TENDER DOCUMENT

TENDER No.: DLI/C&E/WI- 665/021(R)

FOR

Tender for Construction of Civil works for “Augmentation of Raw Material Handling Receipt and Handling facilities for new OHP Part– B for Bhilai Steel Plant (BSP).” (Package - 61), at Chattisgarh.

VOLUME – III

TECHNICAL SPECIFICATION ALONG WITH CLARIFICATIONS (PART 1 & 2)

ENGINEERING PROJECTS (INDIA) LIMITED
(A GOVT. OF INDIA ENTERPRISE)

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**Name of work:** Tender for Construction of Civil works for “Augmentation of Raw Material Handling Receipt and Handling facilities for new OHP Part– B for Bilai Steel Plant (BSP).” (Package - 61), at Chattisgarh.

**INDEX FOR VOLUME - III**

<table>
<thead>
<tr>
<th>SL.NO</th>
<th>DESCRIPTION</th>
<th>NO.OF PAGES</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>TECHNICAL SPECIFICATIONS</td>
<td>89</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>CLARIFICATION OF TS (PART - 1)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>CLARIFICATION OF TS (PART – 2)</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
TECHNICAL SPECIFICATION
FOR
Augmentation of Raw Material Receipt & Handling facilities with new OHP, Part-B

(PACKAGE No. 061)

MECON LIMITED
RANCHI – 834002
## TECHNICAL SPECIFICATION FOR CIVIL ENGINEERING WORKS

### INDEX

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Chapter</th>
<th>Description</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>06.02</td>
<td>Civil Works</td>
<td>1 to 17</td>
</tr>
<tr>
<td>2.</td>
<td>06.03</td>
<td>Structural Works</td>
<td>1 to 12</td>
</tr>
<tr>
<td>3.</td>
<td>06.04</td>
<td>Tech. Specification for Office Buildings, Canteens, Workers’ Rest Room &amp; Toilet Blocks and other areas</td>
<td>1 to 11</td>
</tr>
<tr>
<td>4.</td>
<td>06.05</td>
<td>General Layout</td>
<td>1 to 8</td>
</tr>
<tr>
<td>5.</td>
<td>06.06</td>
<td>Sub-Stores</td>
<td>1 of 1</td>
</tr>
<tr>
<td>6.</td>
<td>06.07</td>
<td>Area Repair Shop</td>
<td>1 to 21</td>
</tr>
<tr>
<td>7.</td>
<td>06.09</td>
<td>Water Supply System</td>
<td>1 to 17</td>
</tr>
</tbody>
</table>
06.02  CIVIL WORKS

06.02.01  This section of the specification covers entire civil engineering work for buildings, technological structures, new equipment and facilities for all production, auxiliary and ancillary units, foundation for all buildings, structures and main equipment described elsewhere in this specification on a Turnkey basis for OHP Package (Part-B).

OHP Package will come up in the area as indicated in the general layout drawing.

Paved areas, approach roads, drainage and sewerage as required, trenches, pits and all other miscellaneous civil engineering works, including demolition, relocation and diversion [if necessary] of the existing foundations, pits, trenches, drains, underground and overhead services, roads, tracks, buried cables, etc., for the proposed OHP PART B Package

06.02.02  The proposed OHP-PART B Package is to be installed in an area indicated in the general layout drawing and situated within the Bhilai Steel Plant boundary. The tenderer is advised to visit the site and acquaint himself of the site condition and collect all such data as may be necessary for preparation of his offer. The scope shall cover complete civil engineering work for the proposed plant within its battery limit, on turnkey basis including design supply of all materials and execution.

06.02.03  Soil Characteristics

Detail soil investigation report is available with the Purchaser and the same may be collected by bidders for use.
06.02.04 The major civil works involved for installation of the OHP PART B Package shall pertain to the following areas:

i) New Ore Handling Plant-Part B for feeding raw material to new BF-8 & Sinter Plant III
ii) New route parallel to existing route from OHP-I to JH-20
iii) New route from junction house JH N102 to new Lime Plant RMP 3 and SMS-III

06.02.05 The materials and services shall include but not be limited to the following:

i. Earthwork for foundations, pits, trenches, basements, tunnels, drains, sumps, sewers, etc including disposal of surplus earth up to 10 Km distance. Final grading inside battery limit up to +/-500mm shall be under the scope of bidder.

ii. Reinforced concrete for raft foundations, spread footings or strip footing, as required in foundations, channels, tunnels, basements, pits, trenches, sumps, etc.

iii. Soling and sub-grade work for all foundations, flooring, trenches, pits and other underground structures. All junction houses and structural buildings shall be provided with RCC grade slab over boulder soling base with required floor finish at ground floor level. Intermediate slabs shall be of RCC over structural beam grid. Further floors of Conveyor galleries shall be of concrete construction resting on structural beams.

iv. All doors, windows, gates, etc.

v. Reinforced concrete work in columns, beams, floors, slabs, frames and other superstructures.

vi. Reinforced concrete work in supporting structures of equipments.

vii. All masonry work in superstructure and partition. Fly ash cement bricks shall be used in construction.

viii. All finishing work in flooring, wall-cladding and ceiling.

ix. All necessary waterproofing, heat resisting, fireproofing and anti-corrosive treatment to building structures and foundations.
x. All plumbing, rainwater drainage, sanitary sewerage works for all buildings, roadway, parking, paved areas and open spaces within the battery limits of this specification

xi. All underground tunnels, basements, (like wagon tippler etc) will be made watertight using latest poly metric Cementacious water proofing methods as per manufacturers specification of approved reputed make like CICO,SIKA,FOSRAC and shall also be provided with sump and pumping system

xii. All temporary buildings, offices, roads, tracks and services for construction of the OHP-PARTB Package.

xiii. Removal of all materials, cleaning, and handing over of site in a workable manner.

It shall include all works required for completeness of the project. All the materials and workmanship shall conform to relevant Bureau of Indian Standard norms and specifications.

06.02.06 Design parameters

i. Loading, design of structures, permissible stresses and other design criteria shall generally be in accordance with the latest edition of relevant I.S. Codes and practices, viz., IS – 456; IS – 875; IS – 1893; IS – 2974; IS – 3370; IS – 1786; IS – 432; etc.

ii. All buildings and supporting structures including connections and foundations shall be designed to withstand the most adverse combination of loads

iii. Rigidity of the building structures in both directions and stability of structures for worst combination of loadings shall be ensured. Other precautions like waterproofing, dust proofing, protection from heat, sound and corrosion etc. shall also be considered.

iv) SBC shall be as per approved Geo Technical report.

For designing of foundations ground water table to
be considered at Terrace level

v) Earth pressure for all under ground structures shall be calculated using co-efficient of earth pressure at rest, co-efficient of active or passive earth pressure as applicable

06.02.07 Concrete and reinforced concrete structures

i. Concrete and reinforced concrete structures including superstructures and underground construction shall be designed and constructed in accordance with I.S. Codes. However, concrete of following minimum grades shall be used:

Mudmat       M 10
R.C.C.        M 25
For flooring / paving etc. M 20 grade concrete may be used.

ii. The mix-design shall be adopted for proper strength, workability and service requirement.

iii. Additives and retarding agents for concreting, floor hardening additives, acid resisting and integral waterproofing compounds shall be added to the concrete depending upon requirements.

06.02.08 Finishes

i. All floor finishes shall be as per B.I.S./ specification given in Annexure-III and shall meet the functional requirements.

ii. The wall finishes shall be as per B.I.S./ specification given in Annexure-III and shall meet the functional requirements.

iii. The roof finishes shall be as per B.I.S./ specification given in Annexure-III and shall meet the functional requirements.
06.02.09 Necessary false ceiling shall have to be provided as per technological requirements and specified elsewhere in this specification.

06.02.10 All concrete roofs exposed to weather shall be provided with water proofing treatment. Drainage of rainwater from roof shall be ensured by rainwater down comers and proper slope.

06.02.11 All doors and windows shall be provided as per technological requirements.

06.02.12 Adequate natural lighting and ventilation shall be planned and provided for general buildings.

06.02.13 The connections of the roads, drains and sewer lines, being provided for the project shall be properly co-ordinated with the existing lines.
   i. The roadways shall be so laid as to facilitate movement of materials, equipment, products, etc. as well as operators and executives.
   ii. Necessary paved areas shall be provided around plant and auxiliary units for car-parking.
   iii. All roads required inside battery limit are under the scope of tenderer

06.02.14 **Drainage and sewerage**

   i. All rain water drainage, sanitary, faecal sewerage and plumbing system for all buildings and open areas shall be provided, as required. Garland drains around buildings shall be of brick work and roadside side drains shall be of RCC.
   ii. All service pipelines, water supply, plumbing and other utility pipelines and electrical wiring within the ancillary and auxiliary buildings of RC/ Masonry construction, will be concealed within the masonry, concrete work etc.
iii. All auxiliary and ancillary buildings housing toilets/ drinking water facilities shall be provided with water storage tanks at roof of the building separately for drinking and sanitary purposes.

iv. All surface drains shall be generally open type and covered with pre cast slabs/ gratings, as per requirements where ever necessary

v. Drains in stock pile area to be provided with MS Gratings on top Suitable settling ponds to be provided to prevent entry of settleable solids from stock pile area before connection to plant drainage system

**Storm Water Drainage**

**Scope of Work**

Storm water drainage system in the proposed plant shall consist of well designed open surface drains network so that all the storm water is efficiently drained off without any water logging. The levels of the drains shall be fixed such that there is no backflow from the drains into the proposed facilities. The storm water collected from the proposed plant area shall be conveyed to the nearest main drains with matching invert level. Storm water drains shall cross the road by providing suitable pipe culverts or box culverts. RCC cover slab over drains shall also be provided, if necessary. The work also covers supply of all materials, construction, testing of all civil works, connection with other drains, protection of any underground utility service, removal of any obstruction, diversion etc.
DESIGN PARAMETERS

i) Design rainfall intensity shall be taken as 100 mm/hr.

ii) Run off co-efficient:

The contractor shall select the following run-off co-efficients for design of drains. Suitable run-off co-efficient for areas not given below will be selected by the contractor.

<table>
<thead>
<tr>
<th>Area</th>
<th>Run-off co-efficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Paved area</td>
<td></td>
</tr>
<tr>
<td>- Concrete</td>
<td>1.0</td>
</tr>
<tr>
<td>- Bituminous</td>
<td>0.9</td>
</tr>
<tr>
<td>b) Open area / green belt area</td>
<td>0.7</td>
</tr>
</tbody>
</table>

iii) Normal material of construction for drain shall be based on the guidelines given below:

<table>
<thead>
<tr>
<th>Type &amp; material</th>
<th>RCC Rectangular drain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>As per scope, Civil specification</td>
</tr>
<tr>
<td>Minimum velocity</td>
<td>0.6 m/sec</td>
</tr>
<tr>
<td>Maximum velocity</td>
<td>2.4 m/sec</td>
</tr>
<tr>
<td>Minimum depth</td>
<td>300 mm</td>
</tr>
<tr>
<td>Minimum rectangular drain width</td>
<td>500 mm</td>
</tr>
<tr>
<td>Slopes</td>
<td>1:500 min. or matching with invert level of main drain</td>
</tr>
<tr>
<td>Free board</td>
<td>100 mm minimum or matching with ground level</td>
</tr>
</tbody>
</table>

iv) Culverts

Storm water drains shall cross the road by suitable pipe culverts or box culverts. Material of construction of culverts shall be as below:

Pipe culverts : RCC pipe class NP3 as per IS 458
Box culverts  : RCC
SEWERAGE SYSTEM

Scope of Work

Sanitary waste from toilets of buildings shall be collected by gravity flow through underground pipes of suitable diameter and manholes at suitable intervals. It will be finally connected to main trunk sewer line.

The design of sewer system covering size, level, route and final connection to the proposed main trunk sewer line shall be submitted by the bidder for approval.

The work also covers supply of all materials, excavation, laying & jointing of pipe, concrete work, backfilling, manholes, testing, connection with nearest main trunk sewer line with matching invert level, protection of any underground utility services, removal of any obstruction, diversion etc.

Design Parameters

a) Pipes

Contractor shall adhere to the following design basis while designing the sewerage system.

Sewers shall be designed for peak flow taking future requirements & flowing 2/3 full.

Minimum velocity shall be 0.6 m/sec subject to a maximum of 2.4 m/sec.

Sewers shall be designed considering 150 litres per capita per day and ground water infiltration.

Minimum size of sewer shall not be less than 200 mm.

Minimum cover over sewer shall be 600 mm & under roads the sewer shall have cover of 1200 mm. In case of less cushion the pipe shall be encased with concrete.

Pipes shall be in accordance with the following standards.

| Concrete pipes | IS 458 |
| Cast iron pressure pipes | IS 1536, 1537, 1538 |
b) **Manholes**

Manholes shall be built at every change of alignment, gradient or diameter and at every junction of two or more sewers.

Maximum distance between manholes should be 30 m.

Manholes shall be RCC and its internal size will be vary according to depth. Contractor should follow following:

i) For depth of manholes upto 0.9 m – 900 x 800 mm. rectangular RCC manhole

ii) For depth of manholes above 0.9 m & upto 1.65 m – 900 mm. dia. circular RCC manhole

iii) For depth of manholes above 1.65 m & upto 2.30 m – 1200 mm. dia. circular RCC manhole

iv) For depth of manhole above 2.30 m & upto 9.0 m – 1500 mm. dia circular RCC manhole

Manhole cover shall be heavy duty cast iron with frame conforming to IS 1726.

The bottom of manhole shall have well finished benching with suitable slope, MS rungs at suitable interval.

**Limit of Contract**

Storm water drain and sewer pipe line shall be connected to the nearest main drain & sewer trunk line respectively matching invert level with all bye-works.

06.02.15 The tenderer shall divert, at his own cost, any unforeseen underground facilities, pipelines that need to be diverted during civil construction in consultation with the client.

06.02.16 The tenderer shall indicate the quantities of major civil engineering works like excavation, Piling, PCC, RCC, reinforcing steel, inserts, shuttering, brickwork, roadwork, pipelines, etc. under his scope of work as indicated under [ANNEXURE -I](#). The Contractor shall not make any additional claim if the total concrete quantity or quantity of any of the civil engineering items required for completion of the entire package as per
terms of contract exceed the quantity indicated by the Contractor in Annexure-I of this section. The tenderer shall also indicate soil investigation and site/ topographical survey, if any, to be undertaken by him.

06.02.17 The tenderer shall indicate the estimated number of civil engineering drawings. [in equivalent A1 size]

06.02.18 The successful tenderer shall submit all basic engineering, schematic and subsequently detailed civil engineering drawings along with relevant load data and design calculations for client’s approval as indicated under ANNEXURE -II as per schedule/ documentation requirements.

06.02.19 General instructions

1) Local conditions

The tenderer, before submitting his tender, shall visit the site and ascertain the local conditions, labour rules, availability of construction materials, traffic restrictions, all obstructions in the area and also ascertain all site conditions including the sub-soil conditions and shall allow for any extras likely to be incurred due to all such conditions in his quoted prices. After the award of work no additional claims will be entertained on these accounts under any circumstances, whatsoever, from the tenderer.

2) Setting out and leveling

The tenderer shall set out and level the work and will be responsible for the accuracy of the same. He is to provide all instruments and proper qualified staff with labour for getting his work checked by Engineer, if so desired by the Engineer. Such checking, if any, shall not, however, relieve the Tenderer in any way, of his responsibility for correct setting out.
3) Safety

The tenderer shall take adequate precautions to ensure complete safety and preventions of accidents at site and shall be responsible for the same. The safety precautions shall conform to the safety regulations prescribed by the Safety Code for constructions and relevant Indian Standard Codes, some of which are stated below:

- IS 4014:1967 : Safety Regulations for scaffolding work
- IS 4081:1986 : Safety Code for drilling and blasting operations
- IS 7923:1985 : Safety Code for working with Constructions machinery

4) Keeping work free from water

The tenderer shall provide and maintain at his own cost, pumps and other equipments to keep the works free from water and continued to do so until the handing over of the works

Rubbish

The tenderer shall keep the site clear on a continuous basis of all rubbish etc. which may arise out of the work executed by him and dispose them suitably in allotted areas.

5) Bench Marks, Reference Pillars etc.

The tenderer shall protect all benchmark, and reference pillars /lines including ground water gauges from damage or movement during working. In case of any damage the tenderer shall have to restore the same to its original condition at his own cost.
6) Standards

Unless otherwise mentioned in the specifications, all applicable codes/standards as published by the Bureau of Indian Standards on the date of award of contract shall governed the work in respect of design, workmanship, quality and properties of materials, method of testing and other pertinent features. In case of variance between this specifications and IS Codes/ Standards, the provisions of this specification shall prevail upto the extent of such variance.

7) Drawings

Work shall be carried out as per drawings prepared by the tenderer and approved by the Client. The drawings shall include General Arrangement, shuttering, excavation, anchorage plans, bolt plans, insert plan and details, conduit plans, etc required for execution of the job. Also, the design calculations shall be submitted in requisite number of copies (as mentioned elsewhere) for the approval by the Client.

8) This specification shall be read in conjunction with the general conditions of contract and other project requirement provided in the other volumes containing special conditions of contract, instruction to bidders, special instructions to bidders etc.

Specification for civil works comprises, besides this section, one volume of General Technical Specification for civil engineering works in GTS and the same will become part of contract.
ANNEXURE-I

Estimated Quantities for Civil Works

1) Excavation
2) Piling
3) RCC
4) PCC
5) Shuttering
6) Reinforcement Steel
7) PCC Flooring
8) Finishing
9) Inserts/ Bolts
10) Any miscellaneous items deemed necessary for successful completion of civil works of the proposed plant.
# ANNEXURE -II

List of Civil Engineering Drawings and Documents for Approval/Information

**Group – 1 : For Approval**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Drawing numbering system</td>
</tr>
<tr>
<td>2.</td>
<td>List of drawings, with drawing Nos. and title</td>
</tr>
<tr>
<td>3.</td>
<td>Basic design criteria and loading for all buildings, structures and foundations</td>
</tr>
<tr>
<td>4.</td>
<td>Site plan/layout drawing with battery limit in 1:500 scale</td>
</tr>
<tr>
<td>5.</td>
<td>Design calculations along with load data for buildings, foundation for equipment and structures, auxiliary etc, (design calculations shall be submitted along with or before submission of G.A. and design drawings).</td>
</tr>
<tr>
<td>6.</td>
<td>General arrangement plan and sectional drawings with all dimensions and details for foundation of equipment and structures, auxiliary facilities etc.</td>
</tr>
<tr>
<td>7.</td>
<td>Layout and sectional details of drainage, sewerage network with all invert levels slopes, sizes, dimensions, manholes top level etc.</td>
</tr>
</tbody>
</table>

**Group – 2 : For information and comments, if any**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Detail reinforcement drawings.</td>
</tr>
<tr>
<td>2.</td>
<td>Detail of bolts, inserts/ embedment, coverings, etc.</td>
</tr>
</tbody>
</table>
## ANNEXURE-III

### Details of finishing etc. for various buildings

#### 1.1 Office Buildings:

<table>
<thead>
<tr>
<th>Jobs</th>
<th>In-charge Room &amp; Conference Room</th>
<th>Other officers up to E-6 level</th>
<th>All other rooms, corridors &amp; stairs etc.</th>
<th>Toilets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>Min. 18 mm white Marble slab &amp; skirting with good finish</td>
<td>Min. 18 mm white Marble slab &amp; skirting with good finish</td>
<td>Min 20/25 mm thick Kota stone slab &amp; skirting with good finish</td>
<td>Approved quality ceramic/vitreous tiles with 2100mm high dado</td>
</tr>
<tr>
<td>Inside Wall finish</td>
<td>Plaster of Paris punning</td>
<td>Plaster of Paris punning</td>
<td>Plaster of Paris punning</td>
<td>Plaster of paris punning</td>
</tr>
<tr>
<td>Inside Wall painting</td>
<td>Plastic Emulsion painting</td>
<td>Plastic Emulsion painting</td>
<td>Plastic Emulsion painting</td>
<td>Plastic emulsion painting</td>
</tr>
<tr>
<td>Door &amp; Frames</td>
<td>Teak Wood frame &amp; flush doors with teak veneering, door closures, door stops, Al. al-drops, Mortice Locks, handles etc.</td>
<td>Painted Sal Wood frame &amp; flush doors, door closures, door stops, Al. al-drops Mortice Locks, handles etc.</td>
<td>Painted Sal Wood frame &amp; flush doors, door closures, door stops, Al. al-drops Mortice Locks, handles etc.</td>
<td>PVC frame with PVC door, Al. - al-drops, latches, handles, locking arrangement etc.</td>
</tr>
<tr>
<td>Windows</td>
<td>Aluminium frame with glazed aluminium shutters</td>
<td>Aluminium frame with glazed aluminium shutters</td>
<td>Aluminium frame with glazed alumimium shutters</td>
<td>Aluminium frame with glazed aluminium shutters &amp; ventilator</td>
</tr>
<tr>
<td>Grills</td>
<td>M.S ornamental grills using flat/square section</td>
<td>M.S ornamental grills using flat/square section</td>
<td>M.S ornamental grills using flat/square section</td>
<td></td>
</tr>
<tr>
<td>Outside Wall finish</td>
<td>Architectural features with wall tile cladding and good quality plaster</td>
<td>Architectural features with wall tile cladding and good quality plaster</td>
<td>Architectural features with wall tile cladding and good quality plaster</td>
<td>Architectural features with wall tile cladding and good quality plaster</td>
</tr>
<tr>
<td>Outside Wall painting</td>
<td>Water proof quality external grade Acrylic paint</td>
<td>Water proof quality external grade Acrylic paint</td>
<td>Water proof quality external grade Acrylic paint</td>
<td>Water proof quality external grade Acrylic paint</td>
</tr>
<tr>
<td>Cup Boards</td>
<td>Built-in Cup Boards with pre-laminated particle boards, locks, handles, etc.</td>
<td>Built-in Cup Boards with pre-laminated particle boards, locks, handles, etc.</td>
<td>Built-in Cup Boards with pre-laminated particle boards, locks, handles, etc.</td>
<td></td>
</tr>
</tbody>
</table>
### 1.2 Control Rooms & other buildings

<table>
<thead>
<tr>
<th>Jobs</th>
<th>Control Rooms</th>
<th>Dispatcher Room, Workers Rest Room, canteen &amp; Laboratory</th>
<th>All office in stores, other areas etc.</th>
<th>Pump House, Stores.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flooring</strong></td>
<td>Min. 18/20mm Granite Stone slab with skirting</td>
<td>Vitrified ceramic tiles floor with skirting</td>
<td>Mosaic Floor with white cement &amp; skirting</td>
<td>Ironite Flooring/ Quartzite Hardner Flooring</td>
</tr>
<tr>
<td><strong>Inside Wall finish</strong></td>
<td>Plaster of Paris punning</td>
<td>Plaster of Paris punning</td>
<td>Plaster of Paris punning</td>
<td>Cement plaster finish</td>
</tr>
<tr>
<td><strong>Inside Wall painting</strong></td>
<td>Plastic Emulsion painting</td>
<td>Plastic Emulsion painting</td>
<td>Acrylic Distemper</td>
<td>White Cement Wash</td>
</tr>
<tr>
<td><strong>Door &amp; Frames</strong></td>
<td>Double door Air-lock arrangement with Aluminium frame with aluminium &amp; toughened glass shutters, door closures, door stoppers, Al. al-drops, etc.</td>
<td>Aluminium frame with aluminium glazed shutters, door closures, door stoppers, Al. al-drops, etc.</td>
<td>Painted Sal Wood frame &amp; flush doors, door closures, door stoppers, Al. al-drops, Mortice locks etc. (MS door for el. rooms)</td>
<td>MS frame &amp; M.S sheets, aldrops, rings etc. Additional grill gates for stores</td>
</tr>
<tr>
<td><strong>Windows</strong></td>
<td>Aluminium frame with toughened glass aluminium shutters</td>
<td>Aluminium frame with glazed aluminium shutters</td>
<td>MS frame &amp; side hung M.S windows with glass panes</td>
<td>MS frame &amp; M.S side windows with glass panes</td>
</tr>
<tr>
<td><strong>Grills</strong></td>
<td>M.S ornamental grills using flat/Sq. section (except dispatch room)</td>
<td>M.S grills using flat/Sq. section</td>
<td>M.S grills using flat/Sq. section</td>
<td></td>
</tr>
<tr>
<td><strong>Outside Wall finish</strong></td>
<td>Architectural features with good quality surface texture</td>
<td>Architectural features with good quality surface texture</td>
<td>Architectural features with good quality surface texture</td>
<td>Architectural features with good quality surface texture</td>
</tr>
<tr>
<td><strong>Outside Wall painting</strong></td>
<td>Water proof quality exterior grade Acrylic paint</td>
<td>Water proof quality exterior grade Acrylic paint</td>
<td>Water proof quality exterior grade Acrylic paint</td>
<td>Water proof quality exterior grade Acrylic paint</td>
</tr>
<tr>
<td><strong>Cup Boards/</strong></td>
<td>Modular type from Godrej, Blowplast, Built-in Cup Boards with laminated/ pre</td>
<td>Built-in Cup Boards with laminated/ pre</td>
<td>Built-in Cup Boards with laminated/ pre</td>
<td>MS racks, locks etc.</td>
</tr>
<tr>
<td>Lockers</td>
<td>Featherlite etc.</td>
<td>Lam particle boards, locks, handles, etc.</td>
<td>Lam particle boards, locks, handles etc.</td>
<td></td>
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<td></td>
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<tr>
<td>False Ceiling</td>
<td>Aluminium Panel/composite panel false ceiling with suitable hanging arrangement &amp; accessories</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>False flooring</td>
<td>Cavity Modular type false flooring in control rooms as per requirement</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
06.03 STRUCTURE WORK

06.03.01 GENERAL

01. This specification for structural works furnished herein are intended as guidelines for execution of the works satisfying the Owner’s requirements as also complying with all technical norms in totality.

02. Units:

Structural steel work under the scope of this contract cover the following main facilities envisaged for New OHP- Part B facilities under Augmentation of Raw Material Handling facilities in Ore Handling Plant of Bhilai Steel Plant, SAIL hereinafter referred to as “Owner” in this specification. Technological layout drawing which is issued along with Main Technological Specification shall be referred in this context.

NEW UNITS: Convoyer Gallery Z2G1, Z2G2, Z3G1, Z4G1, Z5G1, Z6G1, Z4AG1, Z4AG2, Z4BG1, Z4BG2, Z5AG1, Z5AG2, Z5BG1, Z5BG2, Z6AG1, Z6AG2, Z6BG1, Z6BG2, Z7G1, Z7G2, Z8G1, Z9G1, Z10G1, Z11G1, Z12G1, Z11G2, Z13G1, Z14G1, Z15G1, and Junction House JH – Z2 to JH – Z15 including pent houses except JH-Z14 and Handling/Hoisting Facilities in Track Hopper, Junction House JH – Z1, Wagon Tippler Building for portion of OHP II pertaining to raw material feeding of B.F. no. 8 of BSP.


Conveyor Gallery G-9A to G-9B (2 Nos), G9 -1, G9 –H,G 10A, G11-C3,G-14 to G-17G (All parallel to existing conv galleries), G-17A, G-20A and additional line parallel to J9 series conveyors up to JH-20.

Conveyor Galleries L1-G1, L2-G1, L3 –G1, L4 –G1, L5-G1, L6 G1, L7 G1, L8 C1, L9C1, L10C1. Junction House JH-L1 to JH- L10 for introduction of new conveyor line from proposed OHP – II to Lime Plant RMP 3 and SMS-III.
Monorail / Hoisting facility: Monorail shall be considered for the following Electrical Premises of R.C. Construction.


Modification, Addition & Strengthening of Existing Units

For conveyor no. J11C3, J11RC2, J14C2, J15C2, J15RC1, J15BC1, J15BC2, J17C3, J17A-C1 & J20C3, the existing junction houses (JH10, JH11, JH14, JH15 and JH20) shall be suitably modified to suit proposed conveyor transfer points/crossing over.

Gallery of conveyor R103/R104 shall be modified at new junction house Z11.

03. List of Steel Structures

Columns (rolled section or built-up), column bracings, Crane Girder, Surge Girder, Gable Platforms, Rails & Fixtures, Monorail beams and supports, Roof Trusses, Roof Girders, Bunker Girder, Bunker, Liner Plate, Purlins, Roof hand rails, Floor Beams, Sheeting Posts, Side runners, Louvres, Bracings, Sag angles, Sag rods, wind-ties on roof, Wind girders, Platforms, Walk-ways, Stairs, Ladders, Hand rails, Gutters and Down comers, Gallery truss, Gallery Trestles, Bracings, rafter & rafter bracings for gallery truss, End portal, Top & Bottom chord Bracings for Gallery Trusses, Roof & side Cladding with GCS/Translucent sheeting etc.

04. The work to be performed under this specification consists of design, engineering, dismantling, modification, strengthening, addition of new floors, supply, fabrication, erection and cladding, as well as providing all labour, materials, consumables, equipment, temporary works, temporary labour and staff colony, constructional plant, fuel supply, transportation and all incidental items not shown or specified but reasonably implied or necessary for the
completion and proper functioning of all the above units and auxiliaries, all in strict accordance with the specifications, including revisions and amendments thereto as may be required during the execution of the work.

05. Supply of all materials including structural steel, roof cladding & side-cladding sheets, fasteners, paints, consumables like gas, electrodes etc. and all other materials as deemed necessary for proper completion of the work, are included in the scope of the Contractor.

06. The work shall be carried out according to the design/drawings to be developed by the Contractor and approved by the Owner/Consultant. For all buildings and structures, necessary layout and details are to be developed by the Contractor keeping in view the statutory & functional requirements of the plant and facilities and providing enough space and access for operation, use and maintenance. Certain minimum requirements are indicated in this specification for guidance purpose only. However, the Contractor’s offer shall cover the complete requirements as per the best prevailing practices and to the complete satisfaction of the Owner.

06.03.02 **SCOPE OF WORK**

The scope of work shall cover, but shall not be exclusively limited to, the following:

- collection of all site related data & conducting site investigations,
- design, preparation of all design drawings, fabrication drawings,
- Dismantling, Modification, Addition of Floors, Strengthening of Existing Units.
- obtaining Owner’s/Consultant’s approval on general arrangements and design of structures
- dismantling, retrieval, sorting and storing of any existing structures as directed by the owner.
supply of all materials viz, raw steel, sheeting for roof and side cladding, and paints

supply of fasteners like bolts, nuts, washers etc

supply of consumables like electrodes for welding, gases for gas cutting etc

supply of plant & machinery, tools tackles, instruments for fabrication and erection

providing facilities for testing of materials and conducting NDT

providing facilities for transport and handling

deploying requisite skilled and unskilled manpower

making arrangements for all services like approach to site, electricity, water etc

fabrication of structures, their transport and proper storing at site

erection of structures, claddings, gutters, down pipes etc

application of paints at shop after fabrication and at site after erection

providing all reasonable facilities for inspection by Owner/Consultant

conducting NDT as stipulated by the Owner and making test results available to Owner / Consultant for evaluation

compliance with primary acceptance tests / inspection, liquidation of defects; compliance with final acceptance tests / inspection, liquidation of defects;

carrying out field-engineering decisions as desired by the Owner

preparation of “As Built” drawings for all the structures and hand over to the Owner the completed structural work to the Owner’s full satisfaction.

any other work deemed incidental for the completion of the overall work but not included in the above detailed scope.
06.03.03 DESIGN OF BUILDING STRUCTURES

Design considerations

03.01 General

01 Structures shall be designed such that they are economical and safe and meet the functional and service requirement of the technological process for which they are designed. The architectural planning of the building shall be based on technological requirements.

02 The structures shall be designed conforming to the relevant safety regulations, Factory Acts, Electricity Rules and stipulations of Statutory bodies as applicable to the project and as per relevant Indian Codes of Practice or, any International Code approved by the Owner.

03 Natural ventilation shall be provided ensuring that it does not permit rain water entry into the building. Scope of natural lighting shall be used to the maximum possible extent.

03.02 Design

03.02.01 Design of structures

a) Design of steel structures shall be done in accordance with IS:800-1984 or any equivalent international code of practice that may be acceptable to the Owner.

b) Structures subjected to fluctuating/reversal of stress (eg. Rail Supp. Beams) shall be designed in accordance with IS:1024-1979.

c) Resonance in structures: Structures supporting vibratory/reciprocating equipments shall be designed so as to obviate occurrence of resonance. The ratio of applied frequency to natural frequency shall not lie within the range 0.7 to 1.5.
03.02.02 Loading codes

a) All live loads shall be considered in accordance with IS:875(Part-2)-1987. (Also refer clause 3.3.04)

b) Wind loads shall be in accordance with IS:875(Part-3)-1987 and any other consideration specific to the site.

c) Seismic loads shall be in accordance with IS:1893-2002.

06.03.04 FABRICATION OF STEEL STRUCTURES

4.1 Drawings

The Contractor shall prepare fabrication drawings, erection drawings, bill of materials, drawing office despatch lists / shipping documents, schedule of bolts and nuts and as built drawings. All drawing work shall be in metric system and all writing work shall be in English.

4.2 Material of Construction

4.2.1 All steel and other materials used for steelwork and in association with steelwork shall conform to appropriate Indian standards. Only tested materials shall be used unless written authority is obtained for the use of untested materials for certain secondary structural members.

Unless otherwise specified in the drawings

All rolled sections and plates up to & including 20 mm thickness shall conform to Grade "A" as per IS : 2062.

b) Plates of thickness above 20 mm and Plated structures subjected to dynamic loading shall conform to Grade "B" as per IS: 2062.

c) For High Tensile steel requirements, material conforming to IS:8500 or SAIL- MA (HYA or HYB) shall be used.
4.2.2 Steel sheets shall conform to IS: 1079.

4.2.3 Steel tubes for structural purpose shall conform to IS : 1161 (of Grade Yst 240)

4.2.4 Corrugated Galvanised Sheets shall conform to IS:277 with appropriate Zinc coating for the selected thickness of sheet on roof and sides.

4.2.5 Aluminium industrial troughed sheets conforming to IS: 1254 shall be used as follows:
   i) On roof - 0.91mm thick
   ii) On side walls - 0.71mm thick

4.2.6 Translucent sheets shall be fibreglass reinforced polyester sheets of matching profile as per IS:12866.

4.2.7 Colour coated sheets shall be as per appropriate standard.

4.2.8 Gutters shall be of copper bearing steel conforming to Grade "A" as per IS :2062.

4.2.9 Rails shall conform to IS : 3443.

4.2.10 All black bolts, nuts and locknuts shall conform to IS : 1363 and IS : 1364 (for precision and semi precision hexagonal bolts) of property class 6.4 unless otherwise specified. Washers shall conform to IS : 6610

4.2.11 All tapered washer shall be as per IS:5372 for channels, and IS:5374 for Joists. Spring washers shall conform to IS:3063.

4.2.12 All HSFG bolts shall conform to IS : 3757. Assembly of joints using HSFG bolts shall conform to IS : 4000. Nuts and washers for HSFG bolts shall be as per IS:6623 & IS:6649 respectively.

4.2.13 Covered electrodes for arc welding shall conform to IS: 814.

4.2.14 Certified mill test reports of materials used in the work shall be made available for inspection by the Owner / Consultant upon request.
4.3 Fabrication

4.3.1 Fabrication of all structural steelwork shall be in accordance with IS:800 or their equivalent foreign national standard of the country of origin of supply unless otherwise specified, and in conformity with various clauses of the Technical Specification.

4.3.2 Wherever practicable and wherever perfect matching of parts is required at site, members shall be shop assembled before despatch to minimise site work. Parts not completely assembled in the shop shall be secured, to the extent possible, to prevent damage during despatch.

06.03.05 ERECTION OF STEEL STRUCTURES

5.1 Scope

The scope of work under erection includes in addition to provision of erection and transport equipments, tools and tackles, consumables, materials, labour and supervision, the following:

a) Storing and stacking at site of erection of all fabricated structural components/units/assemblies till the time of erection.

b) Transportation of structures at site.

c) Receiving at site of structures including site handling/movement, unloading, storing and stacking at site of erection of technological structures such as bunkers and the related structures.

d) All minor rectification/modification such as:

   i) Removal of bends, kinks, twists, etc. for parts damaged during transportation and handling;

   ii) Cutting chipping, filing, grinding, etc., if required, for preparation and finishing of site connections;
iii) Reaming for use of next higher size bolt for holes which do not register or which are damaged.

iv) Welding of connections in place of bolting for which holes are either not drilled at all or wrongly drilled during fabrication.

e) Other rectification work such as

i) Re-fabrication of parts, damaged beyond repair during transportation and handling or incorrectly fabricated.

ii) Fabrication of parts omitted during fabrication by oversight or subsequently found necessary.

iii) Plug-welding and re-drilling of holes which do not register and which cannot be reamed for use of next higher size bolt.

f) Fabrication of minor items/missing items or such important items as directed by the Owner / Consultant.

g) Assembly at site of steel structural components wherever required including temporary supports and staging.

h) Making arrangements for and providing all facilities for conducting ultrasonic X-ray or gamma ray tests on welds; getting the tests conducted by reputed testing laboratories, making available test films/ graphs, reports and interpretation.

i) Rectifying at site, damaged portions of shop primer by cleaning and touch-up paint.

j) Erection of structures including making connections by bolts/high strength friction grip bolts / welding.

k) Alignment of all structures true to line, level plumb and dimensions within specified limits of tolerances as per IS :12843 “Tolerance for Erection of Steel Structures”.

l) Application of second coat of primer paint and two coats of finishing paint at site after erection.

m) Grouting of all column bases after proper alignment of columns and only after obtaining clearance from Owner / Consultant.
n) Conducting preliminary acceptance and final acceptance tests.

o) Preparation of as built drawings, preparing of sketches/drawings to suit field engineering decisions, availability of material, convenience of fabrication, transportation and erection and changes during fabrication and erection.

All such works are subject to approval by the Owner / Consultant.

06.03.06  **PAINTING OF BUILDING STEEL STRUCTURES**

6.1 All steel structural work shall be painted as follows unless otherwise stated in the drawing / Technical Specification.

6.2 **Surface preparation**

The steel surface which is to be painted shall be cleaned of dirt and grease, and the heavier layers of rust shall be removed by chipping prior to actual surface preparation to a specified grade.

Following are the type and standards of surface preparation to be followed based on the requirement of a particular painting system or as specified in the design drawings.

Manual/Power tool cleaning :- Manual/Power tool cleaning shall be done as per Grade St-2 or St-3 of Swedish Standard Institution SIS 05 5900 or cl. 6.2.1.1 & 6.2.1.2 of IS : 1477 - 1987 (Part - 1).

Grade St-2 :- Thorough scraping and wire brushing, machine brushing, grinding etc. This grade of preparation shall remove loose mill scale, rust and foreign matter. Finally the surface is to be cleaned with a vacuum cleaner or with clean compressed air or clean brush. After preparation, the surface should have a faint metallic sheen. The appearance shall correspond to the prints designated St-2.

If no grade of surface preparation is specified, St-2 grade of preparation as per Swedish Standard shall be followed.
6.3 **Paint System**

i. Surface preparation :- St-2  

ii. Primer paint :- Two coats of zinc phosphate in phenolic alkyd medium (35 microns/coat).  

iii. Finishing paint :- Two coats of synthetic enamel (25 microns/coat) conforming to IS : 2932 - 1974.

All paints shall be of approved and shade as per Purchaser / Consultant's requirements.

6.4 **Paint and Painting**

Manufacture of paints, mixing of paints, etc. shall be generally according to the relevant IS codes of practice.

Generally compatibility between primer intermediate and finishing paint shall be certified by the paint manufacturer supplying the paints.

Guarantee period shall commence from the date of completion of finishing coat of paint on entire structures. The guarantee period shall be indicated depending on the type of surface preparation and system of painting. To fulfill this obligations, the Contractor may obtain from the painting manufacturer, guarantee for the performance of paint/painted surfaces.

Application of paint shall be by spraying or brushing as per IS : 486-1983 and IS : 487-1985 and in uniform layers of 50% overlapping strokes by skilled painters. Painting shall not be done when the temperature is less than 5 degree C or more than 45 degree C and relative humidity is more than 85% unless manufacturer's recommendations permit. Also painting shall not be done in foggy weather. During application, paint agitation must be provided where such agitation is recommended by the manufacturer.

Painting shall be applied at painting manufacturer's recommended rates. The number of coats shall be such that minimum dry film thickness specified is
achieved. the dry film thickness (DFT) of painted surfaces shall be checked with ELCOMETER or measuring gauges to ensure specified DFT.

All structures shall receive one coats of primer paint at shop after fabrication before despatch after surface preparation has been done as per requirements.

Unless otherwise specified all structures after erection shall be given one coat of primer and two coats of finishing paint of approved colour and quality. The undercoat shall have different tint to distinguish the same from the finishing coat.

The proposed make, quality and shade of paint shall have the approval of Purchaser / Consultant.

06.03.07 Quantities of Structural Items:

The bidder shall indicate the estimated quantities of structural items of work ie fabrication/erection tonnage, sheeting in sq.m etc. Bidder shall not make any additional claim if structural quantity of any items required for completion of entire package as per terms of contract exceed the quantity indicated by the bidder.
06.04 TECHNICAL SPECIFICATION FOR OFFICE BLDGS., CANTEENS, WORKERS REST ROOMS & TOILET BLOCKS AND OTHER AREAS

1. **Design Concept:**

The design will be developed considering the technical & functional requirements for efficient operation, ensuring sufficient lighting & ventilation for conducive working environment for employees satisfying the overall modern befitting building aesthetics.

2. **Planning & Space Organisation:**

2.1 **Office Buildings:**

a) Two nos. of office building have been envisaged for Ore Handling Area.

b) (I) One office building will be two storied RCC structure having 700 sq. mt. area of each floor.

   (II) Another office building will be two storied RCC structure having 500 sq. mt. area of each floor.

   (III) Office building (having 700 sq. mt. of each floor) must have false ceiling in GM, DGM and AGM room.

   (IV) Office building (having 700 sq. mt. of each floor) must have wash basin in each room.

   (V) Hierarchy break-up of Officers in each office building:

   - GM - 01 no.
   - DGM - 05 nos.
   - AGM - 10 nos.
   - Sr. Mgr. - 10 nos.
   - Engineer - 09 nos.
   - Staff - 25 nos.
   - Others - 10 nos.

   c) Design will be on open-office planning concept with provisions for separate rooms for higher officials and other use-areas like conference room (for approx 40 persons), Discussion Spaces, Stores & Utilities, Pantry along with Entrance Lobby etc. to be suitably located.
d) Separate toilets will be provided for male & female employees along with space for drinking water facilities in each floor with easy access.

e) Staircase will be suitably located to have easy access from all the useable areas including approach to roof. One fire escape staircase will also be suitably located.

f) Car porch will be provided at the main entrance.

g) False ceiling will also be provided in the A/C Rooms like Conference Room, In-Charges’ Rooms etc.

2.2 Canteen Buildings:

a) There will be two nos. of Canteen building of single storey RCC structure each and having area 200 sq. mt. each to be located suitably in Ore Handling Areas.

b) Space provision for each canteen:

Entrance, Dining facility for 50 persons at a time, Separate toilets for ladies & gents with hand wash & drinking water facilities, Kitchen, Pantry, Stores, Weigh Area, Wash Areas, Staff Room & Staff Toilet etc.

2.3 Workers’ Rest Rooms:

a) There will be two nos. of Workers’ Rest Room of single storey RCC structure each and having area 250 sq. mt. each to be located suitably in Ore Handling Area.

b) Space provision for each Rest room:

Entrance, large space for lockers (about 450 numbers) with work distribution space, rest area, separate toilets for ladies and gents with bathing facilities & drinking water facilities etc.

c) Separate lockers from reputed make: viz. Godrej, Raj & Raj, Chandan etc. will be provided.

2.4 Toilet Blocks:

a) There will be two nos. of Toilet Block of single storey RCC structure each and having area 40 sq. mt. each to be suitably distributed & located in the OHP-Part-B area.
b) Space provision for each toilet block:

Each toilet block will have separate space provisions for the ladies and gents as follows:

- Minimum 2 WCS, 6 Urinals, One shower and 2 wash basins for gent’s toilet
- Toilet facilities for ladies toilet
- Drinking water facilities for ladies & gents

3. **Natural lighting & ventilation**

Total window areas shall be a minimum of 15% of the floor area to ensure adequate lighting & ventilation.

4. **Services**

There should be adequate space for services like Electrical Room, Maintenance Room, Utility, Store etc. Main stairs should be a prominent one & easily accessible from entrance foyer & reception. Toilet & Rainwater Pipe Lines shall preferably be enclosed in ducts, but easily accessible for maintenance purpose & shall not spoil the aesthetics of the buildings.

5. **Specification**

All doors, windows, cup boards, flooring, wall finish etc. shall be as per GTS and shall be as per the specific requirement.

6. **Parking**

a) Office building having 700 sq. mt. in each floor:
   - 20 nos of car parking along with scooter and cycle parking will be provided.

b) Office building having 500 sq. mt. in each floor:
   - 20 nos of car parking along with scooter and cycle parking will be provided.

c) All parking for executives, office staff & visitors to be suitably located and covered shed of tubular structure with coloured metal sheeting shall be provided with interlock paver blocks 80 mm. thick as paving material.

7. **Structural System**
The building shall be designed as a **RCC frame structure**.

8. **Roof Access**

Office Building Roof will be accessed through the staircase.

9. (a) **Stairs**

Stairs, having each flight width of minimum 1500 mm, shall not have normally more than 15 risers in one flight, with maximum riser of 150 mm and a minimum tread width of 250 mm. Proper edge protection has to be ensured.

(b) **Handrails**

Handrails with 20 mm² MS bar in each step, balusters with suitable MS flat and 65 x 100 mm teak wood handrail shall be provided and the top of the handrail should be 1000 mm from the step.

10. **Vertical Headroom**

All accessible areas will be provided with minimum clear headroom as follows, unless otherwise specified:

   i) Floor height - 3600 mm (Structural) for Office & Canteen

   - 3300 mm (Structural) for Rest Room & Toilet Block

   ii) Door opening, Walkways, - 2100mm (Structural) platform etc.

   iii) Mumpty - 2500 mm (minimum)

   iv) Canopy - 3600 mm (minimum)

   v) Lintel level of window - 2100 mm (minimum) (From structural floor or upto beam Bottom matching with the elevation)

11. **Plinth Level**
Finished ground floor level (plinth level) will be minimum 600 mm above the terrace level.

12  **Brick Masonry and Parapet Wall**

12.1 All walls will be non load bearing infill panel walls. External walls of all buildings will be at least one brick (250mm) thick. All internal walls will be at least half brick (minimum 125 mm) thick, excepting staircase, toilets, AHU etc. with one brick thick wall.

12.2 The thickness of the parapet wall will be 250 thick brick wall or 125 thick R.C.C. wall and height will be 1000 mm minimum for accessible roof.

13. **Drainage**

Garland drain of required width will be provided after providing plinth protection all around the building to receive drainage water from roof and floor and lead them to the plant storm water drainage.

14. **Roof Drainage**

Roof drainage system will be provided for quick and efficient draining of rainwater from roof to avoid seepage and damage to roof. The roof gradient for the roof will not be less than 1 in 100. Roof System will be designed to handle design requirements for the specific site and will be in accordance to stipulations of IS: 1742 and IS: 2527. Roof drains will conduct water to storm drains through down take pipes.

15. **Overhead water tank**

Overhead water tank of required size will be provided at the roof top to meet the water requirements of each building.

16. **Other facilities**

a) Water purifier in each floor of office buildings, dispatchers, rest room and canteen;

b) Water cooler in each floor of the office buildings, each canteen & at dispatchers;
c) Executive tables, revolving chairs, cup boards for all executives in the office building from approved reputed make like Godrej, Featherlite, Raj & Raj, Chandan etc.;

d) Steel Tables, Steel Chairs, Cup Boards for all staff in the office building from approved reputed make as above;

e) Window type A/C or split A/C to be provided in all offices of the executives (E-6 & above), conference rooms etc.

17. **Details of finishing etc. for various buildings:**

### 17.1 Office Buildings:

<table>
<thead>
<tr>
<th>Jobs</th>
<th>In-charge Room &amp; Conference Room</th>
<th>Other officers up to E-6 level</th>
<th>All other rooms, corridors &amp; stairs etc.</th>
<th>Toilets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>• (Alt.-1) Min. 18 mm white Marble slab &amp; skirting with good finish</td>
<td>• (Alt.-1) Min. 18 mm white Marble slab &amp; skirting with good finish</td>
<td>Min 20 mm thick Kota stone slab &amp; skirting with good finish</td>
<td>Approved quality ceramic tiles with 2100mm high dado</td>
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<td></td>
<td>• (Alt.-2) Vitrified tiles</td>
<td>• (Alt.-2) Vitrified tiles</td>
<td></td>
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</tr>
<tr>
<td>Inside Wall finish</td>
<td>Plaster of Paris punning</td>
<td>Plaster of Paris punning</td>
<td>Plaster of Paris punning</td>
<td>Plaster of paris punning</td>
</tr>
<tr>
<td>Inside Wall painting</td>
<td>Plastic Emulsion painting</td>
<td>Plastic Emulsion painting</td>
<td>Plastic Emulsion painting</td>
<td>Plastic emulsion painting</td>
</tr>
<tr>
<td>Door &amp; Frames</td>
<td>Teak Wood frame &amp; flush doors with teak veneering, door closures, door stoppers, Al. al-drops, Mortice Locks, handles etc.</td>
<td>Painted Sal Wood frame &amp; flush doors, door closures, door stoppers, Al. al-drops Mortice Locks, handles etc.</td>
<td>Painted Sal Wood frame &amp; flush doors, door closures, door stoppers, Al. al-drops Mortice Locks, handles etc.</td>
<td>PVC frame with PVC door, Al. - aldrops, latches, handles, locking arrangement etc.</td>
</tr>
<tr>
<td>Windows</td>
<td>Aluminium frame with glazed aluminium shutters</td>
<td>Aluminium frame with glazed aluminium shutters</td>
<td>Aluminium frame with glazed aluminium shutters</td>
<td>Aluminium frame with glazed aluminium shutters &amp; ventilator</td>
</tr>
<tr>
<td>Grills</td>
<td>M.S ornamental grills using flat/square section</td>
<td>M.S ornamental grills using flat/square section</td>
<td>M.S ornamental grills using flat/square section</td>
<td></td>
</tr>
<tr>
<td>Outside Wall finish</td>
<td>Architectural features with wall tile cladding and good quality plaster</td>
<td>Architectural features with wall tile cladding and good quality plaster</td>
<td>Architectural features with wall tile cladding and good quality plaster</td>
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</tr>
<tr>
<td>Outside Wall painting</td>
<td>Water proof quality external grade Acrylic paint</td>
<td>Water proof quality external grade Acrylic paint</td>
<td>Water proof quality external grade Acrylic paint</td>
<td>Water proof quality external grade Acrylic paint</td>
</tr>
<tr>
<td>Cup Boards</td>
<td>Built-in Cup Boards with pre-laminated particle boards, locks, handles, etc.</td>
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<td>False Ceiling</td>
<td>Aluminium Panel/composite panel false ceiling with suitable hanging arrangement &amp; accessories</td>
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<tr>
<td>Hardware fittings</td>
<td></td>
<td>As per GTS</td>
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<td></td>
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<tr>
<td>Glazing</td>
<td></td>
<td>As per GTS</td>
<td></td>
<td></td>
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<tr>
<td>Water supply and sanitary fixture</td>
<td></td>
<td>As per GTS</td>
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<td></td>
</tr>
</tbody>
</table>

17.2 Schedule of finishes of Control Rooms & other buildings:

<table>
<thead>
<tr>
<th>Jobs</th>
<th>Control Rooms</th>
<th>Dispatcher Room &amp; canteen &amp; Laboratory</th>
<th>All office in stores, other areas etc.</th>
<th>Pump House, Stores.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flooring</td>
<td>Average 18mm Granite stone slab finish with skirting on RCC floor slab/8mm thick 600 x 600 (app.) Granite Tiles finish with skirting on false flooring</td>
<td>Vitrified tiles floor with skirting</td>
<td>Kota stone Floor with skirting</td>
<td>Ironite Flooring/Quartzite Hardner Flooring</td>
</tr>
<tr>
<td>Inside Wall finish</td>
<td>Plaster of Paris punning</td>
<td>Plaster of Paris punning</td>
<td>Plaster of Paris punning</td>
<td>Cement plaster finish</td>
</tr>
<tr>
<td>Inside Wall painting</td>
<td>Plastic Emulsion painting</td>
<td>Plastic Emulsion painting</td>
<td>Acrylic Distemper</td>
<td>White Cement Wash</td>
</tr>
<tr>
<td>Jobs</td>
<td>Control Rooms</td>
<td>Dispatcher Room &amp; canteen &amp; Laboratory</td>
<td>All office in stores, other areas etc.</td>
<td>Pump House, Stores.</td>
</tr>
<tr>
<td>-------------------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>Door &amp; Frames</td>
<td>Double door Air-lock arrangement with Aluminium frame with aluminium &amp; toughened glass shutters, door closures, door stoppers etc.</td>
<td>Aluminium frame with aluminium glazed shutters, door closures, door stoppers, Al. al-drops, etc.</td>
<td>Painted Sal Wood frame &amp; flush doors, door closures, door stoppers, Al. al-drops, Mortice locks etc. (MS door for el. rooms)</td>
<td>MS frame &amp; M.S sheets, aldrops, rings etc. Additional grill gates for stores</td>
</tr>
<tr>
<td>Windows</td>
<td>Aluminium frame with toughened glass aluminium shutters</td>
<td>Aluminium frame with glazed aluminium shutters</td>
<td>MS frame &amp; side hung M.S windows with glass panes</td>
<td>MS frame &amp; M.S side windows with glass panes</td>
</tr>
<tr>
<td>Grills</td>
<td></td>
<td>M.S ornamental grills using flat/Sq. section (except dispatch room)</td>
<td>M.S grills using flat/Sq. section</td>
<td>M.S grills using flat/Sq. section</td>
</tr>
<tr>
<td>Outside Wall finish</td>
<td>Architectural features with good quality surface texture</td>
<td>Architectural features with good quality surface texture</td>
<td>Architectural features with good quality surface texture</td>
<td>Architectural features with good quality surface texture</td>
</tr>
<tr>
<td>Outside Wall painting</td>
<td>Water proof quality exterior grade Acrylic paint</td>
<td>Water proof quality exterior grade Acrylic paint</td>
<td>Water proof quality exterior grade Acrylic paint</td>
<td>Water proof quality exterior grade Acrylic paint</td>
</tr>
<tr>
<td>Cup Boards/ Lockers</td>
<td>Modular type from Godrej, Blowplast, Featherlite etc.</td>
<td>Built-in Cup Boards with laminated/ pre lam particle boards, locks, handles, etc.</td>
<td>Built-in Cup Boards with laminated/ pre lam particle boards, locks, handles etc.</td>
<td>MS racks, locks etc.</td>
</tr>
<tr>
<td>False Ceiling</td>
<td>Aluminium Panel/composite panel false ceiling with suitable hanging arrangement &amp; accessories</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Additional Information**

- **Hardware fittings**: As per GTS
- **Glazing**: As per GTS
- **Water supply and sanitary fixture**: As per GTS
17.3 Schedule of finishes for Other Areas (unless otherwise specified):

- All shops, Covered Storage area & Work shop flooring shall be Ironite/Quartzite based flooring.

- Conference rooms should be aesthetically designed with requisite conference tables, good quality Chairs, and wall posters showing plant Layout in colour printed sheets.

- All open storage spaces to be paved and made with concrete floor.

- Navatal locks to be provided for all doors.

- Approved coloured Paver blocks to be provided in parking areas.

18. Landscaping

To enhance the overall site environment a beautifully articulated landscape of the surrounding area has to be developed. Whole premises must be properly micro leveled and graded to help in cooling and enhance the microclimatic condition of the site.

a. Adequate Trees those can grow in the local soil & climatic conditions will be planted in proper sequence to provided greenery to site location.

b. Water tapping points will be provided at convenient locations for watering the plants.

c. Seasonal plants for gardening will be provided at strategic locations near office premises only.

d. One no. water fountain will be provided in front of Office building.

e. Green Hedge will be provided on both sides of the roads near office premises only.

f. Gardening with fencing without boundary wall around the buildings and vacant spaces, turfing and peripheral border plantation for the remaining area will be provided.

19. Statutory Requirements

19.1 All the applicable statutory rules pertaining to Indian Factories act, Factory rules of state government, Fire safety rules of LPA, Water act of Pollution Control Boards, Explosives act etc. and stipulations of other relevant statutory authorities will be taken into consideration at the time of design.
19.2 Provisions of safety, health and welfare according to factories act will be complied with design stage. These will include provision of fire escape, locker room for workmen, pantry, toilets rest room etc.

19.3 Adequate number of fire escapes will be provided in a building. Fireproof doors, number of staircases, fire separation walls, lath plastering on structural steel member (in fire prone areas) will be made according to the recommendation of LPA. For fire safety requirements of buildings IS: 1641 and IS: 1642 will be followed in addition to LPA requirements. All masonry firewalls will be minimum 345 mm thick and RCC firewall will be minimum 200 mm thick.

19.4 Any other work required for completeness of the project in all respects shall be the part of the scope of this package.

20. **List of Furniture:**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) For each Office Buildings:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Tables</td>
<td>i) May Fair</td>
<td>- 01 Nos.</td>
</tr>
<tr>
<td></td>
<td>ii) T-104</td>
<td>- 15 Nos.</td>
</tr>
<tr>
<td></td>
<td>iii) T-9</td>
<td>- 10 Nos.</td>
</tr>
<tr>
<td></td>
<td>iv) T-8</td>
<td>- 34 Nos.</td>
</tr>
<tr>
<td>• Chairs</td>
<td>i) PCH 9101 R</td>
<td>- 01 Nos.</td>
</tr>
<tr>
<td></td>
<td>ii) PCH 7002</td>
<td>- 15 Nos.</td>
</tr>
<tr>
<td></td>
<td>iii) CH-7</td>
<td>- 44 Nos.</td>
</tr>
<tr>
<td></td>
<td>iv) CH-4</td>
<td>- 50 Nos.</td>
</tr>
<tr>
<td>b) Conference Room</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Table</td>
<td>Conference table (40 seater) to be design to suit the site</td>
<td></td>
</tr>
<tr>
<td>• Chair</td>
<td>i) PCH7003</td>
<td>- 40 Nos.</td>
</tr>
<tr>
<td>• Vertical Filing Cabinet</td>
<td>i) 4 Drawer VFC</td>
<td>- 30 Nos.</td>
</tr>
</tbody>
</table>

Note:
1. The model indicated is for Godrej make for reference purpose.
2. The bidder shall supply Godrej or equivalent approved makes.
3. Canteen furniture shall be excluded from scope of supply.
21. **Drawings:**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>i.</td>
<td>Site plan &amp; Landscape drawings to be furnished during detail engineering</td>
<td>Suitable scale</td>
</tr>
<tr>
<td>ii.</td>
<td>Floors + Roof Plans</td>
<td>1:100 scale</td>
</tr>
<tr>
<td>iii.</td>
<td>Elevations</td>
<td>1:100 scale</td>
</tr>
<tr>
<td>iv.</td>
<td>Sections</td>
<td>1:100 scale (through stairs and toilets must)</td>
</tr>
<tr>
<td>v.</td>
<td>Part sec. &amp; details, Sch. &amp; det. Of Door, Windows &amp; finishes, det. Of water supply &amp; sanitation fixtures &amp; service lines. To be furnished during detail engineering.</td>
<td>1:50, 1:25, 1:10 or any suitable scale</td>
</tr>
</tbody>
</table>
06.05  **GENERAL LAYOUT**

**General**

Technical Up gradation and Expansion of Bhilai Steel Plant to 7.0 MT of Steel is Planned. New units like, Wagon Tippler, Track Hopper Building, the conveyor galleries and junction houses, etc. have been envisaged and located at the periphery of the plant.

The land for the above proposed facilities is slightly undulating and shall require earthwork. However the earthwork is not covered under the scope of this package and the bidder shall be given a fairly leveled ground.

Notwithstanding this the bidder shall have to include micro-levelling in their scope. Apart from this any earthwork required for roads and drainage shall also be in the bidder’s scope.

1. **New RMHS Yard**

The raw material storage and blending yard is located between the existing ash pond and SMS muck dump area and south of peripheral unloading yards. This area is fairly flat with gentle slope towards south. Conveyor from proposed RMHS Yard shall pass through HT Lines and a number of tracks and existing facilities. Bidder has to keep adequate clearances with these existing facilities during detailing of the conveyor & obtain approval of BSP.
2. **Location of Wagon Tippler, Track Hopper & Railway Track Work**

**Wagon Tippler**

A New Wagon Tippler building has to be built towards South – East of existing track hopper building of the peripheral yard.

The New Wagon Tippler is located in such a way that on both pre-tippling side track and post tippler side full rake of BOXN wagons can be accommodated. The pre-tippling and the post tippling sides of the new tippler are kept the same as that of the pre-tippling and the post tippling sides of the existing tippler for operational flexibility.

The location of new wagon tippler building is very close to the track hopper building and the existing running tracks. As such bidder has to give special attention during construction of new tippler and interconnecting underground conveyor tunnels to keep the existing road traffic maintained by providing temporary diversion. The bidder has to submit plan for any shut down requirement during the construction of tippler and associated works. Bidder will also be required to submit a working methodology for civil construction for above work without disturbing existing adjoining railway tracks and road.

The new tippler and the railway tracks structure within tippler building shall be designed in line with the guide lines given by Member (Traffic), Railway Board regarding the introduction of New Wagons with higher gross load up to 110t.
Track Hopper

The New Track Hopper Building is located between the existing ash pond and SMS muck dump area on south of peripheral unloading yards & is part of the proposed Merry–go–round system. The railway bulb of Merry-go-round system shall be finally connected with the Marouda Exchange Yard via peripheral unloading yard.

Planning, design and construction of associated railway track work and cross drainage work shall be taken up under different packages. As such the same is excluded from the scope of this TS. However railway track within the tippler / track hopper building is included in the scope of work of successful bidder. Similarly OHE (Over Head Electrification), signaling work for additional railway lines to be provided for proposed tippler shall also be taken up separately.

Scope of Work

The scope of work of the bidder shall cover the following:

1. Supply, erection of IRS 60 Kg rail within the tippler / track hopper building including all fittings, fixtures required.

2. Supply, Transportation, Erection & Testing and Commissioning of electronic rail weigh bridge including construction of weigh room and obtain approval of Railway if required.

Brief specifications of the jobs under scope of work are indicated below:

1. **Railway Track Work within Tippler/Track Hopper Building**

   60 Kg rail along with fixtures / fittings shall confirm to Indian Railway Specification.

2. **Rail Weigh Bridge**

   For weighment of incoming and outgoing general purpose wagons of Indian railways / plant owned wagons electronic type In-motion rail weigh bridges have been envisaged. The intent of this specification is to enable the bidder to design, supply, erect, test and get stamping by weights and measures department of Govt. of Chhattisgarh along with RDSO Certification and arrangement of test wagons from SEC Railway and commissioning together. Despatch from works and receipt at site loading / unloading / handling of weigh bridge equipments / materials and arrangement test wagons from S.E.C. Railway are within bidder’s scope.

   The bidder shall also include in the offer the civil & structural work for weigh bridge foundations and weigh room. The weigh room shall be
of hexagonal type heavy duty, front and side glasses of 8m x 4m x 3m double door with hydraulic door closure, 2 nos. of 1.5 t capacity split A.C. and 36” ceiling fans, 4 nos. table, 6 nos. chairs. Indoor & outdoor illumination with HPSV lamp shall be provided. Proper earthing of all electrical installation will be carried out as per IE rules and IS:3043. Special RF earthing will be provided for electronic installation.

The rail weigh bridge shall satisfy the following basic requirements:

<table>
<thead>
<tr>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of rail weigh bridge</td>
<td>2 Nos. electronic type in-motion 150 T capacity</td>
</tr>
<tr>
<td>Types of wagons to be weighed</td>
<td>General purpose wagons of Indian railways (8 wheels wagons) like BOX, BOBR, BOBRN, BOXN, BOXNHS, BOI, BOBS etc.</td>
</tr>
<tr>
<td>Capacity of weigh bridges</td>
<td>22.5 t per axle load with provision of upto 40 T axle load in future to suit the future railway wagons with 130 T capacity.</td>
</tr>
<tr>
<td>Overload capacity of weigh bridge</td>
<td>150% of rated capacity</td>
</tr>
<tr>
<td>Railway track gauge</td>
<td>1676 mm</td>
</tr>
<tr>
<td>Rail section</td>
<td>52 Kg / 60 Kg</td>
</tr>
<tr>
<td>Increment</td>
<td>10 Kg</td>
</tr>
<tr>
<td>Calibration</td>
<td>Auto calibration with auto zero and auto gain compensation.</td>
</tr>
<tr>
<td>Weighment accuracy</td>
<td>For in-motion weighment, the error shall not be greater than 0.2% for whole train load. For individual wagons the error shall not exceed 0.5%.</td>
</tr>
<tr>
<td>Speed while weighing</td>
<td>4 Km / hr</td>
</tr>
</tbody>
</table>
System

The system shall be made of electronic integrated circuits consisting of microprocessors with high operational reliability, long life and standardised connections. The microprocessors shall have programming facility for auto calibration with auto zero and auto gain.

The system shall be capable of being interfaced with the main computer situated at a different location.

Load Cells

Load cells shall be provided in adequate number of reputed make, confirming to OIML / NTEP Standard preferably digital type. They shall be splash and dust proof. The enclosures shall conform to protection category IP 67 or IP 68. These shall be environmentally insensitive against humidity, dust, pollution and high ambient temperature which may rise to about 55°C near the railway track.

Output signal from the load cells shall be large enough to make it insensitive to the electrical disturbances.

Load cells shall be capable of giving very accurate measurements.

The load cells shall be heavy duty type capable of withstanding safe overload of about 150% of rated capacity and ultimate overload of 300% of rated capacity.
Electronics

The system shall be micro-processor based and have adequate memory storage for batching data, tare weight, identification etc. It shall be modular in design having features like diagnostics, calendar clock, battery back-up for retention of memory for minimum 30 minutes during power failure. The system shall have a power stabilizing unit to provide protection from the power mains variation and other interferences. It shall be provided with digital indicating devices to indicate each weighment. The indication shall be clear, distinct and unambiguous.

It shall have provision for acceptance of additional information to be entered externally through keyboard and to process them. It shall be capable of computing the net weight automatically.

Visual Display Unit

A robust, dust-proof wall mounted / cabinet type / desk model with prominent display screen shall be provided. The display shall be clear, distinct and unambiguous and means shall be provided for ensuring that the indication at changeover point is stable. The size of the screen shall be adequate to display all information. The PC based system with colour monitor shall be provided with a keyboard unit having arrangement to enter all the information.

Internal Plant Road
An internal road network has been planned to cater to the needs of various plant units and auxiliary services. Bidder has to include these roads under scope of work. The technical specification of the road has been detailed out in other chapter. These roads will be connected to main plant roads which are outside the scope of this package.

Yard Master Building:

Yard master building (Civil) of size 24mx11mx8m (2 storey) has been envisaged in between existing Track Hopper Building & proposed new Wagon Tippler Building. For civil design refer chapter no.-06.02 of CIVIL.
06.06  SUB-STORES

One no. Sub-stores for the Ore Handling Area shall be provided with a covered area of **9 x 18 m** and an open fenced area of **18x18m** adjacent to it. Suitable road approaches will be provided for effective movement of material to and from the Sub-store.

A supervisor’s cabin and a toilet block shall be provided in the Sub-Store. An open fenced yard adjacent to the Sub-Store of 18mx18m shall also be provided to temporarily store material like belt-conveyor rolls and other spares which can be stored out-doors. The enclosed drawing No. MEC/S/9101/11/17/00/00/060.B07/R0 shows the layout / scheme.

A 5t Capacity Single-Girder Under slung (for the covered area) and a 2t capacity Fork Lift Truck shall be provided to handle various materials. Steel racks, wheel barrows and various other facilities/ equipment shall be envisaged as given below:-

Equipment for sub-store

<table>
<thead>
<tr>
<th>SI No</th>
<th>Equipment Description</th>
<th>Estimated Quantity</th>
<th>Area of operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Single-girder Under-Slung Crane of 5T Capacity</td>
<td>1 No.</td>
<td>Within covered sub-store</td>
</tr>
<tr>
<td>2</td>
<td>Steel adjustable Racks</td>
<td>12 rows of 12m</td>
<td>Inside the Sub-store leaving a central aisle of 6m</td>
</tr>
<tr>
<td></td>
<td></td>
<td>length each upto a</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>height of 8m</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Hand Trolleys</td>
<td>2 nos.</td>
<td>General</td>
</tr>
<tr>
<td>4</td>
<td>Double Wheel Barrows</td>
<td>2 nos.</td>
<td>General</td>
</tr>
<tr>
<td>5</td>
<td>Battery operated fork lift truck (2t)</td>
<td>1 no.</td>
<td>Whole sub-stores complex</td>
</tr>
</tbody>
</table>
06.07 AREA REPAIR SHOP

06.07.01. General

The Area Repair Shop for new OHP-II will have a covered area of $9 \times 18$ m and will be suitably/centrally located keeping in view the large area of the OHP-II package. The Area Repair Shop will have road link and suitable road approach will be provided for effective movement of material/products to/from the shop.

In the shop there will be a supervisor’s cabin, store-room and toilet block. Services facilities e.g. compressed air, drinking/industrial water will be provided from the inter plant distribution network. Minor nature or repair & maintenance work will be carried out in the area-repair-shop. The enclosed drawing Mo.MEC/S/9101/11/00/00/061.B08/R0 shows the scheme/layout of the Area repair shop.
List of equipment envisaged for the Area Repair Shop are given hereunder:

<table>
<thead>
<tr>
<th>SL No</th>
<th>Equipment</th>
<th>Broad Specification</th>
<th>Qty</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Center Lathe Model- NH-22</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Center Lathe Model- NH-26</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Hydraulic press m/c</td>
<td>Suitable capacity</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Shaping machine Stroke= 630 mm</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Bench Drill Cap = 20 mm</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Column Drill Cap in steel 25 mm</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>DE Pedestal Grinder</td>
<td>Wheel dia = 300 mm</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Power Hacksaw Job dia=300 mm</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Hydraulic puller 12t cap</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Electric Hand grinder</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Welding Transformer 400 A(2nos.)+600A(2nos.)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Welding Rectifier 600 Amp</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>13</td>
<td>Gas cutting Machine (PUG)</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Marking Plate</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>Fitter’s bench with vice</td>
<td>Size = 1500x800x 850 mm</td>
<td>2</td>
</tr>
<tr>
<td>16</td>
<td>Tool Cabinet</td>
<td>Size = 1200x600x 2000 mm</td>
<td>4</td>
</tr>
<tr>
<td>17</td>
<td>Induction type heater</td>
<td>Suitable size</td>
<td>1</td>
</tr>
</tbody>
</table>
06.07.02. TECHNICAL SPECIFICATION OF REPAIR POST EQUIPMENT

A) Mechanical (General)

01. This document covers different types of Mechanical Equipment as per equipment wise technical data /features / Specifications given against each under table 06.07.

02. The design and construction of the machine tools and accessories shall incorporate the latest features to ensure high precision, productivity and flexibility. Material shall be new and the workmanship shall be of very high standard with regard to accuracy, rigidity, power, safety, material, electrical, control, ergonomics, aesthetics etc.

03. All controls, push buttons etc., shall be conveniently grouped and located within easy reach of operator.

04. A complete set of service tools levers, cranks etc. shall be supplied with each equipment without any extra cost for easy operation and maintenance. Minimum three copies of instruction manuals, showing operation and maintenance procedures, major drive and greasing diagrams, electric circuits, lubrication and hydraulic circuits etc. shall be supplied with each equipment.

05. All equipment shall be so packed as to avoid any damage to finished surfaces. Finished surface shall be coated with corrosion preventive compound and covered by oil paper.

06. The components of all equipment shall be designed assembled and tested in accordance with Bureau of Indian Standards, wherever available. In case where suitable Indian Standards are not available/ not specifically indicated, the equipment shall conform to other applicable
international standards

07. Standard and optional accessories:

   a) A list of standard accessories offered along with each equipment shall be submitted along with the tender.
   b) In respect of optional accessories, item-wise technical details and prices shall be submitted to enable Owner/Consultant to choose from.
   c) If any of the optional accessories is factory assembled and cannot be retrofitted, the same shall be highlighted.
   d) First fill of oil and lubricants etc will be part of supply.

B) Electrical (General)

01. Scope of work

   The scope of work involves supply, testing, commissioning of all electrical equipment (viz. Drives and controls) coming as part of machine tool/equipment specified in table 06.07 above.

02. Design criteria: All electrical equipment and cable shall be designed, used and tropicalised for following Indian conditions.

<table>
<thead>
<tr>
<th>a)</th>
<th>Site condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>Installation</td>
</tr>
<tr>
<td>ii)</td>
<td>Altitude</td>
</tr>
<tr>
<td>iii)</td>
<td>Ambient temperature</td>
</tr>
<tr>
<td>iv)</td>
<td>Relative humidity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>b)</th>
<th>Systems data</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>Supply voltage</td>
</tr>
<tr>
<td>ii)</td>
<td>Rated frequency</td>
</tr>
</tbody>
</table>
### iii) Combined voltage and frequency variation

± 10%

### iv) Phase and wires

3 phase 4 wire

### v) System grounding

Solidly grounded

The equipment shall be designed for connection of Aluminium power cables of adequate Size.

Each unit and component shall be clearly labelled in accordance with the relevant wiring diagrams and control scheme.

Special attention shall be given to provide danger boards, guards, rubber mats in front of open type of panel boards and switch boards and all other relevant safety devices.

Wherever multiple interlocks are used, a selector switch and lamp shall be provided for the state of each interlock circuit. Provision shall be made for out of sequence operation for testing.

#### 03. a) Motor

i) The motor shall be squirrel cage induction motor, totally enclosed, fan cooled TEFC) type and with IP: 54 degree of protection as per IS: 4691-1985.

ii) The motor shall conform to IS: 325-1996 and shall comply with IEC frame size.

iii) Motor shall have class "F" insulation with maximum temperature rise permissible as per standard, above an ambient of 45°C, by resistance measurement method.

iv) Preferred make of motors: Siemens / Kirloskar/ Crompton Greaves /
Alstom.

b) Motor Starters

i) Motor starter shall be DOL, sheet steel enclosed with IP-54 enclosure of a reputed [like Siemens / L&T/ Yule and chosen correctly taking into account motor rating, duty and cable termination size and conform to IS: 8544 (Part-I) 1977.

ii) Starter shall consist of:

- Air break contactor
- Thermal overload relay with single phase prevention feature
- Push buttons - start / stop / O/L Reset indicative lamps ON/OFF/Trip on O/L
- Incoming and outgoing terminals.

04. Cables

a) All power cables shall be 650V/1100V grade PVC armoured aluminium cables as per IS:1554:1988.

b) All control cables shall be 650V/1100V grade PVC armoured 1.5 sq. mmn copper cables.

05. Each machine shall be connected to a single source of power. Distribution of power to the drives of a machine shall be the integral part of the machine.

06. Protective Measures
Short circuit protection Every machine shall be provided with short protective device at the point of entry of the main supply cables to the equipment

Over load and single phase preventer - Each motor shall be independently protected against overload. A three phase motor shall also be protected against single phasing. Overload relay with limit in single phase protection may be used.

Low voltage protection - Low voltage protection shall be provided and arranged so that the machine will not start up again of itself when, following an interruption the supply is restored.

07. Control circuit

The control circuit shall be fail safe. Every endeavour shall be made to arrange the control circuits so as to ensure in all circumstances the safety of personnel, even in the event of faulty operation, and to protect effectively the machine and work piece, irrespective of a failure of the apparatus or a faulty manoeuvre of the operation.

A machine tool shall be provided with devices enabling

a) to stop the machine as fast as possible in case of emergency and

b) to disconnect the whole equipment from the supply voltages.

08. Protection shall be provided to prevent contact being made accidentally with live parts at a voltage of more than 50V.

09. Earthing
All metal parts of the machine tool and accessories in which electrical equipment is contained whether an integral part of the machine tool itself or whether moving or independently mounted, shall be connected together electrically so that entire machine tool is effectively earthed.

A three phase machine will be provided with 2 earthing terminals. Cross-sectional area of the earthing terminal shall be 16 sq. mm or 50 percent of that of the main supply conductor whichever is higher.

10. All electrical equipment shall be legibly and indelibly marked in such a way as to be readily visible when the equipment is installed.

There shall be at least one name plate with following details:

a) Name of the manufacturer of the electrical equipment, or his trade mark.

b) Nominal voltage with indication of DC or AC and the frequency.


The equipment Manual (operation & maintenance) shall contain the following:

a) Installation drawing

b) Circuit or schematic diagram

c) Sequence of operation

d) Wiring diagram

e) List of units in the equipment

t) Maintenance instructions, if any.

12. The following tests shall be conducted on all welding sets:
a) Insulation resistance test  
b) Voltage test  
c) Resistance to earth test  
d) No load operating test

13. Additional details to be furnished along with Tender  
a) Supply voltage and frequency with upper and lower limits and number of phases required by the equipment.  
b) Type, number, KW rating of drives  
c) Power and control circuit diagrams.

06.07.03. Technical data of specific machine/equipment

A) Welding Rectifier- (600A) : Qty: 4 nos.

Wheel mounted fully thyristorised MMA welding rectifier for use in repair post conforming to relevant & latest Indian/International standards. The machine shall be new, commercially proven and equipped with all standard/essential accessories as per the following specifications:

Technical Specifications:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supply Voltage</td>
<td>415V ± 10% 3 phase, 50 Hz</td>
</tr>
<tr>
<td>2</td>
<td>Rating at 60 % duty cycle</td>
<td>40 KV A</td>
</tr>
<tr>
<td>3</td>
<td>Welding current range</td>
<td>10-600 Amps DC</td>
</tr>
<tr>
<td>4</td>
<td>Open circuit voltage(max)</td>
<td>100 volt DC</td>
</tr>
<tr>
<td>5</td>
<td>Welding current at 60% duty</td>
<td>600 Amp DC</td>
</tr>
<tr>
<td>cycle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Type of welding current regulation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Step less</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Insulation class</td>
<td></td>
</tr>
<tr>
<td></td>
<td>H</td>
<td></td>
</tr>
</tbody>
</table>

Features:

- High capacity and excellent welding properties.
- High open circuit voltage for easy striking and restriking.
- Light weight, reliable and robust in construction.
- Six phases ripple free DC output to ensure excellent welding quality.

Accessories:

1) Electrode holder  
2) Hand screen  
3) Head screen  
4) Chipping hammer  
5) Hand gloves (leather)  
6) Wire brush  
7) Apron  
8) Welding cable in suitable length with lug  
9) Earthing cable in suitable length with lug & earthing clamp.  
10) Set of operation, maintenance & spare parts manual

B) Welding Transformer- (600 A): Qty: 2 nos.

Wheel mounted natural air cooled manual welding Transformer for industrial use. The machine shall be new commercially proven, conforming to relevant Indian/International standards and also equipped
with all standard / essential accessories as per the following specifications:

Technical Specifications:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supply Voltage</td>
<td>415V ± 10% 3 phase, 50 Hz</td>
</tr>
<tr>
<td>2</td>
<td>Welding current range</td>
<td>70-600 Amps</td>
</tr>
<tr>
<td>3</td>
<td>Open circuit voltage(max)</td>
<td>100 volt DC</td>
</tr>
<tr>
<td>4</td>
<td>Welding current at 60% duty cycle</td>
<td>600 Amp</td>
</tr>
<tr>
<td>5</td>
<td>Type of welding current regulation</td>
<td>Step less</td>
</tr>
<tr>
<td>6</td>
<td>Insulation class</td>
<td>H</td>
</tr>
<tr>
<td>7</td>
<td>Protection class</td>
<td>IP-23</td>
</tr>
</tbody>
</table>

Features:

- High capacity and excellent welding properties.
- High open circuit voltage for easy striking and restriking.
- Light weight, reliable and robust in construction for all working environment.

Accessories:

1) Electrode holder
2) Hand screen
3) Head screen
4) Chipping hammer
5) Hand gloves (leather)
6) Wire brush  
7) Apron  
8) welding cable in various length with lug  
9) Earthing cable in various length with lug & earthing clamp.  
10) Set of operation, maintenance & spare parts manual  


Wheel mounted natural air cooled manual welding Transformer for industrial use. The machine shall be new, commercially proven, conforming to relevant Indian/International standards and also equipped with all standard / essential accessories as per then following specifications:

Technical specifications:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supply Voltage</td>
<td>415V ± 10% 3 phase, 50 Hz</td>
</tr>
<tr>
<td>2</td>
<td>Welding current range</td>
<td>70-400 Amps</td>
</tr>
<tr>
<td>3</td>
<td>Open circuit voltage(max)</td>
<td>80 volt</td>
</tr>
<tr>
<td>4</td>
<td>Welding current at 60% duty cycle</td>
<td>315 Amp</td>
</tr>
<tr>
<td>5</td>
<td>Type of welding current regulation</td>
<td>Step less</td>
</tr>
<tr>
<td>6</td>
<td>Insulation class</td>
<td>H</td>
</tr>
<tr>
<td>7</td>
<td>Protection class</td>
<td>IP-23</td>
</tr>
</tbody>
</table>

Features:

- High capacity and excellent welding properties.
• High open circuit voltage for easy striking and restriking.
• Light weight, reliable and robust in construction for all working environment.

**Accessories:**

1) Electrode holder
2) Hand screen
3) Head screen
4) Chipping hammer
5) Hand gloves (leather)
6) Wire brush
7) Apron
8) Welding cable in various length with lug
9) Earthing cable in various length with lug & earthing clamp.
10) Set of operation, maintenance & spare parts manual

**D) Gas Cutting Machine (PUG):**  
Qty: 1 no

Portable gas cutting machine for use in repair post to cut straight line, circle and bevel edges. The machine shall be light weight for easy portability, the body should be covered with asbestos heat deflector.

The machine shall be new, commercially proven conforming to relevant Indian / International standards and shall be equipped with all essential accessories/attachments.

**Technical Specification:**

<table>
<thead>
<tr>
<th></th>
<th>Square cut</th>
<th>up to 100 mm MS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Bevel cut (up to 45°)</td>
<td>up to 75 mm MS</td>
</tr>
</tbody>
</table>
3 Circle  75-1150 mm dia
4 Cutting speed  200-800 mm/min
5 Cutter  NM -Type

Features

- Light weight for easy portability
- Extendable track to produce straight cut, square or bevel edges
- Circle cutting by using suitable attachments

Accessories

1) Torch
2) Hose
3) Gloves
4) Screen
5) Apron
6) Set of operation, maintenance & spare parts manual

E) Bearing puller  -  Qty.- 1no.

Puller type  :  Mechanical
Construction  :  twin grip type
Size  :  250 mm
Capacity  :  12 t

F) Pedestal Grinder (Twin Wheel)  Qty: -1 no.

Double ended pedestal grinder for grinding application in central workshop. The machine shall be new. commercially proven, conforming to the relevant Indian/ International standards and shall be equipped with all standards and shall be equipped with all standard/ essential
accessories (viz, electrics, centralised lubrication etc. ) as per the following specification.

Technical Specification

Size of Grinding wheel : 300x40x50.8 mm  
Wheel centre distance : 645 mm  
Base to centre line of spindle : 860 mm  
Motor rating : 1.5 KW (min.)  
Motor speed : 1440 ( rpm )

Features :

- Sturdy construction for vibration free working.
- Ergonomical design
- Dynamically balanced

Accessories :-

1) Complete electrical equipment
2) Set of grinding wheels
3) First fill of oil, grease and lubrication.
4) Foundation bolts, leveling wedges, anchor bolts
5) Set of operation maintenance & spares parts manual

Spares:

Set of spares for 2 years normal operation
06.07.04. DATA TO BE FURNISHED ALONG WITH THE BID

01. The following important technical details of the equipment offered shall be furnished along with the tender:

02. Catalogues and technical literature giving general description, specifications, general arrangement requirements of power and other services viz. air, water important features of main equipment and accessories.

03. Questionnaire given below shall be filled up to ensure completeness of data and submitted along with the tender:

03.1 General:

i) Bidder's registered name and address

ii) Name and address of Bidder's representative to whom all references can be made for expeditious coordination

iii) Total estimated shipping weight / volume of each of the items offered

iv) Manufacturer's company profile and reference list of similar equipment supplied indicating following:

a) Description:

b) Model number:
c) Year of supply :

d) User's address

.03.2 Technological

i) Make :

ii) Model

iii) Details of lubrication system

iv) Construction of the machine :
   a) Base
   b) Column :
   c) Drill head :

v) List of commissioning / 2-years operation spare parts for mechanical, electrical systems

vi) Overall dimensions of the machine-L x W x H, mm

vii) Weight of single largest piece to be handled during maintenance, kg

viii) Max. weight of job, kg :

ix) Weight of machine with standard accessories, kg

x) Type of foundation (whether of : concrete / floor mounting, etc)
xi) Type of foundation  
(whether of: concrete /  
floor mounting, etc)

xii) Accuracy standard  
followed: (please enclose  
copy of test chart of  
machine or similar  
machine already  
delivered)

xiii) After sales service
xiv) List of standard  
accessories

xv) List of optional  
accessories:

xvi) Safety features available

xvii) Instruction manuals  
(standard: supply)

xviii) Reference list

xix) Blank price bid along with  
techno-commercial bid (  
to be enclosed)

.03.3 Electrical

i) Motor:  
a) Type  
b) Make  
c) Rating  
d) Voltage
e) Current  
f) RPM  
g) Degree of protection  
h) Class of insulation  
i) Temperature rise over 45°C ambient  
j) Starting torque/pullout torque  

ii) Starter  
  a) Type  
  b) Make  
  c) Enclosure  
  d) Degree of protection  
  e) Make and rating of contactor  
  f) Make and range of O/L relays  
  g) Whether O/L relay is with single phase prevention feature  
  h) Provision of ON/OFF/O/L reset buttons  
  i) Provision of tripped on O/L lamp  

iii) Cable  
  a) Make  
  b) Type  
  c) Size  
  d) Schematic electrical diagram  

04. List of recommended spares for two years operation, equipment-wise  

05. Delivery schedule
06. List of special tools and tackles

07. Guaranteed technical parameters

08. Detailed testing procedures

09. Confirmation to the following:
   a) Performance test and inspection
   b) Guarantee including after sales service
   c) Data to be furnished by successful bidder

10. Un-priced break up of deliverables (standard/operation accessories and spares)

06.04.09 DATA TO BE FURNISHED BY THE SUCCESSFUL BIDDER AFTER PLACEMENT OF ORDER

01. The following documents/drawings shall be furnished by the successful bidder within four weeks from the placement of order

02. Drawings:
   a) General arrangement drawing of the equipment indicating overall dimensions, technical parameters, etc.
   b) Foundation drawing with load data for the equipment with all accessories. These drawings shall indicate the location and details of
anchor bolts, inserts, cable trenches / conduits, etc., to be built in the civil work.

c) Scheme of drawing of electrical/instrumentation.

03. Geometrical accuracy chart, performance parameter indicators and Quality Assurance plan for equipment under scope of supply.

04. Requirement of services and utilities like power, air, water, crane facility etc for commissioning and operation of machine.

05. Confirmation of technical parameters furnished in the tender and agreed upon during discussions.

06. The following documents shall be furnished during inspection/despatch of the equipment:

   a) Test certificates
   b) Operation, maintenance and service manual
   c) Complete spare parts lists with ordering information

   The lists of equivalent and alternative makes for those spare parts which are not of manufacturer's own product shall also be furnished.
06.09 WATER SUPPLY SYSTEM

01 Scope of work

The scope of work shall include design, engineering, fabrication, manufacturing, assembly & supply, erection/construction/laying, commissioning, testing & performance guarantee tests etc of plant & equipment and piping etc of complete water supply facilities including pump house buildings, civil & structural work & technological structures, electrics, instrumentation, automation, telecommunication, air-conditioning & ventilation, material handling & hoisting equipment etc as specified and required for complete water systems for the Package 061 as specified in this chapter as well as various chapters of this TS in line with General Technical Specification (GTS) and subject to Purchaser’s approval, complete in all respect on turnkey basis.

The scope of work shall include the following activities.

i) Design, engineering, manufacture /fabrication, assembly, shop testing, painting, packing sequential delivery FOR site, unloading, unpacking, storage at site, preparation & submission of all drawings for civil, mechanical, structural, piping, construction & erection drawings, construction & erection as per approved drawings, site-testing, painting, commissioning and fulfillment of guarantee performance of all plant & equipment of water supply facilities for the entire Package 061 including cooling water system, drinking water system, industrial service/make-up water system and water based fire-fighting system, in accordance with the water system requirements of the proposed plant.

ii) Supply of pipeline supports, thrust blocks/anchor blocks, R.C.C. pedestals etc. for over head / on-ground /underground pipelines.

iii) Supply of all technical literature, drawings & documents, general arrangement drawings, assembly & sub-assembly drawings of all the plant & equipment, construction & erection drawings, as-built...
drawings, operation & maintenance manuals, manufacturing drawings, etc.

iv) Submission of all drawings at (iii) above, design calculations, data sheets for various equipments, pipeline sizing calculation and for approval of Purchaser/ Consultant and finalizing the same as per approval of Purchaser/ Consultant. The approval of the same however does not absolve the Bidder from his responsibilities.

v) Supply of commissioning spares & consumables; a list there of shall be submitted by the Bidder.

vi) Bidder shall submit an itemized price-list of two years operation and maintenance spares.

vii) Supply of special tools, tackles for construction, erection operation and repair & maintenance of the plant & equipment.

viii) Supply of special tools and tackles, spares as mentioned in GTS shall be in the scope of Bidder.

ix) All necessary connections for hook-up with Purchaser’s system at battery limits.

tax) Supply of erection, testing & commissioning equipment and material.

xi) Piping network flushing fluids, chemicals & consumables.

xii) First fill of oils, lubricants, filter media, resins, chemicals reagents and other consumables.

xiii) Inspection and performance testing of individual equipment and system as a whole.

xiv) Participation in design conference with the Purchaser & Consultant as and when called for.

xv) Diversion/relocation of existing water lines required for the installation of the proposed units of the Package 061.

The Bidder’s scope also includes extension of fire-fighting line, drinking water line and industrial water line from the battery limits to various consumer
points of the proposed Package 061 in line with the present technical specification and GTS.

02 Battery Limit
All water tappings except construction water (construction water shall be one point feeding) shall be made by the Bidder through two points (~10-15m apart) from the Purchaser's network through isolation valves; make-up water tappings shall be through flow meter with requisite isolation valves on either side and by-pass arrangement.

a) Industrial water

Industrial quality make-up water (quality as indicated in GTS) will be made available to the Bidder at one point within 100 m from the proposed Package 061 area at a pressure of approximately 1.0 kgf/cm².

b) Drinking water

Drinking water will be made available to the Bidder at one point within 100 m from the proposed Package 061 area at a pressure of 1.5-2.0 kgf/cm².

c) Fire-fighting water

Industrial quality water (quality as indicated in GTS) will be made available to the Bidder at one point within 100 m from the proposed Package 061 at requisite pressure. Bidder shall furnish the pressure requirement at the battery limits for fire-fighting water duly corroborated with design calculation and subject to Purchaser's approval.

d) Construction Water

Construction water will be made available to the Bidder at one point at about a pressure of 1.0 kgf/cm² within 100 m from the proposed
Package 061 for construction activities at site pertaining to this package. The Bidder shall extend the construction water pipeline from the battery limit for his usage through isolation valve; on-line boosting of construction water is not permitted.

03 Specification and Description of Work

Water System Facilities:
Water system shall in general include the following facilities:-

a) Cooling water system,
b) Make-up water system,
c) Water conditioning system
d) Drinking water system,
e) Water based fire-fighting system,
f) Water system for air conditioning and ventilation,
g) Service water system,
h) Dewatering system for underground premises,
i) Interplant pipelines.

a) Cooling Water System

i) For cooling of plant and equipment of the air-compressor unit there shall be a separate cooling water re-circulation system for each unit / sub-system with pumps, cooling towers and piping network. Bidder shall provide a separate pump house to house compatible group of pumps. Separate group of pumps and separate piping shall be provided for each sub-system to enable flexibility in operation.

ii) The cooling water system shall be supplied in line with the GTS with regard to design norms (including no. of
standby pumps, type of pumps, valves and piping design) and subject to Purchaser’s approval.

iii) The total cooling water to the units shall be filtered through simplex strainers. For this simplex strainers (1W+1S) of 500 microns filtration grade shall be installed on each of the two supply headers complete with isolation valves. Strainers shall be backwash type.

iv) The cooling water circuits shall be provided with chemical conditioning system to control corrosion and scaling and prevent bio-fouling. To reduce blow-down higher cycle of concentration shall be targeted.

v) Pump houses shall be provided with air-washer based air-conditioning and ventilation system.

vi) With a view to conserve and save upon fresh water requirement the Bidder will plan to utilize/ reuse/ recycle the reject/blow-down from the cooling water systems in the plant with necessary treatment etc. as specified by the Purchaser.

vii) Make-up water for cooling water re-circulation system for the compressor will be tapped from the Purchaser’s existing industrial water network as mentioned under the clause for Battery Limits and will be conveyed to the various consumers through a pipe network.

b) Make-up Water System

1. The water loss in the various processes in evaporation, process/system, minor leakages including service water requirement, etc. shall be replenished by a separate common make-up water system to be provided by the Bidder.
2. Make up water system will include extension of pipelines from the battery limit with isolation valve to the recirculation cooling water system for equipment cooling, water circulation system for ACVS facilities as well as service and process needs.

3. Make-up water will be tapped from the Purchaser’s existing industrial water network as mentioned above under the clause for Battery Limits and will be conveyed to the various consumers through a pipe network.

4. Tapping of industrial make-up water shall be based on two points feeding and shall conform to provisions of TS/GTS. Bidder shall extend the industrial water line with an isolation valve along with flow meter to his proposed systems for service/make-up water requirement for the entire plant area.

5. Quality of industrial make-up water is furnished in the GTS. This water will be supplied as make-up water to Package 061 for process & cooling needs at only one point for the entire needs of the Package 061 at battery limit as specified. The Bidder shall provide necessary treatment facility, wherever required, to make the water suitable for cooling and other purposes.

6. All make up tapings should have flow meters with by-pass arrangement with isolation facility.

7. Online boosting of the make-up water is not permitted. A makeup water sump with pumps and piping (pump house and sump are to be provided by the Bidder), if required, shall be provided.

c) Water Conditioning Systems

i) To protect the circulation water system from corrosion and scale formation and to bring the make up water to the condition suitable for the cooling water requirement of air-
compressor unit there shall be a water conditioning facility as per system requirement and inline with the details given in GTS.

ii) It shall consist of dosing tanks, pumps, valves, pipes, fitting, pipe supports and associated civil, structural, technological structures, electrical, instrumentation, material handling, air-conditioning & ventilation etc. The scope of work for all these remains the same as specified for cooling water system.

iii) These pumps may also be housed in the same pump-house for cooling water system or separately.

iv) The Bidder shall furnish the details of chemical dosing proposed for the system.

v) The Bidder shall include in the scope of supply three months chemicals requirement for the chemical conditioning system from the date of commissioning.

dl) Drinking Water System

(1) The drinking water shall be made available at one point near Package 061 within battery limit as specified. The Bidder shall extend the pipeline from battery limit with an isolation valve in a valve pit up to various drinking water consumers under the subject package.

(2) Tapping of drinking water shall be based on two points feeding and shall conform to provisions of TS/GTS. Bidder shall extend the drinking water line with an isolation valve in a valve-pit to his proposed units for drinking water requirement for the entire plant area.

(3) On-line boosting of the drinking water is not permitted. If the pressure, as indicated in battery limit parameters, is felt
inadequate for the area under the scope of the Bidder, Bidder shall provide separate sump and drinking water pumps along with piping and electrics etc. to meet the requirement.

(4) The details and specification of pumps, valves, pipes, fitting, pipe supports and associated civil, structural, electrical, instrumentation, material handling, air-conditioning & ventilation etc. for cooling water system is applicable for this system also.

e) Water based Fire-Fighting System

To cater to the needs of water based fire-fighting system, separate fire water piping networks for hydrants and MVWS system shall be provided with provision of yard hydrants and internal hydrants and spray units at regular intervals. The proposed networks shall be connected with the existing networks at the battery limits with an isolation gate valve.

The following specification of work shall be considered:-

i) Category at hazard - ordinary (as par TAC)
ii) Yard hydrants - at 45 m intervals
iii) Internal hydrants - at 30 m intervals
iv) Min. pressure at remotest hydrant - 3.5 kg/cm²

2 nos. of 15 m long hose shall be provided along with fittings for each yard hydrant and 2 nos. of 15 m long hose shall be provided along with fittings for each internal hydrant.

Tapping of fire-fighting water shall be based on two points feeding and shall conform to provisions of TS/GTS. Bidder shall extend the fire-fighting water lines with an isolation valve in a valve-pit to his proposed systems for fire-fighting water requirement for the entire plant area.
The water based fire fighting system shall be designed, supplied & erected inline with the stipulations under various clauses of GTS and subject to Purchaser’s approval. The details of the MVWS system have been dealt with separately.

f) Water Supply System for air-conditioning & ventilation

1. The entire piping network for water supply for air-conditioning and ventilation and other Systems/ Sub-systems is in the scope of the Bidder.

2. It shall consist of pumps, valves, pipes, fitting; pipe supports and associated civil, structural, technological structures, electrical, instrumentation, material handling, air-conditioning & ventilation etc. as required.

3. The details and specification of pumps, valves, pipes, fitting, pipe supports and associated civil, structural, electrical, instrumentation, material handling, air-conditioning & ventilation etc. as specified for cooling water system is applicable for this system also.

4. Makeup water for the system shall be provided by the Bidder from the make-up water network provided for the main plant. No separate connection at battery limit will be provided for this purpose.

5. Pump houses shall be provided with air-washer based air-conditioning & ventilation system.

g) Service Water System

For Service Water, pipeline network shall start from common pump house to all the transfer points of each floor and conveyor gallery. In each floor, 1 no. tapping point will be provided and for the conveyor gallery the tapping point shall be provided at every 50metre interval. For each tapping point 1 no. gate valve, hose and quick fix connection shall be provided.
For service water line each tapping point discharge rate will be 2m³/hr. and maximum 6 Nos. points can be operated at a time.

(h) Dewatering system for underground premises
Dewatering system for underground sumps shall be provided as required. The water from the sumps will be pumped to the nearest surface drainage system through pumping arrangement to be provided as per GTS and subject to Purchaser’s approval.

i) Interplant Pipelines
Industrial water for make-up water supply and general plant usage will be met through the proposed pipelines to be laid from the tapping points /source points to various consumers within Package 061.

Drinking water network and fire-fighting water network will be provided to various consumption points in the proposed Package 061.
All the water lines including make-up water, fire-fighting water, drinking water, process and cooling water lines and service water lines will generally be laid over-ground.

Design Criteria
Efficiency, reliability and flexibility of operation and maintenance will be the guiding criteria of the design of the water system for the proposed plant.
Water system shall be designed as per TS/GTS and subject to Purchaser’s approval.

04 Erection, Testing and Commissioning
1. The erection of all plant and equipment shall be carried out according to the latest engineering practices and according to the
drawings, specifications, Instructions etc. duly approved by the Purchaser.

2. The welding work should be carried out as per the approved WPS and PQR.

3. The successful Bidder shall supply all required manpower, tools and related equipment, all hoisting equipment, all necessary scaffoldings, all necessary transporting equipment, consumables. Construction and erection materials, petrol, diesel oil, kerosene, solvents, sealing compound, tapes, brazing and soldering materials, welding and brazing gases, erection bolts, nuts and packing sheets/compounds, temporary supports, wooden blocks, spacers, templates, jute and cotton wastes, sand/emery paper etc. as required for the satisfactory completion of work.

4. After erection, all equipment having moving part, subject to pressures or voltages shall be given trial operation. The trial operation shall consist of 72 hours of continuous operation. All modifications and rectifications required during the trial operation or required for proper operation shall be done at his own cost by the Bidder as accepted by the Purchaser.

5. Rotating equipment shall be checked for proper direction of rotation and shaft alignment. Equipment subject to pressures shall be carefully examined for leakage. All equipment, such as pressure taps, temperature measurement connections, flow measurement devices etc. shall be provided by the Bidder.

6. On completion of the work, the Bidder shall remove and dispose off all rubbish and other unsightly materials caused by his working to a distance of five kilometer from the Package 061 or as directed by the Purchaser and thereby leaving the premises in good, clean, safe and operable condition.
7. Before giving call for final inspection, all the documents shall be furnished to the Purchaser. The record of manufacturing details, inspection and tests carried out by the Bidder shall be made available to the final inspecting authority. However, approval and final inspection at the manufacturing works shall not relieve the Bidder of responsibility of replacing at his cost any defective part/material which may be detected by the purchaser during erection and commissioning or guarantee period.

8. All materials required for fabrication, construction, testing and inspection shall be supplied by the successful Bidder. No material shall be free issue to the Bidder.

9. No equipment or part item shall be dispatched without final inspection and issuance of inspection certificate.

10. All equipment, assemblies, sub-assemblies shall be shop tested as per relevant standards and the test certificates shall be submitted by the supplier.

11. Erection, testing & commissioning of various equipments and piping etc shall be done also inline with details given in various chapters of GTS.

05 Painting

The Bidder shall follow the painting procedure as mentioned in GTS.

06 Preferred Makes

The Bidder shall follow the list of preferred makes indicated hereinafter.
07 Drawings/Documents to be furnished along with the tender

The Bidder shall submit the following drawings/ documents along with the tender: -

1. Scheme of the complete water supply system with descriptive and illustrative literature.
2. Process flow diagram indicating the water consumption figures complete with temperature, pressure and quality requirements.
3. P&IDs of each circuit of the complete water supply system showing all the consumers, flow rate, pipe diameters, broad parameters of each equipment, instruments, interlocks, water losses etc.
4. Write-up detailing the control logic for the entire water system.
5. Duly filled in data sheets for various pumps, cooling towers, diesel engine, plate heat exchangers, Soft water plant, DM water plant, automatic filters, valves and other equipments as applicable in line with in the GTS.
6. Pipeline materials and specifications considered for various systems.
7. Layout drawing showing the battery limits of make-up water, drinking water, fire fighting water (both inlet & outlets) and the pipeline route to various consumers including requirement of make-up water, drinking water and fire fighting water at battery limits.
8. General arrangement drawings of pump houses showing tentative dispositions of various equipment and piping.
9. Catalogues, literatures and GA drawings of all equipments and valves.
10. General arrangement drawings of cooling towers, soft water plant, DM water plant as applicable.
11. List of special tools and tackles.
12. List of commissioning spares.
13. List of spares for two years of normal operation and maintenance with item wise prices.
14. Specification and capacity of all equipment, valves etc. offered by the Tenderer.

15. Details of various drives, instruments, handling & hoisting facilities, air conditioning & ventilation facilities, etc.

16. Tentative Bill of Quantities covering all equipments, valves, strainers, pipelines, etc. and associated civil, structural, electrics, instrumentation, handling & hoisting facilities, air conditioning and ventilation facilities etc.

08 Drawings/documents to be furnished by the Bidder for approval:

1. Scheme of the complete water supply system with descriptive and illustrative literature.

2. Process flow diagram indicating the water consumption figures complete with temperature, pressure and quality requirements.

3. P&IDs of each circuit of the complete water supply system showing all the consumers, flow rate, pipe diameters, broad parameters of each equipment, instruments, interlocks, water losses etc.

4. Write-up detailing the control logic for the entire water system.

5. All equipment and piping sizing calculations.

6. Data sheets for various pumps, cooling towers, strainers, filters, valves and other equipment as applicable in line with the GTS.

7. Pipeline materials and specifications considered for various systems.

8. Layout drawing showing the battery limits of make–up water, drinking water, fire fighting water and the pipeline route to various consumers including requirement of make-up water, drinking water and fire fighting water at battery limits.

9. General arrangement drawings of pump houses showing tentative dispositions of various equipment and piping.

10. Layout of piping system indicating pipe routing, location of supports, valves and other fittings as required.
11. Data sheets and technical details of all the equipments, valves and piping.
12. Catalogues, literatures and GA drawings of all equipments and valves.
13. General arrangement drawings of cooling towers,
14. List of special tools and tackles.
15. Test procedures for preliminary and final acceptance tests.
17. Test certificates for the following:
   - Material test certificate for all major equipment and their components.
   - Hydraulic test of equipment, pipe fittings & valves.
   - Static and dynamic balancing of all rotary parts/ equipments
18. List of commissioning spares.
19. List of spares for two years of normal operation and maintenance with item wise prices.
20. Specification and capacity of all equipment, valves etc. offered by the Bidder.
21. Details of various drives, instruments, handling & hoisting facilities, air conditioning & ventilation facilities, etc.
22. Bill of Quantities covering all equipments, valves, strainers, pipelines, etc. and associated civil, structural, electrics, instrumentation, handling & hoisting facilities, air conditioning and ventilation facilities etc.
23. Any other drawing/ documents as required by the Purchaser.

09 Drawings / Documents to be furnished by the Bidder for reference and record

1. The Bidder shall submit required sets of all the approved / received for reference drawings, documents and manuals for Purchaser’s record and use. Further, after erection of plant and equipment, the Bidder shall submit one set of linen tracings/ reproducible in required number
of prints along with soft copies in CD (in AutoCAD format) of each “As built drawings”.

2. Operating and maintenance manual.
3. Spare parts recommendation and price list.
4. Instruction for erection, testing and commissioning.
5. Manufacturer's test certificates.
6. Various equipment assembly drawings and bill of material.
7. Welding procedure.
8. Hydraulic test logs.
10. Operation and maintenance manuals for all equipments, valves and complete water system along with soft copies.
11. Test and calibration certificates.
12. Warranty/ guarantee certificates.
13. Technical literature, catalogues and manufacturer’s drawings for all brought out equipment, valves and other items.
15. Any other drawing/ documents as required by the Purchaser/Consultant.

10 List of vendors for Water System

<table>
<thead>
<tr>
<th>Sl No.</th>
<th>Item Description</th>
<th>Manufactures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Horizontal centrifugal Pumps</td>
<td>Kirloskar Brothers, KSB, Beacon Weir, Voltas, Mather &amp; Platt, Jyoti, WPIL (Worthington).</td>
</tr>
<tr>
<td>2.</td>
<td>Submersible pumps</td>
<td>KSB, SU Motors, Kirloskar Brothers.</td>
</tr>
<tr>
<td>3.</td>
<td>Dosing Pump</td>
<td>Shapo Tools, Asia LMI (Madras), Toshniwal, Milton Roy India.</td>
</tr>
<tr>
<td>5.</td>
<td>Sluice Gates</td>
<td>Jash, IVPL.</td>
</tr>
<tr>
<td>SL No.</td>
<td>Item Description</td>
<td>Manufactures</td>
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<tr>
<td>-------</td>
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<td>-----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>7.</td>
<td>Rubber expansion joints</td>
<td>BDK, CORI Engineers.</td>
</tr>
<tr>
<td>8.</td>
<td>CS Valves (gate, NRV)</td>
<td>Audco, Fouress, BHEL, KSB, BDK, Kirloskar, Leader, Chemtech.</td>
</tr>
<tr>
<td>9.</td>
<td>Plug Valves</td>
<td>Audco, Xomox, BDK, Tuflin, Chemtrol Samit, KSB.</td>
</tr>
<tr>
<td>10.</td>
<td>Ball Valves</td>
<td>Audco, Xomox, BDK, KSB.</td>
</tr>
<tr>
<td>12.</td>
<td>Float Valve</td>
<td>Leader, IVPL, Levcon.</td>
</tr>
<tr>
<td>13.</td>
<td>Control Valve</td>
<td>Audco, Fouress, IL, Xomox, Fluid Line.</td>
</tr>
<tr>
<td>14.</td>
<td>Solenoid Valve</td>
<td>Rotex, INDFOS, AVCON.</td>
</tr>
<tr>
<td>15.</td>
<td>Air Release Valve</td>
<td>IVPL.</td>
</tr>
<tr>
<td>16.</td>
<td>Check Valve (Zip type)</td>
<td>L&amp;T, Leader, BDK, Fouress, Chemtech</td>
</tr>
<tr>
<td>17.</td>
<td>Electric Actuators</td>
<td>Beacon Rotork, Auma, Limitorque, IL, Palghat, EL-O-Matic</td>
</tr>
<tr>
<td>18.</td>
<td>Pneumatic Actuators</td>
<td>AL Saunders, Xomox, EL-O-Matic, AUMA</td>
</tr>
<tr>
<td>19.</td>
<td>Hoses</td>
<td>Senior Flexonics, Hydrocrimp</td>
</tr>
<tr>
<td>20.</td>
<td>Pipe a) MS/GI</td>
<td>SAIL, TATA, Jindal, MAN, SAW, Welspun, Prakash, PSL, MSL.</td>
</tr>
<tr>
<td>21.</td>
<td>MS/GI Pipe Fittings</td>
<td>Tube bends, Stewards &amp; Lloyds, BST, Jindal.</td>
</tr>
<tr>
<td>Sl No</td>
<td>Description</td>
<td>As per TS</td>
</tr>
<tr>
<td>-------</td>
<td>------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------</td>
</tr>
<tr>
<td>1.</td>
<td>Layout of the OHP Part – B area including alignment of conveyors</td>
<td>To be planned within area shown in Area layout drawing of the TS.</td>
</tr>
<tr>
<td>2.</td>
<td>Supply, erection of IRS 60 Kg rail within the tippler building including all fittings, fixtures required.</td>
<td>Shall be provided as per TS</td>
</tr>
<tr>
<td>3.</td>
<td>Type of wagons to be handled within the wagon tippler.</td>
<td>General purpose wagons of Indian railways (8 wheels wagons) like BOX, BOXN, BOXNHS, BOXNH, BOXNHA and new wagons introduced by Indian Railways increasing total wagons capacity 130 T in future.</td>
</tr>
<tr>
<td>4.</td>
<td>Type of wagon to be handled within track hopper building.</td>
<td>-</td>
</tr>
<tr>
<td>5.</td>
<td>Capacity of wagon tippler &amp; rail weigh bridge</td>
<td>22.5/25 t per axle load with provision of upto 40 T axle load in future to suit the future railway wagons with 130 T capacity.</td>
</tr>
</tbody>
</table>
### BHILAI STEEL PLANT: AUGMENTATION OF ORE HANDLING PLANT WITH NEW OHP: PART B (PKG 061)
### BID ENQUIRY NO. DGM/PCC/TK/5(490)/2008/4993 dated 27.10.2008
### COMMENTS ON M/s EPI’s OFFER – Ref. no. NRO/MKT/T/422 DTD 22.01.09 DTD 05.01.09 (ANNEXURE VIIA –GENERAL LAYOUT)

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Description</th>
<th>As per TS</th>
<th>As per M/s EPI</th>
<th>Clarification sought by BSP / MECON</th>
<th>Clarification from Bidder</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Weigh room size and all accessories in weigh room</td>
<td>All accessories shall be as per TS.</td>
<td>Silent</td>
<td>Bidder has to confirm all facilities as per TS.</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Load cells of weigh bridge</td>
<td>Shall be provided in adequate number of reputed make, confirming to OIML / NTEP Standard preferably digital type as per TS.</td>
<td>Not indicated</td>
<td>Bidder has to confirm all facilities as per TS.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Weigh bridge approval and certification</td>
<td>Weigh bridges shall be approved by weights and measure department of Chattisgarh and it should also have certification from RDSO as per TS.</td>
<td>Not indicated</td>
<td>Bidder has to confirm all facilities as per TS.</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>New tippler building</td>
<td>The new tippler and the railway tracks structure within tippler building shall be designed in line with the guidelines given by Member (Traffic), Railway Board regarding</td>
<td>Not indicated</td>
<td>Bidder has to confirm all facilities as per TS.</td>
<td></td>
</tr>
</tbody>
</table>
### Sl No | Description | As per TS | As per M/s EPI | Clarification sought by BSP / MECON | Clarification from Bidder
--- | --- | --- | --- | --- | ---
<p>| | the introduction of New Wagons with higher gross load up to 130t as per TS. |  |  |  |<br />
| 10. | OHP conveyor routing | The tentative alignment of conveyor has been shown on the TS drawing. | - | OHP conveyor shall pass through nos. of existing railway tracks / existing structures. Proper clearances shall be maintained while planning of trestle locations. Bidder has to take note that certain tracks of peripheral railway yard are electrified as such proper clearances shall be maintained as per guidelines of railways. |<br />
| | | | | The statutory clearances required from SECR for crossing the conveyor shall be under scope of bidder. Only required assistance will be provided by BSP. |<br />
| | | | | The conveyor alignment shall also pass through 2 nos. of High-tension lines. Proper clearances as per safety norms shall be provided. |<br />
| 11. | Clearance of SMS slag | - | Not indicated | Some portion of SMS-I slag is spread out in the OHP-B area. Bidder has to indicate unit rate for the area clearance. |</p>
<table>
<thead>
<tr>
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<th>Clarification from Bidder</th>
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</thead>
<tbody>
<tr>
<td>12.</td>
<td>Provision of two storey Yard master building to accommodate OHP and T&amp;D staffs to sitting capacity of 30 persons out of which separate- separate rooms for 4nos. of executives with split AC and also adequate nos. of halls for staffs together with storage rooms , waiting rooms , separate toilets for male &amp; female staff with modern repute fittings . Office furniture for 30 nos. shall be also included. The yard master room shall be of civil framed structure &amp; general TS for civil shall be applicable.</td>
<td>-</td>
<td>Not indicated.</td>
<td>Bidder to confirm</td>
<td></td>
</tr>
<tr>
<td>13.</td>
<td>Rerouting &amp; Protection of existing facilities</td>
<td>Any overground / underground facilities encountered during the execution of work shall be rerouted / removed .</td>
<td>Bidder has not considered any type of dismantling.</td>
<td>Shall be included in scope of work. A list of probable underground facilities shall be provided.</td>
<td></td>
</tr>
<tr>
<td>14.</td>
<td>Construction methodology of wagon tippler and inter-connecting tunnels</td>
<td>Tenderer has to give special attention to construction of new tippler and interconnecting under-ground conveyor tunnels to keep the existing railway</td>
<td>Not indicated</td>
<td>Bidder has to confirm all facilities as per TS.</td>
<td></td>
</tr>
<tr>
<td>Sl No</td>
<td>Description</td>
<td>As per TS</td>
<td>As per M/s EPI</td>
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<td>Clarification from Bidder</td>
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<tr>
<td></td>
<td></td>
<td>traffic maintained / minimum shutdown of existing tracks without disturbing operation of the plant as per TS.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td>Lime Feeding Conveyor</td>
<td>Feeding Limestone &amp; dolomite to new lime Dolo Plant RMP-III and new SMS-III Shop</td>
<td>Not specifically mentioned.</td>
<td>The alignment of conveyor are passing from the existing area. As such Bidder has to take proper care to avoid any infringement with the existing facilities. The alignment of conveyor shall also pass through the tandula canal as such necessary clearance shall be obtained from Irrigation department of Chhattisgarh.</td>
<td></td>
</tr>
<tr>
<td>16.</td>
<td>An additional series of conveyor from OHP-1 to new junction house J-20</td>
<td>The proposed alignment of conveyors shall pass through a number of existing facilities. The Bidder has to survey the alignments of proposed conveyors along with existing facilities in the vicinity and</td>
<td>Silent</td>
<td>Bidder has to accept the clause.</td>
<td></td>
</tr>
</tbody>
</table>
### COMMENTS ON M/s EPI’s OFFER – Ref. no. NRO/MKT/T/422 DTD 22.01.09 DTD 05.01.09 (ANNEXURE VIIA –GENERAL LAYOUT)

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<tr>
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<th>Clarification from Bidder</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td>Site terracing including micro-levelling, internal roads, drainage, sewerage</td>
<td>These are under bidder's scope. Bidder to consider connection of internal roads drains and sewers to main roads, drains and sewerage network respectively.</td>
<td>Not described specifically.</td>
<td>To confirm compliance.</td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>Survey of the entire proposed alignment of conveyor &amp; proposed area under scope of work w.r.t plant grid system</td>
<td>Since this is turnkey package as such survey is included in scope of work of tenderer.</td>
<td>Silent</td>
<td>Bidder has to carry out survey prior to submitting engineering drawing for BSP/MECON’s approval under their scope of work. Bidder has to confirm</td>
<td></td>
</tr>
<tr>
<td>SI No</td>
<td>Description</td>
<td>As per TS</td>
<td>As per M/s EPI</td>
<td>Clarification sought by BSP / MECON</td>
<td>Outcome of MOM</td>
</tr>
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<td>---------------------------------------------------------------------------</td>
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<td>-------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>1.</td>
<td>Scope of work</td>
<td>Units to be covered as per T.S</td>
<td>Not indicated</td>
<td>Bidder to confirm</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Soil report</td>
<td>a) Bidder to confirm that soil investigation report to be collected/collected from Purchaser will be considered in Quotation and design shall be based on the report</td>
<td>Not indicated</td>
<td>Party to confirm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) However the design parameters regarding bearing capacity of soil etc as indicated in report shall remain firm and adhered to.</td>
<td>Not indicated</td>
<td>Party to confirm</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Drawings &amp; Documents</td>
<td>a) Bidder to submit drawings together with design calculation for approval along with load data both in soft and hard copies.</td>
<td>a) Not indicated</td>
<td>a) Bidder to confirm</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>b) Successful bidder to establish quality control laboratory at site for day to day testing and concrete mix produced by batching plant only to be used in works</td>
<td>b) Not indicated</td>
<td>b) Party to confirm</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Materials &amp; services</td>
<td>The materials &amp; services shall be as per all clauses of TS</td>
<td>Bidder not indicated</td>
<td>Bidder to confirm</td>
<td></td>
</tr>
</tbody>
</table>
### Design guidelines

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Description</th>
<th>As per TS</th>
<th>As per M/s EPI</th>
<th>Clarification sought by BSP / MECON</th>
<th>Outcome of MOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.</td>
<td>a) Design guidelines as per TS and relevant standards</td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>Bidder to confirm</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>b) All civil engineering works shall be designed and executed as per relevant IS codes.</td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>Bidder to confirm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>c) Ground water table to be considered at ground level in design</td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>Bidder to confirm</td>
<td></td>
</tr>
</tbody>
</table>

### Building requirements

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Description</th>
<th>As per TS</th>
<th>As per M/s EPI</th>
<th>Clarification sought by BSP / MECON</th>
<th>Outcome of MOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Building requirements a) for all units shall be as per TS</td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>To confirm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>b) Requirements for road, drainage &amp; sewerage system</td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>Bidder to confirm the following</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>1) Roads, drainage and sewerage</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>system within battery limit are</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>under the scope of bidder. garland</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>drains around buildings shall be of</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>brick masonry(Fly ash cement</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>bricks shall be mostly used in all</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>masonry works)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>2) Road side drains and drains in</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>stacker area/beds are of RCC</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>perforated cover slabs to be</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>provided for drains of beds</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Bidder not indicated</td>
<td>Bidder indicated</td>
<td>3) Bituminous roads to be provided</td>
<td></td>
</tr>
</tbody>
</table>

### Liquid / water retaining structures

<table>
<thead>
<tr>
<th>Sl No</th>
<th>Description</th>
<th>As per TS</th>
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<th>Outcome of MOM</th>
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<tr>
<td>7.</td>
<td>All liquid/ water retaining structures shall be designed as per provisions of IS:3370</td>
<td>Bidder not indicated</td>
<td></td>
<td>Party to confirm</td>
<td></td>
</tr>
<tr>
<td>Sl No</td>
<td>Description</td>
<td>As per TS</td>
<td>As per M/s EPI</td>
<td>Clarification sought by BSP / MECON</td>
<td>Outcome of MOM</td>
</tr>
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<tr>
<td>8.</td>
<td>Cable, Basement etc</td>
<td>All cable basements, under ground tunnels shall be designed as per limit state method.</td>
<td>Bidder not indicated</td>
<td>Party to confirm</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Foundation design</td>
<td>This will be based on the soil report to be collected from Purchaser</td>
<td>No pile foundations are envisaged and bearing capacities assumed</td>
<td>Bidder to follow the report. Bidder to confirm</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Norms of cement consumption</td>
<td>As per GS</td>
<td>For mix designs minimum and max cement consumption shall be as per relevant Indian standards</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Walk ways of ground portals</td>
<td>Not indicated</td>
<td>RCC floor over 75mm thick PCC to be considered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Schedule of finishes, door windows</td>
<td>Not indicated</td>
<td>Bidder to follow given finishes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Roads</td>
<td>Not indicated</td>
<td>2.0m wide berm to be considered</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>(100mm moorum over 75mm WBM) and width of road shall be 7m or 4m (excluding berm) as per requirement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>ADM building with car parking(2nos), Area repair shop, Sub stores(2 nos), Welfare/office buildings, rest rooms(2 nos), canteen buildings (2 nos)</td>
<td>Indicated</td>
<td>This shall be as per TS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Intermediate floors of JH, strl buildings etc</td>
<td>Not indicated</td>
<td>Intermediate floors are of concrete over strl beams</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Drainage of under ground facilities</td>
<td>Not indicated</td>
<td>All underground facilities like basements, tunnels etc shall be provided with sump, pump and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sl No</td>
<td>Description</td>
<td>As per TS</td>
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<tr>
<td>17</td>
<td>Volume of work</td>
<td>Bidder to indicate</td>
<td>Not Submitted</td>
<td>Bidder to submit</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Waterproofing of roofs and water tightness of underground structures</td>
<td>Not indicated</td>
<td>Water proofi ng of roofs and water tightness of under ground structures shall be done using latest</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>polymer based cementacious material of SIKO,CICA,FOSROC Bidder to confirm</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Dismantling /removal of existing over ground /under ground structures</td>
<td>Not indicated</td>
<td>Bidder to include in scope</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Lead distance for disposal of surplus earth</td>
<td>Not indicated</td>
<td>Bidder to consider disposal distance as 10 KM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Deviations</td>
<td>Not indicated</td>
<td>Bidder to confirm there are no deviations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Stacker beds</td>
<td>300 mm thick compacted murum considered</td>
<td>OK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Settling ponds</td>
<td>Not indicated</td>
<td>Bidder to consider as per requirement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>Floors of conveyor galleries</td>
<td>Not indicated</td>
<td>Bidder to consider RCC as indicated in TS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>Sewerage system</td>
<td>Not indicated</td>
<td>All toilets shall be provided with septic tank and soak pits if the centralized system does not</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>exists .In case of existence of centralized system bidder shall extend net work up to battery limits</td>
<td></td>
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</tr>
</tbody>
</table>