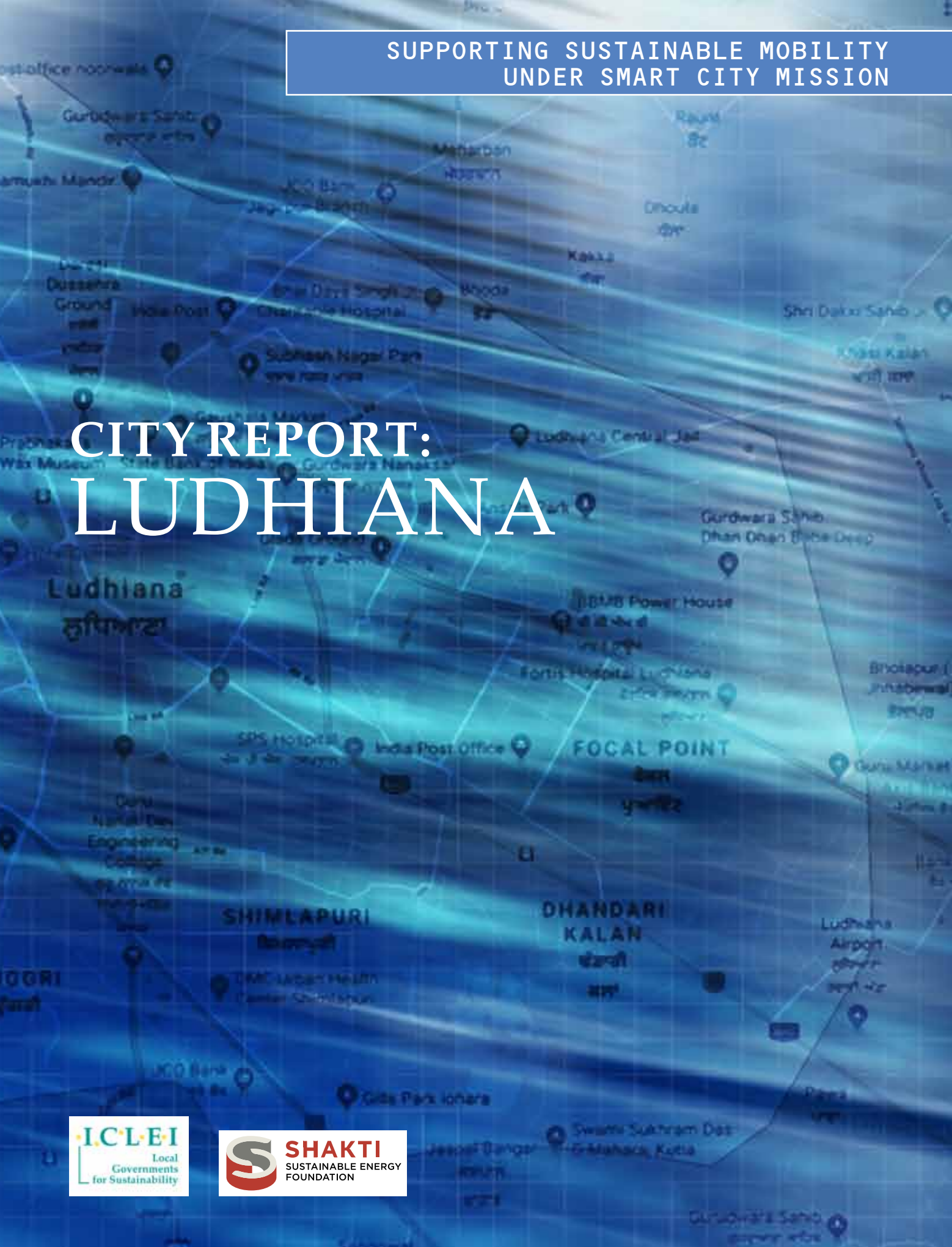
SUPPORTING SUSTAINABLE MOBILITY
UNDER SMART CITY MISSION

# CITY REPORT:
# LUDHIANA




ICLEI Local Governments for Sustainability

SHAKTI SUSTAINABLE ENERGY FOUNDATION

SUPPORTING SUSTAINABLE MOBILITY
UNDER SMART CITY MISSION

# CITY REPORT:
# LUDHIANA

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**About Shakti Sustainable Energy Foundation**
Shakti Sustainable Energy Foundation works to strengthen the energy security of India by aiding the design and implementation of policies that support renewable energy, energy efficiency and sustainable transport solutions.

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# MESSAGE

Greetings!

Urban areas in India act as catalysts of economic growth as they play a significant role in contributing towards national income, employment generation and productivity in their region of influence. Yet, city governments in urban areas continue to lag behind in capacity and have poor infrastructure, resulting in substandard quality of life for end users even today. In order to address the above challenge, Government of India identified Smart City Mission as an integral source of funding amongst its on-going flagship programs to tackle the infrastructural gaps and capacity of urban local bodies.

We are glad to provide our support in association with Sandeep Gandhi Architects in the mobility and built environment sector to four cities which are being developed as Smart Cities. This has been a unique initiative by engaging with the project cities and giving inputs to the smart city proposal, assisting in initiating specific mobility projects, carrying out assessments and studies looking at feasibility and impact of projects, citizens and community engagement based pilots that converted into tender development in line with the Smart City Proposals.

I would like to express our gratitude to Shakti Sustainable Energy Foundation for initiating the approach of assisting the city governments with regard to mobility and built environment. I would also wish to thank the mobility and built environment sector experts, government officials, members of Smart City Special Purpose Vehicle, municipal staff of the project cities for their continuous support provided towards completion of this report.

*(Emani Kumar)*
*Deputy Secretary General, ICLEI – Local Governments for Sustainability &*
*Executive Director, ICLEI South Asia*

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# ACKNOWLEDGMENT


At the beginning, ICLEI- Local Government for Sustainability- South Asia would like to thank 'Shakti Sustainable Energy Foundation' for giving us an opportunity to provide handholding support to the city of Ludhiana (Punjab) to deliver city scale action plans under transport and built environment through its grant program.

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# 1 BACKGROUND

The Ministry of Urban Development's (MoUD) Smart cities initiative provided an opportunity to envision, plan and develop projects for improving the livability in 109 cities selected to be developed as Smart Cities over a period of time. Urban built environment and transport happen to be the core of this program, even though the program only focuses on an identified area for aiming improvements along with pan city initiatives including systemic changes. Currently the smart cities mission focuses mainly on Area Based Development (ABD), while the other ongoing schemes such as AMRUT (another flagship mission of GoI) focus on the remaining city improvements where the funds are allocated for various service sectors. It is observed that the interventions planned at the area level are beneficial but scaling up to the whole city later might become an issue as the cities are continuously sprawling. Hence there is an urgent need to assist the cities in formalizing an integrated action plan in line with the defined vision for smooth implementation of the proposed mobility components of the plan and future scaling up of the same for the entire city.

Additionally, built environment is also a major component under the smart cities mission; however it is also observed that though there are numerous policies and codes notified under the building sector in India to guide the development in built environment, there is very less knowledge available to the stakeholders on the implementation of the same at the city level. Hence, most of the cities though being developed under the Smart City Mission have not been able to show improvement in the built environment sector. Therefore, there is a need to help the cities to understand the implementation of measures in order to reduce the emissions from this sector. This can be done by developing an action plan and creating awareness along with the capacity building exercises including the stakeholders from government and the private sector.

ICLEI- South Asia - Local Governments for Sustainability, which aims to build and serve a regional network of local governments to achieve tangible improvements in regional and global sustainability through local initiatives, together with its partners SGA Architects worked and supported 4 Indian smart cities of Udaipur, Kakinada, Visakhapatnam and Jaipur during 2015-16 with the grant support from Shakti Sustainable Energy Foundation (SSEF). Successful engagements with the city and state governments during implementing this grant provided for close insights into the existing gaps and needs that require addressing as the cities proceed into implementing their smart city proposals.

After successful implementation of phase I of the grant, ICLEI – South Asia was granted the second phase of the handholding support project by Shakti in February 2017 to support four cities to deliver city scale action plans under transport and built environment. The cities in the second phase included

three cities from the prior engagement i.e. Udaipur, Visakhapatnam and Kakinada and a new city i.e. Ludhiana from Punjab was added to the handholding support. In the process, Kakinada was dropped due to inactive engagement and Gwalior was added for the handholding support.

The proposed initiative aims to develop and showcase an integrated and comprehensive approach to address urban transport issues and promote sustainable built environment by implementing nationally recommended steps and strategies. With the background of ongoing national efforts to develop 109 smart cities with complementary funding from programs such as AMRUT, HRIDAY, Housing for all (and few other programs) and expected active involvement of state government for undertaking implementation, the proposed project was scheduled to support four city governments to understand the 'Smart' aspects of urban mobility and built environment, as relevant to their local conditions and make available existing resources for utilisation towards implementing the same for the entire city.

## 1.1 OBJECTIVE

The project aims to deliver city scale action plans under transport and built environment sector for four Smart Cities. The primary intended outcome of the project is to build capacity of the city level authorities for smart built environment approach thus achieving the sustainable transport targets and promoting green and efficient buildings. The project also aims to provide handholding support and build state level preparedness of the cities for implementing the Smart city program.

## 1.2 SMART CITY HANDHOLDING SUPPORT: ENGAGEMENT PROCESS

The engagement process mainly included engaging with Ludhiana Smart City Limited (SPV), Ludhiana Municipal Corporation and Project Management Consultant (PMC) for the Smart City Limited on successfully implementing the proposed projects under the Smart Cities Proposal. The initial engagements with the selected cities were carried out through the state government and city governments, by the means of city specific Memorandum of Understanding (MoUs). The MoUs were signed in order to finalise the activities to be carried out under the support in consultation with Ludhiana Municipal Corporation.

## 1.3 ACTIVITIES CARRIED IN THE CITIES UNDER HANDHOLDING SUPPORT

To implement the activities and provide the support as envisaged in the MoU, the project team from ICLEI-SA commenced the work by reviewing the Smart city proposal of the city. The review of Smart City Proposal emphasized on analyzing the mobility components and understanding the sub components and costs envisaged under the projects. The handholding support in Ludhiana began from September 2017 and since then various activities have been initiated within the city under this project. The subsequent chapters below describe various activities/ tasks/ projects which have been carried out during the engagement in the city.



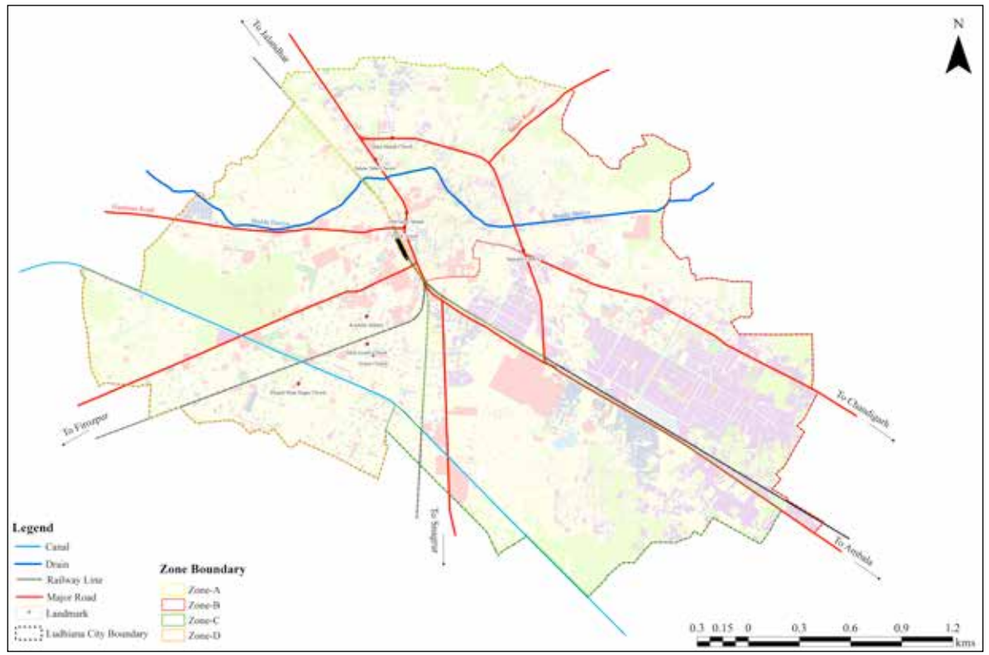


# 2 CITY PROFILE

Ludhiana is the largest city in Punjab, both in terms of area and population. The city is spread over an area of 159.37 sq.km and accommodates 16.18 lacs population (2011 Census). The city is located on Amritsar-Delhi G.T. Road (NH-1) and Amritsar-Ambala railway line which are considered the back bone of the state. The city is located at a distance of about 100 kms. North-West of Chandigarh, - capital city of Punjab. River Satluj flows at a distance of about 8 kms to the North of the city.

Ludhiana is one of the prime industrial and educational center of northern India and is the crossroads of many different cultures. Presently, the city is commonly known as the "Manchester of India", the "hub of the Indian Hosiery Industry" and as Industrial Capital of small-scale Industry in the country. The city is famous for its hosiery goods, woolen garments and leather items. Machine tools, dyes, cycle parts, mopeds, sewing machines and motor parts are also included in the list of the items exported

**Figure 1: Ludhiana municipal Corporation Area**



from Ludhiana.

Besides being a commercial hub, the city of Ludhiana is also an important pilgrimage center with a number of Gurudwaras located within and around the city. There is an important historical monument - The Fort of Lodhi which is about 500 years old and was built by the Muslim ruler Sikander Lodhi along the banks of River Sutlej.

On the academic front, Ludhiana has some of the most prestigious institutions. There are two Medical Colleges, an Engineering College and the famous Punjab Agricultural University[1] in the city catering to students across the country.

## 2.1 POPULATION AND DECADAL GROWTH RATE

The total population of the city as per census 2011 is 16, 18,878 of which the male population is 8, 74,908 and female population is 7, 43,971. As per the population 2017, estimated population of Ludhiana is 1.978 million. Ludhiana has the highest share of urban population in Punjab (15.62%) and roughly houses one out of every six urban dwellers in the state.

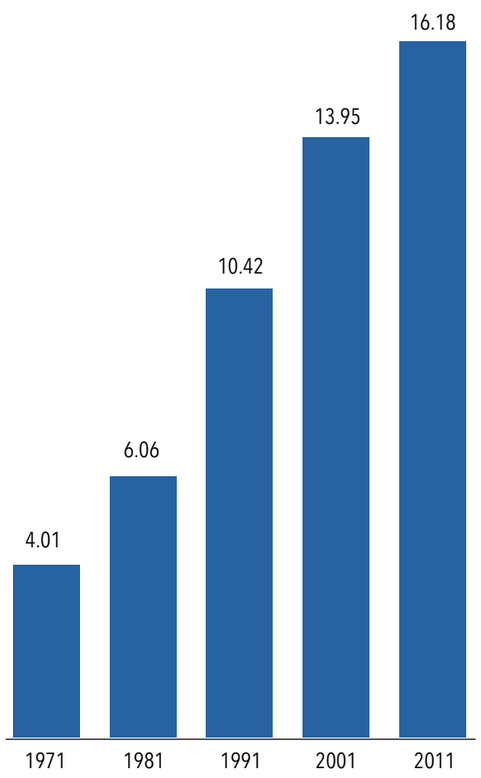
The growth in population was registered to be 51% during 1971-1981 and 71% during 1981-1991, because of the large-scale migration to the city as a result of the growth in industry, trade and commerce sectors. However, it is observed that the growth rate in Ludhiana has reduced to 33.87% during 1991-2001 and further came down to 15.62% during 2001-2011 because of normalized social and economic conditions in the city. The trend of population growth over the last four decades can be seen in Table 1 and Figure 2.

**Table 1: Trend of Population Growth in Ludhiana**

| Year | Population (in lakhs) | Decadal growth rate (%) |
|---|---|---|
| 1971 | 4.01 | |
| 1981 | 6.06 | 51.12 |
| 1991 | 10.42 | 71.94 |
| 2001 | 13.95 | 33.87 |
| 2011 | 16.18 | 15.62 |

*Source: Census of India (2011)*

**Figure 2: Population Growth of Ludhiana City (in lakhs)**

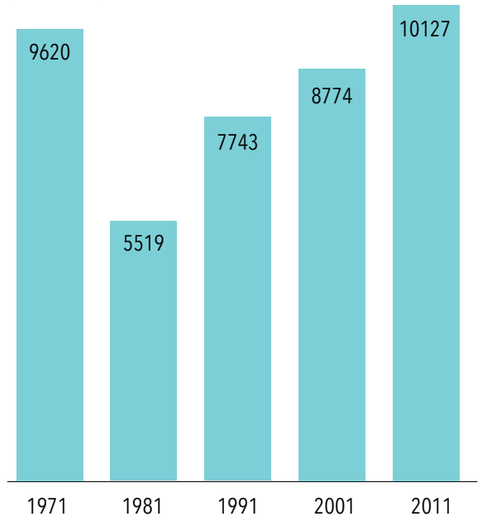



*Source: Census of India (2011)*

## 2.2 POPULATION DENSITY

As per the census 2011, Ludhiana has the highest population density in the state with 10,127 persons per sq.km. Population density of Ludhiana Municipal Corporation is expanding i.e. 55.2 persons per hectare in 1981 which further increased to 77.4, 87.7 and 101.27 persons per hectare in years 1991, 2001 and 2011 respectively. This is solely due to large scale migration taking place in Ludhiana city due to the growth of industrial and trade and commerce sectors. Population density in 1981 in Ludhiana city was on lower side as there was tremendous increase in municipal corporation area i.e. 41.7 sq.km in 1971 to 110 sq.km in 1981 and 159.37 sq.km in 2011. The trend of population density over the last four decades is shown in Figure 3.

**Figure 3: Population Density of Ludhiana City (persons/sq km)**




*Source: Master Plan Ludhiana 2021*

## 2.3 POPULATION PROJECTION

According to the City Development Plan for Ludhiana (2014), the estimated population for the year 2021 and 2031 using Geometric Progression method is 22,25,828 and 30,69,817 at a decadal growth rate of 38% (see Table 2).

**Table 2: Population Projection of Ludhiana City**

| Year | Geometric Progression | Graphical Method | Decadal Growth Rate |
|---|---|---|---|
| 2011 | 1613878 | 1613878 | 15.62 |
| 2021 | 2225828 | 2250000 | 37.91 |
| 2031 | 3069817 | 3100000 | 37.91 |

*Source: City Development Plan has projected based on Geometric Progression Method*

# 3 TRAFFIC AND TRANSPORT PROFILE

The intensity of traffic in Ludhiana city is increasing with its demographic and economic growth. The road network does not follow any well-defined hierarchy. With only 8%[2] area of the city available under the transportation, the road network is incapable of catering to the traffic demand of the city. With Ludhiana recording high growth in industry, trade and commerce, higher education, Medicare and population, vehicle ownership and travel demand in the city are increasing at a rapid pace. The existing transportation network has not kept pace with ever rising travel demand within and outside the city, accordingly roads have lost their functional character and are carrying traffic beyond their service capacity. The traffic and transportation in Ludhiana remain chaotic for major portion of the day and road users suffer enormously in the process.

## 3.1 ROAD NETWORK

The existing road network in the city follows a radial pattern and is dominated by both rail and road network. The entire network converges in the centre with G.T. Road (NH-1) and railways forming the major spines. Considering the centrality of Ludhiana in the state, it has high degree of connectivity with other parts of the state and the country. The city has 2 national high ways and one state highway passing through it (Table 3).

Besides this, there is a bypass connecting G.T. Road at both ends as well as Chandigarh Road. The inner-city road network with irregular alignment, inadequate widths and frequent intersections has serious capacity constraints. There is a link road, which is circular in nature and is used for both intracity as well as intercity vehicular movement. Other major roads meet link at different points which are Jodhan-Pakhowal road, Rahon road, Tajpur-Dhanansu road, Hambran road. The present road network is spread over 12.72 sq. km of area, which accounts for 8% of the total Municipal area. The city has roads ranging from 6 to 35 m width[3].

**Table 3: National & State Highways in Ludhiana**

| Sr. No. | Name of the road | Connecting to |
|---|---|---|
| National Highway | | |
| 1 | Grand Trunk Road NH-44 (Old NH-1) | North - Jalandhar to Delhi |
| 2 | NH-5 (Old NH-95) | Chandigarh and Ferozpur |
| State Highway | | |
| 1 | Gill Road (SH-11) | Sangrur and Mansa |

*Source: Public Works Department (Buildings and Roads) Punjab*





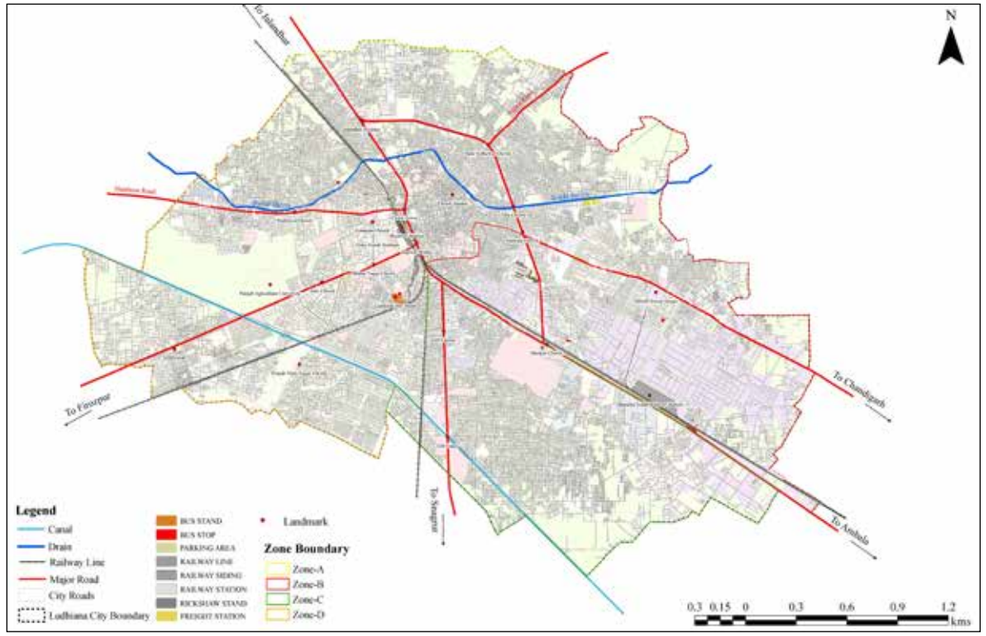



**Figure 4: Road Network Ludhiana City**

## 3.2 VEHICULAR GROWTH

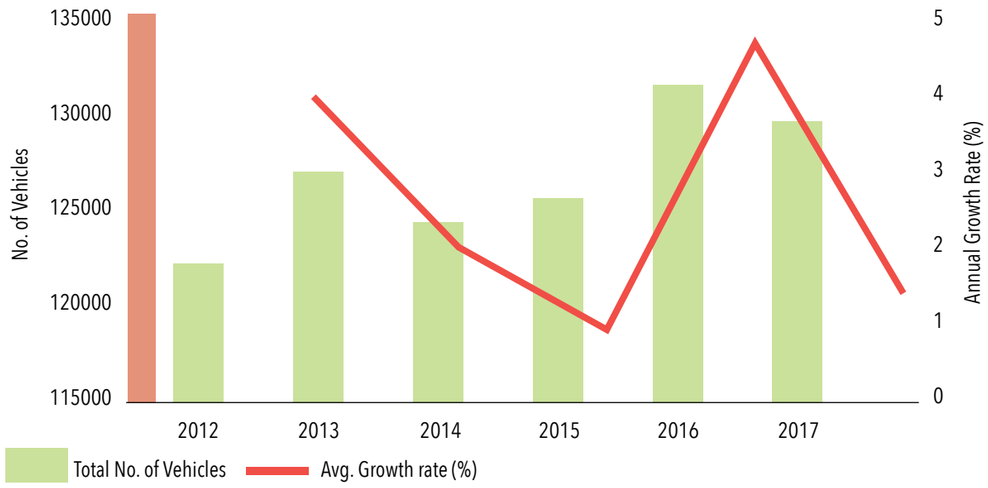
With the rapid growth of urban population, there is an ever-increasing demand on the city's infrastructure to serve the population. The rapid motorization rates have further complicated issues and compete with the public transport systems in the cities, as mode choices for commuting. The trips per household have increased over the years, with increasing per capita incomes and increase in vehicle ownership. Considering the improving socio-economic level in the Indian cities and inadequate mass transport system, personalized motor vehicles have been growing 6-15 per cent per annum in different cities. In most of the cities, scooters/motor cycles comprise of more than 70 percent of the total motor vehicles.

The registered vehicles in Ludhiana have increased significantly over the years. The number has climbed from 122059 to 129386 from 2012 to 2017 (Table 4 and Figure 5). The high density and rapid growth of vehicles have worsened the transport situation to a significant extent. The growth of registered vehicles has been phenomenal registering a growth of 4.6% in 2016 (refer Table 4). The sharp increase of two-wheelers and four wheelers could be attributed to the improved economic status of people and deficient public transport supply. The phenomenal increase of cars - demand more road space, has resulted in dense concentration of traffic on roads. This trend in context to the congested urban road system and the cost these impose on users demands a careful consideration.

**Table 4: Year Wise Total No. of Register Vehicles in Ludhiana**

| Year | Total No of Vehicles | Annual Growth Rate (%) |
|---|---|---|
| 2012 | 122059 | |
| 2013 | 126804 | 3.9 |
| 2014 | 124289 | 2.0 |
| 2015 | 125506 | 1.0 |
| 2016 | 131218 | 4.6 |
| 2017 | 129386 | 1.4 |

**Figure 5: Growth of Total Register Vehicles in Ludhiana**




*Source: Regional Transport Office, Ludhiana*

## 3.3 MODAL SPLIT

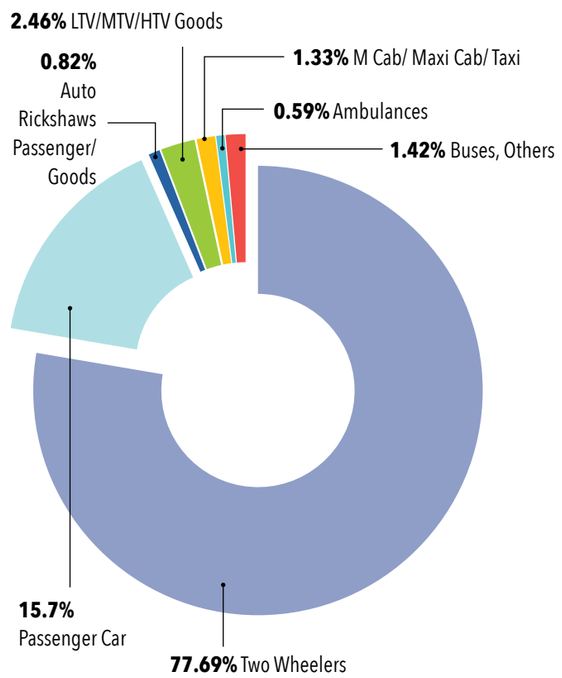
Traffic composition on roads indicates very high share of fast-moving traffic consisting of two wheelers, cars and auto rickshaws. As per Regional Transport Office, registered vehicles in Ludhiana city are more than 1 lakh. The overall modal share of Ludhiana and on major roads is shown in Figure 6.

Figure 7 shows the vehicular growth in Ludhiana city from the period 2012 to 2017. As per the data, the year 2016 registered highest increase in the number of vehicles being registered. The passenger vehicles have greater share in the total number of registered vehicles and are observed to have increased every year. Cars constitute 15.70% and motorized two wheelers constitute 77.69% of the total vehicles registered in 2017. Rest 6.61% of the vehicles include buses, autos, taxi, ambulances and others. The increase in the registered number of vehicles has subsequently led to an increase in the vehicles on the road.

## 3.4 PEDESTRIAN AND NON-MOTORIZED TRANSPORT (NMT INFRASTRUCTURE)

A significant proportion of commuters prefer to walk for work, education and other activities. However, pedestrian facilities such as footpath etc. are not adequate. Due to the mixed traffic such as cars, auto

**Figure 6: Modal Share of Registered Vehicles in Ludhiana City (2017)**

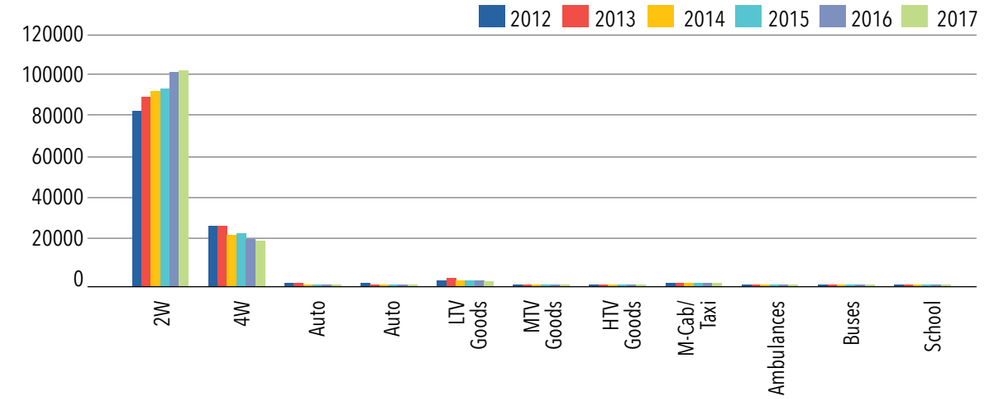



*Source: Regional Transport Office, Ludhiana*





**Figure 7: Year-wise number of Vehicle Registered in Ludhiana City**




rickshaws, cycle rickshaws and cycles, it has become increasingly difficult for the pedestrians to cross the roads particularly in the centre of the city.

Cycle rickshaws are one of the main supports of passenger movement in the city. Still, NMT infrastructure in the city is largely ignored while planning. Cycle Rickshaws serve mainly 1 to 2 km of distance from the main railway station and bus stand and other congested parts of the city. However, because of the road infrastructure, rickshaw pullers travel up to 4 km. There are approximately 9500 number of cycle rickshaws present in Ludhiana city (CMP Ludhiana 2013).

## 3.5 PARKING FACILITIES

Economic and population growth of Ludhiana have led to rapid urbanization and change in the metropolitan infrastructures. Rapid motorization and inadequate space to support it are major factors influencing the mobility and accessibility in a city. As a result of the development induced changes, demand for facilities like parking is increasing. Tremendous pressure on parking spaces have led to serious concerns like traffic congestion, accidents, disproportionate demand and supply ratio, environmental hazards etc. Excessive consumption of the private vehicles negatively impacts

*No footpath for pedestrians in old city area*

the environment and public at large but still private vehicles continue to be a preferred and convenient mode of communication.

There are around 11 sites identified by LMC and two by district administration which are being taken care of by LMC. Contract has been given to the private contractor on annual basis. The contractor is responsible for maintaining the parking areas in the city but it is observed that the parking lots are not managed properly. The condition of the parking site is very poor and the infrastructure present at the site is in dilapidatedcondition. Parking fee is paid at 3 or 4 sites only and at most of the places ticketing is done manually.

*Organized on-street parking in a city*

## 3.6 INTERMEDIATE PUBLIC TRANSPORT (IPT)

IPT modes are popular and play a vital role in city passenger transport movement. The IPT system comprising of auto-rickshaws, taxis, and cycle rickshaws are the backbone of passenger movement in the city. With their limitations and drawbacks, they continue to keep the city mobile and active. There has been a gradual increase in the number of IPT vehicles every year. Most of the people use auto rickshaws or cycle rickshaws depending on the distance of travel.

As the city is growing, the growth of autos and cycle rickshaws are also increasing rapidly.

Auto rickshaws in the city are the main life line for serving the current demand of commuters traveling need. There has been a gradual increase in the number of IPT vehicles every year. The IPT operation is reasonably self-regulated and looked after by operators' unions. Presently, there are about 30,000 autos in the city[4]. Taxies mainly run in the city under emergency circumstances specially the ones stationed

*Road side parking of auto rickshaws in Samrala chowk*





near the hospitals. However, there are other places where the taxies are parked at the designated taxi stands but these taxis ply to other districts and cities of Punjab. The demand for taxis increases to many folds during the marriage season.

## 3.7 SECTOR SPECIFIC FOCUS OF SMART CITY PROJECTS:

According to its Smart City proposal, Ludhiana City envisages to provide an enhanced quality of life to its citizens through social well-being, access to better health and a safe environment with reduced dependence on cars, reduced traffic congestion and better air quality. It also foresees to strengthen itself as a business friendly international manufacturing hub with sustainable infrastructure that will facilitate job growth for all sections of society; where technology will assist citizens to make their desired choices for day-to-day activities; where citizens have a choice of multiple modes of mobility; where education, sanitation and public health facilities are easily accessible where environment and depleting natural resources are preserved leading to a vibrant urban environment.

**Mobility Proposals Identified for Smart City Limited Ludhiana**

Following proposals have been identified under Smart City project for Ludhiana(refer Table 5). The proposals focus on addressing the issues such as - congestion, pollution, safety, disaster management and resilience, deteriorating health etc. The city aims to align the proposed initiatives with the strategic vision to make Ludhiana most bicycle friendly city by making bicycling culturally popular. The proposal covers infrastructure improvements to promote walkability, cycling & healthy living etc.

**Table 5: Identified project under smart city Limited Ludhiana**

| Sr. No | Name of Project | Estimated Cost (In Cr.) | Sector | Identified Under |
|---|---|---|---|---|
| 1 | E Rickshaw | 16.5 | IPT | Pan City |
| 2 | Dedicated Cycle Track in selected Industrial Area | 24.62 | NMT | Pan City |
| 3 | Installation of Way finding & Signages (Digital & Analogue) | 6.13 (awarded cost) | NMT | Pan City |
| 4 | LED Street Lighting | Infra Gap Assessment in progress | NMT | Pan City |
| 5 | Junction Improvement | 21 | NMT | Pan City |
| 6 | UG parking at NH-95 | 28.3 | Parking | ABD |
| 7 | Multi-Level Car Parking (MLCP) at Feroze Gandhi Market | 20 | Parking | ABD |
| 8 | Smart Road- Malhar Road & Retrofit Sarabha Nagar | 22.75+14.89=37.64 | -------- | ABD |
| 9 | Road over Bridge (RoB & RUB) at Pakhowal Road Railway Crossing | 62.25 (excluding cost of obligatory span) | -------- | ABD |
| 10 | Smart Road - Phase II - Ghumar Mandi Road & National Road | 23.3 | -------- | ABD |
| 11 | Smart Road Phase II - Rotary Club Road | 15 | -------- | ABD |
| 12 | Smart Road Phase - II - Pakhowal Road | 20 | -------- | ABD |

*Source: Ludhiana Smart City Limited, Project Management Consultants (Aecom)*

# 4 EXISTING INITIATIVES BY CITY AUTHORITIES/ SMART CITY PROJECTS

## 4.1 PEDESTRIAN AND NON-MOTORIZED TRANSPORT (JUNCTION IMPROVEMENT)

With increasing urban sprawl and rising income levels, non-motorized transport has lost its earlier importance. The longer trip lengths in the city have made cycling more difficult. Further, non-motorized modes are also exposed to greater risk of accidents as they share a common right of way with motorized vehicles. However, it is worthwhile to mention that non-motorized modes are environmentally friendly and must be given their due share in the transport system of a city.

*Broken footpath outside the Government College (G) in Ludhiana*





*Cycle user/pedestrian in industrial area*

There is lack of NMT infrastructure (such as cycle tracks and pedestrian paths) in the city and if at all there is any, they are not being used as envisaged. However, a view has been that this is because these facilities are designed badly and without fully recognizing the limitations and problems faced by cyclists or pedestrians. Encroachment of footpaths too affects the pedestrian safety adversely and requires strict enforcement coupled with opinions from public through citizen engagement. Pedestrian safety is also adversely affected by the lack of safe crossing facilities at busy intersections of even high traffic corridors.

It would, therefore, be essential that such facilities be constructed with acceptable designs from the experts and ideas from the community that is expected to use them.

The pedestrian problems in Ludhiana are mainly at Bharat Nagar Chowk, Mini Secretariat, Bhaiwala Chowk, Aarti Chowk, Railway Station Area, ISBT area, Dugri Chowk, Gill Chowk, etc. These areas require specific attention, refer see Figure 12: showing broken footpath outside the Government College (G) in Ludhiana. Due to the industrial development, labour class is residing in surrounding areas of industrial area. The inhabitation of labour class has increased the cycle traffic on the roads as they travel by cycle or walk for their work. Cyclists, using the carriageway along with motor vehicles and other road traffic, become traffic hazards for themselves and for others. This impedes the free flow of traffic as the cycle users are high in number. Under such circumstances, it is necessary to segregate cyclists from vehicular traffic. Footpaths along the roads are either unavailable in most parts of the city or are in pitiable condition. In most areas, there are no zebra crossings, no foot over bridges (FOBs) and pedestrian traffic signals are also missing.

Unfortunately, footpaths are available in only few parts of the city. The safety of pedestrians is also ignored as footpaths have not been laid on ROBs or flyovers, including Lakkar Bridge, Elevated Road, Southern bypass and Gill Road. In absence of the FOB near bus stand, visitors are forced to cross the road thus putting their lives at risk. Speed limits and direction boards are missing from most roads.

**Table 6: Proposal of Foot Over Bridges/ Pedestrian underpass & Footpath**

| Sr.No. | Name of Road | Proposed Location for Foot Over Bridges/ Pedestrian underpass | Sr. No | Proposals of Footpath on Major Roads |
|---|---|---|---|---|
| 1 | Link Road | Kochhar Market Cut, Bus Terminal, Preet Palace Chowk, Cheema Chowk | 1 | Ferozepur road |
| 2 | Ferozepur Road | Near Gita mandir chowk, Kacheri chowk, Near Gurudev nagar post office, Near Delta hart center Sharaba nagar | 2 | Old GT road |
| 3 | Gurudev Nagar Area | Fountain Chowk | 3 | GT road |
| 4 | Railway Station area | Between Gate 1 and Gate 2 of Railway Station | 4 | Gill road |
| 5 | GT Bypass | Jalandhar Bypass Chowk, Shivpuri Chowk, Basti Jodhewal Chowk, Samrala Chowk, Oswal Chowk, Sherpur Chowk | 5 | Pakhowal road |
| 6 | Malerkotla Road | Punjab & Sind Bank, Over Head Tank, Auditorium | 6 | Rahon road |
| 7 | - | Dhandhari Kalan Railway station | 7 | Dugri road |
| | | | 8 | Chandigarh road |
| | | | 9 | Hambran road |
| | | | 10 | Link Road |
| | | | 11 | Mall Road |
| | | | 12 | Ishmeet road |

*Source: Comprehensive Mobility Plan 2013*

### 4.1.1 Initiative by City Authorities:

In order to address the safety concerns of cyclists and pedestrians the city encouraged construction of segregated rights of way for bicycles and pedestrians. The city recognized that apart from improving the safety, segregation of vehicles moving at different speeds would help improve traffic flow, increase the average speed of traffic and reduce emissions.

In the comprehensive mobility plan (2013) of Ludhiana city, junction improvement plans were prepared for critical/congested junctions identified based on reconnaissance survey of the city area, their traffic characteristics and importance. In all, 18 junctions were identified as critical junctions for whom geometric improvement plans have been prepared. All 18 Junctions are proposed to be improved with the improvements measures as listed in Table 7. In addition to geometric improvements at junctions, suitable provision of at grade pedestrian facilities at junctions along and across by provision of footpaths and pedestrian crossings has been made.

### 4.1.2 Initiative under Smart City Project:

Providing efficient urban mobility and public transport is one of the key projects for Ludhiana city under Smart city mission. Under the smart city mission, number of projects have been identified by Ludhiana Smart City Corporation Limited (LSCL). Public participation and citizen engagement workshops during the SCP stage of work in 2015 suggested air pollution, traffic congestion and public safety issues as the top concerns faced by the city. Based on the suggestions, key projects selected for the Mission include Junction improvements in PAN city. Selected Junctions are facing tremendous traffic related issues pedestrian safety issues and other issues like traffic





**Table 7: Junction Improvement Measures**

| Sr. No. | Name of Intersection | Improvement Activities |
|---|---|---|
| 1 | Geeta Mandir Chowk | Median to be closed and ban all right turns, Island to be provided, turning radius to be improved |
| 2 | Bharat Nagar Chowk | Underpass to be provided and improve junction geometrics |
| 3 | Kacheri Chowk | Median to be closed and ban all right turns, turning radius to be improved |
| 4 | Bhaibala Chowk | Underpass to be provided and improve junction geometrics |
| 5 | Aarti Chowk | Roundabout to be removed and median to be closed, Island to be provided, improve turning radius |
| 6 | Yes Bank Chowk | Median to be closed and ban all right turns, turning radius to be improved |
| 7 | Circuit House Chowk | |
| 8 | Malhar Chowk | Underpass to be provided and improve junction geometrics |
| 9 | Sarabha Nagar Chowk | Median to be closed and ban all right turns, turning radius to be improved |
| 10 | Sherpur Chowk | Flyover to be provided, Improve junction geometrics |
| 11 | Oswal Chowk | |
| 12 | Samrala Chowk | |
| 13 | Basti Jodhewal Chowk | |
| 14 | Shivpuri Chowk | |
| 15 | Jalandhar Bypass Chowk | |
| 16 | Old court chowk | Island to be provided for free left turn, turning radius to be improved |
| 17 | Dandi Swami Chowk | Median to be shifted, Island to be provided, on-street parking to be improved, |
| 18 | Hibowal Chowk | Roundabout to be provided, Median to be shifted, turning radius to be improved |

*Source: Comprehensive Mobility Plan 2013*

jams due to congestion etc . Thus, in order to have an easy mobility & considering all physical constraints, most feasible improvements have been proposed for the junctions. The junctions for improvement were identified on the basis of problem identification and discussions with officials of Ludhiana Municipal Corporation and traffic police. The selected junctions are listed in Table 8.

### 4.1.3 Need for New Approach

Intersection improvement of these junctions is intended to accommodate an infrastructure which ensures a safe and reserved right of way for all the road users and space for accommodating infrastructure which supports context relevant activities currently observed on the street such as pedestrian, vending and landscaping space to support shopping and religious activity on the street along with spaces for parking of IPT, bus stops, etc. The junction improvement needs to meet local objectives of reducing traffic queues during peak hour along with reducing delays and improving safety. Additionally, the traffic 'congestion' at these junctions is not a result of capacity constraint but caused by friction between motor vehicles and slow-moving traffic such as pedestrians and cyclists as well static activities such as street vending, all of which share the right of way with motorized modes. These requirements can be met by modern

**Table 8: Identified Junction Improvement under Pan City**

| Sr. No | Junction Name | New Smart Signals | New Traffic Signal Proposed |
|---|---|---|---|
| 1 | Dandi Swami Chowk | Gill Chowk | Dandi Swami Chowk |
| 2 | Gill Chowk | Pratap Chowk | BRS bypass Chowk |
| 3 | Pratap Chowk | Laxmi Cinema Chowk | Veer Palace Chowk |
| 4 | BRS (B7) Chowk | Haibowal Chowk (2junctions) | Old Kacheri Chowk |
| 5 | Haibowal Chowk (2junctions) | Dugri Chowk (2junctions) | Janta Nagar Chowk |
| 6 | Janta Nagar Chowk | | Metro unit 4 Chowk |
| 7 | Metro Unit 4 Chowk | | |
| 8 | Dugri Chowk (2junctions) | | |
| 9 | Laxmi Cinema Chowk | | |
| 10 | Veer palace Chowk | | |
| 11 | Old Kacheri Chowk | | |

*Source: Ludhiana Smart City Corporation Limited and PMC*

**Table 9: Abstract of Cost for New Smart & Traffic Signals**

| Sr.No. | Description of Items | Unit | Amount (Rs.) |
|---|---|---|---|
| 1 | Civil Work | Complete job | 7196224.46 |
| 2 | Smart Signal With ITMS features:<br>(Gill Chowk, Partap Chowk, Laxmi Cinema Chowk=1Nos), (Haibowal Chowk, Dugri Chowk=2 Nos)= 7 Nos | 7 Nos | 12145679.00 |
| 3 | Traffic Signal With Heavy Robust poles:<br>(Dandi Swami, Focal Point, Janta nagar, BRS Nagar, Old Kacheri Chowk, Veer Chowk) | 6 Nos | 4968324.00 |
| 4 | Electrical | Complete job | 9367749.00 |
| | | **Total=** | **33677976.46** |
| | | Contingencies 0.25% = | 84194.94 |
| | | **GRAND TOTAL =** | **33762171.40** |
| | | **GRAND TOTAL (In Lacs.) =** | **337.62** |

*Source: Ludhiana Smart City Corporation Limited and PMC*

roundabout development at this intersection. Modern roundabouts work best with junction traffic volume, less than 6000 PCU, and they ensure minimal conflicts and offer maximum safety as well efficiency. The salient features which were followed in the junction re designing exercise are as follows:

- Pedestrian Friendly environment.
- Integrated barrier free infrastructure (mandated by disability act of 1995)
- Organized Traffic circulation, through improved geometric design in order to improve junction efficiency, minimize congestion
- Equity in road space allocation, ensure designed space is integrated for activities for all road users such as provision of footpaths.
- Improve safety and security through active and passive means like traffic calming measures, speed control etc.





In order to address the congestion at junctions in Ludhiana, the project team ICLEI SA developed junction specific approach and design as discussed above. The activities carried out by the project team are described in the subsequent sections.

### 4.1.4 Activities suggested/ carried and its Outcomes- Plans, Discussions, Pricing, Policies

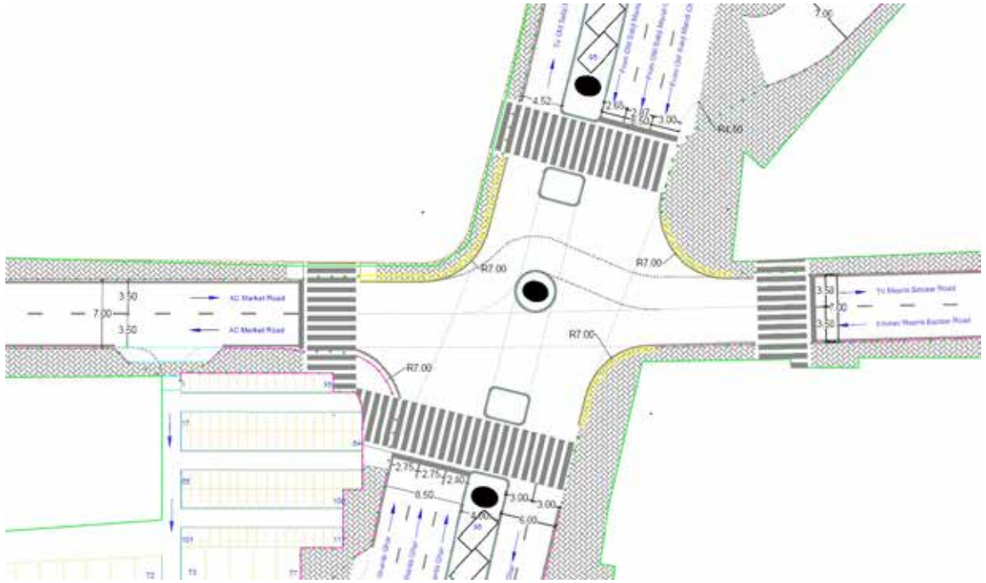
**Junction Trail at Mata Rani Chowk**

To achieve the project objectives following steps were followed by the project team for junction re-development.

1. Issues at the junction were recorded through activity mapping of the entire junction area including streets leading up to it. This creates a real-time activity plan of the junction with informal activities shown on the site plan along with formal/fixed structures and boundaries.
2. Traffic flow data at the junction was collected using sample video recordings during peak hour. Data collected was mode and direction wise, to allow analysis of mode share and directional load.
3. Analysis of the site conditions, activity mapping and traffic data was used to create a complete understanding of all issues at the intersection.
4. Based on the detailed understanding of all the issues at intersection, an ideal solution in line with the principles of equity and sustainability was developed and recommended.

*Glimpse of few junctions during the field survey*

**Figure 8: Plan prepared by project team of Mata rani chowk based on data collected**



5. The recommended solution was replicated on site using temporary barricading and other means, and the resultant impact on the traffic was recorded.

The trail was followed by a meeting with the Additional Commissioner along with other officails from Police Department. The project team discussed and presented the learnings, outcomes of the trail on Mata Rani Chowk. The officials of Ludhiana Municipal Corporation agreed with the suggestions and seeked assistance from the project team for developing final plans for the junction.

After the successful trial at Mata rani chowk, a






**Decongestion: MC starts road demarcation in city**

**INITIATIVE** Civic body is working with a Delhi-based NGO to decongest 10 main junctions

HT Correspondent

LUDHIANA: Aiming to decongest the city roads, the municipal corporation (MC) is working in association with a Delhi based NGO, Shakti Sustainable Energy Foundation.

The authorities are also working to deal with the parking woes of the respective areas and the traffic police have also been involved in the whole project.

As per information, 10 main junctions including Samrala Chowk, Mata Rani Chowk, Gulab Chowk, Kochar market chowk, Mini Guard Chowk, Punjab Mata Nagar Chowk, Ghanta Ghar Chowk, Pakhowal Sahni Mandi Chowk, Jhanda Mandi Chowk and Salem Tabri Chowk will be decongested.

Under the initiative, the members of International Committee Local Environmental Initiatives (ICLEI) had been studying the traffic system and problems in respect five areas from September, 2017 and now, have been created for the same.

One of the ICLEI officials, Asmit said, "A part was signed between ICLEI and MC in September, 2017, following which we have been studying the traffic system here and problems major problem here and by decongesting the city roads, we are aiming to bring some relief to the residents."

"For now, temporary barricading and demarcation has been done as suggested by the



NGO workers during the demarcation work at Mata Rani Chowk in Ludhiana on Friday.

**AREAS SELECTED**

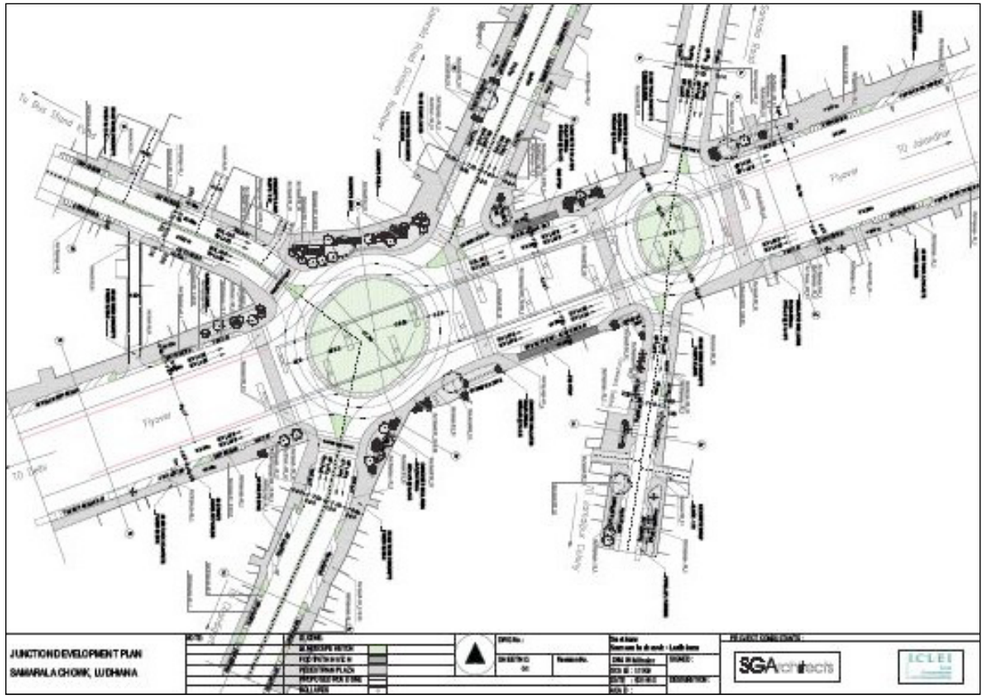
Samrala Chowk, Mata Rani Chowk, Gulab Chowk, Kochar market chowk, Mini Guard Chowk, Punjab Mata Nagar

*Meetings with officials and traffic police, on-site survey, demonstration of plan at Mata Rani Chowk.*

*Print media report on the work*

committee was formed under the chairman ship of the joint commissioner for further processes. The project team finalized the plan and the signal cycle, discussed the same with the committee and the additional commissioner. The project team also communicated the requirement of total station survey for Mata Rani Chowk while making the final plan. The TSS was conducted with support from the PMC, the project team finalized the plans for Mata Rani Chowk based upon the TSS drawings.

**Figure 9: Mata rani Chowk Drawing**




**Junction Trail at Samrala Chowk**

The junction trail at Mata Rani Chowk was well received by the officials of Ludhiana Municipal Corporation, Police Department and the citizens. During the discussions, the project team was asked to conduct a junction trial for Samrala Chowk which is one of the most critical junctions in the city. The project team is now in the process of developing the final plans for Samrala Chowk.

**Figure 10: Activity mapping of the Samrala chowk using google image then took it into AutoCAD for showing actual situation on Ground**







*Top: Glimpse of Samrala Chowk trial run. Bottom: News coverage of Samrala Chowk trial*

राहत• सिग्नल सर्किल और राउंड अबाउट के जरिए लिया ट्रायल, अब सड़क पर नहीं रुकेंगे ऑटो और बस, अलग से होंगे पॉइंट

जाम से निपटने के लिए समराला चौक में ट्रायल, अब होंगे बड़े बदलाव

राजदीप सिंह कैनेथ | लुधियाना

शहर के भीड़ भरे प्रमुख चौकों में से एक समराला चौक में दिल्ली से आई दो एनजीओ के मेंबर्स ने ट्रायल लेकर जाम के कारण पता लगाए। इसमें दो अलग-अलग तरीके से ट्रायल लिए गए। अब जल्द ही इस पर काम शुरू किया जाएगा। समस्याओं को ध्यान में रखकर एनजीओ जल्द चौक का नक्शा तैयार कर प्लान बनाएगी। इसके बाद नगर निगम के साथ मिलकर समराला चौक में बड़ा बदलाव किया जाएगा। इससे यहां भारी लदाद में लगने वाले जाम की समस्या दूर की जा सकेगी। बदलाव से पहले फाइनल कर ट्रेफरेरी ट्रायल लिया जाएगा, इससे यहां से गुजरने वाले लाखों लोगों को राहत मिलेगी।

इसके अलावा चौक के आसपास खड़ी होने वाली बसों और ऑटो पर भी रोक लगाई जाएगी। उन्हें अलग से स्थान दिया जाएगा। इस पर निगम की ओर से खर्च किया जाएगा। इस मौके पर दिल्ली की एनजीओ इंटरनेशनल काउंसिल फॉर लोकल इन्वायरमेंटल इनीशिएटिव्स और एसजीए के मेंबर, एसीपी ट्रैफिक गुरदेव सिंह और नगर निगम मुलाजिम भी मौजूद रहे।

बता दें कि समराला चौक में हर समय जाम की स्थिति बनी रहने से लोगों को काफी परेशानी होती है। यहां ट्रैफिक और निगम ने कई बदलाव किए, लेकिन समस्या हल नहीं हुई। अब दिल्ली की दो एनजीओ को ट्रायल और सर्वे के लिए बुलाया गया है। टीमों ने प्लान बना मंगलवार और बुधवार दो दिन इस पर काम किया।

• अब दूसरे प्रमुख चौकों पर भी शुरू होगा काम

अब दोनों एनजीओ के मेंबर्स गुलाटी चौक, पंजाब माता नगर चौक, मिट्ट गुमटी चौक, सलेम टाबरी चौक समेत अन्य प्रमुख चौकों पर भी काम किया जाएगा। यहां पर हर समय ट्रैफिक जाम रहने से लोग परेशान रहते हैं। इसके चलते यहां भी एनजीओ मेंबर्स की ओर से ट्रायल लेकर जाम के कारण तलाशे जाएंगे।

चौक से ऑटो और बस स्टॉप की होगी 50 मी. दूरी: एनजीओ मेंबर हामिद लतीफ ने बताया कि उन्होंने रेक किया कि चौक में ऑटो-बसें सड़क पर रोकना जाम का अहम कारण है। चौक में बदलाव कर ऑटो-बस स्टॉप भी बनेंगे। इसमें जालौधर की तरफ जाने को खड़ी होने वाली बसों का स्टॉप अलग किया जाएगा, जहां बसें खड़ी होती हैं, वहां ऑटो खड़े नहीं होंगे। चंडीगढ़ रोड की तरफ भी चौक से करीब 50 मी. दूर स्टॉप रखा जाएगा। इसका चौक में आने वाले ट्रैफिक पर प्रभाव नहीं होगा। यहां मुलाजिम भी तैनात रहेंगे।

ट्रेफरेरी लाइटें, बनाया छोटा चौक

एनजीओ के मेंबर आमिद लतीफ ने बताया कि पहले समराला चौक पर स्टडी की गई और फिर प्लान तैयार किया गया। इसके बाद ट्रायल किए। बुधवार को दो अलग-अलग तरीके के सिग्नल सर्किल और राउंड अबाउट के ट्रायल लिए गए। सिग्नल सर्किल के साथ चौक में ट्रेफरेरी ट्रैफिक लाइटें लगाई गईं। चारों तरफ की लाइटें लगाकर उस साइड से आने वाले ट्रैफिक के मुताबिक उसका समय रखा गया। कुछ घंटे इसी तरह ट्रैफिक चलाया गया और इससे मिलने वाली राहत और समस्याओं को नोट किया गया। इसके बाद दूसरे नंबर पर राउंड अबाउट ट्रायल कर चौक में ट्रेफरेरी छोटा चौक बनाया गया। इससे लोग चौक से घुमाकर भेजे गए। इस दौरान राहगीरों और आसपास के दुकानदारों से भी बातचीत कर उनसे राय ली गई। इसके मुताबिक आगे की कार्रवाई की जाएगी।

### 4.1.5 Key Challenges and Broad Level Findings

Elections in the state led to delay in implementation of junction trails, As soon as the code of conduct was announced, the work nearly came to a halt and the project team had to wait for long because there were lot of administrative changes in Ludhiana Municipal Corporation after completion of the elections.

The project team had to spend lot of time in assisting the city to get the total station survey completed before developing the final plans.

While conducting, the junction trail at Samrala Chowk, the project team had to face lot of problems in arranging the necessary infrastructure such as bollards, barriers, ropes etc which delayed the implementation process, thus affecting the overall project progress.

### 4.1.6 Current Status

Mata Rani Chowk- After the successful implementation of junction trail at Mata Rani Chowk, the project team was advised by the Additional Commissioner, Ludhiana Municipal Corporation to develop and discuss the final plans with the PMC- Ludhiana Smart Cities. As per his suggestions, the project team has discussed the proposal with the PMC and the PMC is now in the process of developing the cost. After the costing exercise would be completed, the city plans to float a tender for the execution.

Samrala Chowk- After completion of the junction trail at Samrala, Chowk, the project team is now in the process of discussing with NHAI to propose a slip road near transport nagar so that the heavy truck flow which is going towards Jalandhar can go directly from highway without disturbing the vehicular movement of arterial road.

The team is also, coordinating with various stakeholders in order to encorporate the suggestions/ feedback from the traffic police department and the PMC while developing the final plans for Smarala Chowk.

### 4.1.7 Learnings and Way Forward

The important learning from the exercise was that, the officials and the team executing the task should be well informed and should know every detail of the design. This helps in easy operation of the same when transferred on ground. For smooth implementation, execution plan should be explained in advance (in detail) to the concerned officials such as LMC officials, traffic police officials before conducting the experiment. A brief shall also be provided to the shopkeepers and media so that the unwanted chaos can be avoided at the run time, and co-operation/ support can be gained.

Resource Planning in terms of human resource and provision of infrastructure is very important before project implementation in order to save time and delay

Engagement of public and people representative at various project stages is also very significant task in order to have successful project implementation.

## 4.2 PARKING OVERVIEW

Parking remains another critical area for Ludhiana. With the increasing number of vehicle population, narrow road network, small old houses in the core areas, absence of parking space within majority of built space, parking blues are on the rise in the city. Absence of public transport higher use of personalized vehicles, rapid growth of intermediate public transport has led to more vehicles using road for the parking. In the absence of clearly demarked space for parking, vehicles remain haphazardly parked on the road berms.

In the city, on street parking lots are found in an unorganized manner in every part of the city. People park their vehicles in haphazard manner according to the availability of space which leads to traffic congestion and encroachment on the city roads. There are no parking charges for unorganized parking in the city area which is one of the main reasons







of unorganized on street parking. The absence of parking signages, lack of enforcement also adds to the confusion and causes congestion.

Parking facility for 2 wheelers is available on major junctions like Samrala chowk, Jalandhar bypass & Gill chowk etc. for daily commuters who come from adjacent areas to Ludhiana and vice versa for their work. Capacities of these parking areas vary according to the size of parking lots. The land owner of the parking lot collects the parking charges from the users charging Rs. 10 per day for two wheelers, Rs. 30 for 4 wheelers and Rs. 300 as monthly parking charges. As of now no official permission is required for opening a private parking lot in the city. However, the parking policy of Punjab 2017, allows the Municipal Corporation to modify development control regulations to limit the number of parking slots (equivalent car space) per 100 sq. meter to be

*Haphazard on road parking in Ludhiana city*

provided in a plot area. Many private parking lots in different parts of the city can be seen due to the absence of administrative organized parking lots in the city area. Figure 25 shows some glimpse of on-road parking in Ludhiana city.

### 4.2.1 Initiative by City Authorities

In order to manage parking in the cities of Punjab, the government has notified the state's first public parking policy for municipal corporation towns of Punjab. Under this policy, a fee would be charged for parking vehicles on streets in residential areas. According to the policy, the Municipal Corporation would subdivide the city into multiple parking zones or parking management areas. Each parking zone would consist of the entire street network, including streets with paid parking, free parking, and no parking, as well as any public off-street parking. But due to some political issues, this parking policy has not been implemented yet.

The overall goal through the parking policy is to ensure a travel demand management tool that should be able to reduce the parking demand as well as the traffic volume and encourage use of sustainable modes of transportation. This will help to bring down pollution, congestion, improve road safety and ensure optimum use of land.

**Table 10: Existing & Identified Paid Parking Sites in Ludhiana City**

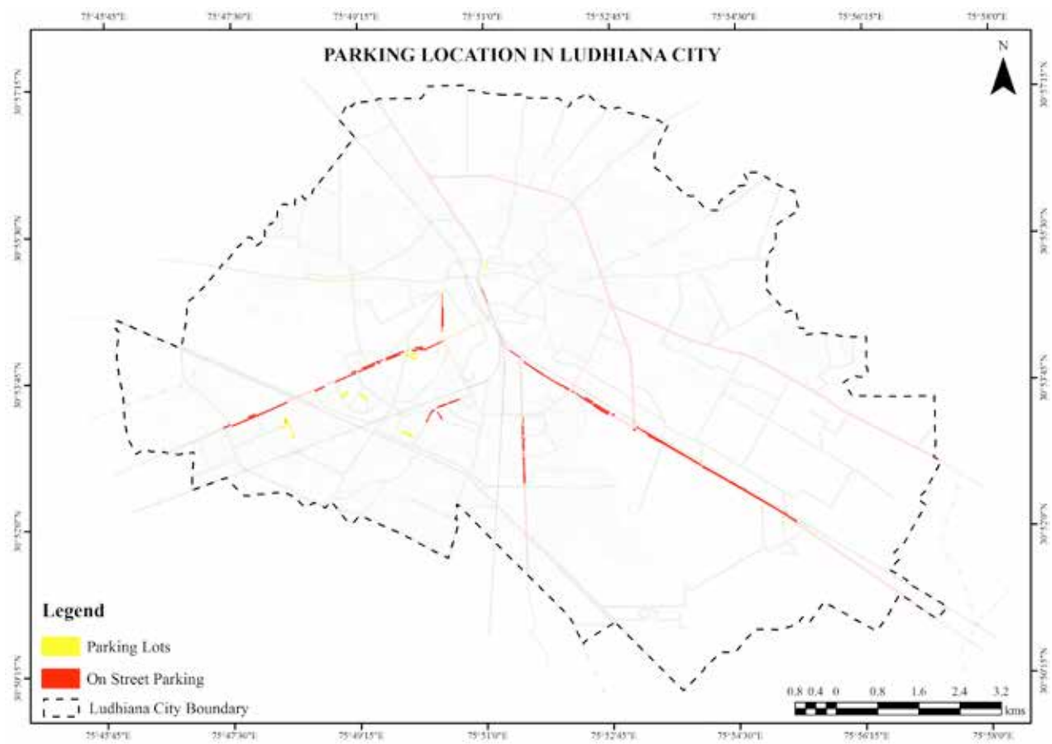
| Sr. No. | Location of Parking |
|---|---|
| 1 | Feroz Gandhi Market |
| 2 | Sarabha nagar, Kipps Market |
| 3 | Model Town Extension Market |
| 4 | Orient Cinema Opp. Police Station, BRS Nagar Market |
| 5 | Bhadud House opp. AC Market and Elevated Bridge from Chand Cinema to Jagraon Bridge |
| 6 | Gill Chowk Opp. Rishi Dhaba |
| 7 | Multilevel Parking Complex |
| 8 | Sidhwan Canal to MC Limit Octri Post |
| 9 | Jagraon Flyover to Sherpur Chowk |
| 10 | Sarabha Nagar, I-Block Market |
| 11 | Mall Road both side (Fountain Chowk to Bharat Nagar Chowk) |
| 12 | Multilevel Parking at Mini Secretariat |
| 13 | Books Market Parking |

*Source: Municipal Corporation Ludhiana*






**Figure 11: Map showing existing parking site in Ludhiana city**




*Parking initiatives. Clockwise from top far left: Feroz Gandhi market parking lot, Off street parking charges rates in kips market, District Administrative MLC Parking and A-zone MLC Parking near Clock tower*

Multi-storied parking lots in Ludhiana are not well maintained and not fully utilized. 4 wheelers are parked on both sides of the entrance of the multi-level parking creating bottlenecks and hindrance in vehicle movement. Dilapidated condition of broken floors and ramps discourage people to use this parking space. Besides, non-functional lifts, neglected fire safety system and poor lighting also need attention at the multi-level parking lots. Shopkeepers use on-street parking instead of multi-level off-street parking available due to poor condition of the parking facilities. The vacant restaurant on top floor of multi-level parking along with the existing toilets are also in poor condition due to lack of maintenance.

Ludhiana city being the largest city of Punjab, has immense potential for revenue generation from on-street as well as off-street parking. In the past, the city took an initiative to address the parking issues by identifying revenue generation through parking policy of Punjab 2017. Since there is a huge potential for Ludhiana Municipal Corporation to generate revenue from parking but the policy has not been implemented due to lack of support from the political representatives and the citizens. Commercial streets with potential of organised and planned on-street parking have been identified in parking management areas and categorised by the city to understand the revenue generation.

The city has also developed a comprehensive mobility plan having proposals for parking facilities in order to cater the parking problem in the city up to the year 2031.

**Table 11: Cost Estimates of Proposed Parking Facilities**

| Sr. No | Parking Facilities | Type | Phasing | Area (Sq. m) | Capacity in ECS | Unit cost (Rs Crore) | Total cost (Rs Crore) |
|---|---|---|---|---|---|---|---|
| 1 | Chaura Bazar Complex (AMP-2200 sqm) | AMP | PH I | 2200 | 500 | 0.05 | 25 |
| 2 | Ghumar Mandi (AMP-3000 sqm) | AMP | PH I | 3000 | 500 | 0.05 | 25 |
| 3 | Near Feroz Gandhi Market (AMP-3300 sqm) | AMP | PH I | 3300 | 1000 | 0.05 | 50 |
| 4 | Near Dayanand Medical College (AMP-2800 sqm) | AMP | PH I | 2800 | 500 | 0.05 | 25 |
| 5 | Model Town (Underground CMP- 2200 sqm) | CMP | PH I | 2200 | 150 | 0.025 | 3.8 |
| 6 | Old Court Complex (CMP-19000 sqm) | CMP | PH I | 19000 | 450 | 0.025 | 11.3 |
| 7 | Dandi Swami Chowk (SP-1000 sqm) | SP | PH I | 1000 | 50 | 0.003 | 0.2 |
| 8 | Near Verka Milk Plant (SP-15000 sqm) | SP | PH I | 15000 | 250 | 0.003 | 0.8 |
| 9 | Near BBMP Power House (SP-5500 sqm) | SP | PH I | 5500 | 200 | 0.003 | 0.6 |
| 10 | Near Samrala Chowk (SP-5200 sqm) | SP | PH I | 5200 | 200 | 0.003 | 0.6 |
| 11 | Near Gill Village (SP-20000 sqm) | SP | PH I | 20000 | 200 | 0.003 | 0.6 |
| 12 | Near Shimla Puri (SP-14000 sqm) | SP | PH I | 14000 | 200 | 0.003 | 0.6 |
| 13 | Near Rahon Road Chungi (SP-6000 sqm) | SP | PH I | 6000 | 200 | 0.003 | 0.6 |
| 14 | Near Guru Vihar on Rahon Road (SP-4800 sqm) | SP | PH I | 4800 | 200 | 0.003 | 0.6 |
| 15 | Near Airport (50000sqm available) | SP | PH II | 50000 | 250 | 0.003 | 0.8 |
| 16 | Near Sherpur Chowk (10000 sqm available) | SP | PH II | 10000 | 200 | 0.003 | 0.6 |
| 17 | Near Budha Nala on Jalandhar Road (32000 sqm available) | SP | PH II | 32000 | 400 | 0.003 | 1.2 |
| 18 | Near Maharaja Ranjeet Singh Memorial on Jalandhar Road (30000 sqm available) | SP | PH II | 30000 | 250 | 0.003 | 0.8 |
| 19 | Near Phillaur on Jalandhar Road (7000 sqm available) | SP | PH II | 7000 | 200 | 0.003 | 0.6 |
| | | | | | | Total (Rs Crore): | 148.4 |

*Source: Comprehensive Mobility Plan Ludhiana 2013*

### 4.2.2 Initiative under Smart City Projects

The city has planned various multi-level parking lots in the city as per the Smart City Proposal. The identified parking areas include Feroze Gandhi market, mechanized parking in books market are some of the projects which have been proposed under the ABD component in Ludhiana.

Under the Smart City Mission, Ludhiana Smart City Limited (LSCL) has also proposed to develop an underground parking near Ghumar Mandi in Ludhiana City. The expected area of the proposed underground parking is from Aarti Chowk to Bhai Wala Chowk along the service lane of Ferozepur Road (refer Figure 31).

### 4.2.3 Need for New Approach

With the phenomenal increase in personalized motor vehicles, one of the major problems confronted by the motorists is the acute shortage of parking space. In the absence of adequate organized parking space, the invaluable road space is being used for vehicular parking. Obviously, the demand for parking has increased in alarming proportion in central business District (CBD) areas and other work/activity centers





**Figure 12: Proposed Underground Parking Location**


**Table 12: Parking Project under Smart City Mission in Ludhiana**

| Sr. No. | Name of Project | Estimated Cost in Crore | Current Status | Way Forward |
|---|---|---|---|---|
| 1 | UG parking at NH-95 | 28.3 | DPR has been approved in CLTC meeting on 22 May 2018. | To forward to Advisor Tech, SLTC and EC for appraisal and approval. |
| 2 | Multi-Level Car Parking (MLCP) at Feroze Gandhi Market | 20.0 | Concept changes suggested by LIT are under preparation. | DPR under preparation. |
| 3 | Smart on street parking (300 bays) | 3.23 | ---------- | ---------- |
| 4 | Mechanized parking at books market | --------- | ---------- | ---------- |

*Source: PMC Smart City Limited Ludhiana*

of the cities. Where car parking spaces are a scarce commodity and owners have not made suitable arrangements for their own parking, ad hoc overspill parking often takes place along sections of road, residential streets, foot paths and green verges of the roads which causes frequent traffic jams. The street spaces are occupied by vehicles for almost 90% of time throughout the day, thus consuming precious street space, but the same land can be put to more efficient and judicious use. It has also been observed that there is lack of institutional arrangement for regulating and enforcing parking management in the city. Ludhiana has also been reported amongst the top most polluting cities in the country, the policy needs to develop strategies to mitigate air pollution.

In order to assist the city in tackling the parking issue, the project team has formulated a comprehensive parking policy as a solution to the

ever-increasing parking problem. This policy helps in controlling and declining the parking demand and provides sustainable mobility solutions to the city. It also talks about the parking management that includes road edge treatment, on-street and off-street parking spaces, various parking price strategies, ITS integration, optimize the use and availability of the existing parking supply and reduce parking demand and improve the efficiency of the existing supply etc. There is also a need of setting up an institutional framework which provides details on responsibilities of each concerned authority and introduction of funding mechanisms to maintain the parking structures. The document prepared by the project team is in line with the provisions of state level policy and the parking study done to estimate revenue generation from parking.

### 4.2.4 Activities suggested/ carried and its Outcomes- Plans, Discussions, Pricing, Policies

Parking management arose out of a concern that parking lots and off-street parking cover a significant proportion of urban areas, particularly high-demand regions such as central business districts. Parking management strategies should promote efficient use of existing parking, such as on street and off-street parking, multi-level car parking, shared parking etc. and improved information on the availability of parking. Parking management techniques are utilized in reforming city ordinances to reduce parking requirements for new development. Most parking management projects utilize a variety of strategies, employing each as needed to best address each unique situation. It is important that the parking strategies are flexible, so that they can be easily adjusted to the changing needs of a community.

An indicative list of new approaches/ strategies for parking improvement is given below

- Develop a fair understanding of parking demand and supply - divide the entire city into three zones i.e. CBD, major corridors and rest of the city. The initial zones should have restrictive parking availability with high pricing while different parking zones should be created for rest of the city.
- Subdivide the city into multiple parking districts - parking districts should be the main unit for administering parking regulations and management. Each parking district should comprise the entire street network - including streets with no parking and paid parking, as well as off-street parking in the vicinity. The management of on-street as well as off-street parking in any particular district should be managed by a single operator.
- Calculate parking demand - parking should be provided separately for different modes and establishments of the particular area mode wise.
- Introduce Parking charges - separately for both on-street and off-street parking spaces, and the parking charges should be reflective of rentals of the zone, parking demand and Equivalent car space (ECS) of the vehicle.
- Encourage private sector's investment - for creating multi story parking structures cost of land, construction of built space, operation and maintenance should be recovered from the users using such facility. The authority shall not give any form of subsidy for development of such parking structures.
- Implementation - successful implementation of parking management system with cooperation between multiple stakeholders (such as urban local bodies, traffic police, planning agencies, operators and others). A Parking Management Committee should be created having experienced professionals, representatives from traffic police, municipal corporations, along with city engineers who are capable of managing and overseeing the complex and highly technical tasks.
- Enforcement - traffic police should declare a "no tolerance zone" for illegal parking on any public place in the project area not designated as parking. Penalising the offender for illegal parking should be adopted while enforcing parking in the city.
- Evaluate - conduct regular surveys to evaluate the satisfaction levels of the customers as well as regulate the parking rates. This will help to understand the public willingness towards a service, thus resulting in creating awareness amongst the users.

*Some of the new approaches/strategies for the parking improvement in the city. Clockwise from top left: Strict enforcement & control, street vending zone, optimum utilization of parking lots, and Parallel parking instead of angular parking*

### 4.2.5 Key Challenges and Broad Level Findings

The city has been facing challenges in implementing the parking policy due to political inferences. The city has also observed violations by contractors who are not managing the parking lots as per the conditions defined in the terms and conditions of the contract. Though the city has identified Feroze Gandhi market parking lot, Mall road parking and Bhadhaur house parking lots which are not being managed properly, but an action is yet to taken against the contractors.

Many objections have been raised by the councilors against the parking policy framed by the state. In response to the objections, it was decided to constitute a committee suggesting changes in 15 days on the parking policy. The above decision was taken in June 2018, but as of now the committee to give suggestions on the parking policy hasn't been formulated by the Mayor, indicating delays due to political inferences.

The project team was suggested to venture more into the activities/ projects which can show impact on the ground instead of policy work. The project team observed the city is more inclined towards junction improvement designs instead of parking policy which is not being implemented in the city.

### 4.2.6 Current Status

Project team has prepared a draft parking policy document for Ludhiana. However, as discussed in the section above the city is more interested in the projects/ activities which show impact on the ground. Moreover, the city has not been able to implement the existing parking policy developed by the state due to lot of political interferences.

The project team still developed a parking policy with respect to Ludhiana based upon the information available from the city. the same has been submitted to the funder (Shakti Sustainable Energy Foundation).

### 4.2.7 Learnings and Way Forward

Successful policy level initiatives need legal backing along with support from all the local stakeholders including the political representatives, local people etc. Many projects get stalled due to limited political support.

Since, parking is a significant source of revenue; the city should take steps to implement the parking policy based upon the strategies discussed in the previous sections. These initiatives will help the city to tackle issues such as congestion and promote public transport instead of personal vehicles in the city.


*Drop off & pick up Near Clock Tower*

## 4.3 INTERMEDIATE PUBLIC TRANSPORT OVERVIEW

Intermediate Public Transport (IPT) refers to the modes that fill the gap between the public and private modes of transport. Unlike Public Transport (PT), Intermediate Public Transport generally does not follow a fixed time or route and is available on hire basis. IPT provides point to point service and some forms also serve as last mile connectivity for PT. Shared IPT services include shared and fixed route services with intermediate stops. These serve relatively shorter trip lengths, and often act as feeder service to PT which caters to relatively longer trips in a city. IPT modes include both motorized (both electric and fossil fuel based) and non- motorized modes. These include auto rickshaw, cycle rickshaws, e-rickshaw, taxis; mini buses, shared cabs, six-seater auto rickshaws (tempos), Jeeps, etc. Contract carriage services which are flexible and demand based also form a apart of Intermediate Public Transport.

**Table 13: Popular Auto Rickshaw Routes (Shared Basis)**

| Sr.No. | ROUTE DETAIL |
|---|---|
| 1 | Railway Station – Jagraon Bridge Chowk – Bharat Nagar Chowk – ISBT |
| 2 | Railway Station – Jagraon Bridge Chowk – Bharat Nagar Chowk – Bhaiwala Chowk – Aarti Chowk – Agar Nagar – Lodhi Club |
| 3 | Railway Station – Jalandhar Bypass Chowk – Basti Chowk – Samrala Chowk |
| 4 | Samrala Chowk – Shingar Cinema – CMC Dental Hospital – Railway Station |
| 5 | ISBT – Dugri Chowk – Gill Chowk – Transport Nagar – Samrala Chowk |
| 6 | Samrala Chowk – Vardhman Textiles – Jain Hospital – Kohara – Nelon pul |
| 7 | Vishwarkarma Chowk – Gill Chowk - ATI Chowk – Sayan Khurd |
| 8 | Railway Station – Jagraon Bridge Chowk – Vishwakarma Chowk – Dholewal Chowk – Sherpur Chowk – Sahnewal Chowk – Doraha |
| 9 | Bhaibala Chowk – Pully Traffic Light Junction – Pakhowal Canal Chowk – Shivpuri |
| 10 | Mullanpur Chowk – Budhel Village |
| 11 | Clock Tower Chowk – Domoriya Pul – Sessions Court Chowk – Rajpura Chowk – Hebbowal Chowk – Pratap College of Engineering–Ghaunspur Village – Hambran |
| 12 | Jalandhar Bypass Chowk – Ladhowal Chowk – Phillaur |
| 13 | Ladhowal Chowk – Manwal Chowle – Noorpur Bet – Ghaunspur Village |
| 14 | Basti Chowk – Sabji Mandi – Fortune TMT – Meharban Chungi |
| 15 | Dugri Chowk – Dugri Canal Chowk – Dugri Village |

*Source: Comprehensive Mobility Plan Ludhiana 2013*





IPT modes may or may not follow a fixed route. They have been popularized and play a vital role in city passenger transport movement. Auto-rickshaws, taxis, and cycle rickshaws are the backbone of passenger movement in Ludhiana. IPT operation is reasonably self-regulated and controlled by operators unions. There has been a gradual increase in the number of IPT vehicles every year. Most of the people use Auto Rickshaws or Cycle Rickshaws depending on the travel distance. There has been a gradual increase in the number of IPT vehicles every year and there are about 30,000 autos[5] in the city. In 2017, total number of registered auto rickshaws in the city were 1056. Increase in the autos is due to the insufficient city bus service as only 75 buses on 5 routes are plying while rest of the area is served by autos only. As per newspapers and the officials, there are more than 15,000 illegal diesel autos on the roads, despite a ban imposed by the Punjab and Haryana High Court on registration of new diesel autos in 2009. The ban was imposed on issuing permits for diesel autos within city limits. Additionally, there are more than 500 E-rickshaws plying on the city road and the number increasing day by day but as of now, the process for registering E-Rickshaws has not been started.

### 4.3.1 Initiative by City Authorities

Diesel auto rickshaws were banned way back in July 2009, after the Punjab and Haryana High court imposed a ban on issuing permit to three-wheelers within the city limit of Ludhiana. Though there is a ban on the entry of diesel auto-rickshaws within the city precincts, most three-wheelers plying on roads in the industrial towns run on fuel, not much preferred by environmentalists. These vehicles cause pollution and emit black smoke. There is no check on the entry of diesel autos despite the ban, which is being flouted with impunity. Auto-rickshaws ply on most city routes. Being ubiquitous, three-wheelers choke roads around railway station and other areas, causing traffic snarls, long jams and causing more pollution due to diesel fumes.

To control the traffic and mitigate pollution in the old city area, traffic police banned entry of autos from

*Flag-off ceremony of e-rickshaw in Ludhiana by DC*

Rikhi cinema to old sabzi mandi chowk. In addition to this, district authority distributed 11 electric rickshaws in 2016 to woman under a district scheme where e-rickshaws were operated by woman for woman in the city. With a capacity of four passengers, the vehicles have been painted pink to make service look like it's especially for woman. The e-rickshaws under the scheme were sponsored by the corporate sector under the corporate social responsibility (CSR) activity. Priced at around Rs1 lakh per unit, five of the E Rickshaws were provided by Hero EcoTech, five by Avon Cycles and by FICCI Ladies Organization.

### 4.3.2 Initiative under smart city project

Ludhiana is amongst the top 10 most polluted cities in India (source-WHO) which is a major health concern for citizens. The impact of the city's proposal to replace polluting vehicles with green options like e-rickshaws is socially and environmentally inclusive creating social awareness through programs, education to citizens, providing immediate improvement in health problems and changing unsustainable patterns of consumption to more equitable resource management.

**Table 14: Smart city proposal for IPT**

| Sr. No. | Name of Project | Estimated Cost (In Rs Cr.) | Current Status | Way Forward |
|---|---|---|---|---|
| 1 | E Rickshaw | 16.5 | Total No. of Rickshaws: 1500. | Decision with LSCL. Concept note to be submitted. |

*Source: Ludhiana smart city Limited*

As per the Smart City proposal of Ludhiana, the city will procure GPS enabled 'Smart' E-Rickshaws which will replace diesel auto rickshaws over the next 5 years. The initiative will reduce pollution, congestion, and improve health and safety situation in the city. Local manufacturing in Ludhiana will also contribute to the auto parts manufacturing industry.

### 4.3.3 Need for new approach

Transport demand in Ludhiana has increased substantially due to increase in population as a result of both natural increase and migration from rural areas and smaller towns. Availability of motorized transport, increase in household income and increase in commercial and industrial activities has further added to it. Unfortunately, a public transport system in Ludhiana has not been able to keep pace with the rapid and substantial increase in travel demand. Qualitatively, the available public transport services are overcrowded particularly during peak hours and involve long waiting periods. As a result, there is a massive shift towards personalized transport, specially cars and two-wheelers and also proliferation of various types of intermediate public transport modes, such as auto-rickshaws and taxis.

The increasing use of private motor vehicles in cities has been rapidly changing their modal-split structure. The city is well known for its diverse industrial base comprising of cycle and auto manufacturing, bicycles and engineering parts, woolens and hosiery, tractors parts manufacturing, machine parts, industrial goods among others. The auto rickshaws in Ludhiana are a major mode of public transport. Most of these autos have 2 and 3 stroke engines, thus contributing to increased air pollution in the city. Ludhiana contributes around 16 percent to Punjab's GDP due to its industrial base but continues to be amongst the top most polluted cities in India. Ludhiana was the 12th most polluted city worldwide and amongst top 6th most polluted cities of India as per WHO reports of 2016. The major factors contributing to the rising levels of pollution are vehicular emissions and extensive Industrial activities. Unclean roads, lack of paved sidewalks and defined green spaces further add to the problem of pollution. As per the WHO report (2016), annual average concentration of the particulate matter PM 2.5, in the city was about 122 microgram per meter which is more than six times above the safety limit of 20 microgram per meter.

The problem of acute road congestion, rising air pollution, and a high level of accident risk faced by city is taking serious dimensions and worsening the people's quality of life. Without vigorous action, this problem would intensify, as rising population over the coming decades and the goal of growing economic prosperity put more pressure on the system. Reducing traffic congestion, vehicular emission, and accident risk requires a comprehensive strategy. The main objective of such strategy should be to provide and promote sustainable high-quality links for people, goods, and services to, from and within the city. Strategy should be designed in such a way that it reduces the need to travel by personalized modes and boosts public transport system and electric vehicles. This requires not only increasingly stringent emissions standards, specifications for clean fuels, proper maintenance of in-use vehicles, optimal pricing of transport services, demand as well as supply side management measures, but also a complete overhaul of eco-mobility system.

### 4.3.4 Activities suggested/ carried and its Outcomes- Plans, Discussions, Pricing, Policies

Detailed primary surveys were conducted to collect information related to operations of the e-rickshaw in the city. Structured observations were also undertaken by taking rides on these modes and conducting focused group discussions with drivers, union heads, and users in order to gather relevant information in each city. Reconnaissance surveys were also conducted to understand the penetration/routes and patterns of operation of these systems. Additionally, consultations were carried out with relevant stakeholders like fleet operators, government officials (traffic police, municipal corporations, etc.), NGO representatives, and academicians.

To procure electric buses (max. 100 per city), electric 4-wheeler passenger cars & electric 3-wheeler for municipal corporation Ludhiana, project team in coordination with the project management consultant for Smart Cities Ludhiana, prepared a proposal for availing incentives under fame India scheme for procuring electric vehicles. Proposal was submitted by the city to the Department of Heavy Industries but Ludhiana was not selected by the central government. The following table shows a snapshot of the proposal submitted by Ludhiana Municipal Corporation.





**Table 15: Funding Pattern for proposed e-vehicles**

| City | Vehicle Type | Details | Units (nos.) | Price (in INR lacs) | Total Price (in INR lacs) | DHI Subsidy (in INR lacs) | Share of State/ULBs |
|---|---|---|---|---|---|---|---|
| Ludhiana | e-Buses | e-Bus | 100 | 160 | 16,000 | 9,600 | 6400 |
| | | Overnight Charger | 100 | 15 | 1,500 | 960 | 1140 |
| | | Intra-day Charger | 20 | 30 | 600 | | |
| | e-Rickshaw | e-Rickshaw | 500 | 0.12 | 600 | 360 | 240 |
| | | Charger | | | | | |
| | | Total | 18,100 | 10,560 | | | |

### 4.3.5 Key Challenges and Broad Level Findings

Due to the absence / inadequacy of reliable / efficient public transportation system, growth of IPT (Cycles and auto Rickshaws) has been increased rapidly in Ludhiana. Though many a times, the traffic police department tries to stream line the movement of the three wheelers but every time there is a huge hue and cry in the city as the three wheeler unions have a strong hold politically.

Lack of awareness is observed amongst the people about the self-employment program of the government through E Rickshaws. As per the program an ainterest subsidy over and above 7% rate of interest is applicable to all SHGs accessing bank loans. Also an additional 3 percent interest subvention has also been provided to all women SHGs who repay their loan in time in all the cities.

As per the Smart City proposal, Ludhiana Municipal Corporation plans to buy E Rickshaws but as of now, the procurement of E Rickshaws has also been kept on hold.

### 4.3.6 Current Status

During the starting phase of the smart city, the city officials were keen to upgrade and enlarge the IPT sector but due to political interventions and lot of administrative changes, the interest of the city has shifted from IPT sector shifted towards the junction improvements.

### 4.3.7 Learnings & way forwarding

The background research and case examples from various cities assisted in developing a sound understanding of the performance of the E-rickshaws considering parameters like mileage, pickup and performance. Ludhiana Municipal Corporation should facilitate shift towards e-rickshaw by putting supporting infrastructure in place. Specifications of e-rickshaws and operation guidelines should be decided keeping in mind road safety measures and passenger comfort.

# 5 SECTOR SPECIFIC ANTICIPATED IMPACTS AND OUTCOMES

## 5.1 SECTOR OVERVIEW

As a part of hand holding support under smart city program, the project team worked in consultation with the Municipal Corporation, SPV Smart Cities and the PMC for Smart Cities Ludhiana to showcase the impact of sustainable mobility interventions. PMC consultants assisted in conducting the TSS and are now assisting in preparing the cost estimates for Mata Rani Junction. City associate was stationed within Ludhiana Municipal Corporation to provide the local support in conducting various traffic surveys, for initiating involvement of other stakeholders in ongoing projects and assisting in managing and conducting junction trails

Project team assisted the city in the following tasks

- Development of draft Parking Policy
- Scoping study on E-rickshaws in the city.
- Assisting in Non-Motorized Transport (NMT) with focus on junction improvement of Mata Rani Chowk & Samrala Chowk
- Assistance in developing a proposal for FAME scheme in order to deploy electric vehicles in the city.

Apart from providing the support in various ongoing smart city proposals, project team also assisted Ludhiana Municipal Corporation in various mobility initiatives in the city.

## 5.2 ANTICIPATED IMPACT AND OUTCOMES (IN CASE IT WOULD HAPPEN)

As discussed in the previous chapter Ludhiana has shown more interest on projects which show impact on ground rather than policy initiatives. Therefore, it plans to float the tender for Mata Rani Chowk after the cost estimates are finalized by the PMC.

The city has also encouraged the project team to discuss the possibilities with NHAI of proposing a slip road in order to tackle traffic situations at Samrala Chowk. The project team is working on the same.

## 5.3 WAY FORWARD

Since the support to Ludhiana Municipal Corporation under the grant has come to an end after the successful completion of the project. It is expected that the city along with the Smart Cities team would continue to work on the remaining junctions which need immediate interventions along with other sub sectors such as parking, IPT and public transport based upon the learnings gained during the project duration.





# 6 OVERALL LEARNINGS FROM THE CURRENT ENGAGEMENT

With the ongoing engagement in Ludhiana, the project team has been able to clearly understand the mobility component with support from the city officials. Based upon the experiences and the field work in the city, the project team has compiled the following learnings and key take aways from the study.

Information transfer to the execution team is important for the successful implementation of the project. Throughout the engagement duration, the project team realized that it is very important to discuss the project in detail with the city officials and the implementing teams before starting project implementation. Ex- The success of junction trails at Mata Rani Chowk and Samrala Chowk is attributed to the above reason. The project team discussed the detailed drawings with the Additional Commissioner Ludhiana Municipal Corporation, officials from Traffic Police and incorporated their suggestions before implementing the junction trail on ground.

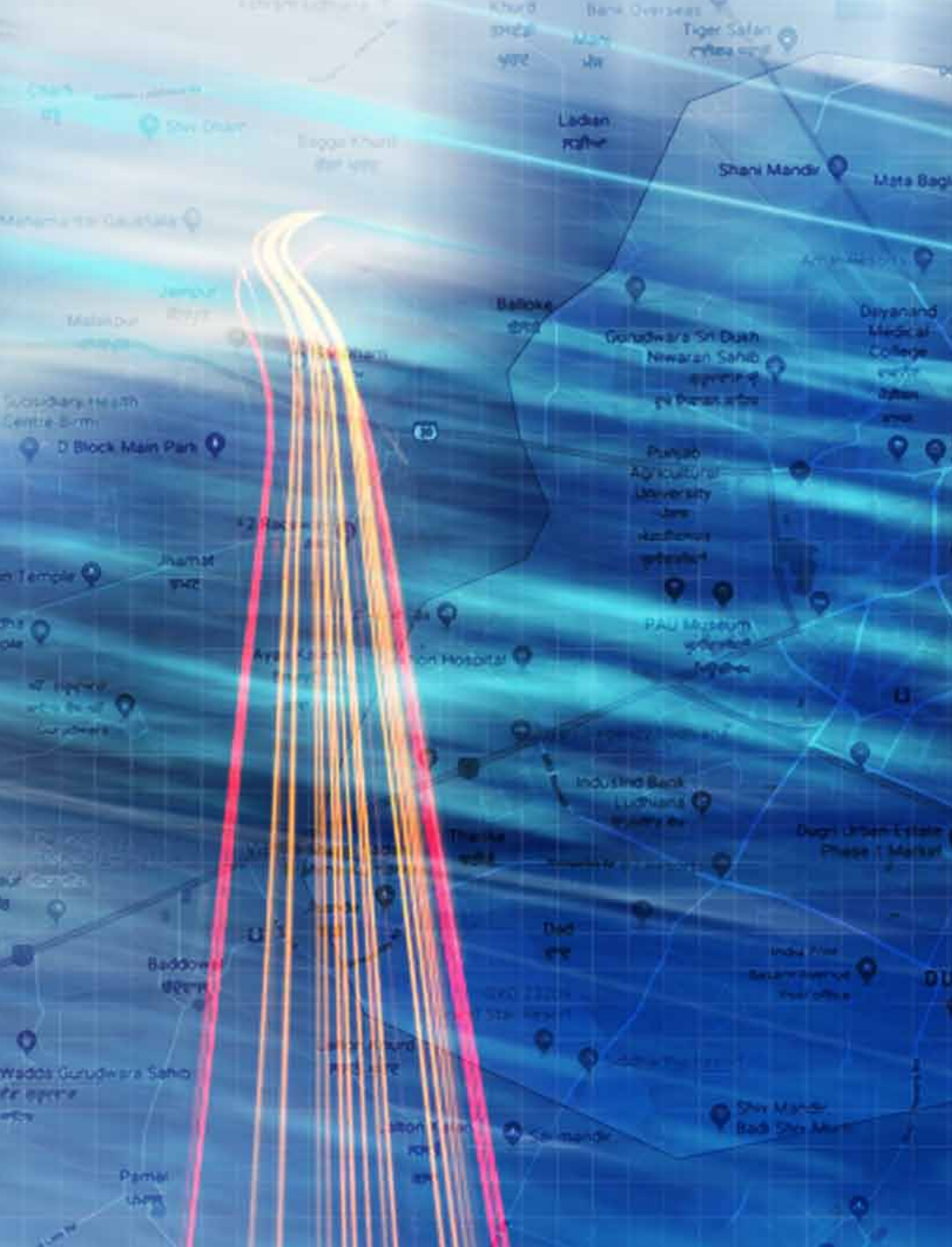
Information briefs should be shared with the residents- While implementing the projects on ground, the project team realized the importance of developing and sharing information briefs with the residents/ shopkeepers of the area before implementing the junction trail. Such initiatives help to gain confidence and save time while executing the project as most of the stakeholders are themselves ready to contribute in project implementation.

Citizen engagement at all levels is important in order to keep the citizens informed about the future and ongoing initiatives of the government in their city. Political leaders play a vital role in realizing the success of the project as they have a major influence on the residents of their area/ ward. Under the Smart City mandate, Ludhiana has constituted a City Level Advisory Forum to seek opinion from the citizens, but it is observed that the forum is not active thus the purpose of citizen engagement gets defeated.

Handholding and Capacity Building of the city staff- It is observed that due to limited staff in the Municipal Corporations; there is a strong need to develop the in house capacity of the existing resources, Such initiatives are beneficial for the project as well as the team or to the persons receiving training, but the city also gets benefitted as the local staff becomes equipped to initiate, plan and execute similar exercise, activity and/ or project without waiting for any external support.

# ENDNOTE

1 CDP & Master Plan, Ludhiana
2 CDP Ludhiana
3 Master Plan Ludhiana
4 Draft Smart City Proposal Ludhiana 2015
5 Comprehensive Mobility Plan Ludhiana 2013


Ladian
Shani Mandir
Gurudwara Sri Dukh
Niwaran Sahib
Punjab
Agricultural
University
PAU Museum
Industrial Back
Ludhiana
Shiv Mandir
Bada Shiv Mandir