Locational Traffic Modelling- A Case Study

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Abstract- **Rapid urban growth is directly impacting the increase of vehicles in the commercial Areas in any city or town. Job locations and amenities are also located in the same areas. Due to these reasons traffic congestion is a common phenomenon in these areas. This resulted in the increase in travel time and cost for the users. In this paper we have studied the traffic characteristics of "Rajam" one of the developing towns of Srikakulam district in Andhra Pradesh where there is no proper planning of the town for catering the needs of the traffic. Foreseeing the need of the hour, study has been taken up to understand and improve the traffic conditions in this town. This study included conducting volume and traffic studies. Through which Improvements has been suggested like extension of the road, designing of Roundabouts at various intersections, improving pedestrian's movements by proper pedestrian's management design etc…**

Key Words: Traffic characteristics, Capacity analysis, Pedestrian movement, speed profile.

1. INTRODUCTION:

The City has many streets that serve as both connections to regional designations and gateways to many of the City's distinct communities and neighborhoods. Many of these areas are heavily traveled with vehicles, transit, and pedestrians, and experience traffic congestion, excessive transit travel times, and safety concerns. Corridor development plans and core are decongestion is more important for a city as it's of the major travel area to reach any destination in the city in the small size cities.

1.2 AIM & OBJECTIVES:

Corridor Improvement & Management plan in the core area of small size city.
To study the traffic congestion and corridor improvement regulations and guidelines. To study and understand the national and global studies on corridor management plans. To study the existing traffic congestion in the case study corridor area. Recommendations and suggestions to improve the corridor by traffic management plans to decongest the core area.

1.3 SCOPE & LIMITATIONS:

Corridor length is restricted up to 1.5km stretch. Decongestion of traffic based on guidelines and regulations. Day time traffic is only concerned as urban areas major congestion occurs in the day time only.

2. METHODOLOGY:

Stage 1:
To study the traffic congestion and corridor improvement regulations and guidelines.
- ❑ Traffic Congestion
- ❑ Safety
- ❑ Traffic Management strategies
- ❑ Corridor improvement plans

Stage 2:
To study and understand the national and global studies on corridor management plans.
- ❑ National Level Studies
- ❑ Global level studies
- ❑ Comparison of two level studies
- ❑ New concepts of Traffic Management strategies

Stage 3:
To study the existing traffic congestion in the case study corridor area.
- ❑ Case study are selection criteria.
- ❑ Base year scenario evaluation
- ❑ Base year traffic regulation and guidelines
- ❑ Finding the base year issue in geometry and traffic movement.

Stage 4:
- ❑ Recommendations/suggestions to improve the existing condition's based on regulations and guidelines evaluated from best alternative scenario.

3. STUDY AREA SELECTION:

Rajam is a town in Srikakulam district of the Indian state of Andhra Pradesh. It is a nagar panchayat and the headquarters of Rajam mandal. Rajam is located at 18.28N 83.40E. It has an average elevation of 42 meters (137 feet). In Rajam there is no proper planning of the town, to cater the needs of the present traffic. Understanding the need of the hour present study has been taken up to understand and improve the traffic conditions in Rajam town. Which includes conducting various volume and traffic studies. Remedial measures may include extension of the road, designing of Roundabouts at various intersections, Improving pedestrians movements by proper pedestrian's management design.

3.1 STUDY AREA GEOMETRIC PROFILE:

Fig 1: geometric profile of Rajam area

- Palakonda Road Right of way at the junction is about 10.5 mts but the turning radius at the junction is very less decreasing the speeds at the junction
- Srikakulam Road has some encroachments near the junction creating a bottle neck.
- Madhav Bazar road has very less carriage way, in one-way conditions there are lot of pedestrian movement obstructing the vehicular flow
- Bobbili road the turning radius has to be improved.
- Entry and exit of the bus terminal has to be changed to decrease the obstruction to the flow of the traffic due to the public transport vehicles (Buses).
- Turning improvements has to be proposed to increase the junction efficiency, decrease vehicular delays and congestion.

4. TRAFFIC CHARATERSTICS AT MID BLOCK:

4.1 TRAFFIC CHARATERSTICS AT MID BLOCK – Location 1:

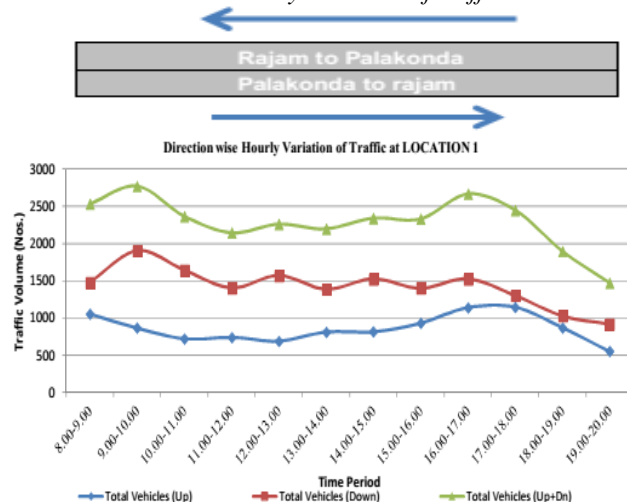*4.1.1 Direction wise hourly variation of traffic location 1:*

Fig 2: Direction Wise Hourly varation of traffic at Rajam-Palakonda Road

Inference:
- In the upward direction traffic is moving more in evening with comparative to morning .
- In the down direction morning traffic is more.
- There is no hourly variation impact on both directions.
- Peak hour in morning 9 to 10 am and in the evening from 4 to 5pm.
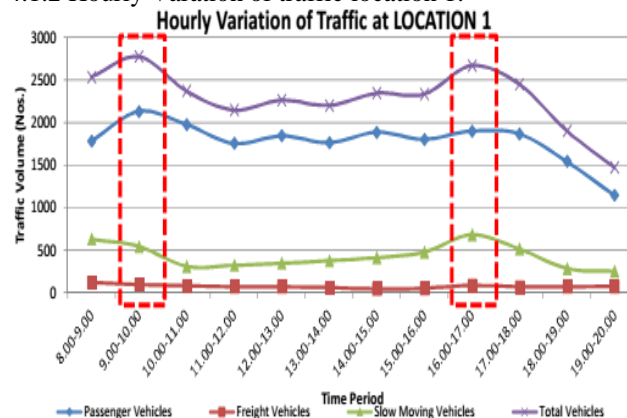
4.1.2 Hourly Varation of traffic location 1:

Fig 3: Hourly varation of traffic at Rajam-Palakonda Road

Inference:
- Freight vehicles don't have any hourly variation in the total day as there movement will be more in night with compare to day.
- Passenger vehicles are more in the morning and NMT vehicles movement is more in the evening with comparing to the hourly variation of the total

day.
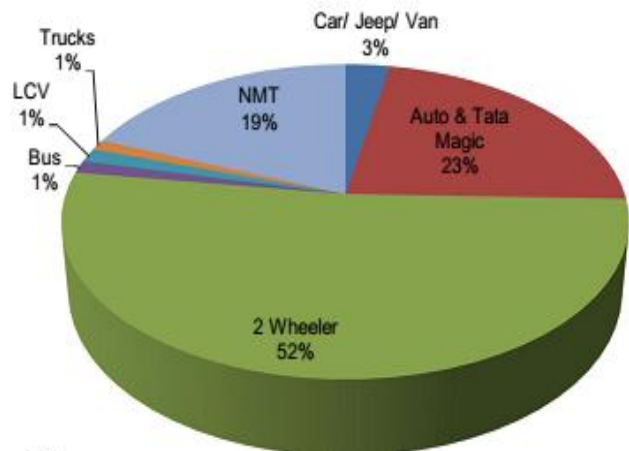
4.1.3 Composition of Traffic at location 1:

Fig 4: Composition of Traffic at Rajam-Palakonda Road

Inference:
- As like every cities in India 2wheeler most predominate traffic with 52% and next follows auto & Tata magic with 23%
- NMT vehicles share is 19% which is a good sign to encourage the NMT usage in the city.

4.2 TRAFFIC CHARATERSTICS AT MID BLOCK – Location 2:

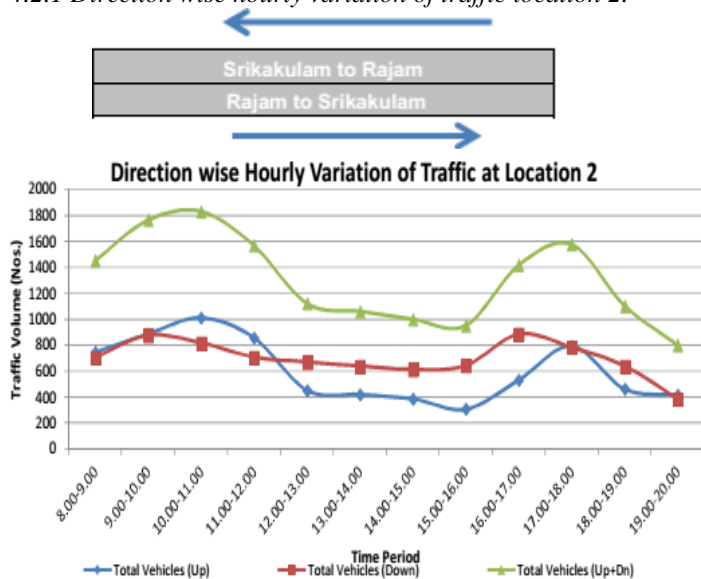### 4.2.1 Direction wise hourly variation of traffic location 2:

Fig 5: Direction Wise Hourly varation of traffic at Srikakulam-rajam road

Inference:
- In both directions morning and evening peak is high with comparing to the total day traffic.
- it clear shows the open and closing timing of Public and semi public buildings and office on impact the traffic.
- Peak period time in the morning is 10 to 11 am and in the evening 5 to 6 pm.
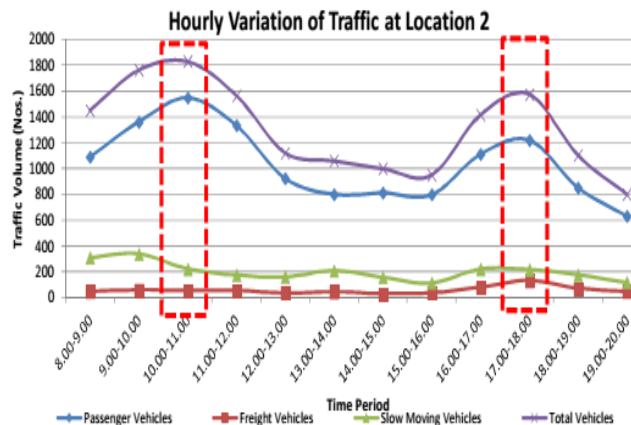
4.2.2 Hourly Varation of traffic location 2:

Fig 6: Hourly varation of traffic at Srikakulam-Rajam Road

Inference:
- Freight vehicles don't have any hourly variation in the total day as there movement will be more in night with compare to day.
- Passenger vehicles are more in the morning and NMT vehicles movement is more in the evening with comparing to the hourly variation of the total day

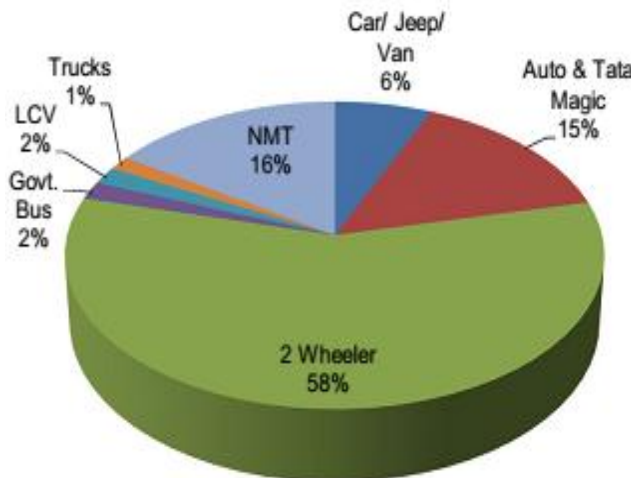### 4.2.3 Composition of Traffic at location 2:

Fig 7: Composition of Traffic at Srikakulam-Rajam Road

Inference:
- As like every cities in India 2wheeler most predominate traffic with 58% and next follows auto & Tata magic with 15%
- NMT vehicles share is 16% which is a good sign to encourage the NMT usage in the city.

4.3 TRAFFIC CHARATERSTICS AT MID BLOCK – Location 3:

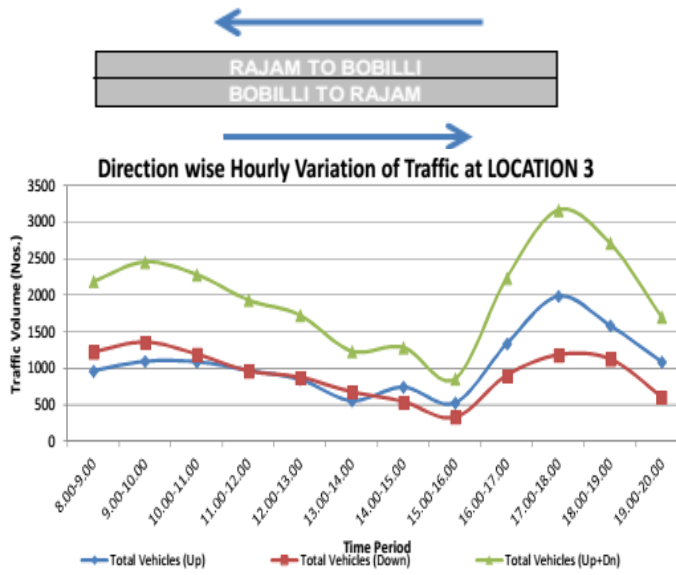### 4.3.1 Direction wise hourly variation of traffic location 3:

Fig 8: Direction Wise Hourly varation of traffic at Rajam-Bobbilli Road

Inference:

- In the upward direction traffic is moving more in evening with comparative to morning.
- In the down direction morning traffic is more.
- There is no hourly variation impact on both directions.
- Peak hour in morning 9 to 10 am and in the evening from 4 to 5pm.
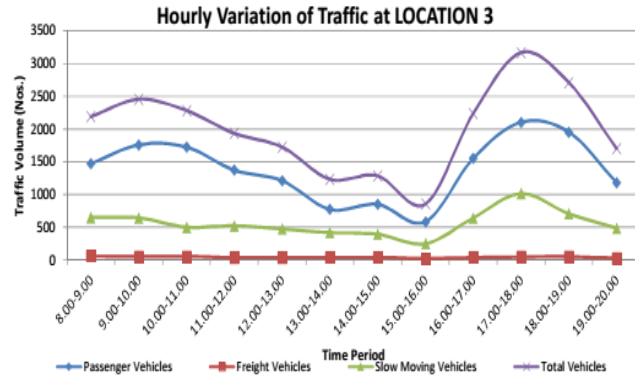
4.3.2 Hourly Varation of traffic location 3:

Fig 9: Hourly varation of traffic at Rajam-Bobbilli Road

Inference:

- Freight vehicles don't have any hourly variation in the total day as there movement will be more in night with compare to day.
- Passenger vehicles are more in the morning and NMT vehicles movement is more in the evening with comparing to the hourly variation of the total day

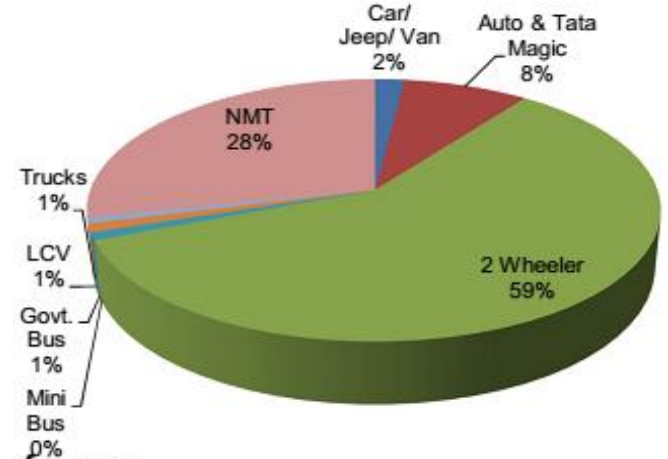### 4.3.3 Composition of Traffic at location 3:

Fig 10: Composition of Traffic at Rajam-Bobbilli Road

Inference:

- As like every cities in India 2wheeler most predominate traffic with 59% and next follows auto & Tata magic with 8%
- NMT vehicles share is 28% which is a good sign to encourage the NMT usage in the city.

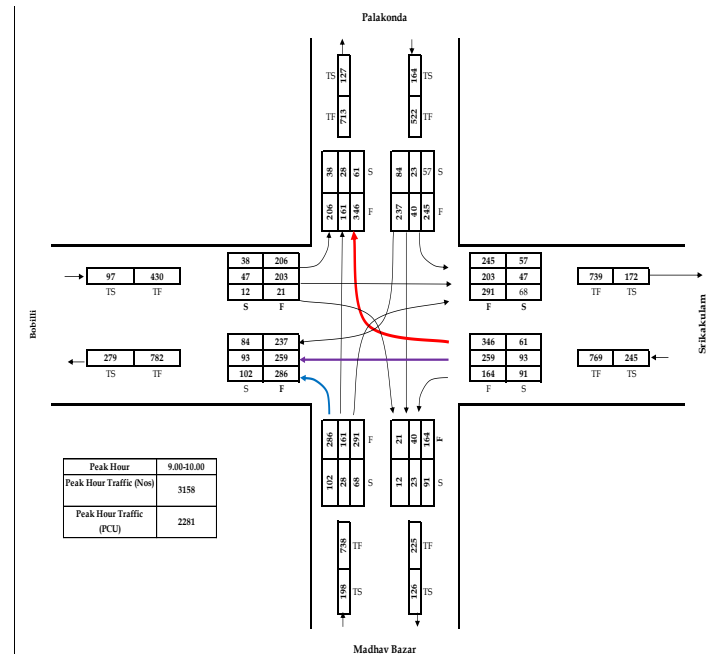## 5. TRAFFIC CHARATERSTICS AT JUNCTION:

Fig 11: Vehicular movements to different directions

Inference:

- In the traffic direction wise movement most of the traffic movement is from Srikakulam to Palakonda road next from Srikakulam to Bobbili road.
- High left turn direction movement is from Madhav Bazar to Palakonda road.
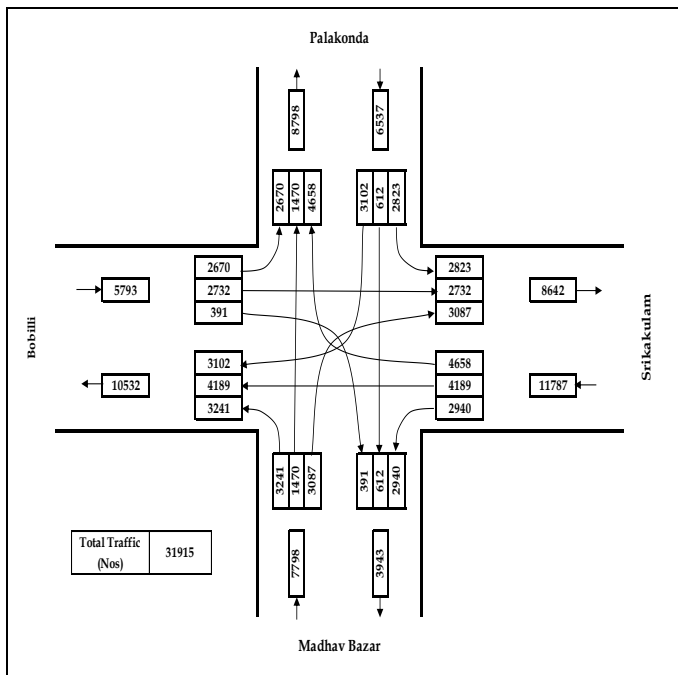- Less traffic direction movement is from Bobbili to Madhav bazar road.

Fig 12: Total traffic flow at Rajam junction

Inference:

- Peak hour traffic is from 9 to 10 am with a traffic of 3158 vehicles.
- Srikakulam road is getting more loadings from the Madhav road and Palakonda road with heavy traffic with comparing other legs in the junction.

6. EXISTING PEDESTRIAN AND TRAFFIC MOVEMENT BEHAVIOR:

Table-1 Pedestrian movement for peak flow and width

S.No	Location Name	Reserved Space	Total Volume	Peak	Peak Flow (Ped/Min)	Flow/ Width	LOS
1	plkd To Rajam Road	1.2	3607	1174	19.57	16.31	C
2	Sklm To Rajam Road	1.5	2454	1097	18.28	12.19	B
3	Bobbili To Rajam Road	1.2	2064	987	16.45	13.71	B
4	Madhav Bazar Road	0.5	1354	454	7.57	15.13	C

Table-2 Pedestrian movement for capacity and V/C

S.No	Location Name	Reserved Space	Total Volume	Peak Volume	Capacity	V/C Ratio	LOS
1	Plkd To Rajam Road	1.2	3607	1174	1363.24	0.86	E
2	Sklm To Rajam Road	1.5	2454	1097	1804.96	0.61	D
3	Bobbili To Rajam Road	1.2	2064	987	1363.24	0.72	E
4	Madhav Bazar	0.5	1354	454	332.56	1.37	F

7. CAPACITY ANALYSIS AND SPEED PROFILE:

Table- 3 Capacity Analysis and speed profile

S.No	Road Name	RoW (M)	Carriage way (M)	Effective Carriage way (M)	On street Parking (M)	Speed (KMPH)	Capacity (PCU)	Volume	V/C Ratio	LOS
1	Bobbili road	10.5	7.0	5.5	1.5	28	1500	1141	0.76	C
2	Skml Road	10.5	7.0	5.5	1.5	22	1500	1398	0.93	E
3	Madhav Bazar Road	7.2	6.0	6.0	0	25	1250	910	0.73	C
4	Plkd Road	15.0	7.0	5.5	1.5	26	1500	1114	0.74	C

Inference

- Srikakulam road is having more traffic with comparing to others roads and its performing with v/c ratio is greater than 0.70 and Level of service at E.

8. EXISTING TRAFFIC MANAGEMENT:

One way Timings:
- Morning 8am to 12am and Evening 4pm to 8pm in the direction of Srikakulam to Bobbili.

Vehicles Restriction
- All vehicles are allowed no timing restriction

Impact of Traffic Management in core area
- Delays in core area.
- Two wheelers are not following the one way timing.
- Increase in travel time.

9. RECOMMDATIONS & CONCLUSIONS:

9.1 Geometric improvements: Option 1

Fig 13: Auto Cad design of geometric improvements optn 1

1. Turning radius of the junction has been improved to reduce delays in the junction and increase the vehicular movement.
2. IPT stand has been proposed in the bus terminal to avoid the conflicts between the bus and IPT.
3. A channelize has been proposed on the palakonda road.
4. Signals has to be designed according to the flow.

9.2 Geometric improvements: Option 2

Fig 14: Auto Cad design of geometric improvements optn 2

1. A channelize has been proposed on the palakonda road.
2. Roundabout has been proposed and designed for free flow of traffic.
3. Turning radius of the junction has been improved to reduce delays in the junction and increase the vehicular movement.
4. IPT stand has been proposed in the bus terminal to avoid the conflicts between the bus and IPT.

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