SUPPORTING SUSTAINABLE MOBILITY
UNDER SMART CITY MISSION

CITY REPORT: UDAIPUR

ICLEI Local Governments for Sustainability

SHAKTI SUSTAINABLE ENERGY FOUNDATION

CITY REPORT:
UDAIPUR

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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 & 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 government's with regard to mobility and built environment. I would also wish to thank the mobility & built environment sector experts, government officials, members of Smart City Special Purpose Vehicles, municipal staff of the project cities for their continuous support provided towards completion of this report.

Warm regards,

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

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ACKNOWLEDGEMENT

At the beginning, ICLEI- Local Government for Sustainability- South Asia would like to thank 'Shakti Sustainable Energy Foundation (SSEF)' for giving us this opportunity to provide handholding support to the city of Udaipur (Rajasthan) 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) focuses 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 Udaipur Smart City Limited (SPV), Udaipur 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 Udaipur 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 second phase of handholding support in Udaipur began from February 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

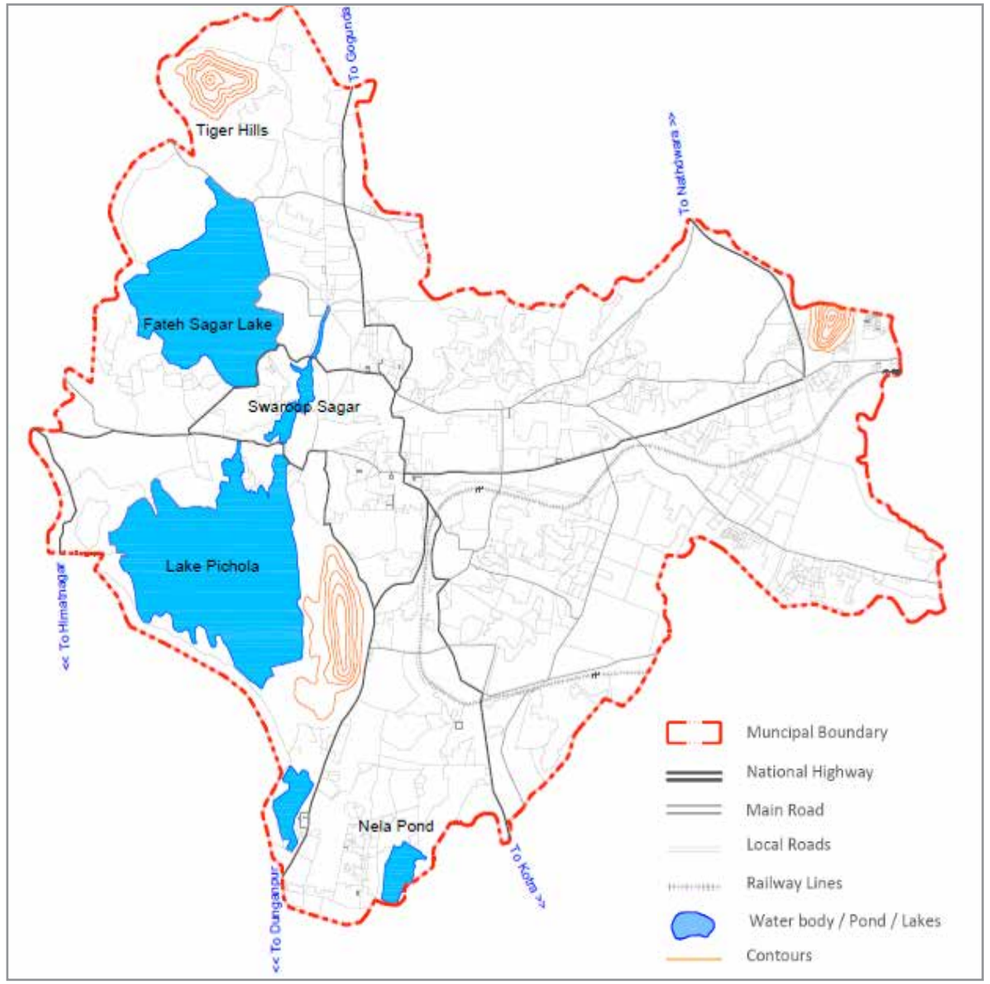
Considered as one of the oldest cities in India and famous nationally and internationally as City of Lakes, foundation of the present day Udaipur, also the capital city of Mewar kingdom, was laid in 1559 by Maharaja Udai Singh. The city continued to be the capital of Mewar till it became a princely state of British India in 1818. Udaipur was constituted as a municipality in 1922 by the Mewar dynasty. In April 2013, it got the status of Municipal Corporation.

With an area of 64 Sq km (city area has increased from 37 Sq km in 2001 to 64 Sq km in 2013), Udaipur is the administrative capital of district and is the only municipal corporation in the district. (Figure 1) The city is divided into 55 election and revenue wards.

Udaipur is surrounded by hills and lakes, and is presently growing towards the north-east and west along the National Highways NH8 and NH76.

The city has witnessed multi-fold development

Figure 1: Municipal Area, Udaipur



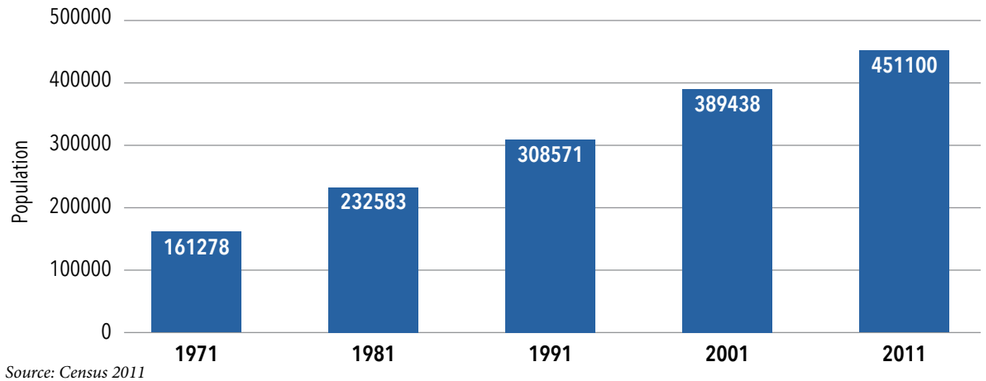
in the last two decades. It acts as an industrial, administrative, and educational center of the region. The city's connectivity and historic significance play a major role in making it an important and famous city of the region, and draws more than a million tourists annually.

2.1 POPULATION AND DECADAL GROWTH RATE

As per the Census of India, the population of Udaipur in 2011 was 4.51 lakhs, and it is the 6th largest city among cities having more than 1 lakh population in the state (Figure 2). The Municipal Corporation population accounts for 2.65% of the urban population of the state and 74.14% of the urban population of the district[1].

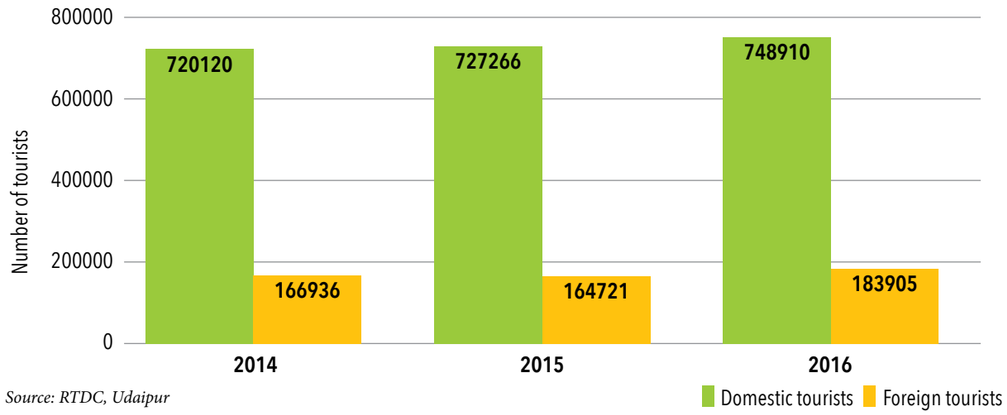
The city has witnessed considerable population growth in the last four decades while acting as a magnet city for the surrounding region. The growing

Figure 2: Population Growth Trend- Udaipur



Source: Census 2011

Figure 3: Number of Tourists in Udaipur on yearly basis, Domestic & International



Source: RTDC, Udaipur

economy and growing tourism sector have attracted both urban as well as rural populace. The decadal growth rate from 2001 to 2011 was 15.83% which is near to natural growth rate of population. Areas outside the core city started developing during the last few years.

As stated above, being a tourist city and famous internationally as one of the most beautiful city in the world, it attracts more than a million tourists annually from across the globe (Figure 3). Tourism sector is the largest contributor to Udaipur's economy. Foreign tourists comprise around 22-24%, while domestic tourists comprises 76–78%[2]. The tourist population has remained in the range of 7 to 7.5 lakh tourists from last 4- 5 years.

2.2 POPULATION DENSITY

Population density within the city has decreased from 10525 persons per sq km (2001) to 7048 persons per sq km (2011), due to increase of total municipal area and inclusion of new census town to the total city area.

Table 1: Population Density, Udaipur

Years	Population	Area (Sq km)	Population Density (person per Sq km)
2001	389438	37	10525
2011	451100	64	7048

Source: Census 2011

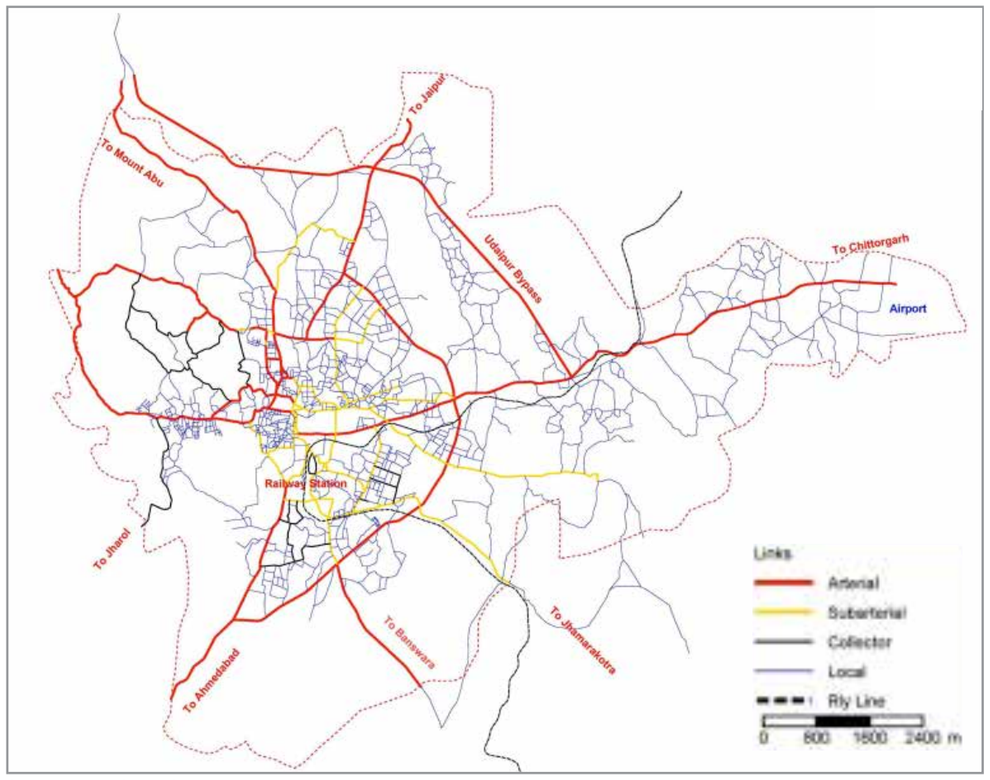
3 TRAFFIC AND TRANSPORT PROFILE

Major modes of transportation in Udaipur include shared auto taxi, mini buses operated by private operators, auto rickshaws, private cars and 2-wheelers. The section below provides the details of the traffic and transport profile of the city.

3.1 ROAD NETWORK

Udaipur has 11 arterial roads and 26 sub-arterial roads, connecting the major residential areas to other areas of the city.

Figure 4: Road Network, Udaipur

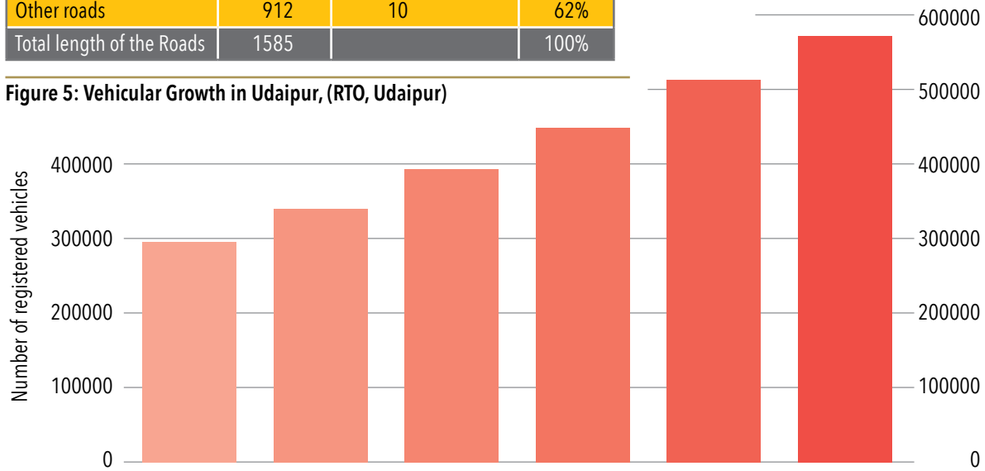


Source: Interim CDP, Udaipur 2014

Table 2 Road Length and RoW, Udaipur

Road category	Length (KM)	Width of the Road (M)	% to total
Arterial Roads (NH, SH)	85	30 to 50	4%
Sub Arterial Roads	223	20 to 30	16%
Collector roads	365	15	18%
Other roads	912	10	62%
Total length of the Roads	1585		100%

Figure 5: Vehicular Growth in Udaipur, (RTO, Udaipur)



Source: RTO, Udaipur

Major roads in the city include Hathipole, Surajpole, Delhi Gate Chauraha, Udaipole Chauraha, and Chetak Circle. Most of these roads cater intra and inter city traffic and have high vehicular movement. About 5% of road length has over 35 M right of way (RoW), 14% has RoW of 20 M to 30 M, 56% has RoW between 10 M to 20 M and rest 23% roads have RoW below 10 M.

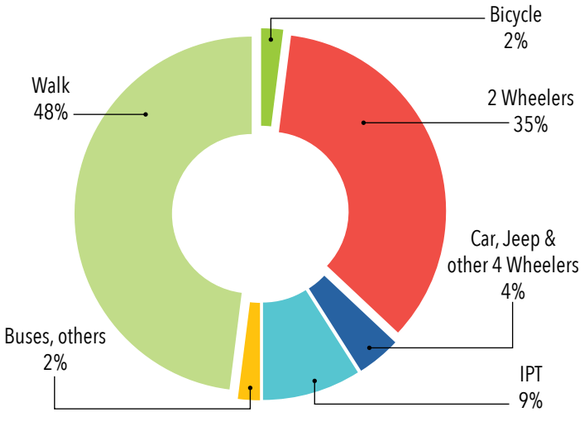
3.2 VEHICULAR GROWTH

Number of registered vehicles in Udaipur have increased from 2,90,567 in 2001- 11 to 5,71,350 in 2015-16, i.e. an average growth rate of 7% per year[3], which is lesser than country's vehicular growth rate. Among these, 2 wheelers constitute about 78% of total registered vehicles. Cars constitute 9% while buses constitute only 1% of the total registered vehicles[4]

3.3 MODAL SPLIT

In the absence of organized and robust public transport (PT) system in Udaipur coupled with consumers purchasing power and accessibility to easy loans and innovative financing scheme (including loans at 0% interest rate), intermediate public transport (IPT), mainly shared autos and privatized modes (cars and two wheelers) plays an important role in city transport scenario. IPT in the city operates as an informal transport system for the public without standard frequencies and adds to higher emission level in longer terms[5].

Figure 6: Trips by Modes



The share of trips in favour of PT is as low as 2%, while walking and non- motorized trips (NMT) are observed at 50%, however significant improvements in NMT infrastructure facilities are required for Udaipur to improve the mode shares of walk and cycle.

3.4 PUBLIC TRANSPORT (PT)

The present PT system in Udaipur includes a limited supply of city bus services with only 13 buses plying on 5 different routes in the city. Presently the system is managed by private contractors under the contract signed between Udaipur Municipal Corporation (UMC) and Contractors.

Out of these 13 buses, 8 are owned by UMC and operated by contractor and 5 are privately owned and operated. Both the contractors have 3 year contract with UMC and are in their final year of operations of the current contract. The minimum and maximum fare on all the routes ranges from Rs. 5 to Rs. 20 respectively[6]

However, in order to improve the PT coverage in the city and to move towards more sustainable modes of transport, city is planning to add a fleet of another 35 buses in its existing inventory under the smart city proposals via PPP. Udaipur City Transport Services Limited (UCTSL), a SPV formed under Companies Act 1956, will be responsible for managing the operations of city bus services in the city. The city plans to run these buses along the major routes, connecting residential neighbourhoods, educational institutes, hospitals dense commercial areas and major market areas in Udaipur.

3.5 INTERMEDIATE PUBLIC TRANSPORT (IPT)

The absence of a robust public transport system in the city has paved the way for conventional fossil fuels based IPT system in the city in the form of smaller and bigger autos and tempos. At present 6,313 auto rickshaws operate in Udaipur city on an area-permit basis and another 2,637 tempos operate on 27 designated routes.[7]

Currently, the IPT system in Udaipur is not organized properly and is also major source of emissions, as these vehicles are old (40% of the overall IPT fleet is more than 10 years old) and do not comply with the current emission norms.

In order to reduce the pollution levels of the city

Current City Bus Service in Udaipur

Top: Shared Autos serving as IPT in the city
Right: 2.5 km Dedicated Bicycle Track at Rani Road

and to improve the mobility needs of the city and also to introduce e- mobility in the city, Udaipur Municipal Corporation has unveiled the operations of e- rickshaws in its smart city projects and also with support from ICLEI- SA under their SDC funded CapaCITIES Project. However, the e- rickshaw operations are still at nascent stage need more efforts in terms of better planning to scale up the E Rickshaw initiative in Udaipur.

3.6 PEDESTRIAN AND NON-MOTORIZED TRANSPORT (NMT INFRASTRUCTURE)

The city has high volume of pedestrian movement; however, only 4% of the road network has footpaths, while 96% is devoid of the same[8]. Majority of footpaths have width less than 1.5 m, making it inconvenient to walk.

Udaipur also has 2.5 km of dedicated bicycle track at Rani Road, but it is devoid of bicycle-friendly facilities such as dedicated cycle tracks or other allied infrastructure in other parts of the city for encouraging environment-friendly NMT movements.

However, in order to improve its pedestrian and

NMT infrastructure, UMC in recent past has taken various initiatives. Pilot implementation of "No Vehicular Zone" or "Pedestrianization Plan in Walled City", conceptualized by ICLEI- SA was one such initiative, aimed at reducing traffic congestion and vehicular emission from the walled city. Floating of Public Bicycle Sharing (PBS) tender to introduce bicycle sharing system in the city is another way of encouraging environment-friendly NMT movements in the city.

3.7 PARKING FACILITIES

The existing parking system of Udaipur is decentralized, unmanaged and largely dysfunctional. A large number of small parking lots dominate the parking scenario in the city. Many of these facilities are generally poorly maintained and lack basic infrastructure.

The current practice of providing and managing parking as well as creating parking infrastructure in Udaipur lies with UMC as well as Urban Improvement Trust (UIT), and traffic police is responsible for enforcing it. On- street parking in Udaipur is free on almost all the major corridors in the city and only few parking lots in and around the walled city are paid parking lots.

The fact that parking is free on majority of the roads as well as in areas within the walled city, most of the parking demand is artificial, as majority of the on- street parking spaces are occupied by the shop and establishment owners and their staff, with very low turnaround time, thus leaving no space for their customers, which ultimately forces them to park their vehicles on the carriageway, effectively reducing the overall traffic carrying capacity of roads. On-street parking exists along 33% of the road network.

In order to improve the parking situation in the city, UMC in past had taken various initiatives to curb parking problems in the city and also to effectively manage the parking needs. Among the many initiatives by city authorities, few initiatives were effective in fulfilling the objective of curbing the parking woes and providing the safe parking infrastructure.

However, to develop long-term solutions for parking management, it is essential to manage parking demand, as uncontrolled parking supply leads to postponement of current saturation, and always create alarming situation for future.

3.8 SECTOR SPECIFIC FOCUS UNDER SMART CITY PROJECTS

Table 3 Sector Specific Listing of Projects under SCP

Sector	Issues	Proposed Intervention under Smart City Projects (SCP)
Public Transport	Due to the lack of the organized public transport, the current share of public transport is only 2%, resulting in a dependency on other private and IPT modes.	Modernization of existing City Bus Service by introducing comfortable GPS enabled semi-low floor buses as per UBS II, integrated with Command & Control Centre for overall controlling & monitoring Development of Smart Bus Queue Shelters (BQS) on PPP basis relaying real time information on buses through GPS enabled devices. ETM and Smart Card Readers on buses
Intermediate Public Transport	Most of the shared autos do not meet the desirable emission norms and constitute outdated technology. Though shared autos have designated routes of operation, they do not operate on the same designated routes and create a chaotic scenario, which is visible in almost every part of the city.	Modernized IPT system that would cater to last mile connectivity needs through introduction of GPS enabled BS III/ BS IV three/ four wheelers that enable better control & monitoring and real time information dissemination. This also includes CNG/ battery operated shared vehicles (e- rickshaws) in walled city on pre- defined routes.
Pedestrian and Non- Motorized Transport	Udaipur as a city has. significant mode share of walking and cycling (~50%) and has high pedestrian movement in most parts of the city. However, the city lacks in terms of pedestrian and bicycle friendly facilities such as footpaths and dedicated cycle tracks (only 4% of the road network has footpaths, while 96% is devoid of the same)	Decongestion through pedestrianization and also by introducing Public Bicycle Sharing (PBS) System;
	Lack in NMT infrastructure that would otherwise encourage the environment for the NMT movements as well as ensure the safety of the people.	Change in road cross- sections to introduce/ include wide pedestrian walkways, bicycle tracks.
Parking	The existing parking system of the city is decentralized, unmanaged and largely dysfunctional. Large numbers of small parking lots dominate the scenario. The carriageway widths in major markets are further reduced due to the haphazard on-road parking across various stretches in the city resulting in reduction of the overall traffic carrying capacity of roads.	Development of off- street parking lots including MLCP. Smart Parking Management System with VMS display for efficient utilization of parking space, smart metering for smart management of parking demand
Traffic Management and Junction Geometry Improvement		Place making of various squares and plazas in the area. This also includes necessary junction geometry improvements, as most of the pols are part of the junctions or are adjacent to them. Comprehensive study for improvement of the public spaces and tourist spots within the old city by reorganizing the areas around historic city gates or pols, temples, chowks and open spaces that have become encroached by parking, utilities, street vendors, etc. through various urban design, landscaping and traffic circulation treatments.

4 SECTOR SPECIFIC PROJECTS/ PLANS/ PROPOSALS AS A PART OF HAND-HOLDING SUPPORT TO UDAIPUR

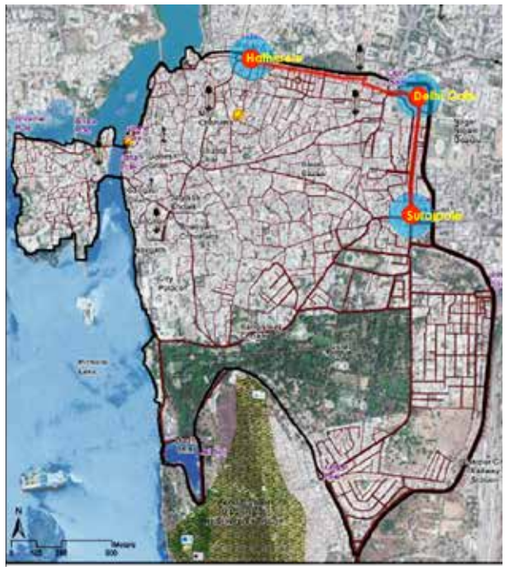
4.1 OVERVIEW: INTERSECTION IMPROVEMENT IN UDAIPUR- A DEMONSTRATION OF PASSIVE JUNCTION DESIGN SOLUTIONS

The walled city of Udaipur forms the core of the city and is accessed through ten traditional gates known as 'pols', which today are, amongst busiest street junctions. Peripheral wall connecting the pols serves as major commercial streets, especially towards the eastern side. These junctions and streets were functional without hassle when the city had a very few number of motor vehicles. But with times, these junctions witnessed considerable traffic demand resulting in long queues and traffic jams, especially during peak hours. As these junctions mark an outer edge between the pedestrian oriented street system of old city and automobile oriented street network of new development, it has become a challenge for the city authorities to manage and maintain the effective geometry for conflict free mobility by all modes.

These Junctions are also affected by on- street parking, high vending activities which include waiting by shared auto rickshaws, hence effectively reducing the carriageway space for clear movement. To improve the mobility and accessibility to walled city area, city authorities in Udaipur seeked assistance from ICLEI- SA to resolve traffic issues at three walled city peripheral junctions- Surajpole, Hathipole and Delhi Gate, along with the streets connecting them. This was done in the, form of on- site demonstration via pilot exercise to test the feasibility of the proposed design solution.

It was also envisaged that based on the success of the proposed design solutions and pilot implementation, other junctions will also be taken up for geometry improvements.

Figure 7: Junctions selected for Redevelopment and Pilot Implementation in First Phase



Need for New Approach

The junctions selected for redevelopment in Udaipur are similar in character, typology and nature. This is because each junction encloses a heritage structure, which is an important activity node and has similar physical as mobility issues. The observed issues on the identified junctions were mainly congestion, interlocking (of traffic) at junctions, on- street parking, scattered informal kiosks and encroachment. It has been seen through observations and data analysis, that these issues are a result of undefined RoW for usage by different modes and functions (vehicular movement, pedestrian movement, etc.). Additionally, it was also observed that traffic 'congestion' at these junctions is not a result of capacity constraint but caused by friction between motor vehicles and slow moving traffic as well static activities such as street vending, all of which share the limited RoW.

To address these problems, project team ICLEI SA suggested developing solutions based on segregating slow moving traffic as well other activities from motorized RoW at the junction. This approach required appropriate geometric design of the junction and the public domain around it based upon the actual traffic demand and existing constraints.

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

Subsequent to the above, and based on the initial meetings, discussions with UMC and Traffic Police officials, the project team ICLEI SA, along with UMC officials conducted multiple site visits to understand the road and junction characteristics, existing traffic situation for activity mapping in and around the junctions, pressure points etc. The project team then documented the major issues and derived key design principles to be used to conceptualize the junction improvement plan. The design principles were derived taking cue from set standards, guidelines and norms like Indian Road Congress (IRC), NCHRP Report 572- Roundabouts in the US, Design of Urban Roads: Code of Practice Part- 1 & Part- 2 – Cross sections, MoUD, etc.

Few of the highlights of the proposed and agreed design principles are- a) Integrated barrier free infrastructure (mandated by disability act of 1995); b) Organized Traffic circulation, through improved geometric design in order to improve junction efficiency, thus minimizing congestion; c) Equity in road space allocation, ensure designed space is integrated for activities such as vending and IPT parking; d) Pedestrian Friendly environment and Integrated bicycle friendly infrastructure to support captive use and bicycle sharing efforts; e) Generation of "city space" treatment through landscaping, lighting, street furniture and signage; f) Enhancement of heritage appeal and attractiveness through better experience, connectivity and access; g) Improve safety and security through active and passive means such as traffic calming (speed control) and better lighting etc.

Based on findings of surveys and site visits, roundabouts were suggested at these intersections and were conceptualized accordingly. The proposed design along with data findings were then presented to city authorities for their consent and approval in a city level workshop organized on 31st May 2016. The workshop included decision-making stakeholders such as key officials from the UMC, Traffic Police, Mayor, Collector and representatives from UIT and PMC for Smart City etc. During this workshop it was decided that Surajpole Junction would be taken up for pilot implementation. After the approval from the city, implementation plans were drafted for on- site demonstration using temporary barricading's and other temporary arrangements. The design proposal of Surajpole Junction is given below.

Figure 8: Design Proposal for Surajpole Junction

Pilot Implementation of Junction Imporvemnt Plan at Surajpole Jn- Day 1- 22nd June 2016

❑ **On-Site Pilot Implementation of 'Proposed Design of Surajpole Junction'**

The pilot implementation at Surajpole Junction was initiated on 22nd June 2016 after setting up necessary infrastructure such as barricades, informatory signages etc. Traffic personnels along with home guards were deputed on the site for managing the traffic at the Junction.

Surajpole junction is running successfully for more than 2 years now and has been appreciated and accepted by city authorities, other stakeholders and most importantly by its users, i.e. motorists and pedestrians and has developed an insight for sense of traffic improvement ideology.

After the successful implementation at Surajpole Junction, similar exercises were carried out at Delhi Gate Junction and Hathipole Junction in October 2016, and at Kumharo Ka Bhatta in November 2018.


स्मार्ट सिटी में ट्रैफिक इंप्रूवमेंट प्लान में सामने आई रिपोर्ट

ऑटो और वेंडर व्यवस्थित हों तो चौराहों पर सिग्नल और पुलिसकर्मी की जरुरत ही नहीं


बदला-बदला सा दिखा सूरजपोल चौराहा


सूरजपोल पर अब बिना रुके चौराहा पार

Broad Level Findings, Key Challenges and Learnings

Currently, urban mobility has become a topic of discussion for city officials, as well as citizens, and the same has been endorsed by not only the UMC and UIT but Traffic Police as well as local media has extended support to the initiative.

While steering the experiment, the importance of conducting Total Station Survey before going for any design intervention solution was realized, as it gives an insight into the actual situation on ground. Also, the infrastructure requirements need a thorough check before , conducting the experiment; else inadequate infrastructure provisions might lead to failure at the time of executing the design on ground.

Another important learning from the exercise was that the officials and the team executing the task need to be well informed and should know the proposed design in detail, as it helps in easy operation of the same when transferred on ground. Media and residents shall also need to be made aware of the planned activities beforehand so as to avoid unwanted chaos and achieve support and cooperation at the time of implementation.

Current Status and Way Forward

Currently, UMC/ USCL under their smart city projects is looking forward to scientific redesigning of important junctions across city and has continuously sent requests to the project team ICLEI SA The project team has assisted the city with the design proposal for more than 10 junction improvement design and continues to do the same till the engagement period.

In the meanwhile, an agency has also been finalized and awarded LOA for executing the design for Surajpole Junction on ground. The work is expected to start soon and the project team is in continuous touch with UMC, PMC for Smart City and implementing agency for smooth implementation of proposed design at Surajpole.

As a part of this project, it is also envisaged to support capacity building of UMC and PMC for Smart City engineers and planners. This shall include knowledge sharing and hand holding support during planning, experimentation and implementation process for re-development of junctions.

Media Coverage of Pilot Implementation of Surajpole Jn Improvement Plan

Summary

Table 4: Engagement activity and learning under Junction Improvement in Udaipur

SCP Component	Reduce congestion through improved traffic flow			Listing in SCP	ABD - Intelligent Traffic Management		
Handholding Project	Junction Improvement and Traffic Management			Components	Junction design, survey and feasibility analysis		
Project Brief	Development of conceptual design of major city junctions providing access to ABD area and other important junctions. It includes activity survey mapping for all junctions and geometric design proposals.						
Locations	Surajpole	Delhi Gate	Hathipole	Kumaharo Ka Bhatta	Duration	Start: March 2016	End: On-going
	Court Chauraha	Shastri Circle	Sevashrm	Thokar Chauraha			
Key Activities	• On- site visual surveys, traffic volume counts, directional survey along with activity mapping of in and around the junctions; • Design Interventions based on the survey results and analysis including designated vending zones, parking and pedestrian walkways, signages, circulation; traffic calming measures etc. • Meetings, discussions, deliberations with key stakeholders on the proposed design; • Also includes feasibility analysis of the proposed flyover at one of the junction; • On- site demonstrations in the form of pilot implementation of the proposed design at few locations; • Support to PMC for USCL on 'as and when basis' on the proposed design						
Learnings	• Pilot project implementation provided flexibility to make improvements; • Temporary test structures gained confidence and sense of ownership amongst the Municipal corporation and the citizens; • The holistic design solution for the junction helped to provide better understanding on sustainable mobility solutions to city stakeholders						

Note: Please refer 'Intersection Improvement in Udaipur- A Demonstration of Passive Junction Design Solutions' for more details.

4.2 PARKING OVERVIEW

The existing parking system of Udaipur is decentralized, unmanaged and largely dysfunctional with large number of small parking lots dominating the scenario. The city also lacks an efficient public transport system, and hence relies on private vehicles for movement. With time, there has been a marked increase in four-wheelers and two-wheelers, which are mobile only for an average of 45 minutes and are parked for the rest of the day. Ratio of vehicles to citizens is increasing at a rapid pace, where 0.53 was observed in 2011[9].

Parking survey conducted at few of the prominent bazaar road stretches revealed that 40-50% of Right of Way (RoW) is occupied by on- street parking at any given point of time. City currently has not enforced any 'no parking zones' or 'no vehicular zones[10] (other than 1 or 2 pilot corridors)' and the whole city looks like a big parking lot during the working hours. The unorganized and undesignated hawkers and vendors on the already choked space add to the already congested right of way, creating severe parking and traffic problems. Due to increasing parking demand, and in the absence of any pricing policy, regulation and/ or enforcement and limited parking supply, there is a continuous spillover of vehicles onto the main carriageway, leading to traffic congestion throughout the day.

The current practice of providing and managing parking as well as creating parking infrastructure in Udaipur lies with UMC and UIT, while traffic police

Unorganized and Haphazard Road Side Parking, Delhi Gate

is responsible for enforcing it. Currently, there are no parking lots with UIT though they are developing one parking lot now and plan to create more in near future to monetize the currently under-utilized land parcel at strategic locations. All the currently operational paid parking lots in the city are under UMC and are given on two year renewable contract and mainly cater to four-wheeler and two- wheeler parking. Even though the parking is priced, it is very nominal and the rates are fixed by the revenue committee of UMC, which are applicable for that particular contract duration with the yearly increase of 10%. The parking revenue is collected manually by parking warden at site and is automated only at newly constructed parking at Hathiwala U/G Parking at Town Hall.

Few of the major roads with high parking demand are Bapu Bazaar, Town Hall Road, Hathipole Road, Ashiwni Bazaar, Ashok Nagar Main Road, Durga Nursery Road, Savina Krishi Mandi Road, Hiran Magri Main Road, areas near Central Bus Stand at Udaipole, Syphon- Bedla Road, MB College Road, University Road, 100'ft Sobhagpura Road. Certain pockets within the walled city and neighbourhood in and around Hiran Magri also cater to high parking demand throughout the day.

As is the case in most Indian cities the traditional approach of providing options like flyovers, road expansion; multi-level mechanized car parks, and more, were being considered to address the increasing parking demand in Udaipur to accommodate private vehicles. However, to develop long- term solutions for parking management, it is essential to manage parking demand, as uncontrolled parking supply will lead to postponement of current saturation, and always create alarming situation for the future.

It is in this context that a joint decision was made by city authorities who seeked assistance from ICLEI SA to assist them in improving the parking situation within the city. City authorities in Udaipur intend to initiate the street improvements that spawn safer streets for its users.

To deal with the issue of choked streets, junctions and informal activities across the city, the project team from ICLEI SA recommended to develop a city focused parking management strategy based on a detailed study and analysis of selected stretches in the city.

Initiative by City Authorities/ under Smart City Projects

Development of open as well as Multi Level Car Parking (MLCPs) spaces under smart city projects as well across strategic locations are amongst some of the initiatives undertaken by UMC and UIT to decongest city roads of parked vehicles, and curbing parking issues upto certain extent.

Currently there are 13 paid on- street and off-street parking lots in the city and majority of them are

situated in and around the walled city for the reason that walled city cater to both locals as well tourists due to presence of prominent markets and bazaars and also due to presence of important tourist destination within it.

Multistoried parking facility at Aasind ki Haveli and parking at Hemaraj Akahara are some of the recent initiatives of UMC within the walled city, mainly aimed at catering to the tourists parking needs. Recently built underground parking at Town Hall by UMC by the means of an MoU signed between UMC and Road Infrastructure Development Company of Rajasthan Ltd. (RIDCOR) with total parking capacity for 450 two wheelers and 150 four wheelers is mainly aimed at reducing parking pressure from Bapu Bazaar (prominent bazar street) and Town Hall Road. Currently the underground parking lot is operating at 30% occupancy of its total capacity. UMC also owns an off- street parking lot outside the Lakecity Mall, mainly catering to the mall parking demand and at present is the only one away from the periphery of the walled city.

Under the smart city projects, UMC recently developed off- street surface parking facility at PWD State Garage (Opp. Gulab Bagh) and Chandpole (within Walled City). In addition to these another 2- 3 off- street parking lots are planned and getting developed under SCM. The PWD State Garage parking lot has seen an average occupancy of 80% upwards during tourist seasons and close to 50% in non- tourist seasons. This parking lot is also used as one of the parking and charging station for e-rickshaws operating within the Walled City.

A multistoried parking lot at Dewali near Fatehsagar Lake is also under construction, developed by UIT from their own funds, aimed at catering to large number of visitors of the lake.

City authorities are also making efforts for installation of smart components for efficient parking

Top: PWD State Garage Parking Lot; First Parking Lot to be built under Smart City Projects; Operationalized since August 2017
Centre: Parking Lot and Multi- Facility Hall at Aasind ki Haveli, Operationalized since 2014
Bottom: U/g Parking Lot at Town Hall; Currently the only Automated Parking Lot; Operationalized since April 2017

management like installation of VMS boards for efficient utilization of parking spaces at few strategic locations across the city under smart city projects.

Need for New Approach

As is the case in most Indian cities, in Udaipur too the traditional approach of providing options like flyovers, road expansion; multi-level mechanized car parks, and more, were being considered to address the increasing parking demand. However, to develop long-term solutions for parking management, it is essential to manage parking demand in order to control the alarming situation for future. In fact the overarching principle for parking is 'to progressively reduce the parking demand and facilitate organized parking for all types of vehicles'. Salient features stated in National Urban Transport Policy (NUTP), 2006 also focus on the same as discussed below. -

- Levy of a high parking fee, that truly represents the value of the land occupied, should be used as a mean to make the use of public transport more attractive;
- A graded scale of parking fee, that recovers the economic cost of the land used in such parking, should be adopted;
- Preference in the allocation of parking space for public transport vehicles and non-motorized modes;
- The objective would be to persuade people to use public transport instead of personal vehicles to reach city centers.

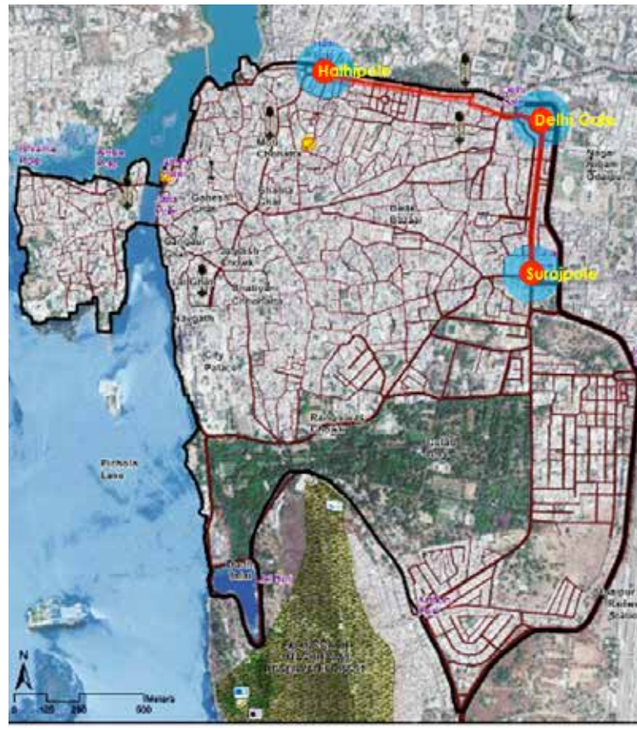
In order to improve the overall parking situation within the city and also to effectively manage the current as well futuristic parking demand vis-a- vis its supply, Udaipur Municipal Corporation seeked technical assistenace from ICLEI- SA on city focused parking management strategy to help the city in controlling the growing parking demand and concerns related to the current parking crisis.

Based on the different consultations with officials from Udaipur Municipal Corporation it was finalized that the parking strategy would be based on the opinions of the key stakeholders, review of best practices. The project team decided to back the parking strategy by conducting one to two pilot projects in order to test the feasibility of the proposed interventions along with developing an institutional framework with detailed roles and responsibilities of the concerned city authorities for effective parking demand management.

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

Based on the initial meetings with the Municipal Commissioner, City Mayor, Councilors, ACE, other engineering members of UMC, Traffic Police and other stakeholders, project team ICLEI SA, conceived and presented the design principles to the city authorities and it was mutually decided and agreed to have a pilot implementation in form of on- site demonstration organized parking in real world scenario, based on the design drafted using these principles.

Figure 9: Junctions locations on selected stretch



The stretch from Surajpole (via Bapu Bazaar road) to Hathipole was decided to be the taken up as the initial pilot site to develop a parking management strategy which could be further scaled up for the entire city. The selected area also witnesses major demand for parking as it is the main commercial center of the

city and also the entrance to the walled city.

To understand and gauge the existing parking details of the selected road stretch and to estimate the futuristic parking demand of the selected road stretch, extensive parking surveys were carried out covering parameters like Origin- destination survey, average travel distance, parking demand in peak/ off- peak hours, willingness to pay and price bandwidth etc. As a part of the surveys, around 700 respondents were surveyed for capturing the opinion of citizens. The respondents included shopkeepers and residents from the area. Udaipur, being a famous tourist destination, draws lot of tourist's round the year, hence it was imperative to consider floating commuters for realistic parking demand estimation.

In a subsequent meeting with city authorities, it was decided that a phase wise proposal shall be developed and implemented to understand people's perception and also the stretch from Delhi gate to Hathi Pole i.e. Ashwini Bazaar road shall be developed initially and rest of the road stretch will be taken once the concept will be accepted by the public and officials.

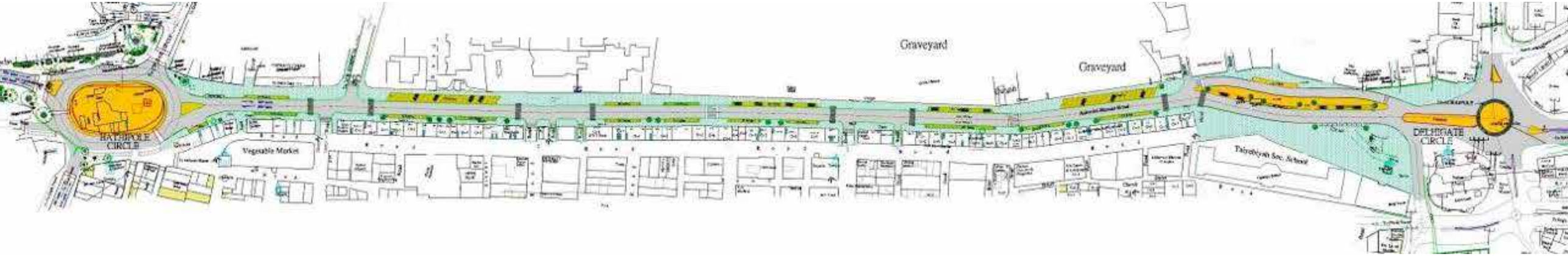
- **Draft Design and Meeting with Key City Officials for finalization**

The draft design proposal for Ashwini Bazaar was conceptualized and discussed with key officials of Udaipur Municipal Corporation and representatives from Ashwini Bazaar Market Association (ABMA) in December 2016. Based on the suggestion in the meeting, a detail proposal for Ashwini Bazaar was developed and presented to key officials of Udaipur Municipal Corporation including the Municipal Commissioner, Chairman, Nirman Samiti, ACE and other engineering officials as well as the representative from ABMA including President, Chairman and others in May 2017 for their approval. Discussions were also held with the stakeholders regarding the on-site demonstration using temporary demarcation on the design, to understand the problems/ issues arising out of it and also to test the feasibility of the same. The meeting was also attended by PMC officials (Project Manager, Team Leader and Networking Expert).

The proposed design for the entire stretch included a major reorganization of the parking along the market and surrounding areas with the larger aim of reclaiming public space from private vehicles to provide safe, comfortable and convenient streets for all modes and deliver a delightful place. The proposal attempts to provide comprehensive facilities for all transport modes, including private vehicles in a well-planned manner, located as per the needs and convenience, functionally integrated with the location and provision of all essential street activities. It was also envisaged that once enforced, paid parking will bring down the city wide parking demand thus reducing the parking pressure from some of the busiest stretches of the city.

Parking Management Plan for Aswhini Bazaar- Meeting with UMC, PMC officials and Representative from ABMA, Location- Board Meeting Room, Municipal Corporation, Udaipur, May 2017

Figure 10: Proposed Parking Plan At Ashwini Bazaar



❑ **On- Site Demonstration at Ashwini Bazaar**

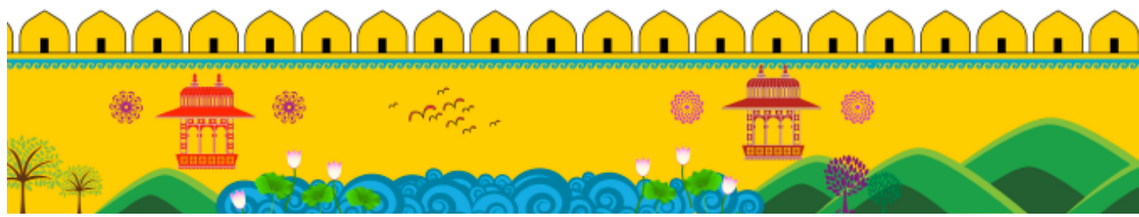
An on- site demonstration of parking design on a 50 M stretch using temporary demarcation of spaces on either side (footpath, parking bays, driveway etc.) was done to showcase the benefits of organized parking and other segregated spaces.

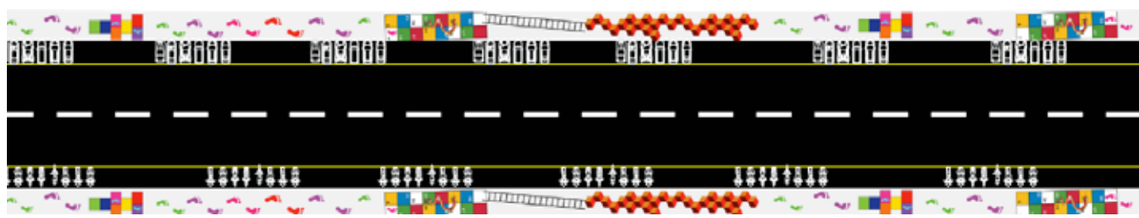
On- Site Demonstration of Parking Plan at Ashwini Bazaa and media Coverage of the On- Site Demonstration of Organized Parking at Ashwini Bazaar

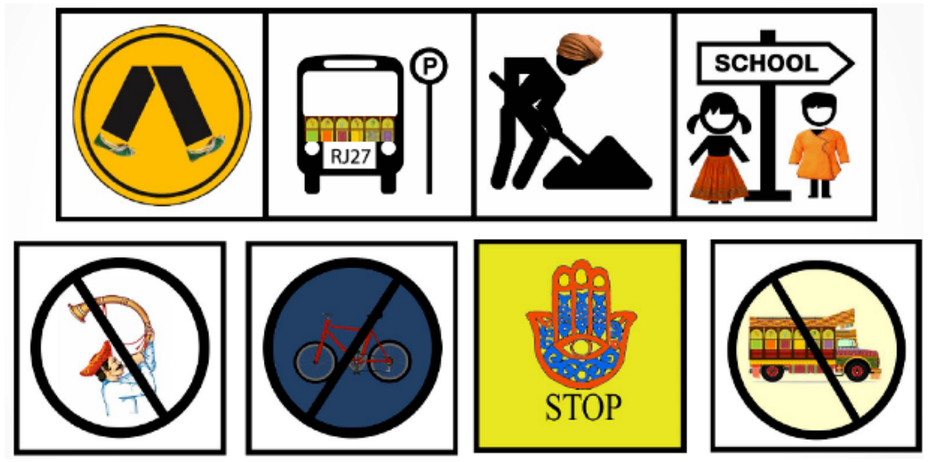
❑ **Proposal to Create Interactive Spaces at Ashwini Bazaar**

After the successful implementation of on- site demonstration, the importance of segregating the available road space for its different users as per the proposed design was emphasized and it was suggested that some short term measures are required on urgent basis to improve the traffic and parking condition on the bazaar street. Hence in this context a proposal to paint the road spaces in visually compelling manner was suggested by the project team ICLEI SA and the same was accepted by Udaipur Municipal Corporation. Subsequently, it was decided to implement the proposed plan in entire road stretch by color coordinated scheme using abstract and contemporary design theme as part of creating visually

Figure 11: Excerpts of Painting Proposal for Ashwini Bazaar as a measure to segregate the road spaces as envisaged in Design Proposal







compelling and interactive streetscape in the city. It was also decided to paint the existing wall surfaces of cemetery, MB Hospital and Masjid as a supplement to the floor surfaces.

Various institutes have been approached to execute the proposal but as per the current status and due to various issues at local level, the work has not been completed. Udaipur Municipal Corporation has agreed to provide logistical and material support such as colors, brushes, primer, sandpaper etc Excerpts of design proposal are shown below.

Broad Level Findings and Key Challenges

The parking management strategy for Udaipur aimed at enhancing the quality of life by supporting and promoting walking, cycling and use of PT and IPT systems and discouraging use and dependency on privatized modes, thus reducing the overall parking demand in longer run. The goals of larger strategy in Udaipur shall be reached by initiating road edge treatment, development of on-street and off-street parking spaces, parking pricing strategies, ITS integration, effective enforcement mechanism etc. This also includes setting up of effective institutional framework, detailing roles and responsibilities of concerned departments.

To effectively manage the current as well growing parking demand of the city, few city level recommendations are suggested as the part of overall parking management strategy. Some of the recommendations are 1) Delineation of Parking Zones (based on its character, landuse, and existing traffic situation etc.); 2) Classification based on RoW and Landuse; 3) No Parking Zones/ Controlled Parking Zones; 4) Parking Pricing Strategies; 5) Parking Management & Enforcement; 6) Use of Intelligent Traffic System; 7) Creation of Multi-Level Car Parks (MLCPs); 8) Proposed Institutional Framework.

Every proposal which challenges the set norms and principle is meant to draw serious outburst and hue and cry not only from general public but sometime also from political/ elected representatives and administrative officials. Udaipur is no different and the concept and proposal of parking management via recommendations like pricing, enforcement, no parking zones etc. has drawn huge backslash from Market Association (Ashiwni Bazaar), as well as from political/ elected representatives. But the persistent efforts of the project team and on- site demonstrations of the proposed plan has helped city immensely in understanding and accepting the recommendations, but is yet to receive in- principle approval and awaiting the city and state government approval to be part of their scheme.

Current Status and Way Forward

A city level draft parking policy for Udaipur will be tabled soon for discussion and approval from Udaipur Municipal Corporation, which if implemented can bring the much needed relief and will also help to streamline the overall traffic scenario of the city.

Summary

Table 5 Engagement activity and learnings under Parking Management Strategy for Udaipur

SCP Component	Provision of paid parking structures with smart parking features (VMS display for efficient utilization of parking space, smart metering for smart management of parking demand)	Listing in SCP	Preparation of DPR for smart parking and implementation of the same at suitable locations across city
Handholding Project	Parking Management Strategy for Udaipur	Components	Improving parking situation of the city by the means of on- street paid parking lots, no parking zones etc.
Project Brief	To develop long- term solutions for parking management, it is essential to manage parking demand side, and it is suggested that a city focused parking management strategy shall help city in controlling the growing parking demand and concerns related to the current parking crisis and shall be the starting point in preparing parking specific plans.		
Locations ABD and Pan City		Duration Start: Aug 2016 End: On-going	
Key Activities	• On- site visual surveys, parking surveys, willingness to pay, user fee surveys along with activity mapping of two major roads of the prominent markets on the periphery of walled city; • Design Interventions based on the survey results and analysis along with parking principles and includes space for designated vending zone, parking and pedestrian walkways, signages, traffic calming measures etc. • Meetings, discussions, deliberations with key stakeholders on the proposed design; • On- site demonstration on a 50 M stretch at one of the road stretch in form of temporary demarcation to showcase the benefits of organized parking and other segregated spaces and also to test the feasibility of the proposed design; • Preparation of strategic document called Parking Management Strategy, proposing various city level interventions and recommendations for effective parking demand management		
Learnings	• Pilot project implementation provided flexibility to make improvements and has given positive insights to city stakeholders on necessity of managing parking demand side w.r.t it supply; • Interventions like user fee, no parking zones etc. are the need of the time for effective parking and traffic management in the city, and the pilot has given confidence to city stakeholders that with planned on- street parking lots, city level parking demand can be managed efficiently, without the need for major investments in creating MLCPs and/ or undergrounds parking lots.		

Note: Please refer 'Draft Report on Parking Management Strategy for Udaipur (Raj.)' for more details.

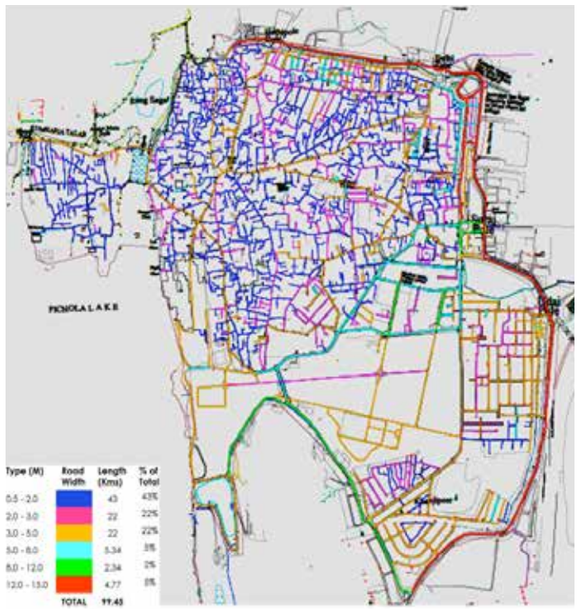
4.3 PEDESTRIANIZATION PLAN IN WALLED CITY, UDAIPUR

Famous not only for it's beautiful lakes and gardens, Udaipur also boasts of having one of the most beautiful and largest palace complex in the state along with several other historic monuments in and around the city, is now famous internationally as one of the most beautiful city in the world, and attracts more than a million tourists annually from across the globe[11].

The walled city, also being the city core is a beautiful amalgamation of rich heritage legacy (City Palace, Jagdish Mandir, Bagore ki Haveli, Gangaur ghat etc.) and the main markets (Bada Bazzar, Maldas Street, Mandi Ki Naal, Dhan Mandi etc.). This brings in an interesting mix of local residents and tourists population sharing the common space within the confined space of walled city. The overlapping of tourist activities and local markets has its own problem, as with narrow roads and by lanes and with no proper traffic management or ample parking

Famous tourists destination within the walled city

Figure 12: Road Network, walled city- Approximately 85% of road length within the walled city is of less than 5.0M wide, (Source- TSS by PMC for Smart City Projects)



Source- TSS by PMC for Smart City Projects

spaces, it is now a daily struggle for the locals and tourist alike to traverse through the walled city.

The walled city, which not so long ago was reeling itself under the glory of its rich past is now facing the harsh realities of crumbling infrastructure and serious traffic and transport problems. This is mainly due to narrow roads and by lanes (road width of 85% of road length in the walled is less than 5m[12]), built to cater primarily the ancient traffic (pedestrians, horses, bullock carts etc.), but now caters to all kind of heavy vehicular traffic such as cars, motorbikes, autos, loading/ unloading tempos etc., due to the kind of activities situated within it.

The inner city core, especially the streets leading to Jagdish Chowk is severely impacted by the frequent traffic congestions and experiences heavy traffic throughout the day. The traffic problem escalates in peak tourist season (from Oct- Dec[13]), as with majority of important tourists destination situated within the inner city core, concentration of numerous hotels[14] within the inner city core, and with no effective traffic management or restrictions in place, tourists ends up driving straight upto the inner city core, and it than become nightmarish for motorists and pedestrians to traverse through the

old city. Moreover in absence of any pedestrian or bicycle infrastructure, it is always a constant struggle between motorists and pedestrians to use the limited RoW, which more often than not results in conflict between these two road users.

It is in this context that a joint decision was made by city authorities (UMC and Traffic Police) to have cleaner, safer, and attractive streets within the walled city and hence project teamICLEI- SA was involved to provide, technical support. The technical support included assistance in improving the traffic conditions within the walled city and building visually compelling streets.

Initiative by City Authorities/ under Smart City Projects

City Authorities in the past had taken various initiatives to streamline the traffic and also to provide safe and comfortable pedestrian streets within the walled city. Among many initiatives by city authorities, few initiatives were effective in fulfilling the objective of curbing the traffic woes and providing safe pedestrian infrastructure.

Udaipur Municipal Corporation experimented with 4" X 4" sizes of cobblestones on few streets in and around Jagdish Chowk and streets leading to various ghats around it; the approach road to Lal Ghat from Jagdish Chowk side was one such street, wherein the surfacing has been changed from bituminous to cobblestones in 2014[15]. This has been done to provide safe and comfortable walking experience to the users and also to reduce the vehicular speed of the motorists.

However due to lack of regular maintenance and upkeep, condition of these stones is deteriorating and potholes along with uneven gaps between the stones are seen. Bigger and uneven gaps, on the road lead to uncomfortable walking experience along with fatal accidents for motorists. In order to tackle this issue, Udaipur Municipal Corporation experimented with cemented, colorful paver block on some of the streets and has received mixed responses from its users.

Traffic Police also took the initiative of restricting two way movements of heavy vehicles (4 wheels, loading and unloading vehicles) on selected road

Barricades by Traffic Police, Udaipur for One Way Directions

Cobblestones and Cemented Color Pavers in and around Jagdish Chowk

stretches within the walled city in 2011, with exemptions for two wheelers and autos. The restrictions are applicable for 12 hours, i.e. from 8:00 AM to 8:00 PM on site. On special occasions like festivals and procession, the restrictions stands null and void and the traffic movement is based on the arrangements by the authorities. These restrictions since its origin have yielded positive outcome in managing the traffic flow and streamlining the traffic movement.

Need for New Approach

The walled city especially the inner city core is severely impacted by the frequent traffic congestion and experiences heavy traffic throughout the day. The traffic problems escalates in peak tourist season, as with no effective traffic management or restrictions in place, tourists ends up driving straight upto the inner city core, and it then becomes difficult for motorists and pedestrians to move through the old city. Moreover in the absence of any pedestrian or bicycle infrastructure, it is always a constant struggle between motorists and pedestrians to use the limited RoW, which usually results in conflict between these two road users.

It is in this context city authorities decided to have cleaner, safer, and attractive streets within the walled city. The project team ICLEI- SA was engaged to provide technical assistance in improving the traffic conditions within the walled city and building visually compelling and safe streets for the users. In fact the overarching principle for any safe neighborhood is 'to facilitate streets and neighborhood for its most important users, i.e. people and to progressively reduce the vehicular demand'. The National Urban Transport Policy (NUTP), 2006 also recommends the following-

- Movement of people rather than movement of Vehicles;
- Equitable allocation of road space by prioritizing the infrastructure development for NMT & Public Transport;

The city authorities with support from ICLEI- SA planned to create more pleasant and profitable urban environment in one of the most beautiful part of the city by restricting cars and other heavy vehicles to ply on selected streets, complete pedestrianization of selected streets along with introduction of non-motorized transport and environment friendly vehicles (e-rickshaws, bicycles) to ply on the narrow streets etc.

To deal with the issue of choked streets, the project team from ICLEI- SA developed a city focused, phase wise "pedestrianization plan" based on a detailed study and analysis of selected road stretches within the walled city.

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

Based on the initial meetings and discussions with the city authorities (Municipal Commissioner, City Mayor, Councilors, ACE and other engineering member of UMC, ASP and DSP of Traffic Police and other stakeholders), it was decided that the road stretches leading to major tourist destination within the walled city and with high tourist oriented activities- hotels, restaurants, shops selling handicrafts, artifacts, paintings, textiles, jewellery etc. shall be taken up for developing pedestrianization plan which could be further scaled up for the entire walled city. It was decided that immediate measures are needed to reduce the continuous conflicts of local and tourist vehicles and to segregate the local and tourist traffic, which will bring in the much needed relief within the walled city. Project team ICLEI SA suggested categorization of roads as 'complete (complete vehicular ban)' or 'partial (partial vehicular ban) pedestinization' based on the parameters like available RoW, overall connectivity in the road network, current activities, tourists loads etc. at the selection stage in order to have selection focused strategies at the design and proposal stage.

It was decided that streets which are 'closed in nature' and don't have any direct or indirect impact on the overall traffic flow should be taken up for complete pedestrianization and remaining roads shall be taken up for partial pedestrianization, wherein effectively the restrictions will apply only on certain vehicular categories and for selective hours in the day. To visually differentiate the streets and to discourage use of any transport modes on streets with complete pedestrianization, the possibility of changing the road surfacing from regular bituminous/ asphalted surfacing to cobbled stones/ paver block was also discussed and was accepted by the city officials.

In a bid to come up with the detailed plan, ICLEI- SA project team did multiple site visits to assess the local conditions, to understand the existing characteristics and also to understand the infrastructure readiness of selected road stretches. As a result, the visits helped the team in detailed activity mapping of the walled city.

Project team ICLEI SA also held multiple meetings with city authorities and other stakeholders (local Councilors, Lal Ghat Hotel Association and shop keepers) to understand their views on the same, and also to understand the potential challenges and issues in order to propose possible recommendations and interventions.

A strategic plan was prepared to be implemented on site in phase wise manner and the characteristics of the identified routes selected for interventions were detailed out which included identification of pressure points, pedestrianization approach, phase wise implementation plan, agencies to be involved and their roles etc.

Figure 13: Local vs Tourist Routes within the Walled City

The plan focuses on strategies to reduce the traffic congestion within the selected road stretches, to streamline the existing traffic with effective traffic management and enforcement measures. It also discusses how to create pedestrian and cycling friendly streets by identifying and introducing "pedestrian only streets" and "pedestrian priority streets", on effective parking management strategies within the walled city. It also emphasizes on reducing the pollution level within the walled city by introducing suitable non- polluting transport modes like cycling and e-rickshaws.

The detailed plan and the phase wise implementation plan were then presented and discussed with city authorities and other stakeholders in July 2017 for their consent and views.

Joint site inspection by the Senior officials from UMC Pedestrianization Plan within the Walled City

❏ **Joint Site Inspection by ICLEI's Project Team along with Senior UMC Traffic Police officials along with Local Councillors**

The discussions and the presentation resulted in joint inspection of the identified routes and the existing supporting infrastructure by project team ICLEI- SA's along with Udaipur Municipal Corporation officials including Commissioner, ACE, others engineering members and Traffic Police, including ASP, DSP and others, and the local councilors.

During the joint site inspection, it was decided to select one road stretch from both the categories to test the same in on pilot basis and rest of the road stretches would be taken up after studying the impact of pilot stretches on overall traffic movement, public adaptability of the same and operations of e-rickshaws, mainly from the load carrying capacity perspective.

The road stretch from Rangniwas Chowk to Jagdish Chowk upto the City Palace Complex was selected as the pilot route, mainly due to the availability of off-street parking lot within the proximity and availability of limited nos. of e-rickshaws. It was decided to operate 25 e-rickshaws (12 under CapaCITES and 13 of Namasteji's- e-rickshaw operator under smart city project) on the pilot route for ferrying the passengers from parking lot to Jagdish Chowk.

❏ **Pilot Implementation of 'Pedestrianization Plan'**

The pilot implementation of pedestrinization plan was initiated on 4th Aug 2017 from Rangniwas Chowk to Jagdish Chowk upto the City Palace Complex, after setting up necessary infrastructure in place (barrications, informatory signages etc.). Traffic personnel along with home guard were deputed on the site for managing the traffic and parking lot respectively.

The charges for parking and e-rickshaws were mutually decided by Municipal Commissioner and Mayor and were fixed at Rs. 5/- and Rs. 10/- for 2 and 4 wheelers parking respectively for every 3 hours. E-Rickshaws charges were fixed and revised at Rs. 10/- per person per trip. The parking and e-rickshaws charges were deliberately kept low for the convenience of users and for the better utilization of parking.

Senior Udaipur Municipal Corporation officials including the Municipal Commissioner, SE, officials from Traffic Police, along with local councilors were present on the site during the opening hours of pilot implementation to monitor the operations first hand and also to understand the overall impact of the pilot exercise.

Pilot Implementation of Pedestrianization Plan- Day 1- 4th Aug 2017

■ The pilot exercise was successful and was followed by extensive media coverage. The iniative the well accepted and appreciated by the local residents and the tourists.

Broad Level Findings, Key Challenges and Learnings

The pilot implementation has its share of success and failures due to various reasons. The success is measured against the main objective of the project, which are a) priority to pedestrians and NMT; b) reduction of traffic congestion by the means of restricting tourist vehicles (mainly 4 wheels) and taxis; c) reduction in emission levels due to reduced vehicular traffic.

It was envisaged that once successful, the system will be replicated in other parts of the walled city also for the complete and holistic outcome of the project.

The key challenges for the pilot project were low turnout of tourists on weekdays, lack of enforcement from traffic police after initial few days, service related issues in e-rickshaws, low income generation by e-rickshaws drivers due to the marginal charges, resistance from conventional auto drivers, lack of awareness of the new initiative etc.

Print Media Coverage of Pilot Implementation of Pedestrianization Plan

❑ **Learnings'**

Communication & Outreach (C&O) activities before and during the implementation of the project is one of the most important factors in success of the project. The C&O activities should be treated as serious and important activity of the project for greater success and desired outcomes and not just a resource draining exercise. However, creating awareness among the target group is an on-going process and hence is a time taking exercise, and if done in an appropriate manner with right information can have very positive results and outcomes, leading towards greater success of the project along with higher satisfaction among its users. Awareness via free social media (Facebook, Twitter etc.), loop messages on local FM channels for certain duration, print media (newspapers, local weekly, monthly magazines etc.) can have a great impact in creating positive brand building.

The pilot project was envisaged to bring an important change in city traffic management strategies for walled city, and it was proposed to have extensive C&O by various means to create awareness among the local citizens as well among the tourists for better success of the project. Due to lack of continuous C&O activities, lot of confusion among local citizens and tourists was observed on the overall planning of the project.

Another learning of the project was on availability of right information in the form of signages and information kiosk for tourist. Suitably placed traffic or tourist signages with unhindered views, disseminating desired information (places, direction, distance etc.) play an important role in the success of the project. Right information not only helps in making informed decision upto great extent but also save time and money and help in creating positive brand building of the city.

Adequate infrastructure as envisaged and planned is key requirement during implementation stage, for the success of the project. In this case, the shortage of e-rickshaws has resulted in increased waiting time for the potential passengers and this in turn has given undue benefits to conventional auto drivers.

The biggest learning from the project comes from the enforcement point of view as enforcement along with right information/ idea of the project by implementing agency plays an important role in success of project. A fully aware/ updated on-ground traffic police personnel can only monitor and enforce the initiative in the way it is designed and envisaged.

■ Current Status and Way Forward

Currently efforts are underway to revive the pedestrianization plan in walled city as envisaged and the construction of new parking lot under smart city projects (at Chandpole) has opened new avenues to scale up the same to more road stretches in walled city.

■ Summary

Table 6 Engagement activity and learnings under Pedestrianization Plan in Walled City, Udaipur

SCP Component	Introducing restrictions on vehicular traffic in walled city in a phased manner and Promotion of pedestrianization, Public Bicycle Sharing (PBS) and operation of battery operated vehicles for local movement	Listing in SCP	Traffic Management- Restriction on vehicles (4 wheels) within the walled city and implementation on one- way vehicular traffic movement with regulation on goods traffic, with removal of all on-street parking Introduction of E-Rickshaws on specified routes and PBS for local movement
Handholding Project	Pedestrinization Plan for Walled City, Udaipur	Components	Introducing phase wise restrictions on 4 wheelers movement within the walled city by the means of operating e-rickshaws on the restricted routes, informatory signages and introducing traffic calming measures for reduced vehicular speed for safer environment to the pedestrians and cyclist
Project Brief The inner city core is severely impacted by the frequent traffic congestions and experiences heavy traffic throughout the day. The traffic problem escalates in peak tourist season and with no effective traffic management or restrictions in place, it becomes extremely difficult for the motorists and pedestrians to move through the old city and hence a constant struggle between motorists and pedestrians to use the limited RoW continues. The project aims at creating more pleasant and profitable urban environment in walled city that spawn safer streets, cleaner and attractive streets for its users by restricting cars and other heavy vehicles to ply on selected streets, complete pedestrianization of selected streets along with introduction of non-motorized transport and environment friendly vehicles (e-rickshaws, bicycles) to ply on the narrow streets etc.			
Locations	ABD	Duration	Start: Aug 2017 • End: Jan 2018
Key Activities	• Identification and segregation of roads as "Complete Pedestrianization Streets' and 'Partial Pedestrianization Streets' based on parameters like RoW, vehicular traffic density, connectivity of road stretches on larger city level network etc.; • On- site visual surveys mapping road characteristics, parking lots, activity mapping, user preference survey; • Phase wise interventions based on the survey results and analysis that includes demarcation of various road stretches as potential 'Complete Pedestrianization Streets' and 'Partial Pedestrianization Streets' based on their city level connectivity; • Interventions also include designs for traffic signages and identifying the suitable and high visibility locations for the benefits of tourists, traffic calming measures, e- rickshaws route and frequency planning etc.; • Meetings, discussions, deliberations with key city stakeholders, Lal Ghat Hotel Associations and with various auto unions on the proposed interventions for their comments, consent; • On- site pilot implementation on one of the road stretch with necessary resources in place (man and machinery both) to showcase the feasibility and benefits of the proposed interventions; • Pilot project ran successfully for almost 3 months, before being taken down due to various reasons; • Pilot project was well received among the local shopkeepers and was well taken by the residents as well;		
Learnings	• Pilot project implementation has given positive insights to the city stakeholders on necessity of effective traffic management using the combinations of series of measures like no entry for 4 wheelers, alternate parking spaces/ lot, first and last mile connectivity with environment friendly vehicular fleet, traffic sinagages etc. • Important to have political will and support at all stages of project (before, during the implementation) as survival of these pilots depends upon it; • Communication and Outreach (C&O) activities form an important feature of the project and shouldbe taken up before and during project implementation for greater success of the project; • Important to train the lower rank traffic personnel not only with the details of the project (what, why & how, their duties, roles & responsibilities etc.) but also on the soft skills, as the success also depends on passing on the right information in the humblest way possible.		

Note: Please refer 'Pedestrianization Plan of Selected Roads in Walled City for Udaipur (Raj.)- Vol II' for more details.

4.4 TERMS OF REFERENCE (TOR) FOR INTRODUCTION OF PUBLIC BICYCLE SHARING (PBS) SYSTEM IN UDAIPUR

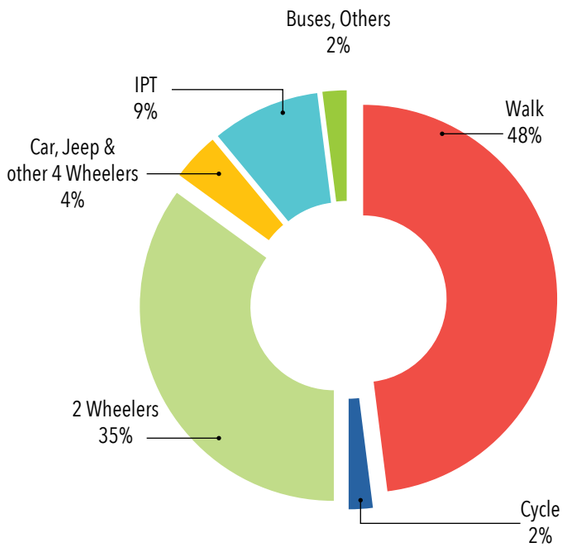
Traffic problems in Udaipur escalate in peak tourist season (from Oct- Dec[16]), due to no effective traffic management.

As per the latest data on mobility for the city, around 50% of trips are taken by foot and cycle. Despite the reliance on Non- Motorised Transport (NMT) modes, the city areas experience traffic pressure, congestion and clogging of streets on regular basis. In absence of any pedestrian or bicycle infrastructure, it is always a constant struggle between motorists and pedestrians to use the limited RoW, which usually results in conflict between these two road users.

In order to curb the emissions caused due to transport sector in Udaipur, improve the mobility environment of the city, Udaipur Municipal Corporation intended to initiate the street improvements that spawn safer streets for its users.

It is in this context, Municipal Commissioner, Udaipur Municipal Corporation in Nov 2017 asked the project team ICLEI SA to assist them in supporting the introduction of PBS system in the city. To introduce and initiate the PBS operations in the city, the project team from ICLEI- SA recommended that a city focused, phase wise "PBS Operationalization Plan" should be developed and implemented, based on national & international best case examples, and analysis of contextual PBS models elsewhere in the country. This is recommended as a larger goal and on-going efforts are being continued for developing "Pedestrianization Action Plan for Udaipur", and in continuation to the pilot implementation of 'pedestrianization plan from Rangniwas Chowk to Jagdish Chowk', commonly referred as 'No Vehicular Zone'.

Figure 14: Trips by Modes



Initiative by City Authorities/ under Smart City Projects

Udaipur has a 2.5 km of dedicated bicycle track at Rani Road, which is completely devoid of dedicated cycle tracks or other allied infrastructure for encouraging environment- friendly NMT movements.

UMC and UIT operate free bicycle operations at two important tourist locations (Fatehsagar Lake and Manikya Lal Verma Park, commonly known as Dudh Talai). The operations at both these locations are from morning 6-9 AM and evening 5-8 PM and are operated from Kiosks situated at both the locations (2 kiosks at Fatehsagar Lake, one by each and 1 at Dudh Talai by UIT). The bicycles used for operations are non-geared ones and are mostly donated by the local cycling groups & local business houses as a part of their CSR activities. The free bicycle operations at these locations have many takers including morning joggers & cyclist, locals and tourists etc.

USCL has identified and constructed docking stations at 11 highly visible locations/ sites across city.

The LCMP, Udaipur, 2014 based on its findings and as a part of its NMT strategy, proposes close to 20 km of dedicated cycle tracks on both sides of the road along with necessary support infrastructure on few major roads, but given the wide Right of Way (RoW) of major roads, city has a potential to have 75- 100 km of dedicated bicycle track which can boost the NMT mode share from the existing 2% to 10% and more.

Need for New Approach

In a bid to expand the use of sustainable transport modes as a key element in a city's strategy to provide a low-cost, environmental friendly mobility option to its residents, city authorities in Udaipur plan to introduce a PBS, wherein bicycles will be available in a closely spaced network of fully automated stations and users can check out bicycles at one station and return them to any other station in the network. PBS is expected to boost the use of sustainable mode of transport by providing crucial last-mile connectivity, thereby expanding the catchment areas for the city's rapid transit systems. By encouraging a shift to sustainable modes, the PBS is expected to reduce dependency on automobiles for short trips, reduce traffic congestion, vehicle emissions, and demand for motor vehicle parking. In addition, the system will expand the health and wellness benefits to its users. Finally, the system will support the transformation of safer and cleaner streets for pedestrians and bicyclists alike. The rollout of the PBS is proposed to be paired with the introduction of dedicated cycling facilities along major streets in Udaipur.

The close proximity of various tourists destination to each other also encourages tourists to explore and

Bicycling Kiosk by UMC at Aravali Vatika near Fateh Sagar Lake

Newly constructed Docking stations at Aravali Vatika, Near Fateh Sagar Lake

experience the city in a way that no other mode can provide. As a thumb rule, potential PBS users are those making short trips of less than or equals to 5 km[17], and the average trip length (ATL) in Udaipur is also observed to be 5 kms[18]. In fact the overarching principle to initiate any PBS is 'to provide free or affordable access to bicycles for short-distance trips to solve the 'first mile and last mile' problems'. The National Urban Transport Policy (NUTP), 2006 recommends the following-

- Movement of people rather than movement of Vehicles;
- Equitable allocation of road space by prioritizing the infrastructure development for NMT & Public Transport;

The city authorities with support from ICLEI-SA plan to create more pleasant and profitable urban environment with introduction of non-motorized transport and environment friendly vehicles to ply across city roads.

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

Based on the meetings and discussions with the Municipal Commissioner, and ACE , Udaipur Municipal Corporation, the project team ICLEI SA prepared the proposal to introduce PBS in Udaipur documenting details like existing bicycle scenario in the city, potential challenges and benefits of PBS w.r.t the city, international and national case examples, various components of the systems, institutional framework to bring in the system in the city, maintenance scheduling for the cycles, communication & outreach etc.

In the meanwhile, few private agencies of national and international repute have shown interest in introducing PBS in the city and have approached Udaipur Municipal Corporation with their proposals. The agencies met project team ICLEI SA for discussions, deliberations. In continuation to receiving the proposals from potential private agencies along with receiving in- principle approval from the Municipal Commissioner, Udaipur Municipal Corporation and project team ICLEI- SA developed an indicative and suggestive Terms of Reference (TOR) for phase wise roll out of bicycle sharing in Udaipur.

Subsequently, in the following months PMC for Smart City was asked to develop Request For Proposal (RFP), taking cue from the TOR, for inviting proposals from interested applicants. PMC, while drafting the RFP has used the entire TOR as scope of work in the RFP document.

Broad Level Findings, Key Challenges and Learnings

The tender to introduce PBS in Udaipur has been floated multiple times now but didn't have any takers for some reasons, that too when agencies have shown interest in the initial stages of the project and held discussions with UMC/ USCL. One of the probable reasons for lack of interest by potential private players is the stringent tender conditions like introducing 500 bicycles within the span of 6 months after signing of concession agreement.

Another challenge was on the overall approach of UMC in pursuing these kinds of innovative projects. UMC is still stuck in tender oriented approach, i.e. awarding and appointing agencies via tender process only, while cities like Pune and Bengaluru hve already shown the way that these kind of innovative projects can be taken forward with innovative mechanism like signing of direct Memorandum of Understanding (MoU) between government and service provider with agreed stringent and clear service delivery terms and conditions including penalties, blacklisting in case of any discrepancies in the service, non - compliance with the agreed T&C, involved in activities outside the purview of the agreement without prior consent from client, in this case UMC/ USCL. etc., MyByk- an Ahmedabad based, nationwide PBS operator was ready to introduce PBS in Udaipur without any financial support via a direct MoU between UMC and MyByk. The proposal also indicated no financial bearing on UMC, as MyByk has offered its own man and machinery resources, but till now nothing has happened in the project. (bicycles, docking stations- if any, software and its integration with Control and Command Centre, anti- theft mechanism, payment gateways, mobile applications, website, maintenance workshop, necessary manpower etc.).

Current Status and Way Forward

Currently efforts are underway to find suitable agency for introducing PBS in Udaipur and necessary modifications are being carried out to make the overall T&C of the tender document to suit the need of potential and interested applicants.

Summary

Table 7 Engagement activity and learnings under Pedestrianization Plan in Walled City, Udaipur

SCP Component	Decongestion through pedestrianization and also by introducing Public Bicycle Sharing (PBS) System;	Listing in SCP	Introducing restrictions on vehicular traffic in walled city in a phased manner and Promotion of pedestrianisation, cycling (Public bicycle sharing) and operation of battery operated vehicles for local movement
Handholding Project	Parking Management Plan for Udaipur	Components	Improving parking situation of the city by the means of on- street paid parking lots, no parking zones etc.
Project Brief Being internationally famous heritage tourist city, it calls for leisurely paced movement to experience the city and PBS allows of just that. The close proximity of various tourists destination to each other also encourages tourists to explore and experience the city in a way that no other mode can provide. However, the city lacks in terms of pedestrian and bicycle friendly facilities such as footpaths and dedicated cycle tracks (only 4% of the road network has footpaths, while 96% is devoid of the same) As a thumb rule, potential PBS users are those making short trips of less than or equals to 5 km, and the average trip length (ATL) in Udaipur is observed just about that. The LCMP for Udaipur, 2014 also proposes a city wide bicycle sharing system in order to increase the NMT mode share. The NMT mode share as reported in LCMP is about 2% of total trips and declining but given the right eco system and suitable environment, has a good chance to increase the same upto 10% and more. The city authorities in Udaipur intends to create more sustainable, pleasant and profitable urban environment in city that spawn safer streets, cleaner and attractive streets for its users and PBS will help to achieve those goals.			
Locations	ABD and Pan City	Duration	Start: Dec 2017 • End: On-Going
Key Activities • Presentation on PBS for Udaipur covering details like existing bicycling scenario, benefits and challenges for introduction and operations of PBS, different models of PBS in India & internationally, various PBS components, institutional framework etc.; • Preparation and circulation of draft TOR for Pilot PBS operations in Udaipur to the interested applicants for their review and feedback; • Replies on the queries shared by the interested applicants on the draft TOR for PBS; • Review of PBS tender document (entire ToR has been used as project scope) prepared by PMC for Smart City, Udaipur and discussion on same with PMC and UMC; • Suggestion on changes in the tender document on multitude of sections (pricing mechanism, fleet size, system insurance etc.); • Review & comments on specific sections (Draft Concession Agreement & Procurement Entity's Requirements) of PBS tender document on special instructions from Commissioner, UMC;			
Learnings • As PBS is a fairly new concept in Indian scenarios with no proven success currently, some form of flexibility is required at government disposal allowing private players to survive initially and then thrive at later stages. • There is always a trust issue with government. offices, as they are yet to come to terms that giving a free hand to private players within the gambit of the written agreement is a need of hour and can go a long way in fostering good relations with them, at the same time seeing increase in productivity from both ends.			

Note: Please refer 'Terms of Reference (TOR) for Introducing Public Bicycle Sharing Operations in Udaipur (Raj.)' for more details.

4.5 DEVELOPMENT OF HIRAN MAGRI ROAD AS SMART ROAD IN UDAIPUR

During the 8th Smart City Board Meeting and the 1st Annual General Meeting (AGM) of the Smart City held on 6th Dec 2017, the Principal Secretary (LSGD) instructed UMC & UIT to select, improve and develop few city roads as world class smart roads which should have amenities like wider and continuous pedestrian walkways, dedicated cycle tracks, dedicated hawking and vending zones, on-street and off- street parking lots for two- wheelers, autos, cars, dedicated bus bays, scientifically designed junctions, traffic calming and speed regulating mechanism, plantation/ boulevards among others. UMC and UIT jointly selected three road stretches to be developed as smart roads. The roads selected to be developed as Smart Road are 1) Hiran Magri Main Road from Sevashram Chauraha till Jadav Nursery Junction; 2) Chungi Naka Road till Balicha Bypass Junction; c) Sukher- Amberi Road from RK Circle till Amberi Circle.

Subsequently, in the month of Feb 2018, senior officials from UMC (Commissioner, ACE, EEs, AEs, DTP for Smart City), UIT (Secretary, SE, EE), PMC for Smart Road (Project Manager, Team Leader, Lead Architect, Engineers) and project team ICLEI SA

Figure 15: Hiran Magri main Road

Top and bottom: Joint Site Visit of Hiran Magri Main Road by UMC, UIT, PMC for Smart City- EPTISA and ICLEI- South Asia on 8th Feb 2018

conducted a joint site visit of Hiran Magri road and Balicha Road in a bid to improve the traffic mobility and accessibility on these roads and also to develop them as smart roads. The project teamICLEI- SA and PMC- EPTISA were instructed to technically assist the Udaipur Municipal Corporatiom in improving these roads and to develop conceptual plan TenderSure Roads, Bangalore and Bhubaneshwar Janpath Road were suggested for referring as best case examples.

The project team ICLEI- SA in collaboration with PMC for Smart City prepared a conceptual plan for Hiran Magri Road which was presented in 9th Smart City Board Meeting held on 21st Feb 2018 to the , Principal Secretary (LSGD). The proposal received in- principal approval in the board meeting and it was instructed to detail out the design at the earliest in order to float a tender for implementation of the same on ground.

Need for New Approach

The road is dotted with numerous inner/ access roads opening to the main road, facilitating the merging traffic to the main road. In the absence of any segregation between the main road traffic and merging traffic, the chances of accidents increase considerably and also hinder the smooth movement of vehicles on the main road. Various intercity buses catering to the neighboring villages are allowed to ply on this road, adding to the risk of accidents. The buses operate at very high speed and are hazards to the city traffic due to their undisciplined and reckless driving. Hiran Magri road is also plagued severely by high on- street parking and road side vending activities, thus reducing the overall driveway width of the roads for vehicular traffic, resulting in more congestion and accidents. The road also lacks pedestrian and NMT infrastructure and due to its wider carriageway (resulting in higher speed of the vehicular traffic) is a safety hazard to pedestrians and cyclists and motorists. The road hence witnesses frequent accidents and requires serious traffic calming measures.

In order to improve the traffic conditions and accessibility of the major roads, city authorities in Udaipur envisaged to develop these city roads as smart roads and asked project team ICLEI- SA and PMC for Smart City to technically assist them in conceptualizing the same.

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

Subsequent to this and based on the meetings, discussions and site visit, project team ICLEI SA along with the PMC officials conducted multiple site visits to understand the road characteristics and its users, existing traffic situation, to map various activity(ies) along the road, pressure points etc. The project team then documented major issues and derived key design principles to be used to conceptualize the road improvement plan. The design principles were derived taking cue from set guidelines and norms like Indian Road Congress (IRC), TenderSure etc.

Discussions on Proposal Design for Hiran Magri Smart Road with Mr. Paras Singhvi, Chariman, Nirman Samiti, Mr. Arun Vyas, ACE and other Engineering Members of UMC

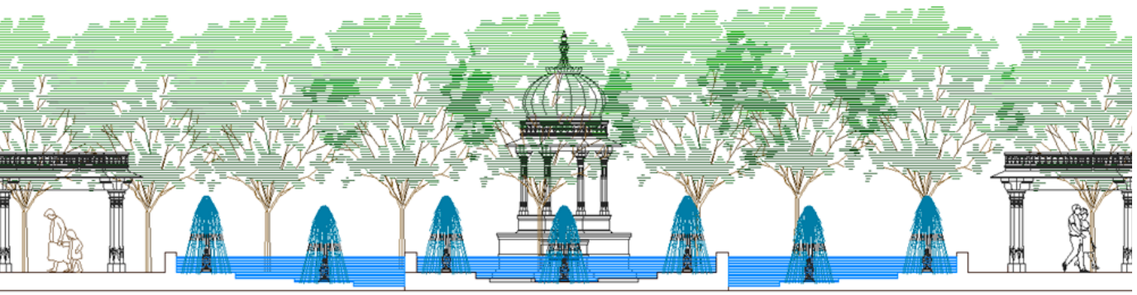
Few of the highlights of the proposed and agreed design principles are- a) To have maximum of 2 lanes of main carriageway on either side for streamlining of the traffic by the means of lane driving; b) Service lane on either side (segregated from the main carriageway by the means of landscaped area wherever deemed fit), catering to the vehicular traffic originating from frequent inner/ access road for segregating fast and slow moving traffic; c) Provision of parking spaces for 2 and 4 wheelers, auto stands at strategic locations; d) Wide and continuous footpath; e) Dedicated bicycle tracks for safe and secure cycling environment; f) Dedicated Hawking/ vending zones; g) Introduction of smart infrastructure like surveillance cameras, smart bus shelters, VMS etc.

Subsequently, in the following months, project team ICLEI SA presented and discussed the conceptual plan to Udaipur Municipal Corporation officials including the Municipal Commissioner, Chairman, Nirman Samiti, ACE along with Ward Councilors for their views and consent on the same.

After round of deliberations and discussions, and approval at city level the conceptual plan was presented in 9th Smart City Board Meeting and received in- principle approval on the same. PMC for Smart City was also instructed in the Board Meeting to develop detail design and RFP, taking cue from the design principles and conceptual design, for inviting proposals from interested applicants for executing the same on ground.

The PMC prepared detailed design, BoQ, estimation along with RFP and has invited applications via appropriate channels from potential bidders for project implementation.

Figure 16: Excerpts of Design Proposal for Hiran Magri Smart Road



Broad Level Findings, Key Challenges and Learnings

The tender to develop Hiran Magri Smart Road into Smart Road in Udaipur has been floated multiple times but met with lukewarm response from the potential bidders initially, and only recently the city has been able to finalize the agency for executing the project on ground.

One of the key challenges of the project was that it was difficult to explain to the city authorities that the projects of this magnitude need proper project planning and designing and generally are time consuming in nature, at the planning as well as at execution stage. Project planning and designing in haste might not be favorable for the project and would result in poor execution and faulty design.

Current Status and Way Forward

Currently an agency has been finalized for executing the project on ground and the agency is waiting for the Letter of Award (LOA) to start mobilizing its resources for executing the project.

Summary

Table 8 Engagement activity and learnings under Hiran Magri Smart Road Project in Udaipur

SCP Component	Development of continuous footpaths, pedestrian crossing facilities with Pelican Signalling at major identified junctions and locations for the safety of pedestrians and to make Udaipur NMT friendly and walkable city	Listing in SCP	In multiple components
Handholding Project	Hiran Magri Smart Road	Components	Improve and develop few city roads as world class smart roads which should have amenities like wider and continuous pedestrian walkways, dedicated cycle tracks, dedicated hawking and vending zones, on-street and off- street parking lots for two- wheelers, autos, cars, dedicated bus bays, scientifically designed junctions, traffic calming and speed regulating mechanism, plantation/ boulevards among others.
Project Brief Improving and developing few city roads as world class smart road which should have amenities like wider and continuous pedestrian walkways, dedicated cycle tracks, dedicated hawking and vending zones, on-street and off- street parking lots for two- wheelers, autos, cars, dedicated bus bays, scientifically designed junctions, traffic calming and speed regulating mechanism, plantation/ boulevards among others.			
Locations Pan City		**Duration** Start: Dec 2017. End: On-Going	
Key Activities	• On- site visual surveys to understand and document road characteristics, TSS, and activity mapping of the entire road stretch; • Deriving key design principles using set guidelines and norms like Indian Road Congress (IRC), TenderSure etc. for conceptualizing the road improvement plan; • Proposed design interventions in collaboration with PMC for Smart City that includes redesigning of entire available RoW to accommodate space for continuous pedestrian walkways, dedicated bicycle tracks, designated vending and hawking zones, dedicated parking for 2W, 4W and autos, traffic calming measures at junctions etc. • Proposal also focused on providing 2 lanes per direction along with introduction of service lanes to segregate the inner road traffic from the main road • Meetings, discussions, deliberations with key stakeholders on the proposed design to finalize the same.		
Learnings	• Important to have detail drawings (workings drawings, GFCs) as a part of tender process. If the same comes under the purview of the interested bidder/ applicant, the tender document should clearly say so, as in absence of none, it becomes difficult to find bidder for implementation. • Interventions like user fee, no parking zones etc. are very essential nowadays for effective parking management in the city.		

Note: Please refer 'Development of Hiran Magri Road as Smart Road, Udaipur (Raj.) and Design Drawings along with BoQ and Estimation' for more details.

4.6 IDENTIFICATION OF BUS QUEUE SHELTER (BQS) LOCATIONS

Public transport in Udaipur is composed of a limited supply of city buses and the current service is operating along five routes. Udaipur has 13 buses plying as city bus services. Out of these 13 buses, 8 are owned by the Municipal Corporation and operated by private contractor and 5 buses are privately owned and operated. Both the contractors have 3 year contract with the Municipal Corporation and both are in their final year of operations of the current contract.

In order to improve the PT coverage in the city and to move towards more sustainable modes of transport, city is planning to add a fleet of 35 buses on PPP mode in its existing inventory under their smart city projects to ply on 17 routes. A separate SPV known as Udaipur City Transport Services Limited (UCTSL) has been formed to oversee the operations of city bus services in the city. It is envisaged to run these buses along the major routes, connecting residential neighbourhoods, educational institutes, hospitals, dense commercial areas and major markets. The tender for bus procurement and operations will be out soon.

Commissioner, UMC and AE along with ICLEI's representative at one of the BQS Locations on a joint site visit, Nov 2018

In addition to introduce the city bus service, 100 Bus Queue Shelters (BQS) are envisaged to be installed across these 17 routes in two phases (50 in each phase), which can complement the city bus service operations in the city. The agency/ contractor for erecting and installing the BQS has already been finalized and is continuously engaged with UMC for installation of these BQS.

The project team ICLEI- SA has been entrusted with the task of leading the team of officials from UMC, PMC for Smart City, and selected contractor for finalization of BQS locations of all the proposed BQS. The locations for BQS are being finalized based on the parameters like landuse, ridership, catchment, distance, space availability, traffic density, etc. The parameters are as per the directives of MoUD guidelines and also as per the national best case practices. As a part of finalizing the BQS locations, following methodology/ approach is adopted - mapping of tentative BQS location on map based on majorly two criteria's- distance and adjacent catchments/ activities (high residential, commercial, educational activities, industrial zone etc.)- Joint site visit with UMC, PMC, and contractor to assess the ground condition of the marked locations (space availability, traffic density, landuse etc.)- briefing and finalization of marked location with ACE and Commissioner, UMC, On-site marking at finalized BQS location after receiving necessary approval from ACE and Commissioner.

The average distance between the two BQS is approximately 800- 900 M (more than the preferable range of 450- 750 M), as with only 50 BQS in phase I, the idea is to spread the 50 BQS across all the routes. It is also suggested by ICLEI's project team to retain the existing bus shelters, built and owned by UMC, UIT in the past.

Meanwhile, Commissioner, UMC in NOV 2018 along with ICLEI's representative, UMC and PMC officials made a site visit to 20 locations across city identified for BQS to assess the feasibility of the identified location and also to assess the look, design, built etc. of the erected BQS at one of the location (Outside Bajaj Sevasharam office, near Sevashram Bridge on Pratapnagar- Surajpole route)

40 BQS locations have been finalized till date at different routes and the list along with map has been shared with contractor for him to take up the same for construction. The contractor has started erecting BQS at the given locations and has been able to erect BQS at 21 locations along with platforms at 6 other locations.

Current Status and Way Forward

The execution of the project is ongoing.

Summary

Table 9: Engagement activity and learnings under Hiran Magri Smart Road Project in Udaipur

SCP Component	Modernization of existing City Bus Service by introducing comfortable GPS enabled semi-low floor buses as per UBS II, integrated with Command & Control Centre for overall controlling & monitoring	**Listing in SCP**	Development of Smart Bus Queue Shelters (BQS) on PPP basis relaying real time information on buses through GPS enabled devices.
Handholding Project	**Identification of Bus Queue Shelter (BQS) Locations**	**Components**	Improving parking situation of the city by the means of on- street paid parking lots, no parking zones etc.
Project Brief Public transport in Udaipur is composed of a limited supply of city buses and currently is operating along five routes. Currently Udaipur has 13 buses plying as city bus services on 5 different routes. In order to improve the PT coverage in the city and to move towards more sustainable modes of transport, the city is planning to add a fleet of 35 buses on PPP mode in its existing inventory under their smart city projects to ply on 17 routes. In addition to the introduction of the city bus service, 100 BQS are envisaged to be installed across these 17 routes in two phases (50 in each phase), which can complement the city bus service operations in the city. The agency/ contractor for erecting and installing the BQS has already been finalized and is continuously engaged with UMC for installation of these BQS.			
Locations	Pan City	**Duration**	Start: Oct 2018 End: On-Going
Key Activities	• Entrusted with the task of leading the team of officials from UMC, PMC for Smart City, and selected contractor for finalization of 100 BQS locations across city; • Locations are finalized based on the parameters like landuse, ridership, catchment, distance, space availability, traffic density, etc.; • The parameters are as per the directives of MoUD guidelines and also as per the national best case practices; • Following methodology/ approach is adopted - mapping of tentative BQS location on map based on majorly two criteria's- distance and adjacent catchments/ activities (high residential, commercial, educational activities, industrial zone etc.)- Joint site visit with UMC, PMC, and contractor to assess the ground condition of the marked locations (space availability, traffic density, landuse etc.)- briefing and finalization of marked location with ACE and Commissioner, UMC, On- site marking at finalized BQS location after receiving necessary approval from ACE and Commissioner, UMC; • The average distance between the two BQS is approximately 800- 900 M (more than the preferable range of 450- 750 M), as with only 50 BQS in phase I, the idea is to spread the 50 BQS across all the routes; • To retain existing bus shelters built in past under various initiatives, with necessary renovation and restoration to increase the reach of limited nos. of BQS for better PT operations; in- total 16 existing BQS has already been identified to be restored under SCP; • 40 BQS locations have been finalized till date at different routes with construction of BQS at 21 identified locations along with platforms at 6 other locations		
Learnings	• Identification of BQS locations can be done in office using satellite imagery and other material (city maps, peer discussion etc.) but site visits are must for finalization of BQS locations to get realistic feel of ground conditions. • Important to take tough decisions sometimes, as everybody want city to be smart, but nobody wants to see and allow any infrastructure component (be it BQS, light pole, transformer or any other) to be installed/ erected in front of the dead boundary wall of their premises.		

Table 10: Summary of Support Provided under Shakti Smart Cities Program vis- a vis Proposed Interventions under Smart City Projects (SCP)

Sector	Issues	Proposed Intervention under Smart City Projects (SCP)	Support Provided under Shakti Smart Cities Program
Public Transport	Due to lack of organized public transport, the current share of public transport is only 2%, resulting in a dependency on other private and IPT modes.	Modernization of existing City Bus Service by introducing comfortable GPS enabled semi-low floor buses as per UBS II, integrated with Command & Control Centre for overall controlling & monitoring	*Tender for Procurement and Operations of City Bus Services* ICLEI- SA has reviewed the bus procurement tender document and has given its recommendations based on city's requirements.
		Development of Smart Bus Queue Shelters (BQS) on PPP basis relaying real time information on buses through GPS enabled devices.	*Identification of BQS Locations* ICLEI- SA led the team of officials from UMC, PMC for Smart City, and contractor for finalization of 100 BQS locations across city (50 BQS in two phases). The locations are finalized based on the parameters such as landuse, ridership, catchment, distance, space availability, traffic density, etc. The parameters are as per the directives of MoUD guidelines and also as per the national best case practices
		ETM and Smart Card Readers on buses	
Intermediate Public Transport	Most of the shared autos do not meet the desirable emission norms and constitute outdated technology. Though shared autos have designated routes of operation, they do not operate on the same designated routes and create a chaotic scenario, which is visible in almost every part of the city.	Modernized IPT system that would cater to last mile connectivity needs introduction of GPS enabled BS III/ BS IV three/ four wheelers that enable better control & monitoring along withreal time information dissemination. This also includes CNG/ battery operated shared vehicles (e-rickshaws) in walled city on pre- defined routes.	*Introduction of electric- mobility in the city* Under the SDC funded CapaCITIES project, ICLEI- SA as a part of a pilot project assisted city in introducing e-rickshaws in the city, the results of which were used to develop an IPT Action Plan for the city. The e-rickshaws operations were closely monitored for 45 to 60 days on different parameters which includes technical and financial feasibility of e-rickshaw operations. The monitoring has helped in identifying various practical challenges and issues encountered in day to day operations of e-rickshaws.
		Introduction of Electric Vehicles	*IPT Action Plan* Based on the findings of Monitoring Plan ICLEI- SA developed and submitted an IPT Action Plan for Udaipur chalking out various strategies, suggestions and recommendations for phase wise scaling up of e- rickshaws along with phasing out of conventional auto rickshaws from the city.
Pedestrian and Non-Motorized Transport	Udaipur as a city still has approx. significant mode share of walking and cycling (~50%) and has high pedestrian movement in most parts of the city. However, the city lacks in pedestrian facilities such as footpaths with only 4% of the road network has footpaths, while 96% is devoid of the same. Lack in NMT infrastructure that would otherwise encourage the environment for the NMT movements as well as ensure the safety of the people.	Decongestion through pedestrianization and also by introducing Public Bicycle Sharing (PBS) System;	*Pedestrianization Plan in Walled City, commonly referred as 'No Vehicular Zone'- Planning and Pilot Demonstration* ICLEI- SA along with the city authorities has identified few roads in walled city to transform them as complete pedestrianized streets or vehiclefree streets and partial pedestrianized streets. A pilot exercise was carried out on one of the road stretch (from Rangniwas Chowk to Jagdish Chowk) and it was envisaged that the same shall be implemented on other identified road stretches after the completion of proposed off- street parking lots. As a part of Pedestrianization Plan, along with phase wise restriction of vehicular traffic, other components are also proposed which are in various stages of implementation (Procurement of e- rickshaws under SCP; Aesthetically designed traffic signage, keeping up with the traditional character of the city in mind; Traffic calming measures- implementation of speed breakers on the pilot road stretch already completed; 4. Construction of new off- street parking lots, 3 new parking lots under construction under SCP; visually compelling tensile Canopies etc.)
		Introduction of Public Bicycle Sharing (PBS) System	*Public Bicycle Sharing (PBS) System for Udaipur* ICLEI- SA initiated the discussions of introducing PBS for Udaipur with UMC and drafted Terms of Reference (TOR) to be used by prospective parties interested in initiating PBS operations in the city, documenting details like existing bicycling scenario, benefits and challenges for introduction and operations of PBS, different models of PBS in India & internationally, various PBS components, institutional framework etc. The entire TOR has been used in PBS tender document (in various sections)

Sector	Issues	Proposed Intervention under Smart City Projects (SCP)	Support Provided under Shakti Smart Cities Program
		Change in road cross- sections to introduce/ include wide pedestrian walkways, bicycle tracks.	*Hiran Magri Smart Road* As a part of various on- going projects under SCP, bicycle tracks are introduced as new cross- sections wherever possible. For Ex- the proposed design for Hiran Magri Smart Road has provisions for dedicated bicycle tracks.
Parking Management	The existing parking system is decentralized, unmanaged and largely dysfunctional. Large numbers of small parking lots dominate the scenario. The carriageway widths in major markets are further reduced due to the haphazard parking across resulting in reducing the overall traffic carrying capacity of roads.	Development of off- street parking lots including MLCP. Smart Parking Management System with VMS display for efficient utilization of parking space, smart metering for smart management of parking demand	*Parking Management Strategy for Udaipur* ICLEI- SA has drafted design interventions for Ashwini Bazaar that includes space for designated vending zone, parking and pedestrian walkways, signage, traffic calming measures etc., and has carried out on- site demonstration on a 50 M stretch to showcase the benefits of organized parking and other segregated spaces and also to test the feasibility of the proposed design; A Painting proposal is also developed as a soft measure to segregate the spaces as per the proposed intervention as a part of creating visually aesthetically streetscape in the city; A city level strategic document called Parking Management Strategy has also been developed proposing various city level interventions and recommendations for effective parking demand management which will be tabled soon for approval from State govt.
Decongestion by the means of Traffic Management and Junction Geometry Improvement			*Junction Improvement Plan for 8 Junctions across city* ICLEI- SA is involved in assisting the city to resolve access to the core city area: Access to the core city area is being resolved by suggesting design improvements to junctions. The junction improvement process included mapping of the junctions with activity mapping, traffic counts, local parking augmentation for all modes, public space development etc. Surajpole, a major junction in heart of Udaipur, was taken as pilot for junction improvement showcase with temporary installation at the junction as per design. The same exercise has been repeated at other junctions in subsequent months seeing the success of pilot at Surajpole. The design for 8 junctions has been submitted to UMC for them to taking up junction improvements at site.
Sustainable Built Environment		Placemaking of various squares and plazas in the area. This also includes necessary junction geometry improvements, as most of the pols are part of the junctions or are adjacent to them. Comprehensive study for Improvement of the public spaces and tourist spots within the old city by reorganizing the areas around historic city gates or pols, temples, & open spaces that have become encroached by parking, utilities, street vendors, etc. through various urban design, landscaping and traffic circulation treatments.	

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 Udaipur to showcase the impact of sustainable mobility interventions. SPV and the PMC consultants assisted the project team in various activities throughout project implementation. City associate was stationed within Udaipur 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

- Junction improvement for Surajpole
- On site demonstration for parking design at Ashwini bazaar
- Pedestrianization plan for walled city area
- Terms & reference for introducing Public Bike Sharing system in Udaipur
- Development of Hiran Magri road as a Smart Road
- Identification of bus que shelters
- Policy framework

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

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

Udaipur has shown lot of interest on projects which show impact on ground along with the policy initiatives. The city has floated tenders for various projects with assistance from the project team. It is anticipated that the city will continue to work on mobility projects with a focus on promoting public transport and non- motorized transport.

5.3 WAY FORWARD

Since the support to Udaipur 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

Urban mobility is the important topic of discussion among the city stakeholders, and is one of the primary components of SCPs with more than 10% budgetary allocation towards various traffic and transport initiative from the total budget under SCP. While the city has been able to seek assistance from the project team ICLEI SA successfully, at the same time it has been a great learning experience for the project team in dealing with various govt. agencies and departments, its officials, and political representatives as well on day to day basis.

1. **The challenges, limitations, learning's from the engagement are listed below.**
   Important to conduct pilot projects

   As the heading suggest, it is important to conduct pilots for all the projects (if the conditions permits), irrespective of the scale and size of the projects. Pilot demonstrations provides an opportunity to make necessary modification(s) in the proposals, based on the actual ground condition, which might have been missed or gone unnoticed while drawing the proposal.

2. **Important to have advance resource planning while executing pilots projects**

   As stated above, it is important to conduct pilot demonstrations, if possible to test the feasibility of the proposed interventions in 'real world scenario' and also to showcase the benefits and usefulness of the proposed interventions if they were to be implemented on a city scale.

   However, prior to conducting pilots, it is very important to plan and put in place all the project requirements and resources (infrastructure, man, machinery etc.) beforehand to avoid last minute hassles on ground as more often than not the inadequate provisions will not allow the project implementation in a way it was envisaged, leading to possibility of the project failure, and sometime might lead to project getting shelved citing the pilot failure, without realizing that pilot failed not because of any technical problem in the proposal but because of poor resource planning.

3. **Important to have quality Total Station Survey (TSS)**

   Authorities/ city officials in Udaipur now have learnt the importance of conducting quality Total Station Survey (TSS) for any physical project, and also of appointing a competitive and qualified agency for conducting the same, so as to have exact on- ground situations on which proposal shall be developed. It is almost now a mandate to have a quality TSS done before taking up any new project.

4. **Important to disseminate project information/ proposals to all the concerned stakeholders**

5. **For success of any project, it is imperative to have inclusive and participatory planning that includes dissemination of project information/ proposals to all the related stakeholders – governmental and non-governmental.**

The level of information which needs to disseminate to different groups depends on the complexity of the project/ activity and also on the level of understanding of each group. For eg. decision makers along with execution, monitoring and enforcement team should know the proposed interventions in detail while media, electric media, and general public may be briefed on the overall proposal to avoid any last minute surprises/ chaos and also for their acceptance to gain necessary support and cooperation.

6. **Important to build capacity of Local Staff**

As the heading suggest, it is very important to build capacity of local staff beginning from junior level to senior most level, based on the roles & responsibilities of the officials during the course of the engagements. This is not only beneficial to the project 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.

In the process, it also helps in strengthening the ULB capacity and liberates them from person, project, government mission, scheme or program to plan and implement the project which has immense societal benefits.

7. **Important to have process driven project and not person driven project**

As the shuffling of officials is common and sometimes frequent across government offices, it is important to have process driven projects, the progress of which is free of inter and intra department transfers of officials, hence will not see any delays in project progress.

8. **Important to have extensive Communication and Outreach Activities**

Communication & Outreach (C&O) activities before and during the implementation of the any project is one of the most important factors in success of the project. The C&O activities should be treated as serious and important factor by the city authorities for greater success and desired outcomes of the project and not just a resource draining exercise. Users should be told and made aware about any new initiative and its benefits via right channels.

Creating awareness among the target group is an on-going process and generally is a time taking exercise, and if done in rightly manner with right information can have very positive results and outcomes, leading towards greater success of the project and lesser confusion among its users. Awareness via free social media (Facebook, Twitter etc.), loop messages on local FM channels for certain duration, print media (newspapers, local weekly, monthly magazines etc.) can have great impact in creating brand building.

ENDNOTE

1 Interim CDP, Udaipur 2014
2 Rajasthan Tourism Development Corporation (RTDC), Udaipur
3 Regional Transport office (RTO), Udaipur
4 Interim CDP, 2014, Udaipur
5 Low- Carbon Comprehensive Mobility Plan (LCMP) for Udaipur, 2014. A UNEP funded study
6 Garage Section, UMC
7 LCMP, 2014, Udaipur
8 LCMP, 2014, Udaipur
9 LCMP, 2014, Udaipur
10 Refer Report titled 'Pedestrianization Plan in Walled City- Vol II,' by ICLEI- SA
11 RTDC, Udaipur
12 Road Network- Total Station Survey (TSS), PMC for Udaipur Smart City Ltd.
13 The Average tourists influx during peak tourists season is 0.085 million (highest at 0.1 million), compare to average of 0.045 in off season, Source- RTDC, Udaipur
14 300 out of total 420-450 hotels (approx. 70%) are located within the walled city, Source- RTDC, Udaipur
15 Source- Engineering Section, Nagar Nigam, Udaipur
16 The average tourists influx during peak tourists season is 0.085 million (highest at 0.1 million), compare to average of 0.045 in off season, Source- RTDC, Surajpole, Udaipur
17 Guidance document for PB for MoUD by IBI, Nov'16
18 ATL- 5.09 km, LCMP, Udaipur 2014