Evaluating the Effectiveness of Traffic Schemes for an Open Campus

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Abstract: Through traffic using streets in residential areas as alternate routes to bypass congested arterials and other roads impose externalities on the residents. These include emissions, noise and road crashes involving vehicles and pedestrians. As such, there are efforts to try to reduce through traffic in order to reduce its negative impacts. Among such efforts are the formulation and implementation of traffic schemes as well as the use participatory methods. A university campus whose roads are open to general traffic has similar characteristics as a residential area although the nature of land use generates more traffic. Nevertheless, a good environment is desirable and schemes are developed to achieve this. This paper presents the case of a university whose roads are open to general traffic. Traffic schemes are evaluated based on their effectiveness in reducing unwanted traffic. Recommendations are made on how to sustain such schemes and their transferability to other cases.

Key Words: TDM, through traffic, campus

1. INTRODUCTION

1.1 Background
The University of the Philippines (UP) campus in Quezon City covers an area of 493 hectares. Its location is strategic in that it is between two major thoroughfares – Commonwealth Avenue and Katipunan Avenue. In a macroscopic scale, Commonwealth and Katipunan are parts of the major arterial system for Metro Manila where Commonwealth is also referred to as Radial Road 7 (R-7) and Katipunan is known as Circumferential Road 5 (C-5). These two roads are connected directly by Tandang Sora Avenue, which appears to be part of C-5 because the north alignment of the latter is yet to be completed.

Since Tandang Sora Avenue is narrow (only two lanes) and there is significant paratransit traffic in the form of tricycles (three-wheeled vehicles composed of a motorcycle with a side cab), traffic can be very congested. Thus, many vehicles choose to use other roads between R-7 and C-5. Due to the location of the university, its roads have been used by traffic between the major roads and this necessitated the construction of a bypass road (C.P. Garcia Street) with 4 undivided lanes to reduce through traffic along campus roads. This bypass road, however, has become very congested especially since the road is used by trucks and often has pavement of poor condition. As such, many private cars prefer to go through the campus instead of using the bypass road. Many of these vehicles are bound for schools along C-5 to the south of the UP and many also are bound for C-5 and will continue on to other cities with the objective that is to bypass the usual route along EDSA (C-4).
The campus also has a peculiar land use as shown in Figure 2. Aside from the academic nature of the university, there are also commercial and residential areas, and even those allocated for government agencies. Residential areas include those that are intended for other land uses but are currently occupied by informal settlers or squatters.

A Transportation and Traffic Management Plan was completed in 2007 (NCTS, 2007) with the assistance of private sector partners. In the study, the negative impacts of unwanted traffic...
inside the campus were examined. These included emissions, noise and road safety issues. The Plan served as the basis for transport and traffic management in the UPD campus including the implementation of a one-way traffic circulation in the Academic Oval.

1.2 Objectives
The objectives of the research are as follows:

- To present the case of an open campus where roads can be used by general traffic when traveling, for example, between two major roads and bypassing a congested road;
- To examine the impacts of traffic schemes implemented since 2007;
- To formulate recommendations on sustainability as well as transferability of the schemes to other cases.

2. TRAFFIC SCHEMES
There are several traffic schemes currently being applied in the university as a result of the implementation of the recommendations of the traffic study conducted in 2007. Among these schemes are the following:

- Rerouting of public transport – to address the demand in the campus, particularly in areas where College of Science and Engineering buildings are being constructed.
- Scheduled opening of gates – some gates are open only during certain periods in the morning (0500 to 0900) and afternoon (1500 – 1900) to facilitate traffic flow during the peak hours. They are closed to all traffic during other times of the day.
- One-way oval – the core of the campus is associated with the Academic Oval, a 2.2-kilometer road along which the main buildings in the campus hosting the colleges are located.
- Restricted entry/ID card policy – all gates except the main gate along University Avenue have guards posted who require identification from persons driving vehicles entering or exiting the university. No ID means no entry or exit for vehicles. Thus, one can only freely enter or exit via the main gate.
- Sticker system – implemented to facilitate identification of vehicles and in lieu of presenting a valid identification card at the gates.

The sticker system was also proposed in 2007 but was only implemented in June 2010 after many consultations with various stakeholders including faculty, staff and students. The scheme was designed to limit the number of vehicles entering the campus core by discouraging through traffic. The sticker policy, however, was implemented on a voluntary basis due to some opposition to the fees being charged for the stickers. A compromise was made where faculty, students and staff were allowed to use their ID as their pass to the gates. Vehicles carrying persons not having any ID would be turned back at the gates whether they are entering or exiting but with the exception of the main gate along University Avenue where passes are not required. Alumni were also accommodated where in lieu of a valid university ID, they were allowed to use their alumni ID as their pass.

Since June 2010, a total of 2,104 stickers have been issued. Stickers are classified according to the users and are color-coded. These have an effective period of one academic year, that is, from June 2010 to May 2011, so as to coincide with the academic cycle for both students and faculty of the university. Table 1 shows the different stickers (i.e., color-coded) that have been issued by
the university. Note that most stickers issued have been for employees and students of the university. Only, it is not known how many alumni have stickers despite many not having any formal business or purpose with the university. This remains an issue whether they should have the same benefits as current employees and students.

<table>
<thead>
<tr>
<th>Sticker color</th>
<th>Users</th>
<th>Number Issued</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maroon</td>
<td>Employees (Faculty, researchers and staff) and Alumni</td>
<td>920</td>
</tr>
<tr>
<td>Green</td>
<td>Students</td>
<td>944</td>
</tr>
<tr>
<td>Yellow</td>
<td>Businesses inside the university</td>
<td>157</td>
</tr>
<tr>
<td>Black</td>
<td>Residents (not connected with the university)</td>
<td>83</td>
</tr>
<tr>
<td><strong>Total number of stickers issued</strong></td>
<td></td>
<td><strong>2,104</strong></td>
</tr>
</tbody>
</table>

3. TRAFFIC ROUTES

Figure 3 shows the typical routes of private vehicles from Commonwealth to Katipunan in 2007. Since then, gates have been constructed along all entry /exit points with the exception of the main entrance along University Avenue. Also, since the gates were constructed, either Magsaysay Avenue Shuster Street had been closed to traffic.

Figure 3 Routes of private cars from Commonwealth Avenue to Katipunan Avenue in 2007 (base map courtesy of UP)

Figure 4 shows the typical routes of vehicles from Commonwealth to Katipunan after most the gates have been constructed and during the construction of the Magsaysay gate that
necessitated its closure and the routing of traffic to the Shuster gate. The figure shows the typical routes as of the time the traffic counts and license plate surveys were conducted.

![Figure 4 Present routes of private cars from Commonwealth Avenue to Katipunan Avenue (base map courtesy of UP)](image)

4. DATA COLLECTION

4.1 Primary data
Traffic data collection included vehicle counts at all the gates of the university core. These counts were limited to private cars and motorcycles. Note that public transport, primarily jeepneys, have fixed routes serving the university and are limited in number while logistics vehicles such as trucks are generally restricted from entering the campus.

License plate surveys were conducted to trace vehicle entries and exits. License plate data from entrances are matched with data from exits. Times of observation recorded in the survey would allow for the determination of whether matching plates correspond to through traffic. That is, a reasonable travel time range from entrance to exit can be determined and employed to qualify whether the vehicle will be counted as through traffic that have no business with the university. Data from the license plate surveys are used for comparison with the outcomes of the 2007 study. Surveys in 2010 and in 2007 both targeted 100% sampling of vehicles with the exception of public transport and motorcycles. The survey stations are shown in Figure 5.
4.2 Secondary data

Most of the secondary data used for this paper were derived from the 2007 study. License plate surveys at the time yielded the results shown in Table 2 for traffic generally coming from Commonwealth to Katipunan during the 6:00 AM to 8:00 AM period that coincides with the morning peak period.

<table>
<thead>
<tr>
<th>Survey Station</th>
<th>Number of samples entering</th>
<th>Total number of matches at exits</th>
<th>% Matching</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Avenue</td>
<td>1,890</td>
<td>433</td>
<td>22.91</td>
</tr>
<tr>
<td>Ylanan Street</td>
<td>1,715</td>
<td>684</td>
<td>39.88</td>
</tr>
</tbody>
</table>

Note: Samples do not include public transport.

The results in 2007 indicate a significant number of traffic passing through the campus via roads indicated in Figure 3. Plates recorded at key entry and exit points from Commonwealth Avenue via the University Avenue and Ylanan Street matched with a combined 31% at key exit points at Magsaysay, Velasquez and Jacinto Streets. This figure is derived from the combined volumes entering University Avenue and Ylanan Street, which are the most logical entry points from Commonwealth Ave. These three exit points eventually lead to Katipunan Avenue. As such, an estimated 69% of the traffic entering can be assumed has having a purpose with the university and are absorbed mostly by parking areas around the campus. The surveys involved 100% sampling of cars and other vehicles other than public transport and motorcycles. Note that there has been no change in the number of jeepneys allowed to enter the campus. Meanwhile, motorcycles were not considered since these are few in number and do not cause congestion within the campus while at the same time, difficult to observe (i.e., difficult to read their license plate information).
5. RESULTS AND ANALYSIS

Table 3 shows the results of license plate matching from the 2010 data set and the percentage reduction in through traffic. The period considered is the same 6:00 AM to 8:00 AM period considered for the 2007 study.

<table>
<thead>
<tr>
<th>Survey Station</th>
<th>Number of samples entering</th>
<th>Total number of matches at exits</th>
<th>% Matching</th>
<th>% Reduction from 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>University Avenue</td>
<td>857</td>
<td>65</td>
<td>7.58</td>
<td>66.91</td>
</tr>
<tr>
<td>Ylanan Street</td>
<td>886</td>
<td>161</td>
<td>18.17</td>
<td>54.44</td>
</tr>
</tbody>
</table>

Note: Samples do not include public transport.

Overall, the % matches is 12.97%, which accounts for a 58.13% reduction in through traffic for the university. The reduction of the volume of traffic is also significant with a decrease of 54.66% for entries along University Avenue and 48.34% decrease for entries along Ylanan Street. Such traffic was restricted from entering the university by the traffic schemes or policies being implemented and instead uses C.P. Garcia Street, which is usually congested during the peak periods. In fact, the traffic along C.P. Garcia for the same direction reaches 3,396 vehicles for the same period, of which 2,456 vehicles are cars and 444 vehicles are trucks (i.e., trucks are not allowed in the university with few exceptions). These outcomes clearly indicate the success and positive impacts of the traffic schemes implemented assuming a direct correlation between traffic and its associated externalities.

6. CONCLUSIONS

It is clear from the results presented in the previous section that the total number of vehicles entering the campus from Commonwealth and exiting to Katipunan has significantly decreased. This is likely the result of the different traffic schemes implemented since 2007. In particular, the most effective schemes seem to be those that involved the restriction of vehicle entries and exits at the university’s gates. Specifically, license plate surveys have also confirmed that there is a significant decrease in through traffic considering the trace of vehicles and the comparison with similar analysis performed in 2007.

In similar campuses, it is desirable to have an environment that is both safe and pleasing. By pleasing, it is associated with what we might define for a neighborhood as having a good quality of life based on indicators such as noise, air pollution as well as security. Thus, the schemes presented and discussed in this paper may also be transplanted and implemented in other situations other than for a predominantly academic land use.

In fact, the schemes presented at UP are part of what is called a model traffic safety zone that has already been replicated but this time in a residential area in the southern part of Metro Manila. Similar success has been reported but after future validation should prove that policies and schemes intended to improve quality of life in an academic area may be applied to a residential area and vice versa. The only caveat is that the university setting presents a larger scale considering its network of roads. Nevertheless, the same principles apply and should lead to improvement in the conditions associated with traffic.
ACKNOWLEDGEMENTS

The author would like to express his gratitude to the University of the Philippines Diliman administration and Geodetic Engineering Department for secondary data and support in the implementation of surveys. Surveys conducted in 2010 were funded by the EASTS for IRG-10 (Sustainable Neighborhood Transportation to Improve Quality of Life in Developing Cities).

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