Design Research Seminar

Observational Research of Bus stops in Mumbai

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Under the Guidance of
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Acknowledgement

First and foremost we would like to thank Prof. Nishant Sharma for guiding us to success in the course of the project. We are highly indebted to him for all the efforts he took to ensure not only a successful completion of our project, but also the right learning expected from the whole exercise.

The acknowledgement and the report would be incomplete without thanking our parents, batch mates and teachers for their guidance and unconditional support, which has made us capable and confident enough to undertake tasks that demand responsibility and commitment.

Thank you

Table of Contents

ABSTRACT		3
1. PRIMARY RESEARCH		10
1.1	Locations Visited	3
1.2	Amchi Mumbai	6
1.3	BEST	7
1.4	Bus Shelters	8
1.5	Research	9
2 . OBSERVATIONAL RESEARCH		14
2.1	Photo Documentation	15
2.1.1	Key Observation 1	16
2.1.2	Key Observation 2	18
2.1.3	Key Observation 3	21
2.1.4	Key Observation 4	25
2.1.5	Key Observation 5	28
2.1.6	Key Observation 6	30
2.1.7	Key Observation 7	33
2.1.8	Key Observation 8	37
2.1.9	Key Observation 9	39
2.1.10	Key Observation10	41

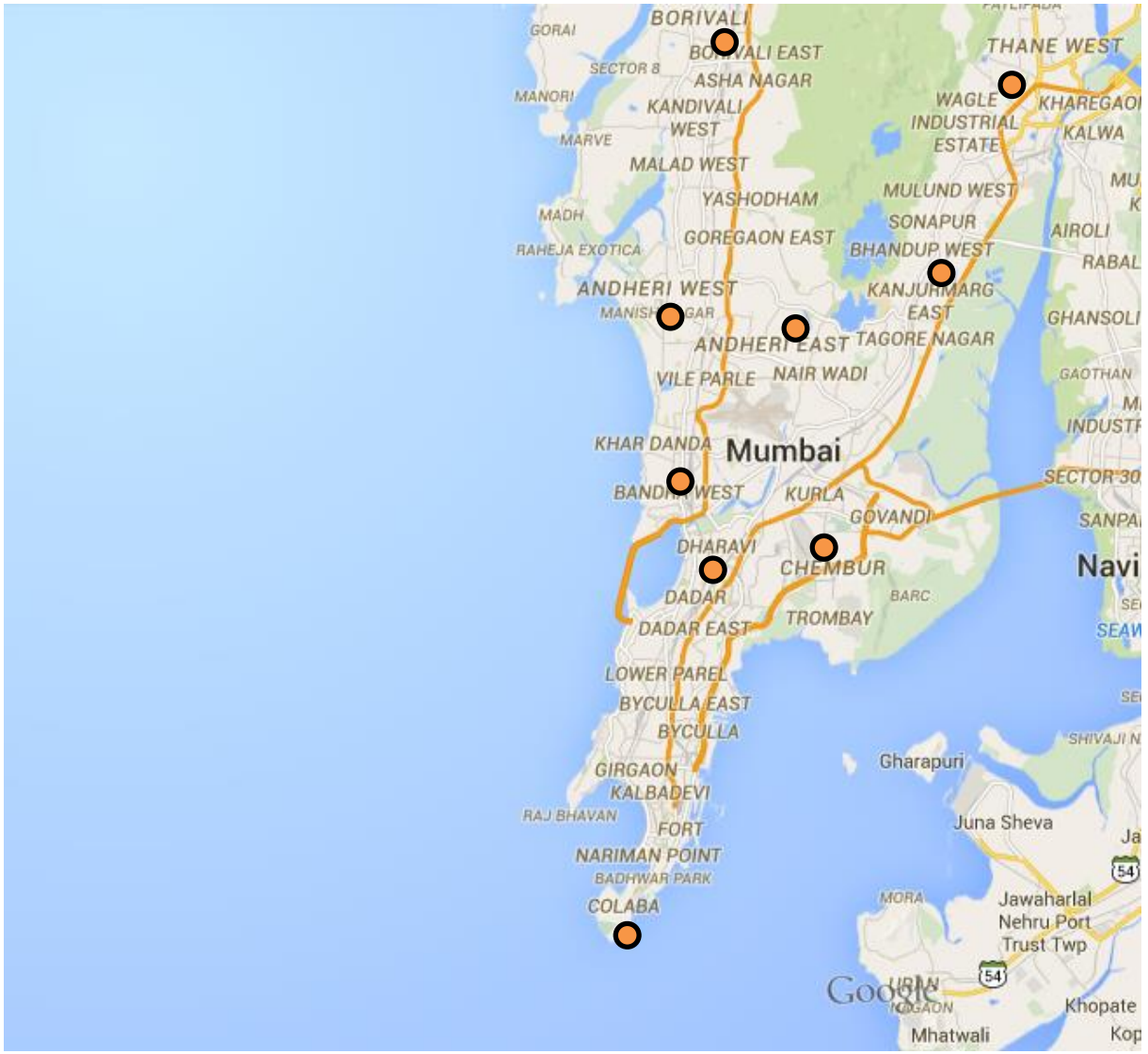
Mumbai, The capital of Maharashtra state. 2680 buses, ferrying 5 million passengers over 365 routes and has a work force strength of 38000 which includes 22000 bus drivers and conductors. The city is divided into 25 depots. There are 5200+ bus shelters in Mumbai.

The study is intended to interpret to interpret the habits of people with respect to the usage of 3bus shelters around them. Also to find the unmet need of people with respect to bus shelter.

The Observational Research is based on the photography taken at various locations in Mumbai, which ware then tagged based on the information they contained. The observations and insights from the each photograph were then documented. An affinity analysis of these insights gave a finer breakdown of the issues that are unmet and unaddressed.

Abstract

In order to conduct observation research, the following areas in Mumbai were visited:



Mumbai, which was previously known as Bombay is a major metropolitan city of India. It is the state capital of Maharashtra . Mumbai city is known as the business capital of India, it being the country's principal financial and communications center. The city has the largest and the busiest port handling India's foreign trade and a major International airport. India's largest Stock Exchange which ranks as the third largest in the world, is situated in Mumbai. Here, trading of stocks is carried out in billions of rupees everyday.

Description about Mumbai/Bombay can not be complete without the mention of Bollywood, the biggest Indian film industry which churns out hundreds of Hindi block-busters every year.

The **Brihanmumbai Electricity Supply and Transport (BEST)** Undertaking is the civic transport and electricity provider public body based in Mumbai, India. Originally set up in 1873 as a tramway company: Bombay Electric Supply & Tramways Company, the BEST set up a captive Thermal power station at Wadi bunder, Mumbai in November 1905 to generate electricity for its trams that positioned it to also supply electricity to the city of Mumbai. Since 1926, the BEST has been an operator of motor buses. In 1947, a week prior to India gaining independence, the BEST became an undertaking of the Bombay Municipal Corporation. It now operates as an autonomous body under the Municipal Corporation. The undertaking operates one of India's largest fleets of buses. The bus transport service covers the entire city and also extends its operations outside city limits into neighboring Navi Mumbai, Thane and Mira-Bhayandar.

In addition to buses, it also operates ferry service in the northern reaches of the city.

The electricity division of the organization is also one of the few electricity departments in India to garner an annual gross profit.

From the perspective of the city agency that is responsible for its management, a good shelter is one that has low maintenance requirements and is vandal-resistant. From the rider's point of view, an ideal shelter is one that allows visibility and easy access to the bus, is comfortable and convenient, provides clear information, and is safe..

Table 4. Main Mode to Work

Transport Mode	Total		Income <Rs. 5k	
	Freq.	Percent	Freq.	Percent
On foot	2649	45.32	796	62.68
Bicycle	175	2.99	76	5.98
Rail	832	14.23	127	10.00
Public Bus	813	13.91	143	11.26
Rail + Bus	462	7.90	63	4.96
Auto-Rickshaw	101	1.73	16	1.26
Taxi	8	0.14	0	0.00
Own Two-Wheeler	488	8.35	10	0.79
Own Car	153	2.62	1	0.08
Other's car	12	0.21	2	0.16
Other	152	2.60	36	2.83
Total	**5845**	**100.00**	**1270**	**100.00**

Source: Authors' calculations

A **bus shelter** is a designated place where buses stop for passengers to board or alight from a bus. These are normally positioned on the highway and are distinct from off-highway facilities such as bus stations. The construction of bus stops tends to reflect the level of usage. Stops at busy locations may have shelters, seating and possibly electronic passenger information systems; less busy stops may use a simple pole and flag to mark the location and "customary stops" have no specific infrastructure being known by their description. Bus stops may be clustered together into transport hubs allowing interchange between routes from nearby stops and with other public transport modes.

- **A good bus** shelter is an essential part of any successful urban mass-transit system. What constitutes "good," however, depends upon your point of view.

To decide what type of shelter to use in a particular area requires an analysis of existing and anticipated conditions, as well as some knowledge of the characteristics of good shelter location and design. Information about each factor is included below.

- Is a bus shelter needed?
- Where should it be located?
- How should it be designed?
- How should it be maintained and managed?
- Are there funding options?
- IS A BUS SHELTER NEEDED?

There are some general guidelines that should be followed in deciding whether or not a bus shelter is needed. Situations where a shelter is required include the following: neighborhoods where buses run infrequently; commercial areas with frequent service and high levels of ridership; areas where security is a problem; neighborhoods where there are many older or infirmed people; and areas where inclement weather is common.

VISIBILITY

People must be able to see the bus coming. Poorly designed shelters that obstruct views of approaching buses will force people to leave the shelters to watch for oncoming buses.

ACCESSIBILITY

People must be able to board the bus conveniently. To many riders this is the most important aspect of a bus shelter's design, because people like to be close to the point where the bus door will open so they will be sure of getting on. The shelter should not obstruct this process of boarding.

Comfort and Convenience

Shelters should provide a place to sit, protection from weather, and a feeling of safety and security.

-

Information

People need to know when a bus will arrive and where it will go. This is especially important for people who are unfamiliar with the service, such as tourists.

LOCATION

Good locations for bus shelters are near retail stores that have products related to bus riders' needs (e.g. bakery, flower shop, newsstand, etc.) and are open late at night; near office building entrances within view of a security guard; near street vendors; and in conjunction with other amenities such as telephones, benches, and so on.

DESIGN

A bus shelter should be designed to reflect the city in which it is located. This can be accomplished through the use of local materials and by the design details. Often standard shelters can be adapted to reflect the unique characteristics of the area in which they are located. Within this context there are four general qualities that any well-designed bus shelter should have. These qualities, described below, are visibility, accessibility, comfort and convenience, and information.

GUIDELINES

The following design guidelines can be used in designing or selecting a bus shelter:

Side Panels

Side panels should generally not be used on the curbside of the shelter, except on very narrow streets with heavy traffic. If side panels are used on the curbside, an opening at least 3 feet wide needs to be provided to allow people access to the buses.

Side panels should be mounted 3 inches off the ground so that debris will not collect inside the shelter. If more than 3 inches off the ground, they will not keep out drafts.

Side panels should be made of clear glass, as noted below.

Roof

A pitched roof should be used to prevent the collection of rain, snow and debris.

Signage

Schedule, route information, and a map should be located in or next to bus shelters but not so that the view of the oncoming bus is blocked.

Size

The size of a bus shelter depends on the climate as well as the number of people who are expected to use it. (In order to determine the expected use, count the number of people who currently use a particular stop at different times of day and week.)

Where there are large fluctuations between peak and off-peak use, a bus shelter can be designed with leaning rails, overhangs, and seating areas outside of the shelter to accommodate the differences.

Seating and Leaning Rails

The amount of seating should be based on both the number of people who will use the shelter and the amount of time people will spend waiting. Where people wait for a long time, or where the shelter is used by the elderly or infirm, more scaling is generally needed than in areas where the bus comes more frequently. Leaning rails should be provided whenever possible. A wood rail at 3 feet 6 inches above the ground is best.

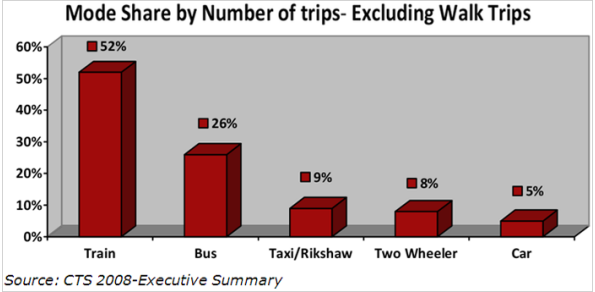
Lighting

Lights should be housed in a protective casing to reduce vandalism, and directed so that they illuminate the waiting and boarding areas. New York City's shelters are lighted at night by backlit advertising panels at an intensity of 20 lumens per square foot.

MAINTENANCE & MANAGEMENT

To be durable, bus shelters should be composed of structural members and inset panels, not snap-together “curtain walls” or decorative sections that are easily vandalized. In general, a steel structure is best. Wood is not as durable and concrete tends to be monolithic in appearance and tends to discolor and soil easily. For flexibility, installation should be by means of bolted attachment rather than by casting in place. There should be few movable parts, as they are easily broken. Parts should be easy to reorder and replace and should not require removal of other parts or sections for access to make the repair. Materials should be vandal, graffiti, weather, salt, and rust resistant, and easy to clean. A protective finish can be applied to steel in cases where salt damage is severe. Herculite glass side panels (used in New York City) resist scratching, are strong, shatter-resistant, and easy to clean. Plastic or Plexiglas is not recommended as it tends to discolor and scratch easily, reducing visibility from the shelter. The manufacturer of the bus shelter should be consulted as to the best combination of materials and finishes for a particular area.

In addition to these specific issues it is also important to consider the bus shelter within the context of the overall transit system. Cooperation is necessary, therefore, between the city, the transit company, and any other parties involved in the maintenance and management of the shelter. This requires a commitment by the city to a high level of maintenance and management.



Type 1

Type 2

Type 3

Type 3

Materials:
Stainless Steel
Polycarbonate/Glass

Footprint:
13 feet X 4 feet

Construction:
There is a structure which holds the shelter and seats together and which goes underground.

The bus stop and the advertisement panel may or may not be fixed on the same superstructure below the ground.

After the structure is fixed concrete is poured over the structure.

Materials:

Stainless Steel,

Concrete,

RCC tiles,

Roof sheets.

Construction:

The structure holds only the pillars in place which holds the cantilever roof in its place. After the structure is laid the roof is completed.

Other elements such as the seats are placed on top with concrete after the ground is filled.

Materials:
Stainless Steel Pipes
Stainless Steel Sheets

Footprint:
13 feet X 2.5 feet

Construction:
The whole of bus shelter comes as a module. There is a structure which holds the shelter and seats together and goes under the surface and forms the base of the shelter.

The Ground is firstly dig up to place the shelter, after the structure is fixed concrete is poured over the structure over which pavement is done later.

Materials:
Steel Pipes and sheets.
Iron pipes.

Footprint:
25 feet X 3 feet

Construction:
The bus shelter may not have a structure which holds it underground. Each pillar can have its own structure to keep it erect.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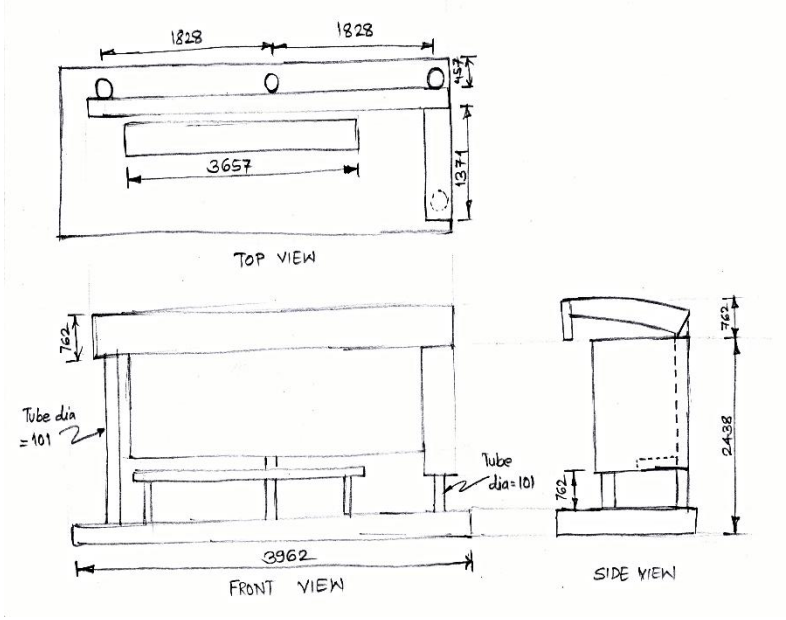
2.5 feet
13 feet

Type 1

Type 2

Type 3

Type 3



The unique stainless steel bus shelters are an eclectic mix of modern design, aesthetics and environment and a disabled friendly structure. These bus shelters provide a comfortable seating arrangement along with display panels for bus routes their timings. These are fabricated according to industrial quality norms of international standards. Some salient features include complete corrosion resistance, light weight, sturdy construction and ease of installation.

Materials: Stainless Steel (Structure)
Polycarbonate/Glass (Display)

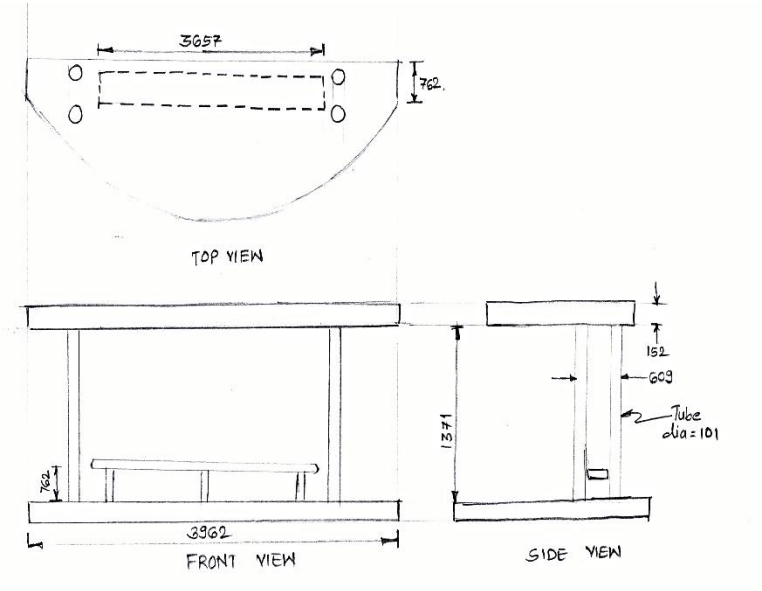
Footprint: 13 feet X 4 feet

Construction:

There is a structure which holds the shelter and seats together and which goes underground.

The bus stop and the advertisement panel may or may not be fixed on the same superstructure below the ground.

After the structure is fixed concrete is poured over the structure.



This type of bus shelter is installed where people wait for a small time, where the shelter is used by the elderly or infirm, more scaling is generally needed than in areas where the bus comes more frequently. (eg. Worli Sea face) Some salient features include complete corrosion resistance, light weight, sturdy construction and ease of installation.

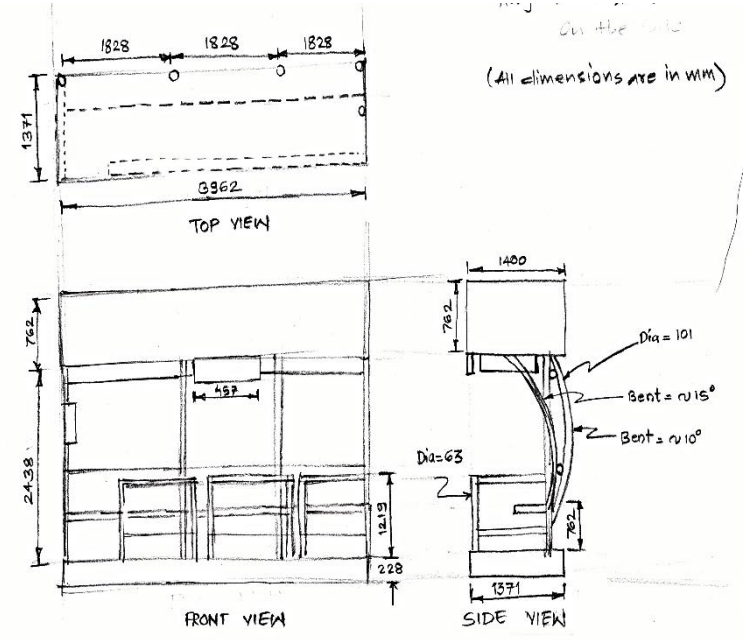
Materials:

Stainless Steel, Concrete, RCC tiles, Roof sheets.

Construction:

The structure holds only the pillars in place which holds the cantilever roof in its place. After the structure is laid the roof is completed.

Other elements such as the seats are placed on top with concrete after the ground is filled.



These bus shelters provide a comfortable seating arrangement along with display panels for bus routes their timings. The space for advertisement is much more given because these are specially designed and installed by the advertisement companies.

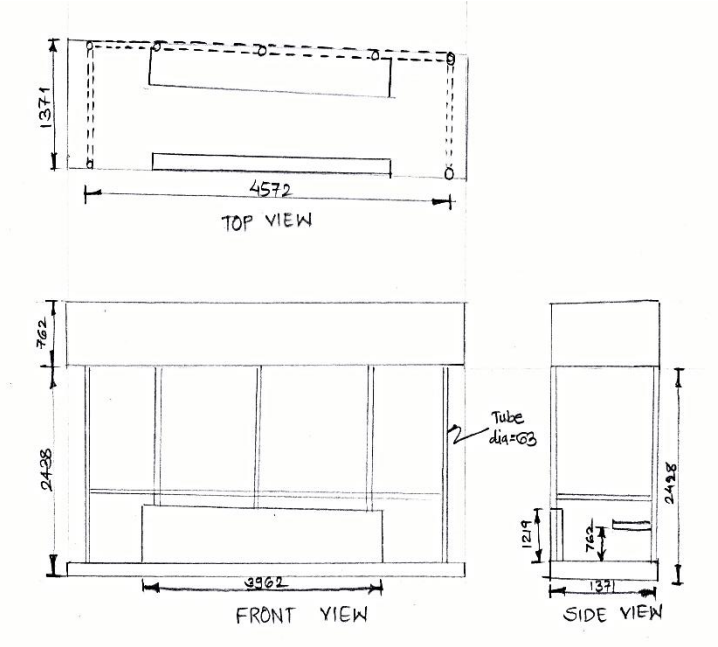
Materials: Stainless Steel Pipes Stainless Steel Sheets. These materials are used because of the champion properties of the stainless steel against Mumbai weather. And that is corrosion resistance in moist weather.

Footprint: 13 feet X 2.5 feet

Construction:

The whole of bus shelter comes as a module. There is a structure which holds the shelter and seats together and goes under the surface and forms the base of the shelter.

The Ground is firstly dig up to place the shelter, after the structure is fixed concrete is poured over the structure over which pavement is done later.



This is one of the old bus shelters found in Worli, where iron pipes are measuredly used and painted with the red color.

Materials: Iron pipes.

Footprint: 25 feet X 3 feet

Construction:

The bus shelter may not have a structure which holds it underground. Each pillar can have its own structure to keep it erect.

Bus-Shelter Interaction

The nature of interaction between bus and bus shelter is unpredictable which creates chaos and results in the reason for constant worry and anxiety amongst people.

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a Halt time

Non predictable bus halting time generates feeling of insecurity and anxiety among passengers.


IR 1


IR 2


IR 3


IR 4


IR 5

b Decisions

There are multiple decisions need to be made by the passenger with respect to limited time, these are related to inquiry of the approaching bus, understanding it's route, confirmation to board and the possibilities to get in.


IR 4


IR 7

c Operations

The unpredictable nature of bus operation by the driver/conductor effects users behaviour. The unpredictability lies whether the bus will halt or not and if is halting then where exactly? and for how long?. Positing is also driven by cascading of buses.


IR 8


IR 9

The nature of interaction between bus and bus shelter is unpredictable which creates chaos and results in the reason for constant worry and anxiety amongst people.

d AC bus

It stops only when somebody is showing hand to stop which should be visible by the driver and hence forces the passenger to stand on the road. Inquiry can be done only through front door which is followed by getting in/out.


IR 10


IR 11


IR 12


IR 13

e Running

When number of passengers at a bus stop is less, bus does not halts or halts for less then 5 seconds or slows down and at times the halt is driven by the passengers gesture. In such cases anxiety drives the passengers to run in order to board/ de-board


IR 14


IR 15


IR 16

f Scattering

Passengers remain scattered in the vicinity of bus stops. The concentration of people is more towards the direction of approaching bus in order to have a clearer visibility and to get the ease to board the bus from rear door.


IR 17


IR 18


IR 19

The nature of interaction between bus and bus shelter is unpredictable which creates chaos and results in the reason for constant worry and anxiety amongst people.

g Third party

There are private vehicles, particularly bikes which overtakes buses from left side and comes on the way of passengers who are boarding and de boarding. The allowance space to overtake is driven by vehicles parked near bus stop or the driving habits of the driver.


IR 7


IR 20


IR 21


IR 22


IR 23

h Children

The step height is inconvenient for children/ toddlers which allows parents to help them in ingress and egress.


IR 24


IR 25


IR 26


IR 27


IR 28

i

Buses are perceived as dynamic entity even when at halt. This feeling is related to non predictable halt time.

The nature of interaction between bus and bus shelter is unpredictable which creates chaos and results in the reason for constant worry and anxiety amongst people.

j Elderly

There is a conflict of passengers getting down from front door with elderly people who uses the same to board the bus.

IR 4

Peoples liberty

People find liberty to use the bus stop in the manner that they want.

Bus stops are familiar entity with expected contents which results in no hesitation to showcase wilful behaviour which often results in harming the infrastructure of the shelter and the environment. For instance writing on the panels, leaning or kicking the railings and throwing garbage.

People find liberty to use the bus stop in the manner that they want.
Bus stops are familiar entity with expected contents which results in no hesitation to showcase wilful behaviour which often results in harming the infrastructure of the shelter and the environment.

a Familiarity

Bus stops are familiar entity with expected contents which results in no hesitation to showcase wilful behaviours like leaning, sleeping, eating, reading, listening to music or socializing.


IR 28


IR 29


IR 30


IR 31


IR 32

b No authority

The awareness that bus stop is not owned by any one provides liberty to people to set up business or transform it into a residence. It also drives people to park in front of it.


IR 33


IR 34


IR 35


IR 36

c Vandalism

Lack of feeling of ownership drives people to litter/ spit or damage infrastructure. They use structures according to their wishes irrespective of probability that they might get damages


IR 37


IR 38


IR 39


IR 40


IR 41

IR 42

People find liberty to use the bus stop in the manner that they want.
Bus stops are familiar entity with expected contents which results in no hesitation to showcase wilful behaviour which often results in harming the infrastructure of the shelter and the environment.

d Landmark

Used as a landmark because bus stops are one of a kind in an area.


IR 43


IR 44


IR 45

e Playfulness

Like adults extracting comfort, kids extract playfulness in the infrastructure


IR 46


IR 47

f Expectation

People expect the space to remain maintained/restored if destroyed


IR 48


IR 49


IR 50

People find liberty to use the bus stop in the manner that they want.
Bus stops are familiar entity with expected contents which results in no hesitation to showcase wilful behaviour which often results in harming the infrastructure of the shelter and the environment.

g Comfort

People tend to adjust themselves to extract comfort out of it's infrastructure.


IR 31


IR 51


IR 52

Opportunity

Bus shelter acts as magnet which invites social and commercial opportunity.

The shelter invites opportunities for fruit vendors, cobblers and other small commercial activities. Moreover the shelter becomes a landmark and a spot for social gathering and interaction.

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a Commerci--alization

Bus stops are landmarks which provides facilities like open space, garbage bins and crowd gatherings to sell products/ services.


IR 36


IR 54


IR 55

b Inquiry facility

People involved in commercial activities act as information providers about bus service/s.


IR 56


IR 57

c Travel options

People gathering at bus stops invites taxis and rickshaws to provide alternative ways to travel.


IR 58


IR 59

Bus shelter acts as magnet which invites social and commercial opportunity.
The shelter invites opportunities for fruit vendors, cobblers and other small commercial activities. Moreover the shelter becomes a landmark and a spot for social gathering and interaction.

d Advertise-ments

The advertisement lightings also enables people to identify it as a bus stop from a distance.


IR 60


IR 61

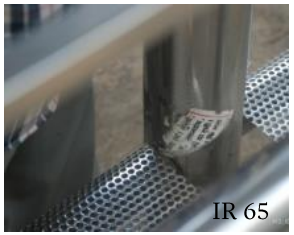

IR 62

e Info. point

Since bus stops are public space which allows people to stay around for a while, the space in it is utilised to put up notice, posters to aware them about current happenings and opportunities.


IR 63


IR 64


IR 65


IR 66

f Problems

The free area in front of bus stops is used by hawkers to set up stalls, obstructing bus halts and also interfering with the traffic


IR 67


IR 68


IR 69

Bus shelter acts as magnet which invites social and commercial opportunity.
The shelter invites opportunities for fruit vendors, cobblers and other small commercial activities. Moreover the shelter becomes a landmark and a spot for social gathering and interaction.

g Landmark

Bus stops are unique spots in an area which are easy to locate and hence are branded as landmarks which supports social gathering / meeting.

Poor planning

Poor planning of bus stop infrastructure- bus stop infrastructure effects other system around the shelter and in turn the various existing parameters effect the utility of bus shelter.

Poor planning of bus stop infrastructure- bus stop infrastructure effects other system around the shelter and in turn the various existing parameters effect the utility of bus shelter.

a Foot path set up

Bus stop set up on footpaths hinders space for pedestrian movement


IR 72


IR 73


IR 74

b Crowd

Passengers moving and waiting around bus stops affects movement of vehicles and pedestrians


IR 73


IR 74

c Visibility

Visibility of surroundings from the bus stop gets effected by trees/ parked vehicles and buildings


IR 75


IR 76

Poor planning of bus stop infrastructure- bus stop infrastructure effects other system around the shelter and in turn the various existing parameters effect the utility of bus shelter.

d Garbage dumping

Bus stops are not used by people to sit, in areas which have open garbage bins/ zones adjacent to them


IR 77


IR 78

e Effective seat height

Execution of concrete base is not considered in various places due to which the effective seat height is variable leading to uncomfortable seating posture.


IR 79


IR 80


IR 81

IR 82


IR 83

f Parking

No Dedicated parking space for taxi/IPT . These vehicles are parked right in front of bus stops.


IR 84


IR 85

Poor planning of bus stop infrastructure- bus stop infrastructure effects other system around the shelter and in turn the various existing parameters effect the utility of bus shelter.

g Drain Covers

Bus stop constructed over drainage/manholes runs into hygiene and safety issues when the lids get damaged


IR87


IR 88


IR 89

Design errors

Errors in shelter design renders poor experiences at execution and users level.

The fault in installing the shelters effect the safety of the travelers to a larger extend, also the various design parameters such as confusions in welding due to design similarities at manufacturing levels directly affect the commuters.

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The fault in installing the shelters effect the safety of the travelers to a larger extend, also the various design parameters such as confusions in welding due to design similarities at manufacturing levels directly affect the commuters.

a Back rest welding

Similar looking vertical tubes confuses the fabricator in welding the back rest. Rear welding position provides comfort while front welding position provides abnormal back support with respect to seat depth.


IR 90


IR 91

b Sharp projections

In cases of wrong installations, there are sharp metal projections near the base


IR 92


IR 93


IR 94

c No under thigh supp.

The seat provides only butt support due to which people uses the front barricade for foot support to balance themselves.


IR 95


IR 96


IR 97

Errors in shelter design renders poor experiences at execution and users level.
The fault in installing the shelters effect the safety of the travelers to a larger extend, also the various design parameters such as confusions in welding due to design similarities at manufacturing levels directly affect the commuters.

d Location Name plate

The bus stop location name plate is of constant size. Because of this, the font sizes are variable which especially gets unreadable if the location name contains more than 5-6 alphabets.


IR 98


IR 99


IR 100


IR 101

e Signage colours

Non contrasting colours in signage affects readability.


IR 102

f Info. poles

Stoppages without shelter have signage about routes positioned too high with smaller text, which caters difficulty in visibility especially to elderly, kids and elders with shorter height


IR 103

Errors in shelter design renders poor experiences at execution and users level

g Sharp Edges

The corners of the shelter railings have a sharp edge formed by welding two pipes at 45 degrees.


IR 105


IR 106

h Footrest

The front barricade base though used as foot rest does not provide support which drives people to use the hand support to use as footrest.


IR 107


IR 108


IR 109


IR 110


IR 111

i No Lightings

There are no illuminations under the shelter or near the signage because of which it is difficult to use them at night time.


IR 60

Bus stop Infrastructure

The Bus stop infrastructure influences the way with which people behave, interact and use it. The design elements inside the shelter dictates how people might use them, it provides opportunities to be used in activities like- sleeping, leaning on pillars, position of the food stalls etc.

The Bus stop infrastructure influences the way with which people behave, interact and use it.

a Queue formation

The Bus shelter design at places allows passengers to stand in a queue inside the shelter whereas at places where the design doesn't allow for people form queues outside the bus shelter. At places seats were removed so that people could stand in a queue rather than sitting


IR 112


IR 113


IR 114


IR 115

b Leaning

People are found often leaning to stand in a comfortable position. The hand railing in front of bus stops provides the best support for this purpose. It also allows to support the bags that people carry with them.


IR 28


IR 117

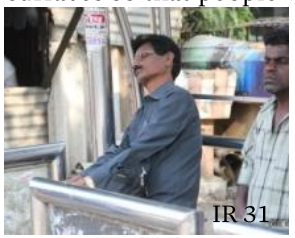

IR 118


IR 119

c Sleeping

People mostly take quick naps on the corner places in bus stops. These corner locations provides the required neck and head support.

People also use the bench for sleeping, at places the benches are provided with extruded surfaces so that people would not sleep on it


IR 31


IR 121


IR 122

The Bus stop infrastructure influences the way with which people behave, interact and use it.

d Platform Height

Usually the crowd is gathered in front of the bus stops (IR-) but increased platform height pushes people to stay inside the bus shelter and bus arrives closer to the stop.


IR 124


IR 125


IR 126


IR 127


IR 128

e approach

Approachable places invite people to sit or place there belongings.


IR 129


IR 130


IR 131


IR 132


IR 133


IR 134

f Orientation

Orientation to maximize comfort

The Bus stop infrastructure influences the way with which people behave, interact and use it.

g Shadow

Shadow dropped by the shelter direct people to change there location.


IR 135


IR 136


IR 137

h Location of shops

The placement of Dustbins around the bus shelter governs the placement of small scale shops as they position themselves near to them.


IR 36


IR 138


IR 139

i Illumination

The illuminated shelters invite people to sit at night against the unlighted shelters were people stand outside.


IR 60


IR 140


IR 141

Interpreting Utility

People have a tendency to interpret the utility of unused spaces.
any such place which doesn't seem to have a purpose or utility and which provides potential to be used in some other way is utilized in various ways such as:
Pinning posters,
Parking vehicles,
Throwing garbage.

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a Under seat space

The under seat space is often used to throw garbage


IR 142


IR 75


IR 76

b openings

Any form of opening is used to throw garbage


IR 50


IR 143


IR 77

c Unutilised open space

Any space which is not accessible and left over behind the bus shelter is used for throwing garbage


IR 144


IR 145


IR 146

People have a tendency to interpret the utility of unused spaces.
any such place which doesn't seem to have a purpose or utility and which provides potential to be used in some other way is utilized in various ways such as: Pinning posters, Parking vehicles, Throwing garbage.

d Posters and advertisements

Pipes with enough surface to stick a poster is used to stick advertisement.

Walls are also used to stic k bills.


IR 64


IR 147


IR 148


IR 149


IR 150


IR 151

e Smoking sopts

Unused accessible places becomes a common smoking spot.


IR 152


IR 139

IR 153


IR 154

f Parking Spaces

Areas not which can not be utilized for the purpose of walking or use for driving is transformed into a parking spot.


IR 74


IR 75

Time Lapse

5:50 AM 6:00 AM 6:10 AM 6:20 AM 6:30 AM 6:40 AM 6:50 AM 7:00 AM

7:10 AM 7:20 AM 7:30 AM 7:40 AM 7:50 AM 8:00 AM 8:10 AM 8:20 AM

8:30 AM 8:40 AM 8:50 AM 9:00 AM 9:10 AM

A typical bus shelter was chosen for observational research. The time frame chosen for making the time lapse was from 5:30-9:30 AM. The shelter was observed from 3 different locations- front, side and side top, and the video was later observed to got insights.

Observation:

The passengers are not aware of which bus is coming as a result of which they are always standing on the road to know about the bus no.

The crowd was observed to be scattered more in the direction of incoming traffic.

Some people come to bus stop in auto and they halt in front of the shelter itself as there is no dedicated parking spot for the them.

Some people come to bus stop in auto and they halt in front of the shelter itself as there is no dedicated parking spot for the them.

Most of the passengers are found to be carrying some sort of luggage- bagpack, briefcase, polyethene bag etc.

Some passengers who were waiting since a long time preferred taking an incoming auto.

The passengers sitting on the stop are found to be sitting only on the sides of the stop as they have to run when the bus arrives. The seats on the center remains vacant

Passengers talking on phone tend to move at a more private place to talk. They also prefer looking towards the incoming traffic to keep watch at the buses.

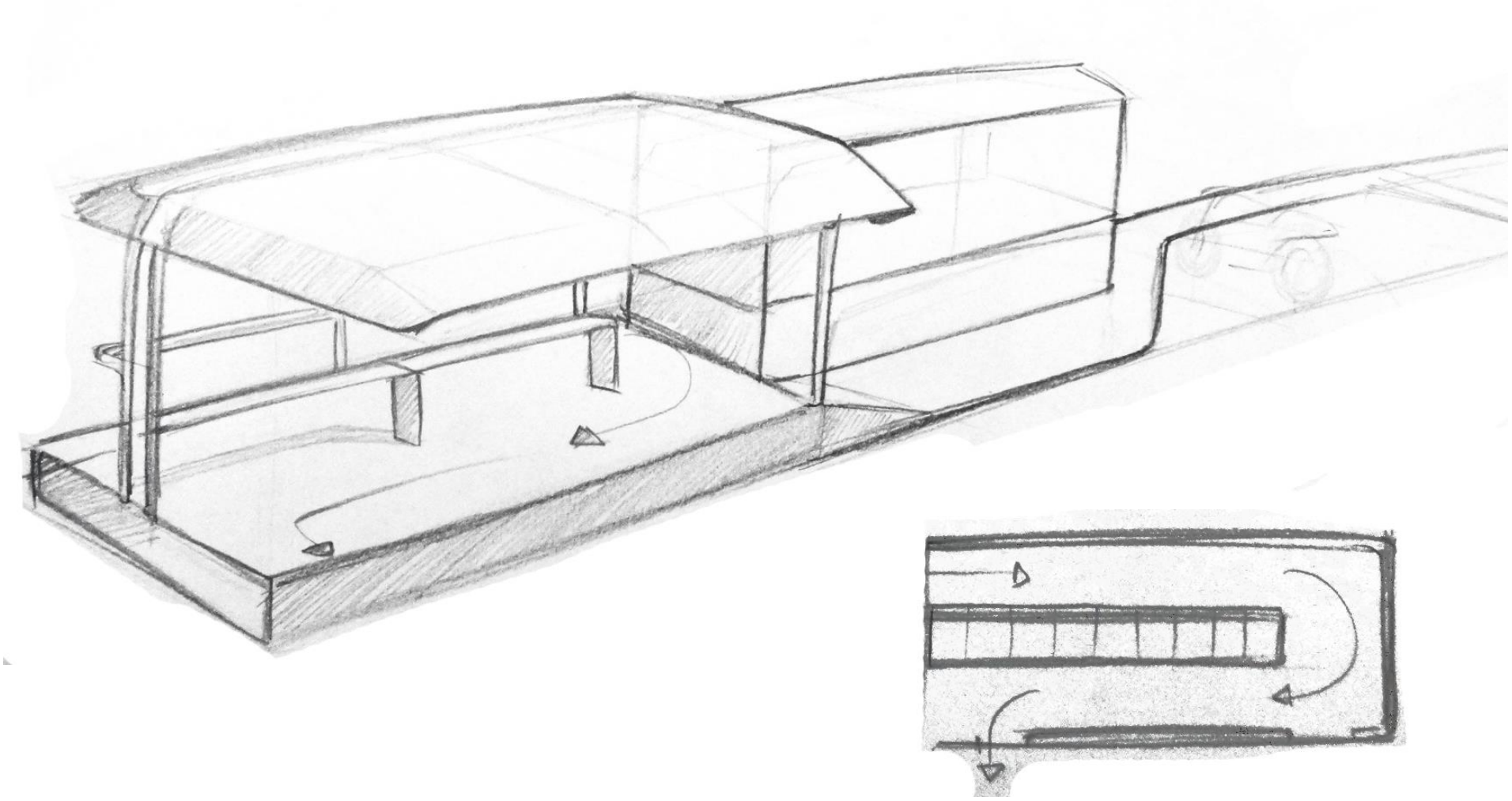
At peak hours- 8:00-9:00 the frequency of buses increases and the waiting time for daily commuters is less. As a result they don't feel the urge to sit.

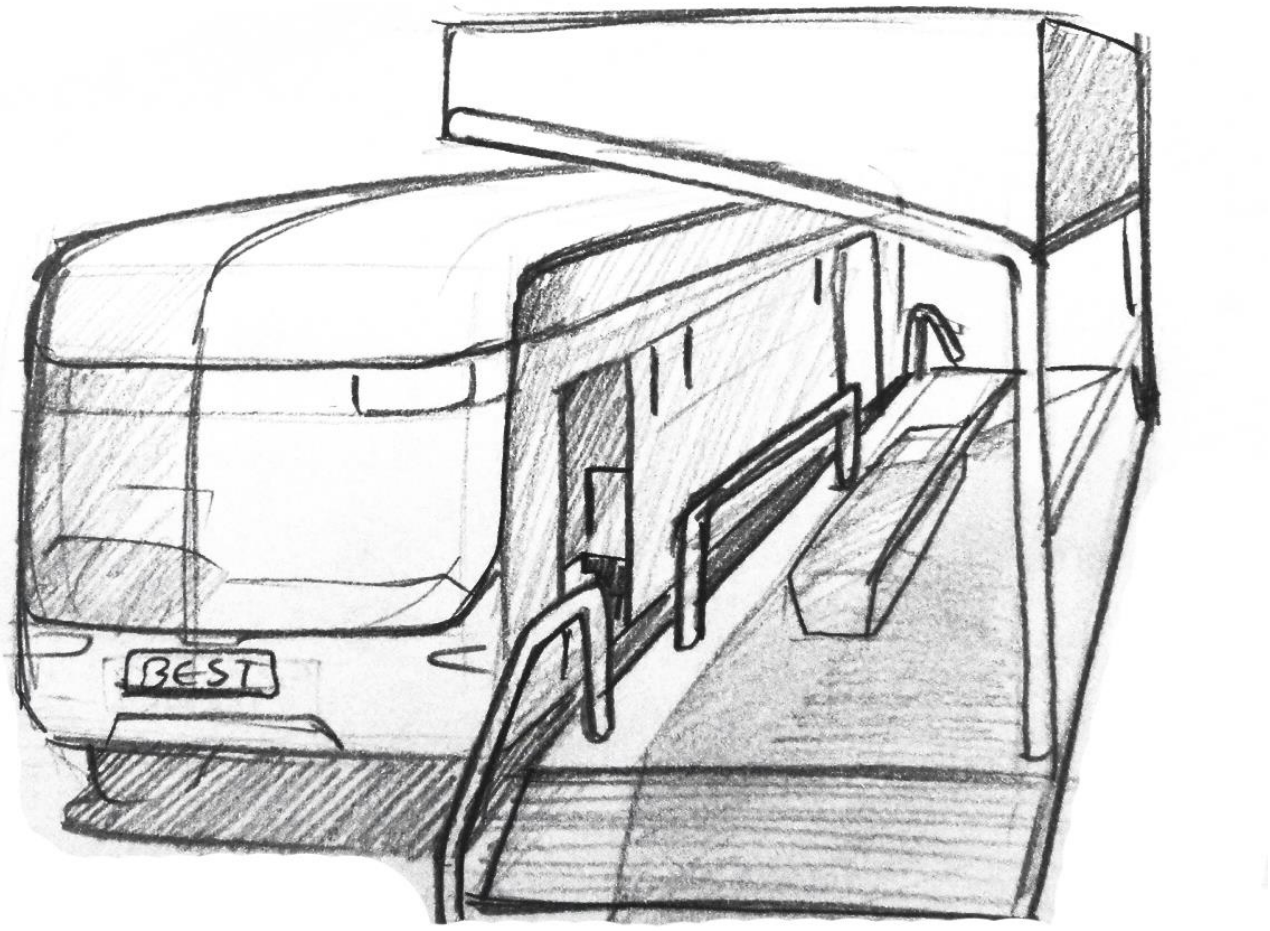
People smoking cigarettes were standing away from the crowd waiting near the bus shelters and towards the opposite side on incoming traffic.

At the end of this research we observed that there are a lot of interlinked factors which affect the way bus shelters are used.

The problems persist as a mix of design, implementation, maintenance and behavior related aspects and designing in isolation will not be ample enough. The various commercial and infrastructure related activities that takes place around the bus stops also need to be properly placed and planned beforehand.

The Design should take into consideration the ease of utility and also the ease in manufacturing and installation of the structures.

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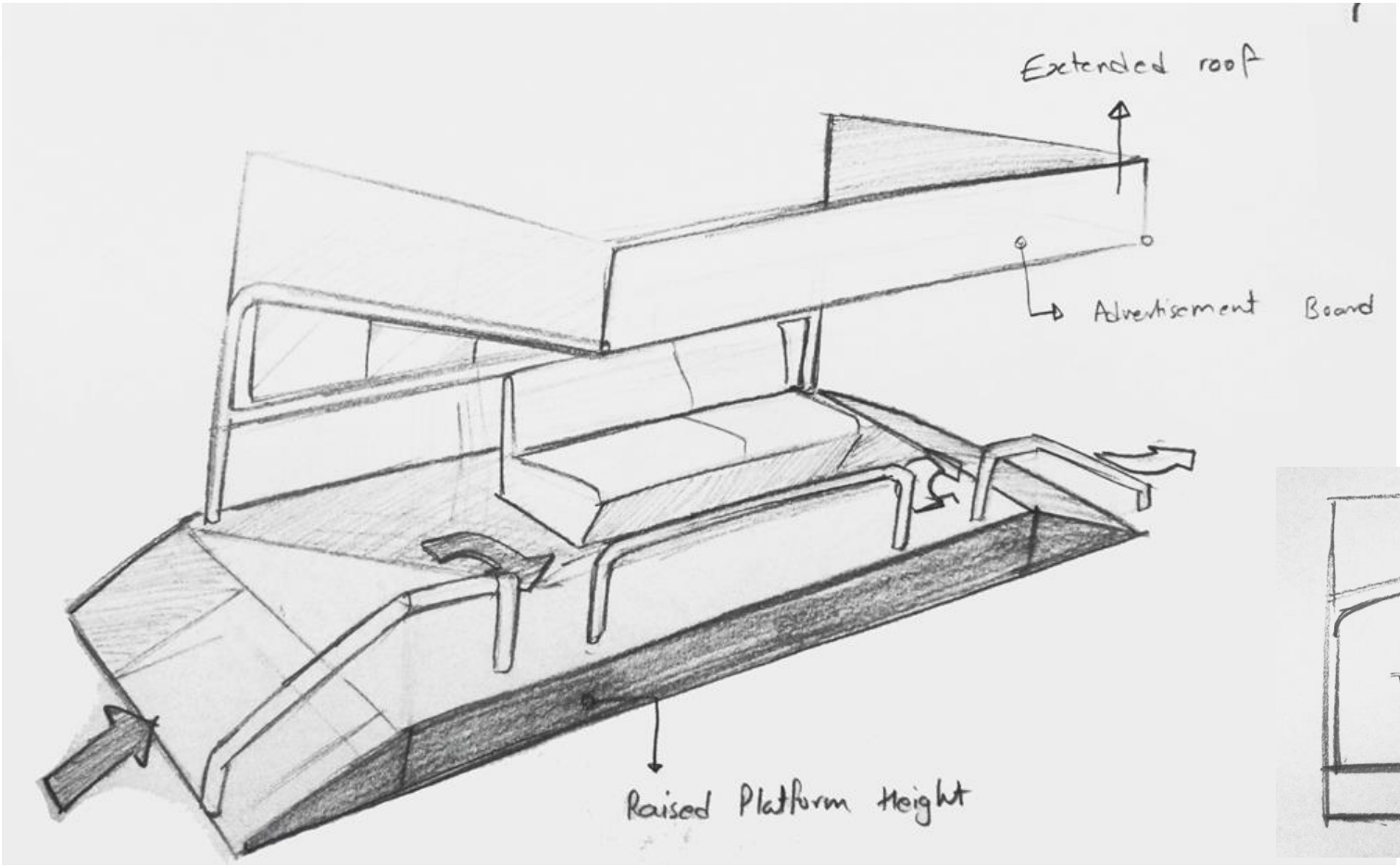
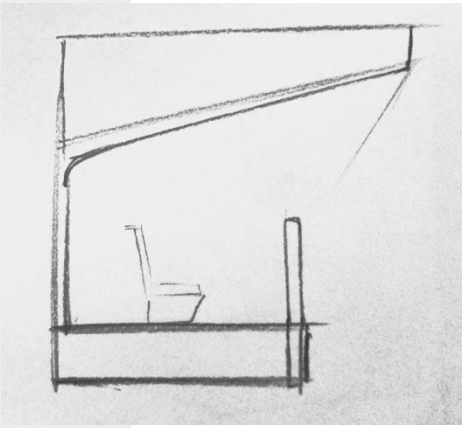
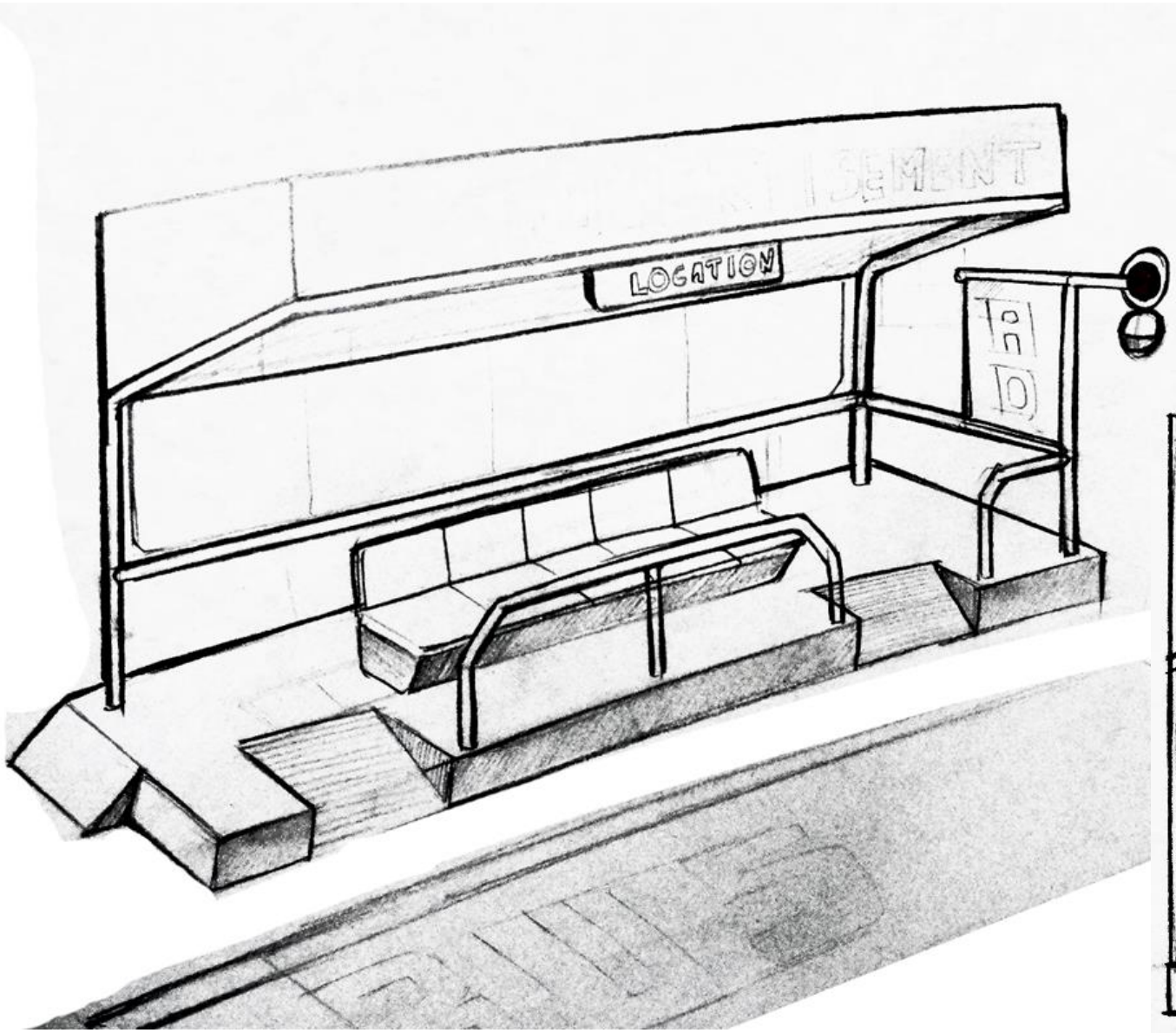
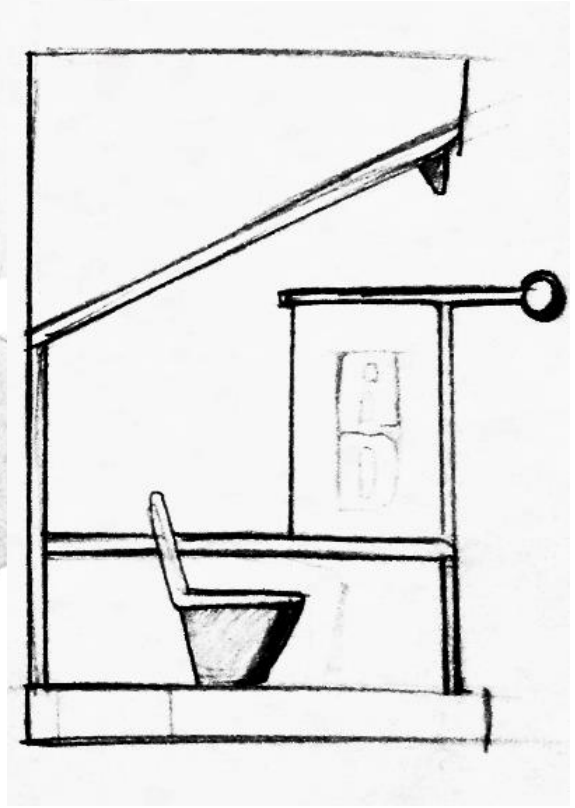
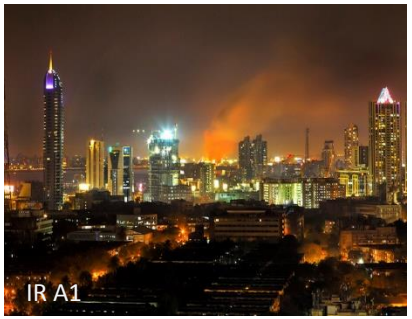

Extended roof
Advertisement Board
Raised Platform Height




LOCATION



Photos taken from Internet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IR A7


IR A10


IR A3


IR A4

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IR A11


IR A5


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IR A9


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IR 4


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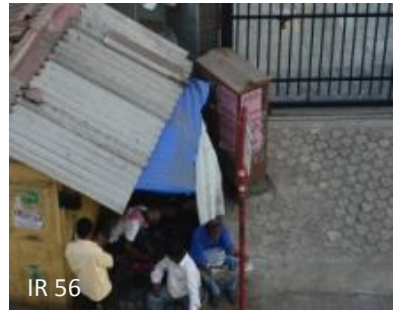
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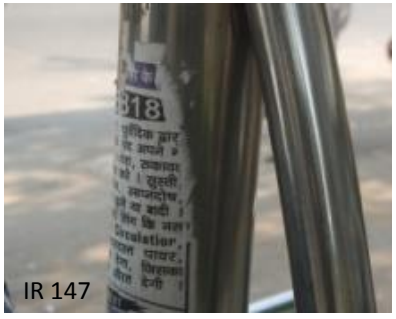

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IR 151


IR152


IR 153