ITEM WISE SPECIFICATION

Item No. 1.0 &
Railway Item No 8.1

Marking out the center line of the Bridge and various other component structures and complete lining out and leveling with theodolite, levels, including constructing necessary masonry pillars for lines and levels and establishing necessary bench marks etc. complete as directed and maintained it till completion of superstructure. If pillar damaged due to any reasons, agency have to reestablished it and verify the values from engineer.

ItemNo.1.1

Felling trees of the girth (measured at a height of 1 m above ground (level), including cutting of trunks and branches, removing the roots and stumps and stacking of serviceable material and disposal off unserviceable material at dumping yard directed by the Authority of RMC.

ItemNo.1.2 (a, b, c, d) &
Railway Item No 8.2 (a, b)

Dismantling of existing structures like pavements, walls, retaining walls, RCC beam and slab, culverts, bridges approaches return wall etc. with T & P and scaffolding wherever necessary, sorting the same dismantled material, disposal of unserviceable material and stacking the serviceable material with all leads, lifts As Directed by RMC/Engineer in charge, as a complete job. At many stages, agency have to take railway traffic block, power block with the permission of railway authority for dismantling the existing structure. Agency has to take the joint measurement of existing structure and take signature in the record book. Payment shall be as per actual and in cubic meter.

Scope of Work

This work shall consist of dismantling and removing existing culverts, bridges, pavements, kerbs and other structures like guard-rails, fences, utility services, manholes, catch basins, inlets, etc., from the right of way which in the opinion of the Engineer interfere with the construction of road or are not suitable to remain in place, disposing of the surplus/unsuitable materials and backfilling to after the required compaction as directed by the Engineer.

Existing culverts, bridges, pavements and other structures which are within the highway and which are designated for removal, shall be removed up to the limit and extent specified in the drawings or as indicated by the Engineer.

Dismantling and removal operations shall be carried out with such equipment and in such a manner as to leave undisturbed, adjacent pavement, structures and any other work to be left in place.

All operations necessary for the removal of any existing structure which might endanger new construction shall be completed prior to the start of new work.

Back filling

Holes and depressions caused by dismantling operations shall be backfilled with excavated her approved materials and compacted to required density as directed by the Engineer.

Disposal of Materials

All dismantled material shall be dumped in designated place as decided by Engineer in Charge

Measurements for Payment

The work of dismantling shall be paid for in units indicated below by taking measurements re and after, as applicable:

I)	Dismantling brick/ stonemasonry/concrete (plain and reinforced)	Cum
ii)	Dismantling flexible and cement concrete pavement	Cum
iii)	Dismantling steel structures	Tonne
v)	Dismantling pipes, guardrails, kerbs, gutters and fencing	Mtr
vi)	Utility services	No.

Rates

The Contract unit rates for the various items of dismantling shall be paid in full for carrying out the required operations including full compensation for all labour, materials, tools, equipment, safe guards and incidentals necessary to complete the work. The rates will include excavation and back filling to the required compaction and for handling, giving credit towards salvage value disposing of dismantled materials with all lifts and leads.

ItemNo.1.2 (c) & Railway Item No 8.3

Excavation of soil by mechanical means for foundation, retaining wall, culverts etc. as per drawing.

If excavation is executed more than required level, no refilling shall be allowed, only filling with lean concrete M15 grade. Unevenness in the level shall not be more then prescribed limit in MoRT&H. If dewatering is required, agency has to install the dewatering pump before concreting for the PCC. Payment shall be as per actual and in cubic meter.

ItemNo.2.3 & 5.3 &
Railway Item No 9.3 (a, b)

Excavation in hard rock by mechanically chiseling, hammering including dewatering preparing foundation base by proper benching and stepping. Ballasting is prohibited. All excavated material shall be removed from the construction site for make the working space to avoid any accident. Site shall be neat and clean. Unsuitable martial shall be dumped outside city area as directed by engineer in charge.

1. The relevant specification for excavation for foundation for open foundation given in MORT&H fifth revisionClause-301&RDSOspecificationshallapplicabletothisitem.
2. The measurement shall be in cum basis.
3. The rate includes shoring, strutting, dewatering, as necessary and disposing of the excavated stuff as directed.
4. The mode of payment shall be in per cum basis.
5. All Excavated sand, gravel, clay soft soils etc. shall be dumped outside of the Rajkot City area as decided by Engineer in Charge.

ItemNo.1.2 (e)

Providing and installation of barricading of G.I. Sheet with retro-reflective paint/film/tapes, 3m high with angle iron as per approved drawing around the construction site of bridge along with necessary diversion arrangement for smooth movement of traffic round the clock. All direction signs, diversion board with light in the night with all fabrications, tools, equipment's, alignment,

shifting, re shifting, foundation work, drilling, grouting, all material, labor with all taxes. Contractors have to maintain the barricading throughout the construction period and clean it/wash it every 15 days for clear visibility. After completion of Project, contractor will take it so 50% cost is considered as resale value in this estimate.

1. Relevant Specifications of MORT&H fifth revision Section – shall apply to this item.
2. The relevant specifications as given in items shall apply to this item.
3. The measurement shall be based on sqm area of barricading.
4. The rate includes labour, material, equipment & removal the same after completion of work. (All material will be the property of the contractor after completion of the bridge).

ItemNo.1.2 (f)
Excavation for laying. R.C.C. Hume pipe for cable to be laid 90 cms. Below ground across the road crossing or on floor with necessary material in an approved manner and making the ground as per original.

1. The relevant specification for excavation for foundation for open foundation given in MORT&H fifth revisionClause-301&RDSOspecificationshallapplicabletothisitem.
2. The measurement shall be in Rmt basis.
3. The rate includes shoring, strutting, dewatering, as necessary and disposing of the excavated stuff as directed.
4. The mode of payment shall be in per Rmt basis.
5. All Excavated sand, gravel, clay soft soils etc. shall be dumped outside of the Rajkot City area as decided by Engineer in Charge.

Item No. 1.2 (I)
RCC precast frame with supply, fitting, fixing with complete as per specification 10 Ton size 1000/700/90 mm for manhole. Payment shall be in the number. Cover shall be flush with the finished road level or footpath.

Item No. 1.2 (j)
RCC precast frame with Jali supply, fitting, fixing with complete as per specification 10 Ton size 550/550/90 mm for drain out the water from the road surface. Cover shall be flush with the finished road level or footpath

Item No. 2.1 & 5.1 & 6.1 & 7.1 &
Railway Item No 9.1
Excavation for foundation in sand, gravel, clay soft soils and murrum etc. including shoring, strutting dewatering as necessary and disposing of the excavated stuff as directed. (A) Depth up to 3.0 M. and transported/dumping within RMC area including dewatering as a complete job.

Item No. 2.2 (a, b) & 5.2 &
Railway Item No 9.2 (a, b)
Excavation in large boulders and soft rock by mechanical means wedging action including shoring, strutting and dewatering as necessary and disposing of the excavated stuff within RMC area as directed by Engineer in Charge up to 2 to 5m depth including dewatering as a complete job.

Item No.2.4 & 5.5 & 7.3
Railway Item No 9.4
Plain/reinforced cement concrete in sub-structure complete as per drawing, level and alignment and as per technical specifications for PCC grade M15 grade and M20 grade for railway portion. This includes shuttering, probing, shoring, dewatering, cement, aggregate, sand including mixing in concrete batching plant, transportation to site, pumping, vibrations, and compaction to match the level. This includes all plant and machinery men power to complete the above work. Item is payable in cum as per drawing.

Item No. 2.5 & 5.6 & 7.4
Railway Item No 9.5
Plain/reinforced cement concrete in open foundation complete as per drawing and technical specifications RCC grade M35 (using batching plant, transit mixer and concrete pump)

1. The relevant specification for excavation for foundation for open foundation given in MORT&H fifth revisionClause-304&RDSOspecificationshallapplicabletothisitem.
2. The measurement shall be in cum basis.
3. The rate includes shuttering, cover block, shoring, strutting, dewatering, as necessary and disposing of the excavated stuff as directed.
4. The mode of payment shall be in per cum basis.

Item No. 4.11
Providing and casting in situ-controlled cement concrete M-40 for approach slab including formwork curing and finishing complete and casting of anti-Friction block in RE wall.
&
Item No. 5.5
Providing and filling in foundation with ordinary Cement concrete M-15 mix and providing necessary vertical pin headers including formwork, vibrating, ramming and curing complete.
&
Item No. 5.6
Plain/reinforced cement concrete in sub structure complete as per drawing and technical specifications RCC grade M35 (using batching plant, transit mixer and concrete pump)

1. The relevant specifications given for machine mixed plain cement concrete M15 grade as per Section-2100, 1500 & 1700 of MORT&H fifth revision specification & as per relevant RDSO specification.
2. The measurement shall be per cum basis.
3. The rate include stamping, vibrating, levelling and curing complete with all formwork, dewatering wherever required including all materials, labours, plants, machineries & tools, all leads and lifts, etc. complete as per specification.
4. The mode of payment shall be in per cum basis.

ItemNo.2.6 & 1.2(k)
Railway Item No 9.6

Before cutting of any reinforcement for any structure contractor have to get the approval of Bar bending schedule in triplicate copy from TPI agency in writing and handover one copy to the client. Supply, cutting, placing TMT-500D bar reinforcement in sub structure complete as per drawing and technical specifications with all material, consumables, cutting, bending, tying, lowering, line and level as a complete job. Overlap shall be staggered and as per approved drawing. All reinforcement must be free from scale, rust, grease etc. Payment shall be in MT.

Item No. 2.7
Providing and fixing mild steel dowel bars of minimum 32 mm dia. for anchoring by drilling holes in foundation strata including necessary bending, hooking of dowel bars and grouting the holes with cement slurry as a complete detailed drawing, specification and as directed.

ItemNo.3.3
Railway Item No 10.3
Before cutting of any reinforcement for any structure contractor have to get the approval of Bar bending schedule in triplicate copy from TPI agency in writing and handover one copy to the client. Supply, cutting, placing TMT-500D bar reinforcement in sub structure complete as per drawing and technical specifications with all material, consumables, cutting, bending, tying, lowering, line and level as a complete job. Overlap shall be staggered and as per approved drawing. All reinforcement must be free from scale, rust, grease etc. Payment shall be in MT.

ItemNo.4.5
Railway Item No 11.2
Before cutting of any reinforcement for any structure contractor have to get the approval of Bar bending schedule in triplicate copy from TPI agency in writing and handover one copy to the client. Supply, fitting, cutting, and placing TMT FE-500D bar reinforcement in super structure complete as per drawing, technical specification with all tools, cutting, bending, lifting, binding, fixing with wires as a complete job.

1. The relevant specifications as per IS1786 Specification & as per relevant MORT&H fifth revision section 1600 shall apply to this item.
2. The measurement shall be in MT basis.
3. The rate includes for supply, loading, unloading, transporting to site, cutting, bending, hooking, placing, supporting in position to ensure lines and levels during concreting, maintaining proper cover / spacing, all leads & lifts, etc. including contractor's own equipment, labour, supervisor, taxes, machineries, etc. complete as per drawings and specification.
4. The mode of payment shall be in per MT basis.

Item No. 2.8 &
Railway Item No 9.7
Filling available excavated earth (excluding rock) in trenches. plinth, sides of foundations etc. in layers not exceeding 20 cm. in depth consolidating each deposited layer by nematic rammer/plate compactor.

1. The relevant specifications given in MoRT&H Clause 305 fifth Revision shall apply to this item.
2. The measurement shall be in cum basis.
3. The mode of payment shall be in cum basis.

Item No. 3.1 &
Railway Item No 10.1

Furnishing and placing reinforcement/prestressed cement concrete in super-structure as per drawing and technical specification R.C.C. work in pier cap, abutment cap and dirt wall including controlled cement concrete bed blocks or pedestals of required size below bearing. RCC grade M35 from ground level to Height 5m to10m. All shuttering must be neat and clean, proper bracing and staging to bear the load, joint must be level. Payment shall be in cum.

ItemNo.3.2 &
Railway Item No 10.2
Furnishing and placing reinforced cement concrete (M-40) for construction of bearing pedestal in as per drawing and technical specification. RCC grade M-40 (height up to 10m).

1. The relevant specifications given for machine mixed Reinforce cement concrete M40 grade as per Section-2300, 1500 & 1700 of MORT&H fifth revision specification & as per relevant RDSO specification.
2. The measurement shall be per cum basis.
3. The rate include stamping, vibrating, levelling and curing complete with all formwork, dewatering wherever required including all materials, labours, plants, machineries & tools, all leads and lifts, etc. complete as per specification.
4. The mode of payment shall be in per cum basis.

Item No. 4.1
Railway Item No 11.1
Providing and casting in situ or precast controlled Cement Concrete M-45 for Prestressed concrete work in Super structure including centering, shuttering, curing, scaffolding, ramming, vibrating, finishing, launching or shifting complete. (I) Deck Slab.
Note: The rate is inclusive of all materials, including necessary mixing in fully automatic batch mix plant, transport, curing, vibrating, placing in position, scaffolding, staging, shuttering, formworks, decluttering carefully, making good the damages, fixing embedment, inserts, pockets, wherever necessary, with all lead and lift with contractor's labor, tools & plants, machineries, as required, with F3 type exposed concrete finish and form mark. Any honeycombing / Undulation found shall be rectify to match F3 class finish. Contractor has to arrange three set of shuttering for slab at site.

Item No. 4.2
Providing and casting in situ or precast controlled Cement Concrete M-45 for Prestressed concrete work in Super structure including centering, shuttering, curing, scaffolding, ramming, vibrating, finishing, launching or shifting complete. (I) Main Girders. (II) Diaphragm or Cross Girder.
Note: The rate is inclusive of all materials, including necessary mixing in fully automatic batch mix plant, transport, curing, vibrating, placing in position, scaffolding, staging, shuttering, formworks, de shuttering carefully, making good the damages, fixing embedment, inserts, pockets, wherever necessary, with all lead and lift with contractor's labor, tools & plants, machineries, as required, with F3 type exposed concrete finish and form mark. Any honeycombing / Undulation found shall be rectify to match F3 class finish. Contractor has to arrange three set of shuttering for girder at site.

Providing and fixing in position to exact profile as specified nominal dia. High Tensile Prestressing steel strands conforming to low Relaxation Prestressing steel strands-CI. II as per IS 14268 of specified ultimate strength for specified capacity of cables including cutting, cleaning, forming cables etc. and further including providing and laying corrugated HDPE sheathing of specified dia., anchorages, stage wise stressing, grouting with neat cement grout of approved & specified Quality, testing of materials and all enabling work for pre tensioning/post tensioning of steel including all leads and lifts etc. complete as per specification and drawing and as directed by Engineer.
Note: - Weight will be calculated considering length of strands between faces of Anchorages plus grip length multiplied by unit weight of strand. Dummy cable as required will be measured under this item.

1. The relevant specifications given in MoRT&H Clause 2300 fifth Revision shall apply to this item.

Item NO. 11.3

Supply, fabrication, trial assembly, transportation, launching of 36meter steel plate composite girder for railway portion shall be fabricated from RDSO approved workshop. Agency have to get the approval of methodology from railway authority and execute the work accordingly. Contractor has to take the traffic block, power block from railway authority and complete the work within the block period.

ItemNo.4.4

Contractor has to get the approval of methodology for launching the girder and submit the latest calibration report for steel rope, crane capacity and RTO approval. Loading/unloading of Precast-PSC girders with own cranes of required certified capacity, shifting, transportation from casting yard, launching and placement in position level and line temporary with wooden battens and final placement including manpower with Elastomeric bearing (Paid separately) as a complete job including removal of defects in surface as per direction of Engineer in charge)

1. The relevant specifications given in MoRT&H Clause 2305 fifth Revision shall apply to this item.
2. The measurement shall be in MT basis.
3. The mode of payment shall be in MT basis.

ItemNo.4.6

Railway Item No 11.4

Providing and fixing 65 mm dia GI pipe hand rail including RCC the crash barrier of concrete grade-M-40 kerb at end of carriage way, approach slab, median including reinforcement, shuttering, staging, concreting and consisting of MS base plate, embedded fastener and nuts, MS vertical plates and pipes etc., as shown in the drawings and as per specifications and painting the same with 3 or more coats of paints. All the railing components as mentioned above to be hot dip galvanized with a zinc coating of at least 175 gm/sqm. Item to include all incidental works required to complete the work as directed by the Engineer-in-charge.

1. The relevant specifications as per MORT&H fifth revision Section 1500, 1700 & 2703 shall apply to this item.

2. The measurement shall be in Cum basis.
3. Crash barrier of concrete of grade M-200 including reinforcement, shuttering, staging, concreting and consisting of MS base plate, embedded fastener and nuts, MS vertical plates and pipes etc, as shown in the drawings and as per specifications
4. The mode of payment shall be in per Cum

ItemNo.4.7
Railway Item No 11.5
Providing and laying of a strip seal expansion joint catering to maximum horizontal movement up to 70mm, complete as per approved drawings and standard specifications to be installed by the manufacturer / supplier or their authorized representative ensuring compliance to the manufacturer's instructions for installation.

1. The relevant specifications given in tender as per clause 2600 of MORT&H fifth revision as per relevant RDSO specification shall apply to this item.
2. The measurement shall be in Rmt. basis.
3. The rate is inclusive of supplying, fixing with contractor's own materials, equipment's, machineries, labour, transport, testing, bolts, socket tubes, neoprene sheet/cap etc. complete. The rate is finished item complete and will be paid after fixing in all respect. The Contractor shall procure Expansion Joint, confirming to relevant MORTH specification from approved MORTH vendor with prior approval of Engineer in- charge
4. The mode of payment shall be in per Rmt. basis.

Railway Item No 11.6
Supplying, fitting and fixing in position true to line and level POT-PTFE bearing consisting of a metal piston supported by a disc or unreinforced elastomer confined within a metal cylinder, sealing rings, dust seals, PTFE surface sliding against stainless steel mating surface, complete assembly to be of cast steel/fabricated structural steel, metal and elastomer elements to be as per IRC:83 parts I&II respectively and other parts conforming to BS:5400, sections 9.1 & 9.2 and clause 2006 of MoRT&H specifications complete as per drawing and approved technical specification.

1. The relevant specifications given in tender as per clause 2000 of MORT&H fifth revision as per relevant RDSO specification shall apply to this item.
2. The measurement shall be in MT. basis.
3. The rate is inclusive of supplying, fixing with contractor's own materials, equipment's, machineries, labour, transport, testing, bolts, socket tubes, neoprene sheet/cap etc. complete. The rate is finished item complete and will be paid after fixing in all respect. The Contractor shall procure Expansion Joint, confirming to relevant MORTH specification from approved MORTH vendor with prior approval of Engineer in- charge
4. The mode of payment shall be in per MT. basis.

ItemNo.4.8
Supplying, fitting and fixing in position true to line and level Elastomeric bearing confirming to IRC-83(Part-II) section IX and clauses 2005 of MORTH specifications complete including all accessories as per drawing and technical specifications including lifting, placement as a complete job.
&
ItemNo.4.9
Supplying and fixing of Elastomeric pad gluid with epoxy etc. complete as directed by

engineer In-charge.

1. The relevant specifications given in tender as per clause 2000 of MORT&H fifth revision as per relevant RDSO specification shall apply to this item.
2. The measurement shall be in Cu.cm. basis.
3. The rate is inclusive of supplying, fixing with contractor's own materials, equipment's, machineries, labour, transport, testing, bolts, socket tubes, neoprene sheet/cap etc. complete. The rate is finished item complete and will be paid after fixing in all respect. The Contractor shall procure Expansion Joint, confirming to relevant MORTH specification from approved MORTH vendor with prior approval of Engineer in- charge
4. The mode of payment shall be in per Cu.cm. basis.

ItemNo.4.10

Providing and casting in situ-controlled cement concrete concrete M-15 for approach slab clouding formwork curing and finishing complete.

1. The relevant specifications given for machine mixed plain cement concrete M30 grade as per Section -2704, 1500 & 1700 of MORT&H fifth revision specification.
2. The measurement shall be per cum basis.
3. The rate is inclusive of all materials, including necessary mixing in fully automatic batch mix plant, transport, curing, vibrating, placing in position, scaffolding, shuttering, formworks, de-shuttering carefully, making good the damages, fixing embedment, inserts, pockets, wherever necessary, with all lead and lift with contractor's labour, tools & plants, machineries, as required, with F3 type exposed concrete finish and form work.
4. The mode of payment shall be in per cum. Basis.

ItemNo.4.12 &
Railway Item No 11.7

Providing and laying 25mm thick mastic asphalt wearing course with paving grade bitumen VG-40 meeting the requirements given in table 500-39, prepared by using mastic cooker and laid to required level and slope after cleaning the surface, including providing antiskid surface with bitumen precoated fine-grained hard stone chipping of 13.2 mm nominal size at the rate of 0.005 cum per 10 sqm and at an approximate spacing of 10 cm center to center in both directions, pressed into surface when the temperature of surfaces not less than 1000C, protruding 1 mm to 4 mm over mastic surface, all complete as per clause 516.

1. The relevant specifications for Bituminous Concrete are as per MORT&H fifth revision Clause 516, 501, 507, 900 & 2702 applicable to this item.
2. The measurement shall be in sqm basis.
3. The rate includes labour, material, equipment etc. complete as per direction of engineer in charge.
4. The mode of payment shall be in per sqm basis.

ItemNo.4.13 &
Railway Item No 11.8

Providing GI 100 mm diameter waterspouts including necessary iron gratings as per drawings. (Up to 10 ton)

1. Material for the drainage spout shall be as mentioned in the item and shall be got approved from the Engineer-in-charge.

2. Water spout shall be 100 mm internal dia. G.I. rating shall be provided at the entry and shall be fixed in the recess so as to be flush with the road surface. The quality and size of the grating shall be got approved for the Engineer-in-charge. The water spouts shall project at-least 10 cm. outside the concrete and shall be rigidly fixed in it. The grating and C.I. pipes shall be painted with two coats of anticorrosive black bitumen paint.
3. Measurement & payment shall be per number of drainage spout fixed.
4. Unit rate includes necessary iron gratings as per drawings

ItemNo.4.14 &
Railway Item No 11.9
Providing and fixing PVC pipe 150 mm dia Heavy duty with Galvanized M.S. clamps at 1.5m c/c to keep in position with all staging, drilling in Down take pipe as a complete job.

1. The relevant specifications for PVC Pipe are as per MORT&H fifth revision Clause 2705 applicable to this item.
2. The measurement shall be in Rmt basis.
3. The rate includes labour, material, equipment etc. complete as per direction of engineer in charge.
4. The mode of payment shall be in per Rmt basis.

ItemNo.4.15 & 5.14 &
Railway Item No 11.10
Road marking with hot applied thermoplastic compound with reflectorizing glass beads on bituminous surface (Providing and laying of hot applied thermoplastic compound 2.5 mm thick including reflectorizing glass beads @ 250 gms per sqm area, thickness of 2.5 mm is exclusive of surface applied glass beads as per IRC:35. The finished surface to be level, uniform and free from streaks and holes.)

1. The relevant specifications given in Section – 800 of MORT&H fifth revision and latest GR of R&B Department as per SOR / 1018/715 / C-1 part, file specification shall apply to these items.
2. The measurement shall be in Sqm basis.
3. The rate includes of reflect rising glass beads at 250 gm/smt area. Thickness of 2.5 mm is exclusive of Surface applied glass beads as per IRC 35. The finished surface to be level uniform free from streak sand holes and as per direction of engineer in charge.
4. The mode of payment shall be in per Sqm basis.

Railway Item No 11.12
Providing and fixing of Protective screen on the Steel bridge girder over running of 25000Volts catenary wire on both side with GI sheet as per the approved RDSO drawing No. ETI/C/0068-sheet 1 of 1Latest complete including supply, transportation, taxes, labor charges, errection, welding, unbolting, painting, Danger board as a complete job to the entire satisfaction of Railway safety norms.

Railway Item No 11.13
Supply and painting on Crash barrier/ Kerb Stone-Black and white alternate with Enamel paint of approved brand -Two coat with prime coat

ItemNo.4.16
Railway Item No 11.14
Providing and applying coats 100% Acrylic breathable, Ant carbonation, Waterproof, Heat insulating, Decorative external coating of Approved Brand or equivalent of approved shade. Mix 1 liter of with 1 L of water and use as priming coat on the surface. Mix 1 l with 400-500 ml water, stir well and apply by brush for subsequent to coats. Acrylic paint shall be spray/brush/roller applied as per approved shade and color as per approved methodology and manufactural manual

1. The relevant specifications given in tender as perclause509 of MORT&H fifth revision specification shall apply to this item.
2. The measurement shall be in cum basis.
3. The mode of payment shall be in Sqm basis.

ItemNo.4.17
Carrying out load test of super structure as directed including all necessary materials plant equipment, instruments, labor and arrangements for test directed.
This Test shall be conducted from the NABL approved Lab which have minimum 5-year experience, the test conducting engineer must be MTech with 15-year experience. Contactor have to submit minimum 3 options of concern lab for approving any one laboratory. The lest must be followed as per IRC-SP-51.

ItemNo.5.7
Supply, fitting, cutting, and placing TMT FE-500D bar reinforcement in super structure complete as per drawing, technical specification with all tools, cutting, bending, lifting, binding, fixing with wires as a complete job.

1. The relevant specifications as per IS1786 Specification & as per relevant MORT&H fifth revision section 1600 shall apply to this item.
2. The measurement shall be in MT basis.
3. The rate includes for supply, loading, unloading, transporting to site, cutting, bending, hooking, placing, tying in position with contractor's own GI annealed binding wire, welding, forming the cage and lowering it in position in pile bore etc. Welding and supporting in position to ensure lines and levels during concreting, maintaining proper cover / spacing, all leads & lifts, etc. including contractor's own equipment, labour, supervisor, taxes, machineries, etc. complete as per drawings and specification.
4. The mode of payment shall be in per MT. basis.

ItemNo.5.8 & 6.2
Plant mix method Construction of granular sub-base by providing close graded material, mixing in 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 roller to achieve the desired density, complete as per clause 401.Grade -I material.

1. The relevant specifications given in MoRT&H Clause 401 fifth Revision shall apply to this item.
2. The measurement shall be in Cum basis.
3. The mode of payment shall be in Cum basis.

ItemNo.5.9 & 6.3

Wet Mix Plant (Providing, laying, spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the material with water at OMC in mechanical mix plant carriage of mixed material 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 as per clause 406 of MoRT&H specification.)

1. The relevant specifications given in MoRT&H Clause 406 5th Revision shall apply to this item.
2. The measurement shall be in Cum basis.
3. The mode of payment shall be in Cum basis.

ItemNo.5.10 & 6.4
Prime Coat (Providing and applying primer coat with bitumen emulsion on prepared surface of granular base including clearing of road surface and spraying primer at the rate of 0.60 kg/sqm using mechanical means.)

1. The relevant specifications given in tender as perclause502 of MORT&H fifth revision specification shall apply to this item.
2. The measurement shall be in Cum basis.
3. The mode of payment shall be in Sqm basis.

ItemNo.5.11 & 6.5
Providing and laying dense graded bituminous macadam with 100-120 TPH batch type HMP producing an average output of 75 tons per hour using crushed aggregates of specified grading, premixed with bituminous binder @4.5 percent by weight of total mix and filler, transporting the hot mix to work site, laying with a hydrostatic paver finisher wit sensor control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MoRT&H specification clause 505 complete in all respect (MoRT&H 5.6)

1. The relevant specifications given in tender as per clause 505 of MORT&H fifth revision specification shall apply to this item.
2. The measurement shall be in cum basis.
3. The mode of payment shall be in cum basis.

ItemNo.5.12
Providing and applying tack coat with bitumen emulsion using emulsion pressure distributor at the rate of 0.20 kg per sqm on the prepared bituminous/granular surface cleaned with mechanical broom.
&
ItemNo.6.6
Providing and applying tack coat with bitumen VG-10 using Bitumen pressure distributor at the rate of 0.25 kg per sqm on the prepared bituminous/granular surface cleaned with mechanical broom as per clause 503 of MoRT&h specification.

1. The relevant specifications given in tender as perclause503 of MORT&H fifth revision specification shall apply to this item.
2. The measurement shall be in Sqm basis.
3. The mode of payment shall be in Sqm basis.

ItemNo.5.13 & 6.7

Providing and laying bituminous concrete with 100-120 TPH batch type hot mix plant producing an average output of 75 tons per hour using crushed aggregates of specified grading, premixed with bituminous binder VG-40 @ 5.4 per cent of mix and filler, transporting the hot mix to work site laying with a hydrostatic pver finisher with sensor MoRT&H control to the required grade, level and alignment, rolling with smooth wheeled, vibratory and tandem rollers to achieve the desired compaction as per MORTH specification clause no. 507 complete in all respect (MoRT&H no. 5.8)1. The relevant specifications given in tender as per clause 507 of MORT&H fifth revision specification shall apply to this item.

2. The measurement shall be in cum basis.
3. The mode of payment shall be in cum basis.

Item No. 5.15

Providing and fixing granite stone including engraving and painting complete with masonry or other structure as per direction engineer in charge including decoration etc. (I) Size max. 1sqm area. (Both ends of bridge)

1. Granite stone shall be white and of approved quality and shall be of size as mentioned in the item. Lettering shall be done by V-shape engraving and shall be filled with black paint of approved quality, lettering shall be done as directed by the Engineer-in-charge. The Marble plate shall be fixed in neat cement at a place as directed by the Engineer-in-charge. Cement shall confirm to relevant IS Specification.
2. The measurement shall be in sqm basis.
3. Unit rates includes cost of all material labour and tools to complete the work

ItemNo.6.8

Supply and fixing of Kerb stone of Grade M-25 of size 330x250x180 with Excavation to required size, laying PCC 75mm thick, 300mm wide and jointing with Cement mortar of 1:6 with all labor, tools, equipment -true level and alignment.

1. The relevant specifications given in tender as per clause 409 of MORT&H fifth revision specification shall apply to this item.
2. The measurement shall be in Rmt basis.
3. The mode of payment shall be in Rmt basis.

ItemNo.6.19

Supply and painting on Kerb Stone-Black and white alternate with Enamel paint of approved brand -Two coat with prime coat.

1. Painting two coats after cleaning the surface with Synthetic enamel paint in all shades on concrete surfaces of central verge / crash barrier after thoroughly brushing the surface to remove all dirt & loose powdered material shall be carried out as per direction of Engineer-in-charge.
2. Measurement shall be in Sqm
3. The rate includes, material labour, equipment's and all requirements to complete this item

ItemNo.7.5

Supply, fitting, cutting, and placing TMT FE-500D bar reinforcement in super structure complete as per drawing, technical specification with all tools, cutting, bending, lifting, binding, fixing with wires as a complete job.

1. The relevant specifications as per IS1786 Specification & as per relevant MORT&H fifth revision section 1600 shall apply to this item.
2. The measurement shall be in MT basis.
3. The rate includes for supply, loading, unloading, transporting to site, cutting, bending, hooking, placing, tying in position with contractor's own GI annealed binding wire, welding, forming the cage and lowering it in position in pile bore etc. Welding and supporting in position to ensure lines and levels during concreting, maintaining proper cover / spacing, all leads & lifts, etc. including contractor's own equipment, labour, supervisor, taxes, machineries, etc. complete as per drawings and specification.
4. The mode of payment shall be in per MT. basis.

Item No.7.6

900 mm Dia. RCC Spun NP-3 PIPE (Socket Spigot with Rubber Ring) with ISI marked &

Item No. 7.7

1200 mm Dia. RCC Spun NP-3 PIPE (Socket Spigot with Rubber Ring) with ISI marked

1. The relevant specifications shall be as per the instruction of manufacturer, methodology approved by the contractor with approved machinery for unloading, laying, concreting, alignment, level, testing and back filling with proper compaction to true level.
2. All joints must be water tight and contractor shall perform the water leakage test.

2. The measurement shall be in Rmt basis.

3. The mode of payment shall be in Rmt basis

Item No. 7.9 RCC Chamber

a) Excavation as per approved drawing.
b) On well compacted bed level, laid the PCC m15 grade to true level and line and alignment as per approved Level sheet.
c) Construction RCC chamber of required size and dimension at site with proper shuttering or place Precast chamber as per convenience of contractor.
d) Approval of Precast for Cast in situ shall be taken from the Engineer-in charge.
e) Put plaster 12mm thick with 1:6 -add water proofing compound and provide manhole cover as approved by RMC as a complete job. RCC pipe IN/OUT must be minimum 300 above the bottom most part of chamber foundation.

Special Note: -

All items are with reference to Road and Bridge works (Latest)-Mort, Railway Bridge manual, Concrete Mix Design codes, BIS, Special Publications, Machinery and Plants, Cranes, Dumers, manufacturer manual shall be applicable and staff of contractor, Engineer, contractor shall strictly follow the same.

For Railway portion, work is under the scope of Rajkot Municipal Corporation and shall be executed by the authorized Engineers of RMC. There is directly control of inspection regarding quality of structure members like plate girder, Railway portion all concrete members, pier, and slab for 36m plate girder portion. Contractor shall to follow Railway codes, manuals. For railway portion, Railway authority is final decision Authority and shall be binding to all. Contractor have to take care for Railway property against any

damage, accident, cable, OHE etc. It is responsibility of contractor to complete the work within Traffic and Power Block.
If there is any ambiguity in the specification, latest amended codes, manuals, specifications shall be final and binding.

GENERAL & TECHNICAL SPECIFICATIONS FOR STRUCTURAL STEEL PLATE GIRDER(PART OF COMPOSITE GIRDER OF MAIN OBLIGATORY SPAN 1X36M SANDHIYA BRIDGE(ROB)

A) **CONTRACTOR HAVE TO SUBMIT THE METHODOLOGY FOR SUPPLY, INSPECTION, STACKING OF MATERIAL IN RDSO APPROVED WORKSHOP 1 MONTH BEFORE START OF WORK.**

B) **SUBMIT THE DETAILS WORKSHOP DRAWING WITH METHODOLOGY FROM CUTTING, DRILLING, CHAMFERING, CLEANING, PAINTING, METERLING TO FINAL INSPECTION AT SITE WITH MONTHLY SCHEDULE.GET ITS APPROVAL FROM CONSULTANT AND RAILWAY AUTHORITY.**

C) **SUBMIT TRANSPORTATION SCHEME, ASSEMBLY AND ERECTION METHODOLOGY WITH TYPE, CAPACITY OF CRANE.**

D) **RAILWAY WILL ASSIST IN TAKING AND APPROVAL OF TRAFFIC BLOCK BUT CONTRACTOR HAVE TO CHASE FOR COORDINATION, IMPLEMENTATION / APPROVAL / CANCELLATION / INFORMATION TO RAILWAY AUTHORITY & WORKING TEAM OF TRAFFIC BLOCK AS PER RAILWAY STANDARD NORMMS.**

E) **CONTRACTOR HAVE TO PROVIDE RAILWAY BACKGROUND MIN. 20 YEARS EXPERIENCED SAFETY ENGINEER DURING CONSTRUCTION PHASE FOR RAILWAY RELATED WORKS SAFETY ONLY.**

F) **ALL METHODOLOGY HAVE TO GET APPROVAL FROM RAILWAY AND SUBMIT THE SAME COPY TO CONSULTANT, RAILWAY AND AUTHORITY OF RAILWAY.**

G) **PAYMENTS TERMS AND CONDITION:-**

I) **ON SUPPLY OF MATERIAL FROM APPROVED VENDOR,**

PROPER STACKING AND STORE IN RDSO APPROVED WORKSHOP,SUBMISSION OF ORIGINAL BILL, MTR,MATERIAL TESTING IN 3RD PARTY APPROVED LAB, WEIGHMENT SLIPS, TRANSPORTATION BILL AND WORKSHOP MATERIAL INVENTORY RECORD- 25% PAYMENT.

II) ON COMPLETE FABRICATION IN SIDE THE WORK SHOP, DIMENSION AND WELDING AND OTHERS RELATED WORK COMPLETED AND MEASURED WITH WORK SHOP DRAWING-40%PAYMENT.

III) ARRIVAL OF COMPLETED FABRICATED GIRDERS AND ACCESSARIES AT BRIDGE SITE, ASSEMBLED, ALL DIMENSIONS ARE VERIFIED, ERRECTED AT LOCATION WITH COMPLETED LEVEL, ALIGNMENT, NUT BOLTING, FINAL REPAIRS AND DEFECTS REMOVED INCLUDING FINAL PAINTING, COMPLETED AS PER DRAWING AND SATISFATION OF ENGINEER-IN CHARGE, SUBMISSION OF WEIGHMENT AND TRANSPORTATION ORIGINAL BILLS, FINAL AS BUILD DRAWING, GIRDER STABILITY BOND AS PER LATEST GUIDELINE -35%PAYMENT.

ITEM SPECIFICATION

Item No.130,131,132,133,134

Street Light Control Box/Feeder Pillar

The scope shall cover design, manufacture, supply, test, installation and commissioning of outdoor type section pillar/feeder pillar for street light with all material and labour.

The scope shall cover design, manufacture Supplying, unloading at site, shifting to site, assembling, leveling, grouting, erecting, Testing, & Commissioning double compartmentalized Double door type section feeder pillar with IP 46 protection & should be powder coated fabricated from 16 Gauge CRCA sheet & folded channel totally enclosed cubical type with pad lock arrangement.

The feeder pillar shall have powder coating, inner neoprene rubber gaskets, 8mm thick hylam sheet with RYB indication lamps with necessary protection, auto/manual switch, suitable cable entry, DIN rail, earth link, neutral link, locking arrangement, canopy, single side opening, hinged door arrangement, danger board, gland plate with appropriate entry holes as per cable size with necessary mounting clamps/arrangements with all internal wiring to be done by using not less than 4 Sqmm FRLS copper wire. It shall have arrangement for mounted either on wall or directly on ground with self-supporting angles.

Minimum Size: 1500mm X 1200mm X 350mm

1) I/C - 4 P, 63A, 10KA, MCB, B Curve & 4 P, 63A, 30mA, ELCB: 1

No. 2)Busbar - 100 Amp Electrolytic Grade AL

3) O/G – 32A, 10KA, MCB, B Curve

4) MNX Series or equivalent power contactor, 2 NO + 2 NC, 40A, AC3 Rating, 4 Nos.

5) 40A DP MCB, B curve 3 No

6) 6-32A SP MCB B Curve 6 No.

7) Astronomical Timer, 2 C/O, USB Interface: 1 No

8) Indicating lamps, Selector Switch, Control MCB, Control Wiring etc, as required.

MINIATURE CIRCUIT BREAKERS:

The Miniature Circuit Breakers (MCBs) shall be heat resistant, moulded type, designed, manufactured and tested as per IS 8828. The MCBs shall have inverse-time tripping characteristic against over loads and instantaneous trip against short circuits. The MCBs shall be of fault current limiting type also. The MCBs shall be slip on type to the busbar. The ON and OFF machines of the switch handle shall be clearly marked. The MCBs shall be suitable for operating in ambient of 45deg.C without derating. The incoming and outgoing of the MCBs shall be accessible only after opening the front door of the DB. The MCBs shall be suitable for 415V, 3 phases, 4 wires, 50 Hz system with the fault level of 10 KA RMS symmetrical. The terminals of MCBs shall be suitable for use with eye lugs. The 4 pole, 3 pole and 2 pole MCB knobs shall betrunked with adequate strength tandem pin.

The MCB value of the instantaneous tripping current, they are categorized into 3 types, namely, B,C and D. Type B is for resistive or slightly inductive loads such as heating and lighting, Type C for Inductive loads such as motors or transformers and Type D for loads such as UPS,VFDs and high discharge illumination.

EARTH LEAKAGE CIRCUIT BREAKERS

Incomer of the DB shall be provided with current operated Earth leakage circuit breakers with a sensitivity of 30mA/100mA/300mA as specified in the BOQ. The ELCB shall have Trip free mechanism and shall operate even on neutral failure.

The ELCB shall be provided with a Test Push Button to stimulate leakage and test the ELCB. The ELCB shall operate and switch off the circuit within milliseconds in case of a fault.

The enclosures of the ELCB shall be moulded from High quality insulating materials, which shall be fire retardant, anti-tracking, non-hygroscopic, and impact resistant and shall withstand high temperatures.

ELCB (HI/SI/Hpi Version) used for UPS application shall have enhanced high immunity against transient current and voltage and hence reduce unwanted tripping of the circuit in environments with disturbances and defects faults with DC components

FIXING OF FEEDER PILLAR POLE

The street light feeder pillars must be installed on fabricated structure of heavy strength or to be installed on the pole length upto 3 Mtr as per site requirements. This work includes supply, installation of feeder pillar stand/pole with cable protection GI pipe and bend at site with all civil works, burial type foundation work, cutting, drilling, welding, alignment, coloring of the stand/poles and fitment of the feeder pillars on it with all labour, material, loading, unloading and transportation at/up to site as per the instructions of EIC.

Item No.135

Maintenance Free Chemical Earthing

The whole system must be made earthed by bore type electrode earthing as per IS: 3043 (1987). Earthing Electrode consisting Flat-in- Pipe technology made of corrosion free B Class G.I.Pipe having outer pipe dia. of 76-80mm with 90-120 micron galvanizing and inner GI strip of 50mm X 5mm with 90-120 micron galvanizing including boring, installation and fitment of RCC earth pit with cover with all related civil work in at site including all labour and material and making site neat and clean after the work. The earthing rod must be CPRI/ERDA tested.

The connection terminal of the electrode must be connected to the earth terminal of the feeder pillar with suitable connectors, nuts, bolts, lugs etc. The whole installation must be covered with highly conductive back filling compound of 50kg. All the materials must be approved by EIC before utilization at site.

Length of electrode: 3	**Depth and size of the bore: As required**
Diameter of the electrode: 76-80 mm	**Earth Pit with Cover: Earth pit with Civil Work and Earth Chamber Cover of Min. Size of**
Back filing compound: 50	**50 kg**

Item No.137 to 149,153

Supply, Laying and Termination for Cables

1.0 SCOPE:

This specification covers the design, manufacture, testing at works, inspection and delivery at site of XLPE insulated and PVC power and Control cables.

2.0 STANDARDS:

The cables covered by this specification shall, unless otherwise stated, be designed manufactured and tested in accordance with the latest revisions of relevant Indian standards.

IS-694 : PVC insulated cables for working voltages up to and including 1100 volts.

IS-1554 : PVC insulated heavy duty cables for working voltages up to and including 1100 volts.

IS-3961 : Recommended current ratings for PVC insulating and PVC sheathed heavy-duty cables.

IS-8130 : Conductors for insulated electric cables and flexible cords.

IS-5831 : PVC insulation and sheath of Electric cables.

IS-3975 : Mild steel wires, strips and tapes for armoring of cables.

IS-7098 : Cross linked polyethylene insulated PVC sheathed cables.

IS-6130 : Conductors for insulated electric cables and flexible cords

3.0 CONDUCTOR:

The conductor shall be Copper as specified in the Schedule of Quantities. It shall be smooth, uniform in quality and free from scale and other defects. The stranded conductor shall be clean and reasonably uniform in size and shape. The conductor shall be either circular or shaped.

4.0 CONDUCTOR SHIELD:

Conductor shield shall be extruded in the same operation as the insulation. The semiconductor polymer shall be cross linked.

5.0 INSULATION:

a) Insulation shall be cross linked polyethylene and it shall preferably be gas-cured for XLPE cable

b) Insulation shall be PVC for PVC cable as specified in the Schedule of quantities.

5.1 OUTER SHEATH:

All cables specified in the Schedule of Quantities shall have Outer sheath with XLPE /PVC, Fire retardant low smoke (FRLS) to reduce the Fire hazard.

a. Oxygen Index - 29 when tested at 27 + 2 C.

b. Temperature Index - Minimum 250 C at Oxygen Index 21.

c. Flammability - As per IS 10810 Part 53 – 61 & 62.

d. Smoke Generator - Smoke density rating shall not be More than 60%.

e. Acid gas generation - Less than 20% by weight.

6.0 INSULATION SHIELD:

This shall preferably be of the strippable, triple-extruded thermostat type.

7.0 ARMOUR:

The armor may be of galvanized steel wires or galvanized steel strips

8.0 SERVING:

The cable serving shall protect the cable sheath and armor from electrolysis caused by stray currents, and from galvanic action. It shall also protect the cable from mechanical damage and corrosion.

9.0 GENERAL:

The cable shall withstand all mechanical and thermal stresses under steady state and transient operating conditions.

10.0 TEMPERATURE RISE:

The maximum conductor temperature shall not exceed 90-degree C during continuous operation at full rated current. The temperature after short circuit for 1.0 second shall not exceed 250 degree C with initial conductor temperature of 90 degree C. Bidder shall give the following information in the Bid for each conductor cross section specified.

a. Rated continuous current

b. Rated 1.0 second short circuit / short time current

Rating factor shall be given by the Bidder for the following:

a. Variation in ground temperature

b. Variation in soil thermal resistivity

c. Variation of Ambient Temperature

d. For the cables laid side by side, at ID spacing and in Tier formation.

The Bidder shall also indicate the percentage overload that the cable can carry and its duration, when operating initially at a conductor temperature of 90 degree C, with peak conductor temperature of 130 degree C.

11.0 CABLE DRUMS:

Cables shall be supplied in non-returnable drums of sturdy construction. All ferrous and other metal parts of drum shall be treated with a suitable rust preventive finish or coating to avoid rusting during transit or storage. Type of dust preventive finish and coating adopted may be mentioned.

The length of cable on each drum shall be determined by manufacturer considering the transport limitations from manufacturer's works to the site.

12.0 TESTS:

12.1 Routine Tests: (To be performed on each drum length)

All tests as per relevant IS shall be conducted and shall be witnessed by the Client.

12.2 Type Tests:

The Bidder shall furnish two (2) copies of type test certificates conducted on similar cables along with the Bid.

a. Partial discharge test

b. Bending test followed by partial discharge test

c. Dielectric power factor as function of voltage

d. Dielectric power factor as function of temperature

e. Heating cycle test followed by dielectric power factor as a function of voltage and partial discharge tests.

f. Impulse withstand test

g. High voltage test.

13.0 SPECIFICATION FOR PVC ARMOURED CABLE:

All codes and standards mean the latest. Where not specified otherwise the installation shall generally follow the Indian Standard codes of practice or the British Standard Codes of practice where Indian standards are not available.

13.1 Cables:

All cables shall be 1100 Volt grade PVC insulated, sheathed with or without steel armoring as specified and with an outer PVC protective sheath. Cables shall have high conductivity stranded copper conductors and cores shall be color coded to the Indian Standards.

All cables shall be new without any kinds or visible damage. The manufacturers name, insulating material, conductor size and voltage class shall be marked on the surface of the cable at every 600 mm centers.

14.0 INSTALLATION:

Cables shall be laid in the routes marked in the drawings. Where the route is not marked, the contractor shall mark it out on the drawings and also on the site and obtain the approval of the Architect / Client before laying the cable. Procurement of cables shall be on the basis of actual site measurements and the quantities shown on the schedule of work shall be regarded as a guide.

Cables rising indoors shall be laid on walls, ceiling, inside shafts, or trenches. Single cables laid shall be fixed directly to walls or ceiling. All supports shall be at not more than 500 mm. Where numbers of cables are run, necessary cable trays shall be provided wherever shown. Cables laid in built-up trenches shall be on steel supports. Aluminium identification tags shall be provided at every 20 m.

Cables shall be bent to a radius not less than 12 times the overall diameter of the cable, or in accordance with the manufacturer's recommendations whichever is higher. In case of direct buried cables, the cable route shall be parallel or perpendicular to roadways, walls, etc., Cables shall be laid in an excavated, graded trench, over a sand cushion to provide protection against abrasion. Width of excavated trenches shall be as per drawings. Backfill over the cables shall be sifted earth 90% compacted cables shall be buried with a minimum earth cover of 600 mm. The cables shall be provided with cable markers at every 20 meters.

The general arrangement of cable laying is shown on drawings. All cables shall be full runs from panel to panel without any joints or splices. Cables shall be identified at end terminations indicating the feeder number and the Panel / Distribution Board from where it is being laid. All cable terminations for conductors' up to 4sq.mm may be insertion type and all higher sizes shall have tinned copper compression lugs. Cables terminations shall have necessary brass glands. The end- terminations shall be insulated with a minimum of six- half- lapped layers of PVC tape. Cable armoring shall be earthed at both ends.

15.0 TESTING:

MV cables shall be tested upon installation with a 500 V Megger and the following readings established.

1) Continuity on all phases

2) Insulation Resistance (a) between conductors; (b) All conductors and ground

All test readings shall be recorded in the separate book and the same to be handed over to the Client/Architects.

SPECIFICATION FOR CABLE LAYING:

1. GENERAL:

All cables shall be laid in ground, trenches & or on walls, trays as may be specified and as per schematic diagram.

Cables shall be laid in the routes marked in the drawings. Where the route is not marked, the contractor shall mark it out on the drawings and also on the site and obtain the approval of the Engineer-in-charge before laying the cable.

All cables shall be clamped properly when laid along the wall /ceiling /cable tray. Cables laid in built-up trenches shall be on steel supports. Aluminum identification tags shall be provided at every 20 m.

Cables shall be bent to a radius not less than 12 times the overall diameter of the cable, or in accordance with the manufacturer's recommendations whichever is higher.

Cables shall be identified at end terminations indicating the feeder number and size and no. of runs and the Panel / Distribution Board from where it is being laid.

For Cables laid in soil, the cable route shall be parallel or perpendicular to roadways, walls, etc.

Cables shall be laid in an excavated, graded trench, over sand cushion to provide protection against abrasion.

Width of excavated trenches shall be as per drawings/ department specifications.

	Width of trench	Height of trench	sand cushioning
i.	For MV cable	600mm	750mm
	250mm		
ii.	For HT cable	600mm	1200mm
	250mm		

The cables laid in the excavated trenches shall be protected with bricks over the cable.

The bricks should be laid laterally to the trench.

The cables laid in buried underground trench shall be provided with cable markers at every 10 meters.

All cable terminations for conductors' up to 4 sq.mm may be insertion type and all higher sizes shall have compression lugs.

Cable terminations shall have necessary brass glands.

Wherever cables pass through floor or through wall openings, it shall be taken through HDPE PVC/GI sleeves. The open ends of the sleeves shall be sealed by cold setting compound after cables are pulled through them to prevent entry of vermin and ingress of water.

In making connection on switches and other terminals no strand of conductor shall be cut to facilitate termination.

Cable armouring shall be earthed at both ends

The cable shall be as per the relevant IS amended from time to time, Test certificate should be submitted by the contractor for the cables supplied by him.

The contractor at his own cost and risk shall arrange all necessary tools &plants. The contractor will be held responsible for any damage to the building or equipment at the time execution of work.

2. TESTING:

Testing of complete cable installation shall be done as provided in general Specification for electrical works (Part 2 External) 1994/1995 amended up to date.MV cables shall be tested after installation with a 500 V Megger and the following

readings established.

1) Continuity on all phases

2) Insulation Resistance(a) between conductors; (b) All conductors and ground

All test readings shall be recorded in the separate book and the same to be handed over to the Engineer-in-charge.

Item No.150

Octagonal Pole of 7 Mtr and 8 Mtr Length

The octagonal poles must be made from CR sheet steel. The pole should be made as per IS and shall be coated with hot dip galvanizing as per IS 2629/4759 and must be with required base plate suitable to sustain local wind speed.

- Material: CR Sheet Steel, BSEN 10025
- Length of the pole: 7 Mtr and 8 Mtr
- Top Dia (A/F): 70mm
- Bottom Dia (A/F): 130mm – 155mm
- Sheet Thickness: 3mm
- Base Plate Dimension (L X B X T): 200mm X 200mm X 16mm
- Hot Dip Galvanizing: As per IS 2629/4659
- Min. Thickness of Galvanization: 65 microns

The integral JB of octagonal pole must be fitted with required size of 6mm thick hylam sheet bolted on the JB support plate. This hylam sheet must be housed with necessary size of DIN rail with mounting of 32A, 4 way copper connector fitted with necessary bolting. The design and material of the products must be approved by EIC before the work.

Each JB must have Earth Link to connect the LEDs earth wire and such earth link must be connected with pole earth terminal with 4 Sqmm flexible wire.

The design and drawing must be approved by EIC prior to erection of the pole at site. Test certificates must be provided on demand.

Radium Stickers should be placed on pole indicating "Ward No./Pole No" or as per instruction of EIC.

Pole Installation Work

Installation of pole on foundation with alignment, leveling etc. including fixing of bracket, fixing of luminaries electrically wired to the respective junction box with all lugs, clamps etc as required with all end termination, connection, and testing at site.

Item No.151

Street Light Pole Bracket

Supply of street light bracket made from B Class GI pipe with hot-dip galvanization. The bidder has to procure and utilize the bracket of the same manufacturer that offered for poles. Sample and design of the bracket must be approved before installation for verification of quality and material specifications.

The design of the bracket must be aesthetically appealing to the overall perspective of the project

The design should conform to relevant IS Standards considering various factors like wind velocity, corrosion resistivity as well as mechanical strength. Test certificates must be provided on demand.

Item No.154 and 155

OUTDOOR TYPE LED STREET LIGHT LUMINARY

Supply of outdoor type LED street luminary as per following specifications:

No	Parameters	Value	Remarks
1	LED Make	Cree, Nichia, Osram, Philips Lumileds	Manufacturer to certify the same and LM 80 Report to be submitted
2	Luminaire Wattage Capacity with driver	70W to 80W	Manufacturer to certify the same and LM 80 Report to be submitted
3	Luminaire Housing	Single Piece Aluminium Pressure Die Cast or Extruded Aluminium	Manufacturer to certify the same and attach necessary documentary evidence
4	Luminary Opening	Top or Bottom or Side Opening	As per OEM's Manufacturing Practice
5	Luminary Diffuser	UV Stabilized Poly Carbonate/Glass	Manufacturer to certify the same and attach necessary documentary evidence
6	Driver Assembly	Driver of luminary must be potted	Manufacturer to certify the same and attach necessary documentary evidence
7	Degree of Protection	IP 66	Manufacturer to certify the same and attach necessary documentary evidence, test report etc.
8	Operating Input Voltage	120 V to 270 V	Manufacturer to certify the same and attach necessary documentary evidence, test report etc.
9	CCT	6000 +/- 500 K	Manufacturer to certify the same and LM 79 Report to be submitted
10	Luminaire Efficacy	>= 100 lm/watt	Manufacturer to certify the same and LM 79 Report to be submitted

11	CRI	>= 70	Manufacturer to certify the same and LM 79 Report to be submitted
12	Harmonics (THD)	<= 15%	Manufacturer to certify the same and attach necessary documentary evidence, test report etc.
13	Power Factor	>=0.95	Manufacturer to certify the same and LM 79 Report to be submitted
14	Life of Light Source	Min. 50000 Hrs at L 70	Manufacturer to certify the same and LM 79 Report to be submitted
15	Driver Efficiency	>85%	Manufacturer to certify the same and attach necessary documentary evidence, test report etc.
16	Surge Test	10 KV	Manufacturer to certify the same and attach necessary documentary evidence, test report etc.
17	Impact Resistance	>= IK 05	Manufacturer to certify the same and attach necessary documentary evidence, test report etc.
18	Guarantee of Luminaire	5 Years	Manufacturer to certify the same and attach necessary documentary evidence, test report etc.
19	EMI/EMC Test	Must be Qualified	IS: 16102-2
20	Working Temp	(-10 to 50 Deg C)	Manufacturer to certify the same and attach necessary documentary evidence, test report etc.
21	Over Voltage Cut-off	Above 295V AC	Manufacturer to certify the same and attach necessary documentary evidence, test report etc.
22	Lumen Depreciation for rated life	Less than 10%	Manufacturer to certify the same and LM 80 Report to be submitted

i. The bidder must submit type Test Certificate of luminaries from NABL accredited/certified test laboratories like CPRI/STQC/ R&D Labs or any other reputed lab.
ii. The bidder must submit the Test certificates for compliance to IP test for Outdoor LED lights.
iii. The bidder must submit LM 79 and LM 80 reports.

The bidder must note that a deep scrutiny of the LED Fixtures and Illumination Design will be done for its all technical and performance aspects. The bidder and OEMs must submit the required data, documents, test certificates etc.

List of Approved Make

SR. NO.	ITEM	APPROVED MAKE
1	LED CHIP	NICHIA, PHILIPS LUMILED, OSRAM, CREE
2	STREET LIGHT LED LUMINARIES & FIXTURES	CG / PHILIPS / SCHREDER / HAVELLS / WIPRO / BAJAJ
3	STREET LIGHT POLE	BAJAJ / VALMONT / CG / TRANSRAIL / WIPRO / PHILIPS
4	CABLES & WIRES	FINOLEX / POLYCAB / RR KABEL / HAVELLS / LAPP / KEI / ALLCAB
5	"B" CLASS ERW G.I. PIPES	TATA/ SURYA/ ZINDAL/ ASIAN
6	SWITCHGEARS & METERS	L & T / HAVELLS / SCHNEIDER / SIEMENS / ABB / INDOASIAN / LEGRAND / HAGER / C&S
7	ASTRO TIMER / TIME SWITCH	L & T / INDOASIAN / GIC / LEGRAND / HAGGER / THEBEN

***Any make/model must be approved by EIC before its utilization for the project.**

SPECIFIC CONDITIONS RELATED TO COMPREHENSIVE O & M

1. The agency has to do all necessary co-ordination with PGVCL to restore power supply failure.
2. The agency has to monitor the roads regularly and perform preventive maintenance.
3. The agency has to repair/replace the lights within 72 hours after receipt of the complaint failing which penalty of Rs. 30 per light per day will be imposed.
4. In case of faulty switchgear, timer etc and control is not operates as per twilight timing; the repairing must be done on the same day failing which penalty of Rs. 500 per day per phase will be imposed.
5. This is comprehensive O&M; hence the agency has to perform all civil, mechanical and electrical activities including all labour and material during the performance guarantee period.
6. If Street light control does not operate as per twilight timings and alternate circuit timing, penalty equivalent to 100% energy charges for such load will be imposed as per prevalent total energy charges.

APPROVED BRANDS OF MATERIAL

1. HT Cable
    - Havells
    - RR Kabel
    - Bhuwal Insulation Cable Pvt. Ltd.
    - Brilltech Engineers Pvt. Ltd

2. POT-PTFE
    - Ansuk Polymers Pvt. Ltd.
    - Deevin Seismic Pvt. Ltd.
    - Dynamic Prestress Ltd.
    - Poly Fluoro Ltd.

3. Elastomeric Bearing
    - PnG Engineering Services
    - Bhopal Rubber Products
    - Ameenji Rubber Pvt. Ltd.
    - D.K.Steels
    - Deevin Seismic Pvt. Ltd.
    - Elatomet Bearing Pvt. Ltd.
    - Hevea Rubber Technologies Pvt. Ltd.

4. Paint
    - Berger Paints India Ltd.
    - Asian Paints Ltd.
    - Indigo Paints Ltd.
    - Nippon Paints.
    - Akzo Nobel India Ltd (Dulux Paints)
    - Nerolac Paints

5. Bitumen
    - Indian Oil Corporation Ltd.,
    - Hindustan Petroleum Corporation Limited
    - Bharat Petroleum Corporation Ltd.

6. Prime coat
    - Fossil Liquid and Minerals Exim Pvt. Ltd.
    - Acrylic primer
    - Hincol
    - ITPL
7. Tack coat
    - Fossil Liquid and Minerals Exim Pvt. Ltd.
    - Godrej & Boyce Mfg Co. Ltd.
    - Sumokha Hitech Products Industries
    - Nakoda plasto coats Pvt. Ltd.
    - IOCL

- HPCL
- BPCL

8. Structural Steel
    - JSW Steel Ltd
    - Steel Authority Of India Ltd
    - Rashtriya Ispat Nigam
    - TATA steel
    - Electro steel Castings
    - Essar Steel
9. GI Pipe
    - Jindal Pipes Ltd.
    - TATA Pipes
    - Zenith Steel Pipes & Industries Ltd.
    - Prakash Surya Steel Tubes & Pipes
    - Swastik Pipe Ltd.
    - Lloyds Line Pipes Ltd.

10. PVC Pipe
    - Finolex Industries Ltd
    - Savera Pipes Pvt. Ltd.
    - Dutron India
    - Apollo Pipes
    - Kankai Pipes & Fittings Private Limited
    - Jain Irrigation Systems Limited
    - Astral Poly Technik Ltd
    - Supreme Polytubes Pvt. Ltd.
    - Ashirvad Pipes

11. CEMENT
    - JK Cement
    - Ambuja Cement
    - Hathi Cement
    - Ultra-Tech
12. Reinforcement steel 500D and above
    - SAIL
    - TATA
    - RINL
    - National steel
    - Electrotherm
    - VIZAG Steel
13. High Tension cable strand for PSC girder cable
    - D P Wire
    - Usha Martin
    -

- At least Three BIS Approved Manufacturers can be submitted by the contractor for approval.

LIST OF ENGINEERS TO BE DEPLOYED AT SITE DURING CONSTRUCTION PHASE

S.NO.	DESCRIPTION	MIN. EXPERIENCE IN YEARS	Nos.
1	TEAM LEADER	15	1
2	RAILWAY EXPERIENCED SAFETY ENGINEER	20	1
3	QUANTITY /BILLING ENGINEER	5	1
4	QUALITY ENGINEER	7.5	1
5	SURVEYOR	5	1
6	SITE ENGINEER	5	3

SITE OFFICE FACILITY

Facility for site inspection: -

50 Sq.m each area for Railway office and 50 Sq.m area for RMC office near Construction site

Supply of Computer, Printer, cartridge and Camera with staff for site work: -

Bidder have to supply the following items for site work and shall handover the same to Engineer at site office with furniture, table, chairs,fan, electricity connection as a complete job.

a) Desk Top Computer:-
Lenovo All in one unit , Model No.A340-24IWL-10th Gen Core i3 original Window , 8GB RAM, 512GB SSD Intel+UHD shared graphics, 54cm white colour or equalent.

b) Colour Printer A3 Size:-
HP Colour Model No. CP5225 Printer-A3 size , memory extendable-448MB

c) Camera:-

NIKON, Model-D3500DSLR, Memory 480MB with good quality stand.

OR

CANON, Model-EOS1500D, DSLR, Memory 480MB with good quality stand.

d) Compute operator for Data Entry at site office: -

One staff for operate the above items who is well versed with MS Word, EXCEL, DTP, PPT have 5 years' experience, must be graduate with typing speed 50wpm.Computer operator shall be custodian of above items and keep it upto date and working condition with all consumable, cell, cartridges etc.

e) Two set of measurement tools like 3,5,30m tape, Right angle,Plumbob,1m steel scale, Screw gauge, Vernier gauge,Temperature rod upto 200 ^{0} , marking pen etc. as per standard tool kit.

Agency have to provide all consumables, stationery, cartridges, refilling as per the requirement at site office.

After completion of Project (Completion certificate issue date), agency shall take over the items as and where basis. All above items rates are inclusive, hence bidder shall consider the cost and operation cost of these items. No Extra payment shall be paid for above items throughout the construction period even in the extension time period.