

VOLUME - IA

Technical Conditions of Contract (TCC) for “CIVIL,
STRUCTURAL & ARCHITECTURAL WORK ALONG WITH
ELECTRICAL, C&I, FDA, MECHANICAL, MATERIAL
HANDLING AND DISMANTLING/DEGUTTING etc.
WORKS”

FOR

Upgradation of SRGM repair facility at Naval
Dockyard, Mumbai to cater for repair cum
test facility for upgraded SRGM at Mumbai,
Maharashtra, India.

BHARAT HEAVY ELECTRICALS LIMITED

Technical Conditions of Contract (TCC) for Civil Works

 Technical Conditions of Contract (TCC) Heavy Power Equipment plant- HYDERABAD		Ref No: HYD/HPEP- Projects- 911/TCC/2026- 27/ND- MBI/Civil/01			
		Rev. No.	00		
COPYRIGHT AND CONFIDENTIAL 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.		TECHNICAL CONDITIONS OF CONTRACT (TCC) “CIVIL, STRUCTURAL & ARCHITECTURAL WORK ALONG WITH ELECTRICAL, C&I, FDA, MECHANICAL, MATERIAL HANDLING AND DISMANTLING/DEGUTTING ETC. WORKS” FOR UPGRADATION OF SRGM REPAIR FACILITY AT NAVAL DOCKYARD, MUMBAI TO CATER FOR REPAIR CUM TEST FACILITY FOR UPGRADED SRGM AT MUMBAI, MAHARASHTRA, INDIA			
Revisions: Refer to record of revisions		Prepared By: Sri Imran Javed Sri Jaya Kumar V Sri D Nagaraju	Checked By: Sri Arif Naiyer Sri K.K. Naik	Approved By: Sri Y. Srinivasa Rao	Date 24.08.2026

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Volume-IA

Part-I: Contract Specific Details

Chapter I- Project Information

1.0 Project Details			
a)	Customer	:	Government of the Republic of India, Ministry of Defence, Directorate Of Weapon Equipment, Naval Dockyard Mumbai.
b)	Project Information	:	Upgradation of SRGM repair facility at Naval Dockyard, Mumbai ND (MBI) to cater for repair cum test facility for upgraded SRGM at Mumbai, Maharashtra, India
c)	Location/address details	:	Weapon Equipment Depot, Gun Gate/Muster Gate Naval Dockyard, SBS Road, Mumbai-400023.
d)	Nearest Railway Station	:	Chhatrapati Shivaji Maharaj Terminus
e)	Road Approach		Well Connected with Roads
f)	Nearest Air Port	:	Chhatrapati Shivaji International Airport
g)	Ambient Air Temperature (Average)	:	a) Maximum: 33 ⁰ C b) Minimum: 19 ⁰ C
h)	Annual average Relative Humidity	:	71%
i)	Climatic Condition	:	Tropical coastal climate

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1.1	INSTRUCTIONS TO BIDDERS								
a)	The Bidder shall visit project site and acquire full knowledge and information about conditions prevailing at site and in & around the plant premises, together with site conditions, transportation routes, various distances, all the statutory, obligatory, mandatory requirements of various authorities and all information that may be necessary for preparing the bid and entering into the Contract. All costs for and associated with site visits shall be borne by the bidder.								
b)	Other contractors would be working in this area and their structures are to be protected. The material brought and stacked for construction should not make hindrance to other contractors.								
c)	The information given herein is for general guidance and shall not be contractually binding on BHEL/Owner/Customer-(ND-Mumbai) (All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder.								
d)	The contractor, in the event of this work awarded to him, shall establish an office at site and keep posted an authorized, responsible officer with valid Power of Attorney for the purpose of the contract. Any order or instructions of the 'Engineer' or his duly authorized representative, communicated to the contractor's representative at site office will be deemed to have been communicated to the contractor at his legal address.								
e)	BHEL will not admit any claims whatsoever on account of Contractor's non-familiarization of local conditions and the contractor's rates shall be deemed to have taken this into account.								
f)	Bidders may fix up their site visit in consultation with below mentioned contact person: <table border="1"> <tr> <td>Name:</td><td>Sri. Jaya Kumar V</td></tr> <tr> <td>Designation:</td><td>Dy GM.</td></tr> <tr> <td>Email:</td><td>jayakumarv@bhel.in</td></tr> <tr> <td>Ph. No.</td><td>7702802169</td></tr> </table>	Name:	Sri. Jaya Kumar V	Designation:	Dy GM.	Email:	jayakumarv@bhel.in	Ph. No.	7702802169
Name:	Sri. Jaya Kumar V								
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Chapter II- Scope of Work

2.0 BHEL has received the contract from the Government of Republic of India, Ministry of Defence, Directorate of Weapon, Naval Headquarter for the upgradation of SRGM Repair Facility at Naval Dockyard Mumbai (ND Mbi) to cater for repair cum test facility for upgraded SRGM.

This Technical Condition of the Contract /Technical specification is for the proposed Civil, Structure and Architectural Works and Other associated works at site for Construction/modification of SRGM pit area in C-57 shop, office room/space, Construction/modification/degutting of facilities in C-57 shop, modification/renovation of area other than SRGM pit area, details are as per the scope mentioned in this tender specification.

2.1 Filling, levelling and grading: Earthwork, filling and levelling in proposed area.

2.2 Micro Grading: The entire area shall be micro graded up to required levels by the contractor to achieve the ground profile as per pavement level requirement. Filling/ cutting required to bring the site up to the required finished levels is in the scope of the contractor. Extra earth required to make up to paved levels shall be arranged by the contractor at his own cost from approved borrow areas.

2.3 The work to be performed under the scope of this tender mainly consists of but not limited to complete Civil, structural and Architectural work and their maintenance for specified period of the following plant buildings, structural equipment foundations and other miscellaneous structures.

For building sizes and number of equipment refer plot plan, please note that these are tentative and likely to change.

A. Design and construction of the following Buildings/Sheds: -

- i) Control room building
- ii) Hydraulic room building
- iii) Electrical Room
- iv) Store room
- v) Electronic room
- vi) Training room
- vii) Electrical switchgear room
- viii) Converter room
- ix) UPS room
- x) Admin area rooms

B. Design and construction of the following sumps/pits.

- i) SRGM test pit

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C. Design and construction of the following services: -

- i). Storm Water drain system
- ii). RCC approach roads
- iii). RCC pavements
- iv). Fire protection system
- v). Crane movement road, main road approach roads, drains culverts
- vi). Potable Drinking water system
- vii). Sanitary and plumbing system in the buildings
- viii). RCC Electrical/Instrumentation cable trenches and pipe trenches
- ix). Road Crossings
- x). Culverts
- xi). Pipe way Bridges
- xii). Pipe way Sleepers
- xiii). Crossings (Culverts, bridges, sleeves as per applicable) of underground services below approach road for all services in the corridor including drains, fire water lines, cooling water lines, waste sewers.
- xiv). Strengthening of existing roads for crane movement if required.
- xv). All approach roads from existing main roads as per detailed engineering requirement for maintenance and operation.
- xvi). Maintenance and erection approach roads/ by strengthening of roads.
- xvii). Micro grading & disposal of surplus and unserviceable material at identified location. Contractor to assess the lead by physically visiting the Plant site. Approval from statutory and local authorities.
- xviii). The plot for construction area/ fabrication yard/ field office/ construction stores has to be developed by the contractor of its own. All the infrastructure facilities which include roads, approaches, drainage system, pavements etc. shall be developed & provided by the contractor of its own.
- xix). Structural platforms, monorail beams, walkways, crossovers, handrails etc for miscellaneous equipment's, piping etc. etc., shall be provided as per requirement of Civil works.
- xx). Unless indicated otherwise all items mentioned in the BOQ shall be inclusive of supply of material, labour consumables etc. Complete.
- xxi). Earthing strips and electrodes will be supplied by BHEL, Hyderabad.
- xxii). Painting on structural steel shall include surface preparation by SSPC-SP-10.

2.4 The scope of works as mentioned above is indicative only, and is not limited to the above list.

2.5 All above jobs shall be executed as per BHEL Engineer's instructions, drawings, detailed specifications and respective BOQ cum Rate Schedule.

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2.6 DRAWINGS:

- i) The tentative drawings and specifications will form part of the tender documents. BHEL reserves the right to modify/alter the tender drawings, if necessary during the actual execution at site. However, the Drawings/Sketches are to be read along with specifications and shall be treated as in the scope of work.
- ii) The work under this contract shall be carried out as per BOQ Cum Rate Schedule and in compliance of tender conditions including technical specifications and approved drawings/ documents.

2.7 General Scope:

- i) Providing all incidental items not shown or specified but reasonably implied or necessary for the successful completion of the work in accordance with contract.
- ii) The drawings enclosed with this tender are intended to give the tenderer a general idea of the type and extent of work involved. The drawings are as such only indicative and not to be considered as the exact construction drawings. Works shall be carried out as per the approved drawings by BHEL.
- iii) Further, this is to be noted that the drawings and the documents furnished along with this specification are the sole property of BHEL. It must not be used directly or indirectly in any way detrimental to the interest of the company.
- iv) Furnishing all labour, materials, supervision, construction plans, equipment, supplies, transport, to and from the site, fuel, electricity, compressed air, water, transit and storage insurance and all other incidental items and temporary works not shown on specified but reasonably implied or necessary for the proper completion, maintenance and handling over the works in accordance with the stipulations laid down in the contract documents and additional stipulations as may be provided by the BHEL Engineer during the course of works.
- v) The area of work shall be cleared of all vegetation, rubbish and other objectionable matter and materials. No separate payment for these operations shall be made for such works.
- vi) All the works areas shall be adequately flood lighted to the satisfaction of the Engineer-in-Charge when the work is in progress during the night shifts.
- vii) All necessary arrangement for safety like Hard Barricading around deep excavation area with scaffolding pipes, providing of safety net on the slope and PPEs as required is in contractor's scope. Contractor shall comply with all safety requirements as per statutes, BHEL and Customer as applicable for execution of works. Safety rules and guidelines are provided elsewhere.
- viii) Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that is required for all works including temporary works.
- ix) Carrying out survey and to establish levels and coordinates at suitable intervals from existing grid levels and coordinates furnished by the owner established bench marks, setting out the locations and levels of proposed structures, constructions and marking of reference pillars and other identification works etc., The contractor shall provide the owner/BHEL such a assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any material used.

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- x) The complete works shall be carried out as per BOQ cum Rate schedule. If any work covered in the scope of contract cannot be executed using items available in BOQ, additional / extra items shall be made and rates for such items shall be worked out as per GCC clause. However, contractor shall be bound to execute all the works under the scope of the contract and decision whether an extra item is applicable or not, shall be taken by BHEL Engineer, which will be binding on the contractor.
- xi) Any activity, which is necessarily required for satisfactory execution of any item of BOQ in line with applicable standard technical specifications / IS code shall be deemed included in BOQ item even if it is not described in the item description and no extra payment, shall be made against such activity.

2.8 Field Quality Assurance:

- i) The contractor shall be responsible for day-to-day quality checks for civil, structural and architectural works including concrete and other building materials during the progress of work. All quality records and log sheets shall be maintained as per the requirement of BHEL/ Customer and as per FQP approved by BHEL.
- ii) Contractor shall furnish the manufacturers test certificate for the steel & cement procured by them. Apart from this all the field test shall be arranged by contractor for cement, bricks, coarse & fine aggregate either at site or nearby Field Quality Lab, approved by BHEL if so desired by BHEL's Engineer. All the expenses in these regards shall be borne by contractor.

Contractor shall procure reinforcement steel, structural steel & Cement from reputed manufacturer & approval for the same shall be obtained from BHEL well in advance before ordering for the materials.

2.9 Setting Up of Laboratory Works:

The contractor shall set up a laboratory in the close vicinity of the work site as per required field QA & QC laboratory set up and as directed by engineer-in-charge. The laboratory shall be equipped with latest testing equipment in sufficient number to carry out all the tests as required under this contract. The contractor should ensure that the equipment is available well in advance of starting of the work to avoid stoppage of work on this account. All the tests shall be carried out by the contractor in the presence of BHEL's representative and a joint record of all observations and results thereof shall be maintained and made available to Engineer-In-Charge.

Minimum Testing Facilities to be arranged by contractor at site are as under:

1. Soil Works:

- 1a. void
- 1b. Field Compaction Test (Core Cutter / Sand Replacement Method).
- 1c. Atterberg Limit Test of Soil.
- 1d. Grain Size Distribution Test.

2. Concreting Works:

- 2a. Facilities for sieve Analysis for both fine and coarse aggregates.
- 2b. Facilities for workability test of concrete by Slump cone / BV.

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2c. Facilities for Cube Strength.

Alternatively, Contractor may tie up with BHEL approved third party Lab/Existing Lab of any other contractor at site, for testing of material / works during execution of works under the contract.

In case the description / specifications as per BOQ are found to be incomplete, Indian Standard Codes (IS Codes) specifications as applicable for the work shall be followed.

The contractor shall provide and maintain at his own cost pumps and other equipment to keep the work free from water and continue to do so until the handing over of the work. The contractor shall clear all trees, rubbish, vegetation, brickbats etc. and dispense them suitably in allotted areas at his own cost.

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Chapter III- Facilities in the scope of BHEL/Contractor

S. No.	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1	ESTABLISHMENT			
3.1.1	FOR CONSTRUCTION PURPOSE:			
a	Open space for office (as per availability)	Yes	Yes	Location will be finalized after joint survey with owner.
b	Open space for storage (as per availability)	Yes	Yes	Location will be finalized after joint survey with owner.
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	At bidder's own cost
d	Bidder's all office equipment, office / store / canteen consumables		Yes	At bidder's own cost
e	Canteen facilities for the bidder's staff, supervisors and engineers etc.		Yes	At bidder's own cost
f	Firefighting equipment like buckets, extinguishers etc.		Yes	At bidder's own cost
g	Fencing of storage area, office, canteen etc. of the bidder		Yes	At bidder's own cost
3.1.2	FOR LIVING PURPOSES OF THE BIDDER			
a	Open space for labor colony outside of the refinery		Yes	Contractor has to make his own arrangements for shelter and transportation of labours as per requirement.
b	Labor Colony with internal roads, sanitation, complying with statutory requirements.		Yes	At bidder's own cost
3.2.0	ELECTRICITY			
3.2.1	Electricity For construction purposes		Yes	Electricity shall be provided by Owner/Customer free of cost at a terminal point. Further distribution shall be done by contractor.
3.2.2	Electricity for the office, stores, canteen etc. of the bidder		Yes	Electricity shall be provided by Owner/Customer free of cost at on terminal point. Further distribution shall be done by contractor.

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S. No.	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc.		Yes	
3.3.0	WATER SUPPLY			
3.3.1	For construction purposes		Yes	Water shall be provided by owner free of cost at one point. Further distribution shall be done by contractor.
3.3.2	<u>Water supply for bidder's office, stores, canteen etc.</u>		Yes	
3.3.3	<u>Water supply for Living Purpose</u>		Yes	
3.4.0	LIGHTING			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	Contractor has to make his own arrangements
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area At the construction site /area		Yes	Contractor has to make his own arrangements
c	Providing the necessary consumables like bulbs, switches, etc. during the course of project work		Yes	Contractor has to make his own arrangements
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	Contractor has to make his own arrangements
3.5.0	COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER			
a	Téléphone, fax, internet, intranet, e-mail etc.		Yes	
3.6.0	COMPRESSED AIR wherever required for the work		Yes	
3.7.0	Demobilization of all the above facilities		Yes	
3.8.0	TRANSPORTATION			
a	For site personnel of the bidder		Yes	
b	For bidder's equipment and consumables (T&P, Consumables etc.)		Yes	

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Sl. No	Description PART II 3.9.0 CONSTRUCTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.9.1	Engineering works for construction:			
a	Providing the construction drawings for all the works covered under this scope	Yes		Drawing schedule shall be finalized at the time of kick off meeting.
b	Drawings for construction methods			NA
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small-bore pipes		Yes	In consultation with BHEL
d	Shipping lists etc. for reference and planning the activities		Yes	In consultation with BHEL
e	Preparation of construction (Concreting B/W, etc.) schedules & other input requirements and work procedures, Job Safety Analysis, Field Quality Plan, Inspection & Test Plan, etc.		Yes	In consultation with BHEL
f	Review of performance and revision of site construction schedules in order to achieve the end dates and other commitments	Yes	Yes	In consultation with BHEL
g	Weekly construction schedules based on S. No. e. hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
h	Daily Progress report /construction / work plan based on S. No. g. hard copy to Construction manager, by email to HO.		Yes	In consultation with BHEL
i	Periodic visit of senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two Weeks.		Yes	
j	Arranging the materials required for Work		Yes	

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Sl. No	Description PART II 3.9.0 CONSTRUCTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
k	Coordination for inspection & checking and getting clearance from customer/or its representative		Yes	
l	Preparation of formats for completion of activities		Yes	
3.10	Work Permits, gate pass etc. from customer for manpower, machinery and material as per customer/owner guidelines		Yes	

3.11 Land/Open Space: -

- i) If customer/owner provides open space to BHEL for contractor's set up of the office, storage etc, then BHEL may provide space to the contractor for his temporary office, shed and the storage of plant & machineries and materials at the project site/within the vicinity of the project, on sharing basis with other contractors depending upon the work requirement. BHEL's decision regarding allotment of such space to the contractor shall be final and binding on the contractor. BHEL shall not provide to the contractor any residential accommodation to any of his staff and the contractor has to make his own arrangements at his cost. Bidder has to identify their own land for labour colony if any required and no land will be given by BHEL for labour colony purpose. Security of stores & work place shall be in Contractor's scope.

3.12 Labour and Staff Colony: Following are in the Bidder's scope of work for labour & staff colony:

- i) Labour colony is to be developed by bidder for all the labourers required to be deployed for the works. All labour colony set-up is to be developed in compliance of statutory requirements. Alternatively, bidder can also arrange for labour accommodations meeting the statutory norms.
- ii) Land for labour colony shall be arranged by Contractor at their own cost as per availability outside project area within 5Km or nearest available land; Necessary levelling/dressing of land shall be done by the contractor. All arrangement for electricity and drinking/service water to be arranged by the contractor within his quoted price.
- iii) Development of Bidder's temporary staff colony and labour colony having adequate no. of rest rooms along with toilets & fencing etc.
- iv) All Civil and Structural work associated with drinking and service water for Bidder's labour and other personnel at the work site/colony/offices including pump houses, pipes, overhead tank, tube wells etc.
- v) Providing and maintaining facilities for safety, welfare, drinking water and sanitation, hygiene, biennial health check-up etc. for construction workers at their workplaces as well as at labour & staff colonies.
- vi) Development and maintenance of above facilities for construction workers deployed by the Contractor shall solely rest with the Contractor.

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vii) Rectification and Corrections in labour hutment/ accommodation as pointed out by BHEL/Customer shall be bidder's responsibility and any cost incurred by BHEL to complete the works, in case of non-compliance of the instructions by bidder, same shall be recovered from his RA Bills along with 5% overheads.

viii) Installation of necessary amenities and temporary infrastructure for construction activities at Project site locations-

Following are the minimum amenities to be provided by the bidder within the quoted price including removal/disposal of the same in environment friendly manner after its intended use/completion of scope of work:

i. Labour rest sheds near work spot.

ii. Canteen facility creation.

iii. Drinking water facility.

iv. Labour Bio toilets near work spot in sufficient nos. with regular cleaning & maintenance arrangement.

v. Labour colony should have all hygienic condition, dining hall, toilets, proper sewerage system, good drinking water arrangements.

3.13 Construction Power:

- i) Construction power shall be provided by the customer/owner at one point, further arranged by the contractor at his own cost and services.
- ii) Contractor shall deploy and install required cables, fuses, distribution boards, switchboards, bus bars, earthing arrangements, protection devices and any other installation as specified by statutory authority/act.
- iii) Contractor shall make necessary arrangements for onward distribution of construction power taking due care of surrounding construction activities like movement of cranes & vehicles, civil work, fabrication/construction/assembly/ erection etc. and safety of personnel. It may become necessary to relocate some of the installations to facilitate work by other agencies or by him. All cabling and installations shall comply in all respects with the appropriate statutory requirements. The installation and maintenance of this shall be done by licensed and experienced electrician.
- iv) The bidder will have to Procure & install General mobile illumination system during construction right from start of his work. This system will include temporary pole lighting, portable lighting towers, within the quoted price. The illumination should be such that minimum illumination requirement as specified by Indian standards for general illumination is maintained.

3.14 Construction water:

Construction water shall be provided by the customer/Owner at one point. Bidder has to make arrangement of further distribution of water at his own cost.

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The Contractor should decide for storage of sufficient quantity of water required for work. The agency should also construct sumps (if required) of suitable size for storage of construction water as per their requirement for construction purposes.

Contractor to satisfy himself that the water drawn by him is fit for construction / consumption and adequately treat such water at his cost.

3.15 CONTRACTOR'S OBLIGATION ON COMPLETION

On completion of work, all the temporary buildings, structures, pipe lines, cables etc. shall be dismantled and levelled and debris shall be removed as per instructions of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.

3.16 DEWATERING:

Contractor shall ensure at all times that his work area & approach/ access roads are free from accumulation of water, so that the materials are safe and the erection/ progress schedule are not affected. No separate claim in this regard shall be admitted by BHEL. No separate payments for dewatering of subsoil, surface water or catchments water, if required, at any time during execution of the work including monsoon period shall be considered by BHEL.

3.17 RECORDS TO BE MAINTAINED AT SITE

The under mentioned Records/ Log-books/ Registers applicable to be maintained.

- i. Hindrance Register.
- ii. Site Order Book.
- iii. Test Check of measurements.
- iv. Records of Test reports of Field tests.
- v. Records of manufacture's test certificates for bought out items as per BHEL's requirement
- vi. Records of disposal of scraps generated during and after the work completion.

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Chapter IV- Tools & plants to be deployed by Contractor

LIST OF TOOLS AND PLANT: The following tools and equipment but not limited to, are required for the efficient execution of the civil works. The contractor shall make them available for construction purposes, including all consumables likely to be used at his own cost at the time of mobilization.

4.0	LIST OF TOOL & PLANTS TO BE DEPLOYED BY THE CONTRACTOR (Need base/ progressively deployment)	
A	Tools and Plants: Nos. of T&Ps to be deployed at site shall be decided w.r.t. monthly plan and review format (F-14) based on site requirement. Below given No./ Nos. are tentative for planning purposes by the bidder.	
Sl. No.	Description of T&P	Tentative Quantity
1.1	For Civil Works	
1.1.1.	Hydraulic Excavator /Poclain	01 No.
1.1.2.	JCB	01 No.
1.1.3.	Dumper	01 Nos.
1.1.4.	Trailer- 15 MT	01 No.
1.1.5.	Mobile Batching Plant	As per Requirement
1.1.6.	Concrete Mixture Machine	02 No.
1.1.7.	Vibrators (electrical/diesel)	03 Nos.
1.1.8.	Reinforcement bending machine	02 No.
1.1.9.	Reinforcement cutting machine	02 No.
1.1.10.	Vibro Roller (8-10 MT Capacity)	01 No.
1.1.11.	Farana crane (Required Capacity) Note- Hydra is not allowed at project site	01 Nos.
1.1.12.	Earth Compactor- 3MT Capacity (Minimum)	01 Nos.
1.1.13.	Total Station	01 Nos.
1.1.14.	Auto level & staff	01 No.
1.1.15.	Water Tanker with sprinkler attachment	01 Nos.
1.1.16.	Curing / dewatering pump – 1.5 / 2 HP	02 Nos.
1.1.17.	De-watering pump (diesel operated)	As per Requirement

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1.1.18.	Plate compactor	As per Requirement
1.1.19.	Self-priming Dewatering pump of various capacity (Diesel/Electric) From 2 HP to 15 HP	As per Requirement
1.1.20.	Ply Shuttering board with adequate supporting structure – (Old steel shuttering plates will not be allowed).	As per Requirement
1.1.21.	MS Scaffolding Pipes.	As per Requirement
1.1.22.	Tractor mounted grader/ loader	As per Requirement
1.1.23.	Man lift crane of Minimum 20m reach	As per Requirement
1.1.24.	DG Set of adequate capacity	As per Requirement
1.1.25.	Construction Cable and Water Pipe Line	As per Requirement
1.2.	For Structural Steel Works	As per Requirement
1.2.1.	Crawler / Tyre Mounted Crane (Required Capacity)	As per Requirement
1.2.2.	Farana crane (Required Capacity) Note- Hydra is not allowed at project site	01
1.2.3.	Magnetic Base Drill Machine	As per Requirement
1.2.4.	Submerged Arc Welding Machine	01
1.2.5.	Welding Rectifier	01
1.2.6.	Trailer (20MT Capacity)	01
1.2.7.	Torque Tightening Machine	As per Requirement
1.2.8.	Power Winch- 03 MT	As per Requirement
1.2.9.	Pipe Cutting Machine	As per Requirement
1.2.10.	Heating Ovens	As per Requirement
1.2.11.	Portable Ovens	As per Requirement
1.2.12.	Spray Painting Equipment	As per Requirement
1.2.13.	APR*- As per Requirement	
1.3.	Measuring and Monitoring Equipment (MMEs): To be finalized as per site requirement.	
1.4.	T&Ps shown in the above-mentioned list is suggestive requirement. However, mobilization schedule as mutually agreed at site for major T&Ps, have to be adhered to. Capacity/Numbers/time of requirement will be reviewed from time to time at site and contractor will provide required T&Ps/equipment to ensure completion of entire work within schedule/target date of completion without any additional financial implication to BHEL. Contractor will give advance intimation &	

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	certification regarding capacity etc. prior to dispatch of heavy equipment. Also, on completion of the respective activity, demobilization of T&Ps in total or in part can be done with the due approval of Engineer-In-Charge. Retaining of the T&Ps during the contract period will be mutually agreed in line with construction requirement.
1.5.	The contractor shall arrange crane operator, diesel, petrol and other consumables including electrical / water / air connections required for the tools and plants, equipment etc. Preventive and routine maintenance of T & P are also to be arranged by the contractor at his cost without any delay. Required number of experienced mechanics and helpers for routine maintenance of the above T&Ps shall be provided by the contractor within his quoted rate.
1.6.	BHEL shall not provide any T&Ps for this scope of work. All T&Ps required for handling of items / materials to be arranged by bidder.
1.7.	BHEL will not provide any tool, plants, facilities or any testing facility/apparatus for the work. It will be contractor's responsibility to arrange all required tools, plants and other testing apparatus, etc. at their own cost. The prices quoted & finalized are inclusive of the charges towards providing such T&P. No extra payment will be entertained because of this.
1.8.	However, subject to availability, BHEL may provide few T&P to the contractor for expediting and in larger interest of the project. In case any such facility is provided to the contractor, BHEL will make necessary recovery in the running account/final bills towards the hire charges. Additionally, departmental charge @ 5% will also be levied such cases. The decision of BHEL on the hire charges will be final and binding on contractor.

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Chapter V- Time Schedule

5.1 TIME SCHEDULE

5.1.1

The entire work detailed elsewhere in the Tender Specification shall be completed within **18 Months** from the date of commencement of work at site.

5.1.2

During the total period of contract, the contractor has to carry out the activities in a phased manner and strictly follow L2/L3 Schedule approved by BHEL and the program of milestone events.

A tentative schedule for completion of various works are as under, which shall be followed in general, but subject to change based on site and other related conditions:

Sl. No.	Milestone	Timeline (In Months)
1	Date of commencement of work at site.	D
2	Degutting of existing infrastructure for the site preparation.	D+2
3	Preparation of the SRGM Pit	D+6
4	Construction of the rooms/Building adjacent to C-57 Shop.	D+10
5	Construction of upgraded SRGM facility in C-57 shop.	D+12
6	Preparation of the converter rooms, lubricants store, Nitrogen charging facility, CCTV Rooms, Supervisors room, Worker Change room, Worker washroom on ground floor in outside area.	D+13
7	Completion of the training Rooms, Conference Room, Ladies & office washroom etc in rooms and building	D+14
8	Completion of all plumbing work, sanitation work, Electrical work, Fire protection, and all other balance work etc.	D+15
9	Finishing, Punch point closure, Commissioning & handling over to customer/BHEL.	D+18

In order to meet above schedule in general, and any other intermediate targets set, to meet project, contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL.

5.1.3

The work shall be commenced on the mutually agreed date between the bidder and BHEL engineer. The decision of BHEL in this regard shall be final and binding on the contractor. The scope of work under this contract is deemed to be completed only when so certified by the site Engineer.

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5.2 COMMENCEMENT OF CONTRACT PERIOD

The date of commencement of contract period shall be the mutually agreed date between the bidder and BHEL engineer to start the work. In case of discrepancy, the decision of BHEL engineer will be final.

5.3 MOBILISATION

5.3.1

The activities for “Civil Works” shall be started as per directions of Construction manager of BHEL.

5.3.2

The contractor should mobilize manpower in order to complete the work in as per schedule 18 **Months**.

5.3.3

Requisite Material, men and machinery should be arranged in order to complete the project within stipulated time.

5.4 CONTRACT PERIOD

For the purpose of contract, the period shall be taken as **18 Months**. Completion of the work shall be as per BHEL Bar Charts/Schedule revised from time to time. In order to expedite the work, the contractor has to deploy manpower as per site requirement without any extra cost to BHEL.

5.5 GUARANTEE PERIOD

The guarantee period of twelve months shall commence from the date of completion of all works as certified by the BHEL site engineer.

5.6 PROTECTION OF WORK

The contractor shall have total responsibility for protecting his works until it is taken over by the Customer Naval Dockyard Mumbai. No claim will be entertained by the /BHEL/ Naval Dockyard Mumbai or the representative of the Employer for any damage or loss to the Contractor’s works and the Contractor shall be responsible for complete restoration of the damaged works to original conditions to comply with the specification and drawings. Should any such damage to the Contractor’s Works occur because of other party not being under his supervision or control, the Contractor shall make his claim directly with the party concerned.

In the event that any disagreement, conflict, or dispute arises between the Contractor and any other party regarding responsibility for damage to the Contractor’s Works, such damaged Works shall be promptly rectified. The existence of such dispute shall not relieve the Contractor of its obligation to carry out repairs.

The Contractor shall not delay the repair or restoration of the damaged Works pending resolution of the dispute and shall proceed with such repairs immediately. No claim, reservation of rights, or cause shall be assigned as a basis for delaying the repair works during the pendency of the dispute.

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Chapter VI- Statutory Regulation

6.1 GST: For All types of works excepting works covered under Sl. no 6.2

6.2 BUILDING & OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICE) ACT, 1996 (BOCW Act) AND RULES OF 1998 READ WITH BUILDING & OTHER CONSTRUCTION WORKERS CESS Act, 1996 & CESS RULES, 1998 and INTER-STATE MIGRANT WORKMEN ACT, 1979 (IN CASE BIDDER ENGAGE MANPOWER FROM OTHER STATE)

In case any portion of work involves execution through building or construction workers and/or inter-state migrant workers, then compliance to the above titled Acts as applicable shall be ensured by the contractor and contractor shall obtain license and deposit the cess under the Act. In the circumstances, it may be ensured as under:-

It shall be the sole responsibility of the contractor in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a license to the Competent Authority under the BOCW Act and/or ISMW Act as applicable and obtain proper certificate thereof by specifying the scope of its work. It shall also be responsibility of the contractor to furnish a copy of such certificate of license / permission to BHEL within a period of one month from the date of award of contract.

It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these acts and rules including that of payment / deposit of cess as per the applicability under above referred Acts within a period of one month from the receipt of payment.

It shall be the responsibility of the sub-contractor to furnish the receipts / challans towards deposit of the cess together with the number, name and other details of beneficiaries (building/Inter-state Migrant workmen) engaged by the sub-contractor during the preceding month.

It shall be the absolute responsibility of the sub-contractor to make payment of all statutory payments & compensations to its workers including that is provided under the Workmen's Compensation Act, 1923.

Chapter VI- Field quality control plan

1. Work shall be executed as per approved field quality plan (FQP)/Inspection Plan (ITP). Contractor shall prepare, submit the field quality plan in line with requirement of the BHEL/customer Naval Dockyard Mumbai. Submitted FQP shall be reviewed and approved by BHEL/ND Mumbai.

Chapter VIII: HSE (Health, Safety and Environmental Management at construction sites

1. Contractor shall follow all the HSE guidelines as mentioned BHEL/ND Mumbai Safety Management Tender Documents and also refer entire specification for any other HSE requirement as applicable.
2. Contractor shall deploy sufficient number of qualified and experienced safety officer for the entire period of contract and as per customer HSE requirement.
3. Contractor shall submit the biodata of safety officer to BHEL/Customer for approval.
4. In case of any dispute/ contradiction, Customer ND Mumbai HSE rules and guidelines shall prevail.

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Chapter- IX Other instruction to Scope of work

1.0 Not Used

2.0 Not Used

3.0 THE WORK WILL INVOLVE:

All civil, structural and architectural works connected with the above-mentioned structures such as earth work, concrete work, brick work, steel work, embedment, plastering and painting, wooden and metal doors, windows and partitions, waterproofing, flooring, plumbing, road work, drainage, grouting etc.

4.0 EXCLUSION: NIL

5.0 CIVIL WORKS: The scope covers all Civil works within the battery limits. The important works covered are as below.

- a) Excavation of earth and backfilling including dewatering of excavations for foundations, trenches, tunnels pits, etc. till the construction of the same is completed and disposal of surplus.
- b) Construction of RCC pile caps with pedestals, foundation footing for lightly loaded structures, trenches, tunnels, sumps, grade beams, tie beams at foundation level, grade slabs, floor slabs and roof slabs, equipment foundations etc.
- c) Complete civil and architectural works such as brick work, plastering, painting, all types of floor/roof finishes, all types joinery etc.
- d) Preparation and submission of detailed calculations, arrangement drawings and detail drawings of formwork, staging and scaffolding for all reinforced
- e) Concrete structures and foundations as directed by the Engineer for his checking and approval.
- f) Preparation of detailed working drawings and bar bending schedules for all reinforced concrete work and getting them approved by the BHEL Engineer.
- g) Supply, fabrication and fixing structural steelwork for cable trench covers, plates etc.
- h) Fabrication supply and fixing of anchor bolts, sleeves, fixing frames, embedment etc. in concrete.
- i) Supply of all instruments and personnel for conducting necessary tests at site as specified/as directed by the Engineer.
- j) Making appropriate fabrication drawing as per agreed schedule before starting fabrication work for any structural GA drawing.
- k) Supply, fabrication and erection of structural steel work including all interfacing works and miscellaneous works. The nature of work shall include columns, beams, splicing of steel works as needed, bracings, sheeting runners, sag rods, ties struts, walkways, galleries, stairs, ladders, hand railing, floor gratings, chequered plate work, M.S pipes, equipment supporting platform, and all other structures required for the successful completion of the project.
- l) Degutting of existing structures, replacement of roof sheet & side sheeting, windows, ventilators, rolling shutters, roof extractors.

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3.0) STRUCTURAL WORKS: The work involve:

- a) Supply, fabrication and erection of structural steel work including all interfacing work and miscellaneous work. The nature of work shall include columns, beams, splicing of steel works as needed, bracings, purling, sheeting runners, sag rods, ties, struts walkways, galleries, stairs, ladders, handrails, floor gratings, chequered plate work , M.S, pipes, equipment supporting platforms and all other structures required for successful completion of project.
- b) Supply of M.S/S.S pipes, fabrication and erection of handrail as per drawing and specifications.
- c) Supply and fixing of floor gratings as per Specifications.
- d) Supply of high tensile bolts, mild steel bolts, nuts, plain/taper and spring washers, all electrodes required for shop and field work.
- e) Shop and final painting as per Technical Specification after properly cleaning the steel surfaces.
- f) Grouting under stanchion bases.

4.0) GENERAL

- a) The drawings enclosed with this tender are intended to give the tenderer a general idea of the type and extent of work involved. The drawings are as such only indicative and not to be considered as the exact construction drawings.
Further the drawings and the documents furnished along with this specification are the sole property of B.H.E.L. It must not be used directly or indirectly in any way detrimental to the interest of the company.
- b) The scope of work will also include such other related works although they may not be specifically mentioned in the above paragraph and all such incidental items not specified but reasonably imply and necessary for completion of the job as a whole all as desired and as directed by the engineer.
- c) The detail scope of work covered above is not a comprehensive list of items of work involved. The detail scope of work may vary considerably depending on the actual construction requirements.

5.0) ALSO INCLUDED IN THE SCOPE:

Unless otherwise specified, the work to be provided by the contractor for the items mentioned in the “Schedule of items”, shall include but not be limited to the following.

- a) Furnishing all labour, materials, supervision, construction plans, equipment, supplies, transport, to and from the site, fuel, electricity, compressed air, water, transit and storage insurance and all other incidental items and temporary works not shown on specified but reasonably implied or necessary for the proper completion, maintenance and handling over the works, except in accordance with the stipulations laid down in the contract documents and additional stipulations as may be provide by the engineer during the course of works.

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- b) Furnishing samples of all materials required by the engineers for testing/inspection and approval for use in the works. The samples may be retained by the engineer for final incorporation in the works.
- c) Furnishing test reports for the products used or intended to be used, if called for the specifications or if so desired by the engineer.
- d) Giving all notices, paying all fees, taxes etc., in accordance with the general conditions of contract, that are required for all works including temporary works.
- e) Arranging manufacturer's supervision for items of work done as per manufacturer's specifications when so specified.
- f) Carrying out topographic survey of the entire and establish levels and coordinates at suitable intervals from existing grid levels and coordinates furnished by the owner established bench marks, setting out the locations and levels of proposed structures,

constructions and marking of reference pillars and other identification works etc., The contractor shall provide the owner/BHEL such an assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing any work and the quality, weight or quantity of any material used.

- g) Providing all incidental items not shown or specified but reasonably implied or necessary for the successful completion of the work in accordance with contract.

6.0) **WORK BY OTHERS:** No work under the specification will be provided by any agency other than the contractor unless specifically mentioned elsewhere in the contract.

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Chapter- X: TECHNICAL SPECIFICATIONS & DRAWINGS FOR INFORMATION.

<u>SECTION</u>	<u>DESCRIPTION</u>
SECTION – A	LIST OF TECHNICAL SPECIFICATIONS
SECTION – B	LIST OF TENDER DRAWINGS

NOTE: Contractor has to make himself well conversant with the Customer specification and amendments. In case of ambiguity between BHEL and customer specification, customer specification shall prevail.

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SECTION-A

LIST OF TECHNICAL SPECIFICATIONS.

SL N O.	DESCRIPTION	SPECIFICATION NUMBER	RE V	PA GE S
1	GENERAL SCOPE.	PEDC/STD.SPEC/001	0	4
2	PROPERTIES. STORAGE&HANDLING OF COMMON BUILDING MATERIALS.	PEDC/STD.SPEC/002	0	5
3	EARTHWORK INEXCAVATION & BACKFILLING.	PEDC/STD.SPEC/003	1	23
4	CEMENT CONCRETE-PLAIN& REINFORCED.	PEDC/STD.SPEC/004	1	56
5	FABRICATION & STRUCTURAL STEEL WORK.	PEDC/STD.SPEC/005	1	25
6	ERECTION OF STRUCTURAL STEEL WORK.	PEDC/STD.SPEC/006	0	15
7	MISCELLANEOUS STEEL WORK.	PEDC/STD.SPEC/007	0	5
8	MISCELLANEOUS METAL.	PEDC/STD.SPEC/008	0	6
9	PAINTING ON STRUCTURAL STEEL.	PEDC/STD.SPEC/009	0	5
10	INSERTS / EMBEDMENTS IN CONCRETE WORK.	PEDC/STD.SPEC/010	0	3
11	GROUTING.	PEDC/STD.SPEC/011	0	4
12	MASONRY & ALLIED WORKS.	PEDC/STD.SPEC/012	0	8
13	FINISH TO MASONRY &CONCRETE.	PEDC/STD.SPEC/013	0	7
14	PAINTING, WHITEWASHING,POLISHING etc.	PEDC/STD.SPEC/014	0	11
15	FLOOR FINISHES & ALLIED WORKS.	PEDC/STD.SPEC/015	0	26
16	GLASS & GLAZING.	PEDC/STD.SPEC/016	0	3
17	METAL DOORS,WINDOWS, VENTILATORS, LOUVERS etc.	PEDC/STD.SPEC/017	0	10
18	ROLLING STEEL SHUTTERS & GRILLS.	PEDC/STD.SPEC/018	0	4
19	ROOF WATER PROOFING, INSULATION & ALLIED WORKS.	PEDC/STD.SPEC/019	0	9
20	FALSE CEILING.	PEDC/STD.SPEC/020	0	5
21	CARPENTARY & JOINERY.	PEDC/STD.SPEC/021	0	6
22	WATER SUPPLY WORKS.	PEDC/STD.SPEC/022	0	11

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23	DRAINAGE & SANITATION.	PEDC/STD.SPEC/023	0	17
24	SUPPLY & LAYING RCC PIPES.	PEDC/STD.SPEC/024	0	4
25	PREMOULDED BITUMINOUS JOINT FILLER & SEALING COMPOUND.	PEDC/STD.SPEC/025	0	2
26	DEMOLITION & DISMANTLING.	PEDC/STD.SPEC/026	0	5
27	TYPE & MAKE OF MATERIALS TO BE USED.	PEDC/STD.SPEC/027	0	2
28	FALSE FLOORING.	PEDC/STD.SPEC/028	0	4
29	50mm THK PREMIX BITUMINOUS CARPET (HOT PROCESS) OVER WBM ROAD SURFACE.	PEDC/STD.SPEC/029	0	4
30	WATER BOUND MACADAM.	PEDC/STD.SPEC/030	0	7
31	RUBBLE MASONARY.	PEDC/STD.SPEC/031	0	4
32	CHAIN LINK FENCING.	PEDC/STD.SPEC/032	0	3
33	SHEETING WORK IN ROOF F / SIDING.	PEDC/STD.SPEC/033	0	4
34	TANK PADS.	PEDC/STD.SPEC/034	0	5
35	CONCRETE PAVEMENTS.	PEDC/STD.SPEC/035	0	11
36	ANTI TERMITE TREATMENT.	PEDC/STD.SPEC/036	0	4
37	FIRE PROOFING OF STEEL STRUCTURES WITH RCC.	PEDC/STD.SPEC/037	0	4
38	COATING & WRAPING OF UNDER GROUND PIPES.	PEDC/STD.SPEC/038	0	15
39	UNDERGROUND EARTHING SYSTEM.	PEDC/STD.SPEC/039	0	7
40	PILING.	PEDC/STD.SPEC/040-a	0	
	(b) PART II – GENERAL SPECIFICATIONS.	PEDC/STD.SPEC/0040-b	0	4
	€ PART III – SPECIFIC REQUIREMENTS.	PEDC/STD.SPEC/0040-c	1	8
	(d) PILING PART-IV – MATERIAL FOR REINFORCED CONCRETE PILES	PEDC/STD.SPEC/0040-d	0	8
	€ PILING PART-V -TESTING OF CONCRETE PILES	PEDC/STD.SPEC/0040-e	0	11
	(f) PILING PART-VI -CONSTRUCTION AND INSTALLATION OF RCC BORED CAST IN-SITU PILES	PEDC/STD.SPEC/0040-f	0	8
41	GRADING AND FILLING	PEDC/STD.SPEC/0042	0	

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SECTION-B

LIST OF DRAWINGS

S.NO.	TITLE	Description	Remarks
1	LAYOUT PLAN (TENDER PURPOSE ONLY)	PY-LE-1-M278-1269-01	

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Chapter- XI: PREAMBLE FOR THE SCHEDULE OF QUANTITIES.

- 1) Details of the items in this Schedule shall be read in conjunction with the corresponding customer specifications, drawings and other documents and shall have precedence over any contrary statement mentioned anywhere in this document.
- 2) The work shall be carried out as per construction drawings, specifications, the description of the items in this schedule and/or Engineer's instructions., Drawings enclosed with these documents are only indicative giving some idea of the type of work involved. The layout, sizes and details of the building, structures and foundations shown in tender drawings may vary at a large extent during actual construction. Final drawings will be issued progressively during the execution of the work.
- 3) Items of work provided in this schedule but not covered in the specifications shall be executed strictly as per instructions of the Engineer.
- 4) Unless specifically mentioned otherwise in the contract, the bidder shall quote his rates for the finished items and shall provide for the complete cost towards fuel, tools, tackle, equipment, constructional plant, temporary works, labour materials, levies, taxes, transport, layout, repairs, rectification, maintenance till handing over, supervision, shops, establishments, services, temporary roads, revenue expenses, contingencies, overheads, profits and all incidental items not specifically mentioned but reasonably implied and necessary to complete the works according to the contract.
- 5) The rate quoted shall be inclusive of cleaning the site of any vegetations, dressing and leveling etc., required for commencement of site activities. No separate payment will be made towards the same.
- 6) The rate shall also be inclusive of carrying out topography survey of site to establish levels and coordinates at suitable intervals, from existing grid levels and coordinates furnished by the owner, establish bench marks, setting out the location and levels of the proposed structures, constructions and making references, pillars and other identification marks etc. No separate payment will be made towards the same.
- 7) Rates shall be quoted both in figures and in words in clear legible writing. No over writing is allowed. All scoring and cancellation should be counter signed by the bidder. In case of illegibility, the interpretation of the engineer shall be final. All entries shall be in English language.
- 8) Engineers decision shall be final and binding on the contractors regarding clarification of items in this schedule with respect to the other section of the contract.
- 9) Incase of any discrepancy between item descriptions, relevant drawing and/ or specification clarification shall be sought at tender stage itself. Otherwise it shall be assumed that the bidder has quoted for the more stringent requirement.

HIERARCHY

In case of any conflict/deviations amongst various documents, the order of precedence shall be as follows

- Statutory Regulations
- Customer ND- Mumbai specification
- Items in Schedule of quantities
- IS/BS standards
- BHEL's standard specification (with prior approval of Engineer-in-charge).

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Chapter-XII: Construction/modification/ Dismantling/Degutting of facilities.

1. The Construction, Modification, Dismantling, Degutting of existing C-57 & C-88 structure or other degutting work shall be done as per instruction of the BHEL engineer in charge/customer.
2. Dismantling Civil work include the Demolishing brick work in cement mortar manually/ by mechanical means including stacking of serviceable material and disposal of unserviceable material.
3. Demolishing cement concrete manually/ by mechanical means including disposal of material.
4. Demolishing R.C.C. work by mechanical means and stockpiling at designated locations and disposal of dismantled materials.
5. Dismantling cement asbestos or other hard board ceiling or partition walls.
6. Dismantling roofing including ridges, hips, valleys and gutters etc.
7. Dismantling steel work in built up sections in angles, tees, flats and channels including all gusset plates, bolts, nuts, cutting rivets, welding etc. including dismembering.
8. Dismantling aluminum/ Gypsum partitions, doors, windows, fixed glazing and false ceiling.
9. Dismantling tile work in floors and roofs laid in cement mortar.
10. Carriage of materials by Mechanical Transport including loading, unloading and stacking Lime, murom, building rubbish etc.
11. Dismantling of the electrical and C&I items and any other non-civil items.
12. Re-establishment of Existing Facilities (E.g Carpentry section, Workers changing room) etc.
13. Barricading Works: Providing and erecting temporary barricading of suitable height and length, comprising suitably designed structural steel/MS tubular framework with vertical posts, horizontal members, bracing and necessary base/anchoring arrangements, covered with approved green shade cloth/fabric/polycarbonate sheet securely fixed to the framework, including cutting, welding, fabrication, erection, fixing, painting/anti-corrosive treatment of MS members, necessary scaffolding/access arrangements, labour, tools and tackles, shifting/adjustment wherever required and all incidental works, complete as directed by the Engineer-in-Charge.

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Chapter-XIII: Furniture Supply and Installation.

13.0 FURNITURE: Supply, delivery and installation of Modular office furniture inclusive of main desk table and joining table, conference hall table & chair, modular office type cubicle for provisions of PCs, dining table, racks, sofa sets, center table & chairs of approved make required as per schematic drawings/ specifications and as directed by Engineer-In-charge etc. all complete.

ST. NO	Item Description	Unit	Quantity	REMARKS
FM	FURNITURE: Supply, delivery and installation of Modular office furniture inclusive of main desk table and joining table, conference hall table & chair, modular office type cubicle for provisions of PCs, dining table, racks, sofa sets, centre table & chairs of approved make required as per schematic drawings/ specifications and as directed by Engineer-In-charge etc. all complete. Note- The furniture shall be Godrej or equivalent make with the approval of BHEL engineer in charge/customer.			
FM-1	14-Seater Modular Conference Table with provision for LAN cables, power sockets etc.	Each	1	For conference room
FM-2	High Back Conference Chair with cushion seat (Revolving & Hight adjustable Type)	Each	14	For conference room
FM-3	High Back Conference Chair with cushion seat (Revolving & Hight adjustable Type)	Each	8	for work stations
FM-4	High Back Cushioned Chair (Revolving & Hight adjustable Type)	Each	4	for offices
FM-5	Low Back Cushioned Chair (Non-Revolving Type)	Each	8	for offices
FM-6	Low Back Cushioned Chair (Non-Revolving Type)	Each	20	for training room
FM-7	Modular workstation 1.5mx 1.5m for provision of PCs	Each	8	for work stations
FM-8	Executive table of size 72inchx36inchx30 inch or higher with 3 drawers one side, lockers cabinet on other side.	Each	4	for offices
FM-9	Supply and fixing of sofa set (3+2+2) along with center table	Each	1	
F-10	Supply and fixing of 4-seater dining table			
i	Stainless Steel Dining Table - 4-Seater Capacity	Each	8	For dining area
ii	Stainless Steel Dining Chair	Each	32	For dining area

Note- The furniture shall be of Godrej or equivalent make with the approval of BHEL engineer in charge/customer. Contractor has to take approval from the BHEL site in charge/customer before supply and installation.

Chapter-XIV: Electrical & Other works

14.01 General Notes for Erection and Commissioning Works:

- 1) The Electrical E&C BOQ consist of the following:
 - a) Cables, Cables Trays and their accessories.
 - b) Cable Lugs, Glands and termination items.
 - c) Illumination Package items (i.e. Lighting fixtures/ Lamps, Panels, JBs, Flexible wires, Poles and related accessories)
 - d) Earthing Material
 - e) Structural Steels
 - f) Other loose items
- 2) Erection Agency (Contractor) shall provide all the required services for installation, erection and commissioning of all the Equipment/ Packages / Systems in BOP Area for successful/satisfactory operation of the Plant including Receipt, Unloading, loading, Storage & Handling of material, Erection & Installation, Commissioning, Calibration & Testing, and Final Painting etc.
- 3) Erection Agency (contractor) shall arrange all the tools and facilities required for calibration, erection and testing required for Erection & Commissioning activities.
- 4) Obtaining statutory approvals from TAC, Electrical Inspector or any other Governing Agencies shall be in Erection agency's scope.
- 5) All the lubricants and consumables required for Commissioning, testing for the operation period specified in customer's specification / Contract shall be in Erection agency's scope.
- 6) Marked-up "AS Built" documents/drawings have to be prepared and provided by Erection Agency to BHEL unit HPEP-DC&N after E&C to enable submission of contractual 'As-Built' documentation.
- 7) Erection Agency shall ensure that Storage and Handling of the BOP equipment/Packages is carried out as per the recommendations of OEMs.
- 8) The Erection/Commissioning work shall be carried out in accordance with the specifications/drawings furnished during detailed engineering.
- 9) Some of the items/parts of the BOP equipment/packages will be supplied loose to site as per OEM's standard practices. These loose items have to be assembled at site by Erection Agency as per the guidelines provided.
- 10) All the necessary procedures and protocols shall be followed by Erection Agency during Erection & Commissioning, Testing, Handing Over, etc. of BOP-equipment as per the procedures finalized with Customer/Consultant.
- 11) The Erection Agency shall be responsible for handling the Essential Spares pertaining to BOP Area including Receipt, Handling & Storage, Handing-Over the items to Customer and obtaining the necessary receipts/acknowledgements from customer for formal records.
- 12) Only general erection guidelines have been indicated in this document. The Erection & Procedures and requirements specified in the Customer's Technical Specifications/Contract Documents shall be followed by the Erection Agency while executing the project. The responsibility for adhering to Customer's Technical Specifications/Contractual requirements shall be with Erection Agency.

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- 13) Erection agency shall carry out the cabling works in line with customer/consultant's Technical specifications.
- 14) Erection agency shall carry out the Earthing and lightning protection works in line with customer/consultant's Technical specifications and approved "Notes & Details for Earthing & Lightning protection system" (Doc. No. PY-DN-4-M278-8906-01).
- 15) It is considered that all the E&C activities of the BOP Electrical items will be carried out directly by Erection Agency.
- 16) Erection agency shall carry out the plant illumination works in line with customer approved "Notes & Details for Illumination system" (Doc. No. PY-DN-4-M278-8901-01).
- 17) Erection agency shall carry out the plant cabling works in line with customer approved "Notes & Details for Cable Laying System" (Doc. No. PY-DN-4-M278-8908-01).

A. Items that are to be erected, tested and commissioned by Erection agency (These items will be supplied by HPEP-DC&N):

Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
1.0	LT SWITCHGEAR PACKAGE					
1.1	415V PMCC	Nos.	1	4300 x 1200 x 2450 mm	2400	In Electrical Switchgear area
1.2	415V Wall Mounted AC & Vent DB	Nos.	1	1600 x 400 x 1500 mm	120	
1.3	415V Wall Mounted Lighting DB	Nos.	1	1600 x 400 x 1500 mm	120	
1.4	240V UPS DB	Nos.	1	1000 x 300 x 1500 mm	60	In UPS Room
2.0	400kVA, 11/0.433kV DRY TYPE DISTRIBUTION TRANSFORMER	Nos.	1	2200X1650X2100 mm	2,100	In Electrical Switchgear area
3.0	400kVA, 415V Trolley mounted DG Sets including 5 Years AMC after warranty	Nos.	2	5800 X 2200 X 2300 mm	7000	Complete Testing & Commissioning of DG set is in supplier's scope, Necessary

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
						support shall be extended by the erection agency. Post Warranty 5 Years AMC is in DG supplier scope
4.0	10KVA, 240V UPS SYSTEM WITH VRLA BATTERY including 5 Years AMC after warranty	Nos.	1	1320 x 962 x 2070 mm	343	Post Warranty 5 Years AMC is in UPS supplier scope
5.0	LIGHTING TRANSFORMER	Nos.	1	1350 x 875 x 1200	490	In Electrical Switchgear area
6.0	PLANT ILLUMINATION PACKAGE					
6.1	Industrial LED Batten Type fixture with 40W LED tube	Nos.	100	NA	2.5	
6.2	600x 600mm Recess mounted decorative LED fixture (33-36W Approx, 230V AC) with high efficiency low glare optics	Nos	85	NA	2.5	
6.3	LED Flood lighting Fixture (100 watt approx.)	Nos	25	NA	6	

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
6.4	Industrial LED high bay Fixture (120 watt approx.)	Nos	92	NA	5	
6.5	3000mm long 25mm GI conduit	Nos	900	NA	3.5	
6.6	GI Conduit accessories (Bend, coupler, Conduit JB, saddle etc.)	Lot	1	NA	200	
6.7	GI Flexible conduit (25mm dia)	Mtrs	250	NA	0.7	
6.8	GI Flexible conduit (20mm dia)	Mtrs	250	NA	0.7	
6.9	3000mm long 25mm PVC conduit	Mtrs	1300	NA	2	
6.10	2Meter length Surface-Mounted Architectural PVC Mini-Trunking	Nos	500	NA	2	
6.11	Combined Voice and Data Outlets (2 RJ45 + RJ11)	Nos	30	NA	0.3	
6.12	PVC conduit bend	Nos	500	NA	0.1	
6.13	PVC conduit coupler	Nos	1400	NA	0.025	
6.14	PVC Conduit branching JB (Deep drawn type for concealed wiring at ceiling)	Nos	500	NA	0.15	
6.15	PVC Conduit branching JB	Nos	300	NA	0.15	

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
6.16	Fan box (deep drawn type for concealed wiring at ceiling)	Nos	40	NA	0.15	
6.17	PVC Ceiling Rose	Nos.	300	NA	0.2	
6.18	3000mm long 20mm GI conduit.	Nos	15	NA	2.5	
6.19	Check nuts for 20mm conduit	Nos	155	NA	.01	
6.20	Check nuts for 25mm conduit	Nos	220	NA	.01	
6.21	Spring loaded ball socket suitable for conduit branching round JB	Nos	80	NA	0.2	
6.22	Galvanised/Chromium plated steel chain for fixture hanging	Mtrs	100	NA	0.25	
6.23	GI Clamp for wall mounting Batten (Bent at 120deg)	Nos	125	NA	.3	
6.24	GI Clamp for LED Batten (For Surface wall mounting)	Nos	130	NA	.3	
6.25	Rubber grommet 20mm	Nos	85	NA	.005	

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
6.26	S Hook for High bay fixture	Nos	115	NA	.075	
6.27	S Hook for Recessed mounted fixture	Nos	325	NA	.05	
6.28	Rawl plug 1.5" with screw	Nos	8000	NA	.005	
6.29	Galvanised anchoring Fastener 6mm dia x 35mm long (Bolt type)	Nos	665	NA	0.05	
6.30	Galvanised anchoring Fastener 6mm dia x 35/70mm long (Hook/Half ring type)	Nos	325	NA	0.05	
6.31	Galvanised anchoring Fastener 10mm dia x 68mm long (Bolt type)	Nos	150	NA	0.075	
6.32	Galvanised U type fan bolt (For Fan & High/Midbay Fixture)	Nos	5	NA	0.075	
6.33	Cable clamps suitable for 3Cx2.5sqmm Cu. Armoured Cable	Nos	750	NA	0.05	
6.34	Cable clamps suitable for 3Cx4sqmm Cu. Armoured Cable	Nos	865	NA	0.06	
6.35	Cable clamps suitable for 4Cx35sqmm Cu. Armoured Cable	Nos	300	NA	0.05	
6.36	4-Way Rectangular Lighting Junction Box	Nos	20	NA	2	

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
6.37	Modular type Surface mounted switchboard with 6A piano type switches	Nos	50	NA	0.3	
6.38	Modular type Surface mounted switch-socket outlet (6/16A, 230V)	Nos	10	NA	0.25	
6.39	Flush mounted switchboard with 3 nos 5A piano type switches (modular type).	Nos	25	NA	0.5	
6.40	Flush mounted switchboard with 3 nos 5A piano type switches and One No. Fan Regulator (modular type).	Nos	20	NA	0.5	
6.41	Flush mounted switchboard with 2 nos 5A piano type switches (modular type).	Nos	40	NA	0.4	
6.42	Flush mounted switchboard with 1 nos 20A piano type switch (modular type).	Nos	40	NA	0.3	
6.43	Flush mounted decorative type switch socket outlet with one no 20A, 230V socket (6 pin / 5 pin)	Nos	40	NA	0.25	
6.44	Flush mounted decorative type switch socket outlet with one no 16A, 230V socket (6 pin / 5 pin) and one	Nos	35	NA	0.5	

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks	
	no. 16A piano type switch.						
6.45	Flush mounted decorative type switch socket outlet with TWO no 16A, 230V socket (6 pin / 5 pin) and TWO no. 16A piano type switch	Nos	60	NA	0.5		
6.46	6-Way AC Indoor type MCBDB	Nos.	5	800x200x800 mm	30		
6.47	9-Way AC Indoor type MCBDB	Nos.	1	800x200x800 mm	30		
6.48	12-Way AC Indoor type MCBDB	Nos.	1	800x200x800 mm	30		
6.49	18-Way AC Indoor type MCBDB	Nos.	3	1000x200x800 mm	60		
6.50	6-way AC outdoor type Lighting Panel	Nos	3	800x200x900 mm	65		
6.51	12-way AC outdoor type Lighting Panel	Nos	1	1200x200x900 mm	75		70
6.52	1Cx1.5sqmm Cu. FRLS PVC Flexible wire (Red, Yellow, Blue , black and Green)	Mtrs	10000	NA	0.025		65
6.53	1Cx2.5sqmm Cu. FRLS PVC Flexible wire (Red, Yellow, Blue , black and Green)	Mtrs	6510	NA	0.03		
6.54	1Cx4sqmm Cu. FRLS PVC Flexible wire (Red, Yellow, Blue , black and Green)	Mtrs	7000	NA	0.05		

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
6.55	Ceiling Fans	Nos	15	NA	5	
6.56	Industrial Wall mounted fan	Nos	25	NA	12	
6.57	Indoor type Industrial metal clad type 1-Ph, 20A Socket with Plug	Nos	21	NA	2	
6.58	Outdoor type Industrial metal clad type 1-Ph, 20A Socket with Plug	Nos	2	NA	2.5	
6.59	Indoor Type Industrial metal clad type 3Ph, 63A (5pin) receptacle with interlocked rotary switch & Plug	Nos	10	NA	2.5	
6.60	Outdoor type Industrial metal clad type 3Ph, 63A (5pin) receptacle with interlocked rotary switch & Plug	Nos	2	NA	2.5	
6.61	Other Installation accessories (Cable clamp, anchoring fastener, Rawl plug, Ball socket, Check nuts, S hook etc.)	Lot	1	NA	500	
	NOTES: 1) Fixtures and other lighting equipment will be supplied to site in loose parts as per standard packing and practices of OEM. Assembly and erection of the same shall be carried out by Erection Agency. 2) Erection of all illumination items (including cutting/ threading/ welding/ drilling holes/ bending etc. of conduit/ pipe/ ISMC/ ISA/ Metsec etc. and fabrication of mounting bracket of ISA/ ISMC etc.) shall be carried out at site by Erection Agency as per the installation requirements. 3) All the required erection consumables (like rawl plugs, screws, check nuts, nuts & bolts, locking wire, insulation tape, sealing compound/plugs, washers etc.) which are not covered in above list but required for successful completion of the work shall be in the scope of Erection Agency.					

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
	4) Before and after the installation work, each equipment shall be thoroughly cleaned and painted wherever required and same shall be considered in Erection Agency's scope. 5) Civil works (Chiseling of wall and plastering & re-painting of walls) for concealed conducting etc. shall be carried out by Erection Agency. 6) In C-57 & C-88 Shed, Existing light fittings (High Bays) to be replaced with new light fittings (High Bays). 7) Lighting system and associated Lighting equipment shall be provided for Indoor Lighting within C-57 Shed, C-88 Shed, Electrical Switchgear room, Rotary Converter Room, SRGM Test pit area, Electrical Room, Electronic Room, Hydraulic Room, Control Room, Store Room, Office rooms, Changing Rooms, Conference Rooms and other general-purpose rooms with in C-57 shed as per Contract Technical specification (Contract No. WM/9395/SRGM RF Dated.05/Jan/2026). 8) For installation of concealed conduit, PVC conduit shall be laid at roof during roofing. Pull box shall be provided near each light and fan box shall be provided near each fan point. Also Pull box shall be provided at regular interval for pulling of wires. Special care shall be taken for location of dropping of conduit for wall run. Location of light point, fans, power sockets, switchboards, MCBDB etc shall be finalized as per illumination layout before roofing is done. 9) Frames/enclosures of the power sockets, switchboards shall be installed and concealed conduit runs shall be made in walls, before plastering is done so as to avoid chiseling.					
7.0	LT POWER CABLE					Cable weight indicated in KG/KM
7.1	3CX2.5 Cu XLPE	Mtr	250	NA	410	
7.2	3CX4 Cu XLPE	Mtr	600	NA	530	
7.3	3CX70 Al XLPE	Mtr	100	NA	1290	
7.4	3CX185 Al XLPE	Mtr	100	NA	2808	
7.5	3.5CX300 Al XLPE	Mtr	300	NA	5940	
7.6	4CX25 Al XLPE	Mtr	1300	NA	940	
7.7	4CX35 Al XLPE	Mtr	650	NA	1050	
8.0	CONTROL CABLES					Cable weight indicated in kg/km

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
8.1	10Cx1.5 sqmm Cu XLPE PVC/FRLS	Mtr	350	NA	750	
9.0	CABLE GLANDS PACKAGE					
9.1	12-16.5	No.	20	NA		This quantity is additional to main quantity supplied along with Switchgear package, so that any mismatches at site shall be met by these supplies. Cable Glands and lugs will be supplied by respective main equipment supplier at Source and Load ends. Cable glands are Double compression Nickel plated Brass type.
9.2	16.5-18.5	No.	60	NA		
9.3	18.5-20	No.	20	NA		
9.4	23-26	No.	60	NA		
9.5	33.5-37	No.	10	NA		
9.6	46.5-52	No.	10	NA		
9.7	52-61	No.	6	NA		
10.0	CABLE LUGs PACKAGE (Tinned Copper)					
10.1	1.5 SQ.MM Tinned Cu Lug	No.	80	NA	15kg (Total)	
10.2	2.5 SQ.MM Tinned Cu Lug		34	NA		This quantity is additional to main quantity

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
		No.				supplied along with Switchgear package, so that any mismatches at site shall be met by these supplies.
10.3	4 SQ.MM Tinned Cu Lug	No.	150	NA		Cable Glands and lugs will be supplied by respective main equipment supplier at Source and Load ends.
10.4	25 SQ.MM Tinned Cu Lug	No.	150	NA		Lugs for power cables shall be of compression type whereas control/signal cables shall be of crimping type
10.5	35 SQ.MM Tinned Cu Lug	No.	80	NA		Individual termination up to wire level shall be considered.
10.6	70 SQ.MM Tinned Cu Lug	No.	10	NA		
10.7	185 SQ.MM Tinned Cu Lug	No.	10	NA		
10.8	300 SQ.MM Tinned Cu Lug	No.	40	NA		
	Note: 1. The glanding, termination and connection of cables shall be done strictly in accordance with the manufacturer’s instruction, drawings and/or directed by the Purchaser.					

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
	2. The work shall include all clamping, fitting, fixing, soldering, tapping, compound filling, cable jointing, crimping, shorting and grounding as required for the complete job. All equipment shall be of Contractor's procurement under this specification. 3. Control cable cores entering control panel/switchgear/MCC etc. shall be neatly bunched and served with PVC perforated tape to keep it in position at the terminal block. 4. The contractor shall put ferrules on all control cable cores in all junction boxes and at all terminations. The ferruling shall be Cross-Ferruling. The ferrules shall carry terminal numbers as per drawings. All ferrules shall be colored, plastic & interlocked type. 5. Spare cores shall also be similarly ferruled, crimped with lug and aped on the ends. Spare cores shall be ferruled with individual cable number. 6. Termination & Connection shall be carried out in such a manner as to avoid strain on the terminals. Cables shall be marked with cable numbers as per applicable drawing. 7. All cable entry points shall be properly sealed and made vermin and dustproof. Unused opening, if any, shall be effectively closed. Sealing work shall be carried out with approved sealing compound having fire withstand capability for at least 3 hours.					
11.0	PRE FABRICATED GI ANGULAR CABLE TRAYS AND ACCESSORIES (GI Cable trays and accessories):					
11.1	Ladder type cable tray, W=300mm.	Sets	160	2.5X0.3X0.1	35	Each cable tray length 2.5 Mtr including coupler plate and Nut & bolts.
11.2	Horizontal Bends of 600mm bending radius for ladder type cable tray, W=300mm	Sets	20	NA	25	
11.3	150mm (W) Perforated type cable tray.	Sets	340	2.5X0.15X0.075	20	Each cable tray length 2.5 Mtr including coupler plate and Nut & bolts

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
11.4	50mm(W) Perforated type cable tray	Sets	200	2.5X 0.05X0.02 5	20	Each cable tray length 2.5 Mtr including coupler plate and Nut & bolts
	Notes for cable trays:					
i	All the Pre-fabricated Ladder & Perforated type Cable Trays & accessories like Bends, etc are made out of GI Sheets.					
ii	Erection agency shall consider supply of Red Oxide Zinc Chromate Primer for site painting of all Structural Steels (required for cable Tray Supports) in the Erection contractor's scope.					
iii	Cable Trays shall be numbered as per layout drawing before laying of cables.					
iv	All cables shall be provided with minimum of 2mm thick aluminum sheets as cable identification tags indicating cable designation in accordance with the cable schedule. The cable tags shall be provided at the ends, every 30mtrs and when the cable changes its direction/elevation. The tags shall be of aluminum with the number punched on it and securely attached to the cable by not less than two turns of 16 SWG GI wire.					
v	The cable trays shall be supported in general at a span of 1.5 Mtrs. horizontally and at a distance of 1 Mtr. vertically.					
vi	For buried cable, the marker shall project at least 150mm above ground and shall be spaced at an interval of 30mtrs and at every change of direction.					
vii	All the cables shall be clamped to the cable trays/support structure with the help of clamps. All power cables shall be clamped individually and control cables shall be clamped in groups of 3 or 4 cables. Clamps for multicore cables shall be fabricated out of 25x3 mm aluminum flats. Single core power cables shall be laid in trefoil formation and suitably clamped with 25mm wide 8 SWG aluminum strips.					
viii	All Sharp edges and Burr shall be removed.					
ix	Cables to be strapped to tray at interval not greater than 300mm.					
x	Apart from supplied cable trays bends, Cable tray bends shall be fabricated at site from straight run cable trays as required to suit at site requirements.					

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
xi	Erection agency shall carry out the plant cabling works in line with customer approved "Notes & Details for Cable Laying System (Doc. No. PY-DN-4-M278-8908-01).					
xii	All the cable trays being supplied for the project are of length 2500 mm. Ladder type cable trays are 2 mm thick and perforated cable trays are 2mm thick.					
12.0	PLANT EARTHING PLANT LIGHTNING PROTECTION MATERIALS					
12.1	75x10mm GI Strip Below ground	Mtr	610	-	6 KG/ Mtr	For underground earth mat and risers
12.2	75x10mm GI Strip above ground earthing	Mtr	250	-	6 KG/ Mtr	For Above ground earthing of Switchgear rooms, Cable trench, DG set
12.3	50 x 6 mm GI Strip	Mtr	200	-	2.5 KG/ Mtr	For earthing of Control Room / Motor above 15kW upto 90kW/MLDB.
12.4	25 x 3mm GI Strips	Mtr	600	-	0.6 KG/ Mtr	Motors above 5.5KW upto 15KW & Welding Receptacles/ Lighting Distribution Boards, DBs
12.5	8 SWG SOLID G.I wire		500	-	1 KG/ Mtr	Motors up to 3.7KW / Lighting, Power &

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
		Mtr				Instrument Panels / small equipments and instrument/ Single Phase Receptacles, Power & Lighting Conduits/ Hand Rails/ Junction Boxes
12.6	65mm DIA x 3000mm long GI Pipe Electrode	Nos	12	-		Treated earth pits connected to Underground earth mat. Material (charcoal & salt etc.) required for treated earth shall be supplied by erection agency
12.7	Chemical Earth Pits with Electrode	Nos	8	-		Chemical Compound shall be supplied along with the Electrodes. Chemical Earth pits shall be constructed as per drawing and shall be filled with the

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Sl. No.	Equipment /Package Description	Unit	Qty	Dimension (each) LxBxH (M)	Weight (each) KG	Remarks
						Chemical compound.
13.0	MS STRUCTURAL STEEL					
13.1	ISMC 100 Channels	Lot	1		1000 kG	This is only for indicative purpose. Painting shall be by Site/Erection agency scope and same shall be carried out as per contract standards
13.2	ISA 50x50x6 mm Runner angles	Lot	1		4000 kG	
14.0	INSULATING MATS					
14.1	Insulating Mats (upto 1.1kV)	No.	4	1MX10M	15Kg	Suitable adhesives for fixing of insulating mats to be supplied by Site/Erection agency.

B. Items that are to be supplied, erected, tested and commissioned by Erection agency:

Erection and Commissioning Consumables: The consumables required for Electrical Equipment/ Items shall be included in Erection Agency's (Contractor) scope (The consumables shall be of Industrial Grade and suitable for use in power plants/refineries). The following are typical erection consumables/minor items that are envisaged in this project:

Sl. No.	Equipment/ Package Description	Unit of Qty	Qty.	Dimension (each) L x B x H (M)	Weight (each) kg	Remarks
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1.0	6 mm thick chequered plate for covering cutouts in Switchgear room	Sq. M	80	--	--	Refer Switchgear Room Layout. Support structure for complete
2.0	One meter long earthing discharge rods (1 no).	Nos	1			
3.0	Cable Tags Aluminum /Stainless Steel	Lot	1	2mm thick, 75mm long, 20mm width	--	At entry, exit and at every 30 M of cable run length
4.0	Cable Markers	Lot	1			
5.0	Clamps for multicore cables – Aluminum Flats	Lot	1	--	--	At every 3M of cable length
6.0	One set of Safety items like danger boards, Do not switch on, man on work, display charts, first aid boxes near LT switchgear panels etc	Lot	1	--	--	
7.0	Erection Hardware like Nuts, Bolts, Washers etc. (M8 Round Headed-500sets) (M10 Round Headed-500sets)	Lot	1	--	--	
8.0	3mm dia. Nylon Cord (Required for tying cables to trays, at every 5 mtrs.)	Lot	1	--	--	
9.0	GI Conduits of 100 mm diameter, medium duty, min 75 microns galvanizing thickness	m	150	--	--	As per Cable Tray/ Trench Layouts. Along with accessories like bends, couplers.
10.0	GI Conduits of 200 mm diameter, medium duty, min 75 microns galvanizing thickness	m	130	--	--	As per Cable Tray/ Trench Layouts.

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						Along with accessories like bends, couplers.
11.0	Anchor Fasteners M10, 90 MM Long	Nos.	20			
12.0	Anchor Fasteners M12, 120 MM Long	Nos.	20			
13.0	Anchor Fasteners M14, 120 MM Long	Nos.	20			
14.0	Other Miscellaneous items (accessories type) for completion of project	Lot	1	--	--	

Note-1: Actual quantities of the items above, that are to be supplied by Erection Agency, shall be as per BHEL instructions.

Notes-2: regarding Erection of Cables, Cable Trays and Accessories:

- a) The termination and connection of cables shall be carried out strictly in accordance with the manufacturer's instruction, drawings and / or directed by the Purchaser. The work shall include all clamping, fitting, fixing, soldering, tapping, compound filling, cable jointing, crimping, shorting and grounding as required for the complete job. Cables shall be checked for insulation resistance before and after jointing. All erection consumables shall be in Erection Agency's scope. Termination & Connection shall be carried out in such a manner as to avoid strain on the terminals. Cables shall be marked with cable numbers as per applicable drawing.
- b) Cable Glands and Lugs are being supplied along with corresponding equipment like Motors, LT Switchgear, Junction Boxes, Push Button Stations, and Transformers etc. However, one lot of Glands and Lugs are being supplied to take care of shortages/mismatches at site.
- c) Control cable cores entering panel/switchgear/MCC etc. shall be neatly bunched and served with PVC perforated tape to keep in position at the terminal block.
- d) Ferrules shall be installed on all control cable cores in all junction boxes and at all terminations. The ferruling shall be Cross-Ferruling. The ferrules shall carry terminal numbers as per drawings. All ferrules shall be colored, plastic & interlocked type. Spare cores shall also be similarly ferruled, crimped with lug and aped on the ends. Spare cores shall be ferruled with individual cable number.
- e) All cables shall be provided with minimum of 2mm thick aluminum sheets as cable identification tags indicating cable designation in accordance with the cable schedule. The cable tags shall be provided at the ends, every 30mtrs and when the cable changes its direction/elevation. The tags shall be of aluminum with the number punched on it and securely attached to the cable by not less than two turns of 16 SWG GI wire.

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- f) For buried cable, the marker shall project at least 150mm above ground and shall be spaced at an interval of 30mtrs and at every change of direction.
- g) The cable trays shall be supported in general at a span of 1.5 mtrs horizontally and at a distance of 1mtr vertically. Cable Tray on the top tier shall have cover whenever running below pipes. Cable Trays shall be numbered as per layout drawing before laying of cables.
- h) All the cables shall be clamped to the cable trays/support structure with the help of clamps. Cables to be strapped to tray at interval not greater than 300mm. All power cables shall be clamped individually and control cables shall be clamped in groups of 3 or 4 cables. Clamps for multicore cables shall be fabricated out of 25x3 mm aluminum flats. All Sharp edges and Blurr shall be removed. Erection Agency shall carry out the plant cabling works in line with customer/consultant's Technical specifications i.e. "Notes & Details for Plant cable Laying System".
- i) "Structural Steels for support" materials are supplied to make supports for cable trays in the buried RCC trenches, Overhead tray arrangement and other arrangements as applicable for the project. These are also required for making of frames for PB stations, junction boxes as per the project requirements. Erection Agency shall ensure that all steel structure used for electrical installation shall be painted with one coat of Red Oxide Zinc Chromate Primer of approved shade for indoor installations- Supply of Red Oxide Zinc Chromate Primer for site painting of all Structural Steels (required for cable Tray Supports) shall be in the Erection contractor's scope. Erection Agency shall ensure that after welding and drilling (if any) of the steels bracket, above mentioned paint of approved shade shall be applied. Site shall carry out the structural steel works in line with customer/consultant's technical specifications "Notes & Details for Plant cable Laying System".

14.02 CONSUMABLES: All electrodes required shall be arranged by the contractor at his cost. The Contractor shall use the BHEL / Customer approved quality electrodes only.

- i) As required for the project: The contractor shall provide within finally accepted price / rates, all consumables like welding electrodes , all gases , soldering material, dye penetrants, radiography films. Other erection consumables such as wrap cloth, tapes, jointing compound, grease, lubricants, M-seal, Araldite, petrol, CTC / other cleaning agents, grinding and cutting wheels are to be provided by the contractor. Steel, H&S, packers, shims, wooden planks, scaffolding and pre-assembly materials, hardware items etc. required for works such as supports, scaffoldings and bed are to be arranged by him. Sealing compounds, gaskets, gland packing, wooden sleepers, required for completion of work except those, which are specifically supplied by BHEL, are also to be arranged by him.
- ii) All consumables to be used for the job shall have to be approved by BHEL prior to use.
- iii) In the event of failure of contractor to bring necessary and sufficient consumables, BHEL shall arrange for the same at the risk and cost of the contractor. The entire cost towards this along with standard BHEL overhead shall be deducted from the contractor's immediate due bills.

14.03 GASES:

- i) All the required gases like Oxygen / Acetylene / Argon / Nitrogen required for work shall be supplied by the Contractor at his cost. It shall be the responsibility of the contractor to plan the activities and store sufficient quantity of these gases. Non-availability of gases shall not be considered as reason for not attaining the required progress.

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- ii) BHEL reserves the right to reject the use of any gas in case required purity is not maintained.
- iii) The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.
- iv) The contractor shall ensure safekeeping of the inflammable cylinder at a separate place away from normal habit with proper security etc.

14.04 Material Handling Services

1) Material Handling services: The scope of work in general are receipt of project material, unloading, storing, preservation, issuing of material with proper documentation at project site on as and when required basis along with the supply of all consumables (slippers, wooden planks, supports, Tarpaulins) tools & tackles (Hydra/Crane, Slings etc.) and all type of manpower (Hydra operator, supervisor, Store keeper, Rigger, helper etc) required for Material handling.

- a. It is not the intent to specify herein all details of material handling items. Any material handling work related to this project not covered, but necessary to complete the project will be deemed to have been included in the scope of the work.
- b. The contractor shall take full responsibility for satisfactory handling of Material & reconciliation under overall guidance of BHEL and shall locate any cause of malfunction and rectify the same for proper operation.
- c. The work shall be executed under the usual conditions without affecting project work and in conjunction with other operations and contracting agencies at site. The contractor and his personnel shall cooperate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.
- d. The contractor shall note that whenever required items/materials shall be unloaded at erection site / assembly yard by the prescribed route without disturbing and causing damage to other works in the most professional manner. All items, Hardware, etc., shall be stored in appropriate manner as per instructions of BHEL engineer.
- e. Contractor shall deploy adequate Manpower for Material Management to meet scope of works and Minimum manpower & T&P's shall be available at site on continuous basis to meet the daily site requirements.

2) Guidelines for handling and storage of electronic cubicles / subassemblies / loose items.

- a) Immediately after unloading at site, the electronic equipment should be kept in a covered area. Handling and lifting of package should be done without jerks or impacts. Packing case should not be dropped or slid along the floor under any circumstances. Suitable forklift should be used to move the case to its final position. All above points are to be strictly followed as electronic equipment may get damaged due to vibration and shock.
- b) After unloading at site, the package of the equipment shall be inspected for external damage. In case the package is damaged, package number and details of damage should be noted. The details of damage should be reported to concerned site engineer.
- c) Cases should be opened/unpacked using correct nail pullers. While opening the planks, care should be taken to see that equipment inside is not damaged. Cases should not be unpacked in

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areas where they are exposed to rain, water/liquid splashing, dust or other harmful materials like chlorine gas, sulphur dioxide etc.

- d) After opening the case, all supports provided for transport are to be removed with due care.
- e) Hinged frames should not be opened when equipment is not secured to floor as this is likely to cause it to topple over. The hinged frame can be opened only if the equipment is still fixed on to bottom wooden pallet.

3) Storage

- a) The equipment should be preferably in its original package and should not be unpacked until it is absolutely necessary for its installation or advised by BHEL engineer. The equipment should be best protected in its cases. It should be arranged away from walls.
- b) The wooden pallet provided for packing itself can be retained for raised platform to protect equipment from ground damp, sinking into ground and to circulate air under the stored equipment. This will also help in lifting packing with fork-lifter.
- c) Periodic inspection if silica gel placed inside the equipment is necessary. It has to be replaced or regenerated when de - colorization takes place.
- d) Due care should be taken to ensure that the equipment is not exposed to fumes, gases etc., which can affect electrical contacts of relays and terminal boards.
- e) The storage room and the equipment should be checked at regular interval to ensure protection from termites, mould growth, condensation of water etc., which can damage the equipment.
- f) All the equipments, materials and goods kept in the store room should be identified and registered in a book. Inspection report should be recorded. Any discrepancy observed should be communicated to site engineer.
- g) The packing material shall be retained if the cubicle is to be repacked after inspection.
- h) All subassemblies should be kept in a separate place where it is easily accessible.
- i) Subassemblies should have a protective cover in case it is stored without wooden packing/case to prevent accumulation of dust. Silica gel packets should also be kept along with it.
- j) Subassemblies should not be stacked one above the other.
- k) The loose items supplied for the main equipment falls into various categories like tools, cables, prefabricated cables, console inserts, recorders, VDU/CRT, other display units, printers, sensors and transducers, cable glands, cable ducts, frames, racks, etc. These are to be categorised and stored separately.

14.05 General Terms and Instruction

- 1. Worker/Supervisors/Engineers, consumables etc., required for the scope of work shall be provided by the contractor. All the expenditure including taxes and incidentals in this connection will have to be borne by him unless otherwise specified in the relevant clause. The contractor's quoted rates should be inclusive of all such contingencies.

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2. It shall be specially noted that, the contractor may have to work round the clock (24x7) to achieve the completion schedules / plans / targets during the entire course of erection, testing and commissioning works, which may involve payment of considerable overtime. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including labors, engineers / supervisors, T&Ps etc.
3. The terminal points can be inferred from the relevant drawings and any further clarifications can be obtained / decided by BHEL and that is final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals. Carrying out work as per the specification between equipments constituting terminal points, whether the terminal equipments fall within the scope of work/specification, contractor shall carry out the terminal joints at either end. Also where the piping connection to the terminal points involve flanged joints, matching of flanges, fixing gaskets, bolting and tightening as per BHEL Engineers instructions is in the scope of work. In case piping connected to equipment, matching of flanges for achieving the parallelism and alignment at the equipment end, by suitably resorting to heat correction or other method as instructed by BHEL Engineer, with in the quoted rate.
4. The work shall conform to dimensions and tolerances given in various drawings and quality manuals provided by BHEL. If any portion of work is found to be defective in workmanship not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost, failing which the job will be carried out by BHEL by engaging other agencies / departmentally and recoveries will be effected from contractor's bill towards expenditure incurred including BHEL's overhead charges.
5. Contractor has to work in close co-ordination with other erection agency at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less/more at a particular given time. Activities and erection program have to be planned in such a way that the milestone events are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.
6. During the course of erection, testing and commissioning, certain rework / modification / rectification / repairs / fabrication etc will be necessary on account of feedback/revision from various relevant sources, and also on account of design discrepancies/ alterations, manufacturing defects, site operations/ maintenance requirements. This will also include modifications / re-works suggested by BHEL / customer / other inspection group. Contractor shall carry out such rework / modification / rectification / fabrication / repairs etc promptly and expeditiously. Daily log sheets indicating the details of work carried out, man-hours etc shall be maintained by the contractor and got signed by BHEL engineer every day. Claim of Contractor if any, for such works will be governed by relevant clauses of 'General Conditions of Contract'.
7. The scope of work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, engineering and construction management and green belt management. The contractor should ensure successful and timely completion of the work. The contractor must have adequate quantity of tools, construction aids, equipments etc., in his possession. He must also have on his rolls adequate trained, qualified and experienced supervisory staff and skilled personnel. The manpower deployment identified by contractor shall match with above scope of works.

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8. Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. The erection manuals, which are available with BHEL site office, are to be referred for compliance and guidance before taking up the work. Any failure to comply with the above might lead to rework and the cost for the same shall be borne by the contractor only. BHEL engineer, depending upon the availability of materials, fronts etc., will decide the sequence of erection and methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the method of erection adopted in erection of similar jobs or for any reason whatsoever.
9. Contractor shall remove all scrap materials periodically generated from his working area in and collect the same at one place earmarked for the same. Load of scraps is to be shifted to a place earmarked by BHEL. Failure to collect the scrap is likely to lead to accidents and as such BHEL reserves the right to collect and remove the scrap at contractor's risk and cost if there is any failure on the part of contractor in this respect.
10. The contractor shall ensure that his premises are always kept clean and tidy to the extent possible. Any untidiness noted on the part of the contractor shall be brought to the attention of the contractor's site representative who shall take immediate action to clean the surroundings to the satisfaction of the Engineer-in-Charge
11. The Contractor may have to execute work in such a place and condition where other agencies also will be under such circumstances.
12. The work shall be executed under the usual conditions without affecting project work and in conjunction with other operations and contracting agencies at site. The contractor and his personnel shall cooperate with the personnel of other agencies, co-ordinate his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.
13. All the work shall be carried out as per instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the contractor.
14. All necessary certificates and licenses required to carry out this work are to be arranged by the contractor expeditiously at his cost.
15. The contractor shall make adequate security arrangements to prevent from theft, fire, pilferage, damage and loss of materials/equipment kept under bidder custody.
16. All equipment shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc, shall be used for handling of the equipment without the specific permission of the engineer.
17. Access to site for inspection by BHEL and customer engineers shall be made available by the contractor at all times.