

Volume-III E
Employers Requirement and Technical Specifications
For Visual Improvement

1 REQUIRED SOLUTIONS & VISUAL IMPROVEMENTS

1.1 Introduction

Visual Improvement of Roads at for ABD, Raipur is proposed for 20.38Km length in total and for 29 Junctions. Roads & junctions are designed on specific themes. Suitable listed streetscape elements e.g. bench, planter, railing, bollards etc. are proposed for each road and Junction according to the width of the road.

Streetscape elements installations above ground level shall be done after work of all underground the services network; those networks are of water supply, electrical & sewerage. After starting the work of streetscape above the ground, Green cover areas i.e. landscape shall be done in priority with respect to street furniture

2 ROADS

Roads are described as following –

All the major roads are considered for visual improvement.

3 JUNCTIONS

3.1 Introduction

Intersection of the roads forms the junctions. The formation of junction is due to intersecting four or three roads. The junctions are facilitating traffic to pass from one direction to another. It acts as a node for the traffic as well as pedestrians. The corner buildings of the junction have the commercial activities. The vibrancy at the junction could be sensed due to various happening activities. Mixed use development along the roads of ABD area makes junctions an active place. It has favorable impact as functional place for people but adverse impact on activities as traffic congestion place.

3.2 Junction categories

Junction improvements could be categorized as, large Junctions on major roads, narrow junctions on minor roads connecting major roads with & without monuments.

❖ Wider Junctions

Large junctions are on the major roads having ROW approximately 30 M. These junctions help to divert major traffic flow through ABD area. In some junctions, there are monuments or round about at the center of the junction placed as a focal point. These large junctions can be identified as follows:

With monument

Jaistambh Chowk

Rathore Chowk

Agrasen Chowk

Telghani Chowk

Budheshwar Chowk

Kalibadhi Chowk

Rajiv Gandhi Chowk

Without monument

Sharada Chowk

Motibagh Chowk

Shastri Chowk

Mahila Thana Chowk

Budhapara Chowk

❖ Narrow junctions

The internal areas are having spatial network of narrow roads, forms narrow junctions. Some narrow junctions have the monuments which reflect a community identity. These narrow junctions can be identified as follows:

With monument

Gurunanak Chowk
Sanjay Gandhi chowk
Tatyapara Chowk

Kotawali Chowk

K.K.Road chowk
Maszid Chowk

Without monument

Station Chowk
Fafadih Chowk
Police Line Gate/Nehru Nagar Chowk
Purani Basti Police Station Chowk
Kankali Chowk
Azad Chowk
Amapara Chowk
Durga Devi Chowk
Chikani Mandir Chowk
Devendra Nagar Chowk
Makahara Chowk

The following are the proposed roads and junctions locations and proposed elements for visual improvement. Refer following map for junction references.

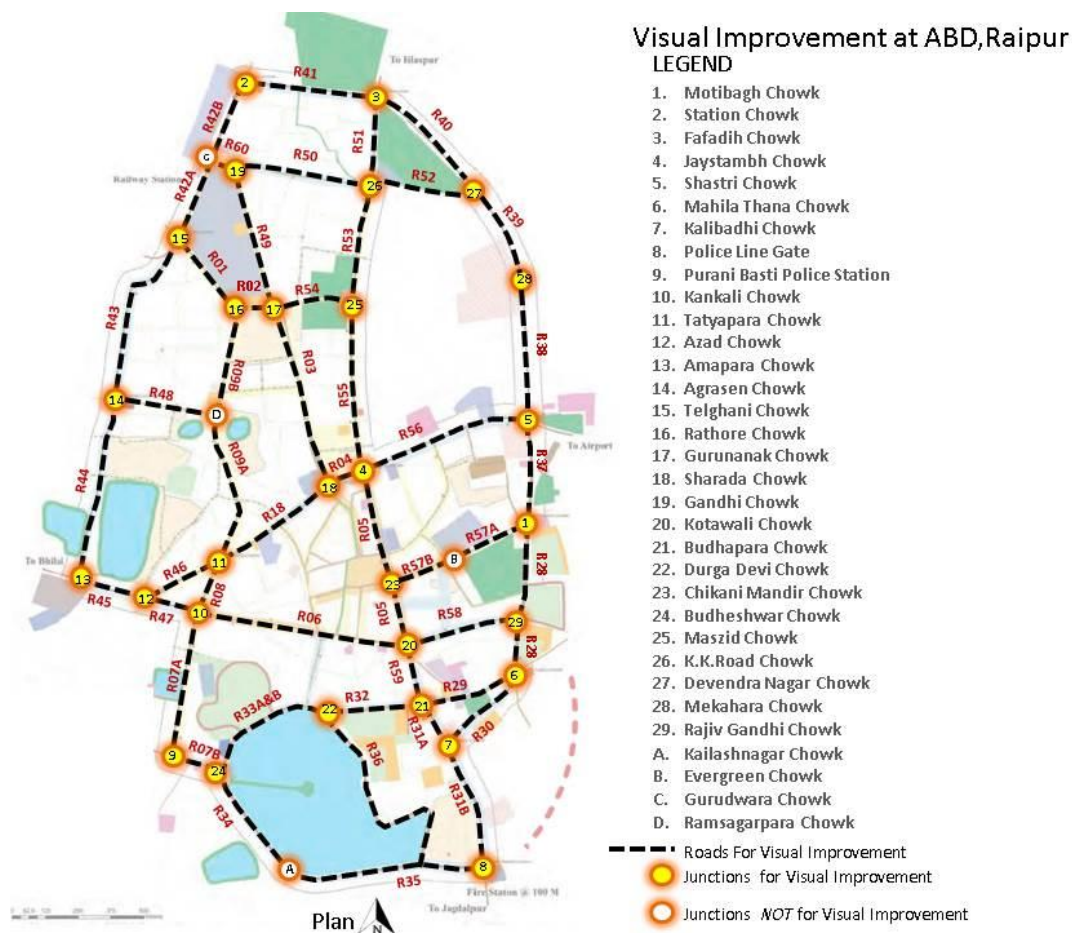


Figure 1: Map showing roads and Junctions

4 ELEMENTS FOR VISUAL IMPROVEMENT - STREETSCAPE






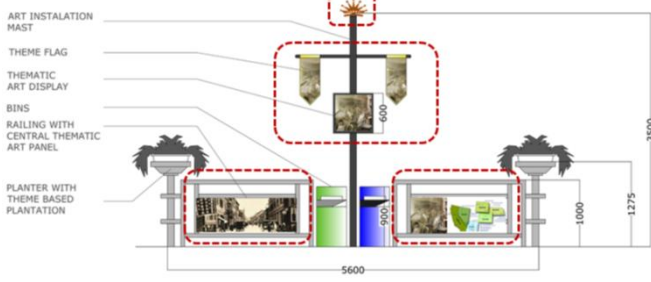
All categorized roads in the ABD area have been planned for improvement. All the basic and necessary elements for smart roads have been incorporated while designing the sections. Smart roads are proposed to have dedicated cycle track, footpaths with street furniture, tree belt and landscaping, smart road elements such as smart light poles, benches, parking, etc. Services are designed underground to increase the visual aesthetic.

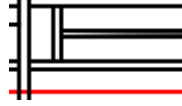
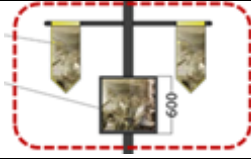




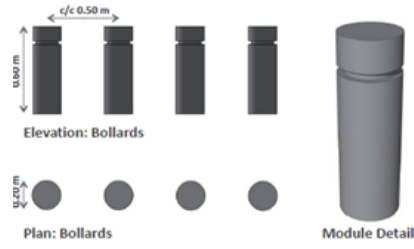

Improvement of the existing scenario will add the aesthetic quality. The possible and standard elements taken under visual improvement are listed below. It will enhance the functional and visual dimensions of the intervention area. These elements primarily used for the physical intervention in the ABD area.

4.1 Streetscape elements

1. Tactile for Footpath
2. Median Planters & Median Painting
3. Statue - Improvement
4. Tree gratings
5. Seating Bench
6. Pedestrian Railing
7. Median Railing
8. Thematic panels
9. Pot & planters
10. Dual system Litter Bins
11. Trees & Shrubs/Hedges
12. Lights for beatification
13. Bollards
14. Sign board

Table 1: Streetscape Elements

ELEMENT NAME	REFERENCE IMAGE
1. Tactile for Footpath	
2. Median Planters & Median Painting	
3. Statue - Improvement	
4. Tree Grating	
5. Seating Bench	
6. Pedestrian Railing	

7. Median Railing	
8. Thematic Panels	
9. Pot & Planters	
10. Dual system Litterbin	
11. Trees/Shrubs	
12. Lights for Beautification	
13. Bollards	
14. Sign Boards	

4.2

5 VISUAL IMPROVEMENT AND STREETScape: SCOPE OF WORK

5.1 Scope

- The streetscape must create a unique sense of place. This should be ensured in a variety of ways, i.e. materials, brick paving, signage, lighting, landscaping, crosswalk markings, and art of sculptural pieces.
- Building frontage and building uses e.g. offices; retail shops, malls etc. should be carefully considered while placing streetscape elements for various mixed activities in front.
- There must be places suitable places to sit and interact along the street with supportive elements like benches, planters, and open plazas.
- Views points from the street to buildings, businesses, or location of interest are extremely important and must be maintained, especially in retail areas, views and sightlines are critical to any businesses' success.
- A Separation between vehicles and pedestrian is important. This could be done with trees, low vegetation, planters, bollards, or other elements as per proposal.
- The movement between vehicles and sidewalks should ensure for smooth flow. Ease of accessibility should be ensured from a vehicle to a desired location on the sidewalk.
- Safety of the pedestrians is critical. The separation of the vehicles discussed before is important, however things like well-marked crosswalks, barricades and parking spaces, proper accessible spaces and curbs all contribute to the safety of the users.

5.1.1 Designing Pedestrian Pathway

Footpaths within the road reserve lie between the edge of the roadway and the frontage of adjacent private property. It is important to distinguish between the total widths likely to be used by pedestrians. Footpaths slope should be between 1:20 to 1:33 .

5.1.2 Surfacing

Standard paving materials should be used. Pavements must be articulated by means of simple patterns created by using different materials, colors and textures to avoid monotony. Promoting of high quality and distinctive environments by installing different footpath surfaces, particularly in areas such as the CBD, commercial areas and at tourist attractions is necessary. A wide range of material can be used as long as it is firm, stable, even, slip resistant when wet, and does not give misleading signals to the vision impaired. As well as the initial costs, the costs and ease of maintenance, repair, reinstatement and replacement should be considered, along with the drainage properties of different footpath materials. Vision impaired pedestrians often use differences in texture, contrast and color as a way-finding cue, so material standardization and consistency are important

Surfaces may be suitable for footpaths are Concrete and asphalt, Stone pavers and unglazed brick, Split-face stone, cobblestones, loose surfacing, such as exposed Aggregate, gravel and bark, Tactile paving etc.

Pattern designs shall be varied by identifying major to minor roads - junctions to give sense of identity to the place.

The materials can be combined in different ways in order to achieve a variety of patterns and textures. These are only a few examples of what can be achieved as a reference,



Figure 2: Design Patterns on pathway with varied paving colours



5.1.3 Width of footpaths

- The width of the various footpath zones will depend on the environment and those to which the route connects. Following table has minimum widths that apply to typical pedestrian and vehicle flow conditions.

Generally, wider street furniture zones are required in areas with:

- high adjacent vehicle speeds, and/or
- high adjacent vehicle volumes

And wider through-route zones are generally required in areas with:

- high pedestrian volumes, and/or
- A high number of pedestrians stopping on the footpath.

Where insufficient width of right of way is available, road space could be allocated from the carriageway to pedestrians.

5.1.4 Footpath zones

Most footpaths within the road reserve lie between the edge of the roadway and the frontage of adjacent private property. It is important to distinguish between the total width and the width of the zone likely to be used by pedestrians (the through route) from pedestrian way.

5.1.5 Crossfall

Crossfall is the slope of the footpath at right angles to the direction of travel. Some crossfall is required for drainage, but excessive crossfall in the through route requires people using wheelchairs and walking frames to use extra energy to resist the sideways forces. As the crossfall is invariably towards the road where footpaths are in the road reserve, anyone losing their balance is directed towards motorized traffic. Through route crossfall should always be between one percent and two percent. Where conditions could lead to greater crossfall, the footpath can be raised or lowered over the whole width. Alternatively, steeper crossfall can be created in the street furniture and/or frontage. Where land next to the footpath's frontage zone has a significant downwards crossfall (greater than 25 percent) or a vertical drop of more than one meter, pedestrians should be prevented from straying from the through path by, for example.

- a 1.2 m-wide strip of a contrasting colored and/or textured material between the edge of the footpath and the start of the hazard
- a raised mountable kerb at the edge of the footpath, together with a 0.6 m-wide strip of a contrasting colored and/or textured material between the herb and the start of the hazard
- A barrier at the edge of the footpath that is at least 0.9 m high.

5.2 Tactile tiles on footpaths

Barrier free Divyang friendly Footpath integrated with new street section design, Smart Public travel stations with tactile info, Divyang friendly street parking zones, Divyang friendly traffic lights (Auditory response) have been planned and proposed to make the road section design barrier free for differently able persons.

In order to make the design divvyng friendly, tactile tiles of suggestively single tile or block having dimension 300 x 300 mm have been planned to along the footpath to mark the line of movement for blind people. The tiles could be interlocking paver tiles of cement concrete and the material should be free from wear and tear. The design and manufacture should comply with ISO. Other solutions such as drop kerb to be used near the zebra crossing and traffic lights with auditory response have been proposed.

5.3 Seating Benches

Seating benches are one of the most important features of streetscape. It not only facilitates the pedestrians to seat in between but also develops the NMT zone into active public realm by providing pause points in the through pass. Thus, fixing location of benches is important, in proposed plan for improvement benches are fixed near the public spaces like bus stop, cycle stand, auto stand, major nodes and landmarks of localities. It should be intalled where wider footpath available more than 1.2 M in widths and approximatelty on 75 m distances.

5.4 Dual system litterbins

It is important to keep the city area clean, thus dustbin is important. Also, to segregate the garbage at source, ABD area improvement has a proposal of dual system litter bin of 60 – 80 LIT each. These shall be installed at major nodes, near the seating places and at a suitable interval along the footpath to make it easily approachable. It shall be assembling with the railing at appropriate distances approximately at 75 m along road.

5.5 Pot with planters

Places where tree or shrub plantations are not possible because of lack of space or because of services running below ground, potted planters are proposed on railing along the footpaths and medians to increase the green cover and to improve the aesthetics of the

place. At few places having larger and wide width of footpath or in plazas the pot and planters should be used.

5.6 Bollard

There is a requirement to bifurcate zones for pedestrian, cyclist from vehicular zone but at the same time it should not block access of pedestrians and cyclist. Bollards solve the purpose by placing at standard distance. Enough clear distance between bollards must be provided so that wheel chair can pass through. It shall be maximum 450 to 750MM in height at every junction at zebra crossings. It shall be placed at the location where no vehicle zone is proposed. i.e at the edge of carriage way along footpaths, cycle tracks plaza etc. All standard shall be followed with respect to all age group and the access of the areas shall be made divyang friendly.

5.7 Way finders & information panel, Signage

Way finders' panel shall at major junctions and nodes to demarcate the nearby amenities like bus stop, auto stand, E-toilet, Water ATM etc. The text written on the panels must be readable from the distance min 30 M.

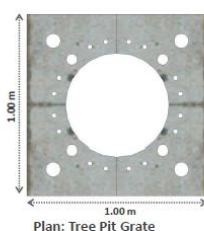
The design of traffic signs and signals must, wherever possible, be physically combined and integrated with other streetscape elements (e.g. markers and gateway structures). Good directional and informational signage is recommended.

5.8 City information panel

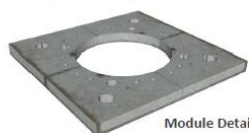
Information panel should have graphics theme in context of the city and speak about the culture and traditional history of city. These may be the digital panels placed near public congregating spaces like auto stand, bus stop etc. facilitated with touch screens. These will be used for advertising, inform people about the locality and city.

5.9 Tree Grating

Green belt or tree grates have been planned wherever sufficient ROW is available. Also, existing green cover has been preserved while new landscaping has been planned. Tree grating shall be provided on footpath existing trees and proposed trees. It shall be of made of concrete or any other suitable durable material equivalent to or more than concrete material quality. Size shall not be less than outer dimension 750mmx750mm in size.



Plan: Tree Pit Grate



Module Detail



3d View: Tree Pit Grate

tree grate vi

5.10 Traffic signals and signs

Traffic signals are provided at junctions to regulate traffic movements. Traffic signs are important as they warn riders about the forthcoming feature of the roads. Traffic signs should be according to the standards and seen from far distance.

5.11 Street Light

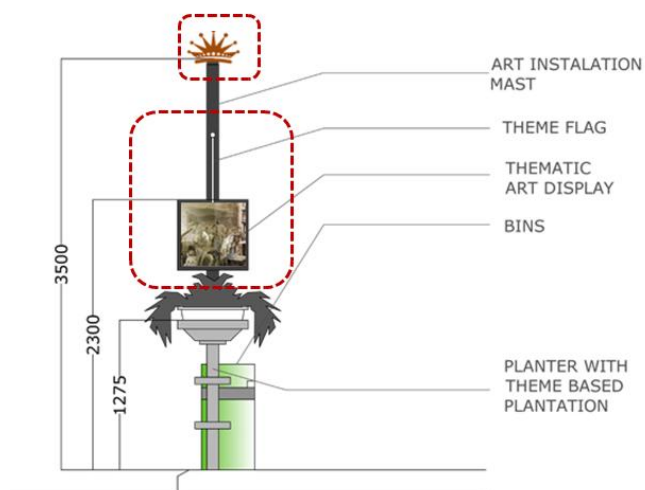
Street lights are important part of street furniture. They provide illumination during night time. Smart street lighting is retrofitted with solar panels and often has WIFI and advertising

panels on them. Some smart lighting is adjustable depending on the night environment lighting. Street lights are provided on medians to illuminate carriageway and on footpaths to illuminate pathway and seating area. All general activity streets and squares for pedestrian areas must be well planned for dark times and purposely designed.

5.12 Railing

Railing allows user visual permeability in all area but restrict from physical access. The design of railing in ABD area roads and junctions is done in such a way that, railing will act as a significant element of street and road. It is on different themes for different roads and junctions. These themes will give great aesthetical in ABD area as a colourful palette of flowers and plants. These themes have been decided as per the use and settlement around each urban corridor. Following module is specially designed for ABD Area as a visual element on roads and on Junctions.

To execute the themes on railing panels above module categorised in 3 ways. One category of railing will be placed on median - separating the traffic of the larger roads and second category will be for larger roads and footpaths and third will be at narrower roads and footpaths - separating the carriage way and footpaths or cycle track. Categories are as follows:



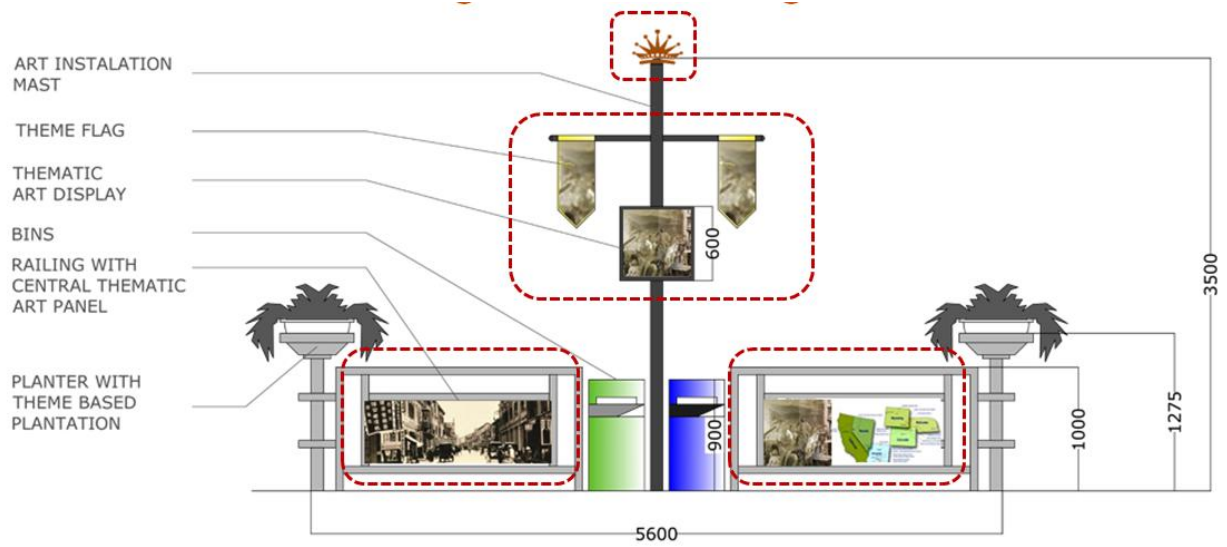


Figure 3:Railing

❖ Railing on median

This element will be placed on where median is available in the ABD area. Main functions of this median & railing are to guide the safe and smooth flow of traffic as segregation of traffic, to protect landscape & Separation of lanes. The drawing details of railing can be seen further.

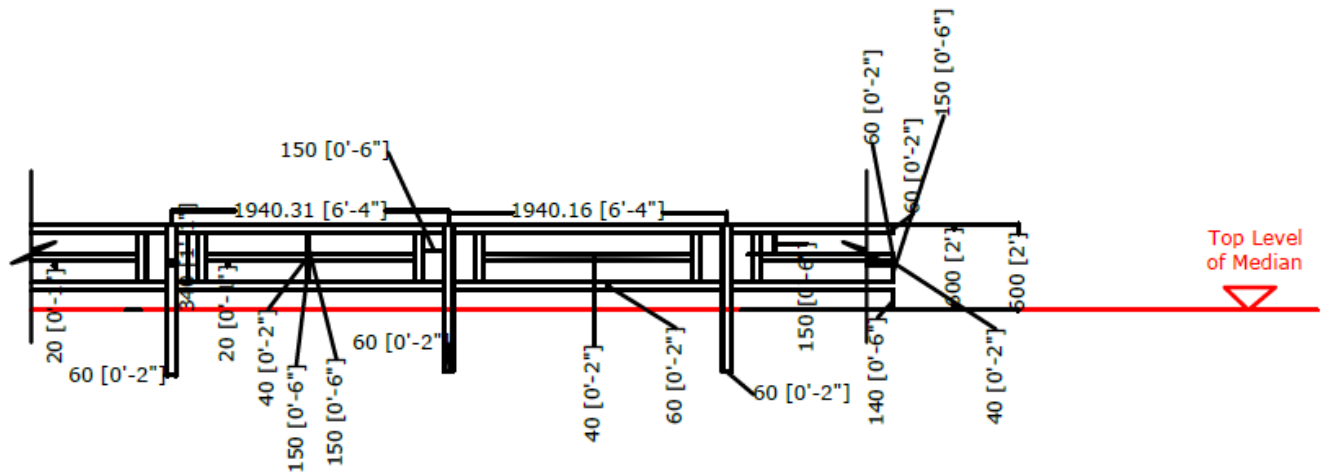


Figure 4 Thematic Railing on Median

❖ Thematic street furniture railing: Module 1

This element will be placed along the wider footpaths. It will separate the carriage way and pedestrian movement. It is proposed in entire ABD area along the identified roads. This railing will have art installation mast, theme flag, thematic art display, central thematic art panel and planter with theme-based plantation. At certain intervals, railing module has a themed element with a mast which interrupts the continuity of railing panels. Additionally, it will have garbage bins at every mast location as a streetscape element.

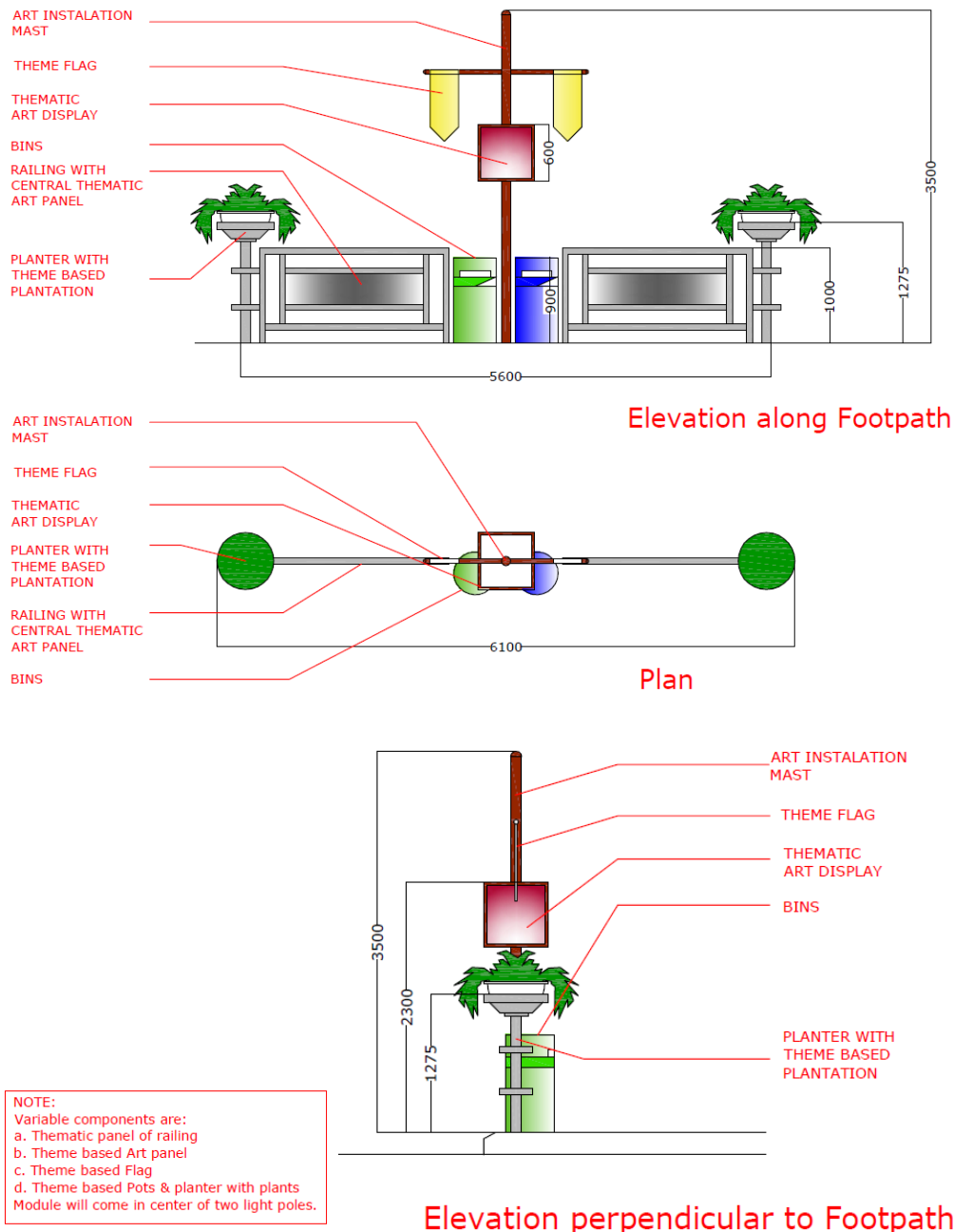


Figure 5 Railing along Larger Footpaths

❖ **Thematic street furniture railing: Module 2**

This element will be placed along the narrower footpaths. It will separate the carriage way and pedestrian movement. It is proposed in entire ABD area along the identified roads. This railing will have art installation mast, theme flag, thematic art display, central thematic art panel and planter with theme-based plantation. Continuation of railing is avoided in such narrower footpaths. This module placed at certain intervals to avoid the claustrophobic effect for pedestrian. Additionally, it will have garbage bins at every mast location as a streetscape element.

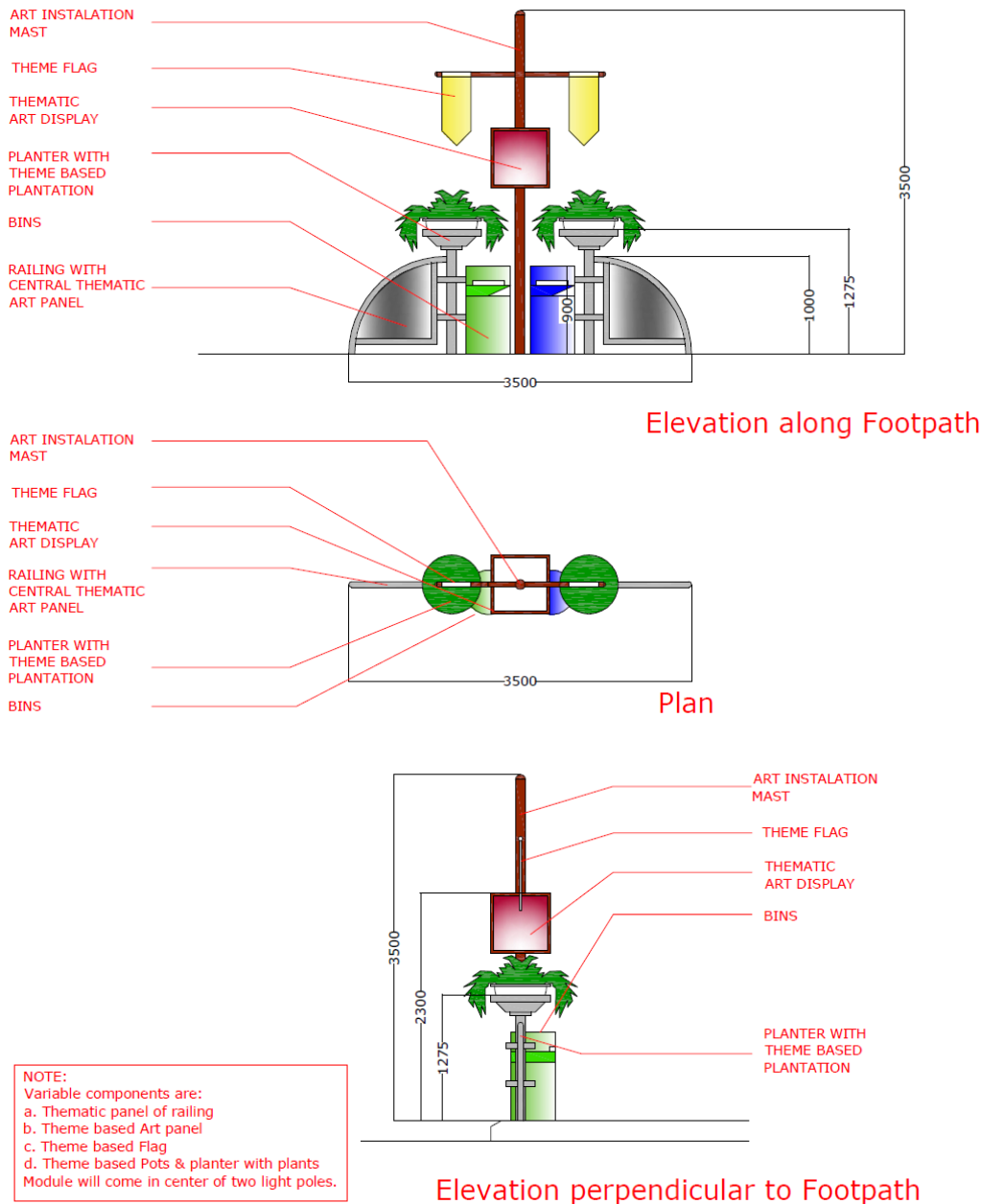
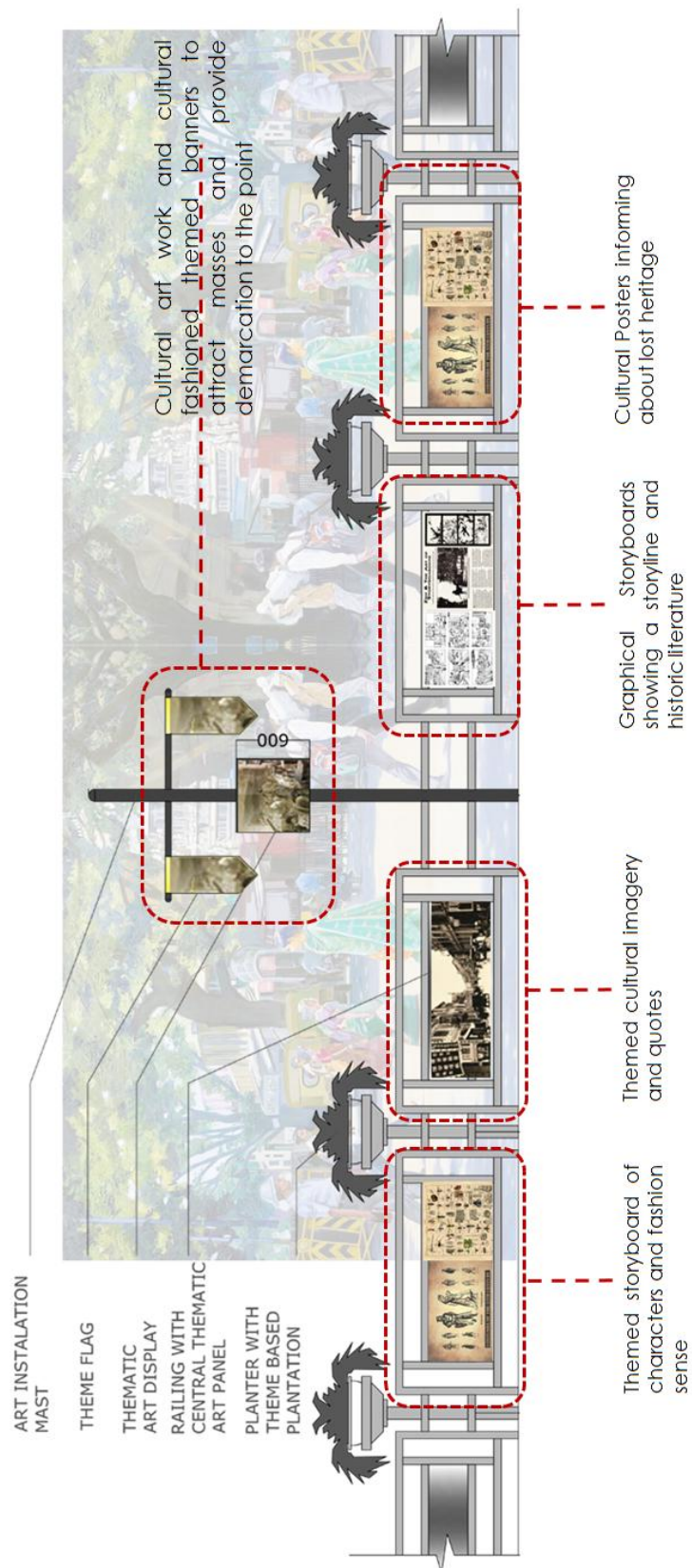


Figure 6 Railing along Narrower Footpaths

Figure 7 Street Elevation with themed Railing














6 LANDSCAPE: TREES AND SHRUBS




Landscaping can create an attractive visual environment and a 'buffer' between the footpath and the roadway. It creates the appearance of a narrower road and can encourage drivers to travel more slowly, as well as possibly providing shade and shelter from wind for pedestrians.

The landscaping of hard urban spaces must create acceptable living and working public environments. It must also contribute to greening the city and enhancing the capital city's image. The landscaping must therefore, adhere to the following general guidelines and principles:

- Indigenous plants shall be used wherever possible.
- Planting used to provide focal points, character, screening, softening and shade.
- Evergreen trees must be used to provide shade, while deciduous trees must be used for seasonal change.
- Shrubs and trees must be placed in such a manner that they do not provide hiding places for criminal elements or create visual obstructions.
- In smaller and isolated areas, ground covers must be used instead of grass.
- Scrambler shrubs must be used as ground cover for large areas.
- Where applicable, efficient erosion control systems must be in place in order to minimize the loss of top soil.
- Appropriate irrigation technologies aimed at reducing water consumption and the unnecessary wastage of water must be investigated and be applied.
- Where hard urban spaces cannot be spatially defined by means of surrounding buildings, landscaping elements (e.g. Trees) must provide the desired spatial definition.
- Landscaping is critical to creating image. However, when landscaping, the designer should use low landscaping or landscaping that is above the users' line of site.
- Most low landscaping should be a maximum of 18-24" tall. Any trees or upper level landscape should be maintained at 6' or above. The middle area of the landscape should be kept clear. This accomplishes two things it, keeps a line of site into things along the street such as retail areas and it helps with safety by not providing potential places for people to hide.
- Trees must be planted along streets and on the perimeter of squares to provide shade and ambience. The areas around trees must be appropriately edged (e.g. with kerbs or bricks) and be filled with gravel or be covered by metal, concrete or other tree grates. The tree grates must be as vandal-proof as possible and be designed in such a way that the collection of rubbish and cigarette butts inside them is minimized.
- A seating facility can be designed to encircle a tree. Planters can also be designed to accommodate seating. The paved surfaces of a general activity square must be complemented by high-quality landscaping to strengthen the desired character and ambience of the square. The use of planters and hanging flower baskets along general activity streets should be considered. All unpaved surfaces must be appropriately landscaped.

PROPOSED SHRUB VARIETIES FOR PLANTATION AT MEDIAN				
Sr N o.	Botanical name	Common Name	Remark	Picture
1	Tabernaemontana divaricata	Crape jasmine, Moonbeam, Carnation of India (Hindi-Chandni, Tagar)	Could not be eaten by cattle	
2	Nerium Oleander (Pink, White)	Kaner (Hindi-Kaner)	-"-	 
3	Asclepias curassavica	Scarlet Milkweed, Bloodflower, Silkweed, Indian root (Hindi-Kakatundi)	-"-	
4	Cascabela thevetia (Yellow, Orange)	Mexican oleander (Hindi-Kaner)	Could not be eaten by cattle & Helps in air purification	
5	Calotropis gigantea	Madar (Milkweed) (Hindi-Aak, Madar, Akvana)	Could not be eaten by cattle	

6	Bougainvillea glabra	Bougainvillea (Hindi- Booganbel)	Aesthetics	
PROPOSED TREE VARIETIES FOR PLANTATION ALONG ROAD				
Sr N o.	Botanical name	Common Name	Remark	Picture
1	Cassia fistula	Golden shower tree (Hindi- Amaltas)	Aesthetics, colour changing, Avenue plantation	
2	Cassia marginata	red shower tree, red or rose cassia, Java Cassia, Apple blossom cassia,	-“-	
3	Shorea robusta	Sal (Hindi-Sal)	State Tree- beneficial for various ways, e.g leaves for natural fertilizer, to produce an oil for perfumery	
4	Terminalia catappa	Sea Almond or Tropical Almond (Hindi- Jangli badam)	Wide foliage – shadow	

5	Plumeria alba (Red, White)	White Frangipani (Hindi- Champa)	For Plaza areas	
6	Schleichera trijuga	Ceylon oak, Lac tree, Gum lac tree & (Hindi- Kusum)	Aeshteics	
7	Lagerstroemia speciosa	Pride of India, Queen Crape Myrtle (Hindi- Jarul)		

6.1 Scope of work:

The planting contractor shall provide all horticultural operations and services specified on the drawings/ schedule of quantities as specified herein or both, as instructed by the Executive Engineer(Hort)/ including :-

- (a) Provide all equipment services and transport i.e. at least 4 Nos. Tractors with Trolleys, Water Tankers, Levellers, Spray Pumps, and Augers etc as required for the project.
- (b) Provide all plant material
- (c) Provide topsoil for all plants
- (d) Provide fertilizers, chemicals and manure as specified
- (e) Preparation of planting locations
- (f) Prepare plants pits, back filling, and prepare "saucers" at least 5" deep for watering, adding soil after settlement.
- (g) Spraying before planting
- (h) Staking supporting, wrapping and tying plant materials
- (i) Transplanting, if any
- (j) Disposal of debris and unused materials
- (k) Guarantee of trees and plants for a period as per the tender requirement
- (l) Plant material – Trees, Shrubs etc.
- (m) Plant list – plants are listed in the drawings. The plants list is enclosed herein.

(n) Nomenclature – The names of the plants species confirm to standardized botanical names.

Quality and general requirements of plants

Plants shall be typical of their species and variety has normal growth habits, well developed branches, densely foliated with vigorous and fibrous root systems. Plant shall be free from disease and insects. Bark shall be free from abrasion.

Plants shall be grown in pots/bags. Plants shall have been grown under climatic conditions similar to those in locality of project. Nursery grown plants shall have been at least once transplanted. Plants growing in natural ground prior to supply shall not be accepted.

Each plant shall be properly identified by weather-proof labels securely attached there to before delivery to project site. No plant shall be delivered to the project site, except for required samples, until inspection has been made in the field or at the nursery or unless specifically authorized in writing by the Executive Engineer (Horticulture)/Landscape Architect

Baled and Burlap plants must be moved with the root system as solid units in balls of earth firmly wrapped with burlap. The diameter and depth of the balls of earth must be sufficient to encompass the fibrous and feeding root system necessary for the healthy development of the plant. No plant shall be used when the ball of earth surrounding its roots have been badly cracked or broken prior to or during the process of planting or after the equipment required in connection with its transplanting has been removed. The plant and earth ball shall remain intact as one unit during all operations.

Container grown stock shall have been grown in container long enough for the root system to have developed sufficiently to hold its soil together, firm and whole. No plant shall be loose in container.

All plants shall be hardy under climatic conditions similar to those in the locality of the project. When plants of kinds or sizes specified are not available, substitution may be made upon request by the contractor if approved by the Project Engineer/Landscape Architect.

All plants should be strong sufficiently to stand straight without any support, but exceptional trees, soon after planting shall be properly supported to ensure their safety against wind or other factor which may affect it adversely.

Size of Plants:

All plants shall be equal to or exceed the sizes given in the plant list, which are minimum acceptable sizes plants shall be measured before pruning, with branches in normal position. Trees shall be minimum length as specified and shall be straight and symmetrical with a crown and having a persistent main stem. The size of the crown shall be in good overall proportion to the height of the tree. The height of the tree shall be measured from the top of foliage including the rootball.

Shrubs shall be well foliated with a crown typical of the species and variety. Shrub height dimension shall be taken from the top of foliage and up to, and including the rootball.

Sweet Earth:

Shall be friable foam material, fertile, typical of the cultivated top soil of the locality , containing at ,least 2% of decay organic matter sweet earth shall be taken from well drained arable sites, it shall be reasonably free of subsoil ,. Stones, weeds, earth, clods, sticks, roots or other objectionable extraneous matter or debris and shall contain no toxic materials. Representative samples shall be tested for fertility and general texture by the contractor or by a recognised commercial or government Contractor. No sweet earth shall be delivered in frozen or muddy condition.

Manure:

Shall be well – rotted, unleached (“Cow Dung Manure”) free of harmful chemicals and other substances which may affect plant life. Manure shall be free of weeds, straw leaves or inorganic debris.

6.2 Planting Operations

Time of planting: Planting operations shall be conducted under favourable weather conditions, the contractor will be notified by the Engineer-In-Charge when areas of work are sufficiently clear of construction work for the contractor to commence work on planting.

Planting shall be done by experienced workmen familiar with planting procedures under the supervision of a qualified foreman.

Planting pits shall be excavated with vertical sides, except for those designated to be planted in beds. Plants pits shall be of the following sizes 0.90 m x 0.90m x 0.90m depth minimum for trees. Tree points shall be large enough to accommodate the root ball + 1/3 root ball depth on all sides shrubs - 0.45m x 0.45m x 0.45m depth excluding 5” depth for watering for both trees and shrubs .

Executive Engineer (Hort)/Landscape Architect shall inspect and approve plants pits before the contractor proceeds with placing of plants. Topsoil shall be made ready for planting before plants are delivered to the site. The pits/beds shall be given anti termite treatment @ 20 ml. Radar per pit after back filling.

Placing of plants: Plants shall be placed at the centre of pits, plumb and straight. The Executive Engineer (Hort)/Landscape Architect shall inspect and approve placing of plants before the contractor proceeds with further operations.

Final Consideration: Sweet earth shall be compacted around basin of balls to fill all voids. Roots shall be properly spread out and sweet earth carefully worked in among them.

Watering: Immediately after plants pit is backfilled a shallow base slightly larger than pit shall be formed with a ridge of soil tone facilitate and contain watering. After planting cultivate the soil between plant pit and rake smooth. Spray the soil with water to settle.

Guying and Staking: All plants shall be inspected for injury to trunks, evidence of insect done immediately after planting. Trees shall stand straight without staking. Executive Engineer (Hort)/Landscape Architect shall inspect and approve plant pits before the contractor proceeds with placing of plants.

After Planting care Watering: Water tree and other plants by flooding within two hours of the time of planting.

Guarantee Period: All plants shall be guaranteed by the contractor for a period as per the tender requirement, after the certified date of completion. During this time any plant which dies due to natural causes or does not grow sufficiently shall be replaced free of cost by the contractor. Trees which perish due to unnatural causes such as human interference, cattle grazing etc. shall not be replaced free of cost but under instructions from engineer in charge and landscape architect shall be replanted and repaid for.

Replacement: All replacements of plants shall be made by the same species/variety and sizes as specified in the plant list. The cost of replacement shall be borne by the contractor.

6.3 Kerb paint

6.3.1 Scope

Painting two coats with Synthetic Enamel paint over a coat of enamel primer on concrete surface including cost, conveyance, taxes, of all materials, T&P,labour etc.

6.3.2 Material

Synthetic Enamel paint of approved black & yellow colour of Asian paint or equivalent brand
Application –

- Ensure that the road surface is clean, free from dust, oil and grease
- Heavy deposits of earlier paint or thermoplastic should be removed
- Wire brushing and water washing is recommended for removal of dust from road surface
- The surface should be thoroughly dry and free from moisture before painting
- Surface temperature must be at least 3°C above dew point but not above 50°C
- Do not paint at temperatures below 10°C or at relative humidity over 85%
- Under cold and humid conditions, the paint would require longer drying time
- Two coat application is recommended for optimum performance

Brush	Recommended thinner : Municipal/ Potable water Volume of Thinner : 5 - 15 %
Air Spray	Recommended Thinner : Municipal/ Potable water Volume of Thinner : 10 - 30 % Nozzle Orifice : 1.5 - 3.0 mm Nozzle Pressure : 0.3 - 0.4 MPa (=approx 3 - 4 atm; 43 - 57 p.s.i)
Airless Spray	Recommended Thinner : Municipal/ Potable water Volume of Thinner : 5 - 15 % Nozzle Orifice : 0.33 - 0.49 mm Nozzle Pressure : 12 - 15 MPa(=approx 120 - 150 atm; 1700 - 2100 p.s.i)

6.3.3 Measurements for Payment

Synthetic Enamel paint shall be measured on per litre basis along with the total running meter of kerb painted

6.3.4 Rate

The Contract unit rates for Enamel paint shall be payment in full compensation for furnishing all materials, labour, tools, equipment for construction and other incidental cost necessary to complete the work

7 TECHNICAL SPECIFICATION OF VISUAL IMPROVEMENT ELEMENTS

7.1 Tactile for footpath:

Providing and laying tactile tile (for vision impaired persons as per standards) of size 300x300x9.8mm having water absorption less than 0.5% and conforming to IS: 15622, of approved make in all colors and shades in outdoor floors such as footpath, court yard, multi modals location etc., laid on 20mm thick base of cement mortar 1:4 (1 cement : 4 coarse sand) in all shapes & patterns including grouting the joints with white cement mixed with matching pigments etc. complete as per direction of Engineer-in-Charge.

- *Maintenance:*

Cleaning should be done at regular intervals. Broken and missing tiles should be replaced as and when required.

7.2 Median Planters;

Plantation of flowering plants and shrubs in central verge i/c digging Trenches, filling earth & farm manure shall be at various roads. The list of the shrubs could be referred from landscape section of this document.

- *Maintenance:*

Daily watering should be avoided. Fertilizer should be given to shrub for better growth. Pruning should be done prior to monsoon. Weed control should be done. Missing shrubs should be planted again within 15 days from the observation recorded.

7.3 Median Painting:

Painting exterior surface (two or more coats) with good quality paint as per manufacturer's specifications and directions as selected by in charge engineer and as approved. Protective and good finish surface including cleaning washing of surface etc. shall be done. The paint should be of various colors including patterns of arts. Surfaces shall be Smooth Base Preparation. Fine Cement Plaster on Brickwork, & Smooth Casting finish on RCC; Honey-Comb to be filled using grouting for smooth surface finish

- *Maintenance:*

Once in a year painting at medians plastered finish surface shall be done.

7.4 Tree plantation:

Digging hole of size 0.60 m dia and 0.60 m deep imported with earth mixed with cow dung manure or sludge in the ratio of 2:1 by volume (2 parts of stacked volume of earth after reduction by 20% :1 part of stacked. Volume of manure after reduction by 8% is including cost of plant, flooding with water, dressing including removal of rubbish and surplus earth, if any with all leads and lifts i/c cost of manure, sludge or extra good earth if needed. Well established, healthy, free from disease, 150-180 cm height in earthen pot of size/poly bag of 25 cm. The list of the plants could be referred from landscape section of this document.

- *Maintenance:*

Daily watering should be avoided. Fertilizer should be given to tree for better growth. Pruning should be done before monsoon. Identification of disease and due care should be taken in respect of all trees. Generally, no more than 25% of the crown should be removed at once, and less for mature trees. No branch should be removed without a reason. It is applicable for existing and newly planted trees. Bracing should be removed after the first growing season to reduce the possibility of plant damage, and to improve the appearance of the planting. Applying mulch at planting, and maintaining it for several years, helps hold moisture in the soil, suppresses weed germination, and keeps trimmers and mowers away from plants. Weed control should be done for grown trees. Missing trees should be planted again within 15 days from the observation recorded. Ensure the fallen tree or broken branches are removed within 24 hours of receiving a report.

7.5 Theme paved circle around statue:

Providing 100 mm thick PCC M-15 Baseband fixing plain cement concrete fiber reinforced heavy duty designer glazed floor tiles or as approved by client with uniform color (for colored tiles) and texture conforming to IS: 1237 (for abrasion wear) and IS: 516 (for compressive strength) of approved make, colors, shades and size on cement Mortar bed and jointing with grey cement slurry @ 3.3kg per sqm including pointing in white cement mixed with matching

pigment complete. On floor, steps and risers over 20mm thick bed of cement Mortar 1:4 (1 cement: 4 coarse sand)

- *Maintenance:*

Do not use abrasive, acid, alcohol-based, or solvent-based cleaners; they will damage the surface. Quarterly, Fixing of damaged part and replacement if necessary.

7.6 Statue base:

Fixing 25 to 40 mm thick **Shahabad Stone** slabs with pointing and finishing joints neatly in CM 1:3 proportion for canal / field channel lining including cost of all materials, labour, cutting slabs to required size, mixing mortar, packing and finishing joints, curing etc., complete with lead up to 50 m and all lifts.

- *Maintenance:*

Quarterly, Rinse the top with warm water to remove surface dirt and wipe dry with a clean, soft cloth for routine maintenance. Wash with a soft cloth and a mixture of a mild detergent and warm water. Rinse with warm water, and wipe dry with a clean, soft cloth. Do not use abrasive, acid, alcohol-based, or solvent-based cleaners; they will damage the surface. Fixing of damaged part and replacement shall be done, if necessary.

7.7 Statue base:

Fixing 25 to 40 mm thick Shot blasted **sadar ali grey granite** stone slabs with pointing and finishing joints neatly in CM 1:3 proportion for canal / field channel lining including cost of all materials, labour, cutting slabs to required size, mixing mortar, packing and finishing joints, curing etc., complete with lead up to 50 m and all lifts.

- *Maintenance:*

Quarterly, Rinse the top with warm water to remove surface dirt and wipe dry with a clean, soft cloth for routine maintenance. Wash with a soft cloth and a mixture of a mild detergent and warm water. Rinse with warm water, and wipe dry with a clean, soft cloth. Do not use abrasive, acid, alcohol-based, or solvent-based cleaners; they will damage the surface. Fixing of damaged part and replacement shall be done, if necessary.

7.8 Railing around statue

Tubular Steel Railing on Medium Weight steel channel (ISMC series) 50mm: Providing, fixing and erecting 50 mm dia steel pipe railing in 3 rows duly painted on medium weight steel channels (ISMC series) 50 mm support, 0.45 meters high above ground, 2 m center to center, complete as per approved drawings. Fixing of Railings anchorage 75mm Deep BGL using Cement Concrete. First Paint surface with Red oxide.

- *Maintenance:*

Checking of railing supports and welding of broken parts as and when required, with quarterly checking should be done. Any stickers, advertising board apart from theme graphics should be removed immediately. To prevent rusting, application of anti-rusting coat on railing should be done prior to every monsoon.

7.9 Green Island around statue:

Installation of Grass of common name Dwarf Bermuda having medium texture and suitable for open sunny situation installation on soil at all area around statue as per details and drawings and as per direction of Engineer-in-Charge should be done.

- *Maintenance:*

Ensure that grass cutting is conducted every 15 day. Plant Nutrition, Mowing Periodically wherever required, Topdressing should be done at every month, Daily Irrigation Should be avoided, over seeding should not be done, Pest Control should be done as per professional way and suitable to lawn species.

7.10 Cleaning and of statue:

For Statue, sculpture of Metals or other material - Sculptures, especially metal ones, can benefit from using protective coatings. Regular application and renewal of protective coatings can be cost-effective means of prolonging the life of the sculpture, since they are much less intrusive and less expensive to replace or adjust than are the artist's original surfaces.

For Statue, sculpture of stone- It should be given periodic overall cleaning as necessary to remove accumulated pollutants. Easily accessible stone surfaces are to be cleaned often like pedestal, lower base etc. It should be kept free of debris and soiling by periodically sweeping and washing with water. Normal maintenance should include periodic inspection of stone surfaces for structural defects, movement, deterioration, or staining.

It is needed to conduct a visual identification of the stone. It is advisable to maintain careful records about the type, name, and origin of the stone. If such records do not exist, it should explore the following options before determining a cleaning and maintenance program. It should be done by professional. It is necessary to identify whether the stone is siliceous or calcareous by simple acid sensitivity test by expert.

- *Maintenance:*

Cleaning should be done once in a year by professional method as per respective make and material of statue. Cleaning should be done around the statue as well. Maintain protective coatings for outdoor sculpture. Maintenance should include regular washing with light hose pressure, using a dilute solution of mild detergent in water followed by water rinse. Use soft, nylon bristle brushes or sponges to apply the detergent. Changes in surface patina, pitting/streaking or other evidence of corrosion, blanching, structural problems or damage should be documented. Care is to be taken of entire central monument with all part as with statue, artwork, landscape and provided technical beatification services.

7.11 Tree grate:

Supply & fixing of Concrete Tree grate (1000x1000x 60) mm is overall dimension made of 4 nos. of panels each unit having dim of (500x500) mm & 40/75 mm thickness as per approved design. It should be suitably reinforced for long use and to prevent damage during transportation & handling. It should Manufactured with M-30 grade of concrete using vibro-compaction process using joint less FRP moulds so as to achieve shuttering finish on five faces and Gurmala finish on the top surface. A choice of standard colors and unlimited custom colors will match any natural stone finish or interlock pavers in the surrounding Parameters & as per the direction of Engineer in charge, complete incl. all consumables, T&P and Labours required for the job.

- *Maintenance:*

Quarterly, Washing should be done at regular intervals and replacing broken part if any immediately.

7.12 Seating Bench:

Sitting platform of bench made of Grey Colour Granite stone without back support having

dimension of 400MM in width, 1500 MM in length and 400MM in height i.e. (1500x400x400) MM & 100 MM in thickness; Leg size - 400mm Height X 400mm Width X 100mm thickness; shall be placed on footpath in a way that the pedestrians pass-by without disturbing the user. Water logging places shall avoid for placing the benches.

- *Maintenance:*

Twice in a year, Rinse the top with warm water to remove surface dirt and wipe dry with a clean, soft cloth for routine maintenance. Wash with a soft cloth and a mixture of a mild detergent and warm water. Rinse with warm water, and wipe dry with a clean, soft cloth. Do not use abrasive, acid, alcohol-based, or solvent-based cleaners; they will damage the surface. Fixing o damaged part and replacement if necessary.

7.13 Pedestrian Railing:

1 M high M.S railing, painted as approved by the site engineer. It should be firmly grouted to ground with bolt or anchored using Cement concrete. Modular design attached to each other with a vertical post as per drawing should be taken. Gauge of the material is as per approved drawing details. Fixing of Railings anchorage 100 mm Deep BGL using Cement Concrete. First Paint surface with Red oxide. Design as per drawing and gauge as mentioned in the drawing.

- *Maintenance:*

Dust, mud and other papers, flex or advertisement boards other than designed theme graphics attached or pasted without permission should be removed immediately. Anti-rusting treatment should be given wherever required once in a year.

7.14 Median Railing:

600M high M.S. Painted as approved by the site engineer. Firmly grouted to ground with bolt or anchored using Cement concrete. It should be Continuous along the median as per drawing details. Fixing of Railings anchorage 75 mm Deep BGL using Cement Concrete. First Paint surface with Red oxide.

- *Maintenance:*

Coloring and replacing of broken, missing parts should be done immediately as and when required. Anti-rusting treatment should be given wherever required once in a year. Any stickers, advertising board apart from theme graphics should be removed immediately.

7.15 Dual system Litter Bins:

Provision should be at approximate 75M intervals along the roads at railing side. It shall be fixed to railing in such a way that, bins shall be accessible from road side and from pedestrian way side. Material shall be FRP of capacity from 60-80 lit or any other approved quality material by client. The litterbins should be fixed in a way that, bins shall be assembled in such a way that, those could be detached. Each bin is made of two bins for segregation of waste. Dual system litterbins model color as approved by the site engineer and site in charge with Installation and fixing at site.

- *Maintenance*

Quarterly checking and Cleaning should be done at regular intervals. Broken and missing bins should be replaced as and when required.

7.16 Flags:

Procurement and installation of good quality double side printed on fabric used in a good-quality umbrella canopy, a nylon taffeta rated at 190T (190 threads per inch) or material as approved by the client, with coating and good finish of size 300x600mm printed graphics as per the street theme.

- *Maintenance:*

Quarterly checking and it should be replaced tear, broken pots and planter, missing flags, panels, art display. Those should be replaced again within 15 days from the observation recorded.

7.17 Thematic art display at mast:

Procurement and installation of art work on each post as per the theme. The material used and printed graphics should withstand weather, temperature of outdoor. The panel material shall be ACP or PVC or as approved by the client. It should with stand the weather. The thickness of the panel shall be min 3MM to 12 MM max. Themes shall be followed for the graphics design.

- *Maintenance:*

Quarterly checking and it should be replaced tear, broken pots and planter, missing flags, panels, art display. Those should be replaced again within 15 days from the observation recorded.

7.18 Central Thematic Panel:

Procurement and installation of art work on each post as per the theme. The material used and printed graphics should withstand weather, temperature of outdoor. The panel material shall be ACP or PVC or as approved by the client. It should with stand the weather. The thickness of the panel shall be min 3MM to 12 MM max.

- *Maintenance:*

Quarterly checking and it should be replaced tear, broken pots and planter, missing flags, panels, art display. Those should be replaced again within 15 days from the observation recorded.

7.19 Pot and Planter:

Procurement and installation of factory made FRC pot or any other material as approved by the client and planting small plants in the same as per necessary methods and in coordination with the site engineer.

- *Maintenance:*

Quarterly checking and it should be replaced tear, broken pots and planter, missing flags, panels, art display. Those should be replaced again within 15 days from the observation recorded.

7.20 Spike / Spot light:

Providing Graphite grey powder coated integral aluminum housing. Die-cast aluminum housing comprises Warm White (WW) COB LED and reflector 9W. COB LED color temperature: 3000°K \pm 250°K, COB LED housing covered with die-cast aluminum ring with weatherproof gasket and toughened glass. Adjustable mounting bracket with spike is provided for easy to focus the object. 2 nos., Ø8mm holes also provided on adjustable mounting bracket for surface mounting. Constant current LED driver. □ Degree of protection: IP65xing

9W to 100 W (5000 to 10000 Lumen) mounted LED bracket spotlight focusing to the statue to enhance its presence. Spot light should be fixed and placed around statue. It should withstand for seasons without affecting the temperature max & Min. Of city in co-ordination of the site Engineer.

- *Maintenance:*

Check for lighting and working of bulbs and fixture should be done.

7.21 Flood light:

Die-cast aluminum housing designed to act as heat sink for efficient dissipation of heat & 30W. Electrochemically brightened and anodized aluminum reflector. Heat resistant toughened glass is provided with die-cast aluminum frame. (IK 08) Luminaires provided with a mounting bracket for aiming adjustment. Driver is provided with open and short circuit protection. Finish: Powder coated. Degree of protection - IP65 providing and fixing light focusing the statue to enhance its presence, in co-ordination of the site Engineer.

- *Maintenance:*

Quarterly, Checking should be done for lighting and working of bulbs and fixture.

7.22 Chowk name:

Name of chowks at suitable eye level & locations painted or mounted or embossed as per design and as selected by in charge engineer and as approved. Fixing of Vertical posts anchorage 100 mm Deep BGL using Cement Concrete. First Paint surface with Red oxide if using MS. As per selection of text height material suitable illumination shall be provided for night time. The text shall be visible from minimum 30 m distance to naked eyes. Material used for junction name shall be weather proof and waterproof. Design of the junction name, boards shall be placed at site after design finalization by the client.

- *Maintenance:*

Quarterly, Checking should be done for lighting and working of bulbs and fixture. Coloring or replacing of broken part should be done immediately as and when required.

7.23 Bollards:

Providing and fixing RCC precast bollards of size 125mm dia of length 650mm casted in CC 1:1.5:3 with 20mm down size aggregates using 10mm dia vertical 4 TMT Steel Rods and 8mm dia Stirrups at 20 cm c/c fixed 300mm above ground level, curing, transportation to work spot including excavation in hard soil in size 250 x 250 x 450mm deep with plain cement concrete 1:2:4 using 20mm down size aggregates including aligning to plumb and line providing enamel painting to exposed faces in alternate black & white strips and painting with reflective paint on top of bollards with a width of 10 cm including cost of all materials, labour, hire charge of machineries complete (As per drawing) Pedestrian crossing and as directed by Engineer-In-Charge of the work etc., complete.

- *Maintenance:*

Quarterly, Checking should be done for bollards. Coloring or replacing of broken bollard should be done immediately as and when required.

8 LIST OF REFERENCES FOR DESIGN BASIS

A. National

1. Guidelines for Pedestrian facilities, IRC:103-2012
2. Street Design Guidelines-UTTIPEC (Revision 1: Nov 2010)

3. Guidelines and space standards for barrier free built environment for disabled and elderly persons (CPWD,1998)

B. International

4. Auckland Transport code of Practice
5. University of Houston campus design guidelines and standards parking lot design guidelines
6. City of Tshwane (South Africa) -Street scape design Guidelines
7. Sustrans (England) Design Manual-Handbook for cycle friendly design ,2014
8. RTS14-Gudelines for facilities for blind and vision impaired pedestrians ,3rd edition, may2015, Road and traffic standard series (New Zealand)

9 PROPOSED THEMES FOR JUNCTIONS IN ABD AREA

Raipur relates to its historical period and some even date back to medieval period. There are several historical stories around the freedom struggle movement, women's emancipation reforms, social reforms, educational reforms, political history, marital valour and many such unique aspects of Raipur history. Several dynasties have left their individual cultural footprint of art and architectural style during their ruling period in the historic city of Raipur. It results in flourishing of art and architecture and its existence can be seen in the form of built architecture in the urban fabric of the city. It is reflected and signified at the intersections of the roads in the form of monuments.

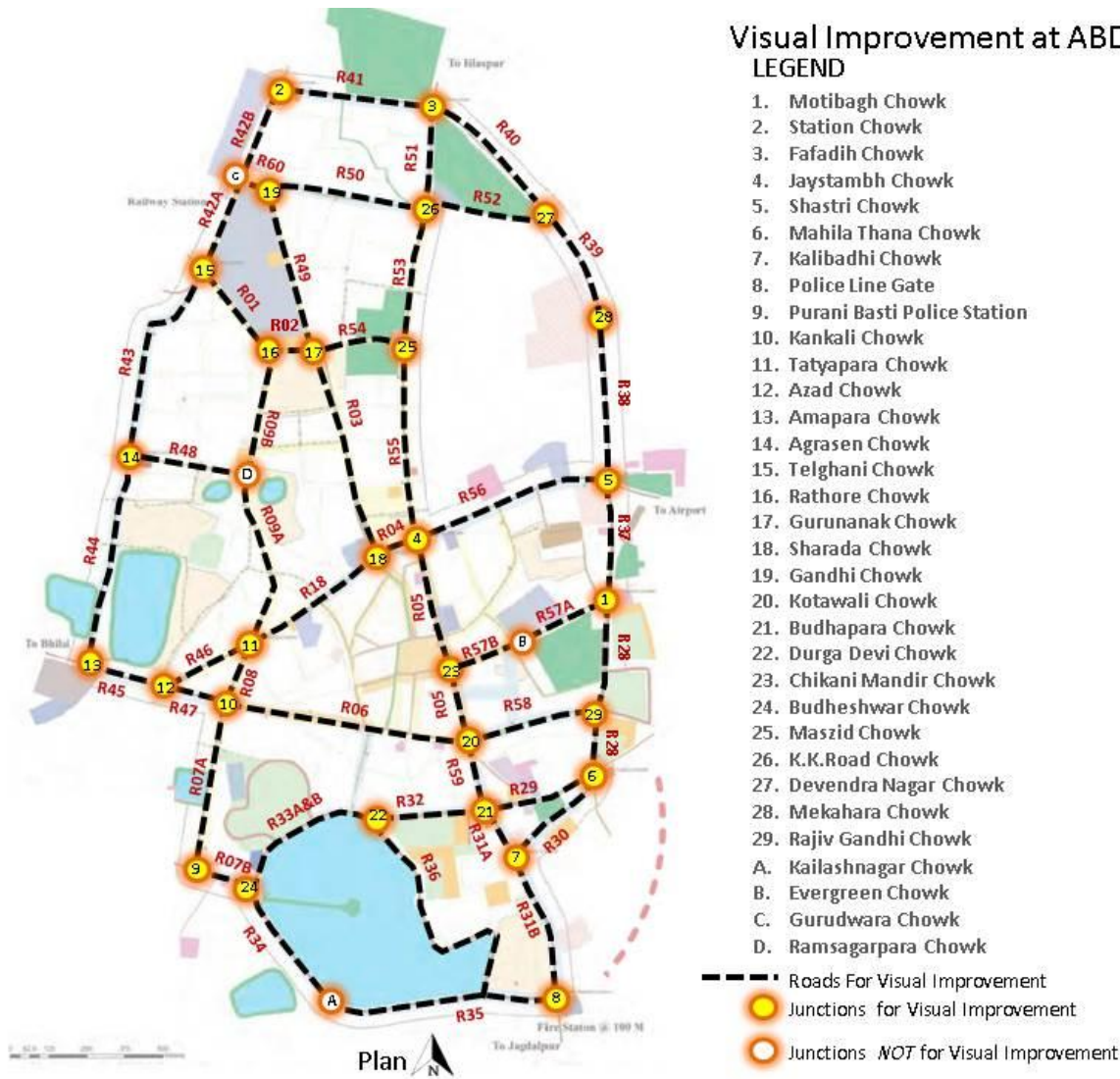
For visual improvement of roads central theme is, The Historical Insignia. In reference to that all junctions to be developed on the themes as well. These junctions formed due to intersection of roads will have different themes. Total 29 junctions identified and to be developed under visual improvement package along with visual improvement of roads. Few junctions have the monument at the centre. Junction with the monument will have theme with reference to the monument appearance, history and memories. Other junctions are without monument; these junctions will have a theme reference to the roads intersecting and landmarks, settlement, culture of residents around them.

Note:

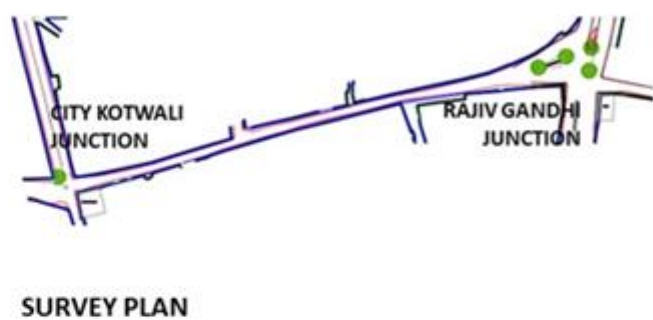
Each road and junction will have separate theme accordingly the graphics of flags, panels and flowers shall be designed and placed on railing at dedicated spaces.

Graphical illustrations/Images are shown for each junction theme as a reference only. Actual design & images will be provided by the contractor and the design will be approved by the client

Examples are demonstrated below.

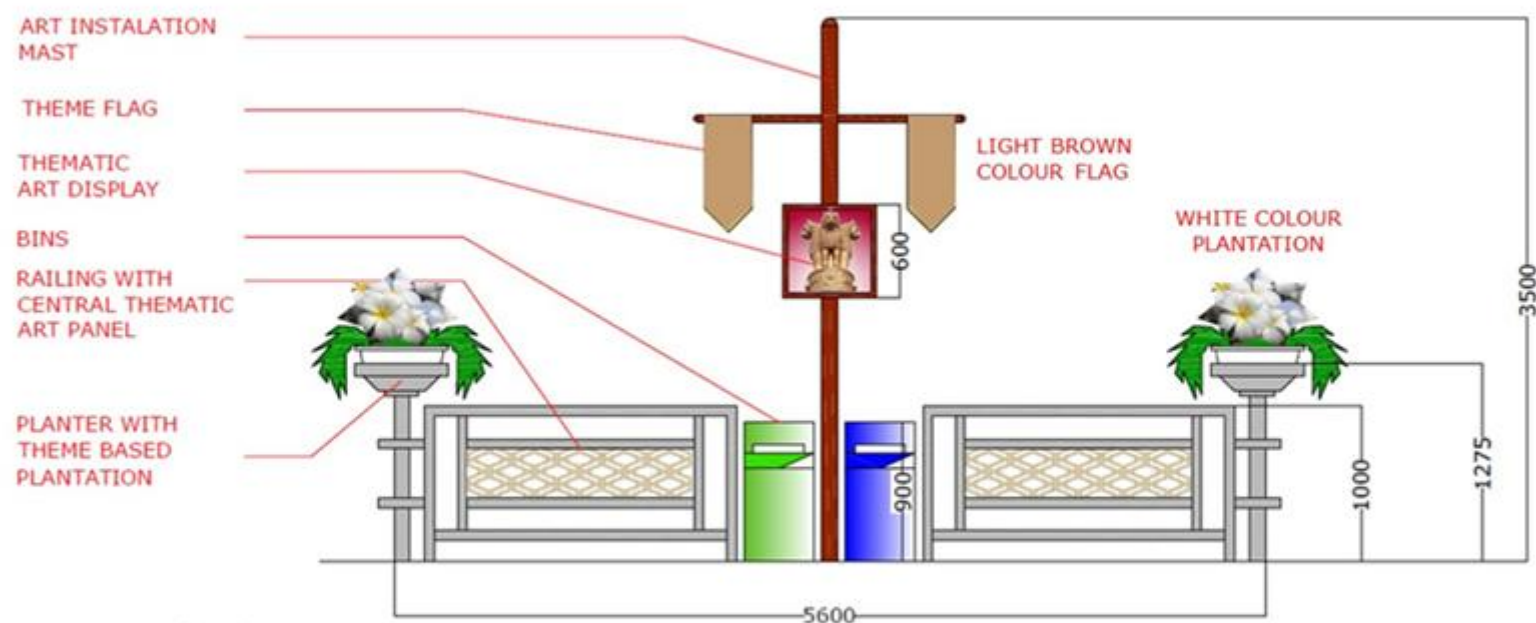


R58 CITY KOTWALI JN TO RAJIV GANDHI JN: Existing Condition For Reference



SITE PHOTOGRAPHS

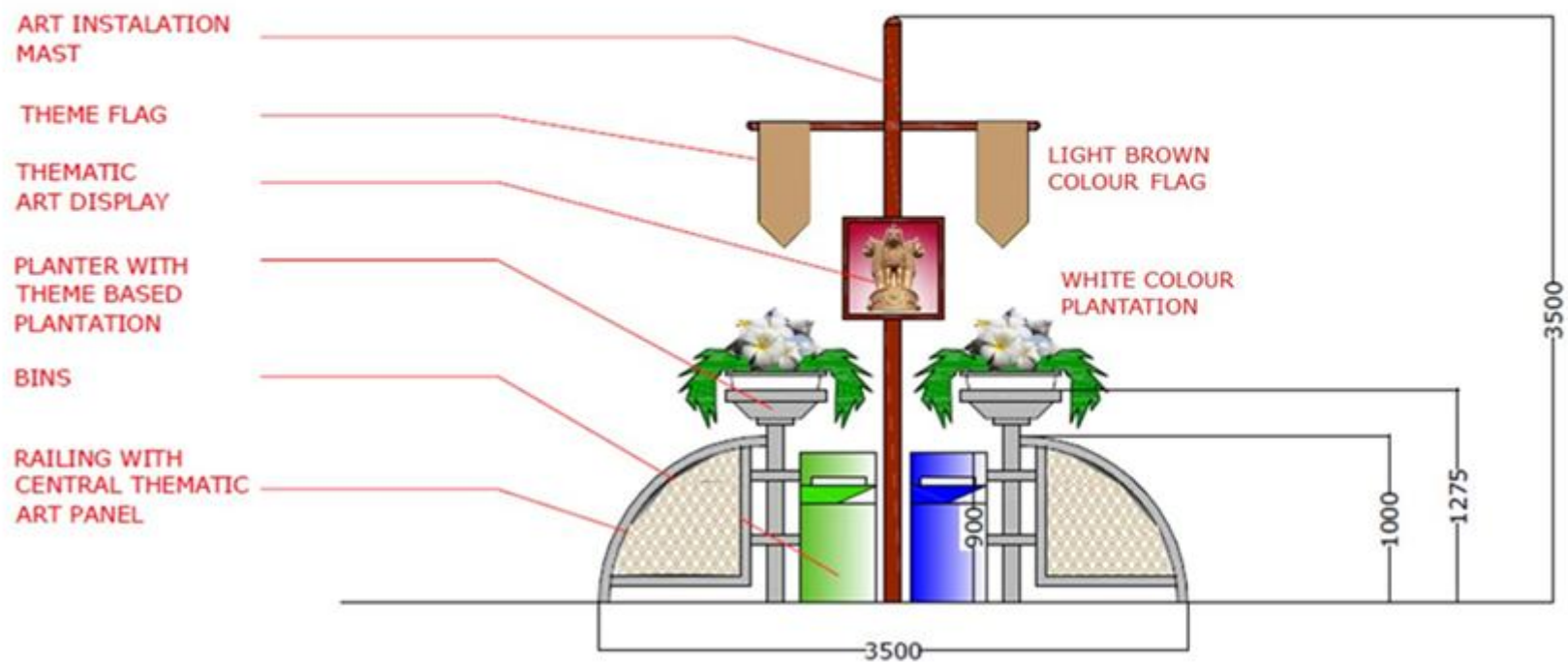
R58 CITY KOTWALI JN TO RAJIV GANDHI JN: Proposed Road theme For Reference



Theme: Law and Order

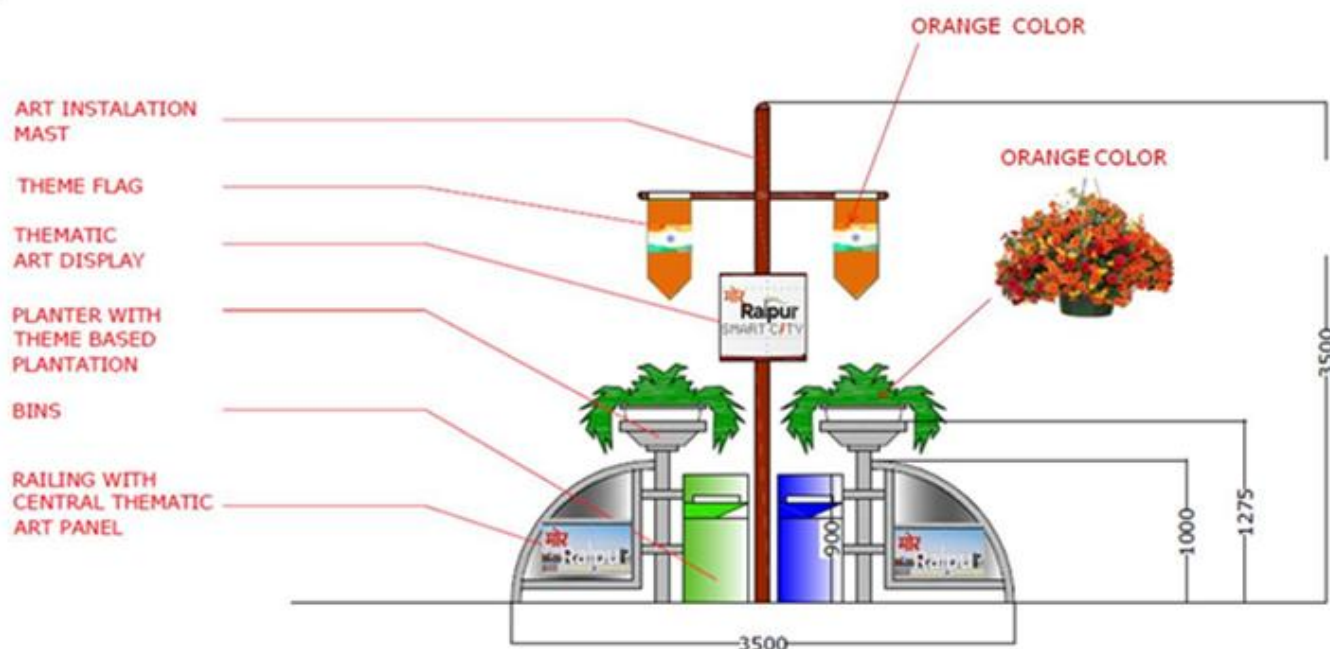
Kotwali means a police station. As the name of the junction suggests, the theme for this junction should be inspired from the works of police services. Thematic display will have graphic of national emblem of India. The emblem demonstrates and strongly promotes the services being offered by the police department. The flags will be of light brown (Khakhi) colour representing the uniform of police services. Central thematic art panel will have graphic of railing design. Planters will be of white colour flowers.

R58 CITY KOTWALI JN TO RAJIV GANDHI JN: Proposed Road theme For Reference



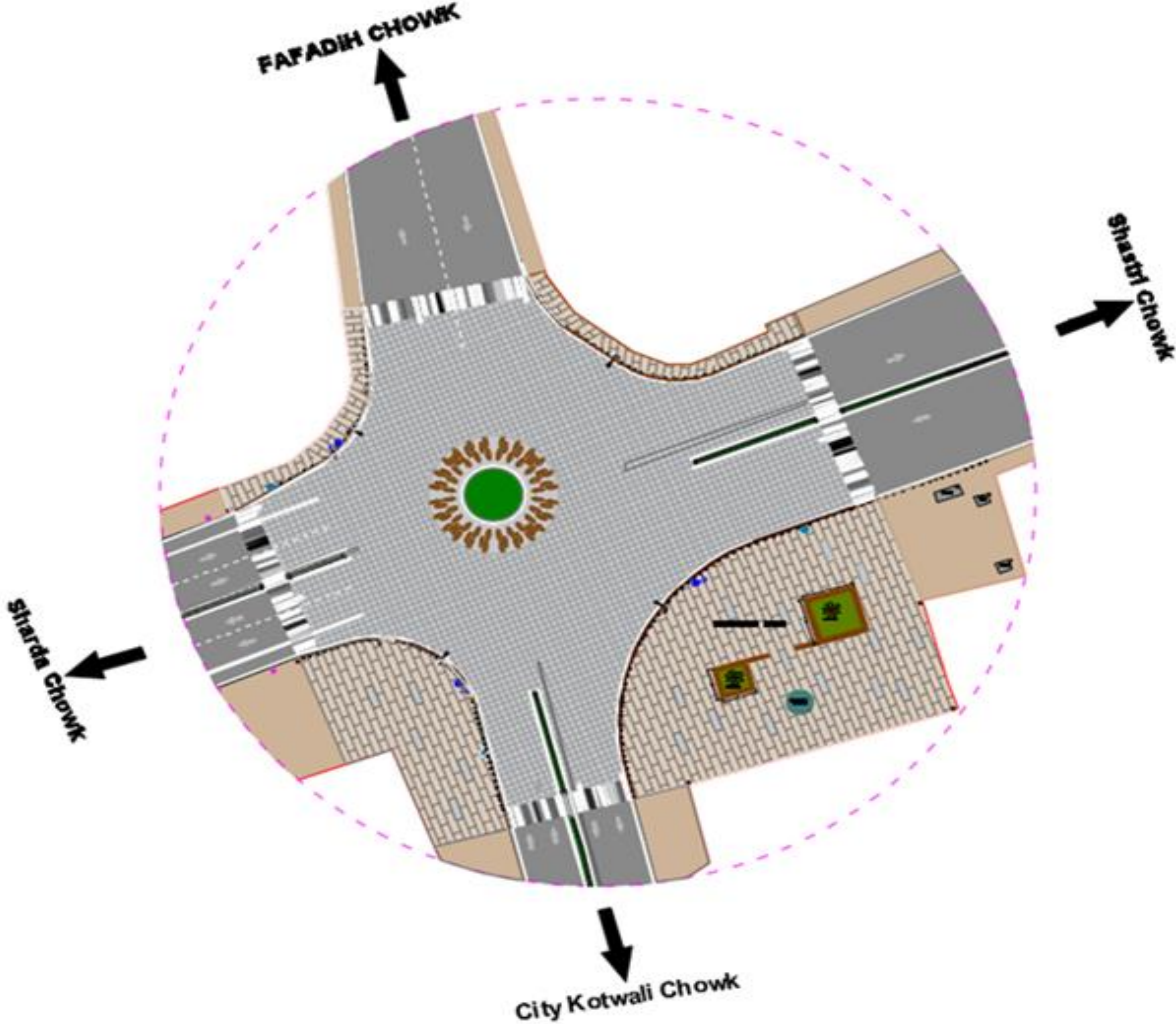


04. JAISTAMBH CHOWK : Proposed Junction theme For Reference



Jaistambh junction has monument carries the Ashoka chakra on it. The monument expresses the memories of power and victory. A Shastri junction is named after the national leader & Former prime minister of India, Lal Bahadur Shastri. Monument is at Gandhi junction of national leader & Former prime minister of India Rajiv Gandhi. All these three junctions are obeying the respect to the leaders and national pride. For now as a new path towards success Smart city Logo/ Vision can be demonstrated. This will portray and strongly promote the development being undertaken by the government. Landmarks building or logo/slogan of Raipur can be displayed on thematic art display panel .For example, Thematic art Panel will have the smart city Raipur logo. Flag colour will be orange with an Indian tricolour artistic flag. Central thematic art panel will have 'Mor Raipur' logo and orange colour flowers will be on planters.

J4 JAISTAMBH CHOWK: For Reference



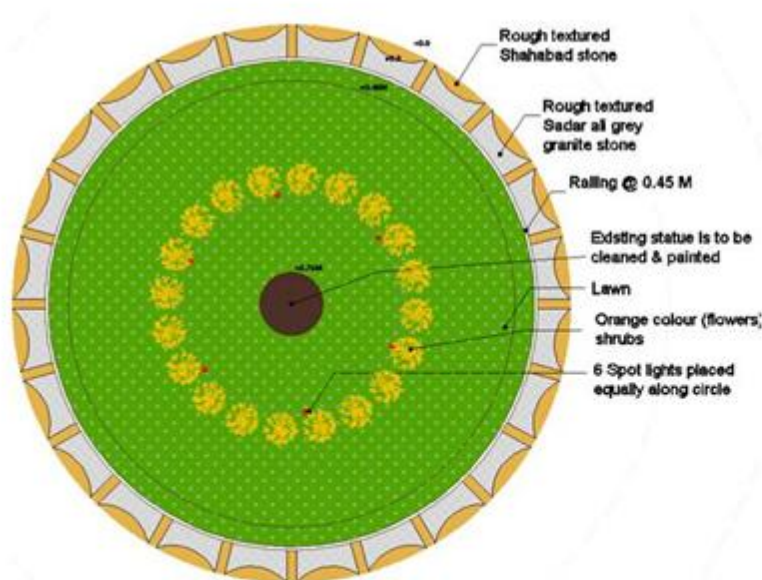
- LEGEND
- CARRIAGE WAY
 - TREE PIT
 - DUSTBIN
 - FOOTPATH
 - TRAFFIC SIGNAL
 - SOFT MARKINGS
 - DROP KERB
 - WAY FINDING SIGNAGE
 - ONE WAY SIGNAGE
 - LIGHTPOLE
 - CURB STONE
 - FIXED BOLLARDS
 - EXISTING FOOTPATH
 - EXISTING MEDIAN



J4.JAISTAMBH CHOWK : Monument Beautification For Reference



Key plan



Plan

