

PART 2: EMPLOYER'S REQUIREMENTS

CHAPTER : EXPLANATORY NOTES

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1. EXPLANATORY NOTES OF BOQ

1.1 General

The item description is intended to briefly describe the work to be performed under the item and to identify associated work. It is not a full and complete description of the work to be performed. The Contractor shall carry out all the work necessary to meet the requirements of the Specification and the contract.

1.2 A1. General Requirements

Item A1-1.0: Training of Employer's staff

This item shall cover the Training of Employer's staff as specified in Part II Employer requirements. The total man-weeks included therein shall be broken down between two Corridors as follows:

Item	G-1 (Corridor-2)	G-1 (Corridor-4)
Off-shore (Man-weeks)	02	02
In India (Man-weeks)	04	04

It shall essentially include, but not limited to:

- Training plan
- Training tools and staff wages
- Training documentation

The price shall also include the cost of the training documents implementing as well as advises after the contract.

The price shall not include the travelling and accommodation cost of trainees.

Item A1-2.0: Maintenance & Operations manuals

This item shall cover the Maintenance & Operations manuals as specified in the GS & Part II Employer requirements.

One set of Manuals shall include all Operations and Maintenance Manuals pertaining to all equipment's/systems which have been used /deployed in the various Corridors under the jurisdiction of Depot.

One set of Manuals is meant to essentially include, but not limited to:

- Operation manuals
- Maintenance manuals, drawings and procedures

The price shall also include the Maintenance & Operations documents implementing as well as documents originals, copies, and electronic files cost.

The documents shall be supplied in the prescribed number of copies.

Item A1-3.0: Integrated testing & commissioning (Item No-A1-3.1 & A1-3.2)

The price shall cover the Integrated testing & commissioning as specified in Part II Employer requirements.

As explained in Part II Employer requirements, the integrated testing and commissioning, shall be performed for each Corridor, after the first 15 days of operation, during which the various actuation and operation situations (putting into service, normal actuation, failure tripping etc) shall be simulated.

The Integrated Testing & Commissioning shall essentially include, but not limited to:

Integrated testing & commissioning plan

- Tools, instruments, tackles, and documents required.
- Providing attendance to the Employer's Representative, including during inspection by statutory Authorities, Ministry of Railways and Commissioner of Railway safety.
- Carrying out the appropriate integrated testing & commissioning functions.

Item A1-4.0: As-Built drawings

The price, under this item, shall include the cost of supplying As-Built drawings for each of the Corridors included in this Bill.

Under this item, the contractor shall prepare the following drawings:

- As built drawings depicting the completed works that have been certified as complete.
- Shop drawings containing information related to the permanent works.
- Working drawings containing the information related to the temporary works depicting the construction of permanent works.

1.3 ITEM A2: OHE SUPPLY C2 & C4: OVERHEAD EQUIPMENT SUPPLY

The Explanatory Notes given here under are applicable to the OHE Supply items.

Item A2-1.0: Galvanized steel masts on viaduct (Item A2-1.1 to A2-1.2)

The price shall include the cost of supplying galvanized steel masts of appropriate sizes mentioned in sub-items, as per specification, for carrying the overhead catenary system and/or equipment for all switching posts.

The masts shall be of adequate length to support the specified conductors and/or equipment on viaducts.

In the case of masts on viaducts the price shall include the cost of base plate, welded to the mast, as

per specification, along with necessary nuts, locknuts, washers etc.

The price of masts shall also include the cost of galvanizing, drilling etc. as per specifications.

Item A2-2.0: Galvanized steel masts At Grade (Item A2-2.1 to A2-2.2)

The price shall include the cost of supplying galvanized steel masts of appropriate sizes meeting the specifications / standards, for carrying the overhead catenary system and/or equipment for all switching posts.

The galvanized steel masts shall be of adequate length to support the specified conductors and/or equipment on at grade in main line.

The price of galvanised steel masts shall also include the cost of galvanizing, drilling etc. as per specifications.

Item A2-3.0: Galvanized steel masts -Viaduct, At Grade (Item A2-3.1 to A2-3.2)

The price shall include the cost of supplying galvanized steel Dwarf mast and Two track Cantilever (TTC) structures of appropriate sizes mentioned in sub-items, as per specification, for carrying the overhead catenary system and/or equipment for all switching posts.

The Dwarf mast & TTC shall be of adequate length to support the specified conductors and/or equipment on at grade/viaduct.

In the case of masts on viaducts the price shall include the cost of base plate, welded to the mast, as per specification, along with necessary nuts, locknuts, washers etc.

The price of masts shall also include the cost of galvanizing, drilling etc. as per specifications.

Item A2-4.0: Galvanized Drop Arm supporting OHE at Stations-At grade, Portals at At-Grade, Viaduct (Item A2-4.1 to A2-4.2)

The price shall include the cost of supplying galvanized steel Drop Arm Supporting OHE including SPS at Stations/portals/TTC of appropriate sizes mentioned in sub-items, as per specification, for carrying the overhead catenary system and/or equipment for all switching posts.

The Drop Arm shall be of adequate length to support the specified conductors and/or equipment on at grade/viaduct, Portals.

The price of Drop arms shall also include the cost of galvanizing, drilling etc. as per specifications.

ItemA2- 5.0: Galvanized steel portal structures Viaduct/At Grade (item A2-5.1 to 5.9)

The price shall include the cost of supplying galvanized steel portal structures on viaduct/At Grade as per specification including, but not limited to,

- Two vertical uprights complete with welded base plate, nuts, locknuts, washers etc.
- Horizontal steel boom with required attachments to the vertical uprights.

The portal structures shall be delivered, complete in all respects. Intermediate boom is inclusive of all SPS for complete assembly.

The price of Portals shall also include the cost of galvanizing, drilling etc. as per specifications.

Item A2-6.0: Overhead wires and conductors (item A2-6.1 to A2-6.4)

The price shall include the cost of supplying different types of conductors, shown in the sub-items.

The conductors shall be delivered in sea-worthy wooden drums, as per specification, in appropriate approved lengths.

Note: Unit of measurement for this item shall be km. And it shall be measured as per AS Built drawings.

Payment will be made for the above measurements only. Leftover, scrap conductors and empty drums will remain with the Contractor.

Item A2-7.0: Droppers (item A2-7.1)

The price under this item shall include the cost of supply of dropper assemblies (current carrying), as per specification. The price of supply shall include, but not limited to, the cost of clips on either end of droppers (M.W. dropper clip and C.W. dropper clip), duly crimped or bolted as per drawings/specifications, the flexible dropper wire of appropriate length in accordance with schedules and all materials necessary to make the dropper complete in all respects.

Item A2-8.0: RC, BEC and OPC (item A2-8.1 to A2-8.3)

The price shall include the cost of supply of Return Conductor / Buried Earth Conductor & Overhead Protection Conductor, as per specification.

The RC, BEC & OPC shall be delivered in sea-worthy wooden drums, as per specification, in appropriate approved lengths. Leftover, scrap conductors and empty drums will remain with the contractor.

Item A2-9.0: Cantilever Assembly (item A2-9.1 to A2-9.2)

The price shall cover cost of supply of a cantilever assembly of appropriate type, under the corresponding sub-item.

The price shall include cost of all cantilever components including, but not limited to,

- Stay tube assembly including insulator of appropriate type (Composite)
- Bracket tube assembly including insulator of appropriate type (Composite)
- Register arm assembly
- Steady arm assembly, wherever required
- Dropper for Register arm and Wind stay dropper for Steady arm as per cantilever design

The price shall also include all fittings and components required for installing the cantilever on masts/drop-arms/ special attachments but shall exclude multiple cantilever cross-arms and other special steelwork, whose supply will be paid for under item A2-10.0.

The cantilevers shall be delivered duly fabricated, assembled and tagged with the location number to which it belongs.

The insulators, if required, may be packed and delivered in separate cases to avoid breakage during transit and handling.

Item A2-10.0: Galvanized steelwork (item A2-10.1 to A2-10.3)

The price shall cover the cost of supply of galvanized steelwork, complete with all bolts, nuts, locknuts, washers (flat or spring), split pins etc. as required under specifications and approved drawings.

The supply of multiple cantilever cross-arms required for mounting more than one cantilever on masts/drop arms, special steelwork necessary for supporting catenary system/conductors from under the roofs in stations, and steel work for supporting feeders from masts / drop arms shall be shown under the appropriate sub-item.

All other steel work for mounting of isolators, automatic tensioning devices etc. as required, on masts/drop arms etc. shall be included in the appropriate items for supply of the concerned equipment/conductor and shall not be claimed under this item.

The steelwork shall be delivered, complete in all respects and in sets ready for erection.

Item A2-11.0: Jumper assemblies (item A2-11.1 to A2-11.4)

The price shall cover supply of a Jumper assembly, as per drawing and specification, for various applications and shall be shown under the appropriate sub-item.

The price shall include the cost of the appropriate flexible copper cable, the necessary connecting clamps, either crimped or bolted and shall be delivered duly assembled and tagged with the location number to which it refers, ready for erection.

Item A2-12.0: Earthing assemblies (item A2-12.01 to A2-12.10)

The price shall include the cost of supply of all materials, components and fittings necessary to establish an earthing connection between the various parts, as shown in the sub-items.

The price shall cover all items to ensure an earthing connection complete in all respects.

In the case of Integral Transversal Link (ITL) (sub-item 12.04) all materials required for establishing the ITL shall be included under this item. Wherever the connection is required to be made to rail, cad welding is to be resorted for making connections to the rail, the price therefore shall be included under item 12.08 inclusive of connecting cable jumpers for each CAD welding. The cost of supplying material required for establishing a connection between the earth connection point and Station Canopy/Metallic overhead structures of any kind/Safety screen panels etc., as

required under specification, shall be included in item 12.06

The price under item 12.07 shall cover all materials required for establishing the earthing connection on Viaduct/at grade including earth pit box and cover arrangements. The price shall essentially include, but not limited to, the following:

- 93.3 sq.mm ACSR for longitudinal connection between earth terminals provided on the inner faces of webs of the end of each girder (on both UP & DN sides) together with the required bolts, nuts etc.
- 93.3 sq.mm ACSR for connection between the BEC and earth plates provided on the inner webs of end of each girder (both for UP and DN sides) i.e., 4 connections per girder.
- 93.3 ACSR for connection between the earth plates on the end segments and those on the pier cap i.e., 4 connections per span.

The payment for item 12.06 shall be 'per span'.

The price of supplying an earthing station of 1 electrode type, in accordance with specification and drawings, shall be included under item 12.05.

Item A2-13.0: Termination assembly (item A2-13.1 to A2-13.4)

The price shall cover the cost of supply of a termination assembly for different types of conductors and shall be shown against the appropriate sub-item.

The price shall cover all items required for termination of the wire/conductor including, but not limited to

- Adjusters (turnbuckle)
- Equalising plate /compensating plate
- Terminating wire, if required
- Insulators etc
- Mast-anchor fittings as necessary, in accordance with approved drawings/specifications.
- Ending clamps

The price shall not, however, include the cost of supply of Automatic Tensioning Device (ATD) which shall be covered under item 16.1.

Item A2-14.0: Anti-creep assembly

The price shall cover the cost of supply of an Anti-creep assembly, including, but not limited to fittings and clamps, insulators, anchor fittings, adjusters, ending clamps and all items required for the anti-creep (except for Anti-creep wire), ready for erection.

The price shall not, however, include the cost of supply of Guy rod assembly (which shall be paid for under item 15.0) and masts (under item A2: 1, 2, 3 & 5).

The anti-creep assembly shall be delivered complete in all respects, ready for installation, duly tagged the location number to which it refers.

The insulators may, however, if required, be packed and delivered in separate cases to avoid breakage during transit and handling.

Item A2-15.0: Guy-rod assembly

The price shall cover supply of a guy-rod assembly including, but not limited to mast – guy-rod fitting, guy-rod assembly, double-straps, anchor loops, link plates and all items required for the installation of the guy-rod assembly.

The price shall also cover special dwarf masts, if required, for anchoring the guy-rod at a height above the ground.

Item A2-16.0: Automatic Tensioning Device assembly (item A2-16.1 & A2-16.2) Item

A2-16.1: Automatic Tensioning Device of 5-Pulley block type

The price shall cover the supply of an Automatic Tensioning Device of 5-Pulley block type, complete in all respects, including, but not limited to the ATD device, the counterweight assembly, guide tubes with necessary clamps for supporting the guide tubes on masts, anti-falling device, GI protection cage, stainless steel wire rope and all other fittings and components.

The ATD device shall be supplied, complete in all respects, ready for erection.

Item A2-16.2: Automatic Tensioning Device of spring type

The price shall cover the supply of complete assembly of spring type Automatic Tensioning Device complete in all respects. Each set would comprise of arrangement for terminating one set of catenaries and contact wire both.

The ATD device shall be supplied, complete in all respects, ready for erection.

Item A2-17.0: Insulator assembly (item A2-17.1 & A2-17.2)

Item A2-17.1: Cut-In Insulator assembly

The price shall cover the cost of supply of a cut-in insulator assembly (composite), complete with ending clamps required on the conductor side, spacers and adjusters as required and all other fittings and components.

Item A2-17.2: Post Insulator

The price shall cover the cost of supply of a post insulator assembly (solid core), complete with required mounting accessories, all other fittings and components.

Item A2-18.0: Section Insulator Assembly

The price shall cover the cost of supply of section insulator assembly Type 1, suitable for Main line, (For details and specifications of Types 1, a reference shall be made to employer's requirement)

The Section Insulator assembly shall be delivered complete in all respects, ready for erection.

Item A2-19.0: Plates and boards set for the catenary system (item A2-19.1 to A2-19.7)

The price shall cover the cost of supply of Number plates and Caution Boards of various types and descriptions to be provided on the catenary system, as per specification.

The prices of different types of plates and boards may be shown against the appropriate sub- item. The price shall also cover all fittings, fixtures, bolts, nuts etc. required for mounting of the plates/boards at appropriate location as per approved drawings.

Note that Caution notices at station can be of 2 or 3 different sizes and description (as per statutory requirements in multi-language)

Item A2-20.0: Safety Screen panels

The price shall cover the cost of supply of safety screen panel, as per approved drawings and specifications; at various locations in stations, equipment's and other places where public has access or on portals, to provide protection from live equipment.

The price shall also cover the various mounting/fixing arrangements along with requisite bolts, nuts etc., as per approved designs.

Item A2-21.0: Neutral Sections

Short Neutral Section Assembly

The price shall cover the cost of supply of one 3-Element type Short Neutral Section Assembly (of Arthur Flury type or equivalent) complete with the phase-break, messenger wire cut-in insulator, droppers, clamps, connectors and socket, and all other items required to make the assembly complete.

Item A2-22.0: Insulated Sleeves

Item A2-22.1: Insulated Sleeves (Line Cover) for catenary

The price shall cover the cost of supply of Insulated Sleeves on Catenary in Stations, FOB and other vulnerable location as per drawing (submitted by contractor) and specifications including covers at both the ends to make the assembly complete in all respect.

Item A2-23.0: Earthquake Sensor and Thermal Imaging Camera

The price shall cover the cost of supply of Thermal Imaging Camera and Earthquake Sensor with the complete assembly and accessories. For details and specifications, a reference shall be made to employer's requirement. The price shall also cover all fittings, fixtures, bolts, nuts etc. required for mounting of the Thermal Imaging Camera and Earthquake Sensor at appropriate location as per approved drawings. The price shall also include the cost of cables, glands and associated accessories required for complete erection as per approved drawings.

Item A2-24.0: Catenary Monitoring System

The price shall cover the cost of supply of Catenary Monitoring System with the complete assembly. The price shall also cover all fittings, fixtures, bolts, nuts etc. required for mounting of the Catenary Monitoring System at appropriate location as per approved drawings. The price shall also include the cost of related fittings required for complete erection as per approved drawings.

For details and specifications, a reference shall be made to employer's requirement.

Item A2-25.0: Wind Speed Sensor

The price shall cover the cost of supply of Wind Speed Sensor with the complete assembly and accessories. For details and specifications, a reference shall be made to employer's requirement. The price shall also cover all fittings, fixtures, bolts, nuts etc. required for mounting of the Wind Speed Sensor at appropriate location as per approved drawings. The price shall also include the cost of cables, glands and associated accessories required for complete erection as per approved drawings.

Item A2-26.0: Anti Bird Arrangement (item No- A2-26.1 & A2-26.2)**Item A2-26.1 Anti Bird Nesting SS net**

The price shall cover the cost of supply of wire mesh/SS net on B series mast and portals along with associated fittings.

Item A2-26.2 Anti Bird Disc

The Price shall cover the cost of supply of Anti Bird Disc on each cantilevers along with associated fittings.

Item A2-27: Providing of Concrete for Foundations & grouting in all types of soils using M-20 grade (incl muffs) including nominal reinforcement wherever required as per RDSO drawings / approved design from Bi-RIDE for Structures / Portals / TTUs / switching stations etc

The price shall cover the cost of supply of concrete for foundation of Masts/Portals/TTU/anchors etc., for OHE and switching stations as per the approved design, drawings and specifications mentioned.

1.4 ITEM NO. A3 OHE ERECTION C2 & C4: OHE ERECTION

The Explanatory Notes given hereunder are applicable to OHE Erection items.

Item A3-1.0: Galvanized steel masts on viaduct (item A3-1.1 to A3-1.2)

The price shall include the cost of erecting galvanized steel masts of appropriate sizes mentioned in sub-items of item 1.0, as per specification, for carrying the overhead catenary system.

On viaducts, the erection prices shall include fixing base plate on foundation bolts and setting and aligning of the mast including provision of Conbextra GP 2 compound or similar compound between parapet and base plate of mast.

Item A3-2.0: Galvanized steel masts -At-grade (item A3-2.1 to A3-2.3)

The price shall include the cost of erecting galvanized steel masts of appropriate sizes meeting the specification, / standard for carrying the overhead catenary system.

At grade, on main line, the erection prices shall include the cost of grouting the masts in the core holes in foundations, their setting and aligning and muffing.

The erection prices shall also include the cost of site drilling of masts, if required and cold galvanising such drilled portions.

Item A3-3.0: Galvanized steel masts -Viaduct, At grade (item A3-3.1 to A3-3.2)

The price shall include the cost of erecting galvanized Dwarf mast and Two Track Cantilevers (TTC) of appropriate sizes mentioned in sub-items of item 3.0, as per specification, for carrying the overhead catenary system.

On viaducts, the erection prices shall include fixing base plate on foundation bolts and setting and aligning of the mast including provision of Conbextra GP 2 compound or similar compound between parapet and base plate of mast.

At grade, the erection prices shall include the cost of grouting the masts in the core holes in foundations, their setting and aligning and muffing.

The erection prices shall also include the cost of site drilling, if required and cold galvanizing such drilled portions.

Item A3-4.0: Galvanized Drop Arm Supporting OHE at Stations, At-Grade, Portals at At- Grade, Viaduct (item A3-4.1 to A3-4.2)

The price shall include the cost of erecting galvanized steel Drop arm including SPS at stations- on Viaduct, At-Grade and Portals of appropriate sizes mentioned in sub-items of item 4.0, as per specification, for carrying the overhead catenary system.

The erection prices shall also include the cost of site drilling, if required and cold galvanizing such drilled portions.

Item A3-5.0: Galvanized steel portal structures for Viaduct/At Grade (item A3-5.1 to A3-5.3)

The price shall include the cost of erecting galvanized steel portal structures, as per specification, complete in all respects, including erection and fixing of booms, duly bolted to the foundations, and ready for service.

In the case of portals on viaducts, the erection prices shall include the cost of fastening portal base plate to the bolts provided in the parapet and their setting and alignment including provision of

Conbextra GP 2 compound or similar compound between parapet and base plate of mast.

Item A3-6.0: Cantilever Assembly (item A3-6.1 to A3-6.2)

The price shall include the cost of erection the cantilever assemblies of all types, including all steelwork, to conform to designs and specifications.

Item A3-7.0: BEC, RC, OPC, Anticreep and Feeder Wire (item A3-7.0 to A3-7.4)

The price shall cover the cost of laying, jointing and termination (as required) of Return Conductor (RC)/Buried Earth Conductor (BEC), Overhead Protection Conductor (OPC), Anti Creep wire and feeder wire as per specification including Bi-metallic strips if required.

The price shall be shown under the appropriate sub-item, depending upon whether the BEC is laid in cable troughs on viaduct and below the cable trough at grade.

The price shall also cover the cost of establishing the necessary connection including materials, between the OPC/RC/BEC and appropriate earth locations on plinths viaduct/piers and other locations at at-grade, as per approved drawings/specifications, other than connections to Earth Terminal strips at stations (whose price shall be included in item 10)

Item A3-8.0: Galvanized Steel work (item A3-8.01 to A3-8.10)

The price shall include the cost of erecting the required steelwork for mounting multiple cantilevers on masts/drop arms, for supporting catenary system under roofs at stations and for supporting feeders from Masts/drop arms. The payment will be made for erection of the required steelwork, measured as the number of Masts/Drop-arms/Supports on which such steelworks are mounted. The price shall include the cost of erection of number plates, caution boards and other boards, as required.

Item A3-9.0: Overhead Catenary System (item A3-9.1 to A3-9.3)

The price shall include the cost of erecting the overhead Catenary system (OCS), complete in all respects, including, but not limited to the following:

- Laying out the conductor, adjusting the heights and staggers after tensioning and all other works necessary to make the erected conductors, ready for operation.
- Providing pull-off assemblies, if required, including materials, to ensure proper positioning of contact wire and messenger wire with respect to track centre line, in accordance with approved designs.
- Marking of implantation, stagger and contact wire on masts
- Erection of Track side equipment (to be supplied by Rolling Stock contractor) at Neutral Sections and warning boards and visual indications.
- Erection of lightning arrester at interface of flexible OHE system and ROCS, if any. And

completing the Overhead Catenary System, in all respects and making it fit for operation.

NOTE: This item-9 covers erection of all items required for completion of the OHE Work other than the items of erection covered elsewhere under this bill schedule.

Item A3-10.0: Neutral Section

The price shall include the cost of erection of neutral section assembly, complete in all aspects and ready for use.

Item A3-11.0: Dropper Assembly

The price shall include the cost of erecting the dropper assemblies, complete in all respects, including, but not limited to the following:

- Installing the dropper assemblies in the Catenary system, including crimping/bolting etc. at site, as required.

Item A3-12.0: Jumper Assemblies (item A3-12.1 to A3-12.3)

- The price shall include the cost of erecting the jumpers, complete in all respects.

Item A3-13.0: Earthing Assemblies (item A3-13.1 to A3-13.6)

The price shall include the cost of earthing assemblies, including, but not limited to the following:

- Erection of Earthing stations (earth electrode and associated arrangements)
- Establishing earthing connections, as per drawings and specifications
- Between metal parts of cantilevers and supporting mast/portal wherever required
- Between OPC and earthing connection points
- Between BEC and earthing connection points and incidental connections to establish continuity between BEC and earth terminals provided on parapet/viaduct/pedestal/pier
- Between platform canopy/overhead metallic structures etc. and the earth connection point of handrail.
- Integral Transversal Links
- Between return Conductor and Rail, and
- Cad welding etc.,

Item A3-14.0: Termination Assemblies (item A3-14.1 to A3-14.4)

The price shall include the cost of terminating the conductors on either end appropriately with all associated fittings and tensioning the conductors to appropriate values.

Item A3-15.0: Anti-Creep Assembly

The price shall include the cost of erection of anti-creep assemblies, with all associated fittings.

Item A3-16.0: Guy Rod Assembly

The price shall include the cost of erection of guy rod assemblies with all associated fittings.

Item A3-17.0: Automatic Tensioning Device Assembly (item A3-17.1 & A3-17.2)

The price shall include the cost of erection of Automatic Tensioning Devices (ATD) assemblies, Spring type or 5-Pulley block type, including anti-falling devices and provision of supporting plinth for counterweights and steel cage of appropriate design as a protection against counter weight falling down, painting the counterweight assembly with Aluminium paint of approved specification, two coats prior to installation and one finish coat after installation, and adjustment of ATD for x-y values depending upon the temperature at the time of adjustment, initial greasing of the ATD equipment, marking of maximum and minimum positions of counterweight assembly on mast, in case of pulley -counter weight type of ATD.

The price shall include the cost for erection of ATD assembly complete in all aspects and ready for service.

Item A3-18.0: Insulator Assembly (item A3-18.1 to A3-18.2)

The price shall include the cost of erection of cut-in insulator assemblies, and Post insulators with associated fittings.

Item A3-19.0: Section Insulator Assembly (Suitable for Mainline)

The price shall include the cost of erection of Section Insulator assembly suitable for main line, complete in all aspects and ready for use.

Item A3-20.0: Earthquake Sensor and Thermal Imaging Camera

The price shall include the cost of erection of Thermal Imaging Camera and Earthquake Sensor with associated accessories and cabling with glands and required connections. The price shall cover the erection of Thermal Imaging Camera and Earthquake Sensor, complete in all aspects and ready for use.

Item A3-21.0: Catenary Monitoring System

The price shall include the cost of erection of Catenary Monitoring System with associated fittings, complete in all aspects and ready for use.

Item A3-22.0: Wind Speed Sensor

The price shall include the cost of erection of wind speed sensor with associated accessories, complete in all aspects and ready for use.

Item A3-23.0: Anti Bird Nest net & Anti Bird Disc (Item No-A3-23 & A3-23.1)

The price shall include the cost of erection of Anti Bird Nesting ss net in B series masts and portals and erection of Anti Bird Disc on each cantilever stay arm & bracket arm.

Item A3-24.0: Installation of concrete Foundations & grouting in all types of soils using M- 20 grade (incl muffs) including nominal reinforcement wherever required as per RDSO drawings / approved design from Bi-RIDE for Structures / Portals / TTUs / switching stations etc

The price shall include the cost of Installation of concrete Foundations & grouting in all types of soils using M-20 grade (including muffs) including nominal reinforcement wherever required as per RDSO drawings / approved design from Bi-RIDE for Structures / Portals / TTUs / switching stations etc.,

Item A3-25.0: Testing and Commissioning of Overhead Catenary System (item A3-25.1 to A3-25.3)

The price shall cover the cost of testing and commissioning of the erected Overhead Catenary System, as per employer's requirement.

Item A3-25.1: Adjustment of Cantilever & SED as per approved drawing

The price shall cover the cost of adjustment of cantilever & SED as per approved design and drawings.

Item A3-25.2: Tower Wagon checking

The price shall cover the cost of checking of overhead catenary system through Tower Wagon.

Item A3-25.3: Others (Tensing & Commissioning of OHE System)

The price shall cover the cost of Commissioning of OHE System other than described as above.

1.5 ITEM No A4 OHE Depot SUPPLY: (SOLADEVAHALLI DEPOT)

The Explanatory Notes given here under are applicable to the Depot OHE Supply items.

Item A4-1.0: Galvanized steel masts. (Item A4-1.1 to A4-1.2)

The price shall include the cost of supplying galvanized steel masts of appropriate sizes mentioned in sub-items, as per specification, for carrying the overhead catenary system and/or equipment for all switching posts.

The masts shall be of adequate length to support the specified conductors and/or equipment on viaducts, at grade or in the depot.

In the case of masts on ramp the price shall include the cost of base plate, welded to the mast, as per specification, along with necessary nuts, locknuts, washers etc.

The price of masts shall also include the cost of galvanizing, drilling etc. as per specifications.

Item A4-2.0: Galvanized steel masts for regulated contact wire only (TRAMWAY type) (item A4-2.1 to A4-2.4)

The price shall cover the cost of supplying galvanized steel masts of appropriate size, for carrying the overhead catenary system (contact wire only).

The masts shall be of appropriate length to support the contact wire system or equipment as per approved design.

The price shall also include the cost of galvanizing, drilling etc. as per specifications.

Item A4-3.0: Galvanized steel portal structures (item A4-3.1 to A4-3.2)

The price shall include the cost of supplying galvanized steel portal structures as per specification including, but not limited to,

- Two vertical uprights complete with welded base plate, nuts, locknuts, washers etc.
- Horizontal steel boom with required attachments to the vertical uprights.
- Required number of drop-arms complete with all components required to fasten the drop-arms to boom.

The portal structures shall be delivered, complete in all respects.

Intermediate boom is inclusive of all SPS for complete assembly.

Item A4-4.0: Overhead wires and conductors (item A4-4.1 to A4-4.7)

The price shall include the cost of supplying different types of conductors, shown in the sub-items.

The conductors shall be delivered in sea-worthy wooden drums, as per specification, in appropriate approved lengths.

Note: Unit of measurement for this item shall be km. And it shall be measured as per approved As-Built Drawings.

In Depot, there will be tracks with conventional OHE (catenary wire and contact wire) and tracks equipped with tramway OHE type (contact wire only)

Payment will be made for the above measurements only. Leftover, scrap conductors and empty drums will remain with Contractor.

Item A4-5.0: Dropper assembly

The price under this item shall include the cost of supply of dropper assemblies, as per specification. The price of supply shall include, but not limited to, the cost of clips on either end of droppers (M.W. dropper clip and C.W. dropper clip), duly crimped or bolted as per drawings/specifications, the flexible dropper wire of appropriate length in accordance with schedules and all materials necessary to make the dropper complete in all respects.

Item A4-6.0: RC, BEC and ACSR (Item A4-6.1 to 6.3)

The price shall include the cost of supply of Return Conductor/ Buried Earth Conductor, as per specification.

The BEC shall be delivered in sea-worthy wooden drums, as per specification, in appropriate approved lengths.

Item A4-7.0: Cantilever Assembly (item A4-7.1 to A4-7.4)

The price shall cover cost of supply of a cantilever assembly of appropriate type, under the corresponding sub-item.

The price shall include cost of all cantilever components including, but not limited to,

- Stay tube assembly including insulator of appropriate type (Composite)
 - Bracket tube assembly including insulator of appropriate type (Composite)
 - Register arm assembly
 - Steady arm assembly, wherever required
 - Dropper for Register arm and Wind stay dropper for Steady arm as per cantilever design
- The price shall also include all fittings and components required for installing the cantilever on masts/drop-arms/ special attachments but shall exclude multiple cantilever cross-arms and other special steelwork, whose supply will be paid for under item 8.0.

The cantilevers shall be delivered duly fabricated, assembled and tagged with the location number to which it belongs.

The insulators, if required, may be packed and delivered in separate cases to avoid breakage during transit and handling.

Item A4-8.0: Galvanized steelwork (item A4-8.1 to A4-8.3)

The price shall cover the cost of supply of galvanized steelwork, complete with all bolts, nuts, locknuts, washers (flat or spring), split pins etc. as required under specifications and approved drawings.

The supply of multiple cantilever cross-arms required for mounting more than one cantilever on masts/drop arms, special steelwork necessary for supporting catenary system/conductors from under the roofs in stations/depos, and steel work for supporting feeders/OPC from masts / drop arms shall be shown under the appropriate sub-item.

All other steel work for mounting of isolators, automatic tensioning devices etc. as required, on masts/drop arms etc. shall be included in the appropriate items for supply of the concerned equipment/conductor and shall not be claimed under this item.

The steelwork shall be delivered, complete in all respects and in sets ready for erection.

Item A4-9.0: Jumper assemblies (item A4-9.1 to A4-9.3)

The price shall cover supply of a Jumper assembly, as per drawing and specification, for various applications and shall be shown under the appropriate sub-item.

The price shall include the cost of the appropriate flexible copper cable, the necessary connecting clamps, either crimped or bolted and shall be delivered duly assembled and tagged with the location number to which it refers, ready for erection.

Item A4-10.0: Earthing assemblies (item A4-10.1 to A4-10.7)

The price shall include the cost of supply of all materials, components and fittings necessary to establish an earthing connection between the various parts, as shown in the sub-items.

The price shall cover all items to ensure an earthing connection complete in all respects.

Similarly, the price against Sub-item A4-10.3 becomes payable only when an independent connection is established between the BEC and an Earth terminal at locations other than the connections between the BEC and earth plates on viaduct segments, which are included under sub-item A4-10.5. When the connection between the BEC and earth terminal is established as part of the Integral Transverse Link (ITL), separate payment against this sub-item will not be made.

The price against Sub-item A4-10.2 similarly becomes payable only when an independent connection is established between the BEC and Rail. When the connection between the SEC and Rail is established as part of the Integral Transverse Link (ITL), separate payment against this sub-item will not be made.

In the case of Integral Transversal Link (ITL) (sub-item A4-10.3) all materials required for establishing the ITL shall be included under this item. Wherever the connection is required to be made to rail, it shall be assumed that connection will be made by drilling holes on the rail and connection made by means of bolts and nuts. If, however, cad welding is required to be resorted to for making connections to the rail, the price therefore shall be included under item A4-10.6 inclusive of connecting cable jumpers as extra over the price for items A4-10.4 and A4-10.5, for each CAD welding. The cost of supplying material required for establishing a connection between the earth connection point and Station Canopy/Metallic overhead structures of any kind/Safety screen panels etc., as required under specification, shall be included in item A4-10.7.

The price under item A4-10.5 shall cover all materials required for establishing the earthing connection on Viaduct segments. The price shall essentially include, but not limited to, the following:

- 93.3 ACSR for longitudinal connection between earth terminals provided on the inner faces of webs of the end segments of each span (on both UP & DN sides) together with the required bolts, nuts etc.
- 93.3 ACSR for connection between the BEC and earth plates provided on the inner webs of end segments of each span (both for UP and DN sides) i.e., 4 connections per span.
- 93.3 ACSR for connection between the earth plates on the end segments and those on the pier cap i.e., 4 connections per span.

The payment for item A4-10.5 shall be 'per span'.

The price of supplying an earthing station of 1 electrode type, in accordance with specification and drawings, shall be included under item A4-10.4.

Item A4-11.0: Termination assembly (item A4-11.1 to A4-11.4)

The price shall cover the cost of supply of a termination assembly for different types of conductors and shall be shown against the appropriate sub-item.

The price shall cover all items required for termination of the wire/conductor including, but not limited to

- Adjusters (turnbuckle)
- Equalizing plate /compensating plate
- Terminating wire, if required
- Insulators etc.
- Ending clamps
- Mast-anchor fittings as necessary, in accordance with approved drawings/specifications. The price shall not, however, include the cost of supply of Automatic Tensioning Device (ATD) which shall be covered under item A4-14.0.

Item A4-12.0: Anti-creep assembly

The price shall cover the cost of supply of an Anti-creep assembly, including, but not limited to fittings and clamps, insulators, anchor fittings, adjusters and all items required for the anti-creep, ready for erection.

The price shall not, however, include the cost of supply of Guy rod assembly (which shall be paid for under item A4-13.0) and masts (under item A4-1.0).

The anti-creep assembly shall be delivered complete in all respects, ready for installation, duly tagged the location number to which it refers.

The insulators may, however, if required, be packed and delivered in separate cases to avoid breakage during transit and handling.

Item A4-13.0: Guy-rod assembly

The price shall cover supply of a guy-rod assembly including, but not limited to mast – guy-rod fitting, guy-rod assembly, double-straps, anchor loops and all items required for the installation of the guy-rod assembly.

The price shall also cover special dwarf masts, if required, for anchoring the guy-rod at a height above the ground.

Item A4-14.0: Automatic Tensioning Device assembly

Item A4-14.1 Automatic Tensioning Device assembly of 5-Pulley block type Block type including all fittings, weight

The price shall cover the supply of an Automatic Tensioning Device of 5-Pulley block type, complete in all respects, including, but not limited to the ATD device, the counterweight assembly, guide tubes with necessary clamps for supporting the guide tubes on masts, anti-falling device, GI protection cage, stainless steel wire rope and all other fittings and components.

The ATD device shall be supplied, complete in all respects, ready for erection.

Item A4-15.0: Insulator assembly

Item A4-15.1: Cut-In Insulator assembly

The price shall cover the cost of supply of a cut-in insulator assembly (composite), complete with ending clamps required on the conductor side, spacers and adjusters as required and all other fittings and components.

Item A4-15.2: Post Insulator

The price shall cover the cost of supply of a post insulator assembly (solid core), complete with required mounting accessories and all other fittings and components.

Item A4-16.0: Section Insulator Assembly (item A4-16.1 to A4-16.2)

The price shall cover the cost of supply of section insulator assembly Type 1, suitable for Main line, and Type 2 for Depots, of approved design. (For details and specifications of Types 1 & 2, a reference shall be made to employer's requirement)

The Section Insulator assembly shall be delivered complete in all respects, ready for erection.

Item A4-17.0: Plates and boards for the catenary system (item A4-17.1 to A4-17.4)

The price shall cover the cost of supply of Number plates and Caution Boards of various types and descriptions to be provided on the catenary system, as per specification.

The prices of different types of plates and boards may be shown against the appropriate sub- item. The price shall also cover all fittings, fixtures, bolts, nuts etc. required for mounting of the plates/boards at appropriate location as per approved drawings.

Note that Caution notices at station can be of 2 or 3 different sizes and description (as per statutory requirements)

Item A4-18.0: Safety Screen panels

The price shall cover the cost of supply of safety screen panel, as per approved drawings and specifications; at various locations in stations and other places where public has access or on

portals, to provide protection from live equipment.

The price shall also cover the various mounting/fixing arrangements along with requisite bolts, nuts etc., as per approved designs.

Item A4-19.0: Anti Bird Nesting SS Net

The price shall cover the cost of supply of wire mesh/SS net on B series mast and portals along with associated fittings.

Item A4-20.0: Anti Bird Disc (2 Nos)

The price shall cover the cost of supply of Anti Bird Disc (2 Nos) on each cantilevers tubes along with associated fittings.

Item A4-21.0: Detail Design, Supply, Inspection, Transport, Delivery, Installation, Testing and Commissioning at site of Retractable OCS including tools, manuals, Interlocking, spares and Training of personnel (offshore)

Inspection bay tracks should be provided with retractable catenary according to the technical specification. The price includes detailed design, supply, inspection and delivery of Retractable catenary system including all tools and spares required for installation, testing and commissioning.

1.6 ITEM NO. A5 - OHE Erection: DEPOT ERECTION – SOLADEVAHALLI

The Explanatory Notes given here under are applicable to OHE Erection items in Depot.

Item A5-1.0: Galvanized steel masts (item A5-1.1 to A5-1.2)

The price shall include the cost of erecting galvanized steel masts of appropriate sizes mentioned in sub-items of item 1.0, as per specification, for carrying the overhead catenary system.

In the case of masts on ramp, the erection prices shall include fixing base plate on foundation bolts and setting and aligning of the mast including provision of Conbextra GP 2 compound or similar compound between parapet and base plate of mast.

In the case of masts at grade in the depot, the erection prices shall include the cost of grouting the masts in the core holes in foundations, their setting and aligning and muffing.

The erection prices shall also include the cost of site drilling of masts, if required and cold galvanizing such drilled portions.

Item A5-2.0: Galvanized steel masts for regulated contact wire only (item A5-2.1 to A5-2.4)

The price shall cover the cost of erecting galvanized steel masts of appropriate size, for carrying overhead catenary system (contact wire only).

The price shall also include the cost of grouting the masts in the core-holes in foundations or fixing the base plate on foundation as the case may be, their setting and aligning including provision of

Conbextra GP 2 compound or similar compound between parapet and base plate of mast.

The erection prices shall include the cost of site drilling of masts, if required and cold galvanizing such drilled portions.

The prices for erection of steelwork required, if any, for supporting the OCS (contact wire only) on the masts, shall also be included under this item.

Item A5-3.0: Galvanized steel portal structures (item A5-3.1 to A5-3.2)

The price shall include the cost of erecting galvanized steel portal structures, as per specification, complete in all respects, including erection and fixing of booms, duly bolted to the foundations, and ready for service.

The erection prices shall also include the cost of erecting and fastening of the drop – arms to the booms.

Item A5-4.0: Overhead Catenary System (item 4.1 to 4.8)

The price shall include the cost of erecting the overhead Catenary system (OCS), complete in all respects, including, but not limited to the following:

- Paying out the conductor, adjusting the heights and staggers after tensioning and all other works necessary to make the erected conductors, ready for operation.
- Providing pull-off assemblies, if required, including materials, to ensure proper positioning of contact wire and messenger wire with respect to track centre line, in accordance with approved designs.
- Marking of implantation, stagger and contact wire height on masts
- Erection of Track side equipment (to be supplied by Rolling Stock contractor) at Neutral Sections and warning boards and visual indications.
- Colour coding of Depot masts to represent elementary sections, including the supply of colours.

The price shall include the cost of erecting the dropper assemblies, complete in all respects, including, but not limited to the following:

- Installing the dropper assemblies in the Catenary system, including crimping/bolting etc. at site, as required.

The price includes the erection of Overhead Protection Conductors to the mast/portals/Drop arm.

And completing the Overhead Catenary System, in all respects and making it fit for operation.

NOTE: This item-A5-4.0 covers erection of all items required for completion of the OHE Work other than the items of erection covered elsewhere under this bill schedule.

Item A5-5.0: Galvanised Steelwork (item A5-5.1 to A5-5.2)

The price shall include the cost of erecting the required steelwork for mounting multiple

cantilevers on masts/drop arms, for supporting catenary system under roofs at stations and for supporting feeders OPC from Masts/drop arms. The payment will be made for erection of the required steelwork, measured as the number of Masts/Drop-arms/Supports on which such steelworks are mounted.

Item A5-6.0: Buried earth conductor and Structure Earth Conductor (BEC & SEC)

The price shall include the cost of laying of Buried earth Conductor and Structure Earth Conductors (BEC & SEC) as per approved design and drawings.

Item A5-7.0: Cantilever Assembly (item A5-7.1 to A5-7.4)

The price shall include the cost of erection the cantilever assemblies of all types, including all steelwork, and adjustment of cantilevers to conform to designs and specifications.

Item A5-8.0: Jumper Assemblies (item A5-8.1 to A5-8.3)

The price shall include the cost of erecting the jumpers, complete in all respects.

Item A5-9.0: Earthing Assemblies (item A5-9.1 to A5-9.5)

The price shall include the cost of earthing assemblies, including, but not limited to the following:

- Erection of Earthing stations (earth electrode and associated arrangements)
- Establishing earthing connections, as per drawings and specifications
- Between metal parts of cantilevers and supporting mast/portal wherever required
- Between OPC and earthing connection points
- Between BEC and earthing connection points and incidental connections to establish continuity between BEC and earth terminals provided on parapet/viaduct/pedestal/pier
- Between platform canopy/overhead metallic structures etc. and the earth connection point of handrail
- Integral Transversal Links
- Between return Conductor and Rail, and

Item A5-10.0: Termination Assemblies (item A5-10.1 to A5-10.3)

The price shall include the cost of termination of the conductors i.e. Contact wire, catenary wire, OPC, RC and Feeder wire on either end appropriately with all associated fittings and tensioning the conductors to appropriate values.

Item A5-11.0: Guy Rod Assembly

The price shall include the cost of erection of Guy Rod assembly (of all type of length) appropriately with all associated fittings as per approved design.

Item A5-12.0: Anti-Creep Assembly

The price shall include the cost of erection of Anti Creep assembly (excl. Contact wire) appropriately with all associated fittings as per approved design.

Item A5-13.0: Automatic Tensioning Device Assembly (item A5-13.1 & A5-13.2)

The price shall include the cost of erection of Automatic Tensioning Devices (ATD) assemblies, Spring type or 5-Pulley block type, including anti-falling devices and provision of supporting plinth for counterweights and steel cage of appropriate design as a protection against counter weight falling down, painting the counterweight assembly with Aluminium paint of approved specification, two coats prior to installation and one finish coat after installation, and adjustment of ATD for x-y values depending upon the temperature at the time of adjustment (marking of temperature values on the mast as per RDSO), initial greasing of the ATD equipment, marking of maximum and minimum positions of counterweight assembly on mast, in case of pulley - counter weight type of ATD.

The price shall include the cost for erection of ATD assembly complete in all aspects and ready for service.

Item A5-14.0: Insulator Assembly (item A5-14.1 to A5-14.2)

The price shall include the cost of erection of cut-in insulator assemblies, Post insulators, complete in all the aspects with associated fittings and ready to use.

Item A5-15.0: Section Insulator Assembly

The price shall include the cost of erection of Section Insulator assembly complete in all the aspects with associated fittings and ready to use.

Item A5-16.0: Number plates (item A5-16.1 to 16.5)

The price shall include the cost of erection of number plates, caution boards and other boards, as required.

Item A5-17.0: Anti Bird Nest & Anti bird disc (Item A5-17.0 & A5-17.1)

The price shall include the cost of erection of Anti Bird Nesting SS ent net in B series masts and portals and erection of Anti bird disc on cantilevers.

Item A5-18.0: Foundations for Depot OHE Locations

The price shall include the cost of excavation and concreting including materials, in all types of soil, either by manual or mechanical means, for foundations for steel masts or portal structures, complete in all respects, as per specifications.

The price shall also include the cost of nominal reinforcement bars in Black cotton soils, as per specification.

The price shall also include the cost of providing all necessary protection arrangements during excavation/concrete, curing of concrete, removal of spoils, finishing the exposed portions of concrete with suitable plastering, suitable back filling of soil and delivering the foundations complete in all respects.

Item A5-19.0: Retractable OCS

The price shall include the erection of retractable catenary and associated accessories in inspection bay according to the technical specification.

Item A5-20.0: Testing and Commissioning

The price shall cover the cost of testing and commissioning of the erected Overhead Catenary System, as per employer's requirement.

1.7 Bill No. A6 TRACTION- SUPPLY & ERECTION (Main Line) FP & SS C2 & C4:

The Explanatory Notes given hereunder are applicable to the Traction Line.

Item A6-1.0: Feeding Post (item no- A6-1.1 to A6-1.4)

The price of following items shall include the cost of all components, terminals, fittings, relays, control panels etc required for measurement & Protection at Switching Stations (other than 25 kV Potential Transformers, current transformers and associated components included in Item 1.4(below). Masts for CBs / Interrupters / Isolators shall be excluded and shall form a part of bill schedule A2 & A3 OHE S & E.

Item A6-1.1: Circuit Breakers

The price shall cover the cost of supplying 25kV Pole mounted Circuit Breakers, as per specification, on masts.

The price shall also cover the cost of:

- Circuit breaker
- Steelwork and other components required for mounting the Circuit Breakers
- Terminal connectors to receive conductors/jumpers as per design.
- Equipment number plates, Caution boards etc.,

Item A6-1.2: Interrupters

The price shall cover the cost of supplying 25kV Pole mounted Interrupters, as per specification, on masts.

The price shall also cover the cost of:

- Interrupter
- Steelwork and other components required for mounting the Interrupters
- Terminal connectors to receive conductors/jumpers as per design.
- Equipment number plates.
- Caution boards

Item A6-1.3: Single Pole Motor Operated Isolators (with earthing heel)

The price shall cover the cost of supplying 25kV Single pole, motor operated isolators with earthing heel, as per specification, on masts

The price shall also cover the cost of

- Isolator
- Steelwork and other components required for mounting the isolators on masts
- Terminal connectors to receive conductors/jumpers as per design.
- Equipment number plates.
- Caution boards

Item A6-1.4: Measuring and Protection Equipment

The price shall cover the cost of supplying the following, as per Specifications, under appropriate sub-item.

A6-1.4.1: - 25 kV Potential Transformers

A6-1.4.2: - 25 kV Current Transformers

A6-1.4.3: - 42 kV Lightning Arrester with counter and other accessories Each

set shall also include,

- Steelwork, outrigger and other components required for mounting the Potential Transformers
- Terminal connectors to receive conductors/jumpers as per design
- Number plates.
- Caution boards

Item A6-2.0: 25 kV, 3.3 kV Cables (item A6-2.1 & A6-2.2)

Details of cables to be provided is as under

- 25 kV Cables (Al 1x400 sq.mm) for connection from the 25 kV Outgoing Switchgear at the TSS up to the feeder pole-mounted Isolator / Interrupter located by the side of the feeding

overlap, on the viaduct & At Grade and 3.3 kV Cable (Al 1x400 sq.mm) / (Cu 1x240 Sq.mm if required) for return current from rail up to TSS (Buried Rail).

- 25 kV Cables (Cu 1x240 sq.mm) Interconnection of OHE (UP & DN Line) between Corridor 2 & Corridor 4 in case if required.
- Splices of cables including the supply of end terminations.

NOTE:

The Unit Rate of this item shall be 1 Km of single core 25KV cable or single core of 3.3KV cable (single or multi core between TSS and FP only), consisting of Termination/Jointing assemblies as required.

Item A6-3.0: C & M Cables (item A6-3.1 & A6-3.3) Item

A6-3.1: C&M Cables (FP, SP, SS & SSP)

Details of cables to be provided is as under

Control & Monitoring cables from Equipment i.e. Circuit breakers, interrupters, isolators, 25 kV PT, CT to Marshalling Box and to the RTU.

- Splices of cables including the supply of end terminations.
- The price shall cover the cost of supplying all cables (excluding cables between TSS and FP), jumpers and connectors, required for interconnection of the equipment's at the FP/SP/SS/SSP/25KV feeding gantry to the traction overhead equipment, wherever required, and also the LT and DC cables feeding the panel & RTU (if kept at the location of switching station e.g. Depot FP) from the nearest station distribution board in ASS (ACDB, DCDB).
- Prices of all connectors, terminals, clamps etc. required for the connections shall be included in this item.
- The price shall include the cost of all cables for control, protection and automatic sequences, interlocking of the switching stations excluding the control and monitoring cables between TSS & FP.

Item A6-3.2: Marshalling Box

The price shall cover the cost of supplying a Stainless-Steel Marshalling Box, as per specification (IP55), to receive

- LT and DC cables from the MDB at the nearest station
- LT and DC Supply wiring cables to the various equipment at the Switching Station

The price shall also include the cost of necessary base plate arrangements to mount and fix the Marshalling box on the parapet (with the help of Holding down Bolts provided on the Parapet) or at a suitable place near track (viaduct & at-grade).

Item A6-3.3: Jumper Assembly between OHE & Isolator, LBS, Interrupter, feeder & isolator, OHE & LT/BT or similar along with all voltage cable cleats

The price shall cover supply of a Jumper assembly, as per drawing and specification, for various applications and shall be shown under the appropriate sub-item.

The price shall include the cost of the appropriate flexible copper cable, the necessary connecting clamps, either crimped or bolted and shall be delivered duly assembled and tagged with the location number to which it refers, ready for erection.

Item A6-4.0: Sheath Voltage Limiters with Link Box

Supply of sheath voltage limiters and all other associated accessories inclusive of earthing materials.

NOTE:

The Unit Rate of this item shall be 1 set per run of single core 25kV cables.

Item A6-5.0: Switching Stations (SP, SS & SSP) (Item No- A6-5.1 to A6-5.2)

The cost of all components, terminals, fittings relays, control panels etc. required for measurement & Protection at Switching Stations are included in the item & below. Masts for interrupters, isolators shall be excluded and shall form a part of bill schedule OHE A1.

Item A6-5.1: Interrupters

The price shall cover the cost of supplying 25kV Pole Mounted Interrupters, as per specification, on masts

The price shall also cover the cost of

- Interrupter
- Steelwork and other components required for mounting the interrupters
- Terminal connectors to receive conductors/jumpers as per design.
- Equipment number plates, Caution boards.

Item A6-5.2: Double Pole Motorized Isolators

The price shall cover the cost of supplying 25kV Double pole, motor operated isolators, as per specification, on masts

The price shall also cover the cost of -Isolator, Steelwork and other components required for mounting the isolators on masts -Terminal connectors to receive conductors/jumpers as per design. -Equipment number plates, Caution boards.

Item A6-6.0: Measuring & Protection Equipment

Item 6.1, 6.2 & 6.3: 25 kV Potential Transformers, Capacitive Voltage Sensor & 42 kV Lightning Arrester with counter and other accessories

The price shall cover the cost of supplying the following, as per Specifications, under the appropriate sub-item.

A6-6.1: 25 kV Potential Transformers, A6-

6.2: 25 kV Capacitive Voltage Sensor

A6-6.3: 42 KV Lightning Arrester with surge monitor at Switching Posts (SP, SS & SSP).

Each set shall also include,

- Steelwork, outrigger and other components required for mounting the Potential Transformers
- Terminal connectors to receive conductors/jumpers as per design
- Number plate, Caution boards.

Item A6-7.0: Erection (Item No- A6-7.1 & A6-7.2)

The price shall include the cost of complete erection, of all equipment and components, including foundations, if required, at the various FP/SP/SS/SSP locations. The rates quoted shall essentially include, but not limited to:

Item A6-7.1: Erection (Feeding Post +/- Switching Stations)

- Erection of structures to support the equipment's
- Erection of all necessary fittings, terminals and components required for installation
- Erection (including supply) of slack feeders, cross-feeders etc to facilitate equipment connections.
- Erection (including supply) of steel gantries, if required.
- Erection of all cables excluding 25kV and 3.3kV cables
- Erection of lightning arrestors (if any).
- All other works relating to erection of the complete FP/SP/SS/SSP to make it ready for operation.

Unit 'Lot' refers to one FP or SS or SP or SSP.

Item A6-7.2: Erection of all 25kV, 3.3kV and C&M cables/ wiring

- Cables supports and clamps on masts, poles etc.
- Erection of all cables between TSS and FP's, clamps, GI supports on poles, erection of grounds and terminations, sheath voltage limiters if required, sheath earthing, AC/DC to the equipment, C&M cables of equipment, Jumper Assembly between OHE & Isolator, feeder & isolator, fencing of Equipment's or similar etc.

Note: Unit Km means one cable of 25kV or 3.3kV one set of C&M cables.

Item A6-8.0: Testing and Commissioning (Feeding Post + / Switching Station)

The price shall cover the complete cost of Testing and Commissioning, as per employer's requirements, of all installations, at the FP/SP/SS/SSP location.

Unit 'Lot' refers to one FP or SS or SP or SSP.

1.8 Item No. A7 TRACTION SUPPLY & ERECTION DEPOT (FP & SSP):

Item No. A7-1.0: 25 kV Switching Equipments (A7-1.1 to A7-1.6)

The price of following items shall include the cost of all components, terminals, fittings, relays, control panels etc required for measurement & Protection at Feeding Post & at Depot (other than 25 kV Potential Transformers, current transformers and associated components included in Item A7-1.6. Masts for CBs / Interrupters / Isolators shall be excluded and shall form a part of bill schedule OHE A1.

Item A7-1.1: Circuit Breakers

The price shall cover the cost of supplying a 25 kV Circuit Breaker along with protection relays (OCR & EF relay) with ports for relay synchronization with RTU on protocol IEC 61850 or IEC 60870-5-103 protocol, as per specification, on mast/gantry.

The price shall also cover the cost of

- Steelwork and other components required for mounting the Circuit Breakers
- Terminal connectors to receive conductors/jumpers as per design.
- Equipment number plates.

Item A7-1.2: Interrupter

The price shall cover the cost of supplying a 25 kV Interrupter, as per specification, on masts/gantry.

The price shall also cover the cost of

- Steelwork and other components required for mounting the interrupter.
- Terminal connectors to receive conductors/jumpers as per design.
- Equipment number plates.

Item A7-1.3: Single Pole Motor Operated Isolators

The price shall cover the cost of supplying 25kV Single pole, motor operated isolators, as per specification, on masts

The price shall also cover the cost of

- Steelwork and other components required for mounting the isolators on masts
- Terminal connectors to receive conductors/jumpers as per design.

- Equipment number plates.

Item A7-1.4: Single Pole Manually Operated Isolators with earth heel

The price shall cover the cost of supplying 25 kV single pole manually operated isolators with earth heel, as per specification, on masts/gantry.

The price shall also cover the cost of

- Steelwork and other components required for mounting the isolators on masts
- Terminal connectors to receive conductors/jumpers as per design.
- Equipment number plates.

Item A7-1.5: Double pole manually operated isolators with earth heel

The price shall cover the cost of supplying 25 kV double pole manually operated isolators, with or without Earthing heel as required as per specification, on masts/gantry.

The price shall also cover the cost of

- Steelwork and other components required for mounting the isolators on masts
- Terminal connectors to receive conductors/jumpers as per design.
- Equipment number plates.
- At IBL, internal cleaning shed (ICL):

Interlocking to be provided for double pole isolator feeding these lines with the roof access platform. A visual LED light signal to emit red and green light respectively to indicate presence or absence of charge in OHE of IBL/ICL.

Item A7-1.6: 25 kV Measuring & Protection Equipment

Item A7-1.6.1 & A7-1.6.2: 25 kV Potential Transformers & Voltage Capacitive Sensor

The price shall cover the cost of supplying the following, as per Specifications,

A7-1.6.1: 25 kV Potential Transformers,

A7-1.6.2: 25 kV Voltage Capacitive Sensor

Each set shall also include,

- Steelwork, outrigger and other components required for mounting the Potential Transformers
- Terminal connectors to receive conductors/jumpers as per design
- Number plate.

Item A7-1.6.3: 25kV Current Transformer

The price shall cover the cost of supplying the 25kV Current Transformer as per required ratio and accuracy class (For Measurement and Protection) along with associated fittings etc.

Item A7-1.6.4: 42 kV Lightning Arrestor

The price shall cover the cost of supplying the 25kV Lightning Arrestor as per required ratio and accuracy class (For Measurement and Protection) along with associated fittings etc.

Item A7-1.6.5: Measuring and Protection equipment other than PT, CS, CT & LA

The price shall cover the cost of supplying the Measuring and Protection equipment other than PT, CS, CT & LA as per approved design along with associated fittings etc.

Item A7-1.6.6: Depot Feeding Gantry

The price shall cover the cost of supplying a Depot Feeding Gantry of Galvanised Steel, as per Specifications, including vertical uprights, crossbeams etc to facilitate mounting of interrupters, isolators, PT's etc, as required and all materials including gates, locking arrangements etc for fencing around the Feeding gantry area. It also includes providing RCC ducts with RCC covers and handles, cable brackets for all cables inside the FP.

Item A7-2.0: 25KV, 3.3KV cables (item no A7-2.1 & A7-2.2)

Details of cables to be provided are as under:

- 25 kV Cables (Cu 1x240 / 1CX400 AL sq.mm) for connection from the 25 kV Outgoing Switchgear at the TSS up to the feeder pole-mounted Isolator / Interrupter located in the feeding post in Depot and 3.3 kV Cable (Al 1x400 sq.mm) for return current from rail up to TSS (Buried Rail).
- 25 kV Cables (Al 1x400 / CU 1CX240 sq.mm) for connection from Depot FP to elementary sections of Depot and from Depot FP to isolator/interrupter connected to UP/DN mainline OHE.
- C&M cables between TSS & FP for interlocking of CB and isolator/interrupter.

Splices of cables including the supply of end terminations.

NOTE:

The Unit Rate of this item shall be 1 Km of 1 core 25KV cable or 1 core 3.3kV cable or 1 no. C&M cables (single or multi core) between TSS and FP for interlocking between CB and isolator consisting of Single run and Termination/Joining assemblies as required.

Item A7-3.0: Jumper Assembly between OHE & Isolator, feeder & isolator, OHE & LT/BT or similar

The price shall cover supply of a Jumper assembly, as per drawing and specification, for various applications and shall be shown under the appropriate sub-item.

The price shall include the cost of the appropriate flexible copper cable, the necessary connecting clamps, either crimped or bolted and shall be delivered duly assembled and tagged with the location number to which it refers, ready for erection.

Item A7-4.0: C & M Cables (item A7-4.1 to A7-4.3) Item

A7-4.1: Marshalling Box

The price shall cover the cost of supplying a Stainless-Steel Marshalling Box, as per specification (IP55), to receive

- LT and DC cables from the MDB at the nearest RSS
- LT and DC Supply wiring cables to the various equipment at the Switching Station

The price shall also include the cost of necessary base plate arrangements to mount and fix the Marshalling box on the parapet /At Grade with the help of Holding down Bolts provided on the Parapet.

Item A7-4.2: Wiring

The price shall cover the cost of supplying all cables (excluding cables between TSS and FP), jumpers and connectors, required for interconnection of the equipment's at the FP/SP/SS/SSP/25KV feeding gantry at depot, to the traction overhead equipment, wherever required, and also the LT and DC cables feeding the panel & RTU (if kept at the location of switching station e.g. Depot FP) from the nearest station distribution board in ASS (ACDB, DCDB).

Prices of all connectors, terminals, clamps etc. required for the connections shall be included in this item.

The price shall include the cost of all cables for control, protection and automatic sequences, interlocking of the switching stations excluding the control and monitoring cables between TSS & FP.

C&M cables from traction equipment to RTU are not covered in this item.

Item A7-4.3: C&M Cables (FP, SP, SS & SSP)

Details of cables to be provided is as under

Control & Monitoring cables from Equipment i.e Circuit breakers, interrupters, Single pole motor operated isolator, 25 kV PT, CT to Marshalling Box and to the RTU.

- Splices of cables including the supply of end terminations.

Item A7-5.0: Sheath Voltage Limiters with link box

Supply of sheath voltage limiters and all other associated accessories inclusive of earthing materials.

NOTE:

The Unit Rate of this item shall be 1 set per run of single core 25kV cables.

Item A7-6.0: Erection (Item No- A7-6.1 & A7-6.2)

The price shall include the cost of complete erection, of all equipment and components, including foundations, if required, at the various FP/SS locations. The rates quoted shall essentially include, but not limited to

Item A7-6.1: Erection (Feeding post)

- Erecting of Depot Feeding Gantry, complete with foundations (including materials)
- Erection of steel supporting structures or steelwork for interrupters, isolators, CB, CT etc.
- Erection of fencing, including gates around the Feeding Gantry area
- Erection of all necessary fittings, terminals and components required for installation
- Earthing of Feeding Gantry
- All other works relating to erection of the complete installation, to make it ready for operation
- Erecting lightning arrestors if any
- Erection of all other cables excluding cables under item 6.2
- Cables supports and clamps on masts, pole etc.

Unit 'Lot' refers to one FP.

Item A7-6.2: Erection of 25KV, 3.3KV and C&M Cables/wiring

- Erecting the 25 kV, 3.3kV and C&M cable between the TSS and the Depot Feeding Gantry
- Erecting 25 kV cables between Up/Dn Main Line Isolators and the CB at the feeding gantry
- Erecting all 25 kV cables from Depot feeding gantry to various track side isolators in the Depot.
- Cables supports and clamps on masts, pole etc.
- 1 set C&M cables (single or multi core) between TSS and FP for interlocking between CB and isolator consisting of Single run.

Item A7-7.0: Testing and Commissioning (Feeding Post)

The price shall include the cost of testing and commissioning, as per Employer's requirement, of all equipment, components, and auxiliaries in the Depot.

Unit 'Lot' refers to one FP.

1.9 Item No. A8: Civil Works (Item No- A8-1.0 to A8-4.0)

The Explanatory Notes given hereunder are applicable to the Civil Works Line items.

Item A8-1.0: Switching Stations (SSP/SP/SS/FP)

Item A8-1.1: Provision of PVC flexible pipes to link Marshalling Box Panel outlet to cable trough along viaduct/At grade

The price shall include the cost of providing adequate number of PVC flexible pipes of appropriate sizes to carry the power/control cables, as necessary, between the Marshalling Box panel mounted on the parapet and the cable ways along the viaduct.

Unit 'Lot' shall be for one marshalling box panel.

Item A8-1.2: Provision of flexible HDPE pipes between the Marshalling box and control boxes of pole-mounted switchgears, PT's, CVS, CB, LA, Isolator etc.

The price shall include the cost of providing adequate number of HDPE pipes of appropriate sizes to carry the power/control cables, as necessary, between the cable trough along the viaduct and the control boxes mounted devices, like interrupters, circuit breakers, PT, CVS, LA isolators, CS's, etc.

Unit 'Lot' shall be the rate for one SS or SP or SSP or FP.

Item A8-1.3: Provision of HDPE pipes between Upside and Downside of viaduct/At Grade to carry connecting cables

At switching stations, it may be necessary to run cables (power and/or control), across or along tracks, to make the connections between various equipments and Switchgear installed on viaduct/At grade. The price under this item shall include the cost of providing HDPE pipes of appropriate sizes, in required numbers, to carry such cables.

Unit 'Lot' shall be the rate for one SS or SP or SSP or FP.

Item A8-2.0: Integral Transverse Link

Item A8-2.1- Provision of HDPE pipes to carry cables across/along tracks for ITL connections

The price shall include the cost of providing the required number of HDPE pipes of appropriate sizes to carry the power and/or control cables across/along the tracks, to establish Integral Transverse Links (ITL), at the locations finally decided in co-ordination with Signalling Contractor and other connected Contractors.

Unit 'Lot' shall be the rate for one ITL.

Item A8-3.0: Cable Paths

Item A8-3.1: From AMS to ASS, TSS to FP, Depot etc.

The price shall include the cost of providing cable trenches/path, as per particular specification and approved plan including the following:

- GPS mapping,

- Supply and laying of required HDPE pipes for SCADA cables, and 2 Nos HDPE pipe for telecom cable of telecom contractor for entire route from the point of exit (boundary wall) of the RSS-cum- AMS to the designated station viaduct/depot in the line.
- Adequate Nos of HDPE pipes and GI pipe for vertical rises etc (as required),
- Spare pipes:
- Cut and cover trenches, protective covers/Slabs, sand cushioning, brick work, warning tape etc.
- Cable pulls boxes,
- Cable markers, joint location boards,

The prices for different types of cable paths, for laying cables not limited to below the footpath or below the road, in trenchless piping, in rail track crossings, on nallah crossing with GI support structure

- in air supported on piers, walls
- GI structure for vertical raising of cables from ground to viaduct including foundations
- metallic fence up to viaduct soffit, sleeves for wall/parapets crossing etc, Length of GI cable brackets/supports path will be common route length in meter for all the cables combined under relevant sub-items in horizontal / vertical direction as per relevant sub items.

The price shall not include the fees payable to Govt agencies for securing right of way & permission to work, deposits for reconstruction/restoration. Fee deposited by the contractor to Government Agencies for obtaining permission for Laying of Cables shall be reimbursed by Engineer/Employer on submission of documentary evidence of payment. Road restoration charges paid by the contractor to the civic agencies will be reimbursed by Engineer/Employer on submission of documentary evidence of payment. Road restoration is to be done by contractor, the price quoted in the BOQ shall be payable.

The contractor shall be responsible for securing permissions, damage/demur on account of cable laying and giving notices to Authorities and taking final clearance after completion of all works and site restoration including pucca road restoration, which shall be included in unit rate of per meter basis.

The actual payment shall be made on measurement basis as per item stipulated in BoQ.

Item A8-3.1.1: Cut and Cover

Item A8-3.1.1.1: For any of the following combinations

- i) up to 2 circuits of 33kV cables & control cables or,
- ii) up to 2 circuit of 25kV & 3.3kv Cables & Control cables

Item A8-3.2.1: Pipe in C&C or elsewhere (item not covered in item A8-1.0)

- a) HDPE Pipes 40mm
- b) HDPE Pipes 100mm

c) HDPE Pipes 160mm

Item A8-3.2.2: - Pucca Road restoration

Item A8-3.2.2.1: For any of the following combinations

- i) up to 2 circuits of 33kV cables & control cables or,
- ii) up to 2 circuit of 25kV & 3.5kV & Control cables

Item A8-3.2.3: Trench Less with HDPE Pipes Item

A8-3.2.3.1: Trench Less with 100 mm dia pipes Item

A8-3.2.3.2: Trench Less with 160 mm dia pipes

Item A8-3.2.4: Nallah Crossing

Item A8-3.2.4.1: For any of the following combinations

- i) up to 2 circuits of 33kV cables & control cables or,
- ii) up to 2 circuit of 25kV & 3.5kV & Control cables

Item A8-3.2.4.2: For Raising cables from ground to viaduct on a Stand alone structures for all cables:

Providing a prefabricated GI structure suitable for raising 33KV 25KV, 3.3KV and control cables from ground to viaduct including foundations and secured fencing - up to viaduct height.

Item A8-4.0: Track crossing for 33 kV cables or 25kV and 3.3kV or C&M cables.

Item A8-4.1: On new viaduct

Providing appropriate arrangement for track crossing on viaduct for 33 KV cables.

Providing HDPE sleeves under track plinth.

Item A8-4.1.1: For any of the following combinations

- i) each circuit of 33kV cables or,
- ii) each circuit of 25kV & return cable.
- a) 1 lot of control cable

Unit 1 Set covers cost of each track crossing for 33 KV cable or 25KV & return cables (one feeder circuit) or C&M cables (1 Lot).

1.10 ITEM No. A9: Spares for OHE Main Line (Viaduct & At-Grade)

The item is supply of Spares for OHE Main line (for Viaduct & At-Grade) (Item No- A9-1.0 to A9- 5.0) at site. The items and quantity provided is indicative and contractor will finalize the quantity in consultation and agreement with Engineer/Employer.

1.11 ITEM No. A10: Site Design of OHE

Item 1.1 a – Preliminary Design

The price includes the verification of the design submitted by DDC. DDC will issue the Good for construction drawing however PST contractor will review and modify the drawings as per site requirement. The scope includes review of all simulation studies, sectioning diagram, Pegging Plan/LOP, HDB list, etc.

Item 1.1 b– Final Design

PST contractor will prepare and submit all the shop drawings such as CSD, SED, ATD, Cantilever arrangement, Profile drawings, Detailed design of switching station indicating jumper arrangement, clearances etc. this includes all the necessary detailed design to carry out the site activities.

Item 1.2 – Schedule of Materials

PST contractor will prepare and submit list of materials along with quantities in line with BOQ mentioned in tender including conductor schedule and equipment schedules etc.

Item 1.3– As Built Drawings

PST contractor will prepare and submit all the As-Built Drawings as per final erected equipment's after joint checking with Engineer/Employer.

Item 1.4– Item Deleted

Item 1.5– Item Deleted

1.12 Item No. A11: MANPOWER (Item No- A11-1.0 to A11-3.0)

Manpower cost to be deployed by contractor during intervening period between Energization & Taking Over of OHE till Revenue Operation Date

The Contractor shall, if required by the Employer, provide Manpower in the OHE and Switching Station already commissioned and handed over to the Employer, for manning the installations, before commencement of the Revenue operation of the line. The staff team deployed at the designated location shall be thoroughly conversant and competent to operate the various switchgear and systems and shall be able to provide Traction power, if so desired by Bi-RIDE, to other Agencies working in the Station area or elsewhere and also to provide power shut-downs of the commissioned systems, provide and remove discharge rods if so directed by Bi-RIDE. The all-inclusive man-day charges shall be included against the relevant sub-item under this item. For measurement purposes,

1) For Field engineer/supervisor, One man day will be measured as deployment of Field engineer/Supervisor per day.

2) Skilled staff and unskilled staff, a period of 8 hours of deployment of one staff should be

considered as 1 man-day.

Three shifts per day should be considered.

Compensation shall include for the approval of the supervisors and replacement as required by the Employer, employment of approved staff including salaries, overtime, airfares,; lodging allowances, their office expenditure, telephones/mobile bills, local travel costs to and from site, training materials, income tax and other taxes deducted at source. The price is inclusive of cost of transportation of men and material.

The Contractor shall follow/comply all labour laws irrespective of rates quoted

1.13 ITEM NO. A12: Tools and Plants

The item is supply of Spares for Tools and Plants (for Viaduct & At-Grade) (Item No- A12-1.0 to A12-1.71 at site. The items and quantity provided is indicative and contractor will finalize the quantity in consultation and agreement with Engineer/Employer.

1.14 ITEM NO. 13: Power Block Provision

The item includes provision of power block for the erection of work done near to the vicinity of the Indian Railway track. The work where the IR track is near to Bi-RIDE track, the work will be carried out under the power block (of Indian Railway) due to induction effect.

In case a portion of work is carried out obtaining power block, 100% extra rates will be paid over and above the accepted Erection rate of relevant items on certification by Employer/Engineer. The extra erection rate under this item will not be payable, if power block is given for a total duration of 4 hour or more in a day.

Necessary interface for obtaining the power block shall be done by the PST contractor in co-ordination with and with strict supervision of Engineer/Employer.

2. BILL OF QUANTITIES

The Bills of Quantities consists of bills; the Tender total collects all prices in the Bills.

The tenderer shall bring forward totals of all bills and show them in the Tender Total (Base Tender). The prices shall be appropriately shown with the imported part expressed in Foreign Currency and local part expressed in Indian Rupees.

The contractor shall provide the reference of economical conditions of prices.

The cost of supplies shall comply with Employer's requirement and cover:

- Equipment and required materials
- In plant and acceptance tests,

- Packaging,
- Transportation and handling,
- Storing and/or placing the equipment and materials in formation
- Documentation and drawings of equipment and materials

The cost of erection testing and commissioning shall comply with Employer's requirement and cover:

- Wages and compensations
- Administrative equipment
- Precaution to avoid damage to existing buildings, structures, services and utilities,
- Temporary works (traffic, access, water, electricity, soils, supply management)
- Erecting materials (screw, bolts...)
- The cost of complying with the employer's requirement.

The Tenderer shall complete and submit all bill sheets endorsed by the signature of his representative.

The Bills of Quantities consists of Bills, as follows:

The Bills of Quantities consists of Bills, as follows:

For Corridor 2 (Benniganahalli Terminal to Chikkabanavara) & For Corridor 4 (Heelalige to Rajankunte)	
BILL NO. A1 GENERAL REQUIREMENT	GENERAL REQUIREMENT
BILL NO. A2 OHE SUPPLY C2 & C4	OHE SUPPLY
BILL NO. A3 OHE ERECTION C2 & C4	OHE ERECTION
BILL NO. A6 TRACTION SUPPLY & ERECTION (MAIN LINE) FP& SS C2 & C4	TRACTION NETWORK
BILL NO. A8 CIVIL WORKS	CIVIL WORKS
BILL NO. A9 OHE SPARES	OHE SPARES
BILL NO. A10 SITE DESIGN	SITE DESIGN
BILL NO. A11 DEPLOYMENT OF MANPOWER DURING INTERVENING PERIOD	MANPOWER
BILL NO. A12 TOOLS & PLANTS INCLUDING TOWER CAR	TOOLS & PLANTS
BILL NO. A13 POWER BLOCK PROVISION	POWER BLOCK
For Soldevanahalli Depot	
BILL NO. A4 DEPOT SUPPLY	OHE SUPPLY
BILL NO. A5 DEPOT ERECTION	OHE ERECTION
BILL NO. A7 TRACTION SUPPLY & ERECTION DEPOT	TRACTION NETWORK