Maharashtra Industrial Township Limited (MITL)

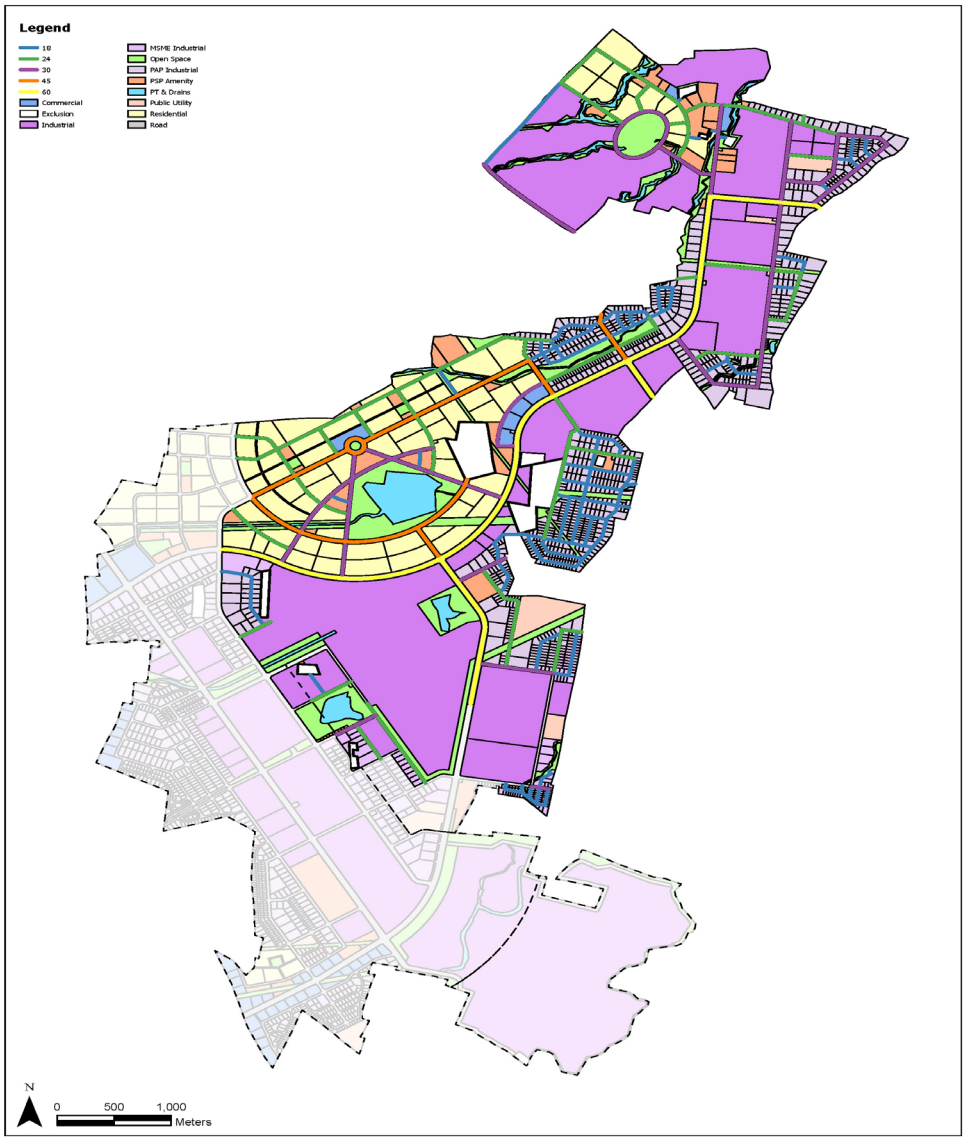
Design, Construction, Testing, Commissioning, Operation and Maintenance of Infrastructure Works at AURIC - Bidkin Industrial Area (BIA), Sector B & C on EPC Basis

Request for Proposal cum Request for Qualification

Volume II - Technical Specifications

Part A - Roadworks

November 2026



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The purpose of this tender is to provide interested parties with information that may be useful to them in making their financial offers (BIDs) pursuant to this tender. This tender includes statements, which reflect various assumptions and assessments arrived at by The Employer in relation to the Project. Such assumptions, assessments and statements do not purport to contain all the information that each Bidder may require. This tender may not be appropriate for all persons, and it is not possible for the Employer, its employees or advisors to consider the objectives, financial situation and particular needs of each party who reads or uses this tender. The assumptions, assessments, statements and information contained in the Bidding Documents, especially the Preliminary Design details/ information, may not be complete, accurate, adequate or correct. Each Bidder should, therefore, conduct its own investigations and analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments, statements and information contained in this tender and obtain independent advice from appropriate sources.

Information provided in this tender to the Bidder(s) is on a wide range of matters, some of which may depend upon interpretation of law. The information given is not intended to be an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of law. The Employer accepts no responsibility for the accuracy or otherwise for any interpretation or opinion on law expressed herein.

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The Employer also accepts no liability of any nature whether resulting from negligence or otherwise howsoever caused arising from reliance of any Bidder upon the statements contained in this tender.

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The Bidder shall bear all its costs associated with or relating to the preparation and submission of its BID including but not limited to preparation, copying, postage, delivery fees, expenses

associated with any demonstrations or presentations which may be required by The Employer or any other costs incurred in connection with or relating to its BID. All such costs and expenses shall remain with the Bidder and The Employer shall not be liable in any manner whatsoever for the same or for any other costs or other expenses incurred by a Bidder in preparation or submission of the BID, regardless of the conduct or outcome of the Bidding Process.

Nothing in this tender shall constitute the basis of a contract which may be concluded in relation to the Project nor shall such documentation/information be used in construing any such contract. Each Bidder must rely on the terms and conditions contained in any contract, when, and if, finally executed, subject to such limitations and restrictions which may be specified in such contract.

The Bidders are prohibited from any form of collusion or arrangement in an attempt to influence the selection and award process of the Bid. Giving or offering of any gift, bribe or inducement or any attempt to any such act on behalf of the Bidder towards any officer/employee of Employer or to any other person in apposition to influence the decision of the Employer for showing any favour in relation to this tender or any other contract, shall render the Bidder to such liability/penalty as the Employer may deem proper, including but not limited to rejection of the Bid of the Bidder and forfeiture of its Bid Security.

Laws of the Republic of India are applicable to this tender.

Each Bidder’s procurement of this tender constitutes its agreement to, and acceptance of, the terms set forth in this Disclaimer. By acceptance of this tender, the recipient agrees that this tender and any information herewith supersedes documents(s) or earlier information, if any, in relation to the subject matter hereto.

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1 Scope of Work

The contractor's scope for the design of roads will include detailed engineering of roads including GFC drawings and 3D BIM model for all the elements of design covering but not limited to horizontal alignment, vertical alignment, design speed, pavement, median, sight distance, intersections, curve widening, geometric design, bridges, culverts, embankments, retaining walls etc.

The contractor's scope for the construction of roads will include excavation, Clearing and grubbing, laying of various layers viz. base course, subgrade, subbase, surface course for the road including construction of shoulders, pavements, cycle track, plot entry, bollards, avenue plantation, embankment as per approved design, specifications and method statement.

Scope of Roadworks and Associated Infrastructure

In accordance with the provisions of Clause 3 of Volume I, Part II, the Contractor's scope shall include the design and construction of roads, together with associated utilities and infrastructure works, for the lengths and Right of Way (ROW) widths specified below:

Type of Road	**ROW Width (m)**	**Length (m)**
A	60	9,980
B	45	6,845
C	30	17,546
D	24	21,777
E	18	20,806
F	12	0
(E) - PAP Roads—Additional Provision	18	10,000
Total Length		86,954

Notes:

1. Contractual Baseline

The road lengths and ROW widths specified above shall constitute the contractual baseline for the roadworks scope and the assessment of changes thereto. The Contractor shall include the design and construction of the scheduled roads, together with associated utilities and infrastructure works, in the quoted Contract Price.

The provision of 10,000 m of PAP roads with an 18 m ROW is additional to, and does not overlap with, the road lengths scheduled under Types A to F.

2. Revision of PAP Area Masterplan

The masterplan enclosed with the Tender Documents presently indicates Type B, C, D and E roads within the PAP area. However, the PAP area is proposed to be comprehensively replanned. Accordingly, the road layout, alignments, ROW widths, lengths, plot arrangements and infrastructure networks presently shown within the PAP area shall be treated as preliminary and subject to revision.

The additional provision of maximum 10,000 RM of PAP roads with all utilities with 18 m ROW shall form part of the contractual baseline and is part of scope. If the Length is less than the above the Contract price shall be adjusted accordingly.

Replanning of the PAP area may also necessitate consequential adjustments to roads, junctions, utility networks and associated infrastructure in adjoining portions of the masterplan.

3. Issue of Revised Masterplan

The Employer shall issue the approved revised masterplan incorporating the revised PAP area layout and consequential changes to adjoining areas within 60 days from the date of signing of the Contract Agreement.

The Contractor shall develop the detailed designs and execute the Works in accordance with the approved revised masterplan, applicable specifications and contractual requirements.

4. Bid Preparation and Contractor’s Obligations

Bidders shall take the proposed revision of the PAP area masterplan and its consequential effects on adjoining infrastructure into account while preparing their Bids.

The Contractor shall undertake the surveys, investigations, detailed engineering, design coordination and preparation of drawings necessary to accommodate the approved revised masterplan. Design development, alignment adjustments, junction detailing and coordination of infrastructure systems within the defined contractual scope shall be included in the quoted Contract Price.

5. Applicability to Utilities and Associated Infrastructure

The above provisions shall apply to roadworks and all associated utilities and infrastructure, including:

a. Potable water supply network;
b. Recycled water supply network;
c. Industrial effluent collection network;
d. Residential sewerage network;
e. Power distribution network;
f. Stormwater drainage network; and
g. Avenue plantation.

The scope shall include associated ancillary works, crossings, Junctions, connections, protection works and interfaces required to provide complete and functional systems in accordance with the Contract.

6. Change of Scope

Any increase or decrease in road lengths and/or change in ROW widths instructed or approved by the Employer relative to the above schedule shall be assessed and dealt with in accordance with the Change of Scope provisions of the Contract Agreement. Such assessment shall be made against the scheduled length and ROW width of each road category, including the additional PAP road provision, and shall not be based solely on a change in the aggregate road length of 86,954 m.

Consequential additions to or omissions from the associated utility and infrastructure scope arising from such changes shall also be assessed under the applicable Change of Scope provisions. The baseline utility and infrastructure scope for such assessment shall be as expressly defined in the relevant contractual schedules, specifications and drawings.

Issuance of the revised masterplan shall not, by itself, constitute a Change of Scope. Routine detailed-design development, alignment adjustments, junction detailing and coordination within the defined contractual scope shall remain the Contractor’s responsibility and shall not attract additional payment.

2 Design Specifications for Roadworks

2.1 Development of the Project Roads and Utilities/Services

Development of the Project Roads and Utilities/Services shall include detailed design, preparation of Good for Construction Drawings and Construction of the following as described in the following sections.

2.1.1 Standards and Specifications

The Project Roads and Utilities/Services shall be designed and constructed in conformity with the Standards and Specifications given in the following sections respectively.

2.2 Design and Construction of Roads

a) The Design and Construction of Roads in the Bidkin Industrial Area is as specified in subsequent sections. Nevertheless, anything to the contrary contained in the document, the Finished Road Level (FRL) shall be designed considering the High Flood level of the area and based on the area natural drainage requirement to optimize stormwater pumping by the contractor. The levels given in the bid are for tender purposes only.

b) The Employer does not warrant either the sufficiency or accuracy of site data provided in the Bid Documents or elsewhere. The Contractor shall be fully responsible for independently verifying or obtaining any and all site data that the Contractor deems necessary to prepare the bid. Any site data in the Employer's possession that is not included in the Bid Documents will be available for inspection at the Employer's address provided in the Tender.

2.3 Width of Carriageway

The width of the carriageway is as given in typical cross sections drawings enclosed in Volume III (Drawings) of the bid documents

2.3.1 Typical Cross Sections

Typical cross-section details for each ROW for the purpose of the tender are represented in indicative drawings enclosed in the bid documents. Typical cross sections shall be as specified in Volume 2 and Volume 3 of the bid documents. The contractor shall develop detailed drawings and obtain approval from the Employer's Engineer.

2.4 Geometric Design and Other Features

Geometric design and other features of the Project Roads shall be in accordance with the Standards and Specifications as per the sections below.

2.4.1 Design Speed

The road classification and the Design Speeds for different categories of roads are as given below in **Table 2-2** below.

Table 2-1: Road Classification and Design Speed

Road Type	Proposed ROW (m)	Design Speed (km/h)
Type A	60	80
Type B	45	80
Type C	30	60
Type D	24	40
Type E	18	40
Type F	12	30

Features like footpath, cycle track, utility corridor, drain would be provided on these roads.

Design speeds given above are general and these may vary at locations due to site-specific constraints or safety requirements.

2.4.2 Coordination on Geometric Design

The contractor, while carrying out the detailed design of the Roads shall maintain the coordination among horizontal and vertical alignment to facilitate smooth transitions, pleasing movement, and desirable sight distances wherever applicable. The designs at such places must abide by relevant IRC specifications and Guidelines.

2.4.3 Cycle Track

Cycle track shall be provided along all the ROWs as per the typical Cross section provided with the Tender document and as per approved detailed engineering design.

2.4.4 Footpath

Footpath shall be provided along all the ROWs as per the typical Cross section provided with the Tender document and as per approved detailed engineering design.

2.4.5 Kerbs and Median

Kerbs and Medians shall be provided along all the ROWs as per the typical Cross section provided with the Tender document and as per approved detailed engineering design. The Kerb shall be provided as per IRC:86-2018.

The central median shall have suitable drainage system so that water does not stagnate in the median. Along the median, longitudinal drain shall be provided to drain off rainwater. The drain should have adequate longitudinal slope to the nearest culvert to drain off transversely. In super elevated sections the longitudinal drains should be designed to take the discharge from one side carriageway also.

2.4.6 Multifunctional Zone/ Separator (Plantation)

A separator between the main carriageway and service road, between the cycle track and pathway, etc., shall be provided along the road corridor on either side as per the cross-section. The width of the separator varies from 0.90 m to 2.1 m. Suitable drainpipes at 10m intervals shall be provided to drain out the water from the carriageway.

2.5 Junctions (At Grade)

The design of different elements of at grade intersections shall be designed as per IRC: SP:41-1994 and also the type designs and standards developed by Ministry of Road Transport and Highways. Additionally, guidelines of Ministry of Urban Development would also be referred. Necessary pedestrian safety measures shall be ensured at the all the at grade junctions during detailed design stage.

All the junctions will be developed as per drawings of road layout and horizontal alignment so as to achieve desired turning movements and effective drainage as per the codal provisions. Suitable Cross Drainage structures are required to be provided to allow drainage from one side to other side.

The Tentative number of junctions is tabulated below:

Table 2-4 : At grade junction for Contractor's scope

JUNCTIONS BIDKIN INDUSTRIAL AREA (BIA) SECTOR B & C		
1	Minor Junction	127
2	Major Junction	27
Total Junction		154

Note: The junctions indicated above represent the minimum identified provisions. The Contractor shall include in the quoted Contract Price the design and construction of all junctions required for the road network, including any additional junctions or modifications to junction layouts arising from the approved revised masterplan and detailed engineering. Any increase in the number of junctions or modification to their configuration shall not, by itself, constitute a Change of Scope or entitle the Contractor to additional payment. Only Changes in road lengths and/or ROW widths shall be governed separately by the applicable Change of Scope provisions of the Contract Agreement.

2.6 Culverts

Minimum two culverts per km for utilities road crossing are to be considered in detail design and cost of same to be deemed included in the Price Bid

The cross-drainage provisions at junctions shall not be treated as balancing Culverts. However, the location and sizes shall be finalised in consultation with the Employer's Engineer during the Detailed Engineering Stage.

The following aspects have been considered while planning for the new culverts:

a) All culverts will be Cast insitu/ precast constructed with a width the same as that of the proposed road at that chainage, i.e., TCS applicable at that section. The culverts shall be precast, factory-made, RCC fair-finished with embossed MITL logo

b) Culverts will be designed for IRC Class-A/Class-70R Tracked/Class-70R Wheeled Loading as per relevant IRC provisions.

c) For box culverts, expansion chambers shall be provided at the median/ between the main carriageway and service road for proper maintenance.

d) Culverts in service road locations to be extended up to the roadside longitudinal drain.

e) Culverts shall be constructed for the full formation width of the roadway.

f) Finalization of the location of the culverts as per the detailed design. The cost of any additional culvert required as per the contractor's design shall be deemed to be included in the contract price.

2.7 Bridges

Details of major and minor bridges are given below.

SPANS OF BRIDGES IN BIDKIN SECTOR-B			
S.No.	**Bridge**	**Road (m)**	**Span (m)**
1	Major	24	1x15
2	Major	45	1x20
3	Major	24	1x30
4	Major	30	1x30
5	Major	30	1x30
6	Major	45	1x30
7	Major	24	1x30
8	Minor	24	1x6
9	Minor	30	1x6
10	Minor	18	1x6

SPANS OF BRIDGES IN BIDKIN SECTOR-C			
S.No.	**Bridge**	**Road (m)**	**Span (m)**
1	Major	24	3x20
2	Major	24	2x30
3	Minor	18	1x12
4	Minor	30	1x12
5	Major	30	2x20
6	Minor	30	1x12
7	Major	30	2x20
8	Major	24	2x20
9	Major	30	3x20
10	Major	30	1x15
11	Minor	30	1x10
12	Minor	24	1x10
13	Minor	18	1x10
14	Minor	18	1x10
15	Major	45	1x15

2.8 Technical specifications for RCC cable trench with Cable Trays

2.8.1 Scope of Work:

The scope is to provide the complete design, engineering and procurement of factory made with fair finish precast concrete/cast insitu trench for all Electrical systems, ICT networks, complete in all respects and with factory made with fair finish precast concrete covers with embossed MITL logo and to undertake subsequent DLP and O&M as detailed in the General Specifications sections. Any works required to provide a complete and fully functional and safe system shall be deemed to be included whether mentioned here or not. The scope of works shall broadly consist of the following items.

The Contractor shall design and construct the complete works of the precast trench necessary at site required to complete the electrical system.

All general civil specifications are mentioned in a separate chapter.

Sl.No.	Description	Requirement	
1	Precast / cast in situ concrete Electrical Ducts	The Contractor has to provide electrical ducts along with the required levels of cable tray as indicated below irrespective of the requirement for cable laying for any area as indicated in the design and drawing of the electrical and ICT systems	
	Road width	**Internal Size of Duct (minimum)**	**Levels of cable trays**
a)	60m	2m X 1.5m	As per Contractors design in line with Relevant Codal provisions
b)	45m	1.5 m X 1.5m	
c)	30m	1.5m X 1.5m	
d)	24m/ 18m/ 12m	As per Contractors design	
2	Manholes with covers	The contractor shall provide manholes with covers at a max internal of 30m center to center and at junctions, turnings, plot connections for ICT and/or plot connections for electrical power.	
		Factory made with fair finish precast concrete covers with embossed MITL logo	
a)	Cable tray	MOC of the cable tray shall be FRP	
b)	Cable tray supports	GI angles of minimum size 50mm x 50mm x 6mm	

2.8.2

2.8.3 Road Crossing

a) From the feeder pillar onward, the service cable shall also be laid in a flexible adapter (duct) and extension from the nearest cable trench to the meter board of individual plots.

b) Wherever the Cables are crossing the road from cable trench and cables shall be laid through DWC Conduits. Pulpit/Manhole shall be provided on either side of the road crossing cables through DWC conduit of required diameters.

c) Cables crossing the bridges the cable shall be laid through suitable size of pipes as per instructions of the Engineer.

2.8.4 Dewatering

Sump pit will be provided at suitable interval in cable trench for dewatering purpose. Suitable slope towards sump pit to be maintained in cable trench to avoid water logging within cable trench. Sump pit water to be drain out through portable water pumps, wherein the scope includes the procurement, erection in complete of these pumps. The pumped-out water from the trench shall be disposed of in existing storm water arrangement nearby.

2.9 Embankment & Subgrade

Construction of embankment and pavement shall conform to the Standards and Specifications as per following sections.

Sub-grade shall meet the requirements stipulated in Cl. 305 of MoRTH specifications. The thickness of sub grade shall not be less than 500mm of effective CBR not less than 10%.

A report on the soil investigation shall be furnished along with the design.

The construction of embankment and subgrade shall follow the applicable provisions of IRC:36.

When corridor passing through BC soil, the unsuitable top 500 mm thick shall be replaced with a suitable soil. Make treatment dependent on geotechnical investigation, expansive-soil characteristics, groundwater and pavement design.

Along the corridor, where water table is high and soil has potential for rapid migration of moisture by capillarity, at such locations capillary cut-off shall be provided to arrest the capillary rise of water in the embankment as per the applicable provisions of IRC:34-2011.

2.10 Pavement Design

IRC:37- Guidelines for the Design of Flexible Pavements and IRC:58 - Guidelines for the Design of Plain Jointed Rigid Pavements for Highways shall be used as guidelines for pavement design.

The type of pavement structure shall be flexible pavement. Design of new pavement sections will be carried out duly considering all relevant factors for assuring reliable performance that satisfy the specified minimum performance requirements. The necessary soil, material and pavement investigations and traffic volume projection studies in accordance with good industry practice for preparing designs shall be undertaken before design.

The materials, mixes and construction practice shall meet the requirements prescribed herein and MoRTH Specifications / IRC Specifications, unless specified otherwise. Where problematic conditions such as expansive soils, swamps or marshes, flooding, poor drainage, etc. are found to exist, adequate measures shall be adopted to deal with such site conditions.

Pavement design shall conform to the Standards and Specifications as per following sub sections. Sub-grade shall meet the requirements stipulated in Cl. 305 of MoRTH specifications. The thickness of sub grade shall not be less than 500mm of effective CBR not less than 10%.

2.10.1 Type of pavement

The pavement types for different road and cross sections shall be as given below in **Table 2-5**

Table 2-6: Pavement Types

Main Carriageway	Service Roads	Cycle Track	Footpath
Flexible Pavement	Flexible pavement	Textured Concrete	Paver block

2.11 Design Requirements

2.11.1 Design Period

Flexible pavement shall be designed in accordance with IRC:37-2018 for a design period of 20 years. Design life of the pavement shall be duly tested as per IRC 115 latest edition.

2.11.2 Design Traffic

Notwithstanding anything to the contrary contained in the Schedules, the Contractor shall consider the pavement design for each of the road type for minimum traffic loading as shown below in Table 2-6.

Table 2-7: Design Traffic

Road ROW	Design Traffic (MSA)
60m MCW	40
45m	40
30m / 24m/ 18m/ 12m/Service Road	30

2.11.3 Pavement Composition

The new pavement shall be designed in accordance with IRC:37-2018 “Guidelines for the design of flexible pavements”. Paved shoulders/Hard strip shall be of same specification and composition as of main carriageway.

To ensure internal drainage of the pavement structure, the GSB layer/filter layer, functioning as drainage layer shall be extended to full width of Roadway Width including in median. CTSB or CTB or Geo-layer are not allowed in payment composition.

2.11.4 Footpath

Footpath/Walkway shall be provided as per cross sections using Paver Blocks and shall be in conformance with the technical specifications provided in IRC 103-2022, IRC 86-2018 and other relevant codes, as applicable. Pattern/style/colour of paver block shall be as per indicative tender drawing and as approved from the Employer’s Engineer prior to construction.

2.11.5 Cycle Tracks

Cycle track shall be provided as per the cross sections using Texture Concrete and shall be in conformance with the technical specifications provided in IRC: 11 and other relevant codes, as applicable. Pattern/style/colour of Textured Concrete shall be as per indicative tender drawing and as approved from the Employer’s Engineer prior to construction.

2.11.6 Plot Entry

RCC grade slab of min 200mm thick as per approved design shall be provided at each plot entry as per approved masterplan. Width of the plot entry shall be as per the urban design guidelines/CDCPR.

2.12 Drawings

Refer Tender Drawings/Tender Drawing Volume-III.

2.13 Project Facilities

The Contractor shall design and construct the Project Facilities in accordance with the provisions of this section.

Each of the Project Facility is briefly described below.

2.13.1 Roadside Furniture / Road Markings & Signage

Roadside furniture and Road markings & signage shall be provided in accordance with the provisions as per IRC 35-2015 and IRC 67-2022.

The roadside furniture shall include the provision of the:

Traffic Signage

Traffic signage include roadside signs, curb mounted signs along the entire road network in scope. Signage shall be provided as per IRC Standards. Cantilever type signages shall be provided at necessary locations along the road network as per IRC:67 and locations & numbers shall be finalized in consultation with Employer's Engineer.

Pavement markings

Pavement markings shall cover road markings for the entire road network in scope as per relevant IRC standards.

LED Traffic Blinkers

For the entire road network in scope as per IRC.

Delineators

Delineators for the entire road network in scope at the locations as per IRC.

Pedestrian facilities

For the safety of pedestrians, Crossings shall be controlled through the provision of zebra crossings and other pedestrian safety measures at the required locations and at the intersections as per the standards and shall be approved by the Authority.

Raised footpath of minimum 1.8m width with Kerb and guardrail shall be provided along the road.

Bollards

Bollards shall be provided at junctions, at the traffic islands, plot entry to stop vehicles from entering the footpath and to keep pedestrians away from vehicular traffic. Bollards should be a minimum of 1000 mm in height and are to be provided at suitable locations with a maximum clear gap of 800mm/1200 mm (as approved) between two bollards. They shall be provided in accordance with the Standards and Specifications.

Planter beds

Planter beds are provided at specified locations as per the relevant Guidelines for every RoW of road. The same shall be in accordance with the Standards and Specifications.

Seating benches & Waste bins

Seating benches are provided at specified locations and waste bins are provided adjacent to the seating benches as per the Urban Design Guidelines which include for every RoW of road. The same shall be in accordance with the Standards and Specifications.

Guard rails

Guard rails shall be confined to junctions at the traffic islands to retain the landscape/plantation from animal menace, this shall be provided in accordance with the Standards and Specifications.

Rumble Strips/Speed Breakers

Rumble Strips/Speed Breakers shall be provided at locations demanding reduction of speeds which include approaches of important junctions and roads. The same shall be in accordance with IRC:99-2018.

Landscaping & Tree Plantation

Trees and shrubs of required number and type at the appropriate locations including medians, islands, junctions etc and in the space earmarked within the Right of way shall be provided.

Planting along the road corridor shall be as per the relevant clause of IRC: SP: 21-2009. Indigenous species that grow in that area shall be preferred and the plantation will be inter-mixed with evergreen species and seasonal flowers.

Visibility of any signs; signals or any other devices erected for traffic control, traffic guidance and/or information shall not be obstructed by plantation.

2.14 Design Standards for Structures

2.14.1 General

This section deals with the standards to be adopted for culverts. It also provides for the type of materials and their specifications that would be adopted for the above structures, the loads and forces to be considered.

The design standards for Culverts shall be worked out on the basis of recommendations regarding loading and material strength characteristic contained in the current Culvert design practices and are contained in the relevant IRC standards. The aspects regarding geometry and structural design of various components and settlement effects shall form main considerations for design of Culverts.

The design of Culverts shall be based on various parameters and data such as design discharge of stream, HFL, scour level, characteristic of stream/river, structure specific sub-soil strata, selection of site, etc. The carriageway width, footpaths, crash barrier shall be provided as per MoRTH guidelines and widths are as per typical cross-sections given in this section.

2.15 Cross-sectional Elements

2.15.1 Width of Culvert

The structural width for all Culverts will be kept same as the entire formation width of road.

2.16 Specification for Material

2.16.1 Concrete

This shall conform to provisions given in IRC: 112-2011.

Table 2-9: Concrete Grades of Structures

Structures	Concrete Grade
Superstructures	
RCC T-Girder and Deck Slab	M35 & above
RCC Solid Slab	M35 & above
Crash Barriers	M40
Approach slab	M35
Substructure	
RCC substructures and foundations	M35
All PCC structural members	M20
All PCC non-structural members	M20

The minimum concrete grade requirement as given in IRC:112 should always be followed as per the exposure condition.

2.16.2 Reinforcement Steel – Applicable Standards

Reinforcement steel shall conform to the provisions of IS: 1786.

2.16.3 Reinforcement Steel

All reinforcement shall be corrosion-resistant high-strength deformed steel bars of Grade Fe500D, conforming to IS:1786 and the applicable provisions of IRC:112, with a characteristic yield strength of 500 MPa and a modulus of elasticity of 200 GPa. Corrosion-resistance requirements shall be additional to the Fe500D grade requirements and supported by manufacturer's specifications and test certificates.

All steel used in any component or application under this Contract shall be new, unused and sourced from approved primary steel producers using iron ore-based steelmaking routes. Secondary scrap-based steel, reclaimed or previously used steel, and steel re-rolled from used rails, plates or scrap shall not be permitted.

The Contractor shall obtain approval of the manufacturer and production route before procurement and provide original manufacturer's test certificates with heat/cast numbers and full source traceability for each consignment. All steel shall meet the applicable standards and application-specific requirements. Non-compliant or untraceable steel shall be rejected and replaced at the Contractor's cost.

2.16.4 Design Standards and Guidelines for road works

2.16.4.1 Design Standards

The Project Roads and Utilities/ Services shall conform to the design requirements set forth in this document.

2.16.4.2 List of Design Standards

A list of Standards is given in Table 2-8, Table 2-9, and Table 2-11. The latest revision of codes shall be referred.

Table 2-10: Standards and Guidelines for Road design

S.No.	Description	Code/Document No.
1	Lateral and Vertical Clearances at Underpasses for Vehicular Traffic	IRC:54-1974
2	Guidelines for Planning and Design of Roundabouts	IRC:65-2017
3	Space Standards for Roads in Urban Areas	IRC:69-1977
4	Guidelines on Regulation and Control of Mixed Traffic in Urban Roads	IRC:70-2017
5	Geometric Design Standards for Urban Roads in Plains(First Revision)	IRC:86-2018
6	Guidelines for the Design of Interchanges in Urban Areas	IRC:92-2017
7	Guidelines on Accommodation of Underground Utility Services Along and Across Roads in Urban Areas (Second Revision)	IRC:98-2011
8	Tentative Guidelines on the Provision of Guidelines for Traffic Calming Measures in Urban and Rural Areas	IRC:99-2018

S.No.	Description	Code/Document No.
9	Guidelines for Capacity of Urban Roads in Plain Areas	IRC: 106-1990
10	Vertical Curves for Highways	IRC: SP:23-1983
11	Guidelines for the design of curves for Highways & Design tables (First Revision)	IRC:38-1988
12	Guidelines for the Design of At-Grade Intersections in Rural & Urban Areas	IRC: SP: 41-1994
13	Standard for vertical and horizontal clearances of Overhead electric power and telecommunication lines as related to roads	IRC: 32-1969
14	Dimensions and weights of Road Design Vehicles	IRC:3-1983

Table 2-11: Standards and guidelines used for design of Road related facilities.

Element of roads/services	Design Standards/Guidelines used for design	
	Code No	Description
Ground improvement	HRB SR No.14,1994	State-of-the-Art-Report: High Embankments on Soft Ground, Part B – Ground Improvement
	IRC:113-2013	Guidelines for the Design and Construction of Geosynthetic Reinforced Embankments on Soft Subsoils
Embankment filling	HRB SR No.3,1999	State-of-the-Art-Report: Compaction of Earthwork and Subgrades
Pavement design	IRC: 37- 2018	Tentative Guidelines for the Design of Flexible Pavements(Fourth Revision)
	IRC: 58- 2015	Guideline for the design of plain jointed rigid pavement for highways (Fourth Revision)
	IRC:109-2015	Guidelines for Wet Mix Macadam (First Revision)
	IRC:111-2009	Specifications for Dense Graded Bituminous Mixes
	IRC:126-2017	Guidelines on Wet Mix Plant
	IRC:SP:63-2018	Guidelines for the Use of Interlocking Concrete Block Pavement (First Revision)
	IRC:SP:19-2020	Manual for Survey, Investigation and Preparation of Road Projects (Second Revision)
	IRC:36-2010	Recommended Practice for Construction of Earth Embankments and Sub-Grade for Road Works (First Revision)
Road markings	IRC: 35-2015	Code of Practice for Road Markings (Second Revision)

Element of roads/services	Design Standards/Guidelines used for design	
	Code No	Description
Signage	IRC:67-2022 IRC: SP:31-1992	Code of Practice for Road Signs (Third Revision) New Traffic Signs
Landscaping	IRC: SP:21-2009	Guidelines on Landscaping and Tree Plantation
Pedestrian facilities	IRC:103-2022	Guidelines for Pedestrian Facilities (First Revision)
Cycle tracks	IRC:11-2015	Recommended Practice for the Design and Layout of Cycle Tracks (First Revision)
Safety features	IRC: SP: 44-1996	Highway Safety Code
Parking Facilities	IRC: SP: 12-2015	Guidelines for Parking Facilities in Urban Roads (First Revision)
Traffic lights	IRC: 93-1985	Guidelines on Design and Installation of Road Traffic Signals
Structures	IRC: 112 -2020	Code of Practice for Concrete Road Bridges: IRC: 5-1998- Standard Specification and Code of Practice for Road Bridges, Section I - General Features of Design
	IRC: 5-2024	Standard Specification and Code of Practice for Road Bridges, Section I - General Features of Design
	IRC: 6-2017	Standard Specification and Code of Practice for Road Bridges, Section II - Loads and Stresses
	IRC: 24-2010	Standard Specification and Code of Practice for Road Bridges, Section V - Steel Road Bridges
	IRC: 78-Part-I - 2024, /Part-II-2020	Standard Specification and Code of Practice for Road Bridges, Section VII - Foundations and Substructure
	IRC: 83-2018 (Part III)-	Standard Specification and Code of Practice for Road Bridges, Section IX-Bearings, Part- III: POT, POT-CUM-PTFE, PIN and Metallic Guide Bearings
	IRC:SP 114 - 2018	Guideline For Design of Seismic Bridges
Protection Works Retaining structure	IRC:89 - 2019	Guidelines for Design and Construction of River Training & Control Works for Road Bridges (First Revision)
High embankments	IRC:75-2015	Guidelines for the Design of High Embankments (First Revision)
Slope stability	HRB SR.No.1,2000	State-of-the-Art-Report: Lime-Soil Stabilization
Kerb and separator	IRC:86-2018	Geometric Design standards for Urban roads in plains(First revision)

Element of roads/services	Design Standards/Guidelines used for design	
	Code No	Description
Drains	CPHEEO IRC SP-42 2014 IRC SP-50 2013	Guidelines for Road Drainage Guidelines for Urban Drainage

Table 2-22: Street Light- Standard for installation

Code	Standard for installation
IS: 1255 1983 (Reaffirmed 1995)	Code of practice for installation and Maintenance of power cables up to and including 33 kV rating.
IEC:60947	Switchgear Protective Components
IEC: 60598 – 2 – 3, IUT (Institute of Urban Transport)	Requirements luminaries for road & street lighting. Standard for road lighting.
IS: 2309	Code of practice for Lightning Protection
IS: 3043	Code of practice for Earthing

Table 2-33: Street Light- Design Standards

Code	Design Standards
IS: 7098 (Part- II & Part-III) 2003 IS: 8130	Standard for XLPE Cables, Part – II up to 3.3 kV to 33 kV and Part– III from 33 kV to 220 kV). Specification for conductors for insulated electric cables & flexible cords.
IS 1554 (Part I & Part – II)	Specification for PVC insulated (Heavy Duty) electric cables. Part 1 For working voltages up to and including 1100. Part 2 For working voltages from 3.3 kV up to and including 11 kV
IEC: 61439 PART 1 & II EDITION 3 IEC: 60947	Feeder Pillar & Switchgear (Totally Type tested Assembly TTTA). Switchgear Protective Components.
IEC: 60598 – 2 – 3 IUT (Institute of Urban Transport) CIE (Industrial commission of illumination)	Particular requirements luminaries for road & street lighting Standard for road lighting Road Transport Lighting for Developing Countries
IS: 2309	Code of practice for Lightning Protection
IS: 3043	Code of practice for Earthing
IS: 1944	Code of practice for lighting of public thoroughfares
IS: 1367 BSEN ISO 1461 BS EN 10025-1:2004	Standards for Poles & Masts Recommended practice for hot-dip galvanizing of iron & steel. Hot dip galvanized coatings on fabricated iron and steel articles. Specifications and test methods Hot rolled products of structural steels. General technical delivery conditions

2.17 Roads and Utilities / Services

Standards and Specifications to be adopted of following Project components are given in this section.

a) Road Works: Carriageway, Pathway, Cycle track, road furniture, road markings, road signage, traffic control devices, safety Works, pedestrian facilities, median plantation, etc.

b) Where the Contractor intends to use an alternative to the Standards/Guidelines for delivering an equal or better product, he shall be permitted to use such alternative subject to the following conditions:

c) Contractor shall demonstrate that the proposed alternative conforms to any of the following International Standards, Codes of Practice, Specifications, Guidelines, etc.

d) American Association of State Highway and Transportation Officials (AASHTO)

e) American Society for Testing of Materials (ASTM)

f) Euro Codes

g) National Standards of any of the following countries: United States of America (USA), Canada, United Kingdom (UK), France, Germany, Sweden, Denmark, Norway, Netherlands, Spain, Australia, New Zealand, Japan, and South Africa

h) In case the Contractor intends to use any alternative Material / technology/ method, whether patented or otherwise, that is not specifically covered in the Indian or International Standards as listed above, but the use of which has been permitted on similar Projects (similar in category of road, traffic and climatic conditions) as the Project Road, he would be permitted, its use on certification by the owners of such similar Projects regarding the continued successful performance of such Materials, technologies, methods, procedures or processes for at-least 2 years of the service life of the Project. Such a certification shall be supported with details of critical performance parameters.

2.18 Specifications and Standards for Construction

2.18.1 Construction

The Contractor shall comply with the Specifications and Standards set forth in this document for Construction of the Project Roads and Utilities/ Services.

2.18.2 Clearing and grubbing

Clearing Road land including uprooting rank vegetation, grass, bushes, shrubs, saplings, and trees girth up to 300 mm, removal of stumps of trees cut earlier and disposal of unserviceable materials and stacking of serviceable material to be used, including removal and disposal of

top organic soil not exceeding 150 mm in thickness at designated plot approved by Employer's Engineer within the project area as per Technical Specification, Clause 201, MoRTH Fifth Revision.

2.18.3 Roadway Excavation

This work shall consist of excavation, removal, and disposal of materials necessary for the construction of roadway, footpath, drains in accordance with requirements of the specifications mentioned below and the lines, grades and cross-sections shown in the drawings as per Technical Specification Clause 301 MoRTH Fifth Revision. Classification of Excavated Material

2.18.4 Embankment

Providing and Construction of Embankment with approved materials from available excavated earth / borrow areas complete as per Technical Specification Clause 305 of MoRTH Fifth Revision with all leads and lifts.

Construction of Subgrade with approved material satisfying the requirements of minimum soaked CBR value as indicated in the drawings including all leads and lifts complete as per Technical Specifications Clause 305 of MoRTH Fifth Revision.

The arrangement for the source of supply of the material for embankment meeting the prescribed specifications as well as compliance to the different environmental requirements in respect of excavation and borrow areas as stipulated, from time to time, by the Ministry of Environment and Forest, Government of India and the local bodies, as applicable shall be the sole responsibility of the Contractor.

2.18.5 Shoulders

Construction of Earthen shoulders including all leads and lifts complete as per drawing and Technical Specifications Clause 408 of MoRTH Fifth Revision.

2.18.6 Granular Subbase

Construction of Granular Sub-Base by providing close graded material, spreading in uniform layers with motor grader on prepared surface, mixing by Mix In Place Method with rotator at OMC, and compacting with vibratory roller to achieve the desired density, complete as per clause 401 of MoRTH Fifth Revision.

The material to be used for the work shall be crushed stone aggregate and the strength of minimum 4 days soaked CBR of 30%. The material shall be free from organic or other deleterious constituents and conform to the Grading given in MoRTH Table 400-1.

2.18.7 Wet Mix Macadam Base

Providing, laying, spreading and compacting crushed graded stone aggregate as per MoRTH Table 400-10 of Wet Mix Macadam specifications including premixing the material with water to OMC in mechanical mixer (Pug mill) as per design mix, carriage of mixed material by tipper to site laying in uniform layers, with Paver Finisher, in sub-base/base course on a well prepared under-base and compacting with Vibratory Roller to achieve the desired density including lighting, guarding, barricading and maintenance of diversion etc. as per Technical Specifications Clause 406 of MoRTH Fifth Revision.

2.18.8 Primer Coat

Providing and applying Primer coat with bitumen emulsion on the prepared surface of the granular base including clearing of road surface and spraying primer using mechanical means as per Clause 502 and Table 500-1 of MoRTH fifth revision.

2.18.9 Tack Coat

Providing and applying tack coat with bitumen emulsion conforming to IS: 8887, using emulsion pressure distributer including preparing the surface & cleaning with mechanical broom and to be applied on bituminous surface as per clause 503 and Table 500-3 of MoRTH Fifth Revision.

2.18.10 Dense Graded Bituminous Macadam

Providing and laying dense graded bituminous macadam with not less than 50 mm compacted thickness with bitumen of grade and filler (percentage by weight of Aggregate) according to IRC 111-2009. The mix shall be prepared in Batch Type Hot Mix Plant of relevant capacity, laying with a hydrostatic paver finisher with sensor control to the required grade, level, and alignment, rolling with smooth wheeled and tandem vibratory rollers to achieve the desired compaction as per MoRTH specification clause No. 505 complete in all respects.

Bitumen: “The minimum content shall be 4.5% (for layer thickness of 50-75mm) and 4.0% (for the layer thickness of 75-100mm)”. The filler shall be as per relevant MoRTH specification

Bitumen VG40, conforming to relevant IRC and MoRTH specifications shall be used for DBM base course.

2.18.11 Bituminous Concrete

Providing and laying Bituminous concrete with required compacted thickness with bitumen of grade and filler (percentage by weight of Aggregate) according to IRC:111-2009, prepared in Batch Type Hot Mix Plant of relevant TPH capacity, laying with a hydrostatic paver finisher with sensor control to the required grade, level, and alignment, rolling with smooth wheeled, tandem vibratory rollers to achieve the desired compaction as per MoRTH specification clause No. 507 complete in all respects.

The minimum content of bitumen shall be 5.2% (for layer thickness of 50mm, grading 1) and 5.4% (for layer thickness of 30-40mm, grading 2). The filler shall be only “cement” of grade approved by the Engineer.

Bitumen VG40, conforming to IRC and MoRTH specifications, shall be used for the BC surface course.

Contractor shall adhere to the following minimum thicknesses for the Crust Layers.

Table 2-44 Proposed thickness of Crust Layers

Road Type	**Row(m)**	**Traffic (MSA)**	**Thickness (mm)**				
			BC	DBM	WMM	GSB	Total
A	60	40	50	60	250	200	560
B	45	40	50	60	250	200	560
C/ D/ E/ F	30/ 24/ 18/ 12	30	40	60	250	200	550

*Effective CBR of Subgrade should be a minimum of 10%

2.18.12 Kerb Stone

Supplying and laying precast/cement concrete Kerb M20 grade mix for median/island complete as per IRC 86-2018 and as per Technical Specifications Clause 409 of MoRTH Fifth Revision. Dry-cast Kerb stones shall not be permitted. Kerb painting with oil-based paints as per the approved design and method statement.

2.18.13 Footpath

Provide cement concrete blocks 60 mm thick as per IRC: SP: 63 for footpath & courtyard in utility compound, jointed with neat cement slurry mixed with pigment to match the shade of tiles, including rubbing and cleaning etc. complete, on 30 mm thick bed of cement mortar 1:4 (1 cement: 4 coarse sand). Light shade pigment using white cement, all as per Technical Specifications Clause 410 of MoRTH Fifth Revision.

2.18.14 Plot Entries

All services below the entry bay shall be protected by encasing in concrete or relevant materials to avoid damage to the services due to settlement of pavement or loads. The pavement shall be minimum 200 mm grade slab with 10mm welded steel mesh.

2.19 Road Furniture

2.19.1 IRC 67 Retro Reflective Sign Board

The retro-reflectorized cautionary, mandatory and informatory sign should be as per IRC:67 made of high-intensity grade sheeting vide clause 801.3, fixed over aluminium sheeting, 1.5 mm thick supported on a mild steel angle iron post 75 mm x 75 mm x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing.

Retro-reflectorized sign as per IRC:67 made of high-intensity grade sheeting vide clause 801.3, fixed over aluminium sheeting, 2 mm thick with an area not exceeding 0.9 sqm supported on a mild steel single angle iron post 75 x 75 x 6 mm firmly fixed to the ground by means of properly designed foundation with M15 grade cement concrete 45 x 45 x 60 cm, 60 cm below ground level as per approved drawing.

Delineators (roadway indicators, hazard markers, object markers) should be 80-100 cm high above ground level, painted black and white in 15 cm wide strips, fitted with 80 x 100 mm rectangular or 75 mm dia circular reflectorized panels at the top, buried or pressed into the ground and conforming to IRC-79 and the drawings.

Road stud 100x 100 mm should be die-cast in aluminium, resistant to corrosive effect of salt and grit, fitted with lens reflectors, installed in concrete or asphaltic surface by drilling hole 30 mm up to a depth of 60 mm and bedded in a suitable bituminous grout or epoxy mortar, all as per BS 873 part 4:1973.

2.19.2 IRC 35 Road marking and strips

The colour, width and layout of road markings shall be in accordance with the Code of Practice for Road Markings with paints, IRC: 35, and as specified in the drawings or as directed by the Engineer-in-Charge.

2.19.3 General

a) The thermoplastic material shall be homogenously composed of aggregate, pigment, resins and glass reflectorizing beads.

b) The thermoplastic compound shall be screened/extruded on to the pavement surface in a molten state by suitable machine capable of controlled preparation and laying with surface application of glass beads at a specific rate. Upon cooling to ambient pavement temperature, it shall produce an adherent pavement marking of specified thickness and width and be capable of resisting deformation by traffic.

c) The thermoplastic material shall conform to ASTM D36/BS-3262-(Part I).

d) The material shall meet the requirements of these specifications for a period of one year. The thermoplastic material must also melt uniformly with no evidence of skins or unmelted particles for the one-year storage period. Any material not meeting the above requirements shall be replaced by the manufacturer/supplier/Contractor.

e) Marking: Each container of the thermoplastic material shall be clearly and indelibly marked with the following information:

f) The name, trademark, or other means of identification of the manufacturer.

g) Batch number

h) Date of manufacture

i) Color (White or yellow)

j) Maximum application temperature and maximum safe heating temperature.

k) Sampling and Testing: The thermoplastic material shall be sampled and tested in accordance with the appropriate ASTM/BS method. The Contractor shall furnish to the Employer’s Engineer a copy of certified test reports from the manufacturers of the thermoplastic material showing results of all tests specified herein and shall certify that the material meets all requirements of this Specification.

2.19.4 Preparation

a) The material shall be melted in accordance with the manufacturer's instructions in a heater fitted with a mechanical stirrer to give a smooth consistency to the thermoplastic material to avoid local overheating. The temperature of the mass shall be within the range specified by the manufacturer and shall on no account be allowed to exceed the maximum temperature stated by the manufacturer. The molten material should be used as expeditiously as possible and for thermoplastic material which has natural binders or is otherwise sensitive to prolonged healing, the material shall not be maintained in a molten condition for more than 4 hours.

b) After transfer to the laying equipment, the material shall be maintained within the temperature range specified by the manufacturer to achieve the desired consistency for laying.

2.19.5 Application

Marking shall be done by a fully /semi-automatic paint applicator machine fitted with profile shoe, glass beads dispenser, propane tank heater and profile shoe heater, driven by experienced operator as specified in item. For locations where painting cannot be done by machine, approved manual methods

shall be used with prior approval of the Engineer-in-charge. The Contractor shall maintain control over traffic while painting operations are in progress so as to cause minimum inconvenience to traffic compatible with protecting the workmen. The thermoplastic material shall be applied hot either by screeding or extrusion process. After transfer to the laying apparatus, the material shall be laid at a temperature within the range specified by the manufacturer or otherwise directed by the Employer's Engineer for the particular method of laying being used. The paint shall be applied using a screed or extrusion machine. The pavement temperature shall not be less than 10°C during application. All surfaces to be marked shall be thoroughly cleaned of all dust, dirt, grease, oil and all other foreign matter before application of the paint. Thermoplastic paint shall be applied in intermittent or continuous lines of uniform thickness of at least 2.5 mm unless specified otherwise. Where arrows or letters are to be provided, thermoplastic compounds may be hand-sprayed.

2.20 Arrangement of Traffic During Construction

2.20.1 General

The Contractor shall at all times, carry out work on the road in a manner creating the least interference to the flow of traffic while consistent with the satisfactory execution of the same. For all works involving improvements to the existing road, the Contractor shall, in accordance with the directives of the Engineer, provide and maintain, during the execution of the work, a passage for traffic either along a part of the existing carriageway under improvement or along a temporary diversion constructed close to the highway. Before taking up any construction or maintenance operation, the Contractor shall prepare a Traffic Management Plan for each work zone and submit it to the Engineer for prior approval. This plan should include inter alia:

a) A qualified safety officer (minimum 5 years of experience in relevant works) with support staff to serve as a site safety team

b) Provision of traffic safety devices as per IRC: SP 55 with the following specifications

c) Signages of the retro-reflective sheet of high intensity grade General Section 100

d) Delineators in the form of cones/drums made of plastic/rubber having retro-reflective red and white bands, at a spacing of 5 m along with a reflective tape to be tied in between the gaps of cones/drums. A bulb using solar energy is to be placed on the top of the cone/drum for delineation in the dark hours and night.

e) Barricades using an iron sheet with adequate iron railing/frame painted with retro-reflective paint in the alternate yellow and black & white stripes. Warning lights at 5 m spacing shall be mounted on the barricades and kept lit in dark hours and night.

f) Road markings with hot applied thermoplastic paint with glass beads.

g) Safety measures for the workers engaged including personal protection equipment

h) First aid and emergency response arrangements

i) Details and drawings of arrangements in compliance with other sub-sections of this Section.

2.21 General Civil Specifications for the works

General Civil Specifications for the works to be carried out form an integral part of these specifications and the contractor shall conform to these specifications.

2.21.1 General

The specifications followed in design and construction shall conform to the following:

a) Indian Roads Congress (IRC) Specifications, Standards, Design Codes

b) IRC Special Publications

c) Ministry of Road Transport and Highways (MoRTH) Publications

d) IRC Seminar Publications

e) Policy circular/Advisory letters issued to all states/UTs on the matter pertaining to urban transport April 2008 – October 2014

f) Four lane and Six lane Manuals i.e. IRC: SP-84-2019, IRC: SP-87-2019 as per the cross-section of the road

g) For Wet Utilities CPHEEO manual on water supply and manual on Sewerage.

h) Any supplement issued with the Bid document

The latest version of the Codes, Standards, Specifications, etc., notified/published at least 60 days before the last date of Bid submission shall be considered applicable.

2.21.2 Standards and Specifications for Construction

a) The Contractor shall comply with the Standards and Specifications for the Construction of roads and utilities/services as given below.

b) All Materials, Works and Construction operations shall conform to the Specifications for Road and Bridge Works (Fifth Revision, April 2013), issued by the Ministry of Road Transport & Highways (MoRT&H). Where the Standards and Specifications for work are not given, Good Industry Practice shall be adopted to the satisfaction of the Employer's Engineer.