Traffic Impact Study At Kancheepuram 2019

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Abstract- *-The objective of this report is to document the work carried out during the preparation of the Traffic Impact Study (TIS) that includes the assessment of the impact on external and internal transportation facilities as a result of the traffic generated by/attracted to this development in the horizon years 2020 and 2030 .*

The project has been organized in line with the methodology and procedures set in the methodology process.

Assessing operational impacts from a permitted access connection is imperative when managing the primary highway system.

Moreover, access management is vital to ensuring that a safe and efficient road system is maintained.

Therefore, the following guidance and requirements have been documented to provide a clear understanding of the operational impacts from moderate to high volume commercial access connections.

Although traffic volumes are a key factor, the Iowa Department of Transportation (Department) may request an impact analysis for lower volume accesses if the highway has been determined, at the sole discretion of the Department, to be nearing capacity.

The purpose of this document is to establish uniform guidelines for preparing a traffic impact analysis.

Keywords- Accident data Analysis, Black spot, tarffic data analysis, kancheepuram

I. INTRODUCTION

What is traffic impact study?

Traffic impact studies (TIS) are a common planning tool used by departments of transportation, such as DelDOT, to foresee demands on the transportation network and determine transportation improvements that may be necessary to accommodate new development.

Traffic access and impact studies are also intended to maintain a satisfactory level of service and the appropriate access provisions for a proposed development.

A TIS may be required as a condition for land use approvals to ensure that area transportation facilities operate adequately to accommodate impacts of new development.

The range of detail and complexity of a TIS may vary—depending on the type, size, and location of the development. While some Delaware jurisdictions require TIS as part of their rezoning and conditional use processes, they are most commonly, and perhaps most effectively, required as part of the subdivision and land development plan processes. Also, DelDOT and Kent and New Castle Counties have warrants for when a TIS is required.

The extent of a TIS is determined in a "scoping meeting" that includes representatives from DelDOT, the developer and, usually, the local jurisdiction. The TIS process generally includes a review of base traffic conditions, an analysis of expected trip generation, an assessment of future traffic volumes, and an analysis of site access locations and nearby intersections. A TIS scope may also consider impacts to queuing at intersections, safety, and impact on other transportation modes (e.g., bicycle, pedestrian, and public transit).

II. PROJECT DESCRIPTION

Kancheepuram district is situated on the North East coast of Tamil Nadu. It is bounded by Chengalpattu district in the East, Chennai district in the northeast, Ranipet and Tiruvannamalai districts in the west and Thiruvallur district in the north.

It lies between 11° 00' to 12° 00' latitudes and 77° 28' to 78° 50' longitudes. The district has a total geographical area of 4,43,210 hectares and a coastline of 57 km.

III. STUDY AREA

The study area is an area where the project is likely to have significant potential impacts on the enclosed transport

facilities. The study area is large enough to include the potential impacts caused by the development on the surrounding transportation facilities near VELLA GATE.

EXISTING ROAD CONDITION ANALYSIS:

traffic counts are required to evaluate the existing conditions of the road network adjacent to the development. This section describes the currently existing transportation system within and surrounding the Study Area, traffic survey findings and related traffic analysis results.

Methods of traffic analysis will be done for this project work.

IV. LAND USE

The immediate area surrounding the project site is characterized by residential settlements, government offices and educational institutions.

The site is located 6KM from the kancheepuram city Major surrounding land uses are listed below and presented

1. Vella gate junction
2. Narasimman polytechnic college
3. Kancheepuram city area.

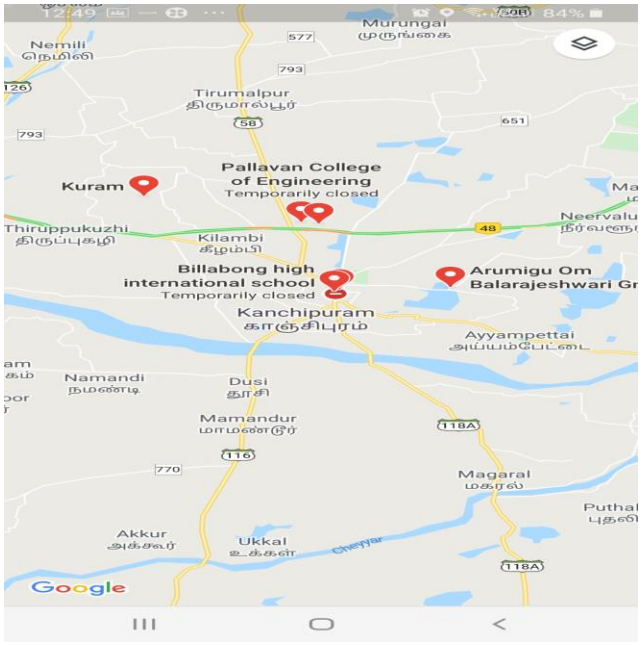
V. SURROUNDING LAND USES:

This chapter deals with traffic modeling and forecasting activities carried out during the course of this project in order to obtain the anticipated future traffic volumes. These traffic volumes were then used to assess the operational characteristics of the various transportation facilities within the study area for two scenarios, the opening year (2020) andultimateyear

5.1 EXISTING LAND USES :

The immediate area surrounding the project site is characterized by residential settlements, government offices and educational institutions. Major surrounding land uses are listed below .

In the immediate road borders of the site, apart from the University for Girls, the other surrounding land uses contribute hardly to the total number of trips to the roadway system.



2030)

5.2 FUTURE LAND USES :

Apart from existing land uses two projects are proposed; an office complex to the west of the site and a family park to the north of the site. The relative position of these projects to the subject site . Since no information was available on either project, following assumptions were made for the trips generated in order to consider their impact on the project access points. Office Complex: As this site has an entry/exit from kancheepuram highway Road through right - in/right – out and another entry/exit through a right-in/right-out shared with a collector road west of the subject site.
In the analysis, 300 trips were assumed to use the back exit to estimate the impact of the office complex on the development's immediate surrounding roads.

Family Park: Typically, the parks experience peak trips during weekends and public holidays which will not fall within a typical week day. As such, no trips were assumed due the family park.

VI. TRIP GENERATION ESTIMATION

presents the trip rates based on individual land use and the corresponding split percentages for inbound and outbound trips. The resulting trip estimates for AM and PM peak hours are summarized. As shown, the proposed development is expected to produce 3,016 trips out and attract 3,119 trips in, in the AM Peak hour. In the PM peak hour, the development is expected to produce 842 trips out and attract 918 trips in.

6.2 PUBLIC TRANSPORT SHARE :

The Kingdom media and published reports show that state and provincial governments intend to invest heavily in public transportation projects to offset existing and predicted heavy traffic congestion issues. However, owing to regional context of the area, a modest share of 5% is only considered for transit share. This transit share is assumed to be contributed by various para - transit modes such as taxi, dial-and-ride and shuttle services, which are expected to be provided in line with intended goals.

6.3 INTERNAL CAPTURE:

Not all the above calculated trips are expected to be external to Tabouk development.

A substantial reduction is expected due to a vibrant land use mix and complimentary uses which will contribute to the internal trips. With respect to the schools, it is expected that the school bound trips would be mainly internal trips as project is mainly envisaged to be a residential with strong student population.

Parsons proposed to apply two reduction factors on the internal total school trips; 20% due to the walk trips and another 20% due to the school bus services.

The trips from retail, mosque, public parks and local government offices are expected to generate mainly internal trips in the AM peak hour, and majorly external trips in the PM peak, which are the return trips from the city center

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VII. PROPOSED EXTERNAL ROAD SYSTEM

Based on the Structural Plan , only one major improvement is proposed to the kancheepuram highway Road. This improvement is part of kancheepuram and Road Improvement Project.

The implication of this project is that the existing highway will be replaced by an interchange to facilitate free flow traffic on Kancheepuram highway Road

7.2 PROPOSED INTERNAL ROAD SYSTEM:

The internal road network was proposed with the purpose of providing connectivity with the external road network and also enough capacity to be able to accommodate the traffic in the site and providing acceptable level of service and safety for vehicles, pedestrians and cyclists.

7.2.1 DEVELOPMENT ACCESS :

Kancheepuram project will be linked to main roads network, namely vella gate on northern side and arakkonam on western side through right in right outs and full access junctions.

- Right – in/right - out connection from chengalpattu road – RI/RO-1

- Right – in/right - out connection from kancheepuram road – RI/RO-2
- Two full access junctions(INT-1 and INT-3) which connect to southern road network

7.2.2 ROAD HIERARCHY :

The project road hierarchy can be broadly classified in to two road systems; collector roads and local roads. The collector roads provide access into and out of development to major roads. The internal local roads distribute traffic to various parts of kancheepuram highway project site. the proposed access points and road hierarchy of the project.

VIII. DEVELOPMENT OF TRANSPORTATION MODEL

This chapter deals with traffic modeling and forecasting activities carried out during the course of this project in order to obtain the anticipated future traffic volumes. These traffic volumes were then used to assess the operational characteristics of the various transportation facilities within the study area for two scenarios, the opening year (2020) and ultimate year (2030).

8.2 DEVELOPMENT OF MODEL:

The initial step in the model development was to code the model network consisting of roadway facilities; i.e. links, nodes, zones, gates, and connectors. Links represent roadway segments, and nodes symbolize intersection

Road type	No of lanes	capacity	Design speed(km/hr)
Local	1	600	30
collector	2	800	50
arterial	3-4	1200	80

IX. ANALYSIS METHODOLOGY

This chapter identifies the proposed development's predicted impact on the roads and junctions in the study area. In the existing scenario as mentioned , there are three (3) junctions and a roundabout. The proposed development consists of nine (9) signalized and three (3) un-signalized junctions.

Analysis of the external and internal junctions is carried out for the Year 2020 and Year 2030 with a growth rate of 3%, which includes the ambient growth as well as the forecasted economical growth in the region.

9.2 OPENING YEAR SCENARIO:

TRFFIX Software are generally used for this type of project and used to conduct the level of service analysis for the four (4) external and twelve (12) internal junctions as well as link evaluation analysis for the roads surveyed and discussed earlier in the report.

The analysis results for both AM and PM peak hours for 2018 with and without proposed development are summarized in Tables 13 and 14 for the junctions and links, respectively. Turning movement volumes and levels of service for 2018 are shown in Figures 11a, 11b and 11c for the without and with project scenarios, respectively.

X. PARKING DEMAND ANALYSIS

Parking is an essential element of the planning process. In order to understand the parking demand of the site, the peak parking demand will be estimated in accordance with the appropriate parking rates. The parking demand calculation was based on the Ministry of Municipal and Rural Affairs (MOMRA) parking requirements. presents the rates for each category of land use within the development. presents the estimated parking for each land-use category. Table

S.no	Land of use	units	Parking demand
1	Multifmily apartment	3140	500
2	Primary schools (boys)	1892	400
3	Primary school (girls)	4524	540
4	Secondary cchool (boys)	2594	420
5	Secondary school(girls)	2590	530
7	Primary health care	150	450

XI. PEDESTRIAN CIRCULATION AND SAFETY

Streets within the kancheepuram site development designed to enable safe access for drivers and pedestrians. All users are able to travel along or across a street in a safe and efficient manner.

Supportive elements comprising the right-of-way (ROW) of the site street network include:

• Wide sidewalks;
• Street trees;
• On-street parking;
• Median/turn lanes;
• Adequate travel lanes.

This section discusses pedestrian and vehicular circulation safety within the site. The functions of pedestrian sidewalks and various street types are also discussed.

11.1 PEDESTRIAN CIRCULATION :

The streets will have a section that is conducive safe and comfortable pedestrian movements by having low vehicle priority, wide sidewalks on both sides of the street, and street trees and/or structures for shading. All streets will have parallel parking on both sides further separating the pedestrian from the moving vehicles. Travel lanes will be restricted to one or two lane(s)direction to reduce crossing distance and enhance cross street connectivity. Three typicalare proposed: minor local, major ll, collector. The minor local streets will have approximately 15 to 18 meter of right-of-way, the major local roads will approximately a 22 meter right-of-way and the collector approximately 36 meters.

XII. KANCHEEPURAM DISTRICT ACCIDENTAL REPORT

In August 2019, the Tamil Nadu (State) Police gave researchers permission to carry out a traffic accident research project on a section of National Highway 45 (NH 45) between Otteri and Acharapakkam in Kanchipuram District, with the help of the Kanchipuram District Police.

The project involved collecting in-depth accident data on accidents occurring in the period starting from 1 September 2019 to 15 October 2019

The objectives for this real time accident investigation and data collection project were:

1. 1.To initiate in-depth traffic accident data collection with the support of the police.
2. To establish a methodology and develop a framework for a comprehensive accident database for road accidents in India.
3. To understand the nature of accidents and identify causes/problems along NH 45.
4. To provide recommendations based on this study for reducing accidents on NH 45.

THE AREA OF STUDY:

A 60 km stretch of the NH 45 between Otteri and Acharapakkam in Kanchipuram District was selected for the study. Some features of this highway are given below:

1. The entire stretch is a 4 lane divided highway.
2. Road surface is asphalt. The divider is about 5 m in width and is usually planted with largebushes and plants, except at Uturns, intersections and bridges. No potholes were observed all along the main highway.
3. Speed Limit at some sections is 60 kmph and at other sections is 80 kmph.
4. Lighting is provided only at intersections/junctions and some areas such as truck lay bys.Otherwise a good part of the highway is not lit.
5. The highway infrastructure also includes:
   a. 1 Toll booth.
   b. 3 Truck Lay-Bys.
   c. 60 bus stops (counting both directions).
   d. 19 petrol pumps.

Number of police stations: 9
Number of highway police patrol cars: 3

EMS is provided by an Emergency Accident Relief Centre (a small station with an ambulance) operated by Parvathy Hospital (private), which is located outside the study area, andChengalpattu Medical College and Hospital (government) located inside Chengalpattu Town.

METHODOLOGY ACCIDENT INTIMATION:

For the 45-day period of this study, an accident intimation network was established between researchers and all the police stations and highway patrols located in the study area. On occurrence of an accident, the police called a dedicated contact number that was manned 24 .

VEHICLE EXAMINATION

Researchers examined crash vehicles on-scene and/or afterwas towed to the side of the road.

This examination involved:

- Recording direct and indirect damages.
- Determination of Collision Deformation Classification (CDC) [1] for cars and SUVs or Truck

Deformation Classification (TDC) [2] for trucks.

- Measurement of interior intrusions.
- Occupant contact points with vehicle interiors.
- Determination of belt use/airbag deployment.

DETAILED ANALYSIS:

To get a deeper insight into the accidents, the 32 accidents were categorized for analysis .The acccidents are first divided into MultipleVehicle and Single-Vehicle Accidents.They are then sub-divided as per the type of accident based on the 1st accident event.

FRONT-REAR COLLISIONS :

Based on the study of 19 Front-Rear collisions, the following are some important observations: Of the two vehicles involved, one "leading" vehicle while the other is a "following" vehicle.

2. The "leading" vehicle suffers either a rear impact (13 out of 19) or a side impact (6 out of 19), while the "following" vehicle suffers a frontal impact. 3. The "leading" vehicleis usually the initiator (but not necessarily the cause) of the accident, while the "following" vehicle is usually the victim of the accident. The "leading" and "following" vehicles arestudied separately to understand their composition andeffects on injury severity.

Some important observations are:

1. 5 cases involved high speeds in excess of 50 kmph.
2. None of the accident scenes had pedestrian warning signals or pedestrian crossings.
3. All the vehicles had drivers who were not the owners ofthe vehicle, and the vehicles were being used on commercial purpose (taxi/hire). 4. 3 of the accidents occurred in broad daylight.

ROAD USER ISSUES:In addition to the above, lack of enforcement and education among motorists is also observed. It appears that little regard is shown for safety and road rules. Some of the observations are:

Seatbelt use is poor. Passenger cars, buses and trucks investigated showed no positive indication of seatbelt use by drivers or occupants.

1. 2-wheeler accidents (3 accidents) investigated show no helmet use and also one of the accidents involved 4 riders (2 adults and 2 children) and none of them were wearing helmets.
2. Trucks and buses were observed not having functioning tail lamps or reflective strips to provide visibility at night.
3. Many trucks on the highways do not have underride protection.
4. Usage of indicators, hazard warning lamps and tail lamps poor. Training in this area essential.
5. Cars, especially commercial taxis, exceed speed limits very often.

RECOMMENDATIONS :

The following is a list of recommendations that consider each of the three main elements of an accident: infrastructure, vehicle and human. Driver Information and Communication:

1. Information concerning U-turns, petrol pumps and restaurants should be provided well in advance to drivers through large, clear signboards mentioning distance to the next opportunity as well as warning of crossing and slowing traffic.
2. Repair shops and off-road areas for performing repairs play critical roles during breakdown. Hence, information on locations ofrepair shops and lay-bys along the highway should be provided.
3. Truck lay-bys can also bedeveloped into effective information and communication centres for all

Highway Facilities:

1. The Padalam Truck Lay-By was found to lack facilities like drinking water and lighting. The facilities should be improved and the area should be wellmaintained. Trucks and buses should be encouraged to use this facility for taking breaks on long drives.

2. 2. Towing service for vehicles should be improved so that breakdown/accident vehicles can be moved away from the road to a safer place, with minimal towing damage.

3. Highway lighting should be regularly checked and these lights should not be affected by power cuts, especially during the night.
4. Pedestrian facilities, for walking alongside and crossing, need to be improved, especially at highway sections close to a city/towHighway Design:

1. Shoulder width alongside the road should be increased to a minimum of 3 metres so that vehicles can be parked well inside the shoulder, in case ovehicle problems/breakdowns.
2. . U-turn designs need to be re-examined as trucks and buses find it difficult to turn within a safe space.
3. Entrances/exits for fuelling stations, restaurants, factories/industries/warehouses should bewell laid out so that vehicles which use them need not have to block/slowdown the trafficimmediately behind them.

VEHICLE

Vehicle Maintenance: Proper/functioning headlamps and tail lamps for trucks and buses should made mandatory.Proper/functioning wipers for both driver and cleaner side should be made mandatory.Tyre depths should be checked regularly.Prominent reflective signs/markings should be used on the backside of vehicles.

Driver Convenience:

1. Proper driver visibility should be ensured through large rear view mirrors and good wipers.
2. Proper seating should be provided for drivers to avoid tiredness and fatigue.

Vehicle Safety Devices and Markings :Side and rear under ride protection devices should be made mandatory for all trucks.

2. Information about an accident ahead should be provided to other vehicles through proper hazard signs and diversions so that other vehicles can be alerted well in time to slow down and drive carefully.

HUMAN:

Enforcement and Traffic Management:

Overloading and speeding above the vehicle speed limit should be strictly prohibited.
1. 2. Seatbelt/helmet use should be enforced, especially in smaller vehicles.
3. Turn signal and tail lamp usage should be enforced.
4. In the event of an accident, traffic should not be diverted to the oncoming lanes.
5. Periodic vehicle checks for lighting, driver visibility and tyres should be conducted regularly.
Training:
Trucks and buses should be warned to stop only at designated areas where road shoulder
width is adequate.
2. Training should be provided on proper marking of accident/breakdown vehicles to avoid front-rear collisions.
3. Existing truck lay-bys may provide a good location to carry out training and information activities, especially for trucks that pass by.
4. Highway workers should be well-equipped with safety equipment and must be educated about its importance and useSafety:
Highway workers should be provided safety jackets and proper safety equipment so that they can carry out their work safely.
2. A single emergency assistance number should be well known to all road users along the entirestretch of the highway.

FUTURE WORK

Heavy trucks account for the largest number of vehicles involved in the highway accidents investigated. More in-depth data studies are required to understand the causes of heavy truck accidents on highways.

2. Networking with accident hospitals is essential to obtain injury data for coding injuries and for detailed injury analysis.

XIII. CONCLUSION

- The proposed kancheepuram city development will be comprised mainly of residential units (Apartments) as well as community facilities, such as schools, retails, hospital, etc.
- Total net trip generation by the proposed development is 4,280 for the AM peak hour (2,209 in trips and 2,071 out trips) and 1,672 for the PM peak hour (872 in trips and 800 out trips).
- Key external junctions are identified and considered in the analysis based on the proposed external road network for the opening year (2020) and the ultimate year (2030).
- Key internal junctions are considered in the analysis as per the proposed internal road network within the development.
- All internal junctions are expected to be operating at acceptable level of service (LOS D or better).

- The external junctions J3 and J4, which are failing in existing conditions, experience more severe failures with the project.
- Parking demand within the proposed development is found to be 7,348 spaces. The proposed junction layout for internal junctions can be adopted as it can satisfactorily accommodate the future traffic demand.

A junction on Kancheepuram highway road between chengalpattu road and the vella gate Intersection is suggested to allow left turn movements as the distance between the two points is about 7 KM without accesses from the arakkonam Road to the developments located on the opposite side of each direction.

Kancheepuram Square roundabout, which is currently failing, is to be mitigated by the opening year i.e. 2020, in order to facilitate the expected volumes from the development as well as the future projects in the area.

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