



**Project Handout
Summer Internship Program- 2016**

**Directorate of Urban Land Transport | Urban Development Department
Bengaluru | Karnataka**



Introduction

Directorate of Urban Land Transport (DULT) has been set up by the Government of Karnataka under the Urban Development Department with objective to coordinate planning and implementation of Urban Transport projects and programs. The Directorate is in general responsible for overseeing all the urban land transport initiatives in Urban/ Local Planning Areas of Karnataka.

Since its inception, the Directorate has implemented many initiatives including service level benchmarking in Bangalore; preparation of policies on parking; preparation of mobility plans for cities in Karnataka; feasibility studies for mass transit systems etc. It is also working in tandem with BBMP, the city corporation of Bangalore and other city corporations on NMT initiatives. The Directorate is also spearheading the implementation of Bus rapid Transit system between the twin cities of Hubli and Dharwad.

The Directorate has grown from its humble beginnings and has now set its sights on fresh challenges. It provides a rare opportunity for technical personnel, urban and transport planners etc to work on urban transport challenges by being a part of a government organization.

In order to provide exposure to students in transport and urban planning sectors, DULT provides opportunity for 2 month internships at its headquarter in Bangalore to Masters as well to Bachelors students from all over the country. The 2 months internship program is in tandem with the colleges/ university curriculum and usually the period is for May- July every year. In continuation to that, internship for the year 2016 is starting from 2nd week of May and this document intends to provide the insights of the selected projects to the interns. The document also looks into the desired deliverables expected from each intern.

This year internship program has been designed in such a way that students will not only be working on their respective team projects, but will also be sent to one of the tier II city in Karnataka for the Rapid Assessment (RA) of existing urban infrastructure & transport system in the city. Students will also be exposed towards various software's like VISSIM, ArcGIS, SketchUp etc. through short hands on training by DULT officials, which are useful in transportation planning, urban planning and designing projects. As a part of this program a one day visit for students will be scheduled to Bangalore Metropolitan Transport Corporation (BMTC) & Namma Metro (Bangalore Metro) Depots & control centre for them to understand the day-to-day operations and also to traffic police control centre to understand the functioning of technology based (cameras, video wall etc.) initiative to manage the traffic related activities in the city.

Students may have to travel to project locations for case study, site visit, data collection, and/ or for meeting with different authorities or stakeholders. In some case students may be stationed at project locations for the whole internship period depending on the requirements of the project and its proximity to Bangalore.

Since it is an 8- 10 weeks program, the schedule has been designed in such a way that there is maximum exposure and value-addition to the students in this short span.

It would be important for the student to have done some background reading before entering the internship program. Being a graduate degree internship, some amount of independence of thought and work decisions, work ethics, and dedication is expected from the student for utmost impact and learning.

Students joining DULT for internship program has to fulfil the below stated administrative requirements:

- It is mandatory for all the students to register themselves with the Administrative office for administration purpose, while entering into Internship program.
- It is mandatory for the students to inform their respective mentor while going out of the office during office hours for official or personal reasons.
- Attendance on all days is mandatory. Leave, if any shall be granted with prior approval from the mentor.
- Time- in and Time- out shall be logged/ report on all days to the mentor (typical timings are from 10:00 AM to 5:30 PM, with 45 min lunch break.
- It is appreciated if personal laptops could be brought to work.

Below is the tentative program for this year internship, designed for maximum exposure and value-addition to the students.

| Planned Activities | Broad level Tasks | Desired Exposure/ Value- addition | Time Period |
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| Individual/ Team Projects | Secondary Data Collection | Exposure towards interacting with various government organizations, understanding and following govt. protocols and meeting with govt. officials will give fare idea of functioning of government departments. | 6 Weeks (10 th May- 15 th July 2016) |
| | Primary Data Collection | Use of various survey formats & techniques (O-D surveys, HHI, RSI, TVC, NMT etc.) exposing students towards conducting on- site surveys, which forms an integral part of any transportation | |

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| | | & urban planning/ designing. | |
| | Use of various software | Exposure towards various software (VISSIM, ArcGIS, Sketchup, Photoshop, AutoCad, MS Excel/ Word/ PowerPoint) which are useful for transportation and urban planning/ designing projects for analysis, for producing drawings, reports & presentation etc. | |
| Rapid Assessment (RA) | Observational Survey | Short span for this exercise will keep students on their toes; hence sharpen the observation skills and attention to details. It will also expose them towards time management, which is the demand of professional work culture. | 1 Week (27 th June- 2 nd July) |
| Site visit to Namma Metro Depot & Control Centre (BMRCL), BMTC Traffic Control Centre and Traffic Police Control Centre | Introduction to the operations of metro system and use of technological interventions in managing day- to- day traffic and transport activities. | This will expose students towards whole new dimension of transport planning, which is independent of their academic curriculum and adds strength to their knowledge by giving them the practical know how of the operations and management of transport activities, which they can use in their future endeavours. | 3 days (4 th July- 6 th July 2016) |
| Group Final Presentations, submission of drawings, maps, reports, presentation etc., data handover to the respective mentors, collecting officials letters and other administrative formalities | | | 1 Week (11 th July- 16 th July 2015) |

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| Parking Action Plan- Zone B (Area inside the Outer Ring Road minus area inside the Core Ring Road) | |
| Project Location | Area inside the Outer Ring Road minus area inside the Core Ring Road, Bengaluru |
| Introduction | |
| <p>Bangalore, the capital of south Indian state Karnataka is India's fifth largest and a rapidly growing metropolis. It is known world over as India's Garden City and Silicon Valley. In the last decade or so, a genial small city, dotted with breathtakingly beautiful gardens and dominated by large defence establishments and government funded labs transformed quickly in to a teeming metropolis with large public sector companies, educational institutions and a global IT hub.</p> <p>The population of Bangalore city increased from 5.67 million (2001) to 7 million (2011). The need for efficient rail-based system was felt in to address its transport problems. That's when Bangalore Metro was proposed and readily accepted by GOI. BMRCL was constituted as a SPV for implementation of the Bangalore Metro Rail Project.</p> | |
| Project Brief | |
| <p>The tremendous increase in private vehicles ownerships has tremendous impact on the city in the form of street congestion and parking problems in Bengaluru.</p> <p>Parking in Bangalore is disorganize in most locations, and is unfriendly from a user perspective, as most often one does not get parking. Charging for parking is also quite disorganised and usually done through parking fee collectors. The demand supply gap will tend to increase and parking will continue to be a major stumbling block for the city. Major issues pertaining to parking are-</p> <ul style="list-style-type: none"> ▪ Limited on- street parking supply compare to huge parking demand. ▪ Mostly the on- street parking is not managed properly due to lack of man power and is free of cost, resulting is huge revenue loss to local authorities as well as increasing traffic congestion. ▪ Confusion on legal, illegal parking bays/ spaces due to lack of or no proper markings and signages ▪ Supply in form of off- street parking, located inside the residential/ office/ commercial buildings is generally not available to public outside the occupants of the buildings. <p>For the purpose of managing the parking in the city, a system called Parking Management System (PMS) was envisaged for city wide implementation and the city was divided into three zones for phase wise implementation</p> <ul style="list-style-type: none"> ▪ Zone A- area inside the Core Ring Road, mainly the Central Business District (CBD), ▪ Zone B- area inside the Outer Ring Road (ORR) minus area under Zone A, ▪ Zone C- area between the ORR and Peripheral Ring Road (PRR). <p>A study called Parking Action Plan was initiated and completed by Directorate for Zone A. The objective of the study was to establish the current and future parking demand and to plan and provide the solutions for effective demand management through Smart Parking Solutions. The study establishes the existing on- street parking demand and through a thorough process of design establishes the on- street supply and thus the shortfall.</p> <p>Directorate now intend to do the similar study for Zone B (area inside the Outer Ring Road minus area under Zone A).</p> | |

Area under Zone B includes neighbourhood like Indiranagar, Koramangala, Jayanagar, Banshankari, Domlur, Hebbal, Malleshwaram, Rajajinagar, Vijaynagara etc.

Neighbourhood under this zone are known for their quite residential areas along with big commercial and educational centres within the individual neighbourhoods. The commercial centre attracts crowd from all over the city, generating huge parking demand on daily basis against the very limited supply of parking spaces. Moreover, this limited parking supply is mostly poorly managed and is free in majority of parts, and at the same time is poorly maintained due to lack of or no proper markings and signages.

As a part of this, the study area shall be divided into several zones, and then each zone shall be further divided into parking blocks, depending upon the area type, block size etc. An inventory of the available on- street, off-street parking infrastructure in each block (both Government and Private owned) shall be mapped, existing parking demand shall be established via data collection & analysis, and finally through a thorough process of design parking supply shall be established.

Tentative Work plan

Below is the broad level of activities planned for an 8 - week period to achieve the above objective.

- Week 1- Literature review, study area delineation to divide the zone into smaller blocks, site visit to project location, identifying data collection needs
- Week 2, 3 & 4 - Data collection to establish existing & futuristic on- street parking demand, mapping & analysis activities,
- Week 5 & 6- preparation of conceptual and detail drawings, preparation and submission of Draft Report with presentation
- Week 7- Submission of final report and presentation (incorporating comments/ suggestion from DULT reviews)

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| Project Duration | 8 weeks |
| Concerned Authorities | BBMP, BMTC (TTMC parking data) |
| Related Documents | Parking Action Plans for Zone A (available in- house), |
| Mentor | Yougal Tak & Shamanth Kuchangi |
| Deliverables | <ul style="list-style-type: none"> • At the end of each week, a summary report of the task assigned to be submitted to the mentor (by end- of- day every Saturday) • Design drawings in AutoCad 2D, clearly indicating the proposed parking plans • By end of 6th week a draft report with proposed parking plans should be submitted • A final report and a presentation will due by 7th week |

Bangalore Mobility Indicators (BMI) 2015- 16

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| Project Location | Bengaluru |
| Introduction | |

Bengaluru is the fifth largest metropolitan city in India and one of the fastest growing cities in Asia. It has grown in many folds in terms of population and area as it got global recognition as IT capital of India and also as a well-developed industrial city. Since decades, Bengaluru city is being witnessed rapid urbanization and motorization. 36% of urban population live in Bengaluru and 1.5 million move in to the city each year. Due to unprecedented growth of Bengaluru, the trips lengths have increased which is presently 11 kms per day. Also due to increased trip lengths, dependency on private vehicle use has also increased at the rate of 10% per year.

The Bangalore Mobility Indicators study- 2008 was the first study initiated in Bangalore to identify a series of indicators that are essential to track the progress of various interventions towards addressing mobility. The subsequent study has been again taken up in 2011 to see the trend in overall transport scenario in the city. The study showcased several issues like congestion and accessibility at different locations of the city. The results had necessitated the need to take up development measures from concerned agencies in the next couple of years. Hence, it is now the time to assess the performance of these developmental measures undertaken after year 2011.

Project Brief

In any urban area, mobility forms one of the key functionalities in the field of transportation. Attempts to improve mobility appear to be negligent of pedestrians, non-motorized and local area travel. Improvements are generally supply-driven- overly accommodating to individual motor vehicles; conservative in public transport regulations; non-protective of street based public transport modes; and overly focused on large-scale investments like widening roads and building elevated corridors, in apparent belief that these visible structures will increase the image of competitiveness of the city. This has been due to a lack of comprehensive information on the issue of the different facets of mobility in the City. In this regard, the Directorate in the year 2008 initiated a study in Bangalore to identify set of transportation indicators towards assessing mobility. These indicators also help in policy decision making.

The indicators can serve many purposes. They will provide trend information from which implications for transportation can be drawn from which transportation policy and investment decisions are made. They can provide a basis for comparisons of mobility parameters among metropolitan sub-areas. They can provide the public with a sense of whether system performance is improving or getting worse over time.

This study is an effort in this direction in making a comparative statement of present and past indicator levels. Besides, this study also establishes a set of Service Level Benchmarks (SLBs) by MoUD for Bangalore.

The main objectives of the study are-

- To provide public with a sense of whether city transport system performance is improving or deteriorating by comparing the same with previous indicators (BMI- 2008 and 2011)
- To track the progress of various transportation interventions
- To generate information that will be useful in making policy level decision on urban transportation
- To suggest best practices based upon the existing level of service for further mobility improvements

Scope of Work:

The study involves establishment SLBs initiated by MOUD and to update mobility indicators developed under Bangalore mobility indicator studies in 2008 and 2011 respectively. Also to develop and assess additional indicators if

required, which are not covered under guidelines suggested by MoUD or in the previous studies.

Tentative Work Plan

Below is the broad level of activities planned for an 8 - week period to achieve the above objective;

1st and 2nd week

- Understanding the project and study area & SLBs by MoUD
- Identification of mobility indicators (indicators which are not addressed in previous BMI reports)
- Reconnaissance survey, Approach and methodology
- Identification of data needs, preparation of survey formats, sample size and survey locations

3rd – 5th week

- Primary surveys
- Assessment and computation of mobility indicators

6th – 8th week

- Preparation of report card (comparison of computed indicators performance with previous years)
- Preparation of report and presentation (which also includes observations/ best practices of each mobility indicator)

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| Project Duration | 6- 8 weeks |
| Concerned Authorities | BBMP, BDA, Traffic Police, Transport Dept, BMTC, DULT |
| Related Documents | BMI- 2008 & 2011 report, CTTs, Census website, other related reports. |
| Mentor | Ragini Nagisetty & Yougal Tak |
| Deliverables | <ul style="list-style-type: none"> • At the end of each week, a summary report of the task assigned should be submitted to the mentor (by end-of-day every Saturday) • By end of 7th week a draft report including assessment, observation, best practices / recommendations on computed indicators • A final report and a presentation will due by 8th week |

| Junction design for accommodating Cycle movements in Yelahanka | |
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| Project Location | Bengaluru |
| Introduction | |
| <p>Bangalore, the capital of south Indian state Karnataka is India's fifth largest and a rapidly growing metropolis. It is known world over as India's Garden City and Silicon Valley. In the last decade or so, a genial small city, dotted with breathtakingly beautiful gardens and dominated by large defence establishments and government funded labs transformed quickly in to a teeming metropolis with large public sector companies, educational institutions and a global IT hub. Bangalore has grown many folds in terms of population as well as area. 36% of urban population live in Bangalore and 1.5 million move in to the city each year.</p> <p>Due to unprecedented growth of Bangalore, the trips lengths have increased which is presently 11 kms per day. Due to increased trip lengths, dependency on private vehicle use has also increased. Bangalore used to have NMT as commuting mode due to shorter travel distances and salubrious climate which is declining and is now reduced to 2% in 2011 from 1985 which was 16%.</p> | |
| Project Brief | |
| <p>Cycle day is an initiative organized by various citizen groups in association with DULT to sensitize citizens of Bangalore. The campaign took a community partner model spin when Yelahanka United Environmental Association (YUVA) took this initiative to the neighbourhood of Yelahanka in the months between July 2014 and September 2014. The fact that the neighbourhood has a lot of educational institutes where students patronize cycling as their mode of commute makes safety for cyclists a major concern. This was clearly evident during the three month campaign that attracted nearly 4000 residents from the neighbourhood each time and expressed their need of ensuring safety to adopt cycling in their daily life style.</p> <p>This initiative was taken up seriously by the local representative and it was decided to draw out a technical proposal by DULT for dedicated cycle tracks in Yelahanka when the community partner themselves asked for safe infrastructure for cyclists. The aim of the project is- To increase, improve and enhance cycling in the City as a safe, healthy and enjoyable means of transportation and recreation. The objectives of this project are:</p> <ol style="list-style-type: none"> 1. Creating cycle safe junctions for the cycling network by integrating different activity generators such as institutions, parks, transport hubs, commercial zones. 2. Enhancing accessibility at junctions. <p>Concept plan of the cycle network has been drawn out for different sections based on the following principles:</p> <ul style="list-style-type: none"> ▪ Identification of traffic generators and anticipated user types ▪ Linking various activities such as recreational locations to other civic functions to tap the potential users in the neighbourhood ▪ Mapping and inspecting physical route conditions to determine- <ul style="list-style-type: none"> - Potential for uninterrupted and direct pathways to encourage frequent use | |

- Available widths for cycle tracks and setbacks for signs, lights, benches, etc.
- Obstacles and negative physical factors, including adjacent structures or transportation mode conflicts

A TSS survey for 6.5 kms has been conducted for the Cycle Track network identified in the neighbourhood of Yelahanka. The deliverable of the internship include detailed design of the cycle tracks & pedestrian infrastructure, junction improvement & safe crossings for cyclists and pedestrians, enhancing accessibility for metro stations and bus stops, provision of limited parking, signages and markings, lighting and street furniture. Following are the details of the tasks to be completed during the internship programme:

1. **DETAILED DESIGN:**

A TSS for around 6.5 kms has been conducted for the Cycle Track network identified in the neighbourhood of Yelahanka.

The deliverable of the internship include detailed design of the cycle tracks & pedestrian infrastructure, junction improvement & safe crossings for cyclists and pedestrians, enhancing accessibility for metro stations and bus stops, provision of limited parking, signages and markings, lighting and street furniture.

Requirement:

- High proficiency in software such as AutoCad and Sketch up
- Knowledge of Indian Road Congress (IRC) standards for road infrastructure with respect to geometric designs, signages, and supporting infrastructure
- Knowledge on preparing detailed designs for submission to local authorities
- On field survey collection of traffic volumes and pedestrian activity.
- Simulation of the network with software such as Vissim.

2. **ESTIMATION AND COSTING:**

The Yelahanka cycle track project will be submitted for implementation to local authorities and local representatives. Implementation drawings submitted will include the detailed project cost.

Requirements:

- Understanding of materials, local availability, and cost
- Knowledge of preparing a detailed BOQ for implementation

Tentative Work Plan

Below is the broad level of activities planned for an 8 - week period to achieve the above objective

Week 1- (i) Best practice for Junction Design (Documentation of National and International Case Studies)

(ii) Methodology for Junction Design

(iii) VISSIM Training (1/2 day workshop by DULT Officials)

Week 2&3 – (i) Development of Conceptual Design for 6 junctions and 2 stretches

(ii) Junction volume counts

Week 4&5- (i) Detail design of 6 junctions and 2 stretches

(ii) Validation of junction design in VISSIM

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| Week 6- (i) BOQ & Sketchup model of 6 finalized junctions and 2 stretches | |
| Week 7- (i) Stakeholder consultation & Final Report | |
| Project Duration | 8 weeks |
| Concerned Authorities | DULT, BBMP |
| Related Documents | <ul style="list-style-type: none"> • IRC standards for road infrastructure with respect to geometric designs, signage and supporting infrastructure • Research on best practices and standards for bicycle infrastructure |
| Mentor | Pranati Awasthi & Sonal Kulkarni |
| Deliverables | <ul style="list-style-type: none"> • At the end of each week, a summary report of the task assigned should be submitted to the mentor (by end-of-day every Saturday) • By end of 6th week drawing detailing different components of design should be submitted. • Final drawings, BOQs and a presentation will due by 7th week. |

| Jayanagar Cycle Network Plan | |
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| Project Location | Bengaluru |
| Introduction | |
| <p>Bangalore, the capital of south Indian state Karnataka is India's fifth largest and a rapidly growing metropolis. It is known world over as India's Garden City and Silicon Valley. In the last decade or so, a genial small city, dotted with breathtakingly beautiful gardens and dominated by large defence establishments and government funded labs transformed quickly in to a teeming metropolis with large public sector companies, educational institutions and a global IT hub. Bangalore has grown many folds in terms of population as well as area. 36% of urban population live in Bangalore and 1.5 million move in to the city each year.</p> <p>Due to unprecedented growth of Bangalore, the trips lengths have increased which is presently 11 kms per day. Due to increased trip lengths, dependency on private vehicle use has also increased. Bangalore used to have NMT as commuting mode due to shorter travel distances and salubrious climate which is declining and is now reduced to 2% in 2011 from 1985 which was 16%.</p> | |
| Project Brief | |
| <p>Cycle day is an initiative organized by various citizen groups in association with DULT to sensitize citizens of Bangalore. The campaign took a community partner model spin when Yelahanka United Environmental Association (YUVA) took this initiative to the neighbourhood of Yelahanka in the months between July 2014 and September 2014. The fact that the neighbourhood has a lot of educational institutes where students patronize cycling as their mode of commute makes safety for cyclists a major concern. This was clearly evident during the three month campaign that attracted nearly 4000 residents from the neighbourhood each time and expressed their need of ensuring safety to adopt cycling in their daily life style.</p> <p>This initiative was taken up seriously by the local representative and it was decided to draw out a technical proposal by DULT for dedicated cycle tracks in Yelahanka when the community partner themselves asked for safe infrastructure for cyclists. The aim of the project is- To increase, improve and enhance cycling in the City as a safe, healthy and enjoyable means of transportation and recreation. The objectives of this project are:</p> <ol style="list-style-type: none"> 3. Creating cycle network for a neighbourhood by integrating different activity generators such as institutions, parks, transport hubs, commercial zones. 4. Improve cycle & pedestrian infrastructure & enhance accessibility. 5. Develop parking management & enforcement plan to provide safe non-motorized environment. 6. Create awareness by engaging the community, govt. bodies & local representatives through campaigns & focus group <p>Concept plan of the cycle network has been drawn out for different sections based on the following principles:</p> <ul style="list-style-type: none"> ▪ Identification of traffic generators and anticipated user types ▪ Linking various activities such as recreational locations to other civic functions to tap the potential users in | |

the neighbourhood

- Mapping and inspecting physical route conditions to determine-
 - Potential for uninterrupted and direct pathways to encourage frequent use
 - Available widths for cycle tracks and setbacks for signs, lights, benches, etc.
 - Obstacles and negative physical factors, including adjacent structures or transportation mode conflicts

A Lidar Survey for 12 kms has been conducted for the cycle track network, identified in the neighbourhood of Jayanagar. The identified cycle track network consists of 18 major junctions and 4 soon to be operationalized metro stations. The deliverable of the internship includes detailed design of cycle track & pedestrian infrastructure, junction improvement, design interventions to enhance accessibility to metro stations and bus stops etc.

Following are the details of the task to be completed during the Program.

Tentative Work plan

Below is the broad level of activities planned for an 8 - week period to achieve the above objective.

- Week 1- Background Study, Site visit to project location- Reconnaissance survey of the area (socio-cultural activities, economic activities, existing infrastructures), stakeholder meetings and identify data collection needs
- Week 2, 3, 4 - Data collection & analysis activities, preparation of conceptual and detail drawings
- Week 5, 6- Preparation and submission of Draft Report with presentation
- Week 7- Submission of final report and presentation (incorporating comments/ suggestion from DULT reviews)

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| Project Duration | 7 weeks |
| Concerned Authorities | BMRCL, DULT, BBMP, BDA, |
| Related Documents | CMP, CTP, TOR for SAP, SAP model document by Embarq for Indiranagar Metro Station, Consultant reports |
| Mentor | Bibek Mahato, Pranati Awasthi, Pallavi N |
| Deliverables | <ul style="list-style-type: none"> • Accessibility study of Majestic metro Station (Underground) • At the end of each week, a summary report of the task assigned should be submitted to the mentor (by end- of- day every Saturday) • Design drawings in AutoCad, GIS, Sketchup renderings, renderings on Photoshop etc. • By end of 6th week a draft report including recommendation on suitable accessibility plan, detailing different components of design should be submitted • A final report and a presentation will due by 7th week |

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| Station Accessibility Plan- Majestic | |
| Project Location | Bengaluru |
| Introduction | |
| <p>Bangalore, the capital of south Indian state Karnataka is India's fifth largest and a rapidly growing metropolis. It is known world over as India's Garden City and Silicon Valley. In the last decade or so, a genial small city, dotted with breathtakingly beautiful gardens and dominated by large defence establishments and government funded labs transformed quickly in to a teeming metropolis with large public sector companies, educational institutions and a global IT hub. Bangalore has grown many folds in terms of population as well as area. 36% of urban population live in Bangalore and 1.5 million move in to the city each year.</p> <p>Due to unprecedented growth of Bangalore, the trips lengths have increased which is presently 11 kms per day. Due to increased trip lengths, dependency on private vehicle use has also increased. Public Transport (PT) is backbone of the mobility in the city where 42% trips are made by PT. However the mode share of PT is on decline, there is increase in private vehicle ownership which is increasing at the rate of 10% per year. As stated earlier more and more people are moving to city due to job prospective, the pressure on PT is increasing. The need for efficient rail- based system was felt in to address its transport problems. That's when Bangalore Metro was proposed and readily accepted by GOI. BMRCL was constituted as a SPV for implementation of the Bangalore Metro Rail Project.</p> | |
| Project Brief | |
| <p>While there are different definitions of access, in transportation planning, accessibility (or just access) refers to the physical ease of reaching goods, services, activities and destinations. Access is the goal of most transport activity. Access to public transport can be achieved through different means/ modes. These are walking, bicycling, feeder public transport, intermediate public transport and private motor vehicles.</p> <p>Improving access to and from Metro is critical to meet ridership goals and serving customer needs. Potential riders may be lost or choose other means of travel if any of the following conditions exist:</p> <ul style="list-style-type: none"> • Pedestrian paths are indirect and fragmented; • High traffic volumes and traffic conflicts exist in and around the station; • Pick-up/drop-off space is inconvenient or limited and access is not provided for shuttle buses; • Short-term and long-term parking are full or unavailable. <p>Potential riders may also be lost if access constraints mean that the door-to-door journey involving Metro becomes more expensive, time consuming, unreliable or frustrating than an alternative means of travel, such as driving. Ultimately, the goal of improving station access is to better serve existing customers while attracting additional customers by:</p> <ul style="list-style-type: none"> • Enhancing the pedestrian experience with a safer and more attractive walking environment; • Maintaining a good level of service for transit access to the site for buses and other transit vehicles; • Accommodating future access needs, which include vehicular traffic growth; | |

- Making transit use more convenient and attractive.

The introduction of Namma metro in Bangalore has initiated and accelerated transformation in the adjacent neighbourhoods with changing movement patterns within these neighbourhoods. The number of passengers expected to travel on the metro every day is estimated at 12 lakhs in 2013 and 19 lakhs in 2021.

The Station Accessibility Plan is to be prepared within the overall framework of the National Urban Transport Policy (2006). It is to bring about more equitable allocation of road space with people, rather than vehicles, as its main focus; and encourage greater use of public transport and non-motorized modes. At the city level, the findings of the CTPP (2007) need to be kept in mind and addressed, especially the decline in public transport modal share over the last two decades and overall inadequate and unmaintained footpath infrastructure. The travel patterns in each neighbourhood around the metro stations are characterized by their land uses, densities, built up area and urban fabric. The Station accessibility plan has to identify the distinct character of each area, identify their distinct travel patterns with a focus on pedestrian and cyclist and propose interventions to address their specific context.

With the overall goal of creating a sustainable Bengaluru, the Station Accessibility Plan for Namma Metro is perceived to improve access to the metro stations by following the green hierarchy i.e. prioritizing walking, bicycling / movement of non-motorized vehicles (NMVs), public transport and intermediate public transport.

Tentative Work plan

Below is the broad level of activities planned for an 8 - week period to achieve the above objective.

- Week 1- Background Study, Site visit to project location- Reconnaissance survey of the area (socio-cultural activities, economic activities, existing infrastructures), stakeholder meetings and identify data collection needs
- Week 2, 3, 4 - Data collection & analysis activities, preparation of conceptual and detail drawings
- Week 5, 6- Preparation and submission of Draft Report with presentation
- Week 7- Submission of final report and presentation (incorporating comments/ suggestion from DULT reviews)

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|------------------------------|---|
| Project Duration | 7 weeks |
| Concerned Authorities | BMRCL, DULT, BBMP, BDA, |
| Related Documents | CMP, CTPP, TOR for SAP, SAP model document by Embarq for Indiranagar Metro Station, Consultant reports |
| Mentor | Bibek Mahato, Pranati Awasthi, Pallavi N |
| Deliverables | <ul style="list-style-type: none"> • Accessibility study of Majestic metro Station (Underground) • At the end of each week, a summary report of the task assigned should be submitted to the mentor (by end- of- day every Saturday) • Design drawings in AutoCad, GIS, Sketchup renderings, renderings on Photoshop etc. • By end of 6th week a draft report including recommendation on suitable accessibility plan, detailing different components of design should be submitted • A final report and a presentation will due by 7th week |

| Bangalore Bicycle Master Plan | |
|---|----------------------|
| Project Location | Bengaluru, Karnataka |
| Introduction | |
| <p>Bangalore, the capital of the south Indian state Karnataka is India's fifth largest and a rapidly growing metropolis. It is known world over as India's Garden City and Silicon Valley. In the last decade or so, a genial small city, dotted with breathtakingly beautiful gardens and dominated by large defence establishments and government funded labs transformed quickly in to a teeming metropolis with large public sector companies, educational institutions and a global IT hub. Bangalore has grown many folds in terms of population as well as area. 36% of urban population live in Bangalore and 1.5 million move in to the city each year.</p> <p>Due to unprecedented growth of Bangalore, the trips lengths have increased which is presently 11 kms per day. Due to increased trip lengths, dependency on private vehicle use has also increased. Public Transport (PT) is the backbone of the mobility in the city where 42% trips are made by PT. However the mode share of PT is on decline, there is increase in private vehicle ownership which is increasing at the rate of 10% per year. As more and more people are moving to the city due to job prospective the pressure on PT is increasing. Therefore it is imperative for the city of Bengaluru to plan for sustainable transport apart from Buses and Metro.</p> <p>The goal of the project is to promote and envision cycling in the city of Bengaluru through a Bicycling Masterplan.</p> | |
| Project Brief | |
| <p>Bangalore's development spans over 500 years where it has grown organically over time with demand. The infrastructure in Bengaluru is not capable of carrying the large volume of traffic that it carries today. With the urgent need to shift masses to sustainable modes of mobility in Bengaluru like cycling, it is imperative to provide the necessary infrastructure for citizens to take up short and long cycle commutes safely. Like most Indian cities, Bangalore is primarily mixed use and have grown with the road network as its spine. With access points to properties directly from roads it is almost impossible to carve out space for dedicated cycle lanes from the limited space available within the existing carriageways. Departing from traditional ways of planning for cycling in cities, the city today is at a juncture where it has to imagine how cycling infrastructure can manifest itself spatially.</p> <p>This exercise is to investigate how a cycling network can be given form using layers apart from the road network. As the city has grown dependent only on road network till today, the exercise is also to validate whether this new network that emerges can be used to negotiate the city from one destination to another. Bangalore has a lake system that is unique to the city but the city has grown over the last 20 years heedless to it. The masterplan as a document is an example of how the city has not had a positive attitude towards its water systems. The cycling masterplan intends to look at various layers such as water (lakes and drains), roads, large land parcels (IT parks, Military), campuses, Government offices, public spaces like parks and maidans etc. to collectively give form to an alternate mobility corridor that is exclusive to the cyclist or pedestrian.</p> <p>During this internship programme it is expected to prepare a select set of base data and layers for the city of Bengaluru</p> | |

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| <p>that can be used to identify various Cycling networks in the city. Following are the identified layers to be mapped using GIS tool – Lakes, rivers, storm water drains, wetlands, public spaces like parks and maidans, Large land parcels (IT Parks, military), Government offices/lands, Campuses, conservancy lanes, transport hubs etc.</p> | |
| <p>Tentative Work Plan Below is the broad level of activities planned for 6 weeks.</p> | |
| <p>Week 1: Orientation to project and Background study, Literature Case studies of best practices for the preparation of a Bicycle Master Plan.</p> | |
| <p>Week 2, 3: mapping layers along pilot corridors and subsequently updating the GIS base.</p> | |
| <p>Week 4, 5, 6: Site validation of spatial entities/land uses</p> | |
| <p>Week 7: Report preparation and presentation to the team</p> | |
| Project Duration | 2 months |
| Concerned Authorities | DULT, BWSSB, IISc, BDA, BBMP, |
| Reference Documents | <ol style="list-style-type: none"> 1. Deccan Traverses: <i>The Making of Bangalore's Terrain</i> by Anuradha Mathur and Dilip Da Cunha 2. Wetlands: Treasure of Bangalore by T V Ramachandra · Asulabha K S · Sincy V · Sudarshan Bhat · Bharath H.Aithal 3. Masterplan For Bengaluru Metropolitan Area 2015, BDA 4. CTPP for Bangalore, 2011 |
| Mentor | Ann Jacob, Ritumoni Sonowal , Sheeba Shetty & Sonal Kulkarni |
| Deliverables | Preparation and submission of GIS map layers, |

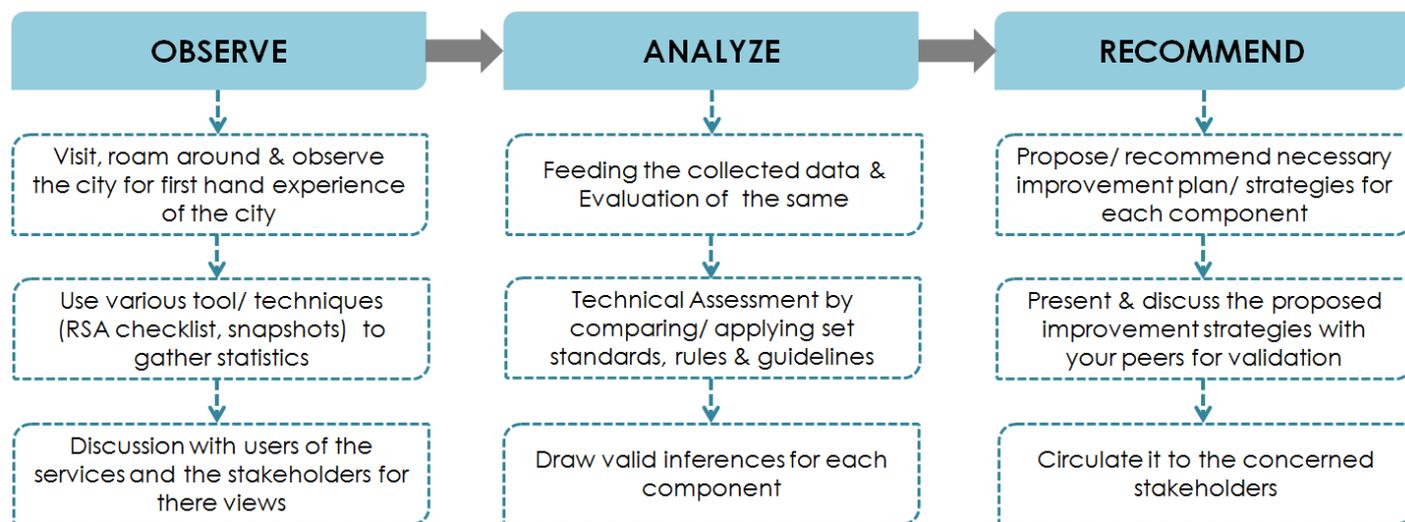
| Feasibility of Bus Priority Lanes on Sarjapur Road | |
|---|----------------------|
| Project Location | Bengaluru, Karnataka |
| Introduction | |
| <p>Bangalore, the capital of the south Indian state Karnataka is India's fifth largest and a rapidly growing metropolis. It is known world over as India's Garden City and Silicon Valley. In the last decade or so, a genial small city, dotted with breathtakingly beautiful gardens and dominated by large defence establishments and government funded labs transformed quickly in to a teeming metropolis with large public sector companies, educational institutions and a global IT hub. Bangalore has grown many folds in terms of population as well as area. 36% of urban population live in Bangalore and 1.5 million move in to the city each year.</p> <p>Due to unprecedented growth of Bangalore, the trips lengths have increased which is presently 11 kms per day. Due to increased trip lengths, dependency on private vehicle use has also increased. Public Transport (PT) is the backbone of the mobility in the city where 42% trips are made by PT. However the mode share of PT is on decline, there is increase in private vehicle ownership which is increasing at the rate of 10% per year. As more and more people are moving to the city due to job prospective the pressure on PT is increasing. Therefore it is imperative for the city of Bengaluru to plan for sustainable transport apart from Buses and Metro.</p> | |
| Project Brief | |
| <p>The Iblur- Sarjapur corridor is located on the SE side of Bangalore which provides a link between Bangalore city and Sarjapur town. The 18Km long corridor is also one of the fast growing corridor in Bangalore with lot of existing and upcoming commercial establishment, residential complexes and SEZ. BBMP has a proposal to widen the corridor upto 45m with a proposal of BRTS network connecting Sarjapur Town to Iblur junction. Because of lot of commercial and residential establishments alongside of the corridor, a road widening upto 45m may not be possible. The existing corridor is not capable of carrying the large volume of traffic that it carries today. Hence, a study needs to be conducted exploring the option of Bus priority lane with safe junction design improvement options.</p> <p>During this internship programme it is expected to prepare a corridor development plan for Sarjapur road with exploring different options like Bus priority lane and safe junction design proposals for the entire 18km long corridor.</p> | |
| Tentative Work Plan | |
| Below is the broad level of activities planned for 7 weeks. | |
| Week 1: Project Orientation and Background study, Literature study of best practices for the preparation of a Corridor Development Plan for Sarjapur Road. | |
| Week 2, 3: Site visit and conducting surveys to check the on-ground needs. | |
| Week 4, 5, 6: Preparation of network plan for the entire corridor. | |
| Week 7: Report preparation and presentation to the team | |
| Project Duration | 2 months |
| Concerned Authorities | DULT, BBMP |

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| Reference Documents | Proposed Master Plan 2031, Bus Priority Lanes on Old Airport Road- Bangalore (In house) |
| Mentor | Sourav Dhar, Srivaran K S & Rakesh Jinka |
| Deliverables | Preparation and submission of network plan for the entire corridor |

| Rapid Assessment of Urban Infrastructure & Transport components | |
|---|-----------------------------|
| Project Location | To be decided- Tier II city |
| Introduction | |
| <p>Recent rapid urban development in India has resulted in transport problems, such as traffic congestion and an increase in traffic accidents. Although the national and state governments have made substantial efforts in their various capacities to prepare strategic plans focused on mobility of people as a basis for developing cost-effective and equitable urban transport measures with an appropriate and consistent methodology, in line with the National Urban Transport Policy (NUTP), problems have been exacerbated by the rapidly increasing number of private vehicles. Existing local government capacity for urban transport planning is still insufficient.</p> <p>All this plans required extensive data collection and analysis and are normally time consuming exercise with certain studies taking time as long as 3-5 years to choke out the basic plans and strategies for development. That's where Directorate thought of taking the pilot exercise of Rapid Assessment (RA) of the existing city needs in terms of transport infrastructure for one of the tier II city of Karnataka.</p> <p>The main objective is to do a quick assessment of the existing transport infrastructure and recommend the short term strategies which can be implementable without disturbing much of the local environment and at the same time doesn't required extensive financial assistance.</p> | |
| Project Brief | |
| <p>This year internship program has been designed in such a way that students will not only be working on their respective team/ individual projects, but will also be sent to one of the tier II city in Karnataka for the Rapid Assessment (RA) of existing urban infrastructure & transport system in the city. This will be a 1 week exercise wherein students have to-</p> <ol style="list-style-type: none"> 1) Map and document the existing physical infrastructure of the town (roads, footpaths, junctions, street furniture, cycle tracks- if any, auto/ taxi stands, parking availability, bus terminals/ stops etc.); 2) Do assessment of available public transport systems in the town (Intra/ city bus service, Intermediate public transport etc.), and; 3) Do Activity mapping of different components such as Educational Institutions- schools, colleges, universities etc., Healthcare Facilities- hospitals, clinics etc., Transport Facilities- bus terminals, railways station, auto stands etc., Entertainment- theatres, shopping malls etc., Open Public Spaces- gardens, parks & playgrounds etc., and others; 4) Mapping of different traffic generators and attractors in the city such as markets, CBDs, etc. 5) Generate Infographics of different components as a mode of presentation <p>Rapid Assessment of physical urban infrastructure will give insights about the existing conditions of infrastructure and based on that, an improvement plan (if necessary/ required) will be drawn and can be given to the concerned stakeholders for them to take it forward from there.</p> <p>As a part of this exercise students will be stationed in the city for 2 days to capture the various aspects and components of the roads (road markings and signages, footpath height and width according to landuse, street lighting and furniture etc.). This can be done using one of the RSA checklist (part of RSA guidelines) prepared in-house by the Directorate.</p> | |

Rapid Assessment of public transport system will be another important aspect of this exercise, capturing the existing penetration of public transport services in terms of comfort, safety, punctuality, reliability etc. in the city. An improvement plan (if necessary/ required) will be drawn and can be given to the concerned stakeholders for them to take it forward.

The approach of doing the Rapid Assessment will be-



Tentative Work Plan

Below is the broad level of activities planned for a week to achieve the above objective.

Site Visit for firsthand experience of the city for 2 days (1 day extra for Mysore tourist attraction)

Photographic documentation & Mapping of the observations and activities on workable map (generation of infographic).

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| Project Duration | 1 Week |
| Concerned Authorities | Respective town Authority (ies) |
| Related Documents | RSA checklist, |
| Mentor | Abhishek Ranjan Prasad, |
| Deliverables | Preparation and submission of infographic of all the collected info, along with supporting documents. |