_i = s_i\left(\frac{g_i}{C}\right)$$

where

c_i = capacity of lane group i (veh/h)

s_i = saturation flow rate for lane group or approach i

$\left(\frac{g_i}{C}\right)$ = green ratio for lane group or approach i

g_i = effective green for lane group i or approach i

C = cycle length

The ration of flow to capacity (v/c) is usually referred to as the degree of saturation and can be expressed as

$$X_i = \frac{v_i}{s_i\left(\frac{g_i}{C}\right)}$$

where

$X_i = (v/c)$ ratio for lane group or approach i

v_i = actual flow rate or projected demand for lane group or approach i (veh/h)

s_i = saturation flow rate for lane group or approach i $(veh/h/g)$

g_i = effective green for lane group i or approach i (sec)

V. Reference

Wright, P. H., & Dixon, K. (2004). *Highway Engineering.* John Wiley & Sons, Inc. Hoboken.

Banks, J. H. (2002). *Introduction to Transportation Engineering.* McGraw-Hill Companies Inc. New York.

Roess, R.P., Prassas, E.S., & McShane, W. R. (2004). *Traffic Engineering 3rd Edition.* Prentice Hall

Mathew, T. V. (2014). *Transportation System Engineering.* Cell Transition Models, IIT Bombay, 37.1

Garber, N. J., & Hoel, L. A. (2012). *Traffic & Highway Engineering 4th Edition.* Cengage 214 Learning Asia Pte Ltd (Philippine Branch).

C. Jotin Khisty, B. Kent Lall (2003). *Transportation Engineering an Introduction.* Prentice Hall. Upper Sadle River.

HCM. *In Highway Capacity Manual, 4th Edition* (2000). Transportation Research Board.

Mannering, F. L. & Washburn, S. S. (2013). *Principles of Highway Engineering and Traffic Analysis 5th Edition.* John Wiley & Sons Singapore Pte. Ltd.

VI. Cost Estimates

Manpower/Overtime Costs				
Name of Person	*Position*	*Rate/Fee*	*No. of Hours*	*Subtotal*
[1] Manpower (Overtime)	**Labor**	**350/day**	**42**	**P1,050.00**
		Total		
Documentation Costs				
Description	*Quantity*	*Cost/Unit*	*Subtotal*	
Printing Fee	**500**	**1/page**	**P500.00**	
Hardbound	**3**	**300/bind**	**P900.00**	
		Total	**P1,400.00**	
Transportation and Accommodation Costs				
Description	*No. of persons*	*Rate/person*	*Subtotal*	
Jeepney Fare	**3**	**600/person**	**P1,800.00**	
Food	**3**	**80/person**	**P240.00**	
		Total	**P2,040.00**	
		TOTAL	**P4,940.00**	

VII. Workplan and Expected Output

Activity/Task	*June*							*Expected Output*	*Person(s) Responsible*
	13	14	15	16	17	18	19		
[1]Gathering ideas for desired topic for this study		X	X	X	X	X		Project Study Topic	Cubillo De Claro Dedicatoria

Activity/Task	*June*							*Expected Output*	*Person(s) Responsible*
	20	21	22	23	24	25	26		
[1]Gathering ideas for desired topic for this study		X	X	X	X	X		Project Study Topic	Cubillo De Claro Dedicatoria
[2] Evaluating possible project adviser				X	X	X		Final adviser for project study	
Activity/Task	*June/July*							*Expected Output*	*Person(s) Responsible*
	27	28	29	30	1	2	3		
[1] Appointment with Engr. Madrona for research advisory acquiescence	X	X						Advisory from Engr. Madrona	De Claro
[2] Proposing final topic to adviser			X	X	X			Final topic for the study	Cubillo De Claro Dedicatoria
Activity/Task	*July*							*Expected Output*	*Person(s) Responsible*
	4	5	6	7	8	9	10		
[1] Informing groupmates about the adviser’s comments		X	X	X	X	X		Considered ideas possible for the study	Cubillo De Claro Dedicatoria
Activity/Task	*July*							*Expected Output*	*Person(s) Responsible*
	11	12	13	14	15	16	17		
[1] Propose topic to adviser			X	X	X			Tentative approval	De Claro
Activity/Task	*July*							*Expected Output*	*Person(s) Responsible*
	18	19	20	21	22	23	24		
[1] Gather information necessary for the study		X	X	X	X	X		Necessary information for this study	Cubillo De Claro Dedicatoria
Activity/Task	*July*							*Expected Output*	*Person(s) Responsible*
	25	26	27	28	29	30	31		
[2] Gather information necessary for the study		X	X	X	X	X		Necessary information for this study	Cubillo De Claro Dedicatoria
Activity/Task	*August*							*Expected Output*	*Person(s) Responsible*
	1	2	3	4	5	6	7		

[1] Propose topic to adviser	X							Approved final topic for this study	De Claro
[2] Visit Municipal Hall for the official street name			X	X				Official street name	De Claro
[3] Site Visit					X			Site Observation	Cubillo De Claro Dedicatoria
Activity/Task	*August*							*Expected Output*	*Person(s) Responsible*
	8	9	10	11	12	13	14		
[2] Gather information for the proposed locations					X	X	X	Maps, Pictures and official street name	Cubillo De Claro Dedicatoria
Activity/Task	*August*							*Expected Output*	*Person(s) Responsible*
	15	16	17	18	19	20	21		
[1] allocated time for exams									
Activity/Task	*August*							*Expected Output*	*Person(s) Responsible*
	22	23	24	25	26	27	28		
[1] Research and gathering of data for theoretical background	X	X	X	X	X	X	X	Theoretical background	Cubillo De Claro Dedicatoria
Activity/Task	*August/September*							*Expected Output*	*Person(s) Responsible*
	29	30	31	1	2	3	4		
[1] Composition of Methodology Scope and limitations Significance of the study Cost estimates Workplan	X	X	X	X	X	X	X	Methodology Scope and limitations Significance of the study Cost estimates Workplan	Cubillo De Claro Dedicatoria
Activity/Task	*September*							*Expected Output*	*Person(s) Responsible*
	5	6	7	8	9	10	11		
[1] Revisions for theoretical background	X	X	X					Theoretical background	

[2] Revisions of Methodology Scope and limitations Significance of the study Cost estimates Workplan				X	X	X	X	Methodology Scope and limitations Significance of the study Cost estimates Workplan	Cubillo De Claro Dedicatoria
Activity/Task	*September*							*Expected Output*	*Person(s) Responsible*
	12	13	14	15	16	17	18		
[1] Revisions for theoretical background, Methodology Scope and limitations, Significance of the study, Cost estimates, Workplan	X	X	X	X	X	X	X	Theoretical background Methodology Scope and limitations Significance of the study Cost estimates Workplan	Cubillo De Claro Dedicatoria
Activity/Task	*September*							*Expected Output*	*Person(s) Responsible*
	19	20	21	22	23	24	25		
[1] Revisions for theoretical background, Methodology Scope and limitations, Significance of the study, Cost estimates, Workplan	X	X	X					Theoretical background Methodology Scope and limitations Significance of the study Cost estimates Workplan	Cubillo De Claro Dedicatoria
[2] submission of final output				X				Final output	
[3] Preparation for defence and Adviser Consultation					X	X	X	Proposal defense	
Activity/Task	*September/October*							*Expected Output*	*Person(s) Responsible*
	26	27	28	29	30	1	2		
[1] Preparation for defence and Adviser Consultation	X	X	X	X	X	X	X	Proposal defense	Cubillo De Claro Dedicatoria
Activity/Task	*October*							*Expected Output*	*Person(s) Responsible*
	3	4	5	6	7	8	9		
[1]Proposal defense				X				Defense	Cubillo De Claro Dedicatoria
[2] Necessary adjustments and adviser consultation		X	X	X	X	X	X	Final Manuscript	
Activity/Task	*October*							*Expected Output*	

	10	11	12	13	14	15	16		*Person(s) Responsible*
[1] Necessary adjustments and adviser consultation	X	X	X	X	X	X	X	Final Manuscript	Cubillo De Claro Dedicatoria
[2] Adviser consultation	X	X	X	X	X	X	X		
Activity/Task	*October*							*Expected Output*	*Person(s) Responsible*
	17	18	19	20	21	22	23		
vacant									
Activity/Task	*October*							*Expected Output*	*Person(s) Responsible*
	24	25	26	27	28	29	30		
vacant									
Activity/Task	*October/November*							*Expected Output*	*Person(s) Responsible*
	31	1	2	3	4	5	6		
[1]preparation for needed survey	X	X	X	X	X	X	X		Cubillo De Claro Dedicatoria
Activity/Task	*November*							*Expected Output*	*Person(s) Responsible*
	7	8	9	10	11	12	13		
[1] Obtaining recorded video for traffic volume	X	X	X	X	X	X	X	Traffic Volume	Cubillo De Claro Dedicatoria
Activity/Task	*November*							*Expected Output*	*Person(s) Responsible*
	14	15	16	17	18	19	20		
[1] Analysis of data	X	X	X	X	X	X	X		Cubillo De Claro Dedicatoria
Activity/Task	*November*							*Expected Output*	*Person(s) Responsible*
	21	22	23	24	25	26	27		
[1] Analysis of data	X	X	X	X	X	X	X		Cubillo De Claro Dedicatoria
Activity/Task	*November/December*							*Expected Output*	*Person(s) Responsible*
	28	29	30	1	2	3	4		

[1] Analysis of data	X	X	X	X	X	X	X		Cubillo De Claro Dedicatoria
Activity/Task	*December*							*Expected Output*	*Person(s) Responsible*
	5	6	7	8	9	10	11		
[1] Analysis of data	X	X	X	X	X	X	X		Cubillo De Claro Dedicatoria
Activity/Task	*December*							*Expected Output*	*Person(s) Responsible*
	12	13	14	15	16	17	18		
[1] Formulation of results and discussion	X	X	X	X	X	X	X		Cubillo De Claro Dedicatoria
Activity/Task	*December*							*Expected Output*	*Person(s) Responsible*
	19	20	21	22	23	24	25		
[1] Formulation of results and discussion	X	X	X						Cubillo De Claro Dedicatoria
Activity/Task	*December/January*							*Expected Output*	*Person(s) Responsible*
	26	27	28	29	30	31	1		
[1] Formulation of results and discussion		X	X	X					Cubillo De Claro Dedicatoria
Activity/Task	*January*							*Expected Output*	*Person(s) Responsible*
	2	3	4	5	6	7	8		
[1] Formulation of results and discussion		X	X	X	X	X	X		Cubillo De Claro Dedicatoria
Activity/Task	*January*							*Expected Output*	*Person(s) Responsible*
	9	10	11	12	13	14	15		
[1] Conclusion and recommendation	X	X	X	X	X	X	X		Cubillo De Claro Dedicatoria
Activity/Task	*January*							*Expected Output*	*Person(s) Responsible*
	16	17	18	19	20	21	22		

[1] Conclusion and recommendation	X	X	X	X	X	X	X		Cubillo De Claro Dedicatoria
Activity/Task	*January*							*Expected Output*	*Person(s) Responsible*
	23	24	25	26	27	28	29		
[1] Conclusion and recommendation	X	X	X	X	X	X	X		Cubillo De Claro Dedicatoria
Activity/Task	*January/February*							*Expected Output*	*Person(s) Responsible*
	30	31	1	2	3	4	5		
[1] Finalization of study	X	X	X	X	X	X	X		Cubillo De Claro Dedicatoria
Activity/Task	*February*							*Expected Output*	*Person(s) Responsible*
	6	7	8	9	10	11	12		
[1] Finalization of study	X	X	X	X	X	X	X		Cubillo De Claro Dedicatoria
Activity/Task	*February*							*Expected Output*	*Person(s) Responsible*
	13	14	15	16	17	18	19		
[1] Finalization of study	X	X	X	X	X	X	X		Cubillo De Claro Dedicatoria
Activity/Task	*February*							*Expected Output*	*Person(s) Responsible*
	20	21	22	23	24	25	26		
[1] Preparation of Final Defense	X	X	X	X	X	X	X		Cubillo De Claro Dedicatoria
[2] Adviser Consultation	X	X	X	X	X	X	X		
Activity/Task	*February/March*							*Expected Output*	*Person(s) Responsible*
	27	28	1	2	3	4	5		
[1] Preparation of Final Defense	X	X	X						Cubillo De Claro Dedicatoria
[2] Adviser Consultation	X	X	X						
[3] Final Defense				X				Final Defense	
[4] Necessary Adjustments					X	X	X		

Activity/Task	*March*							*Expected Output*	*Person(s) Responsible*
	6	7	8	9	10	11	12		
[1] Necessary adjustments	X	X	X	X	X	X	X	Revised Maniscript	Cubillo De Claro Dedicatoria
Activity/Task	*March*							*Expected Output*	*Person(s) Responsible*
	13	14	15	16	17	18	19		
[1] submission of final manuscript				X				Final Manuscript	Cubillo De Claro Dedicatoria

453