Traffic and Transportation Problems of Metro Cities: Case of Meerut, Uttar Pradesh

Vijay kumar*, Dr R.K.Pandit**

Abstract: Metro cities in India are facing acute traffic and transportation problems leading to deteriorated quality of life and weak socio--economic structure. The problems range from inefficiency of roads and transport infrastructure to deal with exorbitantly increasing in magnitude of vehicles especially the personal ones , lack of mass transportation systems , encroachments on roads ,lack of pedestrian facilities and weak traffic management systems. This paper focuses these problems contextual to Meerut city, one of the priority town of NCR. The probable solution to this gigantic problem can be creation of an independent, “Traffic and Transportation Authorities” at city level which should be technically strong in equipments, technology, and trained manpower & experts. Beside this comprehensive traffic and transportation plan should be made mandatory for all cities along with efficient management strict enforcement.

I. INTRODUCTION

Metro towns in India especially the old ones are facing acute Traffic and transportation problems and inspite of making efforts and investments, cities have not been able to cope up with this gigantic problem. The population in towns is regularly increasing but the road area especially in the existing part of the cities and in city cores, remains the same, making the situation grim by increasing the congestion in central and the other important part of cities. Mass transportation systems are generally neglected or do not provide regular, adequate, safe and reliable quality of services there by people relying on the private vehicles, which leads to extreme congestion, increase in pollution, accidents and add to general deterioration of quality of life in cities. In metro cities there are about 15% car users and as 75% of the transport budget is used for widening roads, which primarily benefits the car and two wheelers and not the mass transportation systems. Beside this increase of commercial and institutional activities in central built up areas ,temporary and permanent encroachment on roads ,unauthorized parking of tempos ,Rickshaws , use of same road lanes by slow moving vehicles, intermediate transport systems and fast speed vehicles , poor traffic management add to the problem. The problem can be addressed by preparation of a comprehensive traffic and transportation plan for the town along with appropriate placement/locating various land uses in the Master Plan. This paper is focuses on studying the problems of Traffic and transportation problems of Meerut one of the important historical and priority town of NCR and an important divisional headquarter of state of Uttar Pradesh, India.

II. MEERUT: GENERAL BACKGROUND

Meerut is one of the largest town of Western Uttar Pradesh. Beside a district headquarter it is a divisional headquarter. It is a major commercial, industrial, educational and a city of Archaeological importance. It has got a pride of being largest town in the NCR region after Delhi.

Location

Meerut Town is situated on Delhi -Saharanpur railway line and well connected to Delhi, Saharanpur, Muzaffarnagar, Hapur, Bulandshahar The Distance of Meerut from Delhi is 70 km and from Ghaziabad 50 km Meerut. 360kms from Kanpur , It is situated on state high way No. 45.Meerut town is situated on 29° - 41’ North and longitude 77° - 45’-3‖ East.Meerut is situated at the heart of upper Ganges Yamuna Doab and has a mean sea level between 734.46 - 739.30 feet.
Meerut enjoys a strategic importance from the defense point of view, which is a foremost quality possessed by Meerut, since the dawn of Mughal Dynasty and imperialism and this particular quality was instrumental in the choice of location for military base.

Meerut Town: A Brief Historical Background

There are traces which depict that the settlement in Meerut was surrounded from all sides by a wall and a depression (Khai). It had nine gates, out of which 8 were old and one of the gates was new. It is said that Meerut is a historical town which started developing at the period of Ramayana. As per the mythology available, Meerut was capital of “Mayrastra”. It is also said that princes Mandodra of this city was married to king of Lanka Ravana. Battle of Mahabharata took place near this town. There are number of monuments of the times of Mahatma Buddha, Hindu, & Muslim kings. One of the important such monument is Surajkund, “Shapeer Ki Dargah”, Makbara of Mohammad Kamboh etc. Also Indian Mutinies of 1857 started from this city. Prior to 1881 it was ruined and almost settled again. In 1806 the cantonment was established and at present is an important centre of regimental unit. In 1881 the population of Meerut city was 60,948 excluding that of cantonments Meerut is a historical city. Number of remains have been found near this city. As per the experts these remains are of period approximately 1300 to 1500 BC. and settlement existed here much before the king Ashok. The famous fort in Meerut was got constructed by king Haridutt and he constructed a moat around the fort and a river also with in the premises of fort. This fort spread in the area of 127 hectare, still exists in the city. Maratha Sardar Raghunath Rao captured this fort and Ahmad shah abdali looted the fort. In 1818 Meerut was made the District headquarter and a large cantt. area was established. By 1829 the cantonment was fully developed and natives of Meerut were crushed administratively. In 1847 Meerut was established as important center against British Govt. and consequently in 1857 mutiny started from Meerut. The 54th annual meeting of 1942 “Bharat chodo Andolan” was organized at this place. Beside this Meerut contributed in Indian freedom at many occasions.

In the initial of twentieth century, Meerut city was developed in interior part of old fort. In west towards Delhi Saharanpur, Railway line and areas near main spines connecting District headquarter has sparsely populated; but after independence the settlement developed near the main roads Meerut –Hapur, Meerut-Delhi and Meerut- Roorkee road. In 1965 Meerut Municipal area and area 8 km around this were declared as controlled regulated area under section 3 of “Uttar Pradesh Nirman karya Viniyam Adhiniyam 1958”. Later in 1976 afore said area was declared as Meerut Development area and Meerut Development authority was constituted & in 1978 the first Master plan of Meerut was prepared.

Regional Setting

Meerut lies in almost geometrical centre of District Meerut. Reason for becoming a centre for commerce and industry in western UP is its nodal location. It is situated on a land which is highly fertile agricultural area but devoid of any significant minerals, and very less section of the entire population is urban. Besides the major portion of Meerut tehsil, portion of Sardhana, Mawana, Baraut, Ghaziabad, Bulandshahar, Hapur and Southern portion of Muzaffarnagar fall within the region of Meerut. The services rendered by Meerut are grouped into two categories

- **Local services** such as retail business recreation and personal community services, municipal govt. etc. which are meant for the consumption mostly by the local population.
- **Regional services** such as whole sale business and technical services, administrative services etc. which are meant for the consumption of both the regional components is usually predominant. Meerut is the biggest employment centre in the region where job opportunities exist not only for local population but also for the people of densely settled region. The labour supply zone, all around the town even extends sup to Hapur Bulandshahar and Ghaziabad region from where the journeys are completed within 90 minutes in road and railway. The commuters from the surrounding rural region visit the city to seek employment in its industrial, commercial and services establishments.

Climate

The climate of Meerut is moderate, with winter minimum temperature 3’c to 5’c, The summer of city are generally hot with maximum temperature reaching up to 45’c to 47’c and average rainfall level is 775 mm to 820 mm, which is generally from June to September. In autumns also there happens
some rains which is generally very useful for agriculture. City has good amount of forest land which is in village Rithani near Delhi road and is about 550 hectare.

**Soil and Vegetation**

Meerut has plain topography and with clay loamy soil. It has very fertile agricultural land with high water table, quality of water is good and because of close vicinity to shivalik hills, it has appropriate level of humidity, which makes it suitable for healthy habitation. Meerut is situated in between Ganga and Yamuna with river Ganga canal approximately 10 km away from main city, and so all small rivers and drains lead in to it. On East there is Kali “Nadi” in which all liquid waste of city is disposed in as general slope of city is from North West to South East.

**Socio- Economic Characteristics**

### Status of Housing Stock: Meerut City

<table>
<thead>
<tr>
<th>YEAR</th>
<th>POPULATION</th>
<th>NO HOUSES</th>
<th>NO FAMILIES</th>
<th>AVERAGE SIZE OF FAMILIES</th>
<th>SHORTAGE OF HOUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971</td>
<td>3,71,780</td>
<td>54914</td>
<td>62158</td>
<td>5.98</td>
<td>7244</td>
</tr>
<tr>
<td>1981</td>
<td>536615</td>
<td>101222</td>
<td>101584</td>
<td>5.28</td>
<td>7362</td>
</tr>
<tr>
<td>1991</td>
<td>8,49,799</td>
<td>122957</td>
<td>131476</td>
<td>6.46</td>
<td>8319</td>
</tr>
<tr>
<td>2001</td>
<td>10,74,869</td>
<td>1,74595</td>
<td>184581</td>
<td>5.82</td>
<td>9966</td>
</tr>
</tbody>
</table>

From above it is evident that there is a shortage of 10 thousand houses where as housing board and Meerut Development Authority has floated many housing colonies, which are lying vacant because -

- Costly houses out of the reach of common people.
- Away from city.
- Availability of unauthorised, cheap land available near the city built up area.

No of unauthorised colonies by 31.03.2001 as surveyed by M.D.A is 69. Further 43 more unauthorised colonies were earmarked. So total of unauthorised colonies are 112 and total colonies regularized are 38.

### City Economics & Occupation

<table>
<thead>
<tr>
<th>Types of Industries</th>
<th>No of units</th>
<th>total % labour</th>
<th>skilled % worker</th>
<th>semi skilled % worker</th>
<th>unskilled % worker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large scale industries</td>
<td>39</td>
<td>4683 (6.31%)</td>
<td>235 (32%)</td>
<td>796 (1.07%)</td>
<td>3652 (49.22%)</td>
</tr>
<tr>
<td>Small scale industries</td>
<td>13510</td>
<td>61254 (82.52%)</td>
<td>1838 (2.48)</td>
<td>15513 (20.63%)</td>
<td>44103 (59.41%)</td>
</tr>
<tr>
<td>House hold industries</td>
<td>7922</td>
<td>8295 (11.17)</td>
<td>141 (0.19)</td>
<td>995 (1.34)</td>
<td>7159 (9.04)</td>
</tr>
</tbody>
</table>

|          | 23471 | 74232 (100) | 2214 (2.99) | 17104 (23.04) | 54914 (73.97) |

### Demographic Characteristics

Meerut is a second number of town in terms of population in NCR region. As per 2001 causes the population of Meerut is 11,70,985. The population of Meerut city exorbitantly increased which
was less than 5.5 lakhs in 1981 and nearly 8.5 lakhs until 1991 (in period 71-91). In these two decades the increase in population of Meerut and national increase in urban population are 40.39% and 46.14% respectively. The reason for this growth is because of increase in housing stock, provided by Govt. agencies on large scale through housing board and Meerut. Development Authority, Industrial development in the city and development was of comparatively better infrastructure The increase of population in period 91-2001 is 37.79% which is less as compared to previous one but slightly more than national increase of 36.19%. The recorded increase in the population during 1991-2001 was 37.8%, which was slightly less than that of the previous two decades and is lightly more than the national average of 36.17%. The reason in lower increase is because of good availability of housing facilities in smaller town & nearby town of Ghaziabad, Noida having proximity with Delhi NCR-Plan envisaged Meerut city as one of the regional centre and large no of offices and commercial activities will be shifted to this city in the process of decentralization, but it could not happen. In the central areas of Meerut City the population density is as high as 200 persons per hectare and in other built up areas near major road is about 500 persons per hectare. Thickly populated central built up areas are generally unhygienic & unhealthy and have acute traffic and transportation problems.

III TRAFFIC AND TRANSPORTATION INFRASTRUCTURE OF MEERUT: AN OVER VIEW

The Meerut town is developed in organic pattern, number of regional highways pass through this city. Delhi–Roorkee road, Meerut–Baghpat road, Meerut–Bijnor road, Meerut–Garh road meet at central hub point commonly known as “Begum Bridge”. All these major state/regional/national highways pass through the central built up area of city. So the city has naturally grown concentric pattern of circulation network.

Analysis of Effectiveness of Planning Proposals for Traffic and Transportation Infrastructure in Various Master Plans

III(a) Proposals of First Meerut Master Plan 1971-91

Road Pattern And Typology

The first Master Plan of Meerut 1971-91 respected the organic Growth pattern of the city and further proposed concentric and radial pattern of roads. In the total Regulated Area of Meerut considering only the major master plan road system, the percentage of land under transportation use will be about 5.35%. In case the rural tract is deducted out of the regulated area the land under major transport use including the roads is about 7.67%. To this if we add about 9.32% of land under the existing and future roads below 100ft width located with in the residential and other use zones the total land under transport use will work out to be 17.00%, which is in accordance to generally accepted standards. So traffic has been managed through network of road of 250ft, 200ft’ . Roads of 120ft’ and 100ft’ are arterial roads which further connects to collector roads. The Meerut - Baghpat, Delhi-Mussoorie road, Meerut-Hapur road are part of the National Capital Region transportation Grid focusing on Meerut so right of way has been fixed to 250ft. In trans nauchandi area about 196 acre (79.5 hectare) of land is under transportation use, 64.4 hectare will be covered by roads, while bus and truck terminals shall cover the rest about 15.1 hectare of land.

In Master Plan 1971-91 two kinds of roads were proposed-

1. To provide access to various areas of the town, to individual properties and to collect and distribute the various categories of traffic from and to various areas of the town.
   - (a) Pedestrian foot path and cycle tracks
   - (b) Local streets
   - (c) Collector streets
2. To provide thorough fast and safe movement to vehicles traveling from one part of the town to other and for traffic passing through the town on way to destination out side the city.
   - (a) Arterial streets and ring roads
   - (b) Network of high ways and bye passes
In this category there are mainly Delhi- Nitipas national highway no.58, Meerut- Badaun, State Highway 22, Garh- Meerut- Karnal State highway, Meerut- Baghpát –Sonepat State highway, Meerut –Bijnor – Pouri State highway, Meerut - Baraut, Meerut- Pralikhshitarh road

Bus Stands and Truck Terminus

- About 9.9 hectare of land for Bus Terminal and Truck Parking was proposed in the Abdullapur Planning Units
- In Kankarkhera land was reserved for Zonal City Bus Terminal.
- In Partapur Planning Unit about 11.3 hectare for local City Bus Terminal and 7.7 hectare for Truck Parking.
- In Trans Nauchandi Planning Unit about 196 acre (79.5 hectare) of land is under transportation use, the Bus and Truck Terminals were proposed in about 15.1 hectare of land

Railway Infrastructure

In the Partapur Planning District out of total area of 153 hectares, 24.3 hectare was earmarked for development of Railway Facilities

Analysis of Effectiveness & Outcome of Proposals of First Meerut Master Plan 1971- 91 for Traffic and Transportation Infrastructure

The proposals of Master plan were found not be very effective and very partially addressed the traffic problems of city
- Master plan 71-91 proposed widening of 29 roads within the built up area, but it was not practically possible to widen these roads as there were already large encroachments and few commercial complex plans have been sanctioned with in the road widening area also.
- There has been large encroachment on internal roads and near the crossing and junction of unauthorized path of Rikshaws etc is further magnifying the problem
- Acute traffic issues of built up area could not be addressed. In the entire central area there were problems of traffic jams, unauthorized parking, extremely low average traffic speed

However the Regional infrastructure was improved

The Regional roads Meerut –Roorkee (200), Meerut - Bijnor (200), Meerut -Parikshat garh (120), Meerut –Garh (250), Meerut -Hapur (250), Mmeerut -Delhi (250), Meerut –baraut (250), Meerut –baghpát (250), Meerut -Bhola (150), Meerut -sardhana (150), and beside above, important town roads Begumpul to Hapur chowk (120), Begumpul to university (150), Gagoal road (200), Transport nagar road (150). These afore said roads can be widened.

Status of Mass Transportation modes by the end of Meerut Master Plan 1971-91 period

- There were 175 roadways busses 5.6 busses running in agreement with U.P roadways
- 481 private busses running in which 52,502 passengers came to Meerut city and 51190 passengers more out of the city.

III(b) Proposals of Second Meerut Master Plan 2001

Road Pattern and Typology

(1) Meerut Master Plan- 2001 recommended development of radial and concentric framework of roads, Existing radial pattern of road was maintained through three ring cordons
(2) So Roads in three cordons were proposed:

- **Internal cordon** for transport movement with in the city and to connect different parts& areas of the city
- **Middle cordon** to take care of regional traffic and to connect outer and new areas of town,
• Outer cordon to take care of movement of goods and regional traffic

(3). For Implementation of above cordons, undeveloped portion of the respective rings were to be developed, as per the requirement and priority.

**Bus Stands and Truck Terminus**

- MMP-2001, proposed to Shift Existing Bus Stand to decentralize and proposed four bus stands at the meeting points of middle cordon with Delhi – Roorkee, Bye Pass Road, Roorkee road, Mawana road, Garh road, Hapur road,

On all major roads bus stand has been proposed to take care of regional traffic and internal traffic of respective sides. Since the existing transport Nagar is located in busy area so two new transport Nagar have been proposed on Baghpat road and Garh road

**Railway Infrastructure**

- MMP -2001 recommended additional truck terminus beside one existing keeping in extra requirement

MMP-2001 recommended development of railway stations of Meerut city, Meerut cantt., Pawli khas, Noor nagar for passengers and for the purpose of goods. Partapur Railway station has to be developed. An additional railway station also proposed near Vedvyaspuri residential scheme.

**Analysis of Effectiveness & Outcome of Proposals of First Meerut Master Plan 2001 for Traffic and Transportation Infrastructure**

The proposals of Master plan 2001 were found not be very effective and very partially addressed the traffic problems of city During the Master Plan 2001 period no substantial development for enhancement of traffic and transportation facilities took place, out of proposed 1374.90 hectare of land, only 31.47% ie 432.60 hectare was developed. The development & construction of proposed five bustands didn’t take place, similarly the development and construction of Transport Nagar was not taken up. The development of outer ring road, middle cordon an inner cordon couldn’t take place except at some points. Also at number of places encroachments and unauthorised growth took place.

**III(c) Proposals of Third Meerut Master Plan 2021**

**Road Pattern and Typology**

In Meerut Master Plan 2021 a total of 10% of land ie 1550 hectare of land was earmarked for Transportation

- The major recommendations of Meerut Master Plan 2021 regarding roads are
- Development of Ghaziabad – Meerut Expressway,
- Widening of all regional roads, and Fly Overs
- Development and enhancement of Main Intersections,
- Improvement of Local Bus Service,
- Development of Parking Spaces,
- Development of Comprehensive Traffic Management Plan
- Improvement of Meerut-Baghpat- Sonipat State Highway

**Bus Stands and Truck Terminus**

- Development of bus stands near Railway stations. Shifting of all bus stands located in inner parts of city to outer areas, development of transport nagar near Baghpat and Garh Road
- Proposal of two Transport Stations have been made on Garh road and Baghpat road
- The roads which catres to local and regional traffic can be developed in participation with private persons.
- In the areas where there is probability of development, a proper Zonal Plan may be prepared and accordingly the road may be constructed by the betterment charges obtained from the plot owners of that area.
- Improvement of all intersections and construction of Railway over bridges

**Railway Infrastructure**

- Improvement of Delhi-Saharan pur and Meerut – Hapur Rail Way Line including Electrification,
- Development of Rapid Rail Network Between Delhi and Meerut,
- development of Cargo near Mohiddinpur, construction of Railway Over Bridges
• development of Ghaziabz -Meerut –Saharanpur Railway Line

IV PRESENT STATUS OF TRAFFIC AND TRANSPORTATION FACILITIES:

Meerut Road Statistics: Meerut

The roads in Meerut town are developed, constructed & maintained by different agencies. The National Highway is developed and maintained by Central Public Works Deptt. & National Highway Authority of India where as the State Highways are developed and taken care of by State PWD department.

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>Particulars</th>
<th>Road Length (Km)</th>
<th>%age of Road Length</th>
<th>Jurisdictions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>National Highway</td>
<td>112.5</td>
<td>0.98</td>
<td>NHAi</td>
</tr>
<tr>
<td>2</td>
<td>State Highway</td>
<td>243</td>
<td>19.05</td>
<td>PWD</td>
</tr>
<tr>
<td>3</td>
<td>District Roads</td>
<td>100</td>
<td>7.85</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Municipal Roads (Pucca)</td>
<td>425.61</td>
<td>3.36</td>
<td>M. Corp</td>
</tr>
<tr>
<td>5</td>
<td>Municipal Roads (Kutch)</td>
<td>425.61</td>
<td>33.18</td>
<td>M. Corp</td>
</tr>
<tr>
<td></td>
<td>Cantonment Roads</td>
<td>66.18</td>
<td>5.10</td>
<td>Cantonment Board</td>
</tr>
<tr>
<td></td>
<td>Ground total</td>
<td>1275.66</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Source: Meerut Municipal Corporation & CDP Meerut

The total length of National and State Highway is 365 kms of which 65 kms is in the Cantt. Area. Meerut Municipal Corporation take care of 970 kms. The internal roads are maintained by Municipal Corporation, MDA, Builders and Housing Boards. The total road length of road in Meerut city is 1391 Kms. Road covers about 7.76 % of Meerut Town Area which amounts to about 1.08 m per person. The regular maintenance of 67%roads are taken care by Meerut Municipal Corporation and about only 50% of roads metalled roads.

The Meerut city is located on National Highways 58 which is on the western side of the city. Other important intercity / regional roads

• Meerut -Bidaun (State Highway 22)
• Garhmukteshwar-Meerut-Karnal (State Highway),
• Meerut—Bagpath—Sonipat (State Highway),
• Meerut—Bijnor—Pandi road
• Meerut–Parikshitgarh road.

These roads primarily cater to the ‘thorough traffic’ and some amount of ‘destined traffic. Important city arterial road include Abu lane road, PL Sharma Road, Lal Kurti Road, Burhana Road, Ghanta Ghar Road. These roads take care of huge internal traffic

Traffic Characteristics

Various traffic studies for the city of Meerut reveal that peripheral/outskirt areas of city witness about 80% of the trips being performed by fasts vehicles, this phenomenon decreases to 50% in the inner parts of the city. It is also indicated in these studies that two wheelers account for about 1/3rd of the total vehicular traffic while heavy vehicles constitute 25%. IPT (primarily cycle rickshaw) on the whole constitute 15% of the total vehicular trips. The role of public transport in serving the city’s travel demand is marginal which is substantiated by various para transit modes like tempos, shared jeeps, cycle rickshaws. Traffic volume count data for the inter city roads (regional roads) in the city of Meerut reveals that majority of roads carry traffic in excess of 10,000 vehicles with Dilli road witness the highest amount of traffic (21,835 PCU) while Baraut road
account for the least amount of traffic (7,566 PCU). In terms of composition it is seen that private vehicles constitute the highest category in all the road sections with Car/Jeep/Van having largest share.

**Motor Vehicles Volumes**

There is regular increase in the number of vehicles in the Meerut city, the number of vehicles enhanced from 64.6% to 70,175 in 2005.


Transport System Plan for Meerut – 2011, a study carried out by School of Planning and Architecture (1994) reveals that outer cordon traffic in the year 1992 was heaviest on Delhi Road (24109 PCU) followed by Roorkee Road (15802 PCU). Least Traffic was observed on Bhola Road (1856 PCU).

Traffic surveys carried out at different time slabs reveal that there has been steady growth traffic on various important road corridors. Apart from Delhi Road and Roorkee Road, traffic has grown on all major road corridors. The decrease in traffic along Delhi and Roorkee road could be attributed to the construction of Meerut Bypass (National Highway 58) that has resulted in shifting of ‘through traffic’ from these roads to the new alignment. It is clear from that on an average traffic has grown at the rate of 6.98% and 4.48% in terms of simple and compound growth rates respectively. The largest growth rate was observed on Sardhana Road followed by Mawana and Parikshit Garh Road respectively.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Vehicle Type</th>
<th>Occupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Car</td>
<td>3.55</td>
</tr>
<tr>
<td>2</td>
<td>Two Wheeler</td>
<td>85</td>
</tr>
<tr>
<td>3</td>
<td>Auto Rickshaw</td>
<td>3.29</td>
</tr>
<tr>
<td>4</td>
<td>Tempo/Mini Bus</td>
<td>20.64</td>
</tr>
<tr>
<td>5</td>
<td>Bus</td>
<td>42.58</td>
</tr>
<tr>
<td>6</td>
<td>Cycle</td>
<td>1.25</td>
</tr>
<tr>
<td>7</td>
<td>Cycle Rickshaw</td>
<td>1.86</td>
</tr>
</tbody>
</table>

**Vehicle Occupancy**

Source: Transport System Plan for Meerut – 2011, School of Planning and Architecture

<table>
<thead>
<tr>
<th>Road Name</th>
<th>Outer Cordon Count - 1992</th>
<th>Outer Cordon Count - 2002</th>
<th>Annual Growth Rate (Simple)</th>
<th>Annual Growth Rate (Compound)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roorkee Road</td>
<td>15,802</td>
<td>16,227</td>
<td>0.27%</td>
<td>0.27%</td>
</tr>
<tr>
<td>Mawana Road</td>
<td>4,094</td>
<td>5,000</td>
<td>16.07%</td>
<td>18.05%</td>
</tr>
<tr>
<td>Parikshit Garh Road</td>
<td>2,045</td>
<td>2,567</td>
<td>25.33%</td>
<td>28.40%</td>
</tr>
<tr>
<td>Garhi Muhaddisnagar</td>
<td>11,672</td>
<td>12,414</td>
<td>6.84%</td>
<td>7.62%</td>
</tr>
<tr>
<td>Nihalpur Road</td>
<td>8,115</td>
<td>10,026</td>
<td>2.35%</td>
<td>2.14%</td>
</tr>
<tr>
<td>DNH Road</td>
<td>24,109</td>
<td>25,835</td>
<td>-3.94%</td>
<td>-5.95%</td>
</tr>
<tr>
<td>Baghpat Road</td>
<td>8,482</td>
<td>10,900</td>
<td>1.52%</td>
<td>1.42%</td>
</tr>
<tr>
<td>Sardhana Road</td>
<td>1,370</td>
<td>1,596</td>
<td>1.71%</td>
<td>1.54%</td>
</tr>
<tr>
<td>Sardhana Road</td>
<td>4,485</td>
<td>14,767</td>
<td>23.12%</td>
<td>12.72%</td>
</tr>
<tr>
<td>Average</td>
<td></td>
<td></td>
<td>6.36%</td>
<td>4.48%</td>
</tr>
</tbody>
</table>

**Growth of Traffic along Regional Road Corridors**

Source: CDP Meerut
It is clear from the table above that on an average traffic at the outer cordon has grown at the rate of 4.48% (compound) per annum. However in order to assess traffic on the inner cordon a growth rate of 3.5% (compound) has been adopted on the basis the fact that land use within the city area would not have undergone a significant change. The projected traffic on the city arterials have been summarized in Peak Hour Traffic estimation (PCU).

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Road Name</th>
<th>Estimated Traffic (PCU)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Begur Bridge</td>
<td>7,367</td>
</tr>
<tr>
<td>2</td>
<td>Commissioner Crossing</td>
<td>1,609</td>
</tr>
<tr>
<td>3</td>
<td>Jail Chungi Crossing</td>
<td>2,253</td>
</tr>
<tr>
<td>4</td>
<td>Jail Chungi Crossing</td>
<td>2,254</td>
</tr>
<tr>
<td>5</td>
<td>Gath Bus Stand</td>
<td>4,202</td>
</tr>
<tr>
<td>6</td>
<td>Harpur Bus Stand</td>
<td>5,875</td>
</tr>
<tr>
<td>7</td>
<td>Boombys Cut</td>
<td>2,731</td>
</tr>
<tr>
<td>8</td>
<td>Dilli Gate</td>
<td>4,731</td>
</tr>
<tr>
<td>9</td>
<td>Baghpat Crossing</td>
<td>2,429</td>
</tr>
<tr>
<td>10</td>
<td>City Railway Station</td>
<td>486</td>
</tr>
<tr>
<td>11</td>
<td>Railway Crossing (Baraut Road)</td>
<td>1,504</td>
</tr>
<tr>
<td>12</td>
<td>Sador Thana</td>
<td>1,805</td>
</tr>
<tr>
<td>13</td>
<td>Abu Lajga</td>
<td>4,429</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The traffic of Meerut city is predominantly mostly of personal/ private the public transport modes include rikshaws, autorikshaws, local busses. The auto rikshaws are the most used public transport mode. The local buses ply on nine routes on which the permits have been issued.

<table>
<thead>
<tr>
<th>Year</th>
<th>Gross Tractor</th>
<th>Two Wheelers</th>
<th>Car Tax Free (Govt)</th>
<th>Reserved Bus</th>
<th>Contd Bus</th>
<th>UPS RTC</th>
<th>Trucks (less than 60 Quintal)</th>
<th>Trucks (more than 60 Quintal)</th>
<th>Tempo Taxi</th>
<th>Taxi</th>
<th>Car</th>
<th>Jeep</th>
<th>Private</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>50765</td>
<td>1,31,008</td>
<td>313</td>
<td>680</td>
<td>200</td>
<td>405</td>
<td>1,562</td>
<td>2163</td>
<td>701</td>
<td>126</td>
<td>210</td>
<td>2,02,881</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2002</td>
<td>50664</td>
<td>1,44,199</td>
<td>335</td>
<td>690</td>
<td>314</td>
<td>419</td>
<td>1,586</td>
<td>2872</td>
<td>742</td>
<td>140</td>
<td>210</td>
<td>2,17,995</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td>51224</td>
<td>338</td>
<td>680</td>
<td>693</td>
<td>275</td>
<td>454</td>
<td>1,298</td>
<td>2904</td>
<td>994</td>
<td>171</td>
<td>221</td>
<td>2,45,022</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>51047</td>
<td>1,73,240</td>
<td>232</td>
<td>683</td>
<td>214</td>
<td>446</td>
<td>1,224</td>
<td>2020</td>
<td>1,242</td>
<td>19,099</td>
<td>246</td>
<td>2,51,101</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>52273</td>
<td>1,30,310</td>
<td>215</td>
<td>686</td>
<td>283</td>
<td>349</td>
<td>1,160</td>
<td>1765</td>
<td>2,515</td>
<td>21,022</td>
<td>181</td>
<td>2,71,207</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Meerut Municipal Corporation &CDP, Meerut

There are 18 bus terminals present in the city, the existing city bus routes along with the Details of licenses / permits are shown in

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>City with Population in Millions</th>
<th>Share of Public Transport (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.5 - 1.0</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>1.0 - 2.0</td>
<td>30-40</td>
</tr>
<tr>
<td>3</td>
<td>2.0 - 3.0</td>
<td>50-60</td>
</tr>
<tr>
<td>4</td>
<td>3.0 - 5.0</td>
<td>60-70</td>
</tr>
<tr>
<td>5</td>
<td>5.0 plus</td>
<td>70-85</td>
</tr>
</tbody>
</table>

Share of Public Transport in Indian Cities Source: Traffic and Transportation Policies in Urban Area in India, Ministry of Urban Development – GOI

**Status of Public Transport facilities In Meerut:**

Local Buses Details of City Bus Service Routes
Tempo – Taxi, a seven seater vehicle is also visible in the city of Meerut. These vehicles are licensed for a route length of 16 km. It was assessed that the city would require 600 vehicles in order to fulfill the demand, out of which 583 licenses / permits have been issued to various private operators. Auto Rickshaws also ply in city of Meerut but are confined within the municipal limits of the city. The exact requirements (demand) of these vehicles have not been worked out for the city but 543 permits / licenses have been issued so far. It is estimated that about 13-15% of the total trips in the city are performed by the available public transportation modes which is far below the desired share of public transport as recommended by the Traffic and Transportation Policies in Urban Area in India by Ministry of Urban Development. It can be seen from the table above the share of urban transport in the city of Meerut is far less than optimal when compared against the recommended shares by the Ministry of Urban Development, highlighting the importance of urban transportation.

**STATUS OF INTER CITY BUS SERVICES LS FOR MEERUT CITY**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Routes</th>
<th>No. of Permits / Licenses Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Meerut – Baghpat – Baraut – Chhaprauli</td>
<td>72</td>
</tr>
<tr>
<td>2</td>
<td>Meerut – Kota – Baraut</td>
<td>74</td>
</tr>
<tr>
<td>3</td>
<td>Meerut – Baraut – Kotana</td>
<td>03</td>
</tr>
<tr>
<td>4</td>
<td>Meerut – Mawana – Meerapur – Bijnau</td>
<td>106</td>
</tr>
<tr>
<td>5</td>
<td>Meerut – Parkshigarg – Atfabad – Laliyana</td>
<td>42</td>
</tr>
<tr>
<td>6</td>
<td>Meerut – Hapur – Butlandshahar</td>
<td>102</td>
</tr>
<tr>
<td>7</td>
<td>Meerut – Ambala</td>
<td>03</td>
</tr>
<tr>
<td>8</td>
<td>Meerut – Jaani – Siwal – Khanpur – Lohara</td>
<td>03</td>
</tr>
<tr>
<td>9</td>
<td>Meerut – Sarithana – Elinauli</td>
<td>38</td>
</tr>
</tbody>
</table>

Source: Meerut Municipal Corporation & GDP, Meerut
V. TRAFFIC & TRANSPORTATION PROBLEMS IN MEERUT

The following problems have been observed and identified by people, residing in the city, daily commuters and people frequent to this city to pursue business and other affairs:

- General Problems Related To Traffic and Transport facilities

1. Capacity Constraint: Most of the roads have Capacity Constraint: the width or road especially in inner built up areas, inner cordon roads and even at some points the regional and outer cordon roads have lesser width/related infrastructure in context to the traffic volume they have to bear.
2. Inadequate Road hierarchy: Road hierarchy is not as per the acceptable level, so the traffic movement is not smooth, the primary corridors, secondary corridors do not follow the norms
3. Encroachments: Most of the roads in the area encroached by permanent temporary encroachments, leading to reduction of width and capacity of roads: at most of the places the hoardings, shop displays, advertising panels are placed in ROW even on the Mattelled areas. The roads have also been encroached chajja projections, ramps and other civil features constructed in the ROW.
4. Mixed Traffic: The most of the roads in the city are subjected to mixed kind of traffic, the slow, very slow, fast moving traffic move on the same roads/traffic corridors, due to which the average speed of city is lowered down.
5. Traffic management: The city has very weak traffic management; the traffic is regulated by traffic police, which is mostly untrained/not properly trained in traffic affairs, which fails in regulating traffic.
6. Absence of Traffic Management Plan: No comprehensive Traffic Management Plan is prepared for the city, the only methodology adopted is the traffic plan by police which is done in non-technical way.
7. Poor road quality: The quality of roads in inner cordon, middle cordon, outer cordon as well as regional roads are of poor quality in terms of surfacing, gradients.
8. Weak Traffic infrastructure: The entire infrastructure is weak to cater to the magnitude of traffic.
9. Inadequate Pedestrian facilities: The Pedestrian facilities on all most all the roads of different levels are inadequate, promoting less of pedestrian movement and more of traffic.
10. No provision for bicycles: In the entire city there is hardly any provision required infrastructure to promote cycle movement in the city.
11. Lack of safety: Proper considerations have not been kept for safety of people on the roads, especially for pedestrians, cyclists and people moving on two wheeler. Speed controls, use of helmet are not in practice, the traffic violators are hardly penalized.
12. Enforcement of Traffic rules: The traffic rules are not properly enforced, the reason being the lack of willingness in administration and extremely less and untrained manpower deputed for this purpose.
13. Street furniture: The street furniture on various roads are not adequate, railings for pedestrians, seating facility, tree guard, bus shelters are hardly available.
14. Problem of informal marketing on road side: Hawkers, road side vendors, informal markets: Hawkers, road side vendors, informal squatting of vegetable/grocery item vendors are a serious problem in the city, affecting the road efficiency.

- Problems Related Planning Issues

Meerut is an old and historical town, the core of the city has natural growth pattern and the street width, geometry, alignment and design is not compatible to accommodate the high speed and larger volume of traffic as well to provide vehicular access to the premises, buildings, complexes located in built-up area. So the Traffic Movement in the City Built-Up Core is Highly Problematic the traffic and transportation infrastructure in City Old Built Up areas needs specific attention, design, management, which has generally been not addressed in the Master Plan, Zonal Plans, and building regulations. Master plan, Zonal plan preparing team do not have Experts In Traffic and Transportation Engineers, Traffic/Transportation Planners, no consultation are generally made with the traffic rules/management team the local police force while finalizing the plans. Proposals of Master Plan, Zonal Plans are not based on detailed Traffic & Transportation surveys.

The permissions for development/building activities are allowed without any consideration of Traffic problems, which include granting permissions to schools, institutions, offices, cinema halls and other land uses/buildings which attract/generate traffic on important traffic corridors/roads in competent to hold the kind of Traffic parking issues, they are subjected to. This kind of problem is on all major roads Gar Road, Delhi Road, inner cordon, middle cordon, outer cordon... Concept of Mixed Land use and Allowing Commercial Activities on main corridors have enhanced the problems.
Problems Related To Parking Issues

Problems of Parking, unorganized and unauthorized parking are located at following points in the city:
A large number of markets, commercial and other activity centers on various roads in Meerut are suffering from inadequate parking facilities. On most of these stretches, the root cause of the congestion on the street is caused due to on street parking. List of such areas with severe parking problems is furnished:

The detailed traffic and transportation surveys were got conducted by the authorities and concluded that some of the intersections and crossings had number of problems leading to huge clogging of traffic and slowing down of average speed

1 Begumpul: This intersection having improper road Geometry, there are number of educational institutions leading to huge traffic at peak hours, temporary and permanent encroachments, problem of huge member of road side vendors, parking of rikshaw, and private vehicles leading to inefficient intersection

2 Bachcha Park: This intersection having improper road Geometry, there are number of temporary and permanent encroachments, problem of huge member of road side vendors, parking of rikshaw, tempos, busses and private vehicles leading to inefficient intersection

3 Hapur Adda: This intersection is also used as Hapur bus stand so is having huge traffic beside this sit is having improper road Geometry, there are number of temporary and permanent encroachments, problem of huge member of road side vendors, parking of rikshaw, tempos, busses and private vehicles leading to inefficient intersection

4 Eves Chupala: This intersection is surrounded by number of colleges and commercial establishments and so is having huge traffic beside this it is having improper road Geometry, there are number of temporary and permanent encroachments, problem of road side vendors, parking of rickshaws, tempos, busses and private vehicles leading to inefficient intersection

5 Kchahari chowk: This intersection is having court complex and so is having huge traffic beside this it is having improper road Geometry, there are number of temporary and permanent encroachments, problem of road side vendors, parking of rickshaws, tempos, busses and private vehicles leading to inefficient intersection

6 Nauchandi: This intersection is surrounded by number of commercial establishments, fair ground, thickly populated residential areas and so is having huge traffic beside this it is having improper road Geometry, there are number of temporary and permanent encroachments, problem of road side vendors, parking of rickshaws, tempos, busses and private vehicles leading to inefficient intersection

7 Ghantaghar: This intersection is surrounded by number of commercial establishments, educational institutions, thickly populated residential areas huge commercial markets and so is having huge traffic beside this it is having improper road Geometry, there are number of temporary and permanent encroachments, problem of road side vendors, parking of rickshaws, private vehicles leading to inefficient intersection, Huge number of Pedestrian

8 Baghpath Chowraha: This intersection is surrounded by number of commercial establishments, retail shops, thickly populated residential areas, commercial markets, vegetable market and so is having huge traffic beside this it is having improper road Geometry, there are number of temporary and permanent encroachments, problem of road side vendors, parking of rickshaws, private vehicles leading to inefficient intersection, Huge number of Pedestrian

9 Bhumiapul: This intersection is surrounded by number of small commercial establishments, thickly populated residential areas so is having huge mixed kind of traffic, beside this it is having improper road hierarchy of roads Geometry, there are number of temporary and permanent encroachments, problem of road side vendors, parking of rickshaws, private vehicles leading to inefficient intersection, Huge number of Pedestrian

10 Meerut Bus Stand: The road/Carriageway width is less with inefficient Geometry, number of small commercial establishments along the Delhi road, thickly populated residential areas in the vicinity, so is having huge mixed kind of traffic, beside this this area is having improper road hierarchy of roads, there are number of temporary and permanent encroachments, problem of road side vendors, parking of rickshaws, private vehicles leading to inefficient transport system, Huge number of Pedestrian with no facilities adds to the problem.

11 Thapar Nagar: The road/Carriageway width is less with inefficient Geometry, number of small commercial establishments/commercial strip development along the main roads, thickly populated residential areas in the vicinity, so is having huge mixed kind of traffic, beside this this area is having improper road...
hierarchy of roads, there are number of temporary and permanent encroachments, problem of road side vendors, parking of rickshaws, private vehicles leading to inefficient transport system, huge number of pedestrian with no facilities adds to the problem.

12. Jail Road: The road leads to Bijounor and its width is less, number of small commercial establishments/commercial strip development along the main roads near the existing settlements, residential areas in the vicinity, so is having huge mixed kind of traffic, beside this the area is having improper road hierarchy of roads, there are number of temporary and permanent encroachments, problem of road side vendors, parking of rickshaws, private vehicles leading to inefficient transport system, huge number of pedestrian with no facilities adds to the problem, Hawking and Encroachment, On-street Parking

13 Commissionery choaraha: This is located at major intersection near Divisional commissioners office though the Geometry is comfortable but because of its vicinity to the Meerut College and other important offices, court offices the capacity of road and intersection is week.

14 Sardana Bus Adda: This is located at Meerut–Roorkee Road, though the Geometry is comfortable but because of its vicinity to the central hub, markets begum pul, Abu lane and this place acts as local bus stand to Modipuram area and other important offices, court offices the capacity of road and intersection is week, so is generally acute traffic problem because of hawkers, vendors roadside Rikshaw parking, temps, local busses and heavy pedestrian movement

Problems Related To Road Safety / Accident Characteristics

- The Roads of the city of Meerut have to cater to mixed kind of vehicles very slow, slow moving, intermediate, and fast moving vehicles, there is regular interface and mixing of very slow and fast moving vehicles like rickshaws, bullock carts and SUV/cars, busses which actually makes the situation worse

<table>
<thead>
<tr>
<th>Year</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
<th>GRAND TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>421</td>
<td>83</td>
<td>504</td>
<td>271</td>
<td>37</td>
<td>308</td>
<td>812</td>
</tr>
<tr>
<td>2002</td>
<td>587</td>
<td>64</td>
<td>451</td>
<td>197</td>
<td>29</td>
<td>226</td>
<td>677</td>
</tr>
<tr>
<td>2003</td>
<td>469</td>
<td>73</td>
<td>542</td>
<td>253</td>
<td>21</td>
<td>274</td>
<td>816</td>
</tr>
<tr>
<td>2004</td>
<td>395</td>
<td>56</td>
<td>451</td>
<td>222</td>
<td>25</td>
<td>248</td>
<td>366</td>
</tr>
<tr>
<td>2005</td>
<td>599</td>
<td>71</td>
<td>670</td>
<td>2122</td>
<td>12</td>
<td>231</td>
<td>901</td>
</tr>
</tbody>
</table>

Source: Meerut Municipal Corporation & CDP, Meerut

Road Traffic Injuries and Fatalities Details for Meerut City

- The width of the Roads, Geometry, Alignment is not appropriate/capable to house and to cater to the magnitude of vehicle, they have to carry especially the State Highways, Regional Highways passing the Central Built Up Area, inner ring road another local streets, there is problem of heavy commercial traffic, extreme congestion.
- There are on an average 250 deaths & fatalities and 500 injuries in an year because of road accidents.
- Year 2005 faced maximum about 900 cases of death and serious injuries due to road accidents in an year

VI. RECOMMENDATIONS TO ADDRESS THE TRAFFIC AND TRANSPORTATION PROBLEMS OF MEERUT

- There is a requirement of creation of a “Traffic and Transport Authority” at city level in Meerut. This authority should have the comprehensive responsibility of Planning, Execution, Monitoring, Policing and Managing the Traffic System. This authority should have the responsibility for Development & Construction of the entire infrastructure related to Transport & Traffic including the roads, flyovers, intersections, pedestrian facilities etc. This authority should have the specially trained requisite manpower viz. Civil Engineers, Architects, Traffic Planners, police officials, Public Health Engineers, Structural Engineers, Electrical Engineers, Landscape Architects, IT experts to manage the electronic & advanced equipments etc.
- The Traffic and Transport Authority should have the responsibility and authority to prepare and implement the Comprehensive Traffic Management System & plan including the Traffic Signaling Design & Control, policing the traffic etc.
- The traffic and transportation problems needs to be addressed at various levels viz. Master Plan, Zonal & local plan level. There is a need for the conduct of detailed traffic and transportation surveys periodically, to understand the problematic issues, and the Master Plan and Zonal plan document should
have a separates section to address these areas. Master plan should recommend/proposes the phase wise improvement of Traffic and transportation infrastructure.

- The Master plan should integrate the network of land uses with the Traffic and Transportation plan. The land uses like vegetable market on Delhi roads, retail shops cinema generating & attracting traffic should be shifted to other locations.

- The temporary and permanent encroachments on roads especially in existing built up areas. Master Plan Roads ,Inner ,Middle and Outer Cordon are one of the prime reason which decrease the efficiency of roads. Encroachments should be removed through strong drive. The green belts and buffer zone should be earmarked on both sides of proposed Major Roads.

- A Comprehensive Traffic and Transport Management Plan for Meerut is required to manage different types of traffic, people, goods vehicles. Parking issues, managing pedestrians etc. which should be regularly updated to make necessary modification if required

- There is need for improving Pedestrian facilities in the entire city viz. construction of pedestrian pathways, underpasses, over bridges, bus stops, planting trees along the road /pathways, development of pedestrian infrastructure like resting /seating facilities, railing, bus stops, toilets, drinking water etc.

- Promotion of Bicycles: The Meerut city settlement has a diameter of about 15-20 kms and the internal movement in the city can be comfortably managed by bicycles, so this mode needs to be promoted in the city.

- In most of the roads especially on National Highway, State Highways and on main arteries of the city, there is a requirement for segregation of fast and slow moving traffic. Slow traffic should only be allowed on internal roads

- A Traffic and Transportation Plans for Meerut needs to be evolved. The road & Intersection Geometry especially in old built up areas are not proper, which needs to be improved. this process may require some acquisition of new by areas.

- There is need for improvement of Road Graphics ,like zebra crossing ,directions , road markings, lanes ,road boundaries etc

- The Facilities of physically challenged people on roads ,highways are categorically missing , which should be incorporated

- The Traffic signaling system in the city needs to be improved /strengthened, it should be integrated with latest technology for better efficiency of roads

- All the major Arteries of the city should have Security surveillance measures planted to check any violation of traffic rules, jam ,clogging of roads and safety etc

- There is need for Improvement and enhancement of Mass Transportation modes the tempsos, and local buses. The private players should be made to ensure that the quality of service should be adequate.

- The Comprehensive Traffic and Transportation Plan should have Multi Modal Transportation Approach

- Improvement & regular maintenance of roads, pathways and traffic infrastructure is important.

- There is a need for special mass/Public awareness programmes to motivate use of Mass Transportation Systems & bicycles, promote maximum pedestrian movement in the city. Knowledge of traffic rules and maintaining discipline on roads

- Traffic rules should be strictly followed

- Public authority should develop parking plazas ,multistoried car parking and the special incentive should be given to private players developing multistoried parking plazas

- Truck Terminus and Transport Nagar as proposed in the Master Plan needs to be developed at priority.

- The Railway Infrastructure needs special attention huge of population from Meerut and near by areas depend on railways for movement, so there is need for immediate development of proposals in Master plan to develop the railway infrastructure.

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