Self Financing Development Driven Transportation System

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ABSTRACT

One of the compulsory elements for developers to obtain the development order from the approving authority is the submission of a traffic impact assessment report. The report should cover the assessment of the transportation system before and after or with and without the development project and proposal to mitigate the impact of the development to the transportation system. At present, developers are allowed to implement the mitigation project on piece meal basis by staggering the construction of the access road, the junction with the main road and the improvement along the main road. However, this practice is not sustainable since the construction works is normally completed only toward the end of the project and the impact of the development has been conserved by the authority and the road users. The situation is still manageable by the authority for a single or isolated development but not for multiple or composite developments that will require a systematic and strategic approach in tackling the traffic impact as experienced by the city halls in Malaysia. Fund to implement the planned transportation system is normally made available by the Federal Government since the transportation image of the cities carry national pride but the case may not hold true for other towns. As an option, this paper will explore on the challenges and opportunities for devising a self financing development driven transportation system through coordinated traffic impact assessment.

Keywords: Traffic impact assessment (TIA); Land Use, Transportation system

1. INTRODUCTION

Traffic impact assessment (TIA) study has been practiced in Malaysia by the local authority as part of the submission for obtaining the Development Order of a new development. Draft TIA Guidelines (2005) proposed that a set of standard criteria and trigger levels for the conduct of a TIA study be adopted by the authorities as follows:

- Additional of 150 vehicle per hour is added from the new development to the road network during the peak hours or
- Additional 200 vehicle per hour is added from the new development to the road network during the off peak hours or
- The scale of the residential use of the new development is more than 200 dwelling units or

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- The scale of the commercial use of the new development is more than 45,000 square feet.

All the four criteria must be tested, and if any one of the criteria reaches the trigger level, then a TIA study shall be required. However, in specific cases whenever the authorities deem fit, TIA shall be required even if the added trip generation may be lesser than the trigger levels.

The main goal of the current traffic impact assessment approach is to obtain the approval of the authority on the proposed traffic mitigation and management measures as to counter the impact of the proposed development to the prevailing transportation system. According to A. Zulkiple, et. al. (2005), the step for obtaining the approval commencing with the appointment of the traffic impact assessment consultant by the developer and ending with the approval of the approving authority of the traffic impact assessment study proposals. A. Zulkiple, et. al. (2004) also proposed standard practices by all traffic consultants which are one of the vital elements for building up transportation system GIS data base. The outcomes of the TIA study are supposed to be implemented by the developer with the supervision of the authority. The developer has no problem to comply with any traffic mitigation plans proposed inside the compound of the development area since this will help in the sale of the proposed development units. However, the construction of the access road and the intersection with the main road is normally limited to priority or signalized intersection that is low cost in nature and can sustain short to moderate term traffic demand. It is a very rare that the access road and the intersection can sustain long term traffic demand since along the way, other developers might just request to obtain access to the same intersection via the same access road and the service life of the access road and the intersection become shorter. The problem is exaggerated by passing through traffic from new development outside the area of influence of the proposed development which cannot be accounted for during the TIA study process. As it happening, the traffic congestion problem become complex and simple solution such as readjusting the traffic signal timing and widening of the intersection are not effective anymore. A more costly solution such as constructing an interchange and constructing additional lane are more effective but is yet the best solution. The best solution would be the implementation of a comprehensive public transport system that will require along term planning right from the inception of an isolated development within the town. At this time however, the developers are not around and they are also not liable anymore to contribute in any format for the construction of the proposed infrastructure.

2. OBJECTIVE OF THE PAPER

This paper will emphasize on the issues of implementing the isolated traffic impact assessment proposal as per the current practice, explain about the effort to produce a coordinated traffic impact assessment within a study area and outline of the idea of initiating a self financing development driven transportation system for a town.

3. LAND USE DEVELOPMENT WITH UNCOORDINATED TIA PROPOSALS

3.1 Limitations of TIA Proposals

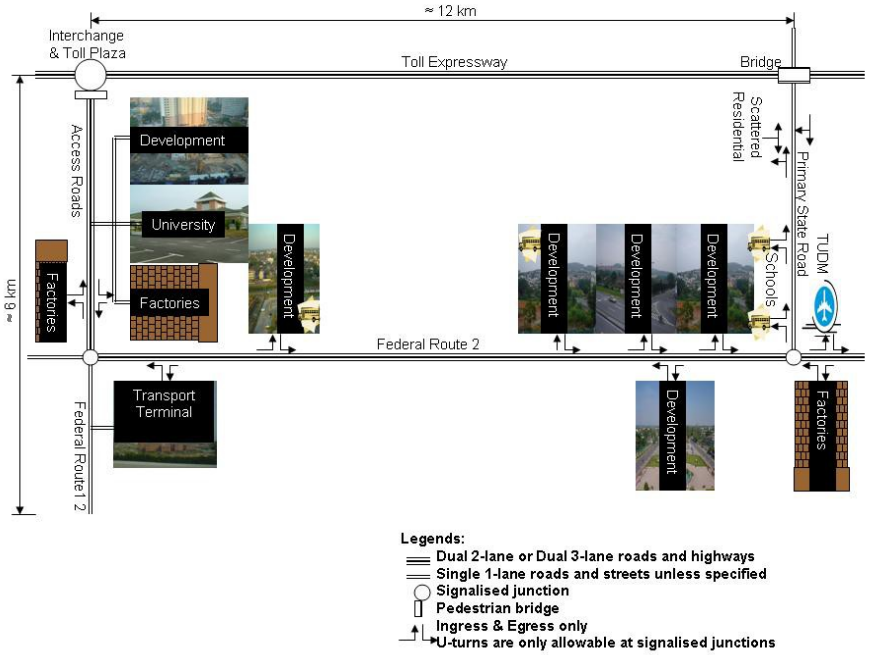
A TIA is an important tool to determine the transportation and traffic impact of a proposed site development project on the surrounding traffic and transportation systems upon full development. It identifies the need for mitigation measures for a transportation system to reduce congestion, as well as to maintain and improve safety. Although TIA should not replace an area-wide or regional transportation studies, they provide the authorities, planners and developers a framework in making critical land use and site planning decisions regarding traffic and transportation issues. Local Authorities may also use TIA as basis for levying impact fees or assessing developer contributions to road improvements. Since TIA is classified as a transport action plan as per HPU (1995) therefore, TIA is a short-term plan that is less than 3-year, designed specifically to address existing traffic problems. The measures incorporated within a transport action plan are relatively low-cost and designed just to make more efficient use of existing road reserve. Due to its time constraint and concentration on certain measures, it is unlikely that any transport action plan will, by itself, be able to fully resolve the traffic problems of a major urban area. Normally, full resolution of such problems will require long-term commitment to more extensive programs that involved high construction cost and demand management.

3.2 Demonstration of Land Use and TIA Proposals

Next, let take a look at a simple demonstration about land use development and the implementation of TIA proposals for the study area. It will demonstrate that there are traffic and bus service related problems as the consequences of uncoordinated TIA proposals.

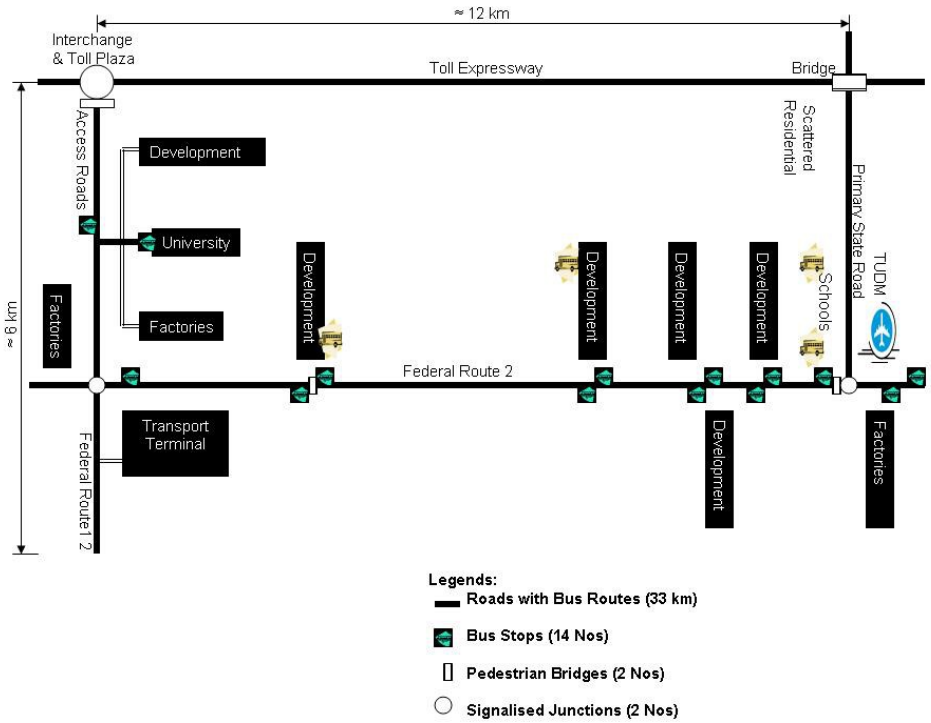
The study area comprises of developments within a 12km x 6 km boundaries served by north-south and east-west roads and highways as shown in figure 1. At present, all developments are hanging to the central federal route (term also as the arterial) which has been upgraded to dual 2-lane carriageway a few years ago. The connection to the new toll expressway at the north east corner of the study area had induced development along the access road and near the intersection the two federal routes. Private vehicle is very dominant in the study area so that bus service is only available along the arterial. Although the traffic volume is monitored to be around the clock, it is still low with good level of service. There are two signalized junctions along the federal road that is located at both ends of the designated study area. Accessibility of the federal route from/to the

development is via ingress and egress with u-turns provided in between the ingress and egress and at the signalized junctions. Express and stage buses are the public transport mode serving the area through main roads and highways within the study area. As shown in figure 2, there is an estimated 33 km of bus routes, 14 covered bus stops and 2 pedestrian bridges at present. The average walking distance to the bus stop is however found to be more than the preferred 500 meters range.



Source: adapted from Zulkiple, A, et. al. (2005-CAFEO 23rd)

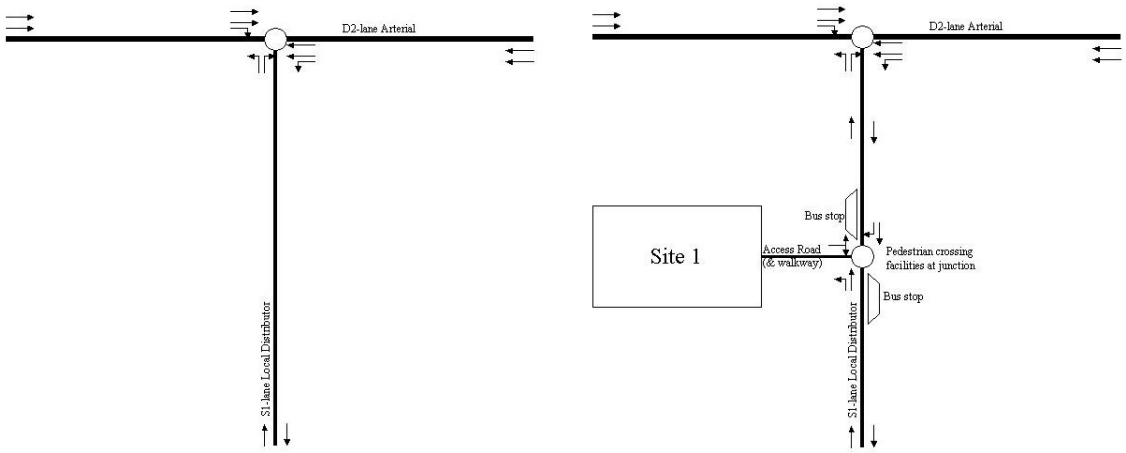
Figure 1: **E**xisting land use of the study area



Source: adapted from Zulkiple, A, et. al. (2006)

Figure 2: **E**xisting public transport facilities of the study area

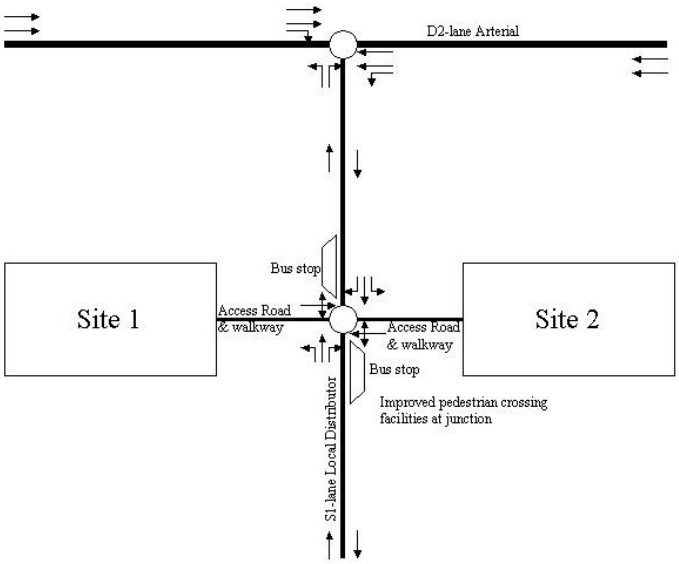
The first development that comes into the picture is site 1 that is presumably developed by developer 1 as shown in figure 3. The development is linked to the local distributor via a single 1-lane access road that brings about considerable traffic impacts to the local distributor but falls short of requiring the new T-junction to be signalized. The level of service for the local distributor drops slightly but not sufficient to attract any bus company to offer its service despite the authority requirement for the developer to provide adequate pedestrian and public transport facilities.



Source: adapted from Zulkiple, A, et. al. (2005-CAFEO 23rd)

Figure 3: Development of Site 1 with transition from vacant to developed land

The good return of investment of site 1 encourages another developer to develop site 2 that is located on the opposite side of the first site as shown in figure 4.

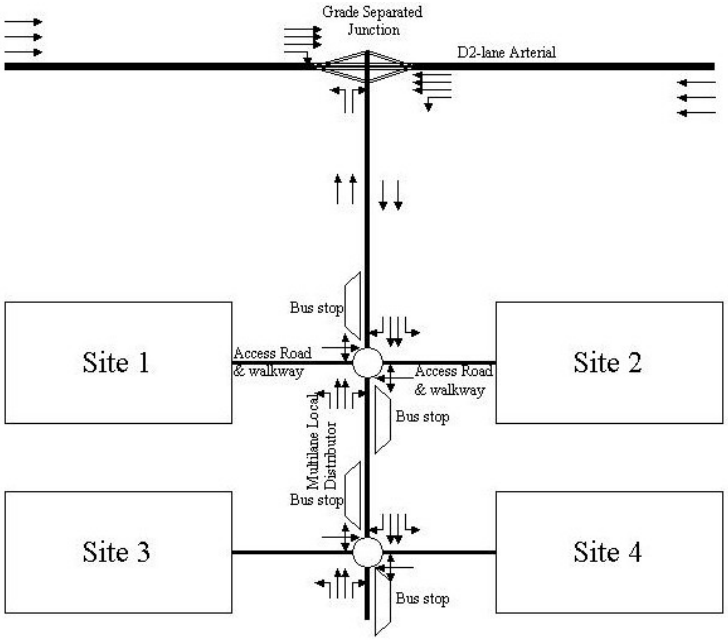


Source: adapted from Zulkiple, A, et. al. (2005-CAFEO 23rd)

Figure 4: Development of Site 2 that shares the same access junction with site 1

The development of site 2 brings major impact to the surrounding areas and requiring the improvement of the T-junction to be a signalized cross-junction. In addition to the provision of public and pedestrian facilities provided by the first developer, the second developer is required to construct walkways of its own and improved pedestrian crossings at the junction. The level of service of the local distributor drops further but not warrants for the construction of a multi-lane road. An expected delay at the junction is unavoidable for allowing inter-site traffic. A bus company starts to service the two bus stops but need to make a sub-standard u-turn at the cross junction.

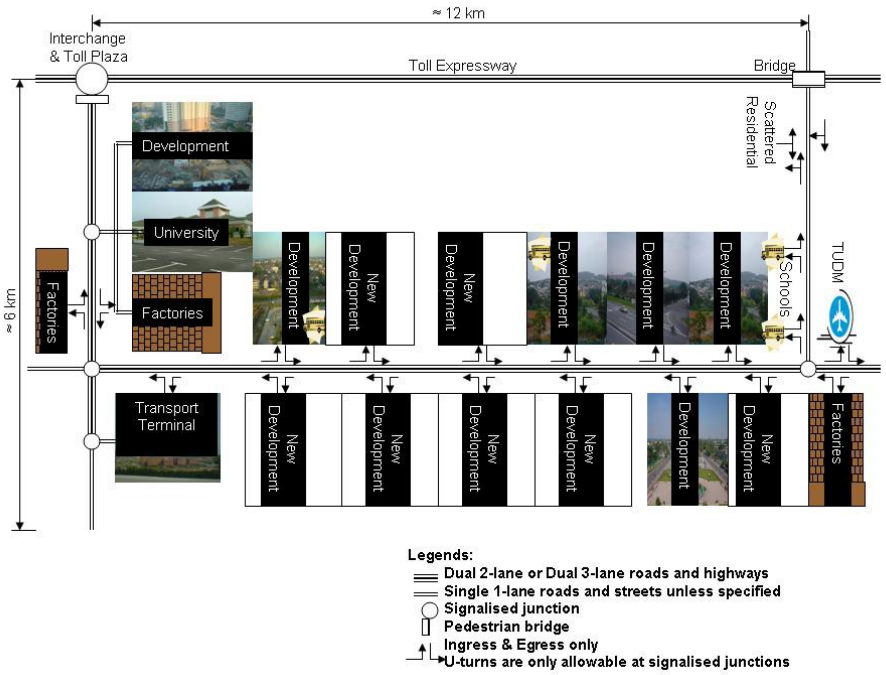
The success story of the two sites attracts more developments to participate in the development of the study area as illustrated in figure 5. The combined generated traffic of the prevailing and new sites warrants not only the widening of the local distributor to a multi-lane road but also the widening of the arterial to a dual 3-lane, which by the standard requires the construction of an interchange to replace the signalized T-junction. Regular bus service is now available but the travel time along the local distributor increase unnecessarily due to the close distance between bus stops. Majority of the bus passengers however still have to walk more than 500 meters to get to the bus stops and need to wait for at least another 30 minutes for the bus service at the uncovered bus stops.



Source: adapted from Zulkiple, A, et. al. (2005-CAFEO 23rd)

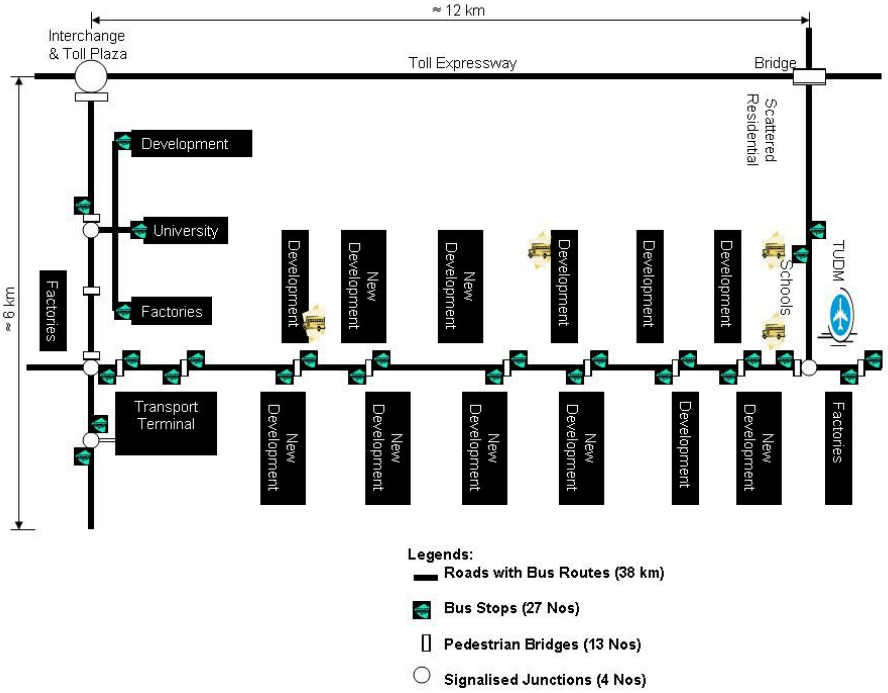
Figure 5: Development of other sites within the study area

The full scale development of the study area is captured in figure 6. All developments are hanging on to the central federal route causing long queue at the u-turn locations that extends back to the central lane and reducing the dual 2-lane carriageway road to 1-lane during the peak hours. The level of bus service which confines strictly to the central route, drops significantly due to delay of traffic movement as the consequences of the delay during the peak hours and additional of new bus stops as shown in figure 7.



Source: adapted from Zulkiple, A, et. al. (2006)

Figure 6: Future land use development of the Study Area



Source: adapted from Zulkiple, A, et. al. (2006)

Figure 7: Future bus routes of the study area

3.3 Issues on Land Use with Uncoordinated TIA Proposals

Obviously there are inherited issues and problems of implementing TIA for the land use development in isolation or in uncoordinated fashion as listed below:

1. *Do we want the first developer to construct or implement all of the proposed transport action plans as part of the traffic mitigation of Site 1 development?*

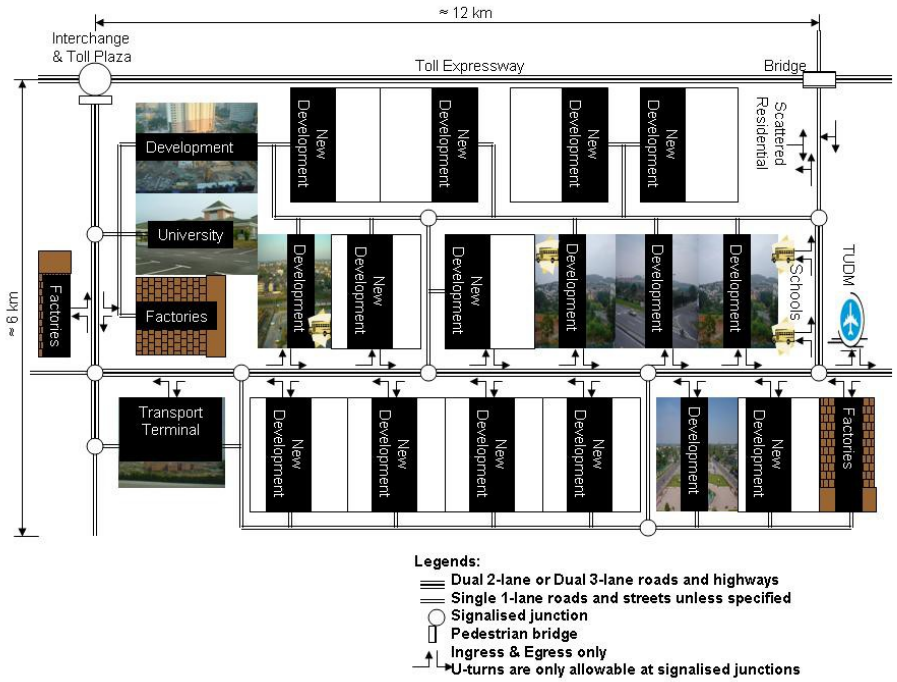
   Developer of site 1 would incur high investment for the development of transportation infrastructure of the site. Say, the developer invested about RM 1 Million extra for the implementation of the transport facilities outside the site and will be commonly use by existing and future road users such as for the provision of the covered bus stops. The local authority might decide not to spend the money and keep it in the public transport infrastructure fund for future use. This practice should be imposed on all other developers until the local authority sees deem viable to spend the fund for the provision of the required public transport facilities.

2. *What are the scope of works for the second and the fourth developers as shown in the example, for the upgrading of the cross junction?*

   In the example, the first and the third developer had constructed the intersection in form of a T-junction for accessibility of their sites. When the second and the fourth developers were connecting to the junction, they would have to upgrade it to a cross junction and made other necessary adjustment to cater for the prevailing and future traffic demand. In some cases, the developers might be required to constructed an elevated junction which easily may cost four times as high as the case of at-grade junction. The cost would need to be incurred by the second and the fourth developers since the previous developers were not liable to make any financial contribution as per the current practice. If the local authority would like to impose on the previous developers to contribute their share, it would be based on unrealistic access fee system as practiced presently by a few local authorities. Actually, the study area needs a real time transportation master plan.

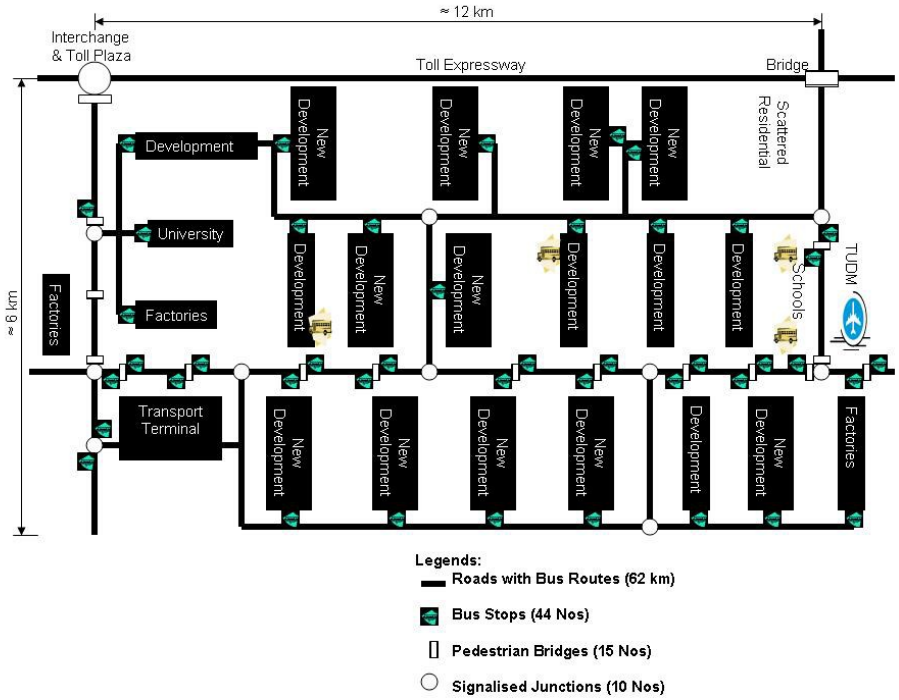
3. If we observed in figure 6, there is a “trapped vacant land” located to the south of the expressway and to the north of the federal route. This trapped land might belong to land owners would have no access to the federal route unless by connecting with the access road of the developments in the frontier (those hanging to the federal road). The transportation master plan of the study area which should have been undertaken prior to the development of Site 1 would have pick up this problem. However, due to the implementation of other sites in phases or rather in the later years, significant adjustments to the transportation master plan as per the TIA proposals, had outdated the master plan somehow. If proper updating system

is devised, we would not only be able to optimize the transportation system but can also synergize the land use of the study area to its optimum as shown in figures 8 and 9.



Source: adapted from Zulkiple, A, et. al. (2006)

Figure 8: Future land use of the study area with optimum use



Source: adapted from Zulkiple, A, et. al. (2006)

Figure 9: Future bus routes of the study area with optimum use

In term of public transport infrastructure development, we can observe significant increase of roads with bus route, number of bus stops with cover, number of pedestrian bridges and number of signalized junctions for coordinated TIA approach.

Table 1: Analysis of Required Pedestrian Facilities

Measurable Item	Development scenario of the study area			
	Existing	Future developments with uncoordinated TIA (2 New)	Future development with uncoordinated TIA along the main route	Future developments with coordinated TIA
Length of Roads with Bus Routes	33 km	38 km	38 km	62 km
No. of Bus Stops with cover	14	21	27	44
No. of Pedestrian Bridges	2	11	13	15
No. of Signalized Junctions	2	3	4	10

Source: adapted from Zulkiple, A, et. al. (2006)

CONCLUDING REMARKS

Coordinated transport action plan will help to segregate the short-term (immediately required/low cost) and the long-term (demand management/high cost) measures. While conducting the study, the traffic consultants for the new sites might not have any idea about the long-term proposals (which has not been implemented) by the previous traffic consultants if the transportation master plan of the study area has not been updated regularly by the relevant agencies. There is also no convincing method for the governing authority to impose on cost sharing policy of major works such as widening of the road and the construction of the interchange without proper record on the severity of the traffic impact from all affected sites.

Having a national traffic impact assessment without good coordination by the responsible agency would only tackle the short-term traffic problems and issues but not the long term one. A combination of a national traffic impact assessment guideline, a coordinated transport action plan and a reliable method of updating the plans for future use would serve both the short-term and the long-term goals.

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