

## Traffic Characteristics of the University of Northern Philippines

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### Abstract

*This paper aimed to present the traffic characteristics of the University of Northern Philippines. The highlight of this research endeavor is based on the assumption that a well coordinated traffic scheme will not only bring a better road traffic that would eliminate conflicts among pedestrians and vehicles but also to maintain safety and to guarantee the comfort of all the members of the UNP community. The traffic regulation of the university should package ways and means to improve the mobility conditions for those who go in and out of its premises, be they are vehicles of students, university employees or clients.*

### Introduction

#### Background of the Study

Because of the ballooning population of the University of Northern Philippines, the oldest university north of Manila, the demand for mobility is expected to increase. It is, thus, imperative to put under thorough rules and regulations the ingress and egress of vehicles in the campus.

So far, there have been no studies conducted to determine the traffic flow of vehicles, members of the UNP community and clients. Hence, the researchers conducted this study as an initial database on traffic flow which will encourage the Civil Security Services Department (CSSD) and other offices which are in charge of planning to formulate or devise an efficient and a well-coordinated traffic flow in the campus.

#### Objectives of the Study

The general objective of the study is to describe the University of Northern Philippines traffic study characteristics.

Specifically, it aimed to:

1. Characterize the road networks of the university;
2. Identify the traffic control device used in the campus;
3. Determine the volume of vehicles entering/exiting in the campus;
4. Identify the peak hour period when vehicles are in the campus;
5. Establish parking information in the university; and
6. Formulate mitigations to ensure efficient flow of vehicles in the university.

## **Methodology**

The research is exploratory in nature. The primary data in this research endeavor is the characterization of the road networks, description of traffic control, traffic volume, and volume of vehicles parked in the campus.

The data were gathered on a regular weekday. The surveyors or enumerators made use of the manual counting in determining the volume of vehicles and classifying the type of vehicles or mode of transportation. The researchers gathered some preliminary information relative to the flow of traffic in the campus and the road conditions.

## **Review of Related Literature**

To have a better understanding of the concepts pertaining to the study, the researchers presented the following readings which were reviewed from different authorities.

Traffic counts are the most basic of all parametric studies as volume (or rate flow) is the unit to quantify traffic demand or the amount of traffic. Thus, volume is a parameter most often used to quantify demand. It is also used in planning, design, control, and operation and management analyses. In traffic studies, the result in the observation and measurement of conditions as they exist in the present current observations do not indicate what will be in the future and do not reflect constraints in the existing highway system that may prevent vehicles from accessing a desired link or section of the system.

The peaking characteristics of streets and highway systems can be determined through analyses of traffic count data. The peak period is generally the weekday morning (7-9 am) and evening (4-6 pm) peak hours, although local area characteristics occasionally result in other peaks (e.g. at major shopping or recreational centers). However, care should be taken to consider the potential changes in peaking characteristics over time, particularly in growing areas (Bochner, 1991)

Traffic flow is the subject to three basic characteristics with variations. These are the trends, which are no repetitive changes over extended periods of time (perhaps several years) the peaking patterns, which are repetitive changes over time intervals such as a day, week or years; and the random variations. A major objective of the analysis of flow data is to separate the effects of these different types of variations (Bank, 1998).

Parking facilities are considerably important in traffic engineering. Most urban regional commercial centers are accessed primarily by automobiles. The viability of these areas depends on a large part on the availability of convenient parking facilities adjacent to or easily accessible to desired considerations. In major activity centers, off-street parking facilities must be regulated. These comprehensive parking programs involve planning, design, construction, operation, and financing of parking facilities, as well as placement and enforcement of parking regulations (Roess, 1990).

### **History and Characteristics of the Site**

University of Northern Philippines is located at barangay Tamag in the heart of Vigan. Vigan, the capital of the province of Ilocos Sur became a UNESCO World Heritage Site on December 2, 1999. It is bounded on the north by the Municipality of Bantay, on the east by the Municipality of Santa, on the south by the Municipality of Caoayan, on the west by the Municipality of Sta. Catalina, and on the southwest by the China Sea. It is 408 kilometers north of the City of Manila, 80 kilometers from Laoag City and 139 kilometers from San Fernando, La Union, the government center of Region I. Vigan, like the rest of the Ilocos region, undergoes two distinct seasons - the dry season and the wet season. The dry season normally commences from November reaching its peak during the torrid months of April and May. The wet months are from July to September, with the month of August as the wettest period. Normally, the average annual rainfall is 228.82 centimeters. The average annual maximum temperature is 30.9°C, whereas the average annual minimum temperature is 23.2°C. The average relative humidity is 81%. With regards to the topography of the place, the terrain is generally flat, but a flat slope of 15 degrees is found in some parts of Tamag and Paoa. The hills are already denuded.

The university is accessible because the province has sufficient transport system. There are four Bus Companies operating within the vicinity of Vigan and they are the Dominion Bus Corp., Partas Trans. Co., Viron Bus Corp., and Aniceto Transportation. They operate direct bus services from Vigan to Manila, Baguio, Laoag and other parts of Luzon. Other mode of transport within the municipality is purely land based. Vehicles for public use include jeepneys, tricycles and calesas. Buses, Mini-buses and jeepneys provide transportation to students and employees of the university especially those who are from places outside Metro Vigan. Upon reaching Metro Vigan, one is serviced by tricycles, which are color-coded for purposes of identifying the municipality to which they come

from. The tricycle number is permanently attached on top of the side car specified by different colors; green for Vigan, red for Bantay, yellow for Caoayan, orange for San Vicente and blue for Sta. Catalina. A horse drawn vehicle, locally called "calesa" is also servicing the locality. Like the City of Vigan, which implements a new traffic scheme that facilitates a more coordinated traffic flow and increase the capacity of the roads in the city, the University of Northern Philippines is also implementing its own traffic scheme in the university campus (see Figure 1 for the traffic flow). This will ensure and enhance the traffic safety among members of the university community. Geometric improvements are present within the university (e.g. sidewalks, new roads, canals).

## Results and Discussion

### Characterizing the Road Network

The road network is shown in Figure I. It describes the flow of vehicles in the campus. The main gate of the university has an access to the arterial road of Quirino Boulevard. The second gate is located at the northwestern part of the campus and has an access to Rizal Street. The descriptions of the road in the campus are presented in Table I. The university main road which is the Crisologo Drive, has a total length of about 412 meters and has an average carriageway of 5 meters except at the front of the Administration Building to the College of Teacher Education and College of Technology to College of Business Administration and Accountancy which is 7 meters wide. Most of the roads are concrete and in good condition except for Diego Silang Road and Santiago Road because it is rough or unpaved and concrete with a damaged pave, respectively.

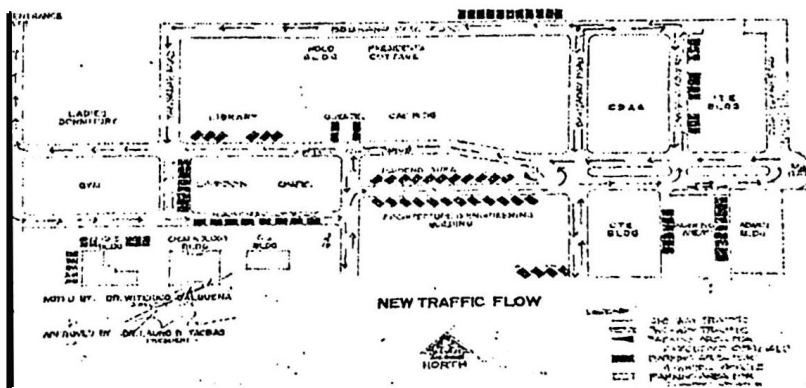


Figure I. Traffic Scheme of the University of Northern Philippines

Table 1. Characteristics of the Roads in UNP Campus

Name of the Road	Length (meter)	Average Carriageway (meter)	Pavement Condition
Crisologo Drive	412	5.0	Concrete pavement in good condition.
Borroro Drive	65	5.0	Concrete pavement in good condition
Basi Revolt Road	278	5.0	Concrete pavement in good condition
Diego Slang Road	202	5.0	Rough road/unpaved
Santiago Cove Road	91	5.0	Asphalt not in good condition
Bantacay Road	174	5.0	Concrete in good condition
Bessang Pass Road	308	5.0	Concrete pavement in good condition
Tangadan Road	75	5.0	Concrete pavement in good condition

### Photographs of Road Conditions

The UNP Main Gate is found at the eastern part of the campus



The Crisologo Drive beside the Administration Building and College of Teacher Education



Crisologo Drive beside College of Technology and CBAA



Crisologo Drive beside Science Complex and Students Park



Bantaoay Road beside CBAA, Guidance Office, CAS and SC Bldg.



Diego Silang Road beside College of Technology



Santiago Cove beside College of Technology and CBAA



Bessang Pass going to the President's Cottage



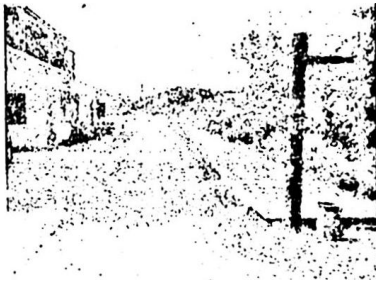
Bessang Pass beside Tandem Office and Ceramics Bldg.



Tangadan Road beside Main Library and Ladies Dormitory



Basi Revolt beside Graduate School, College of Criminology and College of Health Sciences Bldg.



Basi Revolt Road beside UNP Gymnasium



Northwestern Gate beside Ladies Dormitory

### Traffic Control

The traffic control devices used as signs, road markings, parking restrictions and directional signals in the selected roads in the university campus are presented on Table 2. Most of the traffic control devices are found in Crisologo Drive, which is the main road of the university and used as a major access to the different roads and buildings in the campus.



**Table 2. Locution of Traffic Control Devices in Selected Roads in the UNP Campus**

Name of Road	Traffic Control Device/Signs	Number	Existing Adjacent Land Used
Crisologo Drive	• Slow down, keep right	1	Guard House
	• Parking area this way	1	Administration Building
	• Parking for VPPRE, VPAD, VPAA	1	Administration Building
	• Parking area inside	1	Quadrangle
	• Exit for motor vehicles	1	ROTC Building
	• No parking	2	CBAA, College of Technology, Science Complex
	▪ Humps	5	Science Complex, Guestel, Gymnasium
Basi Revolt	• No entry (one way)	1	Graduate School
	• No double parking	1	Chapel, Graduate School
	• Humps	2	Graduate School, Criminology Building
	• No double parking	1	Gymnasium
Bessang Pass Road	• Humps	3	Alumni House President Cottage Roco Bldg.
Santiago Cove Road	- Hump	1	CBAA, College of Technology
Bantaoy Road	- Hump	1	CBAA, Guidance Office

### Traffic Flow

The vehicular volume during the eight (8) hour survey is presented on Table 3. It is noticed that there are 1,786 vehicles that have entered in the university campus during the conduct of the pilot survey held on August 3, 2005 (Wednesday). Majority of the modes of transport that have entered the university campus were tricycles, followed by motorcycles, then cars (e.g. automobile, Van, owner type jeep). Buses and trucks registered the least number of transport mode that entered the campus. It is also revealed on Table 3 that the volume or flows are 129.5 and 93.75 vehicles per hour for both the eastern gate (main gate) and the northwestern gate (exit gate), respectively/

**Table 3. Distribution of Vehicles Entering the Campus During the 8-Hour Survey**

Motor-ode	Vehicle Classification			Total	Vehicle Classification				Total		
	Northwest Gate				North Gate						
	Motorcycle	Tricycle	Car		Tricycle	Car	Bus	Truck			
8:00-9:00	4	67	3	23	3	0	4	1	19	109	
9:00-10:00	2	15	33	2	19	11	31	1	162	22	
10:00-11:00	29	26	2	1	82	1	19	1	6	116	
11:00-12:00	30	30	2	2	94	10	19	1	0	3	17
12:00-1:00	81	53	41	0	175	51	15	2	1	92	267
1:00-2:00	8	30	55	0	169	15	13	39	2	99	248
2:00-3:00	2	20	15	0	0	1	6	1	0	101	
3:00-4:00	52	35	38	0	125	42	13	6	0	5	131
Total	38	353	307	8	13	ml	34	18	7	3	18
%	35.52	34.07	29.64	0.7	10	30.80	45.87	22.41	0.93	100	100
% Total	Volume of	Flow = 12.5 rel. per hour			58.01	Flow = 93.75h. per hour				100	100

Table exhibits the distribution of vehicles that have exited the campus. There are 1,811 vehicles that have left the university during the eight-hour pilot survey. This exceeds the total number of vehicles that have entered the university by 25. This is expected because there were already vehicles that entered the university premises before the conduct of the survey. It is reflected on table 4 that the flow of exiting is 227 vehicles per hour.

**Table 4. Distribution of Exiting Vehicles in the Campus during the 8-Hour Survey**

Motor-ode	Vehicle Classification				Total
	Northwest Gate				
	Motorcycle	Tricycle	Car	Bus/truck	
8:00-9:00	30	219	1	0	280
9:00-10:00	1	160	8	2	211
10:00-11:00	42	51	45	1	139
11:00-12:00	68	56	11	1	209
12:00-1:00	88	62	25	1	102
1:00-2:00	45	48	41	2	133
2:00-3:00	82	31	12	1	156
3:00-4:00	132	76	67	0	275
Total	501	700	599	8	1811
%	27.66	3.2	33.07	0.17	100
Volume of	Flow = 2.1 rel per hour				100

### Peak Hour Period

It is noticed on Table 5, that the peak hour period is observed from 8:00-9:00 in the morning. Majority of the vehicles that entered in the university campus during this period are tricycles. This is followed by cars and single motorcycles. It is suggested that the university officials who are managing the traffic in the university should regulate the ingress and egress of these vehicles in the campus.

Table 5 presents the distribution of vehicles entering the UNP Campus during the peak hour period. There are 230 and 179 different transport modes that entered at the main gate and at the northwestern gate, respectively. It is depicted on Table 5 that 114 or 49.56% vehicles have entered at the main gate are tricycles. Meanwhile, 107 or 59.77 % of the vehicles that entered at the northwestern gate are tricycles.

**Table 5. Distribution of Vehicles Entering the UNP Campus During the Peak Hour Period (8:00-9:00 A.M.)**

Vehicle Classification	Eastern Gate ( Main Gate)		Northwestern Gate (Exit Gate)	
Motorcycle	46	20.00	30	16.75
Tricycle	114	49.56	107	59.77
Car	67	29.13	41	22.90
Bus/Truck	3	1.31	1	0.58
<b>Total</b>	<b>230</b>	<b>100.00</b>	<b>179</b>	<b>100.00</b>

### Parking

The distribution of vehicles parked during the survey conducted at 9:00 to 10:00 in the morning of February 15, 2007 (Thursday) is presented on Table 6. It is observed that majority of the vehicles that are parked in the UNP campus are motorcycles as reflected in the table with a total of 170 units. This is followed by cars at 107, 70 of them are scooters. With regards to the vehicles without plate numbers, there are 108 of them - 57 and 51 for scooters and motorcycles, respectively. It is observed that students just park their vehicles outside the campus majority of which do not have plate numbers.

**Table 6. Distribution of Vehicles Parked during the One Hour Survey (9:00-10:00) AM, February 15, 2007**

	Type of vehicle					Total	Type of vehicle without plate number		Total
	motorcycle	scoter	tricycle	car	bus/truck		motorcycle	Solet	
besides TE Dg., Adm. Bldg. (Quadrangle)	4	1		25		15	15	5	20
In front & beside g's Bldg.	15	5		13		33	6	3	9
In front of Grad. School Bldg.	4	3		5	1	13		2	2
In front of IIS Bldg.	5	2	1	15		3			
In front of Criminology Bldg.	9	2		6		17			
Besides Guesiel		4		2		6		3	3
In front & beside Main Library	12	6		8		2	2	6	8
Besides BIA Bldg., CIS Bldg. and College of Technology	2	11	1	18		5	5	11	1
Along Jessang Pass Road	8	3		15		2	3	3	6
Outside IN? (Northeastern part)	3	19				58	10	19	29
Outside IN? (Northwestern Gate)	1	5				21	1	5	15
Total	70	70	8	107	1	35	51	57	108
Percent	47.75	47.75	2.25	30.05	0.29	100	14.32	16.01	30.33

Table • Suggested )litigations to Ensure Ellicient Flow of Vehicles in the (Campus

Cause	Mitigation
High volume of vehicles entering the campus	<ul style="list-style-type: none"> <li>● Revisit the issuance of gate passes</li> <li>• Tricycle/public vehicles should use the northwestern gate for entrance and ply at the Blasi Revolt Road left turn to Barroro Road, left turn to Risologo Drive and exit at the northwestern gate. Another may be to enter at the said gate, left turn at Rasi Revolt, turn in front of the Gymnasium, or may take Tangadan Road then back to the exit.</li> </ul>
Indiscrimination of Loading and unloading of tricycle in the campus	<ul style="list-style-type: none"> <li>• Identify specific points for tricycles/public vehicles from buildings where classes are being held</li> </ul>
High parking demand	<ul style="list-style-type: none"> <li>• Identify parking spaces ( on-street parking shall not be allowed)</li> </ul>
Related transportation problem such as noise pollution	<ul style="list-style-type: none"> <li>● Regulate the use of two-stroke motor engines for tricycle that enters the campus</li> </ul>

### Conclusion and Recommendations

1. Based on the information gathered, the flow or volume of vehicles that enter in the university campus through the main gate (eastern gate) and the northwestern gate are 130 and 93 vehicles per hour, respectively. On the other hand, the exiting flow is 227 vehicles per hour. The number is very alarming and it might cause traffic congestion in the future. The problem posed by traffic congestion must either be reduced or eliminated through several measures, one of which is to encourage carpooling.

2. Another way to ease traffic congestion is to limit the entry of vehicles, especially tricycles. The use of non-motorized vehicles or bicycles as mode of transportation in entering the university should also be encouraged.

3. The university should provide a low cost means of transportation. A school bus as a transport mode for the members of the UNP community will not only reduce the number of vehicles entering/exiting the campus but will also cut down the number of vehicles plying the streets of Vigan City.

4. The university should provide parking lots for the different types of vehicles and should encourage the owners of vehicles to secure gate passes.

5. It is also recommended that the owner of a vehicle without a plate number should secure one to ensure the legitimacy of the vehicle.

6. The university should adopt traffic engineering policies by considering standard traffic control devices as indicated in the International Convention on Road Traffic Signs which the Philippine government had implemented through the DPWH Philippines Road Signs Manual (revised edition) as published in 1982.

## References

- Asano, Misuyuki, 1994, *Urban Development and Transportation Policy*. Transportation Infrastructure Improvement in Developing Countries. NCTS, University of the Philippines,
- Azicate, Enrico R. 1994. *Aspects of Transportation Policy Development: A Historical Analysis of the Philippine Model*. Transportation Infrastructure Improvement in Developing Countries. NCTS, University of the Philippines.
- Brian S. Bochner, 1991. *Transportation Planners Council Task Force on Traffic Access/Impact Studies*. Traffic Access and Impact Studies for Site Development, Institute of Transportation Engineers
- Gozun, Brian C. 2003., *Attitudinal Factors Toward Cycling as a Transport Mode for School Trips*, Transportation Research in the Philippines, A Compendium of Graduate Theses in Transportation (1993-2003). U.P. NCTS,
- Japan International Corporation Agency, 2001. *Short Term Traffic Improvement Measures for Metro Manila*, Metropolitan Manila Development Authority.
- Kyte, Michael., *Capacity Analysis of Unsignalized Intersections*. Transportation Research, An International Journal, Part A: Policy and Practice, Vol. 33A, No.3/4 April-May 1999, ISSN 0965-8564
- Otadoy, Bong E. 2003. *Urdaneta Prepares P228-M Project to Ease Traffic*, www.manilatimes.net Northern Luzon Bureau, June 2,
- Pak-Poy, P.G. & Associates and Engineering and Management Project. 1977., Ministry of Public Highways, *A Guide to Traffic Engineering and Management Techniques*.
- Roess, Roger P & McShane, William R. 1990. *Traffic Engineering*. New York: Prentice-Hall, Inc.
- Transportas in Association with UP-NCTS, *Traffic Management Manual for Local Government Units*, Nov. 2001, JICA.
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