Auroville Mobility Study 2009
(summer Internship Report)

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# Table of Content

Abstract

1. Introduction
2. Concept of Auroville
3. Existing Scenario
   3.1 Location & regional Setting
   3.2 Existing internal road Network
   3.3 Population Details
4. Concept of Master Plan
   4.1 Traffic pattern of master plan
   4.2 Preference for non polluting movements
   4.3 Streets & Path ways
5. Analysis of Master Plan
   5.1 Projected population
   5.2 Volume count study
   5.3 Distance Study
   5.4 Inferences of study
6. Case study
   6.1 Issues
   6.2 Requirement
   6.3 Concept of Master Plan
   6.4 Probable Solution / Proposal based on Issues & requirement
7. Approach/Strategies to achieve the master plan
   7.1 By Mid-term Development(2010-2025)
   7.2 By long-term Development(2025-2050)
   7.3 Distances Comparison Between Community & Service provider Areas after Proposed Roads
   7.4 Proposed Land use

Glimpses study

Annexure

About Organization

Acknowledgement
**ABSTRACT**

Mobility is a basic need. “To be mobile” is the most important characteristic of a modern society. It means opportunities for education, work and recreation and assures the delivery of goods and information at the right time and place. Obviously, mobility also means a lot of traffic. Pollution and threat to individual health and city life seem to be unavoidable consequences. The ever increasing usage of the private automobile throughout the last century and the “car-centred city” being the ideal of every town planner (working into the hands of the car industry and the real estate managers), led in most cities to the dominance of the technical demands of car-driving in terms of security, speed and comfort.

By giving other traffic participants, such as pedestrians and cyclists, even children playing or going to school, the second priority, the quality of streets and street spaces (which give character and life to a city), as well as the safety and health of its inhabitants has been seriously affected. This development is also responsible for an often inadequate and inconvenient public transport system which is expensive and difficult to finance. Most people regard public transport a third-rate way of getting around suitable only for those who cannot afford a car.

For the greater part of the last century, walking became “old fashioned”. The car got more and more preference even for shorter trips. This did not always save time – but to find oneself the weakest participant in an environment exclusively designed for the car did not do much to support an alternative mode of transport. But no city can eliminate walking. It is indispensable as an interface between the parking lot and the destination. In the city centers, it is still the dominant means of movement (80%). However, further out in the suburbs, the car is used even for short trips. Here walking has almost become a symbol of social failure. While walking, a person not only supports a sound environment but also maintains his health. The highest percentage of sickness-leave in Europe is due to spine problems, the reason for which is lack of exercise. A small dose of regular walking is recommended by orthopedic physicians to counterbalance a sedentary work schedule and to maintain mobility right into old age.

Planners have neglected the qualities of a city experienced by pedestrians. For pedestrians, it is rich in details whereas the drivers can only be interested in fast and immediate information, ultimately reduced to the poster and the billboard. They demand distance and separation from the world of the pedestrians. The predominant means of traffic decisively influences a city’s architecture and urban design. The cities planned in the twentieth century, e.g. Chandigarh and Brasilia, call for being experienced from a moving car. Their public centers impress by their sheer dimensions. The Architects have placed the buildings at ample distances, preventing them from forming urban spaces of a human scale.
1. **INTRODUCTION:**

A City set for the Future Auroville, to be true to The Mother’s vision, will provide alternative forms of mobility to suit the needs for peaceful conditions throughout the city area. Today’s type of environmentally polluting, hazardous, and high-speed motorized transport will no longer have its predominant, overbearing position – the individual will regain his own spatial dignity.

The indications given by the Mother (four zones in the form of a four petal flower) for an experimental town favoring the evolving conditions for man has been translated into the concept of the Galaxy. The 12 Radials, connecting the Crown Road to the Outer Ring Road, are the dynamic representation of the Mother’s symbol. The shape of the Galaxy has the following inherent advantages:

- Reducing transport time;
- Allowing a better interaction between the residents;
- The Crown brings together the prominent activities specific to each zone;
- The pedestrian is freed from the pressure of traffic the closer one comes to the Matrimandir;

The layout of Auroville would ideally be developed to be a pedestrian-friendly city.

There are many reasons to plan for non motorized transportation. Walking, cycling, jogging and skating\(^1\) are increasingly popular for transport and recreation. Safe and convenient non motorized travel provides a many benefits, including reduced traffic congestion, user savings, road and parking facility savings, economic development and a better environment. This section presents a brief overview of the importance of considering non-motorized transport in transport plans.

The ultimate goal of transportation is to provide access to goods, services and activities. In general, the more transportation options available, the better the access. Non-motorized modes are important transport choices, for trips made entirely by walking or cycling, and to support public transport. In urban areas, walking and cycling are often the fastest and most efficient way to perform short trips. A built environment that is hostile to non-motorized transport reduces everybody’s travel choices. The result of this “automobile dependency” is increased traffic congestion, higher road and parking facility costs, increased consumer costs, and greater environmental degradation. Adequate pedestrian and cycling conditions are essential to guarantee everybody a minimal level of mobility.

The present plan- ‘Auroville Master Plan- Direction for Growth’, has been made possible by the ‘Auroville innovative Urban Management’ project funded under the Asia Urbs Programme of the European Commission.

The plan builds on the earlier plan, in effect consolidated the thinking behind the construction of the unique township from out a road map for the future, indicating direction broad based principles on which it is to be built. This latest plan charts out a road map for the future, indicating
direction for its growth in the coming five years, which can lay a strong foundation for realizing the city in a systematic, professional and humane way over the coming two decades.

2. CONCEPT OF AUROVILLE

The Mother in her 1965 sketch of Auroville laid down the basic concept for the town. This sketch delineated all the important areas of activity that will fulfill the vision of making it a Universal Township. This concept is as practical as it is visionary. The way in which this concept lends itself to international, national and local thinking is extraordinary. It is as modern today as it was innovative when it was expounded some thirty years ago. (Refer sketches) The concept envisions close interaction between Auroville and its surroundings to create a holistic model of development in which urban and rural settlements will complement each other and are not seen as separate. This concept of Galaxy is now being widely recommended to move towards balanced sustainable development.

![The Mother's sketch 1965, Nebula 1966, Galaxy 1967, Galaxy 1968]

The activities of the Cultural Zone represent unending education; the International Zone shows acceptance of Auroville's universality; the Industrial Zone emphasizes the importance of a strong economic base; the Residential Zone gives the realization of human oneness; and the Green Belt manifests environmental, economic, spiritual as well as material sustainability. The Green Belt activities help to meet the internal requirements of the town as well as the external requirements of the region. The Mother envisaged developing Auroville as a township for 50,000 inhabitants with a circular form, covering an area of about 20 sq. km.

3. EXISTING SCENARIO

3.1 LOCATION & REGIONAL BACKGROUND

Auroville is located 160 km south of Chennai on the east coast of India, just 6 km north of Pondicherry. Initially the site was a barren plateau traversed by dry canyons and gullied land with hardly any vegetation as depicted in the photograph. As may be seen in image, Auroville Township is located along the East Coast highway which provides easy accessibility both from Chennai and Pondicherry. The regional setting of Auroville Township reveals that although it is part of Villupuram district of Tamil Nadu, functionally it is closely connected to Pondicherry.
As mentioned earlier, the township boundary is in the form of a circle of 2.5 km radius encompassing 20 sq. km Most of the area lies in Villupuram district and comprises the panchayats of Irumbai and Bommalapalayam. Small areas of this land are in Kottakuppam, Rayapudupakkam, Mathur Panchayats and Alankuppam, within the Union Territory of Pondicherry. The land is generally of poor quality for agriculture and the entire area was identified as a backward area. The village settlements of Edayanchavadi, Irumbai, Kottakarai, Rayapudupakkam, Pettai and Alankuppam fall in the designated area of the township. Pondicherry city, is the largest urban centre at a distance of 6 km to its south while Tindivanam, the headquarter of Tindivanam taluk is about 25 km to the north-west.

3.2 EXISTING INTERNAL ROAD NETWORK OF AUROVILLE

Here, as shown in fig 3.2, yellow colour shows the surrounding nearby villages, are well connected by 3.0 m wide tar road which is blue colour in this picture. And from the rest of the roads, yellow (2.0 m) which are mud roads and white are the cycle paths of 1.0 m. The roads which are in red colour, 4.0 m asphalt road are ECR & NH roads respectively.
3.3 Population Details

The township envisaged for a population of 50,000, aims to provide opportunities for people from all nations and all types of backgrounds to come together to work for the fulfillment of its character. Today it has about 1700 residents representing some 35 nations including 350 persons from the adjoining villages. It has also established very cordial relation with the larger population in its vicinity, extending over an area of approx 825 sq.kms.

The population growth in the last decade has been approx.5% per annum. There has been an average addition of around 90 persons per year in Auroville’s population over the last decade. It has been observed that the ratio of newcomer population to total Auroville population usually works out at 1:10. In addition to the resident population there are:

- Researchers and students, during the internship programs learn and contribute to the efforts of development and research. Nearly 100 students and researchers are in Auroville at any given point of time. As Auroville grows, the number of students and researchers will also grow. The estimated number of researchers is 1,200 annually.

- Day-workers, about 5,000 persons residing in its neighbourhood in both manufacturing units and services from neighboring villages working in Auroville's economic and service activities.

- Short-term, including casual visitors, Matrimandir is the main attraction to visitors from outside and, on an average, 1,000 persons visit it every day. Sundays and holidays are special days when the number of visitors go up to 2-5000 persons coming to see the experience of Auroville's work in diverse fields. The number of casual visitors is estimated at 2.5 lakh/year.

*Note: The population listed under the last two categories falls under the category of “floating population” in the township.*

There are 13 villages in the immediate area of Auroville, comprising about 40,000 people, and a total of 40 villages in the wider bioregion. Six villages and colonies are located in the Auroville township area. Among the villages in the Auroville township area, Edayanchvadi is having the highest population of 4,272 and Alankuppan- Annai nagar the lowest, with a total of 528. Alankuppam-Annai nagar is having highest density, and kottakarai the lowest. The population, area & density of these villages & colonies are given in Table 3.3.1.
### Table 3.3.1: Population Detail of Auroville & surrounded villages

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Auroville</td>
<td>300</td>
<td>461</td>
<td>715</td>
<td>1601</td>
<td>53.67</td>
<td>55.10</td>
<td>123.92</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Alankuppam</td>
<td>790</td>
<td>895</td>
<td>985</td>
<td>1380</td>
<td>13.29</td>
<td>10.06</td>
<td>40.10</td>
<td>314</td>
<td>148</td>
</tr>
<tr>
<td>1</td>
<td>Alankuppam-Annai Nagar</td>
<td>315</td>
<td>450</td>
<td>610</td>
<td>528</td>
<td>42.86</td>
<td>35.56</td>
<td>-13.44</td>
<td>148</td>
<td>373</td>
</tr>
<tr>
<td>2</td>
<td>Edaynchvadi</td>
<td>2215</td>
<td>2460</td>
<td>3480</td>
<td>4272</td>
<td>11.06</td>
<td>41.46</td>
<td>22.76</td>
<td>32.77</td>
<td>130</td>
</tr>
<tr>
<td>3</td>
<td>Irumbai</td>
<td>480</td>
<td>490</td>
<td>580</td>
<td>657</td>
<td>2.08</td>
<td>18.37</td>
<td>13.28</td>
<td>102.00</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Irumbai-Chitoor</td>
<td>280</td>
<td>300</td>
<td>315</td>
<td>408</td>
<td>7.14</td>
<td>5.00</td>
<td>29.52</td>
<td>19.42</td>
<td>102.00</td>
</tr>
<tr>
<td>4</td>
<td>Kottakarai</td>
<td>465</td>
<td>570</td>
<td>880</td>
<td>1612</td>
<td>22.58</td>
<td>54.39</td>
<td>83.18</td>
<td>6.23</td>
<td>104</td>
</tr>
<tr>
<td>4</td>
<td>Kottakarai-Ambedkar nagar</td>
<td>310</td>
<td>405</td>
<td>510</td>
<td>650</td>
<td>30.65</td>
<td>25.93</td>
<td>27.45</td>
<td>188</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Raypettai</td>
<td>680</td>
<td>745</td>
<td>780</td>
<td>1028</td>
<td>9.56</td>
<td>4.70</td>
<td>31.79</td>
<td>5.46</td>
<td>188</td>
</tr>
<tr>
<td>6</td>
<td>Sanjeevi Nagar</td>
<td>905</td>
<td>950</td>
<td>1030</td>
<td>1188</td>
<td>4.97</td>
<td>8.42</td>
<td>15.34</td>
<td>9.84</td>
<td>121</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>6740</strong></td>
<td><strong>7726</strong></td>
<td><strong>9885</strong></td>
<td><strong>13324</strong></td>
<td><strong>94.89</strong></td>
<td></td>
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</tr>
</tbody>
</table>

#### 4.1 Traffic Pattern as outlined in the Auroville Master Plan

The centre of Auroville is formed by the Peace Area, with the Matrimandir, Amphitheatre and Banyan Tree. In the Master Plan, according to the Galaxy concept, green corridors (containing pedestrian lanes and cycle paths) radiate out from the centre. Within 5 minutes walking distance of the Peace Area lies the Crown Road, which encircles the inner city area. The Crown Road is conceived as a circle with a radius of about 700m. Within approximately 7 minutes walking distance of the Crown Road is the Outer Ring Road, located with a radius of about 1.25 km. The boundary of the township is also defined in the form of a circle. With a radius of 2.5 km, it encloses an area of about 20 sq. km. (2000 ha) as shown in fig. & table no 4.1.1.

In a similar way, building developments alternating with green areas spiral out from the Peace Area to the Outer Ring Road in an impressive macro-form. The major spirals (called “Lines of Force”) intersect with the Crown Road giving rise to unusual urban spaces of a surprising variety. And in a similar way, building developments alternating with green areas spiral out from the Peace Area to the Outer Ring Road in an impressive macro-form.

These intersections are destined to become the focal points for the city’s services. The ring-shaped roads are perceived as bundles of tangential pathways. The Outer Ring Road leads outward traffic via two main access roads in the west and south to the Pondicherry-Tindivanam Road, and via two in the east and north to the East Coast Road connecting Chennai & Pondicherry.
According to this proposal, guests and visitors arriving in Auroville in buses, cars or two-wheelers will be received at four nodal points, located at the junctions of the main access roads and Outer Ring Road. These nodal points will serve as transport mode exchange areas, offer parking facilities for visitor buses, cars and two-wheelers and distribute the guests and visitors to pedestrian boulevards, cycle paths or Auroville’s public transport system, consisting ideally of non-polluting shuttle buses. The possibility to offer cycles for rent at this point ought to be considered. The nodal points will also offer public facilities such as information desks, bazaars, shops, artisan workshops, exhibition areas, health facilities etc.

### 4.2 Preference for Non-Polluting Movements (As Per the AV Master-Plan)

The proposed layout of Auroville is ideal to develop into a motor-free city. From the Outer Ring Road the Peace Area can be reached within 12 minutes walking time (or 4 minutes by cycle). The longest possible distance, i.e., to cross the City Area diagonally requires 36 minutes. In a motor-free city, preference is given to pedestrians, cyclists and to nonpolluting movement resulting in a peaceful mix of all traffic participants on street spaces that are non-exclusive and common for all. Environment free of noise and other traffic-hazards befits a “peace area”.

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**Table 4.1.1 Basic distances of Auroville Master plan**

<table>
<thead>
<tr>
<th></th>
<th>metres</th>
<th>minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crown Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rad.</td>
<td>700</td>
<td>10</td>
</tr>
<tr>
<td>Dia.</td>
<td>1400</td>
<td>20</td>
</tr>
<tr>
<td>Cir.</td>
<td>4400</td>
<td>63</td>
</tr>
<tr>
<td>Outer Ring Road</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rad.</td>
<td>1250</td>
<td>18</td>
</tr>
<tr>
<td>Dia.</td>
<td>2500</td>
<td>36</td>
</tr>
<tr>
<td>Cir.</td>
<td>8000</td>
<td>114</td>
</tr>
<tr>
<td>Green Belt Limit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rad.</td>
<td>2500</td>
<td>36</td>
</tr>
<tr>
<td>Dia.</td>
<td>5000</td>
<td>71</td>
</tr>
<tr>
<td>Cir.</td>
<td>16000</td>
<td>228</td>
</tr>
<tr>
<td>Peace Area - Crown Road</td>
<td>350</td>
<td>5</td>
</tr>
<tr>
<td>Crown Road - Outer Ring Road</td>
<td>550</td>
<td>8</td>
</tr>
<tr>
<td>Outer Ring Road - Green Belt Limit</td>
<td>1280</td>
<td>18</td>
</tr>
<tr>
<td>Outer Ring Road Diagonal</td>
<td>2800</td>
<td>36</td>
</tr>
<tr>
<td>Green Belt Limit Diagonal</td>
<td>5000</td>
<td>71</td>
</tr>
</tbody>
</table>

(Speed of walking : 70 m per min.)
Therefore for the city area of Auroville it is recommended to create a zone where pedestrians take priority. Cyclists will be allowed where they do not disturb. Cars and motorbikes will be permitted only when necessary for emergencies, or for delivery and removal. Only those with walking problems will be allowed to use motorized vehicles in the pedestrian zone. Access for vehicles for delivery and removal can be restricted to certain times of the day. All motor-vehicles will have to adjust their speed to the pedestrians. Public transport buses are permitted to use the streets and pathways of the city area. 15 km/h is appropriate as the maximum speed. This results in an average speed of 10 km/h for a bus-line, including the time for stops. People owning cars and motorbikes (to be used outside Auroville’s city area, e.g. to go to Pondicherry) will keep them in garages close to the Outer Ring Road. Thus they will have their private vehicle and the bus stop at the same distance.

4.3 STREETS AND PATHWAYS (AS PER THE AV MASTER-PLAN)

There is a hierarchical network of streets and pathways from the centre of the city to the outskirts. The Peace Area and the inner city area form a pedestrian zone limited by the Crown Road. Even cyclists will be partly excluded from this zone.

The Crown Road will be divided by a line of big trees to form a 4-6 m wide promenade for pedestrians on one side and a 7 m wide road on the other side. This road, located on the outside of the ring, will be used by cyclists and Auroville’s non-polluting bus system. Necessary traffic for delivery and removal will also be permitted here (with a maximum speed of 15 km/h) as well as rickshaws, push carts bullock-carts, horse-drawn tongas etc. Architectural designs for the Crown have to show in which way the pedestrian boulevard relates to the building development. A much less disturbing Crown Road will even allow for buildings to be placed close to it, forming street spaces of a human scale populated by pedestrians.
All motor vehicles will be allowed in the Industrial Zone, but there will be access to the Crown Road only for permitted vehicles. In all the zones, the design of restricted-access streets will depend upon the local conditions and architectural layout of the area. For motor-vehicles, a maximum speed of only 15 km/h will be permitted here and they will be allowed to travel only via the Outer Ring Road, not the Crown Road. The drivers will turn back out of their own accord as they will be allowed to drive faster on the Outer Ring Road. Besides the four major Radials, the only direct connections between Outer Ring Road and Crown will be pathways for pedestrians and cycles. The widths of these will be determined according to the local need and architectural design.

5. Analysis of Master Plan

5.1 Projected Population

With reference to Table 3.3.1 about the present population of Auroville & surrounding villages, using that population growth pattern, the projected population of Auroville residents and Auroville & surrounding villages both are as shown in table 5.1.1. This projection has been done by using Arithmetical increase method & Geometrical mean method. And the comparative figures between Auroville & Auroville with Villages as against the estimated population in Auroville master plan is also shown in Population comparison chart 5.1.1. (Refer annexure 1)

### Table 5.1.1 Population Projection (Including surrounded Villages)

<table>
<thead>
<tr>
<th>Sr no</th>
<th>Year</th>
<th>2010</th>
<th>2015</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arithmetical increase Method</td>
<td>19250</td>
<td>22542</td>
<td>25834</td>
<td>29126</td>
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<td>2</td>
<td>Geometrical mean Method</td>
<td>16197</td>
<td>18053</td>
<td>22427</td>
<td>31052</td>
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<tr>
<td>Avg Population</td>
<td>17723</td>
<td>20297</td>
<td>24130</td>
<td>30089</td>
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</table>

### Table 5.1.2 Population Projection (only Auroville)

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<th>Sr no</th>
<th>Year</th>
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<th>2015</th>
<th>2020</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Arithmetical increase Method</td>
<td>2772</td>
<td>3422</td>
<td>4073</td>
<td>4723</td>
</tr>
<tr>
<td>2</td>
<td>Geometrical mean Method</td>
<td>2602</td>
<td>3409</td>
<td>4464</td>
<td>5848</td>
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<tr>
<td>Avg Population</td>
<td>2687</td>
<td>3415</td>
<td>4269</td>
<td>5285</td>
<td></td>
</tr>
</tbody>
</table>

### Table 5.1.3 Population comparison

<table>
<thead>
<tr>
<th>Population Projection All together</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auroville + Villages</td>
<td>2001</td>
</tr>
<tr>
<td>Auroville</td>
<td>1601</td>
</tr>
<tr>
<td>Estimated population as per AV MP</td>
<td>1601</td>
</tr>
<tr>
<td>Estimated population as per AV MP</td>
<td>1601</td>
</tr>
</tbody>
</table>
As shown in table 5.1.3, projected population of 50,000 as per the Auroville master plan far exceeds the growth as projected in yr 2025. So we are considering 50,000 populations with all visitors, students & researchers, villagers & Aurovilians (i.e. all users).

From this projection we come to know that phase wise midterm development by 2010-2025 & Long term development by 2025-2050 is necessary.

5.2 Volume Count Study

Figure 5.2.1 shows the existing condition of the Auroville internal road networks & nearby villages. Considering Matrimandir as a centre, there are main six entries from which most of the traffic comes inside Auroville. And if these six entries are considered for volume count then Auroville traffic is divided in main three stretches shown in figure 5.2.1(a), 5.2.1(b), 5.2.1(c) & the number of vehicles passes through respectively. And number of vehicles passes through these roads are given in table 5.2.1(a), 5.2.1(b), 5.2.1(c) respectively.
• Inferences:
  1. In stretch 1-1’ motorbike traffic is almost double than the bicycle users.
  2. In stretch 2-2’ Motorbike traffic is three times more than the bicycle users.
  3. And similarly in stretch 3-3’ motorbike traffic is more than the bicycle users.

• Based on Volume Count, following is identified / discovered:
  1. Distribution of transportation mode indicating the usage of motorbike, bicycle and others as per chart 5.2.1
  2. Individual strength of road in terms of traffic usage. (Shown in figure 5.2.2) (Refer annexure 2)
  3. Significance of the existing roads.

• During Volume Count Study, following is observed:
  1. Local village traffic coming into Auroville is predominantly bicyclist unlike Auroville residents. (shown in figure 5.2.3, 5.2.4).
5.3 Distance Study (Residential - Commercial)

There isn’t any Commercial activity or Service centre within Auroville. Commercial activity is mainly done at Kuilapalayam & Alankuppam. But Alankuppam does not have a well developed market or Service provider. Auroville residents go to this market to buy daily supplies. Or else they have to depend on Pondicherry for other daily purchases. Figure 5.3.1 shows residential area within Auroville & bordering villages with some commercial activity. Distance study was taken to assess the distance between the residential & commercial / service centre. The nearest available service centre is at Kuilapalayam, which is at a distance of 1.5km from the residential sector (radial distances) & Alankuppam is in between 1 to 1.5 km from Aurodam (shown in fig 5.3.2)

![Figure 5.3.1](image1)

![Figure 5.3.2](image2)

![Figure 5.3.3](image3)

### Table 5.3.1

<table>
<thead>
<tr>
<th>Community</th>
<th>Kuilapalayam (in K.M.)</th>
<th>Kottakarai (in K.M.)</th>
<th>Alankuppam (in K.M.)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Present</td>
<td>Future</td>
<td>Present</td>
</tr>
<tr>
<td>Surrender – Grace</td>
<td>2.4</td>
<td>5.2</td>
<td>1.8</td>
</tr>
<tr>
<td>Madhuca – Sukhavati</td>
<td>3.7</td>
<td>4.0</td>
<td>3.1</td>
</tr>
<tr>
<td>Invocation - Arati – Creativity</td>
<td>3.2</td>
<td>4.7</td>
<td>2.6</td>
</tr>
<tr>
<td>Prarthana – Samasti</td>
<td>3.3</td>
<td>3.4</td>
<td>2.7</td>
</tr>
<tr>
<td>Centre field</td>
<td>4.3</td>
<td>4.0</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Distance study was done by overlapping the proposed Master Plan roads on existing roads. These distances were measured road by road. The difference of distances between the existing (present) & Master plan (future) road shown in Table 5.3.1 & Chart 5.3.1.
Inferences:

1. As per the proposed master plan, distances between residential and service providers will increase. Thereby increasing the motorized traffic.

2. To promote bicycle & to prevent increase in motorized traffic, up gradation of existing roads for the mid-term development is more sustainable.

5.4 Inferences from Study


2. Volume Count: Identification of **important roads** which should be upgraded.

3. Distance Study: The distance of Existing Roads is lesser in comparison to Master plan roads so existing roads should be upgraded.

   - Propose mixed use development with development control regulation & Importance of an integrated planning of land-use with transportation network.

6. Case Study

**Fig 6.1 case study patch**

**Fig 6.2 Detail of case study**

Issues & Requirements are identified after having dialogue with concerned residents of this case study patch as following:

6.1 Issues:

6.1.1 Major Issues:

- Poor Maintenance of cycle path
- Fund allotted to maintain cycle path is very low (1000 rs/month)
- Residential-Commercial Distances
- Insufficient & Inconvenient Public Transport
6.1.2 Other Issues:

- High Speed of motorized vehicles affect the safety of cycle riders
- For motorized vehicles, Regulation is necessary
- Identity of cycle path
- Signage for Cycle path
- Dust situation
- Noise

6.2 REQUIREMENT:

6.2.1 Commercial area: (Centre guest house & College Guest house, workshops, Language Lab, visitor centre)

- No of 2-Wheeler & 4-Wheeler users are more so motorized road is necessary.
- Free flow motorized traffic pattern by excluding cycle path. (i.e. Separate Bicycle path)
- Connectivity of cycle path to the Visitor’s center, Solar Kitchen & Main road with minimum distance.

6.2.2 Institutional Area: (Visitor Center, Nandanam School, Kindergarten, Solar kitchen)

- No of bicycle & 2-Wheelers are more, so motorized road and cycle path are necessary.
- Connectivity to the residential area, with minimum distance is necessary.
- Separate pedestrian walkway in between Matrimandir & Visitor’s Center.

6.2.3 Residential Area: (Aurodam, Courage, Reve, Center Field)

- Silent Zone
- Cycle path connectivity to the Visitor’s Center, School, Solar kitchen, Main Road are necessary with lesser distance.
- Maintenance of Cycle path

6.3 CONCEPT OF MASTER PLAN FOR CASE STUDY PATCH

By overlapping galaxy with this patch proposal is not viable due to following reasons (Shown in fig 6.3.1):

- To avoid the crown road crossing through the existing amenities.
- To avoid unwanted traffic from Edyanchvadi through the radial roads.
6.4 PROPOSAL BASED ON ISSUES & REQUIREMENTS MENTIONED ABOVE:

6.4.1 Institutional Activities (shown in fig 6.4.1):

- By keeping the existing road, the connectivity to the institutional area for motorized vehicles is achieved.
- Also, bicycle connectivity from institutional to residential area & commercial area is achieved with minimum distances.

6.4.2 Commercial Activities (shown in fig 6.4.2):

- By proposing motorized road till Centre/College guest house, avoidable traffic from Edayanchavadi is blocked.
- Also, bicycle connectivity from commercial to residential area & institutional area is achieved with minimum distances.

6.4.3 Residential Activities (shown in fig 6.4.3):

- By respecting the requirement of silent zone in residential areas, the motorized roads are proposed only till the communities while the bicycle connectivity is achieved with minimum distances to commercial and institutional areas.
7. Approach & Strategies to achieve MP

The proposed master plan has taken into careful consideration the existing roads, buildings/existing structures (shown in fig 7.1).

7.1 Mid-term Development Plan (2010-2025) (Refer Annexure 3)

The Mid-term development plan has taken into account the location of private lands, portions of which may have to be acquired over a period of time to develop a comprehensive long term plan.

7.1.1 Outer Ring Road (18 m wide Road):

- The proposed outer ring road starts at Kuilapalayam and connects neighboring villages like Edayanchavadi, Kottakarai and Alankuppam.
- The proposed outer ring road largely helps bypass heavy vehicles, motorized traffic from neighboring villages- Alankuppam, Kottakarai and Edayanchavadi from passing through Auroville, and thereby providing better connectivity between the villages too.
- This Ring road is only a half circle which connects the above mentioned areas, so as to create some semi-public spaces in the Institutional and Residential areas.
- This proposed road is a half circle because, otherwise, it could form a connection between the ECR and the Chennai Highway Road, which could be used as a bypass. For this reason, the proposed half ring does not extend till Transition School, where it could be connected easily to the sea-side villages like Bommaiypalayam, and further to ECR (Refer Fig 7.1.1).

7.1.2 Arterial Road (15 m wide road):

- By taking a volume count study, two major arterial roads were identified, that would take a substantial portion of the internal traffic. (Refer Figure 5.2.2)
- One of these arterial roads connects the Residential with the International and the Industrial zone. The other connects the Residential with the Cultural and the Institutional zone (shown in fig 7.1.2).
7.1.3 SUB-ARTERIAL ROADS (9 m wide road):

- Some existing roads have been identified by a volume count study and are proposed to be upgraded and used as sub-arterial roads which connect the main arterial roads.
- One of these sub-arterial roads connects Kottakarai to the arterial road and caters to traffic from the villages.
- One other sub-arterial road connects the Residential zone to an Arterial road (shown in fig 7.1.3).

7.1.4 BICYCLE PATH (4.5 m road):

- The proposed bicycle path has taken into consideration the existing greens, eco-sensitive areas, canyons and existing cycle paths (shown in fig 7.1.4(a))
- A 20 meter green buffer is proposed around the canyons. (shown in fig 7.1.4(b))
- The bicycle paths are thus proposed to run within communities, through these existing/proposed green areas, and with optimum distances.
- Care has been taken to see that all communities are connected with these bicycle paths.
- The bicycle paths only run through green/eco-sensitive areas, whereas some bicycle tracks (paved tracks for considerably faster travel) have been provided along the motorized roads (shown in fig 7.1.4)
7.2 LONG-TERM DEVELOPMENT PLAN (2025-2050) (REFER ANNEXURE 4)

The next phase of development involves the proposals of cul-de-sac roads from the motorized roads, (based on the assumption that the private lands have been acquired by now), and the re-alignment of the arterial and sub-arterial roads to keep with the Master plan.

7.2.1 Collector Road:
- The collector roads provide further connectivity to the communities from the arterial and sub-arterial roads (figure 7.2.1(a)).
- They end in a cul-de-sac and house commercial centres/service providers with parking.
- These cul-de-sacs do not permit vehicular movement any further inside the community except for service and emergency vehicles. And, also because optimum walking distances of 200m are provided between each cul-de-sac (figure 7.2.1(b)).

7.2.2 View/Detail of Cal-de-sac:
7.3 Road Section Details:
7.4 Distances Comparison Between Community & Service Provider Areas

After Proposed Roads

<table>
<thead>
<tr>
<th>Community</th>
<th>Kuilapalayam</th>
<th></th>
<th>Kottakarai</th>
<th></th>
<th>Alankuppam</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Present</td>
<td>Proposal</td>
<td>Master Plan</td>
<td>Present</td>
<td>Proposal</td>
</tr>
<tr>
<td>Surrender - Grace</td>
<td>2388.77</td>
<td>3613.42</td>
<td>5222.18</td>
<td>1794.51</td>
<td>1648.41</td>
</tr>
<tr>
<td>dhuca - Sukhavati</td>
<td>3705.77</td>
<td>3426.51</td>
<td>3988.27</td>
<td>3111.51</td>
<td>2077.11</td>
</tr>
<tr>
<td>Invocation - Arati - Creativity</td>
<td>3159.77</td>
<td>2939.39</td>
<td>4657.74</td>
<td>2565.51</td>
<td>1940.91</td>
</tr>
<tr>
<td>Prarthana - Samasti</td>
<td>3278.77</td>
<td>2737.5</td>
<td>3409.32</td>
<td>2684.51</td>
<td>2075.4</td>
</tr>
<tr>
<td>Centre field</td>
<td>4397.71</td>
<td>3849.24</td>
<td>3932.89</td>
<td>1672.89</td>
<td>1279.21</td>
</tr>
</tbody>
</table>

Table 7.3 Comparison in between present, Proposed & MP
7.5 PROPOSED LAND USE

7.5.1 Assumptions:

- **Residential Sectors:**
  - Required per head built up area is taken as 35 sq.m. hence,
  - Total Built up required = Population * 35 sq.m
  - Ground coverage is 70% of the total developable area & 30% left for private open spaces and building set back.
  - Proposed land use given by UDPFI (Urban Development Plan Formulation and Implementation) standards which may vary as per future requirement.

- **Industrial Sectors:**
  - Working population is assumed as per UDPFI standards
  - Land use may vary as per future requirement.

  Calculation is shown in table 7.4. And the Proposed land use for international, cultural & institutional will carried out as per the future requirement.

### Ground Coverage & F.S.I. Calculation

<table>
<thead>
<tr>
<th>Residential</th>
<th>Total Area</th>
<th>Non Developable Land</th>
<th>Green Area</th>
<th>Existing Footprint</th>
<th>Population Served</th>
<th>Built up Required</th>
<th>Total Developable Area</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Sq.M.)</td>
<td>(%)</td>
<td>(Sq.M.)</td>
<td>(%)</td>
<td>(Sq.M.)</td>
<td>As per 40000 pop</td>
<td>35 Sq.M. / Person</td>
</tr>
<tr>
<td>Sector 1</td>
<td>316553.12</td>
<td>1734.52</td>
<td>56327.75</td>
<td>63.29</td>
<td>9575.74</td>
<td>3.0</td>
<td>2100</td>
</tr>
<tr>
<td>Sector 2</td>
<td>305533.52</td>
<td>0.00</td>
<td>142727.41</td>
<td>46.57</td>
<td>3937.31</td>
<td>1.2</td>
<td>8000</td>
</tr>
<tr>
<td>Sector 3</td>
<td>663973.61</td>
<td>0.00</td>
<td>224722.75</td>
<td>33.85</td>
<td>5568.49</td>
<td>0.8</td>
<td>30300</td>
</tr>
<tr>
<td>Total</td>
<td>1286060.2</td>
<td>1734.52</td>
<td>567347.92</td>
<td>44.12</td>
<td>19081.5</td>
<td>1.4</td>
<td>404000</td>
</tr>
</tbody>
</table>

**Table 7.4.1 Existing land use in Residential Zone**
Above table shows the detail of existing land-use in Residential area such as, existing building footprints, non developable area as well as existing & proposed green areas. By excluding existing & proposed areas, the developable areas are shown in table. (Refer Table 7.4.1)

By Considering 70% of Ground coverage out of total developable area, achieved individual sector FSI shown in table 7.4.3.(Refer annexure 5)

- **Glimpses for the next stage of study**
  1. Public Transportation Routes & Mode of Public Transportation
  2. Road Sections
  3. Detailed Land use planning & Development Control Regulation
  4. Urban Design Details

**ANNEXURE**

1. Population Projection
2. Importance of road through Volume count
3. Mid-term development
4. Long term Development
5. Detail Calculation of Proposed Land use
ABOUT THE ORGANIZATION:

**TYPE/NATURE OF ORGANIZATION**

Auroville Centre for Scientific Research (CSR) is part of the Auroville Foundation, a statutory body corporate created by an Act of Parliament, Auroville Foundation Act 1988, administered under the Ministry of Human Resource Development, Government of India, as an autonomous institution.

**ORGANIZATIONAL/STRUCTURE/DIVISIONS AND ACTIVITIES WITH KEY PERSONS**

- **Auroville Centre for Scientific Research Trust**
  
  Operates the following units
  
  Auroville Centre for Scientific Research (CSR)
  
  Auroville Building Centre
  
  Auroville Water Harvest
  
  CSR Water and Sanitation
  
  Social Research Centre

- **Trustees and executives:**
  
  Suhasini Ayer
  
  Hemant Lamba
  
  Gilles Guigan
  
  Tency Baetens

**GEOGRAPHIC SPREAD/PRESENCE AND SPECIALIZATION**

India and abroad

Specializing in Design, Energy and Water.

**MAJOR AREA OF WORK**

Auroville Centre for Scientific Research (CSR) focuses on innovative applied research in the areas of environmental protection, appropriate building technologies, eco-friendly architecture, renewable energies, water and sanitation, training and communication.

CSR organizes training courses for professionals and students based on experience in the above mentioned technologies which includes theory, field and implementation, hands-on training.

CSR has an international staff of 15 full-time qualified persons, supported by a work force of more than 50 people.

CSR is a legally recognized Scientific and Industrial Research organisation by the Government of India.
TYPE OF WORK CURRENTLY UNDERTAKEN

• **Water management**
  Projects under UNESCO-HELP, which supports specific improvements in water management, science, policy and law for water studies of the bioregion. Publication of scientific monograph titled “Towards a sustainable water resources management for Auroville and the bioregion.
  Collaboration with the Université Pierre et Marie Curie, Université Paris-Sud, Ecole des Mines de Paris & Ecole Nationale du Génie Rural des Eaux et des Forêts (France) for a study on the hydrogeochemical characteristics of the Kaliveli basin in South-east India. Study also supported a PhD student.
  Collaboration with Hydron, Dutch water board organisation, support for a pre-feasibility study on integrated water management for Auroville and bioregion.

• **Waste water treatment**
  Collaboration with Smithsonian Institute, Department of Botany, Centre for Environmental Restoration. A feasibility study using Algal turf scrubber systems for cleaning waste water. The study explores a pilot project to clean waste water with natural methods for the city of Pondicherry.
  In-house consultants for ITC Ltd, Kolkata, for water audits in hotels and factories. For the implementation of DEWATS ( decentralised waste water treatment systems at hotel and factory premises.
  Implementation of more than 100 Dewats systems in India and abroad.

• **Sanitation**
  Impact assessment of the Tsunami on Water and Sanitation conditions in the temporary shelters along the coast of Tamil Nadu. Collaboration with the Tamil Nadu govt and several major international NGO’s. Resulting in training programs for engineers, professionals and NGO executives on the subject of sanitation and decentralised waste water treatment systems.
  Implementation of 16 innovative sanitation demonstration projects along the coast of Tamil Nadu.

• **Appropriate Technologies**
  Research activities take place under the unit Auroville Building Centre (AVBC). AVBC executes research and development projects in the area of ferrocement and earth technology.
  Major projects in these two areas include the Visitors Centre, the solar Kitchen, Pavilion of Tibetan Culture and numerous individual building spread around the community of Auroville.

• **Renewable energy**
  CSR/Aurore has done research projects and carried out implementations in the area of the following technologies: biogas, wind pumps, wind generators, solar cookers, solar lanterns, solar dryers, solar water heaters, solar concentrators, solar bowl, gasifiers and battery operated vehicles.
  - Development and manufacturing of maintenance-free ferrocement biogas plants of two types: floating drum and fixed dome. R&D was financed by MNES.
- R&D for the prototype of India's best performing wind-pumps (5.5 m diameter wheel, 25 m high tower). The wind pumps are manufactured and marketed by "Aureka", a sister unit under the Auroville Foundation. R&D was financed by MNES.
- R&D for the construction of a 15 metre diameter fixed spherical solar concentrator for Auroville's "Solar Kitchen". The ferrocement base of this stationary bowl is 15 meters in diameter and 7 meters above ground level. The sun's rays, trapped by a huge hemispherical mirror, focus on a cylindrical boiler which follows the sun's position by means of a computerised tracking device. On a clear day, sufficient steam at a temperature of 150°C can be generated in this boiler to cook two meals a day for 1,000 people. The system is fully automatic and hybridized in order to produce steam regardless of the cloud cover. MNES and Hudco were sponsors.
- Implementing a 37 kW solar photovoltaic power plant for Matrimandir.
- Installation of more than 1500 solar photovoltaic water pumps in India.
- Manufacturing of components for a 8-metre diameter solar parabolic concentrator equipped with a 10 kW Stirling Engine. This system was designed in Germany and installed at Vellore Engineering College in Tamil Nadu.

**Communication, Trainings**

Csr organizes training courses for professionals and students based on experience in the above mentioned technologies which includes theory, field and implementation, hands-on training. Students, Indian and foreign, undergo trainings up to 6 months for undergraduates and postgraduates in renewable energy and water and sanitation topics. The training programmes are organized and conducted with the collaboration of 24 different agencies, governmental, non-governmental, both national and international. From 1990 onwards Csr has trained over 3300 professionals and students in 10 different technologies.

**TYPE OF ACTIVITIES RELATED TO PLANNING**

- Integrated site planning for educational and training campus
- Development plan for housing projects
- Master plans with development phasing and marketing support
- Support studies and design consultancy for land, water and waste for rehabilitation projects
- Internship and training programs for students of architecture and planning
- Workshops on sustainable development for NGO, academia and private sector organizations
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Angelika, Solar kitchen
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Gillian Bicycle paths / Aurodam resident

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