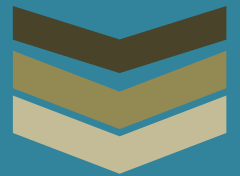


PROJECT MANAGEMENT CONSULTANCY FOR IMPLEMENTATION OF SMART CITY MISSION PROJECTS FOR MANGAL URU CITY

DETAILED PROJECT REPORT – SMART BUS SHELTER AND E-TOILET IN PAN CITY AREA PHASE - II



The purpose of the Detailed Project Report is to provide details of various considerations made towards the elements proposed for the project as mentioned in the title above. It aims to give a basic design idea to all the stakeholders before proceeding for final design and estimates.

MANGALORE SMART CITY PROJECT

Lalbagh, M.G. Road, Mangalore

- 575003

Mangaluru Smart City Limited (MSCL)

3/2/2018

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ISSUE AND REVISION RECORD

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ABBREVIATIONS

ABD	Area Based Development
ATM	At The Moment" or "Automated Teller Machine
MCC	Mangaluru City Corporation
MSCL	Mangaluru Smart City Limited
<i>GoI</i>	<i>Government of India</i>
<i>GoK</i>	<i>Government of Karnataka</i>
<i>SCP</i>	<i>Smart City Proposal</i>
SPV	Special Purpose Vehicle
IRC	Indian Road Congress
IUT	Institute of Urban Transport
KUIDFC	Karnataka Urban Infrastructure Development & Finance Corporation Limited
SCP	Smart City Proposal
SLNA	State Level Nodal Agency
ROW	Right of Way
MESCOM	Mangalore Electricity Supply Company Limited
KSRTC	Karnataka State Road Transport Corporation
LED	Light Emitting Diode
CCTV	Closed-circuit television
MoUD	Ministry of urban Development
IT	Information Technology
ICT	Information and Communication Technology
ITS	Intelligent Transport System
ITMS	Intelligent Traffic Management System
O&M	Operation and Maintenance
DPR	Detailed Project Report
RFP	Request for Proposal
SOR	Schedule of Rates
PWD	Public Works Department
RTO	Regional Transport Office

1. INTRODUCTION

1.1. Mangaluru Smart City Proposal

Karnataka Urban Infrastructure Development & Finance Corporation Limited (KUIDFC) is the State Level Nodal Agency (SLNA) for the Smart Cities Mission in Karnataka. ***Mangaluru was a proud Participant in second round of this Challenge and now aspires to translate the vision i.e. the broad components across both 'area-based' and 'pan-city' heads identified in the Smart City Proposal (SCP) into reality.***

Mangaluru Smart City Proposals (SCP) is considered as Area Based Development Proposals (ABD) and Pan City Proposals. The SCP has identified 65 projects/sub projects to be taken up under ABD and Pan City Proposal.

As part of the Smart City Proposal a last mile connectivity plan was developed detailing the potential development zone and its connectivity through public transport, primarily city bus service. Figure-1 below shows the extent of Mangalore Corporation limits including the ABD Area with the proposed connectivity plan.

This plan was referred as the base information for identifying the locations and typologies of Smart Bus Shelters in ABD and Pan City Area

To implement the same, following three projects were identified for ABD and Pan City Development:

ABD Area

1. Implementation of Smart Bus Shelters
2. E-toilets along with Smart Bus Shelter

Pan City Development

1. Bus Shelters with Wi Fi and E-Toilets

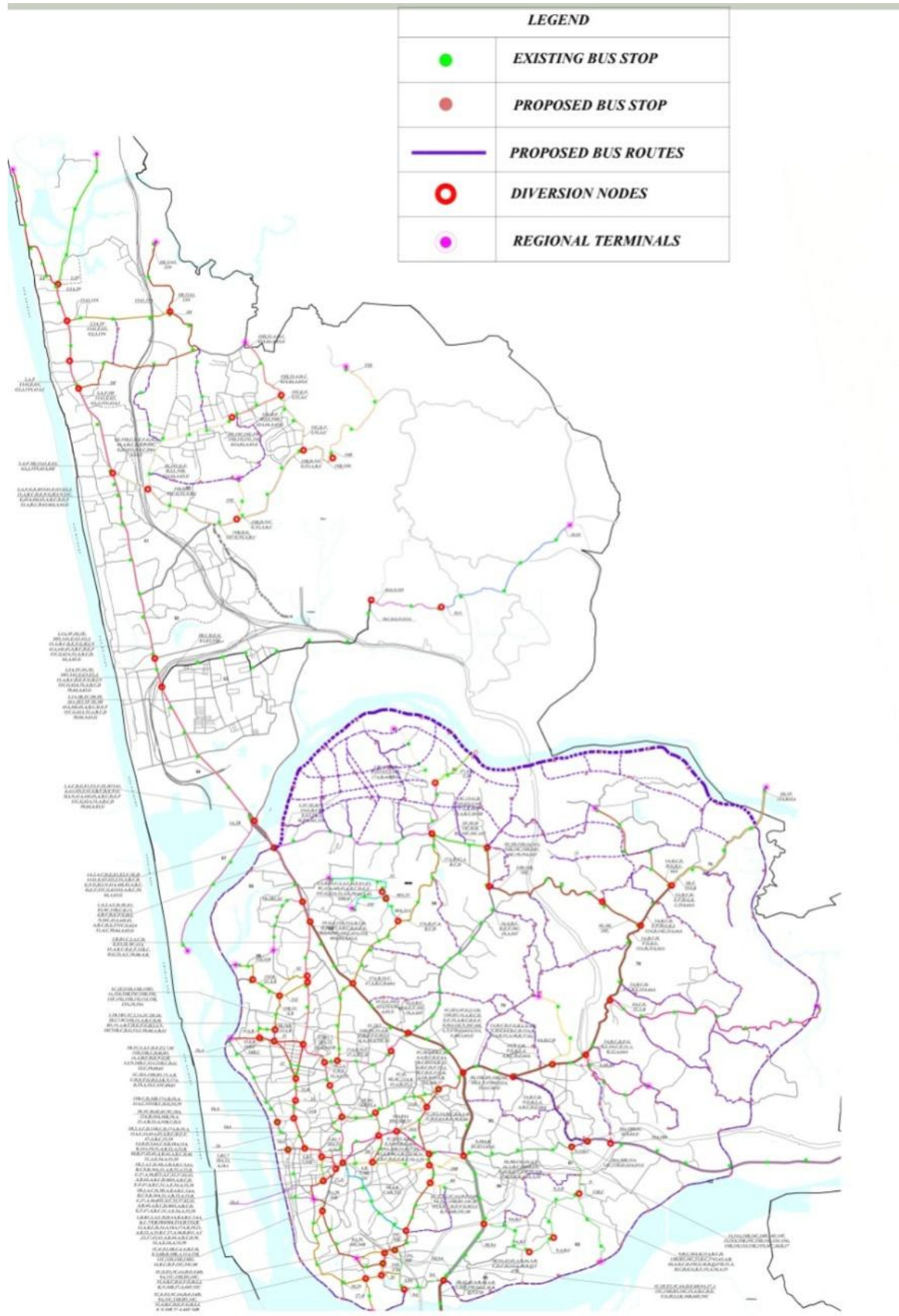


Figure 1 Existing and Proposed Bus Route Proposed as part of the Mangalore SCP - Annexure 3

1.2. Implementation of Smart Bus Shelter and E-toilet under Mangaluru Smart City Project

As part of the implementation strategy a comprehensive list of 235 numbers of existing and proposed bus shelters was prepared.

As part of the Phase – 1, after much deliberation and rationalization, 22 locations are finalized for implementation of Smart Bus Shelters. These locations were further analyzed for typology of Bus Shelters to be implemented. The implementation of E-Toilets at critical locations is also proposed as part of the Phase – 1 implementation strategy.

Similarly, for Phase -2 implementation joint site visits were conducted by Managing Director- MSCL, Staff of MSCL and Project Management representatives to finalized the number and location of Bus Shelters. A final list of 24 locations was finalized.

The remaining Bus Shelters shall be undertaken as part of implementation strategy for Smart Roads and future implementation phases.

A Figure 2 below shows the identified locations of the 24 Bus Shelters.

A joint reconnaissance survey was carried out at all the proposed locations. The list and photos of these locations are covered in the following sections of this report.

1.3. List of Bus Shelter

Sr.No.	Code	Location	Dimension	Bus Bay
1	A1	Lady Hill, Cemetery Side	Bus Shelter- 2.65x8.5	Bus Bay- Available
2	A2	Bharath mall, Towards Kottara Cross road	Bus Shelter- 1.9x4.8	Bus Bay- No sufficient space
3	A3	Circuit House, Near Police station, Kadri	Bus Shelter- 2.65x8.2	Bus Bay- no sufficient Space
4	A4	Pumpwell, Near Indiana Hospiital	Bus shelter- NA	Bus Bay- can be provided
5	B1	Surathkal, Opp Market	Bus Shelter(consuming bus bay)- 3.65x7.4.	Bus Bay- Available
			Footpath- 1.6 m	
6	B2	Gurji Centre	Bus Shelter- NA	Bus shelter- May be provided
7	B3	Near Indira Hospital, Falnir Road	Bus Shelter-4.27x1.52	Bus Bay- Available
8	B4	Panjimogeru	Bus Shelter-	Bus Bay-
9	B5	Kunjathbail Circle	Bus Shelter- 2.1x5.3	Bus Bay- Insufficient Space
10	B6	Mahalingeswara temple, Airport road	Bus shelter- NA	Bus Bay- Available
11	B7	Mahakali temple, DerebailChonchady	Bus shelter- 2.1x4.6	Bus bay- Insufficient Space
12	B8	Bijay church, near Auto stand	Bus Shelter- NA	Bus Bay- insufficient space
			Foot path- 3.4 m	

Sr.No.	Code	Location	Dimension	Bus Bay
13	B9	KotiChennya Circle, Towards Morgan Gate	Bus Shelter- 2.75x5.6	Bus Bay- Insufficient Space, Trees need to be cleared.
14	B10	8 th Block, Chokabettu junction	Bus Shelter- 0.67x6	Bus Bay- Insufficient Space
15	B11	Khanna junction	Bus Shelter- 1.9x3.48	Bus Bay -Holy Tree need to be Cut for Bus Bay
16	B12	Ganeshpura, opp Post Office	Bus Shelter- 2.15x5.9	Bas Bay- Available
17	B13	7th block, Krishnapura	Bus Shelter- 1.9x6	Bus Bay- Insufficient Space
18	B14	KIADB	Bus Shelter- 2.6x7.2	Bus Bay- Insufficient Space
			- 3.65x2.95	
19	C1	Vidyanagar Cross, Panjimogeru	Bus Shelter- 1.9x3.2	Bus Bay- Insufficient Space
20	C2	Markada Junction	Bus Shelter- 2.5x3.85	Bus Bay- Insufficient Space
21	C3	4th Mile, Airport road	Bus Shelter- NA	Bus Bay- Available
22	C4	Maramikatte circle	Bus Shelter- 3x6.5	Bus Bay- Insufficient Space
23	C5	Taneerbhavi Beech, ferry side	Bus Shelter- NA	Bay Bay- Insufficient Space
24	C6	Paldane	Bus Shelter- 1.52 x 4.7	Bus Bay- Insufficient space

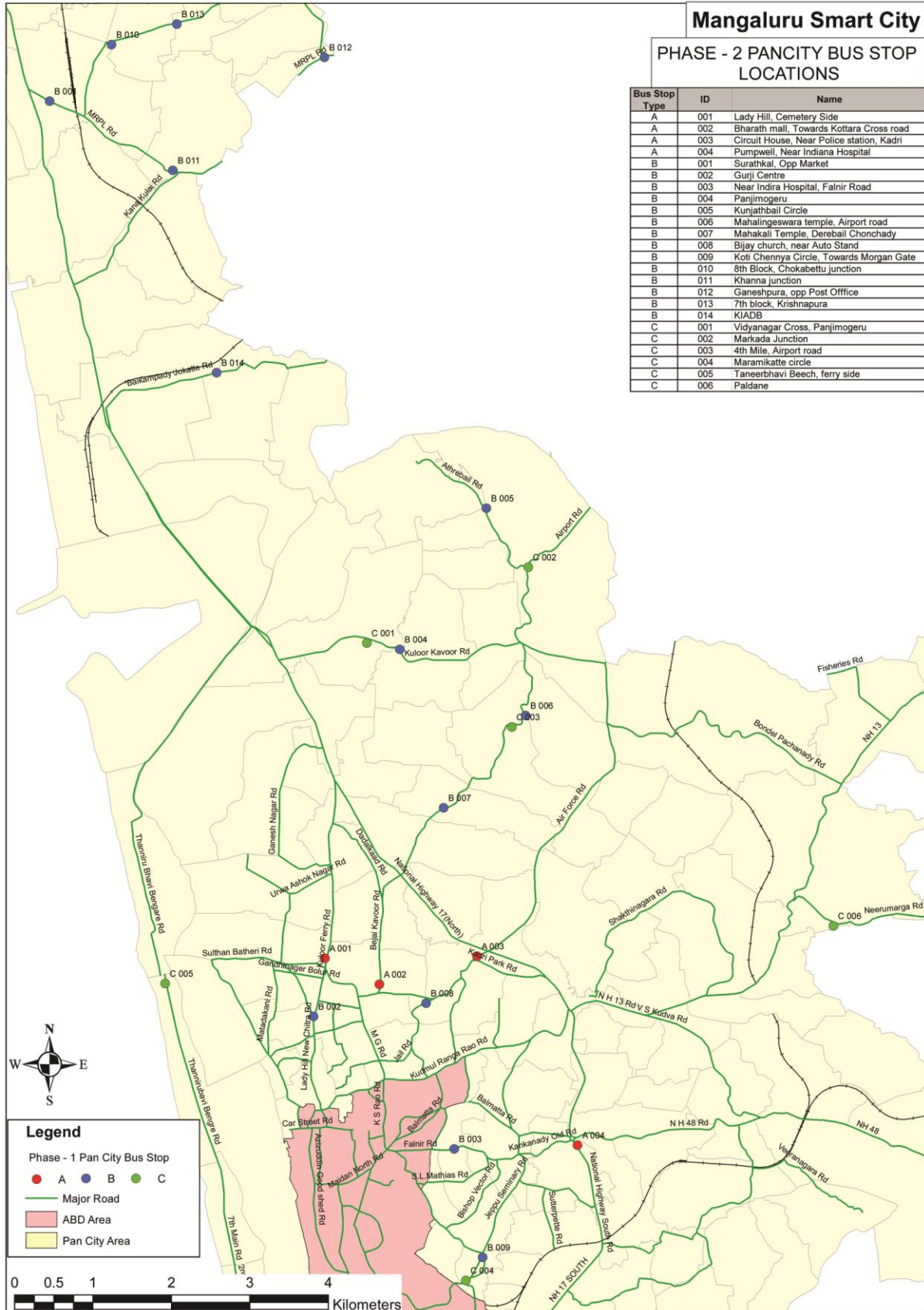


Figure 2: Phase 2 - PANCITY Bus stop Locations

2. NEED FOR INTERVENTION

2.1 Current Scenario

2.1.1. Bus Shelters

For a long time, bus shelters have remained virtually unchanged. Typically, they have provided as a sitting area that can be used while awaiting transportation, as well as shelter from the natural elements like sun, wind and rain. It is also regarded as a mounting surface for static advertising. Bus Shelters have also been a cost to transportation authority. An initial capital investment is required to build them and some level of on-going expenditure is needed for maintenance. This further affects the quality of these structures rendering it unfit for use in long run. Second reason also has been that due to lack of proper funding the Shelters are installed in phased manner or through funding from other organization thereby leading to varied look lacking uniformity.

Figure 3 below depicts the typical Bus Shelter as can be observed in Mangaluru



Figure 3: Existing Bus Shelters

New technologies and applications are now being used that enable bus shelters to be much more than just a waiting space. In fact, new outsourced business models are relieving the transportation authority of the initial capital expenditure (CAPEX) and annual operating expenditures (OPEX), and provided an annual revenue stream for the leased locations. The shelters are becoming a cost to a profit center.

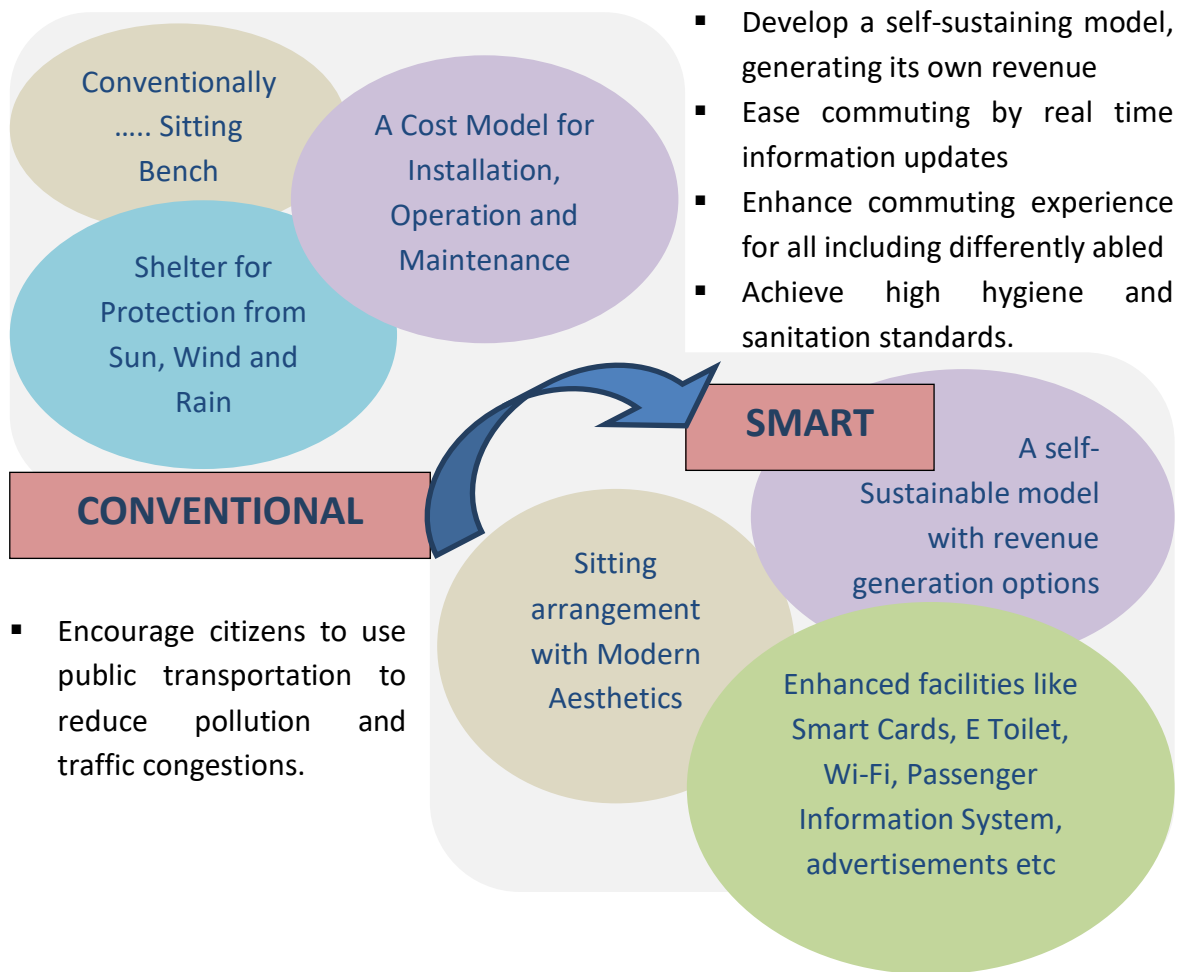
2.1.2. Toilets

Providing a hygienic accessible convenience facility is one of the prime agenda of most of the Municipal Corporations. Mangaluru Corporation is promoting use of

public toilet and making city open defecation free. However, an environment friendly toilet which operates without manual intervention is the need of the hour. Under the Smart City Proposals, Mangaluru has also opted to provide E-Toilet facilities along major populated roads and market streets. It is proposed to provide the facilities along the Smart Bus Shelters which also are major waiting areas for commuting population.

2.2. Need for Proposed Intervention

Smart Bus Shelters..... Transforming from Costs to Revenue Models



2.3. Proposed Interventions

2.3.1. Overall Approach

After preparation of the base data and finalizing the number of Bus Shelters to be implemented a site visit to conducted to carry out a visual survey of the locations and finalizing the shelter locations to be implemented in Phase – I. Different prototypes were developed, namely Type A, Type B and Type C, to suit the site requirement. The tender for the same was floated for the following locations:

SR#	BUS STOP TYPE	LOCATION
1	A	Mak Mall
2	A	Gerosa School
3	A	Opp. St. Agnes College
4	B	Opp. Kadri Market
5	C	Opp. Kadri Service Station
6	B	KPT Junction
7	B	KPT Junction
8	A	Bondel Junction
9	B	Kavoor Junction
10	B	Mullakad
11	B	Kottara Cross
12	C	OppBharath Mall
13	C	Bharath Mall
14	A	MCC Commissioner Complex
15	B	MCC Commissioner Complex
16	A	Urva Store Junction
17	B	Padavinangady Junction
18	B	Chillimbi
19	A	Katipalla Junction
20	A	Hotel Lalith International
21	C	Amul Ice Cream, Opp City Hospital
22	C	Kodikal Road, Near Govt. School

A similar exercise and reconnaissance surveys were carried out for the next implementation Phase. Learnings from Phase 1 were analyzed to maximize the number of Bus Shelters in Phase 2 of the project.

2.3.2. Components of Smart Bus Shelters

We envision that in addition to providing the inherent purpose of sheltering from sun, wind and rain, a place to sit and a static advertisement places the new bus shelter should provide you with the following functions:

- a. **Provide real time transit data** like route numbers, arriving buses with their estimated arrival time.
- b. Provide **interactive data** to the users such as **bus route maps and guides**.
- c. It should be **user friendly** for elderly, children and physically challenged including tactile and braille boards for visually impaired.
- d. Provide safety by means of **increasing visibility for waiting commuters**
- e. Provide **ICT facilities like WiFi Hotspots and mobile charging point**.
- f. Provide **space for advertisements**.
- g. Should be **low and maintenance**.

2.3.3. Components of E-Toilet

E-toilet was conceived with an aim to address the issues associated with traditional public toilets– namely, non-availability of water, power, manpower, lack of maintenance and sustainability. Shortage of personnel was another important pain-point, often hindering sustained service to the users.

Eram Scientific launched e-Lite 14, the world’s cheapest solar-powered unmanned e-toilet for schools, in October, 2014. It incorporates a full-cycle approach in sustainable sanitation, by integrating electronics, mechanical, web-mobile technologies, thereby controlling entry, usage, cleaning, exit, and remote monitoring capabilities with multiple revenue options. The insertion of a coin opens the door of the e-toilet for the user, switches on a light—thus saving energy—and even directs the person with audio commands. The toilets are programmed to flush 1.5 litres of water after three minutes of usage, or 4.5 litres if usage is longer. It can also be programmed to clean the platform with a complete wash-down after every five or 10 persons use the toilet.

An integration of E-Toilet and Smart Bus Shelter is proposed for Mangalore Smart City Project. Design option is being developed for efficient integration of the same.

Some of the features of E-Toilet proposed for Mangalore Smart City shall be:

- Automatic Payment Collection & Access Controls
- Alerts to Users
- Display Boards
- Sensor-based interior facilities

- Automatic Closet Washing & Platform Cleaning
- Traditional Power & UPS
- Water Tank
- External advertisement panels
- Touch free cleaning

2.3.4. Expected Benefits and Beneficiaries

The Bus Shelters with E- Toilets and Wi-fi are proposed to offer the following benefits to the identified beneficiaries:

- **Citizens / Commuters**
 - a. Easy of commuting by real time updates of upcoming buses, timetables etc.
 - b. Wi-Fi hotspots for availing the required data.
 - c. Enhanced travel experience and make waiting an entertaining experience
 - d. Easy access to public sanitation facilities along travel routes.
- **Local Authority/ MCC:**
 - e. Reducing traffic congestions and pollution by encouraging public transport.
 - f. Maintain hygienic environment by reducing open defecation.
 - g. Generate revenue through advertising spaces which can alternatively reduce the operational cost and generate profits.
- **Businesses**
 - h. Prime locations for marketing hoardings for maximum reach
 - i. Further addition of stalls can be conceptualized.

2.3.5. Assumptions/Prerequisites

The identified project of E-Toilets and Smart Bus Shelters although is categorized as a fast track and short duration projects, following are the concerns areas which need continuous monitoring and periodic evaluation, as this may affect the project timelines:

- a. **Dependability of Road Up gradation works and other smart city applications**

The new Smart Shelters and e-Toilets within the ABD Area are primarily envisaged along the smart roads as identified in the SCP. This work also involves widening of road which in turn involves demolition of existing structures within the proposed ROW and acquisition, which is a time consuming process. This may inversely affect the implementation timeline of the project.

b. Availability of Services

The project cost and timelines would also depend on the availability of on-site services like sewage network. In absence of municipal sewage connection for E-toilet, on site provision for a STP or alternate bio-digester needs to be made, which may escalate the cost and project timelines.

c. Effective selection of project locations and unit ratios

Considering the cost allocated for the project an efficient ration of integrated E-Toilet / Smart Bus Stop and Standalone Smart Bus stop is essential as this would affect the number of installations throughout the ABD area.

2.3.6. Stakeholders/ Organizations involved

- Citizens
- Mangaluru Smart City Limited (SPV)
- Mangaluru City Corporation
- Regional Transport Office, Mangaluru
- Mangaluru Smart City PMC
- Karnataka Public Works Department – Mangalore Division
- Traffic Police / RTO
- Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC)
- Mangalore Electricity Supply Company Limited (MESCOM)
- Karnataka State Road Transport Corporation (KSRTC)
- Private Bus Operators Association

3. Site Reconnaissance and Situation Analysis

Site Reconnaissance was carried out at finalized 24 locations. The summary of the Bus Shelters and E-Toilets to be implemented in Phase 2 is as follows:

Type A Bus Shelter = Bus Shelter +E Toilets – 4 nos

Type B Bus Shelter = Stand Alone Bus Shelter – 14 nos

Type C Bus Shelter = Bus shelters in interior area having less crowd – 6 nos

1	A1	Lady Hill, Cemetery Side	Bus Shelter- 2.65x8.5	Bus Bay- Available
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2	A2	Bharath mall, Towards Kottara Cross road	Bus Shelter- 1.9x4.8	Bus Bay- No sufficient space
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3	A3	Circuit House, Near Police station, Kadri	Bus Shelter- 2.65x8.2	Bus Bay- no sufficient Space
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4	A4	Pumpwell, Near Indiana Hospital	Bus shelter- NA	Bus Bay- can be provided
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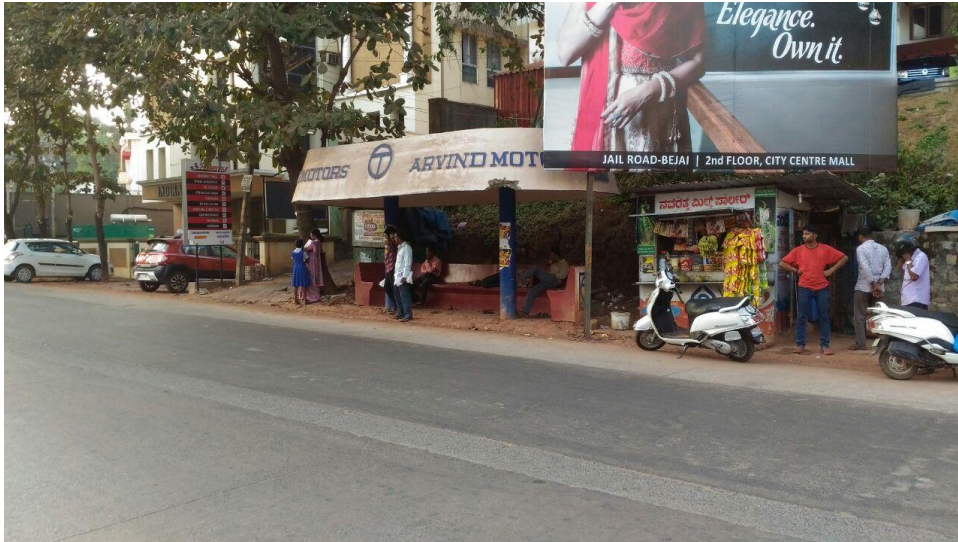
5	B1	Surathkal, Opp Market	Bus Shelter(consuming bus bay)- 3.65x7.4. Footpath- 1.6 m	Bus Bay- Available
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6	B2	Gurji Centre	Bus Shelter- NA	Bus shelter- May be provided
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7	B3	Near Indira Hospital, Falnir Road	Bus Shelter- 4.27x1.52	Bus Bay- Available
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8	B4	Panjimogeru	Bus Shelter-	Bus Bay-
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9	B5	Kunjathbail Circle	Bus Shelter- 2.1x5.3	Bus Bay- Insufficient Space
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10	B6	Mahalingeswara temple, Airport road	Bus shelter- NA	Bus Bay-Available
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11	B7	Mahakali temple, DerebailChonchady	Bus shelter- 2.1x4.6	Bus bay- Insufficient Space
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12	B8	Bijay church, near Auto stand	Bus Shelter- NA Foot path- 3.4 m	Bus Bay- insufficient space
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13	B9	KotiChennya Circle, Towards Morgan Gate	Bus Shelter- 2.75x5.6	Bus Bay- Insufficient Space, Trees need to be cleared.
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14	B10	8 th Block, Chokabettu junction	Bus Shelter- 0.67x6	Bus Bay- Insufficient Space
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15	B11	Khanna junction	Bus Shelter- 1.9x3.48	Bus Bay -Holy Tree need to be Cut for Bus Bay
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16	B12	Ganeshpura, opp Post Office	Bus Shelter- 2.15x5.9	Bas Bay- Available
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DETAILED PROJECT REPORT – SMART BUS SHELTER AND E-TOILET IN PAN CITY AREA – PHASE II

17	B13	7th block, Krishnapura	Bus Shelter- 1.9x6	Bus Bay- Insufficient Space
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18	B14	KIADB	Bus Shelter- 2.6x7.2 - 3.65x2.95	Bus Bay- Insufficient Space
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19	C1	Vidyanagar Cross, Panjimogeru	Bus Shelter- 1.9x3.2	Bus Bay- Insufficient Space
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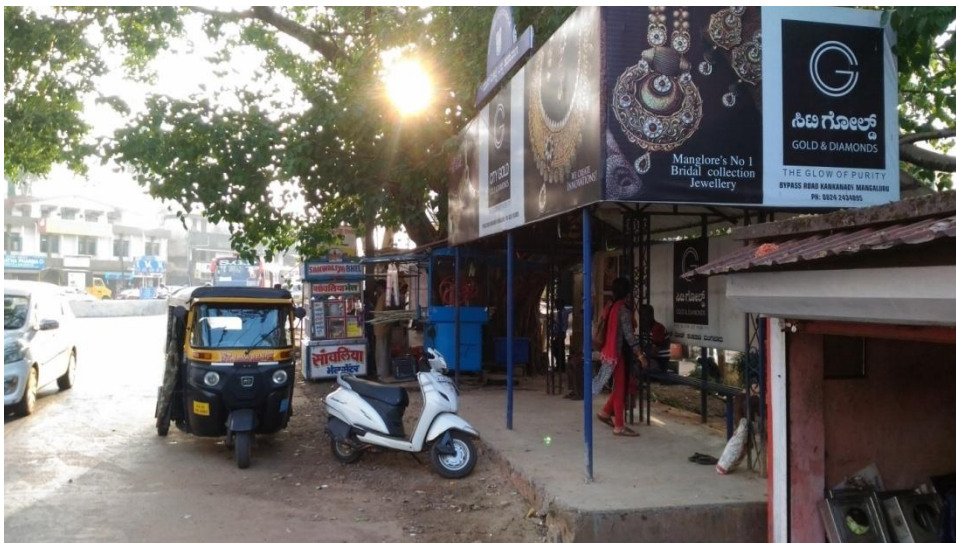
20	C2	Markada Junction	Bus Shelter- 2.5x3.85	Bus Bay- Insufficient Space
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21	C3	4th main, circle point, Airport road	Bus Shelter- NA	Bus Bay- Available
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22	C4	Maramikatte circle	Bus Shelter- 3x6.5	Bus Bay- Insufficient Space
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23	C5	Taneerbhavi Beech, ferry side	Bus Shelter- NA	Bay Bay- Insufficient Space
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24	C6	Paldane	Bus Shelter- 1.52 x 4.7	Bus Bay- Insufficient space
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4. Bus Shelter Design

4.1. Development of Form

Traditional Mangalore House is associated with sloping roof with Mangalore tiles. The design takes inspiration from this shape and is manifested to suit the requirement. The shape is used in creating the form but the roof is kept flat considering the limited surface area, with proper down rain water down take pipes. The same theme is attempted to be continued in all the variations.

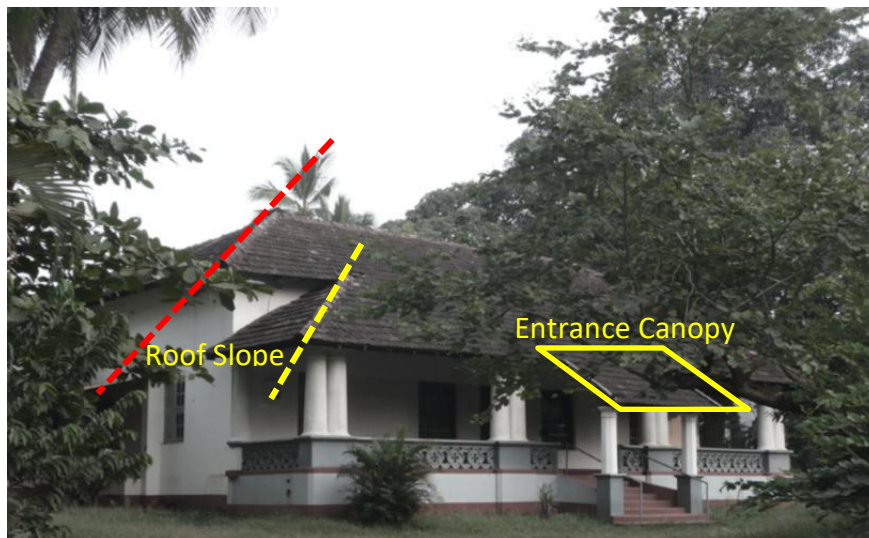


Figure 4: Traditional Mangalore House



Figure 5: Existing Bus Shelter Design

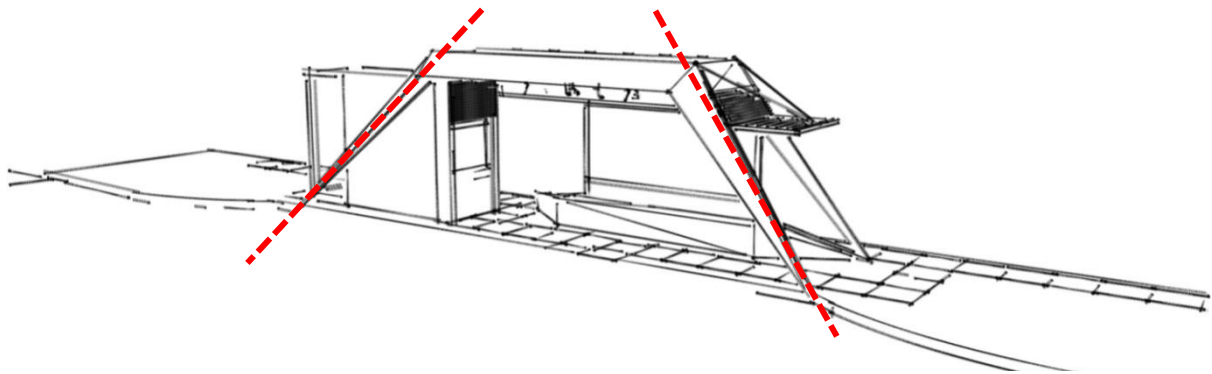


Figure 6: Proposed Modular Design

4.2. Climatic Consideration

Considering the heavy rainfall and bright sunny days, the shelter is designed to receive shading canopies to suit the alignment. The bus shelters are provided with a drop panel (*Name Panel*) of 750mm along the front face. This panel reduces the effective impact area of wind blown rain and sunlight penetration into the bus shelter space. All the shelters have been provided with canopies along its shorter sides which provides additional protection against rain and sunlight.

The back of the bus shelter is provided with advertisement panels thereby shading the waiting area. In addition to the shading, the full size advertising panels prevents any wind blown rain and subsequent splashing on the ground.

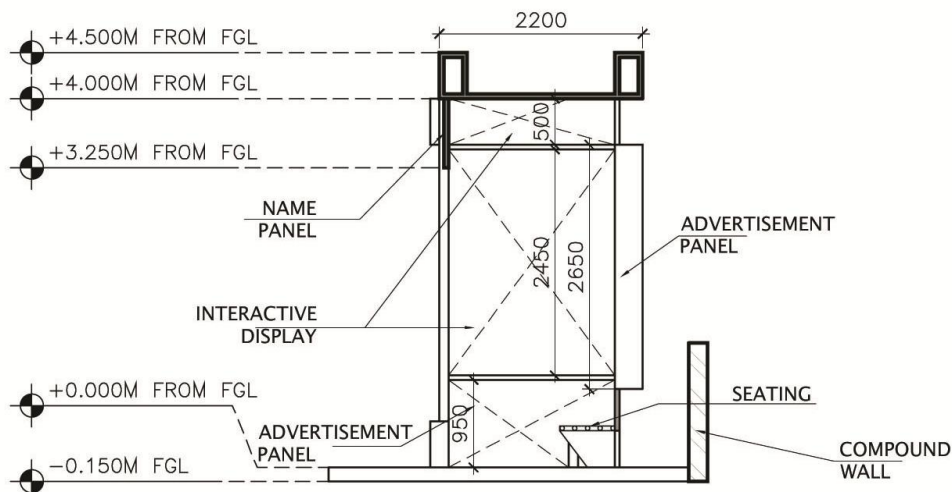


Figure 7: Proposed Section showing additional Canopy Arrangement

4.3. Future Proofing

The bus shelters are design with the intention of adding green or security features if required at a later date. The roof is designed to take solar panels as per the required alignment irrespective of the location.

The shelters also have a designed plug in capacity for CCTV and WiFi router if need to be added at a later date without damaging the structure or finishes.

The finish of the bus shelter is in SS 304 to avoid any rusting due to Mangalore’s proximity to sea. The seats and other components like dustbin area also design in SS 304 for longevity and easy maintenance.

4.4. Integrated E-toilets

In the current scenario the E-toilets are installed as standalone units which differ in its aesthetics than the surrounding street furniture. As such at some Public spaces it is often perceived as an eye sore. The current design aims to integrate the E-Toilet with the Bus Shelter design there maintaining the aesthetics of the entire shelter as a whole. Due care is taken to maintain privacy at entrance of E-toilets without compromising on accessibility to physically challenged.

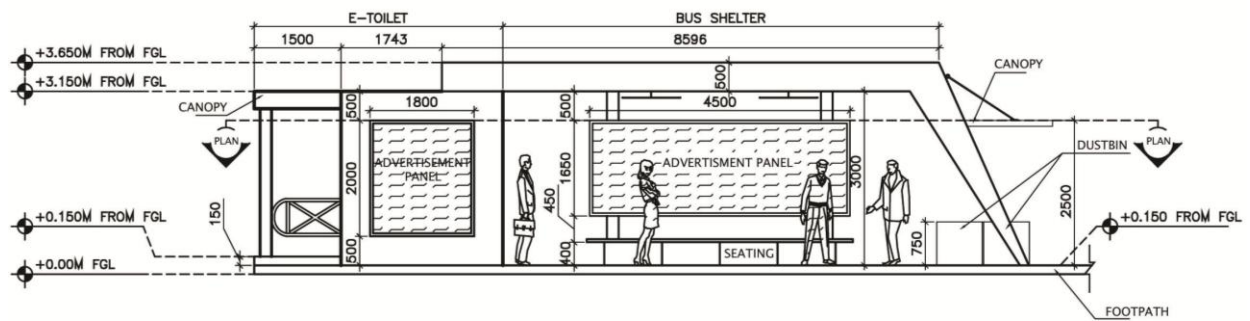


Figure 8: Elevation of Type A Prototype

For detail drawings refer to Annexure 1

5. Design Specifications

5.1. Bus Shelter (All Proto Types)

Bus shelter shall conform to the following parameters:

1. Bus Shelter – BS shall serve as an all-weather shade for the bus commuters.
2. The structure shall be designed to withstand wind load according to regulations.
3. The display systems can have fixed or scrolling faces with back light.
4. The Side Display board for all Prototypes (A, B and C) to have 1100X400mm Electronic display connected with WIFI to show schedules and bus Status. The electronic display board to be of LED Scrolling type with Oval, 4.3 x 5.1mm dia. Diffused. LED's having Amber colour.
5. Bus shelter shall be made of SS 304 frame work with brush steel finish, Insulated Galvalume roofing design to receive load of solar panels in future and electronic circuit to control its lighting.
6. The seating shall be made of SS 304 tubular sections for seat and back rest with adequate mid span support brackets and floor support. The benches shall be modular type with the each unit size of 4500mm x 600mm with a minimum backrest support of 450mm.
7. All the steel parts shall be SS as per the grade mentioned to withstand the local climatic conditions and aluminum parts shall be anodized or powder coated to give longer life and better quality. The material used shall be unaffected by outdoor exposure.
8. The materials used shall be Non-flammable.
9. The Foundation slab shall be made in min M25 concrete. The cast iron nuts, bolts shall be rust proof hot deep galvanized powder coated etc.
10. The display shall be covered using toughened glass/ acrylic, with protective frames on its edges.
11. The Parts used shall not be fragile and safely secured to its foundation with anchor fasteners which makes the furniture more stable and joint fasteners not visible from outside. None of the joints shall be visible from outside the furniture and it is completely sealed. Opening shall be by specialized key.
12. There shall be no falling parts, no sharp edges involved in the furniture all the parts shall be well fastened. The foundation used shall be designed in order to take loads from wind and persons leaning over the panel.
13. Dual bin system should be adopted one for recycle waste & other for dry waste. Sizes may vary as per the manufacturer, recommendations are as per the drawing shown. The system should have minimum ground footprint. Each bin shall be with minimum capacity of 70Ltrs. It should be open-able completely for ease in emptying & cleaning.
14. Interactive Information Panel shall be installed in Type A and Type B Bus Shelters as per the design, equipped with touch/ smart panels. The panel shall be display equipment with information area of 1400 x 1400 and touch screen LED display panel of area not less than 600-900mm with integrated 8mm toughened glass. The metal body shall be powder coated and with graphic imprints.

15. Advertisement Area shall be integrated within the design of the Bus Shelter. This shall be backlit type with SS box framing sides and back complete with electric supply provision. The face shall be of acrylic to prevent vandalism of the advertising panel.
16. Provision for installing outdoor Wi-Fi Router shall be made with integrated conduit for data cable.
17. Provision for installation of Robust IP bullet camera with infrared illumination for outdoor HD surveillance applications.

5.2. E-Toilets

E-Toilets, shall confirm to the following parameters;

1. The external wall and roof of the toilet cubicle shall be fully water tight and weather proof.
2. The roof of the toilet blocks shall be so designed that no water accumulation takes place.
3. The external finish shall be weather proof
4. Each toilet cubicle shall be fitted with Coin validator system for entering to the toilet.
5. Internal finish and assemblies of the toilet should be fully water and leak proof
6. Smart features like Pre Flush, Auto flush, automatic platform cleaning mechanism (to clean the toilet before and after usage) shall be provided.
7. Occupancy indicator with LED display shall be provided on outside of the toilet
8. Display boards where instructions in Hindi, English and local language shall be written for the aid of the user. Such display boards shall be distinctly visible during night hours.
9. In built water tank with LED indicator showing water level shall be provided.
10. GPS Connectivity provision, which will help in the monitoring the health status of the unit from a remote location.
11. Power and water backup for its users in case of sudden power outage or water discontinuation

5.2.1. Material Specifications for miscellaneous components

Each toilet shall be conforming to following technical specification for miscellaneous components of E toilet		
Sl. No.	Items	Specification
1	Inside Area	Width : 1900 minimum, Length : 2500 minimum, Height : 2400 mm minimum all materials inside using Stainless Steel 316 grade
2	Exterior area	Exterior area measurements covered with Aluminium Composite Panels/Glass or similar aesthetic material as per design
3	Floor	Floor upper layer stainless steel AISI 316 with 3 mm thickness perforated & non slippery. Floor inner layer water proof and ventilated 1 mm stainless steel sheet with AISI 304 slopped and connected with Bio digester tank
4	Wall & Roof	Double skin insulated panels, with 1mm thick 316 grade stainless steel inside skin and exterior grade 4mm thick PVDF coated ACP outside facia. Inside hollow space shall be filled up with High density (16 kg/m ³) 40 thick (EPS) Expanded Polystyrene insulation
5	Access control	Front Panel LED sign box for Coin mechanism, voice guidance system
6	Door	Flush Door with 1mm thick Stainless steel (AISI 316) on both sides with EPS insulation
7	Foot step or Ramp	Minimum 1200 mm wide in RCC with exterior grade anti skidding floor tiles
8	Locks	Locks with electric strike door opener and door closure with single way retractable door handle
9	Ventilation	Ventilation with minimum 4" Exhaust fan and wall mounted SS louvers to ensure fresh air flow inside toilet
10	Plumbing	0.5 HP Pressure Boosting Pump, CPVC Plumbing material, Spiral Cleaning Nozzle, water Tank 500 liters for single toilets
11	Electrical	600VA UPS, 60 AH Battery minimum with leakage and surge protection
12	Toilet Pan	Vandal proof Indian style / western style stainless steel 316 grade toilet pan merged with 3mm perforated floor
13	Mirror	Stainless steel Mirror panel
14	Waste Bin	stainless steel waste bin with push door to outside toilet cubicle
15	Water Tap	Chromium plated water tap with mug (fixed with SS chain) and SS health
16	Inside Lock	Tower bolt from inside to lock the door manually
17	Fan/LED light	Vandal proof Fan and LED lights (activated only when the toilet is occupied)

18	Handle/handrail	1" dia Stainless Steel Handle/handrail for aged people
19	Bag Holder	Stainless Steel Bag Holder
20	Cleaning System	Water pressure cleaning system to clean wall, toilet pan and perforated floor
21	Access Control	Coin mechanism and optional Press Button
22	Pre-wetting	Automatic Pre-wetting system with minimum water
23	After use flushing	Automatic flushing after use and its Manual overriding
24	Manual Exit	Manual exit like normal toilet door from APT
25	Emergency Exit	Manual overriding of door opening of toilet from outside in case of emergencies
26	Emergency Numbers	Emergency contact local numbers should be displayed inside
27	Self-Cleaning with pre-programmed intervals	Self-cleaning of floors and walls After pre-programmed intervals
28	Technology Features required	IoT enabled Remote Monitoring, Desktop Application for Remote Monitoring
29	Plumbing pipes	CPVC
30	Pressure Boosting Pump (to generate required pressure for flushing and pressure cleaning)	0.5 HP
31	UPS (For power back up)	600VA
32	Battery (For power back up)	60AH
33	Wash basin	Stainless steel (316 grade) wash basin with sensor operated chromium plated pillar cock and sensor operated soap dispenser

6. Cost Estimates

6.1. Budget under SCP

Budget under SCP for three Identified projects/ sub projects related to Bus Shelter and E- Toilets and their project cost is listed below:

Sr#	Project Name	Cost (in Cr)
ABD Area		
1	Implementation of Smart Bus Shelters	3.31
2	E-toilets along Smart Bus Shelters	4.96
Pan City		
3	Bus shelters with Wi-Fi & E toilets	15

Current Phase -2 of implementation shall be operated under Item 3 above.

6.2. Estimate – Unit Cost

The estimate for the works is split into various components as listed below. Combination of the same would be applicable from site to site basis.

Sr No.	Item Description		Cost estimate
1	Providing and Fixing of Bus shelter(on prepared foundation) made of SS 304 frame work with brush steel finish, GalvanisedAluminium powder coated roofing and electronic circuit to control its lighting.The seating shall be made of SS 304 tubular sections for seat and back rest. Each unit size of 4500mm x 600mm with a minimum backrest support of 450mm.Bus shelter shall have the Side Display board to have 1100X400mm Electronic display.The electronic display board to be of LED Scrolling type with Oval, 4.3 x 5.1mm dia. Diffused. LED's having Amber colour.Dual bin system should be adopted one for recycle waste & other for dry waste.Each bin shall be with minimum capacity of 70Ltrs.Interactive Information Panel-display equipment with information area of 1400 x 1400 and touch screen LED display panel of area not less than 600 x 900mm with integrated 8mm toughened glass.Advertisement Area 2 nos of size 4500mm x 2650mm and 2650mm x 1800mm shall be integrated within the design of the Bus Shelter. This shall be backlit type with SS box framing sides and back complete.Provision for installing	Type A 7.5m x 2.2m Type B 7.5m x 2.2m	Rs 15.00lakhs

	<p>outdoor WiFi Router.The Foundation slab shall be made in min M25 concrete. The cast iron nuts, bolts shall be rust proof hot deep galvanized powder coated etc.The materials used shall be Nonflammable</p> <p>(NON SOR Item)</p>		
2	<p>Providing and Fixing of Bus shelter(on prepared foundation) made of SS 304 frame work with brush steel finish, GalvanisedAluminium powder coated roofing and electronic circuit to control its lighting.The seating shall be made of SS 304 tubular sections for seat and back rest. Each unit size of 4500mm x 600mm with a minimum backrest support of 450mm..Advertisement Area 3 nos of size 1575mm x 2650mm shall be integrated within the design of the Bus Shelter. This shall be static type with back complete. Static information panel of 2900mm x 1200mm.The Foundation slab shall be made in min M25 concrete. The cast iron nuts, bolts shall be rust proof hot deep galvanized powder coated etc.The materials used shall be Nonflammable</p> <p>(NON SOR Item)</p>	<p>Type C 6.5m x 2.2m</p>	<p>Rs. 12.00 Lacs</p>
3	<p>Providing & installing of E- toilet with Super structure of the electronic toilet to have aesthetic ambience with inner room size 1.2 x 0.8 x 2.4 (LXWXH)meters and Size of electronic toilet overall size in meters 2.30x1.25x2.80 (LXWXH) Total area 35 Sft. with Built-access controlled main door and side walls made of SS Grade 304,Toilet floor and closet are to be stainless steel of grade 304.E-Toilet shall have Built-in water tank with minimum 225 Lit capacity and Access control using coin validator for entering the unit based on automatic payment collection mechanism exit from the unit should be manual.Automatic lights inside the unit with gloves on opening the door. E-Toilet shall be Automatic flushing system which includes Automatic Pre flush cleaning before use, Automatic closet washing mechanism after use and Automatic platform cleaning mechanism programmed after specific numbers.In addition to these flush switch is to be provided for manual operation.Standard features should include heath faucet,exhaust fan and cloth hanger.The E-Toilet shall have</p>	<p>E-Toilet Unit</p>	<p>Rs5.75 Lacs</p>

	<p>Alert to users-different indication on 'ready to use', busy are to be provided in the unit also with Voice guidance in the unit for users. Web enabled support-GPRS based Real time data to be provided from the unit through web for knowing the health status like number of users per day and coins collected.E-toilet shall have Modular and portable design enabling easy assembling and installation at site.Call center and web portal facilities for registering compliance and tracking usage,coin collection etc.Status display in LED,Printed instruction stickers are to be provided.For Advertisement purpose space for advertisement display to be provided on the exterior of the unit for income generation and sustainability.</p> <p>Backup power facility like UPS is to be provided to supplement upto 30 Min</p> <p>Base of the unit to be placed on a suitable concrete structure with an aesthetic finish.</p> <p>(Non SOR Item)</p>		
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6.3. Project Estimate – Phase 2

Sr No.	Item Description	Nos	Unit Cost	Cost estimate
1	Type A – Bus Shelter with E-Toilet, but including Interactive Display and Real time indicator.	4	Rs. 20,75,000.00	Rs. 83,00,000.00
2	Type B – Bus Shelter without E-Toilet, but including Interactive Display and Real time indicator	14	Rs. 15,00,000.00	Rs. 2,10,00,000.00
3	Type C – Bus Shelter without E-Toilet, but including Interactive Display and Real time indicator with reduced dimension of 6mx2.2m	6	Rs. 12,00,000.00	Rs. 72,00,000.00
4	Civil Cost including Foundation and Paving (Type A)	4	Rs. 1,78,408.00	Rs. 7,13,632.00
5	Civil Cost including Foundation and Paving (Type B)	14	Rs. 1,43,823.00	Rs. 20,13,522.00
6	Civil Cost including Foundation and Paving (Type C)	6	Rs. 99,989.00	Rs. 5,99,934.00
Estimated Cost				Rs. 3,98,27,088.00
Contingencies 3%				Rs. 11,94,813.00
Tax if applicable @ 8%				Rs. 31,86,167.00
Administrative Expenditure Incl. Tender Premium and Miscellaneous Cost towards demolition of existing structures and connection of electricity, water supply and sanitation etc				Rs. 17,91,932.00
Total Estimated Cost of Installation				Rs. 4,60,00,000.00

Note: Bus Bays are not considered in estimates for Phase II Bus Shelter locations.

7. Timeline for execution

The Total timeline for project are divided into 3 broad categories:

7.1. Construction Phase

The construction phase is considered as 1 year

7.2. Defect Liability

The Defect Liability period is considered as 2 Years

7.3. Maintenance Period

The Maintenance Period is considered as 3 years

Note: Detailed schedule shall be during the final DPR and RFP Stage

8. DRAWINGS

Table below provides the list for drawings for various prototypes of Bus Shelters for Pan City Area

No.	Drawing no	Drawing Title
1	WTE_2292_00_A_1.01	TYPE A – BUSHELTER PLAN SECTION AND ELEVATION
2	WTE_2292_00_A_1.02	TYPE A – 3D RENDERING
3	WTE_2292_00_B_2.01	TYPE B – BUSHELTER PLAN SECTION AND ELEVATION
4	WTE_2292_00_B_2.02	TYPE B – 3D RENDERING
5	WTE_2292_00_C_3.01	TYPE C – BUSHELTER PLAN SECTION AND ELEVATION

ANNEXURE 1-

DRAWINGS FOR SMART BUS SHELTERS (ALL PROTOTYPES)

ANNEXURE 2-

Comparative Statement for EOI

ANNEXURE 3-

Civil Work Estimates