

# TRAFFIC IMPACT ASSESSMENT IN VIJAYAWADA AT JUNCTION, COMMERCIAL AND INDUSTRIAL AREA

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**Abstract** – Vijayawada is a city in the southeast Indian state of Andhra Pradesh. The present project is on the traffic impact studies at the **Mall and Multiplex area** in Benz circle, **Industrial area** in Autonagar and **commercial area** in 1-town **Traffic Impact Assessment(TIA)** is a powerful tool for engineers and planners to determine the possible effects of a project on the transportation and traffic system and also includes **formulation of traffic management** schemes and recommendation of infrastructure for possible transportation and traffic problems that encountered during the construction and operation phases of projects. often it is applied only to the direct area and countermeasures for potential negative impacts are specific for the development.

The three main parameters of traffic are volume, speed and density. In the absence of effective planning and traffic management of the city, the current road infrastructure cannot cater the future needs of the city. pedestrian and vehicle volumes have increased significantly in last decade due to the change of the economics of the middle-class families. Hence the results from present study are helpful in estimating future traffic, controlling the traffic at intersection and also reducing the accident rate.

**Key Words:** Traffic Impact Assessment (TIA)

## 1.INTRODUCTION

A traffic impact study is a study which assesses the effect that a particular development has on the transportation network. A traffic impact study is generally required by roads authorities to evaluate the impact of change in the land use. A traffic impact study varies in complexity depending on the size of the development, the current and proposed land use and the location of the development. Various traffic engineering concepts and principles are applied while conducting a traffic impact assessment. We have conducted traffic impact study for various areas like mall & multiplex building, Commercial area and industry

The purpose of the study is to assess the impact of the Mall & Multiplex area - Trendset mall at Benz circle, Commercial area – 1-town at Indrakeeladri, Industrial area – Autonagar under Krishna Dist. Andhra Pradesh state on the surrounding and adjacent transportation network and to identify potential mitigation measures, which may be necessary to offset any impacts associated with the use.

### Objectives:

- Assess impact of traffic due to new development.
- Support subdivision of land applications.
- Prepare mitigation plans
- Development access and on-site circulation plans.
- Usage of modern techniques to analyze it.

**TRAFFIC IMPACT ANALYSIS:**

Typically, a traffic operations analysis is conducted whenever a proposed development compromises the existing design standards and therefore may cause safety and operational problems in the immediate vicinity of the site. The analysis should be done for the entire system and not just the road or access point under consideration.

The TIA considers a Short-Term Development Scenario and a Long-Term Development Scenario that comprise the following:

**Short Term Development Scenario:**

Development scenario for the study area that is likely to be achieved within 1 to 5 years.

**Long Term Development Scenario:**

Development scenario for the study area that could possibly be achieved within 5 to 10 years.

The remainder of the TIA analyses the possible traffic impact that development on this site will have on the road network and makes recommendations on the extent of access and road infrastructure upgrading required to ensure that traffic congestion levels during the peak periods are kept within acceptable limits. In places where road infrastructure upgrading is not possible and congestion levels are expected to be unacceptably high, the TIA makes recommendations on development limitations that should be imposed on the site.

**LOCATION AND STUDY AREAS:**

**MALL & MULTIPLEX AREA:**

Mall & Multiplex area considered here is Trendset mall located at M.G road, Vijayawada, Krishna Dist. Andhra Pradesh. The study area is about 1km of radius from the mall. The site is strategically located & connected to Benz Circle. The study site is strategically bounded by typical commercial, residential activities. It is well connected with the arterial road system thus providing for excellent connectivity with the city.



Fig 1(a): Study area shown on google maps

**COMMERCIAL AREA**

Commercial Area considered here is 1-town located at Prakasam barrage near Durga temple road, Vijayawada Dist. Krishna. The study area is about 1km of radius from the 1-town. The site is strategically located & connected to M.G road, Kaleshwararao Market road, Krishna Lankaroad, Railway Station road, Fly Over road. The study site is situated at Vinayaka Temple cross Road. The study site is strategically bounded by typical commercial / semi-residential activities. It is well connected with the arterial road system thus providing for excellent connectivity with the city.

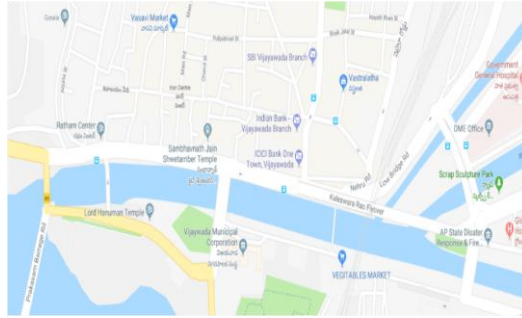


Fig 1(b): Study area shown on google maps

**INDUSTRIAL AREA:**

Industrial area considered here is Autonagar located at Bandar road, Krishna Dist. Andhra Pradesh. The study area is about 1km of radius from the Autonagar. The site is strategically located and connected to Pantakaluva road, Kanuru Road. The study site is strategically bounded by typical commercial, industrial, residential activities. It is well connected with the arterial road system with the city.



Fig 1(c): Study area shown on google

**DESCRIPTION OF THE SELECTED AREAS:**

**MALL & MULTIPLEX**

**AREA Overview:**

The Mall & Multiplex area considered here is Trendset mall it is situated on right side at 4-way junction on the National Highway road. It is the biggest mall in the Vijayawada city. The study area that is considered here is about 1km radius from the junction.

**Terrain:**

The terrain proximate to and surrounding the site is generally classified as level. Existing land use and traffic controls in the vicinity.

The existing land use in the vicinity is configured with mixed activities comprising of residential and commercial activities.

**COMMERCIAL**

**AREA Overview:**

*Commercial area considered here is 1-town which is located at prakasam barrage near Durga temple road . Most of the business in the Vijayawada is done in this area. The study area that is considered here is about 1km radius from the junction.*

**Terrain:**

*The terrain proximate to and surrounding the site is generally classified as level. Existing land use and traffic controls in the vicinity.*

*The existing land use in the vicinity is configured with mixed activities comprising of residential and commercial activities.*

**INDUSTRIAL**

**AREA Overview:**

*Industrial area considered here is Autonagar area. In the area surrounding to it we can find most of the industries situated in the Vijayawada. We have considered Autonagar junction. The study area that is considered here is about 1km radius from the junction.*

**Terrain:**

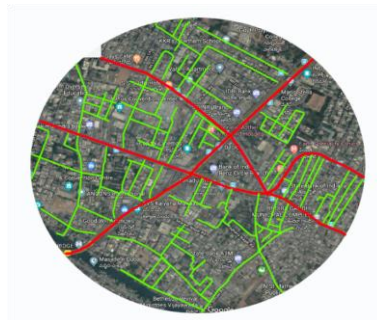
*The terrain proximate to and surrounding the site is generally classified as "level". Existing land use and traffic controls in the vicinity.*

*The existing land use in the vicinity is configured with mixed activities comprising of some residential and mostly commercial activities.*

**MINIMUM STUDY AREA – IDENTIFICATION OF AREA OF INFLUENCE OF DEVELOPMENT:**

**MALL & MULTIPLEX AREA**

*The Minimum Study Area should include all critical site access points as well as signalized and unsignalized intersections adjacent to the site. In the present study, the roads and intersections in the zone from Trendset mall, Krishna Dist. Andhra Pradesh are treated as the minimum study area. The influence area of the site is shown in figure. 2(a)*



**Fig 2(a): Connectivity location map of the selected site showing on google earth map**

## COMMERCIAL AREA

*The Minimum Study Area should include all critical site access points as well as signalized and unsignalized intersections adjacent to the site. In the present study, the roads and intersections in the zone from 1-town, Vijayawada Dist.*

*Krishna are treated as the minimum study area. The influence area of the site is shown in figure 2(b).*

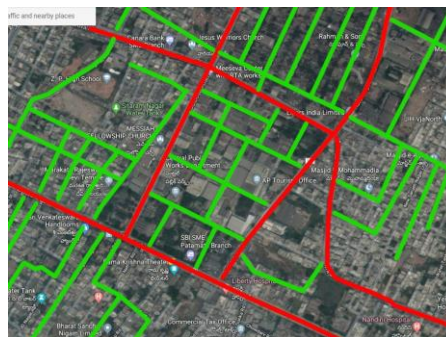


**Fig 2(b): Connectivity location map of the selected site showing on google earth map**

## INDUSTRIAL AREA

*The Minimum Study Area should include all critical site access points as well as signalized and unsignalized intersections adjacent to the site. In the present study, the roads and intersections in the zone from Autonagar, Krishna Dist.*

*Andhra Pradesh are treated as the minimum study area. The influence area of the site is shown in figure. 2(c)*



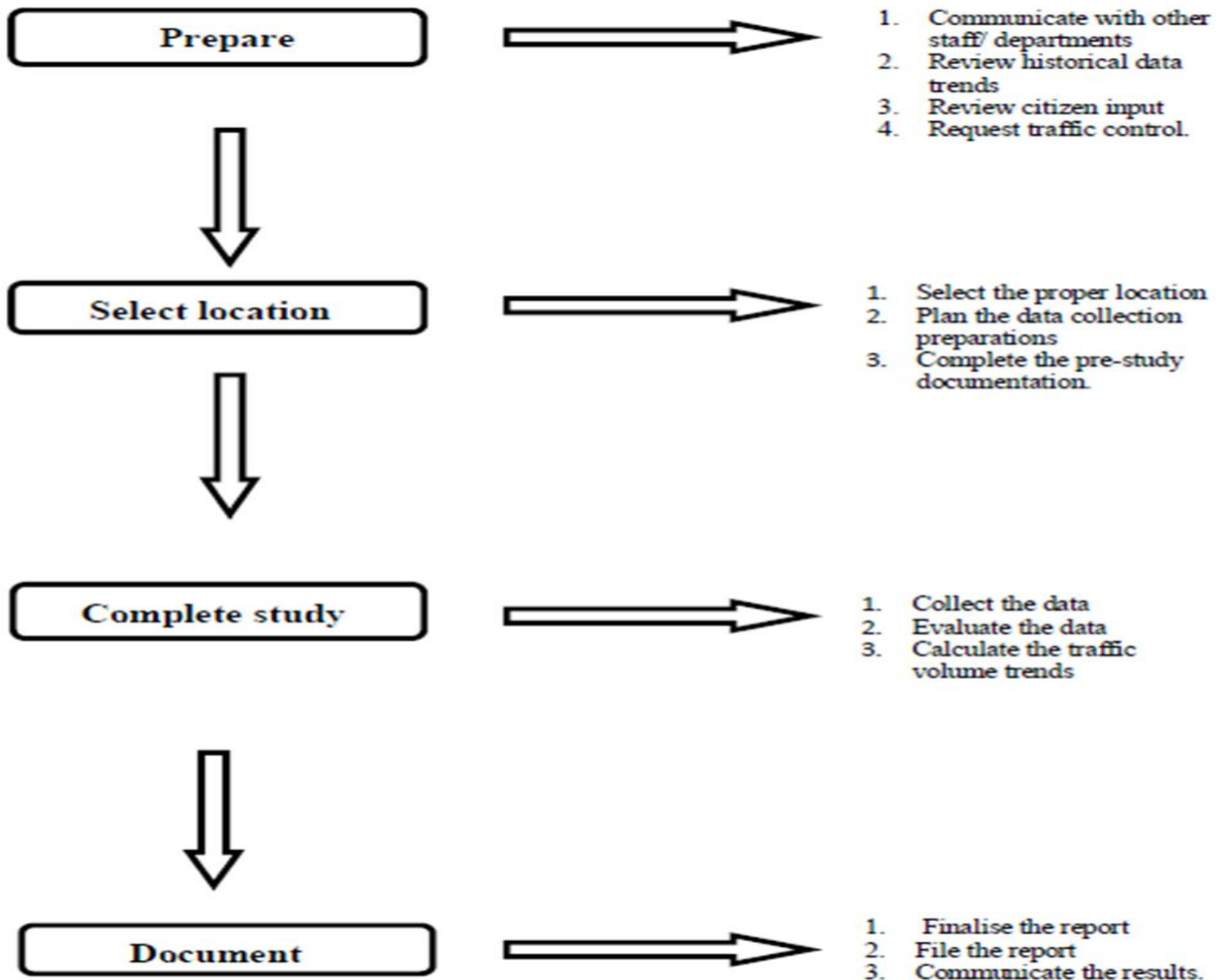
**Fig 2(c): Connectivity location map of the selected site showing on google earth map**

### STUDY METHODOLOGY:

*The study examined the existing conditions in the areas selected in terms of the existing road network and available public transport, pedestrian and cycle infrastructure. Future public transport provision and infrastructure improvements proposed in the vicinity of the development were reviewed*

*Traffic volume counts, delay studies are conducted at the selected site areas and are compared with the previous year data of traffic volume.*

*Future value of the traffic can be estimated based on the collected data. Based on this collected data modification for the existing roads are suggested to improve the road facilities and decrease the traffic congestion.*



## EXISTING ROAD NETWORK

### MALL & MULTIPLEX AREA

The selected area falls along Benz Circle connect to M.G Road, near Trendset Mall and to the right connected to NTR Circle.



Junction/road name	Type of junction	Type of control
<i>Benz Circle Junction</i>	4-legged	Signalized Intersection
<i>Myneni Signals Junction</i>	4-legged	Signalized Intersection
<i>NTR Circle Junction</i>	5-legged	Non-signalized Intersection

**Fig 3(a): Digitized map of the selected area showing road networks on Arc GIS and AUTOCAD at Mall & Multiplex Area**

**1. Benz Circle Junction:** It is 4-way Junction connecting Myneni hotel Center, Shoppers Stop and Ramesh Hospital Signals.

**2. Myneni Signals Junction:** It is a 4-way Junction connecting roads from Polyclinic road, NTR circle, Benz Circle.

**3. NTR Circle Junction:** It is a 5- way Junction connecting roads from Trendset Mall Pantakaluva Road, NH-65.

### COMMERCIAL AREA

The selected area falls along 1-town Junction & connected Durga temple junction, Kaleshwara Rao market road, 1-Town, Prakasam barrage road and Kaleshwara Rao Flyover Road

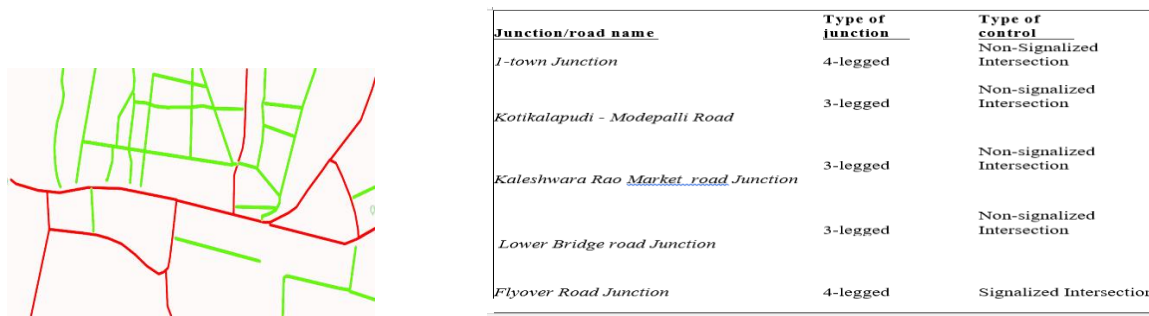
**1-town Junction:** It is a 4-way Junction connecting Gollapudi, Mangalagiri ang M.G road.

**Kotikalapudi - Modepalli Road:** It is a 3-Way Junction connecting 1-town and KrishnaLanka road and Prakasam Barrage Road.

**Kaleshwara Rao Market road Junction:** It is a T-way Junction connecting Nehru Road and Lower Bridge Road

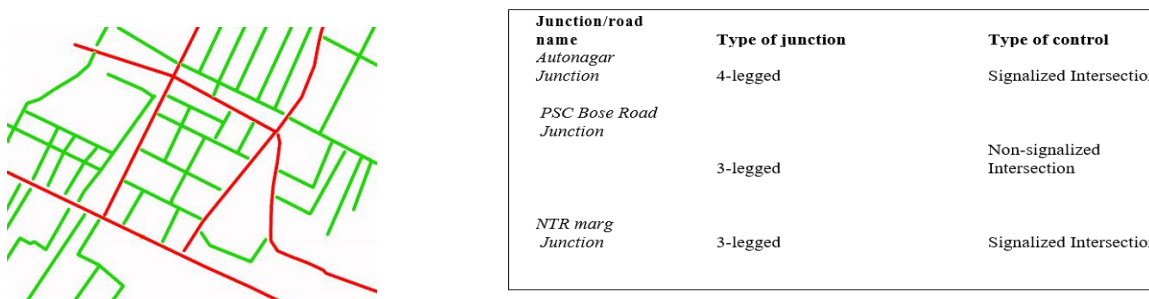
**Lower Bridge road Junction:** It is a 4-way Junction connecting Police control Room, 1-town, Kaleshwara Rao main road, Railway station road.

**Flyover road junction:** it is a major road connecting to the railway station, bus station road and flyover



**Fig 3(b): Digitized map of the selected area showing road networks on Arc GIS and AUTOCAD at Commercial Area. INDUSTRIAL AREA**

The selected area falls along Autonagar Junction & connected psc Bose junction and NTR marg junction



**Fig 3(c): Digitized map of the selected area showing road networks on Arc GIS and AUTOCAD at Industrial Area.**

1: **Autonagar Junction:** It is a 4- way junction connecting 3 major roads Bandar road, Pantakaluva Road, PSC road and 1 minor road.

2: **PSC Junction:** It is a T-Junction connecting Autonagar junction road, Major road and Bandar road.

3: **NTR Marg Junction:** It is a Y-Junction connecting Autonagar junction road, Kanuru Road and Ballem road.

**SURVEYS ORGANISED:**

Following were the surveys conducted for the traffic impact assessment of the selected areas.

- 3-day 16 hour classified volume counts on all major intersections in the influence area:
- Speed studies during morning and evening peak and off-peak hours
- Headway studies
- Delay studies using Floating car technique
- Road side interviews
- Land use studies
- Road network inventory study
- Parking studies

**BACKGROUND TRAFFIC VOLUMES:1MALL & MULTIPLEX AREA**

Intersection traffic counts and Midblock Classified volume counts were carried out from 29-1-19 to 9-2-19 during the morning and evening peak and off- peak periods at all major at-grade intersections and mid blocks in the project influence area. 3- day volume counts were conducted near Benz circle Junction, Myneni signal Junction and Ntr circle junction.



These counts are an indication of the current background traffic levels on roads in the study area and are used as the basis for the analysis of operational conditions at the critical intersections.

S. No	Section name	Direction from to	Volume in no. of veh / hr	
			Peak hour	Off peak hour
1.	Benz circle junction	Connectivity to Myneni hotel center, shoppers stop and Ramesh hospital signals	4800	4000
2.	Myneni Junction	It is a connectivity of Major road to polyclinic road, Ntr circle, Benz circle	3125	2810
3.	NTR circle Junction	Connecting to Trendsetmall, pantakaluva road, NH-65	3560	3125

**Table 1(a): Traffic flows in major sections around the study area (direction wise)**

#### COMMERCIAL AREA

Intersection traffic counts and Midblock Classified volume counts were carried out from 12-2-19 to 28-2-19 during the morning and evening peak and off- peak periods at all major at-grade intersections and mid blocks in the project influence area. 3-day volume counts were conducted the proposed site near 1-town junction, Kotikalapudi-modepalli road, Kaleshwara Rao market road junction, Lower Bridge road junction and Flyover road junction.

These counts are an indication of the current background traffic levels on roads in the study area and basis for the analysis of operational conditions at the critical intersections.

S. No	Section name	Direction from to	Volume in no. of pcu / hr	
			Peak hour	Off peak hour
1.	1-town Junction	Connectivity to Gollapudi, Mangalagiri and M.G road	3890	3255
2.	Kotikalapudi-Modepalli Road	It is a connectivity of Major road to 1-town, KrishnaLanka and Prakasam Barrage Road	1985	1550
3.	Kaleshwara Rao Market road junction	It is a connectivity of major road to Nehru Road and Lower Bridge Road	2821	2395
4.	Lower Bridge road junction	It is a connectivity of major road 1-town, police control room, Kaleshwara Rao road, Railway station road	3219	2980
5.	Flyover road junction	It is a connectivity of major road to railway station road and Bus stand road	4425	3892

**Table 1(b): Traffic flows in major sections around the study area**

### INDUSTRIAL AREA

Intersection traffic counts and Midblock Classified volume counts were carried out from 1-3-19 to 10-3-19 during the morning and evening peak and off -peak periods at all major at-grade intersections and mid blocks in the project influence area. 3 -day volume counts were conducted the proposed site near Auto nagar Junction, Psc Bose road and NTR Marg Junction.

These counts are an indication of the current background traffic levels on roads in the study area and are used as the basis for the analysis of operational conditions at the critical intersections.

S. No	Section name	Direction from to	Volume in no. of pcu / hr	
			Peak hour	Off peak hour
1.	Auto nagarjunction	Connectivity to project site Bandar road, Pantakalaluva road, psc road and 1 minor road	2800	2148
2.	PSC Bose road Junction	It is a connectivity of Major road to Auto nagar junction road, major road and Bandar road	2125	1490
3..	NTR marg Junction	It is a connectivity of major road to Autonagar junction road, Kanuru road and Ballem road	1900	1492

**Table 1(c): Traffic flows in major sections around the study area (direction wise)**

### COMPARISON OF EXISTINNG TRAFFIC WITH PREVIOUS STUDIES ON SELECTED AREAS:

The traffic studies conducted in 2017, 2018 and 2019 by Centre for Transportation Engineering, JNTU have been compared and are shown in tables below.

### MALL & MULTIPLEX AREA

Section of road	Year 2017		Year 2018		Year 2019	
	Peak hour Traffic in pcu / hr	Off-Peak hour traffic in pcu / hr	Peak hour Traffic in pcu / hr	Off-peak hour Traffic in pcu/ hr	Peak hour traffic in pcu / hr	Off-Peak hour traffic in pcu / hr
1. Benz circle Junction	3974	3312	4320	3600	4800	4000
2. Myneni signals Junction	2661	2326	2893	2529	3125	2810
3. NTR circle Junction	2947	2587	3204	2812	3560	3125

**Table 2(a): Comparison of existing traffic volume with previous studies at Mall & Multiplex area (Benz circle)**

**COMMERCIAL AREA**

Section of the road	Year 2017		Year 2018		Year 2019	
	Peak hour Traffic in pcu / hr	Off-Peak hour traffic in pcu / hr	Peak hour Traffic in pcu / hr	Off-Peak hour traffic in pcu / hr	Peak hour Traffic in pcu/ hr	Off-Peak hour traffic in pcu / hr
1. 1-town Junction	3150	2636	3501	2929	3890	3255
2. Kotikalapudi-Modepalli road	1644	1284	1787	1395	1985	1550
Kaleshwara Rao market road junction	2336	1984	2539	2156	2821	2395
4. Lower Bridge road Junction	2666	2467	2897	2682	3125	2980
5. Flyover road junction	3665	3223	3983	3503	4425	3892

Table 2(b): Comparison of existing traffic volume with previous studies at Commercial area(1-Town)

**INDUSTRIAL AREA**

Section of the road	Year 2017		Year 2018		Year 2019	
	Peak hour Traffic in pcu / hr	Off-Peak hour traffic in pcu / hr	Peak hour Traffic in pcu / hr	Off-Peak hour Traffic in pcu / hr	Peak hour Traffic in pcu / hr	Off-hour Traffic in pcu / hr
1.Autonagar Junction	1760	1234	1912	1341	2125	1490
2.PSC BOSE road Junction	2318	1753	2520	1906	2800	2148
3.NTR marg Junction	1574	1236	1710	1343	1900	1492

Table 2(c): Comparison of existing traffic volume with previous studies at Industrial area (Auto Nagar)

**INTERSECTION TRAFFIC VOLUMES:**

The detailed data of intersection volume counts is enclosed in the Appendix

**MALL & MULTIPLEX AREA**

The directional and turning flows at each intersection in the project influence area are given in the following table.

S. No	Direction/ Name of the Road	No. of vehicles in pcu / hr	Peak Hour	Peak hour volume
1.	Benz circle Junction	4800	8:00-9:00AM	11485 Pcu/hr
2.	Myneni signals junction	3125	8:00-9:00AM	
3.	NTR circle Junction	3560	6:00-7:00PM	

**Table 3(a): Traffic flows in Peak Hours near Junctions/Roads**
**COMMERCIAL AREA**

The directional and turning flows at each intersection in the project influence area are given in the following table.

S.NO	Direction/ Name of Road	No. of vehicles in pcu/hr	Peak Hour	Peak hour volume
1.	1-town Junction	3890	9:00-10:00PM	16340 pcu/hr
2.	Kotikalapudi-Modrpalli road	1985	9:00-10:00PM	
3.	Kaleshwara Rao market road Junction	2821	8:00-9:00PM	
4.	Lower Bridge road junction	3219	6:30-7:00PM	
5.	Flyover road junction	4254	6:00-7:00PM	

**Table 3(b): Traffic flows in Peak Hours near Junctions/Roads**
**INDUSTRIAL AREA**

S. No	Direction/ Name of the Road	No. of vehicles in pcu / hr	Peak Hour	Peak hour volume
1.	Autonagar Junction	2125	5:30-6:30PM	6825 pcu/hr
2.	PSC Bose road Junction	2800	9:00-10:00pm	
3.	NTR marg Junction	1900	5:00-6:00pm	

**Table 3(c): Traffic flows in Peak Hours near Junctions/Roads**

**CONCLUSION:**

Traffic impact studies for the selected areas Mall & Multiplex area (Trendset mall), Commercial area(1-town) and Industrial area (Autonagar) are conducted. The impact of the existing areas on the traffic is found out. Based on the traffic volume studies we can design the roads geometrically, we can plan sidewalks, cross walks, and pedestrian signals we can also design the road intersections, plan signal timings and channelization by turning movement study. There is much Traffic congestion in the selected areas. We have made few suggestions to reduce the traffic congestion. But in view of the future developments in the influence area and traffic growth, warrants/recommendations as suggested above may be adopted.

**WARRANTS RECOMMENDED IN THE PRESENT STUDY**

Recommendations for site access and transportation improvements needed to maintain traffic flow to, from, within, and past the site at an acceptable and safe level of service are given below. Improvements typically include roadway widening, turn lanes, traffic signals, bicycle, pedestrian and transit amenities, safety measures, sight distance, and transportation demand management strategies. Detailed improvements specifically associated with the development should be identified.

At Benz Circle Junction a road widening is required where the traffic congestion is taking place and if possible, traffic signals should be placed or a fly over should be constructed on the National Highway road. Required road widening at the Nirmala School Road. Time delay for the Traffic signal at the Benz Circle junction is too high due to which there is a lot of congestion in between the vehicles and vehicular movements are too slow, so it is recommended to construct a flyover on National Highway road. Required signals at junctions, 'U' turns and direction boards should be placed. Service road must be maintained with IRC specification minimum lane width of 3.75 along with right off way. And suggested to maintain all the minor roads lane width of 3.5 minimum.

1. There is a congestion at the entry and exit points of the commercial complex. Hence an additional lane is recommended for the circulation of the vehicles.
2. There is a requirement for the Parking areas near the 1-town, due to the lack of the parking areas the vehicles are being parked on the road side which cause the traffic congestions.
3. Need for the development of junctions in the vicinity is identified.
4. There is a probable need for a new (or modified) traffic signal to control the Highway serving a proposed or existing development(s).
5. Installation of traffic control signs and markings is recommended.
6. Addition of lanes is required after 2017 irrespective of the development on all the roads in the influence area.
7. Adjustment of cycle lengths at all the signals is necessary.
8. Introduction of additional signal phases for pedestrians is necessary at all junction and all other junctions in the influence area.
9. The traffic congestion is occurring due to the Bus stops on the roads, there is a need for the shifting of the Bus stops to appropriate locations.
10. There is also a need to develop a Dedicated bus lane (followed in many foreign countries) to decrease the traffic congestion.

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