

ಬೆಂಗಳೂರು ಸಂಯೋಜಿತ ರೈಲು ಮೂಲಸೌಲಭ್ಯ  
ಅಭಿವೃದ್ಧಿ ಉದ್ಯಮ ನಿಯಮಿತ (ಬಿ-ರೈಡ್)

BENGALURU INTEGRATED RAIL INFRASTRUCTURE DEVELOPMENT ENTERPRISE LIMITED (Bi-RIDE)

**Bi-RIDE**

**C2/PACKAGE – 1**

**“NAME OF WORK:** Design & Construction of Elevated Viaduct including Ramps of Elevated Section of length 7.795 Km (-0.675km to Ch -0.050km & Ch 11.230km to Ch 16.755km & Ch: 16.755km to Ch 18.400km) and RoR for BSTP Corridor and other related infrastructural works in between Bennigenahalli to Shettihalli including validation of Design and stability check for works executed by previous Contractor including design & Construction of Double Decker from Ch. 14+562.903 to Ch. 15+680.447, including design & construction of Double Decker Station at Mattikere & design and construction of balance works at Bennigenahalli Station of Corridor-2 and including part work up to substructure for Corridor-1 at Yeshwanthpur of Bengaluru Suburban Transport Project (BSTP).

**BID DOCUMENT**

**SECTION-8A  
EMPLOYERS' REQUIREMENT-1  
GENERAL INFORMATION  
AND SCOPE OF WORK**

# **SECTION - VIII**

## **EMPLOYER'S REQUIREMENT - 1 GENERAL INFORMATION AND SCOPE OF WORK**

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C2/Package – 1

Design & Construction of Elevated Viaduct including Ramps of Elevated Section of length 7.795 Km (-0.675km to Ch -0.050km & Ch 11.230km to Ch 16.755km & Ch: 16.755km to Ch 18.400km) and RoR for BSTP Corridor and other related infrastructural works in between Bennigenahalli to Shettihalli including validation of Design and stability check for works executed by previous Contractor including design & Construction of Double Decker from Ch. 14+562.903 to Ch. 15+680.447, including design & construction of Double Decker Station at Mattikere & design and construction of balance works at Bennigenahalli Station of Corridor-2 and including part work up to substructure for Corridor-1 at Yeshwanthpur of Bengaluru Suburban Transport Project (BSTP).

**I) BRIEF SCOPE:****ELEVATED VIADUCT**

Design & Construction of Elevated Viaduct including Ramps of Elevated Section of length 7.795 Km (-0.675km to Ch -0.050km & Ch 11.230km to Ch 16.755km & Ch: 16.755km to Ch 18.400km) and RoR for BSTP Corridor and other related infrastructural works in between Bennigenahalli to Shettihalli including validation of Design and stability check for works executed by previous Contractor including design & Construction of Double Decker from Ch. 14+562.903 to Ch. 15+680.447, including design & construction of Double Decker Station at Mattikere & design and construction of balance works at Bennigenahalli Station of Corridor-2 and including part work up to substructure for Corridor-1 at Yeshwanthpur of Bengaluru Suburban Transport Project (BSTP).

This bid is for Design and Construction of elevated (viaduct) structures comprising pile foundation/open foundation, pile caps, Piers, cast in situ /pre-cast post tensioned pier cap and cast in situ/ precast portal beams, pier arms, pedestal, bearings. Elevated super structure includes, Pre-cast PSC I – Girder, PSC T– Girder, deck slabs, Pre-cast full span U Girder including casting, transporting, launching and erection in position, the work also includes road widening, side drains & other allied works, and construction of service roads at required locations.

**II) BROAD SCOPE OF WORK:**

**Scope of Work: Design & Construction of Elevated Viaduct and elevated Stations (Mattikere & Bennigenahalli)**

Sl. No	Name of location from	Name of location to	Start Chainage (km)	End Chainage (km)	Length (km)	Remarks
1	BENNIGANAHALLI	KASTURINAGAR	-0.675	-0.050	0.625	Elevated viaduct including balance work of Bennigenahalli station structures
2	HEBBAL	YESHWANTPUR	11.230	16.755	5.525	Elevated viaduct including double decker from Ch. 14+562 to Ch. 15+843 & Mattikere double decker station structures & ramp

3	YESHWANTPUR	SHETTIHALLI	16.755	18.400	<b>1.645</b>	Elevated viaduct, part work of Corridor-1 up to super-structure
<b>Total Length</b>					<b>7.795</b>	

The details of work executed by previous contractor is mentioned in Employers requirement, Volume-2

The scope includes the **Design and Construction of the Elevated Viaduct**, comprising the following components:

1. **Design and Engineering:** Detailed design as per the Employers requirement and Scope of work for both permanent and temporary works and proof-checking of all the works.
2. **Execution of Balance Viaduct Works:** Construction of remaining viaduct elements including piles, pile caps, piers, pier caps, portal beams, casting of U-girders, I-girders, pedestals, bearings, drainage pipes, ramps, etc., complete in all respects.
3. **Handling of Precast Elements:** Loading, transportation, and erection at site of already cast pier caps, U-girders, and I-girders. Details of the precast elements are provided in Employer's Requirements, Volume-2.
4. **Double Decker Viaduct:** Design and construction of Double Decker Viaducts (BBMP & BSTP), Pile, pile caps, pier, pier arms, pier caps, pedestals, bearings, I-girder, U-girder, deck slabs, parapets, expansion joints, drainage pipes, road work, including associated ramps.
5. **Station Structures:**
  - a) Construction of Double Decker Station at Mattikere (Structural works only; station entry/exit works, architectural and E&M works excluded).
  - b) Execution of balance structural works at Bennigenahalli Station (excluding architectural & E&M items).
  - c) Completion of balance works up to Sub structure level (pile, pile caps, per, pier caps (precast/cast in situ), portal beam, pedestal, drainage pipes etc at Yeshwanthpur for Corridor-1 (Refer tender drawings).
6. **Ramps:** Design and construction of **ramps** at the following locations: (refer GAD enclosed in the tender drawings)
  - a) Bennigenahalli
  - b) Hebbal
  - c) Mattikere
  - d) Post Yeshwanthpur Station (BSTP)
7. **Rail Over Rail (ROR) Structure:** Execution of ROR works as indicated in the **tender drawings** (Refer **General Arrangement Drawings - GAD** enclosed).
8. Corridor-1 alignment (Ch 16+900 to Ch 18+055), from P192/UP 192 to C1P10, the scope of work included in this tender is upto Sub structure.
9. The scope of work also includes permanent road works, Barricading, Interface work, Casting yard and design, Construction & maintenance of Project and Site offices for the Engineer and the Employer, at the locations approved by the Employer and office at the casting yard for the Employer and the Engineer, till the end of DLP. the decision of the Engineer / Employer is final in this regard.

10. The work executed by previous Contractor is enclosed herewith as Annexure 1A of Employer's requirement Vol.-2. The bidder shall visit the site to assess the work executed by the previous contractor. If any modifications are deemed necessary based on their own assessment, the same shall be considered while quoting the price.
11. The successful bidder shall undertake the design validation and stability assessment of the previously completed works, ensuring their compliance with the required standards and specifications.

### MISCELLANEOUS WORKS

- a. Miscellaneous items which are not covered in scope of work of Schedule A and B, shall be executed under Schedule -C, Provisional sum as per the 2024-25 or latest schedule of rates published by KPWD/USSOR/CPWD/BWSSB/BESCOM/KPTCL as on date of award of work based on actual quantity executed at site.

### III) DETAILED SCOPE OF WORK

#### 1.0 OBJECTIVE:

**The objective of the Contract is to ensure the complete execution of the Permanent Works, including their construction, testing, and commissioning; the execution and subsequent removal of all Temporary Works; and the identification and rectification of any defects in the Permanent Works by the Contractor, strictly in accordance with the terms, conditions, and specifications set forth in the Contract.**

In full recognition of this objective, and with full acceptance of the obligations, liabilities and risks which may be involved, the Contractor shall undertake the execution of the Works. The general and specific requirements of the employer are detailed out in this document for understanding of the bidders and for mandatory compliance by the successful bidder/contractor. The Employer's requirements have been divided into different sections / sub-heads for convenience only. They do not restrict any cross-references. The Contractor shall take into account inter-relations between various parts of works. No claim shall be entertained on account of compartmental interpretations.

#### 1.1 DETAILED SCOPE OF THE WORK

1. **VIADUCT WORK:** Design & Construction of Elevated Viaduct including Ramps of Elevated Section of length 7.795 Km (-0.675km to Ch -0.050km & Ch 11.230km to Ch 16.755km & Ch: 16.755km to Ch 18.400km) and RoR for BSTP Corridor and other related infrastructural works in between Bennigenahalli to Shettihalli including validation of Design and stability check for works executed by previous Contractor including design & Construction of Double Decker from Ch. 14+562.903 to Ch. 15+680.447, including design & construction of Double Decker Station at Mattikere & design and construction of balance works at Bennigenahalli Station of Corridor-2 and including part work up to substructure for Corridor-1 at Yeshwanthpur of Bengaluru Suburban Transport Project (BSTP).
2. The scope also includes Design & construction of Double decker viaduct. At level 1 BBMP Road flyover and Level 2 BSTP tracks. The Elevated Section comprised of Double Decker including Y Loop at the entry and exit ramp. The tentative drawing for double decker is attached in Section XI.
3. Corridor-1 alignment (Ch 16+900 to Ch 18+055), from P192/UP 192 to C1P10, the scope of work included in this tender is upto sub structure (i.e. pile, pile cap, pier, pier cap, portal beam, concrete pedestal). The superstructure (i.e. U girder/I girder, obligatory span, bearing, expansion joint, parapet etc) is not in the scope of this tender. Wherever pile completed excavation for pile cap, pile chipping to be carried out by successful bidder including testing of pile as required and as per site condition. The balance work left behind by the previous Contractor shall be carried out by the successful bidder. Refer tender drawing.

4. Design and Construction of elevated (viaduct) structures comprising pile foundation/open foundation, pile caps, Piers, cast in situ /pre-cast post tensioned pier cap and cast in situ/ precast portal beams. Super structure includes, Pre-cast PSC I-Girder, PSC T-Girder, Pre-cast full span U Girder including casting, transporting, launching and erection in position of these precast elements, station pier arms/beams, pedestals, expansion joints, deck slabs, etc.
5. Provision of foundation works for viaducts including Boring and casting of Pile (M35/20 grade) by using hydraulic rig (minimum 1200mm dia for structure carrying two tracks & 1500mm dia for double decker stretch and 1000mm dia for structure carrying single track) shall be constructed for the minimum depth of 22 D for friction pile and for end bearing with anchoring in hard rock 1D & 6D in weathered rock as per relevant IS code. The Construction methodology is required to be approved by Engineer before carrying out the works. The founding level for end bearing piles will be decided by Geotechnical Engineer/Engineer during construction depending on sub soil strata. The initial load test, routine load test, lateral load test, pile integrity test, cross hole sonic test (25% of the total piles), etc., are included in the scope.
6. Scope also includes cutting / chipping of pile up to cut off level or up to good concrete and built up of pile up to required level. The scope also includes loading, unloading and disposal of surplus excavated material along with pile heads using covered trucks to contractor's dumping yard with all leads and lifts and as directed by the Engineer. The contractor shall ensure that during transportation, the carried material does not spill out.
7. Pile caps / Open Foundations resting at any depth depending upon the site condition shall include excavation, leveling course, PCC, dewatering, sheet piling / soldier piling & wooden lagging, if required, Backfilling complete in all respects. Wherever pile completed excavation for pile cap, pile chipping to be carried out by successful bidder including testing of pile as required and site condition.
8. Providing & laying M35/20 grade, reinforced cement concrete using Portland slag cement (Directly from manufacturer or blending of OPC+GGBS) for the following concrete works: Pile cap, Open Foundation/ Stepped Foundation/ Raft, Combined Footing, Columns, Grade beam, monopile pedestals, U/G water tank and Structures of road widening works such as foundation, substructures, and superstructures of culverts, retaining walls, return walls, precast/cast -in-situ culvert deck slabs, road median, drains, etc. including excavation up to 4.0 m from lowest ground level through existing water bound macadam road/ bituminous road/ soil/ murrum/ hard rock/ soft rock old structures below ground as encountered of all thicknesses, dismantling other structures, dead utilities, dewatering, pumping and bailing out water, strutting and shoring, formwork, backfilling in foundation with good earth/quarry dust/sand watering, compacting with a vibratory plate compactor complete as per specifications.
9. Providing & laying plain cement concrete M20/20 grade in open foundation, stepped foundation, combined footing, raft foundation, retaining walls, return walls, walls, U/G water tank, culverts, below pile cap, drains, slab on grade, tie beams, basements, levelling course or any other works as directed by the Engineer, etc. rate is inclusive of required dosage of admixture in concrete for obtaining required workability and as per specifications, approved drawings, laid in layers not exceeding 15cms thick layers, as per drawing including cost of all material, formwork/shuttering, dewatering during concreting, vibrating, compacting, curing, hire charges of machinery, all lead and lift, loading, unloading, transporting, stacking, finishing the exposed faces etc., complete.
10. Excavation exceeding 4m depth, for open foundations, combined footing, underground water tank, etc. in all types of soil, soft rock, hard rock, boulders, old structures below ground as encountered of all types & thickness, including dismantling of other structures, dead utilities and backfilling using good earth including watering, compacting with a vibratory plate compactor complete as per specifications and loading, leading and disposal of surplus excavated material using covered trucks to contractor's dumping yard and as directed by the Engineer so as to ensure that during transportation, the carried material does not spill out with all leads and lifts, including all supports (by sheet pile/ shoring/ strutting to retain and support the soil/ Sloped Excavation or other methods) for stability including dewatering, pumping and bailing out of water.

Note: This item shall be measured on basis of area of PCC for pile cap/foundation multiplied by the excavation depth beyond 4m.

11. Driving 'Z' section MS sheet piles by using 8mm to 10mm thickness, side by side in all kinds of soil mechanically using vibro hammer / suitable means / manually as per the directions of Engineer-in-charge for earthwork excavation in foundations for all depths and removing the sheet piles after the work
12. Provision (Design & Construction) of RCC piers, pier caps, precast pier caps & precast pier arms /portal pier beams, bearings, expansion joints etc as specified or as directed. The balance work left behind by the previous Contractor shall be carried out by the successful bidder.
13. Providing and laying grade M50/ 20 reinforced cement concrete at all levels for Viaduct & station piers of all size, shapes & heights (standard pier, portal pier & cantilever pier), pier head, shear key, portal beams, pier-arms, corbels, pier-ledge, diaphragms, pedestals, deck slab, cast-in-situ Pier Cap of all shapes etc. including centering, shuttering, propping, staging, scaffolding, curing, necessary tools, plants, machinery and all related operations etc. using steel shuttering & steel props. Formwork to be designed in such a way that traffic on road is allowed during the work at all times. Rate shall include cost of providing grooves, chamfers, mouldings, cut-outs, necessary fixtures, insert plates, sleeves for various purposes, shear connectors etc. complete as per drawings, specifications and as directed by the Engineer. The rate shall also include preparation of construction joints as per specification and providing approved wire mesh/weld mesh at such locations as approved by Engineer or as shown in drawings. Rate shall also include cost of using required dosage of admixture in concrete for obtaining required workability as per specification & approval of Engineer.

Note: (i) No cold joints are permitted. However cold joint at the junction of "pile cap - pier" and at the top surface of the starter of pier (which is normally less than 2m height), cold joints are unavoidable. In that case old concrete surface should have adequate shear key depressions, reinforced dowels and a layer of concrete bonding compound. Concrete retarder compound may also have to be used at the concrete surface of starter pier above the pile cap. The rate is inclusive of all above bonding agents/methods. However if any additional cold joints are unavoidable due to the reasons not beyond the control of contractor, all above bonding measures shall be on account of the contractor.

(ii) The cost is included for provision of HDPE pipes for pre-stressing system in station piers as per drawings complete.

14. Pre-Cast Concrete: Providing M50/20 grade reinforced cement concrete for Providing, casting, pre-stressing and curing precast Standard Pier Caps supporting superstructure, including shear key, pedestals, in-situ connection with pier. The item includes lifting the pier caps from the mould and shifting the same to the stacking yard. The item includes provision of holes for lifting and filling of holes after erection using non-shrink grout. Pre-stressing strand/system, Reinforcement steel, anchorages and sheathing shall be paid separately. Rate shall include cost of using required dosage of admixture in concrete for obtaining required workability as per approval of Engineer and all related operations as required to complete the work as per drawing & specifications. The cost shall be inclusive of the cost of centering, shuttering, scaffolding, providing cut-outs where specified, curing arrangements as required, steam curing arrangement if deemed necessary, all handling etc. complete Cast in situ Pier cap/arm concrete.
15. Providing and laying M50/20 Grade reinforced cement concrete for precast PSC I-Girder, (pi)/ T-girder (Pre-Tensioned), for standard/special spans of all types (straight as per approved GAD) in the casting yard including provision of lifting the girders from the mould and shifting the same to the stacking yard. Quoted rate shall be inclusive of all infrastructure in the casting yard, gantry cranes, moulds, casting beds, mobile cranes, stores, concrete batching plant, testing labs, bulk heads, approved curing arrangements as required, all handling etc. complete, 2mm teflon sheet at the end for placing on portal/arrangement for placing bearing with suitable downstand etc. as required and

- shown in drawing etc. complete. Rate shall include cost of lifting hooks and using required dosage of admixture in concrete for obtaining required workability as per approval of Engineer. Note: Type, Size and number of shutter moulds and debonding pipes (HDPE) as per requirement shall be as per the GFC drawings.
16. Providing and laying M40/20 grade reinforced cement concrete for precast parapet, over Deck slab on both side of viaduct, including transition span as per the drawing in all spans (straight or curved), in the casting yard including provision of lifting the parapet from the mould and shifting the same to the stacking yard. Quoted rate shall be inclusive of all infrastructures in the casting yard, gantry cranes, moulds, shuttering, casting beds, mobile cranes, stores, concrete batching plant, testing labs, approved curing arrangements as required. The cost shall be inclusive of shuttering, scaffolding, special adjustable props for alignment of units, moulds, providing cutouts, required dosage of admixture for concrete. Quoted rate shall also inclusive of Loading, transporting precast parapets from casting yard to work site, launching and erection in position using gantry or crane complete with cast in situ stitch concrete of same grade. Bolts & inserts for fixing hand rails.
  17. Provision (Design & Construction) of superstructure for viaduct consisting of precast (Pre-Tensioned & Post-Tensioned) reinforced cement concrete Box- Girders, U-Girders, I-Girders, parapet & cast-in-situ deck slab works. *The balance work left behind by the previous Contractor shall be carried out by the successful bidder and already cast precast element to be transported and erected in position and complete in all respect.*
  18. Provision (Design & Construction) of Composite/Open Web Girders for Obligatory or Railway Spans according to RDSO standards or as approved by Railways or any standards decided by Bi-RIDE as per requirement. Coordination & approval of GAD from Railways is in the scope of the contractor.
  19. Design and Construction of super structure of standard spans, non-standard spans/specials spans, spans supporting special track layouts are in the scope of work. The super structures are U-Girders of full length. Wherever, U-Girders not possible, I-girder shall be executed without any extra cost to the Employer. U-Girder is the Employers preferred choice. The scope of work of the Viaduct contractor also includes pile foundations, substructure (pier and pier arm) for platform and concourse meant for station. The track bed including I-girders and slab at elevated stations are in the scope of work.
  20. The indicative spans are 19m, 22m, 25m, 28 m & 31m, wherein indicative structural spans are 19m to 31m on straights and 22m & 25m on sharp curves. At obligatory portions or where there are constraints, they could be 31 m & 34 m or longer based on site conditions. Minor variations in span length and height may occur in piers and portal at any height. No extra payment shall be made on account of such variations. The quoted rates shall be deemed to include all such minor variations.
  21. The spanning arrangements shall be proposed by the bidder, in accordance with the General Arrangement Drawings (GADs) enclosed with this Tender. However, certain spans shall be designed in a manner that allows for the use of precast pier caps, U-girders, and other associated components provided by Employer.  
  
In addition, substructure elements already constructed at site shall be utilized, and no extra payment shall be made for the use or adaptation of these elements. The final decision regarding the spanning arrangements shall rest with the Employer."
  22. Precasting, shifting, loading, transporting & erection pre-cast full spans U-Girder (in Viaduct Split flyover) of simply supported span, standard precast pier caps, 'U' Girder, 'I' Girder, 'T' Girder, portal beams etc from the casting yard to work site by trailer and Erection in position including temporary supports, erection equipment, lifting cranes (using GOLIATH Crane in Split flyover at Critical location or by Crane with required capacity/launching girder), transporting etc, and positioning on bearings etc for viaduct into completed structures conforming to required lines, grades and dimensions complete as per drawings and specifications. (Note: The suitable launcher for U-girder launching fully

automatic, capable of negotiating 200m radius curve and 4% gradient, speed of trolley carrying U-girder for launching with load 2km/hr. and without load 3km/hr. to be mobilized. The minimum of two numbers of LG for launching of U-girders with motorised bogies for handling and transportation of U-girders to be mobilised and by tandem lifting by two cranes of required capacity. *The balance works left incomplete by the previous contractor shall be executed by the successful bidder. Precast elements already cast at the Gollahalli Casting Yard (near the airport) shall be transported, erected at site, and completed in all respects by the successful bidder.*

23. Conducting span load testing of PSC U-Girder/ I Girder of span length 19/22m/25m/28m/31m or more as per IRC SP51, including making all arrangement and conducting satisfactory Load testing on simply supported span erected in position on the piers at site.
24. The superstructure type at station location shall be U- girder /I-girder with deck slab. The span arrangement may be 15-22m approximately. Exact inter-distance/span arrangement at Mattikere Station shall be decided with the Engineer & Employer at detailed design stage.
25. All cross over location in elevated section to be designed with suitable I-Girder spans/cast in situ spans to accommodate the track alignment.
26. Providing TMT-500 D grade steel bar reinforcement (conforming to IS:1786, HYSD Fe 500 grade) at all heights & depth including straightening bars, cutting, bending, hooking binding with approved quality 18 gauge G.I binding wire, after placing in position tying, lapping and/or welding wherever required and anchoring to the adjoining members wherever necessary as per drawings (Laps, Hooks, and Wastages shall not be measured and paid) including cost of all materials, bar bending charges, labour, lead & lifts etc., Complete as per specifications and as directed including welding involved towards stray current protection effects as per the system approved by Engineer.
27. Supplying and threading uncoated stress-relieved low relaxation steel conforming to IS:14268, class-2 in already positioned Precast Pier-arm, precast I-girder,(pi)/T--Girder, portal beams including Providing corrugated 2.3mm (Tolerances + 0.3mm) thick HDPE duct 107mm ID (Tolerances + 1mm), OD 124mm (Tolerances + 1mm) for 19K15 & 90mm ID (Tolerances + 1mm), OD 104mm (Tolerances + 1 mm) for 12K15 with couplers & vent pipes, spacers, anchorages, stressing using 19K15 or 12K15 system or any other approved pre-stressing system and grouting as per approved methodology including water testing, epoxy protection of anchorages, related operations to complete the work, with all lead and lift and as per specifications. This item shall include Providing and fixing all Strands, Corrugated HDPE Duct (including blister portion) for Laying the Strands, Required Anchorages for live & dead end and at blister portion for future pre-stressing, stressing up to required level using all tools and equipment's & consumables. After stressing is completed, the voids in all ducts are to be grouted with non-shrink cement grout, and filling of all recess with concrete with adequate reinforcement as per drawing & specifications, all complete, as directed by the engineer.

The cost quoted should cover all types of splices including stiffeners hooks, spacer bar, U- bar, chair, bend deduction as required and nothing extra is payable on this account.

28. Supply, fabrication, transportation and erection of fabricated steel girder work of Grade E450BR confirming to IS 2062-2011 (with all latest amendments) including, painting, fully killed and fully normalized at appropriate location using various structural steel sections including MS-plates, etc. as per approved drawing for composite girders including cutting, bending, drilling holes with necessary field rivets welding HSFG bolts tightened by Torque wrench as per drawings supply of necessary templates etc. complete for fixing accessories such as bolts and nuts, etc. Complete duly providing necessary scaffoldings arrangements, temporary staging and metalizing the girders in accordance with the Indian Railway Bridge manual and any other incidental work as required with all leads and lifts, etc. complete and as directed.

NOTE:

- (i) For the superstructure over the flyover, the launching of all steel girders, including bracings, shall be carried out using the push-and-pull methodology or any other suitable and approved launching technique. These may include rolling over the track bed, Crib Crane method, or other methods appropriate to site conditions, subject to the approval of the Engineer-in-Charge
  - (ii) All labour, materials, tools and plants consumables such as welding rods, etc., by contractor.
  - (iii) Metalizing treatment of all steel surfaces shall be done by spraying aluminium having 99.5% purity with a coating of 150microns by minimum 2-phases.
  - (iv) Painting of metalized steel sections shall be done as below.
    - a) First coat- Primer to IS-5666.
    - b) Second coat- Zinc chromium paint to IS:104.
    - c) Third & fourth coat -Aluminium paint to IS:2339.
  - (v) The rates are inclusive of testing of all raw materials, shear connections, HSFG bolts, nuts and welding, etc. including allowances for all types of wastages.
  - (vi) The rate is inclusive of surface preparation, sand blasting, etc.
  - (vii) The rate shall also included supplying and providing of detailed fabrication drawing prior to execution.
  - (viii) The rate shall also include provision and installation of base plates, anchor bolts (For payment measured in Tonnes, etc.,) as per relevant drawings, specifications and direction of the engineer.
  - (ix) Using standard plate sections, H sections, hollow round/square/rectangle sections etc., welded and built.
  - (x) The launching scheme has to be submitted by the contractor using sufficient capacity cranes and get it approved by KRIDE. When girder is to be erected over the existing flyover then each girder is to be launched with proper care and with proper frame to avoid toppling during launching. The girder so placed will be temporarily braced with bolts and nuts before freeing from the frame.
29. Supply, fabrication ,transportation and erection of fabricated shim plates (wedges) of Grade E450BR conforming to IS:2062-2011 (with all latest amendments) including, hot dip galvanised, fully fitted and normalized at appropriate location using various structural steel sections including MS-plates, etc. as per approved drawing. Metalizing in accordance with the Indian Railway Bridge manual and any other incidental work as required with all leads and lifts, etc. complete and as directed.
30. Providing temporary barricade of 2m height of plain MS sheet 16 Gauge fixed with steel frame as per drawing, painting (including primer of approved quality) with synthetic enamel paint of approved colour, quality and brand, writing lettering and logo of Metro including maintenance of the same duly cleaning the same on fortnightly basis and painting if required, arrangement for blinker lights on barricades during night as per requirement and as per the instruction of the engineer. Barricading should be rugged. During the construction, barricading has to be kept continuously. Nothing extra will be paid for dismantling and re-erecting the barricades anywhere on the stretch. There should not be any opening at the end of barricade except at locations approved by Engineer.

Note:

- (i) Barricades on either side shall be measured individually , Barricades to be counted in the entire stretch on monthly basis and billing made as per availability of barricading boards.
  - (ii) Once barricade has been provided and work started, removal of barricade is not permitted till completion of pile, pile cap, pier and pier caps, portal beams, segment (U-Girder) erection, I girder erection, till completion of construction or as directed by engineering as per site requirements.
  - (iii) While erecting barricade, the bottom gap between barricade and road should be plugged with cement concrete from inside.
  - (iv) There should be minimum openings at the end of barricade to allow access of trucks/lorries and machine to site work area. Even these spacing should have proper opening & closing arrangements.
  - (v) Adequate blinking lights on barricade during night time must be ensured. The cost of this item should include provision for power pack/Generator set etc. so as to ensure the blinking of lights in night time as long as barricades are in position at the work spot .
  - (vi) After completion of the entire work, the barricades shall be the property of the contractor.(vii) Payment shall be made at 70% on erection of barricade and 30% on removal of barricade as per the instructions of Engineer.
  - (viii) If the cleaning is not done including removal of posters regularly, a recovery shall be made at the rate of 0.1% of the accepted rate of item per fortnight on pro-rata basis of length not cleaned .
31. Ramp: The ramp work is to be designed and constructed as per relevant codes, specifications, Special Specifications and drawings and/or as directed by the Engineer. The ramp portion shall be constructed at the entry and exit of the elevated sections.
32. Supply fabrication and erection of OPEN WEB GIRDER (OWG) as per RDSO drawing, or as approved by Railways or as per BSTP /DBR, IRS/IS specification for fabrication of steel bridge girders., IRS B-1/2001, IRS Welded bridge code (as corrected up to date), using contractors supply of steel confirming to IS:2062 quality 'BO', grade E 250 or higher from SAIL/TISCO/RINL/JSW complete including load testing.
33. Providing and Fixing the Sealing Gasket for Gap between U girders with EPDM Material, Hard Wearing, Temperature resistant (-30deg to +120 deg), Easy installation and Secure fixing and the Joint shall be Water tight. All as per Drawings and Specifications. Cost inclusive of testing and fixing with all necessary fixtures and epoxy Adhesive etc Complete.
34. Design, manufacture, supply & installation of the approved expansion joint (Omega/Strip Seal) at the site at formation level under the supervision of manufacturer's representative as per specification and expected movement (25 to 50 mm) as mentioned in relevant drawings (wherever required).
35. Design, supply and installation of Elastomeric bearings based on detailed design including bearing pedestals, seismic restrainers, shear keys.
36. Design, supply and installation of POT / PTFE / spherical bearings based on detailed design shall be provided. The type of bearing (POT/PTFE / Spherical or neoprene) will be approved by Engineer / Employer.
37. Loading, transporting precast I-Girders, (pi)/T-Girder, pier-arm and portal beams (PSC & RCC) from casting yard to work site, launching and erection in position with cranes, including the erection and shifting of launching girder/crane, cost of all temporary supports, erection equipment, transporting, and positioning on bearings etc. The weight shall be calculated assuming concrete density of 2.4t/m3.

38. Conducting Load Testing of PSC U-Girder/I-Girder/(pi)/T-Girder, Composite steel girder of any span length as per IRC SPSI, including making all arrangement and conducting satisfactory Load testing on simply supported span erected in position on the piers at site. Arrangement for application of actual design serviceable vertical load as directed by Engineer and arrangement for measurement of deflection at various salient points of the girder and submitting a report. The details of placement, position, increment of load on the simply supported span and installation of measurement devices etc., shall be as directed by the Engineer. Note: Rate shall include submission of method statement and third-party certification of the test.
39. Expansion joint, sealant in the expansion joints as per concept plan as per specification.
40. Earthing arrangement, drainage system, inserts for signaling masts in the parapets and other systems, as may be required.
41. Drainage arrangement will be as per detailed design for viaduct and double decker portion.
42. Providing & fixing UPVC pipes outside the piers and pier cap/pier arm/ portal of OD 200mm, 6.00kg/Sqcm working pressure, approved make with pipe fittings (door bend, door tee, plain tee, plain bend, end cap, reducer, collar, etc.), including cost of fixing arrangement, such as clamp, anchor fasteners etc. with concrete structure, cost of scaffolding, cost of all materials, labour charges, HOM of equipment and testing complete as per drawings & specifications.
43. Providing & fixing PVC pipes of OD 200mm, 6.00kg/ Sq cm working pressure, approved make with pipe fittings (door bend, door tee, plain tee, plain bend, end cap, reducer, collar, etc.), Including cost of fixing arrangement with concrete structure, cost of all materials, labor charges, HOM of equipment and testing complete as per drawings & specifications.
44. Fabrication & Supply of drainage spout hot dip galvanized of dimension 300mm x180mm with MS Flat 50mmx6mmx100mm long with gratings of MS Flat 25mmx6mm with spacing of 50mm c/c and MS pipe 122mm dia. verticals as per drawing including installation of the spout with all tools, plants, leads and lifts and in position in complete and as directed by the Engineer.
45. The structure height from ground level to rail level is about 10.5m (approximately) in case of normal viaduct and 20m (approx.) in case double decker up to rail level.
46. Painting pier identification number on piers & parapet inner face at different locations as directed by Engineer duly following the colour scheme including all material and labour, with all lead & lift. Final coating to be done at the time of handing over.
47. The inspection platforms to be provided at pier and pier cap for inspection of bearings etc., at spans of Railway crossings.
48. supply, fabrication and erection of cable tray supports made out of Hot dip galvanized (65 micron) GI angle / channels / flats fabricated to the required size and shape falling in the category of standard GI sections. Rate shall include cost of Anchor Fasteners and other accessories required for Installation of supports.
  - a) GI channel section of 100 x 65 mm
  - b) GI channel section of 75 x 75x 50 mm
  - c) GI channel section of 50 x 50 x 40 mm
  - d) GI L-Angle section of 75 x 75 x 8 mm
  - e) GI L-Angle section of 50 x 50 x 6 mm
  - f) GI L-Angle section of 40 x 40 x 5 mm
  - g) GI L-Angle section of 25 x 25 x 5 mm
  - h) GI L-Angle section of 25 x 25 x 3 mm
  - i) GI flat section of 75 x 10 mm

- j) GI flat section of 65 x 10 mm
- k) GI flat section of 65 x 8 mm
- l) GI flat section of 50 x 6 mm
- m) GI flat section of 40 x 5 mm
- n) GI flat section of 25 x 5 mm
- o) GI flat section of 25 x 3 mm

#### **49. Rain water harvesting Recharge Pit**

- i. Earth work excavation for Foundation by mechanical means for all works & depth upto 3 m, as per drawing and technical specifications, including setting out, shoring, strutting, barricading, caution lights, including dressing of excavated surfaces, disposing off or levelling the excavated earth or sorting & stacking the selected earth for reuse in a radius of 50 m and lift upto 1.5 m including cost of labour, tools, usage of machinery & other appurtenances In all kinds of soils Depth upto 3m Note : Cost of De-watering upto 5 % of (A+B) may be added, where required assessment for dewatering shall be made as per site condition
- ii. Providing and laying in position Cement Concrete for levelling course for all works in foundation. The granite/trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed, laid in layers not exceeding 150 mm thickness, well compacted using plate vibrators, including all lead & lifts, cost of all materials of quality, labour, Usage charges of machinery, curing, and all the other appurtenances required to complete the work as per technical specifications. Mix 1:2:4 Using 20 mm nominal size graded crushed coarse aggregates
- iii. Providing and laying in position Cement Concrete for all Foundation works. The granite/trap/basalt crushed graded coarse aggregates and fine aggregates as per relevant IS Codes machine mixed with super plasticizers laid in finished layers, well compacted using needle vibrators, including all lead & lifts, cost of all materials, quality confirming to the requirements of relevant IS codes, labour, Usage charges of machinery, curing and all the other appurtenances required to complete the work as per technical specifications.M20 Design Mix Using 20 mm nominal size graded crushed coarse aggregates.
- iv. Providing to work spot rolling, lowering and placing in position RCC perforated rings in the already excavated pit including loading and unloading at both the destinations with all lead and lift with appurtenances., complete.
- v. Providing and laying 100mm thick pre-cast cover slabs over drains & Rain pit of width not exceeding 800 mm using M20 concrete reinforced with Micro Alloyed High carbon steel with 3mm - 3ply wired steel @ 2.00 kg/m<sup>2</sup>, slabs jointed in CM 1:3 proportion and nicely finished Including providing holes in the Cover slabs wherever necessary for easy drainage of surface water including of labour, materials, scaffolding, usage of machinery, curing, lead and lift charges etc, Complete.
- vi. Sinking of Borewell of 165mm dia clear using super fast hydraulic rig of capacity 300 PSIG & above 1100 CMF & above in all strata including over burdern upto 20 m. Fixing of casing pipes, collars and cap with necessary cutting, threading and welding including transportation of rig and supporting vehicle, crew charges and cost of consumables etc., complete including yield testing at the final depth with a minimum working of compressor for one hour (Excluding cost of casing pipes, collars, cap etc., complete ) (Above 450m of drilling add 10% for every 50m depth)Borewell depth of 0 to 50 Mtrs.
- vii. Providing & fixing PVC pipes of OD 200mm, 6.00kg/ Sq cm working pressure, approved make wit h pipe fittings (door bend, door tee, plain tee, plain bend, end cap, reducer, collar, etc.), Including cost of fixing arrangement with concrete structure, cost of all materials, labor charges, HOM of equipment and testing complete as per drawings & specifications.

- viii. Supply & Fixing of Polycarbonate End Cap
  - ix. Providing & installing at site of work Perforated corrugated PVC pipes conforming to IS 9271 with prewrapped 250gsm. Geosynthetic filter material by laser guided trencher machine/by mechanical means including cost of pipe, filter material, pipe accessories and all taxes including all other ancillary operations complete and labour charges only for installation of site at work perforated corrugated PVC pipes including lowering into trenches, laying true to lines, level land and perfect leak proof linking at joints, fittings pipes accessories including the refilling the trench 50 cm around the pipe with gravel or selected earth available from the excavation and all other ancillary operations complete. 100mm dia.
  - x. Supplying, filling, spreading & levelling stone boulders of size range 5 cm to 20 cm, in recharge pit, in the required thickness, for all leads & lifts, all complete as per direction of Engineer-in-charge.
  - xi. Supplying, filling, spreading & levelling gravels of size range 5 mm to 10 mm, in the recharge pit, over the existing layer of boulders, in required thickness, for all leads & lifts, all complete as per direction of Engineer in- charge.
  - xii. Supplying, filling, spreading & levelling coarse sand of size range 1.5 mm to 2 mm in recharge pit, in required thickness over gravel layer, for all leads & lifts, all complete as per direction of Engineer -in-charge
50. GAD enclosed in the tender documents (Section-XI) may be referred. Salient details of GAD are given below:

**Main Viaduct:**

- i) Design and Construction Contractor ensure 5.5m vertical clearance above the existing road level & adequate vertical clearance at railways crossings as per DBR & SOD. The axle load for BSTP tracks shall be designed for 17t.
- ii) Whole length has to be designed for double line Broad gauge track. System is planned with front or end evacuation and 25 KV AC OHE traction.
- iii) The design and construction of the superstructure for standard spans, non-standard spans/special spans, and spans supporting special track layouts shall be within the scope of work. The superstructure shall primarily consist of full-length U-Girders. Wherever the use of U-Girders is not feasible due to site constraints or other considerations, I-Girders or cast-in-situ spans shall be adopted, subject to the Employer's approval and at no additional cost.

The Tenderer shall utilize U-Girders integrated with parapets or I-Girders with cast-in-situ slabs and parapets, as applicable, in the superstructure. The proposed span arrangements shall conform to the limitations and requirements set out in this document and shall be appropriate to site conditions.

Any new design or span arrangement proposed by the Tenderer shall be in line with best practices and proven engineering solutions. Certain spans will be required to be designed as special spans or obligatory spans, particularly where the alignment crosses existing railway tracks or other critical infrastructure.

**D. MISCELLANEOUS: INCLUDING ROADS, BARRICADING, QUALITY, INTERFACE WORK, CASTING YARD, SITE OFFICE AND EQUIPMENT, PERSONNEL ETC.**

- 1. Preliminary works such as site clearance, barricading, diagonal trial trenching etc., wherever required.
- 2. Design of all temporary structures including drawings.

3. Road widening, side drains & other allied works, and construction of service roads at required locations.
4. All temporary traffic diversion works, which will be required for the smooth flow of running traffic in order to carry out the works without any interruption including all safety precautions, signage, barricading, emergency lighting, traffic marshals, look-out men/ watchmen etc.
5. Tree cutting, preservation and disposal (or) translocation along the alignment for cutting / disposal / Translocation / afforestation in lieu of cutting / Translocation.
6. Demolition of RCC framed structures, Brick masonry buildings including basement etc. as existing at site without making damage to adjacent structures, utilities and taking away and disposing all the debris and released materials etc.
7. Geotechnical investigation bores as per the design requirement at every pier location of Viaduct to be carried out as directed by Engineer / Employer. The bidder can use Soil investigation/geotechnical reports for designs, provided with the tender document. **No claim whatsoever will be entertained on account of any change encountered in strata while actual execution of the work on site as compared to geotechnical report enclosed in the tender document.**
8. Conducting survey and fixing benchmarks and alignment markers.
9. Necessary permanent diversion of Utilities.
10. Temporary barricading wherever required.
11. Implementation of Project Quality Management Plan in accordance with ISO-9001:2015.
12. Deployment of adequate manpower (Traffic marshals and watchmen) for management of traffic at intersection, junctions, traffic diversions etc.
13. Carrying out GPR survey to locate underground utilities up to 6m depth with a corridor width of 5mx5m grid as directed by Engineer.
14. Demolition / dismantling of road, footpath, kerb stone, central verge, boundary wall, etc.as required. Retrieved materials obtained from demolition / dismantling shall be the property of the owner. Acquiring and evacuation of the properties will be done by the concerned authorities.
15. Construction of temporary road as required for diversion / widening to facilitate the movement of traffic, dismantling of any existing roads / footpaths etc., for temporary diversion / widening and construction of temporary footpaths, diversion / widening for traffic diversion and its regular satisfactory maintenance as directed by Engineer / Employer.
16. Any other item of work as may be required to be carried out for completing the construction of Elevated structure of specified length including all necessary interface works with station and system-wide Contractors in all respects in accordance with the provisions of the Contract and to ensure the structural stability and safety during and after construction works to be performed, including all general works preparatory to the construction and works of any kind necessary for the due and satisfactory construction, completion and maintenance of the works according to the intent and meaning of the drawings and technical specifications adopted, to best Engineering standards and orders that may be issued by the Engineer from time to time, compliance of all Conditions of Contract, supply of all materials, apparatus, plants, equipment, tools, fuel, water, strutting, timbering, transport, offices, stores, workshops, staff, labour and the provision of proper and sufficient protective works, diversion, temporary fencing, lighting and watching required for the safety of the public and protection of works on adjoining land; first -aid equipment, sanitary accommodation for the staff and workmen, effecting and maintenance of all insurances, the payment of all wages, salaries, fees, royalties, duties or the other charges arising out of the execution of works and the regular clearance of rubbish, clearing of garbage /debris / pile heads from the embankment and premises of project, clearing up and leaving the site perfect and tidy on completion

17. Surveying by establishing DGPS control points and TBMs, True and proper setting out and layout of the works marking of alignment and pier locations, vertical & horizontal clearances for the elevated section including modifications, if any, as per drawings No extra amount will be paid to re-do or to re-establish any of the survey points. The control points shall be fixed using DGPS double frequency and the accuracy of 1 in 50,000 or better shall be assured. Same control points available at site can be used.
18. Providing temporary barricade as per the approved drawing, painting (including primer of approved quality) with synthetic enamel paint of approved colour, quality and brand, painting letters and logo of K- RIDE, including maintenance of the same duly cleaning the same on fortnightly basis and immediately repainting whenever required, arrangement for blinker lights on barricades during night as per requirement and as per the instruction of the Engineer.
19. Barricading should be rugged and fixed / anchored in ground firmly during the construction. It shall be maintained in position till completion of all works at the relevant location. Nothing extra will be paid for dismantling and re-erecting the barricades at a different location. The barricades shall be relocated as the work progresses and as directed by the Engineer.
20. Supply of caution watchmen at locations where caution orders is imposed and at all work sites near the IR track at the rate of one caution watchman per 8 hours shift round the clock with necessary three cell electrical torch, banner flags, hand flags etc. for continuous vigil and to exhibit necessary signals to the trains for their safe passage over the caution spot as directed by the engineer in charge.
21. The Geotechnical reports carried out by the earlier contractor same has been attached. The Contractor can use the same reports for design of the foundation works. Boring of 150 mm dia. (confirmatory bore holes), in all types of soil at each Pier locations (Locations to be decided by the Engineer) up to 3m in hard rock or 30m boring whichever is earlier and collecting core samples in rock for determination of core recovery, RQD and carrying out compressive strength test on rock samples.
22. The scope shall include boring in soil, conducting SPT and collecting samples at 3m depth intervals and submitting bore log reports with soil classifications / SPT, Drilling 3m in hard rock with single/double barrel core for obtaining samples for testing of core recovery, RQD and compressive strength as per standard practice, Preparation and submission of report containing core recovery, RQD, Compressive strength at Hard Rock Locations with all lead and lifts and as per the directions of Engineer. The scope also includes refilling and reinstating surface and disposing off surplus materials.
23. Submitting colour photographs (soft copies and printouts of photos) of the works as directed by the Engineer at intervals as instructed by the Employer along with submission of MPR for every month. The photographs shall be submitted in 3 copies each of size not less than 225mm x 175mm each in album form, apart from 3 soft copies of all photographs. The photographs chosen should cover important activities of the work.
24. Submitting Drone digital video by showing the physical progress of works at an **interval of every 3 months** as per the Employer direction by suitable means of specified duration comprising one master copy and two extra copies duly editable version of entire length of Package 1 of Corridor 2 overlay with Geotagging in MP4 format and including Building infringement in respective to alignment, 3D Model – Auto Cad/sketch up compatible and Orthophoto – Geo ref JPG. Also, before VVIPs' inspection and high-level employer's meetings of the BSTP project.
25. Diagonal Cross trenching works for identifying underground Utility at every Pier location to the required length, width and depth, which includes excavation in all types of soil, hard soil, rock, footpath, bitumen road, concrete road, medians etc. cutting of all types road surfaces and backfilling the same with available excavated earth and reinstate road surface as per the authority requirement.  
  
The scope also includes surveying and taking coordinates of the existing Utility and submitting the reports (hard & soft copy) of the same as per the directions of the Engineer.
26. Trenching for identification of utilities, temporary diversion and permanent diversion of if encountered during cross trenching.

27. Striking out of center line of alignment by using total station theodolite either before commencing work or after completion of earthwork on finished formation and fixing Centre line stones of size 150x150x600 mm with CC 1:3:6 mix with 40mm metal in a pit of size 300x300x600 at every 100-meter interval on straight and at every 50m interval on curve etc.
28. Preparation of computer aided GAD / completion drawings in AO size in tracing film and 6 copies of ammonia paper print for each drawing by contractor with his own materials, manpower, tools and etc., complete with bridge details submitted by the railway and as directed by Engineer in charge. drawings in 7 copies, 1 tracing film, 6 ammonia paper print copies and soft copies should be handed over to Employer.
29. Dismantling of existing structures after ensuring necessary approval from the competent authority of the concerned department. The structures like culverts, bridges, buildings, retaining walls, Railway Platforms, Compound walls and other structure comprising of masonry, cement concrete, pre-stressed / reinforced cement concrete, brick / tile work in cement mortar, stone masonry rubble in cement mortar, stone pitching / dry stones spalls, removal of all types of Hume pipes, cement concrete pavements, kerb stones, BS slab / precast slabs of drain / footpath, paver blocks of footpaths, removal of silt or silt mixed with sand, etc. including T&P and scaffolding wherever necessary, including disposal of dismantled material with all lead and lifts including all labour, hire charges all machineries etc., complete by any mechanical means or any other means as direct by Engineer. Loading / Unloading G.I. sheets, rails, joists, built up sections, angles, C.I., Ductile pipes, A.C Pipes, or G.I. pipes RCC / PCC beams / slabs and other miscellaneous ironwork or woodwork. The scrap materials will be the property of the contractor except the materials of local authorities (BDA, BBMP, BWSSB, BESCOM, BSNL, NHAI) and Railways.
30. Supplying and laying interlocking pre-cast CC block pavers of approved design factory manufactured of specified grade cement concrete on foot paths, circulating area, road junctions etc, including setting in position over 25mm thick bedding layer of fine sand, filling the joints with fine sand, levelling including compaction as per IS 15658, minimum of 80mm thick blocks of M35 grade for medium traffic
31. Supplying and laying of Hume pipes as directed by Engineer.
32. Supplying and fixing precast RCC gratings including cost of all materials, transportation, labour etc. complete (60x40 cm) with all lead and lifts
33. Transportation for disposal of tree trunks, branches, roots, complete including loading and unloading as per BBMP / Forest and local authority guidelines.
34. Preparation of earth ball of tree roots of desired depth & diameters including necessary soil tests.
35. Dislodging, lifting, transportation and translocation tree from original place to the new place including all arrangements, labour etc. for successfully completing the work.
36. Translocation the marked trees of various species and specified girth to the place shown by the
37. Engineer with all lead and lift, tools, plant, men & machinery, and necessary preparation such as:
38. Excavating pits of adequate size, arranging loose soil, mixing of manure, fertilizer, insecticides etc., to ensure survival of the trees being translocated
39. Maintenance of tree i.e., watering, soil heaping, spray of insecticides till the end of DLP or three years from the date of Translocation, whichever is earlier. All above operations shall be executed as per the specifications.
40. Providing & fixing hard drawn steel wire fabric reinforcement, straightening, cutting, cleaning, bending, tying, lap / butt welding placing including binding with mild steel annealed binding wire of 18 SWG in all structural concrete at all heights and depths, with all lead and lift. etc. complete as per drawing, specifications and directions of Engineer for fencing including vertical posts & RCC foundations for Elevated Viaduct Section.
41. Rain water harvesting: Providing and constructing the Rain water harvesting system in the median of the road / Embankments including boring / drilling of bore well of 300mm dia for casting / strainer pipes prescribed in the drawing, excavation in all type of soils / rock, constructing BW chamber, foundation, RCC top slab, plastering, CI manhole cover, filling / packing gravels in the chamber and the annular space in the bore, filling granules in the vertical pipe, laying HDPE pipe from piers to chamber, etc., complete as per the approved drawing
42. Transportation of all usable materials like B.S slabs / precast RCC slab, cement concrete blocks, interlocking paver blocks, kerb stones, steel items, telephone poles. Electric Poles to designated site as directed by Engineer by mechanical transportation including all lift, lead, loading, unloading, labour, machinery etc and handing over to the custodian instructed by Bi-RIDE.
43. Supplying and filling in foundations / backfilling in marshy / clayey foundation pits with granite / trap broken stones of 300mm and downsize with approved sand including hand packing, ramming, watering, including the

Scope of all materials and labour with all lead and lifts etc., complete as directed by Engineer.

44. Design, build and maintaining project & site offices fully furnished for the use of Engineer as per the layout drawing, specifications, & Employer Requirements-Scope of work
45. Providing Project Management Information System (PMIS) approved by the Employer, duly integrating the same with BIM software such that all documents generated by the contractor can be transmitted to the Employer and the Engineer by electronic means (and vice versa) and that all documents generated by either party are electronically captured at the point of origin and can be reproduced later, electronically and in hard copy. A similar link shall also be provided between the Employer's and Engineer's office at site (in Project offices and Site Offices to be provided by the contractor to Employer and Engineer) by the contractor.
46. Any other item of work as may be required to be carried out for completing the construction of structures as specified in drawings including all necessary interface works with infrastructure contractors, system contractors, etc. in all respects in accordance with the provisions of the Contract and / or to ensure the structural stability and safety during and after construction.

#### **E. ROAD WORKS**

1. Direction and Place identification signs up to 0.9 sqm size board as per IRC:67
2. Portable barricades in construction Zone: Installation of steel portable barricade with horizontal rail 300mm wide, 2.5m in length fitted on a 'A' frame made with 45x45x5mm angle iron section, 1.5m in height, horizontal rail painted (2 coats) with yellow and white stripes, 150mm in width at an angle of 45 degree, 'A' frame painted with two coats of yellow paint, complete as per IRC: SP:55-2001 including cost of all materials, labour, loading, lead, lift, transporting etc., complete as per specification.
3. Traffic cones: Supplying of red fluorescent with white reflective sleeve traffic cones made of low-density polyethylene (LDPE) material with a square base of 390x390x35mm and a height of 770mm, 4Kg in weight, placed at 1.5m interval all as per BS-B73 including cost of all material, labour, loading, unloading, lead, lift, transporting, etc., complete.
4. Retro-Reflectorized Road traffic signs: Supplying and fixing of retro-reflectorized cautionary, mandatory and informatory sign as per IRC: 67- 2001 made of high intensity grade micro prismatic HIP type-IV sheeting, including lettering fixed over aluminum sheeting, 2 mm thick firmly fixed to the ground by means of properly designed foundation with M 15 grade cement concrete 45 cm x 45 cm x 60 cm, 60 cm below ground level as per approved drawing
5. Manufacturing of Retro-reflective board - Caution Indicator / Stop indicator / Speed indicator / Whistle Board / any other board with 1.50 mm thick MS plate and MS plate stiffeners on M.S. T angles 75 mm x 75 mm x 6 mm and 4.75 m long approximately as per the specified drawing including cutting, drilling holes in the angles, providing hold fasts, bolts and nuts with washers of required size, bolting, welding.
6. Providing supplying and fixing in position, boundary pillars of standard design as per latest IRC with K- RIDE / Railway logo on it with reinforced cement concrete of M15 grade
7. Clearing and grubbing of land for roads, including uprooting of vegetation, grass, bushes, shrubs, saplings and trees of girth up to 300 mm.
8. Removal of earlier felled tree stumps and disposal of unserviceable materials and stacking of serviceable material (used or auctioned) with all lead and lifts including removal and disposal of top organic soil not exceeding 150 mm in thickness including all labour, hire charges of all machineries etc., complete with all lead & lifts by suitable machinery
9. Excavation for roadwork in all types of soil by mechanical means including cutting and loading to tippers, trimming bottom and side slopes, in accordance with requirements of lines, grades and cross section, and transportation with all & lift lead complete as per specifications, including scarifying the existing bituminous
10. Construction of embankment for road work with approved materials gravel / Moorum with all lifts and leads, transporting to site, spreading, grading to required slope and compacting to meet requirement complete as per specification, including cost of gravel / moorum, watering charges & compaction by vibratory roller to 95% of modified proctors density. MORTH Specification No.305
11. Construction of sub grade and earthen shoulder with approved material Gravel / Moorum with all lifts & lead,

- transporting to site, Spreading, grading to required slope and compacted to meet requirement of table No.300-2 complete as per specification, including cost of earth, watering charges & compaction by vibratory roller to 97% of modified proctors density MORTH Specification No.305 including compaction
12. Construction of granular sub-base Grading-V as Sub-base and drainage layer by providing coarse graded crushed stone aggregates of granite / trap / basalt material, mixing in a mechanical mix plant at OMC, Carriage of mixed material to work site, spreading in uniform layers with motor grader on prepared surface and compacting with vibratory power roller to achieve the 98% proctor density, complete as per specifications. Clause 401 of MORTH V revision
  13. Providing, laying, spreading and compacting crushed stone aggregates of granite / trap / basalt to Wet Mix Macadam specifications including pre mixing the material with water at OMC in mechanical mix plant carriage of mixed materials by tipper to site, laying in uniform layers with paver in sub-base / base course on well prepared surface and compacting with vibratory roller to achieve the desired density complete as per specifications, MORTH specification No.406
  14. Providing and applying primer coat with S.S bitumen emulsion on prepared surface of granular base such as WMM including cleaning of road surface and spraying primer at the rate of 0.60kg per sqm using mechanical means complete as per specifications. Clause 502 of MORTH V revision.
  15. Providing and applying tack Coat using 80 / 100 grade bitumen (VG10) on the bituminous surface at the rate of 0.25Kg per Sqm, heating bitumen in boiler fitted with spray set (excluding cleaning of Road Surface) as per Specifications. Clause 503 of MORTH V revision.
  16. Providing and laying dense graded bituminous macadam using crushed aggregates of specified grading, premixed with VG30 grade bituminous binder and transporting the hot mix to work site, laying to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction in all respects complete as per specifications. Clause 505 of MORTH V revision. Using 40 I 60 TPH capacity H.M.P with sensor paver Gr-II with 4.5% VG-30 Bitumen.
  17. Providing and laying bituminous concrete using crushed aggregates of specified grading, premixed with bituminous binder and filler, transporting the hot mix to work site, laying with a paver finisher to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction in all respects as per specifications. Clause 507 of MORTH V revision. Using 40 I 60 TPH capacity H.M.P with sensor paver Gr-II with 5.4% VG-30 Bitumen.
  18. Filling potholes and patch repairs with bituminous concrete.
  19. Road Marking with Hot Applied Thermoplastic Compound with Reflectorizing Glass Beads on Bituminous Surface / Concrete Surface. Painting lines, dashes, arrows etc., on roads in two coats on new work with ready mixed road marking paint conforming to IS: 164 on bituminous surface.
  20. Painting two coats on new concrete surfaces: Painting two coats after filling the surface with synthetic enamel paint in all shades on new plastered concrete surfaces including cost of all materials, labour, loading, unloading, lead, lift, transporting etc., complete as per specification
  21. Road delineators: Supplying and installation of delineators (Roadway indicators, hazard markers, object markers), 80-100cm high above ground level, painted black and white in 15cm wide strips, fitted with 80x100mm rectangular or 75mm circular reflectorized panels at the top, buried or pressed into the ground and conforming to IRC-79 as per drawings including cost of all materials, labour, loading, unloading, lead, lift, transporting, etc., complete as per specification.
  22. Supplying and fixing pre cast solid concrete kerb stones made out of M15 / 20 (CC 1:2:4) and finished with CM 1:3 Plastering and finishing, cutting, with all lead and lifts etc., complete of size 450 x 200x 400mm.
  23. Construction of Public Roads in all Viaduct, At Grade and Station area with the approval of local authorities in all terms, wherever required as directed by Engineer/Employer.

## **1.2 Clearances, Investigations and Reinstatement**

- 1.2.1 The Permanent Works shall not infringe the IR / Metro railway Structure Gauge as confirmed by the project Schedule of Dimensions (SOD).

- 1.2.2 The Permanent Works shall allow for provisions for the installation of IR / Metro railway operating equipment without infringement of the structural gauge as confirmed by the project Schedule of Dimensions (SOD).
- 1.2.3 The Contractor shall request the Engineer's approval prior to demolishing any building or structure.
- 1.2.4 The Contractor at all times shall minimise the impact of the Works on traffic flows. All traffic diversions, height clearances, road narrowing, and any other restrictions shall be approved by the appropriate Authorities and the Engineer before work commences.
- 1.2.5 The Contractor shall carry out all reinstatement works to the satisfaction of all Stakeholders, Statutory Authorities and the Engineer.
- 1.2.6 The Contractor shall verify the survey information provided by the Employer/Project Partner. The Contractor's survey shall only be used for the basis of the design of the works. Any discrepancy found needs to be resolved before the commencement of work. The survey information shall be shared, verified and confirmed with other Project Partners.
- 1.2.7 The Contractor is advised to conduct further investigations considered necessary by them at their own cost. Any error or discrepancy found in the Employer's / Project Partners data at any stage will not constitute grounds for any claim for an extension of time or cost.
- 1.2.8 Contractor shall take necessary approvals from Statutory department like IR, BBMP, BMRCL, BESCO, BWSSB, Pollution control board, KPTCL, Gas pipe, Traffic etc.,

### 1.3 Detailed Scope of Works

- 1.3.1 The Contractor shall carry out subsurface trial trenches to locate underground utilities for the foundations.
- 1.3.2 The Contractor shall carry out geotechnical borehole soil investigation for foundation design at every alternate pier location. The Geotechnical reports is provided with the tender, the bidder can use these reports for designs.
- 1.3.3 Deleted
- 1.3.4 The Contractor shall fully coordinate and interface their construction work with those prepared by Project Partners.
- 1.3.5 Logistics Areas: The Employer will not provide any land for logistics areas, casting yards or offices. The Contractor shall identify the land they require and procure the same at their own cost.
- 1.3.6 The Permanent Works shall be constructed in such a way that, when maintained in accordance with the Contractor's Operations and Maintenance manuals, the structures will remain serviceable for a minimum 100-year design life.
- 1.3.7 The Contractor shall develop their construction methodology to suit the areas provided for the Works including but not limited to the special design wherever needed on the stations, ramps and other locations.
- 1.3.8 Deleted.
- 1.3.9 Deleted.

### 1.4 Design

- 1.4.1 A Designer or Designers shall be employed by the Contractor. The Designer(s) shall have relevant experience as defined in Qualification of Tenderer of **Section-II** for designing of BSTP/IR/Metro. The Contractor shall provide full details of the Designer(s) past experience and details of the proposed design discipline leads for the Engineer's/Employer approval.

The Contractor may propose to carry out the design work in-house if they have a design office with an experienced design team capable of carrying out the design work for this Contract. The in-house design team should have the relevant experience as prescribed above for the Designer. The Contractor shall provide full details of his design team's past experience and details of the proposed design discipline leads which he intends to deploy for the Engineer's approval.

To ensure progressive design assurance is achieved the Designer(s) discipline leads (including Key Personnel) shall be available at all times for design meetings and workshops with the Engineer and shall be located in Bengaluru.

The Permanent Works shall be designed and constructed in such a way that, when maintained in accordance with the Contractor's Operations and Maintenance manuals, the structures will remain serviceable for a minimum 100-year design life.

- 1.4.2 The Contractor shall develop their design and construction methodology to suit the areas provided for the Works including but not limited to the special design wherever needed on the stations, ramps and other locations.
- 1.4.3 The Works shall be designed to the Employer's requirements and all relevant current codes, specifications and drawings or as otherwise directed by the Engineer.
- 1.4.4 The design shall be fully coordinated for all disciplines including systems installations. The Contractor shall design all disciplines in a fully coordinated BIM 3D model to minimise clashes, which shall be shared with other Project Partner Contractors and Stakeholders, and this shall be carried out on a common digital platform to which the Engineer and other Project Partner Contractors will be provided access.
- 1.4.5 The **Contractor shall appoint a proof check consulting agency (the "Proof Consultant") after proposing to the Engineer & Employer a panel of 3 (three) names of qualified and experienced firms and Engineer will the approval of Employer will select 1 Proof Consultant from panel.** The Parties agree that no firm or person having any conflict of interest shall be engaged hereunder.

## **1.5 Interface and Coordination**

- 1.5.1 The Contractor shall to the satisfaction of the Engineer, coordinate, interface and cooperate with all Stakeholders and Project Partners including all external Agencies and Authorities.
- 1.5.2 The Contractor shall fully co-ordinate the design and construction of his Works with Project Partners, but not limited to Stations, Track, lift & escalators, traction, power supply, Rolling Stock, Signalling and Telecommunication, Automatic Fare Collection (AFC), Passenger Screen Doors (PSD) and Vertical and Horizontal Transportation Systems (VHTS).
- 1.5.3 The Contractor shall include and cooperate and coordinate by provision for the Project Partners equipment movement and installation by providing suitable access routes, staircases, cut/box outs, sumps, service corridors, cable troughs on the station area, raceways, conduits, fixtures, inserts, clearances etc.
- 1.5.4 Earthing and lightning protection shall be provided and fully coordinated with Project Partners.
- 1.5.5 Prior to the Taking-Over Dates, early agreed access shall be provided to other Project Partners appointed by the Employer, to carry out their works. Material and equipment supply delivery routes shall be coordinated and provided to the Project Partners. The security of materials and equipment brought to the site by other Project Partners shall be their responsibility.
- 1.5.6 The Contractor shall conduct, and coordinate interface meetings intimated to the Engineer, and adhere to the decisions taken at the meeting approved by the Engineer.
- 1.5.7 Any coordination or interface disagreements with other Project Partners shall be informed to the Engineer. If the Contractor despite having taken all reasonable efforts cannot resolve such disagreements, then the decision of the Engineer shall be final and binding on the Contractor.
- 1.5.8 Access shall be provided to the staff and labour of the other Contractor appointed by the Employer for carrying out their works and bringing materials and equipment at the site. However, the security of materials and Equipment brought at the site will be the responsibility of the respective Contractors.

## **1.6 Utility Diversions**

- 1.6.1 Utility identification at foundation locations shall be carried out by the Contractor in advance. The Contractor shall modify the reference structural design confirmed in the tender drawings to save the utilities as directed by the Statutory Authority. The relocation/diversion of the utility shall be undertaken by the contractor. The removal/diversion plan shall be approved by the Utility owning agency.
- 1.6.2 The Contractor shall be responsible for design, diversion plan, getting approval, co-ordination and supervision of execution of works pertaining to relocation/shifting/removal of above and below ground utilities, through respective Utility agencies. The payment for these Items will be made under **Schedule 'C'**. The Contractor will be entitled for payment for co-ordination and supervision charges for the executed works as defined in the **Price Schedule**. Any delay in completion of these works shall not relieve the Contractor's obligation and it shall be at

- Contractor's own risk and cost.
- 1.6.3 Utility services that may require removal/diversion or protection while carrying out the scope of work under this Contract may include, but are not be limited to water supply, sewerage, storm water pipes, gas, electricity, telecommunication cables (including fibre optic), military and security, police utilities, medical utilities, sewage and storm water etc.
- 1.6.4 The diversion of overhead and underground electric transmission lines above 33kv shall be arranged by the Employer directly through the utility owning Agencies/ statutory authorities and shall be paid directly by the Employer.
- 1.6.5 Tree cutting, relocation, Afforestation and plantation shall be carried out as per **SCHEDULES -SITE OF THE PROJECT Annexure of Section VIII-Employer's Requirements – 2.** However, grass, lawn, herbs, shrubs, plants, and others which are not to be transplanted/removed by the owning agencies shall be removed by Contractor.
- 1.6.6 The Contractor shall ensure that any salvage materials are returned to the utility owning agencies.
- 1.6.7 The demolition, dismantling and disposal of building structures such details will be advised progressively during the progress of the Contract work and the cost towards the same shall be paid under Schedule-C.
- 1.6.8 The Contractor shall remain responsible for any works carried out by his Subcontractor, Vendors, Utility owning agencies within the right-of-way and/or the construction site boundaries.
- 1.6.9 Utility Diversions include but are not limited to the following scope of work:
- Verify the correctness of all drawings showing utilities provided by the Employer, Engineer and Statutory Authorities;
  - Relocation/diversion of utilities as deemed necessary, and agreed by the Engineer, to enable the execution of the Works;
  - Construction of temporary traffic diversions where the construction of the works for the utility diversion interrupts existing public or private roads or right of way;
  - Provision and submission to the Engineer/Employer and Statutory Authorities of AutoCAD drawings and diversion construction methodology showing details of the utility locations and depth before and after relocation, supported by photographs; and
  - Protection of utilities that are not to be diverted during the execution of the Works as per the Employer's Requirements.
- 1.6.10 In the process of either identifying, relocating or protecting the public utility services located within the right-of-way and/or the construction site the Contractor shall:
- Obtain all necessary approvals (NOC) if necessary, from the relevant authorities to carry out the investigations to identify the location of all existing public utilities within the right-of-way and/or the construction site boundaries;
  - Provide accurate records of existing public utilities identified to the Engineer, prior to commencement of the Works;
  - Provide accurate records of any additional public utilities encountered and take all necessary steps to prevent damage to and to safeguard such services;
  - Draft any utility diversion design plan in accordance with the applicable standards as approved by the relevant Statutory Authorities;
  - Cooperate with any other Stakeholders involved so as to avoid interference with other Project Partner Contractor operations e.g. an independently appointed Enabling Works Contractor;
  - Cooperate with the public utility authorities to safeguard and minimise the disruption of service;
  - Erect suitable barricades around all trenches dug during utility identification or diversion
  - Construct temporary traffic diversions where the construction of the works interrupts existing public or private roads or right of way but only after first obtaining approval from the relevant authorities;
  - Prepare shop drawings, approved by the relevant authorities and the Engineer, before commencing any diversion of utilities;

- j. Construct support and/or protection, as approved by the Utility Authority and Engineer, for those utilities that do not require diversion during construction;
- k. In the event of a service being interrupted as a result of damage caused by the Contractor or Subcontractor, promptly notify the authority concerned and inform the Engineer of the incident. The Contractor shall be responsible for all costs for damage repairs that are required to restore the services and any consequential damages;
- l. Ensure that adequate insurance cover is in place at all times, as approved by the Engineer, to cover all liabilities that may result as a consequence of accidental disruption of any utility service;
- m. Make substitute arrangements, as directed by the concerned Utility Authority, until such time that any damage caused to utility services by the Contractor or Subcontractor has been repaired at the Contractors own expense; and
- n. Submit a copy of all 'As-Built Drawings' to the relevant authorities and Engineer and obtain a completion certificate from the relevant service authority once of the awarded works related to removal, utility diversion, relocation and protection have been completed.

1.6.11 The Employer retains the right to select and appoint the party responsible for carrying out the Utility Diversions scope of work, either in its entirety or to allocate certain parts of the scope of work.

## 1.7 SALIENT FEATURES OF CONSTRUCTION AND OTHER INSTRUCTIONS

- 1) Preliminary works such as site clearance, barricading, trial trenching etc., wherever required, shall be taken up simultaneously along with mobilization activities.
- 2) Construction of pile foundations, pile caps including pier / abutment, bearing pedestals, bearings, shear keys, seismic restrainers, hold down devices etc. complete if required. Provision of Seismic restrainer is mandatory.
- 3) Purely steel structures will not be allowed for standard spans except for special spans.
- 4) If at any location, if permanent liners are required, they shall be provided and payment will be made under relevant items of work.
- 5) Stray current corrosion prevention measures (including extra rebars in various RCC / PSC structural members) for earthing shall be adopted wherever necessary.
- 6) The shape and appearance of piers shall be decided by Employer with the recommendations of Engineer from aesthetics and economy point of view. The maximum eccentricity of alignment center line from the center line of pier is given in the GAD for reference
- 7) Pre-cast piers can be constructed in the interest of rapid progress. The final decision will be by Engineer / Employer as per site requirement, site feasibility and considerations of safety.
- 8) The foundation and the starter of pier with variable height (as per rail level) is cast in situ concrete.
- 9) The pier segments for the portion above starter to be cast with match casting at casting yard by using suitable short line / long line methods with required shutters, supporting arrangements, lifting, curing, grinding and transportation to site for erection.
- 10) Cable ducts shall be placed in foundation, starter, pier segments and pier cap. Epoxy treatment shall be done at the joints before placing the column pier segments. After erecting the column pier segments, the pre-cast pier cap element is placed on top of column pier and the pre-stressing strands are inserted from the top of pier cap to foundation.
- 11) Rapid viaduct construction is essential for the project, due to strict requirements on work zone safety, traffic control during construction and working adjacent to Railway track with OHE lines.
- 12) All necessary safety precautions shall be taken at casting yard during transportation and erection adjacent to railway tracks. The contractor is solely responsible for any untoward incident due to unsafe practices. Suitable capacity cranes of adequate numbers required shall be mobilized. Suitable supporting system shall be provided for pre-stressing activity and its equipment. A suitable supporting system for stability of erected pier segments shall be provided at site as directed by Engineer, if required.
- 13) Doglegged staircases of adequate numbers shall be provided for accessibility and inspection. The price quoted shall be inclusive for the above work.

- 14) Deleted
- 15) Deleted
- 16) All spans should have similar GI brackets for cables, walkways, parapets and railing arrangements.  
Approval of Engineer / Employer will be required after checking of the same by the Engineer. Suitable sleeves for PVC pipes along with insert plate will be in the scope of viaduct contractor.
- 17) Solar panels are planned to be fixed on the parapets of viaducts and all fixtures required to mount the panels shall be fixed by the contractor at his own cost.
- 18) Filling of pile cap/Raft foundation/Open foundation etc area shall be done with good earth, GW/SW Good earth means gravel, moorum, (excluding clay and silt) & similar to the soil which is used for earth work in embankment. Further details are in the technical details of the tender document.
- 19) The portals shall be provided as per the site conditions.
- 20) The girders may be tapering in plan (wherever required as per drawings) shall be cast true to the profile by suitable formwork system.
- 21) The location of piers, abutments, and ramps shall be as per the GAD provided in the tender drawings. However, if minor changes are necessary due to site conditions, the Contractor may propose such changes. The decision of the Employer/Engineer on these proposed changes shall be final and binding.
- 22) Some of the major Utilities cannot be diverted. The contractor shall take into consideration the existence of these Utilities and propose the foundations of piers of BSTP with strengthening the utilities at these locations accordingly.
- 23) Before carrying out the work at site, necessary permissions from various local agencies like BWSSB / GAIL / BSNL / BESCO and Railway authorities / Road authorities such as SWR, NHAI, BBMP, PWD, Traffic Police etc., shall be required to be obtained by the contractor. The Employer will assist only by way of issue of necessary support letters.
- 24) The levels, measurements and other information concerning the existing site as shown on the drawings are believed to be correct and indicative, but the contractor shall verify them himself and also examine the nature of the ground as no claim or allowance whatsoever will be entertained on account of any error or omission in the levels or strata turning out different during execution from what is shown on the drawings. The contractor should validate the L- Section and horizontal / vertical by ensuring best fit alignment without any speed reductions in the design speed using applicable latest software.
- 25) The permanent traffic diversions shall be carried out in consultation with traffic police. Contractors shall provide traffic diversion proposals, traffic marshals, cones, traffic diversion boards etc., as desired by Traffic Police. The text for painting will be given by Engineer / Employer.
- 26) Maximum width of median including crash barrier shall be limited to 3m (if median is required).
- 27) The road works and allied works shall be carried out in co-ordination with BBMP as per MORTH specifications.  
On award of work, the contractor shall start the road work along and complete the same.
- 28) The applicable permits for felling of trees , translocation shall be arranged by the Employer. However, required assistance will be provided by the contractor. The tree cutting and disposal shall be arranged by the contractor and the scope is inclusive of the same. The cut trees will be the property of the respective owning agency
- 29) Deleted.
- 30) The contractor to fix alignment reference points at regular intervals all along the alignment. The contractor along with the Engineer should verify the details of these alignment pillars.
- 31) GFC drawing requirement shall be planned by the contractor based on his three-month rolling Programme and the GFC drawings shall be issued accordingly.
- 32) The contractor shall make the detailed traffic diversion plans in consultation with Bengaluru Traffic Police.
- 33) The work is to be executed with proper liaison with Bengaluru Traffic Police. Necessary assistance will be given by Employer. The contractor shall inspect the site and submit the traffic diversion plan to concerned traffic police authorities for approval.

- 34) The contractor shall liaise with the Utility Authorities for carrying out the work expeditiously, wherever required, so that works at particular locations are not delayed. In case the contractor comes across any uncharted utilities also he shall liaise with the agency concerned for necessary diversion; the cost of diversion shall be paid by Employer under Schedule-C, provisional sum, Contractors shall provide any temporary support for the utilities, if needed, but at no extra cost. If temporary diversion is necessary, it shall be taken up by the contractor in consultation with concerned utility owner, and necessary payment will be made for such diversion one time only under relevant items of BOQ.
- 35) The contractor shall provide temporary barricading during construction at site, work areas (i.e. store, site office, casting yard etc.) and locations where road vehicles / pedestrians are moving, along the Viaduct / Construction sites as directed by Engineer. In elevated section, the temporary barricade of 2m height along the alignment near to railway boundary / acquisition line, road footpath and in between IR and BSTP tracks are included in the scope of work. The work shall be executed as per the technical specifications. The contractor shall provide & maintain barricading as per the drawings.
- 36) Deleted
- 37) Any untoward incident due to any gaps in barricading will be the sole responsibility of the contractor. The barricade and its efficiency shall be monitored by dedicated staff of the contractor all the 24 hours till completion of the work.
- 38) Once barricade has been provided and work started, removal of barricade is not permitted till completion of pile, pile cap, pier and pier caps, portal beams, till completion of construction.  
While erecting the barricade, the bottom gap between barricade and road / ground should be plugged with cement concrete from inside.  
There should be minimum openings at the end of external barricade (the barricade which is not between existing railway track and proposed suburban railway track, but the one on the other side of the existing railway track) to allow access of trucks / lorries and machinery to the area of work  
Adequate blinking lights on barricade during night time must be ensured. The cost of this item should include provision for power pack / Generator set/solar etc. so as to ensure the blinking of lights in night time as long as barricades are in position at the work spot.  
After completion of the entire work, the barricades shall be removed by the contractor and transported away from the Right of Way.
- 39) In addition, the contractor shall be required to carry out various interface works as per interfacing requirements.
- 40) The necessary interfacing / liaison and arrangements with systems contractors shall be done by the contractor and Contractor's DDC and shall form part of the work. Inserts for Electrical, OHE, signaling etc., shall be provided as per drawing and the amount is included in scope.
- 41) The land for setting up casting yards, stacking yards, offices etc., as required, shall be arranged by the contractor at his own cost. No land for casting yards / stacking yards / site offices / laboratories / contractor's offices / camps etc., will be provided by the Employer. The Employer also does not guarantee any vacant Railway land for these purposes. However, assistance can be provided by the Employer by giving recommendation letters etc., to the concerned authorities and it is the responsibility of the contractor to find out and arrange lands etc. for the above.

In case the Railway land / Govt. land is arranged near the railway track for casting of Girders & for initial erection and launching activity temporarily, the necessary land rent / lease charges shall be levied as per Railway guidelines / Govt. norms / Bi-RIDE norms and the same will be deducted from RA bills of the contractor.

- 42) The contractor shall carry out as soon as possible, but not later than the deadlines specified,
- Setting up of fully fledged site laboratories, as per the requirements.
  - Setting up concrete batching & mixing plants.

- c. Setting up of Contractor's site offices.
  - d. Casting yards with complete facilities.
- 43) The contractor shall implement a Project Quality Management Plan in accordance with ISO-9001:2015 "Quality System - Model for Quality Assurance in Design / Development, Production, Installation and Servicing" or any other system as approved by Engineer to ensure that all materials, workmanship, plant and equipment supplied, and work done under the contract meets the requirements of the contract.
- 44) The contractor shall maintain Office accommodation, equipment, appliances, vehicles personnel etc. as per **Appendix 13 of Employer Requirement Annexure-1**.
- 45) Formation grade of Siding line, stabling lines, pocket tracks and cross overs as shown in the drawings and are in the scope of work.
- 46) GADs attached with this tender are for the tentative location of piers. However, they should be verified at site for feasibility. Contractor's Design team shall explore alternate proposals for Engineer / Employer approval if required as per site condition.
- 47) Providing concrete for all works deemed to be inclusive of the cost towards design mix production of concrete by batching plant, transit mixer, transportation of concrete with all leads and lifts, form work, shuttering including staging as required, pouring of concrete by pump/ tower crane to all heights / depths, tremie or other approved means, compaction by vibrators, curing by approved means such as water, steam or curing compound and all labour, tools, plants, machinery required for execution of work complete in all respects including de-shuttering after completion of work and rendering & finishing etc.
- 48) Shuttering required for concrete work shall be of steel except wherever there are site constraints as decided by the Engineer.
- 49) For Pier heights more than 12m, more than one each pour shall be considered above the starter for every 12 Metres height cast in situ piers, but a maximum of two pours is allowed to complete pier concreting. In case of more than one pour, Engineer's approval for "method statement" must be obtained.
- 50) It is also informed that the area available for launching of full span U girder/I-girder is limited in certain stretches in the Viaduct construction and there may be difficulties in keeping segments directly below the span within the base width of overhead launching assembly. The tenderer shall inspect and conduct a survey for studying the field constraints and quote their rate / amount accordingly to perform the contract.
- 51) Boring of 150 mm dia. (confirmatory borehole shall be done at every pier location of viaduct, or as decided by engineer), in all types of soil at Pier locations (locations to be decided by the Engineer) of viaduct up to 3m in hard rock or 30m boring whichever is earlier and collecting core samples in rock for determination of core recovery, RQD and carrying out compressive strength test on rock samples.
- 52) Diagonal Cross trenching works for identifying underground utility at every Pier location, and wherever required as directed by engineer etc., to the required length, width and 2.5 metres depth, which includes excavation in all types of soil, hard soil, rock, footpath, bitumen road, concrete road, medians etc. cutting of all types road surfaces and backfilling the same with available excavated earth.
- 53) Wherever night working is carried out by the contractor, temporary lighting arrangements as per approved layout shall be provided, installed, maintained for the duration of the contract.
- 54) The contractor shall at all-time carryout the work on either side of existing IR tracks / highway / road /service road in a manner creating least interference to the flow of traffic. The contractor shall take prior approval of the Engineer, Railways and traffic police regarding traffic arrangements and diversion of traffic during construction.
- 55) The contractor shall take suitable and sufficient measures as per SHE manual for working at night.
- 56) The viaduct and iconic bridges have unique design and therefore their actual performance in field is required to be monitored with respect to the design parameters. The settlement of foundation, deflection of super structure, deformations, loss of camber etc., to be monitored by the contractor and the cost is included in the Scope
- 57) The debris and waste materials of the median shall be cleared and disposed properly.

- 58) The scope of work shall include detailed survey of the alignment for the Viaduct soil investigation where ever, fixing an optimized span configuration avoiding shifting of utilities. The contractor is advised to carry out his own investigation and collect necessary site details while quoting his rates. The chainage / drawings of major utilities which may not be possible to be shifted shall be identified by the contractor in advance, and the contractor is advised to consider the same while planning / locating the foundation. Utilities may be verified by contractor physically at site. The contractor shall ensure that no foundation of pier is located throughout the length in such locations. If at all, the contractor is required to take up diversion of unchartered utilities, payment towards the same shall be made as per Schedule-C of Price Schedule.
- 59) Demolition / dismantling of RCC framed / steel structures /bridges, buildings, masonry buildings, station platforms, compound walls, drains, Toe walls & retaining walls including basement, ground and above floors as existing at site on the alignment of viaduct without making damages to the adjacent structures, Utilities, etc. including disposing off retrieved materials out of the site of work.
- 60) Contractor shall get necessary permission / NOC from the Railway, Road, Police and other concerned regulatory authorities for blocking services and working in such locations Bi-RIDE will provide assistance like issue of letter and coordination for meeting concerned officials.
- 61) Contractor shall study traffic pattern all along the Corridor & ensure optimized at the detailed design stage taking into consideration of traffic requirement and width of road.
- 62) Disposal of surplus materials including excavation spoils etc., to the dumping site approved by the Employer / Engineer.
- 63) True and proper setting out of the layout, benchmarks and provision of all necessary labour, instruments and appliances for survey as specified or as directed;
- 64) The cost of final carpeting of the roads or new road construction before handing over the roads to road owning agency is included in the scope.
- 65) Also, final restoration of footpaths as per modified specifications and drawings, as per requirements of the road owning agency, is also included in the scope.
- 66) Deployment of adequate traffic marshals and provision of traffic signboards, hand delineators, portable signals etc., and as accepted by Employer & the cost of the same will be made under relevant items of Price Schedule.
- 67) All aspects of quality assurance, including testing of materials and other components of the work, as specified, or as directed are in scope. Nothing extra payable on this account.
- 68) The contractor shall ensure cleanliness of the roads and footpaths by deploying manpower for the same. The contractor shall ensure proper brooming, cleaning and washing of roads and footpaths at regular intervals or as and when required or directed throughout the entire stretch till the currency of the contract including disposal of sewage. Regular interval implies that Roads and Foot-paths should be maintained in clean condition throughout. Nothing extra is payable on this account.
- 69) Results of sub-surface investigations conducted at the project site are enclosed with the tender document.
- 70) This information about the soil and sub-soil water conditions is being made to the contractor in good faith and the contractor shall obtain the details of investigation independently. No claim whatsoever on account of any discrepancy in the sub surface conditions that may be actually encountered at the time of execution work and those given in these tender documents shall be admissible to the contractor under any circumstances.
- 71) The contractor should find out the capacity of the quarries and accordingly plan procurement of coarse / fine aggregates either from the existing quarries or establish their own quarries and crushing arrangements.
- 72) It is the responsibility of the contractor to thoroughly examine the site of work and all constraints before submitting the bid.
- 73) Any services affected by the works must be temporarily supported by the contractor. The work of temporarily supporting and protecting the public utility, services during execution of the works shall be deemed to be part of the contract. Nothing extra shall be payable on this account.

- 74) The contractor shall take all precautions for safeguarding the environment during the course of the construction of the works. He shall abide by all laws, bye-laws, rules and regulations in force governing pollution and environmental protection that are applicable in the area where the works are situated. The contractor must take all necessary steps, especially to avoid dust nuisance during construction of the works.
- 75) Levels, measurements and other information concerning the existing site as shown on the drawings are believed to be correct and indicative, but contractors should verify them for themselves and also examine the nature of the ground as no claim or allowance whatsoever will be entertained on account of any error or omission in the levels or strata turning out different during execution from what is shown on the drawings. The contractor should validate the L- Section and horizontal alignment using applicable latest software.
- 76) Any incidental works required to be carried out in this regard shall be the responsibility of the contractor and the amounts are included in the scope of schedule. Nothing extra shall be payable on this account. In case any new items are required for such work, the same will be processed as per the need on mutual consent.
- 77) Preliminary works such as site clearance, barricading, trail trenching etc., wherever required, shall be taken up simultaneously along with mobilization activities.
- 78) The contractor shall at all-time carry out the work on either side of existing IR tracks I highway / road / service road in a manner creating least interference to the flow of traffic. The contractor shall take prior approval of the Engineer and traffic police regarding traffic arrangements and diversion of traffic during construction. Works to be performed shall also include all general works, including Road widening and allied works of any kind necessary for the due and satisfactory construction, completion and maintenance of the works to the intent and meaning of the drawings adopted and technical specifications, to best Engineering standards and orders that may be issued by the Engineer from time to time.
- 79) Road works and allied works shall be carried out as per BBMP as per MoRTH specifications.
- 80) If diversions of roads need any upgradation, as desired by the Employer I Engineer, the contractor shall carry out the works. Road widening and drainage work shall be completed before the commencement of viaduct section work at any particular location. Necessary payment will be made under relevant items of BOQ.
- 81) Restoration of Road and allied works shall be done immediately after completion of work up to road level or as per instructions of Employer / Engineer.
- 82) The tyres of the vehicles leaving site shall be cleaned with Jet Wash to avoid spillage of earth / mud on public roads. The contractor shall ensure cleanliness of public roads and footpaths, through which contractor's vehicles / personnel move, by deploying manpower for the same. The contractor shall ensure proper cleaning and washing of roads and footpaths on all the times throughout the entire stretch till the currency of the contract including disposal of sweep age. Nothing extra shall be payable on this account.
- 83) While planning for the work of transportation of Viaduct construction materials to the Viaduct site, the finished formation of earth work in banks and cuttings with or without blanket layer should not be used for plying of trucks or other vehicles used for transportation. This restriction has specially been imposed to save the top surface of the formed formation from forming pits and ruts, which later are likely to accumulate water and pose problems for maintenance.
- 84) The mechanical means required to meet the stipulations mentioned in the above sub-para shall be arranged by the contractor
- 85) Contractor shall be required to mobilize resources for taking up work at a number of locations simultaneously. Planning of resources may be done at least to meet these requirements.
- 86) Deleted.
- 87) Maintaining and keeping the Existing Railway banks, structures and adjacent roads clean in the area of work and where construction machineries ply is the responsibility of the contractor.
- 88) Sufficient measures to minimize water, air and noise pollution at / near the area of the work shall be undertaken by the contractor.
- 89) All aspects of quality assurance, including testing of materials and other components of the work, as specified

and as directed by the Engineer shall be ensured.

- 90) Clearing of site and handing over of all the Works, as specified or as directed by Employer shall be ensured.
- 91) Maintenance of the completed Work during the maintenance period as directed by Employer shall be ensured.
- 92) Submission of completion (i.e., 'As Built') drawings and other related documents as specified shall be ensured.
- 93) Contractor shall not display any name-board for the works without the written permission of the Employer.
- 94) No labor camp shall be allowed at work sites or any unauthorized place. The proposed sites for labour camps shall be approved by the Engineer / Employer.
- 95) All goods and materials to be incorporated in the works shall be new, unused, and of the most recent or current models, and they shall incorporate all recent improvements in design and materials, unless provided for otherwise in the contract.
- 96) If Employer wishes to engage third party consultants for quality control assessment, apart from the quality control and field tests by the Employer, the contractor shall co-operate with both Quality control authorities and the third party.
- 97) The above list is not exhaustive. Any other minor requirement inadvertently missed out in the above list, shall be complied with. The contractor shall execute the work as per the requirement of BSTP and as per the latest and best engineering practices. In case of any dispute, the decision of Employer is final in this regard and with regard to whether the requirement is minor or not.

## **V) GENERAL INFORMATION, INSTRUCTIONS AND MISCELLANEOUS ISSUES**

### **1. ITEMS PAYABLE UNDER LUMP SUM COMPONENT OF THE WORK IN SCHEDULE - C**

The items against the scope of the work include (but not limited to) the following:

- a) Shifting of Unchartered Utilities required, if any
- b) Permanent road diversions.
- c) Any other items not covered in the scope of the work of Price **Schedule 'A' & Schedule 'B'**.

### **2. DESIGN PHASES OF PERMANENT WORK**

The contractor shall execute the work in two phases:

- a) Design Phase
- b) Construction Phase

The Design Phase shall commence on the date of issue of Letter of Acceptance. There is no relation of Design Phase with the Notice to Proceed. This phase shall include the preparation and submission of:

- c) The Preliminary Design
- d) The Definitive Design; and
- e) The GFC Drawings.

The design for all temporary structures shall also be submitted during the stage of the Preliminary Design / Definitive Design, as directed by the Engineer.

The Design Phase will be complete upon the issue of a Notice in respect of the comprehensive and complete GFC Drawings submission for the whole of the Permanent Works.

The Design and Good for Construction (GFC) drawings shall be submitted by the Contractor. After due scrutiny by the Engineer and the Employer, the Engineer shall, with the approval of the Employer, issue the approved GFC drawings to the Contractor for execution of the works in accordance with the terms and conditions of the Contract Agreement.

**The drawings approved by KRIDE are enclosed with the tender documents and may be used**

**directly for the execution of the works. For drawings that have not been approved by KRIDE, the bidder shall prepare and submit the required designs and drawings (such as General Arrangement Drawings and structural designs) for approval by the Employer through the General Consultant (GC) prior to execution.**

### **3. REFERENCE DOCUMENTS**

The following Documents shall be referred in conjunction with each other (not necessarily in the same order) by the contractor for construction work as these are mutually complementary to each other:

- a) Good for Construction Drawings will be issued by the Engineer with the approval of Employer
- b) Employer's Requirements
- c) Instructions
- d) Technical Specifications and explanatory notes
- e) Contract Conditions
- f) Particular Conditions of Contract
- g) Price Schedule
- h) Indian and International Standards referenced in the bid document
- i) The schedules and any other documents forming part of the Contract
- j) Any other related section in the bid document

The contractor shall always promptly seek advice from the Employer/Engineer in the event of conflicts among above cited documents, before taking any action in respect of any item of work, where such a conflict has a potential to affect any aspect of the work. In case of conflict, the Employer's decision will be final and binding.

### **4. GENERAL PROJECT INFORMATION**

The project site is located in and around Bengaluru City. The tendered work is BSTP project for Package – 1 of Corridor-2 Suburban Rail Project between Benniganahalli to Shettyhalli. Elevated Viaduct structure is proposed parallel to the existing Railway track alignment on the left / right side and over existing electrified railway line and in the BBMP Road as per tentative alignment drawing.

### **5. AVAILABILITY OF LAND**

A major portion of the required land for the execution of works is available along the alignment. The remaining land will be acquired and handed over to the contractor progressively. The contractor shall take additional land on a lease / rent basis temporarily for installation of his facilities like batching plant / Casting Yard / Site Work Shops / Project offices / Site offices etc. The tenderers are advised to conduct a detailed study and cater for all such expenditure in the bid.

### **6. APPROACHES TO THE PROJECT SITE**

Land acquired for the project caters for construction and operation of the proposed line. The contractor shall plan for approach roads to various sites of work conducting detailed survey and should include the cost of inputs for any such approach roads in his bid for the work.

However, in case any existing road outside railway land needs to be utilized for transportation of materials to the site of work and in the process the road gets damaged or needs to be strengthened and the authority owning the said road submits demand to Employer to carry out some specific works in order to strengthen / repair the road, Engineer / Employer is authorized to get such works executed through this contract and the amounts are included in scope of this work.

### **7. INTER COMMUNICATION FACILITIES**

Telephone and fax services are available at Bengaluru. Should the contractor wish to use Radio communication on the site, the Employer will recommend to the appropriate authority the application for allocation of radio frequencies to the contractor.

### **8. SITE INFORMATION**

The project site is located in and around Bengaluru City. Bengaluru is well connected to other parts of the country by Road, Rail and Air. It has an International Airport. The location of the work and the general particulars are shown in the drawings enclosed with the bid documents.

#### **9. GENERAL CLIMATIC CONDITIONS**

Bengaluru is located in meridians of 12° N latitude and 77°3' E Longitude, spread over an area of 531 sqm km. located at an altitude of 900m, Bengaluru boasts of delightful weather around the year registering a maximum temperature of around 34° centigrade in summer and a minimum temperature of around 14° centigrade in winter. However, there have been instances of break of these maximum and minimum. Bengaluru receives both the Southwest and Northeast Monsoons, getting an annual average rainfall of 760 mm, generally during the months of May to September | October. Bengaluru falls in Seismic Zone II.

#### **10. OBTAINING CLEARANCES / CERTIFICATES FROM AUTHORITIES**

Contractor shall arrange well in advance, stage-wise (if required), submission of all the required documents and drawings for approval of other concerned authorities and arrange for their inspection and obtain approval / completion certificates with respect to the work, as required. All clearances from the Statutory Authorities is the responsibility of the contractor. The contractor shall obtain and deliver to the Employer and the Engineer, on completion of the works, the final Inspection Report and approval from the Authorities.

#### **11. RESTRICTIONS IN WORKING**

- i. The various items of construction work shall have to be carried out in / along narrow roads / streets of Bengaluru city besides / across / parallel to the existing railway lines where there are buildings adjacent to the road / track and where there may be heavy railway traffic.
- ii. There are restrictions for movement of trucks and heavy vehicles (ex: trailers) carrying construction materials, cleaning during the day hours on some roads.
- iii. There are some one-way roads where traffic can't move in both directions.
- iv. Generally, at least two lanes of traffic in both directions shall be kept while the works are on, including foundation works.
- v. The construction of structures shall be planned in such a manner that they do not obstruct or interfere with the existing roads, railways tracks and other Utilities. Since the entire alignment is parallel to the existing IR track / road, continuous movement of trains / heavy vehicles is expected. Wherever the works are near stations / approaches to the stations / at the middle / besides IR Track / road / across the railway tracks / roads, erection of pre-cast members shall be planned in such a way that the erection is done from one end with Back Feeding.
- vi. Unless the competent authorities permit to execute such works during daytime using cranes and restricting the movement of the vehicles / trains, they shall be ordinarily planned in such a way that they do not cause any hindrance to the movement of vehicles / trains and the same shall be planned to be carried out during night. While working in the night hours, the noise pollution shall be restricted to an acceptable level. Special care shall be taken to restrict the noise pollution further, to the minimum levels, in the vicinity of hospitals, educational institutions etc. The bidder should take all these facts into account while quoting rates and devise his methodology of working accordingly.
- vii. Where work is required to be carried out at locations adjacent to such Existing IR tracks, roads, Utilities, structures, monuments, religious structures, etc., suitable safety and protection arrangements shall be ensured. Nothing extra will be payable on these accounts. It shall also be ensured that no damage is caused to any such element and Engineer / Employer shall be indemnified against such damage at no extra cost.

#### **12. POWER & TRAFFIC BLOCK**

- (i) Track occupation may be granted at any time during day or night to suit convenience of traffic operations and will ordinarily be granted over a distance covered by one or two consecutive block sections. Work trains will normally be allowed to take advantage of block shadows. Normally the total duration of block on any section will be maximum of 1.5 to 2.5 hours at a stretch in a day or

2.5 to 5hrs in night depending upon nature of work. Block provided may be utilized for one or more work trains or track Lorries or ladder trolleys to suit convenience of work.

- (ii) Blocks will not ordinarily be given for laying the feeders except where crossing of track is involved, which shall be laid manually in general.
- (iii) Any traffic / power blocks, temporary speed restrictions and caution orders required in connection with execution of works by the contractor, shall be got sanctioned from the Railway authorities well in advance by the contractor through the Engineer. The Railways may sanction the same for specific sites within the overall recovery time available in the Railway timetable. The contractor shall schedule his Programme according to the convenience of the Railways. No claim from the contractor for any delay / inconvenience / loss on this account shall be entertained by the Employer / Engineer.
- (iv) In order to minimize blocking of the track for work / material trains, the contractor shall consider the working conditions on the section and assess the use of alternative method of construction on a part or whole of the work. He should submit a clear proposal along with financial implication if any to the purchaser for such special method of saving of blocks that could be obtained along with reduction / redundancy of the facilities being provided by the Railway / Bi-RIDE.
- (v) The protection required for block working i.e., flagmen, flags etc. shall be provided by the contractor. Competency for the above shall, however, be given by the Railway authority. Protection of track by banner flags etc. shall be done in accordance with General Rules of Indian Railway and Subsidiary Rules of the concerned zonal Railway where work is being carried out. The contractor shall provide a Safety helmet, Safety belt and Safety Shoes to their staff while working at site.
- (vi) In case of theft / breakdown, the contractor shall restore the traffic in the minimum possible time. Failure to do so shall attract suitable penalties.

### 13. PROVISIONAL ACCEPTANCE

- i) Immediately after completion of works / such part of works, the contractor shall certify and advise the Engineer in writing that the works are (i) complete (ii) ready for satisfactory commercial service and (iii) ready to be handed over. He will also place at the disposal of the Engineer the required staff for checking it and putting it into operation.
- ii) The test or tests as stipulated in approved Technical Specifications shall be carried out jointly by the Engineer and the contractor within a month after the receipt of the contractor's notification as stated in sub-Para above.
- iii) The provisions contained in the relevant CC clause shall be followed for taking over the installations.  
Use of Rejected / Sub Standard Items / Equipment.

In the event of such rejection as aforesaid, the Engineer shall, without prejudice to his other rights and remedies and in particular without prejudice to his rights under the clause just preceding, be entitled to the use of the rejected / substandard equipment / item for a time reasonably sufficient to enable him to obtain other replacement. During such period, if the rejected / substandard equipment / item is used commercially the contractor shall not be entitled to the payment on energization until such rejected equipment is rectified and / or replaced, but the Engineer shall not be entitled to claim any damages arising out of rejected / substandard equipment / item in respect of such period.

### 14. GUARANTEE

- (i) The contractor shall guarantee satisfactory working of the installations erected by him, for a period of 24 ( twenty four Months ) months from the date of completion of DLP or from the date of Provisional Acceptance by the Engineer, whichever is earlier. The guarantee for spares (if any) should be coincident with the guarantee for erected equipment. The provisions contained in the relevant clause shall be followed for rectification of defects.
- (ii) During the defect liability period the contractor shall keep available an experienced engineer and necessary equipment to attend to any defective installations / work resulting from defective erection and / or defects in the equipment supplied by the contractor. The contractor shall bear the cost of all modifications, additions or substitutions that may be considered necessary due to faulty materials, design

or workmanship for the satisfactory working of the equipment. The final decision shall rest with the Engineer / Employer.

- (iii) During the defect liability period the contractor shall be liable for the replacement at site of any parts which may be found defective in the equipment whether such equipment be of his own manufacture or those of his sub-contractor whether arising from faulty design, materials, workmanship or negligence in any manner on the part of the contractor provided always that such defective parts as are not repairable at site are promptly returned to the contractor if so required by him at his (Contractor's) own expenses. In case of type defects in Contractor's equipment and components detected during guarantee period, contractor shall replace all such items irrespective of the fact whether all such items have failed or not. The contractor shall bear the cost of repairs carried out on his behalf by the Engineer at site. In such a case, the contractor shall be informed about the works proposed to be carried out by the Engineer / Employer.
- (iv) If it becomes necessary for the contractor to replace or renew any defective portion of the equipment under the Para aforesaid then the provision of the said Para shall also apply to the portions of the equipment so replaced or renewed until the expiration of six months from the date of such replacement or renewal or until the end of the above-mentioned period whichever is later. Such an extension shall not apply in case of defects of a minor nature, the decision of the Engineer or his nominee being final in the matter. If any defect be not remedied within a reasonable time during the aforesaid period, the Engineer may proceed to do work at the contractor's risk and expense, but without prejudice to any other rights and remedies which the Engineer may have against the contractor in respect of such defects or faults.
- (v) The repaired or renewed parts shall be delivered and erected on site free of charge to the satisfaction of the Engineer / Employer.

#### **15. ACCOUNTABILITY AND DISPOSAL OF RELEASED MATERIALS**

- (i) The contractor shall liaison with the Engineer to finalize the procedure for taking over the whole or part of the section and for disposal of the released materials.
- (ii) All released materials shall be handed over to the authorized representative of the Engineer / Employer at the specified depot / location.
- (iii) The material released on account of modifications / alterations shall be accounted by the contractor in the presence of the Engineer and the Employer's Representative, except for the material permitted by the Engineer to be re-used.
- (iv) If any shortfall of released material is noticed at the time of completion of the work, the contractor shall be liable to pay for the shortfall as per the prevailing rates. Else, the same will be recovered from the final bill of the contractor as per the extant policy of Bi-RIDE.

#### **16. CODES AND SPECIFICATIONS**

The work shall be carried out as per Specifications. Wherever reference is made in the Contract to specific standards and codes to be met by the goods and materials to be furnished and work performed or tested the provisions of the latest current edition or revision of the relevant standards and codes in effect shall apply, unless otherwise expressly stated in the Contract. Where such standards and codes are national or relate to a particular country or region, other authoritative standards which ensure an equal or higher quality than the standards and codes specified will be accepted subject to the Engineer's prior review and written approval. Differences between the standards specified and the proposed alternative standards must be fully described in writing by the contractor and submitted to the Engineer at least 28 days prior to the date when the contractor desires the Engineer's approval. In the event the Engineer determines that such proposed deviations do not ensure equal or higher quality, the contractor shall comply with the standards specified in the documents.

- (a) The Standard Specifications of Railways / IS / IRC and the list of codes and manuals given in the annexure thereof shall be prime governing (IRPWM, IR Bride Manual, the relevant IR specifications, Specifications of works of concerned zonal Railway, SOD, DBR, IRS codal provisions / IRC codal provisions / IS codal provisions / MORTH / CPWD.

- (b) Where there is conflict between provisions in IRS & IS specifications, provisions in IRS specifications shall prevail.
- (c) Where there is no provision of specifications in IRS, provisions in IS specifications should be adopted. Where there are no provisions in IRS and IS Specifications, in IRC Specifications should be followed.
- (d) For items not covered in IRS / IS / IRC specifications, BS-5400 Part 1 to 10 / FIP / AASHTO / ASTM may also be considered.
- (e) The decision of Employer is final and binding in the interpretation of the clause of the codes of practice and specifications of this tender and no claim whatsoever shall be entertained on this account from the contractor.

## **17. SURVEY AND FIXING WORKING BENCH MARKS AND ALIGNMENT MARKERS**

The work of conducting survey and fixing bench marks and alignment markers before the start of any work on this tender is included in the works covered by the present Tender.

### **17.1 Bench Marks**

1. All along the length of the corridor, the contractor shall establish bench marks with reference to the permanent bench marks available with the Survey of India. The details of these bench marks along with their reduced levels shall be marked on the alignment drawings indicating the plan and 'L' section which forms a part of the tender. The contractor along with the Engineer shall verify the details in the first instance, soon after getting access to the site. If any mistakes are detected in these details of these bench marks, the same shall be indicated to the Engineer. The mistakes detected shall be corrected in consultation with the Engineer. These corrections should be got approved by the Engineer before starting of any other work.
2. The contractor shall then, in the presence of the Engineer, establish working bench marks at short intervals, adequately connecting them to the reference bench marks set up by the Employer in the Project length. The working bench mark levels should be got approved from the Engineer. An up-to-date record of all bench marks including approved corrections, if any, shall be maintained by the contractor and also by the Engineer.
3. All levels taken for making out the longitudinal section and cross section should be related only to these working bench marks.

### **17.2 Alignment**

1. The contractor shall fix alignment reference points on pillars, cast and erected as per the specifications, at regular intervals all along the alignment. The contractor along with the Engineer shall verify the details of these alignment pillars. If any mistakes are detected in these details, the same should be indicated to the Engineer before starting any work. These detected mistakes should be corrected by the contractor in consultation with the Engineer. These corrections should be got approved from the Engineer.
2. The contractor shall then, in the presence of the Engineer, establish working alignment reference markers at shorter intervals, adequately connecting them to the reference pillars set up by the Employer in the Project length. The location of these pillars and subsidiary alignment markers, if any, should be got approved from the Engineer. An up-to-date record of all alignment pillars, and corrections, if any done, shall be maintained by the contractor and also the Engineer.
3. The alignment should be related only to these working bench marks.
4. The Engineer, when necessary, will provide the contractor with the data necessary for setting out of the centerline. All dimensions and levels shown on the drawing or mentioned in the documents forming part of or issued under the contract shall be verified by the contractor on the site; he shall immediately inform the Engineer of any apparent errors or discrepancies noticed in such dimensions or levels. The noticed mistakes shall be corrected in consultation with the Engineer. These corrections shall have the approval of the Engineer.
5. The contractor will be entirely responsible for accurate setting out of the works and safeguarding all survey monuments, bench marks, alignment references etc. The work of setting out shall be deemed to

be a part of the general works preparatory to the execution of work and no separate payment shall be made for the same.

6. For the entire duration of the contract, the work of setting out shall be deemed to be a part of the general works preparatory to the execution of the work and no separate payment shall be made for the same.

### **17.3 Interfacing and Integrations of Works**

1. The contractor shall take full responsibility in terms of organizing, managing, coordinating and administrating the interfacing of all components of work including all issues related to and arising out of such tasks. The contractor shall interface with all concerned authorities and other contractors as required to complete the work satisfactorily within the stipulated period.
2. Under consideration and application of the above clause, the contractor shall have the obligation to liaise with the other contractors and Authorities to obtain all necessary technical information, all necessary information concerning organization of works, coordinating the works etc. which are necessary to assess, mitigate, take care of contractual obligations, risks, liabilities and whatsoever arising out of interfacing, engineering issues, organization of the works etc. The Employer / Engineer shall not be held liable in any way, throughout the preparation of the offer and / or execution of the works and / or maintenance period and / or defects liability period for any omissions, misunderstanding, negligence etc. arising out of interfacing, coordinating, organizing etc. of the works. The Employer will not entertain any claim arising out of misunderstanding, miscommunication, omission, withholding of necessary / required information or whatsoever between the concerned contractors / Authorities concerning interfacing, organizing etc. of works. In case of any claim arising from any of the contractors, as aforesaid, referring to interfacing and / or interfacing related issues, the Employer will hold the concerned contractors liable for not taking care of their contractual obligation concerning interfacing, organizing, co- ordination etc. of the related works.
3. Needless to say, that commissioning of this project requires close coordination among various agencies executing the works in this section, the Engineer, the Employer and the Railway authorities, wherever applicable. The contractor shall therefore plan all his works requiring interfacing with other agencies, meticulously, in consultation and coordination with all concerned parties, in advance, for expeditious execution, without causing any delay either to his works or those of others.
4. If, in the opinion of Employer / Engineer, any delay in execution of any part of the Project requiring interfacing is attributable to the failures of the contractor to take adequate steps for smooth execution of such works, then the Employer will have the right to take necessary steps to organize and streamline such works, including excluding the requisite portion of work from the scope of the contractor and getting the same executed by other agencies, at the risk and cost of the contractor.

### **17.4 SURVEY EQUIPMENT**

1. The contractor shall provide the survey equipment and other accessories as per the instructions of the Engineer as and when required. He should also provide all necessary help as required by the Employer /Engineer for inspecting and checking the works, whenever required.
2. All power requirements for execution of works shall be arranged by the contractor from his own resources. Subject to availability of power, the Employer / Engineer may recommend to the Railway Authorities for providing power connection. No guarantee whatsoever is given by the Employer in this regard. The contractor shall bear the cost of installation and payment of necessary charges for providing such power connections as per the Terms and Conditions of the Railways. However, in the event of non-availability of Power from Railways, the contractor shall make necessary arrangements to tie up with the local Electricity Authorities etc. for supply of Power, till all the works are over.

### **18. DAMAGE TO PROPERTY**

The contractor shall organize all his activities so as not to cause any damage to the property of Railway or that of other agencies or any third party. In spite of taking all precautions, in the unfortunate event of any damage to any property, there could be claims by the affected parties. The contractor shall not only indemnify the Employer / Engineer against the claims made by the affected parties but also settle the

matters with the affected parties as per the law. If the nature of damage is one of that affecting the train movements or causing a safety hazard to the public, then the situation will be treated as an emergency and the Employer reserves the right to take all necessary steps as deemed necessary to restore train operations or to remove the hazardous situation or to mitigate the damage, at the risk and cost of the contractor.

## **19. STRUCTURAL ELEMENTS, SHAPE AND FORM**

The bidder shall note different structural elements in shape, form and structural configuration in plain. The structural elements may be skew, tapered, curved etc. The bidder shall include these factors while quoting his rates. All the above shall be covered in the quoted rates and nothing extra shall be payable towards this.

### **19.1 Stability of the elements**

During construction, the stability of each element must be ensured until the connections through which the stability is achieved are fully operative. This might require temporary supporting, bracing etc. This is the contractor's responsibility, and no extra payment will be made.

### **19.2 Stability of the Structure**

The overall stability of the structure must be ensured during each phase of construction. This might require special provisions. This is also the contractor's responsibility, and no extra payment will be made.

### **19.3 Temporary Works**

Traffic barricade with reflective tapes and other necessary traffic signages should be provided wherever required so that safety is ensured during day and night continuously. Temporary traffic diversion for smooth flow of traffic during construction including necessary traffic signs, repairs to the diverted route I service lanes, if required, restoration of diverted route to original condition etc. shall be done by contractor at his cost.

The contractor shall also provide any temporary support for the utilities (charted or uncharted), wherever required, at no extra cost to Employer.

### **19.4 Design for Temporary Works**

The Design should cover all the items pertaining to all temporary works, traffic diversion scheme, form work, casting and stacking yard, staging, launching scheme for girders / beams and / or transportation scheme for various structural elements and materials to be transported to and from site during construction period.

Contractor shall formulate a practical and viable scheme for design / fabrication of shuttering, scaffolding / staging, casting, curing, testing and launching / erection of girders / beams / and all other structures. The contractor should, along with the bid, specify the scheme that he proposes to adopt for carrying out all the works including fabrication, transportation, stacking and erection of steel structure and casting, curing, stressing, testing and launching I erection of girders I beams.

Contractor shall formulate the erection scheme, design the staging, including all necessary temporary structures, prepare fabrication drawings in accordance with relevant provision of applicable IRC standards and submit the same to the Engineer for approval with third party certificates. These works will be executed only after the approval has been obtained from the Engineer.

## **20. DRAWINGS**

1. The Drawings furnished with the Bid documents are indicative and approximate and may require changes at the time of actual execution of works based on actual site conditions. Drawings furnished with the Bid Documents show the level of work based on available soil investigation data. These may change at the time of actual execution of works based on actual site conditions without additional cost.
2. Tender drawings represent Employer's proposal based on preliminary design and conceptual plans, which are indicative.

### **20.1 GFC Drawings:**

The Design and drawings are the responsibility of contractor. GFC drawing requirement shall be planned by the

contractor based on his three-month rolling Programme and the GFC drawings shall be submitted accordingly. Errors, Omissions and Discrepancies in Specifications and Drawings:

- a. It shall be the responsibility of the contractor to promptly bring to the notice of Engineer any error, omission, fault, defects or discrepancy in the contract documents, specifications and drawings for the work which are discovered while reviewing the contract documents or in the process of execution of the works and obtain his orders thereon.
- b. Only stated dimensions shall be taken and not those obtained from scaling the drawings.
- c. In case of errors, omissions, faults, defects and / or disagreement on the drawings or between the drawings and specifications the following principles shall be followed.
  - i. As between the written description or written dimensions on the drawing and the corresponding one in the specifications, the former shall apply.
  - ii. As between the written description of the item in the Bill of Quantities and the detailed description in the specification of the same item, the former shall prevail.
  - iii. The drawings on a large scale shall take precedence over those on a smaller scale; and iv. Drawings approved as construction drawings from time to time shall supersede corresponding drawings previously approved. The decision of employer will be final on this matter.

## **20.2 Meaning and intent of specifications and Drawings.**

If any ambiguity arises as to the meaning and intent of any portion of the specifications and drawing or as to execution or quality of any work or material, or as to the measurement of the works, the decision of the Engineer thereon shall be final subject to the appeal (within 7 days of such decision being intimated to the contractor) to Employer, who shall have the power to correct any errors, omissions, or discrepancies in the specifications, drawings, classifications of works or materials and whose decision in the matter in dispute or doubt shall be final and conclusive.

## **20.3 Responsibility for Specifications, Design and Drawings Specifications**

RDSO / MORTH / CPWD, KPWD specification / other Specifications / Codes viz. IS, IRS, IRC, DSR etc. shall be procured by the contractor from the market. One set of these specifications shall always be kept at contractor's site office for reference.

Standards guaranteeing a level of quality or performance equivalent or superior to those indicated will also be accepted. Reference to trademarks or other specific designations that are necessary to explain the nature of the products required does not necessarily mean that the same specific product / brand has to be used, but it means that any other product of equal or superior quality or performance is also acceptable, subject to prior approval of the Employer / Engineer to be obtained in writing for adopting the new standards which are not provided in the contract

## **20.4 Drawings for Permanent Works**

- i. Preliminary Drawings as listed showing general dimensions & details elaborating the scope of work (not based on detailed design) are supplied along with the bid documents. These drawings are broadly indicative of the work to be carried out. These drawings are not "Construction Drawings" and details indicated therein are for general guidance only and shall be modified by the contractor, to incorporate additional details as per design, and as described in the Specifications.
- ii. The Permanent Work shall be carried out in accordance with the "Good for Construction" (GFC) drawings as would be issued to the contractor by the Engineer duly signed and stamped. The contractor shall not take cognizance of any drawings, designs, specifications, etc. not bearing the Engineer's signature and stamp. Similarly, the contractor shall not take cognizance of instructions given by any other Authority except the instructions given by the tender calling authority / competent authority or the nominated official of the Employer / the nominated official of Engineer, in writing. Construction drawings shall be supplied progressively by the contractor during execution of work, well in time (giving sufficient margin of time, as decided by the Employer / Engineer, for their scrutiny and issue), for each activity.
- iii. GFC drawings / Advance copies required for the next three months' work shall ordinarily be submitted by the

contractor to Employer / Engineer for his planning, procuring etc.

- iv. The "Good for Construction" drawings shall be prepared by the contractor after the award of the work.
- v. No deviation shall be made from GFC drawings by the contractor without written permission of employer/engineer. For such portion of deviations which are approved by Employer/Engineer, as built drawings shall be submitted by contractor for approval as soon as the work is completed at site.

#### **20.5. Design, Drawings and Specifications for Temporary or Ancillary works.**

- i. Contractor's proposal for erection of all Ancillary and Temporary works shall be in conformity with the proposals submitted along with the bid and / or as approved by Employer / Engineer.
- ii. The contractor would design all the Ancillary and Temporary works including temporary supports, false work, formwork, staging scheme etc. and will submit the same and related working drawings to the Engineer for approval, after getting check by an independent third-party designer. Bar Cutting and bending schedule for the reinforcement including bend corrections, shop drawings for fabrication work etc. shall also be prepared by the contractor and submitted for Engineer's approval.
- iii. Shop drawings
  - (a) Based on "Good for Construction" drawings issued by the contractor, the contractor shall prepare shop / fabrication drawings to scale as specified, indicating the required details. The shop drawings shall be prepared before execution of work, after taking actual site dimensions and all existing and proposed services / structures etc.
  - (b) Shop / Fabrication drawings submitted by the contractor shall be in sufficient detail to indicate the type, size, arrangement, breakdown for packing and shipment, the external connections, fixing arrangements required, the dimensions required for installation and interconnections with other equipment and materials, clearances and spaces required between various portions and any other information specifically called for.
  - (c) All reference points shall be in relation to the levels and locations, given in the Architectural and Services drawings duly cross-checked on site and confirmed. All locations and levels should be indicated with respect to grid and reduced levels with respect to the Bench Mark adopted for the Project and indicated in the drawings issued by the Engineer.
  - (d) The contractor shall verify the dimensions of all the necessary structural, architectural, Mechanical, Electrical & Plumbing (MEP) Services and other elements, relevant to the system being done, before proceeding with the preparation of the shop drawings and proceeding with the physical work at site and make suitable adjustments to accommodate within the spaces available.
- iv. Approval of Engineer of any such proposal / drawings or delay in approval shall not relieve the contractor of his responsibility of sufficiency of such works.

#### **20.6 Drawing Management**

1. The contractor shall submit all such drawings for Temporary / Ancillary works and shop drawings to the Engineer well in advance before he desires to commence the works and get the same approved from the Engineer. These drawings should be submitted only after they have been duly detailed, checked and verified within the contractor's organization ensuring that the details and data shown / furnished on the drawings are correct and that the requirements of other disciplines have been taken care of. The names and complete signatures of the contractor's personnel responsible for the drawings shall be contained on each drawing. Any drawing which does not contain the above names and signatures shall be summarily returned to the contractor and treated as not having been submitted.
2. The drawings submitted for approval shall be in any one of the standard sizes - AO, A1, A2, A3 or A4, in accordance with Indian standards and as specified.
3. All drawings shall show the following particulars in the lower right-hand corner in addition to the contractor's name.

- i. Project Title
  - ii. Name of the Employer
  - iii. Name of Consultant
  - iv. Contract No.
  - v. Title of Drawing
  - vi. Scale
  - vii. Date of Drawing
  - viii. Contractor's Drawing Number
  - ix. Space for the Engineer's drawing number
  - x. Name of the Engineer
  - xi. Name of Review Consultant
  - xii. This drawing is based on Drawing No.(s.)
  - xiii. Further detail is given on Drawing No.(s.)
4. Each drawing shall carry a revision number, date of revision and brief details of revisions carried out. Whenever any revision is carried out, the revision number must be updated. The revisions carried out on the drawing shall be clearly marked by clouding and each cloud revision shall be numbered by marking the revision number in triangle.
5. All dimensions on drawings shall be in metric units, unless otherwise specified. However, all levels shall be in metres.
6. A template with the above information shall be got approved from Engineer / Employer before start of the work.
7. All shop drawings shall be prepared on CAD using AUTO-CAD Version 2010 or higher.

**20.7 Shop drawings shall be prepared for the following works:**

- a. Reinforcing bar bending schedules
- b. Working drawings for placing of reinforcement
- iii. All form works, Shuttering and Scaffoldings
- c. Shop / Fabrication drawings for structural steel for PEB
- d. Metal work (ferrous and non-ferrous) for inserts, structural work in built up sections etc.
- vi. Seismic joints
- e. Expansion joints
- f. Construction joints
- g. Waterproofing

**20.8 Drawing Management at Site**

- (i) The contractors shall ensure that all drawings (to be laminated at contractors' cost) meant for further engineering, fabrication, erection and field work are issued to their personnel in a controlled manner. A proper record shall be maintained to show to whom the drawing is issued and to ensure that the latest revision of the drawing is being followed for further work.
- (ii) All superseded drawings shall be promptly withdrawn from the personnel to whom they are issued and stamped "SUPERSEDED" in RED. The contractor shall maintain a register of drawings, with their revision / issue number, as received from the Engineer and a record of their distribution to the designated personnel within their organization. A certificate to that effect along with list of drawings withdrawn during the month shall be incorporated in the monthly progress report.
- (iii) In case of revision of Approved Drawings for Temporary / Ancillary and Shop Drawings, if any, at any time before the completion of the work, the contractor shall make such revisions and proceed in the same manner and observe procedure for obtaining approval of the Engineer as for the approval of the original drawings.
- (iv) The contractor shall maintain at Site a set of the drawings issued by the Engineer on which changes shall be progressively marked and signed by the Engineer so that "As-Built" drawings can be made correctly and expeditiously at the end of the work.

**20.9 Documents by Contractor**

- i. The contractor shall submit to the Engineer, for approval, Quality Assurance plans, design calculations, material specifications for each item and system, samples, as may be called for in the Specifications or as the Engineer may reasonably require. Wherever necessary, the contractor shall provide as built

dimensions to facilitate proper Good for Construction drawings being prepared for various construction detailing.

- ii. Number of Copies of Drawings for Temporary / Ancillary works / Shop drawings and Documents
- iii. All Shop drawings I drawings for Temporary and Ancillary works, Documents, Schedules etc. and revisions thereof shall be submitted by the contractor to the Engineer in 6 copies. Copies required in excess of these shall also be borne by the contractor at his own cost.

#### **20.10 Completion Drawings**

On completion of the work in all respects the contractor shall submit the following

- i. Six sets of "As Built Drawings" in the standard sizes of A0, A1 each containing complete set of drawings for every component of work on approved scale indicating the work "As Built". Each set shall also contain technical literature.
- ii. These drawings shall be prepared on CAD using Auto-Cad version (latest, as directed by Engineer) and shall be recorded on writable memory devices and one set of these devices shall also be submitted.
- iii. Four sets of catalogues of all manufactured materials with the name and addresses of the manufacturers for all equipment provided by the contractor.
- iv. The contractor shall also submit one set of original "As Built" drawings on polyester film or as directed by the Engineer.

The Certificate of Completion of Works as per the provisions in the General Conditions of Contract will not be issued by the Employer I Engineer in the event of Contractor's failure to furnish aforesaid "As Built" drawings for the entire works.

#### **20.11 Plans and Drawings for Layout of Plant and Equipment**

The contractor shall submit the following information, in triplicate, to the Engineer, for approval, within the time stipulated against each item given below:

- i. A general layout plan for construction plant and equipment required for execution of work, within thirty days from the date of issue of "Letter of Acceptance".
- ii. Drawings or prints showing the locations of major facilities which he proposes to put up at site, at least fourteen days prior to the commencement of the respective work; and
- iii. Any other details and drawings as required under the contract, within the time as specified in the contract.

The cost of all the above activities shall be deemed to be included in the quoted rates of various items of the Price schedule and nothing extra shall be paid for on this account.

### **21. TRAFFIC MANAGEMENT**

- i. The contractor shall make the detailed traffic diversion plans in consultation with Bengaluru Traffic Police. The work is to be executed with proper liaison with Bengaluru Traffic Police. Necessary assistance in the form of issuing letters to the authorities concerned will be given by Bi-RIDE. The scheme should be such that a minimum of two lanes of traffic on each direction of the road should be available for the smooth flow of traffic. The contractor should inspect the site and observe the traffic flow and pattern before making the diversion plans.
- ii. The permanent traffic diversions will be carried out in consultation with traffic police. Contractors shall provide traffic diversion proposals, traffic marshals, cones, traffic diversion boards etc., as desired by Traffic Police.
- iii. Traffic barricade shall be with reflective tapes, traffic signages, traffic sign board, signals, road delineator reflective lights, traffic cones etc. Deployment of adequate manpower shall be for all 24 hrs in 8hrs shifts. Day and night management of the above, including all other necessary provisions, wherever required, shall be taken care of so that safety is ensured during day and night continuously. Temporary traffic diversion for smooth flow of traffic during construction including necessary traffic signs, repairs to the diverted routes I service lanes.

- iv. It includes but not limited to Diversion to other adjoining parallel roads or other suitable roads including strengthening of the same and all provision and maintaining the flow of traffic towards the diverted route with minimal inconvenience to the flow of affected traffic and close liaison with Traffic Department of Bengaluru.
- v. The contractor shall take necessary and adequate measures to ensure uninterrupted traffic flow within the work area during the currency of the work. It shall be the responsibility of the contractor to provide suitable and acceptable diversions for the passage of the traffic. The contractor shall ensure that at no time, his construction equipment interrupts the movement of the traffic on the road and IR Track.
- vi. The contractor shall prepare a comprehensive Traffic Management Plan. The contractor shall also draw a phased program for traffic arrangements / diversions and get it approved from the Employer / Engineer and Traffic Police well in advance with respect to every stage of construction.
- vii. If traffic diversions require construction of temporary roads and / or improvement of the existing roads, the design / drawings for the same including diversion of utilities etc. (if required) shall be prepared by the contractor using the specifications not inferior to that of the existing roads / utilities and get it approved from the Engineer / Employer and Traffic Police.
- viii. Before taking up the work in a particular stretch, all the traffic diversion plans applicable to that particular area shall be implemented as per the approved plans / drawings and trial runs carried out to the entire satisfaction of Engineer / Traffic Police. If, during trial runs, some modifications are suggested, the same shall be also being carried out before start of work.
- ix. The contractor shall take all necessary measures for safety of traffic during construction and provide, erect and maintain such barricades (as approved by Engineer) having marking with reflective paint, signs / sign boards, pavement markings, flags, lights, traffic marshals and flagmen as may be required and / or directed by the Engineer for guiding, information and protection of the traffic approaching or passing through the stretch. Red lanterns or flashing warning lights of suitable type spaced suitable intervals mounted on barricades along the diversions shall be provided and kept operational and maintained throughout from sunset to sunrise.
- x. There could be locations where below the station structures, there is running traffic underneath which may not be stopped / diverted and will continue to move uninterrupted during construction and post - construction periods. In the case of the pre-cast elements there could be locations where ground just below the launching area is not accessible or restricted due to traffic movement. The contractor should take care of these factors in to account while deciding the construction methodology / launching scheme for cast-in-situ / precast construction. Nothing extra will be paid for such eventualities.

## 22. LIGHTING AND FIRE PREVENTION

- i. Wherever night working is carried out by Contractor, temporary lighting arrangements of required lumen as per approved layout shall be provided, installed, maintained for the duration of the contract and removed after completion of work by and at the expense of the contractor.
- ii. Flashing lights to warn the traffic on roads shall be used at all times on all obstructions.
- iii. Contractor shall provide and maintain adequate firefighting equipment and take adequate fire precautions for the safety of all personnel, plant, and material including temporary and permanent works and shall take action to prevent damage to or destruction by fire of trees, shrubs and grasses.
- iv. No extra payment will be made for the provision of temporary lighting, flashing lights and fire prevention measures and the entire cost of all such work shall be deemed to have been included in the Scope of Price schedule.

## 23. UTILITIES

- i. Necessary permanent diversion of utility services (Chartered utilities) shall be undertaken by contractor. The contractors shall liaise with the Utility Authorities for carrying out the work expeditiously wherever required so that works at particular locations are not delayed. In case they come across any utilities (Uncharted utilities) also they shall have to liaise with the agency concerned for the necessary diversion; the cost of diversion shall be paid by Employer under the relevant item of **Schedule-C** of Price schedule. The contractor shall provide any temporary support for the utilities if called for, but at no extra cost. Temporary diversion of utility if necessary at site, the same shall be done by the contractor up to the satisfaction of the concerned utility

owner and payment will be made under relevant items of work. Such temporary diversion is permitted only once for the particular utility.

- ii. All uncharted underground shall be shifted by the contractor, irrespective of whether it is temporary or permanent diversion. However, during execution of work, if any uncharted utilities are met, the contractor shall temporarily support or temporarily divert the same at his own cost. In case, this is not possible as decided by Engineer, then the same will be permanently diverted by the contractor and the payment will be made under respective item in the relevant payment schedule of Works under **KPWD / IR-USSOR / CPWD / BWSSB / BESCO-SR 2023-24 or latest (Schedule-C.)**.
- iii. For the existing utilities owned by Railways, where the shifting thereof can take place only after certain works for its shifting have been completed by the contractor, the concerned contractor shall, undertake and complete the works required for its shifting first. The concerned contractor in this case may be the contractor executing the present work or another contractor, as directed by the Employer.
- iv. The tender utilities drawings are only indicative. Contractor should make his own survey for identification of underground & above ground utilities;
- v. New utilities: In the event the construction of any work is affected by a new utility, the contractor shall be entitled to a reasonable Time Extension in accordance with the provisions of contract. The decision of Employer is final in this regard.

### 23.1 Damage to Utilities

The contractor shall be responsible for any theft, damage and / or protection of all the existing utilities within the site of work during currency of the Contract. In case of any theft / damage occurring to these utilities while working or otherwise, the contractor shall immediately inform both the Employer's representative and the Engineer's representative as well the utility owning agency and restore the same immediately to the entire satisfaction of the utility owning agency. Any damage due to working / negligence / fault of the contractor (the decision of Employer in this regard shall be final and binding), the same shall be repaired / made good by the contractor at his own cost. Any damage / compensation / penalty etc. if charged by the utility owning agency in this regard shall also be payable by the contractor and no claim in this regard will be entertained by the Employer. Any legal action to be faced in this regard shall also be the responsibility of the contractor. The contractor shall always keep indemnifying the Engineer / Employer against all these issues.

## 24. INTERFACE WORKS

In addition, the contractor shall be required to carry out various interface works as per interfacing requirements. An Approved interfacing Manual will be supplied to the contractor, which needs to be followed by the contractor for all interfacing works.

The Scope of interface works for various interfacing Contracts e.g., Architectural finishes, MEP, Signaling & Telecommunication, Automatic Fare Collection, lifts, escalator, Traction Power & Power Supply, platform screen doors, Track work, Rolling Stock, Noise barrier etc., shall be but not limited to as described below:

- a. Architectural finishes
- b. MEP works.
- c. Fixing arrangements for OHE for traction, Signaling post, Telecommunication structures, AFC, PSD, SCADA, Lifts, and Escalators etc.
- d. ASS and TSS Room size and layout, openings in slab and viaduct beams, foundations and cable trays / ducts / hangers.
- e. Traction Power earthing arrangements- Grid earthing.
- f. Layout of AFC Equipment in concourse, Raceways and cable trays / power sockets required for AFC Equipment.
- g. Rolling Stock- structure gauge / schedule of dimensions etc. yellow line marking on platform. . Location and sizes of platform supervisory panels.
- h. Location of rear-view mirror Train operation group,
- i. Location Layout, sizes, Shafts, walls, power supply for lifts and escalators
- j. Construction of Utility Rooms
- k. Cable ducts / cables / hangers / trays / raceways for routing all type of cables, cross- track cast in

cable ducts, space cut-outs to the ceiling / wall finishes for mounting clocks, telephones, public address system equipment etc.

- l. Foundations for UPS unit, DG set and other equipment as required.
- m. Foundations for antenna mounting tower structure.
- n. Space and mounting arrangement for work stations / control panels and other equipment.
- o. Earthling and lighting protection.

## **25. RESPONSIBILITIES OF CONTRACTOR**

### **25.1 Casting Yard**

The land for setting up of casting yard and stacking yard as required shall be arranged by the contractor at his own cost. However, assistance can be provided by Employer by giving recommendatory letters etc., to the concerned authorities, without any guarantee for providing the land. The casting yard shall have following minimum facilities.

1. Casting beds as required.
2. Sets of form work / moulds, as required.
3. All handling facilities for precast elements like over gantry, etc.
4. Curing arrangements as required.
5. Stacking arrangements for material and precast elements.
6. Storing arrangement of materials.
7. Proper drainage and all-weather approach roads.
8. All facilities for inspections
9. In addition to above shutters, form works and equipments available with Bi-RIDE will be issued to contractor on payment basis and the same shall be made use of by the contractor by making suitable modifications in the design.
  - i. The contractor shall provide and maintain the project site office throughout the period of works the following at his own cost and without extra charge, except for the items specified in the Price schedule and the cost being held to be included in the Contract Scope and price.
  - ii. General works such as setting out, site clearance on completion of works. All weather approach roads to the site office should also be constructed and maintained in good condition.
  - iii. All labor, materials, plant, equipment and temporary works, overhead charges as well as general liabilities, obligations, insurance and risks arising out of GCC, required completing and maintaining the works to the satisfaction of the Engineer.
  - iv. Adequate lighting for night works, and also at other times whenever and wherever required by the Engineer.
  - v. All equipment, instruments, labor and materials required by the Engineer for checking alignment, levels, slopes and evenness of surfaces measurements and quality etc. shall be arranged by the contractor.
  - vi. Design mixes and testing them as per relevant clauses of specifications giving proportion of ingredients, sources of aggregates and binder along with accompanying trial mixes. Test results shall be submitted to the Engineer for his approval before adoption on works.
  - vii. Method Statements, for each main activity of the work (temporary and permanent) to be executed detailing the purpose, scope, resources required, sequence / procedure of execution, persons responsible, time frame, safety requirements & measures, risk analysis, Inspections, and Test Procedures along with standard values / acceptable criteria etc. duly approved by the Employer / Engineer before start of that particular activity at site.
  - viii. Contractor shall also prepare / approve and make available to the Employer and the Engineer the work procedure for each sub-activity to be done at the site, detailing the procedure / process to be followed including work sequence, safety measures, to be followed, level of quality to be maintained, type of material to be used, type of finishing required, and responsibility assigned etc.

- ix. Preparation and compliance with provision of a quality assurance control programme.
- x. Prepare and submit the price breakup schedule based on the Quantities to be executed based on the approved drawings for the purpose of billing.
- xi. Safe setting up and functioning of gantry cranes and any other cranes used for lifting activities will be the responsibility of the contractor.
- xii. Safety measures and requirements of site safety plan

The contractor shall make adequate security arrangements for 24x7 protection of Temporary and permanent works and deployed resources.

- i. The Contractor shall be responsible for the security of the Site for the full time the Site is in its possession, except for the specific case after handover to the Employer. The contractor shall set up and operate a system whereby only those persons entitled to be on the Site can enter the Site. To this end, the contractor shall with the consent of Employer provide the specific points only at which entry through the security fence can be affected and shall provide gates and barriers at such points of entry and whereby maintain a twenty-four (24) hours security guard, and such other security personnel and patrols elsewhere as may be necessary to maintain security.
- ii. The contractor shall maintain all site boundary fences in good condition and shall so arrange site boundary fences at all access drainage points of work areas that its use of such access points etc., are not restricted by the system or method of achieving the required security measures. Notices shall be displayed at intervals around the Site to warn the public of the dangers of entering the Site.
- iii. During the progress of the Works the contractor shall maintain such additional security patrols over the areas of the Works as may be necessary to protect its own and its sub-contractor's work and equipment and shall co-ordinate and plan the security of both the work under this Contract and the work of others having access to and across the Site and the Works.
- iv. In order to operate such a security system, it will be necessary to institute the issue of unique passes to personnel and vehicles entitled to be on the Site, and which may need to be separately identifiable according to the shifts being worked on Site. The contractor shall at the outset determine, together with the Employer I Engineer, a system, and the design of passes to suit the requirements of the foregoing and to suit the methods of work to be adopted by the contractor. The contractor shall at all times ensure that the Employer and the Engineer has an up-to-date list of all persons entitled to be on the Site at any time. The contractor shall also introduce a system of issue passes to any outsider or person I vehicles belonging to agencies other than Employer I Engineers who may have to visit the site in connection with the work.
- v. The contractor shall liaise with the Designated Contractors and the contractors responsible for the adjacent and other interfacing contracts and ensure that coordinated security procedures are operated, in particular in respect of vehicles permitted to pass through the Site and I or the adjacent sites in the latter periods of the Contract.
- vi. Security and checking arrangements as felt necessary shall be provided with advice and help of Police.
- vii. Safe guarding the environment.

**25.2 The contractor shall carry out expeditiously and without delay the following works.**

- a. Identify and get approved of the sources of various major construction materials.
- b. Material testing and mix designs of concrete as contemplated in the specifications.
- c. Setting up of fully fledged site laboratories as per the requirements.
- d. Setting up concrete batching & mixing plant.
- f. Contractor's / Employer/ Engineer project site office setup.
- g. Casting yard with complete facilities.
- h. Any other pre-requisite items required for final execution.
- i. Any other items specified in other sections of the contract.

## 26. ASSOCIATED WORKS DEEMED INCLUDED IN SCOPE OF PERMANENT WORKS

Contractor's Organization and Plant & Equipment

Project Organization Plan

- i) The Contractor's Personnel shall be deployed & maintained in consultation with the Employer and as per the requirements. The Contractor's Superintendence shall be also properly deployed and maintained to carry out the construction activities as described in the relevant General Conditions of Contract (GCC) clause.
- ii) The contractor shall submit an updated Project Organization Plan which includes complete project organization chart during the Construction Phase adding functions and personnel necessary to perform the Works during the Construction Phase in accordance with the conditions of the Contract. This plan shall be updated and resubmitted whenever there are changes to the staff and I or the organizational structure. The plan shall show the management structure and state clearly the duties, responsibilities and authority of key staff members.
- iii) The contractor shall deploy the key personnel of requisite qualification and experience. In case Employer instructs (in writing) the contractor to remove a person of his work force stating the reasons, the contractor shall ensure that the person leaves the Work Area within seven days and shall have no further connection with the Works in the Contract. The Engineer, in case, feels that a person of contractor's work force should leave, the matter shall be brought to the notice of the Employer by the Engineer for issuing suitable instructions to the contractor, after the Employer is satisfied.
- iv) During the Construction Phase, the contractor shall maintain the Design Team in his organization independent of the Construction Team to deal with Preliminary design, definitive design and working drawings.
- v) The minimum requirements for key and other positions are provided in Appendix 4 [Organization Charts and Key Positions] of Employer Requirement Annexure-1.

### 26.1 Plant and Equipment

- a) The minimum Plant and equipment as shall be maintained in consultation with Employer and the Engineer as per the requirements.
- b) The minimum requirements for plant and equipment are provided in Appendix 5 [Plant and Equipment] of Employer Requirement Annexure-1.

## 27. PENALTY FOR NON-COMPLIANCE

Notwithstanding the provisions elsewhere in the bid documents, the contractor shall be penalized as detailed below:

### a) Correction of Defects

If the Employer or Engineer determines that any item or part of it was constructed with bad workmanship and or using sub-standard construction materials,

Sl. No.	Nature of Defects (Indicative only)	Penalty (Rs.)
1	Not maintaining plumb line, level in concrete works / observing honeycombs on the finished surface of concrete	1,00,000 / - each case
2	Usage of unapproved / sub-standard materials	2,00,000 / - each case

The above said penalty is envisaged to act as deterrent against bad workmanship and usage of sub-standard construction materials by the contractor and shall be imposed for every occurrence. These penalties are non-refundable.