SECTION - 8A

EMPLOYER'S REQUIREMENT

GENERAL INFORMATION AND SCOPE OF WORK

PART-1

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SECTION 8A: PART-1

EMPLOYER'S REQUIREMENTS

GENERAL INFORMATION & SCOPE OF WORK

I) NAME OF THE WORK

Design and Construction of Elevated Viaduct of length 8.960km and At-grade Formation of length 37.920km (excluding Station Buildings) including associated Works between Heelalige to Rajanukunte of Corridor-4 of Bangalore Suburban Railway Project (BSRP)

II) BRIEF SCOPE

The proposed work is between Heelalige and Rajanukunte from km. (-) 0.635 to 46.985 approx. (including sidings) excluding 740 m long alignment near Benniganahalli station from km. 21.925 to km. 22.665. The work mainly consists of construction of alignment of (i) Elevated Viaduct of length 8.960 km and (ii) At-Grade Formation of length 37.920 km. The scope also includes road widening, side drains & other allied works, and construction of service roads etc. at all required locations. The scope also includes interfacing and coordination with other contractors at the intersection points and with other agencies, wherever required, for design and construction.

ELEVATED VIADUCT

I. Design and Construction of Elevated Viaduct of length 8.96 km (km. 14.625 to km. 17.950, km. 22.665 to km. 23.750, km :34.450 to km. 36.025 & km. 36.275 to km. 39.250) and 2.11 km of common corridor for C1 & C4 at Yelahanka (km. 36.401 to km. 38.511) including ramps and other related Infrastructural works (excluding Station Buildings) from Heelalige to Rajanukunte, excluding 740 m long alignment near Benniganahalli station from km. 21.925 to km. 22.665

Construction of elevated (viaduct) structures comprising of Pile foundation / Open foundation, Piers, Pier caps, Portal beams & Girders forms the scope of this work. The work includes construction of Pre-cast PSC I – Girders / PSC T– Girders / Pre-cast Box segments / Pre-cast full span U-Girders / Steel Girders including casting / fabrication, transporting, launching and erection in position.

AT GRADE FORMATION

II. Design and Construction of At Grade section of length 37.92 km (km. (-) 0.635 to km. 14.625, km. 17.950 to km. 21.925, km. 23.750 to km. 34.450, km. 36.025 to km. 36.275 & km. 39.250 to km. 46.985) formation in Embankments / Cuttings including Blanketing, Major Bridges, extension of existing Minor Bridges/RUBs/ROBs, Retaining Walls, Drains, Civil Engg. related and other hitherto uncharted Utility Diversions and other related Infrastructural Works (excluding Station Buildings) from Heelalige to Rajanukunte.

Construction of At-Grade section comprising of earthwork in embankment / cutting, Major Bridges, extension of existing Minor Bridges/RUBs/ROBs, pile foundation / open foundation, side drains, approach road works & allied works viz., Retaining walls, Sacrificial retaining walls, RE Walls etc. at required locations forms the scope of this work.

MISCELLANEOUS WORKS

III. Miscellaneous items for works which are not covered in schedule A & B. (Items not covered in Schedule A & B shall be executed under latest schedule of rates published by KPWD.

The scope of work also includes provision & maintenance of at least four Project Offices earmarked for the Engineer and the Employer separately, at the locations approved by the Employer and two offices at the casting yards earmarked for the Employer and the Engineer separately, till the end of DLP. The locations, layouts, construction standards, materials, furniture, appliances, other furnishings, tools, personnel, maintenance standards, hygienic standards etc. in all these offices shall be as approved by the Competent Authority of the Employer and the decision of the Employer is final in this regard.

III) BROAD SCOPE OF THE WORK

The broad scope of work includes the Design, Proof Checking of the Designs by a separate approved agency of repute and Construction/provision of the following:

A ELEVATED VIADUCT

a. Elevated Viaduct of length 8.96 km is required to be constructed at the locations mentioned above.

b. Portals (and not piers) are required to be constructed at the following locations:

   a. From km. 17.340 to km. 17.526
   b. From km. 22.909 to km. 23.279
   c. From km. 35.481 to km. 35.605
   d. From km. 38.666 to km. 38.697

c. Portals (and not piers) for double decker (for Corridor-4 at Level-1 and Corridor-1 at Level-2) are required to be constructed from km. 36.975 to km. 37.471 between Jakkur & Muddenahalli. The above portals will continue in Yelahanka station from km. 37.130 to km. 37.347.

d. Piers for double decker (for Corridor-4 at Level-1 and Corridor-1 at Level-2) are required to be constructed from km. 36.429 to km. 36.966 between Jakkur & Yelahanka and from km. 37.347 to km. 37.471 between Yelahanka & Muddenahalli.

e. From km. 37.471 to km. 38.029 between Yelahanka and Muddenahalli, Corridor-1 will be on piers of variable height and will ramp down from Level 2 to Level 1 to match with the Level of Corridor-4 at km. 38.029.

f. From km. 37.471 to km. 38.029 between Yelahanka and Muddenahalli, Corridor-4 will be at Level 1 on piers of equal height.

g. Portals (and not piers) to accommodate 4 tracks (2 tracks of Corridor-4 & 2 tracks of Corridor-1) are required to be constructed from km. 38.029 to km. 38.525 between Yelahanka and Muddenahalli.

h. The ROW of BMRCL is shared by BSRP from km. 22.831 to km. 23.484 between Benniganahalli and Channasandra. The alignment of BSRP is at Level 1 and the alignment of BMRCL is at Level 2. At these locations, the contractor is required to liaison between both the authorities viz., K-RIDE & BMRCL and coordinate with the concerned authorities of BMRCL and other agencies during design and construction of the works.

i. In order to prevent induction of high voltage current between BMRCL system and BSRP system, a metal sheath shall be provided between the OHE line of BSRP and the bottom of the girder carrying BMRCL system as per the approved drawing in the above location being shared by BMRCL & BSRP.

j. Open web girder of 61m span at Benniganahalli to cross the existing Railway track / road forms a part of the scope of this work. The span may vary during detailed designing. The bridge is on 6 degree curve (Approx.). The bridge shall be designed by the contractor for the above curvature. The drawings given in the Bid document are tentative.

k. The alignment from km. 21.925 to km. 22.665 (on both sides of Benniganahalli station) does not form part of the scope of this work.

l. Construction of stations does not form part of the scope of this work. However, the following information is provided:

   (i) Marathahalli and Yelahanka stations are Elevated and remaining stations are At Grade.

   (ii) Marathahalli station is at Level-2.

   (iii) Yelahanka station is at Two Levels. The station of Corridor-4 is at Level 1 and the station of Corridor-1 is at level 2.

m. Maintenance of the completed works during the contract period as specified and during the defect liability period forms a part of the scope of work.

B AT GRADE

a. Earth work in Cutting, Filling & Blanketing as per the levels shown in the Bid document.

b. Extension of existing Minor bridges: The details are in part - 2 of Employer's requirement.

c. Construction of foundation works for Minor bridges structure including open foundations / rafts for RCC box up to the minimum founding depths. Track supporting structure above the RCC Box viz., earthwork and blanketing.

d. Preparation and submission of detailed GAD, design and drawing for minor bridges for 25T Axle loading

e. Waterproofing for RCC Boxes of Minor Bridges & RUBs is in the scope.

f. Major bridges: The details are in part - 2 of Employer's requirement.

   i. Construction of foundation works for different structures i.e., track structure, Major bridges etc. including piles and pile caps / open foundations / rafts for columns / piers (wherever required) up to the minimum founding depths in accordance with the actual soil parameters as obtained from detailed sub-surface exploration as specified or directed.

   ii. Pile caps / Open Foundations resting at any depth depending upon the site condition shall include excavation, leveling course, PCC, dewatering, sheet pilling / soldier pilling & wooden lagging, if required, Backfilling complete in all respects

   iii. 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.

   iv. Construction of Abutments / piers, Pier caps / Bed blocks, bearings, as specified or as directed. The fabrication of the girder and testing shall be done by RDSO approved agency / workshop/ NABL Accredited labs.

g. Water way calculations for all bridges (Major & Minor) crossing water bodies shall be got done by the contractor and submitted for the approval of the Employer through the Engineer. In case, the proposed water way of any bridge is insufficient, the span/ height/ both span & height shall be increased as per the requirement and as per the site conditions. All the spans & heights of all the bridges given in the Bid document are tentative and subject to the above requirement.

h. Extension of existing RUBs & ROBs in At-grade section. The details are in part - 2 of Employer's requirement.

i. RCC drains of 50.025 km (approx.) are required to be constructed. The tentative cross section drawings are attached.

j. Retaining walls of 21.625 km (approx.) are required to be constructed at certain locations of insufficient land width for supporting the embankment / cutting.

k. Retaining walls / RE Walls at Ramp locations are required to be constructed wherever needed.

l. Formation for Stabling lines at the following locations forms a part of the scope of this work:

   (i) km. (-) 0.635 to km. (-) 0.481 → 2 nos.
   (ii) km. 0.158 to km. 0.587 → 4 nos.
   (iii) km. 2.367 to km. 2.624 → 1 No.
   (iv) km. 19.037 to km.19.775 → 2 nos.

m. Road work: The road work is required for diversion of traffic during construction at earthwork / retaining wall locations, major and minor bridge locations, RUB locations and ROB locations. After completion of ROB and RUB structures, the permanent roads are required to be constructed on ramps and approaches of ROB / RUB and also on ROB / RUB structures.

n. Maintenance of the completed works during the contract period as specified and during the defect liability period

C MISCELLANEOUS

a. Designs and drawings of all the temporary structures

b. Road widening, side drains & other allied works

c. 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

d. Submission of completion (i.e., 'As-Built') drawings and other related documents as specified

e. Maintenance of existing roads, service roads, footpaths, etc. along the alignment of viaduct during the entire contract period and during the defect liability period

f. Tree cutting, preservation and disposal (or) translocation / afforestation in lieu of cutting

g. Demolition of RCC framed structures, Brick masonry buildings including basement etc.

h. Construction of temporary road as required for diversion / widening to facilitate the movement of traffic, dismantling of any existing roads / footpaths

i. Provision of fully furnished Project offices and Site offices with all appliances, vehicles, equipment, personnel etc.

j. Maintenance of the completed works during the contract period as specified and during the defect liability period

IV) DETAILED SCOPE OF WORK

1.0 OBJECTIVE

The objective of the contract is Design, Proof Checking of the Designs by a separate (not the same agency, which designed the structures) approved agency of repute, construction & testing of permanent works, construction and removal of Temporary Works and rectification of defects appearing in Permanent Works by the contractor in the manner stipulated 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 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

A. VIADUCT WORK

1) Provision of foundation works for different structures i.e., viaduct / track structure etc. including piles (diameter of the pile may differ for single / double / double decker viaducts) and pile caps / open foundations / rafts for columns / piers (wherever required) up to the minimum founding depths as per the drawings in accordance with the actual soil parameters as obtained from detailed sub-surface exploration / GTI as specified or directed

   Construction methodology is required to be approved by K-RIDE before carrying out the works. The founding level will be decided by Employer/Geotechnical Engineer during the construction.

2) Pile caps / Open Foundations (M35 Grade) resting at any depth depending upon the site condition shall include excavation, leveling course, PCC, dewatering, sheet pilling / soldier pilling & wooden lagging, suitable shoring if required, Backfilling complete in all respects

3) Driving 'Z' section MS sheet piles by using 8mm to 10mm thickness, side by side in all kind of soil mechanically using vibro hammer / suitable means / manually as per directions of Engineer-in-charge for earthwork excavation in foundations for all depths and removing the sheet piles after the work

4) Provision of RCC piers, pier caps, precast pier caps & precast pier arms / portal pier beams, bearings, as specified or as directed

5) Provision 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 as applicable

   The contractor shall design the Viaduct ensuring 5.5 m vertical clearance above the existing road level & 6.525 m vertical clearance at Railways crossings as per SOD of KRIDE and also for BMRCL Structure (where applicable).

6) Provision of Composite / Open Web Girders for Obligatory or Railway Spans according to RDSO standards or any standards decided by K-RIDE

7) Design and Construction of super structure of standard spans, non-standard spans / specials spans, spans supporting special track layouts

   The super structures are U-Girders/ segmental box girder / PSC-I Girder of full length. The scope of work of the Viaduct contractor also includes pile foundations, substructure (pier). The track bed including I-girders / segmental box girder and slab at elevated stations are in the scope of work.

   The indicative spans considered in present tender document / tender drawings are only for reference. However, contractor may propose different spans according to the site condition with the recommendation of Engineer for the approval of the Employer. At obligatory portions or where there are constraints, they could be longer / shorter, based on site conditions. The number of piers and portal beams may increase or decrease during finalization / validation of GAD and during construction period and for which no extra payment shall be given.

   Minor variations shall not be considered as change of scope. Minor variations during finalization / validation of GAD and during detailed design shall not be considered as variation.

   Any variation in longitudinal span or individual span length and height may take place during design and execution stage. The contractor is bound to carry out such variations and, no extra payment will be paid (till the limit specified elsewhere in this document to process additional payment for variation).

   The span of superstructure at station locations may be different from that in viaduct section of alignment in mid-section. Exact inter-distance shall be decided at detailed design stage in consultation with DDC for station buildings, with interface coordination with the station building contractor.

   The Spanning Arrangements shall be proposed by contractor subject to the GADs enclosed with this Tender. The final decision will be of K-RIDE.

8) Loading & Transporting pre-cast full span U-Girders / Box-Girder segments (in Viaduct) of simply supported span from the casting yard to work site by trailer / trucks, launching, erection in position including temporary supports, erection equipment, lifting cranes (using GOLIATH Crane in Split flyover / Critical location), transporting etc., applying epoxy based bonding agent on end surface of segments after dry matching including temporary prestressing required during its curing period and positioning on bearings etc., for viaduct and converting into completed structures conforming to required lines, grades and dimensions complete as per drawings and specifications.

   Suitable launcher for U-girder launching fully automatic, capable of negotiating as per SOD shall be arranged by the contractor for erection. The maximum possible number of Launching Girders for launching of Girders as per site conditions with motorized bogies for handling and transportation of Girders shall be mobilized by the contractor. The decision of Employer / Engineer with regard to the

maximum possible number of launching girders at any given site as per the site conditions and contract conditions, is final and the contractor shall arrange that many launching girders without fail. Any failure to arrange sufficient launching girders at any given location, will attract penalty by the Employer. The quantum of penalty will be calculated by arriving at the loss of rate of progress and its effect on the overall project. The decision of the Employer on the quantum of the penalty is final and binding on the contractor.

9) Elastomeric bearings (based on detailed design) including bearing pedestals, seismic restrainers, shear keys. POT / PTFE / Spherical bearings (based on detailed designs) / continuous spans / special spans / sharp curves / cross overs including vertical stoppers.

   The choice of bearing whether POT / PTFE / Spherical or neoprene will depend on accepted design by K-RIDE. The spherical bearings / rocker & roller bearings or suitable type for special spans like open web girder, composite girder etc., to be used.

10) Conducting Load Test on Girders (erected in position on the piers) of all type of spans as per applicable / approved loading standards, including making all arrangement at site as directed by the Engineer / Employer.

11) Construction of Ramps for viaducts

   The work is to be constructed and maintained as per relevant codes, specifications, Special Specifications and drawings and as directed by the Engineer.

12) Bridge no. 533 Rail Over Rail at km. 23.00 for span 1 x 61 m Open Web Girder as described above

   Supply fabrication and erection of OPEN WEB GIRDER (OWG) as per RDSO drawing, as per BSRP / DBR, IRS / IS specification for fabrication of steel bridge girders, using contractors supply of steel conforming to the specifications mentioned, including load test duly following block / speed restrictions and liaison with all concerned authorities.

13) Conducting load test on girders as per the relevant codes and as directed by the Engineer

14) Inspection platforms at pier and pier cap for inspection of bearings etc., at spans of Railway crossings.

15) Obligatory Special span at Marathahalli over ROB no. 516 at km.15.975 as described above

16) Benniganahalli to Channasandra: Obligatory Special spans to suit the site conditions between km. 22.608 and km. 22:786.

17) Sharing of Corridor with BMRCL alignment Benniganahalli to Channasandra as described above

   BSRP structures (pier, pier cap, portal, foundations, and super structures) shall not infringe the BMRCL structures. The contractor shall design the spans avoiding all the infringements.

18) Obligatory special span for double decker (C1 & C4) to suit the site requirement at km. 36.575 over RUB no. 516A at Yelahanka

19) MS railing over Parapet as per tender drawing including epoxy painting on man holes

   Integrated Parapet shall be provided with grooves and as per the design approved by K-RIDE.

20) Providing and fixing G. I. brackets with suitable covering arrangement on both parapet walls of viaduct for electric cables, Signaling and Telecom cables as per tender drawing

   Arrangements for OHE masts shall be as per the tender drawing.

21) Crash Barrier for piers, portal legs etc., as per Tender drawing

22) Insert / shear connectors / starter bars for Track plinth

23) Expansion joint (omega / strip seal), sealant in the expansion joints as per concept plan as per specification

24) Manholes with manhole covers made of Cast Iron on the deck with locking arrangement as per drawing

25) Earthing arrangement, drainage system, inserts for signaling masts in the parapets and other systems as may be required

26) Arrangements for ground water recharging / Rain water harvesting systems in alternate span to cater all the piers

Drainage arrangement will be as per detailed design.

Rain water harvesting system shall be as per the approved drawing.

27) Providing and laying M50 grade concrete, using 20mm maximum nominal size aggregates of reinforced cement concrete at all levels including the cost of cement, fine aggregates, coarse aggregates for Viaduct & piers of all size, shapes & heights (standard pier, portal pier & cantilever pier), pier head / Cap, shear key, portal beams, pier-arms, corbels, pier-ledge, diaphragms, pedestals, deck slabs over pre-cast I girders / steel girders and cross girders and stich concrete etc., including centering, shuttering, propping, staging, scaffolding, curing, necessary tools, plants, machinery and all related operations etc. using steel shuttering & steel props.

Form work shall be designed using of shutter vibrators & traffic on road and IR track is allowed during the work at all times. The scope includes cost of providing grooves, chamfers, mouldings, cut-outs, necessary fixtures, insert plates, sleeves for various purposes, shear connectors & providing of K-RIDE logo on every pier etc., complete as per drawings, specifications and as directed by the Engineer. The scope also includes preparation of construction joints as per specification and providing proposed wire mesh / weld mesh at such locations as approved by Engineer or as shown in drawings. The scope shall include cost of using required dosage of admixture in concrete for obtaining required workability as per specification & approval of Engineer.

No cold joints are permitted. However cold joint at the junction of Pile cap-pier, Pier and Pier cap 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 shall also be used at the concrete surface of starter pier above the pile cap. The scope 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.

The scope includes provision of HDPE pipes for pre-stressing system in piers, wherever applicable.

28) Pre-Cast Concrete: Providing M50 / M55 / M60 using 20mm maximum nominal size aggregates in 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. The scope includes 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 includes the cost of centering, shuttering, scaffolding, providing cut-out where specified, curing arrangements as required, steam curing arrangement if deemed necessary, all handling etc. complete Cast in situ connection concrete is included in the scope.

All the Pier caps shall be checked for UPV (Ultra sonic pulse velocity) test by NABL Accredited Agency before dispatching the Girders from casting yard to site. Rates for the test are included in Scope.

29) Pre-Cast: Providing and laying M55 / M60 Grade using 20mm maximum nominal size aggregates in concrete as per technical specifications, including the cost of cement, fine aggregates, coarse aggregates for casting, pre- stressing and curing of precast full span U-girder / Box segments of all simply supported spans (straight or curved) in the casting yard including provision of shear connector for secondary pour concrete (rail plinths), additional bars for earthling, bars / strands / hooks for lifting of U-Girder / Box segments, cutting of bars / strands / hooks after transportation and sealing of

lifting recess as specified in drawings, lifting the full spans from the mould and shifting the same to the stacking yard

The scope includes the cost of centering, shuttering, scaffolding, providing cut-outs wherever specified, curing arrangements as required, steam curing arrangement if deemed necessary, all handling etc. Pre-stressing strand. The Scope shall include cost of using required dosage of admixture in concrete for obtaining required workability as per approval of Engineer, anti-corrosive paints for lifting hooks, insert plates and exposed steel surfaces and all other related operations as required to complete the work as per drawings and specifications

All the segments shall be checked for UPV (Ultra sonic pulse velocity) test by NABL Accredited Agency before dispatching from casting yard to site. Rates are included in scope.

30) Providing and laying M50 Grade reinforced cement concrete for precast PSC I-Girder, portal beams and pier-arm etc. (Post-Tensioned), simply supported standard / special spans of all types (straight or curved 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

The Scope includes all infrastructure in the casting yard, gantry cranes, moulds, shuttering, casting beds, mobile cranes, stores, concrete batching plant, testing labs, bulk heads, approved curing arrangements as required, all handling etc. Teflon sheet at the end for placing on portal / arrangement for placing bearing as required and shown in drawing etc. Pre-stressing system (Strands, Anchorages, sheathing, vent pipe, etc.). The Scope shall include cost of lifting hooks and using required dosage of admixture in concrete for obtaining required workability as per approval of Engineer.

All the PSC precast I girders shall be checked for UPV (Ultra sonic pulse velocity) test by NABL Accredited Agency before dispatching from casting yard to site. Rates for the test are included in Scope.

31) Pre-cast: Providing and laying M40 reinforced cement concrete using 20 mm graded aggregates for precast parapet, over Deck slab on both side of viaduct, including transition span (straight or curved), pre-cast drains, crash barriers etc., in the casting yard including provision of lifting the elements from the mould and shifting the same to the stacking yard

The Scope includes 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 Scope includes shuttering, scaffolding, special adjustable props for alignment of units, moulds, providing cut outs, required dosage of admixture for concrete.

The Scope includes Loading, transporting precast parapets and other elements 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. The Scope is inclusive of providing bolts & inserts for fixing hand rails. The Scope also includes providing K-RIDE logo in parapet.

32) Providing and laying M35 grade concrete using 20mm maximum nominal size aggregates, reinforced cement concrete including the cost of cement, fine aggregates, coarse aggregates for Viaduct and all structures of all size, shape & heights for crash barrier, Median, entry structure columns, beam, plinth beam, staircase, lift walls, parapets, diaphragms, cross-girder, deck slab including centering, shuttering, propping, staging, scaffolding, curing, necessary tools, plants, machinery and all related operations etc. using steel shuttering & steel props

Form work to be designed in such a way that traffic on road / IR track is allowed during the work at all times. The Scope shall include cost of providing grooves, chamfers, mouldings, cut-outs, necessary fixtures, insert plates, sleeves for various purposes, shear connectors etc. complete, specifications and as directed by the Engineer.

33) Providing & laying cement concrete M35 grade using 20mm maximum nominal size aggregates, pile foundations with socketing in weathered rock, soft rock, hard rock of any type and for any depth as necessitated by the design

Piling with temporary liners / permanent liners & socketing in soft rock / hard rock are included.

The initial load test, routine load test, dynamic load test, lateral load test, pullout test, pile integrity test, cross hole sonic test, plate load test etc., are included. The 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. In case of spill out, the responsibility of cleaning and throwing the garbage at the appropriate location approved by the Engineer lies with the contractor.

34) Transporting pre-cast Standard Pier Caps, I-Girders (PSC / RCC) from the casting yard / storage yard to the work site by trailer / trucks, erection in position including temporary supports, erection equipment, lifting cranes, (Using Mobile crane having suitable capacity as per Site requirement), transporting etc., positioning and fixing on pier / positioning on bearings etc., for viaduct into completed structures conforming to required lines, grades and dimensions complete specifications.

35) Transporting pre-cast full spans U-Girder of simply supported span from the casting yard to work site by trailer / trucks, erection in position including temporary supports, erection equipment, lifting cranes (using GOLIATH Crane in Split flyover / Critical location), 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

Suitable launcher for U-girder launching fully automatic, capable of negotiating the gradient and curvature as per the requirements shall be arranged by the contractor.

36) Transportation of pre-cast box segments from casting yard to the site launching and erection in position - loading, transporting precast segments from casting yard to work site, launching and erection in position with launching girder, including erection and shifting of launching girder, temporary supports, launching girders, erection equipment's, transporting etc., applying epoxy based bonding agent on end surface of segments after dry matching including temporary prestressing required during its curing period and positioning on bearings etc.

37) Providing, fabricating and fixing MS members to be used as fixtures supports / hangers etc. for system contractors

38) Installing and fixing in position holding down bolts supplied by K-RIDE / other contractor to be used for system contractors

39) Supplying, pouring and packing non shrink grout under base plates of columns, trusses etc.

40) Providing footways with provision for cable ducts, parapet walls, verges, expansion joints, drainage spouts / down take pipes in station building / track supporting structures and approach ramp, taking suitable measures for the smooth flow of traffic on road / IR track or as directed

41) Providing TMT-500D / 550D grade steel bar reinforcement (conforming to IS:1786, HYSD Fe 500 / 550 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.

As far as possible bars of the maximum length available shall be used. For bars having larger diameter more than 20mm mechanical couplers shall be provided as per Technical Specifications and no lap shall be permitted. Welding in lieu is not permitted unless specified in the drawings or as instructed by the Engineer. Laps joints are permitted in Pile, Pile cap, raft, piers, pier caps, portals, pier-arm, I-Girders girder and portal beams. However, mechanical couplers in place of lap joints can be used only in pile cap and raft without extra cost.

For pile reinforcement, welding of lap joint is allowed.

The scope includes all welding and providing mechanical couplers, all types of laps, standard laps, spacer bar, U-bar, chair, bend deduction as required and nothing extra is payable on this account.

The scope includes all welding and providing mechanical couplers, all types of laps, standard laps, spacer bar, U-bar, chair, bend deduction as required and nothing extra is payable on this account. Anti-corrosive treatment / paints exposed steel surfaces and all other related operations as required to complete the work as per specifications.

42) Supplying, placing and threading uncoated stress-relieved low relaxation steel (HTS) conforming to IS :14268 (class -II) in already positioned pre-cast box segments (for post tensioning), pre-cast pier-arm, pier cap, precast I girder, portal beams in casting yard including Providing corrugated 2.3 mm (Tolerances + 0.3 mm) thick HDPE duct 107 mm ID (Tolerances + 1 mm), OD 124 mm (Tolerances + 1 mm) for 19K15 & 85 mm ID (Tolerances + 1 mm), OD 104 mm (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 shall 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.

43) Supplying of uncoated stress-relieved low relaxation steel strands conforming to IS: 14268 (class-II), for pre-tensioning of precast full span U-girders (simply supported spans) including spacers, stressing of strands, protection of exposed cut-strands, anti-corrosive paints, HDPE debonding tubes at ends of strands if required, and all related operations to complete the work for viaduct

HDPE debonding tubes for prestressing strands (to be cut off flush to concrete after casting), epoxy-based sealing compound at edges of strand and epoxy putty to avoid slurry ingress during concreting. The quantity given is the net length of tubes without extra tube length required during construction. Scope includes filling HDPE debonding tubes with grease as specified in ASTM.

44) Supply and fabrication of OPEN WEB GIRDER (OWG) as per RDSO drawing, as per BSRP / DBR, IRS / IS specification for fabrication of steel bridge girders., as per approved specifications using contractors supply of structural steel from SAIL / TISCO / RINL / JSW complete

The work includes supply of steel, fillet or butt welding, post weld treatment, steel drifts, shop welding, shop riveting, HSFG Bolts, jigs, fixtures, testing of weld by NDT / radiography or any specified method.

The work includes transportation of fabricated girder components from contractor's workshop to bridge site including loading and unloading with contractor's own labour, materials, tools, plants, machinery, scaffolding etc., with all lead, lift, ascent, descent, crossing obstruction etc., including all taxes, royalties etc., complete in all respects and as directed by the Engineer.

The scope includes, preparation, submission and getting approval of fabrication (shop) drawings / schemes from railways by contractor, cutting, shaping, drilling holes, welding of components, welding consumables, all inspection and testing of raw materials, fabrication process and fabrication material, connections of all the types of ties, stiffeners, packing, diaphragm, HSFG. bolts, steel drifts, welding shop, rivets, templates, gigs, fixtures back up supports, accessories etc., and marking each member for site identification and transporting various components from contractor's fabrications yard / workshop to bridge site in packages bundles and other means with due care and safeguards, as described in the contract conditions and specifications and as directed / approved by engineer-in-charge including loading, unloading, sorting, member-wise systematic matching etc., complete with contractor's own labour, material, tools & plants including all lead, lift and taxes complete.

All works shall be carried out as per approved drawings, relevant codal provisions, technical specifications (corrected up to date) and as directed by the engineer-in-charge.

The girder components transported to the site shall be stacked at site properly as directed by engineer-in-charge and no extra payment will be made for the same.

The scope includes trial assembling in the shop yard or at site as directed by the engineer-in-charge, contractor shall arrange for laboratory testing of steel and submission of the results to the Railways. no extra payment will be made for this.

The contractor shall engage 3rd party as a consultant / inspection (as approved by the Engineer / Employer) for testing of the weld of the fabricated welded type girders, as required.

The scope is inclusive of conducting of welding procedure specification sheet (WPSS) and procedure for qualification record (PQR) to qualify welder and welding procedures.

The scope is inclusive of conducting laboratory tests on samples of steel materials and welds like physical and chemical tests as per IS respectively, as and when required.

The scope is inclusive of conducting test on welds like Dye penetration test (DP), Magnetic particle test (MP) Ultrasonic test (UT) and Radiography test (RT) as required.

In case of Rolled steel section; KRIDE may permit use to steel conforming to relevant codes as per specification. The metallization and painting of all steel superstructures are included in the scope.

45) Assembling and launching of fabricated OPEN WEB GIRDER, corrected up to date and alterations, riveting with contractors' rivets, HSFG bolts, welding wherever required with contractor's welding material

The scope includes preparation and the approval of erection / assembly / launching scheme (contractor shall submit the same to K-RIDE for approval). It includes contractors' own cranes of sufficient capacity and boom length, steel trestles as per site conditions or floating barge of safe and adequate capacity or other manual / mechanical methods of erection and launching of truss members / girders.

The scope includes the work of battens, placings, ties, stiffeners, packing, diaphragms, T and F bolts, steel drift, field rivets, HSFG bolts, templates, jigs, fixtures, back up support accessories, temporary staging of CC cribs of sufficient quantity for flooring and camber jacks mechanical and hydraulic jacks steel wire ropes and winch crabs, launching nose of steel for cantilever launching (if any), dead anchorages and any other suitable material such as small cranes for field assembly, shifting of leaves of steel girders from horizontal position to vertical position and vice versa, scaffolding, and air compressors welding plants, pneumatic tools and mini workshop facilities etc.

The scope includes cost of material, fabrication, erection and dismantling of all temporary components like gap structure, tower, high tensile cables (including anchorages), truss strengthening members restraining devices such as sway ropes, restraining cables, counter weights, dead anchorages and other preliminary arrangements used for launching of truss members etc., to suit the requirement, for which no extra payment will be made.

The scope also includes lowering and placing of the girder on bearing and its centering / alignment. all additional steel (over and above approved payable weight as per approved structural drawings) required for permanent / temporary strengthening for proper launching / erection of the girders shall be arranged by contractor at his own cost.

Metalizing of Full fabricated components of through type for OPEN WEB GIRDER duly preparing surfaces by sand / grit blasting as per the specification of metalizing and sand / grit blasting (Metalizing thickness of minimum 115 microns with average thickness of 150 micron) and painting with one coat of each primer to IS:5666 (1970) followed by one coat of zinc chromatic primer to IS:104 (45micron) and two finishing coat of Aluminum paint to IS 2339 (each of 35 micron) with contractor's materials, labour, tools and plants scaffolding etc., complete and as directed by the engineer-in-charge. Detailed procedure shall be followed as per additional special conditions and as per IRS B-1 / 2001.

46) Performing load test on OPEN WEB GIRDER as per design loading standard, including loading unloading the spans taking observation and all other activities and submission of results to engineer. The complete load test will be carried out as per scheme approved by K-RIDE. This test shall be conducted at the stage of commissioning of the bridge

47) Fabricating, supplying and erecting in position BEARING as per approved drawing OWG span complete in all respect including transportation, loading, unloading with own labours, materials, fuels, equipment etc., testing of bearings for relevant tests to be arranged by the contractor and results to be submitted to Railways

One set means all 4 bearings of one span i.e., two roller and two rocker bearings / spherical bearings work shall be done strictly in the presence of K-RIDE's authorized representative. The Scope is inclusive of anchor bolts, pins, drilling and grouting complete in all respects to correct specifications. The Scope is inclusive of lead from manufacturer to the bridge site. The Scope also includes greasing of knuckle and roller of free bearing and knuckle of fixed bearing by approved grease graphite as per IS:508-1987 and painting the bearings as per the schedule of painting girder.

48) Design, manufacture, supply & installation of the approved expansion joint (Omega 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

49) Design, manufacture, supply & installation of the approved expansion joint (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)

50) Supply and fixing in position true in line & level, Elastomeric bearings of approved make, placing and fixing in location as per specification and as directed by the engineer

51) Supplying to site and placing of POT cum PTFE Bearings (Free POT bearing, Fixed POT bearing, Longitudinal guide POT bearing and Transverse guide POT bearings) / Spherical bearings and its components in position during casting of pier / pedestal and superstructure, including, grouting of holes for anchor bolts and underside of base plate with approved non-shrink cementitious grout as per specification. The forces and movements as per the design

52) Fabrication & Supply of drainage spout hot dip galvanized of dimension 300mmx180mm 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

53) Supply, fabrication, transportation and erection of fabricated steel girder work of Grade E450BR Conforming 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 QAP and drawings 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

In case of superstructure over flyover all steel girders with bracings together shall be launched using push and pull methodology / suitable launching schemes including Crib Crane method, etc.,

All labour, materials, tools and plants consumables such as welding rods, etc., by contractor.

Metalizing treatment of all steel surfaces shall be done by spraying Aluminum having 99.5% purity with a coating of 150 microns by minimum 2 passes.

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- Aluminum paint to IS: 2339

The rates are inclusive of testing of all raw materials, shear connectors, HSFG bolts, nuts and welding, etc. including allowances for all types of wastages.

The Scope is inclusive of surface preparation, sand blasting, etc.

The Scope shall also include supplying and providing of detailed fabrication drawing based on the GFC drawings, required for all permanent and temporary structure and their approval from Engineer-In-charge prior to execution.

The Scope shall also include provision and installation of base plates, chequered plate for pathway, anchor bolts (measured in Tonnes, etc.) as per relevant drawings, specifications and directions of the Engineer.

Using standard plate sections, rolled sections, tubular rolled sections, angles, channels, I section, T sections, C sections, H sections, hollow round / square / rectangle sections etc., welded and built.

The launching scheme shall be submitted by the contractor using sufficient capacity cranes and get it approved by K-RIDE. When girder is to be erected over existing flyover then each girder is to be launched with proper care and with proper frame to avoid toppling during launching. The girders so placed will be temporarily braced with bolts and nuts before freeing from the frame. The fabrication of the girder shall be done by RDSO approved agency / workshop.

54) Earth work in filling with COE: Earthwork in embankment in making formation at Ramps covering all over retaining walls as per Specification No: RDSO / 2020 / GE: IRS-0004 (Including ACS No-01 dated 16.12.2021) and latest guidelines with contractors own earth of approved quality in specified layers not exceeding 300mm thickness from approved earth quarries outside railway limits in all soils with loading, unloading, all lead and lifts, rehandling, transportation, spreading in layers, compaction using vibratory compactors of adequate capacity, benching of slopes, sectioning to profile, clearing of debris / garbage / vegetation / shrubs etc., using contractor's vehicles, machinery, labour, consumables etc., on both sides of the bridge approaches to be compacted with plate vibrator.

The Scope includes loading, unloading and disposal of surplus excavated material 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. The contractor to ensure sprinkling of water over the road regularly to avoid the dust formation.

55) Earthwork in excavation by mechanical means (Hydraulic excavator) in cutting, in formation etc. at ramps covering all over retaining walls. The Scope includes loading, unloading and disposal of surplus excavated material 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. The contractor to ensure sprinkling of water over the road regularly to avoid the dust formation.

56) Providing and laying blanketing materials at Ramps covering all over retaining walls of specifications as per RDSO guidelines using well graded granular material having Cu>7, Cc between 1 and 3, fines (passing 75 microns) between 3% to 10%, Minimum soaked CBR value ≥ 25, (Soil compacted at100% of MDD *in Lab). Blanket material should be compacted in layers of maximum 20 cm thickness in loose state using graders and compaction using vibratory compactors, top and side dressing to provide final formation as per designed profile. Specification No: RDSO / 2020 / GE: IRS-0004 (Including ACS No-01 dated 16.12.2021) and latest guidelines.

57) Supply, planting ornamental plants including mixing of good earth, sand saw dust and leaf mould watering with contractor's materials, transportation etc., with all lead and lift complete etc., and plant should be maintained for three months till after the completion of project and as directed by the Engineer-in-charge.

58) Providing safety barricading as per drawing. No. K-RIDE / BSRP / SBAR / 03 / 2021 with contractor's materials and labour including all leads and lifts complete as directed by Engineer in charge. (Size 100

mm x 100mm x 1650 mm RCC pole) including foundation work as per the drawing Note: 1. Casting of RCC pillars shall be carried out in nominated depot and submerged water curing. 2. The precast RCC posts shall be transported to duly handling carefully without causing any damage and erect it at nominated locations as per drawing duly ensuring safety of running trains.

59) Maintaining including watch & ward and repairs of the barricading provided as per above item no.81 including cost of all contractors' men, materials, tools and plants required in this regard.

60) Supplying, Providing, fabricating, transporting and erecting structural steel for hand railing / inspection platform, inspection ladder, height gauges and other structural members for viaduct including Ramps / OHE including transition span consisting of tubular and rolled sections profiled to require shape, insert plates, steel plates, sheets, strips and flats for structural and general engineering purposes / inserts for cable tray, inserts for OHE / signaling mast, steel brackets over parapet for fixing signaling post, earthing arrangement consisting of flats / plates with welded hold fast, welded headed nuts, internal threaded sleeve, studs in the form of U bars (grade 8.8), bolts (class 4.6) etc., with welded hold fasts for walk-way, earth terminal plates, insert plates with welded hold-fasts, internal threaded sleeves including MS bolts Conforming to IS 3757:1985 (Reaffirmed:2008) & IS 4000:1992 (reaffirmed:2013) (Code of practice for high strength bolts in steel structures) tightened by Torque wrench and primer coat and aluminum paint as per specification and drawing, with all lead and lifts and as per the directions of engineer. The cost shall also include required surface preparation (sand blasting). 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- Aluminum paint to IS: 2339
d. Structural steel conforming IS: 226

B. EARTHWORK IN EMBANKMENT AND CUTTING INCLUDING RETAINING WALL AND DRAINS:

The Design of formation and specification for 25 T axle load shall be referred and followed.

The scope includes the following:

1) Earthwork in embankment

2) Earthwork for laying of a blanket layer as per RDSO guidelines with suitable materials as approved by Engineer.

Specification no. RDSO / 2020 / GE: IRS-0004 (Including ACS No-01 dated 16.12.2021) and latest guidelines shall be referred for earthwork in embankment and for blanket layer.

Earthwork shall be provided with contractor's own earth, wherever Railway cut spoil is not available / not feasible.

Useful Railway cut spoil released from cuttings shall be utilized subject to suitability of cutting soil as per the RDSO Guidelines with the approval of Engineer / Employer.

The top width of embankment and cutting of BSRP lines and stabling lines will be as per the drawings and specifications.

The drainage arrangement between IR tracks and BSRP tracks at formation level, side drains at toe / ground level, drains at berm level, catch water drains / saucer drains are included in the scope of work.

The contractor to work out the methodology suitably for stagewise construction for continuing the IR traffic without any hindrances and this aspect may be considered while quoting the Lumpsum Price. Nothing extra shall be payable for phase wise construction. The improvement of existing RUBs of IR with plastering, painting, pitching and lighting also to be carried out along with the new construction of RUB. The plastering, painting, lighting and electrification is required to be carried out in all new RUBs for full length.

3) Earthwork in cutting by mechanical means (Hydraulic excavator) including leading disposing off the surplus unusable cut spoils to outside of Railway limits as per directions of the engineer including cutting in hard rock requiring blasting, cutting in rock requiring controlled blasting and chiseling.

   The scope includes loading, unloading and disposal of surplus excavated material using covered trucks to contractor's dumping yard with all leads and lifts and as directed by the Engineer

4) Construction of side drains, yard drains, catch water drains, etc. to the designed profile. The contractor shall ensure that during transportation, the carried material does not spill out.

5) Turfing / planting, including all lead and lift, and watering as required until properly rooted in embankment. The turfing shall be provided on slopes of the embankment for one side of BSRP slope. The turfing shall be provided on the approach roads of RUB.

6) Major Bridges, Extension of existing Minor Bridges/ ROBs / RUBs, side drains & allied works approach road works viz., Retaining wall, Sacrificial retaining wall, R E Wall, at required locations.

7) Supply, planting ornamental plants including mixing of good earth, sand saw dust and leaf mould watering with contractor's materials, transportation etc., with all lead and lift complete etc.

   The plants should be maintained for three months till the end of DLP and as directed by the Engineer-in-charge.

8) Construction of Trolley / Man Refuges in cutting as per K-RIDE's drawing No. K-RIDE / BSRP / TR / 01 / 2021, as directed by the Engineer in charge (All labour, materials, consumables, leads, lifts including cement and steel by contractor).

9) Fabrication and construction of Trolley / Man Refuges in high embankment using K-RIDE's rails / contractor's structural steel, including earthwork in excavation, erection of rail posts and RCC ballast retainers and RCC slabs as per K-RIDE's drawing no. K-RIDE / BSRP / TR / 02 / 2021, as directed by the Engineer in charge (All labour, materials, consumables, leads, lifts including cement and steel by contractor).

10) Providing safety barricading as per drawing. No. K-RIDE / BSRP / C4 / TD / BD / 04 / 01 & 02 with contractor's materials and labour including all leads and lifts complete as directed by Engineer in charge. (Size 100 mm x 100mm x 1650 mm RCC pole) including foundation work as per the drawing

    Casting of RCC pillars shall be carried out in nominated depot and cured by submerging in water.

    The precast RCC posts shall be transported to duly handling carefully without causing any damage and erected at nominated locations as per the drawing, duly ensuring safety of running trains.

11) Maintaining including watch & ward and repairs of the barricading provided as per above item including cost of all contractors' men, materials, tools and plants required in this regard

12) Supplying, laying Non-woven Needle Punched and Mechanically or Thermally bonded type Geotextile for use as Separator / Filtration for Railway formation as per RDSO Specification No. RDSO / 2018 / GE: IRS-0004 - Part I made of Polypropylene / Polyethylene / Polyamide or combination thereof having apparent opening size of ≤ 85 microns and elongation at failure > 50% in both directions including transportation labour, lead & lift complete as directed by Engineer

    On top of subgrade or prepared subgrade before laying blanketing layer with minimum strengths in Grab test, Trapezoidal Tear test and Puncture test of 700N, 250 N and 1800 N respectively of full formation width at required locations shall be conducted.

13) Compaction of embankment slope using hydraulic vibratory plate slope vibratory plate compactor attached to Excavator by doing 2 or more passes as required to get firm and neat compacted slope of embankment as directed by Engineer

The item is inclusive of all men, materials, equipment, watering arrangement, fuel etc. complete.

14) Providing & laying Reinforced cement concrete M35 grade using 20mm maximum nominal size aggregates, reinforced cement concrete using Portland slag cement (Directly from manufacture or blending of OPC+GGBS) for following concrete works: 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, RE Wall foundations, return walls, precast / cast-in-situ culvert deck slabs, road median, drains, RUB etc. including excavation for all depths from lowest ground level through existing water bound macadam road / bituminous road / concrete road / soil / moorum / 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.

    The scope includes loading, unloading and disposal of surplus excavated material 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. The scope includes cost of using required dosage of admixture in concrete for obtaining required workability as per approval of Engineer, curing of concrete.

15) Levelling Course: Providing & laying plain cement concrete M15 / M20 grade using 20mm maximum nominal size aggregates in open foundation, stepped foundation, combined footing, raft foundation, retaining walls, return walls, walls, U / G water tank, culverts, 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, form work / 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.

    Skin reinforcement, if necessary, shall be provided.

16) Providing Boulder backing behind abutment, wing wall, return wall, retaining wall with hand packed boulders & cobbles with smaller size boulders toward the back including all lead, lift, labour & other incidental charges as complete work in all respects

17) Demolition and removing of signal post / water columns / lighting towers / BG gate boom posts & rail columns etc., including foundation in concrete, masonry to entire satisfaction of the Engineer-in charge, with all men, material & equipment

18) Fixing of reference pillars at the edge of formation as per specification

19) Providing and laying of filter media consisting of granular materials of GW, GP, SW groups as per IS 1498-1970 in required profile behind abutments, minor bridge RCC boxes, RUB / ROB RCC Boxes, wing walls and return walls etc., above bed level with all labour and material complete job as per drawing and technical specification of RDSO.

20) Providing Weep Holes in stone masonry / Plain / Reinforced concrete abutment, wing wall, return wall, retaining walls and drains with 100 mm pipe extending through the full width of the structure with slope of 1V:20H towards drawing force.

21) Providing cast in situ plaques for bridge foundations details of size 45x45x5 cm in cement concrete 1:2:4 mix using 20mm hard stone aggregate embedded in 30mm deep notch over abutment & piers, engraving the letters & figures with CM 1:3 and finished smooth.

22) Design of high bank / deep cutting slope based on slope stability analysis as specified by RDSO / theoretical methods, for railway cuttings / embankment more than 6m in height / depth based on the material available in cutting / embankments, including collecting required number of soil samples and conducting required laboratory tests as per RDSO specifications so as to find out soil parameters

required in slope stability analysis, working out design slope based on manual method / computer software including furnishing detailed calculations in a report form with contractor's men, material, machinery etc. and as directed by Engineer-in-charge.

Note: Recommended slopes designs shall be from reputed designers and shall include detailed calculations to be submitted in 3 copies.

C. MINOR BRIDGES, MAJOR BRIDGES, RUB, ROB AND ROR

The scope includes the following:

1) Construction of foundation works for different structures i.e., track structure, Major bridges, Minor bridges etc. including piles and pile caps / open foundations / rafts for columns / piers (wherever required) up to the minimum founding depths in accordance with the actual soil parameters as obtained from detailed sub-surface exploration as specified or directed.

   The Construction methodology is required to be approved by K-RIDE before carrying out the works. The founding level will be decided based on the Geotechnical reports by Engineer / Employer during construction.

2) Construction of Abutments / piers, Pier caps / Bed blocks, bearings, as specified or as directed.

3) Construction of Composite / Open Web Girders for Obligatory or Railway Spans according to RDSO standards or any standards decided by K-RIDE.

   The Standard Drawings of box culverts (25 T Axle loading) of RDSO for minor bridges may be referred and the tentative spans are given in the minor bridges list. The standard drawings of RDSO for major bridges & ROB may be referred. The standard RUB Drawings (Segmental Construction) as per IRS / RDSO may be referred, if available otherwise the same shall be designed as per IRS Codes / DBR. The IRS Codes shall be followed in-principle and the design criteria is based on IRS Codes viz. IRS-Bridge Rules, IRS Concrete Bridge Code & IRS Bridge Substructure & Foundation Code.

4) Supply, fabrication and erection of Composite Steel Girder as per RDSO drawing, as per BSRP / DBR, IRS / IS specification for fabrication of steel bridge girders, conforming to IS:2062 complete including load testing.

5) Pile caps / Open Foundations resting at any depth depending upon the site condition shall include excavation, leveling course, PCC, dewatering, sheet pilling / soldier pilling & wooden lagging, if required, Backfilling complete in all respects

   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.

6) Providing & laying Reinforced cement concrete M35 grade using 20mm maximum nominal size aggregates, pile foundations with socketing in weathered rock, soft rock, hard rock of any type and any depth if arising. The piling with temporary liners / permanent liners & socketing in soft rock / hard rock are included. The initial load test, routine load test, dynamic load test, lateral load test, pullout test, pile integrity test, cross hole sonic test, plate load test is included.

   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. Contractor shall ensure that during transportation, the carried material does not spill out.

7) Elastomeric bearings based on detailed design including bearing pedestals, seismic restrainers, shear keys

8) POT / PTFE / spherical bearings based on detailed design shall be provided. The type of bearing (POT / PTFE / Spherical or neoprene) will be approved by K-RIDE.

9) MS railing over Parapet as per tender drawing including epoxy painting on man holes Integrated Parapet shall be provided with grooves as per the design approved by K-RIDE.

10) Expansion joint, sealant in the expansion joints as per concept plan as per specification

11) Manholes with manhole covers made of Cast Iron on the deck with locking arrangement as per the drawing

12) Earthing arrangement, drainage system, inserts for signaling masts in the parapets and other systems, as may be required

13) Arrangements for ground water recharging / Rain water harvesting systems in alternate spans of the entire corridor

    Drainage arrangement will be as per detailed design.

14) Pre-cast elements: Providing and laying M40 reinforced cement concrete using 20 mm graded aggregates for precast parapet, pre-cast drains, crash barriers etc., in the casting yard including provision of lifting the elements from the mould and shifting the same to the stacking yard.

    i. The Scope includes 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.

    ii. The Scope includes shuttering, scaffolding, special adjustable props for alignment of units, moulds, providing cut outs, required dosage of admixture for concrete.

    iii. The Scope shall is also inclusive of Loading, transporting precast parapets and other elements 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.

    iv. The Scope is inclusive of providing bolts & inserts for fixing hand rails.

    v. The scope is also inclusive of providing K-RIDE logo in parapet.

15) Providing & laying Reinforced cement concrete M35 grade using 20mm maximum nominal size aggregates, Reinforced cement concrete using Portland slag cement (Directly from manufacturer or blending of OPC+GGBS for the following concrete works:

    i. 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, RE Wall foundations, return walls, precast / cast-in-situ culvert deck slabs, road median, drains, RUB etc. including excavation for all depths from lowest ground level through existing water bound macadam road / bituminous road / concrete road / soil / moorum / 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.

    ii. The Scope includes loading, unloading and disposal of surplus excavated material using covered trucks to contractor's dumping yard with all leads and lifts and as directed by the Engineer.

    iii. The contractor shall ensure that during transportation, the carried material does not spill out.

    iv. The scope shall include cost of using required dosage of admixture in concrete for obtaining required workability as per approval of Engineer, curing of concrete.

16) Levelling Course: Providing & laying plain cement concrete M15 / M20 grade using 20mm maximum nominal size aggregates in pile foundation, open foundation, stepped foundation, combined footing, raft foundation, retaining walls, return walls, walls, U / G water tank, culverts, 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 15 cm thick layers, as per drawing including cost of all material, form work / 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.

Skin reinforcement, if necessary, shall be provided.

17) Providing Boulder backing behind abutment, wing wall, return wall, retaining wall with hand packed boulders & cobbles with smaller size boulders toward the back including all lead, lift, labour & other incidental charges as complete work in all respects

18) Providing and laying of filter media consisting of granular materials of GW, GP, SW groups as per the approved specification in required profile behind Slab bridges, RCC boxes, Abutments, wing walls / return walls etc., above bed level with all labour and material complete job as per drawing and technical specification of RDSO.

19) Providing and laying Pitching with stone boulders weighing not less than 35 kg each with the voids filled with cement sand mortar 1:4 on slopes laid over prepared filter media including boulder apron laid dry in between bridge proper and curtain / drop wall of minor bridges complete as per technical specifications.

20) Drilling holes up to required diameter or 32 mm diameter, providing Weep Holes in stone masonry / Plain / Reinforced concrete abutment, wing wall, return wall with 100 mm AC pipe extending through the full width of the structure with slope of 1V:20H towards drawing force.

21) Providing Granite plaques for bridge foundations details of size 45x45x8 cm in cement concrete 1:2:4 mix using 20mm hard stone aggregate embedded in 30mm deep notch over abutment & piers, engraving the letters smooth notching corners. Providing cast in situ bridge number plaques of size as per the IRBM using cement concrete of M25 grade with 20mm hard stone aggregate over the bridge parapet as directed by Engineer in Charge. Marking high flood level (HFL) and danger level (DL) to be marked on the abutment and piers of Minor, Major bridges as per IRBM.

22) Preparation and submission of detailed GAD, design and drawing for minor bridges for 25T Axle loading including all details such as new bridge location with respect to existing bridge, methodology of construction without disturbing the existing bridge structure, drawing and detailed design shall be based on hydraulic data, geotechnic investigations, etc., Drawing and design shall be as per IRS Specifications and SOD standard specifications and schedule of dimensions. (Design calculation for the bridges shall be submitted and approval obtained from Railway's competent authority).

23) Design, manufacture, supply & installation of the approved expansion joint (Omega 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.

24) Design, manufacture, supply & installation of the approved expansion joint (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).

25) Supply and fixing in position true in line & level, Elastomeric bearings of approved make, placing and fixing in location as per specification and as directed by the engineer.

26) Supplying to site and placing of POT Cum PTFE Bearings / spherical bearings (Free POT bearing, Fixed POT bearing, Longitudinal guide POT bearing and Transverse guide POT bearings) and its components in position during casting of pier / pedestal and superstructure, including, grouting of holes for anchor bolts and underside of base plate with approved non-shrink cementitious grout as per specification. The forces and movements are as per the design.

27) Fabrication & Supply of drainage spout hot dip galvanized of dimension 300mmx180mm 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.

28) Waterproofing for RCC Boxes of Minor Bridges & RUBs are in scope.

29) Supply, fabrication, transportation and erection of fabricated steel girder work of Grade E450BR conforming 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 QAP and drawings 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 Indian Railway bridge manual and any other incidental work as required with all leads and lifts, etc. complete and as directed.

Notes:

(i) In case of superstructure over flyover all steel girders with bracings together shall be launched using push and pull methodology / suitable launching schemes including Crib Crane method, etc.,

(ii) All labour, materials, tools and plants consumables such as welding rods, etc., by contractor.

a. Metalizing treatment of all steel surfaces shall be done by spraying aluminum having 99.5% purity with a coating of 150 microns by minimum 2 passes.
b. Painting of metalized steel sections shall be done as below.
c. First coat- Primer to IS: 5666
d. Second coat- Zinc chromium paint to IS: 104
e. Third & fourth coat- Aluminum paint to IS: 2339

(iii) The rates are inclusive of testing of all raw materials, shear connectors, HSFG bolts, nuts and welding, etc. including allowances for all types of wastages.

(iv) The scope is inclusive of surface preparation, sand blasting, etc. The scope shall also include supplying and providing of detailed fabrication drawing based on the GFC drawings, required for all permanent and temporary structure and their approval from Engineer-In-charge prior to execution.

(v) The Scope shall also include provision and installation of base plates, chequered plate for pathway, anchor bolts (measured in Tonnes, etc.) as per relevant drawings, specifications and directions of the Engineer

(vi) Using standard plate sections, rolled sections, tubular rolled sections, angles, channels, I- section, T sections, C sections, H sections, hollow round / square / rectangle sections etc., welded and built

(vii) The launching scheme shall be submitted by the contractor using sufficient capacity cranes and get it approved by K-RIDE. When girder is to be erected over existing flyover then each girder is to be launched with proper care and with proper frame to avoid toppling during launching. The girders so placed will be temporarily braced with bolts and nuts before freeing from the frame.

(viii) The fabrication of the girder shall be done by RDSO approved agency / workshop.

30. Providing Boulder backing behind abutment, wing wall, return wall, retaining wall with hand packed boulders & cobbles with smaller size boulders toward the back including all lead, lift, labour & other incidental charges as complete work in all respect.

31. Providing and laying of filter media consisting of granular materials of GW, GP, SW groups as per IS 1498-1970 in required profile behind minor bridge RCC boxes, abutments, wing walls / return walls etc., above bed level with all labour and material complete job as per drawing and technical specification of RDSO.

32. Providing and laying Pitching with stone boulders weighing not less than 35 kg each with the voids filled with cement sand mortar 1:4 on slopes laid over prepared filter media including boulder apron laid dry in front of toe of embankment complete as per technical specifications.

33. Drilling holes up to required diameter or 32 MM diameter, providing Weep Holes in stone masonry / Plain / Reinforced concrete abutment, wing wall, return wall with 100 mm PVC pipe extending through the full width of the structure with slope of 1V;20H towards drawing force.

34. Providing cast in situ plaques for bridge foundations details of size 45x45x5 cm in cement concrete 1:2:4 mix using 20mm hard stone aggregate embedded in 30mm deep notch over abutment & piers, engraving the letters & figures with CM 1:3 and finished smooth.
35. Preparation and submission of Hydraulic / Hydrologic calculations for bridges including Waterway and scour depth calculations as per RDSO guidelines and Railway Bridge Substructure Code with all calculations and details in three copies in CD and six sets of booklets, including collection of field details from the site with contractor's men, materials and equipment etc complete and as directed by the Engineer in-charge a) for Major bridges & Minor Bridges
36. Completion Drawing: Preparation and submission of GAD / Completion drawing for the Major bridges / ROBS / RUBs based on soil exploration and water way calculation for fixing suitable span as per RDSO design and drawing in AutoCAD on 100micron film double mat finish as per Railway standard approved by the Engineer-in-charge to specified scales including submission of check print for proof check to incorporate suggested corrections and modifications and supply final copy in compact disk and 6 copies in ammonia print in A0 size with all contractor's materials, labours, tools, plants etc., complete
37. Excavation along the alignment of signaling cable OFC / Power cable carefully and exposing the same without any damage, and excavating new trench along the railway alignment or along the alignment as specified by Engineer-in-charge, laying of removed cable, filling up all complete with sand and laying a layer of brick with, contractor's own material, tools and plants etc., as directed by the Engineer-in-charge. In case the cable is damaged, cost of restoration and the cost of cable will be recovered from the contractor. The decision of the Employer will be final.

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

1. Preliminary works such as site clearance, barricading, trial trenching etc., wherever required
2. Designs and drawings of all the structures
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, major bridges, minor bridges, ROBs, RUBs required to be carried out as directed by Engineer / Employer
8. Conducting survey and fixing bench marks 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. Instrumentation of bridges and viaducts, as directed

15. Provision of sensors in structures for measurement of strain etc., as directed

16. Plantation of Bougainvillea plants/ any other approved plants along the median of viaduct and at other locations along the alignment as directed and at Project / Site offices and at other their maintenance till the end of DLP

    a. Supply of garden soil well sieved, farm yard manure, mixing garden soil with manure thoroughly well, watering, planting required plant species, lawn grass, shrubs as directed, trimming of branches etc., complete are included in the scope of work.

17. Design, construction & maintenance (till the end of DLP) of at least 4 (four) nos. of Project Offices (earmarked for Employer & Engineer separately) and at least 2 (two) Site Offices at the casting yards (earmarked for Employer & Engineer separately) as given below:

    a. The area of each Project / Site office will be as approved by GM/ L,PC&C4/K-RIDE within the overall limit of area mentioned in Appendix-06, read in conjunction with clause 1.3 for additional offices.

    b. Project offices: The locations of the Project Offices shall be approved by the Employer (at least four offices). The work of providing the above project offices for Employer and the Engineer shall be commenced in the right earnest and at the earliest, but not later than 15 (Fifteen) days from the date of issue of LOA. All the project offices shall be made fully functional with doors and windows, proper layout design (approved by GM / K-RIDE) with all furniture, equipment, appliances, seating arrangement, computers, printers, vehicles, personnel, high speed broadband internet and Wi-Fi routers, etc. (as mentioned in the Employer's requirement) within 60 (Sixty) days from the date of issue of LOA. At least one Project Office shall be made fully functional with all the above and the personnel specified and approved, within 45 (forty-five) days from the date of issue of LOA. Liquidity damages as mentioned in Annexure – 1C are applicable in case of delay.

    c. Site Offices: Site Offices in Casting Yards with the above specifications to suit the requirement (at least two offices) shall be provided. Liquidity damages as mentioned in Annexure – 1C are applicable in case of delay.

    d. The area, locations, layouts, designs, disposition of doors and windows, other technical requirements, furniture, computers & printers, appliances, seating arrangement, materials of doors & windows, landline internet connections, WIFI routers etc., of project offices & site offices shall be as per the requirement of Employer and the Engineer & as decided and approved by GM/ L,PC&C4/K-RIDE.

    e. The specifications, equipment and other requirements of Project offices & Site offices are given in detail in Appendix-06.

    NOTE: All the requirements of offices, furnishings, equipment, appliances, tools, maintenance standards, personnel – including their qualifications and expertise, are designed for effective execution and close monitoring of the progress and quality of work. The tenderer shall note that all the conditions will be enforced in letter and spirit.

18. Demolition / dismantling of road, footpath, kerb stone, central verge, boundary wall, etc.

    The contractor must visit the site and ascertain actual magnitude of quantum of work involved for footpaths, kerb stone, central verge, boundary wall, etc. and nothing shall be payable on this account. Retrieved materials obtained from demolition / dismantling shall be property of the owner. Acquiring and evacuation of the properties will be done by the concerned authorities.

19. 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

20. Any other item of work as may be required to be carried out for completing the construction of elevated structure & At-Grade Section 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/site offices, clearing up and leaving the site perfect and tidy on completion

21. 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.

22. 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

    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.

23. 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

24. Felling of trees of girth as directed (measured at a height of 1m above ground level) with lead and stacking of material including preservation

25. Boring of 150 mm dia. (confirmatory bore holes), in all types of soil at Pier locations (Locations to be decided by the Engineer) and major bridges, minor bridges, RUB, ROB 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

    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 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 directives of Engineer. The scope also includes refilling and reinstating surface and disposing off surplus materials.

26. 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 l75mm each in album form, apart from 3 soft copies of all photographs. The photographs chosen should cover important activities of the work.

27. Supply of drone digital video by suitable means of specified duration comprising one master copy and two extra copies duly edited titled showing the progress of works and methodology and at interval of every 3 months and also before VVIPs' inspection of the corridor.
28. Carrying out GPR survey to locate underground utilities up to 6m depth with a corridor width of 5 m x 5 m grid as directed by Engineer

    The scope shall also include preparation of report and drawings both in soft and hard copy.
29. Diagonal Cross trenching works for identifying underground Utility at every Pier location, Minor Bridge, Major Bridge, ROBs, RUBs, Retaining Wall location, sacrificial wall etc., 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.

    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.
30. Trenching for identification of utilities and re-location / diversion of utilities if encountered
31. Striking out of centre 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.
32. Preparation of computer aided GAD / completion drawings in AO size in tracing film and 6 copies of ammonia paper print for each Minor bridge 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 copy should be handed over to Employer
33. Dismantling of existing structures after ensuring necessary approval form 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 wood work
34. The scrap materials will be the property of the contractor except the materials of local authorities (BBMP, BWSSB, BESCOM, BSNL) and Railways.
35. 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 find 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
36. Supplying and laying of Hume pipes as directed
37. Supplying and fixing precast RCC gratings including cost of all materials, transportation, labour etc. complete (60x40 cm) with all lead and lifts
38. Tree cutting along the alignment of the corridor to facilitate the construction of corridor works

39. Tree cutting, preservation and disposal (or) Translocation along the alignment for cutting/disposal/translocation/afforestation (as per the norms of Forest Department) in lieu of cutting/ translocation

    The applicable permits/ permissions for felling of tress / Translocation shall be arranged by Employer. The tree cutting and disposal is included in the scope of work. The cut trees will be the property of the contractor. However, the contractor shall deposit an amount not less than Reserve Price of the trees (as fixed by Forest Department/ BBMP) plus FDT (Forest Development Tax) to KRIDE for onward transmission to Railways/BBMP/Forest Department, as the case may be.

40. Transportation for disposal of tree trunks, branches, roots, complete including loading and unloading as per BBMP / Forest and local authority guidelines

41. Preparation of earth ball of tree roots of desired depth & diameters including necessary soil tests

42. Dislodging, lifting, transportation and translocation tree from original place to the new place including all arrangements, labour etc. for successfully completing the work

43. Translocation the marked trees of various species and specified girth to the place shown by the Engineer with all lead and lift, tools, plant, men & machinery and necessary preparation such as:

44. Excavating pits of adequate size, arranging loose soil, mixing of manure, fertilizer, insecticides etc., to ensure survival of the trees being translocated

45. 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

46. 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 At-Grade Section

47. 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

48. 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.

49. 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.

50. 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

51. 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.

52. CCTV Cameras at various locations along the alignment, casting yard, all worksites

    The contactor shall install CCTV cameras at various locations along the alignment, Casting yard, all worksites along with monitoring system - LED TV connected to internet including software for BSRP project. The live feed of all the cameras shall be connected to the relevant mobile app, and access of the same shall be provided to the nominated officials of K-RIDE & the Engineer. Outdoor network termination box with electrical junction box for each camera, media convertor, cable for power up to CCTV cameras, OFC cable, installation of CCTV on MS poles, storage provision, central monitoring etc. shall be provided.

    All the installed cameras will be connected to central console and will be installed at BSRP HQ office, Bangalore where the monitoring will be done.

    The power supply arrangements and cables shall be provided by contractor. The location of CCTV cameras will be finalized by Employer / Engineer.

    The security and safety of the equipment will be the responsibility of the contractor. The necessary precautions for avoidance of accident at site by any equipment or cable to be ensured by contractor. The dedicated service Engineer / Service provider Engineer to be deputed for full time. The repair / replacement shall be done within 24Hrs. positively. The shifting of cameras wherever required are also included in the Scope.

53. Any other item of work as may be required to be carried out for completing the construction of At-grade / elevated (viaduct) 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-873 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 / 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 / 60 TPH capacity H.M.P with sensor paver Gr-II with 5.4% VG-30 Bitumen

18. Filling pot holes 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. Suppling 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

F. SALIENT FEATURES OF DESIGN AND 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) All the concerned structures shall be designed for the gauge and the loading standard given in the SOD of BSRP.
3) The contractor shall design the Viaduct, ensuring 5.5 m vertical clearance above the existing road level & adequate vertical clearance at Railway crossings as per the SOD.
4) Any new design or span arrangement being proposed by the tenderer shall be in conformity with the contemporary best practice. The alignment crosses the existing railway lines at some locations. Some spans shall have to be designed as special spans / obligatory spans for crossing the existing railway tracks.
5) Design and Construction of open / raft / footing / pile foundations and construction including pier, pier cap, bearing pedestals, bearings, shear keys, seismic restrainers, hold down devices if required etc. complete. Provision of Seismic restrainer is mandatory.
6) The indicative spans considered in the tender document are for only for reference. The contractor may propose different spans according to the site condition with the recommendation of the Engineer for the approval of the Employer. At obligatory portions or where there are constraints, spans could be longer/shorter based on the site conditions. The decision of the Employer is final in this regard.
7) The scope of work includes pile foundations, substructure (pier, pier cap) The station piers / Portals will not have platform pier arms (to support platform girders). The viaduct will pass through all elevated station locations. The platform girders, pier arms at track level, pier arms at concourse level and concourse girders are NOT in the scope of the present tender.
8) Steel columns / steel piers are not permitted. Indicative spans may be followed for standard units as far as possible. However, in case of obligatory span and sharper curves, I-Girders / Steel composite Girders may be resorted to with the approval of K-RIDE. Minor variations in levels etc., shown in the drawings shall be allowed as per technical requirements & Site conditions with the approval of K-RIDE.
9) Purely steel structures will not be allowed for standard spans except for special spans.
10) Nothing extra is payable for cast in situ spans and no deductions will be made either.
11) If at any location, if permanent liners are required, they shall be provided at no additional cost.
12) Stray current corrosion prevention measures (including extra rebars in various RCC / PSC structural members) for earthing shall be adopted wherever necessary.
13) Preparing detailed designs, general drawings and working drawings for various components of the works and obtaining approval in respect thereof from the Engineer, inclusive of incorporation of all modifications, alterations, changes, etc. shall be carried out as per the direction of Engineer & Employer.

14) The shape and appearance of piers shall be as decided by K-RIDE 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.

15) Pre-cast piers can be constructed in the interest of rapid progress. The final decision will be by K-RIDE as per site requirement, site feasibility and considerations of safety.

16) The foundation and the starter of pier with variable height (as per rail level) is with cast in situ concrete. 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.

17) 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.

18) 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.

19) 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. Suitable supporting system for stability of erected pier segments shall be provided at site as directed by Engineer, if required.

20) Doglegged staircases of adequate numbers shall be provided for accessibility and inspection. Price quoted shall be inclusive for the above work.

21) Pre-cast piers are preferable, wherever possible and feasible. However, the scheme needs the approval of Engineer and the Employer.

22) For all spans, the design shall be done by the contractor and shall be approved by K-RIDE. The design of bearings, shear keys of seismic restrainers, hold down devices, if required, shall also be done by the contractor, which shall be approved by K-RIDE.

23) All spans should have similar GI brackets for cables, walkways, parapets and railing arrangements. Approval of K-RIDE will be 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.

24) Solar panels are planned to be fixed on the parapets of viaducts. The designers shall take this into account in their design & all fixtures required to mount the panels shall be fixed by the contractor at his own cost.

25) Earth filling of pile cap area shall be done with proper compaction with Contractor's own good earth up to plinth level wherever required. For the area falling on the road, backfilling shall be done with sand only. Good earth means gravel, moorum, sand (excluding clay and silt) & similar to the soil which is used for earth work in embankment. Further details are in technical details of tender document.

26) The portals shall be provided as per the site conditions.

27) The girders may be tapering in plan (wherever required as per drawings) shall be cast true to the profile as far as possible by suitable formwork system.

28) The location of piers shall be proposed by the contractor and before proposing those locations for the approval of the Employer through the Engineer, the feasibility of providing the same shall be verified at site by the contractor involving all the stakeholders. The locations should be in such a way that they do not disturb the road layout or any other obligatory point such as structures, Utilities etc., and do not obstruct water flow, if any. The decision of K-RIDE is final in this regard.

29) 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 BSRP at these locations accordingly.

30) Before carrying out the work at site, necessary permissions from various local agencies like BWSSB / GAIL / BSNL /BESCOM 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.

31) 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 should verify them for 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.

32) The permanent traffic diversions shall be carried out in consultation with traffic police. Contractor 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 K-RIDE.

33) Maximum width of median including crash barrier shall be limited to 3m (if median is required).

34) 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.

35) The applicable permits / permissions for felling of tress / translocation shall be arranged by Employer. The tree cutting and disposal shall be arranged by contractor and the scope is inclusive of the same. The applicable permits/ permissions for felling of tress / Translocation shall be arranged by Employer. The cut trees will be the property of the contractor. However, the contractor shall deposit an amount not less than Reserve Price of the trees (as fixed by Forest Department/ BBMP) plus FDT (Forest Development Tax) to KRIDE for onward transmission to Railways/BBMP/Forest Department, as the case may be.

36) The GTI report of tender document is based on preliminary investigation and it is tentative and for reference only. In case of any variation in Geotechnical details during construction, no claim (Financial or otherwise) shall be entertained by Employer.

37) 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.

38) GFC drawing requirement shall be planned by the contractor based on his three-month rolling Programme and the GFC drawings shall be issued accordingly.

39) 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 will be given by Employer. The scheme should be such that minimum of two lane of traffic on each direction of the road should be available for the smooth flow of traffic. The contractor should inspect the site.

40) 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 he 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 the relevant item of Schedule-C of Price schedule. Contractor shall provide any temporary support for the utilities, if needed, but at no extra cost.

41) The contractor shall provide temporary barricading during construction at site, work areas (i.e., Construction Depot, store, site office, casting yard etc.) and locations where road vehicles / pedestrians are moving, along the At-Grade section / Viaduct / Stations / Construction sites as directed by Engineer. The temporary barricade of 2m height along the alignment near to railway boundary / acquisition line and road footpath and the railway standard barricade along the alignment in between IR tracks and BSRP tracks are included in the scope of work for At-grade section. 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 BSRP tracks are included in the scope of work.

42) The contractor shall provide temporary barricade during construction at site, work areas (i.e., Construction Depot, store, site office, casting yard etc.) and locations where road vehicles / pedestrians are moving, along the at-grade section / Viaduct / Stations / Construction sites as directed by Engineer. The above work shall be executed as per the technical specifications. The contractor shall provide & maintain barricading as per the drawings.

43) 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.

44) 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 / BOX segments) erection, I girder erection, till completion of construction.

45) While erecting barricade, the bottom gap between barricade and road / ground should be plugged with cement concrete from inside.

46) 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.

47) 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.

48) After completion of the entire work, the barricades shall be removed by the contractor and transported away from the Right of Way.

49) 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 / K-RIDE norms and the same will deducted from RA bills of the contractor.

50) In addition, the contractor shall be required to carry out various interface works as per interfacing requirements.

51) The necessary interfacing / liaison and arrangements with systems contractors shall be done by the contractor 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.

52) 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 / project offices / 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.

The contractor shall carry out as soon as possible, but not later than the deadlines specified,

a. Setting up of fully fledged site laboratories, as per the requirements.
b. Setting up concrete batching & mixing plants.
c. Setting up of Contractor's site offices.
d. Casting yards with complete facilities.
e. Setting up site offices for Employer and Engineer

53) 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.

54) The contractor shall provide the Key Personnel as per Appendix-04.

55) The contractor shall provide the Key Plant and Equipment as per Appendix-05.

56) The contractor shall provide the Office accommodation, equipment, appliances, vehicles, personnel etc. as per Appendix-06.

57) Formation grade of Siding line, stabling lines, pocket tracks and cross overs as shown in the drawings and are in the scope of work.

58) 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 K-RIDE approval.

59) Construction of Trolley / Man Refuges is included in the scope.

60) 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.

61) Shuttering required for concrete work shall be of steel except wherever there are site constraints as decided by the Engineer.

62) For Pier heights more than 12m, more than one pour shall be considered above the starter for 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.

63) Tripods shall be permitted for casing driving. Hydraulic rig can be used for installation of casing in exceptional cases.

64) Mock-up pier and mock-up segments to be cast at casting yard & nothing extra will be paid and these mock up works are not to be used as the permanent work.

65) It is also informed that the area available for launching of segment full span 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 will inspect and conduct survey for studying the field constraints and quote their rate/amount accordingly to perform the contract.

66) Boring of 150 mm dia. (confirmatory borehole shall be done at every pier location of viaduct, at major bridge location, ROB locations, etc,.), in all types of soil at Pier locations (Locations to be decided by the Engineer) of viaduct, Major bridges, Minor bridges, ROB's and RUB's 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.

67) Diagonal Cross trenching works for identifying underground utility at every Pier location, Minor Bridge, Major Bridge, ROBs, RUBs, Retaining Wall location, sacrificial wall etc., 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.

68) Design and Drawings shall be developed in conformity with the Specifications and Standards set forth in Schedules and Employers Requirement and scope of work. The contractor shall appoint a proof check consultant (the "Proof Consultant"). If demanded by "Client" or "The Engineer", third party proof check shall be done without any financial implication. Contractor shall submit detailed designer's organization chart to the Employer.

69) Wherever night working is carried out by contractor, temporary lighting arrangements as per approved layout shall be provided, installed, maintained for the duration of the contract.

70) 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.

71) The contractor shall take suitable and sufficient measures as per SHE manual for working at night.

72) 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.

73) The debris, waste materials of the median shall be cleared and disposed properly.

74) The scope of work shall include detailed survey of the alignment for the viaduct, soil investigation at each pier, fixing an optimized span configuration avoiding shifting of utilities. K-RIDE has got done the investigations of Utilities falling in the alignment. However, this information will only be indicative and the contractor is advised to carry out his own investigation and collect necessary site details while quoting his rates. K-RIDE will not be responsible for any cost implications due to any hindrance due to Utilities falling in the alignment. 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 maybe 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, contractor is required to take up diversion of unchartered utilities, payment towards the same shall be made as per Schedule-C of Price Schedule.

75) Demolition / dismantling of RCC framed / steel structures / 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.

76) Contractor shall get necessary permission / NOC from the Railway, Road, Police and other concerned regulatory authorities for blocking services and working in such locations K-RIDE will Facilitate for getting them permission from concerned regulatory authorities for working in such locations.

77) 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.

78) Disposal of surplus materials including excavation spoils etc., to the dumping site approved by the Employer/Engineer, irrespective of lead and lift (ascent / descents).

79) Nallah diversions and drain diversions are in the scope of work.

80) 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;

81) Electric Traction, Signalling & Telecom structures are excluded from the scope of the work, but related civil works are in the scope of the work.

82) The system is planned with end-evacuation of passengers in case of emergency.

83) The electrical system comprises of 25 KV AC OHE traction.

84) Siding line, stabling lines, pocket tracks and cross overs as shown in the GAD are in the scope of work

85) 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.

86) 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.

87) Deployment of adequate traffic guards, supervisor, in-charge and provision of traffic signboards, hand delineators, portable signals etc., and as accepted by Employer & the cost of the same are included in the Scope.

88) All aspects of quality assurance, including testing of materials and other components of the work, as specified, or as directed are in the scope.

89) The contractor shall ensure cleanliness of the roads and footpaths by deploying man power 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.

90) Results of sub-surface investigations conducted at project site are enclosed with the tender document. 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.

91) 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.

92) It is the responsibility of the contactor to thoroughly examine the site of work and all constraints before submitting the bid.

93) 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 and the amounts are included in scope of schedule. Nothing extra shall be payable on this account.

94) 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, specially, to avoid dust nuisance during construction of the works.

95) 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.

96) Any incidental works required to be carried out in this regard shall be the responsibility of the contractor and the amounts are included in scope of schedule. Nothing extra shall be payable on this account. In case any new items are required for such works, the same will be processed as per the need on mutual consent.

97) Preliminary works such as site clearance, barricading, trail trenching etc., wherever required, shall be taken up simultaneously along with mobilization activities.

98) 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 and traffic police regarding traffic arrangements and diversion of traffic during construction.

99) 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.

100) Road works and allied works shall be carried out in co-ordination with BBMP as per MoRTH specifications.

101) Road widening works, wherever required, are in the scope of contract. Further, if diversions of roads need any upgradation, as desired by the Employer / Engineer, the contractor shall carry out the works. Road widening and drainage work shall be completed before the commencement of viaduct / At-grade section work at any particular location.

102) 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.

103) Tree cutting and (or) translocation along the alignment shall be arranged by Contractor at her / his own cost. The applicable permits / permissions for felling of trees or translocation will be arranged by Employer. However, no clear time limits can be specified for the same.

104) 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., shall be done by contractor, the amount of the same is included in the price schedule.

105) All disposable excavated material shall be collected and transported for disposal at contractor's dumping yard, which shall be approved by the relevant authorities. Dumping yard area cannot be provided by the Employer.

106) 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 man power for the same. 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.

107) While planning for the work of transportation of bridge construction materials to the bridge 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.

108) The mechanical means required to meet the stipulations mentioned in the above sub-para shall be arranged by contractor.

109) 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.

110) The bidder may ascertain availability of suitable / preferred type of soil for embankment and lead / lift involved before quoting his rates / price.

111) 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.

112) Sufficient measures to minimize water, air and noise pollution at/ near the area of the work shall be undertaken by the contractor.

113) 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.

114) Clearing of site and handing over of all the Works, as specified or as directed by Employer shall be ensured.

115) Maintenance of the completed Work during the maintenance period as directed by Employer shall be ensured.

116) Submission of completion (i.e., 'As-Built') drawings and other related documents as specified shall be ensured.

117) Contractor shall not display any name-board for the works without the written permission of the Employer.

118) No labor camp shall be allowed at work site or any unauthorized place. The proposed sites for labour camps shall be got approved by the Engineer/ Employer.

119) 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.

120) 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.

121) 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 BSRP and as per the latest and best engineering practices. In case of any dispute, the decision of GM/K-RIDE is final in this regard and also with regard to whether the requirement is minor or not.

V) GENERAL INFORMATION, INSTRUCTIONS AND MISCELLANOUS ISSUES

1. ITEMS PAYABLE UNDER LUMPSUM 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 Utilities required, if any
b) Any other items not covered in the scope of the work of Schedule 'A' and Schedule 'B'

2. PHASES OF WORK

The contractor shall execute the work in two phases:

a) Design Phase
b) ConstructionPhase
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.

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

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

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 issued by the Engineer
b) Employer's Requirements
c) Instructions

d) Technical Specifications and explanatory notes
e) Contract Conditions
f) Particular Conditions of Contract
g) Bill of Quantities
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 BSRP project for Corridor-4 Suburban Rail Project between Heelalige and Rajanukunte. At-grade section and Elevated Viaduct structure are proposed parallel to the existing Railway track alignment on the left / right side and over existing electrified railway line 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. Remaining land will be acquired and handed over to the contractor progressively. The contractor shall take additional land on 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. 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 K-RIDE to carry out some specific works in order to strengthen / repair the road, GM / L,PC & C4 / K-RIDE is authorised 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. 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 day time 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 time table. 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 use of alternative method of construction on a part or whole of the work. He should submit 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 / K-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. Contractor shall provide 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 minimum possible time. Failure to do so shall attract suitable penalty.

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 of 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 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 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 Engineer / Employer.

15. ACCOUNTABILITY AND DISPOSAL OF RELEASED MATERIALS

(i) The contractor shall liaison with the Engineer to finalize the procedure for taking over of 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 K-RIDE.

16. CODES AND SPECIFICATIONS

The works 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, provisions 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 form 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 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 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 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 works 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 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 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 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 constructions. This might require special provisions. This is also 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 / service lanes, if required, restoration of diverted route to original condition etc. shall be done by contractor at his cost.

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 / erection of girders / 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 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 works 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 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 K-RIDE 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 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 work.

v. No deviation shall be made from GFC drawings by the contractor.

20.5. Design, Drawings and Specifications for Temporary / 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, 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 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, Al, 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 K-RIDE 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:

i. Reinforcing bar bending schedules
ii. Working drawings for placing of reinforcement
iii. All form works, Shuttering and Scaffoldings
iv. Shop / Fabrication drawings for structural steel for PEB

v. Metal work (ferrous and non-ferrous) for inserts, structural work in built up sections etc.
vi. Seismic joints
vii. Expansion joints
viii. Construction joints
ix. 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 / 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 / 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.

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 K-RIDE. The scheme should be such that a minimum of two lane 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. Contractor 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 man power 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 / 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. 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. Payment for the same shall be made under relevant item of Price Schedule.

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 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 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 (Charted 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. Contractor shall provide any temporary support for the utilities if called for, but at no extra cost.

ii. All charted underground and overhead utilities shall be shifted by 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 / BWSSB / BESCOM-SR 2021-22 (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. Th 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 indemnified 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, Traction Power & Power Supply, Track work, Rolling Stock, Noise barrier etc., shall be but not limited to as described below:

i. Architectural finishes
ii. MEP works
iii. Fixing arrangements for OHE for traction, Signaling post, Telecommunication structures, AFC, SCADA, Lifts, and Escalators etc.
iv. ASS and TSS Room size and layout, openings in slab and viaduct beams, foundations and cable trays / ducts / hangers.
v. Traction Power earthing arrangements- Grid earthing.
vi. Layout of AFC Equipment in concourse, Raceways and cable trays / power sockets required for AFC Equipment.
vii. Rolling Stock- structure gauge / schedule of dimensions etc. yellow line marking on platform.
viii. Location and sizes of platform supervisory panels.
ix. Location of rear-view mirror Train operation group,
x. Location Layout, sizes, Shafts, walls, power supply for lifts and escalators
xi. Construction of Utility Rooms
xii. 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.
xiii. Foundations for UPS unit, DG set and other equipment as required.
xiv. Foundations for antenna mounting tower structure.
xv. Space and mounting arrangement for work stations / control panels and other equipment.
xvi. Earthling and lighting protection.

The track supporting structure for elevated station will support ballast less track with long welded rails, which will be laid later on by another contractor. Arrangements required for provision of such ballast less track shall be incorporated in the deck / track area within stations in consultation with the Engineer. On the portion where ballast less track concrete is to be laid, the top of the deck slab shall be finished rough and dowel bars / shear connectors left in the deck slab, as directed by the Engineer, for proper keying up further concrete layers and / or casting blocks which will form part of Track Work to be done by another contractor.

The contractor shall interface the work with station building contractor. The arrangements required for dowel bars / shear connectors for beam, slab, column connection shall be made by the contractor, as directed by Engineer. The Scope is inclusive of same.

25. RESPONSIBILITIES OF CONTRACTOR

25.1 Casting Yard

The land for setting up two numbers of casting yard and stacking yard as required shall be arranged by the contractor at his own cost. However, assistance can be provided by K-RIDE 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. Site office with furniture and other specified items.

i. The contractor shall provide and maintain at site 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.

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 Standard Quantities for the purpose of billing based on the approved drawings.

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 it's 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 / 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 / vehicles belonging to agencies other than Employer / 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 / 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 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.
e. Project offices and Site Offices for Employer and Engineer.
f. Contractor's 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 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 / or the organizational structure. The plan shall show the management structure and state clearly the duties, responsibilities and authority of key staff member.

iii) The contractor shall deploy the key personnel of requisite qualification and experiences. 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 man-power are attached as Appendix 4 [Organization charts and key positions] to the Employer's Requirement.

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 & equipment are attached as Appendix 5 [Plant and Equipment] to the Employer's Requirement.

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 / Engineer determines that any item or part of it was constructed with bad workmanship and /

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

or using sub-standard construction materials,

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.

APPENDIX-01

1. PROGRAMME REQUIREMENTS

1.1 General

1.1.1 Construction Programme and project monitoring

1. The contractor shall propose and submit his detailed construction program separately and as per the procedure detailed in the scope of work. Contractor may be asked to schedule and complete the work block wise / area wise in a phased manner fixing priorities to different stretches of the work to give access to other interfacing contracts as mentioned in the Bid documents.
2. The tentative construction program shall be submitted within the period as specified in the Bid document for approval of the Employer as 'Baseline Program'. The base line program shall clearly reflect interface and access dates for other civil / system-wide contracts. The basis of the time schedule for each activity such as productivity of man and machines and time cycle of each activity and resource planning shall be submitted along with the base line program.
    a. After the work has started, the contractor shall deliver in the first week of every month to the Employer and the Engineer an update of the Construction Program showing changes, if any, in planning or progress scheduling and reflecting the progress of all the activities of the network and the project status as at the end of previous month.
    b. If the contractor falls behind the approved Construction Program by more than one month, he shall, within fourteen days of the date of such information, submit to the Employer for approval, a revision of the construction program showing the proposed measures, including augmentation of plant, labor and material resources to complete the works on time.
    c. Whenever the contractor proposes to change the construction program, he shall immediately advise the Employer in writing and, if the Employer / Engineer considers the change a major one, the contractor shall submit a revised program for the approval of the Employer.
    d. Detailed Network Plan (Works Program): Detailed Network Plan shall be prepared by the contractor for each and every activity within the same time frame and in the same sequence. Activity at this level shall not be more than 15 days' duration, except for summary items like procurement / mobilization etc.

3. The contractor shall select a PC-based broad planning and control software (licensed version of Primavera, M.S. Projects etc.). The two networks shall be implemented on works as detailed in the Scope of work. The contractor shall supply one original licensed copy of the software selected including manuals and any subsequent versions thereof at no extra cost along with the Baseline program network and detailed network plan and load it on the PC system of the Employer and Engineer so that uniform monitoring of the project is done and any slippages are identified well in time and corrective action taken. The contractor shall also arrange suitable training of the personnel of Employer and the Engineer on the selected software, if required, at no extra cost, as per the directions of the Employer.

   The following reports, in agreed formats and frequency, shall be submitted by the contractor at his own cost:

   1) Progress Reports
   2) Material Status Reports
   3) Equipment and Manpower Deployment Reports
   4) Any other Report desired by the Employer or the Engineer

4. The Employer / Engineer's monitoring team will have access to all the data / information of the contractor, required for the assessment of the progress and monitoring. If necessary, the monitoring team will visit the Vendor / Contractor's works in order to assess the status of critical activities.

5. Periodic Project Status Review Meetings will be held by the Employer. The contractor shall depute his Engineers / Managers at appropriate level, as decided by the Employer, to attend the Review Meetings with all up to date information in a presentable quickly perusable format.

6. Progress photographs of the major events shall be submitted by the contractor along with the Progress Reports. Video Recording of the progress of works shall be maintained from beginning till completion of work as directed by the Engineer.

7. The contractor shall provide additional inputs whenever the PERT-CPM / network diagram (Primavera / MS Projects) indicates a possible slippage in the completion schedule. Such additional inputs may require supplementing of equipment, personnel, work in excess of the normal work per day, and work in excess of the normal work per week or other resources. Provisions in the relevant Clause of General Conditions of Contract will be applicable in cases of delays due to contractor.

1.1.2 Purpose of Program

a) The purpose for the requirement of Program (Scheduling) information described in this document is to provide the Engineer with status reports for managing, monitoring and coordinating the awarded contract during the execution within the overall multi-contract project schedule. It describes a series of reports to be submitted by the contractor to the Engineer during the execution of the contract, following the award of Contract.

b) Contractor shall program his work at all times to meet the Key Dates and the Works Area Hand-over Dates specified in the bid documents and the specified interface periods for the design and installation of the works with those of the Designated Contractors and shall during the progress of the works constantly monitor his progress against the programs described below.

c) Contractor shall include in all programs his work obligations towards shared access, shared site areas and other coincident or adjacent Works Areas.

d) The Works Program, and all more detailed or revised versions, shall be submitted to the Engineer for his consent.

1.2 Methodology

1.2.1 The computerized MSP / Primavera network using the Precedence Diagramming Method (PDM) has been selected by the Employer as the technique for contract management system and in coordinating the multi-contract project. This technique shall also be employed by the Bidder in preparing their Bid submissions and by the contractor in their Construction Stage submissions.

1.2.2 Unless otherwise agreed by the Employer, all programs submitted by the contractor shall be produced using computerized MSP / Primavera Networks developed implementing the Precedence Diagramming Method (PDM) with Resource Loaded Charts and Tables.

1.2.3 Contractor shall implement and use throughout the duration of the Contract, a computerized system to plan, execute, maintain and manage the planning, design, pre-construction, construction, and sub-contracts in executing the MSP / Primavera scheduling by PDM. The reports, documents and data shall be provided monthly and shall be an accurate representation of the current status of the Works and of the work remaining to be accomplished; work planned to be taken up during next month, shall provide a sound basis for identifying problems, deviations from the planned works, and for making decisions; and shall enable timely preparation of the same for presentation to the Engineer.

1.3 Programme management software

MSP / Primavera programming software used shall be Primavera 6.0 v 21.12 programming software shall be used.

1.4 Submissions

1.4.1 The contractor shall develop bid Program into the Initial Works Program including an outline Narrative Statement and submit within 28 days of the date of receipt of Letter of acceptance and its more detailed version within 15 days of receiving the Employer's consent to the proposed Initial Works Program.

1.4.2 Activities in the initial works program should be arranged as per the Works Break down Structure (WBS) of the work. The WBS of the work would be developed by the contractor in consultation with the Employer / Engineer. Contractor would get the WBS approved by the Employer and the program expert.

1.4.3 The first Three Month Rolling Program shall also be submitted along with Initial Works Program within 28 days of the date of receipt of Letter of Acceptance and all subsequent editions shall accompany the Monthly Progress Report. The Monthly Progress Reports shall also include a Program Update as described below. These programs shall subsequently be updated as described below.

1.4.4 Following the Employer's consent to Contractor's Initial Works Program submission, the contractor shall make submissions of the Detailed Works Program suitably amended to take into account the programs of Designated Contracts. It is the contractor's responsibility to ensure timely co-ordination with the Designated Contractors to review, revise and finalize his Initial Work Program so as not to affect the progress of Works / and or the works of the Interfacing Contractors. The resubmitted program when approved by the Employer and the program expert shall form the Baseline Program against which actual progress of the Contract shall be reckoned. As the work progresses, it may be necessary to update / revise the Baseline program but such updating shall only be carried out with the prior consent of the Employer / Engineer or when directed by them.

1.4.5 For Initial & Detail Work Program submission, one (1) original and six (6) copies each (along with electronic copy) of the following Programs and Reports shall be submitted to the Employer / Engineer:

a) Program: Baseline MSP / Primavera Network
b) Program: Baseline Milestone based Cost Activity Schedule
c) Baseline Schedule Report
d) Narrative
e) Baseline Physical Progress 'S' curve
f) Baseline Resource Charts (with Resource leveling)
g) Detailed Method Statement

1.4.6 The Employer / Engineer shall review and comment on the Contractor's programs and information submitted. The Engineer will confirm his consent or otherwise of the submissions.

1.4.7 The Employer / Engineer shall require the contractor to re-submit within fifteen (15) calendar days if he is of the opinion that the programs and information submitted by the contractor is unlikely to meet the Contract key dates.

1.4.8 If in the opinion of the Employer / Engineer, any of the contractor's revised programs or Baseline Schedule Report is not acceptable, it shall be construed as a failure of the contractor to meet a Milestone.

1.4.9 Notwithstanding the above, the Employer / Engineer may at any time during the course of the Contract require the contractor to reproduce the computer-generated Baseline Schedule Report described above to reflect actual activity dates and generate schedules based upon "what if" statements. The initial computer-generated report after receiving the Engineer's consent will serve as the base against which the contract progress will be measured. Any changes to the Report reflected in subsequent Baseline Schedule Reports shall also require the Engineer's consent.

1.4.10 Failure to include any element of work required for performance of the Contract shall not relieve the contractor from completing all works required under the Contract to achieve the original or any extended key completion date.

1.5 Works Programme

1.5.1 The Works Programme shall show the contractor's plan for organizing and carrying out whole of the Works.

1.5.2 The Works Programme shall be a computerized MSP / Primavera network developed using the Precedence Diagramming Method (PDM) and shall be present in bar chart and time-scaled network diagram format to a weekly time scale.

1.5.3 Tasks in the Works Programme shall be sufficiently detailed to describe activities and events that include, but are not limited to, the following:

(a) Key Dates, and Works Area Hand-over Dates and Interface dates.

(b) All physical work to be undertaken in the performance of the Contract obligations, including Temporary Works,

(c) The requested date for issue of any drawings or information by the Engineer,

(d) Procurement of major materials and the delivery and / or partial delivery date on-Site of principal items of Contractor's Equipment,

(e) Commissioning date of Contractor's major equipment

(f) Any off-site work such as production or pre-fabrication of components,

(g) Installation of temporary construction facilities,

(h) Interface periods with Designated Contractors or utility undertakings,

(i) Design, supply and / or construction activities of sub-contractors,

(j) Any outside influence which will or may affect the Works.

1.5.4 The Works Programme shall show achievement of all Key Dates, Interface dates and Works Area Hand-over Dates. The Works Program shall also show all Milestones, but the Milestones shall not be taken as imposing any constraints that in any way affect the logic or limit any other dates in the program.

1.5.5 Activity descriptions shall be unique, describing discrete elements of work. Any activity creating an imposed time or other constraint shall be fully defined by the contractor.

1.5.6 The Works Programme shall be organized in a logical work-breakdown-structure including work stages and phases, and shall clearly indicate the critical path(s).

1.5.7 Activity duration shall not exceed 15 days, unless otherwise consented to by the Engineer, except non-construction activities such as submittals, submittal reviews, procurement and delivery of materials or equipment and concrete curing. The contractor shall submit a Program / Project Calendar cross reference clearly indicating the allowance for holidays.

1.5.8 The Works Program, in each submission, shall be accompanied by an Activity Report and a Narrative Statement as described below in both electronic and hard copy format (time scale logic diagrams in A1 / A3 size, reports in A4 size).

1.5.9 Activity Report shall list all activities, and events in the Works Program, sorted by activity identification number.

The Activity Report shall include the following for each activity and event:

i. Activity identification number and description,
ii. Duration expressed in Days,
iii. Early and late start & early and late finish dates. Planned start and finish dates,
iv. Calculated total float and free float,
v. Predecessor and successor(s), accompanying relationships and lead / lag duration,
vi. Imposed time or date constraints,
vii. Calendar.

1.5.10 Narrative Statement

The Narrative shall be a comprehensive statement of the contractor's plan and approach for the execution of the Works and the achievement of key dates, handover dates, submission dates and any intermediate dates. It shall incorporate outline method statements in respect of major items of work including construction sequences, launching scheme, resources required including primary item of plant, Construction Equipment required, person responsible, quality checks, inspection and test procedures, tolerances, Temporary Works and the like, risk analysis, etc. for carrying out that activity. It shall fully explain the reasons for the main logic links in the Program and include particulars of how activity duration is established. This shall include estimated quantities, production rates, hours per shift, work days per week and a listing of the major items of Construction Equipment planned for use on the project. Activities, which may be expedited by use of overtime or additional shifts, shall be identified and explained. A listing of holidays, and other special non-work days being used for the computer reports shall be included.

1.5.11 Baseline Physical Progress 'S' Curve

The contractor shall also submit a forecast Cumulative Physical Progress 'S' curve based on the time-phased distribution of cost in the MSP / Primavera Network Logic Diagram, expressed in percentage terms. This 'S' curve shall be generated from the computerized MSP / Primavera Network Logic Diagram.

1.5.12 Baseline Resource Charts

The contractor shall also submit a Resource Charts, generated from the Contractor's MSP / Primavera Network Diagram, showing the anticipated manpower and main Construction Equipment usage during the execution of the Project. The Resources shall be properly leveled using primavera VP6 software.

All submissions of proposed Works Programs subsequently, after approval of the Initial Works Program, shall include the actual physical progress of work and forecast of the remaining work. Actual progress shall be stated in percent complete, remaining duration, and actual start and finish dates for each activity in the Works Program.

1.6 Initial Works Programme

1.6.1 The Initial Works Programme submitted as under Clause 1.4.1 need not include the full details given under Clause 1.5 above. It should be a condensed version with combined activities of longer duration but must show clearly how the requirements of the Contract shall be achieved. Activities in the initial works program should be arranged as per the Works Break down Structure (WBS) of the work. The WBS of the work would be developed by the contractor in consultation with the Engineer. Contractor would get the WBS approved by the Engineer. The outline Narrative Statement shall be in sufficient detail to clearly show the contractor's intention.

1.6.2 Within 15 days of the Engineer's consent to the Initial Works Program, the contractor shall submit to the Engineer an expanded and more detailed version of the Initial Works Program containing all of the information and detail required under Clause 1.4 and 1.5 above.

1.6.3 Such submission shall make use of the Program submitted earlier but refined to include the best estimates of dates for the work of Designated Contracts which has impact on the contractor's program. Such programs shall be amended subsequently to incorporate the actual dates / schedule of the affecting contracts. It is the contractor's responsibility to ensure timely co-ordination with the Designated Contractors to finalize the Initial Program, without affecting progress of the work.

1.7 Works Programme Revisions

1.7.1 The contractor shall immediately notify the Employer and the Engineer in writing of the need for any changes in the Works Program, whether due to a change of intention or of circumstances or for any other reason. Where such proposed change affects timely completion of the Works or any other Key Date the contractor shall within fourteen (14) days of the date of notifying the Engineer submit for the Engineer's consent its proposed revised Works Program and accompanying Narrative Statement. The proposed revised Works Program shall show the sequence of operations of any and all works related to the change and the impact of changed work or changed conditions.

1.7.2 If at any time the Employer /Engineer considers the actual or anticipated progress of the work reflects a significant deviation from the Works Program, he may request the contractor to submit a proposed revised Program which together with an accompanying Activity Report and Narrative Statement, shall be submitted by the contractor within fourteen (14) days after the Engineer's instruction. The proposed revised Works Program shall show the sequence of operations of any and all work related to the change and the impact of changed work or changed conditions. Revisions should not affect the overall completion of the project.

1.7.3 All activities that have negative float must be analyzed by the contractor to identify the impact on the timely completion of the Works or on the achievement of Key Dates.

1.8 Three-Month Rolling Programme

1.8.1 The Three-Month Rolling Programme shall be an expansion of the Detailed Works Program, covering sequential periods of three months. The Three-Month Rolling Program shall provide more detail of the contractor's plan, organization and execution of the work within these periods. In particular, the contractor shall expand each activity planned to occur during the next three (3) month period, if necessary, to a daily level of detail.

1.8.2 The Three-Month Rolling Program shall be developed as an MSP / Primavera network, and shall be presented in bar chart and time-scaled network diagram format. Bar charts shall be presented on an A4 and time-scaled networks diagrams on an A3 size reproducible media. Tasks in the program shall be derivatives of and directly related to tasks in the approved Works Program.

1.8.3 The contractor shall describe the discrete work elements and work element inter-relationships necessary to complete all works and any separable parts thereof including work assigned to sub-contractors within the contract period.

1.8.4 Activity duration shall not exceed two (2) weeks unless and otherwise consent of Engineer is granted.

1.8.5 Each activity in the Three-Month Rolling Program shall be coded, or described so as clearly to indicate the corresponding activity in the Works Program.

1.9 Three-Month Rolling Programme Revisions and update

1.9.1 The Three-Month Rolling Programme shall be extended forward each month as described under Clause 1.8.1 above. Each submission of the Three-Month Rolling Program shall be accompanied by a Program Analysis Report, describing actual progress to date, and the forecast for activities occurring over the next three-month period in order to achieve progress as per the approved Works Program.

1.9.2 If the Three-Month Rolling Program is at variance with the Works Program, the Program Analysis Report shall be accompanied by a supporting Narrative Statement describing the contractor's plan for the execution of the activities to be undertaken over the three-month period, including program assumptions and methods to be employed in achieving timely completion.

1.9.3 The contractor shall revise the Three-Month Rolling Program or propose revisions of the Works Program, or both, on a monthly basis to ensure consistency between them.

1.9.4 Three-Month Rolling Program (revised) to be submitted on a monthly basis by 5th of every month with respect to the progress achieved by the last day of the previous month. A penalty of ₹. 100,000 / - (Rupees One Lakh) per instance will become applicable to the contractor for non-submission of the revised Three-monthly rolling program as per above clauses, irrespective of the causes lead to variances if any and the penalty will be **deducted in the subsequent IPC which will be non-refundable.**

1.10 Weekly review

Once a week, on a day mutually agreed to by the Engineer and the contractor, a meeting will be held to assess progress by the contractor during the previous week, progress review which will also be attended by the programs Expert and the contractor's Program Engineer. The contractor shall submit a construction schedule listing activity completed and in-progress from the previous week and the activities scheduled for the succeeding two weeks based on the detailed Works Program. Copies of the schedule shall be submitted on A3 sized papers.

1.11 Project Calendar

For the Project, the contractor shall adopt 7 days a week calendar, identical calendar for the purpose of programming and Execution of Works. Official documents shall be transacted during 6 days' week – Monday through Saturday. For Project purposes, a week begins at 00:01 hours on a Monday and ends at 23:59 hours on a Sunday. The completion of an activity or the achievement of an event when given a week number shall be taken to mean midnight on the Sunday at the end of the numbered week. An access date or activity start date when given as a week number shall be taken to mean 00:01 hours on a Monday of the Numbered week.

1.12 Programming Personnel

The contractor shall submit, as part of its Staff Organization Plan, the names and required information for the staff to be employed on Works Programming. The principal Works Programmer shall hold reputable professional qualifications acceptable to the Engineer including at least five (5) years relevant experience in programming civil engineering works. Others in the group shall have at least three (3) years' experiences in such work. The programmers shall be employed by the contractor full time on the Contract until the completion or such earlier time the Engineer may give his consent.

1.13 Programme and Report Submission Format

The contractor shall submit one (1) original and six (6) copies and one (1) reproducible (for Programs) of all submissions to the Engineer. All submissions shall be in A0, A1, A3 or A4 size, as appropriate except as may otherwise be agreed by the Engineer. In addition, the computerized program and report shall be submitted in compatible discs. The format for all Program and Report submissions shall be strictly in accordance with the format as stated herein or as requested by the Engineer.

2. MONTHLY PROGRESS REPORTS

2.1 General

The contractor shall submit to both the Employer and the Engineer, a Monthly Progress Report, in a format approved by the Employer. The format may be modified any number of times by the Employer and the revised formats shall be followed by the contractor from the date of advice of the same by the Employer. This Report shall be submitted by the end of each calendar month and shall account for all work actually performed from 26th day of the last month and up to and including the twenty-fifth (25th) day of the month of the submission. The above days (i.e., 26th and 25th) may be modified by the Employer. It shall be submitted in a format to which the Employer shall have given his consent and shall contain sections / sub-sections for, but not be limited to, the topics listed in clauses below.

2.2 Physical Process

a) It shall describe the status of work performed, significant accomplishments, including critical items and problem areas, corrective actions taken or planned and other pertinent activities, and shall, in particular, address interface issues, problems and resolutions.

b) It shall include a simplified representation of progress measured in percentage terms compared with percentage planned as derived from the Works Program.

2.3 Programme Update (For Entire Project)

Programme updating shall include

(a) The monthly Program Update which shall be prepared by recording actual activity completion dates and percentage of activities completed up to the twenty-fifth (25th) of the month together with estimates of remaining duration and expected activity completion based on current progress. The above day (i.e., 25th) may be modified by the Employer. The Program Update shall be accompanied by an Activity Report and a Narrative Statement. The Narrative Statement shall explain the basis of the contractor's submittal:

(i) Early Work and Baseline Submittals – explains determination of activity duration and describes the contractor's approach for meeting required Key Dates as specified in the Contract.

(ii) Updated Detail Program Submittals – state in narrative the Works actually completed and reflected along Critical Path in terms of days ahead or behind allowable dates. Specific requirements of narrative are:

1. If the Updated Detailed Work Programme indicates an actual or potential delay to Contract Completion date or Key Dates, identify causes of delays and provide explanation of Work affected and proposed corrective action to meet Key Dates or mitigate potential delays. Identify deviation from previous month's critical path.
2. Identify by activity number and description, activities in progress and activities scheduled to be completed.
3. Discuss Variation Order Work Items, if any.

(b) The Program Status which shall: -

(i) Show Works Program status up to and including the current report period, display Cumulative progress to date and a forecast of remaining work.

(ii) Be presented as a bar-chart of size A3 or A4 and as a time-related logic network diagram on an A1 media, including activity listings.

(c) The Activity Variance Analysis which shall analyze activities planned to start prior to or during the report period but not started at the end of the report period as well as activities started and / or completed in advance of the Works Program.

2.4 Three Month Rolling Program

The monthly issue of the Three-Month Rolling Program.

2.5 Financial Status

It should include following

a) A narrative review of all significant financial matters, and actions proposed or taken in respect to any outstanding matters.

b) A spread sheet indicating the status of all payments due and made.

c) A status report on status of extra items, if any

2.6 Status of Claims

A report on of the status on any claims outstanding. The report shall in particular provide interim updated accounts of continuing claims.

2.7 Milestones / Key Dates Status

A report on the status of all milestones / key dates due to have been achieved during the month and forecasts of achievement of any non-achieved key dates and those due in the next month, with explanatory remarks for not achieving them.

2.8 Resources Status

2.8.1 The contractor shall submit to the Engineer each month a detailed list by trade classification, of manpower employed during the report period, stock of all major construction materials as also a list of all serviceable major items of construction plant and equipment on site including those which are proposed to be mobilized during the next month.

2.8.2 A report on the status of deployment of all key personnel and other manpower by trade

Vis – a - Vis their deployment schedule and explaining constraints if any.

2.8.3 Status of stock of all the major construction material vis -a- vis its requirements for next month.

2.8.4 Status of all serviceable major construction plant and equipment at site.

2.9 Procurement Report

2.9.1 A summary of all significant procurement activities during the month, including reasons of delay (if any) and action taken to overcome problems.

2.9.2 A report listing major items of plant and materials which will be incorporated into the Works. The items shall be segregated by type as listed in the Specifications and the report should show as a minimum the following activities:

(a) purchase Order Date – Scheduled / Actual,
(b) manufacturer / Supplier and Origin,
(c) letter of Credit Issued Date,
(d) manufacturer / Supplier Ship Date – Scheduled / Actual,
(e) method of Shipment,
(f) Arrival Date in India – Scheduled / Actual.
(g) Arrival date at site and commissioning date

The report should also explain the delays (if any) in arrivals of the major equipment at site and the actions taken by the contractor to expedite the same and the measures proposed to makeup the time loss.

2.10 Production and testing

It should include following:

(a) A review of all production and manufacturing activities during the month.
(b) Summaries of all production and manufacturing outputs during the month together with forecasts for the next month.
(c) Review of all testing activities (both at site and at the manufacturer's premises) during the month.

2.11 Safety

A review of all safety aspects during the month including safety inspections / audits, reports on all accidents and actions proposed to prevent further occurrence.

2.12 Environment

A review of all environmental issues during past month shall include all monitoring reports, mitigation measures undertaken, and activities to control environmental impacts.

2.13 In case of failure of the contractor to make submissions as per section 1.4 herein above, the Employer / Engineer will retain 5% of the due progress payment till the submissions. For non-submission of Monthly Update and Progress Reports as per Clause 2 herein above, the Employer / Engineer will retain 5% of the due progress payment in each case, which shall be released upon submission of the same. In case the submissions are not made in the month it is due, the retained payment would be released only in the next Monthly Running Bill.

APPENDIX-02
METHOD OF MEASUREMENTS FOR PERMANENT WORKS

1. INTRODUCTION

1.1 The detailed procedure to be followed for the recording of measurements and for the preparation and passing of contractors Bills for permanent works is set out in the following paragraphs.

2. MEASUREMENT OF WORKS

2.1 General

2.1.1 Measurements shall be taken at such intervals as are found necessary or convenient. Generally, one bill will be preferred in a month or as specified in the contract.

2.1.2 Entries should be made only in ink, and no entry should be erased or defaced so as to make it illegible. Correction of mistake, if any, shall be made by neatly crossing out the incorrect entry and rewriting and correct words or figures. All such corrections should be initialed by the contractor's Engineer as well as by the Engineer's Representative at site.

2.1.3 Format of Record of Measurements sheets and procedure for issue of these measurement sheets will be as decided by Employer in consultation with the Engineer.

2.1.4 Before starting the earth work for embankment, cutting, bridge excavations etc., the initial ground levels shall be taken jointly along with engineer.

2.2 Items for which Good-for-Construction GFC Drawing is issued

2.2.1 As soon as the Good-For-Construction GFC drawing for a work is issued, the contractor will calculate the details of quantities of various items of PRICE SCHEDULE involved, in a format approved by Engineer, and submit the calculations and schedule of quantities to the Engineer / Engineer's Representative and get them approved for the drawing.

2.2.2 Once the schedule of quantities is thus approved, the contractor will submit five copies of the approved schedule to Engineer's Representative in an approved format.

2.2.3 The contractor will submit his payment claims based on the approved schedule of quantities along with certification of actual work done as per specifications, drawings and contract conditions and within the tolerances as specified. Measurement will be entered in Record of Measurement Sheet duly signed jointly on each page by contractor's authorized qualified engineer and Engineer's Representative.

2.2.4 Abstract of measurement will be prepared by the contractor in the approved form based upon these measurements.

2.3 Items for which Good-For-Construction GFC Drawing is not issued

2.3.1 For all such works, whose measurement cannot be calculated from any Good-For-Construction (GFC) drawing, all measurements will be taken by the contractor's authorized qualified Engineer in the presence of the Engineer's Representative at site. These measurements will be recorded on approved form of Record Measurement Sheet and signed jointly by contractor and Engineer's Representative.

2.3.2 Contractor will ensure that a properly qualified Engineer is deputed for taking measurements and also that all the measurements taken are witnessed and signed by the Engineer's Representative.

2.3.3 All measurements should be recorded at site on the Record of Measurement Sheet in the presence of the Engineer's Representative.

2.3.4 Each Measurement Sheet should be signed by the contractor's Engineer as well as by the witnessing Engineer's Representative.

2.3.5 Based on the recorded measurement, the contractor shall prepare abstract of quantities in the approved format.

APPENDIX-03

I. QUALITY ASSURANCE

1.1 General

The contractor shall implement a Project Quality Management Plan in accordance with ISO-9001 "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. This plan shall apply to all activities related to the quality of items, including designing, purchasing, inspecting, handling, assembling, testing, storing, and shipping of materials and equipment and different elements of construction work and installations of system components.

The Quality Plan to be prepared by the contractor and submitted to the Engineer shall follow the requirements of ISO 9001 and address each element therein. This Quality Plan / QA manual, specific to this work must be submitted within one month of award of contract.

Running on account payment will be released after the following milestones are achieved and Engineer has issued a 'Notice of No Objection' or a Notice of No Objection subject to (specifying the condition)'.

a. Release of on-account payment after two months of signing the contract agreement – On submittal of QA Manual duly approved by Engineer. Otherwise, 10% of the running bill be withheld till compliance.
b. Closure of Non-conformance Report – Action taken on non-compliance and its closure to be ensured within 15 days of issue of non-conformance report. In case of non-closure of report, running on-account bill will be withheld @ 1 % of amount for every non closure, till the same are closed satisfactorily.
c. Release of on-account payment after four months and thereafter every 3 months from the date of start of work – On submittal of Internal Quality Audit Report duly reviewed by Engineer and Action Taken Report. Otherwise, 10% of the running bill be withheld till compliance.
d. Release of Final bill
    i) Closure of all non-conformance Report
    ii) Submittal of all quality documented record pertaining to monitoring and accountability including QA Manual & Procedures

Registration of the contractor's organization, or subcontractors or sub-consultants is not required for this Project but the Project Quality Management Plan as submitted shall meet the intent of the ISO 9001 requirement in that there is a comprehensive and documented approach to achieving the project quality requirements.

1.2 Quality Assurance Management Plan

The Project Quality Management Plan (PQMP) shall as a minimum address the quality system elements as required by ISO 9001, generally noting the applicability to the contractor's Works Program for the Project. Procedures or Quality Plans to be prepared by others (Suppliers, Subcontractors, and Sub-consultants) and their incorporation in the overall PQMP shall be identified.

The contractor shall provide and maintain a Quality Assurance Plan (QA) to regulate methods, procedures, and processes to ensure compliance with the Contract requirements. The QA Plan, including QA written procedures, shall be submitted to the Engineer for his review.

Adequate records shall be maintained in a readily retrievable manner to provide documented evidence of quality monitoring and accountability. These records shall be available to Employer at all times during the term of the Contract and during the Defects Liability Period and for a five-year period thereafter.

The Plan shall identify:

a. Design Process: that control, check and verify the accuracy, completeness and integration of the design shall be performed by certified personnel and in accordance with documented procedure that have the written consent of the Engineer.

b. Special Processes: that control or verify quality shall be performed by certified personnel and in accordance with documented procedures that have the written consent of the Engineer;

c. Inspection and Test: Inspection and testing instructions shall provide for reporting non-conformances or questionable conditions to the Engineer; Inspection shall occur at appropriate points in the installation sequence to ensure compliance with drawings, test specifications, process specifications, and quality standards. The Engineer shall designate, if necessary, inspection hold points into installation or inspection planning procedures;

d. Receiving Inspection: These procedures shall be used to preclude the use of non-conforming materials and to ensure that only correct and accepted items are used and installed;

e. Identification and Inspection Status: a system for identifying the progressive inspection status of equipment, materials, components, subassemblies, and assemblies as to their acceptance, rejection, or non-inspection shall be maintained;

f. Identification and Control of Items: an item identification and tractability control shall be provided;

g. Handling, Storage, and Delivery: provide for adequate work, surveillance and inspection instructions.

h. The Plan shall ensure that conditions adverse to quality such as failures, malfunctions, deficiencies, deviations, and defects in materials and equipment shall be promptly identified and corrected.

i. The Plan shall provide for establishing, and maintaining an effective and positive system for controlling non-conforming material including procedures for the identification, segregation, and disposal of all non-conforming material. Dispositions for the use or repair of non-conforming materials shall require the Engineers consent.

1.3 Plan Implementation and Verification

The Plan shall clearly define the QA Organization. Management responsibility for the QA shall be set forth on the contractor's policy and organization chart. The Plan shall define the requirements for QA personnel, their skills and training. Records of personnel certifications shall be maintained and monitored by the QA personnel. These records shall be made available to the Engineer for review, upon request.

The QA operations shall be subject to the Engineers, Employer or Employer's authorized representative's verification at any time, including: surveillance of the operations to determine that practices, methods and procedures of the plan are being properly applied; inspection to measure quality of items to be offered for acceptance; and audits to ensure compliance with the Contract documents.

The contractor's Quality Audit Schedule shall be submitted to the Engineer for consent every three months or more frequently as required.
The results of Quality Audits shall be summarized in the contractor's monthly reports.
The contractor shall provide all necessary access, assistance, and facilities to enable the Engineer to carry out on-site and off-site surveillance of Quality Assurance Audits to verify that the quality system which has the consent of the Engineer is being implemented fully and properly.

APPENDIX-04

ORGANISATION CHART AND KEY POSITIONS

The contractor shall provide the following organization chart for the Works as follows:

Head office Organization Chart

One organization chart shall be provided for the contractor head office indicating the management and staff structure, with responsible personnel / departments described for all aspects of the work.

Site organization Chart

The contractor shall provide the proposed site organization indicating the proposed structure, staff partners and positions necessary to adequately manage and control the Works.

The contractor shall have a competent team of Managers, Engineers, Technical staff etc. so as to complete the work satisfactorily as per various requirements of the contract.

The Key Positions (not limited to) and corresponding qualification and experience are as under:

Sl. No	DESIGNATION	QUALIFICATION	EXPERIENCE LEVEL (FOR SIMILAR WORKS)	MIN. NO. REQUIRED
1	Project Manager (Team Leader)	Bachelor's Degree / Post Graduate Degree in Civil Engineering	Minimum18 years total experience and 5-year experience in the role of Project Manager in the execution of similar type of work	1
2	Deputy Project Manager / Construction Manager	Bachelor's Degree in Civil Engineering / Diploma in civil Engineering	Experience level: a) Bachelor's Degree in Civil Engineering Minimum 12 years total experience and 5-year experience in the role of Construction Manager in the execution of similar type of work. b) Diploma in Civil Engineering Minimum 15 years total Experience and 8 years' experience in the role of Construction Manager in the execution of similar type of work	8
3	Design Manager	Bachelor's Degree in Civil Engineering and Post Graduate Degree in Structural Engineering	Minimum 15 years total experience and 10-year experience in the role of Design Manager in the execution of similar type of work	2
4	Deputy Project Manager / Construction Manager for Mechanical & Electrical	Bachelor's Degree in Mechanical Engineering	Minimum 12 years total experience and 8-year experience in execution of similar type of work.	2
5	QA &QC Manager.	Bachelor's Degree in Civil Engineering	Minimum 12 years total experience and 8-year experience in the role of QA&QC Manager in the execution of similar type of work.	2

Sl. No	DESIGNATION	QUALIFICATION	EXPERIENCE LEVEL (FOR SIMILAR WORKS)	MIN. NO. REQUIRED
6	Chief Safety and Health Manager	Bachelor's Degree in Engineering & Diploma in Safety Course.	Minimum 10 years total experience and 8-year experience in the role of Chief Safety and Health Manager in the execution of similar type of work.	3
7	Traffic Coordinator	Bachelor's Degree in Civil / Transportation Engineering	Minimum 10 years total experience and 5-year experience in the role of Traffic Coordinator in the execution of similar type of work.	4
8	Interface manager	Bachelor's Degree in Civil / Mechanical / Electrical Engineering	Minimum 10 years total experience and 5-year experience in the role of Interface manager in the execution of similar type of work.	2
9	Planning Manager	Bachelor's Degree in Civil Engineering with Knowledge of M.S Project/Primavera/equi-valent Software	Minimum 12 years total experience and 5-year experience in the role of Planning Engineer in the execution of similar type of work.	2
10	Geotechnical Engineer	M.Tech in Geotechnical Engineering	Minimum 8 years total experience and 3-year experience in the role of Geotechnical Engineer in the execution of similar type of work.	2
11	Billing Engineer / Quantity Surveyor.	Graduate / Diploma in Civil Engineering	Total minimum experience of 5 years with knowledge of computer applications for Degree and 8 years for Diploma with knowledge of Computer applications.	2
12	Procurement Specialist	Graduate / Diploma in Civil Engineering	Minimum 5 years in relevant field.	2
13	Senior Civil Engineer	Bachelor's Degree in Civil Engineering	Total minimum 7 Years for graduate & 10 years for Diploma in relevant field.	15
14	Civil Engineer	Bachelor's Degree in Civil Engineering / Diploma in Civil Engineering	Experience level: a) Bachelor's Degree in Civil Engineering Minimum 5 years. b) Diploma in Civil Engineering Minimum 8 years	28
15	Electrical and Mechanical Engineer	Bachelor's Degree in Electrical / Mechanical Engineering	Total minimum experience 5 Years	5
16	Junior Civil Engineer	Diploma in Civil Engineering	Total minimum experience 4 Years	50

Sl. No	DESIGNATION	QUALIFICATION	EXPERIENCE LEVEL (FOR SIMILAR WORKS)	MIN. NO. REQUIRED
17	JE (Electrical and Mechanical)	Diploma in Electrical / Mechanical Engineering	Total minimum experience 4 Years	6
18	Safety Engineer / Officers	Bachelor's Degree in Civil Engineering & Diploma in Safety Course	Total minimum experience 5 Years	14
19	BIM Engineer	Bachelor's Degree in Civil Engineering / Diploma in Civil Engineering	Total minimum 10 Years for graduate & 12 years for Diploma in relevant field. (BIM Experience in Metro / Railway / Suburban / Building project implementation is preferable).	2
20.	Environmental Engineer	Bachelor's Degree in Civil Engineering and M.Tech in Environmental Engineering.	Total 10 Years & Minimum 4 years in Metro / Railway / Highway / Infrastructure works.	2

NOTES:

1. The above categories of key positions shall be minimum required for successful completion of the work which shall be deployed at different points of time as per the progress and requirement of work and may not be required to deploy simultaneously and continuously. However, these personnel shall be deployed at site in advance as per requirement and as directed by the Engineer and the decision of Engineer in this regard shall be final and binding. The above Manpower deployment plan shall be submitted by the contractor within 14 days of award of work and shall be approved by the Employer.
2. The contractor shall submit the CVs of the above key positions to Employer for approval within 28 days of issue of letter of Acceptance (LOA).
3. The contractor shall deploy resources as per the above-mentioned minimum requirement and also confirm to deploy manpower over and above the minimum numbers indicated above, if the work requires so.
4. The performance of project personnel deployed will be evaluated periodically by the Employer during the contract period. In case the performance of any of the project personnel is not satisfactory, the contractor shall replace them with better or equivalent personnel immediately as per the directions of the Employer.
5. The tenderer may propose any number of names of Personnel for each Key Position. Any of the proposed personnel as approved by the Employer for each key position shall be mandatorily deployed in case of award of work.
6. Non-deployment of the Key personnel as per approved personnel for Sl.no 1,2,6 &10 as per approved man power plan leads to imposition of Penalty of Rs 2,00,000 / - Per Key personnel per month. For other personnel, a penalty of Rs. 50,000 / - per person per month shall be levied.
7. The proposed Key personnel shall not be changed till the completion of the work. Under emergent circumstances, in case they are required to be changed, the new incumbent should have similar or better experience and qualification than as required above. These changes are permitted only with the approval of the Employer. Change in key personnel for one time without penalty is permitted. However,

for subsequent changes there will be Penalty at Rs 2,00,000 / - Per Key personnel for Sl.no 1,2,6 &10, unless the change is desired by the Employer.

8. All Key Personnel must be permanently stationed at Bengaluru till the completion of the work.
9. The penalties imposed are non-refundable.

APPENDIX-05

PLANT AND EQUIPMENT

Key and Critical Equipments

S. No.	Type of Equipment required for the work	Proposed to be Deployed (Minimum)	Remarks
1.	Piling Equipment Rotary Rig / Hydraulic Rig for soil boring and rock boring including diamond bits for rock boring.	12 nos.	50% own+50% Lease / Hire
2.	Piling rig (Tripod) with conventional winch	24 nos.	50% own+50% Lease / Hire
3.	Fully Automatic and Computerized Batching Plant -1 nos. (2 of 60 Cum / h) and (2 of 30 Cum / h) minimum or equivalent capacity in different configuration at casting yard with a RO of suitable capacity for proper quality of water.	4 nos.	50% own+50% Lease / Hire
4.	Concrete boom placers	4 nos.	50% Own+50% Lease / Hire
5.	Concrete pumps with sufficient pipes	8 nos.	50% own+50% Lease / Hire
6.	Transit Mixers	24 nos.	50% own+50% Lease / Hire
7.	Launching Girder to Launch Box segments as per site requirements (Maximum permissible age in years is 10 Years).The suitable launcher for U-girder launching fully automatic, capable of negotiating 200m radius curve and 3% gradient, speed of trolly 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 motorized bogies for handling and transportation of U-girders to be mobilized.)	6 nos.	50% own+50% Hire / Lease
8.	Crane of suitable capacity for Erection of LG Girders, / U Girders / Box Girders.	4 nos.	50% own+50% Hire / Lease
9.	Cranes in casting yard / site of suitable capacity	6 nos.	50% own+50% Hire / Lease
10.	Gantry of suitable capacity in casting yard	10 nos.	50% own+50% Hire / Lease
Road work, Embankment and cutting works.			
11.	Hydraulic excavator (1 cum bucket)	12 nos.	50% own+50% Lease / Hire
12.	Tippers / trucks (10 / 14 cum capacity)	60 nos.	50% own+50% Lease / Hire
13.	Dozer of suitable capacity	10 nos.	50% own+50% Lease / Hire

S. No.	Type of Equipment required for the work	Proposed to be Deployed (Minimum)	Remarks
14.	Front end loader with suitable capacity	10 nos.	50% own+50% Lease / Hire
15	Vibratory roller 8 / 10-ton capacity	10 nos.	50% own+50% Lease / Hire
16.	Smooth wheeled roller 10-ton capacity	6 nos.	50% own+50% Lease / Hire
17.	Water tanker of 6000 lit capacity	10 nos.	50% own+50% Lease / Hire
18.	Motor Grader	10 nos.	50% own+50% Lease / Hire
19.	Back hoe loader of suitable capacity	6 nos.	50% own+50% Lease / Hire
20	Plate Vibratory Roller	5 nos.	60% own+40% Lease / Hire
21	Slope Compactor Roller	6 nos.	50% own+50% Lease / Hire

(I) Other Plant and equipment to be deployed The Tenderer shall furnish the details of Own basis or Lease / Hire basis for the following equipment

Sl. No.	Type of Equipment Required for the Work	Proposed to be Deployed (Minimum)	Remarks
1	Pile cap Shutters	24 sets	
2	Pier and pier cap Shutter, staging and supporting arrangement for all type of Piers	24 Sets	
3	Pre cast Post tension shutter staging support for Casting of Pier caps	10 Beds with Shutters	
4.	Pre cast post-tension I Girder Beds along with necessary shutter and support arrangements	8 Beds with Shutters	
5.	Portal shuttering & staging of required capacity in Viaduct	8 nos.	
6.	Minimum number of pre-casting beds for Box / U girders along with shutters and supporting for straight and curved spans.	9 nos. of long line and 9 nos. for S1 Segments.	
7.	250 MT or more capacity suitable cranes for erection of I Girders / RCC Portals, super structures of Viaduct work	4 nos.	
8..	Trolley to transport U / Box Girder of 200 MT weight over the erected span	4 nos.	
9.	Trailers / MAV for carrying U Girder / Box segments of Suitable capacity as per site requirement	12 nos.	

Sl. No.	Type of Equipment Required for the Work	Proposed to be Deployed (Minimum)	Remarks
10	Trailers / MAV for carrying I Girders / Pier caps and other Precast elements of Suitable capacity as per site requirement	4 nos.	
11	Gantry for parapet erection	4 sets	
12.	Man-lift for adequate height	10 nos.	
13.	Parapet, Crash Barriers & Friction slab Shutters	6 Sets	
Road work, Embankment and cutting works.			
14	Crane 5 MT capacity	4 nos.	
15.	Crane 35 MT capacity	10 nos.	
16.	Generators 125 KVA	10 nos.	
17	Pneumatic road roller	3 nos.	
18	Tandem road roller	3 nos.	
19	Survey equipment's: Total stations and auto level	5 sets	

NOTE: Plant and equipment indicated above is minimum to be deployed at appropriate stage of the work. However, depending on the requirement to complete the work within the stipulated completion period the Tenderer shall deploy additional machinery as circumstances warrant at no extra cost. Plant and machinery above shall not be older than 5years. In case of failure of any plant and machinery deployed at site the same shall be repaired / replaced within 7 days from the time of failure.
The tenderer shall submit the copies of ownership of the equipment, in case of hire / purchase, copies of MOU with the supplier / owner of the equipment.

NOTES:

1. The above type of plant and equipment (but not limited to) may be required for execution of the work. The contractor shall submit the details of plant & equipment to be deployed in the above table within 28 days of issue of LOA to the Engineer for approval.
2. Plant and Equipment indicated above is minimum to be deployed at appropriate stage of the work. However, depending on the requirement to complete the work in the stipulated completion period, the tenderer should deploy additional machinery as circumstances warrant at no extra cost.
3. Plant and equipment to be mobilized for the work shall be in good serviceable condition.
4. The contractor will be penalized as deemed fit by the Employer, in case of any shortage.

APPENDIX-06

OFFICE ACCOMMODATION, EQUIPMENT AND PERSONNEL

1.0 Accommodations for the Employer & Engineer (earmarked separately) with sufficient natural light & ventilation with the layouts, designs, materials, appliances, personnel etc. approved by GM / L,PC&C 4/K-RIDE

1.1 The contractor shall provide the following offices within the time limits specified (Refer Annexure 1C for details of Liquidated Damages, in case of delay beyond the limits):

1.1.1 Project office accommodation of at least 1200 sqm (with at least 30% of specific area decided by the Employer, air-conditioned) spread across 4 Project Offices (the minimum number mentioned in the scope) for the Employer & Engineer with air-conditioned cabins for senior officials of Employer and Engineer (as decided by the Employer) and conference halls, as per the approved drawings. Each Project Office shall have separate areas/buildings ear marked for Employer & Engineer, as approved by the Employer. Distribution and periodical redistribution of the above area in different offices will be done by the Employer as per the need.

1.1.2 Site office accommodation of at least 160 sqm (with at least 30% of specific area decided by the Employer, air-conditioned) spread across 2 Site Offices (the minimum number mentioned in the scop) at/near casting yards for the Employer & Engineer with cabins, as per the approved drawings. Each Site Office shall have separate areas ear marked for Employer & Engineer, as approved by the Employer. Distribution of the above area in different offices will be done by the Employer as per the need.

1.2 In addition to the above area, covered parking facility shall be provided exclusively for the cars of Employer & Engineer for at least 10 Cars at each Project Office and for at least 4 Cars at each Site Office. There shall be a portico or a basement (basically, a covered area from the location of getting off the car to the entrance of the office), so that officials do not get drenched during heavy rain, while entering the offices.

1.3 The above total area of 1200 Sqm. For project offices and 160 Sqm. For Site offices, mentioned above, is considering 4 Project offices and 2 Site offices. If there is an increase in this number as per the need, additional area @ at least 300 Sqm for each additional Project office and @ at least 80 Sqm for each additional Site office shall be provided.

1.4 Small or eensy-weensy, cramped, grungy, shabby, dribbling, shoddy sheds/cabins with temporary/inferior materials/furnishings will not be allowed as project/site offices, even temporarily.

1.5 The following specifications shall be followed for various items of the Project / Site office earmarked for Employer/Engineer. All the requirements mentioned above and below are minimum requirements and shall be complied with. These are not exhaustive and any associated specification for any other relevant item can be specified by the Employer later by GM / K-RIDE. Superior specifications / materials than those specified can be used with the approval of GM / K-RIDE.

i. False Ceiling:

a. GI-powder coated (T & L) grid system and high-density fiber reinforced Cement board of approved brand, texture, colour & quality of size (1200 x 1200) mm, 6mm thick are having density of 1250 Kg / m3 conforming to ASTM-E84, ISI 14862-2004, respectively

ii. Doors:

a. 2.1 m X 1.2 m Teak wood door – (Main Door); Brass Fittings; PVC Doors or any other approved doors for toilets

b. Doors of approved material shall be provided for the cabins of various senior officials of Employer & Engineer and for the conference hall.

iii. Windows:

a. UPVC/Aluminum windows 3 track Sliding windows with M.S grill; frames with metal mosquito nets (gap-less) in one track

iv. Tiles:

a. Vitrified tiles (Scratch Proof) / Wooden flooring of approved brand & quality for office cabins & common rooms; Antiskid tiles of approved brand & quality for the floors of bath rooms

v. Toilets, Plumbing & Sanitaryware:

CPVC pipes for internal work and PVC pipes for outer walls (2.5'' PVC pipes)

All Fittings shall be of ISI standard. Ceramic Fittings of approved brand & quality shall be provided for all sanitaryware of washrooms & washbasins. All plumbing fittings, doors, handles etc., shall be of approved brand & quality.

Attached washrooms with one wash basin with pedestal (or wall mounted) and a platform and one wall mounted EWC shall be provided for at least four cabins and for conference hall in each Project Office and for at least two cabins in each Site Office. The Employer may redistribute the above as per the requirement. In addition, at least one common toilet each with at least four urinals for men and at least two EWCs shall be provided near the common area in each Project Office. In addition, one exclusive toilet with one washbasin and one EWC shall be provided for Female staff in each Project Office / Site office. At least one attached washroom with one wash basin and one EWC shall be provided in one cabin in each Site office. At least one common toilet with at least two urinals and at least two EWCs shall be provided in each Site Office. In addition, one separate toilet (outside the building) with one washbasin and at least one IWC shall be provided in each Project Office and each Site Office for assistants, office boys/site attendants, drivers, mechanics, cleaning staff etc. By all means, uninterrupted clean water supply shall be ensured in all these toilets for all the 24 hours till the end of DLP. Handwash of approved quality shall be available on all wash basins and it shall be recouped as and when required. Hand towels of approved quality and colour shall be available on a towel rod / hanger near all wash basins and the same shall be got washed once in every 2-3 days, depending on the need. They shall be replaced as and when necessary.

All project offices / site offices and their premises and all the toilets (attached, common and outside) shall be maintained in a clean and hygienic condition by deploying dedicated staff for this purpose. The cleaning of all the toilets shall be done frequently (common toilets - once in about 2-3 hours). The exact frequency of cleaning of each toilet will be specified by the Employer based on the need in each Project office / Site office and the same shall be meticulously followed.

All the toilets shall be provided with mosquito nets and efficient & noise-less exhaust fans. The nets shall be periodically checked for any gaps, holes etc., through which mosquitoes can enter and the nets shall be always maintained hole-free and gap-free. The exhaust fans shall be always maintained in proper working condition.

The dimensions of toilets and disposition of openings and fittings shall be at least in accordance with the anthropometric data as per the relevant IS code(s).

vi. Electrical Wiring:

a. Concealed wiring with fire proof cables of IS standard, as directed, with approved materials

vii. Electrical Fittings & Appliances:

b. Switches, fans, Split type air conditioners of required tonnage (to suit the cabin concerned or the conference hall) and fluorescent ceiling lamps (LED / CFL) of sufficient lumen of approved brand, lumen & quality.

c. The outer units of split type air conditioners shall be sufficiently away from the cabins or conference halls, as approved by the Employer, so that the noise is not audible to the officials

viii. Painting:

Inside: primer one coat +2 coats of emulsion paint of approved brand and colour.

Oustside:1coat primer+2 coats of weather proof paint of approved brand and colour.

ix. Others:

a. Overhead water tanks with sufficient Head of water to ensure the required velocity for water supply; Septic tanks/ authorised connection to public sewerage system

x. Networking:

a. Wiring with CAT6E cable or superior, with switches and router connector point as per the approved Plan.

xi. Intercom: A system of intercom telephones, as specified and approved

1.6 The contractor shall provide at least the following furniture / facilities in each project office and site office for the use of Employer and Engineer:

a. Manager's Premium tables of approved brand, colour, texture, height & quality: size at least 5'x3' L-table with side cadenza complete with laminate finish - at least 4 nos. in each project office and at least 01 no. in each site office

b. Executive Tables of approved brand, colour, texture, height & quality: size at least 4'x3' table with side cadenza complete with laminate finish - in least 6 nos. at each project office and 02 nos. in each Site office

c. Conference Tables (20' x 6' approx.) of approved brand, colour, texture, height & quality with conference chairs: for 20 - person seating - 01 no. (in each project office)

d. Workstations of approved brand, colour, texture & quality with partitions up to the approved height: size 4'x 5'. Modular workstations green ply make with merino Laminate and storage cabinets - in least 8 nos. in each project office and at least 3 nos. in each site office.

e. Workstations of approved brand, colour, texture & quality with partitions up to the approved height: Modular size 4'x3' straight workstation with partition and storage. Cabinets under the working counter as per the approved plan-10 nos. (10 nos. in each project office)

f. High back High quality revolving Executive chairs of approved brand, colour, texture & quality with tiltable neck rest and adjustable hand rests (adjustable in 3 dimensions) and with fabric finish - at least 5 nos. in each project office (one for each cabin and one for each conference hall) and at least 01 no. in each site office

g. Medium back revolving chairs with hand rests of approved brand, colour & texture and quality with FRP finish- at least 30 nos. in each project office and at least 10 nos. in each site office (these include visitors chairs)

h. Low back revolving chairs of approved brand and quality with FRP finish - 24 nos. (for each Project office)

i. White magnetic boards and pin boards in each room / work stations, white board with stand & 4 white board markers of approved colours (to be recouped as and when needed) and one TV of approved size, brand and quality for projecting the presentations for conference room (for each Project Office)

j. Racks & shelves as per the requirement in all chambers and common area, as approved.

k. Supplying, erection, testing and commissioning of Off-Line UPS system suitable for operation with all accessories on sufficient power back up (with minimum backup time of 2 hours) including 12

V DC, AH Batteries in polypropylene container for UPS low maintenance tubular batteries, to meet the power load in case of power disruption (for project office). The system should be able to feed the power to all the desktop computers, printers etc. for at least 4 hours continuously.

l. Split type air-conditioners of approved make and quality - 1.0 Tonne capacity – at least 03 nos. (at least 02 nos. in each project office and at least 01 no. in each Site Office); 1.5 Tonne capacity - at least 04 nos. in each project office for cabins; 2 air conditioners of 1.5 Tonne or required capacity for each Conference hall in each project office.

In addition, the contractor shall provide the following for each Project/Site Office:

a. Telephones, intercom & High-speed Broad band Connection - 2 Land line connections + 10-line intercom with instruments & Broad Band Connection.
b. Digital color Photocopy Machine (Up to A3 size)- 01 no. of approved brand & quality
c. Refrigerator (290 Litre capacity) - 01 no. of approved brand & quality
d. Microwave oven – 02 nos. of approved brand & quality
e. Drinking Water Dispenser (Hot, Cold & Normal) - 01 no. of approved brand & quality
f. Tea / Coffee Dispenser - 01 no. of approved brand & quality
g. Standby DG Power - As required, to run and maintain the office for at least 6 hours.
h. Safety Helmets, Boots, and any other safety device - as per Requirement to be specified by the Employer / Engineer

NOTES: Though the above requirement of furniture and others is mentioned for each office, GM / K-RIDE may redistribute the total requirement as per the need of each quarter or earlier. Transporting the same from / to each project / site office each quarter or earlier, based on need, forms a part of the scope of the work. The sizes of a few tables, side racks etc. may be more or a little different from the sizes mentioned above, to suit the layout. The decision of the Employer is final in this regard.

In addition to the above, the following furniture, appliances, equipment, and tools are required combinedly for all the project/site offices (This is additional requirement for all the offices. Distribution and periodical redistribution of these to various Project & Site offices will be done by the Employer, as per the need). GM may alter the specifications depending on market availability, requirement and other site considerations etc.

i. Side units with table - 30 sets
ii. Filing cabinet (36 lockers unit) – 15 nos.
iii. Lockers cabinet (36 lockers unit) – 12 nos.
iv. Steel Cupboard - 12 nos.
v. Digital Camera – 01 No.
vi. Crockery including cups and saucers – 50 sets.

1.7 The contractor is required to maintain the offices till the end of DLP and to provide the following (but not limited to):

i. Timely pay all electricity/phone/water/high-speed Broad band charges (A nominated staff member of the contractor shall take care of timely payment without being reminded.)
ii. Timely provide all stationery items and consumables for office use and keep a reserve, as approved (A nominated staff member of the contractor shall take care of them and ensure reserve supplies.)
iii. Carry out all necessary repairs to office, equipment, appliances, toilet fittings immediately, as and when required, without any delay (A nominated staff member of the contractor shall daily inspect all of them and identify any problem and undertake repairs, even without being told.)
iv. Provide mineral water bottles as per the daily consumption of the staff (A nominated staff member of the contractor shall take care of them and ensure reserve supplies.)

v. Provide tea, coffee, snacks, sanitizers, tissue papers etc., as per the requirement and advice, during meetings/discussions and during late evening/early morning/night working etc. (A nominated staff member of the contractor shall take care of them, without any delay.)
vi. Arrange proper and safe conveyance (through four wheelers engaged for this purpose) to female staff working for Employer/Engineer, whenever the work gets delayed and whenever the situation warrants (as decided by the Employer) - (A nominated staff member of the contractor shall take care of them.)

1.8 Fire extinguishers shall be provided as per the recommendations of the Bengaluru City Fire Brigade.

1.9 To facilitate coordination for site activities, testing, inspections, liaison with other concerned agencies etc., the contractor shall provide two vehicles of approved make, model and quality along with drivers till the end of the contract period for each project office and each Site office and one till the end of DLP for each project office and each site office, to the Employer.

1.10 The contractor shall provide, erect, and maintain appropriate name boards, as specified, with approved materials, for each of the offices and cabins. The material of each name board, font size, font type, spellings etc. on each name board and their locations shall be as approved by the Employer before they are erected.

1.11 The contractor shall supply the following personnel within 30 days from the date of issue of LOA for the use of the Employer, till the end of DLP.

a) Watchmen: Round the clock at each Project / Site office
b) Office Assistant / Secretary: 08 nos.
c) CAD Operator / Technical Assistant: 03 nos.
d) Computer Programming Assistant: 04 nos.
e) Office boy cum Site attendant: 18 nos.

The candidature of all the above personnel shall be as personally approved by the GM/K-RIDE. Any inefficient / problematic personnel shall be replaced forthwith. The qualifications, expertise, allotment of work, working time, shifts, overlap time, grouping, seating arrangement and any other related matter will be as decided by the Employer. The decision of the GM/K-RIDE is final in all these regards. Proper approved safety equipment shall be provided for the site attendants.

2 Equipment for the use of Engineer and Employer:

The contractor shall provide the following new equipment and software at each Project/ Site office as listed and maintain them for the exclusive use of the Employer and the Engineer till the end of DLP (The distribution will be done by the Employer):

(a) Desktop Computers (with computer tables) – 06 nos. of approved brand & quality with cordless keyboards and cordless mice, as approved by the Employer. The computers shall be Intel core i7 or its latest generic descendent or higher, running at the specified and approved clock rate (Hyper technology) with no wait state, If the Central Processing Unit has no floating-point arithmetic capabilities, a math-coprocessor shall be installed.

A minimum of 256 megabytes with software configurable into extended memory and expanded memory. The expanded memory shall be one combo drive (DVD, R / CD RW), (7200 RPM);
22" color monitor – 04 nos. and 18" color monitor – 02 nos.

(b) Lap Top Computers with carry cases – 10 nos. of approved brand & quality – with at least 15.6" display, as approved by the Employer.

Both the desktop & laptop computers shall at least have the following specifications:

1. Processor: Intel core i7 or higher, 5.0 GHz (hyper technology) with in-built LAN, Modem, AGP card, Audio Card, and Wi-Fi Internet Card.

i. Cache Memory: 512 KB L2 cache
ii. Memory: 8GB DDR RAM Expandable up to 16GB

iii. Hard Disk: 1 TB or at least 500 GB - preferably SSD

2. At least 1920 X 1080 resolution, S3 VIRGE MX 3D Graphics Controller Chip, 64 Bit Graphics Accelerator, Bit BLT hardware
3. Pointing Device: 102 multimedia Keyboard Acupoint Point Device
4. Ports: 1 Parallel, 1 Serial, at least 2 USB Ports, PS / 2 Mouse / Keyboard, SVGA Video Port, Line in Jack, Headphone & External Microphone Jack, 1 Serial Infrared Port, USB port with Wi-Fi LAN.
5. Card Bus: 2 x PCMC1A Slots (Type II) or 1 x PCMC1A Slot (Type III) Card Bus ready.
6. Battery / Power: AC Adaptor / Li-Lon rechargeable battery with built in battery charger & Software Power Management.
7. OS / Software: Pre-installed Windows 11 professional or Mac OS as approved, latest version of MS office, Windows Utilities, Mediamatics Arcade Pak, Diagnostic Utilities, Ring Central, MS Internet Explorer, Norton Anti-Virus, Speech activated typing software, latest version of MS Project / Primavera (as approved).
8. Communication: 56 Kbps Integrated Fix / data Modem with V.90 support; Speakers
9. Carrying Case: Laptop carrying cases (for all the Lap top computers) of approved brand and quality.

NOTE: Recoupment of batteries of cordless keyboards and mice, as per the requirement, are included in the scope.

(c) Printers – 08 nos. (A4 size – 06 nos. and A3 size – 02 nos.)

At least one printer of A3 & three printers of A4 size shall be Colour; Two printers of A4 size shall be Laser Colour; Timely replacement of Toners/Cartridges with original ones, as per the consumption pattern

(d) Languages:

Python (latest version), Java and any other language as directed by the Engineer.

(e) Application Software:

(i) Microsoft office, latest release

(ii) A database management package as approved by the Employer

(iii) Latest licensed version of AUTOCAD Civil 3-D, for 05 users.

Project Management Package (Microsoft Project) / Primavera V. P6-2 licenses (1 Core Module and 1 Web based Module), as approved

Multimedia, as approved

(f) UPS system with sufficient power backup (with minimum backup time of 2 hrs.) to meet the power load in case of power disruption.

(h) Surge Protection Devices (one for each computer and printer as given above) Power supply for the systems is to be AC 240 volts, 50 Hz from normal building wiring circuit mains, Power regulator, stabilizer or transformer should be supplied by the contractor for the computer systems such that the systems can function efficiently.

(i) Four mice with cord (not cordless) for standby purpose.

NOTE: Though the above requirement of computers and others is mentioned for each office, GM / K-RIDE may redistribute the total requirement as per the need in each quarter or earlier and transporting

and reinstalling the equipment from / to each project / site office each quarter or earlier, based on need, forms a part of the scope of the work.

NOTES:

a. The items under Clause 2.0 above can be retained by contractor (except 2.0 (e)-Application Software) after the completion of the project/DLP, as specified.

b. The tenderer is supposed to take all the above requirements and the above retention clause into account while quoting the price. The above requirements are for effective execution and close monitoring of the progress and quality of work and the all the conditions and provisions will be enforced in letter and spirit.

3 Documentation

3.1 A complete set of documentation will be supplied with each System. The documentation should be self-tutorial in nature and be readily understood by non-computer personnel.

The following manuals shall be supplied with the system:

a. Manual on how to operate the equipment; and

b. Manual on how to use the facilities and software provided by the supplier. (Including languages and utilities)

4 Auto CAD Operator:

The contractor shall provide one sufficiently experienced Auto CAD operator with a separate desk top computer, 22" monitor, computer table, computer chair, keyboard, mouse and all other relevant items and software including licensed version of latest Auto CAD software exclusively for the Engineer till six months beyond the date of completion of contract. This is in addition to the requirement of CAD operators specified earlier. The candidature of the above personnel shall be as approved by the Employer.

APPENDIX-07

DOCUMENT SUBMISSION AND RESPONSE PROCEDURE

1. PROJECT MANAGEMENT INFORMATION SYSTEM (PMIS)

The contractor shall utilize a PMIS integrating 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 or electronically captured at the point of the origin and can be reproduced later, electronically and in hard copy. A similar link shall also be provided between the Engineer office at sit and the Employers office by the contractor.

All requisite training and periodical refresher courses of the above PMIS, to all the staff nominated by the Employer shall be organized by the contractor. The same is within the scope of this work.

IFC format (Industry foundation Classes):

IFC list format is a platform neutral format. Hence all / any BIM program used by tenderer should provide files in IFC format for interoperability between different BIM programs.

2. SUBMISSIONS TO THE ENGINEER

The general requirements are as follows:

2.1 PROJECT MANAGEMENT INFORMATION SYSTEM (PMIS)

1) The Employer will provide a web-based information management system of transmittal for formal project correspondence, documents, and information to ensure efficient information management on the Project. Where it is necessary to transmit original signed documents, these shall be acceptable forms of correspondence only when they have been issued via the system first.

2) The Employer will provide the Project-wide use of the system during the Design and Construction

Phases and also the Defects Notification Periods.

3) The system shall be capable of issuing a list of outstanding responses from the Engineer 7 days before the due date of the response.

2.2 DRAWING AND SPECIFICATION REGISTER

The contractor shall submit drawings and specifications register to the Engineer in electronic copy and hard copy with each submission of drawings and at an interval agreed by the Engineer. The drawings and specifications register shall be in a format submitted for review and agreed without objection by the Engineer and shall include each document reference number, version, date, title and data-file name.

3. RECORDS AND REPORTS

3.1 FORMAT

Reports and records shall be submitted via the system to the Engineer and shall be in a format agreed by the Engineer. Reports and records shall be signed prior to submission by the contractor's agent or by a representative authorized by the contractor.

3.2 PROJECT DOCUMENT CONTROL PROCEDURE

Within twenty-eight (28) days after Commencement Date, the contractor shall submit via the system a Project document control procedure to the Employer and Engineer for review, which shall include but not be limited to the following:

1) A document approval system which shall specify the level of authority for approval of all documents and material before submission to the Engineer;
2) A system of issuing documents to ensure that pertinent documents are issued to all appropriate locations;
3) A document change or re-issue system to ensure that only the latest revision of a document can be used; and
4) A submission identification system that identifies each submission uniquely by the following:
    a) contract number;
    b) discipline;
    c) submission number; and
    d) revision indicator.

3.3 PROJECT RECORD

Project records will eventually be used by the Employer to manage, operate and maintain the Works after the completion of the Project under construction and for future reference.

3.4 ADEQUACY OF THE PROJECT RECORD

The contractor shall submit the documents as required by the Engineer as Project records in full and on time. The Engineer shall determine the adequacy of the Project record. Any delay, beyond a reasonable limit, is liable for penalty, as deemed fit, by the Employer.

4. SUBMISSION AND RESPONSE PROCEDURE

4.6 GENERAL

Except where specific procedures are given for certain items, all submissions shall be submitted and reviewed according to the procedure laid down in the following clauses.

4.7 PROPOSAL

Each submission shall be accompanied by a brief introduction to explain which sub-system, part or section of the Works to which the submission refers, listing the documents enclosed with the

submission, and describing in outline how all relevant requirements of the Employer's Requirements are achieved by the proposals.

4.8 SUBMISSION RESPONSE REQUEST

For each stage of submittal, the contractor shall prepare a Submission Response Request (SRR) carrying the date of submission, the submission reference number as defined in Clause 2.2 (4) above, the submission title, the stage of submission (e.g., Technical Design, etc.), and the authorized signature of the contractor's responsible engineer to confirm that, in the opinion of the contractor, the submission:

1) complies with all relevant requirements of the Employer's Requirements;
2) conforms to all interface requirements;
3) contains, or is based on auditable and proven or verified calculations or design criteria;
4) has been properly reviewed by the contractor, according to the contractor's Quality Assurance System, to confirm its completeness, accuracy, adequacy and validity; and
5) has taken account of all requirements for approval by statutory bodies or similar organizations, and that where required, such approvals have been granted.
6) contains 2 (two) properly signed copies of Independent Design Checker Certificate (Form IDCC) and 2 (two) properly signed copies of the Construction Design Pack Certificate (Form CDPC).

4.9 THE ENGINEER'S RESPONSE

The Engineer's response to the submission from the contractor will be made within 21 calendar days of receipt of the submission. If the submission is made later on the Design Submissions Programme, the Engineer may extend the review period depending on the amount of documentation accompanying the submission.

4.10 MONTHLY DESIGN REVIEW MEETINGS

Throughout each Design Stage, the contractor shall attend monthly design review meetings with the Engineer and the Employer. At these review meetings, the contractor shall present information, drawings, and other documents to the Engineer in respect of all submissions programmed to occur during the following five-week period. The contractor's presentations shall be in sufficient depth to enable the Employer / Engineer obtain a clear understanding of the contractor's proposals and to discuss the methodology and process used in reaching the proposed design solutions.

4.11 THE ENGINEER'S OBSERVATIONS

The contractor shall record all of the Engineer's observations and any agreed actions resulting from the Engineer's review meeting and shall address each of these fully before submission of the respective documents for formal review.

4.12 NOTIFICATION

If, in the Engineer's opinion, following receipt of a submission, there is benefit to be gained from a meeting with the contractor to clarify or discuss any of the contents of the submission, he will notify the contractor accordingly with not less than 3 days advance notice, and the contractor shall attend at the time and place notified by the Engineer.

4.13 NOTICE OF NO OBJECTION

The contractor in respect of the Works or any sub-system, part or section may make no submission thereof unless a Notice of No Objection of No Objection with Comments has been received for the previous stage of the same Works or any sub-system, part or section thereof.

5 RESPONSED PROCEDURE

5.1 RESPONSED PROCEDURES

The Engineer will respond in one of the following three ways:

1) "Notice of Rejection" (with "A" Comments)
2) "Notice of No Objection"
3) "Notice of No Objection with Comments" (with "B" or / and "C" Comments)

5.2 RESPONSE DEFINITION

Definition of the Engineer's response:

1) "Notice of Rejection" (with "A" Comments):

   If, following his review of the submission, the Engineer discovers major non-compliance, discrepancies, or omissions etc. that in his opinion are of a critical nature, the Engineer will issue a "Notice of Rejection" (NOR) with type "A" comments. The contractor shall revise and reissue the submission at the earliest, but not later than 15 calendar days of receipt of "Notice of Rejection" from the Engineer addressing the Engineer's comments. Subsequently the Engineer will respond at the earliest, but not later than 15 calendar days of receipt of the resubmission. Following the issue of a NOR by the Engineer, the contractor is not entitled to proceed to the next programmed stage for that section of the work until all of the Engineer's comments have been fully addressed and a NONO issued. As this is critical in nature, any delay in revising and reissuing by the contractor beyond the limit specified above, is liable for penalty, as deemed fit, by the Employer. The decision of the Employer is final in this regard.

2) "Notice of No Objection":

   If, following his review of the submission the Engineer has not discovered any non-compliance with the contract the Engineer will issue to the contractor a formal "Notice of No Objection (NONO). A NONO from the Engineer irrespective of with or without comments does not in any way imply the Engineer's consent of the submission nor does it remove any responsibility from the contractor for complying with the Contract. Issue of a NONO from the Engineer only entitles the contractor to proceed to the next stage of the programmed work.

3) "Notice of No Objection" (With Comments):

   if following his review of the submission, the Engineer discovers discrepancies or omissions etc. that in his opinion are not of a critical nature the Engineer may issue a "Notice of No Objection" with Comments, (NONOC) the comments will be of either type B or type C as defined below. The contractor shall respond to the comments in accordance with the requirements of Clause 4.3. Following the issue of a NONOC by the Engineer the contractor is entitled to proceed to the next stage of the programmed work subject to the inclusion of amendments necessary to address the comments.

6 The contractor shall respond to Type B and C comments and get the Engineer's agreement and closure prior to full inclusion in the Final Design.

6.1 THE ENGINEER'S COMMENTS

Definition of the Engineer's comments:

1) Type "A" Comments are of a critical nature that renders the submission non-compliant with the Contract, the submission shall be corrected and resubmitted.
2) Type "B" Comments are of an intermediate nature that shall be responded, agreed and incorporated.
3) Type "C" Comments are of a minor nature or may affect future submissions.

7 RECORDS

The contractor shall establish and maintain a place for the storage and archiving of all the documents relating to the Works that are not required to be submitted to the Engineer under Clause 2.

8 IMPLEMENTATION OF BIM SYSTEM

(i) The contractor shall implement BIM system for executing and delivering the services set out in this Agreement. Building Information Modelling (BIM) uses computing power and systems to create 3D models of all kind of buildings and infrastructure, with information about its design, operation and current condition. At the planning and design stage, it enables designers, owners, and users to work together to produce the best possible designs and to test them virtually before they are constructed. During construction, it enables the Employer, contractors, and suppliers to integrate all components, cutting out waste and reducing the risk of errors. In operation, it provides users with real-time information about available services and facility managers with accurate assessments of the condition of assets.

(ii) Proof checking of all structural designs shall be done using BIM modelling. The contractor shall implement the necessary hardware, software, and provide human resources towards this till the end of DLP. 3D Coordination between all disciplines shall be achieved by incorporating them in a single model.

(iii) The contractor shall be required to produce, update and present to Employer on a fortnightly basis an integrated 3D BIM model incorporating rail track (Viaduct), topography, architecture, structure, plumbing and all other building services and system wide requirements in design review meetings. These models shall be 3D rendered and shall help in design visualization and clash detection of elements as well as finalization of design.

In addition, contractor shall also provide following individual models:

1. Rail alignment Modelling
2. Structure design modelling
3. Terrain modelling
4. Quantity take-off from BIM model wherever required
5. Visualization and Animated Walkthrough
6. Clash detection

(iv) Final coordinated GFC drawings of all disciplines shall be generated only from the BIM model.

(v) The contractor shall develop as built BIM Model up to LOD 500 level and submit the same to Employer at the time of completion of the project. Schedule of BIM implementation Plan and standards to be adhered to, shall be provided after award of contract.

(vi) IFC format (Industry Foundation Classes)

IFC format is a platform neutral format. Hence all / any BIM program used by tenderer should provide files in IFC format for interoperability between different BIM programs.

ANNEXURE 1

The contractor shall prepare and submit his detailed Programme of Work so as to achieve key dates of various activities on time. The contractor shall complete the work in a phased manner by fixing priorities to different stretches of work to give access to the other interfacing contractors as per the requirement of project from time to time and as per the key dates (mile stones) indicated below:

I. FOR 'ELEVATED' PORTION-ANNEXURE 1A

Key Dates No.	Description of stage	Period from the date of issue of notice to proceed with the work (Days)	Liquidity Damages for non-achieving the key dates
KD 1	Completion of 1st working pile	90	0.001% of total contract price per day of delay for the key date
KD 2	Start of casting of Box girder / U-Girder segments	110	0.001% of total contract price per day of delay for the key date
KD-3	Casting of first pier after approval of mark up	120	0.001% of total contract price per day of delay for the key date
KD 4	Start of Erection of box girder / U-Girder	190	0.001% of total contract price per day of delay for the key date
KD 5	Partial access of Viaduct (for a minimum length of 3 km) to track, S&T and electrical contractor for their respective works	660	0.007% of total contract price per day of delay for the key date
KD 6	Partial access of Viaduct (for a minimum length of another 3km; total 6km) to track, S&T and electrical contractor for their respective works	720	0.007% of total contract price per day of delay for the key date
KD 7 (Taking over date)	Completion of Entire Work as per the contract	914 Days (30 months)	0.036% of total contract price per day of delay for the key date

FOR 'AT-GRADE' PORTION-ANNEXURE 1B

Key Dates No.	Description of stage	Period from the date of issue of notice to proceed with the work (Days)	Liquidity Damages for non-achieving the key dates
KD 1	Start of earthwork in embankment / cutting	60	0.001% of total contract price per day of delay for the key date
KD 2	Completion of 2 km of embankment / cutting	130	0.001% of total contract price per day of delay for the key date
KD-3	Start of one minor bridge	80	0.001% of total contract price per day of delay for the key date
KD 4	Completion of 15 minor bridges	270	0.001% of total contract price per day of delay for the key date
KD 5	Partial access of section (for a minimum length of 9 km) to track, S&T and Electrical contractor for their respective works	550	0.007% of total contract price per day of delay for the key date
KD 6	Partial access of section (for another minimum length of 20 km, total 29 km) to track, S&T and Electrical contractor for their respective works	710	0.007% of total contract price per day of delay for the key date
KD 7 (Taking over date)	Completion of Entire Work as per the contract	914 Days (30 Months)	0.036% of total contract price per day of delay for the key date

NOTES:

1. For the Viaduct, the key dates KD 5, 6,7 is pertaining to the interface with other contractors / Parties to be read in conjunction with the relevant clause of Contract Data.
2. For the At-grade, the key dates KD 5,6, 7 is pertaining to the interface with other contractors / Parties to be read in conjunction with the relevant clause of Contract Data.

FOR 'MISCELLANESOUS ITEMS' PORTION-ANNEXURE 1C:

Key Dates No.	Description of stage	Period	Liquidity Damages for non-achieving the key dates
KD 1	Completion and Commissioning of first Project Office for the Employer & Engineer, duly furnished with all furniture, cabins, conference hall, appliances, equipment, tools, personnel, cleaning staff, consumables etc. complete	45 days from the date of issue of LOA	0.0005% of total contract price per day of delay for the key date
KD 2	Completion and Commissioning of second Project Office for the Employer & Engineer, duly furnished with all furniture, cabins, conference hall, appliances, equipment, tools, personnel, cleaning staff, consumables etc. complete	60 days from the date of issue of LOA	0.0005% of total contract price per day of delay for the key date
KD 3	Completion and Commissioning of first Site Office at/near casting yard for the Employer & Engineer, duly furnished with all furniture, cabins, appliances, equipment, tools, personnel, cleaning staff, consumables etc. complete	30 days from the date of issue of notice to proceed with the work	0.0005% of total contract price per day of delay for the key date
KD 4	Completion and Commissioning of all project offices and site offices for the Employer & Engineer, duly furnished with all furniture, cabins, conference halls, appliances, equipment, tools, personnel, cleaning staff, consumables etc. complete as per the contract	120 days from the date of issue of notice to proceed with the work	0.00075% of total contract price per day of delay for the key date

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