



Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

ENQUIRY NOTICE INVITING TENDER	Phone: +91 431 257 76 53 Fax : +91 431 252 00 31 Email : skaruna@bheltry.co.in Web : www.bhel.com
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TWO PART BID Tender to be submitted in two Parts	Enquiry Number: 2731600006	Enquiry Date: 05.03.2016	Due date for submission of quotation: 11.04.2016
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You are requested to quote the Enquiry number date and due date in all your correspondence. This is only a request for quotation and not an order.

Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 hrs on the Date of tender opening.

Item	Description	Quantity
10	3 Ton Double Girder EOT Crane with DSL	01 No.
20	5 Ton Crab Assembly for Existing 15 Ton EOT Crane	01 No.

as per the technical specification & commercial conditions applicable (to be downloaded from web site www.bhel.com or <http://tenders.gov.in>)

Important points to be taken care during submission of offer

1. The rate of EMD for this Tender will be (INR) : 1,00,000/-
2. The Compliance form for Acceptance of Commercial Terms & Conditions to be filled and enclosed along with the offer failing which, the offer will not be considered for evaluation.
3. All updates, amendments, corrigenda, etc., (if any), for each tender will be posted only on the above websites from time to time, as and when required, until each tender is opened. There will be no publication of such updates, amendments, corrigenda, etc., through newspapers or any other media.

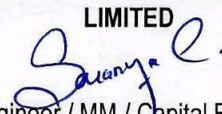
BHEL's General guidelines / instructions (refer MM/CE/GENL/001/EMD) including bank guarantee formats and list of consortium banks, commercial terms Compliance form can be downloaded from BHEL web site <http://www.bhel.com> or from the Government tender website <http://tenders.gov.in> (public sector units > Bharat Heavy Electricals Limited page) under above Enquiry reference.

Tenders should reach us before 14:00 hours on the due date.

Tenders will be opened at 14:30 hours on the due date.

Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present.

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**


Sr. Engineer / MM / Capital Equipment

C. SARANYA
Senior Engineer
MM / Capital Equipment
BHEL / Tiruchirappalli - 620 014.

PART 1

This Technical Specification contains SECTION I, SECTION II and SECTION III.

- SECTION –I - One page (1 of 3)
 SECTION –II - Two pages (2 of 3 & 3 of 3)
 SECTION –III - Fifteen pages (1 to 15)

SECTION – I: CHECK LIST FOR VENDORS

Vendor to note the following

S.No.	INSTRUCTIONS TO VENDOR	VENDOR'S RESPONSE
1.0	The VENDOR shall submit the offer in TWO PARTS - Technical and commercial bid, PART 1 and Price Bid, PART 2.	
2.0	The Offer shall contain statement of Technical Specifications given by BHEL and the Offer Details submitted by the Bidder, against each clause. Where details are required, a mere 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer.	
3.0	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items' with copies of Product Catalogue and Selection Criteria	
4.0	The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation	
5.0	VENDOR has to indicate the Country of Origin for the supply of equipment.	

**SIGNATURE WITH SEAL
(Authorised Signatory)**

R. Vysakbabu

B.Vadivalagan

V.Ramesh Kumar

H.Nagarajan

SECTION-II: -QUALIFYING CRITERIA

The VENDOR has to compulsorily meet the following requirements to get qualified for consideration of the technical offer for the SUPPLY OF EOT CRANE

S. No.	PARTICULARS	VENDOR'S RESPONSE
1.0	<p>Only those vendor (OEM), who have supplied and commissioned at least TWO 3Ton or higher capacity double girder EOT crane class-3 with minimum span of 11.0 Mtr or higher, fitted with Variable voltage variable frequency converter drive, in the past five years and such crane is working satisfactorily for more than one year after commissioning (on the date of opening of Tender), should quote.</p> <p>Copies of Purchase Order with detailed specification and Annexures and corresponding Commissioning certificates shall be submitted along with the offer.</p>	
2.0	<p>Vendor to submit Performance certificates along with their offer from minimum two of their customers for satisfactory performance of 3T EOT or higher capacity cranes of class-3 with minimum span of 11m or higher, fitted with Variable voltage variable frequency converter drive, supplied to them and are working satisfactorily for more than one year after commissioning (as on the date of opening of tender). Suggestive format is given in the annexure.</p>	
3.0	<p>BHEL reserves the right to verify the information provided by vendor. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected.</p>	
4.0	<p>The vendor should have 'in-house' or 'self-owned' facility for FABRICATION and TESTING at 125 % of the rated capacity</p>	
5.0	<p>The vendor should have minimum 5 years' experience in design, fabrication and supply of EOT cranes.</p>	
6.0	<p>DELIVERY - The vendor shall quote the best possible delivery. However the delivery shall not exceed 8-10 weeks from the date of Placement of Purchase Order. The additional grace period will attract a penalty which is explained in the commercial terms of the enquiry.</p> <p>Vendor shall offer the pre dispatch inspection, atleast 15 days in advance of the dispatch date.</p>	

**SIGNATURE WITH SEAL
(Authorised Signatory)**

R. Vysakbabu

B.Vadivalagan

V.Ramesh Kumar

H.Nagarajan

PERFORMANCE CERTIFICATE
(On Customer's Letter Head)

1. Supplier of the Equipment :
2. Make & Model of the Equipment :
3. Month & Year of Commissioning :
4. Application :
- 5.
- a) Crane Type:
 - b) Crane Capacity (Metric Tonnes):
 - c) Crane span :
 - d) Mechanism class :
6. Performance of the Equipment : Satisfactory / Good / Average / Not Satisfactory
(Strike off whichever is not applicable)

7. Any other remarks:

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

R. Vysakbabu

B.Vadivalagan

V.Ramesh Kumar

H.Nagarajan

SECTION-III: 3T EOT CRANE - TECHNICAL SPECIFICATION**(Technical Specifications for 3T Electrically Operated Overhead Travelling (EOT) crane with Double Girde**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
1.0.0	APPLICATION	a. The crane operation environment will be an ISO Class-8 Clean room designed and constructed as per ISO 14644-1. b. The subject crane is meant for the purpose of handling small to medium (within the lifting capacity of the crane) components, in a special material fabrication facility. c. The crane will be put to use for continuous duty with CT, LT and Hoist movements, which may occur simultaneously (within the operating parameters specified under Clause Nos. – 3.1.0, 3.4.0 and 3.5.0).	
2.0.0	SCOPE OF SUPPLY	a. Design as per Tender Specifications b. Detailed Design, Manufacture, Assembly and Testing before Dispatch c. Supply in Modules / Sub-Assemblies d. Commissioning and Performance Prove-Out at BHEL Works e. Performance Guarantee for 12 months, from the date of commissioning. <u>A. Supply</u> 1. EOT crane 3 Ton 11 M span 4.88 Mtr height of lift ----- 1 No. 2. Shrouded conductor 4 line ----- 36 Mtrs. 3. Current collector----- 4 Nos. <u>B. Service</u> 1. Commissioning of 3 Ton EOT crane ---1 No. 2. Commissioning of shrouded conductor ---- 36 Mtrs.	
3.0.0	TECHNICAL SPECIFICATIONS		
3.1.0	CAPACITY	Lifting Capacity	
3.1.1	Main Hoist	3 Metric Tonnes	
3.1.2	Auxiliary Hoist	NO AUX HOIST	
3.2.0	SPAN	Wheel Centre to Wheel Centre Dimensions	
3.2.1	Long Travel (LT)	11000mm	
3.2.2	Cross Travel (CT)	1,600 mm	
3.3.0	Height of Lift	4,880 mm	
3.4.0	DUTY CYCLE	Related to Drive Motor & Mechanisms. Refer to clause 7.3.1 for detailed information.	

SECTION-III: 3T EOT CRANE - TECHNICAL SPECIFICATION**(Technical Specifications for 3T Electrically Operated Overhead Travelling (EOT) crane with Double Girde**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
3.4.1	Hoists	40 % CDF	
3.4.2	Long Travel	40 % CDF	
3.4.3	Cross Travel	40 % CDF	
3.5.0	SPEED	Operating / Working Speed [Maximum]	
3.5.1	Main Hoist	5 mtrs./minute.	
3.5.2	Cross Travel (CT)	15.0 mtrs./minute.	
3.5.3	Long Travel (LT)	30.0 mtrs./minute.	
3.6.0	MOTOR RATINGS	Electric Motor Ratings & Frame Sizes shall be as per IS-325 and IS-1231 and also suitable for 300 starts per hour. Refer to clause 7.3.1 for detailed information.	
3.6.1	Main Hoist	Minimum 5 kW - Frame size - 132 M/6 Pole , S4 duty	
3.6.2	Cross Travel (CT)	Minimum 2 kW - Frame size - 112 M/6 Pole , S4 duty	
3.6.3	Long Travel (LT)	Minimum 3 kW x 2 - Frame size - 132 M/6 Pole , S4 duty	
3.7.0	GEAR BOX	Gear Box Size	
3.7.1	Main Hoist	HR 450 mm	
3.7.2	Cross Travel (CT)	VR 275 mm	
3.7.3	Long Travel (LT)	HR 250 mm	
3.8.0	ACCELERATION		
3.8.1	Cross Travel (CT)	300 mm / sec.sq.	
3.8.2	Long Travel (LT)	300 mm / sec. sq.	
3.9.0	HOIST ROPE DETAILS	Size and Number of Falls of Rope	
3.9.1	Main Hoist	Dia. 10 mm ; Falls - 4	
3.9.2	Rope Lubrication	Self-Lubricating type.	
3.10.0	CONTROL	Pendent Operation for all motions	
3.10.1	Type of Control	Pendent	
3.10.2	Control Voltage	110 V AC	
3.10.3	Input Power Supply	415 V with $\pm 10\%$ fluctuation , 50HZ with $\pm 3\%$ fluctuation, 3 Phase- AC	
3.10.4	Duty Class	Class - 3 [Indoor Service]	
3.10.5	Mechanism Group Classification	M 6	
3.11.0	DESIGN STANDARD	IS - 807 & 3177 / 2006	

SECTION-III: 3T EOT CRANE - TECHNICAL SPECIFICATION**(Technical Specifications for 3T Electrically Operated Overhead Travelling (EOT) crane with Double Girde**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
3.12.0	Runway Rail Size		
3.12.1	Cross Travel (CT)	ISR 60 Lbs./Yard	
3.12.2	Long Travel (LT)	ISR 90 Lbs./Yard	
3.13.0	Wheel Size		
3.13.1	Cross Travel (CT)	200 mm	
3.13.2	Long Travel (LT)	250 mm	
3.14.0	Brake Drum Size	Hoist Brake Drum Sizes	
3.14.1	Main Hoist	200 mm	
3.14.2	Cross Travel (CT)	100 mm	
3.14.3	Long Travel (LT)	160 mm	
4.0.0	MAIN FEATURES	Crane Operational Features	
4.1.0	Control System	Variable voltage variable frequency Converter type for all motions	
4.2.0	Remote Control	Pendant Control for all motions	
4.3.0	End Clearance	End Clearances to be fixed to suit the workshop building clearances [Refer Drawing no. 3-M-02A63-15553 - Drawing enclosed with tender as Annexure-I]	
4.4.0	Crane Operation	Through Pendant operation.	
5.0.0	STRUCTURAL FABRICATION	Crane Structure Constructional Details	
5.1.0	Bridge / Girder & End carriages of LT & CT	PLATE FORMED Box type Construction for Girders, End carriages of LT & CT.	
5.1.1	Bridge girder section	The minimum size shall be as follows	
5.1.1.1	Cross section of Girder	Min. Girder Height-520mm Min. Girder width- 250mm Top flange plate thickness - 6 mm Bottom flange plate thickness - 6 mm Web plate thickness - 6 mm	
5.1.2	End Carriage	Box type construction for the end carriages	
5.1.2.1	Cross section of End Carriage	Min. Height- 300 mm Min. width- 320mm Top flange plate thickness - 6mm Bottom flange plate thickness - 6 mm	

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S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
		Web plate thickness – 6 mm	
5.2.0	Raw Material	IS: 2062 Only steel plates tested and certified for quality by the OEM steel mill, shall be used. Test Certificates of the steel mills to be produced for BHEL verification and form part of the documentation.	
5.3.0	Welded Joints	To be followed for Bridge/leg Fabrication	
5.3.1	Number of weld Joints allowed	Two joints only in flange and web plate of bridge girder. (Joint at the center of the span shall be avoided)	
5.3.2	Welding between web plate and flanges	Full welding shall be done on the outside between web plates and the flanges. On the inside, equal stitch welding of 100mm to be done between web plate and top flange. All diaphragm plates shall be of full plates.	
5.3.3	Welding of vertical diaphragms	The vertical diaphragms shall be equal stitch welded to the top flange and both the web plates. The length of stitch welding shall be 100mm.	
5.3.4	Welding Electrodes	a. For all Horizontal Welding E 7018 / ER70S-6 (MIG) Electrode only should be used. b. For all Vertical Welding E 7048 / ER70S-6 (MIG) Electrode only should be used.	
5.3.5	Welded Joint Testing	All Butt Welded Joints (both compression / tension and flanges / web joints) shall be subjected to 100% X-Ray Testing and X-Ray Films to be produced for BHEL verification and form part of the documentation.	
5.4.0	Splice Joints	NO SPLICE JOINT IS ALLOWED IN GIRDER FABRICATION [Girder has to be of SINGLE PIECE only].	
5.5.0	Platform on Girders	The Platforms provided on both the Girders shall be fixed through BOLTED JOINTS using fit bolt only.	
5.6.0	Wheel Assembly	The Wheel Assembly coming for Cross Travel (CT) & Long Travel (LT) shall be of LIVE AXLE SYSTEM with L-Type Bearings and as per BHEL Drawing No. 3-M-02R-0011993 . [Drawing is enclosed and given as Annexure-II].	
5.7.0	Heat Treatment & NDT Examination	The Trolley shall be Stress Relieved if required after welding and NDT examinations. All weldings shall be tested by NDT means [MPI, LPI & RT].	

SECTION-III: 3T EOT CRANE - TECHNICAL SPECIFICATION**(Technical Specifications for 3T Electrically Operated Overhead Travelling (EOT) crane with Double Girde**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
5.8.0	Machining Operation	All mechanical mating surfaces and wheel seating areas are to be machined to the required finish and protected.	
5.9.0	Surface Cleaning	Both the Girders, end-carriages and the Trolley are to be thoroughly cleaned after completion of all operations but prior to painting.	
5.10.0	Painting	The crane parts are to be painted as follows :	
5.10.1	At supplier site	Prior to painting, the crane structure shall be sanded and cleaned to remove all rust and dust. During Stage-II inspection, the crane shall be painted with One coat of Primer with 25 microns of DFT (Dry Film Thickness) and 48 hours of compulsory curing after painting. Then, prior to dispatch, the crane shall be painted with 2 coats of epoxy enamel paint (colour – deep orange- IS 5: 2007- No 591 or RAL 2011) each with a DFT of 25 μ and intermittent curing of 16 hours.	
6.0.0	MECHANICAL ELEMENTS		
6.1.0	Gears	Gears in all the Stages shall be helical in design and to be of machined, lapped/ground and hardened.	
6.2.0	Gear Box Casing	Shall be of fabricated type and stress relived by thermal heat-treatment process, prior to machining.	
6.2.1	Oil level indicator	Glass window with minimum level indication shall be provided for all gearboxes.	
6.2.2	Leakage protection	Oil seals shall be provided for all the bearing covers and wherever required. Additional measures shall be taken to make the gearboxes leakage proof.	
6.3.0	Rope Drum	Shall be of fabricated type and stress relieved. The circumferential weld joints shall be tested by 100 % X-Ray for quality assurance. Or seamless pipe to suit the requirement.	
6.4.0	Type of Coupling	Only GEARED COUPLING to be used a. Between Electric Motor and Gear Box – Full gear coupling. b. Between Gear Box and Rope Drum- suitable rope drum coupling. c. Between Gear Box and Wheels- Half gear coupling with floating shaft.	
6.5.0	Wheels	The Wheels shall be of Forged and Wheel Tread hardened to 300/350 BHN. Wheels shall be fitted with L-Type Bearings	
6.6.0	Mechanical Joints	Fit Bolts as per IS 3640-1982 for all joints coming in main members and platform with reamed holes	

SECTION-III: 3T EOT CRANE - TECHNICAL SPECIFICATION**(Technical Specifications for 3T Electrically Operated Overhead Travelling (EOT) crane with Double Girde**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
6.7.0	Pulley Dimension	Rope Pulley diameter shall be 23 times that of Rope diameter	
6.8.0	Hook	Hook latch shall be provided for the hooks	
6.9.0	Buffer	Spring loaded buffers shall be provided for Crab and End carriages	
7.0.0	ELECTRICAL ELEMENTS		
7.1.0	Control Voltage	110 V AC , \pm 50 Hz	
7.2.0	Type of Brakes	a. Hoist - DCEM Brake b. Cross Travel - EH Thruster Brake c. Long Travel - EH Thruster Brake	
7.3.0	Protection	All Panels, Limit-Switches and Motors shall have IP 54 protection.	
7.3.1	Electric Motors	All Electric Motors shall be as per IS-325 and IS-1231 and also suitable for 300 starts per hour. All the Electric Motors shall be foot mounted with terminal boxes at the Top. All the Electric motors shall be VVFD class with Crane Duty. Vacuum Pressure Impregnation (VPI) shall be provided to windings. All motors shall be wound with super enamelled dual coat copper wires. Motor shall be Type tested, routine tested .test certificates shall have all the details. Motors are designed for noise level well below the limits specified in IS: 12065 Motors are designed for Temperature rise measurement of rotating electrical machines as per IS 12802. Rotors are dynamically balanced with a half key in the shaft extension	
7.3.2	Electrical Panels	All electrical Panels the SS Sheet thickness shall be minimum 3 mm, Height shall be minimum 1200 mm. All electrical Panels shall be fixed by bolts only in Girder. Proper cooling arrangements shall be present in all Panels. The Air dust filter must be bottom. The Panel shall be provide with glow lamps to indicate the condition of each VFD.	

SECTION-III: 3T EOT CRANE - TECHNICAL SPECIFICATION**(Technical Specifications for 3T Electrically Operated Overhead Travelling (EOT) crane with Double Girde**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
		<p>These lamps should be fixed external to the panel along with RESET Push Button.</p> <p>i. The RED glow lamp for drive fault indication ii. The GREEN glow lamp for drive ready indication.</p> <p>Separate R,Y,B indication lamp along with Multifunction Digital Harmonic meter shall be present in Panel. Necessary cable shall be provided for Downloading the recorded data in the Multifunction meter.</p>	
7.3.3	Inside Electrical panel	<ol style="list-style-type: none"> 1. Under, over voltage relay with time settings shall be provided in the output of 110V control transformer. 2. Spare control contactors of 3 numbers shall be provided in the panel. 3. NO DBR , No transformer shall be placed inside Electrical Panel. 4. Proper Spacing shall be provided between VVFD , Contactors , MCCBs, Terminal Blocks. 5. The Clearance between VVFD and Panel top shall be minimum 180MM. 6. The Clearance between adjacent VVFDs shall be minimum 300 MM. 7. The Clearance between terminal block and Panel bottom shall be minimum 200MM. 8. For each motion the contactor shall be arranged and marked suitable. 9. The 10% extra terminal blocks shall be provided. 10. The panel Dimensional drawings, All electrical components positioning drawing shall be provided for approval. 11. The Semiconductor fuse shall be placed after MCCB before VVFD for each motion. 	

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S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
7.4.0	Electric Contactors	All Panels shall have contactors suitable for AC3 Duty Class. (Refer clause 8.6.0 for approved makes)	
7.5.0	Contactors Rating	The rating of all Contactors shall be at least 50% higher than the respective electric motor full load current, at the specified duty cycle.	
7.6.0	Long Travel Motion	A Dual Drive Mechanism shall be provided for LT (Long Travel) Motion.	
7.7.0	Illumination	All Electric Panels shall be provided with suitable illumination for visibility and trouble shooting.	
7.8.0	Frequency Converter	<p>The VVVF Drive shall be supplied with suitable DBR for all motions. All the drives shall be suitable for heavy duty application. The heavy duty VVVF Drive shall be supplied with suitable DBR for all motions.</p> <ol style="list-style-type: none"> 1. The VVVF Drive should be suitable for CRANE DUTY application for HOIST MOTION. 2. VVFD for each motion shall be one step higher than motor KW. 3. The rated output current of the drive should be at 45 deg. C ambient Temperature and maximum operating temperature shall be 55 deg. C. 4. Two no of potential free contactors has to be present in the drive. 5. Keypad of the drive shall be LCD (at a time minimum three parameters shall be seen) 6. The keypad of the VVVF drive shall be panel mounted with necessary extension wire from the drive. 7. The DBU and Drive shall be of same manufacturer. 8. The DBR values of all motions shall be at least 40% of the motor rated KW. 9. The drive has to trip on input/ output phase loss, overload, input/ output short circuit, DBR damage /short, DBU short. <p>The needed data cable, converter modules shall be supplied along with drive. All the VVFD Earth and motor Body shall be connected with a Single core wire of Needed Sq mm to neutralize the high Frequency Harmonic noise. Vendor to specify the model of the VVVF drives to be used for each motions. VVVF Drive Test certificates shall be submitted at the time of Inspection</p>	
7.8.1	Resistance box /DBR	It shall be Punched stainless steel, TIG welding shall be done. Resistance HV test, Megger Test Certificates shall be submitted at the time of Inspection.	

SECTION-III: 3T EOT CRANE - TECHNICAL SPECIFICATION**(Technical Specifications for 3T Electrically Operated Overhead Travelling (EOT) crane with Double Girde**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
7.8.2	Transformer	415/230V (lighting) -1.5 KVA and 415/110V (control, remote) – 1 KVA All the transformer shall be with input Fuse. All the transformer shall be Class F insulation. Both transformer shall not be placed inside any Electrical panels. All the transformer shall be mounted outside the panel with suitable safety precautions.	
7.8.3	Wiring	The crane shall be fully wired without junction box. Proper Crimping tool needs to be used for Crimping the Lugs without any air gaps.	
7.8.4	Cables	All cables shall be flexible copper FRLS only. Cables rating shall be 1.6 times of the rated current.	
7.8.5	Pendent for Hoist, CT and LT operation	The pendant should consists of ON,OFF,Emergy stop ,Hoist,Lower,Forward, Reverse, Front and Back push buttons with one power ON Indication lamp 1. No. of Push Button : 8nos 2. Push Button Type : 2step 3. The emergency stop pushbutton shall be of "MUSHROOM HEAD [Stay Put]" type 4. The pushbutton shall be suitable for 110 V AC supply 5. Enclosure : Glass Filled Nylon 6. Protection : IP65 7. Standard : IEC529	

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S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
7.9.0	Hoist limit	Hoist shall be provided with both rotary and counter weight limits. Limits shall be suitable for minimum 500 operations/Hr.	
7.9.1	CT Cabling	Drag chain with cable system can be used for CT motion. Drag chain make and specification to be submitted with offer with specific details of prevention of wear of chain due to chain sliding. Cable used in Drag chain shall be suitable and approved by Drag Chain OEM. Minimum cable size shall be 2.5 Sq mm.	
7.9.2	MCCB	Input and Each motions shall have separate MCCBs. Input MCCB after SFU shall be with advanced protection, necessarily earth fault protection and indication shall be present. Conformity standards shall be as per IEC 60947-2/IS:13947-2	
8.0.0	SELECTION of BOI and COMPONENTS	The makes of Components or Bought-Out-Items shall be strictly as per the list given below.	
8.1.0	Hoist Hooks	HERMAN MOHTTA / HERCULES / SILPA UDYOG / SMRITI FORGINGS / KARACHIWALA	
8.2.0	Wire Rope	USHA MARTIN / FORT WILLIAM / RA WIRE ROPE	
8.3.0	Electric Motors	GEC / BHARAT BIJLEE / SIEMENS / kirloskar /Toshiba /ABB/Hindustan	
8.3.1	DC Brake Unit with rectifier panel.	Only BCH make	
8.3.2	Pendant Control	SCHNEIDER/DEMAG/SPEED-O-CONTROLS	
8.4.0	Thruster Brake Unit	ELECTROMAG / SPEED-O-CONTROL / OMEGA	
8.5.0	Limit Switch (Gravity Type)	SIEMENS / INDUSTRIAL SYNDICATE / BCH / SKC / SOC	
8.6.0	Contactors	SIEMENS / L&T / INDO ASIAN	
8.7.0	Over-Load-Relay	SIEMENS / L&T (THERMAL TYPE)	
8.8.0	HRC Fuses	GE / L&T /SIEMENS	
8.8.1	MCB/MCCB	L&T/SIEMENS	
8.9.0	Rotary limit switch	SIEMENS / OMEGA / SOC / INDUSTRIAL SYNDICATE	
8.10.0	Switch fuse unit	L&T / SIEMENS / GEC	
8.11.0	Moulded case CB	SIEMENS / L&T	
8.12.0	Pneumatic Time Delay	Only BCH make	

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S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
8.13.0	Push - Buttons	SIEMENS / L&T / AIRON	
8.14.0	Connectors	ELMAX make or reputed make with IS approved with acceptable BHEL	
8.15.0	Couplings	FENNER / SKF / ALLFLEX (TYPE - AHG)/ ESCO / NU-TECK/ LOVEJOY	
8.16.0	Bearings	SKF / NBC / ZKL / TIMKEN	
8.17.0	Cables	ELKAY,KUNDAN, GOVIND, GLOSTER, NICCO,L&T, RADIANT,HAVELLS, MARDIA, DELTON, RR, SIECHEM AND FINOLEX	
8.18.0	VVVF Drives	YASAKAWA / MITSUBISHI / FUJI/TOSHIBA	
9.0	DOCUMENTS/ DETAILS for APPROVAL	The following documents and details are to be submitted for BHEL Approval, prior to taking up the manufacture of the crane.	
9.1	Drawings and Documents	<u>Set I:</u> a. Calculations for Selection of Electric Motors, Gear Reducers, Brakes, Couplings, etc. b. Calculations for Bridge Girder, Crab, End - Carriage and their connections. c. GA Drawing of the Crane. d. GA Drawing of Trolley e. GA Drawing of Individual Mechanisms.	
9.2	Drawings and Documents	<u>Set II:</u> a. Drawings of Bridge, Legs, End-Carriage and their connection. b. Sub-Assembly Drawing for Wheels, Hook Block, Gear Boxes, Hoist rope drum and all brake Drums. c. Wiring Diagram with Logic Circuits. d. Cable Selection based on Current Rating. e. Drag chain and Drag chain cables Selection based on Current Rating. f. Electrical Panel GA drawing and Electrical Elements Positioning Drawing. Initially Set I drawings to be submitted in one lot and approval to be obtained from BHEL. Based on this, set II drawings to be submitted for approval.	
9.3	Technical Details	a. Total Weight of the Crane including all Electrical Equipment b. Total Weight of Trolley including all Electrical Equipment c. Weight of each Bridge assembled and ready for erection with and without Mechanical and Electrical Equipment. d. Weight of End-carriage assembled and ready for erection	

SECTION-III: 3T EOT CRANE - TECHNICAL SPECIFICATION**(Technical Specifications for 3T Electrically Operated Overhead Travelling (EOT) crane with Double Girde**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
		e. Total Weight of Structural, Mechanical and electrical Equipment and indicated separately also.	
10.0	INSPECTION	The following Schedule of Stage Inspections is to be strictly adhered to, prior to dispatch from the Supplier's Works by BHEL	
10.1	STAGE – I at Supplier Work's	<ul style="list-style-type: none"> a. Verification of Test Certificate for Raw Materials used for Girders, legs, End-Carriages, Trolley, Gear Box Casings, etc. b. Verification of X-Ray Report of Butt-Joints coming in the Girders and Random Testing on the Welds, by physical examination. c. Box Girder setting before closing of the Bottom Flanges – for inspecting the quality of welding and presence of waviness d. Trolley Frame Fabrication before setting the Mechanisms e. End-Carriage Fabrication before closing of the Bottom Flanges 	
10.2	STAGE – II [Final Inspection] at Supplier Work's	<ul style="list-style-type: none"> a. Inspection of Bridges, End-Carriages and platform fabrication. b. Verification of Span & Diagonal Dimensions, Checking of Wheel Alignment, Mechanical Assemblies and Total Alignment. c. Free running of all the Mechanisms. d. Measurement of CAMBER in the Bridges as per IS 3177-1999. e. Full / Rated Load Test for bridges and trolley and Deflection Test as per IS-3177-1999 f. Deflection and Permanent Set Measurement as per IS 3177-1999. g. 25% OVER-LOAD Lifting Ability Check as per IS 3177-1999. 	
11.0	CRANE ERECTION & COMMISSIONING		
11.1	Unloading of all crane parts (like girders. End carriage, CT assembly, LT mechanism etc)	Unloading of all crane components shall be the scope of BHEL.	
11.2	Crane Erection & Cabling	Complete crane erection/installation, wiring/cabling of the various components at BHEL shall be the scope of BHEL.	
11.3	Crane Commissioning	Commissioning of the Crane and Performance Prove –Out for 125% of Crane's Capacity and Smooth Functioning of the Crane (at BHEL Works) shall be the RESPONSIBILITY of the supplier.	

SECTION-III: 3T EOT CRANE - TECHNICAL SPECIFICATION**(Technical Specifications for 3T Electrically Operated Overhead Travelling (EOT) crane with Double Girde**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
11.4	Test Load	Arrangement of 125% test load for load testing shall be the scope of BHEL.	
12.0	O & M MANUALS	Each Crane shall be provided with the following 1. VFD Programming & Maintenance manual and Technical Information catalogue 2. Data Sheet containing the Program data loaded in the VFD units. 3. Manual for the Load cell calibration and trouble shooting THREE Copies of Erection, Operation & Maintenance Manual hard copy and soft copy in CD, containing the following technical details	
12.1	Drawings & Details	a. Crane GA Drawing b. Crab Assembly Drawing c. Total Crane Wiring Schematics d. Detailed Wiring Diagrams for Sub-Systems / Panels e. Wheel Assembly Drawings f. Bottom Block Assembly Drawing g. Gear Box Assembly Drawings h. Coupling Drawing and Details i. Specifications/Ratings of All Bought-Out-Items j. Warranty / Guarantee Card for all Bought-Out-Items k. Trouble Shooting Chart for Main and all Sub-Systems	
13.0	PERFORMANCE GUARANTEE	The Performance of the Total Crane and/or the Components / Sub-Assemblies / Bought-Out-Items shall be guaranteed for a minimum period of twelve months from the date of performance acceptance at BHEL Works.	
Specification for 4-Line DSL shrouded conductor system required for EOT crane.			
S1.0	CONDUCTOR		
S1.1	Total length of shrouded conductor required	36 mtrs.	
S1.2	Installation Quantity in each	Red color insulated conductor = 36 Mtr Yellow color insulated conductor = 36 Mtr	

SECTION-III: 3T EOT CRANE - TECHNICAL SPECIFICATION**(Technical Specifications for 3T Electrically Operated Overhead Travelling (EOT) crane with Double Girde**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
		Blue color insulated conductor = 36 Mtr Green color insulated conductor = 36 Mtr	
S1.3	Current rating of conductor / Material	125 Amps / Copper	
S1.4	Standard length of each conductor	4.5Mtr (Appx.)	
S1.5	Cross sectional area of conductor	Shall be adequate for the current rating.	
S1.6	Insulation cover	Red, Yellow, Blue & Green.	
S1.7	Support pitch	Minimum distance between support brackets - 1000 MM	
S1.8	Hanger clamp	4 pole with double bolted arrangement.	
S1.9	Location of power feeding	Center feeding	
S1.10	Minimum Pitch between conductors	40 mm	
S1.11	Conductor Joint type	4 bolted (2+2 each side) joint	
S1.12	System voltage	415V AC	
S1.13	Insulation	PVC	
S1.14	Protection	IP21	
S1.15	Ambient tem.	Suitable for 50°C Ambient Temperature rise.	
S1.16	Installation	Indoor.	
S2.0	CURRENT COLLECTOR		
S2.1	Rating of current collector	125 A	
	Material	sintered copper	
S2.2	Type	Sliding contact with sufficient contact pressure while on movement	
S2.3	Tolerance in collector movement	Horizontal +/- 200 mm Vertical +/- 60 mm	
S2.4	Current collector assembly	Shall be suitable to take vertical and horizontal misalignment during long travel motion of the EOT cranes.	
S2.5	Anchoring	Anchoring clamps shall be provided to avoid conductor longitudinal movement.	
S2.6	Insulated covers shall be provided	At all conductor joints, at all center power feed, anchoring point and at all ends.	

SECTION-III: 3T EOT CRANE - TECHNICAL SPECIFICATION**(Technical Specifications for 3T Electrically Operated Overhead Travelling (EOT) crane with Double Girde**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR's OFFER
S2.7	No. of current collector assembly required	8 nos.	
S2.8	Indicator lamps Red, Yellow, Blue & Green	LED lamps shall be provided at the center feed location. With Supply Input - 3Phase 3wire, 415V AC	
S2.9	Current collector holding brackets required.	For 1 no. EOT crane.	

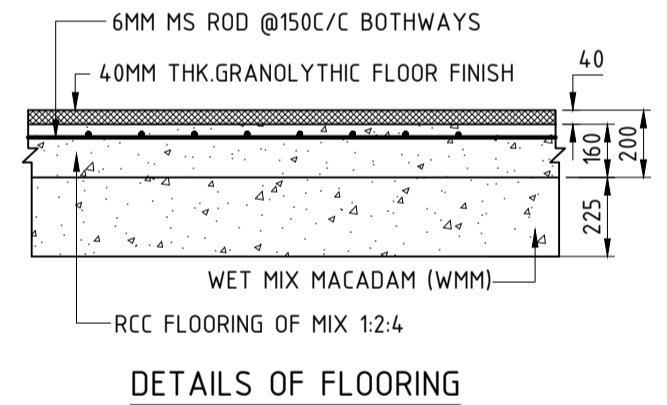
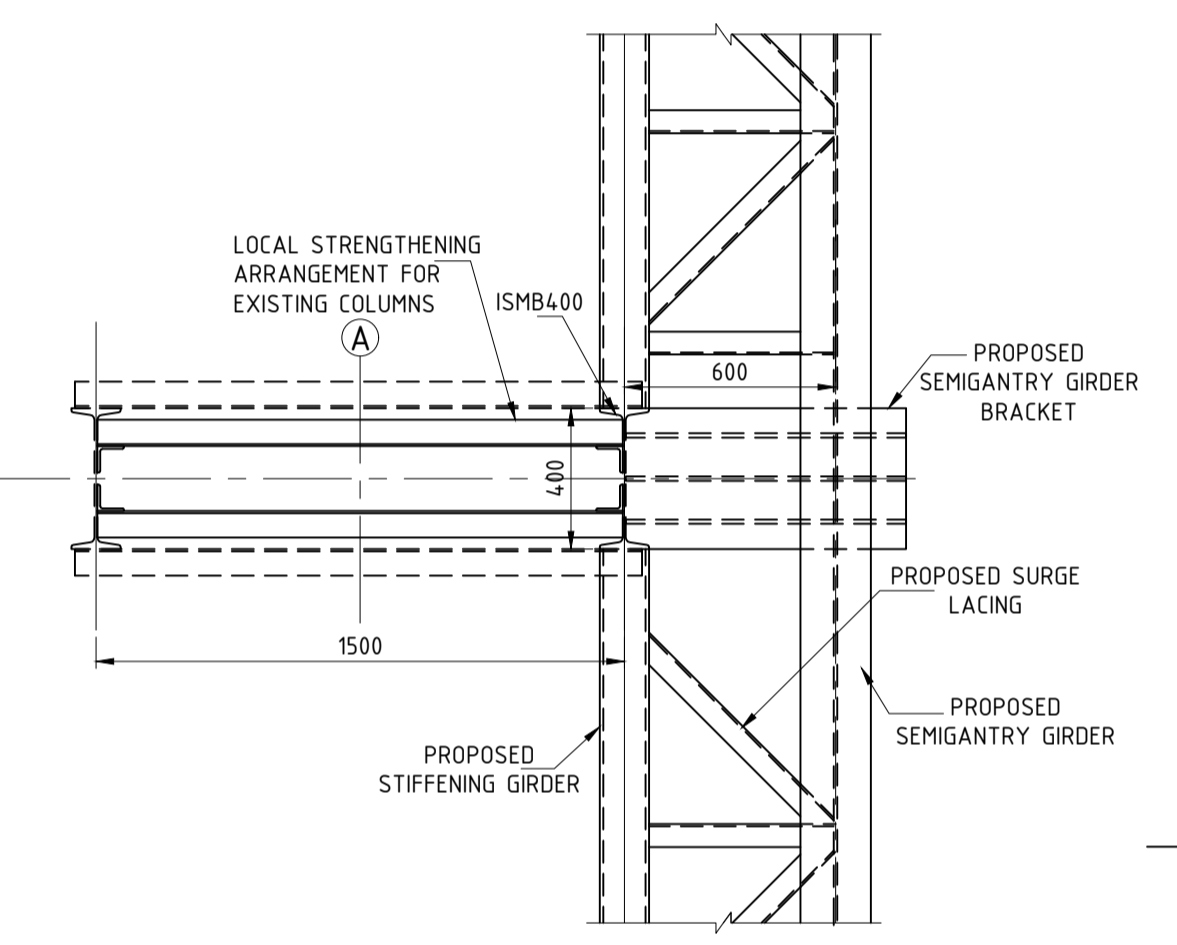
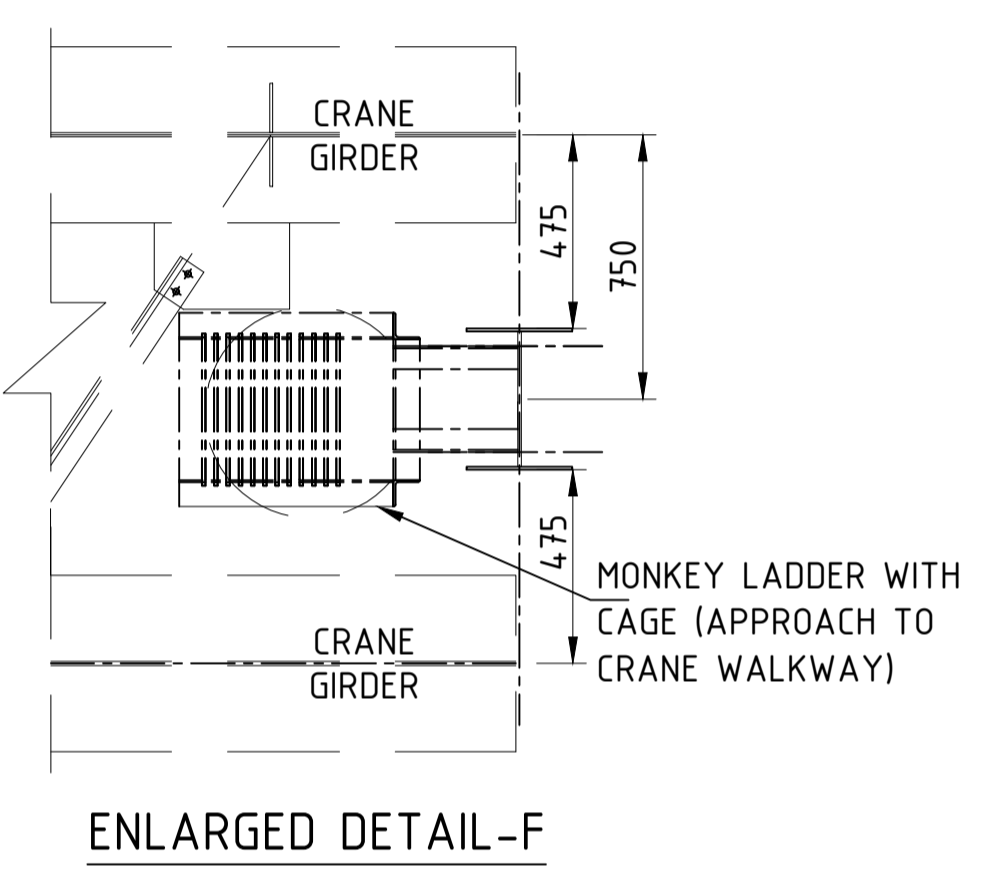
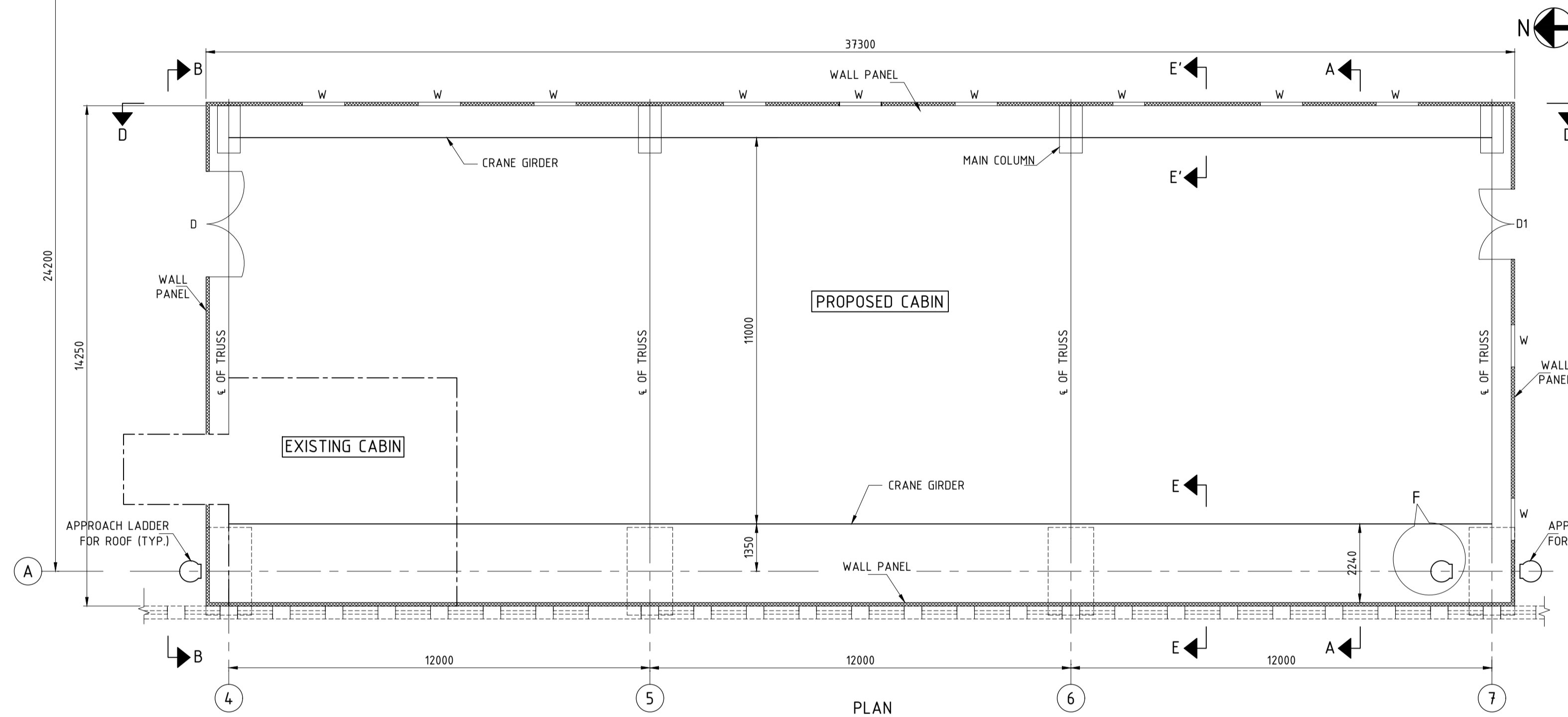
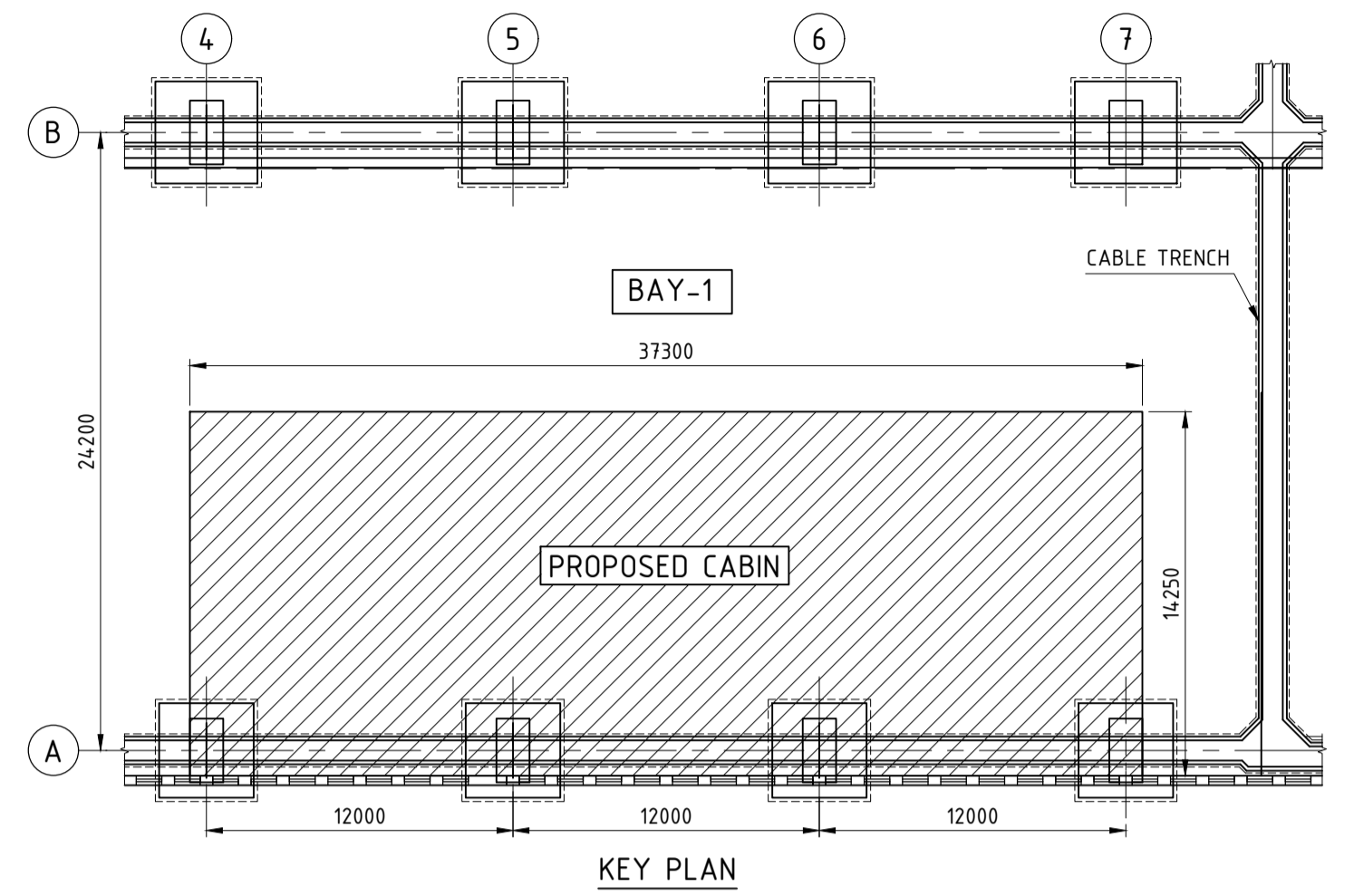
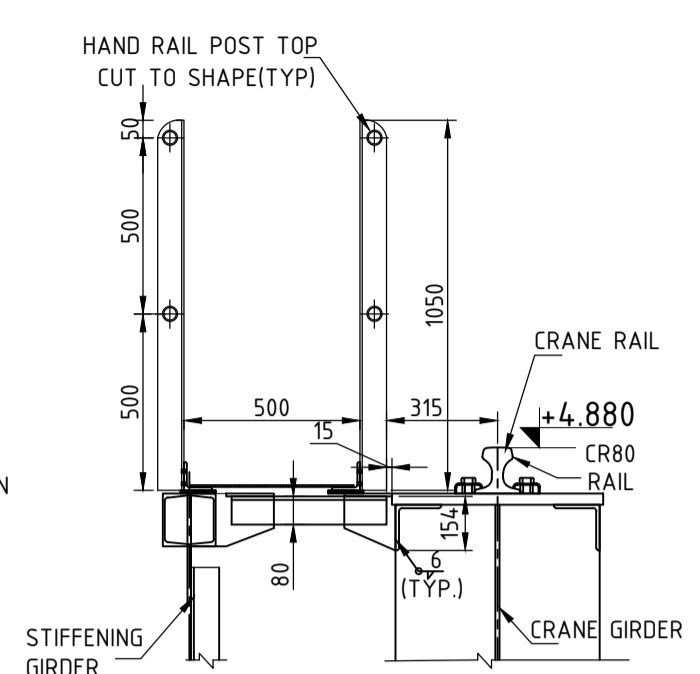
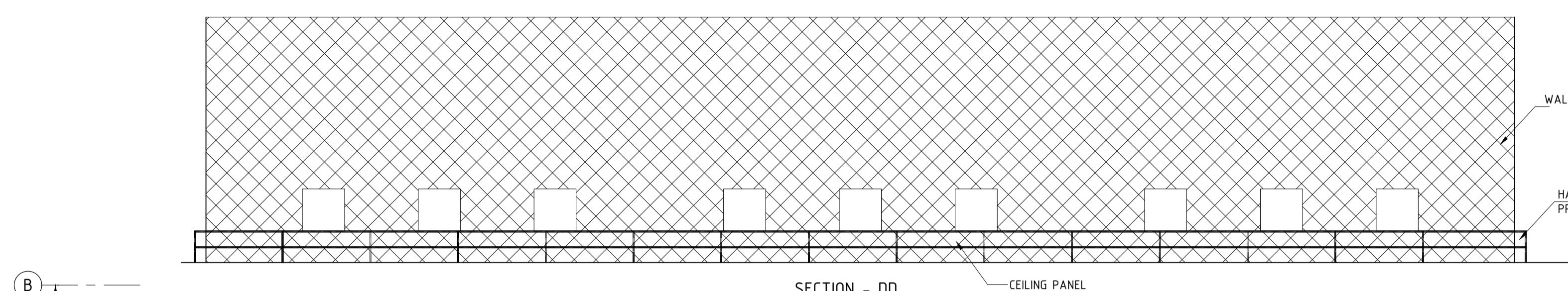
SCOPE**A. Supply**

1. EOT crane 3 Ton 11 M span 4.88 Mtr height of lift ----- 1 No.
2. Shrouded conductor 4 line ----- 36 Mtrs.
3. Current collector----- 8 Nos.

B. Service

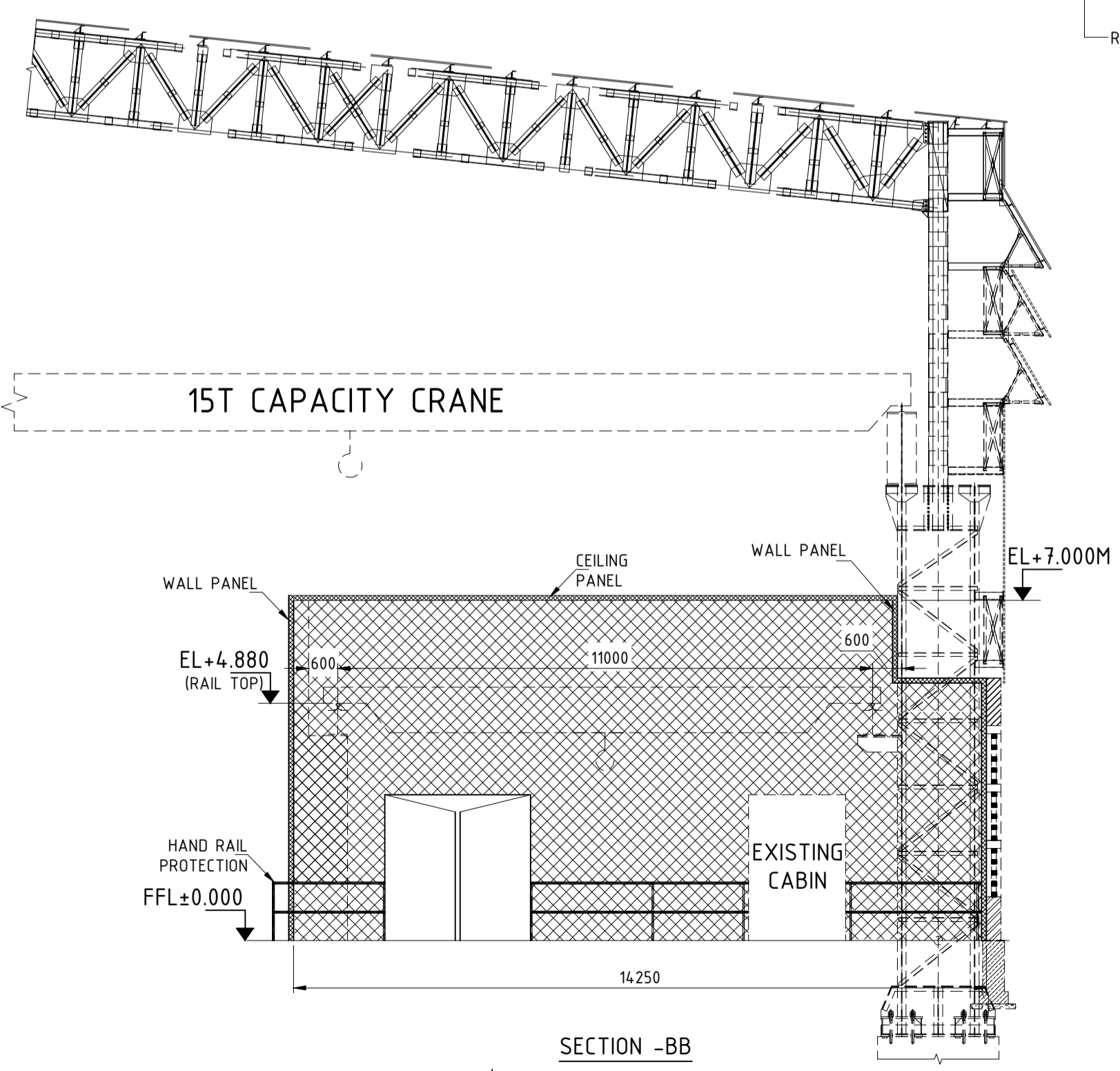
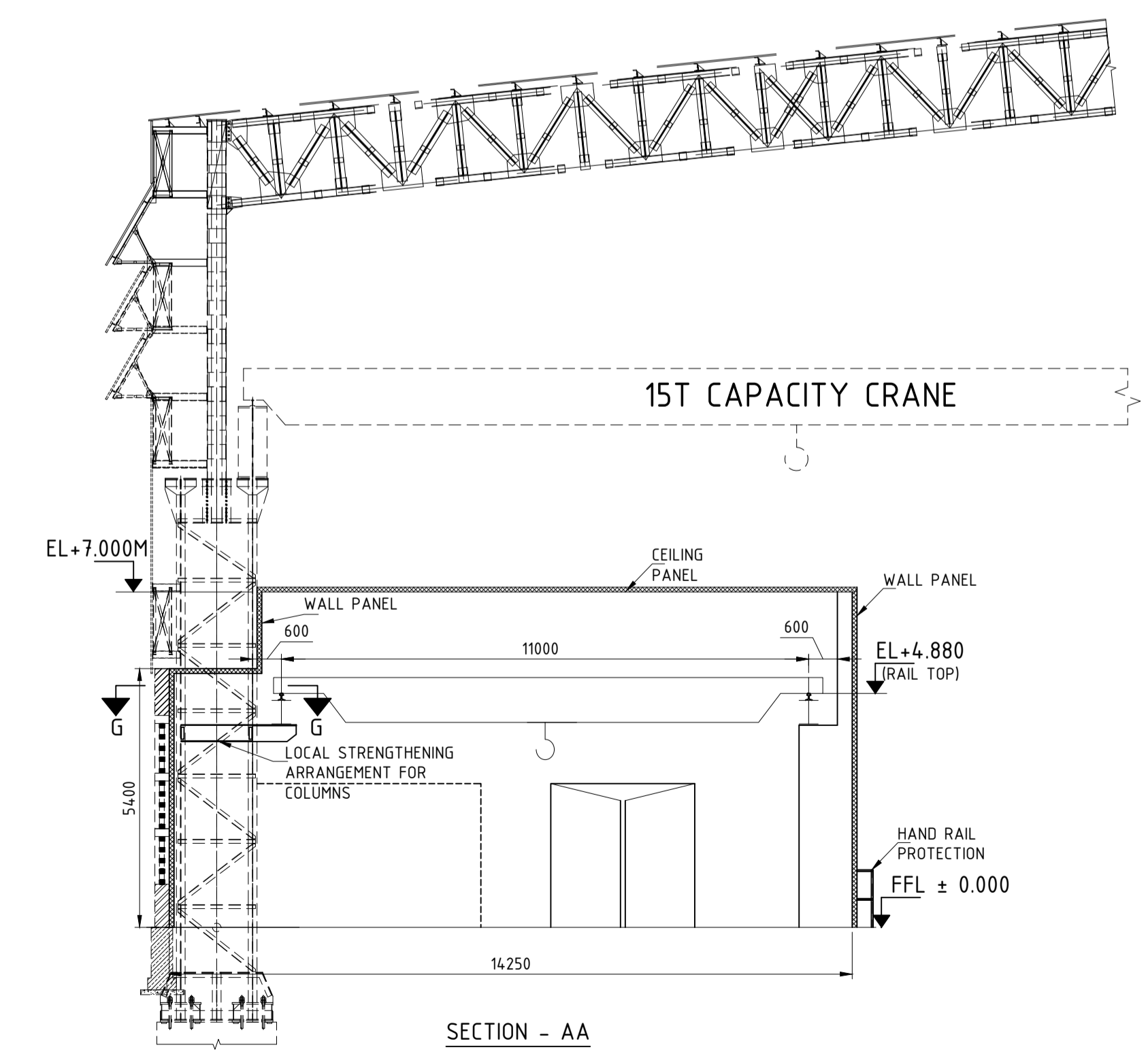
1. Commissioning of 3 Ton EOT crane ---1 No.
2. Commissioning of shrouded conductor and current collector---- 36 Mtrs.+ 8 nos.

Note: Order to be placed for above Supply & Service (3+2=5 items) .Both are to be made to a single vendor only.



LEGEND:
 D-STEEL DOOR-3000mmX 3000mm
 D1-ALUMINIUM DOOR-2000mmX2100mm
 W-SEE THROUGH GLAZED WINDOW-1200mmX1200mm

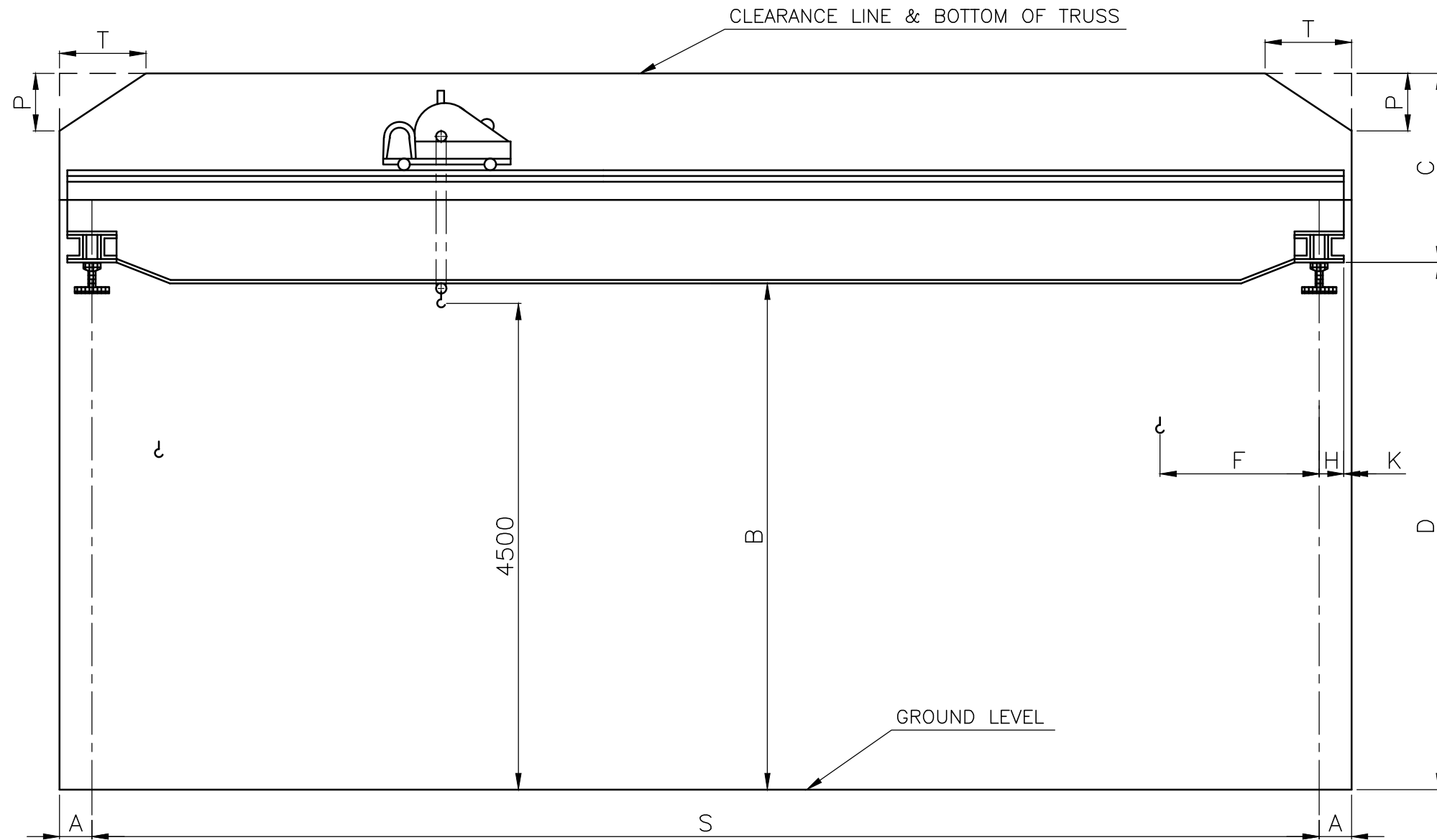
NOTES:-
 1) ALL DIMENSIONS ARE IN 'MM' & LEVELS ARE IN 'M'
 2) DO NOT SCALE THE DRAWING. FOLLOW WRITTEN DIMENSION ONLY
 3) ATLEAST 5% OF ROOF AREA IS TO BE COVERED USING POLY CARBONATE ROOF SHEETING FOR LIGHTING PURPOSE. 4) CUT OUT OPENINGS TO BE PROVIDED WHEREVER AC DUCT IS TO BE PLACED
 5) NECESSARY LIFELINE ARRANGEMENT TO BE PROVIDED ON ROOF TOP CEILING PANEL FOR ITS MAINTENANCE.
 6) STRENGTHENING / MODIFICATION OF EXISTING MAIN COLUMN SHALL BE DONE AFTER APPROVAL FROM CIVIL DESIGNS.
 7) UTILITY LOAD OF 500 KG PER RUNNING METRE ON ALL STEEL COLUMNS AT 2.4M ABOVE CRANE BEAM LEVEL WITH AN ECCENTRICITY OF 150MM MAY BE CONSIDERED.
 8) SAFE BEARING CAPACITY OF SOIL CAN BE TAKEN AS 20T/50M.



TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT		UNIT-II (BUILDING - 123) MANUFACTURING CENTER FOR TITANIUM EQUIPMENT SHOP					
CAUTION: The information on this document is the property of Bharat Heavy Electricals Ltd. It shall not be used directly or indirectly in any way detrimental to the interest of the company.	Bharat Heavy Electricals Ltd UNIT: HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		DRN	N.KAVITHA	SIGNATURE	DATE	NO. OF VAR
	CHD	T.AARUYIR YOGAA	APPO	P.RAVINDRAN		31.12.2015	
DEPT	CIVIL	GRADE OF UNTIL DM	C/M/F	SCALE	1:100, 1:20	WEIGHT (Kg)	REF TO ASSY / OLD DWG
CODE	2200						ITEM NO
TITLE	GENERAL ARRANGEMENT OF PROPOSED DUST FREE CABIN WITH 3T CRANE		CARD CODE	U 01	DRAWING NO :	1-TP-CEG-01936	
					REV	00	

ALL DIMENSIONS ARE IN MILLIMETRES

DRAWING NO: 3-M-02A63-15553



3T x 11M x 4.88M	
S	11000
D	4880
C	1750
A	300
K	100
T	
P	
B	
L	
Q	
F	
H	

CLEARANCE DIAGRAM FOR E.O.T CRANE
(3T x 11M x 4.88M SPAN)

REV	DATE	ALTERED	C.PONNUSAMY
01	03.02.16	CHECKED	G.GOVINDARAJ
		APPROVED	G.THIAGARAJAN
ZONE	DRAWING MODIFIED AS PER MR.VYSAKH MAIL DATE ON 02.02.16		

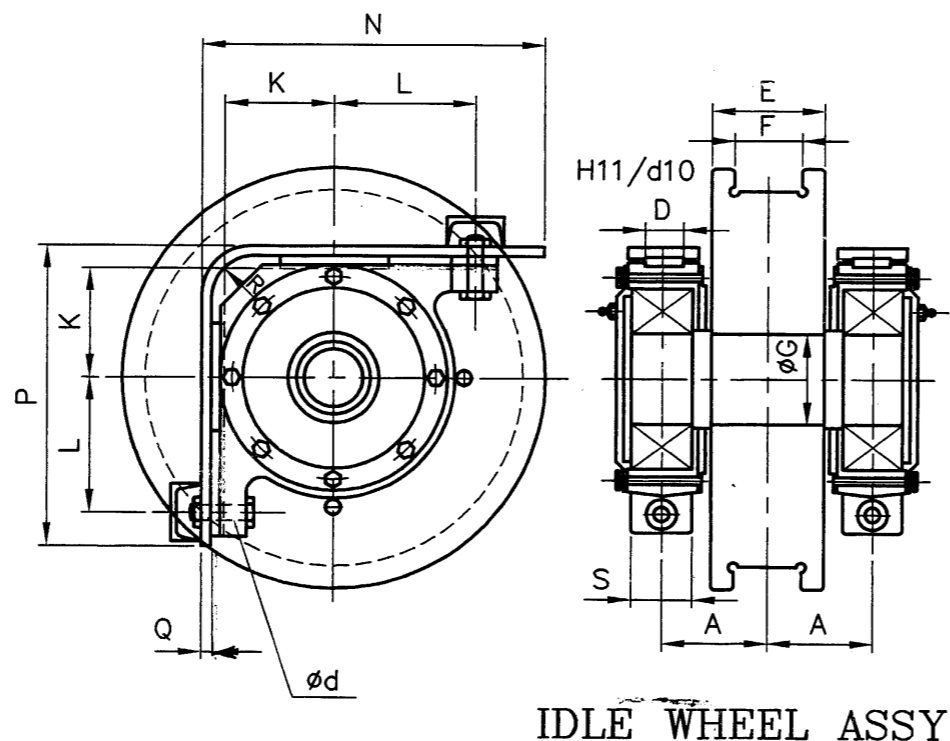
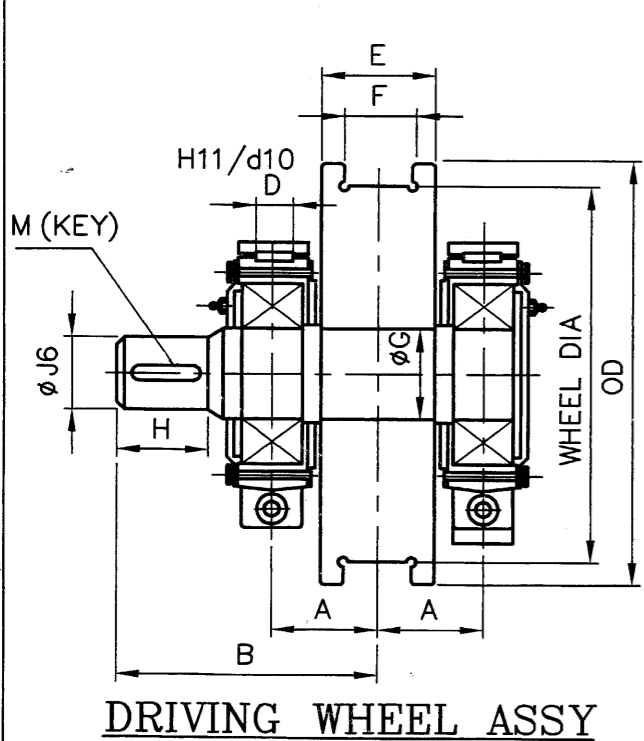
CAUTION: THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BHARAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY.

ITEM NO	DESCRIPTION	DRAWING NO	MATL CODE	UNIT WT	
			MATL SPEC	QTY	
EQPT: E.O.T CRANE / BAY 158 -ATP / UNIT II					
Bharat Heavy Electricals Ltd HIGH PRESSURE BOILER PLANT TIRUCHIRAPALLI - 620014		DRN	NAME C.PONNUSAMY	SIGNATURE <i>C. Ponnusamy</i>	DATE 23/12/15
		CHD	G.GOVINDARAJ	<i>G. Govindaraj</i>	23/12/15
		APPD	G.THIAGARAJAN	<i>G. Thiagarajan</i>	24/12/15
DEPT M&S	GRADE OF UNTOL. DIM	SCALE	WEIGHT (Kg)	REF TO ASSY DWG NO	ITEM
CODE 2597	φ/M/F IS: 2102	1:50	-	REF TO OLD DWG NO M&S-PD-08-018	
TITLE CLEARANCE DIAGRAM (FOR E.O.T CRANE)			CARD CODE U 01	DRAWING NO : 3-M-02A63-15553	REV 01

CAUTION: THIS DRAWING IS OUR SOLE PROPERTY AND SHOULD NOT BE USED IN ANY FORM FOR ANY PURPOSE WITHOUT THE WRITTEN PERMISSION OF BHARAT HEAVY ELECTRICALS LIMITED TRICHIRAPPALLI - 620 014.

ALL DIMENSIONS ARE IN MM

SL. No.	O.D. (WHEEL DIA) IN MM	RAIL SIZE	A	B	D	E	F	ØG	H	ØJ	K	L	Ød	M (KEY)	N	P	Q	S	R	COUPLING No.	SKF BRG No. & BRG. SIZE	TOTAL WEIGHT IN Kg. FOR DRIVE & IDLE
16	800/850	CR-100 CR-120	190	450	80	210	150	152	140	130	212	255	32	32x18x130	687	588	20	150	80	107	22330 150x320x108	870.00 845.00
15		CR-80	168	420	80	180	110	152	125	110	212	255	32	28x16x115	687	588	20	150	80	106	22330 150x320x108	796.00 775.00
14	710/750	CR-100 CR-120	190	450	80	210	150	152	140	130	212	255	32	32x18x130	642	588	20	150	80	107	22330 150x320x108	808.00 784.00
13		CR-100 CR-120	180	420	71	210	150	132	125	110	180	224	32	28x16x115	607	517	20	130	80	106	22326 130x280x93	728.50 711.50
12	630/680	CR-80	180	400	71	180	110	132	125	110	180	224	32	28x16x115	607	517	20	130	80	106	22326 130x280x93	653.00 636.00
11		CR-80/CR-100 & CR-120	180	420	71	210	150	132	125	110	180	224	32	28x16x115	567	517	20	130	80	106	22326 130x280x93	629.00 611.50
10	500/550	90-105 Lbs/Yd CR-80	150	365	60	180	105	111	110	90	160	190	26	25x14x100	547	462	20	120	60	105	22322 110x240x80	448.00 434.50
9		CR-80 CR-100	160	375	60	180	125	111	110	90	160	190	26	22x14x100	482	462	20	120	60	105	22322 110x240x80	253.00 245.50
8	400/450	CR-80	150	360	50	180	125	91	105	80	125	160	26	22x14x90	445	395	20	100	50	104	22318 90x190x64	389.00 378.00
7		60/75/90 & 105 Lbs/Yd	150	360	50	180	105	91	105	80	125	160	26	22x14x90	445	395	20	100	50	104	22318 90x190x64	301.00 294.00
6	320/370	CR-80 CR-100	150	360	50	180	125	91	105	80	125	160	26	22x14x90	395	395	20	100	50	104	22318 90x190x64	253.00 245.50
5		90 Lbs/Yd 105 Lbs/Yd	145	315	40	180	105	76	85	70	112	140	22	20x12x75	375	345	16	90	50	103	22315 75x160x55	197.00 192.00
4	250/280	75 / 90 & 105 Lbs/Yd CR-80	145	315	40	180	105	76	85	70	112	140	22	20x12x75	345	345	16	90	50	103	22315 75x160x55	162.00 157.00
3		50 SQ.BAR 60 Lbs/Yd 75 Lbs/Yd	112.5	260	40	125	85	61	65	55	85	112	17	16x10x55	312	287	16	80	50	102	22312 60x130x46	118.50 118.00
2	200/230	50 SQ.BAR 60 / 90 & 105 Lbs/Yd	105	250	32	125	85	61	65	55	76	100	17	16x10x55	254	249	12	60	40	102	22212 60x110x28	66.00 63.00
1		30 Lbs/Yd 50 SQ.BAR 60 Lbs/Yd	95	220	32	100	67	46	55	40	71	95	17	12x8x45	239	232	12	65	40	101	22309 45x100x36	51.00 50.00



MATERIAL :- SHAFT - 45CB/IS:7283.
 WHEEL - 55CB/IS:5517.
 FORGED.
 TREAD PORTION WHEEL HARDNESS 300 TO 350 (BHN)

No. of Pieces	DESCRIPTION	MATERIAL	STANDARD	NET.WT.IN KGS.	DRAWING No.	ITEM No.
REFERENCE:			COMPONENT CODE: 29	EQUIPMENT CODE: 00		
SCALE	DRAWN		ALTERATIONS:	DCN REF	DATE	SIGN. INDEX
	CHECKED					
	APPROVED					
	DATE	20-10-2000				
MACHINE: CRANE WHEEL ASSY			TYPE: GENERAL			
TITLE: STANDARD CRANE WHEEL ASSY			DRAWING No: 3-M-02R-11993			REV.
No. of Sheets			Sheet No:			

Technical Specifications:

The technical specifications contains SECTION I, SECTION II and SECTION III

SECTION –I - One page (1 of 3)

SECTION –II - Two pages (2 of 3 and 3 of 3)

SECTION –III - Eleven pages (1 to 11)

SECTION – I: CHECK LIST FOR VENDORS

Vendor to note the following

S.No.	INSTRUCTIONS TO VENDOR	VENDOR'S RESPONSE
1.0	The VENDOR shall submit the offer in TWO PARTS - Technical and commercial bid, PART 1 and Price Bid, PART 2.	
2.0	The Offer shall contain statement of Technical Specifications given by BHEL and the Offer Details submitted by the Bidder, against each clause. Where details are required, a mere 'CONFIRMED' or 'COMPLIES' or 'YES' or 'NO-DEVIATION' or similar words in the technical comparative statement may lead to disqualification of the Technical Offer.	
3.0	The Technical Offer shall be supported by Product Catalogue and Data Sheets in ORIGINAL and complete technical details of 'Bought-Out-Items' with copies of Product Catalogue and Selection Criteria	
4.0	The Commercial Offer (given with the Technical Offer) shall contain the Scope of Supply and the Un-Priced Part of the Price-Bid, for confirmation	
5.0	VENDOR has to indicate the Country of Origin for the supply of equipment.	

**SIGNATURE WITH SEAL
(Authorised Signatory)**

R. Vysakbabu

B.Vadivalagan

V.Ramesh Kumar

H.Nagarajan

SECTION-II: -QUALIFYING CRITERIA

The VENDOR has to compulsorily meet the following requirements to get qualified for consideration of the technical offer for the SUPPLY OF 5 TON CRAB ASSEMBLY FOR EOT CRANE.

S. No.	PARTICULARS	VENDOR'S RESPONSE
1.0	<p>Only those vendor, who have supplied and commissioned at least TWO 5Ton or higher capacity EOT/Gantry crane class-3 or above, fitted with Variable voltage variable frequency converter drive, in the past five years and such crane is working satisfactorily for more than one year after commissioning (on the date of opening of Tender), should quote.</p> <p>Copies of Purchase Order with detailed specification and Annexures and corresponding Commissioning certificates shall be submitted along with the offer.</p>	
2.0	<p>Vendor to submit Performance certificates along with their offer from minimum two of their customers for satisfactory performance of 5T EOT /Gantry cranes of class-3 or higher, fitted with Variable voltage variable frequency converter drive, supplied to them and are working satisfactorily for more than one year after commissioning (as on the date of opening of tender). Suggestive format is given in the annexure.</p>	
3.0	<p>BHEL reserves the right to verify the information provided by vendor. In case the information provided by vendor is found to be false/ incorrect, the offer shall be rejected.</p>	
4.0	<p>The vendor should have 'in-house' or 'self-owned' facility for FABRICATION and TESTING at 125 % of the rated capacity</p>	
5.0	<p>The vendor shall have minimum 5 years' experience in design, fabrication and supply of EOT / Gantry cranes.</p>	
6.0	<p>DELIVERY - The vendor shall quote the best possible delivery. However the delivery shall not exceed 8-10 weeks from the date of Placement of Purchase Order. The additional grace period will attract a penalty which is explained in the commercial terms of the enquiry.</p> <p>Vendor shall offer the pre dispatch inspection, atleast 15 days in advance of the dispatch date.</p>	

**SIGNATURE WITH SEAL
(Authorised Signatory)**

R. Vysakbabu

B.Vadivalagan

V.Ramesh Kumar

H.Nagarajan

PERFORMANCE CERTIFICATE
(On Customer's Letter Head)

1. Supplier of the Equipment :
2. Make & Model of the Equipment :
3. Month & Year of Commissioning :
4. Application :
- 5.
- a) Crane Type:
- b) Crane Capacity (Metric Tonnes):
- c) Crane span :
- d) Mechanism class :
6. Performance of the Equipment : Satisfactory / Good / Average / Not Satisfactory
7. Any other remarks:

Date:

Signature & Seal of the Authority
Issuing the Performance Certificate

R. Vysakbabu

B.Vadivalagan

V.Ramesh Kumar

H.Nagarajan

SECTION III: 5T CRAB ASSEMBLY FOR EOT CRANE - TECHNICAL SPECIFICATION
(Technical Specifications for 5T Crab assembly for Existing 15T Electrically Operated Overhead Travelling (EOT) crane with Double Girders)

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER
1.0.0	APPLICATION	Additional crab assembly (5 Ton capacity) for the existing 15 Ton EOT crane. Refer to page 11 of SECTION III for detailed information.	
2.0.0	SCOPE OF SUPPLY	a. Design as per Tender Specifications b. Detailed Design, Manufacture, Assembly and Testing before Dispatch c. Commissioning and Performance Prove-Out at BHEL Works d. Performance Guarantee for 12 months, from the date of commissioning. <u>A. Supply</u> 1. 5 Ton crab assembly 2.500 M span 11 Mtr height of lift ----- 1 No. <u>B. Service</u> 1. Commissioning of 5 Ton crab assembly ---1 No.	
3.0.0	TECHNICAL SPECIFICATIONS		
3.1.0	CAPACITY	Lifting Capacity	
3.1.1	Hoist	5 Metric Tons	
3.2.0	Cross Travel (CT) SPAN (Wheel Centre to Wheel Centre Dimensions)	2,500 mm	
3.3.0	Height of Lift	11,000 mm	
3.4.0	DUTY CYCLE	Related to Drive Motor & Mechanisms. Refer to clause 7.4.0 and 7.5.3 for detailed information	
3.4.1	Hoist	40 % CDF	
3.5.0	SPEED	Operating / Working Speed [Maximum]	
3.5.1	Hoist	15 mtrs./minute.	

R. Vysakbabu

B.Vadivalagan

V.Ramesh Kumar

H.Nagarajan

SECTION III: 5T CRAB ASSEMBLY FOR EOT CRANE - TECHNICAL SPECIFICATION**(Technical Specifications for 5T Crab assembly for Existing 15T Electrically Operated Overhead Travelling (EOT) crane with Double Girders)**

S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER
3.6.0	MOTOR RATINGS	Electric Motor Ratings & Frame Sizes shall be as per IS-325 and IS-1231 and also suitable for 300 starts per hour. Refer to clause 7.4.0 for detailed information.	
3.7.0	GEAR BOX	Gear Box Size	
3.7.1	Hoist	HR 500 mm	
3.8.0	HOIST ROPE DETAILS	Size and Number of Falls of Rope	
3.8.1	Hoist	Dia. 12 mm ; Falls - 4	
3.9.0	Control Voltage	110 V AC	
3.10.0	Input Power Supply	415 V with $\pm 10\%$ fluctuation , 50HZ with $\pm 3\%$ fluctuation, 3 Phase- AC	
3.11.0	Duty Class	Class - 3 [Indoor Service]	
3.11.0	Mechanism Group Classification	M 6	
3.13.0	DESIGN STANDARD	IS - 807 & 3177 / 2006	
3.14.0	Runway Rail Size		
3.15.0	Cross Travel (CT)	ISR 60 Lbs./Yard (for vendor information only for the selection of wheel assembly)	
3.16.0	Wheel Size		
3.16.1	Cross Travel (CT)	320 mm	
3.17.0	Brake Drum Size	Hoist Brake Drum Sizes	
3.17.1	Hoist	250 mm	
4.0.0	MAIN FEATURES	Crane Operational Features	
4.1.0	Control System	Variable voltage variable frequency type for hoist motion	
4.2.0	Crane Operation	Through Radio Remote Control /cabin operation by master controller. (for vendor information only)	
5.0.0	STRUCTURAL FABRICATION	Crane Structure Constructional Details	
5.1.0	Raw Material	IS: 2062 Only steel plates tested and certified for quality by the OEM steel mills, shall be used. Test Certificates of the plates from the steel mill to be produced for BHEL verification and form part of the	

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S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER
		documentation.	
5.2.0	Crab assembly	The CT platform on which the hoist rope drum, brake assembly, hoist motor, hoist gearbox etc. are to be mounted shall be at a height of 370mm when measured from the wheel centre of all the four CT wheels.	
5.3.0	Welding Electrodes	a. For all Horizontal Welding E 7018 / ER70S-6 (MIG) Electrode only should be used. b. For all Vertical Welding E 7048 / ER70S-6 (MIG) Electrode only should be used.	
5.4.0	Wheel Assembly	The Wheel Assembly coming for Cross Travel (CT) shall be of LIVE AXLE SYSTEM with L-Type Bearings and as per BHEL Drawing No. 3-M-02R-0011993 . [Drawing is enclosed and given as Annexure-II].	
5.5.0	Heat Treatment & NDT Examination	The Trolley frame shall be Stress Relieved after welding and NDT examinations. All weldings shall be tested by NDT means [MPI, LPI & RT].	
5.6.0	Machining Operation	All mechanical mating surfaces and wheel seating areas are to be machined to the required finish and protected	At least not less than
5.7.0	Surface Cleaning	The Trolley is to be thoroughly cleaned after completion of all operations but prior to painting.	
5.8.0	Painting	The crab parts are to be painted as follows :	
5.8.1	At supplier site	Prior to painting, the crab structure shall be sanded and cleaned to remove all rust and dust. During PDI , the crane shall be painted with One coat of Primer with 25 microns of DFT (Dry Film Thickness) and 48 hours of compulsory curing after painting. Then, prior to dispatch, the crane shall be painted with 2 coats of enamel paint (colour – deep orange- IS 5: 2007- No 591 or RAL 2011) each with a DFT of 25µ and intermittent curing of 16 hours.	

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S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER
6.0.0	MECHANICAL ELEMENTS		
6.1.0	Gears	Gears in all the Stages shall be helical in design and to be of machined, lapped/ground and hardened.	
6.2.0	Gear Box Casing	Shall be of fabricated type and stress relived by thermal heat-treatment process, prior to machining.	
6.2.1	Oil level indicator	Glass window with minimum level indication shall be provided for all gearboxes.	
6.3.0	Rope Drum	Shall be of fabricated type and stress relieved. The circumferential weld joints shall be tested by 100 % X-Ray for quality assurance. Or seamless pipe to suit the requirement.	
6.3.1	Type of Coupling	Only GEARED COUPLING to be used a. Between Electric Motor and Gear Box - Full gear coupling. b. Between Gear Box and Rope Drum- suitable rope drum coupling.	
6.4.0	Wheels	The Wheels shall be of Forged and Wheel Tread hardened to 300/350 BHN. Wheels shall be fitted with L-Type Bearings	
6.5.0	Pulley Dimension	Rope Pulley diameter shall be 23 times that of Rope diameter	
6.6.0	Hook	Hook latch shall be provided for the hook.	
7.0.0	ELECTRICAL ELEMENTS		
7.1.0	Control Voltage	110 V AC , \pm 50 Hz	
7.2.0	Type of Brakes	a. Hoist - DCEM Brake	
7.3.0	Protection	Panels, Limit-Switches and Motors shall have IP 54 protection.	
7.4.0	Electric Motor	Electric Motor shall be as per IS-325 and IS-1231 and also suitable for 300 starts per hour. Motor rating shall be minimum 18.5kW , Frame size -200L/6pole - S4 duty The Electric Motor shall be foot mounted with terminal boxes at the Top. The Electric motor shall be VVFD class with Crane Duty. Vacuum Pressure Impregnation (VPI) shall be provided to windings.	

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S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER
		<p>Motor shall be wound with super enameled dual coat copper wires. Motor shall be Type tested, routine tested .test certificates shall have all the details.</p> <p>Hoist Motor to be designed for noise level well below the limits specified in IS: 12065</p> <p>Motor designed for Temperature rise measurement of rotating electrical machines as per IS 12802 shall be selected.</p>	
7.5.0	Electrical Panels	<p>The electrical Panels the SS Sheet thickness shall be minimum 3 mm, Height shall be minimum 1200 mm.</p> <p>The electrical Panel shall be fixed by bolts only in Girder. Proper cooling arrangements shall be present in Panels. The Air dust filter must be bottom.</p> <p>The Panel shall be provide with glow lamps to indicate the condition of each VFD. These lamps should be fixed external to the panel along with RESET Push Button.</p> <ul style="list-style-type: none"> i. The RED glow lamp for drive fault indication ii. The GREEN glow lamp for drive ready indication. <p>Separate R,Y,B indication lamp along with Multifunction Digital Harmonic meter shall be present in Panel. Necessary cable shall be provided for Downloading the recorded data in the Multifunction meter.</p>	

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S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER
7.5.1	Inside Electrical panel	<ol style="list-style-type: none"> 1. Spare control contactors of 2 numbers shall be provided in the panel. 2. NO DBR shall be placed inside Electrical Panel. 3. Proper Spacing shall be provided between VVFD , Contactors , MCCBs, Terminal Blocks. 4. The Clearance between VVFD and Panel top shall be minimum 180MM. 5. The Clearance between terminal block and Panel bottom shall be minimum 200MM. 6. For contactor shall be arranged and marked suitable. 7. The 10% extra terminal blocks shall be provided. 8. The panel Dimensional drawings, All electrical components positioning drawing shall be provided for approval. 9. The Semiconductor fuse shall be placed after MCCB before VVFD for each motion. 	Inside Electrical panel
7.5.2	Electric Contactors	Panels shall have only SIEMENS / L&T Contactors and shall be suitable for AC3 Duty Class.	
7.5.3	Contactors Rating	The rating of all Contactors shall be atleast 50% higher than the respective electric motor full load current, at the specified duty cycle.	
7.5.4	Frequency Converter	<p>The VVVF Drive shall be supplied with suitable DBR for hoist motion. The drive shall be suitable for heavy duty application.</p> <ol style="list-style-type: none"> 1. The VVVF Drive should be suitable for CRANE DUTY application for HOIST MOTION. 	

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S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER
		<p>2. VVFD for hoist motion shall be one step higher than motor KW.</p> <p>3. The rated output current of the drive should be at 45 deg. C ambient Temperature and maximum operating temperature shall be 55 deg. C.</p> <p>4. Two no of potential free contactors has to be present in the drive.</p> <p>5. Keypad of the drive shall be LCD (at a time minimum three parameters shall be seen)</p> <p>6. The keypad of the VVVF drive shall be panel mounted with necessary extension wire from the drive.</p> <p>7. The DBU and Drive shall be of same manufacturer.</p> <p>8. The DBR values of all motions shall be at least 40% of the motor rated KW.</p> <p>9. The drive has to trip on input/ output phase loss, overload, input/ output short circuit, DBR damage /short, DBU short.</p> <p>The needed data cable, converter modules shall be supplied along with drive.</p> <p>The VVFD Earth and motor Body shall be connected with a Single core wire of Needed Sq mm to neutralize the high Frequency Harmonic noise.</p> <p>Vendor to provide the model no. of the drive to be supplied.</p> <p>VVVF Drive Test certificates shall be submitted at the time of Inspection</p>	Specification for VFD spare.
7.6.0	Resistance box /DBR	It shall be Punched stainless steel, TIG welding shall be done. Resistance HV test, Megger Test Certificates shall be submitted at the time of Inspection.	
7.7.0	Cables	All cables shall be flexible copper FRLS only. Cables rating shall be 1.6 times of the rated current.	

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S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER
		Following cables shall be supplied 1. For hoist 10 Sqmm 3.5 C IGUS cable – 26 mtrs 2. For Control rotary , gravity)-1.5 Sqmm 3 core – 2 runs IGUS cable – 26 mtrs. Note -These three cables will be placed in existing Iigus drag chain E2.26.10.150	
7.8.0	Hoist limit	Hoist shall be provided with both rotary and counter weight limits.	
7.9.0	Master controller	One number of master controller for hoist motion shall be supplied .	
7.10.0	MCCB	Input and Each motions shall have separate MCCBs. Input MCCB after SFU shall be with advanced protection, necessarily earth fault protection and indication shall be present. Confirmity standards shall be as per IEC 60947-2/IS:13947-2	
8.0.0	SELECTION of BOI and COMPONENTS	The makes of Components or Bought-Out-Items shall be strictly as per the list given below.	
8.1.0	Hoist Hooks	HERMAN MOHTTA / HERCULES / SILPA UDYOG / SMRITI FORGINGS / KARACHIWALA	
8.2.0	Wire Rope	USHA MARTIN / FORT WILLIAM / RA WIRE ROPE	
8.3.0	Electric Motors	GEC / BHARAT BIJLEE / SIEMENS / kirloskar /Toshiba /ABB/Hindustan	
8.3.1	DC Brake Unit with rectifier panel.	Only BCH make	
8.4.0	Limit Switch (Gravity Type)	SIEMENS / INDUSTRIAL SYNDICATE / BCH / SKC / SOC	
8.5.0	Contactors	SIEMENS / L&T / INDO ASIAN	
8.6.0	Over-Load-Relay	SIEMENS / L&T (THERMAL TYPE)	
8.7.0	HRC Fuses	GE / L&T /SIEMENS	
8.8.0	MCB,	L&T/SIEMENS	
8.9.0	Rotary limit switch	SIEMENS / OMEGA / SOC / INDUSTRIAL SYNDICATE	
8.10.0	Moulded case CB	SIEMENS / L&T	

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S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER
8.11.0	Pneumatic Time Delay	Only BCH make	
8.11.0	Connectors	ELMAX make or reputed make with IS approved with acceptable BHEL	
8.13.0	Couplings	FENNER / SKF / ALLFLEX (TYPE - AHG)/ ESCO / NU-TECK/ LOVEJOY	
8.14.0	Bearings	SKF / FAG / NSK / TIMKEN/NTN	
8.15.0	Cables	Reputed Makes & ISI Approved acceptable by BHEL.	
8.16.0	VVVF Drives	YASAKAWA/ MITSUBISHI / FUJI/TOSHIBA	
9.0.0	DOCUMENTS/ DETAILS for APPROVAL	The following documents and details are to be submitted for BHEL Approval, prior to taking up the manufacture of the crane.	
9.1.0	Drawings and Documents	<ul style="list-style-type: none"> a. Calculations for Selection of Electric Motor, Gear Reducers, Brake, Couplings, etc. b. GA Drawing of Trolley c. GA Drawing of Hoist Mechanism. d. Sub-Assembly Drawing for Wheels, Hook Block, Gear Box, Hoist rope drum and brake Drum. e. Wiring Diagram with Logic Circuits. f. Cable Selection based on Current Rating. g. Electrical Panel GA drawing and Electrical Elements Positioning Drawing. <p>Drawings to be submitted in one lot and approval to be obtained from BHEL, subject to corrections if needed.</p>	
9.2.0	Technical Details	<ul style="list-style-type: none"> a. Total Weight of Trolley including all Electrical Equipment b. Total Weight of Structural, Mechanical and electrical Equipment and indicated separately also. 	
10.0.0	INSPECTION	The following Schedule of Stage Inspections is to be strictly adhered to, prior to dispatch from the Supplier's Works	
10.1.0	Pre-dispatch Inspection At Supplier Work's by	<ul style="list-style-type: none"> a. Inspection of Crab assembly. b. Verification of Span & Wheel base Dimensions, Checking of 	

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S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER
	BHEL.	Wheel Alignment, Mechanical Assemblies and Total Alignment. c. Free running of hoist Mechanism. d. Full / Rated Load Test for Trolley. (as per IS 3177 -1999) e. 25% OVER-LOAD Lifting Ability Check. (as per IS 3177 - 1999)	
11.0.0	ERECTION & COMMISSIONING		
11.1.0	Unloading of all crab assembly and other electrical parts	Unloading of all crab and other components shall be the scope of BHEL	
11.2.0	Erection & Cabling	Complete erection/installation, wiring/cabling of the various components at BHEL shall be the scope of BHEL	
11.3.0	Commissioning	Commissioning of the Crab and Performance Prove -Out for 125% of Capacity and Smooth Functioning of the Crab (at BHEL Works) shall be the RESPONSIBILITY of the supplier.	
11.3.1	Test load	Arranging of test load (125% of SWL) for load testing shall be the scope of BHEL.	
12.0.0	O & M MANUALS	Crab shall be provided with the following 1. VFD Programming & Maintenance manual and Technical Information catalogue 2. Data Sheet containing the Program data loaded in the VFD units. THREE Copies of Erection, Operation & Maintenance Manual hard copy and soft copy in CD, containing the following technical details	
12.1.0	Drawings & Details	a. Crab Assembly Drawing c. Wiring Schematics d. Detailed Wiring Diagrams for Sub-Systems / Panels e. Wheel Assembly Drawings f. Bottom Block Assembly Drawing g. Gear Box Assembly Drawings	

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S.No.	PARTICULARS	BHEL SPECIFICATIONS	VENDOR'S OFFER
		h. Coupling Drawing and Details i. Specifications/Ratings of All Bought-Out-Items j. Warranty / Guarantee Card for all Bought-Out-Items k. Trouble Shooting Chart for Main and all Sub-Systems	
14.0.0	PERFORMANCE GUARANTEE	The Performance of the Crab and/or the Components / Sub-Assemblies / Bought-Out-Items shall be guaranteed for a minimum period of twelve months from the date of performance acceptance at BHEL Works.	

SCOPE OF CONTRACT EXPLAINED IN BRIEF

A. Supply

1. Crab assembly, 5 Ton 2.500 M span 11 Mtr height of lift ----- 1 No.

The crab assembly shall consist of crab frame , assembled with 4nos. of idler wheel assembly, hoist motor , hoist gearbox assembly , rope drum assembly, hoist brake assembly with brake drum , full gear coupling (between motor and gearbox), Rope drum coupling (between gearbox and rope drum), rotary limit switch assembly with its coupling and counter weight limit switch assembly.

The 5 Ton crab assembly shall be mechanically connected to the existing 15 Ton crab assembly in the crane , which shall be under the scope of BHEL. (The 5 Ton Hoist shall be used as auxiliary hoist in the existing 15 Ton crane)

- 2. Hoist control panel ----- 1 no.
- 3. Brake panel assembly----- 1 no.
- 4. Master controller for AH----- 1 no.
- 5. 5 Ton Hook Block Assembly----- 1 no.
- 6. 12mm steel wire rope of required specification----- 1 no.
- 7. Electrical cables of required specification-----1 no.
- 8. DBR for hoist-----1 no.

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