KIOCL Limited invites bids from reputed Contractors/ Firms for execution of Civil, Structural, Sheeting & Painting works in the Chrome Ore Beneficiation Plant no. 2 of M/s. Odisha Mining Corporation at South Kaliapani Mines, Odisha State.

The tender details are available on our website www.kioclltd.in and www.eprocure.gov.in. Bidders can also collect the tender documents on all working days from the office of the DGM (CP&TS), till 30.08.2018, 2.00 PM. The last date for submission of sealed bid is 30.08.2018, 5.30 PM.

A pre bid meeting is scheduled on 10.08.2018 @ 10.00 AM at Project site, Chrome Ore Beneficiation Plant no. 2 of M/s. Odisha Mining Corporation at South Kaliapani Mines, Odisha State for related clarifications.

Corrigendum, if any, would be published in our website only.

Dy. General Manager (CP&TS)
Mob : 08105133993

The above advt., clip is published in the following newspapers on 01.08.2018.
1. Business Line – All India Editions.
2. The Samaj – (Oriya) – Odisha Editions
3. Orissa Post – Bhubaneswar Editions
KIOCL Limited
(Formerly Kudremukh Iron Ore Company Limited)
(A Govt. of India Enterprise)
Block II, Koramangala, Sarjapur Road, Bangalore - 560 034

Telephone: (080) 25531461 to 25531470 (10 lines) Fax: 080-25532153
Website: www.kioclltd.in Email: bgmcpts@kioclltd.com


ANNEXURE – I

No. TS/COBP/CIVIL & STRL/F-365/203
Date: 01.08.2018

INVITATION TO BIDS

KIOCL Limited invites bids from reputed contractors / Agencies / Firms for completion of Balance Civil, Structural, Sheeting & Painting works in the Chrome ore Beneficiation Plant no.2 of M/s. Odisha Mining Corporation at South Kaliapani Mines, Odisha State.

KIOCL Limited (Formerly Kudremukh Iron Ore Company Limited):


ODISHA MINING CORPORATION LIMITED:

A Gold Category State PSU, Odisha Mining Corporation Limited (M/s. OMC) was set up in 1956 as a joint venture between the Govt. of India and the Govt. of Odisha to harness the mineral wealth of the state. In 1961, the company became wholly owned by the Govt. of Odisha.

The major minerals mined by OMC are chrome, iron and manganese ore which cater to the requirement of mineral based industries such as steel, sponge iron, pig iron, ferro-manganese, ferro-chrome, etc. both in India as well as overseas.
M/s. OMC was in the process of setting up Chrome Ore Beneficiation Plant (COBP) no. 2 adjacent to the existing COBP no. 1. The plant was constructed but half way due to some techno-commercial reasons, the work has come to a standstill for the last couple of years.

M/s. OMC are desirous of getting the balance work carried out by engaging KIOCL and have expressed their desire to get the plant commissioned at the earliest. As such M/s. OMC requested KIOCL to make use of their expertise and put efforts to get this work carried out and complete the project and plant to be commissioned at the earliest.

KIOCL Limited has agreed for taking up the above job and KIOCL Limited will be the “Contractor” for carrying out and completion of balance Civil, Structural, Sheeting & Painting works in the Chrome Ore Beneficiation Plant no. 2 of M/s. Odisha Mining Corporation Limited at South Kaliapani, Odisha State as per the Agreement entered between M/s. OMC and KIOCL Limited.

KIOCL Limited will be engaging a “Sub-Contractor” for carrying out the Civil, Structural and Sheeting jobs based on the Schedule of Works through open tendering process in transparent manner & guideline.

The role of “Sub-contractor” is to complete the specified jobs as per the NIT - Scope of work, terms & conditions and timely completion.

The “Sub-contractor” is termed as a “Contractor” for the said job and referred as “Contractor” in the Tender Document. (that means, KIOCL Limited will be the paying authority to contractor based on progressive completion of works).

1.0 Scope of Work:

Scope of work under this contract includes mobilization of men, material, machinery, special shutter forms, complete shuttering system, Civil, Structural, Sheeting & Painting works as required for completion of balance works in the Chrome Ore Beneficiation Plant no. 2 of M/s. Odisha Mining Corporation at South Kaliapani Mines, Odisha State. The Scope of work also includes of all materials and consumables required for the successful completion of the works unless otherwise it is specified in the tender.

2.0 Bid qualifying conditions

The agencies / contractors who are submitting their tender documents shall furnish the following details.
**General Information**

<table>
<thead>
<tr>
<th>Name of the Agency/Contractor</th>
<th>Address for Communication</th>
<th>Contact Person</th>
<th>Contact Number</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
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</tbody>
</table>

**Eligibility Criteria**

The bidder should fulfill the following eligibility criteria to submit the tender:

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Description</th>
<th>Minimum Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Average annual financial turnover during last three (03) years, ending 31&lt;sup&gt;st&lt;/sup&gt; March 2018.</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Audited Profit & Loss account and Balance sheet for last three completed financial years should be furnished to meet the PQ criteria.*

Should be at least Rs. **328.00 Lakhs**
(Rupees Three hundred Twenty Eight lakhs)

| 2      | Highest value of having successfully completed similar work/s during last seven (07) years. |

**Similar work means** The contractor / agency shall have carried out the construction of Industrial/Plant buildings construction works consisting of Civil, Structural, Sheeting, Painting jobs.

*Note: The work order and work completion certificates and its value should be furnished to meet the PQ Criteria.*

|  | (a) Three (03) nos. of similar EACH completed works costing not less than Rs. **438.00 Lakhs** of each work. (Rupees Four hundred Thirty Eight lakhs) |

*OR*

|  | (b) Two (02) nos. of similar EACH completed works costing not less than Rs.**547.00 Lakhs** of each work. (Rupees Five hundred Forty lakhs only) |

*OR*

|  | (c) One (01) no. of similar completed work costing not less than Rs.**875.00 Lakhs**. (Rupees Eight hundred Seventy five lakhs only) |
Specific Information

<table>
<thead>
<tr>
<th></th>
<th>The contractor / firms should have own PF, ESI Codes, Income tax PAN number, GST number etc.,</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PF Number</td>
</tr>
<tr>
<td></td>
<td>ESI Number</td>
</tr>
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<td></td>
<td>PAN Number</td>
</tr>
<tr>
<td></td>
<td>Service Tax Number</td>
</tr>
<tr>
<td></td>
<td>GST Number / Details</td>
</tr>
</tbody>
</table>

2  **BANK DETAILS:**

Name of the Bank

Branch Address

Type of Account

Account No.

MICR No.

Branch Code

IFSC/RTGS No.

3.0  **Tender Documents**

The tender document consists of:

a)  Open tender Notice – Advertisement copy.

b)  Invitation to bid at Annexure - I.

c)  Technical specifications for the works at Annexure – II: For Civil, Structural, Sheeting & Painting Jobs

d)  Special conditions of contract at Annexure – III

e)  Schedule of Items and Prices at Annexure - IV :

   For Civil works: Part-A,

   For Structural, Sheeting and Painting Jobs: Part-B

f)  General Conditions of Contract (GCC) of KIOCL at Annexure - V

g)  Integrity Pact Agreement format at Annexure – VI

h)  Business rule and terms & conditions of online price bidding cum e-reverse auction format at Annexure- VII

The tender documents can be collected during the working days from the office of the Dy. General Manager (CP&TS), KIOCL Limited, II Block, Koramangala, Bengaluru 560 034, Tel 080 25532168, Fax: 080 2553941/25532153 from **01.08.2018 to 30.08.2018 till 2.00 PM** on payment of a non-refundable fees of **Rs.10,000/-** (Rupees Ten thousand only) in the form of
Demand Draft drawn from any nationalized bank in the favour of KIOCL Ltd., payable at Bengaluru.

The tender documents are also available in the website www.kioclltd.com and Govt Portal. Those who download the tender form from the websites may submit the cost of the tender document along with the offer in the form of DD for the specified value.

A pre bid meeting has been scheduled to be held on 10-08-2018, 10.00 AM at the office of the

Dy. General Manager (CP & TS),
KIOCL Limited
(A Govt. of India Enterprise),

Camp: Chrome ore Beneficiation Plant no.2 of
M/s. Odisha Mining Corporation at South Kaliapani Mines,
Odisha State for related clarifications.

Bidders are requested to confirm in advance about their participation in the pre-bid meeting. The last date for submission of bids is 30-08-2018, 5.30 PM.

Bidders are requested to make site visit, get acquainted with site conditions before submission of their bids.

4.0 Sealed bids shall be submitted in the manner as mentioned below:

a) First sealed cover superscribed as “Un Priced – Completion of balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no. 2 of M/s. Odisha Mining Corporation at South Kaliapani Mines, Odisha State.”, shall contain ONE (01) full set of all the above tender documents at 3.0 above including all annexure duly filled-in and documents in support of pre-qualification with official seal & signature on all pages but without any mention of rates & prices.

First envelope shall also contain “EARNEST MONEY” in the form of Demand Draft as per Para 5.0 below & the “TENDER DOCUMENT FEES” if the tender documents is downloaded from the website.

b) Second sealed cover superscribed as “Priced – Completion of balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no. 2 of M/s. Odisha Mining Corporation at South Kaliapani Mines, Odisha State” shall contain ONE (01) Set of prices filled in strictly as per format 3.0 (e) above i.e. Schedule of Items and Prices at Annexure – IV. Prices should be quoted and written in the wording in Annexure-IV and no other additional papers to be enclosed there in.
c) Both the above covers should be kept in 3rd cover and sealed and superscribed as “Bid – Completion of balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no. 2 of M/s. Odisha Mining Corporation at South Kaliapani Mines, Odisha State” and addressed to

Dy. General Manager (CP&TS),
KIOCL Limited, II Block,
(A Govt. of India Enterprise)
Koramangala,
BENGALURU – 560 034

and shall be submitted to his office till 05.30 PM, on or before 30-08-2018.

5.0 The Bid shall be accompanied by an Earnest Money Deposit (EMD) of Rs 10,00,000/- (Rupees ten lakhs only) to be deposited in any one of the following form:

i. Demand draft from any Nationalized Bank, Scheduled Bank or any other Bank acceptable by company in favour of “KIOCL LIMITED” payable at Bengaluru.

ii. Pay Order in favour of “KIOCL LIMITED” payable at Bengaluru.

iii. Through RTGS:
KIOCL Limited
UNION BANK OF INDIA
PBS (KORAMANGALA) BENGALURU –560 034
ACCOUNT NO. 515401010022015
IFSC CODE: UBIN0551546
Account type: CURRENT.

iv. Bank Guarantee as per the KIOCL’s format. (Ref: GCC of KIOCL Limited, Annexure-V)

No interest will be paid on Earnest Money Deposit. Bids not accompanied by EMD & tender document fee shall be liable to be rejected at the sole discretion of KIOCL without any further consideration.

EMD shall be returned to unsuccessful bidders without any interest after issue of Letter of Intent / work order to the successful Bidder and in case of the successful bidder, the same shall be returned after submission and acceptance of the Security Deposit for this work as referred to in Article No. 37 of “General Conditions of Contract” (TS/B/KIOCL/QF-31/REV-1).

No other form of EMD and cost towards tender document will be accepted. However cost of tender document may be submitted through cash receipt in addition to above instruments, if the tender document is obtained from the office of Deputy General Manager (CP & TS).
**Note:** There is no exemption for NSIC/MSME certificate holder from submission of EMD and Tender Document fee. All the bidders have to submit the required EMD & Tender Document fee in the above manner along with the tender document.

6.0 Further to the submission of the offer, un-priced offers will be opened on **31-08-2018 at 02.00 PM** for scrutiny and on ascertaining qualification & technical suitability. The price bids of technically acceptable offers will be opened in the presence of bidders in due course of time.

7.0 Award of work will be intimated to the successful bidder through a letter / fax which will be treated as authorization to mobilize and commence the work.

8.0 **Time Schedule:**

All the jobs as per schedule of items (Annexure –IV) of this tender shall be completed within nine (09) months from the date of LOI / award of work order.

9.0 **Terms of Payments & Paying Authority:**

The payment will be made progressively as per the quantities (Schedule of Items, Annexure-IV) executed at the site and as per the recommendation of the Engineer-in-charge.

The quantities given in the schedule of items are approximate and may vary or some of the items may not be executed. No claim by the contractor on account of variations, omissions and modifications shall be entertained.

Any extra items executed at site as per the site requirements, the payment shall be made to contractor as per KIOCL’s GCC terms.

The paying authority shall be Joint General Manager (Finance), KIOCL Limited, 2nd Block, Koramangala, Bengaluru 560 034 based on the certification by Engineer-in-charge.

10.0 **Prices:**

(i) Price quoted shall be inclusive of all expenses towards the scope in complete as per Schedule of Items (Annexure-IV).

(ii) The price shall be firm and binding without any escalation whatsoever till the completion of works in all respects.

(iii) The quoted price shall be inclusive of all applicable taxes & duties, but exclusive of GST, which will be paid by KIOCL along with each tax invoice/s.

(iv) Income tax as per prevailing rate shall be deducted from each invoice/s and the TDS certificate will be issued by KIOCL Limited at the end of the financial year.

(v) Prices shall be filled in the Price Schedule with ink/ball pen. There shall not be any corrections or over writings. Please ensure that the column where prices need to be mentioned is filled up.

(vi) Price schedule shall be signed and sealed on each page and shall not contain any alterations/conditions/notes whatsoever.
(vii) Any variation in taxes, levies, & duties imposed after the date of submission of offer will be paid/recovered by KIOCL, only during the tenure of contract, depending upon nature of levies and enabling clauses to pay/recover the same from the concerned party.

11.0 The bid shall be valid for a period of “Three (03) months” from the due date of receipt of the bid.

12.0 KIOCL Limited decision shall be final & no correspondence shall be entertained in this regard.

13.0 Method of Evaluation:

(i) The total price quoted against the Schedule of Items for Civil, Structural, Sheeting and Painting at Annexure-IV, will be considered for finalizing the L-1 bidder.

(ii) The order will be placed on the L-1 offer on totality basis on final price excluding item rates only mentioned in schedule of items.

(iii) The L-1 bidder shall match the lowest unit rate for the rate only items with respect to other bidder’s quoted price in the schedule.

Note: Wherever the quantities are available in the schedule of items, the bidder shall quote the average rate per unit for the respective items. However, the payment will be made on the basis of rate quoted for each sub-items executed at site.

14.0 Detail of EVALUATION AND COMPARISON OF BIDS:

The detailed process for BID Evaluation is as follows:

a) First Stage : Techno-Commercial Bid Evaluation:

The techno-commercial offers received from the bidders will evaluated as per the tender terms and conditions of the NIT. The Tender Committee may call the bidder/bidder’s representatives for detailed techno-commercial discussions, clarifications, presentation if required. The names of techno-commercially qualified vendors will be intimated for participation in the online price bidding cum reverse auction and for opening of the Price bids (i.e., sealed price bid received along with the bid).

b) Second Stage : Online Price bidding cum Reverse Auction and Collection of online final price bid history from service provider:

As per prevailing guidelines, KIOCL shall be conducting Online Price bidding cum Reverse Auction prior to opening of price bids. All techno-commercially acceptable bidders those who have accepted business rules provided by our service provider are eligible to participate in the online price bidding cum reverse auction.
After the online price bidding cum reverse auction, KIOCL will collect the final price comparative statement from service provider.

**Note:** All Techno-commercially qualified bidders are required to submit the Process Compliance Form duly signed prior to online bidding and Reverse Auction to the service provider. The price bid shall not be submitted along with the process compliance form before start of auction.

c) **Third Stage : Composite price comparative statement**

After the receipt of final online price bid cum reverse auction comparative statement from the service provider, the sealed price bids of all the Techno-commercially acceptable tenderers, irrespective of whether they have participated in the Online price bidding cum Reverse Auction or not, shall be opened within a short duration i.e., within 2 to 4 working days.

Based on the prices so received, through Online price bidding cum Reverse Auction and the Sealed price bids received along with the techno-commercial offer, a composite price comparative statement shall be made considering the lower of the prices (i.e., sealed price bid prices & final online prices) of all the tenderers. Placement of the order shall be considered on the L-1 price so arrived on totality basis.

**Note :**

a) During the online price bidding cum reverse auction, if no bid is received within the specified time, then KIOCL, at its discretion may scrap the online price bidding cum reverse auction process and open only sealed price bids of those bidders who are techno-commercial qualified for opening of Price bids.

b) In case of offers which contain price details / partial price details of the prices in the Techno-Commercial bid, sealed price offer only shall be considered for evaluation.

c) In case two or more firms quote exactly same rates in e-reverse action; In such cases, the firm who has quoted the lowest price in the hard copy of the price bid shall be considered as L1.

d) If no participation for online price bidding :

   i) In case if, no bidders are participated in the online price bidding cum reverse auction within the specified time & duration, only 'Sealed Price Bid' received along with techno-commercial bid will be opened and Price bids will be evaluated.

   ii) In case of Reverse auction is conducted, where there is a response from bidders, composite price comparative statement shall be made.
15.0 Except in exceptional cases, there is no post tender negotiation is envisaged on the subject tender. Bidders are requested to quote competitive rates against schedule of items at Annexure-IV.

16.0 The General Conditions of Contract (GCC) of KIOCL Limited (Ref: Annexure–V) form part of this tender.

17.0 Security deposit, Liquidated damages, Maintenance period & other terms and conditions shall be as per the GCC of KIOCL Limited.

18.0 The special conditions of contract and other contract documents shall be read in conjunction with each other. In case any conflict of meaning between any documents, Clause-33 of KIOCL’s General Conditions of Contract shall apply.

19.0 **Jurisdiction**: The court at Bengaluru will have jurisdiction on any disputes for adjudication arising out of the contract.

20.0 **KIOCL’s GST details**: 
   Taxpayer Legal Name: **KIOCL LIMITED**  
   GST Number: **29AAACK8438M1ZX**

21.0 **Integrity Pact**: The bidder shall execute Integrity Pact Agreement with KIOCL as per the Integrity Pact Agreement prescribed format supplied by KIOCL Limited. The following Independent External Monitor (IEM) is nominated for the above job.

   Shri Kumar Jitendra Singh, Ex-CMD, MOIL  
   1 MOIL VATIKA  
   Chicholi Road  
   Fetri Kajol Road  
   Nagpur – 441 501  
   Mobile No.09665083386  
   E-mail: kumarjsingh1942@gmail.com

The bidder shall sign and seal with witness signature in the Integrity Pact Agreement format (Annexure – VI) and shall submit along with the tender document.

22.0 **Fraud Prevention Policy of KIOCL**: A “Fraud Prevention Policy” is being followed at KIOCL, which provides a system for prevention/detection/reporting of any fraud. It is also forbids provides everyone from involvement in any fraudulent activity and that where any fraudulent activity is suspected by any one, the matter must be reported to the ‘Nodal Officer’ (Chief Vigilance Officer) as soon as he/she comes to know of any fraud or suspected fraud.
23.0 For any related clarifications please contact the following officers:

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name &amp; Address</th>
<th>Contact Nos.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mr. NOOR AHMED&lt;br&gt;Dy. Gen. Manager (CP &amp; TS)&lt;br&gt;KIOCL LIMITED&lt;br&gt;2nd Block, Koramangala&lt;br&gt;BENGALURU – 560 034</td>
<td>08105133993&lt;br&gt;Email:&lt;br&gt;<a href="mailto:bgmcepts@kiocltd.com">bgmcepts@kiocltd.com</a></td>
<td>For any related clarifications on tender.</td>
</tr>
<tr>
<td>2</td>
<td>Shri. M. KRISHNAMURTHY&lt;br&gt;Asst General Manager (TS)&lt;br&gt;Shri Babu M Bhajantri&lt;br&gt;Asst General Manager (TS)</td>
<td>09740355455&lt;br&gt;09448744528</td>
<td>For Civil, Structural, Sheet ing and Painting works</td>
</tr>
</tbody>
</table>

24.0 KIOCL Limited reserves the right to reject any or all bids without assigning any reasons whatsoever.

-Sd-
(Noor Ahmed)
Dy. General Manager (CP&TS)
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TECHNICAL SPECIFICATIONS

1. GENERAL

The detailed specifications given hereinafter are for the items of works described in the schedule of quantities attached herein, and shall be guidance for proper execution of work to the required standards. It may also be noted that the specifications are of generalized nature and these shall be read in conjunction with the description of item in schedule of quantities and drawings. The work also includes all minor details of construction which are obviously and fairly intended and which may not have been referred to in these documents but are essential for the entire occupation in accordance with standard Engineering practice.

Unless specifically otherwise mentioned, all the applicable codes and standards published by the Indian Standard Institution / Bureau of Indian Standards and all other standards which may be published by them before the date of receipt of tenders, shall govern in all respects of design, workmanship, quality and properties of materials and methods of testing, methods of measurements etc. Wherever any reference to any Indian Standard Specifications occurs in the documents relating to this contract, the same shall be inclusive of all amendments issued thereto or revision thereof, if any, up to the date of receipt of tenders. In case there is no I.S.I. / B.I.S. specification for the particular work, such work shall be carried out as directed by the Engineer-in-Charge and unless otherwise mentioned, nothing extra shall be paid on this account.

Samples of various materials, fittings, etc. proposed to be incorporated in each work shall be submitted by the contractor for approval of the Engineer-in-charge before order for bulk supply is placed.
The contractor shall take instructions from the Engineer-in-charge regarding collection / stacking of materials in any place. The excavated earth and other debris / construction materials shall be stacked in the specified location as per the instruction and direction of Engineer-in-charge.

The contractor shall maintain in good condition all works executed till the completion of the entire work awarded to him. Where phased delivery is contemplated, this provision shall apply for each phase.

The contractor shall clear the site thoroughly of all scaffolding materials and rubbish / debris etc. left out of his work and dress / level the site around the Silos / Work place to the satisfaction of the Engineer-in-charge before the work is considered as complete.

The KIOCL Limited, shall be the sole deciding authority as to the meaning, interpretations and implications for various provisions of the specifications and his decision in writing shall be final and binding on all concerned.

In case any difference or discrepancy between the specifications and the description in the schedule of quantities, the schedule of quantities shall be considered on priority. In case of any difference or discrepancy between specifications and drawing, the specifications shall be taken into consideration.

2. EXCAVATIONS, FILLING & BACK FILLING

2.1 Scope of Work

The scope for work covered under this specifications pertain to excavation of foundations, trenches, pits and over areas, in all sorts of soil, soft and hard rock, correct to dimensions given in the drawing including shoring, protections of existing underground utilities of any, such as water lines, electric cables etc. dewatering and shoring if necessary, stacking the useful materials as directed within the lead specified, refilling around the foundation and into the plinth with selected useful excavated earth and disposing off the surplus earth / materials within specified lead and finishing the surface to proper levels, slopes and camber etc. all complete.

2.2 Site Clearance:

Before the earth work is started the area coming under cutting and filling shall be cleared of all obstruction, loose stones, shrubs, vegetation, grass, bushes and rubbish removed up to a distance of 1 KM outside the periphery of the area under clearance.

2.3 Roots and Vegetation clearance:

The roots of trees if any shall be removed to a minimum depth of 60 cm below ground level or a minimum of 30 cm below formation level whichever is lower and the hollows filled up with earth leveled and rammed. This work is deemed to be included in the earthwork items and no separate payment will be admissible for the work.
Any material obtained from the site will be the property of the KIOCL Ltd., and the useful materials as decided by the Engineer-in-charge will be conveyed and properly stacked as directed within the lead specified.

2.4 Setting out and making profiles:

Masonry or concrete pillars shall be erected at suitable points in the area to serve as benchmarks for the execution of the work. These benchmarks shall be connected with G.T.S. or any other permanent benchmark approved by the Engineer-in-charge. Necessary profiles with pegs, bamboo and strings or Burjis shall be made to show the correct formation levels before the work is started. The contractor shall supply labours, surveying instruments and materials for setting out and making profiles for the work at his own cost and the same shall be maintained / protected during the execution of work. The Engineer in charge of KIOCL Limited will show grid co-ordinate or other reference points. It shall be the responsibility of the contractor to set out center lines correctly with reference to the drawings and install substantial reference marks. Checking of such alignment by the KIOCL Ltd., will not absolve the contractor from his responsibility to execute the work strictly in accordance with the drawings.

2.5 Excavation:

The contractor shall notify the Engineer-in-charge before starting excavation and before the ground is disturbed, to enable him to take existing level for the purpose of measurements. The ground levels shall be taken at 2 to 3 meters intervals in uniformly sloping ground and at closer distance where local mounds, pits, or undulations are met with, as directed by the Engineer-in-charge. The ground levels shall be recorded in field books and plotted on plans, which shall be signed by the Contractor and the Engineer-in-charge, before the earthwork is started. The labours, surveying instruments and other materials required for taking levels, shall be supplied by the Contractor at his own cost. The Contractor shall perform excavation in all types of soils, murrum, soft and hard rock, boulders etc. in foundation, over areas and in trenches to widths, lines, levels, grades and curves as shown in the drawing or lesser widths, lines, levels, grades and levels as directed by the Engineer-in-charge and per items in the schedule of quantities.

The item in the schedule of quantities shall specify the earth work in excavation for raft. For this purpose, the excavation shall be a minimum depth of 1.80 Mts over the excavation area as per the drawing and as per the direction of engineer- in-charge.

2.6 Excavation in Soft Rock:

This shall include all materials which are rock or hard conglomerate, all decomposed weathered rock, highly fissured rock, old masonry, boulders bigger than 0.03 cum, in volume but not bigger than 0.5 cum. and other varieties of soft rock which can be removed only with pick axes, crow bars, wedges and hammers with some difficulty. The mere fact that the contractor resorts to blasting and / or wedging and chiseling of reasons his own, shall not mean the rock is classifiable as hard rock.

2.7 Excavation in Hard Rock:

This includes all rock other than soft rock mentioned in para above 2.6 viz. Excavation in soft rock, occurring in masses, boulders having approximate volume more than 0.5 cum. plain or reinforced
cement concrete, which can best be removed by chiseling and wedging where blasting cannot be permitted owing to any restriction at site.

2.8 Excavation in Hard Rock by Chiseling and Wedging:

Where blasting is not permitted and if the Engineer-in-charge so desires, the excavation shall be done by chiseling and wedging or any other agreed method.

Note: All the excavated hard rock obtained shall be stacked properly and neatly within the specified lead by the contractor as directed by the Engineer-in-charge.

2.9 Excavation: Method of execution

The excavation under all classifications of strata in areas, in trenches or in pits shall be carried out systematically. Cutting shall be done from top to bottom and not under pining or under cutting will be allowed. The bottom and sides of excavation shall be dressed to proper level, slopes, steps, camber etc. by removing high spots and ramming thoroughly as directed by the Engineer-in-charge.

All the excavation shall be carried out strictly to the dimensions given in the drawing. The width shall generally be of the width of mud mat/plain cement concrete and depth as shown in drawing or as directed by the Engineer-in-charge. Any excavation if taken below the specified depths and levels, the contractor shall at his own cost fill up such over cut to the specified level and to be compacted as per the direction of Engineer-in-charge.

After the excavation is completed, the contractor shall notify the Engineer-in-charge to that effect and no further work shall be taken up until the Engineer-in-charge has approved the depth and dimensions as also the nature of foundation materials, levels and measurements shall also be recorded prior to taking up any further work.

2.10 Shoring:

Unless separately provided for in the schedule of quantities, the quoted rate for excavation shall include excavation of slopes to prevent falling in soil by providing and/or fixing, maintaining and removing of shorting, bracing etc. The contractor would be responsible for the shoring for proper retaining of sides of trenches, pits etc. with due consideration to the traffic, design superimposed loads etc. Shoring shall be of sufficient strength to resist the pressure and ensure safety from slips and to prevent damage to work and property and injury to persons. If the slips occur the slipped materials shall be removed and slope dressed to a modified stable slope. Removal of the slipped earth will not be measured for payment.

2.11 Dewatering:

Unless specifically provided for as a separate item in the schedule of quantities, rate shall also include bailing or pumping out all water which may accumulate in the excavation during the progress of further works such as mud mat concrete, R.C. footings, shuttering etc. either due to seepage, springs, rain or any other cause and diverting surface flow by bunds or other means. Care
shall be taken to ensure that the water discharged sufficiently away from the foundations keep it free from nuisance to other works in the neighborhood.

2.12 Disposal of Excavated Materials:

2.12.1 Antiquities:

Any finds of archeological interest such as relics of antiquity, coins, fossils or other articles of value shall be delivered to the KIOCL Ltd., and shall be the property of the Government.

2.12.2 Useful Materials:

Any material obtained from the excavation which in the opinion of the Engineer in charge is useful, shall be stacked separately in regular stacks as directed by the Engineer in charge and shall be the property of the KIOCL Limited.

No material excavated from foundation trenches of whatever kind they may be are to be placed even temporarily nearer than about 3 Mts from the outer edge of excavation. Discretion of the Engineer-in-charge in such cases is final. All materials excavated will remain the property of the KIOCL Limited. Rate for excavation includes sorting out of the useful materials and stacking them separately as directed within the specific lead. Material suitable and useful for backfilling or there use shall be stacked in convenient place but not in such a way as to obstruct free movement of materials, workers and vehicles or encroach on the area required for constructional purposes. It shall be used to the extent required to completely backfill the structure to original ground level or other elevation shown on the plan or as directed by the Engineer-in-charge. Materials not useful in anyway shall be disposed off, leveled and compacted as directed by the Engineer-in-charge within a specified lead. The site shall be left clean of all debris and leveled on completion.

2.13 Backfilling in sides of Foundations, Plinth, Under Floor etc:

2.13.1 Filling in Foundation:

The backfilling shall be done after the concrete has fully set and shall be done in such a way as not to cause under-thrust on any part of the structure. Where suitable excavated material is to be used for backfilling, it shall be brought from the place where it was temporarily deposited and shall be used in backfilling. The scope of work for backfilling/ filling in foundation shall include filling for all the structures covered under this contract. Surplus earth available, if required, shall be used for backfilling / filling for other structure as per KIOCL requirement also within the specified lead mentioned in the item.

All timber shoring and form work left in the trenches, pits, floors etc. shall be removed after their necessity ceases and trash of any sort shall be cleared out from the excavation. All the space between foundation masonry or concrete and the sides of excavation shall be backfilled to the original surface with approved materials in layers not exceeding 150mm, in thickness, watered and well consolidated by means of rammers to at least 90% of the consolidation. Areas inaccessible to mechanical equipment such as areas adjacent to walls and columns etc. shall be tamped by hand rammer or by hand held power rammers to the required density. The backfill shall be uniform in character and free from large lumps, stones, shingle or boulder not larger than 75mm. in any
direction, salt, clods, organic or other foreign materials which might rot. The backfilling in plinth and under floor shall be well consolidated by means of mechanical or hand operated rammers as specified to achieve the required density.

2.13.2 Filling in Plinth and Under Floors:

After the available suitable excavated materials are exhausted as backfilling, the contractor shall notify the Engineer-in-charge of the fact and levels taken jointly with Engineer-in-charge. The earth, murrum, sand, gravel etc. or such materials suitable for filling proposed to be filled under floors and so mentioned in the item of schedule of quantities shall then be brought to site from approved locations and sources.

2.13.3 Earth Filling:

The earth, soft murrum etc. so brought shall be filled up in layers of 15 cm depth, each layer being well watered and consolidated by approved hand or mechanical tampers or other suitable means to achieve the required density as per the direction of engineer-in-charge.

2.13.4 Gravel or sand filling:

Gravel if required to be filled under floors, shall be single washed gravel of approved quality and of size varying from 12mm to 20mm. It shall be uniformly blind with approved type of soil and / or sand to obtain full compaction. Gravel shall be filled in specified thickness and shall be well watered and rammed entirely to the satisfaction of the Engineer-in-charge.

If sand is required to be filled under floors, it shall be clean, medium grained and free from impurities. The filled in sand shall be kept flooded with water for 24hrs. to ensure maximum consolidation shall be done by the contractor at his own cost. The surface shall then be well dressed and got approved from Engineer-in-charge before any other work is taken over the fill.

2.14 Lead and Lift:

2.14.1 Lead: The lead for disposal / deposition of excavated materials shall be as specified in the respective item of work. For the purpose of measurements of lead, the area to be excavated or filled or area on which excavated material is to be deposited/ disposed off shall be divided in suitable blocks and for each of the block, the distance between center lines shall be taken as the leads which shall be measured by the shortest straight line route on the plan and not the actual route adopted.

2.14.2 Lift: Lift shall be measured from ground level. Excavation up to 2.0 m depth below ground level and depositing excavated material on the ground shall be included in the item of earthwork for various kinds of soil.

2.15 Mode of Measurements:

The rate quoted in cum. for items of excavation is deemed to include the necessary additional quantity of excavation involved beyond the plan dimensions of the work which may be necessary for carrying out the work as per the directions of engineer-in-charge. No extra payment will be
made for any excavation done other than the required quantity as per the plan dimension indicated in the drawings.

The rate quoted for excavation shall be deemed to have been included the cost of stacking of excavated materials, conveying within the specified lead, picking of selected stacked materials, conveying it to the place of final backfill.

Payment for back filling and consolidation inside the trenches, sides of foundations, plinth etc. with available excavated material, shall be paid as per the rates in schedule of quantities. Actual quantity of consolidated filling shall be measured and paid in cubic meters up to two places of decimal.

3. HARD CORE / SOLING UNDER FLOORS / FOUNDATIONS:

3.1 Scope of work:

The work covered under this specification includes all type of soling work either by bricks or by rubble stones laid under floors / foundations, hand packed, complete as per specification mentioned below and applicable drawings.

3.2.1 Rubble Stone Soling:

The rubble stone shall be of best variety of black trap / granite / basalt or other approved variety of stone available locally. The stone shall be hard, durable free from defects and of required size and shall be approved by the Engineer-in-charge.

3.2.2 Preparation of Surface:

The bed on which rubble soling is to be laid shall be cleared of all loose materials, leveled, watered and compacted and got approved by the Engineer-in-charge before laying rubble soling. Cable or pipe trenches if shown in the drawing and as required by the Engineer-in-charge shall be got done before the soling is started.

3.2.3 Workmanship:

Over the prepared surface, the stone shall be set as closely as possible and well packed and firmly set. The stones shall be of full height and shall be laid so as to have their bases of the largest area resting on the sub-grade. Soling shall be laid in one layer of 230mm or 150mm depth or specified thickness of soling with a tolerance of 25mm.

After packing the stones properly in position, the interstices between them shall be carefully filled with quarry spoils or stone chips of larger size possible to obtain a hard, compact surface. Spreading of loose spoils or stone chips is prohibited.

The entire surface shall be examined for any protrusions and the same shall be knocked off by a hammer and all interstices shall be filled with approved murrum. Excess murrum if any over the surfaces shall be removed. Unless otherwise specified, the murrum shall be supplied by the contractor at his own cost from the selected area. The surfaces shall then be watered and consolidated with mechanical or sufficiently heavy wooden tampers and log-rammers as approved by the Engi-
neer. After compaction, the Engineer-in-charge to give the required slope or level and dense sub-
base and the surface shall present clean look. Adequate care shall be taken by the contractor while 
laying and compacting the rubble soling to see that concrete surfaces in contact with soling are not 
damaged.

3.2.4 Mode of Measurement:

The quoted rate shall be per Cu.M metre of the soling. The rate shall include all the materials la-
bour, transport etc. and no extra payment shall be made for work done at different levels. The rate 
shall also include the cost of preparation of surface, all materials and labour, watering, consolid-
ation etc. all complete.

4.0 PLAIN AND REINFORCED CONCRETE AND ALLIED WORKS:

4.1 Scope:

This specification covers the general requirements for Plain and Reinforced concrete works using 
on-site production facilities and Ready Mixed concrete (RMC), if specified, including requirements 
in regard to the chipping of existing concrete, applying nito bond or any other equivalent chemical 
as per specification & direction of Engineer in charge, quantity, handling, storage of ingredients, 
proportioning, batching, mixing and testing of concrete and also requirements in regard to the qual-
ity. This also covers the transportation of concrete from the mixer to the place of final deposit 
and the placing, consolidation, curing, protecting, repairing and finishing of concrete.

After award of the work, if so desired by the contractor, he / they may be allowed by the Engineer-in-
charge till the designed mix is obtained, to carry out reinforce concrete work in foundation and 
plinth as per equivalent nominal mix against the specified design mix concrete as per IS Codes. 
However, all other specification for design mix shall govern for nominal mix also and nothing extra 
shall be paid for use of extra cement on this account whether the cement is supplied by the Depart-
ment or procured by the contractor.

4.2 Cement Concrete: Plain and Reinforced:

The quality of materials and method and control of manufacture and transportation of all concrete 
work in respect of mix, where reinforced or otherwise, shall conform to the applicable portions of 
these specifications.

The Engineer-in-charge shall have the right to inspect the sources of materials, the layout and oper-
ation of procurement and storage of materials, the concrete batching and mixing equipments and 
the quality control system. Such an inspection shall be arranged by the contractor and the Engi-
neer-in-charge's approval shall be obtained prior to starting the concrete work.

4.3 Materials for Standard Concrete:

The ingredients to be used in the manufacture of standard concrete shall consist solely of a standard 
type Portland cement, clean sand, natural coarse aggregate, clean water and admixtures if specially 
called for as per drawings or schedule of quantities.
4.3.1 Cement:

The cement required will be supplied by KIOCL Ltd. If on specific occasion contractor is required to procure cement on his own unless otherwise specified or called for by the Engineer-in-charge, cement shall be ordinary Portland cement in 50 kg bags. The use of bulk cement will be permitted only with the approval of the Engineer-in-charge. Changing of brands or type of cement within the same structure will not be permitted. Ordinary Portland cement (OPC) 53 grade manufactured as per I.S. specifications of reputed brands like ACC / Ultratech / Ambuja / Zuari / Coramendel or any other brands as approved by the Engineer-in-charge from time to time shall be procured and used on the work. Joint account of cement consumed at site for every day for items of work carried shall be maintained by the Contractor for verification to ensure effective control on quality of cement used in the work.

A certified report attesting to the conformity of the cement to I.S. specifications by the cement manufacturers chemist shall be furnished to the Engineer-in-charge, if demanded. In case the cement is required to be arranged by the Contractor, the Contractor will have to make his own arrangement for the storage of adequate quantity of cement. Cement in bulk may be stored in bins or silos which will provide complete protection from dampness, contamination and minimize caking and false set. Cement bags shall be stored in a dry enclosed shed (storage under tarpaulins will not be permitted), well away from the outer walls and insulated from the floor to avoid contact with moisture from ground and so arranged as to provide ready access. Damaged or reclaimed or partly set cement will not be permitted to be used and shall be removed from the site. The storage bins and storage arrangements shall be such that there is no dead storage. Not more than 12 bags shall be stacked in any tier. The storage arrangement shall be got approved by the Engineer-in-charge. Consignments in cement shall be stored as received and shall be consumed in the order of their delivery.

Contractor shall establish cement/concrete/soil testing laboratories at site of work with qualified person to handle the laboratory. Every consignment of cement procured shall accompany test certificate from the company indicating Lot No, Week No. etc. Sample shall be taken for each lot and sent to Standard Approved Material Testing Laboratory for physical and chemical analysis. The cost of testing shall be borne by the Contractor.

Cement held in store for a period of 90 (ninety) days or longer shall be retested before use in work. Should at any time the Engineer-in-charge have reasons to consider that any cement is defective, then irrespective of its origin and / or manufacturers test certificate, such cement shall be tested immediately at a Approved Test Laboratory Departmental Laboratory or such approved laboratory, and until the results of such tests are found satisfactory, it shall not be used in any work.

4.3.2 Aggregates:

"Aggregate" in general designates both fine and coarse inert materials used in the manufacture of concrete.

"Coarse Aggregate" is aggregate most of which is retained on 4.75 mm I.S. sieve.

"Fine Aggregate" is aggregate most of which passes through 4.75 mm I.S. sieve.
All fine and coarse aggregates proposed for use in the work shall be subject to the Engineer-in-charge’s approval and after specific materials have been accepted, the source of supply of such materials shall not be changed without prior approval of the Engineer-in-charge.

Aggregate shall, except as noted above, consists of natural sand, crushed stone and gravel from a source known to produce satisfactory aggregate for concrete and shall be chemically inert, strong, hard, curable against weathering, of limited porosity and free from deleterious materials that may cause corrosion to the reinforcement or may impair the strength and / or durability of concrete. The grading of aggregates shall be such as to produce a dense concrete of and shall be based on the "mix design" and preliminary test on concrete specified hereinafter.

a) Sampling and Testing:

Sampling of the aggregates for mix design and determination of suitability shall be taken under the supervision of the Engineer-in-charge and delivered to the laboratory, well in advance of the schedule placing of concrete. Record of tests which have been made on proposed aggregates and on concrete made from this source of aggregates shall be furnished to the Engineer-in-charge in advance of the work or use, in determining suitability of the proposed aggregate.

b) Storage of aggregates:

All coarse and fine aggregates shall be stacked separately in stock pile in the material yard near the work site in bins properly constructed to avoid inter mixing of different aggregates. Contamination with foreign materials and earth during storage and while heaping the materials shall be avoided. The aggregate must be of specified quality not only at the time of receiving at site but also at the time of loading into mixer. Rakers shall be used for lifting the coarse aggregate from bins or stock piles. Coarse aggregate shall be piled in layers not exceeding 1.00 meters in height to prevent conning or segregation. Each layer shall cover the entire area of the stock pile before succeeding layers are started. Aggregates that have become segregated shall be rejected. Rejected materials after remixing may be accepted, if subsequent tests demonstrate conformity with required gradation.

c) Specific Gravity:

Aggregates having a specific gravity below 2.6 (saturated surface dry basis) shall not be used without special permission of the Engineer-in-charge.

4.3.2.1 Fine Aggregate:

Fine aggregate except as noted above, and for other than light weight concrete shall consist of natural or crushed sand conforming to IS 383. The sand shall be clean, sharp, hard, strong and durable and shall be free from dust, vegetable substances, adherent coating, clay, loam, alkali, organic matter mica, salt or other deleterious substances which can be injurious to the setting qualities / strength / durability of concrete.

a) Screening and Washing:

Sand shall be prepared for use by such screening or washing or both as necessary, to remove all
objectionable foreign matter while separating the sand grains to the required size fractions.

Sand with silt content more than 3 percent will not be permitted to be used unless same is washed and silt content is brought within 3% by weight.

b) Foreign Material Limitations:

The percentages of deleterious substances in sand, delivered to the mixer shall not exceed the following and as specified in Table-1: IS: 383-1970

c) Gradation:

Unless otherwise directed or approved the grading of sand shall be within the limit indicated here under and as per Table-4: IS-383-1970

Where the grading falls outside the limits of any particular grading zone of sieves, other than 600 micron (IS) sieve by not more than 5% it shall be regarded as falling within that grading zone. This tolerance shall not be applied to percentage passing the 600 micron (IS) sieve or to percentage passing any other sieve size on the coarser limit of grading zone I or the finer limit of grading zone IV. Fine aggregates conforming to Grading zone IV shall not be used unless mix designs and preliminary tests have shown its suitability for producing concrete of specified strength and workability.

d) Fineness Modulus:

The sand shall have a fineness modulus of not less than 2.2 or more than 3.2 the fineness modulus is determined by adding the cumulative.

Percentages retained on the following IS sieve sizes (4.75 mm, 2.36 mm, 1.18mm, 600 micron, 300 micron and 150 micron) and dividing the sum by 100.

4.3.2.2 Coarse aggregate:

Coarse aggregate for concrete except as noted above and for other than light weight concrete shall conform to IS 383. This shall consist of natural or crushed stone and gravel, and shall be clean and free from elongated, flaky or laminated pieces, adhering coatings, clay lumps, coal residue, clinkers, sag, alkali, mica, organic matter or other deleterious matter. The coarse aggregate and fine aggregate shall be tested from time to time as required by the Engineer-in-charge to ascertain its suitability for use in construction and the charges for testing aggregate shall be born by the contractor as specified herein after.

a) Screening and Washing :

Crushed rock shall be screened and / or washed for the removal of dirt or dust coating, if so demanded by Engineer-in-charge.
b) Grading:

Coarse aggregates shall be either in single or graded in both the cases. The grading shall be within the following limits and as per Table-2: IS: 383-1970

The aggregate shall be angular in shape and shall have granular or crystalline surfaces. Friable, flaky and laminated pieces, mica and shale, if present, shall be only in such quantities that will not in the opinion of Engineer-in-charge, affect adversely the strength and/or durability of concrete the maximum size of coarse aggregate shall be the maximum size specified above, but in no case greater than 1/4 of the minimum thickness of the member, provided that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and fill the corners of form. Plums above 160mm and up to any reasonable size can be used in plain mass concrete work of large dimensions up to a maximum limit of 20% by volume of concrete when specifically approved by Engineer-in-charge. For heavily reinforced concrete members, the nominal maximum size of the aggregate shall be 5mm, less than the minimum clear distance between the reinforcing main bars of 5mm less than minimum cover to the reinforcement whichever is smaller. The amount of fine particles occurring in the free state or as loose adherent shall not exceed 1% when determined by laboratory sedimentation tests as per IS 2386. After 24 hours immersion in water, a previously dried sample shall not have gained more than 10% or it's over dry weight in air, as determined by IS 2386.

c) Foreign Material Limitations

The percentage of deleterious substances in the coarse aggregate delivered to the mixture shall not exceed the following and as per Table-1: IS:383-1970

4.3.3 Water:

Water used for both mixing and curing shall be free from injurious amount of deleterious materials; potable waters are generally satisfactory for mixing and curing concrete. In case of doubt, the suitability of water for making concrete shall be ascertained by the compressive strength and initial setting time test specified in IS 456. The sample of water taken for testing shall be typical of the water proposed to be used for concreting, due account being paid to seasonal variation. The samples shall not receive any treatment before testing other than that envisaged in the regular supply of water proposed for use in concrete. The sample shall be stored in a clean container previously rinsed out with similar water.

Average 28 days compressive strength of at least three 150mm concrete cubes prepared with water proposed to be used shall not be less than 90% of the average strength of three similar concrete cubes prepared with distilled water.

The initial setting time of test block made with the appropriate test cement and the water proposed to be used shall not be less than 30 minutes and shall not differ by more than (+) 30 minutes form the initial setting time of control test block prepared with the appropriate test cement and distilled water. The test blocks shall be prepared and tested in accordance with the requirements of IS 4031. Where water can be shown to contain an excess of acid, alkali, sugar or salt, Engineer-in-charge may refuse to permit its use. As a guide, the following concentrations represent the maximum permissible values.

The details of test shall be as given in IS 3025.
a) Limits of Acidity

To neutralize 200 ml of sample of water using phenolphthalein as an indicator, it should not require more than 2 ml of 0.1 normal NaOH. The details of test shall be as given in IS:3025

b) Limits of Alkalinity

To neutralize 200 ml of sample of water, using methyl orange as an indicator, it should not require more than 10 ml of 0.1 normal HCL. The details of test shall be as given in IS:3025

4.4 Design Mix Concrete:

All reinforced concrete in the works shall be "Design Mix Concrete" as defined in I.S. 456-2000 with provisions for minimum cement content for extreme exposure conditions. Concrete Mix Design shall be done as per I.S. 10262-1982 and SP-23.

Admixtures may be used in concrete only with the approval of engineer-in-charge based upon evidence that, with the passage of time neither the compressive strength nor its durability reduced. When admixtures are used, the designed concrete mix shall be corrected accordingly.

Admixtures shall be used as per manufacturer’s instructions and in the manner and with the control specified by Engineer-in-charge. Rate quoted for concrete should include cost and labour for admixture. No extra payment will be made.

4.5 Batching and mixing of concrete:

The material and proportions of concrete materials as established by the preliminary tests for the mix design shall be rigidly followed for all concrete on the project and shall not be changed except when specifically permitted by Engineer-in-charge.

Concrete shall be produced only by weigh batching the ingredients. The mixer and weigh batcher shall be maintained in a clean serviceable condition. The accuracy of weigh batches shall be periodically checked. They shall be set up in level on a firm base and the hopper shall be loaded evenly. The needle shall be adjusted to zero when the hopper is empty. Fine and coarse aggregates shall be weighed separately unless otherwise stated. Volume batching will be permitted only at the discretion of the Engineer-in-charge. Concrete shall be of strength stipulated, all concrete shall be mixed in mechanically operated batch mixers complying with IS 1791 and of approved make with suitable provision for correctly controlling the water delivered to the drum. The quantity of water actually entering the drum shall be checked with the reading of the gauge or valve setting, when starting a job. The test should be made while the mixer is running. The volume of the mixed material shall not exceed the manufacturers rated mixer capacity. The batch shall be charged into the mixer so that some water will enter the drum in advance of cement and aggregate. All water shall be in the drum by the end of the first 15 seconds of the specified mixing time. Each batch shall be mixed until the concrete is uniform in colour, for a minimum period of two minutes after all the materials and water are in the drum. The entire contents of the drum shall be discharged in one operation before the raw materials for the succeeding batches are fed into the drum.
4.6 READY MIXED CONCRETE

Scope:

The supply of ready-mixed concrete shall be as specified in IS: 4926-1976. The strength of RCC design mix shall be as covered under clause 4.4 'Design Mix Concrete.

4.6.1 Terminology

For the purpose of this standard the provisions covered under 4.4 'Design Mix Concrete shall apply.

a) Ready-mixed Concrete- Concrete delivered at site in plastic condition and requiring no further treatment before being placed in the position in which it is to set and harden.

b) Agitation - The process of continuing the mixing of concrete at a reduced speed during transportation to prevent segregation.

c) Agitator - Truck mounted equipment designed to agitate concrete during transportation to the site of delivery.

d) Truck- Mixer- A mixer generally mounted on a self-propelled chassis capable of mixing the ingredients of concrete and of agitating the mixed concrete during transportation.

4.6.2 MATERIALS

Materials such as cement, coarse & fine aggregates, water & admixture, etc. shall confirm to the specifications mentioned in the RCC works covered under 4.4 Design Mix Concrete and other relevant provisions. Cement shall be Ordinary Portland cement - 53 grade covered under IS-12269.

4.6.3 Basis of Supply

i) The ready-mixed concrete shall be manufactured and supplied on the following basis: a) Specified strength based on 28 days compressive strength of 15 cm cubes tested in accordance with IS: 456-2000.

ii) The responsibility for the design of mix shall be that of the manufacturer/contractor and the concrete shall confirm to the requirements as specified in.

4.6.4 General requirements

a) The ready-mixed concrete shall generally comply with the requirements of IS: 456 considering as 'extreme' environment.

b) Minimum quantity of cement and the details regarding proportioning and control shall be in accordance with IS: 456.
c) The concrete shall be delivered to the site of work and discharge shall be completed within 2 hours of adding the mixing water to the mix of cement and aggregate or of adding the cement to the aggregate whichever is earlier.

d) Adequate facilities shall be provided by the manufacturer for KIOCL Ltd./contractor to inspect the materials used, the process of manufacture and methods of delivery of concrete. Manufacturer shall also provide adequate facilities for the KIOCL Ltd./Contractor to take samples of the materials used.

e) Sampling and Testing - The sampling and testing of concrete shall be done in accordance with the relevant requirements of IS: 456-2000, IS: 1199-1959 and IS: 516-1959.

f) Consistency or Workability – The tests for consistency or workability shall be carried out in accordance with the requirements of IS: 1199-1959 or by such other method as may be agreed to between the manufacturer and KIOCL Ltd./contractor.

g) Strength Test - The compressive strength and flexural strength tests shall be carried out in accordance with requirements of IS: 516-1959 and the acceptance criteria for concrete supplied on the basis of specified strength.

h) Cost of Testing - The cost of the tests carried out in accordance with requirements of this specification shall be borne by the manufacturer/contractor.

i) Manufacturer's Records and certificates - The manufacturer shall keep batch records of the quantities by mass of all solid materials, of total amount of water used in mixing and of the results of all tests. If required by the KIOCL/Contractor the manufacturer shall furnish certificate, at agreed intervals, giving this information.

The manufacturer shall supply the following information for guidance of the supplier for approval:

a) The type of cement to be used.

b) The maximum size and type of aggregates.

c) The type of admixtures to be used.

d) The minimum accepted compressive strength or flexural strength or both, determined from samples of plastic concrete taken at the place and time of delivery, in accordance with requirements of IS: 456-2000.

e) The ages at which the test cubes or beams are to be tested and the frequency and number of tests to be made shall be as required by KIOCL/Contractor.

f) Tolerances - The concrete shall be deemed to comply with the requirements of this specification, if the results the tests where applicable, lie within the tolerances. Sampling and Testing Concrete in the field:
f) **Consistency or Workability** - The slump (average of two tests) shall not differ from the specified value by ± 10 mm for a specified slump of 75 mm or less and ± 25 mm when the specified slump is greater than 75 mm. The compacting factor average of two tests shall be within ± 0.03 of the value specified. The test for consistency or workability shall be completed within 15 minutes of the time of receipt of the ready-mixed concrete at site.

### 4.7 Placement of Concrete

#### 4.7.1 Preparation Prior to Concrete Placement, Final Inspection & Approval:

Before the concrete is actually placed in position, the inside of the form work shall be inspected to see that they have been oiled. Temporary openings shall be provided to facilitate inspection, especially at bottom of columns and wall forms, to permit removal of saw dust, wood shavings, binding wire, rubbish, dirt etc. Opening shall be placed or holes drilled so that these materials and water can be removed easily. Such openings/holes shall be later suitable plugged.

The various traders shall be permitted ample time to install conduits, hangers, anchors, inserts, sleeves, bolts, frames and other miscellaneous embedment to be cast in the concrete as indicated on the drawing or as necessary for the proper execution of the work. All such embedment shall be correctly positioned and securely held in the forms to prevent displacement during depositing and vibrating of concrete.

Slots, openings, holes pockets etc. shall be provided in the concrete work in the positions indicated in the drawings or as directed by the Engineer-in-charge.

Reinforcement and other items to be cast in concrete shall have clear surfaces that will not impair bond.

Prior to concrete placement, all works shall be inspected and approved by Engineer-in-charge, and if found unsatisfactory, concrete shall not be poured until all defects have been corrected at contractors cost.

Approval by Engineer-in-charge of any and all materials and work as required herein shall not relieve contractor form his obligations to produce finished concrete in accordance with the drawings and specifications.

#### 4.7.2 Rain or Wash Water:

No concrete shall be placed in wet weather or on a water covered surface. Any concrete that has been washed by heavy rain shall be entirely removed, if there is any sign of cement and sand having been washed away from the concrete mixture. To guard against damage which may be caused by rain, the works shall be covered with tarpaulins immediately after the concrete has been placed and compacted before leaving the work unattended. Any water accumulating on the surface of the newly placed concrete shall be removed by approved means and no further concrete shall be placed thereon until such water is removed. To avoid sumps shall be provided.
4.7.3 Bonding Mortar:

Immediately before concrete placement begins, prepared surfaces, except form work, which will come in contact with concrete to be placed, shall be covered with a bonding mortar of same strength of concrete.

4.7.4 Transportation:

All buckets, containers or conveyers used for transporting concrete shall be mortar-tight. All means of conveyance shall be adopted to deliver concrete of the required consistency and plasticity without segregation or loss of slump whatever method of transportation is employed. Chute shall not be used to transport the concrete without the written permission of the Engineering-charge and concrete shall not be re handled before placing.

4.7.5 Re-tempered or Contaminated Concrete:

Concrete must be placed in its final position before it becomes too stiff to work. On no account water shall be added after the initial mixing. Concrete which has become stiff or has been contaminated with foreign materials ad which has not been placed within half an hour of mixing water with cement shall be rejected.

4.7.6 Cleaning of Equipment:

All equipments used for mixing, transporting ad placing of concrete shall be maintained in clean condition. All pans, buckets, hoppers, chutes, pipe lines and other equipments shall be thoroughly cleaned after each period of placement.

4.7.7 Procedure for placing of concrete:

a) Engineers approval of Equipment and Methods:

Before any concrete is placed, the entire placing programme, consisting of equipment, layout proposed procedures and methods shall be submitted to Engineer-in-charge and no concrete shall be of such size ad design to ensure a practically continuous flow of concrete during depositing without segregation of materials, considering the size of the job ad placement location.

b) Time Interval between Mixing ad Placing :

Concrete shall be placed in final position before the cement reaches its initial set and concrete shall normally be compacted in its final position within thirty minutes leaving the mixer once compacted it shall not be disturbed.

c) Avoiding Segregation:

Concrete shall in all the cases be deposited as nearly a practicable directly in its final position and shall not be re-handled or caused to flow in a manner which will cause segregation, loss of materials displacement of reinforcement, shuttering or embedded inserts or impair its strength. For locations where direct placement is not possible, ad in narrow forms, contractor shall provide suitable prop
ad trunks to confine the movement of concrete. Special care shall be taken when concrete is dropped from height, especially if reinforcement is in the way, particularly in columns and thin walls.

d) Placing by Manual Labour:

Except when otherwise approved by Engineer-in-charge, concrete shall be placed in the shuttering by shovels or other approved implements and shall not be dropped from a height more than 1.0m or handle in a manner which will cause segregation.

e) Placing by Mechanical Equipment:

The following specifications shall apply when placing of concrete by use of mechanical equipment is specially called for while inviting bids or is warranted, considering the nature of work involved.

The control of placing shall begin at the mixer discharge. Concrete shall be discharged by a vertical drop into the middle of the bucket of hopper and this principle of a vertical discharge of concrete shall be adhered to through out all stages of delivery until the concrete comes to rest in its final position.

Type of buckets:

All concrete shall be conveyed from the mixer to the place of final deposit in suitable buckets, dumpers, containers which shall be leak tight. All means of conveyance shall be adopted for delivering concrete to the required consistency / Workability d plasticity without segregation.

Central bottom dump buckets of a type that provides for positive regulation of the amount and rate deposition of concrete in all dumping position shall be employed.

Operation of Bucket:

In placing concrete in large open areas, the bucket shall be spotted directly over the position designated and then lowered for dumping. The open bucket shall clear the concrete already in place and the height of drop shall not exceed 1.0m. The bucket shall be opened slowly to avoid high vertical bounce. Dumping of buckets on the swing or in any manner which results in separation of ingredients or disturbance of previously placed concrete will not be permitted.

f) Placement in restricted forms:

Concrete placed in restricted forms by borrow, buggies, cars, short chutes or hand shoveling shall be subject to the requirement for vertical delivery of limited height to avoid segregation and shall be deposited as nearly a practicable in its final position.

Chutting:

Where it is necessary to use transfer chutes, specific approval of Engineer-in-charge must be obtained. The type, length, slopes, baffles, vertical terming of operations. These shall be so arranged that al-
most continuous flow of concrete is obtained at the discharge end without segregation. To allow for the loss of mortar against the sides of the chutes, the first mixes shall have less coarse aggregate.

During cleaning of chutes, the waste water shall be kept clear of the forms. The concrete shall not be permitted to fall from the end of the chutes by more than 1.0 m. Chutes, when approved for use, shall have slopes not flatter than 1 vertical to 3 horizontal and not steeper than 1 vertical to 2 horizontal. Chutes shall be of metal or metal lined of rounded cross section. The slopes of all chute sections shall be approximately same. The discharge end of the chutes shall be maintained above the surfaces of the concrete in the forms.

g) Placing by Pumping / Pneumatic Placers:

Concrete may be conveyed and placed by mechanically operated equipments e.g. pumps or pneumatic placers, only with the written permission of Engineer-in-charge. When pumping is adopted, before pumping of concrete is started, the pipelines shall be lubricated with one or two batches of mortar composed of one part cement and two parts sand. The concrete mix shall be specially designed to suit pumping. Care shall be taken to avoid stoppages in work once pumping has started.

When pneumatic placer is used, the manufacturer’s advice on layout of pipeline shall be followed to avoid blockages and excessive wear. Restraint shall be provided at the discharge box to cater for the reaction at the end.

Manufacturer’s advice shall be followed regarding concrete quality and all other related matters when pumping / pneumatic placing equipments are used.

h) Concrete in Layers:

Concreting, once started, shall be continuous until the pour is completed. Concrete shall be placed in successive horizontal layers of uniform thickness ranging from 15cm to 90cm as directed by Engineer-in-charge. These shall be placed as rapidly as practicable to prevent the formation of cold joints or places of weakness between each succeeding layers within the pour.

The thickness of each layer shall be such that it can be deposited before the previous layer has stiffened. The bucket loads or other units of deposit, shall be spotted progressively along the face of the layer with such overlap as will facilitate spreading the layer to uniform depth and texture with a minimum of shoveling stone into mortar rather than mortar on to stones. Such a condition shall be corrected by redesign of mix or other means, as directed by Engineer-in-charge.

i) Bedding of layers:

The top surface of each pour ad bedding places shall be approximately horizontal unless otherwise instructed.

j) Special provision in placing:

When placing concrete in walls with openings, in floors of integral slab and beam construction and other similar conditions, the placing shall stop when the concrete reaches the top of the opening in
walls or bottom horizontal surface of the slabs a the case may be. Placing shall be resumed before the concrete in place takes initial set, but not until it has had time to settle as determined by Engineer-in-charge.

**k) Placing Concrete through reinforcing steel:**

While placing concrete through reinforcing steel, care shall be taken to prevent segregation of the coarse aggregate. Where the congregation of steel make placing difficult, it may be necessary to temporally move the top steel aside to get proper placement and restore reinforcing steel to design position.

**l) Bleeding:**

Bleeding or free water on top of concrete being deposited into the forms shall be caused to stop the concrete pour ad the conditions causing this defect corrected before any further concreting is resumed.

**m) Construction Joints and Keys:**

Concrete shall be placed without interruption until completion of the part of the work between pre-determined construction joints, as specified therein after. Time lapse between the pouring of adjoining units shall be as specified in the drawing or as directed by Engineer-in-charge.

If stopping of concreting becomes unavoidable anywhere, a properly formed construction joint shall be made where the work is stopped. Joints shall be either vertical or horizontal, unless shown otherwise in drawings. In case of an inclined or curved member, the joints shall be made in such a manner that the joint lines coincide with the architectural features of the finished work. Vertical joints in walls shall be kept to a minimum. Vertical joints shall be formed against a stop board, horizontal joints shall be level and wherever possible, arranged, so that the joint lines coincide with the architectural features of the finished work. Battens shall be nailed to the form to ensure a horizontal line ad if directed, shall also be used to form a grooved joint. For tank walls, similar work joints shall be formed as per IS 3370. Concrete that is in the process of setting shall not be disturbed or shaken by traffic either on the concrete itself or upon the shuttering, horizontal and vertical construction joints and shear keys shall be located ad shall con-form in detail to the requirements of the plans unless otherwise directed by Engineer-in-charge. Where not described, the joints shall be in accordance with the following:

**n) Column Joints:**

In a column, the joint shall be formed 75mm below the lowest soffit of the beams including haunches if any. In flat slab construction the joint shall be 75mm below the soffit of column capital. At least 2 hours shall elapse after depositing concrete in column, piers or walls, before depositing in beams, girders or slabs supported thereon.

**o) Beam and Slab joints:**

Concrete in a beam shall be placed throughout without a joint but if the provision of a joint is unavoidable, the joint shall be vertical ad at the center or within the middle third of the span unless otherwise shown in drawings. Where a beam intersects a girder, the joints in the girder shall be off-
set a distance equal to twice the width of the beam and additional reinforcement provided for shear. The joints shall be vertical throughout the full thickness of the concrete member. A joint in a slab shall be vertical and parallel to the principal reinforcement where it is unavoidable at right angles to the principle reinforcement, the joint shall be vertical and at the middle of span.

p) **Stone Pockets and Mortar Pondages:**

Formation of stone pockets or mortar pondages in corners and against faces of forms shall not be permitted, should these occur, they shall be dug out, reformed and refilled to a sufficient depth and shape for thorough bounding as directed by Engineer-in-charge.

q) **Placement Interval:**

Except when placing with slip forms, each placement of concrete in multiple lift work shall be allowed to set for at least 24 hours after the final set of concrete and before the start of a subsequent placement.

r) **Dowels:**

Dowels for concrete work, not likely to be taken up in the near future, shall be wrapped in tar paper and burlap.

s) **Mass Foundations:**

Mass foundations shall be poured in lifts not exceeding 1.5m in height unless, otherwise indicated on the drawings and approved by Engineer-in-charge.

Treatment of construction joints on resuming Concreting:

Drier shall be used for the top lift or horizontal pours to avoid a laitance. All laitance and loose stones shall be thoroughly and carefully removed by wire brushing / hacking ad surface washed.

Just before concreting is resumed, the roughened joint surface shall be thoroughly cleaned and loose matter removed and then treated with a thin layer of cement grout of proportion specified by Engineer-in-charge ad worked well into the surface. The new concrete shall be well worked specially against the prepared face before the grout mortar sets. Special care shall be taken to obtain thorough compaction ad to avoid segregation of the concrete along the joint plane.

4.7.8 **Compaction:**

Concrete shall be compacted during placing, with approved vibrating equipment, until the concrete has been consolidated to the maximum practicable density, is free of pockets of coarse aggregate ad fits tightly against all form surfaces, reinforcement ad embedded fixtures. Particular care shall be taken to ensure that all concrete placed against the form faces and into corners of forms or against hardened concrete at joints is free from voids or cavities. The use of vibrators shall be consistent with the concrete mix ad caution is to be exercised not to over vibrate the concrete to the point of segregation.
a) **Type of Vibrators:**

Vibrator shall conform to IS specifications. Type of vibrators to be used shall depend upon the structure where concrete is to be placed. Shutter vibrators, to be effective, shall be firmly secured to the form work which must be sufficiently rigid to transmit the vibrations strong enough not to be damaged by it. Immersion vibrator shall have No load frequency amplitude and acceleration a as per IS 2505 depending on the size of the vibrator. Immersion vibrators in sufficient numbers and each of adequate size shall be used to properly consolidate all concrete. Tapping or external vibrating of forms by hand tools or immersion vibrators will not be permitted.

b) **Use of Vibrators:**

The exact manner application of the most suitable machines for the purpose must be carefully considered and operated by experienced men. Immersion vibrators shall be inserted vertically at points not more than 450mm apart and withdrawn when air bubbles ceases to come to the surface. Immersion vibrators be used to transport concrete inside the forms. Particular attention shall be paid to vibration at the top of lift, e.g. in a column or wall.

c) **Melding successive batches:**

When placing concrete in layers, which are advancing horizontally as the work progress, great care shall be exercised to ensure adequate vibration, blending and melding of the concrete between the successive layers.

d) **Penetration of Vibrations:**

The immersion vibrator shall penetrate the layer being placed and also penetrate the layer below the under layer is still plastic to ensure good bond and homogeneity between the two layers ad prevent the formation of cold joints.

e) **Vibrating against reinforcement:**

Care shall be taken to prevent contact of immersion vibrators against reinforcement steel. Immersion vibrators shall not be allowed to come in contact with reinforcement steel after start of initial set. They shall also not be allowed to come in contact with forms of finished surfaces.

f) **Use of form attached Vibrators:**

Form attached vibrators shall be used only with specific authorization of Engineer-in-charge.

g) **Use of surface vibrators:**

The use of surface vibrators will not be permitted under normal conditions. However, for thin slabs, such as highways, runways and similar construction, surface vibrators shall be specifically designed may be permitted, upon approval of Engineer-in-charge.
4.8 Curing, Protecting, Repairing and Finishing:

4.8.1 Curing:

All concrete shall be cured by keeping it continuously damp for the period of time required for complete hydration and hardening to take place. Preference shall be given to the use of continuous sprays or pounded water, continuously saturated covering of sacking, canvas, hessian or other absorbent materials, or approved effective curing compounds applied with spraying equipment capable of producing a smooth, even textured coat. Extra precautions shall be exercised in curing concrete during cold ad hot weather as outlined hereinafter. The quality of curing water shall be the same as that used for mixing concrete.

a) Curing with Water:

Fresh concrete shall be kept continuously wet for a minimum period of 14 days from the date of placing of concrete, following a lapse of 12 to 24 hours after lying concrete. The curing of horizontal surfaces exposed to the drying winds shall however begin immediately the concrete has hardened.

Water shall be applied to unformed concrete surfaces within 1 hour after concrete has set. Water shall be applied to formed surfaces immediately upon removal of forms.

b) Continuous Spraying:

Curing shall be assured by use of an ample water supply under pressure in pipes, with all necessary appliances of hose sprinklers a spraying device. Continuous fine mist spraying or sprinkling shall be used, unless otherwise specified or approved by Engineer-in-charge.

c) Alternate curing Methods:

Whenever in the judgment of Engineer-in-charge, it may be necessary to omit the continuous spray method, covering of clear sand or other approved means such as wet gunny bags, which will prevent loss of moisture from the concrete, during or after the curing period, will not be permitted.

Conversing shall be kept continuously wet during the curing period.

For curing of concrete in pavements, side-walks, floors, flat roofs or other level surfaces, the pounding method of cutting is preferred. The method of containing the pounded water shall be approved by Engineer-in-charge. Special attention shall be given to edges and corners of the slab to ensure proper protection to these areas. The pounded areas shall be continuously filled with water during the curing period.

d) Curing Compounds:

Surface coating type curing compound shall be used only on special permission of Engineer-in-charge. Curing compounds shall be liquid type while pigmented, conforming to U.S. Bureau of Reclamation specification. No curing compound shall be used on surface where future blending with concrete, water or acid proof membrane or painting is specified.
e) Curing Equipment:

All equipments and materials required for curing shall be on hand and ready for use before concrete is placed.

4.8.2 Protecting Fresh Concrete:

Fresh concrete shall be protected from the elements, from defacement and damage due to construction operations by leaving forms in place for ample period as specified later in this specification. Newly placed concrete shall be protected by approved means such as tarpaulins from rain, sun and winds. Steps as approved by Engineer-in-charge, shall also be taken to protect immature concrete from damage by debris, excessive loading, vibrations, abrasion or contact with other materials etc. that may be warned against and prevented from disturbing green concrete during its setting period, if it is necessary may be warned against and prevented form disturbing green concrete during its setting period, if it is necessary that workmen enter the area of freshly placed concrete, Engineer-in-charge may require that bridges be placed over the area.

4.8.3 Repair and Replacement of unsatisfactory Concrete:

Immediately after the shuttering is removed, the surface of concrete shall be carefully gone over and all defective areas called to the attention of Engineer-in-charge who may permit patching of the defective areas or else reject the concrete unit either partially or entirely. Rejected concrete shall be removed and replaced by contractor at no additional expense to the Department. Holes left by form bolts etc. shall be filled up and made good with mortar composed of one part of cement to one and half parts of sand passing through 2.36mm IS sieve after removing any loose stones adhering to the concrete. Mortar filling shall be struck off flush at the face of the concrete. Concrete surface shall be finished as described under the particular item of work.

Superficial honey combed surfaces and rough patches shall be similarly made good immediately after removal of shuttering in the presence of Engineer-in-charge and superficial water ad air holes shall be filled in. The mortar shall be well worked into the surface with wooden float. Excess water shall be avoided. Unless instructed otherwise by Engineer-in-charge, the surface of the exposed concrete placed against shuttering shall be rubbed down immediately on removal for shuttering to remove fine or other irregularities, care being taken to avoid damaging the surfaces. Surface irregularities shall be removed by grinding.

If reinforcement is exposes or the honey combing occurs at vulnerable position e.g. ends of beams or columns, it may be necessary to cut out the member completely or in part and reconstruct. The decision of Engineer-in-charge shall be final in this regard. If only patching is necessary, the defective concrete shall be cut out till solid concrete is reached (or to a minimum depth of 25mm), the edges being cut perpendicular to the affected surface or with a small undercut if possible, anchors, tees or dowels shall be provided in slots whenever necessary to attach the newly concrete securely in place.

An area extending several centimeters beyond the edges and the surfaces of the prepared voids shall be saturated with water for 24 hours immediately before the patching material is placed.
a) Use of Epoxy:

The use of epoxy for bonding fresh concrete used for repairs will be permitted upon written approval of Engineer-in-charge. Epoxies shall be applied in strict accordance with the instruction of the manufacturer.

b) Method of repair:

Small size holes having surface dimensions about equal to the depth of the hole, holes left after removal of form holts, grout insert holes and slots cut for repair of cracks shall be repaired as follows:

The hole to be patched shall be roughened ad thoroughly soaked with clean water until absorption stops.

A 5mm thick layer of grout of equal parts of cement and sand shall be well brushed into the surface to be patched followed immediately by the patching concrete which shall be well consolidated with a wooden float and left slightly proud of the surrounding surface. The concrete patch shall be built up in 10mm thick layers. After an hour more, depending upon weather conditions, it shall be worked off flush with a wooden float d a smooth finish obtained by wiping with hessian. Steel trowel shall not be used for this purpose. The mix for patching shall be of the same materials and in the same proportions as that used in the concrete being repaired, although some reduction in the maximum size of the coarse aggregates may be necessary and the mix shall be kept as dry as possible.

Mortar filling by air pressure (guniting) shall be used for repair of areas to large ad / or too shallow for patching with mortar. Patched surfaces shall be given a final treatment to match the colour and texture of the surrounding concrete. White cement shall be substituted for ordinary cement, if so directed by Engineer-in-charge, to match the shade of the patch with the original concrete.

c) Curing of Patched Work:

The patched area shall be covered immediately with an approved non-staining water saturated material such s gunny bags, which shall be kept continuously wet ad protected against sun and wind for a period of 24 hours. Thereafter, the patched area shall be kept wet continuously by a fine spray of sprinkling water for not less than 10 days.

Approval by Engineer-in-charge:

All materials, producers and operations used in the repair of concrete a also the finished repair work shall be subject to the approval of Engineer-in-charge. All fillings shall tightly bonded to the concrete and shall be sound, free from shrinkage cracks after the fillings have been cured and dried.

d) Finishing:

This specification is intended to cover the treatment of concrete surfaces of all structures.
4.9 Finish for Formed surfaces:

The type of finish for formed concrete surfaces shall be as follows, unless otherwise specified by the Engineer-in-charge.

For surface below grade the concrete shall be free of surface irregularities.

Unless specified, surfaces which will be exposed when the structure is in service shall receive no special finish, except repair of damaged or defective concrete, removal of fins and abrupt irregularities, filling of hole left by form ties and rods and clean up of loose or adhering debris.

Surfaces which will be exposed to the weather and which would normally be leveled shall be sloped for drainage. Unless the drawing specify a horizontal surface or shows the slope required, the tops of narrow surfaces such as staircase treads, walls, curbs ad parapets shall be sloped across the width approx. as 1 in 30, Broader surface such as walkways, roads, parking areas ad platforms shall be sloped about 1 in 50. Surfaces that will be covered by backfill or concrete, sub floors to be covered with concrete topping, terrazzo or quarry tile ad similar surfaces shall be smooth, screened ad leveled to produce even surfaces. Surface irregularities shall not exceed 6mm. Surfaces which will not be covered by backfill, concrete or tile topping such a outside decks, floors of galleried ad sumps, parapets, gutters, sidewalks, floors and slabs shall be consolidated, screened d floated.

Excess water and laitance shall be removed before final finishing. Floating may be done with hand or power tools and started a soon as the screeded surface has attained a stiffness to permit finishing operations ad these shall be the minimum required to produce a surface uniform in texture ad free from screed marks or other imperfections. Joints ad edges shall be tooled as called for on the drawings or as faceted by Engineer-in charge.

a) Standard Finish for Exposed Concrete:

Exposed concrete shall mean any concrete other than floors or slabs exposed to view upon completion of the job. Unless otherwise specified on the drawings, the standard finish for exposed concrete shall be of smooth finish.

A smooth finish shall be obtained with use of lined or plywood form having smoothed and even surfaces and edges. Panels and form linings shall be of uniform size and be as large as practicable and installed with closed joints. Upon removal of forms, the joint marks shall be smoothed off and all blemished, projections etc. removed, leaving the surfaces reasonably smooth ad unmarred.

b) Integral Cement concrete Finish:

When specified on the drawings, an integral cement concrete finish of specified thickness for floors and slabs shall be applied either monolithic or bonded, as specified in the drawings ad as per IS 2571. The surface shall be compacted and then floated with a wooden float or power floating machine. The surface shall be tested with a straight edge a any high and low spots eliminated. Floating or trowelling of the finish shall be permitted only after all surface water has evaporated. Dry cement or a mixture of dry cement and sand shall not be sprinkled directly on the surface of the cement finish to absorb moisture or to stiffen the mix.
c) Rubbed Finish:

A rubbed finish shall be provided only on exposed concrete surfaces as specified on the drawings. Upon removal of forms, all fins a do there projections on the surfaces shall be carefully removed, off sets leveled and voids ad/ or damaged sections immediately saturated with water ad repaired by filling with water and repaired by filling with concrete or mortar of the same composition as was used in the surfaces. The surfaces shall then be thoroughly wetted and rubbed with carborandum or other abrasive. Cement mortar may be used in the rubbing, but the finished surfaces shall not be brush coated with either cement or grout after rubbing. The finished surfaces shall present a uniform a smooth appearance.

4.10 Protection:

All concrete shall be protected against damage until final acceptance by Engineer-in-charge.

4.11 Foundation Bedding, Bonding and Jointing:

All surfaces upon or against which concrete will be placed shall be suitably prepared by thoroughly cleaning, washing and dewatering a may be indicated in the plans or as Engineer-in-charge may direct to meet the various situations encountered in the work.

Soft or spongy areas shall be cleaned out and back filled with either a soil cement mixture, lean concrete or clan sand fill compacted to minimum density of 90%. Modified proctor, unless otherwise mentioned in schedule of quantities. Prior to construction of form work for any item where soil will not act as bottom form, approval shall be obtained from Engineer-in-charge as to the suitability of the soil.

4.12 Preparation of Earth Strata of Foundations:

All earth surfaces, upon which additional concrete is to be placed later, shall preferably be done by scarifying and cleaning while the concrete is between its initial ad final set. This method shall be used wherever practicable and shall consist of cutting the surface with picks ad stiff brooms and by use of an approved combination of air and water jet as directed by Engineering-charge. Great care shall be taken in performing this work to avoid removal of too much mortar and the weakening of the surface by loosening of aggregate. When it is not practicable to follow the above method, it will be necessary to employ air tools to remove laitance ad roughen the surface.

The final required result shall be pitted surface from which all dirt, unsound concrete, laitance ad glazed mortar have been removed.

4.13 Cleaning and Bonding of formed Construction Joints:

Vertical construction joints shall be cleaned as specified above or by other methods approved by Engineer-in-charge in placing concrete against formed construction joints, the surfaces of the joints, where accessible, shall be coated thoroughly in the specified bed-joint bonding mortar immediately before they are covered with concrete or by scrubbing with wire brooms, dipped in to
the fresh converter. Where it is impracticable to apply such a mortar coating, special precautions will be taken to ensure that the new concrete is brought into intimate contact with the surface of the joint by carefully paddling and spading with aid of vibrators and suitable tools.

4.14 Sampling and Testing Concrete in the field:

The sampling and testing of materials and concrete shall be carried out as per the requirements and directions of Engineer-in-charge in accordance with the relevant IS codes viz., IS-456, IS-1199 and IS-519.

Samples from fresh concrete shall be taken as per IS 1199-1959 and cubes shall be made, cured and tested at 28 in accordance with IS 516-1959. The frequency of sampling shall be as per Clause 15 of IS-456 ‘Sampling and Strength of Designed Concrete Mix’

Testing Charges:

Different tests required to be carried out for concrete works including the mix design, cube tested as per the above specifications shall be got done by the contractor at his own cost in one of the approved laboratories. The choice of laboratory shall rest with KIOCL Ltd., . All incidental charges / cost shall be borne by the contractor.

4.14.1 Additional Sampling and Strength Test of Concrete:

In order to get a relatively quicker idea of the quality of concrete, option tests on beams for modulus of rupture at 72 hours (3 days) or at 7 days or compressive strength tests at 7 days may be carried out in addition to 28 days compressive strength test. For this purpose, the values given in Table-5 of IS-456:1978 may be taken for general guidance in the case of concrete made with ordinary cement. In all cases, the 28 days compressive strength specified shall alone be the criterion for acceptance of rejection of the concrete as per IS-456:2000. If however, from test carried out in particular job over a reasonably long period, it has been established to the satisfaction of the Engineer-in-charge that a suitable ratio between 28 days compressive strength and modulus of rupture at 72 (+) 2 hours or 7 days may accepted the Engineer-in-charge may suitably relax the frequency of 28 days compressive strength, provided the expected strength values at the specified early stage are consistently met.

4.14.2 Acceptance Criteria:

The acceptable criterion for the test results shall be in accordance with provisions of Clause 16 ‘Acceptance Criteria’ of IS-456:2000

4.14.3 Inspection and Testing of Structures

a) Inspection:

To ensure that the construction complies with the design an inspection procedure should be set up covering materials, records, workmanship and construction. The inspection and testing of structure shall be carried out as per provisions of Clause 17 ‘Inspection and Testing of Structures’ of IS-456:2000
Immediately after stripping the form work, all concrete shall be carefully inspected and any defective work or small defects, either removed or made good before concrete has thoroughly hardened, as instructed by engineer-in-charge.

In case of doubt regarding the grade of concrete used or results of cube strength are observed to be lower than the designed strength as per specifications at 28 days, compressive strength test of concrete based on core test, ultrasonic test and/or load test shall be carried out by the digital Engineer-in-charge all at the cost of the contractor. In case these tests do not satisfy the requirements, the KIOCL Ltd., will be at liberty to reject the concrete, and the contractor, at his own cost, has to dismantle and re-do the same or carry out such remedial measures as approved by KIOCL Ltd.,

4.14.4 Mode of Measurement for concrete work:

General:

Concrete as actually done shall be measured for payment as per IS 1200 series of codes for Measurement of Works.

4.15 Grouting:

a) Standard Grout:

Grout shall be provided as specified in the drawings and shall be carried out as per the guidance of Engineer-in-charge.

Sand shall be such as to produce a flow able grout without any tendency to segregate. Sand, for general grouting purposes, shall be graded within the following limits:

- Passing I.S. sieve 2.36mm - 95 to 100%
- Passing I.S. sieve 1.18mm - 65 to 95%
- Passing I.S. sieve 300 micron above - 10 to 30%
- Passing I.S. Sieve 150 micron above - 3 to 10%

Sand for fluid grouts shall have the fine material passing the 300 and 150 micron sieves at the upper limits specified above.

Sand for stiff grouts shall meet the usual grading specifications and concrete surface to be grouted shall be thoroughly roughened and cleaned of all foreign matter and laitance.

The proportions of grout shall be such as to produce a flowable mixture consistent with minimum water content and shrinkage. The grout proportions shall be limited as follows:
Table 4.1 Standard grout

<table>
<thead>
<tr>
<th>Use</th>
<th>Grout Thickness</th>
<th>Mix. Proportions</th>
<th>W/C Ratio(Max.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Fluid Mix</td>
<td>Under 25mm</td>
<td>One part Portland cement of one part sand</td>
<td>0.44</td>
</tr>
<tr>
<td>b. General</td>
<td>25mm and over but less than 50mm</td>
<td>One part Portland cement of two part sand</td>
<td>0.53</td>
</tr>
<tr>
<td>c. Stiff mix</td>
<td>50mm and over</td>
<td>One part Portland cement of three part sand</td>
<td>0.53</td>
</tr>
</tbody>
</table>

Anchor bolts, anchor bolt hole and bottom of equipment and column base plates shall be cleaned of all oil, grease, dirt and loose material. The use of hot, strong, caustic solution for this purpose will be permitted.

Prior to grouting, the hardened concrete surfaces to be grouted shall be saturated with water. Water in anchor bolts holes shall be removed before grouting is started.

Forms around base plates shall be reasonably tightened to prevent leakage of the grout.

Adequate clearance shall be provided between forms and base plate to permit grout to be worked properly into place. Grouting once started shall be done quickly and continuously to prevent segregation, bleeding and breakdown of initial set. Grout shall be worked from one side of one end to the other to prevent entrapment of air. To distribute the grout ad to ensure more release from entrapped air, link chains can be used to work the grout into place. Grouting through holes in base plate shall be by pressure grouting. Variations in grout mixes ad procedures shall be permitted if approved by the Engineer-in-charge.

b) Special Grout:

Special grout where specified on the drawing shall be provided in strict accordance with the manufacturer’s instructions / specifications on the drawings.

c) Inspection:

All materials, workmanship and finished construction shall be subject to the continuous inspection ad approval of Engineer-in-charge. All rejected materials supplied by contractor and all rejected work or construction performed by contractor, as is not in conformance with the specifications and drawings, shall immediately be replaced at no additional expense to the KIOCL Limited.

Approval of any preliminary material or phase of work shall in no way relieve the contractor from the responsibility of supplying concrete and/ or producing finished concrete in accordance with the specifications and drawings.

All concrete shall be protected against damage until final acceptance by the KIOCL Limited or its representatives.
d) Clean up:

Upon the completion of concrete work, all forms, equipments, construction tools, protective coverings and debris resulting from the work shall be removed from the premises.

All debris, i.e. empty containers, scrap wood etc. shall be removed dump daily or as directed by the Engineer-in-charge. The finished concrete surfaces shall be left in a clean condition to the satisfaction for the Engineer-in-charge.

5. FORM WORK FOR PLAIN AND REINFORCED CONCRETE WORKS

5.1 General:

The form work shall consist of shores, bracings, sides of beams and columns, bottom of slabs, silo and hopper walls etc, including ties, anchors, hangers, inserts etc. complete which shall be properly designed and planned for the work. The false work shall be so constructed that up and down vertical adjustment can be made smoothly. Wedges may be used at the top or bottom of timber shores, but not at both ends, to facilitate vertical adjustment and dismantling of form work.

5.2 Design of Form Work

The design and engineering of form work as well as its construction shall be the responsibility of Contractor. The drawings and calculations for the design of the form work shall be submitted well in advance to the Engineer-in-charge for approval before proceeding with work, at no extra cost to the Department. Engineer-in-charge's approval shall not however, relieve Contractor of the full responsibility for the design and construction for the form work. The design shall take into account all the loads vertical as well as lateral that the forms will be carrying including live and vibration loadings.

5.3 Tolerances:

The tolerances in form works for building works comprising of beams, columns, stairs, slab etc., shall be as per Clause 11 ‘Form Work’ of IS-456.

5.4 Type of Form work:

Form work may be of timber, plywood with Acrow spans, Acrow pipe (or) Doka type formwork. For special finishes, the form work may be lined with plywood, steel sheets, oil tempered hard board etc. Sliding forms and slip forms may be used with the approval of Engineer-in-charge.

5.5 Form work requirements:

Forms shall conform to the shapes, lines grades and dimensions including camber of the concrete as called for in the drawings. Ample studs, braces, straps, shores etc. shall be used to hold the forms in proper position without any distortion whatsoever until the concrete has set sufficiently to permit removal for forms. Forms shall be strong enough to permit the use of immersion vibrators.
special cases, form vibrators may also be used. The shuttering shall be close boarded. Timber shall be well seasoned, free from sap, shakes, loose knots, worm holes, warps or other surface defects in contact with concrete. Faces coming in contact with concrete shall be free from adhering grout, plaster, paint, projecting nails, splits or other defects. Joints shall be sufficiently tight to prevent loss of water and fine material from concrete.

Plywood shall be used for exposed concrete surfaces, where called for. Sawn and wrought timber may be used for unexposed surfaces. Inside faces of forms for concrete surfaces which are to be rubbed finished shall be planed to remove irregularities or unevenness in the face. Form work with lining will be permitted.

All new and used form lumber shall be maintained in a good condition with respect to shape, strength, rigidity, water tightness, smoothness and cleanliness of surfaces. Form lumber unsatisfactory in any respect shall not be used as if rejected by Engineer-in-charge shall be removed from the site.

Shores supporting successive stores shall be placed directly over those below or be so designed and placed that the load will be transmitted directly by them. Trussed supports shall be provided for stores that cannot be secured on adequate foundation.

Formwork, during any stage of construction showing signs of distortion or distorted to such a degree that the intended concrete work will not conform to the exact contour indicated on the drawings, shall be repositioned and strengthened. Poured concrete affected by the faulty formwork, shall be entirely removed and formwork corrected prior to placing new concrete.

Excessive construction camber to compensate for shrinkage settlement etc. that may impair the structural strength of members will not be permitted.

Forms shall be so designed and constructed that they can be stripped in the order required and their removal do not damage the concrete. Face formwork shall provide true vertical and horizontal joints shall be as directed by Engineer-in-charge.

Where exposed smooth or rubbed concrete finishes are required, the forms shall be constructed with special care so that the desired concrete surfaces could be obtained which require minimum finish.

5.6 Bracings, Struts and Props:

Form work shall be braced, strutted, propped and so supported that it shall not deform under weight and pressure of the concrete and also due to the movement of men and other materials. Bamboos shall not be used as props or cross bracings. The shuttering for beams and slabs shall be so erected that the shuttering on the sides of beams and under the soffit of slab can be removed without disturbing the beam bottoms.

Re-propping of beams shall not be done except when props have to be reinstated to take care of construction loads anticipated to be in excess of the design load. Vertical props shall be supported on wedges or other measures shall be taken whereby the props can be gently lowered vertically while striking the shuttering.
If the shuttering for a column is erected for the full height of the column, one side shall be left open and built upon sections as placing of concrete proceeds, or windows may be left for pouring concrete from the sides to limit the drop of concrete to 1.0 m or as directed by Engineer-in-charge.

5.7 Inspection of Formwork:

Following points shall be borne in mind while checking during erection of form work and formwork got approved by the Engineer-in-charge before placing of reinforcement bars:

a) Any member which is to remain in position after the general dismantling is done should be clearly marked.

b) Material used should be checked to ensure that, wrong items/ rejects are not used.

c) If there are any excavations nearby which may influence the safety of form works, corrective and strengthening action must be taken.

d) (i) The bearing soil must be sound and well prepared and the sole plates shall bear well on the round.
(ii) Sole plates shall be properly seated on their bearing pads or sleepers.
(iii) The bearing plates of steel props shall not be distorted.
(iv) The steel parts on the bearing members shall have adequate bearing areas.

e) Safety measures to prevent impact of traffic, scour due to water etc should be taken. Adequate precautionary measures shall be taken to prevent accidental impacts etc.

f) Bracing, struts and ties shall be installed along with the progress of form work to ensure strength and stability of form work at intermediate stage. Steel sections (especially deep sections) shall at adequately restrained against tilting; overturning and form work should be restrained against horizontal loads. All the securing devices and bracing shall be tightened.

g) The stacked materials shall be placed as catered for, in the design.

h) When adjustable steel ropes are used, they should: (i) Be undamaged and not visibly bent (ii) Have the steel pins provided by the manufacturers for use (iii) Be restrained laterally near each end. (iv) Have means for centralizing beams placed in the fork heads.

i) Screw adjustment of adjustable props shall not be over extended.

j) Double wedges shall be provided for adjustment of the form to the required position wherever any settlement / elastic shortening of props occur. Wedges should be used only at the bottom end of single prop. Wedges should not be too steep and one of the pair should be tightened / clamped down after adjustment to prevent other shifting.

k) No member shall be eccentric upon vertical member

l) The number of nuts and bolts shall be adequate
m) All provisional of the design and / or drawings shall be complied with

n) Cantilever supports shall be adequate

o) Props shall be directly under one another in multistage constructions as far as possible.

p) Guy ropes or stays shall be tensioned properly.

q) There shall be adequate provision for the movement and operation of vibrators another construction plant and equipment.

r) Required camber shall be provided over long spans.

s) Supports shall be adequate and in plumb within the specified tolerances.

5.8 Form Oil:

Use of form oil shall not be permitted on the surface which requires painting. If the contractor desire to use form oil on the inside of formwork of the other concrete structures, a non staining mineral oil or other approved oil CEMOL-35 of Ms. Hindustan Petroleum Co. Ltd may be used, provided it is applied before placing reinforcing steel and embedded parts. All excess oil on the form surfaces and any oil on metal or other parts to be bedded in the concrete shall be carefully removed. Before treatment with oil, forms shall be thoroughly cleared of dried splatter of concrete from placement of previous lift, wooden shavings and other unwanted materials.

5.9 Chamfers and Fillers:

All corners and angles exposed in the finished structure shall be formed with moldings to form chamfers or fillers on the finished concrete. The standard dimensions of chamfers ad fillers, unless otherwise specified, shall be 20 X 20 mm. Care shall be exercised to ensure accurate moldings. The diagonal face of the molding shall be planed or surfaced to the same texture as the form s to which it is attached.

5.10 Vertical Construction Joint Chamfers:

Vertical construction joints on faces which will be exposed at the completion of the completion of the work shall be chamfered as above accept where not permitted by Engineer-in-charge.

5.11 Wall Ties:

Wire ties passing through the walls, shall not be allowed. Also through bolts shall not be permitted. For fixing of formwork, alternate arrangements such as coil nuts shall be adopted at the contractors cost.

5.12 Reuse of forms:

Before reuse, all forms shall be thoroughly scrapped, cleaned, nails removed, holes that may leak suitably plugged and joints examined and when necessary repaired and the inside retreated to
prevent adhesion, to the satisfaction of Engineer-in-charge. Warped lumber shall be resized.

Contractor shall equip himself with enough shuttering to complete the job in the stipulated time.

5.13 Removal of forms:

Contractors shall record on the drawings or a special register, the date upon which the concrete is placed in each part of the work and the date on which the shuttering is removed there from.

In no circumstances shall forms be struck until the concrete reaches a strength of the at least twice the stress due to self weight and any construction erection loading to which the concrete may be subjected at the time of striking form work.

In normal circumstances (generally where temperature are above 20C) forms may be struck after expiry of the periods as per Claus 11.3 'Stripping Time of IS 456:2000'

Striking shall be done slowly with utmost care to avoid damage to arise ad projection a without shock or vibration, by gently easing the wedges. If after removing the formwork, it is found that timber has been embedded in the concrete, it shall be removed ad made good as specified earlier.

Reinforced temporary opening shall be provided, as directed by Engineer-in-charge, to facilitate removal of formwork which otherwise may be inaccessible. Tie rods, clamps, form bolts etc. which must be entirely removed from walls or similar structures shall be loosened not sooner than 24 hours no later than 40 hours after concrete has been deposited.

Ties, except those required to hold forms in place, may be removed at the same time.

Ties withdrawn from walls and grade beams shall be pulled towards the inside face. Cutting ties back from the faces of walls and grade beams will not be permitted. Work damaged due to premature or careless removal of forms shall be reconstructed at contractors cost.

5.14 Mode of measurement:

The form work measured shall be the area of concrete in contact with form work only. In case the item of concreting is inclusive of cost of form work, it shall not be measured separately. All temporary form work such as bulk heads, stop boards provided at construction joints which are not shown in the drawings shall not be measured. No deduction shall be made for opening /obstructions upto an area 0.1 sqm. And nothing extra shall be paid for forming such openings. The rate shall include the cost of erecting, centering, shuttering materials, transport, de shuttering and removal of materials from site a labour required for all such operations etc.

6. STEEL REINFORCEMENT

Steel reinforcement bars, if supplied or arranged by contractor, shall be either plain round mild steel bars grade as per IS 432 (part-I) or medium tensile steel bars as per IS 452 (part-I) or hot rolled mild steel ad medium tensile steel deformed bars as per IS 1139 or cold twisted steel bars and hot weld strength deformed bars as per IS 1788, as shown and specified on the drawings. Wire mesh or fabric shall be in accordance with IS 1566. Substitution of reinforcement will not be permitted ex-
cept upon written approval from Engineer-in-charge.

6.1 Storage:

The reinforcement steel shall not be kept in direct contact with ground but stacked on top of an arrangement of timber sleepers or the like. Reinforcement steel shall be with cement wash before stacking to prevent scale and rust. Fabricated reinforcement shall be carefully stock to prevent damage, distortion, corrosion ad deteriorations.

6.2 Quality:

All steel shall be of approved grade and quality. No rolled material will be accepted. If demanded by the Engineer-in-charge contractor shall submit the manufacturers test certificate for steel. Random tests on steel supplied by contractor may be performed by KIOCL Ltd., as per relevant Indian Standards. All costs incidental to such tests shall be at contractor’s expense. Steel not conforming to specifications shall be rejected. All reinforcement shall be clean, free from grease, oil, paint, dirt loose mill, scale dust, bituminous materials or any other substances that will destroy or reduce the bond. All rods shall be thoroughly cleaned before being fabricated. Pitted and defective rods shall not be used. All bars shall be rigidly held in position before concreting. No welding of rods to obtain continuity shall be allowed unless approved by the Engineer-in-charge. If welding is approved, the work shall be carried as per IS 2751, according to best modern practices and as directed by the Engineer-in-charge. In all cases of important connections, tests shall be made to prove that the joints are of the full strength of bars welded. Special specifications, as specified by the Engineer-in-charge, shall be adhered to in the welding of cold worked reinforcing bars and bars other than mild steel.

6.3 Laps:

Laps and splices for reinforcement shall be shown in the drawings. Laping for existing reinforcement shall be welded as per drawing. Splices, in adjacent bars shall be staggered and the locations of all splices, except those specified on the drawing shall be approved by the Engineer-in-charge. The bars shall not be lapped unless the length required exceeds the maximum available length of bars at site.

6.4 Bending:

All bars shall be accurately bent according to the sizes and shapes shown on the detailed working drawings/ bar bending schedules. They shall be bent gradually by machine or other approved means.

Reinforcing bars shall not be straightened and rebent in a manner that will injure the materials. Bars containing cracks or splits shall be rejected. They shall be bent cold, except bars of over 25mm in diameter which may be bent hot if specifically approved by the Engineer-in-charge. Bars bent hot shall not be heated beyond cherry red colour (not exceeding 645°C) and after bending shall be allowed to cool slowly without quenching. Bars incorrectly bent shall be used only of heat means used for straightening and rebinding is such as shall not, in the opinion of the Engineer-in-charge injure the material. No reinforcement bar shall be bent when in position in the work without approval,
whether or not it is partially embedded in hardened concrete. Bars having links or bends other than those required by design shall not be used.

6.5 Bending at Construction Joints:

Where reinforcement bars are bent aide at construction joints and afterwards bent back into their original position, care should be taken to ensure that no time the radius of the bend is less than 4 bar diameters for plain mild steel or 6 bar diameters for deformed bars. Care shall also be taken when bending back bars to ensure that the concrete around the bar is not damaged.

6.6 Fixing / placing ad Tolerance on Placing:

Reinforcement shall be accurately fixed by any approved means maintaining the correct position as shown in the drawings by the use of blocks, spacer and chairs as per IS 2502 to prevent displacement during placing and compaction of concrete. Bar intended to be in contact at crossing point shall be securely bound together at all such points with number 16 gauge annealed soft iron wire. The vertical distances required between successive layers of bars in beams or similar members shall be maintained by the provision of mild steel spacer bars at such intervals that the main bars do not perceptibly sag between adjacent spacer bars.

6.7 Tolerance on placing of reinforcement:

Unless otherwise specified by the Engineer-in-charge, reinforcement shall be placed within the tolerances covered by Clause 12.3 of IS-456.: 

a) For effective depth 200 mm or less - + 10 mm
b) For effective depth more than 200 mm - + 15 mm

6.8 Cover to Reinforcement:

The cover to reinforcement shall be as specified in the drawings. The general guidelines for the cover to reinforcement are listed below.

The cover shall in no case be reduced by more than one third of specified cover or 5 mm whichever is less. Unless indicated otherwise on the drawings, clear concrete cover for reinforcement (exclusive of plaster or other decorative finish shall be as follows):

a) At each end of reinforcing bar not less than 25 mm, nor less than twice the diameter of such bar.

b) For a longitudinal reinforcing bar not less than 25 mm, nor more than 40 mm, nor less than the diameter of such bar. In the case of column of maximum dimensions of 200 mm or under, whose reinforcing bars do not exceed 12 mm, a cover of 25 mm may be used.

c) For longitudinal reinforcing bar in a bar, not less than 25 mm nor less than the diameter of such bar and.

d) For tensile, compressive, shear, or other reinforcement in a slab, not less than 25 mm, nor less than the diameter of such bar and.
e) For any other reinforcement not less than 15mm, nor less than the diameter of such bar.

f) Increased cover thickness may be provided when surfaces of concrete members are exposed to the action of harmful chemicals (as in the case of concrete in contact with earth faces contaminated with such chemicals), acid, vapour, saline, railways etc. and such increase of cover may be between 15mm and 50 mm beyond the figures given in (a to e) above as may be specified by the Engineer-in-charge.

g) For reinforced concrete members, totally immersed in sea water the cover shall be 40mm, more than specified (a to e) above.

h) For reinforced concrete members, periodically immersed in sea water or subject to sea spray, the cover of concrete shall be 50 mm more than that specified (a to e) above.

i) For concrete of grade M25 and above, the additional thickness of cover specified in (f), (g) and (h) above may be reduced to half. In all such cases the cover should not exceed 75mm.

j) Protection to reinforcement in case of concrete exposed to harmful surroundings may also be given by providing a dense impermeable concrete with approved protective coating as specified on the drawings. In such case, the extra cover, mentioned in (h) and (i) above, may be reduced by the Engineer-in-charge, to those shown on the drawing.

k) The correct cover shall be maintained by cement mortar briquettes or other approved means. Reinforcement for footings, grade beams ad slabs on sub grade shall be supported on precise concrete blocks as approved by the Engineer-in-charge. The use of pebbles or stones shall be permitted.

l) The minimum clear distance between reinforcing bars shall be in accordance with IS 456 or as shown in drawings.

6.9 Cover Blocks and Spacers:

a) In case of beam ad slab construction precast cover blocks in cement mortar 1:2 (1 cement : 2 coarse sand) about 4X4 cm section and of thickness equal to the specified cover shall be placed between the bars and shuttering, so as to secure and maintain the requisite cover of concrete over reinforcement.

b) In case of cantilevered ad doubly reinforced beams or slabs, the vertical distance between the horizontal bars shall be maintained by introducing chairs, spacers or support bars of steel at 1.0 metre or at shorter spacing to avoid sagging.

b) In case of columns and walls, the vertical bars shall be kept in position with block of cement mortar 1:2 (1 cement: 2 coarse sand) of required size suitably tied to the reinforcement to ensure that they are in correct position during concreting,
c) In case of other RCC structure such as walls, hopper etc., a combination of cover blocks, spacers and templates shall be used as directed by Engineer-in-charge.

6.10 Inspection:

Erected and secured reinforcement shall be inspected and approved by Engineer-in-charge prior to placement of concrete.

6.11 Mode of Measurement for reinforcement for R.C.C Works:

Reinforcement as detailed in schedule of quantities shall be measured for payment linearly as per height, cutting length nearest to a centimeter shown in bar bending schedule submitted by the contractor and approved by the Engineer-in-charge and weight calculated based on the standard weights as per I.S. per meter length. The steel required will be supplied by KIOCL Ltd., against indent by the contractor in 20 days advance. Pins, chairs, spacers shall be provided by the contractor wherever required as per drawing and bar bending schedule and as directed by the Engineer-in-charge and such measurement will be considered for quantity estimation and will not payable.

The rate shall include the cost of handling, transportation from KIOCL Ltd stores, storing at worksite, labour required for all operations including transport, wastage, straightening, cutting, bending, binding and the binding wire as required.

7. BRICK WORK & BLOCK WORK

7.1 General:

This section covers the requirements for brickwork and concrete block masonry in walls and partitions.

IS: 2212 ‘code of practice for brickwork’ shall apply in so far as it is applicable. The provision of the following Indian standard specifications shall form a part of these specifications to the extent they have been referred to or are applicable with this specification.

IS: 2116 ‘Specification for sand for masonry mortar’
IS: 1007 ‘Specification for common burnt clay building bricks’
IS: 3466 ‘Specification for masonry cement’
IS: 2250 ‘Code of practice for preparation and use of masonry mortar’
IS: 2185 ‘Specification for concrete masonry units’
IS: 2572 ‘Code of practice for construction of hollow concrete masonry’.

7.2 Materials:

Bricks:
Bricks shall be first class well burnt bricks of the best quality. The contractor shall submit samples and have these tested and submit the test results for approval prior to work commencement. The bricks shall have a crushing strength of not less than 45 kg/sq cm. When dry.
Cement:

Cement for mortar shall conform to IS: 8112 generally and to the requirements of clause 3.2.1 of this document. Contractor may substitute masonry cement conforming to IS: 3466 approved no charge in the rate grouted for brick masonry is required. Masonry cement conforming to IS: 3466 if brought on the site shall be stacked separately and adequate and approved provision shall be made prevent mixing of the same with ordinary Portland cement conforming to IS: 8112.

Sand:

Sand for masonry mortar shall conform to the requirements of IS: 2116.

Water:

Water shall conform to the requirements stipulated in clause 3.2.6 of IS: 2116.

Mortar:

The mortar for masonry shall be composed of one part of cement and 6 parts of dry sand proportioned by volume. The mortar for half brick walls shall be of 1:4 proportions.

The unit measurement shall be standard bag of cement (50kg) summed to be 35 liters (0.0354 cum) sand shall be measured in boxes of suitable size. In case of damp sand, its quantity may be corrected for bulkage.

Cement and sand shall be mixed together thoroughly on a clean dry platform until the mixture is of uniform color. Water shall then be added to obtain a mortar of the consistency of a stiff paste, care being taken to add just sufficient water for the purpose.

Only that quantity of mortar shall be mixed as can be placed in the work within one hour of it’s mixing, Mortar unused for more than one hour from the time of mixing shall be rejected and removed from the site.

7.3 Workmanship:

a) Only skilled and experienced masons shall be employed for laying the brick masonry.

b) All bricks shall be thoroughly soaked in water for at least six (6) hours before they are placed in the work. At the time of laying, the surfaces shall be just moist but not too wet to case dripping of water.

c) No bats or cut brick shall be used in the work unless it is absolutely necessary around irregular openings or for adjusting the dimensions of different courses and for closures, in which case, full bricks shall be laid at the corners, the bats being placed in the middle courses.

d) The bricks shall be laid in mortar to lines, levels and shapes as shown in the drawings, slightly pressed and thoroughly bedded in the mortar and all joint shall be properly fleshed and completely packed with mortar so that no hollows are left. Edges of bricks shall not be damaged during handling. Vertical joint shall not come one over the other in the adjacent corners and shall not
normally be nearer than one quarter of the brick length.

e) Fixtures, plugs, frames for doors and windows, etc. shall be placed in the positions shown in the plan while laying the courses and not later by removal of bricks already laid.

f) Vertically of the walls and horizontality of the courses shall be checked frequently by means of plumb bobs and spirit levels respectively.

g) Bond: unless otherwise specified in the plan or ordered by the engineer, the bond used shall be English.

h) Joints: joints shall not exceed 10 mm in thickness. All joints shall be struck flush with the face when placing for all the walls requiring plastered finish.

i) Rate of rising: the brick masonry shall not be raised more than 60 cm per day and courses shall be raised in uniform height as far as possible. Where this is not possible, the bricks shall be steeped so as to enable the latter courses of masonry to bond with the former. The brickwork shall be done in stages as directed by the engineer to ensure that the load transmitted to the structure does not exceed that for which it has been designed.

j) Scaffolding: Scaffolding may be doubled or singled as warranted by the working conditions. Scaffolding may be of timber bellies, bamboo or tubular steel sections. All scaffolding shall be built of adequate strength to support all conceivable loads likely to come on them.

k) Put long holes shall be made good by bricks to match the face work and holes behind shall be made good by filling solidly with 1:4:8 cement concrete.

l) Watering: All bricks when laid shall be initially protected against hot sun, and drying winds, if necessary, by covering with wet sacking or similar other absorbent material. The brickwork shall be kept wet for a period of at least 14 days after laying. At no time shall mortar be allowed to dry.

m) Bad work: Should the mortar perish, i.e. become dry or powdery through neglect of watering or the masonry be hollow or the work done not according to plans and specifications, the work shall be pulled down and rebuilt, all at the contractor’s cost.

n) The maximum permissible tolerances in masonry should be as specified in IS:1905 table-I.

### 7.4 Half Brick Walls:

Half brick walls shall be constructed wherever shown in the drawing. These shall be all of structures only and half bricks shall not be used. The mortar to be used shall be cement sand mortar 1:4 and as per specification mentioned elsewhere. The work shall be carried out as per IS: 2212.

Reinforcement consisting of 2 bars of 6 mm. shall be provided after every fourth course. The M.S. Bars shall be well anchored at the end of the partition. These bars shall be dully embedded in mortar and over laps if any shall be min. 12" (30mm) and shall conform to specifications mentioned under ‘steel reinforcement’
Whenever the height of the wall is more than 2.1m and R.C runner shall be provided if so instructed by the engineer at the rate of one runner for every 1.5m height. The R.C.C runner and reinforcement in that shall be paid separately. But the reinforcement in the brickwork shall be included in the rate of the brick masonry.

Care shall be taken to see that the wall is not disturbed till it is fully set. All scaffolding, shuttering and formwork for RCC work connected to the newly built wall shall be constructed with utmost care, so that the stability of the wall is fully secured. While making the shuttering for the RCC runner-nailing planks to the walls shall not be permitted. While curing, the water is to be sprinkled by a hose to the wall and not by throwing and splashing across the wall.

**7.5 Measurement and payment:**

For wall the quoted rate shall be per Sqm. of brick masonry in place, the thickness being specified. For mass brick masonry work, the quoted rate shall be per cum. In place. Measurements shall be based on actual quantities at site, limited however by the drawing and as directed by the engineer.

The quoted rate shall cover the supply of all materials, labour, tools, tackle, plants and equipment, scaffolding and temporary works and all other incidental work required to complete the work in accordance with the above specifications. No deductions shall be made for openings less than 0.1 Sqm. in area and for fixtures up to 0.05 Sqm. in area.

**7.6 Hollow block & solid block work:**

**7.6.1 Materials:**

Hollow blocks shall be machine moulded & the concrete used for making the blocks shall be machine mixed. They should generally conform to IS: 2185. All blocks shall be free from cracks, broken edges, honeycombing and other defects.

The blocks shall be stored in such a way as to avoid any contact with moisture on the site.

**Mortar:**

All mortar shall be prepared in accordance with IS: 2250.

Mortar when mixed shall have a slump of 75 mm when tested in accordance with IS: 1199. Water shall be added to only that quantity of dry mortar mix, which can be used within one hour after mixing with the water. Mortar laying unused for more than one hour from the time of mixing the water shall be rejected and removed from the site.

**7.6.2 Workmanship:**

a) Only skilled and experienced masons shall be employed in laying the concrete block masonry.

b) All blocks shall be thoroughly dry before use.
c) The blocks shall be laid in cement mortar to lines levels, etc., as shown in the drawings, lightly pressed and thoroughly embedded in the mortar, and all the joint properly flushed and packed with mortar. Vertical joints shall not come one over the other. Each vertical joint shall be at the mid length of the block below.

d) A course of solid concrete block masonry shall be provided under door & window openings or a 10cms thick precast concrete cill block under windows. The solid course shall extend for at least 20cms beyond the opening on either side.

e) M.S. holdfasts should be so fastened to the door or windows frames that these occur at block course level and their ends embedded in a hollow which shall be filled up with 1:3:6 cement concrete.

f) Workmanship shall strictly conform to IS: 2572.

g) Masonry work shall be cured with water for at least 7 days.

7.6.3 Mode of payment:

For walls the quoted rate shall be Sqm. of block masonry in place, the thickness being specified. Measurements shall be based on actual quantities at site, limited however by the drawings and as directed by the engineer. Quoted rate shall cover the supply of all materials, labour, tools, tackle, plant and equipment, scaffolding, curing the exposed surfaces for 7 days and temporary works and all other incidental work required to complete the work in accordance with the above specifications. No deductions shall be made for openings less than 0.1 Sqm. in area and for fixtures up to 0.05 Sqm. in area.

8. COURSED RUBBLE MASONRY

8.1 General:

This specification refers to providing materials and construction of coursed rubble masonry in foundations, plinth, basement walls and superstructure.

8.2 Stones:

Stones to be used in the masonry shall generally conform to IS: 1805. They shall be trap, granite, quartzite or gneiss. The stones shall stand weathering well and when immersed in water for 24 hours shall not absorb water more than 5% of its dry weight when tested according to IS: 1124. The stone of the required quality shall be obtained from quarries approved by the civil engineer. All stones shall generally be freshly quarried.

The stone shall be kept free from dirt, dust, oil or any other injurious materials, which may attach the stone or mortar or prevent adhesion of mortar. Stones with skins shall not be used.

Different categories of stones such as face stone, backing stone, hearting stone, headers, quoins, etc. shall be collected in advance to suffice at least for a week’s requirement and shall be stacked separately category wise.
a. Face and backing stones:

These stones shall be chisel dressed top and bottom, true and square for at least 5 cm (2”) back from the face the rest of the width shall tail into the work and shall not project below or above the plane of dressing. No stone shall tail to a point. The vertical joints shall be chisel dressed for a depth of not less than 4 cm (1 1/2”) from the face. Individual stones shall have thickness and width of not less than 15 cm. (about 6”) in its thickest part and no stones shall have its length less than 1 1/2 times its height.

The face stones and backing stones shall be selected from the mass of quarry stones for their greater size, good beds, close grain and uniform colour. 50% of the stones shall be more than 0.010 cum. (about 1/3 cft.) in walls up to 50 cm. (about 20”) in thickness and 0.15 cu.m (about 1/2 cft.) in thicker walls.

b. Through stones:

One through stone shall be provided per half square meter of facing evenly distributed. They shall be about 0.03 Sqm (about 1/3 sq.ft.) in face area and shall have a tailing of the full width of the masonry when the width is 60 cm. (about 2’) or less. If the wall or masonry be over 60 cm. (about 2”) in width line of headers overlapping each other by at least 15 cm. (about 6”) shall be laid right through the wall from face to back. The length of the interior headers shall not be less than 45 cm. (about 18”) and their average cross sectional area shall not be less than 0.025 Sqm (about ¼ Sqm). Face header shall be distinctly marked on its face.

c. Vertical headers:

For the massive work with a width of a meter (about 3.28’) and above, vertical headers 45 cm. (about 18’) long or depth of two courses whichever is more shall be provided at the rate of one for every Sqm (about 10.76 sq.ft.) of area in plan. For every course a new set of headers shall be introduced at this rate in a staggered pattern. Their average sectional area shall not be less than 0.03 Sqm (1/3 sq.ft.).

d. Hearting stones:

These can be rubble stones. In wall of 50 cm. (about 20”) and less about 30 percent of the stones shall not be less than 0.10 cu.m (about 1/3 cft.) and for thicker walls about 30 percent stones shall not be less than 0.015 cu.m or (about 2 cft.). The hearting stones shall be hammer dressed on the top and bottom beds. A small proportion of spalls and chips can be used to fill the hollows between the sides of the hearting stones in each course so as to avoid thick mortar joints. However spalls shall not be used for making up the height of hearting to that of the course.

e. Quoins:

The quoins shall be of selected stone and shall normally be 19 cm. X 29 cm. (about 8” x 10” x 16”) or as directed by the engineer. The faces of quoins shall be rough tooled or provided the same type of dressing of that of the face stones as directed. Chisel draft of about 40 mm (about 1 ½”) shall provide on each side of the exposed corner.
The beds and top shall be dressed to the face and rough tooled to 10 cm. (about 4") from the face and vertical joints similarly dressed to 4 cm. (about 1.5") from the face. In the embedded portion the length of the side shall be less than that of the exposed side opposite by more than 8 cm. (about 3") for longer side and 5 cm. (about 2") for the shorter side.

8.3 Mortar:

Cement, sand and water shall be as specified elsewhere in this document. Cement and sand shall be mixed in specified proportions, sand being measured in measuring boxes. The proportions will be by volume on the basis of 50 kg. Bag of cement being equal to 35 liters (about 1.2 cft.). The mortar may be hand mixed or machine mixed.

8.4 Preparation:

In hand-mixed mortar, cement and sand in the specified proportions shall be thoroughly mixed dry on a clean impervious platform by turning over at least 3 times till a homogeneous mixture of uniform colour is obtained. Fresh and clean water as specified above shall be added gradually through a hose and thoroughly mixed to form a stiff plastic mass of uniform colour so that each particle of sand shall be completely covered with a film of wet cement. The water cement ratio may be as directed by the civil engineer.

Mixing platform shall be so arranged that no deleterious extraneous material shall get mixed with mortar nor the mixing water of the water shall flow out. Machine mixed mortar shall be prepared in an approved mixer. About 5% to 10% of mixing water shall be put into the mixer and sand and cement and in the required proportions shall be than added. The remainder of water, quantity of which shall be predetermined by consideration of strength and consistency shall be added uniformly. Mixing will be continued until all particles of sand are uniformly coated with cement paste. Mixing for 1 ½ to 2 minutes will normally be sufficient. Water cement ratio will be as per hand mixed mortar. The mortar so prepared shall be used within 30 minutes of adding water. Only such quantity of mortar shall be prepared as can be used within 30 minutes. The mortar remaining unused after that period or mortar which has partially hardened or is otherwise damaged shall not be retempered or remixed. It shall be destroyed or thrown away.

8.5 Construction:

The masonry shall be laid to lines levels, curves, and shapes shown in the plans. All iron, stone, concrete or other fixtures, plugs, frames, etc. if any, shall be built and bonded in at places shown on the plan or as directed by the civil engineer as the work proceeds and not inserted or joggled on after the masonry is advanced. Holes of the required size and shape shall be left in the masonry during construction itself for fixing pipes, services lines or for passage of water. After the service lines, pipes etc. are fixed in the extra hollow left if any shall be filled with 1:4:8 cement concrete and the face shall be neatly finished with matching stones. If any fixtures are to be provided, they shall be neatly embedded in the required positions while laying the masonry. Iron fixtures shall be embedded in 1:4:8 cement concrete.

Stones in the hearting shall be laid on their broadest face, which gives better opportunity to fill the space between stones. Stratified stones must be laid on their natural beds. All bed joints shall be normal to the pressure upon them. The stones shall be wetted before laying in mortar. Each mason
shall be supplied by the contractor with a vessel full of water and a tumbler for wetting stones, care being taken not to spill any water on green masonry. The bed, which is the receive the stones shall be cleaned, wetted and settled carefully in place with a mallet immediately on placement and solidly bedded in mortar before it has set. Clean chips and spalls, carefully selected to fit in the space shall be wedged in to the mortar joints wherever necessary, to avoid thick joints of mortar. In case any stone already set in mortar is distributed or the joint broken the stone shall be taken out without disturbing the adjoining stones and joints, the mortar thoroughly cleaned from the joints and the stone reset in stone over another already laid.

Shaping and dressing shall be done before the stone is laid in the work. No dressing and hammering which will loosen the masonry will be permitted after it is once placed. There shall be good collection of stones and spalls within easy reach of each mason to enable proper selection of stones for individual location while laying. The stones shall be continuously replenished.

The face stones and backing stones shall be laid without any pinning on the exposed faces. In each course the headers or lines of headers, as the case may be, shall be kept in position at specified internals and with specified laps, where such laps are required before the masonry of the layer is commenced to ensure that they are being laid properly and in required numbers and intervals. They shall be embedded in mortar as masonry in that layer progress.

Quoins shall be laid stretchers and headers wise as seen on each face and shall correspond to the arrangement of quoins in the same course. The quantity of mortar for 1 cubic meter of thin and massive masonry shall range from 0.30 cu.m to 0.35 cu.m respectively and for water retaining masonry from 0.46 cu.m to 0.48 cu.m.

**Bond:**

**a. Lateral bond:**

To give sufficient lateral bond a stone in any course shall break joint with the stone in the course below or above about half the height of the course and regularly not less than 8 cm. (about 3") i.e. joints parallel to the pressure in courses above and below shall not lie too closely near the same vertical line.

**b. Transverse bond:**

To give sufficient transverse bond, the prescribed number of headers shall extent to back of thin walls up to a width of 60 cm. (about 2’) or prescribed number of lines of over-lapping headers from face to back of walls over 60 cm. (about 2”) at each. To ensure provision of full number of headers of the required size, they shall be kept at specified intervals in each course in advance of starting masonry and then embedded in mortar. Their position in each course shall be staggered, so that each will be near about the middle of the two in the courses below and above. Their faces shall be marked with a distinguishing sign to identify them.

**c. At Junctions:**

To bond work at all angles junctions of walls, the stones at each alternate course shall be so carried into each of the respective walls as to joint the work thoroughly. Quoins shall be laid header and
d. With Old Work:

When new work has to be started on the old or one completed a long while ago or in the previous working season, care shall be taken to roughen and clean masonry before laying the new. It shall be wetted before laying the bedding mortar.

Were practicable the whole of the masonry in the structure shall be carried up to a uniform level throughout. But where breaks are unavoidable in carrying up the work continuously in horizontal courses, sufficiently long step shall be left to join the courses to be laid later. All junctions of walls shall be formed at the time the walls are being built cross-walls should be carefully bonded in the main walls. The practice of building two thin faces tied with occasional through stones and filling up the middle with dry packing of stones and spalls and putting mortar on top must be strictly guarded against. Putting dry chips in the joints of stones before filling them with mortar shall not be permitted.

For ensuring good bond, masonry shall be left uneven at the top of each course. But the top of plinth and verandah walls shall be leveled up with flat chips laid in mortar if necessary to receive damp proof course, coping etc.

Joints:

No face joints shall exceed 16 mm (about 5/8").

a. Striking joints:

The face joints should be properly struck while the mortar is fresh. Joints which can not be so struck at the time of laying, shall be prepared for it by racking joints to a depth of not less than 16 mm (about 5/8") when the mortar is fresh. These joints should be properly cleaned of loose particles wetted thoroughly and filled with good fresh cement mortar 1:3 and finished off by being trowel led smooth.

b. Treatment of joints:

When joints are to be provided, they shall be racked to a depth not less than their width when the mortar is still green. When pointing is not be done, the mortar in the joints shall be pressed and trowel led smooth while masonry is being laid. Joints shall be racked when plastering is to be done.

Watering:

All masonry shall be initially protected from sun rain, etc. by wet Hessian or straw till set and there after kept continuously wet for 14 days from the date of laying, unless other length of period is ordered in the special provisions. Watering shall be done carefully in the beginning through a hose so as to wash the mortar out of the joints. On Sundays, holidays, at the close of day’s work and other periods of cessation of work, the masonry is to be kept continuous wet for the specified period of curing and labourers are to be employed for the purpose. Should the contractor fail to water the work to the satisfaction of the civil engineer, the latter may order the masonry to be dimensioned at
the contractors cost.

**Bad work:**

Should the mortar perish, i.e. become dry, white or powdery through neglect of watering or if the masonry shows hollow joints or non-adherence of mortar to the stones or if the work does not conform to plans and these specifications, the work must be pulled down and rebuilt at the contractor's expense without any delay after the order of the civil engineers to do so.

**Final Finish:**

All masonry shall be washed down on completion and all stains and adhering mortar removed from the face as the scaffolding is being lowered and removed.

**Wet Foundations:**

In wet foundations, or other situations where water is met with, the work space shall be kept free of water by the contractor while the masonry is in progress and until the civil engineer considers the mortar has sufficiently set. Dewatering shall be carried out in such a way as not to injure the concrete or masonry in any way. Dewatering shall also be done when required for taking checking measurements, passing foundations, etc. dewatering will be included in the rate of masonry.

**Scaffolding:**

Scaffolding required for facility of construction shall be provided by the contractors at his expense. Scaffolding shall be double or single, but the ends of poles should not be placed in the position of header stones. Scaffolding shall be erected with steel sections of pipes, bullies or bamboos of adequate strength so as to be safe for all construction operations. The contractor shall take all measures to ensure the safety of the work and working people. Any instructions of the civil engineer in this respect shall also be completed with. The contractor shall be entirely responsible for any damage to property or injury to persons resulting from ill-erected scaffolding, defective ladders and materials or otherwise arising out of his default in this respect. Proper scaffolding shall be provided to allow easy approach to every part of the work. Overhead work shall not be allowed. Putlog holes shall be made good by stones to match the face work when scaffolding is being removed after ensuring that all holes behind are solidly filled in with 1:4:8 cement concrete.

**Rate of Raising Masonry:**

The rate of raising coursed rubble masonry brought up in uniform levels may be limited to a height of 60 cm. (about 2') per day in case of cement mortar. But no fresh source shall be laid over masonry previously laid with in 4 hours of its laying.

**Item to Include:**

Coursed rubble masonry laid in cement/mortar of specified proportion, build in any position to any height or depth and to lines, levels, curved and batters shown on the plans or as ordered by the
civil engineer including quoins, headers etc. and striking joints and curing.

Erecting and removing all scaffolding, ladders and use of plant required for excavation of the item, safety of the labour and inspection of the work are including compensation for any injury, damage etc. dewatering to allow construction in the dry and proper setting of masonry. Clearing the site round the masonry.

All labour, use of tools, materials and other items incidental to satisfactory completion of the item.

8.6 Mode of Measurement and Payment:

The quantity of coursed rubble masonry to be paid under this item shall be in number of cubic meter of the finished work including quoins, etc. measurements shall be taken as specified in IS: 1200 with the limiting dimensions not exceeding those shown on the plans. No deduction shall be made for pipes and opening each up to 0.1 Sqm in area or for fixtures up to 0.05 Sqm in area. The contract rate shall be based on a unit of one cu.m of finished masonry.

9. PLASTERING & POINTING

9.1 Cement plastering with lime rendering:

General:

This specification refers to the furnishing of materials and plastering the surfaces of concrete, brick or rubble masonry.

Materials:

Cement and water shall be as specified for the item of concreting. Sand shall conform to IS: 1542.

Lime rendering paste shall be prepared of class ‘c’ lime (i.e. pure fat lime) as mentioned in IS: 712. All impurities, ashes or pieces improperly burnt shall be screened or picked out before slaking. The lime shall be slaked with water not less than one week or more than two weeks before use. The slaked lime shall be screened through. Storage shall comply with IS: 712. The slaked lime if stored shall be kept in a weatherproof and damp-proof closed shed with impervious floor and sides to protect it against rain, moisture, weather and extraneous materials mixing with it. The lime shall be used when fresh, i.e. within 14 days of its removal from kiln. All lime that has been in any way damaged by rain, moisture, dirt, air-slaking or any other cause shall be rejected and all rejected materials shall be removed from the work site forthwith. Sample of lime shall be got approved by the engineer who shall keep it in his office for reference.

Lime shall be slaked and mixed with sufficient water to form a thick paste. It shall be reduced to a fine paste by grinding.

It shall then be passed through a fine sieve (3 mm. Mesh) to remove all unslaked particles and foreign matter and allowed to mellow under water for at least 10 days in large slaking tanks. The surplus water on the top shall be allowed to run off.
The lime rendering paste shall be provided by mixing together 4 parts of this lime paste and 1 part of fine sieved sand by volume. Just fiber finally chopped shall be added to the above cum. Of lime-sand mixture (or 1 lb. of just for every 4 cft. of lime-sand mixture). The mixture shall then be properly ground to a fine paste.

The lime rendering paste thus prepared shall be kept moist until used and no more than what can be consumed in 15 days shall be prepared at a time. Field testing shall be carried out as specified in IS: 1624. Cement mortar shall have the proportion of cement to sand as mentioned in the item.

**Surface Preparation:**

All joints in the face work that is to be plastered shall be raked out to a depth equal to not less than the width of the joints or as directed by the civil engineer. The racking shall be done taking care not to allow any chipping of masonry. In new work, the racking out shall be done when the mortar in the joints is still green. Smooth surfaces of concrete, old plaster etc., must be suitable roughened to provide necessary bond to the plaster. All dirt, soot, oil, paint or any other materials that might interfere with satisfactory bond shall be removed. In the case of stone masonry, bushing on the walls to receive the plaster shall not be more than 12 mm. The surface to be plastered shall be cleaned and scrubbed with fresh water and kept wet for 6 hours prior to plastering. It shall be kept damp during the progress of the work. The plastering shall not be commenced unless the preparatory work is passed in writing by the engineer.

**Plastering Operation:**

Patches of plaster 15 cm. X 15 cm. shall be put on about 3m. (about 10") apart as gauge to ensure even plastering in one plane. In all plaster work, the mortar shall be firmly applied with some what more than the required thickness and well pressed into the joints and on the surfaces and rubbed and leveled with a flat wooden rule to give required thickness. Long straight edges shall be freely used to ensure a perfectly plane and even surface. All corners must be finished to their true angles or rounded as directed by the engineer. The surface shall be finished to plane or curved surfaces as shown on the plan or directed by the engineer and shall present a neat appearance. The mortar shall adhere to the masonry surface intimately when set and there should be no hollow sound when struck. Plastering shall be done from top downward. In any continuous face of a well, finishing treatment of any type should be carried out continuously and day to day breaks made to coincide with architectural breaks in order to avoid unsightly junctions. All exposed angles and junctions with doorframes etc. shall be carefully finished. Arises shall be beaded if ordered.

Lime rendering with paste shall be applied to the prepared and partially set but somewhat plastic surface with steel trowel to a thickness slightly exceeding 1.5 mm and rubbed down to 1.5 mm thickness and polished to a perfectly smooth and even finish, working from top to bottom. While traveling is going on, soap stone powder contained in thin muslin bags shall be dusted over the surface and worked in.

Moistening shall be commenced as soon as the plaster has hardened sufficiently and is not susceptible to injury. Soaking of wall shall be avoided and only as much water as can be readily absorbed shall be used.
All plasterwork shall be kept damp continuously for a period of 14 days. To prevent excessive evaporation on the sunny or windward side of the building in hot, dry, weather, matting or gunny bags may be hung over on the out side of the plaster in the beginning and kept moist. Should be the mortar of the plaster perish though neglect of watering or for any other default and if the work is not done as specified above, the plaster shall be removed and redone at the contractor’s expense.

Precautions:

The standard of workmanship shall be of the very best quality and the whole of plastering shall be carried out in the best possible manner to the entire satisfaction of the engineer. Tools and accessories used in plasterwork shall conform to IS: 1630-1960. Metal tools shall be cleaned after each operation. All tools shall be examined to see that they are thoroughly cleaned before plastering is begun. The programming of other building operations before, during and after plastering, shall be according to the instructions contained in IS: 1616 clause 9, shall be taken and preparation of the background shall be done as laid down in clause 13 of IS: 1661. Care shall be taken to see that other parts of the work or adjacent works are not damaged while plastering. Scaffolding shall be as specified for the item of masonry.

9.2 SAND FACED PLASTER:

General:

The preparation of the surfaces, programming of work, general precautions and other miscellaneous details shall be as detailed under plaster with lime rendering.

Base coat:

The base coat shall be of cement mortar 1:6 or otherwise specified in the item and shall be done as given under specification no.7.1. The thickness of base coat shall be 12 mm. (1/2").

Final coat:

The finishing coat shall be of cement mortar 1:4 and 6 mm thick. The mortar shall contain sand with slightly larger proportions of coarse material and shall be approved by the engineer. After application, the surface shall be finished with

Wooden float it the correct plane. Then it shall be treated with wetted sponge rubber by which sand particles stand out and given an even finish as approved by the engineer. A sample over a considerable area shall be first made in consultation with the engineer and shall be approved before starting the work.
Curing shall be perfect and to be continued for at least 14 days.
9.3 ROUGH CAST PLASTER:

General:

The specification for sand faced plaster shall be applicable to rough cast plaster also, subject to the following:

Base coat:

The first coat of plaster shall be cement mortar 1:4 mixed and applied according to relevant provisions of IS: 1661. The finished thickness of the first coat shall be 12 mm for brick masonry or concrete surfaces and 15 mm for rubble stone masonry. The plaster shall be laid by throwing the mortar (by using a strong whipping motion) on the prepared surface with a trowel in a uniform layer, and pressed to form a good bond. The surface shall be roughened.

Second coat:

The second coat shall be the roughcast mixture consisting of aggregate which may vary in size from 5 mm to 8 mm. And may consist of specially graded mixture mixed with fine sand and cement. The proportion of cement to sand aggregate shall be 1:1-1/2:3. It shall be flung upon the first coat with large trowels to form an over protective coat. The second coat must be applied while the first coat is still soft and plastic. The work shall generally conform to requirements IS: 1661. Thickness of the coat shall be about 12 mm.

Item to Include:

As per relevant portion of specification for plastering with lime rendering plaster. It shall include also the base coat and finishing rough cast plaster coat as above.

9.4 ORDINARY CEMENT PLASTER:

General:

The preparation of the surface, programming of work, general precautions and other miscellaneous details shall be as detailed under ‘cement plastering with lime rendering’.

The base coat shall be of cement mortar 1:6 or otherwise specified in the item and shall be done as indicated under ‘cement plastering with lime rendering’. The thickness of this coat shall be 12 mm.

Final coat:

The finishing coat shall be of cement mortar 1:3 and 6 mm. Thick. After application of the mortar, the surface shall be finished with wooden float to the correct plane. The surface shall be finished off with a rendering of pure cement and polished. A sample over a considerable area shall be first made in consultation with the engineer and shall be approved before starting the work.
9.5 Mode of Measurement and Payment:

All work shall be measured in square meter and as specified in IS: 1200. If the average thickness of plaster provided by the contractor is more than what is specified on any account, no extra payment will be made.

The quoted rate shall be per Sqm and shall include:

1. Erecting, dismantling and removing the scaffolding.
2. Preparing the surface to receive the plaster.
3. Providing cement plaster with lime rendering finish of the specified minimum thickness.
4. All labour, materials, use of tools and equipment to complete the plastering as per specification.
5. Curing for 14 days.
6. Any grooves, bands etc. if shown on the drawings or as directed by the engineer.
7. All lifts and leads.

9.6 Pointing on Masonry Works:

Types of pointing:

Pointing, where specified, shall be of the following types, recessed, flush and raised and cut.

Surface Preparation:

All joints in the face work that are to be pointed shall be racked out to a depth equal to not less than the width of the joints or as directed by the engineer. The raking shall be done taking care not be allow any chipping of masonry. In new work the racking out shall be done when the mortar in the joints is still green.

The joints shall be brushed clean of dust with wire brush and wetted thoroughly for 6 hours before pointing is commenced.

Application and Finishing:

Specification for cement and water shall be given for the item of concreting. Sand shall conform to IS: 1542. cement mortar shall have the proportion of cement to sand as mentioned in the item.

The mortar shall be pressed into prepared joint with pointing trowel and finished as specified or to the dimensions as shown in the drawing. The superfluous mortar shall be cut off form the edges of the lines and the surface of masonry shall be cleared of all mortar finish to be free of slack spots, cut faces and other blemishes. Finished work of pointing shall be to exact size and shapes stipulated and edges shall be straight, neat and clear.

In recessed pointing the mortar shall be simply struck off with a trowel and the work left showing the line and the surface of the masonry themselves. In flush pointing the joint shall be finished level.

In ruled pointing along horizontal joints at all courses, ruled lines are formed on flushed on flushed surface to the required size.
In case of raised pointing, it shall project from the wall facing with its edges cut parallel so as to have a uniformly raised bond about 6 mm. Raised and width 10 mm. Or more as directed, showing the line and the surface of masonry themselves.

9.7 Curing:

The pointing shall be kept wet for 7 days. During this period it shall be suitably protected from all damages.

9.8 Measurement and Payment:

The quoted rate shall include cost of all labour involved in the operations including the cost of scaffolding required for work, curing etc.

All work shall be measured in square meter as specified in IS: 1200.

10. DOORS

10.1 General:

This item of specification relates to the requirement of supplying, fabricating, erecting in position, painting or polishing and efficient functioning of the door with frames of press metal steel and shutters of two panels of flush, glazed if required, with necessary fittings and fixtures.

Reference to Standard Specifications:

The provision of the Indian standard specifications shall form a part of these specifications:

IS: 4021 Timber door, window and ventilator frames
IS: 1003 Timber paneled and glazed shutters
IS: 4913 Selections, installation and maintenance of timber door & Windows, code of practice for.
IS: 1141 seasoning of timber
IS: 2202 wooden flush door shutters (solid core type)
IS: 303 Plywood for general purpose
IS: 1328 Veneered decorative plywood
IS: 3097 veneered particle boards
IS: 2380 Wood particle boards and boards from other lignocellulososes materials, methods of test for.
IS: 1477 specification for pretreatment of press metal frames.
IS: 2338 Finishing of wood and wood based materials
IS: 348 French polish
IS: 1341 steel butt hinges
10.2 GLASS:

All glass shall be of superior quality from approved standard manufacturer having uniform refractive index and free from flaws, speeks and bubbles. Sheet glass for glazing and framing purposes shall conform to IS: 1761 latest edition. The glass shall be brought to site in the original packing from the manufacturer and cut to size. The cut edges shall be straight and free from chips, spalls or any other damages. Wherever clear glass is specified it shall be flat drawn sheet glass and shall be at least 4 mm thick or as specified in IS: 3548 and shall conform to relevant glass factor and prevalent wind pressure in this part of area. Wind pressure shall be considered as per IS: 5437 for calculating glass thickness. Where wire glass is mentioned, it shall be thick rolled glass with centrally embedded wire mesh of Georgian type. Where obscure glass is mentioned it shall have a cast surface on one side. The contractor shall submit samples of glass for prior approval of the employer.

10.3 PUTTY:

In general, the putty shall conform to IS: 420 latest editions. The putty shall be of best quality from approved manufacturer. It shall be brought to site in the manufacturer’s original packing. Quick setting putty shall be used for windows and sashes except when glare reducing glass is used where it shall be of nonsetting type.

11. STEEL WINDOWS

11.1 General:

The section covers the requirements of materials and workmanship for the supply, fabrication, erection, glazing and painting of steel windows. It also generally applies to other glazings and roof lights at all levels.

Reference to Standard Specifications:

- IS: 1038 steel doors, windows and ventilators
- IS: 1361 steel windows for industrial buildings
- IS: 420 putty for use on metal frame
- IS: 1081 code of practice for fixing and glazing of metal doors, windows and Ventilators
- IS: 1761 Transport plate glass for glazing and framing purposes
- IS: 3548 Code of practice for glazing in buildings
- IS: 1568 Specification for wire gauze for general purposes.

11.2 Materials:

Rolled steel sections and coupling members:

Rolled sections to be used shall be as per C1.5.1 and 5.2 of IS: 1038. The relevant specifications of structural steel work mentioned elsewhere are also applicable to this item. Coupling shall be done by coupling sections manufacturing from mild steel plate 1.6 mm. In thickness and other dimensions to suit the opening size.
**Glass Panes:**

Glass panels shall conform to IS: 1761. The different thickness of the glass panels to be used shall be as shown in the drawing. The modulus of rupture of glass shall be not less than 380 kg per sq.cm. The contractor shall produce the manufacturer's certificate conforming the same and if found necessary by the civil engineer, further tests shall be conducted. The engineer's interpretation of IS: 3548 shall be final and binding in case of any dispute. Glass panes less than 3 mm. Thick shall not be used. They shall be distortion free and where specified frost glass shall be used. All glass planes shall have properly squared corners & straight edges.

**Putty:**

Putty shall be as specified in IS: 420.

**Fixing Lugs:**

Fixing lugs shall be 16mm wide x 3 mm thick x 170 mm long and shall have a standard slot of 8 mm wide for M.S. Screw of 6 mm dia & 12 mm long with square nuts. Wire lugs shall not be used. Screw treads of machine screw used in manufacture shall conform to IS: 1362.

**Hinges:**

Hinges shall be of projecting type friction hinges for side hung windows and in such cases no peg stays shall be used.

**Handle:**

The handle for side hung and the peg stays for the top hung and bottom hung shutters shall be of steel protected against rusting finished with stove painting in specified shade after electro galvanizing. The handle shall be moulded on a steel handle plate. The handle shall have a two point nose which shall engage with a brass striking plate on the fixed frame in a slightly open position as well as in a fast position.

The boss of the handle shall incorporate a friction device to prevent the handle from dropping under its own weight and the assembly shall be so designed that the rotation of the handle may not cause it to unscrew from the pin. The strike plate shall be so designed and fixed in such a position in relation to the handle that with the latter bearing against its stop, there shall be adequate tight-fit between the casement and outer frame.

**Pivots:**

Cenozoic hung windows shall be hung on 2 pairs of brass cup pivots required to the inner and outer frames of the windows to permit the window to swing at an angle of approximately 85. The opening portion of the window shall be so balanced that it remains open at any desired angle under normal weather conditions.
Glazing Clips:

Glazing clips shall be provided at a spacing not exceeding 30 cms. The holes for the same will have to be drilled during fabrication by the manufacturers and not while glazing.

Beading:

Where mentioned in the drawings, metal beading (extruded aluminum) of 10 mm x 10 mm size shall be provided and fixed to the window sections with no.8 pan head self tapping (NPK) screws for which necessary holes will have to be drilled during fabrication by the manufacturer. The bed shall be supplied along with the windows duly fitted on the windows with corner clips by the manufacturer.

Fixed Louvered Windows:

In locations as shown in drawings fixed glass louvered windows are to be provided. The glass shall be provided in fixed steel guides of 16 gauges. The guides shall be screwed to the window frame and shall be channel shaped similar to ‘Godrej’ manufacture.

Operable Louvered Windows:

Where shown in drawings operable louvered windows shall be provided. The width of each louver shall be 300 to 450 mm and the system of guides and links between louvered shall be as per drawings of manufacturer’s details which shall be got approved by the civil engineer prior to procurement.

11.3 Manufacture:

All windows, doors, ventilators and composite units shall be manufactured by approved manufacturer like ‘Godrej’ or ‘Hopes’ to IS: 1038. All the fixed and opening frames shall be constructed of sections, which have been cut to length and mitered. The corners of the frames shall be electrically flash butt welded to form a solid ant right angle.

The size shown in the drawing is the size of the clear opening in masonry or concrete before plastering.

Subdividing bars of the units shall be tenoned and riveted into the frame. No face welding at the joint of the sub-dividing bars and the frame is required.

Doors, windows or composite units shall be thoroughly cleaned free of rust, millscale, dirt, oil etc. either by mechanical means for example, and/or shot blasting or by chemical means, for example, pickling or then painted. After free treatment of the surfaces, 2 Coats of primer paint shall be applied on the units. All units shall be painted with 2 coats of paint of approved shade after erection.

11.4 Storage:

All windows, doors, ventilators and composite units shall be stocked at site separately in a vertical position, proper care being taken that they are not twisted or warped. All the individual units shall
have a number or mark to identify the same.

11.5 Constructional Operations:

Casements shall be fitted to their frames by the contractors, so as to provide continuous contact for weathering on the inside and outside and shall be secured in closed position by the fittings which shall have been properly checked and adjusted.

All windows, doors, ventilators and composite units shall be got checked by the civil engineer, before erecting in position.

All the steel windows, doors, and composite units are to be fixed in brick masonry or concrete on the sides and concrete lintel on top and sill at bottom.

The sizes of the prepared openings should be checked first and these should be cleared of all the obstructions. All the units shall be fixed into the prepared openings. They shall not be forced into the openings, which are out of square or too small. The sizes shown on drawings are those of the opening before plastering. The size of the windows, doors, ventilators or composite units shall be ½" less all around to allow for plastering. The frames of each unit shall be grouted with cement mortar tamped, into the channel of the frame.

The windows, doors, ventilators or composite units shall be erected and set straight, to plumb and level and shall operated satisfactorily after fixing.

The exterior joints between the building openings and the units shall be raked out to a depth of 10 mm and the grooves thus formed shall be caulked with mastic cement of an approved make. The mastic cement shall be of such composition that it will not stain the masonry work and will receive paint without bleeding, will not sag or run and will not set hard or dry out under any conditions or weather or temperature recorded in the locality of the building.

While fixing to concrete members, wood screws shall be used as specified in clause 6.12.1 of IS: 1081-1960.

Directly after fixing, and before glazing, the units shall be thoroughly cleaned, set and bedded and then painted with one coat of paint. After glazing, the final coats of paint shall be applied. In no circumstances, shall the finishing coats contain lithophone or carbon black. There shall be no direct contract between glass and metallic part of the frame without a layer of putty in between.

11.6 Mode of Measurement and Payment:

Measurements shall be taken of the clear opening in the wall without plaster. The quoted rate shall include all the materials, beadings, fittings and fixtures, glazing, fabrication, erection, caulking with mastic cement, grouting with cement mortar, painting, scaffolding, maintaining in position till the completion of the job, necessary tools, tackle, plant and equipment and all other work incidental to the completion of the work as per these specifications.

The quoted rate shall be in square meter of the clear openings where the door, windows or composite unit have to be fitted in.
12. ALUMINIUM WINDOWS AND DOORS

12.1 General:

This item of specification relates to the requirements for the supply, fabrications, erection and proper functioning of aluminum door, windows and glazings wherever it occurs.

Reference to standard specifications:

IS: 1948 Aluminum doors, windows and ventilators
IS: 1949 Aluminum windows for industrial buildings
IS: 1081 Fixing and glazing of metal (steel and aluminum) doors, windows and ventilators.

In addition the specification of ‘steel windows and ventilators’ (specification no.10) shall be generally applicable to this item in so far as there is no specific contradiction.

12.2 Materials:

a. Aluminum sections and hardware:

All Aluminum members shall be specially extruded aluminum alloy with anodized matt finish. The materials shall conform to the IS specifications indicated in IS: 1949 and IS: 1948.

The frame for all doors as well as directly connected adjustment units shall be of hollow rectangular section 100mm x 45mm. The frames for independent fixed glazings only shall of hollow rectangular sections 50mm x 25mm.

The shutters of doors shall have jambs, head member and sill member as per patent sections of standard manufactures. The workmanship shall be as per IS: 1948 and IS: 1949.

All members shall have built-in grooves for taking snap on anodized aluminum beading.

The doors shall have concealed floor springs of double action type. Certain doors are of single action type with hinges as shown on drawings. The complete units with doors and windows including hardware, locking arrangements etc. shall be obtained from approved manufacturer, i.e. E.C.I.E, Ajit Indian pvt. Limited (Aluminex) or equivalent. Unless otherwise permitted all hardware shall be of plated brass.

b. Top Hung Ventilators:

Shall be made of medium range aluminum sections with fly screen and peg stay though the screen.

c. Glass panes:

The glass panes of the doors as well as directly connected adjustment units shall be 5.5mm thick. For other requirements refer Para 10.3.2 of specification for steel windows.
d. Miscellaneous:

Apart from the applicable provision of specification for steel windows the following extra items shall be catered for.

The shutters shall have provision of PVC/neoprene weather strips. The fixing of the glass in shutter section by means of snap-on beading shall have provision of neoprene gasket to ensure there is no direct contact between glass and metal.

All doors shall be provided with a push plate of 22.5 cm. which of Aluminum fixed to the door frame on both sides. The aluminum push plate shall be 6mm thick and for full width of door.

12.3 Measurements & Payment:

The dimensions of clear opening before plaster which is to be covered with the units shall be measured correct up to 0.5cm and payment made per Sqm of area.

The quoted rate shall include supply of all materials, fixtures and fittings, fabrication, erection, glazing, finishing, push plates, floor springs, locking arrangements, holdfasts and other necessary Embedment’s, labour, tools, tackle, scaffolding and all other incidental works for the satisfactory completion of the work as per these specification.

13. ROOF DRAINAGE & WATER PROOFING

13.1 Brick Bat Lime Concrete or Surki concrete

General:

This specification refers to the brickbat coba (brick jelly lime concrete) coming either on roof for regarding or under floors.

Reference to Standard Specifications:

Provision of the following Indian standard specifications shall form part of this specification in so far as they are applicable or specifically referred to in this specification.

IS: 712  Building limes
IS: 1344 Surkhi for use in mortar and concrete
IS: 1635 Code of practice for field slaking of lime and preparation of putty.
IS: 2541 Code of practice for use of lime concrete in buildings
IS: 3068 Broken brick (burnt clay) coarse aggregate for use in lime concrete.

Brick bat concrete shall be made by using brick bat aggregate, lime and Surkhi conforming to the following requirements:

a. Brickbat coarse aggregate shall conform to the requirements of IS 3068 and shall be prepared from well burnt or over burnt bricks. It shall be free from adherent coating of silt or soil and
deleterious materials like unburnt or under burnt particles of clay alkali, soft fragments, organic impurities, etc. in such quantities as to affect adversely the strength and durability of brick bat concrete. The brick bat aggregate shall satisfy the requirement to tests for water absorption and water soluble materials as set out in IS: 3068. The maximum size of burnt brick aggregate shall be 25mm (1”). All aggregate shall be retained on a 3/16” opening sieve (4.75mm IS sieve).

b. Sand:

Sand shall conform to the requirements of IS: 383 generally and to specification no.3 this document.

c. Water:

Water shall conform to the requirements of specification no. 3 of this document.

d. Lime:

Lime shall conform to the requirements of IS: 712 classes a lime (eminently hydraulic lime) may be used directly in the brickbat coba. If semi-hydraulic lime or fat-lime corresponding to class B or class C is used, it will have to be mixed with “SURKHI” to give it the desired hydraulic property. The proportion of lime Surkhi mortar shall be 1 part of slaked lime to 2 parts of Surkhi and the mixture shall be ground in a mill or machine grinder with the addition of water. Class B or C lime, if brought to the site, as quick lime shall be first slaked at the site in accordance with IS: 1635.

e. SURKHI:

Surkhi shall conform to the requirements of IS: 1344.

Construction procedure:

Preparation of brickbat concrete:

a. Brickbat concrete shall be prepared by thoroughly mixing the brickbat aggregate in the proportions of 2 parts of brickbat aggregate to 1 part of lime sand mortar or lime Surkhi mortar (by volume). The proportion of lime mortar itself shall be 1:2 (lime to sand) and the mortar shall be machine mixed. The burnt brick shall have been thoroughly wetted in water for at least six hours before use in the mix and shall be in a saturated surface dry condition at the time of mixing.

b. Mixing water shall contain 12 kg. Of soap and 4 kg. Of alum per cubic meter added to it. Amount of mixing water to be added shall be such that the resulting mix shall not have a slump of more than 5 cm when tested in accordance with standard procedure given in clause A.4 appendix A of IS: 2541.

c. All mixing of brickbat coba shall be done in a machine mixer. Well-soaked burnt brick aggregate shall be first added to the mixer. Lime mortar or lime Surkhi mortar shall then be added in the specified proportions and the contents mixed until there is a uniform appearance and colour.

d. Only such quantity of brickbat coba shall be mixed as can be placed in position with in 2 or 3
hours of mixing the same.

e. **Laying:**

i. The brickbat coba shall be laid to a thickness as given in the drawing. The entire layer shall be in one operation.

ii. Before laying the brickbat coba, the surface of the roof slab shall be roughened (if not already done at the time of casting the slab) and cleared of all dust, dirt and loose stones and particles. It shall be thoroughly wetted but all standing pools of water shall be removed.

i. After the brickbat coba is laid, it shall be initially rammed with a rammer weighting not more than 2.25 kg. (51b) and the finish brought to the required evenness and slope. Further consolidation may be done using wooden thapies which should be operated close together and shall beat the surface slightly in rhythm and move forward gradually. This beating may have to be repeated every day for at least 7 days until the thapies make no impression on the surface and rebound readily from it when struck.

If the deviation of the surface from the desired shape becomes pronounced during the process of compaction, so that water lodges in pools, the surface shall be picked and fresh brickbat coba shall be spread and consolidated as necessary so as to ensure the desired surface, slope and levels.

ii. During the process of compaction by hand beating the surface shall be sprinkled with admixture of limewater and jaggery (dissolved at the rate of 1.5 kg/100 liters).

iii. On completion of beating, the mortar that squeeze out on beating shall be smothered with a trowel but the surface shall be left unfinished so as to be rough to bond subsequent layer of waterproofing treatment.

f. **Curing:**

After compaction, the brickbat coba shall be cured for a further period of 7 days by covering with wet tarpaulin, hessain or grass which shall remain continuously wet for the entire period of curing.

13.2 **Mode of Measurement:**

Mode of measurement shall be made per Sqm of area

**14. PAINTING**

**14.1 OIL BOUND DISTEMPER:**

**14.1.1 General:**

The specification refers to the furnishing of materials and painting of plastered or unplastered surfaces with oil bound washable distemper.

**14.1.2 Materials:**

The oil bound washable distemper shall be approved manufacture like “Nerolac”, “Asian paints” and also shall be in accordance with IS: 428. The primer shall also be of the same manufacture and
as recommended by the manufacturers.

14.1.3 Preparing the Surface:

The surface to be distempered shall be cleaned and all cracks, holes and surface defects shall be repaired with gypsum and allowed to set hard. All irregularities shall be sand papered smooth and wiped clean. The surface so prepared must be completely dry and free from dust before distempering is commenced.

14.1.4 Priming Coat:

The priming coat shall be applied over the completely dry surface in the manner recommended by the makers. When no priming coat is specified by the manufacturer a finally powdered chalk mixed with a thin solution of glue shall be applied to prepare a good, hard background, the coating; when dry being rubbed as clean and smooth as possible.

14.1.5 Application of distemper:

The instructions of the makers shall be followed regarding preparation of the surface and application of priming and finishing coats. Distemper shall not be mixed in larger quantity than is actually required for a days work. Good water should be used to prepare the; mixture. Distemper shall be applied in dry weather with a board stiff brush in long parallel strokes. The treated surface shall be allowed to dry and harden. Next coat of distemper shall be laid on in exactly the same manner as the; first one but only after earlier coat laid has thoroughly dried. The number of coats of distemper to be applied shall be as mentioned in the item. The brushes used should never be allowed to rest on the bristles and after the use they should be carefully and thoroughly cleaned.

Necessary scaffolding shall be provided as required and as specified elsewhere in this document.

14.1.6 Mode of Measurement and Payment:

Measurements shall be based on area of painted surfaces and the rate shall be per Sqm of this area.

For openings, the following principles shall apply:

a. Area of opening less than 0.5 Sqm
   No deductions shall be made for the opening and no additions shall be made for reveals, jambs, soffits, sills etc.

b. Area of opening between 0.5 Sqm and 3 Sqm.
   No additions shall be made for reveals; jambs, soffits, sills etc. and deductions shall be as follows:

   i) When only one face is painted, no deductions shall be made.
   ii) When both faces are painted with the same paint, deductions shall be made for one face only.

   iii) When the faces are painted with different paints, deductions shall be made for that face on which the width of reveal is less, but on deductions shall be made on the other side.
c. Area of opening greater than 3 Sqm.

Deductions shall be made for the actual opening and reveals, jambs, soffits, sills etc. shall be separately measured and paid.
The quoted rate shall include supply of all materials, labour, scaffolding, plant and equipment, tools and tackles and all other work incidental to the completion of this item as per these specifications and all lead and lifts.

14.1.7 Important note:

The principles regarding measurement and payment for openings as described above shall also be applicable to all types of painting and plastering works.

14.2 CEMENT PAINTING:

14.2.1 General:

The specification refers to furnishing of materials and painting of plastered or unplastered surface with cement paint of approved makes like, snowcem.

14.2.2 Preparing surfaces:

The surface to be painted shall, be cleaned and all holes, cracks, surface defects repaired with gypsum and allowed to set hard. All irregularities shall be made smooth by sand preparing; grinding etc. the surface so prepared shall be completely free from dust before painting is commenced. Any unevenness shall be made good by applying putty, made of plaster of Paris mixed with water on the entire surface including filling up the undulation and then sand papering the area after it is dry. The cement primer shall preferably be applied by brushing and not by spraying. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as smooth as possible leaving no brush marks.

14.2.3 Finishing Coat:

The prepared surface shall be thoroughly wetted with clean water before water proof cement paint is applied. The paint shall be prepared strictly as per manufacturer’s specifications, in the absence of which it shall be mixed in two stages. The first stage shall comprise of 2 parts of water proof cement paint and one part of water stirred thoroughly and allowed to stand for 5 minutes. Care shall be taken to add the paint gradually to the water and not vice versa. The second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain a liquid of workable and uniform consistency. The paint shall be mixed in such quantities as can be used up within an hour of its mixing.

Paint shall be applied with brushes or spraying machine. The solution shall be kept well stirred during the period of application. It shall be applied on the surface which is on the shady side of the building so that direct heat of the sun on the surface is avoided. Method of application shall be similar to oil bound distemper. The complete surface shall be watered, after the day’s work. Before application of the second or subsequent coats, the surface of the previous coat shall not be wetted.
and a uniform shade should be obtained after application of paint.

14.2.4 Mode of Measurement:

Shall be as given for oil bound washable distemper.
The quoted rate shall include supply of all materials, labour, scaffolding, equipment tools and tackle and curing of painted surfaces, all leads and lifts.

14.3 Plastic Emulsion paint:

The surface on which plastic paint has to be laid must be thoroughly cleaned and prepared and all defects rectified. The surface shall be dry and rubbed smooth by means of sand paper to the satisfaction of the engineer. One coat sealer and two coats of plastic emulsion paint are to be applied. The work is to be carried out under direct guidance and instructions from the manufacturers whose expert's advice and supervision are to be made available in order to achieve the high grade finish. The painters employed for this work must be capable of producing the highest standard of workmanship required. If the finish is of doubtful nature, the contractor shall have to rectify at his own cost to the entire satisfaction of the civil engineer.

15. STRUCTURAL WORKS

15.1 General

This specification shall apply to structural steelwork in roof over silos, technological structures, railings, plat forms, embedded parts, inserts and such other covered items.

15.2 Scope of Work

The work shall cover Supply, fabrication and delivery to erection site, including one coat of shop paint specified in the tender in accordance with a general programme to be agreed with KIOCL Ltd.,

15.3 Special Instructions

Notes or specifications on drawings supplied by KIOCL Ltd., shall be considered as superseding or canceling the specification with which or where they conflict. On all drawing dimension shown in figures shall be acted upon.

15.4 Erection Drawings

Erection drawings may consist of line diagram showing every detailed member in position with the respective erection mark. Erection marks shall appear on the left end of the members as detailed. The following note shall be incorporated on all erection drawings-“All steel members shall be erected with marks in the same relative position as shown in plan or elevation."
15.5 Material

Unless otherwise specified in the drawings/specifications/instructions, materials shall be used as follows:

15.6. Structural steel

All steel material required for fabrication will be supplied by KIOCL Ltd. The contractor shall receive these materials from KIOCL Ltd. stores and transport to work/fabrication site at his own cost. The material supplied will be in accordance with the available sizes in the market. If in any case the contractor is directed to procure the material used for steel it shall conform to the specifications shown in the drawings or otherwise conform to appropriate Indian standard specifications. Only tested materials shall be used unless written authority is granted for untested materials for certain parts. The contractor shall submit test certificates of all steel materials used for fabrication including bolts, nuts, rivets, electrodes, etc. the test certificates shall comply with appropriate standards.

15.7. Electrodes

Unless otherwise stated in the drawings/specifications/instructions, electrodes used shall be mild steel electrodes shall conform to IS-814 and high tensile steel electrodes to IS-1442. For welding in any particular position, the electrodes used shall be those recommended by the manufacturer for use in that position.

15.8. Other materials

Unless otherwise stated in the drawings/specifications/instructions, other materials used in association with steel work shall comply with appropriate Indian standard specifications and shall be procured by the contractor. Before ordering bought out items, special accessories and equipments etc., materials of any description, the contractor shall submit, for the approval of the client, the names of the propose makers or suppliers together with the specifications of the materials and shall thereafter send to the client copies of the orders. In addition to the special provisions made hereafter as to the sampling and testing of materials by particular methods, samples of materials and workmanship proposed to be employed in the execution of the work comprised in this contract may be called for by the client at any time. When so called for by the client the same shall be furnished by the contractor, free of cost, without delay. The samples when approved shall be kept by the client who may reject all materials or workmanship not in conformity with the quality and character of the approved samples. The contractor, free of cost, shall provide suitable labeled boxes for the storage of the side samples.

15.9 Substitutions

In order to suit the availability of materials it may be found desirable to substitute certain specified sections by different sections. Prior approval to the substitutions shall be obtained before fabrication is taken on hand.
15.10 Welded Connections

The dimensions of all the welds shall be as specified on the working drawings. The length specified shall be the effective length excluding end cleats.

15.11 Fabrication

All structural steel work shall be in accordance with IS-800 “Code of practice for the use of structural steel in general building construction” unless otherwise stated herein.

15.12 Storing Details

All materials shall be stored properly on skids above the ground, which shall be kept clean and properly drained. Girders and beams shall be placed upright and stored. Long members such as columns and chord members shall be supported on skids placed near enough to prevent damage due to deflection.

15.13 Workmanship

All workmanship shall be equal to the best practice in modern structural shops. Greatest accuracy shall be observed in the manufacture of every part of the work and all identical parts shall be strictly interchangeable.

15.14 Templates

Templates used throughout the work shall be of steel, steel-bushed in such cases as the Engineer-in-charge may consider necessary, in cases where actual materials have been used as templates for drilling similar pieces the engineer-in-charge shall decide they are fit to be used as parts of the finished structures.

15.15 Straightening

All materials should be straight and if necessary before being worked shall be straightened and/or flattened by pressure unless required to be curvilinear form and shall be free from twists.

15.16 Clearances

The erection clearances for cleated ends of members connecting steel to steel should preferably be not greater than 1.5mm at each end. The erection clearance at ends of beams without web cleats should not be more than 3mm at each end but where for practical reasons greater clearance is necessary suitably designed seating shall be provided.

15.17 Shearing, Flame Cutting & Planning

Shearing and flame cutting may be used at the contractor’s option provided that a mechanically controlled cutting torch shall be used for flame cutting and that the resulting edge shall be clean and straight. Sheared members shall be free from distortion at sheared edges. The edges and ends of all flange plates and web plates of plate girders and built up columns, plate forming
chord of web members of lattice girders, all cover plates, the ends of all angles, tees, channels and other sections forming the flanges of plate girders and columns, and chords and web members of lattice girders shall be planed.

The ends of all stiffeners shall be planned or ground to fit tightly between the main angles and flanges unless otherwise stated on the drawings. Care shall be taken to ensure a full bearing of the stiffeners at the supports and at other points where concentrated load is applied. The ends shall not be drawn or caulked.

The butting surfaces at all joints of girders or columns shall be planed so as to butt in close contact throughout the finished joint. The end of all built-up girders and all columns shall be faced in an end-milling machine after the members have been completely bolted. The bearing surface of all slabs and plates for caps and bases of columns and for seating for heavy girders shall be machined.

Unless clean square and true to shape, all flame cut edges shall be planed.

Cold sawn ends if clean, and flame cut ends of sections not inferior to sawn ends in appearance need not be planned except for butting ends.

15.18 Holing

Holes for black bolts shall as indicated in the drawings or as per IS-800, unless otherwise specified. All holes shall be drilled to the required size sub-punched 3mm less in diameter and reamed thereafter to the required size. All matching holes for black bolts shall be prepared so that gauge 0.8mm diameter less than the hole can pass freely through the members assembled for bolting. All holes for turned and fitted bolts shall be drilled and reamed if necessary, to a tolerance of only plus 0.13mm unless otherwise specified. When the number of thickness to be bolted exceeds three or the total thickness is 90mm or more, the holes shall be drilled or reamed in position after assembly, except when steel bushed jigs are used. The parts shall be firmly bolted together during such block drilling and taken apart for removal of burrs after drilling. No holes shall be made by gas cutting process.

15.19 Assembly

All parts assembled for bolting shall be close contact over the whole surface and all bearings, stiffeners shall bear tightly without being drawn or caulked. The component shall be so assembled that they are neither twisted nor otherwise damaged a specified cambers, if any, shall be provided. All parts of bolted and welded members shall be held firmly in position by means of jigs or clamps while bolting or welding. No drifting of hole shall be permitted except to draw the parts together. Drifts used shall not be larger than the nominal diameter of the rivet or bolt. Drifting done during assembling shall not distort the metal or enlarge the holes. Sufficient trials assembly shall be carried out in the fabrication works to prove the accuracy of workmanship and the number of such trials required will be at client’s discretion.
15.20 Bolting

Where bolting is specified on the drawing the bolts shall be tightened to the maximum limit. The threaded portion of each bolt shall project through the nut by at least one thread. In all cases where the full bearing area of the bolt is to be developed, the bolts shall be provided with a washer of sufficient thickness under the nut to avoid any threaded portion of the bolt being within the thickness of the parts bolted together. Tapered washers shall be provided for all heads and nuts bearing on beveled surfaces. Use of special bolts such as, high strength or friction grip bolts, shall be according to the relevant Indian or other recognized standards and shall be subject to the prior approval of the client before use. In case of vibrating structures spring washers or lock nuts shall be provided.

Where black bolts are used as permanent fastenings two nuts shall be used for every bolt. Where used all turned and fitted bolts shall be parallel throughout the barrel. The barrel of each turned bolt shall be of such a length that it is in full contact with the work throughout, the screwed portion being made at least 1.6mm less in diameter than the barrel or to suit the next smaller size of metric screw thread. The barrel portion shall be joined to the threaded portion by a 45-degree chamfer within the thickness of the washer. Unless otherwise specified, faces of heads nuts bearing on steelwork shall be machined. All such bolts shall be provided with the washers having a hole of 1.6mm larger in diameter than the barrel of bolts and thickness not less than 6.0mm so that the nut, when tightened, shall not bear on the unthreaded body of the bolt.

15.21 Field Bolts

Requirements stipulated under bolting shall apply for field bolts. Field bolts, nuts and washers shall be furnished in excess of the nominal number required. Where erection at site is not carried out by the contractor, he shall supply the full number of bolts, nuts, and washers and other necessary fittings required to complete the work together with 5% extra.

All holding down bolts and anchorages etc., to be embedded in concrete foundations or supporting structures shall be supplied as and when required by the client.

15.22 Welding

The welding and the welded work shall conform to IS-816 and other relevant codes unless otherwise specified. Relevant portions given under “Requirement of welded joints” shall also apply. As much work as possible shall be welded in shops and the layouts and the sequence of operations shall be so arranged as to eliminate distortion and shrinkage stresses to the satisfaction of the client.

Welding work shall be under constant competent supervision in a properly organized manner with the approved quality welding sets and with manual/automatic welding machines. Details of welding procedure shall be agreed upon with the client before fabrication is commenced.

15.22.1 Electrodes

All electrodes for use in the work to which this specification relates shall be kept under dry condition. Electrodes which are damaged by moisture shall not be used unless it is stated by the manu-
facturer that when it is properly dried there will be no detrimental effect. Any electrode which has part of its flux coating broken away or is otherwise damaged shall be discarded.

15.22.2 Preparation of joints

The contractor shall prepare the edges with an automatically controlled flame cutting torch correctly to the shape, size and dimensions of the groove, prescribed in the design and shop drawings. In case of U-groove joint, the edges shall be prepared with an automatic flame cutting torch in two passes following a bevel cut with a gauging pass, or by machining.

The welding surfaces shall be smooth, uniform and free from fins, tears, notches or any other defect which may adversely affect welding and shall be free of loose scale, slag, rust, grease, paint, moisture or any other foreign material.

15.22.3 Welding procedures

Welding procedures shall include the following:

1. Type and size of electrodes
2. Current and (for automatic welding) arc voltage.
3. Length of run per electrode, or (for automatic welding) speeds of travel.
4. Number and arrangement of runs in multirun welds and when necessary.
5. Position of welding.
6. Preparation and set up of parts.
7. Welding sequence.
8. Pre or post-heating.
9. Any other relevant information.
10. The welding procedure shall be arranged to suit the details of the joints as indicated on the drawings and the positions in which the welding is to be carried out. The welds shall meet the requirements of quality specified.

Every weld found defective shall be cut by using either chipping hammer or gauging torch in such a manner that adjacent material is not injured in any way. Where full strength butt welds are specified run-on and run-off pieces shall be used. Peeling of the welds involving deformation of the welds surfaces either during deslagging operation or thereafter shall not be allowed.

15.22.4 Fusion faces and surrounding surface

Fusion faces and the surroundings surfaces within 50mm of welds shall be free from oil, paint, or any substances which might affect the quality of the Weld or impede the progress of welding. They shall be free from irregularities and defects. If the preparation or cutting of the fusion faces is necessary the same shall be carried out by shearing, chipping, gas cutting or flame gauging. Where hand gas cutting or hand gauging is employed, the blowpipe or gouging blowpipe shall be properly guided.
15.22.5 Assembly for welding

Parts to be welded shall be properly assembled and held firmly in position by means of jigs and clamps prior to and during welding.

Manipulators

Manipulators shall be used where necessary and shall be designed to facilitate welding and to ensure that all welds are easily accessible to the operators.

Weld face and reinforcement of butt welds

The weld face shall at all places be deposited proud of the surface of the parent metal. Where a flush surface is required the surplus metal shall be dressed off.

Minimum leg length and throat thickness in fillet welds

The minimum leg length of a fillet weld as deposited shall be not less than the specified size. In no case shall a concave weld be deposited without specified permission of the client. Where permitted, the leg length shall be increased above that specified, so that the resultant throat thickness is as would have been obtained by the deposition of a flat-faced weld of the specified leg length.

Deslagging

After making each run of welding all slag shall be thoroughly removed and the surface cleaned.

15.22.6 Quality of welds

The weld metal, as deposited (including tack welds if to be incorporated) shall be free from cracks, slag inclusion, gross porosity, cavities and other deposition faults. The weld metal shall be properly fused with the parent metal without serious under-cutting or over lapping at the toes of the weld. The surfaces of the weld shall have a uniform and consistent contour and uniform appearance.

15.22.7 Working conditions

Welding shall not be done under such weather or other conditions which might adversely affect the efficiency of the welding and where necessary effective protection or other safeguards shall be provided.

15.22.8 Qualification and testing of welders

The contractor shall satisfy the client that the welding operators are suitable for the work upon which they will be employed and shall produce evidence to the effect that welders have satisfactorily completed appropriate tests as described in IS-817. The client may at his discretion order periodic tests of the welders and/or of the welds produced by them. Such tests shall be at the expense of the contractor.
15.22.9 Supervision

The contractor shall employ a competent welding supervisor or charge hand to ensure that the standard of workmanship and the quality of the materials comply with the requirements laid down in this specification. The contractor shall strictly follow the methods of control, testing procedure, sampling etc., as outlined in these specifications.

15.22.10 Slab Bases & caps

Slab bases and caps, if applicable, shall be in one solid piece, and except when cut from plates with true surfaces, shall be accurately machined over the bearing surfaces, and shall be in effective contact over the whole area of the machined end of the stanchion.

15.23 PAINTING:

15.23.1 Painting after Erection

Field painting shall only be done after the structure is erected, leveled, plumbed & ground in its final position & accepted by the Engineer in charge. Painting shall not be done in frosty or foggy weather, or when humidity is such as to cause condensation on the surfaces to be painted. The air temperature should not less than 4.4°C and relative humidity greater than 80%.

Before painting of steel, which is delivered only with shop primer shall be dried and thoroughly cleaned from all loose scale and rust. Painting shall be done by brushing or spraying. Steel work that has received a shop coat primer shall be cleaned with emery paper followed by application of second coat of primer. Damaged areas shall be carefully cleaned and repainted.

Painting shall be proceed as soon after cleaning and before further deterioration of the surface occurs. Two coats of approved paint shall be applied after approval of the Engineer and allowing a drying time according to manufacturer’s instructions.

All field rivets, bolts, field welds, and serious abrasions to the shop coat shall be spot coat. Where specified surfaces which will be in contact after site assembly shall receive a coat of paint (in addition to any shop priming) and shall be brought together while the paint still wet. Where the steel has received a metal coating in the shop, this coating shall be completed on the site so as to be continuous over any field welds, field rivets or bolts. Each coat of paint to have an optimum thickness. The overall paint thickness should not be less than 100 microns.

15.23.2 Shop Painting:

After inspection & issue of test & acceptance certificate, all steel surfaces which are to be painted or otherwise treated shall be dried and thoroughly cleaned by effective means of all loose mill scale, rust and foreign matter as per is : 1477 Part-1. The following methods like wire brushing, scrapping and chipping, sand papering or cleaning with steel wool or abrasive paper, power tool cleaning, flame cleaning, sand blasting or shot blasting, chemical rust removal may be adopted for preparing the steel surface to be painted. Except where encased in concrete, all steel work shall be given one coat of approved metal protection as specified, thoroughly and evenly and well worked into the
joints and other open spaces. Materials shall be of best quality available and produced directly from approved manufacturers. Samples shall be submitted to the Engineer in charge for approval before procurement. Surfaces not in contact, but inaccessible after shop assembly, shall received two coats of shop paints positively of different colors or such materials to provide use of two coats before assembly. This does not apply to the interior of sealed hollow sections.

Shop contact surfaces shall be cleaned by effective means before assembly, but not painted.

In the case of surface to be welded, the steel shall not be painted or metal coated within minimum 50mm distances of any edges to be welded, if the paint specified or the metal coating would be harmful to welds or impair the quality of welds. Welds and adjacent parent shall not be painted prior to de slagging, inspection and acceptance.

Machine finished surfaces shall be protected against corrosion by suitable coating.

Primers should be applied by brushing. Red oxide shall be used as shop painting. Where two coats are specified to be applied at shop to inaccessible parts, the second coat shall be red oxide air chromate paint (primer) conforming to IS: 2075.

In areas which are difficult to reach either by brushing or spraying daubers, mops or both may be used by dipping the same in paints and pulling or pushing them through narrow spaces. Regarding the methods of application of paint, weather by spraying or brushing, the instructions of the manufacturers shall be followed.

### 15.24 Marking, Packing & Dispatching

Each piece shall be distinctly marked before delivery, in accordance with an approved marking diagram and shall bear such other marks as will facilitate erection. For easy identification at site a small distinguishing mark for each building shall be painted at each end of every member before dispatch from fabrication shop. The fabricated steelwork shall be dispatched in such portion as may be found convenient for the erection or as ordered by the client.

All projecting plates or bars and all ends of members at joints shall be stiffened, all straight bars and plates shall be stiffened, all straight bars and plates shall be bundled, all screwed ends and machined surfaces shall be suitably packed and all rivets, bolts, nuts, washers and small loose parts shall be packed separately in boxes so as to prevent damage or distortion during transit.

### 15.25 Inspection and Testing

The client shall have free access at all reasonable times to those parts of the manufacturer’s works which are concerned with the fabrication of the steel work and shall be afforded all reasonable facilities at all stages of preparation, fabrication and trial assemblies for satisfying himself that the fabrication is being undertaken in accordance with the provisions of this specification. Reasonable notice shall be given to the client of intention of making trial assembly.

Should any structure or part of a structure be found not to comply with any of the provisions of this specification, it shall be liable to rejection. No structure or part of structure once rejected be resubmitted for inspection/test, except in cases where the client or his authorized representative
considers the defect as rectifiable. Defects which may appear during fabrication shall be made good with the consent of and according to the procedure laid down by the client. All gauges and templates necessary to satisfy the client shall be supplied by the manufacturer. The client may, at his discretion, check the test results obtained at the manufacturer’s works by independent tests at the third party testing facilities and should the materials so tested be found to be unsatisfactory, the costs of such tests shall be borne by the contractor.

15.25.1 Control in the Manufacture & Assembly of various Structures

The contractor shall adopt the following forms of control in the manufacture and assembly of structure as outlined below:

a) Steel structures of industrial and civil buildings

The contractor shall routine check execution of established technological processes or general technological instructions. All welds shall be visually examined and measured for external dimensions by appropriate gauges. He shall also conduct selective examination of welds by ultrasonic or drilling method. However, welded joints of doubtful quality examined by ultrasonic or drilling methods would be examined by x-ray or gamma ray although this may be beyond the number of such tests specified. The contractor shall arrange for examination by ultrasonic, x-ray or gamma ray for welded joints of high quality control and in areas of doubtful welding.

15.25.2 Quantum of Tests

The contractor shall conduct the following quantum of tests:

The nature and quantum of tests shall be carried out as per the directions of Engineer-in-charge which include the following.

1. Visual examination- hundred percent (100%) of the welded joints.

2. Ultrasonic or drilling method- one drilling hole for 50 meters of welded joint and not less than 50mm for each 50 meters of welded joint.

3. X-ray and gamma ray examination- two percent (2%) of the length of weld made by manual or semi-automatic machine and one percent (1%) of the weld if made by automatic welding machine (flux welding, shielded arc welding, electro-slag automatic welding).

Tests

a) Visual Examination-

The contractor shall conduct visual examination and measurement of the external dimension of the weld for all joints. Before examining the welded joints, areas close to it on both sides of the weld for a width not less than 20 mm shall be cleaned of slag and other impurities. Examination shall be done by a magnifying glass which has a magnification power of ten (10) and measuring
The instrument which has an accuracy of +/- 0.1 mm or by weld gauges. The contractor shall examine the following during visual examination:

1. Check the correctness and shape of the welded joints.
2. Incomplete penetration of weld metal.
3. Influx.
4. Burns.
5. Unwelded craters.
6. Under cuts.
7. Cracks in welded spots and heat affected zones.
8. Porosity in welds and spot welds.
9. Compression in welded joints as a result of electrode impact while carrying out contact welding.
10. Displacement of welded element.

The contractor shall document all the above data in systematic manner.

b) Mechanical test

The contractor shall carry out various mechanical tests to determine weldability, nature of break, correct size and type of electrodes, degree of pre-heat and post-heat treatment etc. if envisaged. The type, scope and sample of various mechanical tests shall be determined in agreement with the Engineer-in-charge. The number of tests conducted shall depend on the results obtained to satisfy the engineer-in-charge.

c) X-ray and Gamma ray examination

X-ray and gamma ray examination shall be conducted by the contractor to determine gas inclusion (blow holes, hollows) slag inclusion, shallow welds and cracks. Before conducting the examination the welded joints shall be cleaned of slag and scales and visually examined. The welds shall be marked into separate portions depending on the length of photograph. The length of photograph shall be such as to ensure that there are no distortions and shall reveal the defect correctly. The length shall not be more than 0.75 of the focal distance and the width of the photograph would depend on the width of the welded joint plus 20 mm on either side of the weld. The cassette with film shall be protected by sheet of lead or equivalent of proper thickness against incidental, diffused and secondary radiation.

The direction of the ray with relation to the film shall be as specified here under. Welds of butt joints without edge slopes with edge processing shall be examined by central ray directed at right angles to the weld. In special cases examination of welds with inclined rays directed along edge slopes may be permitted by the client.

Lap joints shall be examined by directing rays at 45 degree to the bottom plate. Welds in Tee-joints without any edge preparation shall be examined by rays directed at 45 degree to the bottom plate on both the welds. Welds in Tee-joints with one sided or two sided slopes of the edges shall be examined by ray directed at 45 degree to the weld. Angle weld in lap and tee-joint shall be examined by the rays in opposite direction i.e., the film will be on the side of the weld. Weld in angle joints shall be checked by directing ray along the bisector of the angle between the welded elements. Opposite direction of the ray and location of the film may also be permitted by the
KIOCL Limited
Completion of Balance Civil, Structural, Sheet ing and Painting
works in the Chrome Ore Beneficiation Plant no.02 of
M/s. Odisha Mining Corporation at
South Kaliapani Mines, Odisha.

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engineer.

d) Ultrasonic test-

Ultrasonic test shall be conducted by the contractor to detect gas inclusion (pores), slag inclusion, shallow welds, cracks, lamination and friability etc. prior to starting of ultrasonic test the welded joints shall be thoroughly cleaned of slag and other materials. Surface of the basic metal adjacent to welded joint on both sides shall be mechanically cleaned by a grinder or a metal brush to provide the contact of the whole ultrasonic probe surface with surface of basic metal. The width of the clean surface shall be as directed by the client. The welded joints then shall be covered with a thin coat of transformer oil, turbine or machine oil to ensure acoustic contact. The joints so treated shall be marked and the marks shall be entered into the documentation, subsequent to this, ultrasonic test shall be carried out as directed by the client.
e) Kerosene Test-

In carrying out the kerosene test the contractor shall moisten one side of the welded joint with solution of chalk / kaolin with water and allow it to dry. The opposite side of the weld shall be moistened 3 or 4 times with kerosene will be observed on the surface painted with chalk.
f) Test by blowing-

The surface of the weld shall be covered with soap solution consisting of one (1) liter of water and hundred (100) grams of soap. Compressed air shall be blown from the opposite side at a pressure of 4 to 5 kg/cm². The distance between the tip of hose and the weld shall not be more than 50 mm. Any formation of soap bubble will indicate welding defects.
g) Test by Vacuum Box Apparatus-

The welded joint shall be moistened with soap solution consisting of one (1) liter of water, fifty (50) grams of soap, five grams of glycerin and ten (10) grams of dry extract of plant root. Subsequent to this, metallic box chamber with transparent top and rubber washers shall be firmly held over the treated portion and air pumped out of the box. Any bubble on the surface of the weld will indicate that the welded joint is defective.
h) Test by ammonia-

This test shall be conducted by the contractor in the following manner. A paper tape of 20 mm width saturated with 5% solution of nitric acid mercury compound in water shall be put on the weld. The weld on the other side shall be exposed to compressed air containing 1% ammonia for a period of 2 to 3 minutes. Any black spot appearing on the paper tape will indicate defective weld. Also weld permeability may be examined by filling the welded container with air and ammonia mixture under excess pressure of 10 mm of water column and spraying the opposite side of the weld with suspension of following composition – phenolphthalein powder 4 parts by weight, rectified alcohol – 40 parts by weight, water – 100 parts by weight. Weld will be considered defective if the suspension changes colour.
a) Air Pressure Test-

Air pressure test shall be conducted by the contractor in the following manner. The surface of the weld shall be covered with soap solution as indicated in item (g). The product shall then be filled with air under pressure as directed by the client. Any formation of air bubble will detect defective weld.

15.26 ERECTION

15.26.1 Scope of Work

The Contractor shall provide all construction and transport equipments, tools, tackles, consumables, materials, labour, and supervision for erection including carrying out the following:

- Receiving, unloading, checking and moving into storage at site as outlined under general conditions including prompt attendance to all insurance matters as necessary for all materials arriving at site.

- Transportation from site storage, handling, rigging, assembling, riveting, bolting, welding and satisfactory installation of all fabricated materials in proper location according to drawing and/or as directed by the client.

- Checking center lines, levels of all foundation blocks including checking line, level, position and plumb of all bolts and pockets. Any defect observed in the foundation shall be brought to the notice of client. The contractor shall fully satisfy himself regarding the correctness of the foundations before installing the fabricated structures on the foundation blocks.

- Aligning, lining, leveling, riveting, bolting, welding, securely fixing in position in accordance with drawings or as directed by the client.

- Painting as per specifications including supply of paint.

- Supply of all required consumables, construction and erection materials, including but not limited to gauges, welding brazing gases and rods, electrodes and wires, oxygen, acetylene, fuels, bolts, nuts, rivets and temporary supports etc. as required for incidental works and for the completion of erection.

**Erection shall also comprise of the following work:-**

- All minor modification such as:
  
  i) Removal of bends, kinks, twists etc. for parts damaged during transport 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 of rivet or 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. Welding in place of riveting or bolting will be permitted only at the discretion of the client. These shall be included in the scope of erection work.

Other rectification work such as:

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

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

iii) Plug welding and redrilling of holes, which do not register, and which cannot be reamed for use of next size of rivets or bolts.

iv) Drilling of holes, which are either not, drilled at all or are drilled in incorrect positions during fabrication.

These rectifications under 01(b) shall be carried out by the erector on a mutually agreed basis. The erection shall be carried out according to the best modern practice and as laid down in the latest edition of IS-800 and other relevant standards referred to therein and this erection specification.

15.26.2. Erection Drawings:

The approved erection drawings and any approved arrangement drawings, specifications or instructions accompanying them shall be followed in erecting structural and miscellaneous connected items throughout the project.

Erection marks shall appear on the structural steel members as detailed and all steel shall be erected with marks in the same relative position as shown on the plan or elevation.

If any dimensions figured upon a drawing or plan differ from those obtained by scaling the drawing or plan, the dimension as figured upon the drawing or plan shall be taken as correct. In case of discrepancy between large-scale details and small-scale drawings, the former will be followed. However, in such cases of discrepancy, the contractor shall get the same clarified by the client.

15.26.3 Storing & Handling of Material

The material on receipt at plant area shall be carefully unloaded, examined for defects, checked, sorted out for each building and stacked securely on skids above level ground, which shall be kept clean and properly drained. Girders and beams shall be placed upright and stored. Long members, such as columns and chord members shall be supported on skids placed near enough to prevent damage from deflection.

The material shall be verified with marking on the marking plan or shipping lists. Any material found damaged or defective shall be stacked separately and the damaged or defective portions
be painted in distinct color for identification. Such materials are to be dealt with under the orders of the client without delay.

15.26.4 Setting Out

The contractor shall be responsible for checking the alignment and levels of foundations, correctness of foundation centers well in advance of starting erection. Work and shall be responsible for any consequences for non-compliance thereof. Discrepancies, if any, shall immediately be brought to the notice of the Engineer-in-charge.

One set of reference axis and benchmark level will be furnished to the contractor. These shall be used for setting out of structures. The contractor shall assume full responsibility for the correct setting out of all steel work and erecting correctly in accordance with alignment and levels shown on the drawings and plumbing of vertical members.

Notwithstanding any assistance rendered to the contractor by the client, if at any time during the progress of the work, any error should appear or arise therein, on being required to do so, the contractor at his own cost shall remove and amend the work to the satisfaction of the client.

15.26.5 Bedding & Grouting

Where it is a part of erection contractor’s work, the bedding shall be carried out with Portland cement grout or mortar to Engineer-in-charge specifications. The bedding shall not be carried out until a sufficient numbers of columns have been properly aligned, leveled and plumbed and sufficient girders, beams, trusses and bracings are in position to the satisfaction of the client. Immediately before grouting, the space under the steel shall be thoroughly cleaned of all foreign particles and left free from excessive moisture. The grout or mortar shall be mixed as thickly as possible consistent with fluidity and shall be poured under pressure with pressure grouting machine, until the space has been filled with mortar.

15.26.6 Defects in Materials & Fabrication

All materials shall be straight unless required to be of curvilinear form, and shall be free from twist. All cold straightening shall be by pressure only.

During assembly and before erecting the units to position, the erector shall compare the structures with drawings to ensure that there are no fabrication omissions or errors. Should any omission or defect be found, the same shall immediately be brought to the notice of the client, who will issue necessary instructions for its rectification.

15.26.7 Assemblies & Erection

Before starting the work, the contractor shall inform the Engineer-in-charge fully as to the method he proposes to use which shall be subject to the approval of the client. Any method likely to produce damage by twisting, bending or otherwise damaging the materials shall not be used. All defects shall be brought to the notice of the client before carrying out rectification work. The contractor shall satisfy the client that adequate provisions have been made and that parts required to be inspected before use are not used before inspection. Erected parts of the structure shall be
stable during all stages of erection and the structural elements to be erected shall be strong enough to bear erection loads. The stability of structures subjected to the action of wind, dead weight and erection forces shall be obtained by observing specified sequence of erection of vertical and horizontal structural members by installing permanent and temporary bracings.

The contractor shall provide adequate supervision at all stages of the work and examine each portion of the work for accuracy before fabrication or erection is commenced. Contractor shall also provide facilities such as, adequate temporary access ladders, gangways, tools and tackle, instruments, etc., satisfactory to the engineer-in-charge for his inspection at any stage during erection. Irrespective of any inspection and tests made by the Engineer-in-charge of the work or of tests carried out either by the client or the contractor. The Engineer-in-charge shall have the right to inspect all such materials and the contractor shall produce these, if so desired by the client for his inspection. The Engineer-in-charge has the right to reject and disallow the use of any materials, which in his opinion is of substandard quality. The contractor shall remove all rejected materials from the site of work within 7 (seven) days of the issue of the order by the client to do so. Assemblies of structures shall, as far as possible, be made on ground itself.

No permanent bolting or welding shall be done until proper alignment has been obtained.

15.26.8 Alignment

Instrumental checking for correctness of initial setting out of structures shall be carried out in sequence, as determined by the design. The final leveling and alignment shall be carried out immediately after completion of assembly of each section of a building or when called for by the Engineer-in-charge.

15.26.9 Field Connections

The holes of erection joints riveted or bolted (with machined bolts) shall be filled with temporary bolts and plugs after mounting the structures. The number of bolts and plugs is determined by design but it shall not be less than 50% of the total number of holes. In joints where the number of holes is equal to 5 or less, not less than 3 holes shall be filled. The number of plugs shall be about 20% of the holes filled.

The number of washers on permanent bolts shall not be more than two (and not less than one) for the nut and one for the bolt head. Any departure from plans and allowances shown in the specifications, in dimensions, amount of cambers, etc., of the structure must be noted and reported to the client immediately and rectification carried out if necessary. Wooden rams or mallet shall be used in forcing members into position, in order to protect the metal from injury or shock.

Chipping of angle flanges and edges of plates shall be done without breaking parent metal. Chipped edges shall be finished with a file and all short corners, hammered rough faces shall be rounded off. Chipping with the use of sledgehammer shall only be permitted in exceptional cases and shall be done without resulting in fractured edges.
15.26.10 Erection Tolerances

The deviations in the erected structures shall not exceed the permissible deviation given in IS: 7215 or as later specified by the engineer-in-charge.

15.26.11 Field Bolting

Where bolting is specified on the drawings the bolts shall be tightened to the maximum limit. The threaded portion of each bolt shall project through the nut by at least one thread. In all cases where the full bearing area of the bolts is to be developed, the bolts shall be provided with a washer of sufficient thickness under the nut to avoid any threaded portion of the bolt being within the thickness of the parts bolted together. Tapered washers shall be provided for all heads and nuts bearing on beveled surfaces. Use of special bolts such as, high strength or friction grip bolts, shall be according to the relevant Indian or other recognized standards and shall be subject to the prior approval of the Engineer-in-charge before use.

In case of vibratory structures spring washers or lock nuts shall be provided as required. All machine fitted bolts shall be perfectly tight and the ends shall be checked to prevent nuts from becoming loose. No unfilled holes shall be left in any part of the structures.

15.26.12 Field Welding

All field assembly and welding shall be executed in accordance with the requirements for shop fabrication. Where the steel has been delivered painted, the paint shall be removed before field welding, for a distance of at least 50mm on either side of the joints.

Welders tested and certified fit by the Engineer-in-charge, for the type of welding involved are to be employed by the contractor.

The welding shall be uniform and shall not contain any slag or blowholes. There shall be no undercutting of the parent metal or over-lapping. The welding shall have to be subjected to tests as specified by the Engineer-in-charge. In addition, relevant portions given under “Requirement of welded joints” shall apply.

15.27 Acceptance of Work

Acceptance of erected steel structures shall be either after completion of erection of the whole building or in blocks. Intermediate acceptance certificates on embedded work are to be taken in the following cases:

a) Any steelwork embedded in concrete.

b) Steel structures which are to be covered in the process of carrying out further work.
The following documents shall be produced at the time of acceptance of erected steel structures:

i) Documents showing approved deviations from the design, if any.
ii) Documents on acceptance of embedded work.
iii) Documents of tests of steel structures (if the tests are provided for in the design or by special instructions/specifications).
iv) Data and results of geodetic measurements while checking the erection of structures.

PREAMBLE TO SCHEDULE OF QUANTITIES:

These preambles apply to all the sections of the schedule of quantities although they may not be repeated later.

The quantities shown in the “schedule of quantities” are tentative and subject to variations, additions and deletions.

Quotations for various items of works shall include the cost of all leads, temporary supporting, structures, adequate staging, loading and unloading, staking, complete handling etc., including putting up of temporary sheds etc.

TECHNICAL SPECIFICATION FOR METAL SHEET ROOFING:

1 Purpose

The purpose of this standard is to define the specifications to be followed for metal sheet roofing and cladding including all fixings/fastenings, all accessories, roof gutters and down take pipes.

2 Scope

The work described herein shall cover providing and installing metal sheet roofing and cladding including translucent sheets and all accessories such as flashings, cappings, gutters, trims, supporting straps, brackets, foam fillers, sealants and the work shall be carried out in strict accordance with this specification and applicable drawings. Supplier shall prepare shop drawings for roofing, cladding, gutters etc and shall take the approval of Engineer In Charge prior to manufacturing and supply. Based on roof slope, supplier shall propose the type of profiled sheet to be used and the proposal shall be justified through proper calculations.

3 Technical Requirements

3.1 Material Material for sheets and accessories shall strictly conform to BIS/BS/ASTM/AS specifications as mentioned. Supplier shall furnish test certificates for verification of the same and shall make arrangements for inspection and marking of the materials at his works. Erection shall not be started before approval of materials including all accessories. Length shall be such that numbers of joints are minimum. Wherever specified, to avoid longitudinal overlaps for larger span, sheets shall be of single length and shall be site formed.
3.1.1 Steel Sheet & Accessories

Profiled steel substrate shall be cold roll formed conforming to IS 513-1994. Total coat thickness (TCT) of sheet shall be minimum 0.55mm with base metal thickness without any coating shall be minimum 0.50mm with minimum yield stress 550 Mpa / 275 Mpa (ASTM A446, Grade E) as required by Engineer-in-Charge. On top of base steel any one of the following coatings should be used:- Galvalume sheets shall conform to AZ 150 of AS 1397 or ASTM 792 with hot-dip metallic coating of 55% Al and 45% Zn alloy having total coating mass of min. 150 gms/m² inclusive of both sides. Accessories such as ridge capping, corner closing pieces (barge capping), single ridge capping with or without upstand, apron flashings, cover flashings/edge trimmings, louvres etc. shall be as per manufacturer’s specifications to suit the type of roof sheeting. The accessories shall have same specifications as of roof/cladding sheets as far as colour, material, thickness, protective coating etc. The shape of accessories shall be as per drawings and generally shall suit the profile of the sheets. Overlaps shall be minimum 150 mm. The sheeting including accessories shall be fixed as per manufacturer’s specifications. The down-take pipes shall be fixed to gutter suitably to ensure leak-proof joints.

3.1.2 Pre-finished Gutters

Material for pre-finished gutters shall have the same specification and finish of the prefinished sheeting as specified in Clause 3.1.1. The colour shall match the roofing or side sheeting as applicable. The minimum total coated thickness shall be 0.6 mm. The gutters shall be fabricated with lines and angles sharp and true and plane surfaces free from objectionable wave, warp or buckle. The use of exposed fasteners shall be minimised.

3.1.3 Rain water Down-take Pipe Work

All down-take pipes and sockets shall be carefully examined for defects prior to installation and only defect-free, undamaged sound, straight pipes shall be used. All pipe and pipe fittings shall be fixed in vertical alignment unless otherwise specified. Pipe and pipe fittings shall be kept at a distance of not less than 30 mm from the wall/column face to facilitate cleaning, painting etc. Pipe, pipe fittings shall be secured to walls/column surfaces at all joints. Fixing shall be by means of lugs of the pipe, MS galvanised clamps, or cast iron brat clamps. All the joints shall be watertight and shall be works tested (hydrotest). UPVC Down-take Pipes shall comply with the material, colour, dimensions, visual, reversions, stress relief, impact strength, tensile, axial shrinkage, water tightness of joint tests specified in IS:13592. Generally, pipe of Type B shall be used unless specified otherwise. Joints shall be made by using solvent cement or as directed by manufacturer.

3.2 Shop Drawings

The Contractor shall prepare shop drawings for roof sheeting and cladding, based on the design drawings and/or fabrication drawings supplied to him. Shop drawings of sheeting and cladding work shall be such that roofing and cladding can be procured cut if required, erected, laid and fixed as shown on the design drawing and as per specifications and the direction of the Engineer-In-Charge. These drawings shall show the layout and exact lengths of the sheets, details of all sheeting accessories, rain water gutters, rain water down-take pipe work. Shop drawings shall indicate layout and details of fixing arrangements including details to enable procurement of bolt assemblies and everything necessary for the complete execution of the sheeting work. Shop drawings of sheeting shall be submitted to the Engineer-In-Charge for his review, and approval prior to starting any work. The En-
engineer-In-Charge’s approval shall not absolve the Contractor of the responsibility of correctness and accuracy of his drawings.

3.3 Stacking and Handling

Sheets shall be handled, stacked and stored carefully so as to eliminate damage and prevent wastage. Stacking shall be on firm level dry ground. Sheets of equal size shall be stacked together. Damaged material shall not be stacked along with sound material. Stacking shall be away from roads/accesses to prevent damage by vehicular traffic. While handling, care shall be taken so that lifting hooks, clamps, cups, ropes, pallets etc. do not damage (scratch, bend or locally buckle) the sheets. Also this shall be as per manufacturer’s specifications.

3.4 Laying and Fixing

The sheets shall be ordered in lengths suitable for minimising the number of end laps. Suitability for handling and transporting the sheets shall also be given due importance in deciding the sheet length. Sheet length shall be such that the end laps fall on a purlin.

Roof sheets shall be laid so that corrugations are in the direction of the roof slope. Laying of roof sheets shall begin at the lowest level/eaves portion and away from the direction of the most prevalent wind direction.

When the roof slopes are less than 15° or rainfall intensity is expected to be higher than 45 mm/hour, then troughs between the crests of the sheet at the ridge of the roof shall be turned up through 80° degrees and at lower edge/eaves turned down through 80 degrees by using turn-up tool.

Sequence of work shall be first the roofing, eaves gutter work and then side cladding. Wall sheeting shall be laid with corrugations vertical. Laying of wall sheeting shall be started at one end and shall be laid to have side lap away from the direction of the most prevalent wind. Also this shall be in line with manufacturer’s specifications.

During sheet-work workers shall wear footwear with soft soles (non-scratch producing) and workers shall not step on crests (step only in troughs) and damage the profile of the sheets. The use of cat ladders/planks is recommended.

Sheet laying shall be started after ensuring that all required sheeting, accessories, fixings are available at site and their shortfall will not hold up the sheet work. Notching tool shall be used for making notches in copings and flashings.

4 Acceptance Criteria

The installation of sheeting work shall be accepted if the installation presents a neat appearance, if NO external light is visible when viewed from inside especially through the gaps at laps, joints, flashings, or no cracks are visible, and if the installation is water tight when tested.
Following aspects shall be checked for acceptance:

a. Soundness of sheets and accessories Absence of cracks, holes, punctures, dents, scratches, consistency of colour shade, crests shall be parallel to sheet edges, consistent thickness of sheet, warping, broken/non smooth edges etc.
b. Correct laying sequence and method especially adequate side and end laps, direction of laying, mitring.
c. Fixings Size of bolts, number of bolts and bolt spacing, size and number of washers, caps, method of making hole for bolts and its size, bolt material.
d. Adequate and proper installation of flashing to make installation water tight.
e. Gutter and down-take Line, level, slopes, consistency and uniformity of size and shape, proper jointing, adequate brackets.
f. Hydro-testing of gutters and down-takes for water tightness, integrity and stability.

(A) **SPECIFICATION FOR GALVALUME SHEET ROOFING:**

1. The roofing system should be designed to withstand the wind load (As per IS 875 Part- 3). The design should also comply with any other relevant IS Codes.
2. The steel sheet shall be 3'-0" (914MM) width (tolerance +/-2mm) which shall be curved and moulded at site using mechanical press and dies to the desired curves and shape to form 2'-0" (605 MM) wide interlocking panels. These panels shall be erected in position and their seams shall be interlocked and pressed to close the seam forming a water tight joint. Minor colour chipping/scratching should be rectified by applying Epoxy lacquer. Necessary arrangement including the supply for the installation of fasteners at the end will be there in the scope of the work.
3. The installation should be done by mechanized methods. The agency has to mobilize required number of Hydra for transportation of sheets and Cranes for the erection of seamed sheets.
4. Adequate precaution shall be taken by the agency during the installation process for the safety of their workers. Safety belts, helmets and other safety equipments for the execution of job must be used, wherever required. Works in height panel installation process shall not be carried out in case of wind velocity at site location is above 22 K.M./Hrs.
5. The design & drawing for the roof must be submitted for approval before the installation of the sheets at site. The agency shall make provisions for hangers and clamps etc. for providing light fixtures in the roof, wherever required.
6. The material of Galvalume sheets shall have the following specifications:
   MATERIAL : Alloy Coated High Tensile steel imported Galvalume sheets of Bluescope (Australia)/Dongbu(Korea) make with coating of 55% Aluminum, 43.5% Zinc and 1.5% Silicon.
   TENSILE STRENGTH : Grade 350 with details as recommended in ASTM 792 M.
   COATING : Coating Mass of AZ-150(150 gms/sqm on both sides) of the shade to be decided by HWC.
7. ORGANIC PAINT COATING SYSTEM : Regular polymer Coat of 20 micron on top coat over 5 micron of primer .On bottom, coat of 7 micron of grey colour.
8. THICKNESS: i) Basic material thickness(BMT) = 1.00 mm ii) Total coated thickness (TCT) = 1.09 mm.
9. TESTING OF MATERIAL: The sheets shall be tested before use to check the basic metal thickness, coating mass and tensile strength from the laboratory which shall be decide by the Engineer in charge / consultant.
10. **STANDARDS:** The agency shall be ISO certified and shall follow International standards for Galvalume sheet roofing.

11. **FIXTURES:** The fixtures like fasteners, turbo ventilators and translucent sheets shall be designed to suit the requirements of HWC.

12. **SYNCHRONISATION:** The agency to whom the contract of fixing of Galvalume sheet is awarded and the civil contractor shall remain in touch with each other for proper liaisoning during the various stages of the work.

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Completion of Balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no.02 of M/s. Odisha Mining Corporation at South Kaliapani, Odisha State.

SPECIAL CONDITIONS OF CONTRACT

ANNEXURE –III

1.0 **Scope of work**: Scope of work under this contract includes mobilization of men, material, machinery, special shutter forms, complete shuttering system, Civil, Structural, Sheeting, Painting, Fabrication and Erection as required for completion of balance works in the Chrome Ore Beneficiation Plant no. 2 of M/s. Odisha Mining Corporation at South Kaliapani Mines, Odisha State. The Scope of work also includes all materials and consumables required for the successful completion of the works unless otherwise specified in the tender.

2.0 The work shall be governed by KIOCL Limited’s **General Conditions of Contract** - GCC (TS/B/KIOCL/QF-31/REV-1) Ref: Annexure – V.

3.0 Scope of work in this contract broadly covers as per **schedule of work**. Ref: Annexure - IV.

4.0 The progressive payment will be made as per the quantity executed in the site and as per the recommendation of the Engineer-in-charge.

5.0 The quantities given in the schedule of items are approximate and may vary or some of the items may not be executed. No additional claim on the unit rate quoted by the contractor on account of variations, omissions and modifications.

6.0 No escalation is admissible on any account whatsoever till the completion of the work.

7.0 Power and water required for the job will be provided at one point on free of cost as per GCC of KIOCL Ltd.

8.0 Reinforcement steel and structural steel wastages, recovery shall be as per KIOCL’s General Conditions of Contract.

9.0 No advance shall be payable and payment will be based on the actual work done.

**Note:** However, the Mobilization advance up to 10% of the contract value shall be payable by KIOCL against submission of Bank Guarantee of equivalent amount plus 10% (i.e, 110% of the mobilization advance). The advance shall be interest bearing at 12% or SBI lending rate plus 2% shall be recoverable proportionately against each progressive bills.

10.0 Contractor shall submit daily consumption of materials at site indicating the status of materials consumed in work and the balance available.

11.0 Contractor shall submit detailed Bar Chart within fifteen days from the placement of the LOI / Work Order for the approval of the engineer.
**SPECIAL CONDITIONS OF CONTRACT**

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12.0 Mode of measurements for the work shall be as per IS-1200 latest edition, unless otherwise specified for items not covered in IS-1200, CPWD standard shall be adopted.

13.0 **Maintenance period:** The work executed shall be maintained in good condition for a period of **ONE YEAR** from the date of completion including repair required if any at contractor's cost. If the contractor fails to fulfill his obligation during the maintenance period, the same shall be got done by the KIOCL at contractor's risk and cost.

14.0 **SECURITY DEPOSIT:** 10% of the value of work shall be deducted as security deposit and retained till the completion of maintenance period as applicable.

   i.e, Initial Security Deposit of 3% of the value of work shall be deposited immediately after the placement of order. EMD / BG shall be adjusted against the part of initial Security Deposit. The balance 7% shall be recovered from each running bill. The Security Deposit shall be refunded after successful completion of maintenance period.

15.0 Any damage to the owner's property caused by the contractor during the execution/maintenance of work shall be charged to the contractor. The quantum of damage caused shall be ascertained by the Engineer-in-charge and that will be final.

16.0 Statutory deduction towards all applicable taxes shall be made as per rules.

17.0 Royalties if any for materials applicable shall have to be paid by the contractor.

18.0 All safety appliances like safety belt, helmets, ear plugs, hand gloves etc. have to be provided by the contractor to all his workers and supervisors. Workmen without safety appliances shall not be allowed to work at plant premises.

19.0 The contractor should obtain Insurance Policy to cover the risk of the labourers under Workmen Compensation Act-1923 and should be produced before commencement of the work.

20.0 Contractor should furnish the PF & ESI code numbers obtained from respective authorities and also produce the same to the Personnel Department before commencement of the work. However, in case of contractors who do not have PF & ESI code number, such contractors should apply for PF & ESI code numbers from the respective authorities based on the LOI/Work Order issued to them and produce the same to KIOCL.
21.0 The Canteen facilities will not be provided for the contractor and his workmen.

22.0 **TIME OF COMPLETION**

The entire work under this contract shall be completed within Nine (09) MONTHS from the date of issue of Letter of Intent / work order.

23.0 **PENALTY / LIQUIDATED DAMAGES:**

If the contractor fails to complete the work within the stipulated completion time, the contractor shall pay to KIOCL as Penalty / Liquidated damages for such default as per the clause No. 36.00 (C) of General Condition of Contract, KIOCL Limited.

The KIOCL has the discretion to reduce or waive the Penalty / Liquidated Damages.

24.0 An experienced supervisor and Site engineer shall be deployed to ensure that the contract workers safety in accordance with all the provisions of Factories Act- 1948 and Rules, Regulations, Byelaws & orders till the completion of the work.

25.0 Wherever it is observed that the contractor has not provided safety appliances to the workers engaged by him, the KIOCL reserves the right to issue the necessary safety appliances to his workers on cost recoverable basis.

26.0 The contractor shall mobilize the men and materials within Fifteen (15) days from the date of LOI / WO.

27.0 **Integrity Pact:** The name & address of the IEM, please refer the clause no. 21.0 of the Invitation to bid of Annexure-I.

28.0 **OBLIGATIONS OF THE AGENCY / CONTRACTOR WITH REGARD TO STATUTES:**

The Agency shall be solely responsible as regards salary, wages and service conditions and terms extended by the Agency to his employees/workmen and shall in that connection maintain requisite records and comply with all laws, enactment, rules and regulations and orders dealing with employment of contract labour, payment of workmen’s compensation, contribution under ESI Act, 1948 and PF/EPF Act 1952, payment of minimum wages, payment of bonus, fire and safety regulations, regulations relating to employment of female workforce, security requirements and such other and regulations as may be applicable at present made applicable hereafter. The
wages prescribed by the appropriate Government under the Minimum Wages Act, 1948 and all provisions of the Contract Labour Regulation Act and Factories Act shall be complied with by the Agency. Agency shall insure all employees for accidents and third party losses and produce the policy before commencement of Contract. All employees of the Agency shall be covered under Workmen Compensation Insurance and Group Accident Insurance cover, by the Agency.

Technical specification for Civil, structural, sheeting and painting works

1.0 GENERAL GUIDELINES FOR CIVIL WORK, STRUCTURAL WORK, SHEETING, ERECTION/INSTALLATION AND SAFETY

1.1 This section of the contract technical specification covers construction work for civil, structural steelwork (fabrication & erection), sheeting, erection of all mechanical plant & equipment, technological structures, inter connection chutes, pipes etc.

1.2 Any item or accessories not included in this section but essential for efficient, satisfactory and co-ordinated construction of the Plant will be included in the scope of Contractor.

1.3 The construction work will be carried out in such a manner that where some existing features/structures are to be integrated with the new work, work will proceed without upsetting the existing situation. Construction will be carried out in a co-ordinate manner with the work of other contractors in the area.

1.4 All erection and related work will be carried out by the Contractor in accordance with the agreed work plan to be submitted by the Contractor and approved by the Employer/Engineer and based on working drawings to be provided by Employer.

1.5 The Contractor and its subcontractors shall abide by and follow all instructions given by the Employer/Engineer during the execution of the work at site. Employer’s requirement, if any, will be intimated at site.

1.6 All works to be carried out by the Contractor, will strictly conform to Mines Act, Metalliferous mines regulation, mines rules etc. and all other statues enforced by Directorate General of Mines Safety, Indian Bureau of mines and other statutory central/state government agencies.
1.7 Balance quantum of work estimated for civil, structural fabrication & erection, sheeting work and mechanical equipment erection is indicated in Annex-1.

1.8 The Contractor shall provide all temporary ladders, scaffolding materials, platforms, barricades, supports and other necessary facilities required for handling, erection, testing and visual inspection of supplies at the point of installation and shall also provide necessary packing plates, wedges, shims, levelling screws etc., required for erection of equipment and structures.

1.9 The Contractor shall return to the Employer all crates, packing cases and packing materials and all returnable supplies at a place and manner designated by the Employer.

1.10 The Contractor shall provide erection consumables like oxygen and DA gas, welding rods, solder lugs, oil, grease, kerosene, cotton waste, etc., required for erection of plant equipment and steel structures.

1.11 The Contractor shall construct and maintain its own site offices and stores as required for the work and arrange for maintaining in neat manner of the area placed at the Contractor’s disposal. The temporary allotment of land for the purpose of site office, stores and temporary works for execution of Contract, shall be on the following terms:

a) Land will be allotted free of charge for the purpose of site office & stores

b) The allotment shall remain valid till the period of Contract and shall automatically cease after Final Acceptance completion of the Contract. The validity shall also automatically cease on termination of Contract due to any reason whatsoever.

c) On completion of the work and on Final Acceptance, the Contractor shall remove all Scraps, structures built by the Contractor and restore the land to its original condition.

1.12 The Contractor shall provide sufficient fencing, notice boards and lights to protect and warn others as may be considered necessary by the Employer / Engineer.

1.13 All guarantees and test certificates obtained by the Contractor from its sub-vendors/sub-suppliers during the execution of work shall be transferred to the Employer before issue of Commissioning Certificate.
1.14 The plant & equipment and structures will be erected by Contractor as per construction drawings of Consulting Engineers and the instructions/erection manual of equipment suppliers. The Contractor shall use to the maximum extent, pre-assembly and mechanization in order to fulfill the erection and construction targets.

1.15 The Contractor shall be responsible for protection and / or diversion of underground and all existing over ground services, wherever required and / or diversion of the underground services which are indicated in the drawing made available to the Contractor. In case there are underground services which need to be protected and / or diverted but are not shown in the drawing, the Contractor shall be responsible to execute the same at extra price, if any, to be mutually agreed between Contractor & Employer.

1.16 The Contractor shall provide and maintain at its own expense all lighting, fencing, barricades and watching as and where necessary within battery limits for the proper execution and the protection of the Facilities and for the safety of the public.

1.17 As and when the Consulting Engineer/ EMPLOYER considers it necessary to carry out work on extended hours / three shift basis or on Public Holidays so as to meet the Time for Completion and request the Contractor to carry out work on extended hours / three shifts or on Public Holidays, the Contractor shall carry out the work accordingly to meet the Time of Completion.

1.18 The Contractor shall take all reasonable steps to protect the environment and to avoid injury, damage and nuisance to people and property resulting from pollution, noise and other results of his construction.

1.19 The Contractor must adhere to all the applicable statutory laws pertaining to Safety, Health and Environment.

1.20 The Contractor must ensure that there is no wastage of water/power at the work site. The Contractor must also ensure that all the water tapping points are leak proof.

1.21 All the motor vehicles of the Contractor used for transporting materials/machinery etc. should have pollution control certificates and the same should be submitted at the time of obtaining gate passes. A copy of the same must be exhibited/pasted on the vehicle also.
1.22 The Contractor must ensure dust suppression measures in the work areas by sprinkling of water etc. and also ensure that all his workers use dust masks while working in dusty areas.

1.23 The Contractor must ensure proper house keeping at site by keeping the work areas free from unwanted material, scarps scraps and greases, oil to avoid slips & falls.

1.24 The Contractor must ensure that all the debris generated during the work is transported safely to dump yard such that there is no spillage of debris on the road during transportation (by covering with a plastic sheet/tarpaulin)

1.25 All the garbage collected from dustbins etc. should be transported in covered vehicles.

1.26 All the material which may be recycled/reused should be transported to the designated place for reuse/recycling.

1.27 All the cut jungle growth and trees (if any) should be disposed at the dumping yard without open air burning.

1.28 Heating/melting of bitumen in open drums/containers is prohibited.

1.29 The Contractor must ensure that there is no spillage of oil or paints on the floors/grounds etc. According proper care to be taken by the CONTRACTOR during the said work.

1.30 In the course of carrying out the execution of work, the Contractor shall keep the Site reasonably free from all unnecessary obstruction, store or remove any surplus materials, clear away any wreckage, rubbish or temporary works from the Site, and remove any Contractor’s Equipment no longer required for execution of the Contract. After Completion of all parts of the Facilities, the Contractor shall clear away and remove all wreckage, rubbish, debris and surplus material of any kind from the Site, and shall leave the Site and Facilities clean and safe.

1.31 The Contractor shall be responsible for the true and proper setting-out of the Facilities periodically in relation to bench marks, reference marks, check lines and levels provided to it in writing by or on behalf of the Employer.

1.32 Contractor’s Supervision: The Contractor shall give or provide all necessary superintendence during the installation of the Facilities, and the Contractor's Representative(s) shall be constantly on the Site to provide full-time superintendence of the installation. The Contractor/ sub-contractor engaged by the Contractor, shall provide
and employ only technical personnel who are skilled and experienced in their respective discipline and supervisory staff who are competent to adequately supervise the work at hand.

1.33 The Contractor shall provide and employ on the Site in the installation of the Facilities such skilled, semi-skilled and unskilled labour as is necessary for the proper and timely execution of the Contract.

1.34 The Contractor shall at all times during the progress of the Contract use its best endeavours to prevent any unlawful, riotous or disorderly conduct or behaviour by or amongst its employees & labour and labour of its Sub-Contractors / Vendors.

1.35 The Contractor shall ensure that the contract worker(s) engaged by them shall not have any adverse record with respect to his character in the past. The CONTRACTOR shall be fully responsible for any acts, omission, adverse behavior of its contract workers.

1.36 All representatives/supervisors/workers of contractors must take Safety Induction Training to be conducted by the Employer at site and comply with the instructions given by the Contractor’s supervisor.

2.0 SCOPE OF WORK

2.1 CIVIL WORK

2.1.1 The construction of all balance civil work for the New Chrome Ore Beneficiation plant and miscellaneous civil work as will be necessary for completion of the plant shall be carried out by the Contractor on item rate basis for which necessary construction drawings shall be provided by the Employer/Consulting Engineers.

2.1.2 The work includes all balance civil work comprising construction of all foundations, substructures and superstructures but not limited to the following units:

- Loading bridge for the crusher house
- Crusher house
- R.C.C storage bin
- Conveyor system for ore handling
- Concentration plant
- Concentrate thickener
- Concentrate stockpile
- Tailing thickener
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- New pump house with foundation of pumps only, RCC reservoirs at Quarry D and extension of pump house in the existing COBP
- 33 kV VCB room
- New switchgear room
- 440 V crusher house switchgear room.
- Extension of existing boundary wall along with gate, gate house and time office as indicated in drawing
- Modification of existing pump foundations and R.C.C water reservoir at Quarry – II.

2.1.3 All approach roads from the plant roads to equipment and buildings, loading/unloading areas; pavements, aprons, surface drains, sewer lines, cover slabs etc.

2.1.4 All electrical installations, auxiliary & ancillary buildings Trenches, Tunnels etc. as necessary along with plant illumination.

2.1.5 Connection of all approach roads, surface drains & sewer line within battery limit to nearby main plant roads, main drains & main sewer lines respectively.

2.1.6 Detailing of scope of civil works

The Contractor shall carry out all civil works in accordance with the construction drawings and specifications issued by the Employer/Engineer. The scope of work of the Contractor shall cover the following:-

2.1.6.1 Earthwork

Earthwork in excavation in all types of soil including excavation/ breaking of hard rocks, at all depths below ground level, dewatering of excavated pits, slush removal, proper barricading the excavated area etc and transportation of surplus excavated earth to spoil dump/fill areas/excavated pits to any lead distances as directed by Engineer, all tools, plant and labour complete in all respect.

2.1.6.2 Earthwork Back filling

Backfilling in all positions and heights and descents in foundations, pits, pipe trenches, tunnels, around foundations and structures, in plinth etc with approved excavated material obtained from spoil dumps at all heights, or reclaiming from dump at all depths, transporting, depositing and dressing, compaction complete in all respect all as per drawings, specifications and directions of the Employer/Engineer, all tools, plant, rollers and labour complete in all respect.
2.1.6.3 Plain Cement Concrete (PCC)

Supplying, laying and compacting plain cement concrete of all grades as defined in IS: 456 in all foundations and super structures at all depths and heights below and above ground level all as per drawing. All materials, concrete, shuttering, tools, plant and labour complete in all respect.

2.1.6.4 Reinforced Cement Concrete (R.C.C)

Supplying, laying and compacting curing reinforced cement concrete of all grades as defined in IS: 456 in all foundations and super structures at all depths and heights below and above ground level all as per drawing. All materials (like re-bar, cement, sand, aggregate etc), tools, plant and labour complete in all respect.

2.1.6.5 Reinforcement Barbending

Straightening, decoiling, cutting, bending, cranking, tack welding as necessary, placing and fixing in position steel reinforcement including angles/pins provided for the approved welded joints, at all levels above and below finished ground level for reinforced cement concrete and precast reinforced cement concrete works including supplying approved 20 SWG annealed black binding wire, cover blocks etc all as per drawings and directions of the Employer/Engineer all materials, tools, bar bending and cutting machine, plant and labour complete in all respect for a) with M.S. rounds of all diameters b) with TMT/high strength deformed bars of grade Fe 500 of all diameters.

Reinforcement bars will be measured in lengths in position to be laid as specified in drawings and will include bends, hooks, cranks and authorised laps, chairs, separators and dowels as per IS. Weights shall be calculated in ton based on standard weights as per Indian Standards and/or as per for civil work including rolling margin. The Contractor scope includes preparation of bar bending schedule and getting the same approved by the Employer/Consulting Engineer.

The scope also includes cutting and bending of steel reinforcement, which shall be done by reinforcement cutting & bending machine.

2.1.6.6 Inserts, embedments and other steelworks

Supplying, fabricating, erecting and fixing in position at and at all heights & depths above and below finished ground level, M.S. plates for anchor box, permanent steel shuttering (with or without anchor pin) for anchor bolt pockets (straight or tapered), M.S.foundation/anchor bolts for embedding permanently in concrete or masonry work, true to line, level and plumb including all connected works and adjustments in shuttering
Completion of Balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no.02 of M/s. Odisha Mining Corporation at South Kaliapani, Odisha State.

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and reinforcement, all as per drawings and directions of the Employer/Engineer, all materials, tools, plant and labour complete in all respect. All nuts and washers shall be supplied by the contractor at cost plus basis.

2.1.6.7 Shuttering

Providing and fixing shuttering (formwork) in position with necessary centerings, bracings, proppings etc striking, removing and clearing the same after the specified periods and applying one coat of oil on shuttering surfaces in contact with concrete and for all types of shuttering (Straight shuttering, Curved shuttering in single radius, shuttering for core holes and pockets for building column and equipment foundation bolts etc) for all plain and reinforced cement concrete works including all chamfers, splays, fillets, keys, wedges, props, nails, bracings, brackets, cutting holes for passing embedments etc and applying waste oil on shuttering surfaces in contact with concrete all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete in all respect.

2.1.6.8 Brickwork

Supplying, constructing one or more brick thick burnt clay brickwork using bricks of compressive strength not less than 50 kgf/sq cm as defined in IS:1077 in cement sand mortar (1:6) at all depths below ground level in foundations, at all heights above ground level super structure, manholes, ducts, drains etc including fair cutting, waste, bonding, plumbing, lining, levelling, flushing, raking joints, scaffolding and curing, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete in all respect.

Supplying, constructing one or more brick thick flyash brick work using bricks as defined in IS:12894 in cement sand mortar (1:6) in foundations at all depths below ground level and at all heights above ground level in super structure, manholes, ducts, drains etc including fair cutting, waste, bonding, plumbing, lining, levelling, flushing, raking joints, scaffolding and curing, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete.

Supplying & constructing random uncoursed rubble masonry in cement sand mortar (1:6) in foundations, super structure etc with flush pointing as per drawings and direction of Engineer at all depths and heights below and above finished ground level including wastage, scaffolding and curing, fair cutting, lining, levelling etc, all materials, tools, plants and labour complete in all respect.
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2.1.6.9 Plastering & Finishing

Supplying and laying ordinary plaster with (1:4) cement sand mortar of 15 mm /20 mm thick and (1:3) cement sand mortar of 25 mm thick waterproofing plaster mixed with approved waterproofing compound at and at all heights and depths above and below finished ground level to faces of walls, pillars, columns, posts, lintel sides, drains, jambs, column projections, narrow bands and widths etc including chipping and hacking of concrete surfaces, raking joints, scaffolding, cleaning and curing, all as per drawings and directions of the Engineer, all materials, tools, plant and labour complete in all respect.

This also includes cleaning of all existing civil structures while washing & painting as per the standard procedure.

Supplying and applying all types of paints, over approved primer confirming to IS:2074, plaster of paris, neat cement finish etc as per drawing at all heights and depths above and below finished ground level including rubbing, cleaning, putty filling etc and scaffolding, all materials, tools, plant & labour complete in all respect (measurement will be according to IS:1200)

2.1.6.10 Soling & Hardcore

Supplying, laying and packing brick, stone boulder soling of finished thickness under floors/plinth/ foundations etc hand and hammer packed with spalls and stone chips and blinding with crushed stones including watering, ramming, compacting and rolling with a 8-10 ton power roller/vibro rammer or by any other approved mechanical means for stone boulder soling, all as per drawings and directions of the Engineer, all materials, tools, plant and labour complete in all respect.

2.1.6.11 Flooring

Supplying and laying all types of flooring including dado and skirting with approved quality materials as per drawing, specification and directions of the Engineer.

2.1.6.12 Doors, Windows and Rolling Shutters

Supplying, fitting and fixing in position standard all types of doors, windows, ventilators, rolling shutters with approved quality materials and fixtures including cutting/drilling necessary holes in walls concrete and grouting of lugs in the same with (M20D) cement concrete, glazing as per drawings, specifications and directions of the Engineer.

2.1.6.13 Waterproofing
Providing waterproofing to base, walls & vertical faces of underground structures, roof, basement as shown in drawings and as specified with a guarantee of waterproofing for a period of ten (10) years from date of Final Acceptance of work and including supply of all materials and labour complete in all respect.

2.1.6.14 Sanitary and Plumbing

Supplying, laying, fitting and fixing all types of sanitary items including all pipe works, fittings, joints and other necessary items to run the system successfully. The scope includes cutting chases and holes in brickwork, rubble masonry, concrete, plaster etc for embedding or passing pipes, fixing brackets, fitting and making good the damages to the original condition wherever necessary and the scope also includes cutting, bending, threading, jointing etc of pipe works and applying one coat of single pack air drying heavy duty anti-corrosive paint to the inside of soil, waste, vent and rainwater pipes and fittings.

2.1.6.15 Miscellaneous items - Grouting, painting to walls (inner and outer walls), grills, gates, doors, windows & rolling shutters etc.

Supplying, installing, painting all miscellaneous item of work as required to complete the work as shown in drawings and as directed by Consulting Engineer, all materials, tools, plant and labour complete in all respect.

2.1.6.16 Dismantling of temporary structures/ existing shuttering scaffolding in use at site/ other machines not in use

Dismantling with due care brickwork, masonry work, concrete, flooring, road & pavement, water pipe lines, drainage pipe lines, sewer lines and all existing erected structural steelwork consisting of tie/rafter bracings, purlins, runners, cleats etc. without damaging the same as well as the connected structures at all heights above finished ground level including necessary cutting of welded structures, loosening of bolts etc. carefully segregating the various members, transporting to Employer’s weighbridge, obtaining weighment certificate and stacking neatly at a location shown by the Employer, all as directed by the Employer/Engineer, all materials, tools, plant and labour complete in all respect.

Dismantling of shuttering material and scaffolding materials in use at the site inside plant premises and stacking at a designated space intimated by the EMPLOYER.

Dismantling of existing construction machines like winch etc. which are not in use and to stack at a designated space.

2.1.6.17 Reinforcement steel including loading, unloading and transportation to site
Supplying, loading, transporting and unloading and stacking at site all types of reinforcement steel and structural steel with due care of safety during loading, transportation and unloading including supply of labour, plant and machinery.

2.1.6.18 Road, drainage & sewerage work

The work will consist of excavation & backfilling (as required), supply and transportation of all type of materials, aggregate, gravels etc to the site as may be required for construction of roads, laying and compacting well-graded material on prepared sub grade in accordance with the requirements of the drawings and specifications provided by the Employer/Engineer. The material will be laid in one or more layers as lower sub-base and upper sub-base as necessary according to lines, grades, camber and cross-sections as directed by the Employer/Consulting Engineer.

2.1.7 Materials and Services

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

2.1.7.1 Excavation work in all types of soil (hard and soft) for foundation, pits, sewers, underground pipes etc. including dewatering, shoring and strutting, sand bagging wherever required.

2.1.7.2 Backfilling, Soling and sub-grade work for all foundations, flooring pits etc.

2.1.7.3 Concrete and reinforced concrete work in foundations, pits, cable trenches, roads and other sub-structures.

2.1.7.4 Concrete and reinforced concrete work in supporting structures of equipment.

2.1.7.5 Concrete and reinforced concrete work in columns, beams, floors, slabs, frames, other superstructures and water storage tanks, tailing thickener, concentrate thickener.

2.1.7.6 All holding down bolts, anchor bolts, cutouts, all types of embedment including plate and pipe inserts in PCC, RCC and masonry work, grouting & encasing etc.

2.1.7.7 All civil work in tunnel/trenches, utilities & services etc.

2.1.7.8 Steel gutters, collector pipes and down comers for adequate roof drainage.
2.1.7.9 Miscellaneous steel structures including platforms, walkways, cross-overs, stairs, ladders, hand-rails, pipe supports etc.

2.1.7.10 Roof and side ventilators as per process requirement.

2.1.7.11 Doors, windows, rolling shutters, ventilators etc.

2.1.7.12 Painting for steelwork, windows, doors etc.

2.1.7.13 All masonry work in sub-structures and superstructures.

2.1.7.14 All finishing work to floor and wall cladding.

2.1.7.15 All finishing including plaster and painting work, tiling work to masonry & concrete structures.

2.1.7.16 All necessary waterproofing, heat resisting, acid resisting and anti-corrosive treatments to building structures including underground construction. Anti-termite treatment under ground floors and around the buildings wherever necessary.

2.1.7.17 All rain water drainage, sanitary sewerage, industrial contaminated sewerage system for all buildings and open areas within the battery limits and all connection work at the interface with the plant system as per drawing and as directed by the Engineer.

2.1.7.18 All plumbing work.

2.1.7.19 All pipe work and duct work.

2.1.7.20 All false ceiling, false floor, partitioning work, duct work including the supporting structures.

2.1.7.21 All roads, parking areas and paved areas, aprons etc.

2.1.7.22 All dismantling work of existing road, drains, underground/over ground PCC, RCC, masonry work, sewer lines etc. during excavation work/piling work wherever necessary. All dismantling work will be carried out by the successful bidder on the basis of mutually negotiated and settled item rate.

2.1.7.23 All temporary building, offices, roads and services required for construction in the battery limits.

2.1.7.24 All cleaning work and levelling of site after the construction work is over.

2.1.7.25 Cleaning and painting of existing civil works and plastering of existing incomplete brick area.
2.2 STRUCTURAL STEELWORKS (INCLUDING SHEETING)

2.2.1 The fabrication and erection of building steel structures as well as sheeting work of all balance civil work for the New Chrome Ore Beneficiation plant as will be necessary for completion of the plant shall be carried out by the Contractor on item rate basis for which necessary structural steel fabrication/erection drawings and construction drawings shall be provided by the Employer/Consulting Engineers.

2.2.2 Facilities to be provided will include but not be limited to the following:-
- Rock breaker structures
- Feeder hopper
- Crusher House
- Shed over crushed ore storage building
- Conveyor Galleries including supporting trestles and towers
- Main Chrome Ore Concentration Building
- Junction House
- Concentrate stockpile house

2.2.3 Structural steelwork will include base plate and anchorage, columns, floor beams, grid beam, chequered plates, liners, trusses, rafters and roof girders, monorails, purlins, crane gantry girders, crane rail with fixings, crane buffers, roof and column bracings, side, gable and louver runners, posts, brackets, platforms and walkways, crossovers, ladders, staircases, handrails, pipe and equipment supports and all miscellaneous members, frames, gutters, downpipes, collector pipes etc. as per the drawings provided by the Employer/Engineer.

2.2.4 Pre-colour coated corrugated steel sheets for roof and side cladding. Translucent sheets, glazing etc on roof and sides.

2.2.5 The Contractor shall carry out structural load test on any part of the building/structure at its own cost if such structural load test is warranted due to unsatisfactory test results of concrete cubes and if so directed by the Employer.

2.2.6 Louvres will be provided at sides if specified in the drawings.

2.2.7 Doors, rolling shutters, windows, gates etc.

2.2.8 Painting of steelwork, doors, rolling shutters, windows, gates etc.

2.2.9 Detailing of scope of building structural and sheeting works
The Contractor shall carry out all building steel structural and sheeting works in accordance with the construction (fabrication / erection) drawings and material specifications issued by the Employer/Engineer. The scope of work of the Contractor shall cover the following:

2.2.9.1 Structural steel fabrication

Supplying and fabrication of all types of structural steelwork including applying primer and finish paint after surface preparation as per General Specification of painting and transporting the fabricated structure to place of erection at site, all materials, tools, plant and labour etc complete in all respect.

2.2.9.2 Structural Steel erection

(a) Upto 10 m level

Assembling, erecting and fixing in position at heights upto 10 m level and depths below ground level welded/bolted structural steelwork as specified for all members of building structures, such as all types of columns with machining of cap, bearing pads and stiffner plates as per drawing, column bracings, roof legs, all types of girders including gantry girders with machined seat end of bearing stiffners, surge diaphragms, platforms, roof trusses, roof girders, auxiliary girders, purlins, lacings, bracings, stiffeners, side and gable runners, beams, roof plates, MS louvres, brackets, monorails and its supports, lifting beams, posts and hangers, wind girders, floor & platform supports, staircases, roof hand rails, toe guards, ladders, walkways, clamps, ties, struts, diaphragms, sag rods including threading, nuts & washers, sag angles, pipe trestles & towers, doors and all other miscellaneous structural steelwork etc as specified and as shown on drawings and/or as directed by the Engineer including supplying (precision/semi-precision type), nuts, washers, fittings, fixtures etc., applying touch up finish paint after erection complete in all respect. (Connection of spring plates, gusset plates of surge and bottom girders, diaphragms plates etc to be developed by high tensile bolts of property class 8.8 and above. Connection developed by bolts of property class 6.8). The scope includes identification, sorting as per drawing, collecting, transporting, cleaning, painting and erecting fabricated structures laying in the fabrication yard at EMPLOYER’s COBP-2 site.

(b) Above 10 m level

Assembling, erecting and fixing in position at heights above 10 m level and depths below ground level welded/bolted structural steelwork as specified for all members of building structures, such as all types of columns with machining of cap, bearing pads and stiffner plates as per drawing, column
bracings, roof legs, all types of girders including gantry girders with machined seat end of bearing stiffeners, surge diaphragms, platforms, roof trusses, roof girders, auxiliary girders, purlins, lacings, bracings, stiffeners, side and gable runners, beams, roof plates, MS louvres, brackets, monorails and its supports, lifting beams, posts and hangers, wind girders, floor & platform supports, staircases, roof hand rails, toe guards, ladders, walkways, clamps, ties, struts, diaphragms, sag rods including threading, nuts & washers, sag angles, pipe trestles & towers, doors and all other miscellaneous structural steelwork etc as specified and as shown on drawings and/or as directed by the Engineer including supplying (precision/semi-precision type), nuts, washers, fittings, fixtures etc., applying touch up finish paint after erection complete in all respect. (Connection of spring plates, gusset plates of surge and bottom girders, diaphragms plates etc to be developed by high tensile bolts of property class 8.8 and above. Connection developed by bolts of property class 6.8). The scope includes identification, sorting as per drawing, collecting, transporting, cleaning, painting and erecting fabricated structures laying in the fabrication yard at OMC COBP-2 site.

2.2.9.3 Refurbishment of existing steel structures (old existing structures)

Refurbishment of existing structures (either lying at site or erected) as directed by the Employer/Engineer including supply of bolts, nuts, washers, etc with application of touch-up paint as shown in the drawing or as directed by Engineer, all materials, tools, plant and labour complete in all respect.

2.2.9.4 Structural steel materials including loading, unloading and transportation to site

Supplying, loading, transporting and unloading and stacking at site all types of structural steel materials with due care of safety during loading, transportation and unloading including supply of labour, crane, plant and machinery.

2.2.9.5 Painting of structures (including supply of paints & its material, grit blasting, labour etc.

Supplying and applying painting to steel structures as per specification after surface preparation. All materials, tools, plant and labour complete in all respect.

2.2.9.6 Sheeting Work

Supplying, transporting at site with guard on both sides and erection of steel sheets, FRP and polycarbonate sheets as specified, manufactured of approved industries, measured as laid for side/gable sheeting including
supplying and fixing of screws with washer and EPDM sealing washers etc. as specified and approved non-hardening poly-sulphide or other sealant and mastic tapes to prevent water ingress, as per specification or as directed by the Engineer and as shown in drawings, all materials, drilling machine, tools, plant and labour complete in all respect.

2.2.9.7 Consumable for sheeting work

Supplying and fixing approved quality fixtures as mentioned in serial no. 7 above as specified including tools and labour complete in all respect.

2.2.10 Material

2.2.10.1 Structural steel
All hot rolled steel sections and plates upto 20 mm thickness will conform to IS 2062 Fe 410W A, designated as E 250 (Fe 410W A). Above 20 mm. thickness, the same will conform to IS 2062 Fe 410W B, designated as E 250 (Fe 410W B).

All structural steel will be free from rust, scales, laminations, cracks, fissures and other surface defects. Cold formed sections, wherever used, will be galvanized with zinc coating of 275 gm/m² minimum. Cold formed section will not be used for main load bearing members.

2.2.10.2 Bolts and nuts
All bolts and nuts will conform to IS:1363 & IS:1364 as applicable. Nuts will have property class conforming to IS: 1367 compatible to property class of mating bolts. High strength structural bolts and nuts will be conform to IS:3757 and IS: 6623 respectively.

2.2.10.3 Washers

Plain washers will conform to IS:2016 unless specified otherwise. Washers for high strength bolts and nuts will conform to IS:6649.

2.2.10.4 Electrodes
Electrodes/wire-flux will be selected ensuring the compatibility of strength/mechanical properties between the weld deposit and the parent metal, besides other factors and will comply with the requirements of relevant British standards or equivalent (English version of all codes).

2.2.10.5 Roof and side coverings

Pre-colour coated corrugated steel sheets of trapezoidal profile (with galvanized processed steel substrate with zinc coating of minimum 275 gm/m²) of minimum thickness of 0.6 mm Total Coated Thickness [TCT] will be used at sides and minimum thickness of 0.65 mm (TCT) will
be used on roof. Ridging & flashing will be made with plain sheet of 0.8 mm (TCT).

Self drilling/tapping stainless steel screws, having steel washers built monolithically with the screw head and with bonded EPDM sealing washers of requisite size will be used for fastening the sheets to structural members. Aluminium pop rivets with sealing washers will be used for stitching between sheets / flashing and sheet.

Sealants, mastic tapes, foam fillers, clamps, bolts, nuts, neoprene rubber gaskets etc. will be used as per manufacturer’s specification to seal the gap between sheets / flashing and sheet at end and side laps.

Polycarbonate sheets, wherever used for the provision of natural lighting through walls, will be 2mm thick rigid, transparent sheet with UV protection and will match with trapezoidal profiles of the pre-colour coated sheets used on walls.

FRP sheets, wherever used for the natural lighting through roofs, will be 3mm thick sheet of milky white colour and will match with trapezoidal profiles of the pre-colour coated sheets used on roofs.

2.2.10.6 Lighting

Adequate illumination during construction will be provided by the Contractor for ensuring proper working conditions during day time. Where adequate natural light is not available due to space restrictions or other technological reasons, natural lighting will be supplemented by temporary lighting till the illumination system for the plant is installed and energized.

2.2.10.7 Moving equipments will be provided with heavy cage of adequate height all around for protection of personnel.

2.3 MECHANICAL ERECTION

2.3.1 The Mechanical equipment erection shall be done in accordance with the good industry practice.

2.3.2 Detailing of scope of erection/installation of Mechanical equipment/items

The Contractor shall carry out all erection/installation works in accordance with the erection drawings provided by the equipment suppliers or the Employer/Engineer (as the case may be). The scope of work of the Contractor shall cover the following:-

2.3.2.1 Refurbishment of already erected/positioned Mechanical equipment:

2.3.2.1.1 Arranging all required tools and tackles, cranes, oil, grease, consumables, cotton waste, manpower for the job.

2.3.2.1.2 Arranging all types of erection equipment required for the job.
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2.3.2.1.3 Preparing the work area by leveling, filling etc. and making it hard and plain for mobile equipment to function.

2.3.2.1.4 Taking delivery of Construction Water & Power from the Employer at a certain point as provided by the Employer and bringing the Construction Water & Power to the location of the job by providing the Contractor’s own resources.

2.3.2.1.5 Fulfilling all kinds of safety requirements like supplying of barricading tapes, barricading GI sheets, PPEs like safety helmets, gloves, safety shoes, welding helmet, goggles, safety belts, aprons etc. to the workmen, submission of government approved third party inspection of all the mobile equipment and abiding in general to the safety regulations of the local authority and the Employer.

2.3.2.1.6 Preparation of Field quality assurance plan and Inspection Test procedure/plan for refurbishment/realignment and erection work and submitting the same to the Employer/Engineer for approval prior to commencement of work.

2.3.2.1.7 General clean-up of Equipment and its’ vicinity until the job area is workable including supply of all required cleaning resources.

2.3.2.1.8 Collecting drawings of the job from the Employer/Engineer and studying it thoroughly before start of refurbishment.

2.3.2.1.9 Assessing the condition of equipment, its technological structures and equipment media services by visual inspection for rusting, thickness checking, extent of corrosion, condition of the joints, cracks etc., enlistng the missing parts / components i.e. Valves, Instruments, couplings, gear box etc., checking the condition of the supports, access and approaches, anchor bolts and fasteners, checking of Electrical panel connections along with all components, checking of electrical cable conditions along with power & control circuit, No load trial of all motors and noting down the characteristic/performance, comparing the performance with the designed parameters, etc., inspection of weld joints with necessary NDT, checking for wear and damage of the flanges, bolts, gaskets, compensators, filters, hydraulic cylinders, all pipe fittings, connectors, valves, instruments on each line, etc.

2.3.2.1.10 Preparing a complete list of the above observations, getting it verified by the Employer/Engineer and submitting the verified list to the Employer for taking delivery of the missing or damaged materials.

However, for assessing the condition of bearing, the bearing cover to be opened, condition of bearing can be seen and necessary grease to be cleaned and new greasing to be done by the Contractor as necessary.
2.3.2.1.11 Taking delivery of the listed missing or damaged materials from the Employer’s store/stockyard, transporting the same and loading/unloading it to the job site. If not available with the Employer, receiving the design details from the Employer/Engineer and supplying the materials as per the design details, its’ subsequent transportation up to the Employer’s premises/work site, loading/ unloading of the same.

2.3.2.1.12 Providing covered storage and safe custody of the materials till such time these are erected, commissioned and handed over to the Employer including supplying materials for preparing covered storage.

2.3.2.1.13 Checking of foundation levels as per drawing and carrying out the correction, if required, in consultation with the Employer/Engineer.

2.3.2.1.14 De-rusting of the Equipment and its parts, thorough cleaning of nuts, bolts and other parts of the Equipment by supplying all types of cleaning, lubricating and greasing agents.

2.3.2.1.15 Arranging for Welder qualification test by providing all required resources and getting it witnessed and approved by the concerned engineers.

2.3.2.1.16 Making level beds for technological structure fabrication, if required, including supply of all enabling steel and other materials required for preparing the beds.

2.3.2.1.17 Fabrication of technological structures as per the drawings including supply of all resources like welding electrodes, gases, welding machineries, etc.

2.3.2.1.18 Conducting required NDTs to the technological structures, submitting NDT reports to the Employer/Engineer for observations and rectifying the defects, as observed in the NDTs, to assess load bearing strength.

2.3.2.1.19 Preparation of erection scheme, getting it approved by the Employer/Engineer and erection of the newly replaced missing or damaged materials.

2.3.2.1.20 Rectification/Modification, as and where required, for equipment and technological structures for proper assembly and fitting, like machining, grinding, chipping, welding, cutting, drilling, tapping etc. including supply of all required resources.

2.3.2.1.21 Aligning, leveling, coupling, welding, bolting, grouting to make the equipment ready for commissioning as per relevant drawings, manuals, recommended standards or codes and also as per guideline or
instruction of Equipment supplier/Employer/Engineer including supply of approved grouting materials.

2.3.2.1.22 Supplying all required resources for cleaning, flushing, testing (Hydro/ Pneumatic), blowing of the equipment pipelines like pumps, temporary pipes, fittings, valves, testing media, hydraulic oil, blowing media, etc.

2.3.2.1.23 Arrangement of testing and blowing, water flushing the equipment pipelines, Hydro/ Pneumatic testing of pipelines at the required test pressure in the presence of Employer/Engineer, rectifying the leakages by cutting, grinding, welding, etc. and after necessary rectification, Hydro/Pneumatic testing of pipelines shall be repeated until no leakage is observed.

2.3.2.1.24 Supplying all pickling materials, as required, and execution of the pickling process on the required pipes.

2.3.2.1.25 Blowing and Drying of the circuit using the blowing media.

2.3.2.1.26 For Hydraulic and lubricating pipes, hooking up with the tanks and looping for the pressure test, filling up the tank with hydraulic oil and conducting of pressure test by using Hydraulic pumps in circuit, conducting pickling & flushing including supply of pickling material & flushing oil and attaining the required NAS value for the cleanliness of the pipes, draining of the flushing oil and finally filling up the tank with operating hydraulic oil. Pickling material and flushing oil shall be provided by the employer.

2.3.2.1.27 Hooking up of the pipelines to the equipment, as required.

2.3.2.1.28 Compliance of all plug list points as required by the Employer/Engineer.

2.3.2.1.29 Preparation of stage inspection reports, final alignment or inspection reports, Test reports, Plug lists compliance reports, commissioning reports and preparation of all erection, alignment, testing and commissioning protocols and submitting the same to the Employer for approval and verification.

2.3.2.1.30 Conducting testing of equipment, trial runs as well as start-up and commissioning, without and with load, of the equipment and carrying out of rectification work required during commissioning, if necessary and/or as required by the equipment supplier/ Employer/Engineer.

2.3.2.1.31 Hooking up of the pipelines to the equipment, as required.

2.3.2.1.32 Handing over the entire pipe network to the Employer.
2.3.2.1.33 Submitting reconciliation statement to the Employer for the materials taken as free issue from the Employer.

2.3.2.1.34 Overall supervision of the job.

2.3.2.2 Pipes Installation

2.3.2.2.1 Arranging all required tools and tackles, sling rope, D-Shackles, manpower for the job.

2.3.2.2.2 Arranging all types of erection equipment like forklift, cranes, hoists, winches etc. required for the job.

2.3.2.2.3 Preparing the work area by leveling, filling etc. and making it hard and plain for mobile equipment to function.

2.3.2.2.4 Receiving the design details from the Employer/Engineer and supplying of pipes, pipe fittings, valves, structural steel for pipe supports etc. as per the design details, its’ subsequent transportation up to the Employer’s premises/work site, loading/unloading of the same.

2.3.2.2.5 Receiving the painting specification from the Employer/Engineer and supply of Paints of Employer approved make, its’ subsequent storing.

2.3.2.2.6 Providing covered storage and safe custody of the materials till such time these are erected, commissioned and handed over to the Employer including supplying materials for preparing covered storage.

2.3.2.2.7 Fulfilling all kinds of safety requirements like supplying of barricading tapes, barricading GI sheets, PPEs like safety helmets, gloves, safety shoes, welding helmet, goggles, safety belts, aprons etc. to the workmen, submission of government approved third party inspection of all the mobile equipment and abiding in general to the safety regulations of the local authority and the Employer.

2.3.2.2.8 Taking delivery of Construction Water & Power from the Employer at a certain point as provided by the Employer and bringing the Construction Water & Power to the location of the job by providing the Contractor’s own resources.

2.3.2.2.9 Preparation of Field quality assurance plan and Inspection Test procedure/plan for fabrication and erection work and submitting the same to the Employer/Engineer for approval prior to commencement of work.

2.3.2.2.10 Collecting drawings of the job from the Employer/Engineer and studying it thoroughly before start of work.
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2.3.2.2.11 Making level beds for pipe fabrication including supply of all enabling steel and other materials required to prepare the beds.

2.3.2.2.12 Arranging for Welder qualification test by providing all required resources and getting it witnessed and approved by the concerned engineers.

2.3.2.2.13 Fabrication of pipes as per the drawings including supply of all resources like welding electrodes, gases, welding machineries, oxygen and DA gases, gas cutter etc.

2.3.2.2.14 Fabrication of pipe supports as per drawings, surface preparation and application of paints on the same as per the painting specification.

2.3.2.2.15 Conducting required DP test/NDTs to the fabricated pipes, submitting reports to the Employer/Engineer for observations and rectifying the defects, as observed in the NDTs.

2.3.2.2.16 Surface preparation and application of paints to the fabricated pipes as per the painting specification.

2.3.2.2.17 Checking of DFT and preparing required protocols and getting it approved by the Employer/Engineer.

2.3.2.2.18 Preparation of erection scheme, getting it approved by the Employer/Engineer and erection of the supports and painted pipe segments as per drawings.

2.3.2.2.19 Securing the erected pipeline with proper arrangement including supplying of all required securing materials until it is aligned.

2.3.2.2.20 Alignment of pipes and supports including field welding and final painting and final DFT checking including preparing required painting protocols and getting it approved by the Employer/Engineer.

2.3.2.2.21 Preparation of stage inspection reports, final alignment or inspection reports, Test reports, Plug lists compliance reports, commissioning reports and preparation of all erection, alignment, testing and commissioning protocols and submitting the same to the Employer for approval and verification.

2.3.2.2.22 Supplying all required resources for cleaning, flushing, testing (Hydro/ Pneumatic), blowing of the pipelines like pumps, temporary pipes, fittings, valves, testing media, hydraulic oil, blowing media, etc.
2.3.2.2.23 Arrangement of testing and blowing, water flushing the pipelines, Hydro/ Pneumatic testing of pipelines at the required test pressure in the presence of Employer/Engineer, rectifying the leakages by cutting, grinding, welding, etc. and after necessary rectification, Hydro/Pneumatic testing of pipelines shall be repeated until no leakage is observed.

2.3.2.2.24 Supplying all pickling materials, as required, and execution of the pickling process on the required pipes.

2.3.2.2.25 Blowing and Drying of the circuit using the blowing media.

2.3.2.2.26 For Hydraulic and lubricating pipes, hooking up with the tanks and looping for the pressure test, filling up the tank with hydraulic oil and conducting of pressure test by using Hydraulic pumps in circuit, conducting pickling & flushing including supply of pickling material & flushing oil and attaining the required NAS value for the cleanliness of the pipes, draining the test oil and finally filling up the tank with operating hydraulic oil.

2.3.2.2.27 Hooking up of the pipelines to the equipment, as required.

2.3.2.2.28 Handing over the entire pipe network to the Employer.

2.3.2.2.29 Overall supervision of the job.

2.3.2.3 Equipment Erection (up to 6m as well as beyond 6m):

2.3.2.3.1 Arranging all required tools and tackles, sling, D-Shackles, manpower for the job.

2.3.2.3.2 Arranging all types of erection equipment like forklift, cranes, hoists, winches etc. required for the job.

2.3.2.3.3 Preparing the work area by leveling, filling etc. and making it hard and plain for mobile equipment to function.

2.3.2.3.4 Taking delivery of Construction Water & Power from the Employer at a certain point as provided by the Employer and bringing the Construction Water & Power to the location of the job by providing the Contractor’s own resources.

2.3.2.3.5 Fulfilling all kinds of safety requirements like supplying of barricading tapes, barricading GI sheets, PPEs like safety helmets, gloves, safety shoes, welding helmet, goggles, safety belts, aprons etc. to the workmen, submission of government approved third party inspection of all the mobile equipment and abiding in general to the safety regulations of the local authority and the Employer.
2.3.2.3.6 Preparation of Field quality assurance plan and Inspection Test procedure/plan for erection & alignment work and submitting the same to the Employer/Engineer for approval prior to commencement of work.

2.3.2.3.7 Collecting drawings of the job from the Employer/Engineer and studying it thoroughly before start of erection.

2.3.2.3.8 Receiving the design details from the Employer/Engineer and supplying the Equipment along with its components and technological structures as per the design details, its’ subsequent transportation up to the Employer’s premises/work site, loading/unloading of the same.

2.3.2.3.9 Providing covered storage and safe custody of the materials till such time these are erected, commissioned and handed over to the Employer including supplying materials for preparing covered storage.

2.3.2.3.10 Checking of foundation levels as per drawing and carrying out the correction, if required, in consultation with the Employer/Engineer.

2.3.2.3.11 Thorough cleaning of foundation bolts, nuts, bolts and other parts of the Equipment by supplying all types of cleaning, lubricating and greasing agents.

2.3.2.3.12 Arranging for Welder qualification test by providing all required resources and getting it witnessed and approved by the concerned engineers.

2.3.2.3.13 Making level beds for assembly of equipment & technological structures, as required, including supply of all enabling steel and other materials required to prepare the beds.

2.3.2.3.14 Site modification of technological structures, if required before erection, as per the drawings including supply of all resources like welding electrodes, oxygen, DA gases, cutter set, welding machineries, etc.

2.3.2.3.15 Conducting required NDTs to the technological structures, if required, submitting NDT reports to the Employer/Engineer for observations and rectifying the defects, as observed in the NDTs.

2.3.2.3.16 Preparation of erection scheme, getting it approved by the Employer/Engineer and erection of the new Equipment and its technological structures.

2.3.2.3.17 Rectification/ Modification, as and where required, for equipment and technological structures for proper assembly and fitting,
like machining, grinding, chipping, welding, cutting, drilling, tapping, reaming etc. including supply of all required resources.

2.3.2.3.18 Securing the erected Equipment and technological structures with guy ropes or other arrangement including supplying of all required securing materials.

2.3.2.3.19 Preparation of stage inspection reports, Test reports and preparation of all erection protocols and submitting the same to the Employer for approval and verification.

2.3.2.3.20 Overall supervision of the job.

2.3.2.4 Refurbishment and Alignment of new Mechanical Equipment Erection up to 6m:

2.3.2.4.1 Arranging all required tools and tackles, cranes, manpower for the job.

2.3.2.4.2 Arranging all types of erection equipment like winches etc. required for the job.

2.3.2.4.3 Taking delivery of Construction Water & Power from the Employer at a certain point as provided by the Employer and bringing the Construction Water & Power to the location of the job by providing the Contractor’s own resources.

2.3.2.4.4 Fulfilling all kinds of safety requirements like supplying of barricading tapes, barricading GI sheets, PPEs like safety helmets, gloves, safety shoes, welding helmet, goggles, safety belts, aprons etc. to the workmen, submission of government approved third party inspection of all the mobile equipment and abiding in general to the safety regulations of the local authority and the Employer.

2.3.2.4.5 Erection, aligning, leveling, coupling, welding, bolting, grouting to make the equipment ready for commissioning as per relevant drawings, manuals, recommended standards or codes and also as per guideline or instruction of Equipment supplier/Employer/Engineer including supply of approved grouting materials.

2.3.2.4.6 Conducting NDTs, if required, submitting NDT reports to the Employer/Engineer for observations and rectifying the defects, as observed in the NDTs.

2.3.2.4.7 Supplying all required resources for cleaning, flushing, testing (Hydro/ Pneumatic), blowing of the equipment pipelines, if required, like pumps, temporary pipes, fittings, valves, testing media, hydraulic oil, blowing media, etc.
2.3.2.4.8 Arrangement of testing and blowing, water flushing the equipment pipelines, Hydro/ Pneumatic testing of pipelines at the required test pressure in the presence of Employer/Engineer, rectifying the leakages by cutting, grinding, welding, etc. and after necessary rectification, Hydro/Pneumatic testing of pipelines shall be repeated until no leakage is observed.

2.3.2.4.9 Supplying all pickling materials, as required, and execution of the pickling process on the required pipes.

2.3.2.4.10 Blowing and Drying of the circuit using the blowing media.

2.3.2.4.11 For Hydraulic and lubricating pipes, hooking up with the tanks and looping for the pressure test, filling up the tank with hydraulic oil and conducting of pressure test by using Hydraulic pumps in circuit, conducting pickling & flushing including supply of pickling material & flushing oil and attaining the required NAS value for the cleanliness of the pipes, draining the test oil and finally filling up the tank with operating hydraulic oil.

2.3.2.4.12 Hooking up of the pipelines to the equipment, as required.

2.3.2.4.13 Compliance of all plug list points as required by the Employer/Engineer.

2.3.2.4.14 Preparation of stage inspection reports, final alignment or inspection reports, Test reports, Plug lists compliance reports, commissioning reports and preparation of all alignment, testing and commissioning protocols and submitting the same to the Employer for approval and verification.

2.3.2.4.15 Conducting testing of equipment, trial runs as well as start-up and commissioning, without and with load, of the equipment and carrying out of rectification work required during commissioning, if necessary and/or as required by the equipment supplier/Employer/Engineer.

2.3.2.4.16 Hooking up of the pipelines to the equipment, as required.

2.3.2.4.17 Handing over the entire pipe network to the Employer.

2.3.2.4.18 Overall supervision of the job.

2.3.2.5 Already erected Mechanical equipment refurbishment between 6m & 15m:

2.3.2.5.1 All activities shall be as point 2.3.2.1.
2.3.2.5.2 However, the equipment piping shall be interconnected with the equipment piping up to 6 m, as required. Any other connections, as required, shall also be made with the Equipment up to 6 m.

2.3.2.6 Refurbishment and Alignment of new Mechanical Equipment Erection above 6m:

2.3.2.6.1 All activities same as point 2.3.2.4.

2.3.2.6.2 However, the equipment piping shall be interconnected with the equipment piping up to 6 m, as required. Any other connections, as required, shall also be made with the Equipment up to 6 m.

2.3.2.7 Painting of already erected Equipment, not erected Equipment & newly erected Equipment:

2.3.2.7.1 Arranging all required tools and tackles, machineries, manpower for the job.

2.3.2.7.2 Arranging all types of mobile equipment required for the job.

2.3.2.7.3 Receiving the painting specification from the Employer/Engineer and supply of Paints of Employer approved make, its’ subsequent storing.

2.3.2.7.4 Providing covered storage and safe custody of the materials till such time these are used including supplying materials for preparing covered storage.

2.3.2.7.5 Surface preparation of the Equipment and its technological structures and application of paints as per the painting specification.

2.3.2.7.6 Checking of DFT and preparing required protocols and getting it approved by the Employer/Engineer.

2.3.2.7.7 Securing the painted Equipment and its components by barricading etc. until further action is taken on them.

2.3.2.8 For other mechanical equipment/items like Dry fog deducting system at various location, Motorised pulp distributor, Compressor, Air receiver, Concentrate head tank for hydrosizer, Concentrate head tank for wet table, Concentrate head tank for feed pump, the activities/scope as listed under 2.3.2.3 & 2.3.2.4 shall be applicable.

1.0 PAINT APPLICATION

1.1 General
1.1.1 All items/equipment and structural materials (fabricated/Semi finished) available at site will be thoroughly cleaned and re-painted with anti-rust paints. The CONTRACTOR will take adequate safety measures to avoid unwanted damage during painting in-situ condition.

1.1.2 All equipments, new fabricated items/fabricated items (if any available at site) and fabricated items already erected will be painted suitably prior to erection/installation.

1.1.3 All balance equipment will be shop painted and touch-up painting will be done after installation. Similarly, all structures will be erected after final painting and touch-up painting will be done after erection.

1.1.4 Paint will be applied in accordance with manufacturer's recommendations as supplemented by this specification. The work will generally follow IS:1477 (Part II) for jobs carried out in India and SSPC-PA-1 or DIN 55928 or equivalent for Jobs carried out outside India.

1.1.5 Paint will generally be applied by brushing, except that spraying may be used for finish coats only when brushing may damage the prime coats. Roller coat or any other method of paint application will not be used unless specifically authorised. Spraying will not be adopted for red lead or zinc rich paints. Daubers may be used only when no other method is practicable for proper application in areas difficult to access.

1.1.6 Paint will generally not be applied when the ambient temperature is 10°C and below. For paints, which dry by chemical reaction, the temperature requirements specified by the manufacturer will be met with. Also, paint will not be applied in rain, wind, fog or at relative humidity of 80 percent and above or when the surface temperature is below dew point resulting in condensation of moisture or during fog, rain or mist. Any wet paint exposed to damaging weather conditions will be inspected after drying and the damaged area repainted after removal of the paint.

1.1.7 Each coat of paint will be continuous, free of pores and of even film thickness without thin spots. The film thickness will not be so great as to affect detrimentally either the appearance or the service of the paint.

1.1.8 Each coat of paint will be allowed to dry sufficiently before application of the next coat to avoid damage such as lifting or loss of adhesion. Defects such as pinholes, voids, runs, sags, over-spray, orange peel, fish-eye and skins will be prepared by mild sanding (by hand/power) of the damaged area. Undercoats having glossy surface will be roughened by mild sand papering to improve adhesion of subsequent coat. Successive coats of same colour will be tinted, whenever practical, to produce contrast and help identify the progress of work.

1.1.9 The application of paint by brush or spray are covered below.

1.1.10 The sub-base of the underground structure will be cleaned of all dirts and kept dry by continuous pumping of water. The surface will then be painted with two (2) coats of approved acrylic polymer modified cementitious compound to form a thick resilient and flexible membrane over the sub base.
1.1.11 All civil works including existing civil structure and plastered wall.

1.2 Brush Application

1.2.1 Proper brushes will be selected for a specific work piece. Round or oval brushes to IS:487 are better suited for irregular surfaces whereas flat brushes to IS:384 are convenient for large flat areas. The width of flat brushes will not normally exceed 125 mm.

1.2.2 Paint will be applied in short strokes depositing uniform amount of paint in each stroke followed by brushing the paint into all surface irregularities, crevices and corners and finally smoothing or levelling the paint film with long and light strokes at about right angles to the first short strokes. All runs and sags will be brushed out. Brush marks will not be left in the applied paint as far as practicable.

1.3 Spray Application

1.3.1 The spraying equipment will be compatible with the paint material and provided with necessary gauges and controls. The equipment will be cleaned of dirt, dried paint, foreign matter and solvent before use.

1.3.2 The paint will be applied by holding the gun perpendicular to the surface, at a suitable distance and moved in a pattern so as to ensure deposition of a uniform wet layer of paint. All runs will be brushed out immediately. Areas not accessible to spray will be painted by brush or dauber.

1.4 Shop Painting

1.4.1 All fabricated steel structures will have a minimum of two primer coats prior to despatch to site. The paint will be applied immediately after surface preparation to the specified quality preferably within two hours.

1.4.2 Surfaces in contact during shop assembly will not be painted. Surfaces in contact after field erection will receive three shop coats of specified primer unless the paint will interfere with assembly. Surface which will be inaccessible after assembly will also receive three shop coats of specified primer. Surfaces which cannot be painted but require protection will be given a coat of rust inhibitive grease to IS:958 or solvent deposited compound to IS:1153 or 1674 or an international equivalent.

1.4.3 Surfaces to be in contact with concrete will not be painted. Surfaces to be in contact with wood, brick or other masonry will be given one shop coat of the specified primer.

1.4.4 The shop coats will be continuous over all edges including ends meant for joining at site by bolting/welding, except where the paint is harmful to welding operator or is detrimental to the finished welds. In such cases, no paint will be applied within 50 mm of the welding edge and the unprotected surface will be given a coat of corrosion inhibitive compound. The unpainted area will be exposed prior to welding, the welded joint cleaned and deslagged and immediately covered by paint as that has been used for the remaining surface.
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1.4.5 Small machinery, motors, electrical equipment and instruments etc will receive the full specified coats of paint in the shop.

1.4.6 Large machinery, large motors, cranes, gear cases, conveyors etc will be shop painted completely as per the relevant paint system taking into account the service conditions.

1.5 Site/Field Painting

1.5.1 After the erection/assembly of fabricated structures at the Plant site, damaged and defective shop coats will be touched up with the same type of paint as used for shop coat. The work will include removal of damaged paint work, surface preparation of the damaged area (due to erection or due to site fabrication) to the specified quality and painting thereof to cover-up all field connections, welds, fasteners and all damaged or defective paint and rusted areas. If in the opinion of the Employer, damage to shop primer coats is extensive, then instead of spot touch up, one overall coat of primer for each coat will be applied after cleaning. The fabricated steel structures will then be painted with intermediate (where applicable) and finish coats as specified.

1.5.2 Equipment and large machinery pieces will be despatched from shop after application of two coats of primer while intermediate (if necessary) and finish coats of paint will be applied at site. In case vendors are permitted by Employer to despatch these items after application of finishing paints, these items will be given one finish coat compatible with shop finish coats after cleaning and retouch, if necessary.

1.5.3 The first coat of paint at site will be applied before weathering of the top shop coat becomes excessive, preferably within three months of the application of shop coat. The finish coats of paint will be applied after all concrete work has been completed and all cement and concrete spatters and drippings removed and damaged surfaces touched up before application of the finish coats.

1.5.4 Surfaces requiring painting which have not been shop/yard painted will be given necessary surface preparation and prime coats before application of intermediate and finish coats and before any damage occurs to the Surface from weather or other exposure.

1.5.5 Steel structures, which are fabricated will be painted with prime and finish coats after specified surface preparation on completion of fabrication and erection.

1.5.6 All cracks and crevices considered not detrimental to mechanical strength will be filled with compatible paint or metal putty.

1.5.7 All field welds and all areas within 50 mm of welds will be cleaned before painting, using surface preparation method as specified to attain the specified surface quality grade. All welds will either be blast cleaned, or thoroughly power wire brushed or chemically scrubbed or solvent cleaned depending on the nature and position of the weld deposits.

1.5.8 During application of paint at site care will be taken to prevent any damage to building, floors, structures, electrical equipment including motors, valve stems, glass, moving parts, bearings, couplings, shafts, lubrication points and other sensitive parts. Any paint falling on or applied to such surfaces will be removed.
2.0 PAINT SYSTEMS

The paint systems to be followed in general for different service conditions has been classified and listed in ‘Table A – Painting System’ of this section.

2.1 General Service Painting

2.1.1 This system is applicable for painting of non-load bearing structure, such as partitions, minor platforms, ladders, walkways etc under normal atmospheric environment, which is fairly clean, dry and non-corrosive

2.1.2 Surface preparation will be of SIS grade St-2 hand tool cleaning or St-3 power tool cleaning for oil-based paint and Sa 2½ near white blast cleaning in case PVC-copolymer-alkyd-based paint is used.

2.1.3 The paint system for this service the details of which has been specified in ‘Table A – Painting System’ will be at least two coats or oil-based red lead or zinc chromate or zinc phosphate or equivalent primer and one coat of weather resistant modified phenolic resin varnish with micaceous iron (MIO) as an intermediate coat in the shop and one finish coat or long oil-alkyd resin paint at site after necessary touch-up operation. Alternative paint specification based/on PVC-copolymer alkyd can be used.

2.1.4 Steel doors, windows etc which are subject to regular handling will have surface preparation to SIS grade St-3 power tool cleaning or pickling. The prime coat as specified in ‘Table A – Painting System’ will be red lead based - two component epoxy-polyamide and an intermediate coat of micaceous iron oxide (MIO) based two component epoxy-polyamide in the shop. The finish coat at site will be two component epoxy-polyamide MIO paint followed by two component polyurethane, after filling all cracks with putty during application of primer coat.

2.2 Wearing Surface Painting

2.2.1 This system covers Chequered plates, Monkey ladders, walkways, staircase treads and other similar surfaces for general service.

2.2.2 Surface preparation will be Sa 2 or Sa 2½ or St-3 depending on nature of exposure and paint system adopted as outlined in ‘Table A – Painting System’.

2.2.3 The shop prime coat for light corrosive environment will be either zinc chromate based PVC-copolymer alkyd enamel or red Lead/zinc chromate based epoxy ester resin varnish. The intermediate coat at shop will be a compatible paint with micaceous iron oxide. The finish coat at site will be compatible with prime and intermediate coat that is either PVC-copolymer alkyd or epoxy. Top surface of floor plate will have higher paint film thickness than bottom.

2.2.4 In case of extreme corrosive atmosphere, the shop primer coat for top and bottom surface will be two component epoxy polyamide with zinc chromate and one intermediate coat will be compatible paint with micaceous iron oxide. The site painting will be of epoxy polyamide finished with two component polyurethane.
2.2.5 For hand railing with toe guards two coats of red lead epoxy as a primer and two coats of epoxy polyamide as finish coat will be applied.

2.3 Light Corrosive Service Painting

2.3.1 This system is applicable for light corrosive atmosphere due to presence of mild corrosive fumes and gases of neighbouring plant. In view of the location of site, the paint system, which will be generally applicable for most of the equipment and structures will be covered under this category unless otherwise specified.

2.3.2 Painting of all load bearing steel structures, structural steelwork for plant and shop building, equipment, pipework etc which are exposed to such light corrosive atmosphere as detailed in 'Table A – Painting System' are covered under this system.

2.3.3 The surface preparation will be of Sa 2, or Sa 2½ or Sa 3 depending on nature of paint system adopted.

2.3.4 The paint system under this service as specified in ‘Table A – Painting System’ for respective item will be any one of the following such as chlorinated rubber, PVC-copolymer alkyd, epoxy polyamide and zinc ethyl silicate and combination thereof depending on nature of exposure conditions, compatibility and durability of paint life.

2.3.5 For temperature condition in between 80°C and 150°C zinc ethyl silicate primer will be used followed by a coat of high build epoxy polyamide enamel.

2.3.6 For temperature condition above 150°C the primer coat will be zinc ethyl silicate and finish coat will be silicone-aluminium paint.

2.4 Extreme Corrosive Service Painting

2.4.1 This system is applicable where there is extreme corrosive atmosphere prevailing due to marine industrial atmosphere or presence of inorganic and organic acids, alkalis, corrosive salts, corrosive vapours and fumes, solvents etc.

2.4.2 Painting of all load bearing steel structures, equipment, pipes and ducts, and its fittings which are exposed to such extreme corrosive atmosphere as detailed in ‘Table A – Painting System’ are covered under this system.

2.4.3 The surface preparation will be Sa 2½ or Sa 3 or St-3 depending on nature of paint system adopted.

2.4.4 The paint system under this service as specified in ‘Table A – Painting System’ will be primarily red lead/zinc chromate based epoxy-polyamide punt as primer coat and micaceous iron oxide as intermediate coat and epoxy-polyurethane as finish coat.

2.4.5 In case of higher temperature service of above 150°C and zinc ethyl silicate will be used as prime-coat and silicone-aluminium as finish coat.

2.5 Hot Surface Painting
2.5.1 ‘This system is applicable when temperature condition under light or extreme corrosive service exceeds 80°C.

2.5.2 The prime coat will be ethyl zinc silicate or epoxy-polyamide and silicone aluminium as a finish paint the specific application of which has been indicated in ‘Table A – Painting System’.

2.6 **Heavy Machinery and Accessories Painting**

2.6.1 This system is applicable for heavy machinery such as those in Rod mill and Ball mill and accessories, which are subjected to varying exposure conditions and excessive wear.

2.6.2 The surface preparation will be of Sa 2½ or Sa 3 depending on paint system adopted.

2.6.3 The paint system will be epoxy polyamide based as specified in ‘Table A – Painting System’.

2.7 **Switchboards/Control Panel Painting**

2.7.1 This system covers fabricated sheet metal items, namely. Electrical panels, switchboards, instrument panels, control desks, cabinets etc.

2.7.2 The surface preparation will be pickling or white blast cleaning to Sa 2½. The clean surface will be given a phosphate coating consisting of a thin layer of zinc, iron or manganese phosphate deposited either by immersion or powder spray. The coating weight will not be lower than 5 gm per sq m; the coating will be tested, when required, by a continuous salt spray as per ASTM B 117.

2.7.3 The phosphate coated surface will have one coat of baking primer of zinc chromate - butylated melamine - alkyd resin based and two coats of finish paint of amino-alkyd resin stove enamel as specified in ‘Table A – Painting System’ of this section.

2.7.4 For large electric drives, transformers etc for indoor and outdoor installation, epoxy polyamide and polyurethane system will be adopted as indicated in ‘Table A – Painting System’ of this section.

2.8 **Metallic Coating**

2.8.1 This system covers permanent structures namely, transmission towers, cable trays and its support structures, outdoor electric substation structures, pipe trestles, lighting poles etc which cannot be conveniently repainted.

2.8.2 The surface preparation will be degreasing, followed by pickling and shall also be in accordance with IS 2629.

2.8.3 The cleaned surface will be coated by a layer of zinc by hot dipping, in accordance with IS 4759. The deposition will be at least 610 gm per sq m for metal thickness of 5 mm and above, and 460 gm per sq m for up to 2 mm metal thickness. Alternatively hot dip aluminium coating can be used, in accordance with IS 6697.
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2.8.4 In case hot dip coating can not be applied, sprayed aluminium/zinc coating as per IS 5905 can be applied with the permission of the Employer.

2.9 Small Items of Equipment Painting

2.9.1 Standard bought out items and machines such as valves, pumps, cylinders, small motors which are mass production item and are being painted in a production line in the manufacturer's shop, may be painted as per respective manufacturer's standard but will meet the requirement of the exposure condition and the specific system of painting thereof as stipulated in this specification. The colour to be adopted for such equipment will be subject to approval by Employer before commencement of manufacture.

3.0 COLOUR CODE

3.1 Shades of finish paint coat to be applied will be as per IS:5 or as per Munsell colour reference (published by Munsell Colour Co Inc, Baltimore, USA). Shades of finish coat of major item like steel structures, equipment and piping will be as per existing standards of OMC/Employer.

4.0 INSPECTION AND TESTING

4.1 The contractor will ensure that the surface treatment and painting carried out meets the requirements of the relevant painting systems specified.

4.2 Testing will be carried out on materials to be used by the Contractor, as well as work being carried at stages. Record will be maintained by the Contractor of all such tests and reports submitted to the Employer/Consulting Engineers. The Employer/Consulting Engineers may examine the test reports, and in addition undertake inspection at any or all stages.

4.3 Manufacturer's test certificates will be made available by the Contractor for all materials to be used in the works. In addition, the Employer/Consulting Engineers reserves the right to call for test of samples at random, reject any batch or lot if the quality thus found is deficient, and the Contractor will have to bear expenses of testing.

4.4 The inspection and test reports will include but not be limited to the following essential information which are grade of surface preparation, paint system adopted, name of paint manufacturer, dry film thickness of each coat as measured.

   i) Rust grade
   ii) Grade of surface preparation
   iii) Container identification of each coat of paint applied
   iv) Dry film thickness of each coat

4.5 For the job execution, inspection will be carried out by the Contractor after each stage of work, namely pre-treatment and each coat of paint. The Contractor will maintain record of stage inspection, in formats to be approved by Employer/Consulting Engineer. Countersignature by Employer/Consulting Engineer on these will be required, before proceeding with next stage of work.
The Contractor will arrange equipment required for inspection and testing required during job execution. These will include but not be limited to the following.

a) Sling psychrometer and electric psychrometer for measuring wet and dry bulb temperatures, digital thermometer for instant air temperature.

b) Digital and surface temperature thermometer for recording temperature of substrate.

c) Zahn Cup for measuring viscosity of paint.

d) Wet film thickness gauge, inter-chemical wet film thickness gauge, Elcometer minitest and quanmix of different models, Positector 6000 for measuring coating thickness, and pocket-size 30X Microscope for examination of coatings.

e) Pinhole and holiday detectors e.g. Tinker-Rasor high and low voltage wet sponge holiday detector, K-D bird dog low voltage wet sponge holiday detector, spy high voltage holiday detector are required to find the nicks, scrapes and pinholes in the coating film.

Record will be maintained by the Contractor on inspection of each identifiable part of the work.

In addition, Dew point and relative humidity be will recorded at the start of work, in the middle of each shift, or at intervals approved by Employer.

The Contractor will have available, for reference at the work site, a set of essential standards, such as IS 1477 (Parts I & 2), IS 1303, and SIS 055900 (or equivalent ISO, SSPC, BS).
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Table A – PAINTING SYSTEM

<table>
<thead>
<tr>
<th>Description</th>
<th>Nature of exposure</th>
<th>Surface quality</th>
<th>No. of coats</th>
<th>DFT/ coat in microns</th>
<th>Paint system</th>
<th>No. of coats</th>
<th>DFT/ coat at in microns</th>
<th>Paint system</th>
<th>DFT in microns (shop &amp; site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General service painting</td>
<td>Normal atmospheric environment non-corrosive atmosphere</td>
<td>St 2 or St 3</td>
<td>2 P</td>
<td>35</td>
<td>alkyd based zinc phosphate anti-corrosive primer</td>
<td>Clean and retouch</td>
<td>1 F</td>
<td>30</td>
<td>Synthetic enamel of long oil alkyd resin based paint</td>
</tr>
<tr>
<td>Non-load bearing structural steelwork such as partitions, minor platforms, walkways, ring ladders pipe/cable support brackets etc. Location - all indoor temperature less than 80°C</td>
<td>I</td>
<td>55</td>
<td>I</td>
<td>Dust preventive paint based on modified phenolic resin with M10</td>
<td>Clean and retouch</td>
<td>1 F</td>
<td>50</td>
<td>High build two component epoxy polyamide with M10</td>
<td>170</td>
</tr>
<tr>
<td>Steel doors, windows etc. of regular handling</td>
<td>St 3</td>
<td>1 P</td>
<td>30</td>
<td>Two component epoxy zinc phosphate anti-corrosive primer</td>
<td>Clean and retouch</td>
<td>1 F</td>
<td>50</td>
<td>Two component epoxy polyamide with M10</td>
<td>170</td>
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<tr>
<td>Wearing surface painting</td>
<td></td>
<td></td>
<td>I</td>
<td>50</td>
<td>Two component epoxy polyamide with M10</td>
<td>1 F</td>
<td>40</td>
<td>Two component polyurethane</td>
<td></td>
</tr>
<tr>
<td>Painting of floor plates, walkways, staircase treads handrail etc. which are prone to mild abrasion</td>
<td>Light corrosive atmosphere</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Floor plates/walkways/staircase treads etc.</td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>
Completion of Balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no.02 of M/s. Odisha Mining Corporation at South Kaliapani, Odisha State.

**SPECIAL CONDITIONS OF CONTRACT**

**ANNEXURE –III**

<table>
<thead>
<tr>
<th>Description</th>
<th>Nature of exposure</th>
<th>Surface quality</th>
<th>No.of coats</th>
<th>DFT/ coat in microns</th>
<th>Paint system</th>
<th>No.of coats</th>
<th>DFT/coat in microns</th>
<th>Paint system</th>
<th>DFT in microns (shop &amp; site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top surface temperature less than 80°C</td>
<td>Sa 2.5</td>
<td></td>
<td>1 P</td>
<td>15-20</td>
<td>Weldable shop alkyd primer</td>
<td>Clean and retouch</td>
<td></td>
<td></td>
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<td>1 P</td>
<td>70-80</td>
<td>PVC-copolymer-alkyd resin-</td>
<td>2 F</td>
<td>40-50</td>
<td>PVC-copolymer alkyd resin</td>
<td>220-260 (Excluding weldable primer coat)</td>
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<tr>
<td></td>
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<td></td>
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<td>zinc phosphate</td>
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<td>1 I</td>
<td>70-80</td>
<td>PVC-copolymer alkyd resin</td>
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<tr>
<td></td>
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<td>with MI0</td>
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<td>Sa 2 or St 3</td>
<td>WP 15</td>
<td>Long exposure type zinc</td>
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<td>butynal resin varnish</td>
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<td>wash</td>
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<td>2 P</td>
<td>30-40</td>
<td>Dust preventive zinc</td>
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<tr>
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<td></td>
<td></td>
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<td>1 I</td>
<td>50-60</td>
<td>Dust preventive epoxy ester</td>
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<td>paint with MI0</td>
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<tr>
<td>Floor plates/walkways/staircase trends etc.</td>
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</tr>
<tr>
<td>Bottom surface: temperature less than 80°C</td>
<td>Light corrosive</td>
<td>Sa 2.5</td>
<td>1 P</td>
<td>15-20</td>
<td>Weldable shop alkyd primer</td>
<td>Clean and retouch</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td>1 P</td>
<td>70-80</td>
<td>PVC-copolymer alkyd resin-</td>
<td>1 F</td>
<td>40-50</td>
<td>PVC-copolymer alkyd resin</td>
<td>180-210 (Excluding weldable primer)</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>zinc phosphate</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1 I</td>
<td>70-80</td>
<td>PVC-copolymer</td>
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</table>
Completion of Balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no.02 of M/s. Odisha Mining Corporation at South Kaliapani, Odisha State.

**SPECIAL CONDITIONS OF CONTRACT**

**ANNEXURE –III**

<table>
<thead>
<tr>
<th>Description</th>
<th>Nature of exposure</th>
<th>Surface quality</th>
<th>Treatment in the shop</th>
<th>Treatment at site</th>
<th>Total DFT in microns (shop &amp; site)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treatment in the shop</strong></td>
<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Description</td>
<td>Nature of exposure</td>
<td>Surface quality</td>
<td>No. of coats</td>
<td>DFT/ coat in microns</td>
<td>Paint system</td>
</tr>
<tr>
<td>Floor plates/walkways/staircase treads etc.</td>
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</tr>
<tr>
<td>Top and bottom surface - temperature less than 80°C</td>
<td>Extreme corrosive atmosphere</td>
<td>Sa 2.5</td>
<td>1 P</td>
<td>15</td>
<td>Long exposure type zinc phosphate based vinyl butynal resin varnish wash</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Hand railing (site)</td>
<td>Light</td>
<td>Nil</td>
<td>-</td>
<td>St 3</td>
<td>40-50</td>
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</table>

- **alkyd resin with M10**
- **OR**
- **Sa 2.5**
- **Weldable epoxy based, shop primer**
- **Two component epoxy polyamide with M10**
- **Two component polyurethane**
**Special Conditions of Contract**

**Annexure –III**

<table>
<thead>
<tr>
<th>Description</th>
<th>Nature of Exposure</th>
<th>Surface Quality</th>
<th>No. of coats</th>
<th>DFT/Coat in Microns</th>
<th>Paint System</th>
<th>Surface Quality</th>
<th>No. of coats</th>
<th>DFT/Coat at in Microns</th>
<th>Paint System</th>
<th>Total DFT in Microns (Shop &amp; Site)</th>
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<tr>
<td>Fabricated)</td>
<td>Corrosive</td>
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<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>Two component epoxy polymer</td>
</tr>
<tr>
<td>Light Corrosive Service Painting</td>
<td>Marine industrial atmosphere in tropical climate, or mild corrosive environment due to presence of mild acidic fumes and gases from neighbouring plant</td>
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<td></td>
</tr>
<tr>
<td>Structural Steelwork for plant and shop building: temperature less than 80°C</td>
<td>Light corrosive</td>
<td>Sa 2.5</td>
<td>1 P</td>
<td>15-25</td>
<td>Weldable epoxy based shop primer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>170-210 (excluding weldable epoxy primer)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 P</td>
<td>30-40</td>
<td>High Build chlorinated rubber based zinc phosphate primer</td>
<td>Clean and retouch</td>
<td>2 F</td>
<td>30-40</td>
<td>Chlorinated rubber resin varnish with weather resisting pigments</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 I</td>
<td>50-60</td>
<td>High build chlorinated rubber paint with MI0</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Miscellaneous Technological Steel Structure such as conveyor galleries, pipe trestles etc. indoor and outdoor: temperature less than 80°C</td>
<td>Light corrosive</td>
<td>Sa 2.5</td>
<td>1 P</td>
<td>15-25</td>
<td>Weldable epoxy based shop primer</td>
<td>Clean and retouch</td>
<td>2 F</td>
<td>30-40</td>
<td>Chlorinated rubber with weather resisting pigments</td>
<td>170-210 (excluding weldable epoxy primer)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 P</td>
<td>30-40</td>
<td>High Build</td>
<td></td>
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</tbody>
</table>
Completion of Balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no.02 of M/s. Odisha Mining Corporation at South Kaliapani, Odisha State.

### SPECIAL CONDITIONS OF CONTRACT

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<table>
<thead>
<tr>
<th>Description</th>
<th>Nature of exposure</th>
<th>Surface quality</th>
<th>No.of coats</th>
<th>DFT/coat in microns</th>
<th>Paint system</th>
<th>Surf. quality</th>
<th>No.of coats</th>
<th>DFT/coat in microns</th>
<th>Paint system</th>
<th>DFT in microns (shop &amp; site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment in the shop</td>
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</tr>
<tr>
<td>Manufactured equipment and its associated structures such as vessels, bunkers, exchangers, heaters, furnace, pumps, cranes, stacks etc.</td>
<td>Light corrosive</td>
<td>Sa 2.5</td>
<td>1 P</td>
<td>15-25</td>
<td>Weldable epoxy based shop primer (optional)</td>
<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 P</td>
<td>70-80</td>
<td>PVC - copolymer alkyd resin with zinc phosphate</td>
<td>Clean and retouch</td>
<td>1 F (optional)</td>
<td>40-50</td>
<td>PVC - copolymer alkyd with weather resistant pigment and of glossy finish</td>
<td>180-210</td>
</tr>
<tr>
<td>- Non-insulated: temperature less than 80(^\circ) C</td>
<td></td>
<td></td>
<td>1 I</td>
<td>70-80</td>
<td>PVC - copolymer alkyd resin with MI0</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>1 P</td>
<td>40-50</td>
<td>Chlorinated rubber paint with weather resisting pigments of glossy finish</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Sa 2.5</td>
<td>15-25</td>
<td>Weldable epoxy based shop primer (optional)</td>
<td>Clean and retouch</td>
<td>1 F (optional)</td>
<td>25-30</td>
<td>Chlorinated rubber paint with weather resisting pigments of glossy finish</td>
<td>150-180</td>
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</table>
SPECIAL CONDITIONS OF CONTRACT

ANNEXURE –III

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<thead>
<tr>
<th>Description</th>
<th>Nature of exposure</th>
<th>Surface quality</th>
<th>No.of coats</th>
<th>DFT/coat in microns</th>
<th>Paint system</th>
<th>No.of coats</th>
<th>DFT/coat in microns</th>
<th>Paint system</th>
<th>Total DFT in microns (shop &amp; site)</th>
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<tbody>
<tr>
<td>Treatment in the shop</td>
<td>Treatment at site</td>
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<tr>
<td>2 P 25-30</td>
<td>Zinc phosphate based epoxy primer</td>
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<tr>
<td>1 I 50-60</td>
<td>Dust preventive epoxy ester resin paint with M10</td>
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<tr>
<td>2 P 25-30</td>
<td>Chlorinated rubber paint with weather resisting pigments of glossy finish</td>
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</tr>
<tr>
<td>- Temperature 80° - 150° C</td>
<td>Sa 2.5</td>
<td>1 P 60-70</td>
<td>Two component solvent based inorganic zinc rich ethyl silicate based primer</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>- Temperature over 150° C</td>
<td>Sa 3</td>
<td>1 P 60-70</td>
<td>Two component solvent based inorganic zinc rich ethyl silicate based primer</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>- Insulated surfaces</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Temperature less than 80° C</td>
<td>Sa 2.5</td>
<td>Same as of non-</td>
<td>Clean and retouch</td>
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</tbody>
</table>

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### Completion of Balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no.02 of M/s. Odisha Mining Corporation at South Kaliapani, Odisha State.

### SPECIAL CONDITIONS OF CONTRACT

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<th>Description</th>
<th>Nature of exposure</th>
<th>Surface quality</th>
<th>No.of coats</th>
<th>DFT/ coat in microns</th>
<th>Paint system</th>
<th>DFT/coat at in microns</th>
<th>Paint system</th>
<th>DFT in microns (shop &amp; site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature over 80° C</td>
<td>Sa 3</td>
<td>1 P only</td>
<td>60-70</td>
<td>Two component solvent based inorganic zinc rich ethyl silicate based primer</td>
<td>Clean and retouch</td>
<td></td>
<td></td>
<td>60-70</td>
</tr>
<tr>
<td>Overground pipework inclusive of pipes, fittings, hangers, cable ducts, gas ducts etc.</td>
<td>Light corrosive</td>
<td></td>
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<tr>
<td>Non-insulated pipework :</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>- Indoor and outdoor temperature less than 80° C</td>
<td>St 2 or 3</td>
<td>2 P</td>
<td>40</td>
<td>Two component epoxy zinc phosphate anti-corrosive primer</td>
<td>Clean and retouch</td>
<td>2 F</td>
<td>30</td>
<td>Chlorinated rubber with weather resisting pigments</td>
</tr>
<tr>
<td>- Indoor and outdoor temperature between 80° C and 150° C</td>
<td>Sa 3</td>
<td>1 P</td>
<td>60-70</td>
<td>Two component solvent based inorganic zinc rich ethyl silicate based primer</td>
<td>Clean and retouch</td>
<td>1 F</td>
<td>40</td>
<td>Two component epoxy polyamide enamel</td>
</tr>
<tr>
<td>- Indoor and outdoor temperature more than 150° C</td>
<td>Sa 3</td>
<td>1 P</td>
<td>60-70</td>
<td>Two component solvent based inorganic zinc rich</td>
<td>Clean and retouch</td>
<td>2 F</td>
<td>15</td>
<td>Silicon-aluminium</td>
</tr>
</tbody>
</table>
Completion of Balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no.02 of M/s. Odisha Mining Corporation at South Kaliapani, Odisha State.

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<th>Surfac e quality</th>
<th>No. of coats</th>
<th>DFT/coat at in microns</th>
<th>Paint system</th>
<th>DFT in microns (shop &amp; site)</th>
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<tbody>
<tr>
<td>Insulated pipework :</td>
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<td>ethyl silicate based primer</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>- Indoor and outdoor temperature less than 80º C</td>
<td>St 2 or 3</td>
<td>2 P</td>
<td>40</td>
<td>Two component epoxy zinc phosphate anticorrosive primer</td>
<td>Clean and retouch</td>
<td>-</td>
<td>-</td>
<td>No finish coat</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>- Indoor and outdoor temperature over 80º C</td>
<td>Clean</td>
<td>1 P</td>
<td>40-60</td>
<td>Corrosion protective wax/grease</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>40-60</td>
<td></td>
</tr>
<tr>
<td>Extreme corrosive service painting</td>
<td>Strongly corrosive atmosphere due to presence of inorganic and organic acids, alkalis, salts, corrosive vapours and fumes etc.</td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Equipment such as process, vessels, pumps etc. and its associated structure in handling and treatment area, neutralising area etc. where acids/alkalis/miscellaneous chemicals are handled</td>
<td>Extreme corrosive</td>
<td>Sa 2.5</td>
<td>1 P</td>
<td>15-20</td>
<td>Zinc phosphate - weldable epoxy primer(optional)</td>
<td>Clean and retouch</td>
<td>1 F (optional)</td>
<td>30-40</td>
<td>Two component polyurethane</td>
<td>170-180 (weldable primer coat excluded)</td>
</tr>
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<td></td>
<td></td>
<td>2 P</td>
<td>30-40</td>
<td>Two component solvent based inorganic zinc rich ethyl silicate</td>
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### SPECIAL CONDITIONS OF CONTRACT

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<tr>
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<th>Nature of exposure</th>
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<th>No. of coats</th>
<th>DFT/coat in microns</th>
<th>Paint system</th>
<th>Surfacc e quality</th>
<th>No. of coats</th>
<th>DFT/coat at in microns</th>
<th>Paint system</th>
<th>DFT in microns (shop &amp; site)</th>
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<tbody>
<tr>
<td>Treatment in the shop</td>
<td></td>
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</tr>
<tr>
<td>Temperature below 150°C</td>
<td></td>
<td></td>
<td>1 I</td>
<td>50-60</td>
<td>Two component: high build epoxy</td>
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<td>polyamide with MI0</td>
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<td>1 F</td>
<td>30-40</td>
<td>Two component epoxy polyamide</td>
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<td></td>
<td></td>
<td></td>
<td>1 F</td>
<td>30-40</td>
<td>Two component polyurethane</td>
<td></td>
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<tr>
<td>Overground pipework inclusive of pipes, fittings,</td>
<td>Extreme corrosive</td>
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<tr>
<td>supports, hangers, cable ducts, gas ducts etc.</td>
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<tr>
<td>Non-insulated pipe/duct work :</td>
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<tr>
<td>- Indoor and outdoor temperature below 150°C</td>
<td>Sa 2.5</td>
<td></td>
<td>1 P</td>
<td>40</td>
<td>Two component solvent based zinc</td>
<td></td>
<td></td>
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<td>Two component epoxy polyamide enamel</td>
<td>190-200</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>rich ethyl silicate based primer</td>
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<td></td>
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<td></td>
<td>1 I</td>
<td>50-60</td>
<td>Two component epoxy polyamide</td>
<td></td>
<td></td>
<td></td>
<td>1 P</td>
<td>40</td>
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<td></td>
<td></td>
<td>with MI0</td>
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</tr>
<tr>
<td>- Indoor and outdoor temperature over 150°C</td>
<td>Sa 3</td>
<td></td>
<td>1 P</td>
<td>40-70</td>
<td>Two component solvent based inorganic</td>
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<td>Clean and retouch</td>
<td>2 P</td>
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<td></td>
<td></td>
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<td>zinc rich ethyl silicate based primer</td>
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<td>2 P</td>
<td>15</td>
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<td></td>
<td></td>
<td></td>
<td>Silicone aluminium</td>
<td>90-100</td>
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</table>
SPECIAL CONDITIONS OF CONTRACT

ANNEXURE –III

<table>
<thead>
<tr>
<th>Description</th>
<th>Nature of exposure</th>
<th>Surface quality</th>
<th>No. of coats</th>
<th>DFT/coat in microns</th>
<th>Paint system</th>
<th>Surfac e quality</th>
<th>No. of coats</th>
<th>DFT/coat in microns</th>
<th>Paint system</th>
<th>DFT in microns (shop &amp; site)</th>
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</thead>
<tbody>
<tr>
<td>Insulated pipe/duct work :</td>
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<tr>
<td>- Indoor and outdoor temperature below 150°C</td>
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<td></td>
<td></td>
<td>Same as of non-insulated pipe/duct work</td>
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<td>No finish coat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Indoor and outdoor temperature over 150°C</td>
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<tr>
<td>Hot surface painting</td>
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<tr>
<td>Temperature above 80°C</td>
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<td></td>
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<td></td>
<td></td>
<td>Environment may be light or extreme corrosive similar to system no. 7.3 and 7.4 respectively</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>Painting shall follow according to system no. 7.3 and system no. 7.4 depending on temperature conditions and nature of environment</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Mill machineries, heavy equipment and accessories</td>
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<tr>
<td>Temperature up to 150°C</td>
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<td>For all environment</td>
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<td>Sa 2.5</td>
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<td></td>
<td></td>
<td>2 P</td>
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<td>25-30</td>
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<td></td>
<td></td>
<td>Two component solvent based inorganic zinc rich ethyl silicate based primer</td>
<td></td>
<td>Clean and retouch 1 F (optional)</td>
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<td></td>
<td></td>
<td>Two component epoxy polyamide with MI0</td>
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<td>Two component epoxy polyamide</td>
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<td></td>
<td></td>
<td>Two component epoxy polyamide</td>
<td></td>
<td>Two component epoxy polyamide</td>
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</tbody>
</table>

48
Completion of Balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no.02 of M/s. Odisha Mining Corporation at South Kaliapani, Odisha State.

SPECIAL CONDITIONS OF CONTRACT

ANNEXURE –III

<table>
<thead>
<tr>
<th>Description</th>
<th>Treatment in the shop</th>
<th>Treatment at site</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td>Description</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Light machineries, such as general working</td>
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<td></td>
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</tr>
<tr>
<td>machineries, machine tools etc.</td>
<td></td>
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</tr>
<tr>
<td>Indoor location and temperature upto 80°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light corrosive environment due to handling</td>
<td></td>
<td></td>
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<tr>
<td>of mineral oils, vegetable oils, grease etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sa 2</td>
<td>2 P</td>
<td>Phenolated alkyd</td>
<td>140-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>based zinc phosphate primer</td>
<td>170</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clean and retouch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 I</td>
<td>Phenolated alkyd</td>
<td></td>
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<td></td>
<td></td>
<td>based under coat</td>
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<tr>
<td></td>
<td></td>
<td>with MI0</td>
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<tr>
<td></td>
<td>2 P</td>
<td>High gloss styrene</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>nated alkyd enamel</td>
<td></td>
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<tr>
<td>Switchboard/control panel painting</td>
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<tr>
<td>This includes fabricated sheet metal item such</td>
<td></td>
<td></td>
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<tr>
<td>as switchboard, control panel, control desks,</td>
<td></td>
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<tr>
<td>cabinet, starters, small electric machines etc.</td>
<td></td>
<td></td>
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<tr>
<td>For all environment</td>
<td>Pickling or Sa 2.5</td>
<td>Zinc phosphate butyrate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>phosphate treatment</td>
<td>melamine alkyd resin baking primer</td>
<td></td>
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<tr>
<td></td>
<td>1 P</td>
<td>Clean and retouch</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 P</td>
<td>Aminoalkyd resin</td>
<td>75</td>
</tr>
<tr>
<td>Electric motors, transformers etc.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>- Indoor and outdoor installation</td>
<td>Sa 2.5</td>
<td>Two component</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 P</td>
<td>epoxy zinc phosphate anti-corrosive</td>
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<td></td>
<td>25-30</td>
<td>Clean and retouch</td>
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<td></td>
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<td>1 F (optional)</td>
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<td></td>
<td></td>
<td>Two component epoxy</td>
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<td></td>
<td></td>
<td>polyamidene or polyureth</td>
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<td></td>
<td></td>
<td>30-40</td>
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<td></td>
<td></td>
<td>160-200</td>
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</tr>
</tbody>
</table>

DFT in microns (shop & site)
Completion of Balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no.02 of M/s. Odisha Mining Corporation at South Kaliapani, Odisha State.

SPECIAL CONDITIONS OF CONTRACT

ANNEXURE –III

<table>
<thead>
<tr>
<th>Description</th>
<th>Nature of exposure</th>
<th>Surface quality</th>
<th>No. of coats</th>
<th>DFT/coat in microns</th>
<th>Paint system</th>
<th>Surface quality</th>
<th>No. of coats</th>
<th>DFT/coat in microns</th>
<th>Paint system</th>
<th>DFT in microns (shop &amp; site)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment in the shop</td>
<td>Treatment at site</td>
<td>Total</td>
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<tr>
<td>- Temperature less than 150°C</td>
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<td></td>
<td></td>
<td></td>
<td>1 I</td>
<td>50-60</td>
<td>Two component epoxy polyamide with MI0</td>
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<td></td>
<td>2 P</td>
<td>30-40</td>
<td>Two component polyurethane</td>
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<tr>
<td>Metallic Coating Protection System</td>
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<tr>
<td>This system is applicable for protection of permanent structures, which cannot be conveniently repainted, such as transmission towers, outdoor electric substations structures, pipe tressels, poles, etc.</td>
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<tr>
<td>Pickling followed by metallic coaging</td>
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</tbody>
</table>
Cement Painting

Preparation of mix:  Approved type and shade of cement paint will be mixed in such quantities as can be utilised within an hour of its mixing. Cement paint will be mixed in two stages, firstly to make slurry so as to see that the paint is well mixed with water and in the second mixing proper consistency is obtained. Mixing will in any case generally follow the manufacturer's instructions.

Preparation of surface: The surface of walls will be prepared and wetted prior to starting application of cement painting.

Application: The surfaces will be applied with three or more coats of paint to get uniform and even colour and surface. Application of the paint will be with proper brushes. Each coat will constitute two strokes of brush application of the paint in horizontal and vertical direction applied immediately one after the other. Each coat of paint will be allowed to dry at least for 24 hours before the next coat is undertaken. Wetting the surface prior to application of each coat will have to be done. Final surface will be uniform and even in colour. Completed work will be wetted for two (2) days. Doors, windows and other like fixtures will be cleaned of all droppings of paint. All splashes will be removed and cleaned.

Finish to masonry plastered wall surface (Both existing and new)

Internal face :  Two coats of interior grade acrylic emulsion paints of approved make and shade over a coat of approved primer over cement putty wherever applicable.

External face :  Two (2) coats of approved quality weather coat paint over one coat of primer with shades as per manufacturer’s specifications.

Hot bitumen paint (Both existing and new)

All underground concrete surfaces :  Two (2) coats of approved hot bitumen paint using bitumen of grade 20/30 @ 1.5 kg bitumen per sq m over one (1) coat of approved bituminous primer may be applied depending on nature of soil and underground water.
Completion of Balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no.02 of M/s. Odisha Mining Corporation at South Kaliapani, Odisha State.

**SPECIAL CONDITIONS OF CONTRACT**

**ANNEXURE –III**

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## SCOPE MATRIX

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Job Description</th>
<th>KIOCL</th>
<th>CONTRACTOR</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td></td>
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<tr>
<td></td>
<td><strong>Excavation</strong></td>
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<td></td>
</tr>
<tr>
<td>a)</td>
<td>Existing drawings for excavation, if any</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>Excavation at site</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>c)</td>
<td>Supply of mobile equipment like Hydra, Crane, Excavator, excavation tools etc required for excavation</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>d)</td>
<td>Blasting, if required</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>e)</td>
<td>Supervision at site</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>f)</td>
<td>Joint certification of excavated material (Measurement)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>g)</td>
<td>Disposal of excavated material</td>
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<td>✓</td>
</tr>
<tr>
<td>h)</td>
<td>Bill certification</td>
<td>✓</td>
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<tr>
<td>2.</td>
<td><strong>Civil Construction at site</strong></td>
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</tr>
<tr>
<td>a)</td>
<td>Supply of existing drawings for various areas</td>
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<td></td>
</tr>
<tr>
<td>b)</td>
<td>Preparation of balance drawings for apron, surface drain, approach road, wherever required</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>c)</td>
<td>Preparation of civil drawings during construction which are included in the existing drawing list</td>
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<td>✓</td>
</tr>
<tr>
<td>d)</td>
<td>Construction power and water at one point within Site on free of charge basis</td>
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<td>✓</td>
</tr>
<tr>
<td>e)</td>
<td>Supply of sand, cement, aggregates, bricks, finishing items etc. (i.e. all types of construction materials)</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>f)</td>
<td>Storage of cement, re-bars, etc. Note: The TMT (re-bars will be supplied by KIOCL Limited)</td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
Completion of Balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no.02 of M/s. Odisha Mining Corporation at South Kaliapani, Odisha State.

SPECIAL CONDITIONS OF CONTRACT

ANNEXURE –III

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<th>Sl. No.</th>
<th>Job Description</th>
<th>KIOCL</th>
<th>CONTRACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>g)</td>
<td>Inspection of sand, cement and re-bars at site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h)</td>
<td>Cube testing</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>i)</td>
<td>Arranging required mobile equipment during construction</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>j)</td>
<td>Arrangement of welding machine, welding rods and accessories</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>k)</td>
<td>Supply of foundation bolts, insert plate lugs etc., if not found at site</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>l)</td>
<td>Supervision of work at site</td>
<td></td>
<td></td>
</tr>
<tr>
<td>m)</td>
<td>Safety at site</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>n)</td>
<td>Joint Measurement of work done</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>o)</td>
<td>Certification of measurement</td>
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<td>√</td>
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<tr>
<td>p)</td>
<td>Bill certification</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>3.</td>
<td>Structural Fabrication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Supply of existing fabrication drawings to contractor</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>b)</td>
<td>Balance Fabrication which are not completed till date</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>c)</td>
<td>Preparation of fabrication drawing which are not completed till date</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>d)</td>
<td>Fabrication based on newly made drawings provided by Consulting Engineers</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>e)</td>
<td>Certification of drawings (except fabrication drawings)</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>f)</td>
<td>Arranging welding machine (gas and electric), accessories and supply of consumables, gas cutting sets, rods, electrodes etc.</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>g)</td>
<td>Supply of sheeting materials, etc. Note: The Structural steel materials will be supplied by KIOCL Limited.</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>h)</td>
<td>Arrange of mobile equipment, cranes etc as required.</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>i)</td>
<td>Construction power and water at one point on free of charge basis</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>j)</td>
<td>DFT,USG and radiography testing</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>k)</td>
<td>Painting of new fabricated items</td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>
Completion of Balance Civil, Structural, Sheeting and Painting works in the Chrome Ore Beneficiation Plant no.02 of M/s. Odisha Mining Corporation at South Kaliapani, Odisha State.

**SPECIAL CONDITIONS OF CONTRACT**

**ANNEXURE –III**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Job Description</th>
<th>KIOCL</th>
<th>CONTRACTOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>l)</td>
<td>Inspection of new fabricated items at site</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>m)</td>
<td>Cleaning and Painting of old fabricated items on ground at site before erection</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>n)</td>
<td>Cleaning and Painting of old erected items at site</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>o)</td>
<td>Supply of paints and primers</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>p)</td>
<td>Final welding of erected items, if required at site</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>q)</td>
<td>Rectification of defective items, if any, at site</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>r)</td>
<td>Supply of pipes, bends, fittings, valves, etc</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>s)</td>
<td>Fabrication of pipe supports and saddles</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>t)</td>
<td>Inspection of welding of pipes and its supports and fabricated structures</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>u)</td>
<td>Supervision of work</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>v)</td>
<td>Bill certification</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>4)</td>
<td><strong>Structural erection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Erection of steel structures at site</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>b)</td>
<td>Construction power and water at one point on free of charge basis</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>c)</td>
<td>Arranging of all types of tools and tackles for erection</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>d)</td>
<td>Arranging of mobile equipment</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>e)</td>
<td>Supply of missing items if found during erection (as per drawing) except structural steel.</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>f)</td>
<td>Supervision of erection at site</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>g)</td>
<td>Certification/ measurement of various types work done at site</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>h)</td>
<td>Bill certification of the contractor</td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>
Sub: Completion of Balance Civil, Structural & Sheeting works in the Chrome Ore Beneficiation Plant no.02 of M/s. Odisha Mining Corporation at South Kaliapani Mines, Odisha.

Ref: No. TS/COBP/CIVIL & STRL/F-365/203, Date: 01.08.2018

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Unit Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>EARTHWORK</td>
<td>Cum</td>
<td>1350</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A-1(a)</td>
<td><strong>Note</strong>: Adequate precautions for carrying out deep excavation work has to be taken by the Contractor. Earthwork in excavation in all types of soil, moorum (hard, compacted or soft), rock, mica schist, boulders, quartz, etc. and fill materials like slag, cinder, light scraps, skulls, steel plant muck, mill scale mixed with tar or tar sludge, compacted slag or slag in mass or any other plant debris etc., at depths as specified below in foundations of structures and equipment pipe trenches, tunnels, sewerlines, drains, basement, cellars, pits etc. to required levels and grades and dressing complete as per the specifications, approved excavation scheme keeping the provisions of IS:3764 and directions of the Engineer in both dry and wet conditions including shoring necessary pumping/bailing out of water, slush removal etc. clearing all rubbish, vegetation, debris, bushes etc. (if any) and transporting the excavated materials to spoil dumps/fill areas/excavated pits within a lead of 1km at all heights and descents including dozing, levelling at the site of filling all as directed by the Engineer, all tools, plant and labour complete (authorised working space, benching and side slopes for the excavation will be measured and paid under this item. Scrap steel recovered shall be stacked within 2.5 km lead from the edge of the excavation as directed by the Engineer)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note for item A-1(a)**

1. This item will be operated upon that category of strata which can be excavated with reasonable application of hydraulic excavators.


<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Unit</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>upto 3 m depth below existing ground level</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>ii)</td>
<td>exceeding 3 m depth upto 6 m depth below existing ground level</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>iii)</td>
<td>exceeding 6 m depth upto 9 m depth below existing ground level</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>iv)</td>
<td>exceeding 9 m depth upto 12 m depth below existing ground level</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>v)</td>
<td>beyond 12 m depth below existing ground level</td>
<td>cu m</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**A-1(b)**
Same as in item A-1(a) but for excavation done with the help of excavator provided with rock breaker attachment or for excavation done by any other mechanical means as approved by the Engineer, all tools, plant and labour complete in all respects.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Unit</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>upto 3 m depth below existing ground level</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>ii)</td>
<td>exceeding 3 m depth upto 6 m depth below existing ground level</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>iii)</td>
<td>exceeding 6 m depth upto 9 m depth below existing ground level</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>iv)</td>
<td>exceeding 9 m depth upto 12 m depth below existing ground level</td>
<td>cu m</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**A-1(c)**
Same as in item A-1(a) but for excavation done manually at depth as specified below for cutting of trenches/Pits or any other excavations manually and approved by the Engineer In charge in both dry and wet conditions including shoring, necessary pumping/bailing out of water, slush removal, clearing all rubbish, vegetation, debris, bushes etc., and transporting the excavated material within a lead of 1.00 Km from the site of excavation all as directed by the engineer, all tools, plant and labour complete in all respects.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Unit</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Depth upto 2 m below EGL</td>
<td>cu m</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**A-1(d)**
Earthwork in excavation in hard compacted slag, hard rock etc for cutting of trial trench/trial pit or any other excavation manually by pneumatically operated chisel/breaker or any other approved means and transporting the excavated materials within a lead of 1 Km from the edge of excavation at all heights and descents including leveling at the site of filling all as directed by the engineer at tools, plant and labour complete.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Unit</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Depth upto 2 m below EGL</td>
<td>cu m</td>
<td>1.0</td>
</tr>
</tbody>
</table>
Note for item A-1(a), A-1(b), A-1(c) and A-1(d)

1. For the purpose of payment for earthwork in excavation, the unit rate quoted for the corresponding item of work will be operable for the volume of earthwork carried out between the specified levels as per below:

   a) item A-1 (a) i & (b) i to be measured upto 3.0m depth below existing ground level

   b) item A-1 (a) ii & (b) ii to be measured separately between 3.0m to 6.0m depth below existing ground level

   c) item A-1 (a) iii & (b) iii to be measured separately between 6.0m to 9.0m depth below existing ground level

   d) item A-1 (a) iv & (b) iv to be measured separately between 9.0m to 12.0m depth below existing ground level

   e) item A-1 (a) v & (b) v to be measured separately beyond 12.0m depth below existing ground level

2. Prior to the commencement of work the contractor must furnish excavation plan for approval of the Engineer. Excavation will be measured and paid as per the approved excavation plan or as per actuals whichever is less.

3. The contractor may be asked to excavate and transport the earth directly for mass backfilling in other areas within a lead of 1km. In such cases, no extra payment for backfilling shall be made. However, if the lead exceeds 1 km then extra payment for transporting the earth shall be made as per item No. A-5

4. Contractor has to take prior approval from Employer/ Engineer for excavation using hydraulic excavator/ rock breaker/any other mechanical means identifying the strata and approximate quantity of work involved.
| A-2 | Excavation in rock in mass requiring blasting at all depths to required levels and grade including dressing in both dry and wet conditions including necessary pumping/bailing out of water, slush removal and covering the blasting area with sand bags, scrap conveyor belts, heavy steel plates etc to avoid occurrence of splashing. The excavated materials shall be stacked within a lead of 1 km as per directions of the Engineer complete in all respects | cu m | 1.0 |

**Notes for item A-2:**

i) For payment under this item stack measurement shall be made and 50% deduction will be made towards void.

ii) All preparatory work like drilling holes, muffling, necessary man power, cordonning off the area, and safety related work will be carried out by the Contractor.

iii) The rate shall include the cost of explosives, detonator, fuses and all other necessary work required for carrying out blasting work.

iv) Rate shall include the filling of extra depth than the specified with plain cement concrete/plum concrete max. 20% plum M 7.5

| A-3 | BACKFILLING OF EARTH | CUM | 996 |

Backfilling in all positions at all heights and depths and descents in foundations, pits, pipe trenches, tunnels, sewer lines, around foundations and structures, in plinth etc with approved excavated material obtained within a lead of 1km including reclaiming from spoil heaps at all heights, or reclaiming from dump at all depths, transporting, depositing and dressing complete all as per drawings, specifications and directions of the Engineer, all tools, plant and labour complete

a) mass backfilling including dozing, leveling and dressing complete in all respects as directed by the Engineer | cu m | 1.0 |
| **b)** backfilling in layers not exceeding 250 mm thickness including dozing, leveling, dressing and compacting with vibro-rollers to the density of 95% at optimum moisture content complete in all respects as directed by the Engineer | cu m | 1.0 |
| c) plinth filling in layers of 150 mm thickness where special compaction is required including watering and consolidating by mechanical means as per specification and directions of the Engineer | cu m | 1.0 |

**Item Rates only A-4 to A-14**

| **A-4** | Dozing, dressing and leveling of earth/plant debris/slag dumped on ground or in excavated pit/areas of fill complete all as per directions of the Engineer, all tools, plant and labour complete | cu m | 1.0 |
| **A-5** | Extra over item No. A-1(a), A-1(b), A-1©, A-1(d) and A-2(a) & A-2(b) for disposal of excavated material | cu m | 1.0 |
| A. Within Employer's Works, a) for each 1 km beyond initial lead of disposal | cu m | 1.0 |
| B. Outside Employer's Works, a) for each 1 km from plant gate. | cu m | 1.0 |
| **A-6** | Extra over item No. A-3 for lead distance only | cu m | 1.0 |
| A. Within Employer's Works a) for each 1 km beyond the initial lead from borrow pit | cu m | 1.0 |
| B. Outside Employer's Works a) for each 1 km beyond the initial lead from borrow pit | cu m | 1.0 |

**Note for items A-5 and A-6**
1. Lead shall be measured on actual route of haulage. However, the route shall be approved by the Engineer prior to commencement of work.
2. For calculation of lead one way movement of vehicle shall be considered.

| **A-7** | Supplying, filling, watering and compacting coarse sand in foundations, pipe trenches, pits, sewerlines, drainage lines, plinth, underneath flooring and in soaking pits etc all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete | cu m | 1.0 |
| A-8 | Supplying and providing single layer of sand bag shoring at all depths in foundations and trenches as directed by the Engineer, all materials, tools, plant and labour complete in all respect | Sq.m | 1.0 |
| A-9 | Micro leveling, dressing, watering and compacting of ground surrounding buildings and paved areas, wherever necessary in all kinds of soils to the required finished ground level (upto a thickness of 50 mm) and profile including all leads and lifts and disposal of surplus earth or obtaining earth required for filling etc, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete | Sq.m | 1.0 |
| A-10 | Providing cut-off trench filling using selected impervious soil from approved borrow areas in layers of 250 to 300 mm before compaction including cost of all materials, machinery, labour, all other operations such as excavation, sorting out, transportation, spreading in layers of specified thickness, breaking clods, sectioning, watering, compacting to density control of not less than 95 percent using power roller etc., complete with initial lead up to 01 km and all lifts | cum | 1.0 |
| A-11 | Providing and laying sand blanket below embankment including cost of all materials, machinery, labour, spreading to specified thickness etc., complete with initial lead upto 50 m and all lifts. | cum | 1.0 |
| A-12 | Corrugated Galvanised Steel sheet shoring and strutting at all depth below existing ground level, complete in all respect all as per directions of the Engineer, all tools, plant and labour complete in all respect | Sq.m | 1.0 |
| A-13 | Providing timber shoring and strutting at all depths below ground level in trenches, foundations, as specified | Sq.m | 1.0 |
| a) | close boarded shoring | | |
| b) | open boarded shoring | | |

**Note:** 50% of the overall surface area of the sides of excavation covered by open boarded shoring will be measured.
A-14 | Supplying and laying of 50 mm thick moorum over crushed stone layer below all floors with suitable interstices binding material on the stripped and compacted surfaces with necessary transportation, watering and compacting each layer with 10 T static Roller all as per drawings, specification and the direction of the Engineer. (Measurement will be on consolidated thickness) | cu m | 1.0

B | **PLAIN CEMENT CONCRETE** | CUM | 845

1. Suffix A, B, C and D to the grade of concrete indicate the use of size of the graded coarse stone aggregates in concrete as follows:

**Note:**

A-75 mm and down graded stone aggregate
B-40 mm and down graded stone aggregate
C-20 mm and down graded stone aggregate
D-10 mm and down graded stone aggregate

2. In case of supply of concrete, Civil contractor will use Batching Plants, Transit Mixers, Concrete Pumps, Boom Placer (if required) etc. for all major concreting works and the rate shall include the provision for the same.

3. All R.C.C. works shall be done using super-plasticizer as per manufacturer’s specification / instruction and as directed by Engineer / Consultant. The rate shall include the provision for the above.

B-1 | Supplying, laying and compacting plain cement concrete of nominal mix (1:4:8) M 7.5 by volume as defined by IS:456 in all mudmats / levelling courses including mass filling of loose pockets etc under foundations, pipelines, tunnels, floors etc at all depths below finished ground level as per drawings, specifications and directions of the Engineer, including curing but excluding the cost of shuttering, all materials, tools, plant and labour complete | cu m | 1.0

a) with 75 mm down graded coarse stone aggregates | cu m | 1.0

b) with 40 mm down graded coarse stone aggregates | cu m | 1.0
<table>
<thead>
<tr>
<th>B-2</th>
<th>Supplying, laying and compacting plain cement concrete of following grades as defined by IS:456 with graded stone aggregates in all foundations, bed blocks, manholes, chambers, scale flumes, tunnels, trenches, floors, roofs, pavements, screwings, encasing etc at and at all heights and depths above and below finished ground level to required levels, slopes etc including curing but excluding the cost of shuttering, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>for M10 B grade concrete</td>
</tr>
<tr>
<td>b)</td>
<td>for M10 C grade concrete</td>
</tr>
<tr>
<td>c)</td>
<td>for M10 D grade concrete</td>
</tr>
<tr>
<td>d)</td>
<td>for M15 B grade concrete</td>
</tr>
<tr>
<td>e)</td>
<td>for M15 C grade concrete</td>
</tr>
<tr>
<td>f)</td>
<td>for M15 D grade concrete</td>
</tr>
<tr>
<td>g)</td>
<td>for M20 B grade concrete</td>
</tr>
<tr>
<td>h)</td>
<td>for M20 C grade concrete</td>
</tr>
<tr>
<td>i)</td>
<td>for M20 D grade concrete</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>B-3</th>
<th>REINFORCED CEMENT CONCRETE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplying, laying and compacting reinforced cement concrete of following grades as defined by IS:456, in all foundations and super structures, in walls, slab, columns, beams, lintels, chajjas, facia, mullion, floor/roof slabs, stair, footings, basements, cellars, tunnels, trenches, drains, encasing of structural steel members / tunnels, trenches, drains, encasing of structural steel members / excluding cost of shuttering and steel reinforcement, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete:</td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>At and at all depths below finished ground level</td>
</tr>
<tr>
<td>i)</td>
<td>for M25 B grade concrete</td>
</tr>
<tr>
<td>ii)</td>
<td>for M25 C grade concrete</td>
</tr>
<tr>
<td>b)</td>
<td>At all heights above finished ground level</td>
</tr>
<tr>
<td>i)</td>
<td>for M25 B grade concrete</td>
</tr>
<tr>
<td>ii)</td>
<td>for M25 C grade concrete</td>
</tr>
<tr>
<td>c)</td>
<td>Same as item No.B-3 above, but RCC with minimum cement as per IS 3370 for Cu.m</td>
</tr>
</tbody>
</table>
water retaining structures below and above FGL with concrete grade M-30

<table>
<thead>
<tr>
<th>ITEM RATES ONLY</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>B-4</strong></td>
</tr>
</tbody>
</table>

| **B-5** | Supplying, manufacturing, erecting and fixing in position at and at all heights and depths above and below finished ground level different types of precast R.C. units of concrete grade M-25 as defined by IS:456 with 20 mm and down graded stone aggregates including shuttering and curing but excluding steel reinforcement, all as per drawings, specifications and directions of the Employer/Engineer, all materials, tools, plant and labour complete |
| | a) for units weighing upto 0.5 ton | cu m | 1.0 |
| | b) for units weighing above 0.5 ton and upto 1.5 ton | cu m | 1.0 |

<p>| <strong>B-6</strong> | Supplying and providing grout with concrete of following grades as defined by IS:456 with 6 mm and down graded stone aggregates in foundation bolt holes, pockets and column bases after aligning and levelling of steel structures including cleaning holes and foundation tops, providing shuttering, mixing, placing, compacting and curing, all as per drawings, specifications and directions of the Employer/Engineer, all materials, tools, plant and labour complete |
| | a) for M25 grade concrete | cu m | 1.0 |
| | b) for M30 grade concrete | cu m | 1.0 |</p>
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-7</td>
<td>Supplying and providing pre-mixed non-shrinkable grout having minimum working compressive strength of 250 kg/sq cm in 3 days (type &quot;Shrinkkomp 20 of ACC&quot;/Sika grout 214 of Sika /EXCEM - GP of Chryso/Conbextra GP2 of Fosroc or approved equivalent make) in base of equipment and machineries, bases of columns, foundation bolt holes and pockets etc excluding formwork but including cleaning foundation tops, holes, pockets etc mixing, placing, compacting, curing etc as specified and as directed by the Engineer, all materials, tools, plant and labour complete</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>B-8</td>
<td>Supplying &amp; providing vacuum dewatered flooring by TREMIX or approved equivalent system with reinforced cement concrete of grade M25 as defined by IS:456 with 20 mm down graded stone aggregates in panels of approved sizes including providing side-shuttering for panels with M.S. channels, vibrating the concrete with immersion and surface vibrators and dewatering by filter mat and suction pump of approved make, finishing the top surface by floating and trowelling to required level and grade using skim floater fitted with a floating disc and/or trowelling blades of approved make, covering the finished concrete surface with approved polythene sheets, including plasticizer compound and curing, all as per drawings, manufacturer's specifications and directions of the Engineer, all materials, tools, plant and labour complete (Reinforcement, in the floor concrete, will be measured and paid separately under item C-1; depth of vacuum dewatering flooring will be maximum 400 mm)</td>
<td>Cu.m</td>
<td>1.0</td>
</tr>
<tr>
<td>B-9</td>
<td>Extra over items for supplying and mixing approved water proofing admixtures in place of super plasticiser according to manufacturer's specification and as directed by the Employer / Engineer</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>Item</td>
<td>Description</td>
<td>Unit</td>
<td>Quantity</td>
</tr>
<tr>
<td>-------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>B-10</td>
<td>Extra over items for supplying and mixing micro silica all as per manufacturer's specification and as directed by the Employer/Engineers.</td>
<td>Cu.m</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**Note for item no. B-9 & B10**

1. These items shall be operated only after obtaining Employer/Engineer's permission in writing.

2. Dosage of admixtures shall be in line with manufacturer's specification and as approved by the Employer/Engineer.

<table>
<thead>
<tr>
<th>C</th>
<th>REINFORCEMENT BAR BENDING</th>
<th>MT</th>
<th>585</th>
</tr>
</thead>
</table>

**Note**: Reinforcement bars in item C-1 will be measured in lengths in position to be laid as specified in drawings and will include bends, hooks, cranks and authorised laps, chairs, separators and dowels as per IS. Weights shall be calculated in kgs based on standard weights as per Indian Standards and refer to Clause 2.6 of Special Conditions of Contract for rolling margin.

| C-1   | Taking delivery from Employer's stores/stockyard or directly from trucks at site, loading, unloading, transporting, straightening, decoiling, cutting, bending, cranking, tack welding as necessary, placing and fixing in position steel reinforcement including angles/pins provided for the approved welded joints, at all levels above and below finished ground level for reinforced cement concrete and precast reinforced cement concrete works including supplying approved 20 SWG annealed black binding wire, cover blocks etc all as per drawings, specifications and directions of the Engineer all materials, tools, plant and labour complete: | ton  | 1.0      |

<p>|     | a) with M.S. rounds of all diameters                                                                                                           | ton  | 1.0      |
|     | b) with high strength deformed bars of grade Fe 500/Fe 550 of all diameters confirming to IS: 1786                                             |      |          |</p>
<table>
<thead>
<tr>
<th>D</th>
<th>INSERTS, EMBEDMENTS AND OTHER STEELWORKS</th>
<th>Sq.M</th>
<th>85</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Note:</strong> All nuts and washers to be supplied by the Contractor and steel used for this purpose will not be provided by the Employer.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D-1</td>
<td>Supplying, fabricating, erecting and fixing in position at and at all heights and depths above and below finished ground level M.S. foundation/anchor bolts, anchor box and sleeves for T-headed bolts, permanent steel shuttering (with or without anchor pin) for anchor bolt pockets (straight or tapered) with all jigs, nuts and washers for embedding in permanent concrete or masonry work, true to line, level and plumb including all connected works and adjustments in shuttering and reinforcement, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>MT</td>
<td>1.0</td>
</tr>
<tr>
<td>D-2</td>
<td>Taking delivery from Employer’s stores/stockyard or directly from trucks at site, fabricated steel materials received from Equipment Supplier, loading, unloading, transporting, erecting and fixing in position at and at all heights and depths above and below finished ground level M.S. foundation/anchor bolts with all jigs, nuts and washers for embedding in permanent concrete or masonry work, true to line, level and plumb including all connected works and adjustments in shuttering and reinforcement, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>MT</td>
<td>1.0</td>
</tr>
<tr>
<td>D-3</td>
<td>Fabricating, erecting and fixing in position at and at all heights and depths above and below finished ground level M.S. inserts, curb angles, channels, joists and other rolled sections, M.S. and G.S pipes, pipe sleeves, with or without puddle flanges, M.S. rungs, ladders and M.S. fabricated ducts etc with all jigs, nuts and washers for embedding in permanent concrete or masonry work, true to line, level and plumb including all connected works and adjustments in shuttering and reinforcement all as per drawings,</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
specifications and directions of the Engineer, all materials, tools, plant and labour complete. (Pipes should be medium duty as per IS:1239)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>M.S. plates/flat inserts, angles, channels etc. with lugs</td>
<td>MT</td>
<td>1.0</td>
</tr>
<tr>
<td>b)</td>
<td>G.I. Pipe sleeves/conduits of various diameter</td>
<td>MT</td>
<td>1.0</td>
</tr>
<tr>
<td>c)</td>
<td>MS pipes/pipe sleeves/conduits with or without puddle flanges</td>
<td>MT</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**ITEM RATES ONLY**

D-4 Supplying, fitting and fixing concrete expansion fasteners or anchor bolts with nuts, plain washers etc made from extruded M.S rods in the RCC foundations, walls, floor etc including drilling holes in RCC/PCC using template, blowing out dust from drilled hole, fixing anchor bolt into the hole and tightening the nut all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete

1. Double sleeve wedge expansion fastener of approved type
   
i) M-10 Nos 1.0
   
ii) M-12 Nos 1.0
   
iii) M-16 Nos 1.0
   
iv) M-20 Nos 1.0
   
v) M-24 Nos 1.0

(Note: Expansion fasteners supplied must be accompanied by manufacturer's test certificate indicating holding capacity (Pull and safe torque for each fastener))

D-5 Same as item no. D-4 above but using chemical anchor fasteners of approved make & quality of following diameters :-

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>M-8.</td>
<td>Nos</td>
<td>1.0</td>
</tr>
<tr>
<td>ii)</td>
<td>M-10.</td>
<td>Nos</td>
<td>1.0</td>
</tr>
<tr>
<td>iii)</td>
<td>M-12.</td>
<td>Nos</td>
<td>1.0</td>
</tr>
<tr>
<td>iv)</td>
<td>M-16.</td>
<td>Nos</td>
<td>1.0</td>
</tr>
<tr>
<td>v)</td>
<td>M-20.</td>
<td>Nos</td>
<td>1.0</td>
</tr>
<tr>
<td>vi)</td>
<td>M-24.</td>
<td>Nos</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Unit</td>
<td>Quantity</td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>D-6</td>
<td>Supplying M.S liner plates (approx. 10-16 mm thick), loading, unloading, transporting to site, bending to shape, fabricating and embedding M.S lining with stiffeners in scale flume tunnel or elsewhere at all heights &amp; depth above or below finished ground level all as per drawings, and directions of the Engineer, all materials, tools, plant and labour complete (Only liner plate will be measured and paid under this item. Lugs and inserts will be paid under item No. D-3)</td>
<td>Kgs</td>
<td>1.0</td>
</tr>
<tr>
<td>D-7</td>
<td>Supplying liner plates (LA60 - 20 mm thick) or equivalent bending to shape, fabricating, fixing in position on concrete surfaces of track hopper, ground hopper etc. on spacer ribs welded to M.S. plate inserts embedded in concrete at all heights and depths above and below finished ground level all as per drawings and directions of the Engineer, all materials, tools, plan and labour complete in all respect (only liner plate will be measured and paid under this item. Inserts with lugs will be paid under item No. D-5)</td>
<td>Kgs</td>
<td>1.0</td>
</tr>
<tr>
<td>D-8</td>
<td>Supplying, fabricating, erecting and fixing in position at all heights and depths above and below finished ground level structural steelwork in M.S. ladders, stairs, platforms, brackets, runners, stringers, posts, stiffeners, monorails, structural beams, frames in openings etc including supplying and applying complete painting with two coats of synthetic enamel paint of make, colour and shade as approved by the Engineer over one coat of primer conforming to IS:2074 all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>Kgs</td>
<td>1.0</td>
</tr>
<tr>
<td>D-9</td>
<td>Supplying, fabricating, erecting and fixing in position at all heights and depths above and below finished ground level chequered plate/ M.S. plate covers, M.S gratings, in floors, trenches, hatch, manholes etc, including supplying and applying complete painting with two coats of approved black bituminous paint over one coat of primer conforming to IS:2074 all as per drawings, specifications</td>
<td>Kgs</td>
<td>1.0</td>
</tr>
</tbody>
</table>
and directions of the Engineer, all materials and labour complete (Only plates will be measured under this item, frame work to be measured and paid under item D-19)

| D-10 | Fabricating with scrap reinforcement bars, erecting and fixing in positions at all heights and depths above and below finished ground level, jigs and fixtures which are setting permanently embedded in concrete for fixing anchorage as described all as per drawings, specifications and directions of the Engineer, all (Material covered under item C-1) tools, plant and labour complete | Kgs | 1.0 |

**E. SHUTTERING**  
**E-1**  
Providing and fixing shuttering (formwork) in position with necessary centerings, bracings, proppings etc and striking, removing and clearing the same after the specified periods for all types of shuttering for all plain and reinforced cement concrete works including all chamfers, splays, fillets, keys, wedges, props, nails, bracings, brackets, cutting holes for passing embedments etc and applying waste oil on shuttering surfaces in contact with concrete all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete:

| a) Straight shuttering |  
| i) at and at all depths below finished ground level | sq m | 1.0 |
| ii) at all heights above finished ground level | sq m | 1.0 |

| b) Curved shuttering in single radius |  
| i) at and at all depths below finished ground level | sq m | 1.0 |
| ii) at all heights above finished ground level | sq m | 1.0 |

| c) Conical shuttering in hopper bottom at & all heights above finished ground level | sq m | 1.0 |

<p>| d) Straight shuttering in hopper bottom at all heights &amp; depth above or below FGL | sq m | 1.0 |
| E-2  | Providing and fixing in position shuttering for core holes and pockets for building column and equipment foundation bolts etc including all temporary formwork, applying one coat of waste oil on shuttering surfaces in contact with concrete and striking, removing and clearing shuttering after the specified period, cleaning and protecting the core holes and pockets, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete |
|      |                                                                                     | sq m  | 1.0 |
|      | a) Plain core holes/ pockets in concrete                                             |       |     |
|      | b) Corrugated core holes/ pockets in concrete                                        |       |     |
| F.   | <strong>BRICKWORK</strong>                                                                       | CUM   | 625 |
| F-1  | Supplying, constructing one or more brick thick burnt clay brickwork using bricks of compressive strength not less than 50 kgf/sq cm as defined in IS:1077 in cement sand mortar (1:6) in foundations, super structure, manholes, ducts, drains etc including fair cutting, waste, bonding, plumbing, lining, levelling, flushing, raking joints, scaffolding and curing, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete |
|      |                                                                                     |       |     |
|      | a) at and at all depths below finished ground level                                  | cu m | 1.0 |
|      | b) at all heights above finished ground level                                        | cu m | 1.0 |
| F-2  | Supplying and constructing half-brick thick burnt clay brickwork using bricks of compressive strength not less than 50 kgf/sq cm as defined in IS:1077 in cement sand mortar (1:4) with continuous HB wire netting reinforcement at every fourth course at and at all heights and depths above and below finished ground level for partition walls and including fair cutting, waste, bonding, plumbing, lining, levelling, raking joints, scaffolding and curing, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete |
|      |                                                                                     | cu m | 1.0 |</p>
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-3</td>
<td>Supplying and constructing 75 mm thick brickwork in partition walls, parapets, fins etc at and at all heights and depths above and below finished ground level using bricks of compressive strength not less than 50 kgf/sq cm as defined in IS:1077 in (1:4) cement sand mortar with continuous HB wire netting reinforcement at every third course, including fair cutting, waste, bonding, plumbing, lining, levelling, raking joints, scaffolding and curing as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete.</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>F-4</td>
<td>Supplying, constructing 200 mm or more thick hollow concrete block work using required grade concrete hollow block as defined in relevant IS codes in cement sand mortar in foundations, super structure, manholes, ducts, drains etc including fair cutting, waste, bonding, plumbing, lining, levelling, flushing, raking joints, scaffolding and curing, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) at and at all depths below finished ground level</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>b) at all heights above finished ground level</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>F-5</td>
<td>Supplying and constructing hollow concrete block work of 100 mm thickness, with cement sand mortar (1:4) with continuous HB wire netting reinforcement at every fourth course at and at all heights and depths above and below finished ground for partition walls and including fair cutting, waste, bonding, plumbing, lining, levelling, raking joints, scaffolding and curing, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete.</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Unit</td>
<td>Quantity</td>
</tr>
<tr>
<td>----</td>
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</tr>
<tr>
<td>F-6</td>
<td>Supplying &amp; constructing random uncoursed rubble masonry for Garland drain, earthen dam etc, in cement sand mortar (1:6) in foundations, super structures etc with flush pointing as per drawings, specifications and as directed by the Engineer/Consultant at all depths and heights below and above finished ground level including wastage, scaffolding and curing, fair cutting, lining, levelling etc, all materials, tools, plants and labour complete in all respects.</td>
<td>Cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>F-7</td>
<td>Supplying &amp; constructing coursed rubble masonry in cement sand mortar (1:6) in super structures including sunk pointing of finished size 15 mm wide and 10 mm deep or as specified in the drawings and as directed by the Engineer/Consultant at all heights &amp; depths above and below finished ground level, including wastage, scaffolding and curing, fair cutting, plumbing, lining, levelling etc all materials, tools, plants and labour complete in all respects.</td>
<td>Cu m</td>
<td>1.0</td>
</tr>
</tbody>
</table>
| F-8| Supplying, constructing one or more brick thick fly ash brick work using bricks as defined in IS:12894 having compressive strength 75 kg/sq cm(min) in cement sand mortar (1:5) in foundations, super structure, manholes, ducts, drains etc including fair cutting, waste, bonding, plumbing, lining, levelling, flushing, raking joints, scaffolding and curing, all as per drawings, specifications and directions of the Owner/Consultant, all materials, tools, plant and labour complete  
  a) at all depths below finished ground level  
  b) at all heights above finished ground level | Cu m | 1.0      |
| F-9| Supplying and constructing half-brick thick fly ash brick work using bricks as defined in IS:12894 having compressive strength 75 kg/sq cm(min) in cement sand mortar (1:4) with continuous HB wire netting reinforcement at every fourth course at and at all heights and depths above and below finished ground level for partition walls and including fair cutting, waste, bonding, plumbing, | Cu m | 1.0      |
lining, levelling, raking joints, scaffolding and curing, all as per drawings, specifications and directions of the Owner / Consultant, all materials, tools, plant and labour complete

<table>
<thead>
<tr>
<th>G.</th>
<th>PLASTER &amp; FINISHING ITEMS</th>
<th>SQM</th>
<th>2850</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-1</td>
<td>Supplying and laying plaster with (1:4) cement sand mortar at and at all heights and depths above and below finished ground level to ceiling of floors and roofs, beams, ceiling of waste slab of staircases, beams, lintel soffits, chajjas, projections, narrow bands and widths etc including chipping of concrete surfaces, raking joints, scaffolding, cleaning and curing all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>a) 6 mm thick</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G-2</td>
<td>Supplying and laying plaster with (1:6) cement sand mortar at and at all heights and depths above and below finished ground level to faces of walls, pillars, columns, posts, lintel sides, drains, jambs, column projections, narrow bands and widths etc including chipping and hacking of concrete surfaces, raking joints, scaffolding, cleaning and curing, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>a) 12 mm thick (in one operation)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) 20 mm thick (in two operations)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G-3</td>
<td>Making vertical and horizontal grooves in cement plaster at and at all heights above finished ground level, finished neatly in line and level with sharp and square edges including scaffolding, curing etc, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>RM</td>
<td>1.0</td>
</tr>
<tr>
<td>a) 10 mm x 10 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) 15 mm x 10 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) 25 mm x 10 mm</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Unit</td>
<td>Quantity</td>
</tr>
<tr>
<td>---</td>
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<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>G-4</td>
<td>Supplying and laying 25 mm thick waterproofing plaster with (1:2) cement sand mortar at and at all heights and depths above and below finished ground level including supplying and mixing approved waterproofing agent as per manufacturer's specification (Plastocrete Plus of Sika/Struco Excel of Chryso/Conplast X421 IC of Fosroc or other approved equivalent) thickness of plaster applied in three layers and then finished with a coat of neat cement finish including chipping and hacking of concrete surfaces, raking joints, scaffolding, cleaning and curing, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>Note:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Dosage of admixtures shall be in line with manufacturer's specification and as approved by the Engineer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G-5</td>
<td>Supplying and making drip course 40 mm wide and 10 mm deep at chajjas, sills and other outside projections at and at all heights above finished ground level in (1:4) cement sand mortar, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>RM</td>
<td>1.0</td>
</tr>
<tr>
<td>G-6</td>
<td>Supplying and applying two coats of cement based paint of approved shades over a coat of cement primer to plastered surfaces at and at all heights and depths above and below finished ground level including scaffolding, cleaning and curing, all as per manufacturer's specifications and as per drawings and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>G-7</td>
<td>Supplying and applying three coats of white wash with lime over the plastered concrete surfaces at all heights and depths above and below finished ground level including scaffolding, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
</tbody>
</table>
Providing one coat of approved primer conforming to IS:2074 and two coats of approved synthetic enamel paint as specified at all heights and depths above and below ground level including rubbing, cleaning, putty filling etc and scaffolding, complete in all respects (measurements will be according to IS:1200)

<table>
<thead>
<tr>
<th>Description</th>
<th>sq m</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>i) steel doors</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>ii) M.S. louvres</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>iii) steel windows &amp; ventilators</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>iv) M.S. grills</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>v) rolling shutters/rolling grills</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>vi) masonry/plastered surfaces</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>vii) steel inserts</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>viii) wooden post in doors &amp; windows</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>

Providing one coat of approved primer conforming to IS:2074 and two coats of approved synthetic enamel paint as specified to all exposed soil, waste and water supply pipelines including all fittings such as bends, junctions, elbows, tees, sockets, clamps, bobbins etc including cleaning before applying paints including scaffolding etc complete work to the satisfaction of the Engineer

<table>
<thead>
<tr>
<th>Description</th>
<th>RM</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) for sizes upto 25 mm dia</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>b) for sizes above 25 mm dia upto 75 mm dia</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>c) for sizes above 75 mm dia upto 150 mm dia</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>

Supplying and applying two coats of interior grade acrylic emulsion paint of approved make and shades over a coat of approved primer to exposed surfaces of wall, ceiling, timber partitions, false ceiling etc at and at all heights above finished ground level including scaffolding, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete (total 3 coats including primer)

<table>
<thead>
<tr>
<th>Description</th>
<th>sq m</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-10</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>

Supplying and applying two coats of exterior grade acrylic emulsion paint of approved make and shades to exposed surface of wall, chajja, parapet etc including thorough cleaning of all loose, dirt, fungi, algae and fill up minor cracks of surface with cement sand mortar (1:3) at all heights above finished ground level including scaffolding, all as per

<table>
<thead>
<tr>
<th>Description</th>
<th>sq m</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>G-11</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Description</td>
<td>Unit</td>
<td>Quantity</td>
</tr>
<tr>
<td>-------------</td>
<td>------</td>
<td>----------</td>
</tr>
<tr>
<td>Providing neat cement finish on green plastered surfaces of drains, walls, pits, manholes, sewers etc at and at all heights and depths above and below finished ground level, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>Supplying and applying Plaster of Paris on cement plastered surfaces at and at all heights and depths above and below finished ground level including scaffolding, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>Providing and applying two coats of approved high built chemical resistant epoxy protective coating finish paint (minimum dry film thickness of 150 micron per coat) over one coat of approved epoxy resin based primer on masonry or concrete wall, floor etc including cleaning the surface as per manufacturer's instructions all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>Providing two coats of approved high built chlorinated rubber with zinc phosphate primer and two coats of approved plasticised chloro-rubber finish paint as specified at all heights and depths above and below ground level including preparing the surface to Sa-2½ grade, all as per the direction of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>i) Steel doors</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>ii) Steel windows &amp; ventilators</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>iii) Rolling shutters / rolling grills</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>iv) M.S. grills</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>Providing lime punning on plastered surfaces as specified with approved shell and stone lime at all heights above plinth level all as per drawings, specification and direction of the Engineer including scaffolding etc, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>G-17</td>
<td>Supplying and applying two coats of approved colour wash over a coat of white wash to the plastered surfaces at and at all heights and depths above and below finished ground level including scaffolding, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
</tr>
<tr>
<td>G-18</td>
<td>Supplying and applying cement punning with white cement based putty of J.K.Wall Putty or approved equivalent on cement plastered surfaces at and at all heights and depths above and below finished ground level including scaffolding, all as per drawings, specifications and directions of the Engineer/Consultant, all materials, tools, plant and labour complete in all respect.</td>
<td>sq m</td>
</tr>
<tr>
<td>G-19</td>
<td>Supplying and applying two coats of approved oil bound washable distemper of approved shade over a coat of primer as per manufacturer's specification to plastered surfaces at all heights and depths above and below finished ground level as per drawings, specifications and directions of the Engineer/Consultant, including scaffolding, all materials, tools, plants and labour complete in all respect.</td>
<td>sq m</td>
</tr>
<tr>
<td>G-20</td>
<td>Supplying and applying (spray applied) two coats of synthetic enamel paint having VOC (volatile organic compound) content maximum 50 g/L, of appvd. make and shade over a coat of approved primer at all heights and depths above and below plinth level including rubbing, cleaning, putty filling etc and scaffolding, all materials, tools, plant &amp; labour complete in all respect (measurement will be according to IS:1200):</td>
<td></td>
</tr>
<tr>
<td>a) Steel doors</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>b) Rolling shutters</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>c) Masonry/plastered surfaces</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>d) Steel inserts</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>e) Wooden doors &amp; windows</td>
<td>sq m</td>
<td>1.0</td>
</tr>
</tbody>
</table>
| G-21 | Supplying and applying two coats of approved synthetic enamel paint having VOC (volatile organic compound) content maximum 50 g/L, of appvd. make and shade over a coat of approved primer to all exposed soil, waste and water supply pipe lines including all fittings such as bends, junctions, elbows, tees, sockets, clamps, bobbins etc including rubbing, cleaning, putty filling etc and scaffolding, all materials, tools, plant & labour complete in all respect:  
   a) For sizes between 15 mm dia and 25 mm dia | RM | 1.0  
   b) For sizes above 25 mm dia upto 75 mm dia | RM | 1.0  
   c) For sizes above 75 mm dia upto 150 mm dia | RM | 1.0 |
| G-22 | Supplying and applying exterior grade acrylic self washing roof paint of approved make and shade having high solar reflectance (minimum 0.65) and high emissivity (approx. 0.9) over properly levelled roof surface as per manufacturer's specifications including cleaning of all loose dirt, fungi etc as per specification and directions of the Engineer/Consultant, all materials, tool, plant and labour complete in all respect | sq m | 1.0 |
| G-23 | Providing two coats of cement paint of approved or equivalent of different approved shades over one coat of white cement and as specified by the manufacturer to external plastered surfaces at heights and depths above and below plinth level as per drawings and directions of the Engineer including scaffolding, cleaning and curing, all materials, tools, plant and labour complete | sq m | 1.0 |
| G-24 | Supply and applying Acid Resistant Paint of approved make & shade over primer for steel doors and windows in the battery room & chemical rooms as shown in the drawings and as directed by the Engineer all materials, tools, plant and labour complete |  
   a) Steel Doors  | sq m | 1.0  
   b) Steel Windows | sq m | 1.0 |
<p>| G-25 | Supplying and applying three coats of oil proof epoxy coating (&quot;Sigmarite GP finish&quot; or approved equivalent) on concrete/plastered surface as per | sq m | 1.0 |</p>
<table>
<thead>
<tr>
<th>H.</th>
<th>SOLING AND HARD CORE</th>
<th>CUM</th>
<th>535</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-1</td>
<td><strong>SOLING AND HARD CORE</strong></td>
<td><strong>cu m</strong></td>
<td>1.0</td>
</tr>
<tr>
<td>H-2</td>
<td>Providing and laying single layer flat brick soling with bricks of compressive strength not less than 50 kgf/sq cm as defined in IS:1077 over a layer of sand bed including dry sand filling of joints and brooming as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete.</td>
<td><strong>cu m</strong></td>
<td>1.0</td>
</tr>
<tr>
<td>H-3</td>
<td>Supplying and laying single layer 100 mm thick solid concrete block flat soling with minimum compressive strength 10.5 N/sq mm over a layer of sand bed including dry sand filling of joints &amp; brooming as per drawings, specifications and directions of the Engineer-In-Charge all materials, tools, plant and labour complete.</td>
<td><strong>cu m</strong></td>
<td>1.0</td>
</tr>
<tr>
<td>H-4</td>
<td>Providing, laying and compacting 40 mm and down graded stone of approved quality aggregates, blinded with sand not exceeding 200 mm thickness per layer including consolidating each layer by watering, ramming and compacting with a power roller, all materials, tools, plant and labour complete.</td>
<td><strong>cu m</strong></td>
<td>1.0</td>
</tr>
<tr>
<td>H-5</td>
<td>Supplying and filling moorum of approved quality in layers, each layer not exceeding 100 mm thick, including consolidating each layer by watering and ramming at any location all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete.</td>
<td><strong>cu m</strong></td>
<td>1.0</td>
</tr>
<tr>
<td>H-5</td>
<td>Providing 150 mm to 250 mm thick pitching with trap stone boulders to proper slope including thoroughly packing the joints with trap ballast and grouting with cement sand mortar (1:6) and finishing the joints flush as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete.</td>
<td><strong>cu m</strong></td>
<td>1.0</td>
</tr>
<tr>
<td>H-6</td>
<td>Providing and constructing 450 mm thick hand packed rough stone rip-rap over a filter media of sand, gravel and crushed rock in formation of upstream side embankments for Earthen dam, Garland drain, flood protection structures etc at all heights and depths to correct slope /grade and dressing to profile as per drawing, specification and direction of the Engineer, all materials, tools, plant and labour complete. (Measurement will be made on the basis of finished cross-section of the embankment)</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>H-7</td>
<td>Providing and laying single layer flat block soling with 100 mm thick fly ash brick of compressive strength not less than 50 kgf/sq cm as defined in IS:12894 over a layer of sand bed of thickness 25 mm including dry sand filling of joints and brooming as per drawings, specifications and directions of the Owner/Consultant, all materials, tools, plant and labour complete in all respect</td>
<td>Sq.m</td>
<td>1.0</td>
</tr>
</tbody>
</table>

| J. | FLOORING | SQM | 985 |
| J-1 | 1. The tenderer in his rate should include the cost of white cement wherever required which will not be supplied free of cost by the Employer.  
2. Cement will not be supplied for tile manufacturing.  
3. The quoted rate of the Contractor should include the cost for providing borders to floors and bands to skirting/dado of different colours and shades as shown in the drawing or as directed by the Engineer.  
Supplying and laying 40 mm thick cast-in-situ silver/pearl grey terrazzo (marble mosaic) floor finish in floors, steps, landings etc at and at all heights and depths above and below finished ground level, with approved quality, size and shade of marble chips, laid in panels of suitable size including providing glass/aluminium strip dividers in joints for the full depths with an underlayer of 30 mm thick cement concrete of M15 grade with 10 mm and down graded stone aggregates and 10 mm thick | sq m | 1.0 |
<table>
<thead>
<tr>
<th></th>
<th>marble mosaic topping including curing, rubbing, machine polishing in 3 operations as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>J-2</strong></td>
<td>Supplying and laying 25 mm thick cast-in-situ silver/pearl grey terrazzo (marble mosaic) in dado and skirting on walls, staircase risers etc at and at all heights and depths above and below finished ground level with approved quality, size and shade of marble chips with underlayer of 15 mm average thickness in cement mortar (1:3) and 10 mm thick marble mosaic topping including curing, rubbing, hand polishing in 3 operations as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
</tr>
<tr>
<td></td>
<td>sq m</td>
</tr>
<tr>
<td><strong>J-3</strong></td>
<td>Supplying and laying 40 mm thick floor finish with 200 mm x 200 mm x 25 mm thick silver/pearl grey terrazzo tiles conforming to IS:1237 on 15 mm thick bedding mortar comprising of cement, hydrated lime and sand in the proportion of 1:1:6 with approved quality size and shade of marble chips including curing, rubbing, machine polishing in 3 operations as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
</tr>
<tr>
<td></td>
<td>sq m</td>
</tr>
<tr>
<td><strong>J-4</strong></td>
<td>Supplying and laying 30 mm thick skirting / dado with 20 mm thick terrazzo tiles on 10 mm thick cement sand bedding mortar including curing, rubbing, machine polishing in 3 operations all as per drawings, specifications and directions of the Engineer.</td>
</tr>
<tr>
<td></td>
<td>sq m</td>
</tr>
<tr>
<td>J-5</td>
<td>Supplying and laying 40 mm thick grey cement concrete M20D (granolithic) floor finish at all heights and depths above and below finished ground level in panels in two layers, bottom layer 25 mm thick with 10 mm and down graded stone aggregates finished rough and 15 mm topping with 6 mm and down graded stone aggregates, spaded, tamped, trowelled and finished smooth with a floating coat of neat cement including providing glass/aluminium strip dividers in joints for the full depth of the floor finish to form suitable panels and curing, as per the drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
</tr>
<tr>
<td>J-6</td>
<td>Supplying and laying 20 mm thick grey cement concrete finish M20D as specified in skirting/dado finished smooth including curing, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
</tr>
<tr>
<td>J-7</td>
<td>Supplying and laying 15 mm thick heavy duty floor hardener topping course with &quot;Ironite&quot; @ 2.75 kg per sq m or approved equivalent including the bedding layer of 25 mm thick screed concrete M25D, topping course laid whilst the screed concrete is still green, all according to the manufacturer's specification including trowel finishing and curing, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
</tr>
<tr>
<td>J-8</td>
<td>Providing and laying 40 mm thick flooring with 3 mm thick (minimum overall) heavy duty non-metallic floor hardener topping course with &quot;Sika Chapdur&quot;/Emalite RTU of Chryso/Nitoflor Hardtop S of Fosroc or approved equivalent product applied @ 6 to 7 kg/sq m as recommended by approved manufacturer including the bedding layer screed concrete of grade M20D as defined by IS:456, machine mixed with 10 mm and down graded stone aggregate, topping course laid whilst the screed concrete is still green and the bleed water has evaporated and troweling to a smooth finish as per manufacturer's specification/direction after the spreaded non-metallic granules have moistened uniformly by the surface water contained in the green concrete, laying operation including finishing with the floor hardener being completed before initial set of concrete, curing etc all as per drawing, specification and direction of the Engineer, all materials, tools, plant and labour complete</td>
</tr>
<tr>
<td>J-9</td>
<td>Supplying and laying 5mm thick oil resistant floor topping of approved quality over 35 mm thick screed concrete (C20) laid to slope at all heights and depths above and below finished ground level including applying one coat of approved primer on the base and finishing the epoxy screed with one coat of topping epoxy all materials, tools, plant and labour complete.</td>
</tr>
</tbody>
</table>
| J-10 | Supplying and laying overall 40 mm thick PVC tile floor finish of approved quality, size and shade with a layer of 25mm thick PCC, (M20D) two coats of bitumen paint on PCC surface and 13 mm thick cement sand bedding mortar over it, including fixing PVC tiles with rubber based adhesive conforming to manufacturer's specification as per drawings, specification and direction of the Engineer/Consultant:  
   a) 2 mm thick homogeneous PVC tiles  
   b) 2 mm thick antistatic PVC tiles | sq m | 1.0 |
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-11</td>
<td>Supplying and fixing 2 mm thick homogeneous PVC skirting / dado over plastered surface, levelled and smoothened with neat cement slurry and fixing with rubber based adhesive conforming to manufacturer's specification as per drawings, specification and direction of the Engineer/Consultant.</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>J-12</td>
<td>Supplying and laying 40 mm thick acid/alkali resistant flooring on concrete base at and at all heights and depths above and below finished ground level with 20 mm thick unglazed vitreous ceramic acid/ alkali resistant tiles of approved make conforming to IS:4457 including providing 5~6 mm thick resin type mortar bedding over 15 mm thk cement sand mortar levelling course conforming to IS:4832 (Part-II) and filling the joints to full depths of tiles with resin type mortar conforming to IS:4832 (Part-II), all as per IS:4443-1980 &amp; drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete (The joints between the tiles shall be 2 to 3 mm. The epoxy/ polyester resin shall be prepared according to the manufacturer's specification)</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>J-13</td>
<td>Supplying and laying 25 mm thick acid/alkali resistant skirting and dado at all heights and depths above and below finished ground level with 12 mm thick unglazed vitreous acid/alkali resistant ceramic tiles conforming to IS:4457 including 6 mm thick epoxy type mortar bedding conforming to IS:4832 (Part-II) and filling the joints to full depth of the tiles with epoxy type mortar conforming to IS:4832 (Part-II), all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>J-14</td>
<td>Providing trowel finish with neat cement slurry on green concrete surface of floors, ramps, steps, etc at and at all heights and depths above and below finished ground level as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
</tbody>
</table>
### J-15
Supplying & fixing overall 40mm thick Ceramic flooring tiles of 1st quality of approved size, colour & make in floors including providing maximum 32mm thick cement sand bedding mortal, filling of joints with white cement paste mixed with matching pigments and cleaning with saw dust and dilute sulphuric acid, curing etc. all as per drawings, specifications and direction of the Engineer/Consultant:

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) minimum 8 mm thick tiles</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>b) minimum 8 mm thick skid resistant tiles</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>c) minimum 8 mm thick vitrified tiles</td>
<td>sq m</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### J-16
Supplying and fixing overall 20 mm thick ceramic dado/ skirting of 1st quality tiles of approved size, colour & make including providing 14 mm thick cement sand bedding mortar and each tile plastered on the back side with neat cement slurry before fixing to the bedding mortar including filling and finishing of all joints with white cement paste with matching pigments and cleaning with saw dust and dilute sulphuric acid, curing etc as per drawings, specifications and directions of the Engineer/Consultant.

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) minimum 6 mm thick tiles</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>b) minimum 6 mm thick vitrified tiles</td>
<td>sq m</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### J-17
Supplying and laying 40 mm thick floor finish with 25 mm thick Kota stone slab, machine polished, machine cut edges, uniform colour on bedding mortar 15 mm thick and jointing with cement grout at all heights and depths above or below finished ground level, including curing, polishing complete as per drawings, specifications and directions of the Engineer all materials, tools, plant and labour complete

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>sq m</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### J-18
Supplying and laying 30 mm thick finished dado/skirting/steps/ risers of stair/window sill with 20 mm thick Kota stone slab, polished, machine cut edges of uniform colour fixed on 10 mm thick bedding of mortar (1 cement: 1 hydrated lime: 3 sand) and jointing with cement grout at all heights and depths above and below finished ground level including curing, polishing, complete as per drawings, specifications and directions of

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
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<tbody>
<tr>
<td></td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>No.</td>
<td>Description</td>
<td></td>
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</tr>
<tr>
<td>J-19</td>
<td>Supplying and laying 5 mm thick acid/alkali/chemical resistant non-skid epoxy concrete floor topping over 35 mm thick screed concrete (M20D) base laid to slope at all heights and depths above and below finished ground level including applying one coat of primer on the base and finishing the epoxy screed with one coat of topping epoxy all as per drawings, manufacturer’s specification and direction of the Engineer, all materials, tools, plant and labour complete</td>
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<tr>
<td></td>
<td>sq m 1.0</td>
<td></td>
</tr>
<tr>
<td>J-20</td>
<td>Supplying and providing false flooring with 30 mm thick cement bonded particle board of different size with seasoned hardwood edging strip and 2 mm thick rigid PVC ‘Z’ beading on all the 4 sides supported on pedestals comprising of MS adjustable jack heads, all as per attached drawing, manufacturer’s specification and direction of the Engineer/Consultant.</td>
<td></td>
</tr>
<tr>
<td>I) Adjustable jack upto 600 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) with 65X460X15mm approved wooden strip fixed with approved adhesive</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sq m 1.0</td>
<td></td>
</tr>
<tr>
<td>ii) 2mm thick homogeneous PVC tiles fixed with approved adhesive</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sq m 1.0</td>
<td></td>
</tr>
<tr>
<td>iii) 2mm thick anti-static PVC tiles fixed with approved adhesive</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sq m 1.0</td>
<td></td>
</tr>
<tr>
<td>II) Adjustable jack upto 1000 mm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) with 65X460X15mm approved wooden strip fixed with approved adhesive</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sq m 1.0</td>
<td></td>
</tr>
<tr>
<td>ii) 2mm thick homogeneous PVC tiles fixed with approved adhesive</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sq m 1.0</td>
<td></td>
</tr>
<tr>
<td>iii) 2mm thick anti-static PVC tiles fixed with approved adhesive</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sq m 1.0</td>
<td></td>
</tr>
<tr>
<td>J-21</td>
<td>Supplying and providing false flooring with 30 mm thick cement bonded particle board of different size with seasoned hardwood edging strip and 2 mm thick rigid PVC ‘Z’ beading on all the 4 sides supported on MS framework, all as per attached drawing, manufacturer’s specification and direction of the Engineer/Consultant. (Steel sections like MS angle, Channels etc will supplied as free issue material)</td>
<td></td>
</tr>
<tr>
<td>i) with 65X460X15 mm approved wooden strip fixed with approved adhesive</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sq m 1.0</td>
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</tr>
<tr>
<td><strong>J-22</strong></td>
<td><strong>Supplying and providing false flooring</strong>&lt;br&gt;with 30 mm thick cement bonded particle board of different size with seasoned hardwood edging strip and 2 mm thick rigid PVC 'Z' beading on all the 4 sides supported on RCC (M25C) pedestals, all as per attached drawing, manufacturer's specification and direction of the Engineer/Consultant. (RCC will be paid as per relevant item of BOQ)</td>
<td></td>
</tr>
<tr>
<td>i)</td>
<td>with 65X460X15 mm approved wooden strip fixed with approved adhesive</td>
<td>sq m</td>
</tr>
<tr>
<td>ii)</td>
<td>2mm thick homogeneous PVC tiles fixed with approved adhesive</td>
<td>sq m</td>
</tr>
<tr>
<td>iii)</td>
<td>2mm thick anti-static PVC tiles fixed with approved adhesive</td>
<td>sq m</td>
</tr>
<tr>
<td><strong>J-23</strong></td>
<td>Making saucer drain upto 300 mm deep finished with neat cement slurry on green concrete surface of floors in the basement, tunnels, slab etc to correct slope, line and level including curing, shuttering for forming shape of saucer, all as per drawings, specifications and directions of the Engineer/Consultant, all materials, tools, plant and labour complete in all respect (Measurement and payment shall be based on plan area)</td>
<td></td>
</tr>
<tr>
<td><strong>J-24</strong></td>
<td>Supplying and fixing 50 mm thick precast PCC interlocking paving tiles at finished ground level as per drawing, specification and direction of the Engineer/Consultant.</td>
<td></td>
</tr>
<tr>
<td><strong>J-25</strong></td>
<td>Supplying and fixing External quality ceramic tiles 'Eurocon' or approved equivalent external wall cladding ceramic tiles at all heights to be fixed as per manufacturer's specification and as per the direction of the Engineer/Consultant</td>
<td></td>
</tr>
<tr>
<td><strong>J-26</strong></td>
<td>Supplying and fixing 40 mm thick marble flooring at floor and treads of staircase with 25 mm thick marble slab / tile of approved shades and texture laid with vein matching, set in 15 mm thick mortar of cement and coarse sand laid, polished, filling the joints with white cement to floor, including machine cutting of the</td>
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<tr>
<td>J-27</td>
<td>Supplying &amp; laying 25 mm thick marble skirting/dado with 15 mm thick marble slab of approved shade and texture laid with 10 mm thick cement sand mortar, cement floated, laid, polished, filling the joints with white cement including machine cutting of the slab, rubbing, curing, cleaning, polishing all as per drawing, specification and direction of the Engineer/Consultant</td>
<td>sq m 1.0</td>
</tr>
<tr>
<td>J-28</td>
<td>Supplying and fixing 40 mm thick granite floor finish / treads of staircase with 20 mm thick granite slab / tile polished, machine cut edges of uniform colour fixed with 20 mm thick cement sand (1:3) bedding mortar and jointing with cement grout with matching pigment including curing, cleaning, polishing all as per drawing, specification and direction of the Engineer/Consultant</td>
<td>sq m 1.0</td>
</tr>
<tr>
<td>J-29</td>
<td>Supplying and fixing 30 mm thick granite dado/skirting/riser of staircase with 20 mm thick granite slab / tile polished, machine cut edges of uniform colour fixed with 10 mm thick cement sand (1:3) bedding mortar and jointing with cement grout with matching pigment including curing, cleaning, polishing all as per drawing, specification and direction of the Engineer/Consultant</td>
<td>sq m 1.0</td>
</tr>
<tr>
<td>J-30</td>
<td>Supplying and laying acid/alkali/chemical resistant epoxy skirting/dado over plastered surface all as per attached drawings, manufacturer's specification and direction of the Engineer, all materials, tools, plant and labour complete in all respect</td>
<td>sq m 1.0</td>
</tr>
<tr>
<td>K.</td>
<td>DOORS, WINDOWS, PARTITION AND FALSE CEILING</td>
<td>SQM 175</td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Unit</td>
</tr>
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<td>---</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>K-1</td>
<td>Supplying and fixing well seasoned salwood or approved equivalent, preserved and treated for protection against termite, insects, fungi, splitting, cracking etc as per IS 401:2001 for wooden frames of all sizes for doors including applying one coat of coal tar over the surface in contact with masonry/concrete with holdfasts (40 mm x 6 thk - 225/90 long), all screws, wedges, keys, nails etc and cutting/drilling of necessary holes in masonry/concrete and grouting of holdfasts with (M20D) cement concrete, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
</tr>
</tbody>
</table>
| K-2 | Supplying, fabricating and fixing single or double leaf door shutters (Glazed or non Glazed) of the following types made of kiln seasoned "Hollock" or approved quality hardwood preserved and treated for protection against termite, insects, fungi, splitting, cracking etc as per IS 401:2001, including necessary hardware all as per attached drawings, specifications and directions of the Engineer/Consultant (glazing shall be measured separately):  
  i) Wooden panelled door shutter with cement bonded particle board, panel insert conforming to IS:14276  
  ii) Same as in item K-2 (a) i) above but with fully glazed shutter  
  iii) Same as in item K-2 (a) i) above but with partly panelled and partly glazed shutter  
  iv) Same as in item K-2 (a) i) above but with glazing at top panel and seasoned hardwood louvres at bottom panel | sq m  | 1.0      |
<table>
<thead>
<tr>
<th>K-3</th>
<th>Supplying, fitting &amp; fixing in position fully sheeted single/double leaf pre-coated pressed steel panel door Glazed or Non Glazed sections provided with UV resistant powder coated paint finish of approved make and shade over galvanisation (base steel as per IS:513 &quot;D&quot; quality, galvanised as per IS:277 with zinc of 120 GM/Sq M with total coating thickness 0.55 to 0.6mm) with Pressed steel frame and CRCA sheet welded to frame work as shutter including all necessary fittings and fixtures including cutting /drilling necessary holes in walls/concrete &amp; grouting of lugs in the same with (M20) cement concrete all as per attached drawings, specifications &amp; direction of Engineer/Consultants (glazing shall be measured separately):</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Partly pannelled partly glazed pressed steel doors but using panel insert</td>
</tr>
<tr>
<td></td>
<td>(i) cement bonded particle board conforming to IS:14276 sq m 1.0</td>
</tr>
<tr>
<td></td>
<td>(ii) exterior grade medium density fibre board (MDF) conforming to IS:12406 sq m 1.0</td>
</tr>
<tr>
<td>b)</td>
<td>Fully glazed pressed steel doors sq m 1.0</td>
</tr>
<tr>
<td>c)</td>
<td>Air tight pressed steel doors with fully sheeted &amp; with rubber Strip glued to shutter &amp; door frame all round sq m 1.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>K-4</th>
<th>Supplying, fitting &amp; fixing in position fully sheeted single/double leaf pre-coated pressed steel flush door Glazed or Non Glazed including all necessary fittings and fixtures including cutting /drilling necessary holes in walls/concrete &amp; grouting of lugs in the same with (M20D) cement concrete all as per attached drawings, specifications &amp; direction of Engineer/Consultants (glazing shall be measured separately):</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Pressed steel flush door sq m 1.0</td>
</tr>
<tr>
<td>b)</td>
<td>Pressed steel flush door with vision panel sq m 1.0</td>
</tr>
<tr>
<td></td>
<td>Pressed steel flush door with louvre sq m 1.0</td>
</tr>
<tr>
<td>c)</td>
<td>Pressed steel flush door with vision glass and louvre Pressed steel airtight sq m 1.0</td>
</tr>
<tr>
<td>d)</td>
<td>door with rubber strip glued to shutter &amp; door frame all round sq m 1.0</td>
</tr>
<tr>
<td>e)</td>
<td>Pressed steel airtight door with rubber strips glued to shutter and door frame all around sq m 1.0</td>
</tr>
</tbody>
</table>
### K-5
Supplying, fitting and fixing in position standard single / double leaf steel door with shutters and frame, vision panel etc. with all fittings and fixtures including cutting/drilling necessary holes in walls/concrete and grouting of lugs in the same with (M20D) cement concrete, as per drawings, specifications and directions of the Engineer/Consultant (glazing shall be measured separately):

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Fully sheeted steel door</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>b)</td>
<td>Fully sheeted steel door with vision panel</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>c)</td>
<td>Fully sheeted steel door with louvre</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>d)</td>
<td>Fully sheeted steel door with vision panel at top and louvre at bottom</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>e)</td>
<td>Fully sheeted steel airtight door with rubber strip glued to shutter &amp; door frame all round</td>
<td>sq m</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### K-6
Supplying, fitting and fixing in position aluminium single/double leaf doors of approved make including single/ double action floor spring and pivot and all other fittings and fixtures as per attached drawings, specifications and directions of the Engineer/Consultant (glazing shall be measured separately):

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) i)</td>
<td>Fully glazed aluminium door</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>a) ii)</td>
<td>Fully glazed sliding aluminium door</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>b) i)</td>
<td>Item K-5(a) above but with exterior grade medium density fibre board (MDF) panel inserts conforming to IS:12406</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>b) ii)</td>
<td>Item K-5(a) above but with fully pannelled door with cement bonded particle board panel inserts conforming to IS:14276</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>b) iii)</td>
<td>Item K-5(a) above but with exterior grade medium density fibre board (MDF) panel inserts conforming to IS:12406</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>c)</td>
<td>Partly glazed and partly panelled using panel inserts:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) i)</td>
<td>cement bonded particle board conforming to IS: 14276</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>c) ii)</td>
<td>medium density fibre board conforming to IS: 12406</td>
<td>sq m</td>
<td>1.0</td>
</tr>
</tbody>
</table>
### K-7
Supplying, erecting and fixing in position aluminium framed fully glazed/fully panelled/partly glazed and partly panelled partition wall with anodised aluminium extruded sections of approved make as per attached drawings including necessary fitting and fixtures as per specification and direction of the Engineer/Consultant. (doors will be paid as per relevant item of BOQ and will be measured as per area of the door panel).

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) fully panelled partition wall using panel inserts:</td>
<td>sq m</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>(i) cement bonded particle board conforming to IS:14276</td>
<td>sq m</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>(ii) medium density fibre board (MDF) conforming to IS:12406</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Fully glazed partition wall with 6 mm thk clear float glass for partitions &amp; 6 mm thick clear toughened glass for doors</td>
<td>sq m</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>c) Partly pannelled and partly glazed partition wall using panel inserts:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i) cement bonded particle board conforming to IS:14276</td>
<td>sq m</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>(ii) medium density fibre board (MDF) conforming to IS:12406</td>
<td>sq m</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>

### K-8
Supplying, fitting and fixing in position fixed type single glazed aluminium observation windows with anodised natural colour extruded aluminium sections all as per attached drawings including all fittings and fixtures complete of following types:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 6 mm thick clear float glass</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>b) 6 mm thick clear toughened heat resistant glass</td>
<td>sq m</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### K-9
Supplying, fitting and fixing in position fixed type double glazed aluminium observation windows with anodised natural colour extruded aluminium sections all as per attached drawings, including all fittings and fixtures complete of the following type:

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) 6 mm thick clear toughened heat resistant double glass</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>K-10</td>
<td>Supplying, fitting and fixing in position aluminium windows and ventilators (fixed/openable/sliding type) 4mm thk. float glass of approved make with frames and shutters of standard anodised aluminium sections including handles, locking arrangement, stays, all as per attached drawings, specifications and directions of the Engineer/Consultant (Glazing will be measured separately &amp; paid under relevant item of BOQ)</td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Fully glazed side hung window sq m 1.0</td>
<td></td>
</tr>
<tr>
<td>b)</td>
<td>Fully glazed centre hung ventilator sq m 1.0</td>
<td></td>
</tr>
<tr>
<td>c)</td>
<td>Fully glazed sliding window sq m 1.0</td>
<td></td>
</tr>
<tr>
<td>d)</td>
<td>Fully glazed fixed window/ ventilator sq m 1.0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>K-11</th>
<th>Supplying, fitting and fixing in position pressed steel windows and ventilators (fixed/openable/sliding type) fabricated from roll formed sections made of galvanised steel colour coated/powder coated All steel sections shall have a primer coat with epoxy primer of 5-7 microns thick finished with a polyester paint of 12-16 microns thick and back coated with alkyd lacquer of 5-7 microns or powder coated with pure polyester powder upto to 50-60 microns thick, including supplying, fitting and fixing in position 4 mm thick float glass to windows and ventilators of approved quality including glazing putty, glazing clips, handle, locking arrangements, stays etc. all as per attached drawings, specifications and directions of the Engineer/Consultant. (glazing will be measured separately and paid under relevant item of BOQ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Fully glazed side hung window sq m 1.0</td>
</tr>
<tr>
<td>b)</td>
<td>Fully glazed centre ventilator sq m 1.0</td>
</tr>
<tr>
<td>c)</td>
<td>Fully glazed sliding window sq m 1.0</td>
</tr>
<tr>
<td>d)</td>
<td>Fully glazed fixed window/ ventilator sq m 1.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>K-12</th>
<th>Supplying, fitting and fixing in position glazing to doors, windows and ventilators as specified of approved quality clear/toughened float glass, including glazing putty, glazing clips etc, all as per drawings, specifications and directions of the Engineer/Consultant, plant and labour complete in all respect (glazing will be measured on the basis of individual glass pane size as specified in IS:1038):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Description</td>
</tr>
<tr>
<td>------</td>
<td>-------------</td>
</tr>
<tr>
<td>i)</td>
<td>4 mm thick clear float glass of approved quality</td>
</tr>
<tr>
<td>ii)</td>
<td>6 mm thick clear float glass of approved quality</td>
</tr>
<tr>
<td>iii)</td>
<td>6 mm thick toughened float glass</td>
</tr>
</tbody>
</table>

**K-13**

Supplying, fitting and fixing 4 lever mortice latch and lock of "Godrej" make or approved equivalent with keys in duplicate to wooden door shutters including chromium plated brass and face plates with necessary screws etc, all as per drawings, specifications and directions of the Engineer/Consultant:

<table>
<thead>
<tr>
<th>Variant</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Plain</td>
<td>1.0</td>
</tr>
<tr>
<td>b) Rebated</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**K-14**

Supplying, fitting and fixing single leaf fully sheeted fire check steel doors as per IS:1038 and IS:1081 with shutters consisting of 16 gauge M.S sheet on both faces of shutter inside fitted with rock wool board having density 150 kg/cu m Spintex 900 or approved equivalent and frame shutters conforming to IS:1038, all joints flush butt welded including 4x2.4 mm dia asbestos rope glued to shutter frame, all fittings, fixtures, approved quality hinges, hold fasts, latch lock, drop bolts, stays etc and keys in duplicate including cutting/drilling necessary holes in the brick wall and concrete and grouting of lugs in the same with(M20D) cement concrete providing anchor fastners as mentioned in the drawing or as directed by the engineer all materials, tools, plant and labour complete.

<table>
<thead>
<tr>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
</tr>
</tbody>
</table>

**K-15**

Supplying, fitting and fixing false ceiling with Gypsum board of approved quality providing cut out for light fitting, AC grills, all as per attached drawings, specifications and directions of the Engineer/Consultant (cost of M.S. hangers is included in the rate of this item)

<table>
<thead>
<tr>
<th>Variant</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) with Plain Gypsum board</td>
<td>sq m</td>
</tr>
<tr>
<td>(ii) with semi perforated Gypsum board</td>
<td>sq m</td>
</tr>
<tr>
<td>(iii) with fully perforated Gypsum board</td>
<td>sq m</td>
</tr>
<tr>
<td>(iv) with vinyl laminated Gypsum board</td>
<td>sq m</td>
</tr>
<tr>
<td>K-16</td>
<td>Supplying and fixing in position Lineal Metal False Ceiling of approved make, providing cut outs for lighting fittings and ventilation grills suspended from ceiling as per the direction/instruction of the manufacturer including supplying and fixing all fittings and fixtures as necessary and as per attached drawings, specifications and direction of Engineer/Consultant. (The rate should include the cost for supplying and fixing hangers)</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>K-17</td>
<td>Supplying and fixing in position False Ceiling boards fixed with aluminium frames and providing cut outs for lighting fittings and ventilation grills as per drawings, specification and the direction of the Engineer/Consultant, including supplying and fixing all fittings and fixtures as per attached drawing (The rate should include the cost for supplying and fixing hangers)</td>
</tr>
<tr>
<td></td>
<td>(i) with cement bonded particle board conforming to IS:14276</td>
</tr>
<tr>
<td></td>
<td>(ii) with medium density fibre boards (MDF) conforming to IS:12406</td>
</tr>
<tr>
<td>K-18</td>
<td>Supplying and providing in position composite underdeck thermal insulation to soffit of roof slab with Gypsum board topping and glass wool underlayer as per attached drawings, specification and direction of the Engineer/Consultant.</td>
</tr>
<tr>
<td>K-19</td>
<td>Supplying, fitting and fixing in position Indian Standard steel windows and ventilators with frames and shutters of different types according to IS:1038 with all joints flush butt welded including coupling bars for composite windows and ventilators with heavy duty brass handles and peg stays and all other steel fittings and fixtures like hinges, lugs, stoppers etc and including cutting/drilling necessary holes in walls etc and grouting lugs in the same with (M20D) cement concrete and finishing neatly, all as per drawings, specifications and directions of the Engineer/Consultant, all materials, tools, plant and labour complete in all respect:</td>
</tr>
<tr>
<td></td>
<td>a) Openable type</td>
</tr>
<tr>
<td></td>
<td>b) Fixed type</td>
</tr>
<tr>
<td>K-20</td>
<td>Supplying, fabricating and welding of M.S guard bars 10 mm square section at maximum spacing of 125 mm c/c with 19 mm x 5 mm M.S. flat fixed to masonry wall at a distance of 75 mm on the inside face of steel window frame and as per drawings, specifications and directions of the Engineer/Consultant, all materials, tools, plant and labour complete in all respect</td>
</tr>
<tr>
<td>K-21</td>
<td>Supplying, fitting and fixing in position approved quality M.S. rolling shutters conforming to IS: 6248, pull and push type of fully sheeted/partly sheeted partly grilled/fully grilled types as specified with all accessories, side guides, 20 gauge hood cover of hexagonal shape, locking arrangement, handles to operate rolling shutters, rolling grills of following types including cutting necessary holes in walls and grouting with (M20D) cement concrete and finishing neatly all as per drawings, specifications and directions of the Engineer/Consultant, all materials, tools, plant and labour complete in all respect (measurement of rolling shutters shall be the same as that of clear wall opening)</td>
</tr>
<tr>
<td>a) Manually operated</td>
<td></td>
</tr>
<tr>
<td>b) Mechanically gear operated</td>
<td></td>
</tr>
<tr>
<td>c) Electrically operated</td>
<td></td>
</tr>
<tr>
<td>K-22</td>
<td>Supplying and fixing PVC door of thickness 30 mm with frame as per the manufacturer's specifications and as shown in the drawing with all materials, tools, tackels and labour complete in all respect</td>
</tr>
<tr>
<td>K-23</td>
<td>Supplying, fitting and fixing in position approved make automatic hydraulic door closer conforming to IS:3564 with all necessary screws, fittings and fixtures, all as per drawings, manufacturer's specification and directions of the Engineer/Consultant.</td>
</tr>
<tr>
<td>M. WATER PROOFING</td>
<td>SQM</td>
</tr>
<tr>
<td>M-1</td>
<td>Providing waterproofing to base, walls &amp; vertical faces of underground structures as shown on drawings and as specified under with a guarantee of waterproofing for a period of ten (10) years supply of all materials and labour complete</td>
</tr>
<tr>
<td></td>
<td>Supplying and applying two coats of cementitious waterproofing compound like Raintite I of Sika/ MASTERSEAL 511 of BASF / Powercrete of Pidilite/ ShaliCrete of STP/ CHRYSO Armourcrete or approved equivalent according to manufacturer's instructions over concrete surfaces including rectification of any defects in concrete surfaces by rendering with (1:3) cement sand mortar before application of the approved cementitious compound</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>b)</td>
<td>Supplying and applying two coats of coal tar epoxy based waterproofing compound like MasterProtect 1812 of BASF/ Sika Inertol Poxitar/Nitocote ET140 of Fosroc/ CHRYSO Armourcote 560 / Dr.Fixit Coal Tar Epoxy/ Shalimastic EHD of STP or approved equivalent according to manufacturer's instructions over concrete surfaces including rectification of any defects in concrete surfaces by rendering with (1:3) cement sand mortar before application of the approved waterproofing compound</td>
</tr>
<tr>
<td>c)</td>
<td>Supplying, placing and fixing 15 mm dia M.S threaded nozzles having a minimum thickness of 16 gauge (medium quality) of suitable length in approximate grid pattern of 1.5 m c/c prior to or as per manufacturers specification prior to or during concreting in base, walls and vertical faces of under- ground structures and also providing 15 mm dia M.S threaded nozzles/packers at regular intervals not exceeding 1.5 m c/c along construction joints and at critical joints as directed, plugging both ends of the nozzles to prevent ingress of foreign materials all as per drawings and as directed by the Engineer</td>
</tr>
<tr>
<td>d)</td>
<td>Supplying and applying plasticiser-cum-water proofing compound Sikament 170 (SWP) of Sika/CHRYSO WP 01/Shaliplast LW+ of STP/MASTERRHEOBUILD 614TT of BASF/ Conplast P211(M) of Fosroc or approved equivalent in concrete as per manufacturers instructions and specifications and as directed by the Engineer (Payment will</td>
</tr>
</tbody>
</table>
be made on the volume of concrete)

e) Injecting Intraplast EP of Sika/MasterFlow 150 of BASF/Chryso Excem-C /Cebex 100 of Fosroc/Shaligrout IP of STP / Pidicrete AM of Pidilite non-shrink polymeric waterproof grouting compound or approved equivalent and mixed with cement slurry through the nozzles set in the base, walls and vertical faces of concrete under pressure by pump and finally sealing off the nozzles after the injection operation is over with Sika 4a of Sika/Chryso XEL03 /Renderoc Plug of Fosroc/ Instant Leak plug of Pidilite quick setting admixture or approved equivalent all as per instructions of the manufacturer and as directed by the Engineer.

Note: For payment under this item inside surface area to be considered for measurement of underground structures.

| M-2 | Providing and laying chemical based impermeable waterproofing treatment over the roof slabs consisting of spreading an even layer (min. 12 mm thick) of approved waterproofing compound (1 kg compound for every 50 kg of cement) in cement mortar (1:4) over which a layer of halfcut bricks or brick bats of an average thickness of 115 mm shall be laid in slope or uniform level as required in the site of work, filling the voids in brick bats with the waterproofing compound mixed in cement mortar (1:4) and including jointless finishing on the top with 20 mm thick cement mortar (1:4) mixed with waterproofing compound, to be left rough or finished smooth as required including the cost of all material complete (work to be carried out through approved specialists). |
| sq m | 1.0 |

| M-3 | Providing and laying chemical based impermeable waterproofing treatment for vertical sides of beams and parapet walls with two coats of plaster each 12.5 mm thick in cement mortar (1:4) including fixing brick ballast in green mortar and with addition of approved waterproofing compound (1 kg compound for every 50 kg of cement) and finished with a coat of neat cement |
| sq m | 1.0 |
punning (Work to be carried out through approved specialists)

| M-4 | Supplying and laying of fibre glass cloth over acrylic polymer modified cementitious water proofing compound Sika Top Seal 107 of Sika/MASTERSEAL 550 of BASF/ Brush Bond of Fosroc/Pidilite Pidifin 2k /CHRYSO Tapelastic/ShaliCem FWP or approved equivalent laid over roof slab and including overlapping in parapet wall rendered with (1:4) cement sand mortar and protected by a layer of avg. 50 mm thk screed concrete (M15) admixed with Sika Plasto Crete plus of Sika/Chryso WP 01/Conplast X 421IC of Fosroc/Pidilite Pidiproof LW + or ShaliPlast LW+ of STP approved equivalent laid in slope underlaid by a layer of acrylic polymer modified cementitious water proofing compound same as above true to specification as shown in the drawing and as directed by Engineer, with all ancillary civil work with all materials, tools, labour complete in all respect | sq m | 1.0 |

| M-5 | Supplying and painting one coat of approved hot bitumen using 1.5 kg/sq m of bitumen of 20/30 grade of STP or equivalent as per IS:702 for water proofing on all concrete/plastered surfaces at all depths below ground level including a coat of approved bituminous primer as per drawings, specifications and directions of the Engineer/ Consultant, all materials, tools and labour complete in all respect | sq m | 1.0 |

| M-6 | Supplying and laying in position Roof water proofing and thermal insulation for trafficable flat roof as detailed below of Texsa India Ltd or approved equivalent.  

i) Minimum 50 mm thick PCC (1:1.5:3) bottom layer laid to slope.  

ii) Rubberised bituminous emulsion “Emufal TE”/CHRYSO Bitcote/Dr.Fixit Torchshield Primer/ ShaliTex Primer of STP or approved equivalent @ 0.3 kg/sqm  

iii) Water proofing membrane Sika WP Shield 104 P/CHRYSO/ Armourshield 4 | sq m | 1.0 |
mm/Dr.Fixit Torchshield AP4160/Super ThermoLay of STP or approved equivalent over prime surface by

iv) Spot sticking geotextile "Terram 1000" 125 gsm of TEXSA / ShaliGeo Text of STP or approved equivalent over water proofing membrane as separation layer.

v) Thermal insulating membrane "Roofmate TG of TEXSA /CHRYSO XPS RG/ Shali XPS of STP or approved equivalent (50 mm thick, 30kg/cu m density, thermal conductivity 0.023 kcal/mh deg C) over geotextile layer.

vi) "Drentex Impact 200" laid over thermal insulation.

vii) Finish with terrace tile. Work shall include all materials, tools, plant and labour complete and shall be done as per manufacturer's specification drawings, and as directed by Engineer/Consultant.

<table>
<thead>
<tr>
<th>M-7</th>
<th>Injecting waterproofing compounds through the nozzles /packers already fixed in the concrete at all heights and depths by pressure pumps with all material, tools and tackles, labour, scaffolding etc. complete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>sq m 1.0</td>
</tr>
</tbody>
</table>

a) with polymer based non-shrink chemicals (ShaliGrout IP of STP/Chryso Excem C/Dr.Fixit Pidicrete AM)

b) with moisture sensitive epoxy based chemicals (ShaliGrout EI of STP/Dr.Fixit Epoxy Injection Grout)

c) with Polyurethane Based Chemicals (ShaliGrout PU of STP/ Dr.Fixit PU Foam Injection or Dr.Fixit PU Plain Injection)
| M-8 | Supplying & laying in position roof waterproofing and overdeck thermal insulation providing Layer 1: Minimum 50 mm thk. PCC (1: 1.5: 3) bottom layer laid to slope Layer 2: Rubberised bituminous emulsion EMUFAL TE of TEXSA/ CHRYSO Bitcote / ShaliTex Primer of STP or approved equivalent @ 0.3 kg/sqm over layer 1 Layer 3: Waterproofing membrane Sika WP Shield 104 P of Sika /CHRYSO Armourshield 4 mm/Dr.Fixit Torchshield AP4160/ SuperThermoLay of STP or approved equivalent over layer 2 by torch on method. Layer 4: Spot sticking geotextile "Terram 1000" 125 gsm of TEXSA/ ShaliGeoText of STP or approved equivalent over layer 3 as separation layer. Layer 5: Thermal insulating membrane "roofmate TG of TEXSA/ CHRYSO XPS RG/ Shali XPS of STP or approved equivalent (50 mm thk, 30kg/cum density, thermal conductivity 0.023 kcal/mg deg C) over layer 4 Layer 6: Spot sticking geotextile "Terram 1000" 125 gsm of TEXSA / ShaliGeo Text of STP or approved equivalent over layer 5 as separation layer. Layer 7: one layer of 50 thk. Screed concrete (1:1.5:3) over layer 6 The work shall be per drawings, specifications and directions of the Engineer/ Consultant, all materials, tools and labour complete in all respect | sq m | 1.0 |

<table>
<thead>
<tr>
<th>N.</th>
<th><strong>SANITARY AND PLUMBING</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Note:</strong> The rates to include the cost of cutting chases and holes in brickwork, rubble masonry, concrete, plaster etc for embedding or passing pipes, fixing brackets, fitting and making good the damages to the original condition wherever necessary, also the rates should include the cost of cutting, bending, threading, jointing etc of pipeworoks and applying one coat of single pack air drying heavy duty anticorrosive bituminous paint to the inside of cast iron soil, waste and vent and rainwater pipes and fittings.</td>
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</tbody>
</table>
### N-1

Supplying, laying, fitting and fixing the following sanitary items including all pipeworks, fittings, joints and other necessary items to run the system successfully

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>a)</td>
<td>Supplying, fitting and fixing white glazed earthenware European type water closet of approved make with 'P' or 'S' trap with or without vent hole, black solid plastic seat and cover of approved make with chromium plated hinges and rubber studs, 15 litres capacity white glazed porcelain, lowdown mosquitoproof cistern of approved make with Porcelain syphon, non-ferrous internal and external fittings, chromium plated flush bends, push handle etc, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete</td>
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<td>Each</td>
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<tbody>
<tr>
<td>b)</td>
<td>Supplying, fitting and fixing in position white glazed earthenware Indian type water closet comprising of 580 mm long 'Orissa Pan' of approved make with 15 litres capacity mosquito proof low level high impact white (HDPE) polystyrene flushing cistern of approved quality complete in all respect with all internal and necessary external fittings all as per drawings, specifications and directions of the Engineer/Consultant, all materials, tools, plant and labour complete in all respect</td>
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<td>Each</td>
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<thead>
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</thead>
<tbody>
<tr>
<td>c)</td>
<td>Supplying, fitting and fixing 590 mm x 390 mm x 375 mm white glazed vitreous China standing type flat back, urinal of approved make fixed on wall with concealed type bracket, wooden gutties etc including partition wall, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete</td>
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<td>Each</td>
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<tbody>
<tr>
<td>d)</td>
<td>Supplying, fitting and fixing white glazed vitreous China approved make automatic flushing cistern fixed on wall with supporting brackets and brass screws, 25 mm to 15 mm dia galvanised steel medium quality flush pipes with all necessary G.I. Fittings such as bends,</td>
</tr>
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<td></td>
<td>Each</td>
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</table>
elbows, tees, 15 mm dia PVC connector with heavy brass coupling at one end and as per drawing, all materials, tools and labour complete

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<tbody>
<tr>
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</tr>
<tr>
<td>i) 5 litres capacity with 20 mm dia syphon and 15 m dia brass nose cock for the range of one urinal</td>
<td>Each</td>
<td>1.0</td>
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<tr>
<td>ii) 10 litres capacity with 25 mm dia syphon and 15 mm dia brass nose cock for the range of two urinals</td>
<td>Each</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>

e) Supplying, fitting and fixing PVC approved make automatic flushing cistern fixed on wall with supporting brackets and brass screws, with PVC flushing pipes and all necessary PVC fittings such as bends, elbows, tees, 15 mm dia PVC connector with heavy PVC coupling at end and as per drawing, all materials, tools and labour complete in all respects:

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<tbody>
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<td></td>
<td></td>
</tr>
<tr>
<td>i) 5 litres capacity with 20 mm dia syphon and 15 m dia brass nose cock for the range of one urinal</td>
<td>Each</td>
<td>1.0</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>ii) 10 litres capacity with 25 mm dia syphon and 15 mm dia brass nose cock for the range of two urinals</td>
<td>Each</td>
<td>1.0</td>
<td></td>
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</tbody>
</table>

f) Supplying, fitting and fixing white glazed vitreous China wash basin of approved make with central tap hole including supplying and fixing of C.I. brackets painted with one coat of approved red oxide zinc chromate primer and two coats of approved synthetic enamel paint, 15 mm dia chromium plated approved deluxe head pillar tap, 32 mm dia chromium plated heavy duty approved waste fittings, chain rubber plug etc, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete

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<tbody>
<tr>
<td></td>
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<td></td>
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<tr>
<td>i) 550 mm x 400 mm</td>
<td>Each</td>
<td>1.0</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i) 550 mm x 400 mm (Oval)</td>
<td>Each</td>
<td>1.0</td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>ii) 450 mm x 300 mm</td>
<td>Each</td>
<td>1.0</td>
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<tr>
<td>g) Supplying, fitting and fixing in position stainless steel kitchen sink with integral single drain board, of following sizes stainless steel waste fittings made of approved make fixed on wall with M.S. angle brackets of required section painted with one coat of red oxide zinc chromate primer and two coats of approved synthetic enamel paint to the brackets, all materials, tools and labour complete</td>
<td></td>
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<tr>
<td></td>
<td>i) Overall size 940 mm x 535 mm</td>
<td>Each</td>
<td>1.0</td>
</tr>
<tr>
<td>h) Supplying, fitting and fixing in position 500 x 350 x 150 mm deep white glazed fire clay laboratory sink inside laboratory room of ‘Parryware’ make or other approved equivalent including supplying and fixing a pair of CI brackets, 40 mm dia CP waste fittings complete and applying one coat of red oxide zinc chromate primer and two coats of synthetic enamel paint of approved make to CI brackets, all materials, tools and labour complete</td>
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<td></td>
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<tr>
<td></td>
<td>Each</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>N-2</td>
<td>Supplying, laying, fitting and fixing the following pipes for drainage and sewerage line including all pipeworks, fittings, joints and other necessary items to run the system successfully</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>Supplying and laying in slope following stoneware pipes conforming to grade I of IS:651 at all depths below plinth level as specified and as shown in drawing including spigot and socket jointing with joints filled in (1:1) cement mortar with necessary hemp yarn etc, curing joints and testing of pipes as specified in specification, IS:4127 and IS:1200 but excluding excavation, bedding, haunching of concrete and backfilling, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>i) 100 mm dia</td>
<td>R M</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>ii) 150 mm dia</td>
<td>R M</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>iii) 200 mm dia</td>
<td>R M</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>iv) 250 mm dia</td>
<td>R M</td>
<td>1.0</td>
</tr>
</tbody>
</table>
b) Supplying, fitting and fixing in position HDPE pipes conforming to material grade PE 100 for industrial use of underground drainage and sewarage application conforming IS 14333:1996 and for pressure rating PN-10 (wp 1.0 Mpa) at all depths below plinth level as specified and shown in drawing including necessary fittings and joined either by click ring type fittings or by butt welding but excluding excavation, bedding and backfilling all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete

<table>
<thead>
<tr>
<th>Size (mm)</th>
<th>Rate (R M)</th>
<th>Each</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td></td>
<td></td>
</tr>
<tr>
<td>160</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>200</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>250</td>
<td></td>
<td>1.0</td>
</tr>
<tr>
<td>300</td>
<td></td>
<td>1.0</td>
</tr>
</tbody>
</table>

N-3 Supplying and fixing 100 mm dia square mouth 'P' type salt glazed S.W. gully/yard gully traps Grade-I with 200 mm sq C.I. hinged grating including filling joints with cement mortar (1:1) and necessary hemp yarn, curing etc, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete

<table>
<thead>
<tr>
<th>Description</th>
<th>Rate (R M)</th>
<th>Each</th>
</tr>
</thead>
</table>

N-4 Supplying and fixing master trap for sewer line

a) Supplying, fitting and fixing 150 mm dia salt glazed stoneware master trap with cleaning access and cover conforming to IS:651 inside the pit at all depths below plinth level including joints with cement mortar (1:1) all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete

<table>
<thead>
<tr>
<th>Description</th>
<th>Rate (R M)</th>
<th>Each</th>
</tr>
</thead>
</table>

b) 160 x 160 x 110 mm size HDPE master trap with cleaning access and cover inside the pit at all depths below plinth level, joints shall be as per manufacturer's specification and direction of the Engineer, all materials, tools and labour complete.
<table>
<thead>
<tr>
<th>N-5</th>
<th>Supplying and laying manhole cover with frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Supplying, fitting and fixing with PCC (M-10) 500 mm dia C.I. manhole cover and frames conforming to IS:1726 to inspection pits and septic tank, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete</td>
</tr>
<tr>
<td></td>
<td>i) Medium duty - MD 10 grade/116 kg Each 1.0</td>
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<tr>
<td></td>
<td>ii) Heavy duty - HD 20 grade/270kg Each 1.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N-6 (a)</th>
<th>Supplying, fitting and fixing heavy cast iron (HCI) C.I. soil pipes conforming to IS:1729 of the following sizes at all heights and depths above and below plinth level including caulking joints with lead as specified, clamps, C.I. bobbins, wooden plugs, nails etc and testing of pipes, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>i) 50 mm dia R M 1.0</td>
</tr>
<tr>
<td></td>
<td>ii) 100 mm dia R M 1.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N-6(b)</th>
<th>Supplying, fitting and fixing UPVC soil pipes conforming to IS 13592:2013 of the following sizes at and at all heights and depths above and below plinth level including solvent cement or rubber seal type joints as specified and testing, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>i) 50 mm dia R M 1.0</td>
</tr>
<tr>
<td></td>
<td>ii) 100 mm dia R M 1.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>N-7(a)</th>
<th>Supplying, fitting and fixing following HCI soil fittings such as junctions, bends, tees, inspection pieces, 'P' or 'S' trap, trap extension piece, WC connector etc at all heights and depths above and below plinth level with or without cleaning, access door, 3 mm thick insertion rubber washer, putting bolts including caulking joints with lead as specified and testing, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>i) 50 mm dia Each 1.0</td>
</tr>
<tr>
<td></td>
<td>ii) 100 mm dia Each 1.0</td>
</tr>
</tbody>
</table>
### N-7(b)
Supplying, fitting and fixing following uPVC fittings such as junctions, bends, tees, inspection pieces, 'P' or 'S' trap, trap extension piece, WC connector etc conforming IS: 14735 at and at all heights and depths above and below plinth level with or without cleaning, access door, 3 mm thick insertion rubber washer, solvent cement or rubber seal type joints as specified and testing, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete.

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Quantity</th>
<th>Rate (RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>

### N-8(a)
Supplying, fitting and fixing in position galvanised steel waste pipes of following dia conforming to IS:1239 (medium duty) at all heights and depths above and below plinth level including necessary galvanised steel fittings such as elbows, tees, plugs, sockets, short pieces, H.B. clamps etc and testing of the pipelines all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete.

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Quantity</th>
<th>Rate (RM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>1.0</td>
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</tr>
</tbody>
</table>

### N-8(b)
Supplying, fitting and fixing in position uPVC pressure pipes conforming IS: 13892 and as per ASTM D-1785 for waste water of following dia at and at all height and depths above and below plinth level including necessary uPVC fittings such as coupler, tee, sockets, elbow, bend, short pieces etc and testing of the pipelines as per drawings, specification and direction of the Engineer, all materials, tools, and labour complete.

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Quantity</th>
<th>Rate (RM)</th>
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<tbody>
<tr>
<td>32</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Description</td>
<td>Diameter (mm)</td>
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<tr>
<td>---</td>
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</tr>
<tr>
<td>N-8(c)</td>
<td>Supplying, fitting and fixing in position uPVC pressure pipes conforming IS:13592 and as per ASTM D-1785 for waste water of following dia at and at all height and depths above and below plinth level including necessary GI fittings such as coupler, tee, sockets, elbow, bend, short pieces etc and testing of the pipelines as per drawings, specification and direction of the Engineer, all materials, tools, and labour complete</td>
<td>i) 32</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) 40</td>
</tr>
<tr>
<td></td>
<td></td>
<td>iii) 50</td>
</tr>
<tr>
<td>N-9(a)</td>
<td>Supplying, fitting and fixing in position galvanised steel (medium duty) distribution pipes of the following sizes conforming to IS:1239 at all heights and depths above and below plinth level including necessary galvanised steel fittings such as bends, elbows, tees, plugs, sockets, short pieces, clamps etc and testing of the pipe lines hydraulically, all as per drawing, specifications and directions of the Engineer, all materials, tools and labour complete</td>
<td>i) 15</td>
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<tr>
<td></td>
<td></td>
<td>ii) 20</td>
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<td></td>
<td></td>
<td>iii) 25</td>
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<td></td>
<td></td>
<td>iv) 32</td>
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<td></td>
<td></td>
<td>v) 40</td>
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<td></td>
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<td>vi) 50</td>
</tr>
<tr>
<td>N-9(b)</td>
<td>Supplying, fitting and fixing in position uPVC pressure pipes conforming IS 4985 and as per ASTM D-1785 for distribution water of following dia at and at all height and depths above and below plinth level including necessary uPVC fittings such as coupler, tee, sockets, elbow, bend, short pieces etc and testing of the pipelines as per drawings, specification and direction of the Engineer, all materials, tools, and labour complete</td>
<td>i) 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ii) 20</td>
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<tr>
<td></td>
<td></td>
<td>iii) 25</td>
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<td>iv) 32</td>
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<td></td>
<td></td>
<td>v) 40</td>
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<tr>
<td></td>
<td></td>
<td>vi) 50</td>
</tr>
<tr>
<td>N-9(c)</td>
<td>Supplying, fitting and fixing in position uPVC pressure pipes conforming IS 4985 and as per ASTM D-1785 for distribution water of following dia at and at all height and depths above and below plinth level including necessary GI fittings such as coupler, tee, sockets, elbow, bend, short pieces etc and testing of the pipelines as per drawings, specification and direction of the Engineer, all materials, tools, and labour complete</td>
<td></td>
</tr>
<tr>
<td></td>
<td>i) 15 mm dia</td>
<td>R M</td>
</tr>
<tr>
<td></td>
<td>ii) 20 mm dia</td>
<td>R M</td>
</tr>
<tr>
<td></td>
<td>iii) 25 mm dia</td>
<td>R M</td>
</tr>
<tr>
<td></td>
<td>iv) 32 mm dia</td>
<td>R M</td>
</tr>
<tr>
<td></td>
<td>v) 40 mm dia</td>
<td>R M</td>
</tr>
<tr>
<td></td>
<td>vi) 50 mm dia</td>
<td>R M</td>
</tr>
</tbody>
</table>

| N-9(d)  | Supplying, fitting and fixing in position cPVC pressure pipes for hot and cold water distribution system conforming to IS 15778:2012 of following dia at and at all height and depths above and below plinth level including necessary fittings such as coupler, tee, sockets, elbow, bend, short pieces etc and testing of the pipelines as per drawings, specification and direction of the Engineer, all materials, tools, and labour complete |
|         | i) 15 mm dia | R M | 1.0 |
|         | ii) 20 mm dia | R M | 1.0 |
|         | iii) 25 mm dia | R M | 1.0 |
|         | iv) 32 mm dia | R M | 1.0 |
|         | v) 40 mm dia | R M | 1.0 |
|         | vi) 50 mm dia | R M | 1.0 |

| N-10    | Supplying, fitting and fixing tested heavy duty (10 Kg/ sq cu) gun metal fullway gate valve of approved make, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete |
|         | i) 15 mm dia | Each | 1.0 |
|         | ii) 20 mm dia | Each | 1.0 |
|         | iii) 25 mm dia | Each | 1.0 |
|         | iv) 32 mm dia | Each | 1.0 |

<p>| N-11    | Supplying, fitting and fixing 15 mm dia chromium plated brass deluxe head approved angular/straight stop cock/ bibcock with C.P. wall flange, all as per drawings, specifications and directions of the Engineer, all materials, tools and |
|         | Each | 1.0 |</p>
<table>
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</thead>
</table>
| N-12 | Supplying, fitting and fixing approved quality tested high pressure type (10 kg/sq cm) following dia fullway brass ball cock (horizontal plunger type) with polyethylene float of approved make at all heights above plinth level, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete  
   a) 15 mm dia | Each | 1.0 |
<p>| N-13 | Supplying, fitting &amp; fixing in position 15 mm dia heavy PVC connector of required length fitted with C.P. brass heavy coupling nuts and rubber washers at both ends to basins, cisterns etc, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete | Each | 1.0 |
| N-14 | Supplying, fitting and fixing in position approved make 125 mm dia chromium plated slotted brass grating over C.I. floor trap including cutting floors, if necessary, and making good etc, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete | Each | 1.0 |
| N-15 | Supplying, fitting and fixing in position 100 mm dia chromium traps, screws, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete | Each | 1.0 |
| N-16 | Supplying, fitting and fixing in position and slope 100 mm dia half-round white glazed vitreous China channels of approved make, plain with outlet and stop-end pieces including grouting the channels with PCC of nominal mix (1:4:8) by volume and filling joints with white cement etc, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete | RM | 1.0 |
| N-17 | Supplying, fitting and fixing in position white glazed porcelain recess roll type toilet paper holder of approved make fixed on wall with brass screws etc, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete | Each | 1.0 |</p>
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-18</td>
<td>Supplying, fitting and fixing in position approved polyethylene liquid soap container fixed on wall with C.P. round headed brass screws, wooden gutties, rawl plugs etc, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete</td>
<td>Each</td>
<td>1.0</td>
</tr>
<tr>
<td>N-19</td>
<td>Supplying, fitting and fixing in position approved make 600 mm long transparent type acrylic towel rail with brackets fixed with C.P. brass screws, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete</td>
<td>Each</td>
<td>1.0</td>
</tr>
<tr>
<td>N-20</td>
<td>Supplying, fitting and fixing in position approved make 600 mm long stainless steel towel rail with brackets fixed with C.P. brass screws, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete in all respect</td>
<td>Each</td>
<td>1.0</td>
</tr>
<tr>
<td>N-21</td>
<td>Supplying, hoisting, fitting and fixing in position at all heights above plinth level approved make high density polyethylene double layer, cylindrical, vertical, water storage tanks of following sizes and capacities at all heights above finished ground level with 400 mm dia hinged manhole cover of the same material with locking arrangement, providing necessary holes for pipe connections etc all materials, tools and labour complete a) 1000 litres cap</td>
<td>Each</td>
<td>1.0</td>
</tr>
<tr>
<td>N-22</td>
<td>Supplying, fitting &amp; fixing C.I. foot steps for manhole, as per drawing, specification and directions of the Engineer/ Consultant, all materials, tools and labour complete in all respect</td>
<td>Each</td>
<td>1.0</td>
</tr>
<tr>
<td>N-23</td>
<td>Supplying, fitting &amp; fixing 15 mm dia chromium plated brass self closing tap of approved make all as per drawing, specification and directions of the Engineer, all materials, tools and labour complete in all respect</td>
<td>Each</td>
<td>1.0</td>
</tr>
<tr>
<td>N-24</td>
<td>Supplying, fitting and fixing chromium plated flush valve of approved make in line with the flush pipe of WC with necessary cast iron box and cover, making the joints of pipe connecting the flush valve and the operating level completely leak proof and making good</td>
<td>Each</td>
<td>1.0</td>
</tr>
</tbody>
</table>
the finish of toilet wall all tools, plants and labour complete in all respect.

| N-25 | Supplying, fitting and fixing in position 100 mm dia chromium plated brass dome shaped grating for urinal waste outlet traps, screws, all as per drawings, specifications and directions of the Engineer/Consultant, all materials, tools and labour complete in all respect. | Each | 1.0 |
| N-26 | Supplying, fitting and fixing C.I. cowl over C.I. ventilation pipe of following dia. as shown in drawings and as directed by Engineer, all materials, tools, plant and labour complete an all respect a) 100 mm dia. | No. | 1.0 |

**P. MISCELLANEOUS**

| P-1 | Supplying, cutting, placing and fixing in position high density polyethylene (HDPE) down pipes conforming to IS:4984 to dispose off rain water at and at all heights and depths above and below finished ground level with joints sealed with white zinc and hemp yarn including all HDPE fittings, such as heads, bends, offsets, swan necks, shoes, bobbins, sockets, M.S. clamps, wooden plugs, nails etc, all as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete  

i) 100 mm dia | R M | 1.0 |

ii) 150 mm dia | R M | 1.0 |

| P-2 | Supplying, fitting and fixing in position uPVC SWR pipes conforming IS 13592-2013 to dispose off rain water at all height and depths above and below finished ground level with joints by sealing rings or solvent cement as per manufacturer's specification including all SWR fittings such as coupler, sockets, elbow, bend, short pieces etc and testing of the pipeline as per drawing, specification and direction of the Engineer, all materials, tools and labours complete  

i) 75 mm | R M | 1.0 |

ii) 90 mm | R M | 1.0 |

iii) 110 mm | R M | 1.0 |

iv) 160 mm | R M | 1.0 |
<table>
<thead>
<tr>
<th>P-3</th>
<th>Supplying and laying in position cast iron grating in roof for disposal of water as shown in the drawing, specifications and directions of the Engineer, all materials, tools, plant and labour complete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a) 200 mm dia \hline</td>
</tr>
<tr>
<td></td>
<td>b) 250 mm dia \hline</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P-4</th>
<th>Supplying, laying, jointing and fixing in position of approved P.V.C. conduit pipes of the following diameters in foundations and super structures including bending, cutting, jointing with special resin, providing 14 gauge G.S pull wire through the pipes, fixing identification number tags etc as per drawings, specifications and directions of Engineer, all materials, tools, plant and labour complete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a) upto 25 mm dia (nominal) \hline</td>
</tr>
<tr>
<td></td>
<td>b) above 25 mm and upto 50 mm dia (nominal) \hline</td>
</tr>
<tr>
<td></td>
<td>c) above 50 mm dia and upto 80 mm dia (nominal) \hline</td>
</tr>
<tr>
<td></td>
<td>d) 100 mm dia (nominal) \hline</td>
</tr>
<tr>
<td></td>
<td>e) 150 mm dia (nominal) \hline</td>
</tr>
<tr>
<td></td>
<td>f) 200 mm dia (nominal) \hline</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P-5</th>
<th>Supplying and laying approved quality building paper as shown on drawings and as directed by the Engineer, all materials and labour complete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>P-6</th>
<th>Supplying and fixing approved premoulded bitumen impregnated fibre board (Shalitex board or approved equivalent) of following thickness at expansion joints, gaps etc at and at all heights and depths above and below finished ground level as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a) 25 mm thick \hline</td>
</tr>
<tr>
<td></td>
<td>b) 40 mm thick \hline</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>P-7</th>
<th>Supplying and laying 25 mm deep approved bitumen sealing compound in expansion joints of following widths in required proportion 80 kg of hot bitumen and 0.25 cu m of coarse sand complete as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a) 25 mm thick \hline</td>
</tr>
<tr>
<td></td>
<td>b) 40 mm thick</td>
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</tr>
<tr>
<td>P-8</td>
<td>Taking delivery from Employer’s stores/stockyard or directly from site steel materials, loading, unloading, transporting, fabricating, cutting, bending and fixing in position fan hooks made of 16 mm dia x 650 long M.S. round to ceilings, including cutting holes in shuttering, if necessary, and providing painting the fan hooks with two coats of ready-mix synthetic enamel paint of make, colour and shade approved by the Engineer over one coat of approved primer conforming to IS:2074, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
</tr>
<tr>
<td>P-9</td>
<td>Supplying and filling toilet drop slabs with Jhama concrete (1 part cement:4 parts sand:8 parts jhama aggregates) including curing etc, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
</tr>
<tr>
<td>P-10</td>
<td>Supplying, fabricating, transporting and fixing in position, M.S. grills consisting of 25 mm x 6 mm M.S. flats of design, pattern and sizes as shown in the drawings including necessary welding, grinding and drilling of holes to the frames for fixing etc and including providing complete painting with two coats of synthetic enamel paint of make, colour and shade as approved by the Engineer over one coat of primer conforming to IS:2074 all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
</tr>
<tr>
<td>P-11</td>
<td>Supplying and filling in soaking pits, trenches etc brickbats of following grades laid in layers in dry and loose conditions at all depths below finished ground level all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
</tr>
<tr>
<td></td>
<td>a) with 50 mm and down graded brickbats</td>
</tr>
<tr>
<td></td>
<td>b) with 100 mm and down graded brickbats</td>
</tr>
</tbody>
</table>
Supplying, fitting and laying in position to correct level and slope R.C. pipes of following dia conforming to IS:458 including collars with joints packed with jute braiding dipped in hot bitumen and filled with cement mortar (1:2) and curing, neatly finished with with 45 degree splay, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete (Excavation and backfilling required for laying RC pipes will be measured and paid separately under relevant items).

**a) NP2 class**

<table>
<thead>
<tr>
<th>Dia</th>
<th>RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 mm</td>
<td>1.0</td>
</tr>
<tr>
<td>250 mm</td>
<td>1.0</td>
</tr>
<tr>
<td>300 mm</td>
<td>1.0</td>
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</tbody>
</table>

**b) NP3 class**

<table>
<thead>
<tr>
<th>Dia</th>
<th>RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>350 mm</td>
<td>1.0</td>
</tr>
<tr>
<td>400 mm</td>
<td>1.0</td>
</tr>
<tr>
<td>450 mm</td>
<td>1.0</td>
</tr>
<tr>
<td>500 mm</td>
<td>1.0</td>
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<tr>
<td>600 mm</td>
<td>1.0</td>
</tr>
<tr>
<td>900 mm</td>
<td>1.0</td>
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<tr>
<td>1200 mm</td>
<td>1.0</td>
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</tbody>
</table>

**c) NP4 class**

<table>
<thead>
<tr>
<th>Dia</th>
<th>RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>600 mm</td>
<td>1.0</td>
</tr>
<tr>
<td>1000 mm</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Supplying and fixing in position approved water stop in expansion /contraction joints and approved construction joints of finished ground level, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete

<table>
<thead>
<tr>
<th>Dia</th>
<th>RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 mm wide 6 mm thick, dumb-bell shape, PVC water stop without centre bulb of approved make</td>
<td>1.0</td>
</tr>
<tr>
<td>225 mm wide 6 mm thick, dumb-bell shape, PVC water stop with centre bulb of approved make</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Supplying and fixing in position approved water stop in expansion joint of RCC structure at all heights and depths above and below finished ground levels, all as per drawings, specifications and directin of the Engineer/Consultant, all materials, tools, plant and labour

<p>| RM | 1.0 |</p>
<table>
<thead>
<tr>
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</tr>
<tr>
<td>No.</td>
<td>Description</td>
<td>Unit(s)</td>
<td>Quantity</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------------------------------------</td>
<td>-----------</td>
<td>----------</td>
</tr>
<tr>
<td>P-19</td>
<td>Supplying and fixing in position galvanised steel strips 32 mm x 6 mm for earthing as shown in drawings and as directed by the Engineer, all materials, tools, plant and labour complete</td>
<td>RM</td>
<td>1.0</td>
</tr>
<tr>
<td>P-20</td>
<td>Supplying and painting one coat of approved hot bitumen using bitumen of grade 20/30 @ 1.5 kg bitumen per sq m for waterproofing on all concrete/plastered surfaces at all depths below finished ground level including applying a coat of approved bituminous primer as per drawings, specifications and directions of the Engineer, all materials, tools and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>P-21</td>
<td>Supplying, fabricating and fixing in position M.S. tubular gates made of M.S. tubes, flats, angles, weld mesh etc including supplying and applying one coat of approved primer and two coats of synthetic enamel paint complete in all respects all as per drawings and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>MT</td>
<td>1.0</td>
</tr>
<tr>
<td>P-22</td>
<td>Supplying and laying in position approved quality heavy duty cast iron grating over storm water drain, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>MT</td>
<td>1.0</td>
</tr>
<tr>
<td>P-23</td>
<td>Supplying and fixing chicken wire mesh at the junction of concrete, brickwall and screed concrete, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>P-24</td>
<td>Breaking and chipping the top concrete in the pile heads to the correct level including cleaning the reinforcement and bending into the pile cap to the shape all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>R M</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>a) for 400 mm dia piles</td>
<td>R M</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>b) for 550 mm dia piles</td>
<td>R M</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>c) for 600 mm dia piles</td>
<td>R M</td>
<td>1.0</td>
</tr>
<tr>
<td>P-25</td>
<td>Supplying and providing brick on edge paving with bricks of compressive strength not less 50 kgf/sq cm as defined in IS:1077, set in 1:6 cement sand mortar, laid over 25 mm thick sand bedding, including pointing the top surface with</td>
<td>sq m</td>
<td>1.0</td>
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</tr>
<tr>
<td><strong>P-26</strong></td>
<td>Supplying, fitting and fixing in position at all heights CI rain water pipes with specials including all fittings, clamps as specified, all materials and labour complete</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) 100 mm dia</td>
<td>R M</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>b) 150 mm dia</td>
<td>R M</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td><strong>P-27</strong></td>
<td>Supplying and providing about 25 mm average thick gunniting with cement sand mortar of (1:3) as defined in IS:9012 and IS:6433 at all heights above or below finished ground level with hard drawn steel wire welded fabric conforming to IS:1566 as shown in drawing after thorough cleaning of the surface of any dirt, grease or loose particles, providing shuttering if required, mixing, placing, compacting and curing, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td><strong>P-28</strong></td>
<td>Supplying and fastening of reinforcement bars/threaded rods in RCC by Hilti HIT HY200R system or approved equivalent including drilling holes in RCC using template if required, blowing out dust from drilled hole, positioning of bar/rod and fixing/setting with resin hardener chemical, as per drawing, manufacturer’s specification and direction of the Engineer, all materials, tools, plant and labour complete.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) 12 dia bars/rods</td>
<td>Nos.</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>b) 16 dia bars/rods</td>
<td>Nos.</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>c) 20 dia bars/rods</td>
<td>Nos.</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>d) 25 dia bars/rods</td>
<td>Nos.</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td><strong>P-29</strong></td>
<td>Supplying and application of &quot;SIKADUR 32 (LP) of Sika&quot;/DP Bonding Agent of Chryso or other approved equivalent on roughened and cleaned old concrete surface prior to pouring of new concrete within specified time and at all depths above and below finished shop floor level including roughening the old surface by scarifying/ chipping and cleaning the same by colour brush and water/air jetting, as per drawing, manufacturer’s specification and direction of the Engineers, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>P-30</td>
<td>Supplying and filling sand in trenches, at all positions, all as per drawings, specifications and directions of the Engineer, all materials, tools, plant and labour complete</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>P-31</td>
<td>Testing for water tightness according to clause 10 of IS:3370 (Part-I) - Code of Practice for concrete structures for storage of liquids, including providing necessary temporary pipelines, pumps, valves, connections etc and filling of tanks with required water for testing for water retaining structures, complete in all respects as directed by the Engineer, all tools, plant and labour complete</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Note:</strong> Item shall be measured only after successful demonstration by the Contractor of the watertightness to the satisfaction of the Engineer/Consultant</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>a) Overhead water tank</td>
<td>Each</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>b) On-ground water tank</td>
<td>Each</td>
<td>1.0</td>
</tr>
<tr>
<td>P-32</td>
<td>Supplying, decoiling, stretching fully and fixing to &quot;Y&quot; shaped M.S. angle fencing posts approved galvanised steel RPBT (Reinforced Punched Barbed Tape) &quot;Concertina&quot; barbed wire of approximately 600 mm effective diameter with minimum 8 nos turns/meter run along the length of fencing and is to be fixed at the top two ends and at the bottom of the already grouted &quot;Y&quot; shaped M.S. angle frame placed at max. 3m c/c distance and will run along the length of the wall alongwith three horizontal running strands of RPBT including supply and fixing of wire clip for fixing bolts, nuts, washer etc. for fixing at corner posts all as per drawings, and directions of the Employer/Engineer with all materials, tools, plant and labour complete in all respect. The concertina core wire should be hot dip galvanised and conform to IS 4454-Part-I/2001-Grade-II with minimum wire diameter of 2.59 mm.</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td><strong>Note:</strong> For the purpose of measurement length of the boundary shall be measured in RM.</td>
<td>RM</td>
<td>1.0</td>
</tr>
<tr>
<td>P-33</td>
<td>Supplying, decoiling, stretching fully and fixing to M.S./R.C fencing posts approved galvanised steel barbed wire of 2-ply, 12 gauge wire with 4 point thick set barbs at 75 mm centres including wire clip for fixing bolts, nuts, washers etc for fixing at corner posts all as per drawings, and directions of the Engineer, all materials, tools, plant and labour complete (each barbed to be measured separately; MS/RC posts will be measured and paid separately under relevant BOQ items).</td>
<td>RM</td>
<td>1.0</td>
</tr>
<tr>
<td>P-34</td>
<td>Supplying &amp; fixing electrical Exhaust Fan of Crompton Greaves/ Bajaj/Havells or approved equivalent make in line &amp; level at required locations with all necessary fittings &amp; fixtures to place the fan within exhaust grill properly including wiring with socket all as per drawings, specifications and direction of the Engineer In Charge, all materials, tools, plant and labour complete in all respect. i) 400 mm dia</td>
<td>Nos.</td>
<td>1.0</td>
</tr>
<tr>
<td>P-35</td>
<td>Providing and laying 200 mm diameter perforated pipes with collars in rock-toe for drainage including cost of all materials, machinery, labour etc, complete with lead upto 1 km and all lifts</td>
<td>RM</td>
<td>1.0</td>
</tr>
<tr>
<td>P-36</td>
<td>Providing and fixing in position 150 NB stainless steel tube with necessary flange with cover plate, insulation, etc., as sampling ports (750 mm long) at all levels including necessary anchors, grouting, etc., complete for chimney</td>
<td>Nos.</td>
<td>1.0</td>
</tr>
<tr>
<td>P-37</td>
<td>Supplying, fitting &amp; fixing mosquito net at the mouth of vent pipes 50-100 mm diameter as per drawing, specification and directions of the Engineer/Consultant, all materials, tools and labour complete in all respect.</td>
<td>Each</td>
<td>1.0</td>
</tr>
<tr>
<td>P-38</td>
<td>Supplying and filling toilet drop slabs with Jhama concrete (1 part cement:4 parts sand:8 parts jhama aggregates) including curing etc, all as per drawings, specifications and directions of the Engineer/Consultant, all materials, tools, plant and labour complete in all respect.</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>S. No</td>
<td>Description</td>
<td></td>
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<td>-------</td>
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<tr>
<td>P-39</td>
<td><strong>Manufacturing, erecting and fixing in position as shown in the drawing and as specified, R.C precast fencing posts of grade M25 as defined by IS:456, machine mixed and mechanically vibrated with 10mm and down graded stone aggregates excluding reinforcement but including formwork, curing, etc. all materials, tools, plant and labour complete in all respect (reinforcement shall be paid under item C-1(b))</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>cu m</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>P-40</td>
<td><strong>Supplying and laying of concrete interlocking paver block conforming to IS:15658 with suitable concrete grade as mentioned below, including bedding material over a stable sub-base/base, without any deformation over finished surface during operation, laid in specified pattern, correct level and gradient as per direction/design including minor surface dressing as required. Workmanship should conform to the guidelines given in IRC: SP: 063, all as per drawings, manufacturer’s specifications and directions of the Engineer/Consultant, all materials, tools, plant and labour complete in all respect. over 25 mm thick coarse sand backing of approved quality on finished ground with min. safe bearing capacity 5 T/sqm, filling up the joints with approved quality sand.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>i) <strong>50 mm thick solid precast concrete interlocking paver blocks (M30 grade) for non traffic walkways laid over 25 mm thick coarse sand backing of approved quality on finished ground with min. safe bearing capacity 1 T/sqm, filling up the joints with approved quality sand.</strong></td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>ii) <strong>80 mm thick medium traffic solid precast concrete interlocking paver block (M40 grade) for walkway/car drive way/car park laid</strong></td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td>iii) <strong>Heavy duty 100 mm thick precast concrete interlocking paver block of M-50 grade on minimum 40 mm thk. compacted sand blanket over compacted base filled up and interlocking with coarse sand as per drawing, specification and direction of the Engineer/Consultant.</strong></td>
<td>sq m</td>
<td>1.0</td>
</tr>
</tbody>
</table>
iv) Very heavy duty 120 mm thick precast concrete interlocking paver block of M-55 grade on minimum 50 mm thk. compacted sand blanket over compacted base filled up and interlocking with coarse sand as per drawing, specification and direction of the Engineer/Consultant.

<table>
<thead>
<tr>
<th>Q</th>
<th>DISMANTLING AND TEMPORARY WORK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-1</td>
<td>Dismantling with due care of brick masonry work at all heights and depths above and below ground level and disposing of the muck/debris within a lead of 1 km as directed by the Engineer</td>
</tr>
<tr>
<td>cu m</td>
<td>1.0</td>
</tr>
</tbody>
</table>

| Q-2a | Dismantling with due care of plain/reinforced cement concrete work at all heights and depths above and below ground level using hand operated jack hammer/electrical chippers and disposing of muck/debris within a lead of 1 km as directed by the Engineer |
| i) work including cutting of reinforcement rods and embedments |
| cu m | 1.0 |
| ii) work including exposing the reinforcement rods, straightening and cleaning the same |
| cu m | 1.0 |

| Q-2b | Dismantling with due care of plain/reinforced cement concrete work at all heights and depths above and below ground level using hydraulically operated robotic hammer/crusher and disposing of muck/debris within a lead of 1 km as directed by the Engineer |
| i) work including cutting of reinforcement rods and embedments |
| cu m | 1.0 |
| ii) work including exposing the reinforcement rods, straightening and cleaning the same |
| cu m | 1.0 |

| Q-3 | Dismantling of road/pavement work including all layers and removal of muck/debris upto a lead of 1 km as directed by the Engineer |
| a) Bituminous Road/Pavement |
| cu m | 1.0 |
| b) Concrete Road/Pavement |
| cu m | 1.0 |

<p>| Q-4 | Extra over item No. Q-1 for lead distance only |
| a) for a lead beyond 1 km but not exceeding 2 km |
| cu m | 1.0 |
| b) for a lead beyond 2 km but not exceeding 3 km |
| cu m | 1.0 |</p>
<table>
<thead>
<tr>
<th>Q-5</th>
<th>Extra over item No. Q-2 and Q-3 for disposal of excavated material A. Within Works</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a) for a lead beyond 1 km but not exceeding 3 km cu m 1.0</td>
</tr>
<tr>
<td></td>
<td>b) for a lead beyond 3 km but not exceeding 5 km cu m 1.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q-5</th>
<th>Extra over item No. Q-2 and Q-3 for disposal of excavated material B. Outside Works</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a) for a lead above 5 km but not exceeding 8 km cu m 1.0</td>
</tr>
<tr>
<td></td>
<td>b) for a lead exceeding 8 km but not exceeding 10 km cu m 1.0</td>
</tr>
</tbody>
</table>

**Note for items Q-4 and Q-5**

Lead shall be measured on actual route of haulage. However, the route shall be approved by the Engineer prior to commencement of work.

<table>
<thead>
<tr>
<th>Q-6</th>
<th>Dismantling of drainage pipelines and disposal of muck/debris within a lead of 3 km as directed by the Engineer:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a) upto 300 mm dia pipes R M 1.0</td>
</tr>
<tr>
<td></td>
<td>b) 300 mm-600 mm dia pipes R M 1.0</td>
</tr>
<tr>
<td></td>
<td>c) above 600 mm dia pipes R M 1.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q-7</th>
<th>Dismantling with due care sewage pipelines and disposal at a place anywhere inside the Works as directed by Engineer, including loading, unloading and transporting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a) upto 200 mm dia pipes R M 1.0</td>
</tr>
<tr>
<td></td>
<td>b) 200 mm-600 mm dia pipes R M 1.0</td>
</tr>
<tr>
<td></td>
<td>c) above 600 mm dia pipes R M 1.0</td>
</tr>
</tbody>
</table>

| Q-8 | Taking delivery from Employers stores/stockyard, R.S. joists/rail clusters and supporting existing railway tracks with these and sleeper cribs/concrete pad for underpinning during excavation under running tracks, salvaging the girders/rail clusters after completion of work and restoration of the railway track to the original position to the satisfaction of the Engineer. (The girders/rail clusters will be supplied to the Contractor free of cost by the Employer from Employer's stores/ yard. Work should include necessary cutting/splicing of girders, fabrication if required. On completion of the work the salvaged materials shall be returned by the Contractor to the Employer at |
|-----|---------------------------------------------------------------------------------------------------------------
locations within the steel plant area as directed by the Engineer)

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Using RSJs</td>
<td>MT</td>
<td>1.0</td>
</tr>
<tr>
<td>b) Using rail clusters</td>
<td>MT</td>
<td>1.0</td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-9 Jungle cutting and removal of all vegetation, shrubs, bushes etc complete as directed by Engineer/Consultant and disposing the same anywhere within plant works as directed by Engineer/Consultant, all materials, tools, plant and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Q-10 Cutting core holes with due care of plain/reinforced cement concrete work horizontally/vertically in walls/floors using power driven equipment having diamond cutting bit (HILTI, FISCHER or equivalent) and disposing of debris within a lead of 500 m as directed by Engineer/Consultant, all materials, tools, labour and plant complete in all respect:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) Upto 100 mm dia</td>
<td>R M</td>
<td>1.0</td>
</tr>
<tr>
<td>b) 150 mm dia</td>
<td>R M</td>
<td>1.0</td>
</tr>
<tr>
<td>c) 200 mm dia</td>
<td>R M</td>
<td>1.0</td>
</tr>
<tr>
<td>d) 250 mm dia</td>
<td>R M</td>
<td>1.0</td>
</tr>
<tr>
<td>e) 300 mm dia</td>
<td>R M</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**R ROAD WORK**
| **R. R-1(a)** | Earthwork in excavation for box-cutting in all types of soil and filled materials like slag, cinder, scrap, skulls, steel plant muck, moorum (hard/compacted/soft), soft rock, mica schist, mill scale mixed with tar or tar sludge or any other plant debris but excluding hard rock/compacted slag in mass which requires blasting for forming road base to required sub-levels and cross-sections and dressing the bottom of excavation, in both dry and wet conditions, including stripping of the existing vegetation cover clearing all rubbish, debris, bushes etc. and necessary pumping/bailing out of water, slush removal etc and transporting the excavated material to spoil dumps/fill areas/excavated pits or for formation of embankment/road berms within a lead upto 1 km including levelling of the disposed excavated materials all as directed, as per drawing, specification and direction of the Engineer, all tools, plant and labour complete (authorised working space, benching and side slopes for the excavation will be measured and paid under this item. Scrap steel recovered shall be stacked within 200 m lead from the edge of the excavation as directed by the Engineer) |
| **Note** for item R-1(a) | This item will be operated upon that category of strata which can be excavated with reasonable application of hydraulic excavators  
 a) up to 1.5 m depth below ground level |
| **R-1(b)** | Same as in item R-1(a) but for excavation done with the help of excavator provided with rock breaker attachment, jack hammer, chiselling etc or excavation done by any other mechanical means as approved by the Engineer, complete in all respects all tools, plant and labour complete  
 i) upto 1.5 m depth below existing ground level | cu m | 1.0 |
| R-1(c) | Same as in item R-1(a) but for excavation done manually as approved by the Engineer, complete in all respects all tools, plant and labour complete  
  
i) upto 1.5 m depth below existing ground level  
  
Note for item R-1(a) and R-1(b) & R-1(c)  
  
Excavation will be measured paid as per the approved excavation plan or as per actuals whichever is less.  
  
The contractor may be asked to excavate and transport the earth directly for mass backfilling in other areas within a lead of 1 km. In such cases, no extra payment for backfilling shall be made.  
  
However, if the lead exceeds 1 km then extra payment for transporting the earth shall be made as per item No. R-4. | cu m | 1.0 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R-2</td>
<td>Earthwork in formation of embankments and/or road berms at all heights and depths with earth obtained directly from excavation kept elsewhere within a lead of 1 km to correct slope and grade to be formed in layers not exceeding 200 mm in thickness compacting each layer by mechanical means to obtain a minimum dry density of not less than 95% of the maximum dry density of the soil as obtained by Standard Proctor Test in each layer, dressing to profile, trimming etc all complete as per drawing, specification and direction of the Engineer, all materials, tools, plant and labour complete. (Measurement will be made on the basis of finished cross-section of the earthwork in embankment and/or road berms)</td>
<td>cu m</td>
</tr>
</tbody>
</table>
**R-3** Removing the loose earth and earthwork in formation of subgrade at all depths with earth obtained directly from excavation elsewhere within a lead of 1 km to correct slope and grade to be formed in layers not exceeding 200 mm in thickness compacting each layer by mechanical means to obtain a minimum dry density of not less than 97% and the maximum dry density of the soil as obtained by Standard Proctor Test in each layer, dressing to profile, trimming etc all complete as per drawing, specification and direction of the Engineer, all materials, tools, plant and labour complete. (Measurement will be made on the basis of finished cross-section of the earthwork)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>cu m</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>R-4</td>
<td>Extra over item No. R-1(a) and (b)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>A. Within Works</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>for a lead beyond 1 km but not exceeding 2 km</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>b)</td>
<td>for a lead beyond 2 km but not exceeding 4 km</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>c)</td>
<td>for a lead beyond 4 km but not exceeding 5 km</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td></td>
<td><strong>B. Outside Works</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a)</td>
<td>for a lead above 5 km but not exceeding 8 km</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>b)</td>
<td>for a lead exceeding 8 km but not exceeding 10 km</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>c)</td>
<td>for a lead above 10 km but not exceeding 15 km</td>
<td>cu m</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**R-5** Extra over item No. R-2 and R-3

<table>
<thead>
<tr>
<th></th>
<th>cu m</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>for a lead above 1 km but not exceeding 2 km</td>
<td>cu m</td>
</tr>
<tr>
<td>b)</td>
<td>for a lead exceeding 2 km but not exceeding 4 km</td>
<td>cu m</td>
</tr>
<tr>
<td>c)</td>
<td>for a lead above 4 km but not exceeding 5 km</td>
<td>cu m</td>
</tr>
</tbody>
</table>

**Note for items R-4 and R-5**
Lead shall be measured on actual route of haulage. However, the route shall be approved by the Engineer prior to commencement of work.
<table>
<thead>
<tr>
<th></th>
<th>Description</th>
<th>Unit</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-6</td>
<td>Watering, rolling and compacting the bottom of excavation with minimum six (6) passes of 80 - 100 KN power roller for formation of road sub-grade to achieve a CBR value as specified in the drawing and minimum dry density of not less than 97% and maximum dry density of the soil as obtained by Standard Proctor Test and dressing to correct camber, profile and slope all as per drawings, specification and direction of the Engineer, all materials, tools, plant, and labour complete</td>
<td>sq m</td>
<td>1.0</td>
</tr>
<tr>
<td>R-7</td>
<td>Providing and laying sub-base with 75 mm and down graded trap stone boulder spreaded in uniform layers and finished to a thickness as specified in the drawing to correct grade, camber, cross-section as shown in the drawing including watering and rolling by 80 - 100 kN power roller in all respect, all as per the direction of the Engineer, all materials, tools, plant and labour complete</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>R-8</td>
<td>Providing and filling moorum of approved quality in layers, each layer not exceeding 100 mm thick, including consolidating each layer by watering and ramming at any location all as per drawings, specifications and directions of the Engineer/Consultant, all materials, tools, plant and labour complete in all respect</td>
<td>cu m</td>
<td>1.0</td>
</tr>
<tr>
<td>R-9</td>
<td>Supplying and laying wet mix macadam (WMM) course consists of approved quality crushed stone aggregates, granular materials conforming to physical and grading requirements as per Table 1 &amp; 2 of specification, premixed in a mixing plant with controlled addition of water, laying and spreading of mix uniformly to correct grade, slope, thickness, cross-fall, rolling, compacting with 80-100 KN vibratory roller, all as per drawing, specification and direction of Engineer, all materials, tools, plant and labour complete. Note for item no. R-9: Coarse sand shall be spread over sub-base uniformly before laying of WMM surface, for which no extra payment shall be made. Contractor’s quoted rates shall be inclusive of this.</td>
<td>cu m</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**Total Amount:**
(In words)
Note:-
1.0 The quoted rates of the items mentioned above should be inclusive of all applicable taxes, duties, levies and cess but exclusive of applicable GST. GST will be paid by KIOCL along with the tax invoice submitted by the contractor.

2.0 The above items of BoQ are indicative only. The applicability of the items mentioned above are purely based on detail engineering to be carried out as the project progresses and approval of drawings by OMC/M/s MN DASTUR. During actual execution, many of the items mentioned above may not be applicable. The payment to the Contractor shall be based on actual measurements and certification by OMC/M/s MN DASTUR.

3.0 The reinforcement steel will be issued by KIOCL on free of cost for the job and contractor has to make arrangement for shifting reinforcement steel from owner’s store/yard to work site including loading and unloading at site at his cost.

4.0 Except reinforcement steel, all other materials required for the job shall be under contractor’s scope.

5.0 Wherever the quantities are not available against items, the unit rate to be quoted against respective items.

Seal & Signature of the bidder
Name & Address
<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
<th>Rate</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Fabricating, transporting, erecting and fixing in position at all heights and depths above and below finished ground level welded/bolted structural steelwork as specified for all units of buildings (including multi-storied framed type buildings) and structures, e.g. trestles, towers, galleries for conveyor junction houses, stagings for circular/rectangular tanks, cable racks, pipe racks etc for all members like various types of columns, column bracings, roof legs, gantry girders, auxiliary and surge girders, bottom girders, gable box girders, buffers, crane rails and fixtures for crane rails and surge diaphragms, platforms, trusses, purlins, roof plates, bracings, lacings, stiffeners, side and gable runners, beams, monorails and its supports, lifting beams, girts, posts and hangers, roof and wind girders, roof ventilation monitors, floor and platform supports, stagings, staircases, toe guards, ladders, walkways, heat shields, clamps, ties, struts, diaphragms, sag rods including threading, sag angles, M.S louvres, brackets, doors and all other miscellaneous structural steelwork consisting of built-up welded sections and rolled sections as specified and as shown on drawings and/or as directed by the Engineer including fixing of all types and grades of bolts, studs, nuts, lock nuts, washers (normal/tapered), spring washers fitting, fixtures etc and including all tools, plants, labour etc to complete the work in all respects as specified.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>Structural fabrication</td>
<td>MT</td>
<td>400</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.2</td>
<td>Erection of fabricated steel structures up to 10.0 mtrs level</td>
<td>MT</td>
<td>245</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.3</td>
<td>Erection of fabricated steel structures above 10.0 mtrs level and up to 45.00 mtrs level approx</td>
<td>MT</td>
<td>455</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Refurbishment of existing steel structures at all heights</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>In situ Modification/rectification of erected structures due to any change in engineering/</td>
<td>MT</td>
<td>405</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
basic engineering or due to other reasons which are not attributed to agency in position at all heights and depths above and below finished ground level welded/bolted structural steelwork as specified for all units of buildings (including multi-storied framed type buildings) and structures, e.g. trestles, towers, galleries for conveyor junction houses, stagings for circular/rectangular tanks, cable racks, pipe racks etc for all members like various types of columns, column bracings, roof legs, gantry girders, auxiliary and surge girders, bottom girders, gable box girders, buffers, crane rails and fixtures for crane rails and surge diaphragms, platforms, trusses, purlins, roof plates, bracings, stiffeners, side and gable runners, beams, monorails and its supports, lifting beams, girts, posts and hangers, roof and wind girders, roof ventilation monitors, floor and platform supports, stagings, staircases, toe guards, ladders, walkways, heat shields, clamps, ties, struts, diaphragms, sag rods including threading, sag angles, handrailings, M.S louvres, brackets, doors and all other miscellaneous structural steelwork consisting of built-up welded sections and rolled sections as specified and as shown on drawings and/or as directed by the Engineer including fixing all types and grades of bolts (Product Grade A/Product Grade B), studs, nuts, lock nuts, washers (normal/tapered), spring washers fittings, fixtures etc.

| 3 | Supply and application of paint on steel structures as per the general specifications including all tools, plant, labour etc., at all heights up to maximum of 45 mtrs height approx to complete the work as per the directions of engineer-in-charge. The paint system is enclosed in the contract technical document. The colour and shade of the paint shall be finalized in consultation with engineer-In-charge. | MT | 1105 |
| 4 | Supplying, transporting to site, cutting, placing and fixing in position at all heights above finished ground level single skin trapezoidal pre-painted Aluminium Zinc alloy metal coated steel sheet with standard cover width / profile matching with existing roof sheeting and colour shade with substrate 0.45 BMT and 0.5 mm TCT excluding paint thickness conforming to IS | Sq m | 6700 |
15965: 2012 / YS 550 /Az 150/ Class 3 with paint coating on top and bottom surfaces as super durable polyester of approved colour shade and conforming to IS 15965 class 3 of approved make for Roof sheeting work and necessary water sealing arrangements along with supplying and fixing with galvanized (40 micron zinc coated) steel self drilling and self tapping screws with integral EPDM washers of approved make, non-hardening silicon/butyl sealant tape or any other approved sealant to prevent water penetration, including supplying and fixing of stainless steel pop rivets in side laps and with flashings at specified spacings as per the approved manufacturer's specifications, as directed by the Engineer in charge and as shown in drawings, all materials, tools, plant and labour complete.

**ITEM RATES ONLY**

<table>
<thead>
<tr>
<th>Item</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>5.</strong></td>
<td>Supplying of all MS/high tension normal/countersunk type bolts (Product Grade A/Product Grade B) with nuts, washers, fittings, fixtures etc as shown in the drawing and as specified.</td>
</tr>
<tr>
<td></td>
<td>a) <strong>Grade 4.6</strong></td>
</tr>
<tr>
<td></td>
<td>i) Normal type</td>
</tr>
<tr>
<td></td>
<td>b) <strong>Grade 8.8</strong></td>
</tr>
<tr>
<td></td>
<td>i) Normal type</td>
</tr>
<tr>
<td></td>
<td>ii) Countersunk type</td>
</tr>
<tr>
<td></td>
<td>c) <strong>Grade 10.9</strong></td>
</tr>
<tr>
<td></td>
<td>i) Normal type</td>
</tr>
<tr>
<td></td>
<td>ii) Countersunk type</td>
</tr>
<tr>
<td><strong>6.</strong></td>
<td>Fabricating, transporting, erecting and fixing in position at all heights and depths above and below finished ground level, welded chequered plate work including structural steelwork for supports and stiffeners at floors, walkways, platforms, staircases etc as shown on drawings and/or as directed by the Engineer and applying paint as per General Specification for painting including all tools, plants, labour etc to complete the work in all respects as specified (only chequered plate will be measured in this item. All structural steelwork for supports and stiffeners will be measured under item No.1)</td>
</tr>
<tr>
<td></td>
<td>MT 1.0</td>
</tr>
<tr>
<td></td>
<td>Description</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>7.</td>
<td>Fabricating, transporting, erecting and fixing in position at all heights and depths above and below finished ground level, welded M.S. plate work in water tank (circular/rectangular) including fixing of pipes/fittings and base plate as per drawing and/or as directed by the Engineer applying paint as per General Specification for Painting including all tools, plants, labour etc to complete the work in all respects as specified (only M.S. plates will be measured under this item. All supporting structures will be measured under item 1)</td>
</tr>
<tr>
<td>8.</td>
<td>Supplying, transporting to site, fabricating, erecting, fixing at all heights and depths above and below finished ground level welded/bolted M.S. tubular hand railing comprising of posts top rail, mid rails, toe guard (to be measured as per item 1 etc for roofs, gantry girders, stair cases, platforms, walkways, fencing etc as specified and as shown on drawings and/or as directed by the Employer/Engineer including supplying and fixing all types and grades of bolts, studs, nuts, washers (normal/ tapered), fittings, fixtures etc, applying paint as per General Specification for Painting and including, all materials, tools, plants, labour etc to complete the work in all respects as specified</td>
</tr>
<tr>
<td>9.</td>
<td>Supplying, transporting to site, fabricating and fixing Galvanised link chains used for handrailng at all heights and depths above and below finished ground level made up of 6 mm dia. MS Rounds electrically welded. Outside length and width of links shall not exceed 6 times and 3½ times the diameter of the material respectively as shown on drawings and/or as directed by the Engineer with all materials, tools, plants, labour etc. complete in all respects as specified</td>
</tr>
<tr>
<td>10.</td>
<td>Supplying, fabricating, transporting, erecting and fixing in position at all heights and depths above and below finished ground level welded square/ rectangular mesh grating made of steel sections such as flats, bars, angles and channels as shown on drawings and/or as directed by the Engineer and applying paint as per General Specification for Painting including all materials, tools, plants, labour etc to complete the work in all respects as specified</td>
</tr>
<tr>
<td>11.</td>
<td>Supplying, transporting to site, fabricating, erecting and fixing in position as shown in the drawings, at all heights and depths above and below finished ground level welded mesh of M.S. rod with square opening including structural framework for safety guards at roof openings, coverings etc as shown in the drawings and/or as directed by the Engineer including supplying and fixing of all types and grades of bolts including nuts, washers, fittings, fixtures etc and applying paint as per General Specification for Painting, including all materials, labour, tools, plants etc to complete the work in all respects as specified</td>
</tr>
</tbody>
</table>
| 12. | Supplying, fabricating, transporting to site, erecting and fixing in position at all heights and depths above and below ground level gutters of M.S. plate, down comers and collector pipes generally of ERW pipes but in some cases fabricated from steel plates, as shown on drawings and/or as directed by the Engineer including all structural steel work for support and fixing of all types and grades of bolts, nuts, washers fitting, fixtures etc etc and as per General Specification for Painting including all materials, tools, plants, labour etc to complete the work in all respects as specified:  
   a) Gutters | MT | 1.0  
   b) Downcomer/Collector pipes | MT | 1.0 |
| 13. | Conducting radiographic testing of welds complete as per specification, all materials, tools, plants, labour etc complete the work in all respects. | RM | 1.0 |
| 14. | Conducting ultrasonic testing of welds complete as per specification, all materials, tools, plants, labour complete etc complete the work in all respects | RM | 1.0 |
| 15. | Supplying, shaping and fixing wooden blocks of approximate size 200 mm x 200 mm x 300 mm long to crane rail buffers with through bolts, nuts and washers as shown on drawings and/or as directed by the Engineer all materials, tools, plant, labour etc to complete the work in all respects | nos. | 1.0 |
| 16. | Supplying, transporting to site, cutting, placing and fixing in position at all heights above finished ground level FRP sheets 3 mm thick milky white colour on roof profile matching with that of pre-colour coated steel sheets of approved make including | sqm | 1.0 |
supplying and fixing of all necessary accessories and finally sealing the joints with silicon sealant to prevent water penetration, all as per the technical specification all as per the direction of Engineer and as shown on drawings, all materials, tools, plant and labour complete.

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. Supplying, transporting to site, cutting, placing and fixing in position at all heights above finished ground level translucent Polycarbonate sheets 2 mm thick on vertical faces matching with the trapezoidal profile sheets including supplying and fixing of all necessary accessories and finally sealing the joints with silicon sealant to prevent water penetration, all as per the technical specification all as per the direction of Engineer in-charge and as shown on drawings, all materials, tools, plant and labour complete.</td>
<td>sqm</td>
<td>1.0</td>
</tr>
</tbody>
</table>

**Note:**
1) Paint should be lead free and have stable resin and inorganic pigment for paint durability.
2) Paint coating shall be factory painted and oven backed class 3 with total coating thickness of 35 microns minimum.
   - Epoxy primer - 5-8 microns DFT on both sides
   - Top coat - super durable polyester paint 16-20 microns DFT of approved colour
   - Bottom coat - super durable polyester paint 5-7 microns DFT of approved colour
3) The Contractor is to take approval on the sheet profile, design and installation methodology before installation of sheets from the Engineer in-charge.
4) All materials used for installation shall be compatible with sheeting material.
5) Sample material to be submitted to Engineer In-charge for approval.

**TOTAL AMOUNT (Rs.)**

(Rupees in words)
Notes:
1.0 The quoted rates of the items mentioned above should be inclusive of all applicable taxes, duties, levies and cess, but exclusive of applicable GST. The GST shall be paid by KIOCL on submission of Tax invoice.

2.0 The above items of BoQ are indicative only. The applicability of the items mentioned above are purely based on detail engineering to be carried out as the project progresses and approval of drawings by OMC/M/s MN DASTUR. During actual execution, many of the items mentioned above may not be applicable. The payment to the Contractor shall be based on actual measurements and certification by OMC/DASTUR.

3.0 For supply of structural steel materials will be issued free of cost by KIOCL Limited.

4.0 Except structural steel, all other materials required for the job shall be under contractor’s scope.

5.0 Crane or any other equipment as may be required for erection will be under the contractor’s scope at their cost.

6.0 For payment against non-destructive testing, the tenderer shall take into account the provisions of the relevant Clause of the Specifications.

7.0 Prior to erection of any heavy item, scheme drawings stating location of cranes, items to be erected etc shall have to be submitted by the Contractor to Engineer in charge for approval.

8.0 For all types of bolts, Product Grade A/Product Grade B corresponds to precision/semi-precision as was specified in earlier revision of relevant standard code of practice

9.0 Painting refer to General Specification for Painting. (Refer Specil conditions of contract for paint scheme)

10.0 For high tension bolts contractor to ensure achieving at least 50% of the torque tightening value unless otherwise specified.

11.0 All type of pack plates required for erection work should be supplied by contractor and quoted rate should be inclusive of that.

Seal & Signature of the bidder
Name & Address
INVITATION TO BID, INSTRUCTION TO BIDDERS,
FORM OF BID
AND
GENERAL CONDITIONS OF CONTRACT

KIOCL Limited
REGISTERED AND CORPORATE OFFICE
II BLOCK, KORAMANGALA, BANGALORE – 560 034.
<table>
<thead>
<tr>
<th>SL.NO.</th>
<th>CONTENTS</th>
<th>PAGE NO.</th>
</tr>
</thead>
<tbody>
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<td>INVITATION TO BID</td>
<td>4-5</td>
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<tr>
<td>II</td>
<td>INSTRUCTION TO BIDDERS</td>
<td>7-11</td>
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<td>III</td>
<td>FORM OF BID</td>
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<td>GENERAL CONDITIONS OF CONTRACT</td>
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<td>VI</td>
<td>FORM OF BANK GUARANTEE FOR SECURITY DEPOSIT</td>
<td>92-94</td>
</tr>
<tr>
<td>VII</td>
<td>FORM OF BANK GUARANTEE FOR EARNEST MONEY DEPOSIT</td>
<td>95-97</td>
</tr>
</tbody>
</table>
INVITATION TO BID
INVITATION TO BID
Date:

No…………………………….
Dear Sirs,

Sub:…………………………………………………

1. Bid documents for the above work are enclosed herewith.

2. Sealed bids will be received until 15.00 hours IST on .........................at the location shown below Bids received after this date are liable to be rejected as per Instructions to Bidders.

3. The Bidders shall abide by all the details of "Instructions to Bidders" enclosed with the tender documents, Sealed bids shall be submitted in the manner as mentioned below:
   a) First envelope shall contain the technical and commercial portions of the offer in four copies and shall be superscribed as "UNPRICED" - "NAME OF THE WORK" containing one full set of all tender documents including all the annexures duly filled-in and signed with official seal on all pages but without any mention of rates and prices,
   b) Second sealed envelope superscribed "EMD-NAME OF THE WORK" shall contain Demand Draft/Bank Guarantee towards Earnest Money Deposit.
   c) Third sealed envelope superscribed as "PRICED" - "NAME OF THE WORK" containing schedule of units, quantities and prices of the tender document with all the rates, prices etc. duly signed with official seal on all pages.

   Tenderer shall strictly submit the offer in the way as mentioned above.

   Sealed bids with the above markings and marked "Confidential" shall be addressed to
   a) KIOCL Limited, II Block, Koramangala, Bangalore – 560 034
      OR
   b) KIOCL Limited, Panambur, Mangalore – 575 010
OR

c) KIOCL Limited, Kudremukh, Chickmagalur District – 577 142

As may be applicable.

4. The bid shall be accompanied by an Earnest Money Deposit (EMD) of Rs...................(Rupees.............................................only) to be deposited only in the form of Demand Draft on a Scheduled Bank drawn in favour of "KIOCL Limited, Mangalore/Bangalore/Kudremukh" if the EMD amount is upto and inclusive of Rs. 2 lakhs and Bank Guarantee towards EMD as per the KIOCL's approved format will also be acceptable if the EMD amount is more than Rs. 2 lakhs. No interest will be paid on Earnest Money Deposit. No other form of Earnest Money Deposit will be accepted. Bids not accompanied by EMD shall be liable to be rejected at the sale discretion of the OWNER without any further consideration.

5. This Earnest Money shall be returned to unsuccessful Bidders within 28 days after deciding the successful Bidder and in case of the successful Bidder, the same shall be returned after submission and acceptance of the Security Deposit for this work referred to in Article No.37 of "General Conditions of Contract".

6. Acceptance of the Bid will be intimated to successful Bidder through a Letter Of Intent (LOI) / Work Order/Supply Order.

The time of completion of all works under this Contract shall be ................. from the date of issue of Letter of Intent/Work Order/Supply Order.

Thanking you, 

Yours faithfully, 

for KIOCL Limited.

Encl: As stated
INSTRUCTIONS TO BIDDERS
INSTRUCTIONS TO BIDDERS

1.0 PURPOSE

1.1 It is the purpose of these instructions to serve as a guide to Bidders when preparing proposal for the work described in the attached specifications.

2.0 TENDER CONDITIONS

2.1 Sealed Bids will be received until 15.00 IST hours on the date indicated in the Invitation to Tender/Bid at the location indicated in "Invitation to Bid".

2.2 BIDS RECEIVED AFTER THIS DATE IS LIABLE TO REJECTION AT THE SOLE DESCERTION OF THE OWNER WITHOUT ASSIGNING ANY REASONS.

3.0 REQUESTS FOR INFORMATION

3.1 Enquiries relating to Engineering and Commercial aspect of this specification shall be made to the address given in the Invitation to Tender/Bid.

4.0 PROPOSAL

4.1 Bidder shall prepare his proposal in accordance with the specification and strictly as per the schedule of items. No additions/alterations/changes shall be made by the bidder. While submitting the tender. deviations. if any. shall be separately furnished. Anything not specifically mentioned, but necessary to complete the work. shall be provided by the Bidder and the cost thereof shall be deemed to be included in the prices quoted.

4.2 PROPOSALS SHALL BE SUBMITTED ON THE FORMS PROVIDED FOR THIS PURPOSE. FAILURE TO COMPLY MAY RESULT IN DISQUALIFICATION OF THE BID AT THE SOLE DESCERTION OF THE OWNER WITHOUT ASSIGNING ANY REASONS.

5.0 GENERAL

5.1 Bidder shall study thoroughly the General Conditions. Special Conditions. Specifications, Contract Drawings and other documents in the Invitation to Bid and submit his quotations accordingly.
By submitting Bid for the work, Bidder will be deemed to have satisfied himself with the actual requirements in the Bid Documents.

5.2 By submitting the Bid for the work, Bidder will be deemed to have inspected and examined the worksite, its surroundings, locality, nature of the grounds and subsoil, the scope and nature of the work, materials necessary for the completion of the work, safety requirements, means of access to the worksite and the accommodation which may be required for storage, office, residence etc. Bidder will also be deemed to have obtained all information as to the risks, contingencies, responsibilities and other circumstances which might influence or affect his Bid and to have taken into account all conditions and difficulties that may be encountered during the progress of the work. The rates quoted by him in the Bid shall be deemed to be adequate to complete the work according to the Contract and to cover the entire responsibility involved in executions, completion and maintenance of work. Bidder will be further deemed to have included all labour and material rates which shall include cost of materials with taxes, octroi and other duties, quarry, fees, royalty, lead, lilt, loading and unloading freight for the materials, transportation, storage, insurance and all other charges necessary for the completion of the work. He shall collect from OWNER any other information he may require relating to the execution of works All items excluding the items specifically covered under OWNER’s scope shall be under the scope of the bidder and same is deemed to be included in the prices quoted.

5.3 The Bidder shall be deemed to have satisfied himself before bidding as to the correctness or sufficiency of his Bid for the work and of the rates and prices quoted by him which shall cover all his obligations under the Contract including programme of work which may be fixed by OWNER in accordance with General Conditions of Contract and all mailers and things necessary for the proper construction / erection, completion and maintenance of works. No extra charges whatsoever consequent on any misinterpretation or otherwise shall be allowed.

54 Details and Drawings as are not attached but referred to In the Bid Documents for the work may be seen in the office of the KIOCL Limited during office hours. Failure to avail himself of this shall not relieve the Bidder of his responsibility of submission of correct bid for work involved.

5.5. Canvassing in any form is strictly prohibited and the Bids submitted by the Bidders, who resort to canvassing will be liable for rejection.
5.6 The successful Bidder shall make his own arrangements for all materials except those otherwise specified in the Bid documents for issue by the OWNER at stipulated cost / or free of cost. Any materials or service to be issued/rendered to CONTRACTOR, unless specifically stipulated to be free of cost to the CONTRACTOR, shall be at the rates fixed or to be fixed by ENGINEER / OWNER based on cost plus 15%.

5.7 Bids shall be valid for a period of 3 (three) months from the due date of submission of the Bid.

5.8 OWNER reserves the right to divide and award the work in this invitation to Bid to more than one Bidder if considered necessary. OWNER also reserves the right to reject any or all the Bids without assigning any reason and does not bind himself to accept the lowest Bid or any Bid.

5.9 Bidders shall quote the rates in figures as well as in words in English. The amount of each item shall be worked out and the total given. Bid containing "Over Written" or "erased" rate or rates and amounts and rates not shown both in figures and words in English may be liable for rejection. Bidders shall quote rates for all items, failing which the Bid will be considered incomplete and the bid is liable to be rejected. In case of discrepancy between rates in figures and words, the rates indicated in words shall be taken as final. In case of discrepancies between Rates and Amounts, the rates indicated shall be taken as final and the amounts worked out on the basis of quoted rates given in the Bid.

5.10 Unless otherwise specified, all rates and prices in the Bid shall cover Sales Tax and other Taxes, Octroi and other Duties, Quarry Fees, Royalties, etc., if any applicable.

5.11 Except when so stipulated in the Contract or mutually agreed, no foreign exchange or Import Licence for Importing equipments, components, spares or raw materials will be arranged or provided by ENGINEER / OWNER unless this is mandatory under the Government rules and regulations. OWNER may however, provide project authority certificate and disclaimer certificate as applicable to assist the Contractor, as appropriate.

5.12 Bidder shall sign all the pages of the Bid Document. The signature in the "Form of Bid" alone shall be deemed to be taken as acceptance of other documents. Bid submitted by Partnership firm may be signed in the Firm’s name by all the partners or a person authorised in the partnership deed such as the Managing Partner or any other duly authorised representative, followed by the name and designation of the
person so signing. An attested copy of Registered Partnership Deed and proof of registration of the firm and the authorisation of the signatories shall accompany the Bid of any Partnership Firm.

Bid by a Company shall be signed with the name of the Company by a person on its behalf and registered duly notorised Power of Attorney or other satisfactory proof showing that the person signing the Bid documents on behalf of the Company is duly authorised to do so, shall accompany the Bid.

5.13 Signature of the Bidder shall be attested in English by two responsible witnesses. The witnesses shall be persons of status and their addresses, names, occupations etc. shall be stated below their signature

5.14 Bids with rates in units different from those prescribed in the Bid Schedules may be liable for rejection.

5.15 If a Bidder seeks to clarify his quotations or rates, this shall only be done in a separate covering letter in the letter, the clarifications/modifications desired shall be with specific reference to the relevant conditions in the Invitation to Bid and the page numbers and clause numbers of the conditions shall be indicated.

5.16 Bidder is responsible to ensure that the bids reach before the date and time specified.

5.17 Acceptance of Bid will be intimated to the successful Bidder through a "Letter of Intent/Supply order/Work Order" with the issue of which the CONTRACT shall stand concluded. However, CONTRACTOR may be required to execute a formal agreement within the time specified in the Letter of Intent.

6.0 PARTICULARS TO ACCOMPANY BID

6.1 The following particulars shall also accompany the Bid:

a) Details of work of similar nature and magnitude carried out by Bidder, in the Proforma shown in Appendix-I

b) Details of construction equipments belonging to and / or to be procured by the Bidder for use in this work, in the Proforma shown in Appendix-II.

c) Details of manpower he proposes to engage for completion of work, in the Proforma shown in Appendix-III.

d) All other details as may be required by ENGINEER in the form or manner stipulated thereof.
e) List taken into account while preparing the Bid in the proforma as of the bulletins/amendment to Bid documents received and shown in Appendix-VI.
f) Details of deviations made by the bidder.

6.2 Bidders shall, along with their Bids, submit the following:

a) Certificate from a Scheduled Bank or any other bank accepted by Owner to prove their financial ability to undertake the work.
b) Proof for technical and organisational ability to execute the work in its various aspects.
c) The organisation chart along with number of the qualified Engineers and Supervisors who will be deployed at the site together with their qualification in the proforma shown in Appendix-IV Please Indicate separately those available on the roll of the Bidder and the numbers to be recruited for the work.
d) Details of manufacturing and erection facilities owned and to be deployed on the work.
e) Income Tax Clearance Certificate valid as on the date of Bid.
f) List of proposed sub-contractors, if any, in the proforma shown in Appendix-V to be engaged subject to approval of the OWNER.
g) Details of Insurance coverage presently considered and secured or to be secured by Bidder in the proforma shown in Appendix-VII.
h) Balance sheet for the preceding three financial years and the latest unaudited Balance Sheet, if any.
i) Provident Fund Account nos. in respect of workers deployed by the Bidder, if any.
j) PAN issued by the Income Tax Authorities to the Bidder.
k) Disputes (arbitration law suits) initiated by or against the bidder during the last 3 years (completed or pending) as per Appendix-VIII.
l) Sales Tax No. : Central and State.

6.3 BIDS NOT GIVING THE FULL PARTICULARS AS REQUIRED ABOVE ARE LIABLE FOR REJECTION AT THE DISCRETION OF THE OWNER WITHOUT ASSIGNING ANY REASONS.
FORM OF BID
FORM OF BID
(Bidder is required to fill up the blank spaces in this form)

M/s. KIOCL Limited.,
Second Block, Koramangala,
Sarjapura Road,
Bangalore - 560 034.
Attn.:....................
Technical Services Dept.,

OR

M/s. KIOCL Limited.,
New Mangalore Port,
Panambur – 575 010.
Attn.:....................
Contracts Dept.,

OR

M/s. KIOCL Limited
Kudremukh, PO.577142
Chikmagalur District.
Attn.: ............
Tender and Claims dept.,

Name of work:
........................................................................................................
........................................................................................................
........................................................................................................

(As shown in the "Invitation to Bid")

Sir / Madam,

Having examined the "Invitation to Bid", Instructions to Bidder, General Condition of Contract, Special Conditions, Specifications, Bid Schedules, Contract Drawing and other documents for the above work, I/We, the
undersigned offer to construct, erect, complete and maintain the whole of
the said works in conformity with the said Bid Documents on the terms and
conditions and under the provisions set out or called for in the Contract
Documents at the rates listed In the Schedule of the Unit prices.

We agree to keep our Bid valid for a period of three months from the date
fixed for receiving the same.

I / We undertake to commence the works within seven days from the date of
Issue of Letter of Intent / Supply Order/ Work Order and to complete and
deliver the whole of the works comprised in the Contract as per the Time
Schedule agreed to in the Contract Document.

We agree that the following Appendices prepared and submitted by us
are by this reference incorporated herein and made part of this contract.

<table>
<thead>
<tr>
<th>APPENDIX</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Details of similar nature of work executed by us</td>
</tr>
</tbody>
</table>
| II       | list of equipments to be deployed (owned! to be
|          | procured) |
| III      | Manpower proposed to be deployed (existing/ to be
|          | recruited) |
| IV       | Organisation chart (positions filled/ to be filled) |
| V        | Proposed sub-contractors to be engaged subject to
|          | approval of Owner |
| VI       | Bulletins |
| VII      | Insurance coverage |
| VIII     | Disputes / arbitrations/legal suits initiated by or against
|          | in which the Bidder (by present or previous names. If any)
|          | was or is involved in last three years. |

Dated day of 20

WITNESS

1.

Signature: Signature
Date: In the capacity
duly authorised to sign Bids for
and on behalf of

Occupation (in block letters)
2.

Signature:
Date:
Address:

Date:
Address:

Occupation
DETAILS OF WORKS OF SIMILAR NATURE AND MAGNITUDE CARRIED OUT DURING THE LAST THREE YEARS.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name of work done</th>
<th>Value</th>
<th>Date of starting</th>
<th>Date of completion</th>
<th>Date of completion as per contract</th>
<th>Reasons for delay</th>
<th>Remarks</th>
</tr>
</thead>
</table>

NOTES:

1. In the remarks column, please state whether the works stated above are carried out by you in the name of the firm in which the present Bid is submitted or any previous name or in collaboration with another party. If latter, state role/relationship of the firm vis-à-vis other party/partner and also a copy of the partnership Deed/Joint Venture agreement or the like.

2. Please enclose the true copy of the certificates issued by the authorities for works listed above.

3. In case of any dispute/differences arose amongst the partners, please give brief details in a separate annexure the status of the proceedings and the final result, if any.

(Signature of Bidder)
LIST OF EQUIPMENTS, TOOLS AND PLANT TO BE DEPLOYED ON THIS WORK

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Details of equipments, tools and plants etc.</th>
<th>Nos.</th>
<th>Whether owned or hired or to be procured</th>
<th>If to be procured source / cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTES: Add more sheets, if required.

(Signature of Bidder)
DETAILS OF MANPOWER PROPOSED TO BE DEPLOYED ON THIS WORK

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Category of manpower</th>
<th>Nos. to be deployed by Contractor / By Sub-Contractor</th>
<th>Remarks</th>
</tr>
</thead>
</table>

(Signature of Bidder)
DETAILS OF QUALIFIED ENGINEERS AND SUPERVISORY PERSONNEL ETC. TO BE DEPLOYED FOR THIS WORK

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Name, qualification and relevant experience</th>
<th>Responsibility areas</th>
</tr>
</thead>
</table>

**NOTE:**
Organisational chart shall be enclosed. Attach more sheets, if required.

(Signature of Bidder)
# LIST OF PROPOSED SUB – CONTRACTORS

<table>
<thead>
<tr>
<th>Sl. no.</th>
<th>Name of sub-contractor</th>
<th>Description of work or trade to be carried out</th>
<th>Approximate value of sub-contract</th>
</tr>
</thead>
</table>

(Signature of Bidder)
**BULLETINS**

(BIDDER SHALL SUBMIT A LIST OF THE BULLETINS ISSUED BY OWNER, IF ANY, THAT HE HAS TAKEN INTO ACCOUNT WHILE PREPARING THIS BID)

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Bulletin No.</th>
<th>Date</th>
<th>Brief contents</th>
</tr>
</thead>
</table>

(Signature of Bidder)
### DETAILS OF INSURANCE COVERAGE PRESENTLY CARRIED BY BIDDER

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount of coverage</th>
<th>Individual claim</th>
<th>Occurrence aggregate</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Public liability &amp; property damage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b) Fire and Extended coverage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c) Automobile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d) All Risks, Builder’s Risks etc.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e) Workman’s Compensation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f) Others as applicable under the prevailing laws or otherwise</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Signature of Bidder)
### DISPUTES / ARBITRATIONS / LEGAL SUITS FOR LAST THREE YEARS

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Brief description of dispute</th>
<th>Dispute with</th>
<th>Value</th>
<th>Status as on date of submission</th>
</tr>
</thead>
</table>

Note: Attach more sheets, if required

(Signature of Bidder)
GENERAL CONDITIONS OF CONTRACT
### GENERAL CONDITIONS OF CONTRACT

<table>
<thead>
<tr>
<th>Article No</th>
<th>Description</th>
<th>Page No.</th>
</tr>
</thead>
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<td>Definitions</td>
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</tr>
<tr>
<td>2.00</td>
<td>Expeditious Completion</td>
<td></td>
</tr>
<tr>
<td>3.00</td>
<td>Tender</td>
<td></td>
</tr>
<tr>
<td>4.00</td>
<td>Site Investigations and Sub-Surface Conditions</td>
<td></td>
</tr>
<tr>
<td>5.00</td>
<td>Standards of Workmanship</td>
<td></td>
</tr>
<tr>
<td>6.00</td>
<td>Direction and Performance of Work</td>
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GENERAL CONDITIONS OF CONTRACT

1.00 DEFINITIONS

A. As used in the Contract including all documents contained in or referenced by the Invitation to Bid, the following terms shall have the meaning ascribed herein unless the context within which they are used clearly precludes such meaning. Terms and Expressions not herein defined shall have the same meaning as one assigned to them in the Indian Contract Act (Act IR of 1872) and failing that in the General Clauses Act (1897) and subsequent amendments thereof.

1. ACTUAL CONTRACT VALUE means the Final cost of the Work including the cost of Extra Work(s) or adjustments due to changes in works.

2. APPROVAL of OWNER/ENGINEER shall mean the written approval by OWNER/ENGINEER of a document or drawing or other particulars or matters in relation to the Contract.

3. “BID” shall mean the offer tendered by BIDDER to the OWNER to do and perform all work and other things necessary to complete the work required for the Project / Portion of the Project as described in the Bid document.

4. “BIDDER/TENDERER” shall mean the party submitting a bid for the work.

5. “BID DOCUMENTS” shall mean a document prepared and issued to the Bidder by OWNER which will contain, among other things a description of the Work to be performed, schedule of quantities and the time schedule for completion of work.

6. “CLEAR DAYS” shall mean consecutive days without interruption for week ends or holidays and shall include the day on which the notice/request is received.

7. “CONSTRUCTION EQUIPMENT” shall mean all machinery, plant, apparatus, parts, appliances, instruments, articles and things required for erection, construction and completion of the work required for the
Project or any Portion thereof and the operation thereof, including supply of maintenance items, spare parts and consumables etc. required therefore.

8. ‘CONTRACT’ shall mean and include the Invitation to Bid, Instruction to Tenderers, Offer / bid (initial/modified), the General Conditions, the Specifications, Drawings, Special Conditions and Bulletins, if any, and the Letter of Intent /Work Order/ Supply Order/the Agreement entered into by the parties including mutually agreed subsequent amendments/ changes, if any.

9. “CONTRACTOR” shall mean the Bidder whose Bid has been accepted and shall include his/ her/its/their heirs, executors, administrators, legal representatives, successors and assigns.

10."CONTRACT DRAWINGS” shall mean and include the designs, blue prints or other documents of a similar nature which show or illustrate the character and nature of the work to be performed which are supplied by Owner enclosed with the Bid Document or available with the Owner for inspection by the Bidder or Drawings issued by the Owner during the execution of Contract.

11."CONTRACT VALUE” shall mean the amounts as stipulated in the Letter of Intent/Work Order / Supply Order/Agreement which amount represent the estimated total cost of the work to be performed by CONTRACTOR under the CONTRACT.

12."EFFECTIVE DATE OF THIS CONTRACT” shall mean the date of issue of Letter of Intent/ Supply Order/Work Order unless otherwise specified.

13."ENGINEER” shall mean person/persons nominated by or authorized by OWNER among other things to administer the Contract and / or supervise the work under the Contract.

14."IN PLACE” shall mean the work or any items of Work being fully completed / installed and completely incorporated as determined by ENGINEER/OWNER whose decision in this regard shall be final, binding and conclusive on the Parties.

15."LETTER OF INTENT” shall mean the acceptance by the OWNER of the Bid tendered by CONTRACTOR and the award there under of the
work to be performed in accordance with the terms and conditions of CONTRACT.

16. “MONTH” when used for the purpose of calculating a period of time, shall mean the period from the day of one month to the corresponding day of the next calendar month if such day exists, or, if not, to the last day of the next calendar month.

17. “OWNER” shall mean KIOCL Limited having its Registered Office at Second Block, Koramangala, Bangalore - 560 034, Karnataka, India and include its Lawful successors and assigns.

18. PERIOD OF MAINTENANCE shall mean a period of Twelve continuous months or any other period, if specifically stipulated in the Special Conditions calculated from the date the whole work, is “IN PLACE” as certified by ENGINEER/OWNER.

19. “PORTION” shall mean that part or parts of the work as identified in the Contract and shall include all aspects of such part or parts as are included in the Contract.

20. “RUPEES” or “Rs” shall mean Rupees, the currency of India.

21. "SITE" shall mean the actual place or places where the work is to be done by the Contractor and/or services are to be performed under the Contract as notified / indicated by OWNER/ENGINEER.

22. “SPECIFICATIONS” shall mean and include the descriptions/type, quality, standard of materials and work, general arrangements, statements of technical data, performance and/or documents of a similar nature which are included in the Contract and/or issued or supplied by OWNER relating to the Work.

23. “SUPERVISION” shall mean the direction and control in relation to the execution of work and instructions given by OWNER/ENGINEER or their authorized representative in relation thereto under the terms of the Contract.

24. “WORK” shall mean and include all works operations / activities to be performed by CONTRACTOR as set out and/or required in the CONTRACT in accordance with the Bills of Quantities, Specifications and Drawings or to be implied there from or incidental thereto or as
may be specified during the execution of work or required in such explanatory/additional instructions and drawings as shall, from time to time, during the progress of the work hereby contracted for, be issued by OWNER/ENGINEER.

25. “WRITING” shall mean any information, request, notice, data contained or given in any manuscript, typewritten or printed statement or other document under seal or hand and includes telegrams, telexes, taxes and cables and words “In Writing” shall mean any document duly signed by any person authorized to represent CONTRACTOR and OWNER/ENGINEER.

B. The words “Including” and “Include(s)” as used in this Contract are not to be construed as words of limitation, unless the context otherwise requires or unless a contrary intention otherwise appears in the matter.

C. Words imparting “Persons” shall include firms, companies, corporations and associations or of individuals, whether incorporated or not.

D. Word imparting the singular only shall include plural and vice-versa where the context so requires.

E. Word imparting masculine gender shall also include feminine gender and vice-versa where the context so requires.

2.00 EXPEDITIOUS COMPLETION

It is understood and agreed by and between CONTRACTOR and OWNER/ENGINEER that time stipulated in the Contract is of the essence of this CONTRACT and accordingly CONTRACTOR shall do and perform his obligations in such a manner as not to hinder, delay or impair timely completion of the works awarded to him or interfere with, delay or impair those Portions or items of work undertaken by other contractors or interfere with, delay or impair the timely completion of the entire Project.
3.00 TENDER

A. CONTRACTOR acknowledges that this Bid contained all the information required in the Invitation to Bid, specifically for CONTRACTOR’s firm lumpsum price or his firm unit price for the work to be performed. CONTRACTOR agrees that the price(s) as awarded include any / all cost components including profits, overhead charges and other costs including but not limited to labour, equipment, materials, insurance, transportation facilities and plant not specified to be furnished by OWNER or others. CONTRACTOR further agrees to do all things necessary to complete such Work in a proper and workman-like manner to the satisfaction of the ENGINEER/OWNER.

B. CONTRACTOR is expected to review and is chargeable with knowledge of the information contained in or referred by BID DOCUMENTS or that available with OWNER and available for examination by the CONTRACTOR.

4.00 SITE CONDITIONS.

A. CONTRACTOR by tender of his Bid, acknowledges that he has obtained / collected available data and satisfied himself as to the nature and location of the Work, the general and local conditions, particularly those bearing upon transportation, disposal, handling and storage of materials, equipment, availability of labour, water, electric power, roads and uncertainties of weather, rock soil or other physical condition on the Project, the configuration and strata and sub soil conditions, the character and quantity of Equipment, Plant and facilities needed preliminary to and during the execution and maintenance of the Work and all other matters which can in any way affect the work or the cost thereof under this Contract.

B. CONTRACTOR further acknowledges that he has obtained and collected data and satisfied himself as to the character, quantity of any and sub surface materials including ground water, to be encountered. CONTRACTOR has considered all exploratory work done on the Project by the OWNER and other firms / agencies in relation to the work to be performed by CONTRACTOR as well as information presented by the Specifications, Contract Drawings or other documents relating to the work. Any failure of CONTRACTOR to acquaint himself with all the available information will not relieve him of the responsibility for assessing the difficulty or estimating the cost.
of successfully performing the work. Representations made but not so expressly stated and for which liability is not expressly assumed by ENGINEER or OWNER in this Contract and any information on or opinions concerning soils and sub-surface conditions or other matters furnished by or for ENGINEER/OWNER or any understanding, opinions or representations made or expressed by any of their officers, employees or agents, during or prior to the execution of this Contract shall be deemed only for the information of CONTRACTOR to be appropriately checked and utilized by the CONTRACTOR in preparation and submission of the bids and CONTRACTOR shall have no claim against ENGINEER or OWNER resulting from such information.

C. Contractor shall be deemed to have acquainted himself with the regional / local geology. CONTRACTOR shall bear full responsibilities for deductions and conclusions as to the nature or conditions of the rock and other materials to be excavated, the difficulties of making and maintaining the required excavations and of doing other work affected by the geology of the site of works.

D. In addition to the information acquired by himself from the tender documents supplied by Owner, the Contractor shall be free to conduct any further test to ascertain / obtain /acquaint additional information to take care of site / soil condition at his cost for which the OWNER shall extend facilities to the extent possible.

5.00 STANDARDS OF WORKMANSHIP

A. CONTRACTOR guarantees that all workmanship shall be in accordance with Contract Specifications / Indian Standard Specifications and shall conform to any applicable laws, codes and/or regulations and such workmanship shall at all times be satisfactory in all respects to ENGINEER / OWNER. Should ENGINEER/OWNER determine that any work performed by CONTRACTOR fails or is likely to fail to meet the Specifications / Standard of workmanship, ENGINEER / OWNER may direct CONTRACTOR to remove such inferior work and replace such work at Contractor’s sole expense, failing which the OWNER/ENGINEER may get it replaced / executed at the Contractor’s risk and cost.

B. The decision of ENGINEER/OWNER in this regard shall be final and binding upon the Parties.
6.00 DIRECTION AND PERFORMANCE OF WORK

A. While CONTRACTOR shall be free to employ his own methods of executing the Work in accordance with the Specifications, OWNER/ENGINEER shall have the right to direct, instruct and supervise CONTRACTOR and through him any subcontractors, to provide the maintenance of effective working organizations, to ensure the performance of the Work in the time, sequence and manner as determined by OWNER/ENGINEER, to carry out proper correction and remedy of any and all defects discovered in the work or materials used and to make modifications in construction or the cost of construction in accordance with available construction methods. The decision(s) of OWNER / ENGINEER in these respects shall be final and binding upon the Parties. Nothing herein shall be interpreted as creating any direct relationship between the OWNER/ ENGINEER and the Sub-Contractor or the OWNER/ ENGINEER and the Employees / labour force of the Contractor / Sub-Contractor.

B. 
   i) CONTRACTOR shall employ a competent Manager for the Works and supervisory staff who shall be constantly on the works site and shall give their whole time to the execution and supervision of the Work. Such Manager shall have full authority to represent CONTRACTOR in all matters pertaining to this CONTRACT and the performance of the work hereunder and all directions and notice given to him shall be as binding as if given to CONTRACTOR.
   
   ii) CONTRACTOR shall employ on the work only such persons as are careful, skilled and experienced in their several trades. CONTRACTOR agrees to remove employees/ labour force engaged on the Work covered by this CONTRACT who are found to lack necessary skill, expertise or care by the ENGINEER/OWNER. CONTRACTOR shall not engage / utilise employees of OWNER, any other Contractor or any subcontractor without obtaining a written release from the party affected. CONTRACTOR shall be solely responsible for employees removed, discharged by him or leaving his employment for any reason whatsoever.

C. CONTRACTOR shall check all materials and labour to be utilised for the Work and shall keep in convenient form such full and detailed accounts and records as may be necessary for proper financial management
under this CONTRACT and the system shall be such as is found satisfactory by the OWNER/ENGINEER. Such records shall include accurate records of all personnel employed, materials brought, material consumed for the Work including the Work executed by the sub-contractor.

D.

1. Materials and Workmanship will be subject to inspection and approval by ENGINEER / OWNER at all times as considered appropriate. However, such approval / inspection shall not relieve CONTRACTOR of his obligation to perform the Work properly. CONTRACTOR shall cooperate in permitting access for inspection at all places where Work is done, is being done or material is stored and shall provide sufficient, safe and proper facilities at all times for carrying out such inspection of the work by the OWNER/ENGINEER or such personnel / agencies as may be appointed for the purpose.

2. OWNER may appoint an inspection and testing agency whose representative (hereafter referred to as “INSPECTOR”) will carry out shop, laboratory and/or field inspection. CONTRACTOR shall furnish such INSPECTOR or ENGINEER / OWNER all facilities for carrying out such inspection at his own cost. However, OWNER will bear his own cost in relation to the tests carried out by them or through their Inspector as a part of their quality control checks.

3. All materials and workmanship shall be of the respective kinds described in this CONTRACT and in accordance with ENGINEER’s instructions and shall be subjected from time to time to such tests as ENGINEER may direct at the place of manufacture or fabrication or on the work site or at all or any other mutually agreed location. CONTRACTOR shall at his cost, provide such assistance, instruments, machines, labour and materials as are usually required for examining, measuring, any testing of the work and its quality, weight or quantity of any materials used and shall supply samples of materials before incorporation in the Work for testing as may be selected and required by ENGINEER free of cost.

4. Unless otherwise provided, the cost of all tests as stipulated in this Contract shall be borne by CONTRACTOR excepting as brought out in the following sub para 5.

5. If any test(s) are ordered by ENGINEER, which are either.
i. not so intended or provided for in the CONTRACT or become necessary due to lack of clear-cut results obtained from the tests carried out by the Contractor as per its quality control programme.

OR

ii. though so intended or provided for, is ordered by ENGINEER to be carried out by an independent agency at any place and if the test results establish that the material/ workmanship conform to the Contract Specifications.

In all cases, the decision of the Engineer in this regard shall be final, binding and conclusive on the Parties.

E. Prior to the completion of the work by CONTRACTOR and the acceptance thereof by ENGINEER/OWNER, the work shall remain under the custody and care of and at the risk of CONTRACTOR and CONTRACTOR shall be responsible for all loss and damage to the Work and equipment in the CONTRACTOR’s care and custody and shall repair, renew and make good at his own expense, all such loss and damage however caused including theft, pilferage etc.

F. CONTRACTOR shall repair, restore and replace at his own cost any other work or any personal property (including, but not limited to, tools and equipment) belonging to OWNER, which CONTRACTOR or his sub-contractors or suppliers or their respective employees or invitees, may damage or destroy while on the Project.

G. CONTRACTOR shall co-operate with ENGINEER/OWNER for ensuring the performance of the Work and in the preparation of all documents and reports necessary and advisable for such purposes.

H. CONTRACTOR shall co-ordinate the work of his sub-contractors and his material suppliers and in scheduling of materials so that the construction and completion of the work will progress smoothly, expeditiously and economically.

I. All materials and workmanship supplied by CONTRACTOR shall conform to the CONTRACT including any Specifications, Drawings or other documents and shall be so delivered, stored and handled by CONTRACTOR as to prevent any loss, damage, adultration, deterioration or avoidable wastage.
J.

1. CONTRACTOR shall, at any time during progress of the work or within the Period of maintenance upon written notice from ENGINEER/OWNER to do so, proceed to remove from the site all materials and structures determined by ENGINEER/OWNER to be defective, deficient or otherwise unsatisfactory, whether assembled or not and dismantle all parts of the work which shall stand rejected as unsound, improper, unsatisfactory or which in any way fail to conform to the requirements of this Contract and replace all such work, materials and/or structures at his cost in time periods stipulated by the OWNER/ENGINEER.

2. The cost and risk of such removal and replacement shall be borne solely by CONTRACTOR. If CONTRACTOR does not remove and replace such rejected / condemned work, materials and structures with in a reasonable time as specified in OWNER/ENGINEERS’s written notice, OWNER may remove or have the same removed and replace the same and charge the cost thereof to CONTRACTOR, who will continue to bear the risk thereof.

3. Further more, if any applicable law, ordinance, statute or regulation creates a more extended liability for faulty materials, structures or workmanship, then the provisions of such law ordinance, statute or regulation shall apply to the Contractor/Sub-contractor in the same manner and the same extent, as applicable to the OWNER, as a part of contractor’s obligations under the Contract.

K. All equipment operated by CONTRACTOR for the work shall be of such type, standard & quality and shall be operated, inspected, serviced, maintained and equipped with spares in such a manner, as to ensure effective and smooth operation with a minimum of down time acceptable to ENGINEER / OWNER whose decision in this regard shall be final and binding upon and conclusive on the Parties. If any piece of Equipment fails to meet the aforesaid requirement, CONTRACTOR shall at his sole expense and using his own resources replace it with appropriate equipment. The Contractor shall have no claim whatsoever for any additional compensation owing to this replacement.

L. Any work not specifically mentioned but that may reasonably be inferred from the Specifications, Contract Drawings or other documents as being required to produce the intended result shall be
performed and completed by the CONTRACTOR without raising any claim or demanding any additional renumeration.

M. If by reason of any emergency, accident or failure or other event occurring in or in connection with the work or any part thereof either during the execution of the work or during the period of maintenance, any remedial or other item of work or repair, shall in the opinion of ENGINEER/ OWNER, be urgently necessary for ensuring security and stability of the work and CONTRACTOR is unable or unwilling at once to do such work or repair, ENGINEER / OWNER may have such work or repair executed by others as ENGINEERS/OWNER considers necessary. If the work or repair so done in work which, in the opinion of ENGINEER, CONTRACTOR was liable to at his own expense under this CONTRACT all costs and charges incurred in so doing shall on demand be paid by CONTRACTOR to OWNER or may be deducted by OWNER from any moneys payable to CONTRACTOR, provided that ENGINEER/OWNER shall soon after the occurrence of any such emergency as may be reasonably practicable notify CONTRACTOR thereof in writing.

N.

1. OWNER / ENGINEER or any person authorised by him shall, at all times, have access to the work and to the location of any work to and all workshop and places where any part of work is being carried out and Contractor shall afford every facility and every assistance to the OWNER/ENGINEER or any person authorised by them in obtaining the right to such access.

2. No items of work shall be covered up or put out of view without a notice to and the prior approval of ENGINEER and CONTRACTOR shall afford full opportunity for ENGINEER to examine and measure any item of work which is about to be covered up or put out of view such as examination of the foundations before other permanent item(s) of work are placed thereon. CONTRACTOR shall give due notice to ENGINEER whenever any such item(s) of work such as foundation is/are ready or about to be ready for examination by ENGINEER.

3. If no such notice is given or prior approval obtained, CONTRACTOR shall, at his cost, uncover any part or parts of the Work or make openings in or through the same as ENGINEER may, from time to time, direct for ENGINEER’s examination or
check and later on reinstate and make good such part or parts to the satisfaction of ENGINEER.

If any such part or parts have been covered up or put out of view after compliance with the requirements set forth above and are found by the ENGINEER to be executed in accordance with this CONTRACT, the expenses of uncovering, making openings in or through reinstating and making good the same shall be reimbursed by OWNER. If, however, the Contractor did not notify the Engineer or obtain Engineer’s prior approval and / or the work is not in conformity with the Contract provision, the cost of opening up and reinstating shall be borne by the Contractor.

O.

1. If the Contract provides for the use of any special description of materials to be supplied from OWNER’s store or if it is required that CONTRACTOR is required to use certain stores to be provided by OWNER (such materials and stores and the prices to be charged thereof as hereinafter mentioned being so far as practicable for the convenience to CONTRACTOR but not so has in any way to control the meaning or effect of this CONTRACT), CONTRACTOR shall be supplied with such materials and stores as required from time to time to be used by him for the purpose of this CONTRACT only (this being calculated from Specification, Contract drawings etc). The value of the full quantity of materials and stores so supplied shall be charged by the OWNER at the rates specified in the schedule of items and shall be to CONTRACTOR’s account. All materials supplied to CONTRACTOR shall continue to remain the absolute property of OWNER and shall not on any account be removed from the location of the Work and shall at all times be opened to inspection by ENGINEER. Any such materials unused and in perfectly good condition at the time of the completion or termination of this CONTRACT shall be returned to OWNER’s store by a notice in writing but CONTRACTOR shall not be entitled to return any such material except with such consent and shall have no claim for compensation on account of any such material so supplied to him as aforesaid, being left with him or for any wastage in or damage to any such materials. In cases under the CONTRACT, such materials and stores are to be supplied to CONTRACTOR free of charges, all unused and waste materials shall be returned to
OWNER by CONTRACTOR at CONTRACTOR’s own cost and CONTRACTOR shall be responsible to account fully for such materials and stores.

2. All materials (eg. stone and other materials) obtained in the work of dismantling, excavation etc. will be considered to be OWNER’s property and issued to CONTRACTOR (if he requires the same for the Work) at rates approved by OWNER. If these materials are not required by CONTRACTOR, they will be disposed off by the OWNER to the best advantage of OWNER.

3. The operation of the preceding paragraphs shall not be deemed to imply any approval by ENGINEER for the materials or other matters referred to therein nor shall it prevent the rejection of any such materials at any time by ENGINEER. The OWNER shall permit the Contractor to arrange such materials on his own.

P. SITE CLEAN UP

During the progress of the Work and as required by ENGINEER, CONTRACTOR shall keep areas occupied by him and access to such areas in the neat, clean and safe condition and free from accumulation of packing or crating materials, waste and rubbish. Rubbish and combustible wastes shall be removed on a daily basis. On the completion of any item of work, CONTRACTOR shall promptly fill up any pits and excavations and remove from such area all of his equipment and surplus material to approved areas. Upon completion of the work, CONTRACTOR shall before final payment is made, at his own expense and to the satisfaction of ENGINEER, dispose off or remove from the work site all equipment, rubbish, unused material and other equipment and materials belonging to him or used under his direction during the performance of the Work and shall leave the premises (including the quarters of CONTRACTOR employees) in a neat and clean condition satisfactory to ENGINEER.

In the event of CONTRACTOR’s failure to comply promptly with any of the foregoing, OWNER/ENGINEER may, after serving a written notice of three (3) days to the CONTRACTOR, cause the same to be accomplished by any other agency at CONTRACTOR’S expense and the cost of the same may be deducted from any money due to or becoming due or payable to
CONTRACTOR whether under this or any other contract. Furthermore, the said clause shall apply should it become necessary for OWNER to have the complete or part of worksite cleared as indicated above at the expense of CONTRACTOR.

ENGINEER/OWNER shall, under no circumstances, be held liable for any loss or damage caused to CONTRACTOR’S property left at the worksite owing to its removal and / or disposal through public auction or otherwise of such materials and property as deemed fit by the OWNER.

7.00 SURVEY LINES AND GRADES

7.01 As considered appropriate, ENGINEER will establish reference bench marks from which CONTRACTOR shall establish such other points, lines, elevations etc. as he may require for the proper execution of the Work.

7.02 CONTRACTOR shall be responsible for the true and proper setting out of the works and for the correctness of the positions, levels, dimensions and alignments of all the parts of the works and for the provisions of all necessary instruments, appliances and labour in connection therewith. If, at any time during the progress of the work any error appears or arises in the positions, levels, dimensions or alignments of any part of the works, CONTRACTOR, on being required to do so by ENGINEER, shall at his own expense, rectify such error to the satisfaction of ENGINEER unless such error is based on incorrect data supplied in writing by ENGINEER / OWNER, in which case the expenses of rectifying the same shall be borne by OWNER. The checking of any setting out or anyline or level by ENGINEER shall not in any way relieve CONTRACTOR of his responsibility for the correctness thereof and CONTRACTOR shall carefully protect and preserve all the bench marks, side rails, pegs and other things used in setting out of the works till such time required and thereafter remove with the prior written approval of the ENGINEER.

8.00 CONSTRUCTION SCHEDULE

8.01 Construction schedule shall be submitted by the Contractor to the OWNER/ENGINEER within fifteen days of award of Work or as agreed upon, indicating therein the different component items of work and time required for completion of each component item month wise and season wise, so as to complete the work in all respects within the stipulated period of completion.
8.02 CONTRACTOR shall also furnish his approach to work, indicating briefly his method of working, his plans in tackling the construction programme vis-a-vis the capacity of equipments he proposes to deploy on various components of work etc. CONTRACTOR shall obtain approval of ENGINEER / OWNER to the above. They shall mutually decide upon updating any changes in agreed Schedule including crashing required and maintain joint records in connection with all important activities. In case of any disagreement, the decision of ENGINEER shall be final and binding on the Parties.

8.03 CONTRACTOR shall submit a weekly schedule of work, identifying each item of work, for acceptance by ENGINEER and submit regular progress reports, as directed by the ENGINEER on all activities in an approved format.

9.00 WORK IN MONSOON

9.01 The execution of works may entail working in the monsoon also. CONTRACTOR must maintain minimum labour force as may be required for the job and plan and execute the construction works according to the prescribed construction schedule. Even if the work has to be stopped in the monsoons, the Contractor shall maintain to the satisfaction of Engineer requisite manpower and facilities to undertake regular monsoon protection works and for tackling any contingencies that may arise.

10.00 POWER

10.01 Power required for the work to the extent available may be provided free of cost at one point. Contractor shall draw power from this point complying all applicable statutory rules and regulations. CONTRACTOR shall strictly follow all safety rules and regulations. CONTRACTOR shall comply with the Indian Electricity Act & Rules, Factories Act & Rules and all other relevant statutes.

10.02 No electricity will be supplied to staff quarters and labour colony of CONTRACTOR and quarry sites.

10.03 CONTRACTOR shall make his own arrangements for drawing the distribution lines from the tapping point at the sub-station.
ENGINEER/OWNER does not guarantee continuous power and CONTRACTOR shall make alternate arrangements by stand-by generating set etc. No claim whatsoever on this account shall be entertained by ENGINEER/OWNER.

10.04 ENGINEER/OWNER will not be liable for any loss or damage to CONTRACTOR’s equipment as a result of variation in voltage or frequency or interruptions of power supply or for any other losses to CONTRACTOR arising there from. CONTRACTOR shall ensure that electrical equipments deployed by him are such that the aggregate power factor does not fall below 0.9 at its premises.

10.05 CONTRACTOR shall ensure that there is no wastage or misuse of power. If any wastage or misuse of power is detected, the quantity so wasted or misused shall be charged to CONTRACTOR at rates to be decided by ENGINEER/OWNER, whose decision shall be final and binding.

11.00 WATER

11.01 Water for construction purposes will be supplied by ENGINEER/OWNER at one point free of cost. CONTRACTOR shall make his own arrangements for pumping and storing the required quantity of water and for the necessary distribution pipelines. Any shifting of this distribution pipelines necessary in the course of the work, whether necessitated by his work or others, must be done at his own cost and no claim on this account will be entertained. CONTRACTOR shall make judicious use of the water and shall ensure that there is no wastage and leakages etc.

11.02 CONTRACTOR shall have to make his own arrangements for requirement of drainage and water for his works, staff and labour. All the precautions shall be taken so as not to pollute the water source or surroundings.

11.03 ENGINEER reserves the right to draw water from the distribution lines laid down by CONTRACTOR, should the same be required for any other works or needs.
12.00 LAND AND HOUSE

12.01 No housing accommodation for CONTRACTOR or his personnel will be made available by ENGINEER/OWNER. CONTRACTOR will have to make his own arrangements with due regard to the weather and monsoon conditions, as applicable.

12.02 Land to the extent available may be allocated for temporary use for site office, stores, bar bending yards near the construction site, free of cost on the basis of recommendation of ENGINEER. For other requirements such as labour camps, staff quarters etc., CONTRACTOR will make his own arrangement. CONTRACTOR shall maintain the areas allotted to him in a neat and clean condition as required by ENGINEER/OWNER. CONTRACTOR shall make his own arrangements of water, sanitary and power facilities for labour camps/staff quarters. On completion of the work, all temporary structures must be removed by CONTRACTOR with approval of ENGINEER and the land brought to its original condition. OWNER reserves the right, on completion of work, to take over any or all of the structures put up by CONTRACTOR at terms to be mutually agreed upon.

13.00 QUARRIES AND APPROACH ROAD

13.01 Where required, CONTRACTOR shall locate suitable quarries for stone aggregate, sand and borrow area and satisfy himself of the quality and quantity of the materials required for construction. CONTRACTOR shall make his own arrangements for obtaining the quarries and establish source of required materials of appropriate quality.

13.02 CONTRACTOR shall not extract any materials from OWNER’s land except with the prior written consent of OWNER. Permission to quarry materials from OWNER’s land for bonafide use of the works may be given to the extent of the quantities available at the sole discretion of OWNER, failing which the Contractor shall make his own arrangements.

13.03 Washing of sand/gravel, stone aggregate for concrete/filter material shall be done where the percentage of deleterious materials is more than that specified in the Bureau of Indian Standards (BIS) specification.
13.04 The approach roads to work site, quarries, borrow areas and dumping areas should be laid /provided and maintained by CONTRACTOR, wherever necessary, at his cost.

13.05 Removal of overburden in quarries and its disposal, wherever necessary shall be done by CONTRACTOR at his cost, in conformity with the direction of the ENGINEER/State Authorities as applicable.

13.06 Construction of roads and/or the use of existing roads by CONTRACTOR for the transportation of materials, machinery, supplies, fuels etc., and to serve for all his other requirements to and from the Work site or on the work, shall have the prior approval of ENGINEER/State Authority.

14.00 COMMUNICATION LINES AND NATURAL WATER RESOURCES

14.01 CONTRACTOR shall not close any communication lines without the permission of ENGINEER. CONTRACTOR shall also not obstruct any natural lines of drainage without the prior written approval of ENGINEER.

15.00 COMMUNICATION FACILITIES

15.01 CONTRACTOR shall provide, maintain and operate at his cost all communication facilities as may be necessary for safe and efficient performance of the Work.

16.00 PERMITS & LICENCES

16.01 CONTRACTOR shall secure and pay for all licences and permits which he may require to comply fully with all laws, ordinances and/or regulations of the proper public authorities in connection with the performance of the Work.

16.02 CONTRACTOR shall be responsible for all losses / damages and shall defend, indemnify and save harmless OWNER and ENGINEER in accordance with Article 41 hereof. Indemnify OWNER from and against all damages and liability which may arise out of the failure of CONTRACTOR to secure and pay for any such licenses and permits or to comply fully with any and all applicable laws, ordinances and regulations.
17.00 LEVIES FOR ENTRY INTO PORT AREA AT MANGALORE

17.01 It is the responsibility of CONTRACTOR to pay the Port authorities the charges levied for entry of men and vehicles into Port area at the rates fixed by them.

18.00 MATERIALS

18.01 The work is for complete job including labour and supply of all materials. Unless otherwise specified, CONTRACTOR shall make his own arrangements for cement, steel, stone ballast, stones, stone chips, sand and other construction materials as required for satisfactory completion of the Work.

18.02 In case of materials supplied by OWNER, the CONTRACTOR shall ensure that only the required quantities of materials are indented and got issued. Any such materials remaining unused and in perfectly good condition at the time of completion or termination of the contract shall be returned to OWNER at a place or places as directed by ENGINEER, by a notice in writing under his hand, if he shall so require. Credit for such materials will be given at the issue rate. The CONTRACTOR shall bear the cost of loading, transporting and unloading and incidental charges for returning the surplus materials from and to the stores where from they were issued or as directed by the OWNER/ENGINEER.

18.03 All CONTRACTOR’s materials shall be generally inspected and approved by ENGINEER from time to time at the source of supplies. CONTRACTOR shall provide all facilities for such inspection free of cost to ENGINEER. Notwithstanding any inspection at the source, the ENGINEER shall have liberty to reject any material brought to site that does not conform to the specifications without being liable for compensation.

18.04 All rejected materials shall be removed from the Site by CONTRACTOR at his own cost, as directed by the ENGINEER.

18.05 CONTRACTOR shall at his own cost, properly store all materials brought by him to the work site to prevent damage owing to rain, wind, direct exposure to sun etc., and also from theft, pilferage
etc. CONTRACTOR shall maintain stocks of all materials required by him for proper and speedy execution of the work without any interruption.

18.06 All materials, construction plants and equipments, once brought by CONTRACTOR within the project area, are not to be removed from there without the prior written authority from ENGINEER.

18.07 ASSISTANCE FOR PROCUREMENT OF MATERIALS

A. CONTRACTOR shall be responsible for procurement of all materials required for satisfactory completion of the work. However, OWNER may at his discretion, release suitable quantity of materials available with OWNER. CONTRACTOR shall make necessary arrangements for payments, transportation etc., for the quantity of materials so released.

B. Where the CONTRACT is terminated owing to any default on the part of CONTRACTOR, CONTRACTOR shall pay all transport charges incurred for transporting any materials to any other place to be nominated by OWNER.

19.00 SPECIFICATIONS

19.01 All technical documents regarding construction of works are given in the Metric System and all works should be carried out as per Drawings and Specifications. Where the Specifications are not available in the drawings, the Specifications given in the Bid Documents shall apply. Where the Specifications are not available in either of the above, B.I.S. Specifications (Latest editions, unless otherwise specified) will be followed. For points not covered by the B.I.S. Specifications and/or the portion thereof and if no mention be made therein, the written instructions of ENGINEER shall be binding on CONTRACTOR.

19.02 If CONTRACTOR performs any work in a manner contrary to the Specifications or Drawings or any of them and without such reference to ENGINEER, he shall bear all the costs arising or ensuring there from and shall be responsible for the losses to ENGINEER/OWNER.
20.00 RATES

The rates to be quoted are intended to provide for works duly and properly completed in accordance with the General and Special Conditions of Contract, Specifications and Drawings together with such alterations and/or additions as may be required/ordered and without prejudice to the generality thereof and shall include for details of construction which are obviously and fairly intended and which may not have been specifically referred to in these documents and working drawings, but are essential for execution and satisfactory completion of work including those of minor nature and shall be deemed to include and cover but not limited to inter-alia the following:

i) The cost of all superintendence and labour, materials, tools, plants, equipments, mobilising and demobilising of equipments, fuel, lubricants, fixtures, transport charges, temporary and permanent works and quarrying charges, testing, screening, washing, handling of materials, stacking and removal charges of any rejected materials, water and power arrangements and satisfactory maintenance of the same for the full and satisfactory completion of the Work intended.

ii) All fees, duties, royalties, rent and compensation to OWNER for surface damage or taxes and impositions payable to local authorities in respect of land and structures for all materials supplied for the Work or other duties/or expenses for which CONTRACTOR may become liable or may be put to under any provision of the law for the purpose of or in connection with the execution of the Contract including levies payable on all transactions.

iii) Watching and lighting arrangements as required for satisfactory performance.

iv) Setting of work profiles etc. and of construction, repair and upkeep of all central lines, bench marks and levels and pegs thereof, including provision of masonry/concrete pillars showing the central lines of structures, grid lines and levels and maintenance and protection of the same including providing fencing etc., throughout the period of Contract.

v) Erection, maintenance and removal of temporary works and building.

vi) Supply of samples, moulds, cost of testing of materials, works etc.

vii) Working in all conditions including in/under water, liquid, mud, foul conditions etc., and shall also include bailing or pumping out water from the foundations, basement or any other place of construction collected
from rains or any other source whatsoever, de-sludging and allied operation, at any stage of work and any time till the completion of Work including all suspension period and delays whatsoever, cost of curing including pumping of curing water wherever necessary.

viii) Diversion and draining works, protection works, temporary facilities, bridges, gangways, drainage etc.

ix) Work at all depths in foundations below Ground level and in superstructures up to all heights above ground level including all lifts and descents involved at any other place of work and disposal areas.

x) Cost of all leads unless otherwise specified in the Specification / Schedule.

xi) Provision of centering, scaffolding, strutting props etc.

xii) All materials and labour required for fencing and protection against risk of accidents, for providing necessary planking, strutting gangway with handrails, gumboots, helmets, safety belts etc., during the progress of work.

xiii) Diversion including compensation payable for barrier arrangements for the safety of the public or employees during the execution of works, all sanitary and medical arrangements for labour camps as may be prescribed by ENGINEER. Works in all shapes, straight, inclined or curved and all sizes as shown or as required.

xiv) Clearing the sites after the completion of the work of all debris, left out construction materials, machine, equipment, temporary houses, offices, stores, workshops, labour colonies etc., including micro dressing the area in neat and clean shape.

xv) Such other incidental charges or contingencies as may have been provided in the Specifications or as necessary or levied

21.00 ESCALATION

21.01 No escalation will be admissible on rates, materials, labour, royalties, taxes etc. on any account unless otherwise specifically provided for.

22.00 WASTAGES

22.01 For the purpose of accounting of ENGINEER/OWNER supplied materials either free or on cost recoverable basis, the following wastages shall be allowed which shall include loss of cement in bags / transit and in case of steel, rolling margin as per BIS, invisible wastage and cut pieces of less than 3 meters in length or plates of size less than 0.5 sq. meter subject to one dimension not exceeding 300 mm.
### a) CEMENT:

5% (Five Percent)

The theoretical quantity of cement to be used in the work shall be calculated on the basis of the norms indicated for consumption of cement or as per the authorised design mix. Where such norms are not given, norms available in CPWD Schedule showing quantity of cement to be used in different items of works shall be applicable. Where CPWD norms are not available, it shall be calculated as directed by the ENGINEER.

In the event of it being discovered that the quantity of cement used is less than the quantity ascertained as herein before, the cost of quantity of cement not so used, shall be recovered from the CONTRACTOR on the basis of actual landed cost plus 50% as compensation/damages, provided such works are technically accepted. Shortage of cement after accounting as stipulated above will be charged at rate specified in Article 22.02.

### b) REINFORCED STEEL:

5% on the actual quantity incorporated in the works and measured for payment by ENGINEER/OWNER.

### c) STRUCTURAL STEEL:

(i) Sections 5% on the quantity computed based on DOD lists.

(ii) Plates 7.5% on the quantity computed based on DOD lists.

### d) STEEL PIPES:

3% on the quantity computed from the measurements/“As made” drawings.
e) C.I.PIPES:

5% on the quantity computed from the measurements/ “As made” drawings.

f) OTHER MATERIALS:

5% unless otherwise specified.

22.02 Quantity in excess of the above specified wastages shall be charged at actual cost +50%, unless otherwise specified.

22.03 The surplus / balance steel beyond the maximum permissible limits allowable for invisible wastages including rolling margin shall be returned to OWNER.

23.00 SUPPLY OF DRAWINGS

23.01 OWNER / ENGINEER will provide drawings and other information for start of the first item of work. Subsequently, ENGINEER will maintain a flow of drawings and other required information sequenced and timed in such a manner as to permit CONTRACTOR to execute the work in accordance with the scheduled and subsequent scheduled releases.

23.02 Only three sets of drawings will be supplied by ENGINEER. Failure on the part of ENGINEER to provide drawing or maintain flow of drawings as stated above will attract the provision of Article 32 hereof.

23.03 One set of drawings shall be returned to ENGINEER/OWNER showing therein all additions and alterations in the process of execution. This set of drawings will show the “As Built Installation’. However, all alterations, additions or deletions from the original drawings must have the prior approval in writing of ENGINEER.

24.00 SITE ORDER BOOK

24.01 CONTRACTOR shall provide at Site, a “Site order” book. The pages in the site order book shall be machine numbered. CONTRACTOR shall be responsible for obtaining all the orders entered in the order and within 24 hours, he or his authorised agent shall sign the orders issued by ENGINEER and shall carry them out strictly in accordance with these
instructions and compliances shall also be recorded by CONTRACTOR and got duly countersigned by ENGINEER or his authorised agent.

25.00 PROGRESS REPORT AND DAILY REPORTS

25.01 Progress reports shall be submitted by CONTRACTOR in the proforma furnishing the details as required by ENGINEER.

25.02 CONTRACTOR shall submit daily reports of the following by 10 AM:

   i) Total number of labourers in the working areas.
   
   ii) Total number of local labourers in the working areas.
   
   iii) List of equipments deployed and worked.
   
   iv) Progress Report of the previous day.

26.00 EMPLOYMENT OF ENGINEERS

26.01 To ensure proper execution of work, CONTRACTOR must engage adequate number of full time qualified engineers possessing the requisite experience.

27.00 SECURITY

27.01 CONTRACTOR shall make his own arrangements to protect his materials, plant and equipment from pilferage, vandalism, accidental damage or loss of any kind and ENGINEER/OWNER shall not be responsible for any such occurrences.

28.00 JOB SITE REGULATIONS AND REQUIREMENT

28.01 CONTRACTOR shall comply with and be bound by all regulations and requirements established by ENGINEER governing CONTRACTORS, Sub-contractors and their employees engaged in the work under this CONTRACT or in preparation for such work.
29.00 EXECUTION OF WORK DURING NIGHT

29.01 When the work is carried out at night or in obscured daylight, adequate arrangements for floodlighting the working area shall be made by CONTRACTOR at his own cost and got approved by ENGINEER.

30.00 FUEL STORAGE TANKS

30.01 The storage of gasoline (petrol) and other fuel oils or other inflammable materials shall conform to the regulations for such storage issued by the concerned Statutory Authorities / State Government and Central Government Authorities.

31.00 ALTERATIONS AND OMISSIONS - VARIATIONS IN QUANTITIES - EXTRA WORKS

A. Revisions to the Specifications and Drawings, may, from time to time during the progress of work, be issued by ENGINEER. Additionally, ENGINEER may, from time to time without invalidating CONTRACT make changes in the Specification and issue additional instructions and/or require additional work to be performed or delete certain work.

B. The quantities contained in the “Schedule of Units and Quantities” are only approximate and subject to variations. Payment will be based upon the actual quantities as certified by ENGINEER and at the unit rates stipulated in the CONTRACT.

C. Rates for extra, altered or substituted work (hereinafter called “extra works”) shall be determined as set forth hereinafter in consultation with OWNER. If the rates for extra work are not specifically provided for in the CONTRACT the rates will be derived by ENGINEER from the rates for similar items/ clauses of works as are specified in the CONTRACT. The decision of ENGINEER in this regard shall be final and binding on and conclusive to Parties. In the absence of similar items of work, the rate for extra work/item shall be established by ENGINEER on the basis of inputs and its cost as determined by ENGINEER, plus 15% towards Contractor’s overheads, profits etc.
D. CONTRACTOR shall not be entitled to any claim because of any variation (plus or minus) in the Contract Value above the Estimate Value of Contract.

E. CONTRACTOR shall expeditiously perform such work as is directed by ENGINEER regardless of whether such work requires variation of quantities or includes extra work with payment being made in accordance with this CONTRACT.

32.00 EXTENSION OF TIME

A. If CONTRACTOR believes that the work is being delayed owing to the failure of OWNER to keep a commitment, he shall immediately notify ENGINEER/OWNER in writing, if ENGINEER/OWNER is satisfied that the reasons stated by CONTRACTOR have a bearing on the time schedule and that such delay cannot be made up by CONTRACTOR by rearranging the sequence of items of work, a change in method, by compressing the execution time required through improved supervision, more manpower or more effective equipment, by paying incentives or in any other way, then OWNER shall extend, by written notice, the said specified required completion time for a period of time equivalent to any such delay on receipt of request from the CONTRACTOR along with full justification. The decisions of OWNER in this regard shall be final and binding on the Parties.

B. The Contractor shall not delay / discontinue execution of job for want of grant of extension of time.

C. Such extensions shall be in full settlement and satisfaction of any or all claims which CONTRACTOR may have against OWNER for damages or losses as a result of any such delay.

33.00 PRIORITY OF AGREEMENT, OTHER CONTRACT DOCUMENTS AND DRAWING AND CONSTRUCTION DOCUMENTS.

A. All Documents and Drawings forming part of the CONTRACT are intended to be read together and to be complete and in agreement.
B. If conflicts between documents arise the documents shall prevail in the order stipulated below:

1. Special conditions shall prevail over General Conditions.

2. Specifications shall prevail over Tender Drawings.

3. Description of items in “Schedule of Units and Quantities” read in conjunction with preamble to the Schedule, if any, shall prevail over those provided in Specification and Drawings.

4. Between two issues of the same document, the document revised or re-issued as of the later date shall prevail.

5. All Specifications, Drawings and other documents shall be interpreted in conformity with these General Conditions of Contract as supplemented by and/or modified in the Special Conditions.

6. Wherever a Lumpsum Price for the Work is stipulated in the Award, the quantities stipulated in the “Schedule of Units and Quantities”, if any, shall be disregarded in construing this Contract, and CONTRACTOR shall perform all the Work as envisaged in this CONTRACT including the Specifications and Drawings and CONTRACTOR shall be paid only the amount of such Lumpsum price in consideration thereof.

C. All dimensions marked on the Drawings are to be taken as correct in preference to measurements by scale.

D. CONTRACTOR shall bring to the attention of ENGINEER any obvious errors, omissions or discrepancies in the Specifications, Contract Drawings or other documents and shall request clarification from ENGINEER, whose decision shall be final and binding on and conclusive to the Parties. If work is done incorrectly because of failure to obtain this clarification from ENGINEER, CONTRACTOR shall correct such work at his own expenses.
34.00 CONDITIONS UNDER WHICH WORK MAY BE CAUSED TO BE COMPLETED BY OWNER.

A. If CONTRACTOR shall, at any time in the judgment of ENGINEER, fail to engage enough properly skilled workmen or materials, plant, equipment, tools, facilities and supplies of the proper quality or fail to execute the Work with promptness and diligence or fail to make prompt payment to sub contractors or for materials or labour or fail in performance of any of his obligations within the intended meaning of this CONTRACT as provided for herein and shall within three (3) days after receipt of written notice from ENGINEER, fail to remedy or commence to remedy any such defaults or shall interfere with or disrupt or threaten to interfere with or disrupt the work or any portion thereof in any manner, whether by reason of labour disputes, shortage of labour, materials or otherwise or if the presence of CONTRACTOR or his agents or employees upon OWNER’s premises or the fact that this CONTRACT has been made results in acts by third parties, which interfere with or disrupt the work or any portion thereof in any manner, whether by reason of a labour dispute, picketing, boycotting or otherwise or if a petition in bankruptcy shall be filed by or against CONTRACTOR or CONTRACTOR shall become insolvent, OWNER may, in any such event, terminate this CONTRACT with immediate effect or may exclude CONTRACTOR and his employees, sub-contractors and agents from the work or any portion thereof without terminating this CONTRACT.

Having exercised either of the above options, the work may be finished by their agencies to be appointed by OWNER and for that purpose the agency so appointed shall be authorised to enter upon the premises and take charge of all materials, tools, equipment, facilities and supplies thereof and may have the work so taken over finalised by whatever method OWNER may deem expedient.

B. CONTRACTOR shall not be entitled in any such event as aforesaid to receive any further payment under this CONTRACT until such Work shall be wholly finished and maintained as determined by OWNER and all Payments shall be subject to Article 36F Final Payment. CONTRACTOR shall be entitled to payment only for the work performed by CONTRACTOR prior to the time of termination or exclusion as provided in paragraph A above. However, should any excess cost, expenses or any damages be incurred in completing the
work, CONTRACTOR shall pay OWNER, such excess cost, expenses and/or damages as may be determined by OWNER whose decision in regard to the quantum shall be final and binding on and conclusive to the Parties and such cost, expenses or damages may be deducted or retained by OWNER in accordance with the provisions of the CONTRACT.

C. Any unused materials, tools, equipment, facilities and supplies furnished by CONTRACTOR for the work shall be returned to CONTRACTOR following the completion thereof.

D. The cost and expense of completing the work, as herein provided and any damage incurred through default of CONTRACTOR shall be audited and certified by OWNER, whose certificate thereof shall be final and binding and conclusive to the Parties.

E. In the event this CONTRACT is terminated as aforesaid, CONTRACTOR shall not be released from any costs, expenses, penalties or damages which may be assessed against or levied on the CONTRACTOR.

35.00 USE OF COMPLETED PORTIONS OR ITEMS OF WORK

A. Whenever, as determined by ENGINEER/OWNER any portion or item of work performed by CONTRACTOR, is in a condition suitable for use and require such use in the best interests of the Work, OWNER may cause the same to be taken over and used. Such use by OWNER shall, in no case, be construed as constituting final acceptance and shall neither relieve CONTRACTOR of any of his responsibilities under the CONTRACT nor act as a waiver of any of the conditions thereof provided that CONTRACTOR shall not be liable for the cost of repairs, rework or renewals which may be required owing to ordinary wear and tear resulting from such use.

B. If, as a result of CONTRACTOR’s failure to comply with the provisions of this CONTRACT, CONTRACTOR has to perform work on the portion or item of work being used, such operation or use may continue until such portion or item of work can without injury to the WORK be taken out of service provided that the period of such operation or use pending completion of appropriate remedial action, shall not exceed twelve (12) months, unless otherwise mutually agreed upon in writing between the parties hereto. Nothing contained herein shall prejudice
the right of OWNER or ENGINEER for claiming damages for any delay in completion of work or extra costs involved.

C. CONTRACTOR shall not use any permanently installed equipment unless such use is approved in advance by ENGINEER in writing on such terms as may be stipulated in such approval. Where CONTRACTOR's written request is granted for the use of certain equipment, CONTRACTOR shall properly use and maintain the equipment. Upon completion of its use and at his expense, repair, if necessary, such equipment to the satisfaction of ENGINEER.

36.00 PAYMENTS

A. ADVANCE PAYMENTS

I. Normally mobilisation advance will not be paid. However, in exceptional case, if the same is agreed to, the OWNER may approve payment of the following advance to CONTRACTOR to the extent and under the conditions as may be stipulated by OWNER at his entire discretion. Such advance payments shall carry interest at State Bank of India's lending rate.

1. Initial mobilisation advance against Bank Guarantee in favour of the OWNER from any Nationalised / Scheduled Bank and in the format approved by the OWNER.

2. Equipment brought to site against hypothecation of the said Equipment:- Advance against machinery shall be made only in respect of those machines, the requirement of which is approved by ENGINEER as being minimum and the value in case of second hand machinery being subject to the assessment of ENGINEER/OWNER.

3. The recovery of mobilisation advance and the advance against old/new machinery shall be made on prorata basis during the period of Contract, starting from when 10% of the value of the Work is completed and recovered in full by the time 90% of the Work is completed. The OWNER, however, reserves the right to recover the full advance from the payments due to the CONTRACTOR in the event of termination of the CONTRACT or such circumstances that the necessity of advances is otherwise classified.
4. The value of Bank Guarantee furnished against mobilisation advance shall progressively stand reduced to the extent recoveries are effected from the bills of CONTRACTOR towards the mobilisation advance.

II. Advance to the extent of 75 % against cost of imperishable materials brought to the work site for incorporating in the Work, shall be paid at the sole discretion of the Owner.

Advance against materials to be incorporated in the item of Work brought to the work site shall be recovered from running bills prorata according to quantity of work billed for including wastage, if any.

B. PROGRESS PAYMENTS

1. OWNER shall pay to CONTRACTOR for such WORK as is performed by CONTRACTOR and as certified by ENGINEER as being acceptable in accordance with the provisions of this CONTRACT. Payment shall be based upon the quantity of work IN PLACE as per terms stipulated in the CONTRACT.

2. CONTRACTOR shall submit to OWNER a fortnightly bill showing the unit of work IN PLACE and the amounts claimed to be payable to CONTRACTOR in accordance with the terms and conditions of this CONTRACT. In case of a lumpsum CONTRACT, OWNER may stipulate in the CONTRACT Progressive Payments as a percentage based on the Progress Work as certified by ENGINEER. Upon receipt by ENGINEER of said bill, ENGINEER shall review such bill and within Fifteen (15) clear days from submission shall,

   a) Approve such bill and certify the same for payment

   OR

   b) Approve part of the bill(s) and certify that part for payment, request further clarifications / revisions from CONTRACTOR as to the balance and upon receipt of satisfactory clarifications/revisions from CONTRACTOR, certify the balance for payment

   OR
c) Reject the entire bill subject to further clarification/ revisions from CONTRACTOR. Upon receipt by ENGINEER of satisfactory clarification/revisions to such rejected bill, ENGINEER shall approve and certify the clarified/revised bill for payment. Payment for all bills shall be due from OWNER, except as otherwise provided herein within Fifteen (15) Clear Days of receipt by Owner ENGINEER’s certification of such bills.

3. All equipment and materials brought to the Worksite by CONTRACTOR when so brought shall be deemed to vest in OWNER without prejudice to the obligation of CONTRACTOR for their safe custody. CONTRACTOR shall intimate to ENGINEER all equipment and material brought to the Worksite at the time of bringing to the Worksite and the said Equipment and materials shall be subject to check by ENGINEER/OWNER at all times. No such equipment or materials shall be removed from the Worksite by CONTRACTOR without the express written permission of OWNER.

4. Delay of Payment shall not be construed as a breach of this CONTRACT

5. OWNER shall, in accordance with the Indian Income Tax Laws, withhold from payments to be made to CONTRACTOR as advance Tax, all amounts as may be required.

6. Payments made pursuant to this CONTRACT by Owner shall not be construed as the waiver of any breach hereof by CONTRACTOR or as an acceptance of defective Work or items of work not in conformity with the terms and conditions of this CONTRACT.

7. Progress payments shall be made as the Work progresses based upon quantities of Work In Place, less appropriate adjustment.

OWNER or his designated representatives may verify the progress of the work at any time. CONTRACTOR shall co-operate in permitting access, for verification of the progress to all places where work is being done or material is stored and shall provide safe and proper facilities at all times for such verification of progress.

8. Ad hoc / Advance of 75% will be released against the work done as assessed by the ENGINEER and on submission of progressive bill by
the CONTRACTOR, pending detailed scrutiny/ verification by the ENGINEER. This will be adjusted fully on passing and releasing the full payment against the bill.

9. All progressive payments shall be regarded as advances against final payment and not as payment for Work done.

C. LIQUIDATED DAMAGES

1. The date(s) of completion of Work as stipulated in the CONTRACT including various intermediate milestones fixed by Engineer shall be of the essence of CONTRACT.

2. If, CONTRACTOR fails to complete the Work or the component part of the work within the stipulated completion date or the component milestone stipulated in the CONTRACT, CONTRACTOR shall pay to OWNER, as liquidated damages for such default (unless extension of time is granted by Engineer as provided under Article 32.0 hereof) for everyday which lapse between the date prescribed thus for and the actual date of completion of such component part of the Work, the amounts determined on the basis of the percentages of the apportioned value of such components as specified herein.

   i) Delay for first 20 days 0.1 % per day.
   ii) Delay beyond first 20 days 0.15% per day.

   Subject to maximum of 5% of the total CONTRACT VALUE.

3. OWNER reserves the right to waive the liquidated damages either in part or in full at its sole discretion.

4. The payment or deduction or retention of such liquidated damages shall not relieve CONTRACTOR of the obligations and liabilities under this CONTRACT.

5. OWNER may recover, deduct or retain the liquidated damages as assessed above from any moneys due or which may become due or payable to CONTRACTOR in this or any other Contract or in any other manner decided by the OWNER.
6. Liquidated damages as provided herein above relate only to delay in the performance by CONTRACTOR of the Work or component part thereof and the parties hereto agree that such amount for such events are pre-estimated, fair and reasonable and acceptable to the parties.

7. Component Completion Milestone as used in this Article shall mean that point at which the respective component is sufficiently complete to permit CONTRACTOR or others to proceed with subsequent steps towards completion of the Work or any portion thereof without interference from or with the immediate area or an adjacent area. OWNER/ENGINEER shall be the sole judge as to whether such Component Completion Milestone has been achieved and his decisions shall be final, binding and conclusive. Nothing in this paragraph shall be deemed to limit CONTRACTOR’s obligations to complete all components to the satisfaction of ENGINEER/OWNER.

D. CONSEQUENTIAL DAMAGES

In case of Turnkey contracts, the Contractor will have to compensate the Owner towards Consequential Damages suffered by Owner due to time and / or cost overrun in completion of the turnkey projects. This will be in addition to the Liquidated Damages leviable.

E. CLAIMS AND DEDUCTIONS

1. CONTRACTOR shall send to ENGINEER/OWNER once each month an account giving full and detailed particulars of all claims for any additional expense(s), to which CONTRACTOR may consider himself entitled and of all Extra Work(s) ordered by ENGINEER which he has executed during the preceding month and no claim for payment for any such work(s) will be considered as has not been included in such particulars, provided always that OWNER shall be entitled to authorise payment to be made for any such work(s), notwithstanding CONTRACTOR’s failure to comply with this condition of CONTRACT, if he has, at the earliest practicable opportunity, notified OWNER / ENGINEER in writing that he intends to make a claim for such work.

2. All costs, charges or expenses, which OWNER may have paid to others for which, under this CONTRACT, CONTRACTOR is liable and all costs, claims, charges, damages or expenses to which OWNER and/or ENGINEER are entitled to receive from CONTRACTOR under this
CONTRACT may be retained by OWNER from or set-off against any money payable by OWNER to CONTRACTOR under this CONTRACT or any other contract, without prejudice to the right of OWNER and/or ENGINEER, to recover such costs, claims, charges, penalties or expenses as otherwise provided by or under law.

F. FINAL PAYMENT

Final payment of all sums due to CONTRACTOR shall be made as follows:

1. On completion of the work(s) and acceptance thereof, CONTRACTOR shall prepare a final bill of all the works performed by him under the CONTRACT and submit the same for certification by ENGINEER within a period of 60 days of the completion of Work.

2. ENGINEER shall verify the bill and check the admissibility thereof under the CONTRACT, determine the liquidated damages, consequential damages, if any, recoverable from CONTRACTOR, make appropriate adjustment for all recoveries and advances and certify to OWNER that the work under CONTRACT is duly performed by CONTRACTOR and the amount, if any, payable or recoverable from CONTRACTOR.

3. Final payment of all sums, if any, due to CONTRACTOR shall be made by OWNER. OWNER having always the right to recheck the bill of CONTRACTOR fully.

4. CONTRACTOR shall provide ENGINEER and OWNER with a certificate satisfactory to both that all privileges, liens, claims, obligations and liabilities against or chargeable to ENGINEER or OWNER have been fully paid, satisfied and released and that CONTRACTOR has no claim(s) against OWNER and/or ENGINEER

37.0 SECURITY DEPOSITS

A. Within 15 days of the award of the CONTRACT, CONTRACTOR shall deposit with OWNER an initial Security Deposit of 3% (three percent) of the Contract Value and the same shall be in cash or in any of the following forms.
1. Demand drafts drawn in favour of OWNER from any Nationalised / Scheduled Bank.

2. Bank Guarantee in prescribed Proforma (attached), executed by a Nationalised Bank / Scheduled Bank. If the bank guarantee is from a non-Indian Bank, the same shall be got stamped at Bangalore, karnataka State, India, by the Foreign Banker’s Associates / Subsidiaries or agents in India, in accordance with the laws applicable in State of Karnataka, India.

B. If CONTRACTOR fails to provide the security within the period specified, such failure will constitute a breach of the Contract and the Owner shall be entitled to award the work elsewhere at CONTRACTOR’s risk and cost.

C. No claims shall lie against OWNER either in respect of interest due, if any, on security deposits or depreciation in their value.

D. As and by way of additional security, from every progressive bill of CONTRACTOR, Security Deposit at the rate of 7% of the Gross Value of such bill as determined before payment shall be retained by OWNER or CONTRACTOR can submit additional Security Deposit by Bank guarantee.

E. Whenever the Security Deposit is furnished by CONTRACTOR in any form other than cash or Demand Draft, CONTRACTOR shall be entirely responsible to keep such form of security deposit enforceable by OWNER by extending the validity thereof, if required, by removing the restrictions thereon, within one month before the due date of expiry and keep them enforceable until released by OWNER after the period of maintenance.

F. The Security Deposit shall remain at the entire disposal of OWNER as a security for satisfactory execution and completion of the Work(s). OWNER shall be at liberty to deduct and appropriate from the Security Deposit such damages (liquidated or otherwise) and other dues and recoveries from CONTRACTOR under this CONTRACT and the amount by which Security Deposit is reduced by such appropriations will be made by further deductions from CONTRACTOR’s subsequent bills to that extent as to make up the Security Deposit to the full.
G. Notwithstanding anything to contrary, in as much as the Security Deposit is to be in cash with OWNER, OWNER shall be entitled to enforce any of the approved forms of Security Deposit furnished by CONTRACTOR at any time and realise cash thereof irrespective of whether or not CONTRACTOR disputes such right. However, if CONTRACTOR obtains the extension of the time limit, if any, for the enforceability of such form of Security Deposit and intimates OWNER of such extension within one month before expiry, OWNER may not enforce such form of Security Deposit, unless it has otherwise become enforceable.

H. On due and satisfactory performance of all the obligations of CONTRACTOR under this CONTRACT including completion of work in all respects carrying out the obligations of CONTRACTOR during Period of Maintenance, Security Deposit shall be released by OWNER subject to recoveries, deductions and retentions there from as provided under the CONTRACT.

38.00 PERIOD OF MAINTENANCE AND MAINTENANCE CERTIFICATE

A. To the extent that the work shall, at or as soon as practicable after the expiry of the Period of Maintenance, be delivered up to OWNER in as good and perfect condition (fair wear and tear excepted) to the satisfaction of OWNER, as that, in which they were at the commencement of the Period of Maintenance, CONTRACTOR shall execute all such work of repair, modification, reconstruction, rectification and making good of defects, imperfections, shrinkages or other faults as may be required on CONTRACTOR in writing by ENGINEER / OWNER during the Period of Maintenance or within fourteen days after the expiry as a result of an inspection made by or on behalf of OWNER prior to its expiry. The decision of OWNER shall be final, conclusive to and binding on the Parties in this regard.

B. All such work shall be carried out by CONTRACTOR at his own expense if the necessity thereof shall, in the opinion of ENGINEER/OWNER, be due to the use of material or workmanship not in accordance with this CONTRACT or to neglect or failure on the part of CONTRACTOR to comply with any obligation expressed or implied on CONTRACTOR’s part under this Contract. If, in the opinion of ENGINEER/OWNER, such necessity is due to any other cause, the value of work shall
be ascertained and paid for as if it was Extra Work. In case the CONTRACTOR fails to keep the required work force at Site during maintenance period, the OWNER reserves the right to change / replace any portion of the work without waiting for the CONTRACTOR, if the same is essential for keeping the operations running. The cost of such work will be recovered from the CONTRACTOR.

C. If CONTRACTOR fails to do any such work as aforesaid required by OWNER/ENGINEER, OWNER shall be entitled to have such work carried out at CONTRACTOR’s own cost and OWNER shall be entitled to recover from CONTRACTOR the cost thereof or may deduct the same from any money payable to CONTRACTOR or otherwise.

D. CONTRACTOR shall, if required by ENGINEER/OWNER in writing, search for the cause of any defect, imperfection or fault under the directions of ENGINEER. Unless such defects, imperfection or fault shall be one, for which CONTRACTOR is not liable under this CONTRACT, the cost of the work carried out by CONTRACTOR is not liable under this CONTRACT, the cost of the Work carried out by CONTRACTOR in searching as aforesaid, shall be borne by OWNER. But if such defect, imperfection or default shall be one for which CONTRACTOR is liable as aforesaid, the cost of work carried out in searching as aforesaid, shall be borne by CONTRACTOR and he shall, in such case, repair, rectify and make good such defect, imperfection of default at his own expenses to the satisfaction of ENGINEER/OWNER. The decision(s) of ENGINEER / OWNER in these respects shall be final and binding on and conclusive to the Parties.

E. The work shall not be considered completed, until the work shall have been completed and maintained to ENGINEER/OWNER’s satisfaction. The Maintenance Certificate shall be given by ENGINEER fourteen days after the expiration of the period of maintenance on the request of CONTRACTOR, or as soon thereafter, as any work ordered during such period, shall have been completed to the satisfaction of OWNER/ENGINEER and full effect shall be given to this Article, notwithstanding any previous entry on or the taking possession of or using thereof.
F. No certificate other than the Maintenance Certificate referred to above shall be deemed to constitute approval of any work or other matter in respect of performance of this CONTRACT or any part thereof or the accuracy of any claim or demand made by CONTRACTOR or of Extra Work, having been ordered by OWNER or should any other certificate conclude or prejudice any of the powers of ENGINEER/OWNER.

G. ENGINEER/OWNER may by any certificate make any correction or modification in any previous certificate, which shall have been issued by him and shall have the power to withhold any certificate if the work or any item hereof is not being carried out to his satisfaction.

H. No claim by CONTRACTOR for any matter or thing arising out of or in connection with this CONTRACT or the execution of the Work shall be considered unless CONTRACTOR shall have made a claim in writing in respect thereof before giving of the Maintenance Certificate.

I. Period of Maintenance shall be calculated from the date of completion of the Works certified by ENGINEER

J. The period of maintenance shall cover a period of twelve (12) months (unless otherwise specified in the (CONTRACT) after a final certificate of the completion of the work has been issued by ENGINEER as stated above.

39.00 RESPONSIBILITY FOR SAFETY

CONTRACTOR shall comply safety regulations as per statutory requirement under The Factory Act and other relevant statutes.

A. The safety of all persons employed by CONTRACTOR and his SUB-CONTRACTORS on the work site or any other person who enters upon the work site for reasons relating to this CONTRACT, shall be the sole responsibility of CONTRACTOR and CONTRACTOR shall defend, indemnify and save harmless OWNER and ENGINEER from / and against any actions, claims, damages, cost resulting from death to or injuries sustained by these person(s), on the work site. Statutory regulations for safety of
workers shall be followed and the workmen provided with necessary safety gadgets.

B. Contractor shall at all times maintain good order among his employees and shall not employ on the work site any unfit person or anyone not skilled in the work assigned to him. Contractor shall confine his employees and all other persons, who come on to the work site at Contractor’s request or for reasons relating to this CONTRACT, and confine his equipment to that portion of the Work where the work under this CONTRACT is to be performed or to roads leading to and from, such work sites and to any other area which ENGINEER/OWNER may permit CONTRACTOR to use.

C. CONTRACTOR shall take all reasonable measures and precautions at all times to prevent injuries to or the death of any of his employees or any other person who enters upon the project. Such measures and precautions shall include, but shall not be limited to, all safeguards and warnings necessary to protect workman and others against any conditions on the portion of the WORK which could be dangerous and to prevent accidents of any kind whenever work is being performed in proximity to any moving or operating machinery, equipment or facilities, whether such machinery, equipment or facilities are the property of or are being operated by CONTRACTOR, his sub-contractors, OWNER / ENGINEER or other CONTRACTOR or other persons.

D. It is understood that if employees of ENGINEER/OWNER perform any acts for the purpose of discharging the responsibility undertaken by CONTRACTOR in this article, whether requested to perform such acts by CONTRACTOR or not, such employees of OWNER or ENGINEER, while performing such acts, shall be considered the agents and servant of CONTRACTOR, subject to the exclusive control of CONTRACTOR

40.00 EXPLOSIVES AND HAZARDOUS MATERIALS.

40.01 The character, storage and method of use of all explosives / hazardous materials shall be subject to and in conformity with any applicable laws, ordinances and/or regulations. In case of blasting, the hours during which blasting operations may be carried out shall be subject to the approval of ENGINEER/OWNER.
41.00 INDEMNITY

A. CONTRACTOR shall defend, indemnify and save harmless ENGINEER and OWNER, their Officers, Directors, Servants and Employees from and against any and all expenses and cost (including court cost and attorney’s fees), damages or liabilities of any kind or nature whatsoever, which may arise out of or result from any claims, demands, causes of action and/or judgements stated or obtained by or threatened to be instituted by CONTRACTOR, his employees, other contractors, any third party or any person or persons including, but not limited to, property damage or the death or injury of any person resulting from any defects, faults, shortages, errors, omissions, neglect, whether deliberate or accidental or wilful misconduct of CONTRACTOR, his agents, servants or sub-contractors, in the use, occupation, ownership of property or the performance of any work undertaken by CONTRACTOR, his agents, servants or sub-contractors. These obligations shall survive the completion, cancellation or termination of this CONTRACT.

B. Should ENGINEER or OWNER deem himself insecure as to the ability of CONTRACTOR to so indemnify, ENGINEER/OWNER may demand that CONTRACTOR promptly provide reasonable assurance in form and substance satisfactory to OWNER, of CONTRACTOR’s ability to comply with the provisions of this Article. CONTRACTOR’s failure to provide such satisfactory assurance shall be a sufficient ground for termination of this CONTRACT OWNER shall have the final decision of the satisfactoriness of any such assurance and OWNER’s decision shall be final and binding.

42.00 INSURANCE

A. CONTRACTOR shall maintain and require his sub-contractors to maintain in full force and effect, from Insurance Companies in India acceptable to OWNER from the time of execution of this CONTRACT.

1. All such Insurances as are required by law concerning the ownership, operation or use of any motor vehicles, specifically including liability insurance protection
2. Such Insurance(s) in such amounts to cover such risks as shall be required by OWNER.

3. CONTRACTOR shall obtain and maintain such Insurance(s) as will protect CONTRACTOR and OWNER from claims under any employee benefit laws, workmen’s compensation laws and disability benefit laws, from claims of damages because of bodily injury, occupational sickness or disease or death of any of CONTRACTOR’s employees resulting from or relating to the Work.

4. CONTRACTOR shall obtain and keep in full force and effect Insurance(s) of such types and for such amounts as are required by Indian Laws, Ordinances or Regulations.

B. CONTRACTOR shall submit copies of such policies and coverage for written approval by ENGINEER/OWNER.

C. CONTRACTOR shall ensure that the insurer furnishes ENGINEER/OWNER with evidence of such Insurance(s), a copy of the issued policy and any amendments thereto and prompt notification of any cancellation or termination thereof. Should CONTRACTOR default in paying any premium when due, OWNER, without prejudice to other remedies set forth in this CONTRACT shall be at liberty to pay such premium and recover the same from CONTRACTOR.

D. Any such insurance requirements are hereby established as the minimum policies and coverages which CONTRACTOR must secure and keep in force. CONTRACTOR shall, at all times, be free to obtain additional or increased coverage at CONTRACTOR’s sole expense.

E. The provisions contained within this Article are not intended and do not impair or in any manner limit the liabilities or obligation assumed by CONTRACTOR as may be set forth more fully elsewhere in this CONTRACT.
43.00 LABOUR LAWS

CONTRACTOR shall comply with any and all laws, ordinances, regulations and decisions of courts (which shall be deemed to be a part of this CONTRACT) concerning the health, sanitary arrangements, wages, welfare, safety and employment of any and all of his workers upon the work site or any portion thereof and shall exclusively bear the consequences of failure to comply therewith. CONTRACTOR shall indemnify and hold ENGINEER and OWNER harmless from any claims, fines or penalties which may be made against ENGINEER or OWNER as a result of CONTRACTOR’s failure to fulfill these obligations.

Without limiting the generality of the foregoing, CONTRACTOR shall fully comply with the following:

A. CONTRACTOR shall not employ children below the age stipulated under law.

B. Minimum Wages Act: CONTRACTOR shall comply with the provisions of the Minimum Wages Act and any Rules made thereunder by any Government in respect of all employees employed by him in carrying out this CONTRACT. CONTRACTOR shall pay the employees wages not less than the minimum rates of wages, if any, fixed by such Government for that Category (including wages, payable for weekly holidays contemplated under the Minimum Wages Act).

CONTRACTOR, subject to the authority given to ENGINEER under the paragraphs of this Article and subject to OWNER’s right to control access to the project, shall have full control of labour employed by CONTRACTOR on or about the work, with the power to employ and discharge and CONTRACTOR shall fulfil his obligations to pay or cause to be paid wages or compensations made applicable by any laws, ordinances or regulations promulgated by the Government of India or any State Government or local authorities. In the event of failure of CONTRACTOR to disburse wages due to his own and sub-contractors labour, the OWNER reserves the right to effect such
payments directly and adjust the same against amount due to the CONTRACTOR.

CONTRACTOR shall, at all times indemnify OWNER against all claims arising out of provisions of such Minimum Wages Act and any Rules framed thereunder as admissible in respect of any workman employed by CONTRACTOR in carrying out this CONTRACT and against all costs and expenses incurred by OWNER in connection with and without prejudice to other means of recovery. OWNER shall be entitled to deduct from any moneys due or to become due to CONTRACTOR (whether in this CONTRACT or any other Contract) all money paid or payable by OWNER by way of wages and other dues (including compensation, penalty, if any, imposed for committing breach of any provision of any such act by CONTRACTOR) in connection with any claim thereto and CONTRACTOR shall abide by the decision of OWNER as to sum payable by CONTRACTOR under the provisions of this paragraph.

CONTRACTOR shall ensure payment of minimum wages not only as existing at the time of award but also as may be notified by statutory authorities.

C. CONTRACTOR shall comply with all the provisions of the Contract Labour (Regulation and Abolition) Act and the Rules made thereunder. CONTRACTOR shall get his establishment registered and/or obtain Licence, as the case may be, from the authorities declared under the said Act and Rules and intimate OWNER before starting the work under this CONTRACT. If CONTRACTOR fails to obtain the licence before commencement of the work, ENGINEER/OWNER shall have the right to terminate this CONTRACT without any reference to CONTRACTOR and in such case CONTRACTOR shall be liable to pay all the expenditure and cost incurred or may be incurred owing to cancellation of this CONTRACT.

CONTRACTOR shall ensure, as provided in the said Act, that the disbursement of wages to his direct and indirect labour is made in the presence of the authorized representative of OWNER.
CONTRACTOR shall give for this purpose prior notice to the authorized representative of OWNER at least 48 hours prior to the time of actual payment of wages regarding the date, place and time at which the disbursement of wages is to be made for his direct and indirect labour. CONTRACTOR shall also ensure that the payment to his indirect labour is made on the same date and time and at the same place where his direct labourers are paid. Further, the payment of wages by CONTRACTOR to his direct labourers shall be made only on working days and only at this place of work and not otherwise. In case the total strength of the direct and indirect labourers of all the work that CONTRACTOR is executing exceeds at any time the strength of the workers specified in his licence, it shall be CONTRACTOR’s responsibility to ensure that his licence is modified for the increased strength prior to the engagement of such additional direct and indirect labourers.

D. CONTRACTOR shall, at all times, indemnify OWNER against all claims for compensation under the provision of the Workman’s Compensation Act 1923 (viii of 1923) or any other law for the time being in force by or in respect of, any workmen employed by CONTRACTOR in carrying out this CONTRACT and against all costs and expenses or damages incurred by OWNER in connection there with and without prejudice to any other means of recovery. OWNER shall be entitled to deduct from any money payable to CONTRACTOR (whether under this CONTRACT or any other contract) all money paid or payable by OWNER by way of compensation aforesaid or for costs or expenses in connection with any claim thereto and CONTRACTOR shall abide by the decision of OWNER as to the sum payable by CONTRACTOR under the provisions of this paragraph.

E. In respect of labourers directly or indirectly employed on the work, CONTRACTOR shall provide at his costs, reasonable facilities for securing proper working and living conditions such as water supply, lavatories, bathing places, cleanliness etc. Where women labour is employed, urinals and lavatories shall be provided separately by CONTRACTOR for male and female workers as well as crèches for the infant children of women labourers. Labourers engaged on hazardous jobs and occupations
shall be provided with necessary safety appliances by CONTRACTOR free of charge. CONTRACTOR shall provide hutments for labourers employed on the work.

F. CONTRACTOR’s establishment will be subject to inspection, investigation etc., by ENGINEER/OWNER for assuring proper and faithful compliance of the provision of this CONTRACT by CONTRACTOR with regard to the implementation of Labour Laws and other matters anticipated herein. CONTRACTOR shall abide by the decisions and orders of ENGINEER/OWNER with regard to any such matter and furnish, if required, necessary compliance report within the stipulated time.

G. CONTRACTOR shall be responsible for the observance of the provisions of this clause by subcontractors employed by him in the execution of this CONTRACT.

H. CONTRACTOR shall comply with the provisions of the Payment of Wages Act, 1936 and Rules made thereunder in respect of all employees employed by him in carrying out this CONTRACT.

I. CONTRACTOR shall comply with all the provisions of Employees Provident Fund and Misc. Act 1952, Rules and Schemes made thereunder. CONTRACTOR shall get his establishments covered under the said Act, Rules and Schemes made thereunder and intimate to the OWNER the Account Number allotted or any other arrangement approved by the concerned authorities before starting working under this Contract. If CONTRACTOR fails to comply the aforesaid before commencing the work, ENGINEER/OWNER shall have the right to terminate this CONTRACT without any reference to the CONTRACTOR and in such cases, the CONTRACTOR shall be liable to pay to the ENGINEER/OWNER all the expenses and cost incurred or may be incurred owing to the cancellation of this CONTRACT. The ENGINEER/OWNER shall also have the right to recover any penalties levied by the concerned authorities for any failure on the part of the CONTRACTOR,

J. The CONTRACTOR shall comply with all the Provisions of the Factory Act, Rules and Regulations made thereunder.
K. The CONTRACTOR shall comply with all the provisions of the Maternity Benefit Act 1961 and Rules made thereunder in respect of female workers, if any engaged by them.

L. The CONTRACTOR shall furnish all the information required by the OWNER monthly or at such intervals to enable the OWNER to satisfy himself that all labour and welfare measures prescribed by Law have been fulfilled by the CONTRACTOR from time to time.

44.00 CONFIDENTIALITY: TITLE TO DRAWINGS AND TECHNICAL DOCUMENTATION

A. Title to all technical data including, but not limited to, Specifications, Drawings, Bills of materials, How Diagrams, Layout details and the contents thereof, furnished by ENGINEER to CONTRACTOR shall remain with ENGINEER or with OWNER as the case may be.

1. Such data shall not be used or divulged to others by CONTRACTOR except to the extent necessary in connection with CONTRACTOR’s performance hereunder.

2. CONTRACTOR shall use his best efforts to prevent any disclosure of such data to others by CONTRACTOR’s personnel and shall take all reasonable steps necessary to prevent such disclosures.

3. At ENGINEER’S request, any Specifications, Drawings or other technical data furnished to CONTRACTOR by ENGINEER shall be returned to ENGINEER/OWNER upon

   a) Complete or partial termination, as provided for herein, of CONTRACTOR’s services:

   Or,

   b) Completion of the Work.

B. CONTRACTOR shall not have any title in Specifications, Drawings, Bills of materials, Diagrams, Reports, Layout details, Memorandum as well as any other technical data and the
contents thereof whether prepared by ENGINEER or CONTRACTOR and ENGINEER/ OWNER, as the case may be, shall have the full title thereof, such materials and data shall not be used or divulged to others by CONTRACTOR except to the extent necessary in connection with CONTRACTOR’s performance hereunder.

C. The provisions relating to confidentiality of technical data as set forth above shall not apply to technical data which

1. In the case of data furnished to CONTRACTOR by ENGINEER were known to CONTRACTOR prior to the time they were furnished in and in the case of data prepared thereunder or by any third party under CONTRACTOR’s direction, were known to CONTRACTOR or such third party prior to their preparation hereunder (except if CONTRACTOR and/or such third party are prohibited from disclosing such technical data by separate prior agreement) ; or

2. Is or later becomes generally available to public; or

3. Is received from third parties having a bonafide right to make such disclosure.

D. CONTRACTOR, before making disclosure to third party of any of the information referenced in this Article, shall obtain a written commitment from such third party to abide by the provisions of this Article, Such commitments shall be approved by ENGINEER and shall expressly set forth the provisions contained in this Article and shall be signed by such third party,

E. No part of this CONTRACT nor any information relating to the project or any portion thereof shall be made public by CONTRACTOR in any manner without the prior review and written consent of ENGINEER. In addition, CONTRACTOR shall not make public any information related to the progress of the work or any portion thereof.

F. Obligations arising under this Article shall survive complete termination of this CONTRACT.
45.00  CO-OPERATION WITH OTHER CONTRACTORS

45.01 CONTRACTORS and his sub-contractors, if any, shall co-operate with OWNER/ENGINEER and other contractors on the project and shall so carry out their work so that other Contractors shall not be hindered, delayed or interfered with, in the progress of their work and so that the Work shall be properly and expeditiously completed. CONTRACTOR shall also plan his operations as to avoid interference with the operations of OWNER or other Contractors or sub-contractors on the work site any portion thereof or other items of work in the area. Where precedence of the work between various Contractors is involved, the decision of ENGINEER/OWNER shall be final and without recourse.

46.00  STORAGE

46.01 CONTRACTOR shall provide or cause to be provided all storage yards, transit sheds and warehouses necessary for the performance of his work at locations approved by ENGINEER / OWNER. Material supplies, equipment and plant stored by CONTRACTOR shall be effectively protected against pilferage and against damage by the elements. CONTRACTOR shall adopt all procedures, maintain all personnel and keep all records so that at all times CONTRACTOR can account for

- store receipts
- storage locations
- inventories
- disbursements
- final destinations

of all stored items received for CONTRACTOR’s work on the Works or/and portion thereof.

47.00  PRIVILEGES

47.01 CONTRACTOR shall also pay, satisfy and discharge liens and all claims, obligations and liabilities which may be asserted against ENGINEER or
OWNER or his property by reason of or as a result of any acts or omissions of CONTRACTOR, his employees, representatives, licencees or suppliers or his sub-contractors, in connection with or relating to the performance of this CONTRACT.

48.00 INVENTIONS AND PATENTS

A. If any officer or employee of CONTRACTOR, during the performance of the Work, makes any invention directly related to the project, such invention shall be promptly disclosed to ENGINEER and OWNER.

B. CONTRACTOR agrees to indemnify, save and defend harmless ENGINEER/OWNER from and against any and all suits, legal proceedings, claims, demands, damages, costs and attorney's fees incidental to any infringement or to any claimed infringement of any patent or patents in the manufacture, sale or use of any materials or apparatus furnished by CONTRACTOR under this CONTRACT. ENGINEER and/or OWNER may be represented in any such or legal proceedings by attorneys of their own selection.

49.00 REPORTS AND RECORDS

A. Within Fifteen (15) days of the award, Contractor shall submit to ENGINEER/OWNER, CONTRACTOR’s programme, the content and form of which shall be satisfactory to OWNER / ENGINEER, showing the order of procedure and method in which he proposes to carry out the work and time limit and sequence of carrying out the work and shall, whenever required by ENGINEER/OWNER, furnish for his information particulars in writing of CONTRACTOR’s arrangements for the carrying out of the Work and constructional plant and temporary works which CONTRACTOR intends to supply, use or construct as the case may be, The approval by ENGINEER/OWNER of such programme or the furnishing of such particulars shall not relieve CONTRACTOR of any of his duties or responsibilities under this CONTRACT.

B. CONTRACTOR shall submit to ENGINEER/OWNER by the Fifth (5) day of each month for each part of his Work under this CONTRACT and in summary.
1. A month by month forecast and a historical record upto completion of his requirements and actual use of:

- manpower by craft, type and position or other description.
- materials and supplies including quantity on hand and delivery status.
- construction equipment and plant furnished by CONTRACTOR.

2. A month by month forecast upto completion of the amount of work done and the amount remaining to be completed and all historical record of the work performed.

3. Such other reports as ENGINEER/OWNER may from time to time specify.

50.00 MEASUREMENTS

A. The mode of measurement shall be in accordance with Bureau of Indian Standard Specifications as laid down in BIS 1200 unless otherwise specified to the contrary. In the event BIS does not specify any mode of measurement for a particular item of work, the same shall be measured as directed by ENGINEER/OWNER.

B. ENGINEER shall, unless otherwise stated, ascertain the value and work done in accordance with this CONTRACT. ENGINEER shall, when he requires any part or parts or the work to be measured, give notice to CONTRACTOR who shall forthwith attend or send a qualified agent to assist ENGINEER or ENGINEER’s representative in making such measurement and shall furnish all particulars required by either of them. Should CONTRACTOR not attend or neglect or omit to send such agent, then the measurement made by ENGINEER or approved by him shall be taken to be the correct measurement of the work.

C. RECORDS OF MEASUREMENTS

I. Progress payments of all Work in place will be on the basis of measurement sheet/books.
II. All pages of measurement books/sheets shall be machine numbered. All receipts and issues of measurement books/sheets shall be recorded in a register. The eventual return of all measurement books/sheets shall be recorded and carefully preserved.

D. DETAILED MEASUREMENT

All measurement shall be neatly written on the measurement books/sheets. Each set of measurements shall commence with entries stating
   a) Full Name of Work as given in the Contract.
   b) Location of work.
   c) Name of CONTRACTOR.
   d) Date of CONTRACT entered into with CONTRACTOR.
   e) Date of Commencement of work,
   f) Date of completion of work.
   g) Date of measurement.

At the end of measurements, dated signature, designation of the person, who recorded the measurements shall be made.

E. CONTRACTOR’s SIGNATURE ON MEASUREMENT BOOK

Measurements entered in the Measurement Book shall invariably be signed by CONTRACTOR or his authorised agent in token of his acceptance. Should CONTRACTOR fail to sign, ENGINEER shall note this in such Measurement Book and the measurements recorded by ENGINEER shall be final and binding on and conclusive to the Parties.
51.00 TAXES

51.01 CONTRACTOR shall pay all contributions, fees, taxes and premiums payable under all applicable laws relating to the employment and/or measured upon the payroll of employees engaged in the performance of work under CONTRACT and all sales tax, excise, octroi, royalty, transportation, privilege, occupational and other taxes and duties applicable to Equipment, materials and supplies furnished or work performed which CONTRACTOR is required by law to pay and shall keep harmless OWNER from liability for such contributions, premiums and taxes. Under no circumstances shall CONTRACTOR be reimbursed for any income taxes or corporate taxes, fees or levies.

52.00 AUDIT

A. CONTRACTOR’s accounts, related to the Work or any portion thereof shall be available for audit by designated representatives of OWNER at all reasonable times.

B. Such representatives shall at all times be afforded proper facilities for inspection of CONTRACTOR’s accounts and shall have access to CONTRACTOR’s premises, work and materials, records, ledgers and vouchers of every description pertaining to CONTRACTOR’s performance of this CONTRACT.

53.00 INDEPENDENT CONTRACTOR

53.01 In the performance of the work, CONTRACTOR shall act as an independent Contractor and not as agent or employee of ENGINEER or of OWNER.

54.00 ASSIGNMENT

A. CONTRACTOR shall not assign this CONTRACT or sublet it in whole or in part without prior written consent of OWNER, nor shall CONTRACTOR assign any moneys due or to become due hereunder without the prior written consent of OWNER. Any permitted assignment of subletting under this CONTRACT shall not release CONTRACTOR from his obligation to perform and any assignee or sub-contractor shall be considered the agent of CONTRACTOR and, as between the parties, hereto, CONTRACTOR
shall be and remain liable as if no such assignment or subletting had been made.

B. Without restricting the foregoing, CONTRACTOR hereby agrees and undertakes to include in his contract(s) with subcontractor(s), in their essence, all the terms and conditions of this CONTRACT.

55.00 FORCE MAJEURE

A. Any delay, in or failure of performance of the CONTRACT by CONTRACTOR or OWNER shall not constitute defaults by such party or give rise to any claim for damages against it, if and to the extent such delay or failure of performance is caused by acts of God, acts of war or hostilities, acts or omissions of Government, invasion, revolution, civil commotion, blockade, embargo, sabotage, fires, severe earth quakes, typhoons, cyclones, lightning, plague, epidemic or other act, omission or circumstances, (excluding monsoon) which are beyond the reasonable control of the parties affected which they could not have reasonably foreseen and guarded against and which by exercise of reasonable care and diligence, they are unable to prevent (hereinafter referred to as Force Majeure). ENGINEER/OWNER shall be the sole judge to decide whether or not an event is Force Majeure and decision is final and binding. Monsoon season is not considered a FORCE MAJEURE event.

B. The party affected by the occurrence of the event of Force Majeure shall promptly notify within 10 days of such occurrence to the other part hereto at its commencement and termination along with the copies of any documents, if any, showing the existing or termination of such event and its effect on the WORK. Delay occasioned by Force Majeure shall give rise to an extension of the time for performance of either party obligations under this CONTRACT commensurate with such delay.

C. Should CONTRACTOR or OWNER be prevented from fulfilling his obligations as provided for under this CONTRACT by the existence of a cause of Force Majeure lasting continuously for a period of forty five (45) days, the party which is so prevented shall prior to the termination of the Force Majeure condition and after the expiry of the said period of forty five (45) days have the option to
terminate this CONTRACT without further liability to either party, except that CONTRACTOR shall be paid for the work performed upto the date of such termination.

56.00 TERMINATION

Except as otherwise provided in Article 34, conditions under which the work may be caused to be completed, which Article, if applicable shall expressly, supersede the provisions of this Article, if either party hereto commits a breach of any of the terms and provisions contained in this CONTRACT and required to be observed/complied with on its part other than delay in payment or non-payment by OWNER and CONTRACTOR of any amounts when due, the party affected by such breach shall notify the other party of such breach and the party committing the breach shall have fifteen (15) clear days from the receipt of such notice to correct or commence action to correct such breach.

1. If the party committing the breach fail or neglect to remedy or commence action to remedy such breach within the said fifteen (15) clear days from the date of service of the notice as aforesaid, the party affected by the breach may thereafter serve on the party committing the breach a written notice of seven (7) clear days terminating this CONTRACT.

2. In the event of termination of this CONTRACT by OWNER, as aforesaid, OWNER subject to the provisions of paragraph (3) below shall pay to CONTRACTOR such amounts as may remain due and outstanding at the time of such termination in accordance with the terms and provisions of this CONTRACT.

3. If this CONTRACT is terminated by OWNER on account of breach of any of its terms and provisions which CONTRACTOR failed to remedy in spite of notices having been given to them as aforesaid, OWNER shall be entitled to make a claim on, and demand payment in respect thereof from CONTRACTOR for damages (including liquidated damages / consequential damages) arising as a result of such breach. For the purpose aforesaid, OWNER shall be entitled to deduct or retain amounts for such damages from moneys payable to CONTRACTOR any amount payable or which may become
payable to CONTRACTOR in accordance with the terms and provisions of this CONTRACT.

4. If this CONTRACT is terminated by CONTRACTOR on account of breach of any of its terms and provisions which OWNER failed to remedy in spite of notices having been given to him as aforesaid, CONTRACTOR shall be entitled to make claim and demand payment in respect thereof from OWNER for actual damages arising as a result of such breach.

5. OWNER shall have the right to terminate this CONTRACT hereunder on fifteen (15) clear days notice without assigning any reason thereof, in which event OWNER will pay CONTRACTOR for all work performed upto the date of such termination in accordance with the Award. Such work performed shall be documented to the satisfaction of OWNER and OWNER shall take full credit for any amounts previously paid to CONTRACTOR. OWNER shall not pay or be liable to pay any damage or other claim by CONTRACTOR for his expected profit or interest on the value of the uncompleted items of Work and CONTRACTOR hereby waives any right of action in damages or otherwise against OWNER by reason of such termination.

**57.00 MISCELLANEOUS**

A. CONTRACTOR shall, at his own cost, provide the material for and execute all temporary shoring, timbering and strutting and such other structures as are necessary during the execution of Work for stability and safety of all structures, excavations and work such that no damage, injury or loss is caused or likely to be caused to any person or property.

B. CONTRACTOR shall, at his own cost, provide such sheds, store houses as OWNER/ ENGINEER may consider necessary for storing of materials and shall also, at his own cost provide all construction equipments.

C. Any demurrage charges that may be incurred owing to CONTRACTOR’s failing to unload or load the same on being called upon to do so, unload his own materials and equipments booked in the name of the OWNER will be debited to CONTRACTOR’s account and shall be paid by him to the proper officer on demand.
or deducted from any sum which may be due to him from OWNER.

D. When work is being carried out in or around a running plant where the plant must run uninterrupted, CONTRACTOR can only work at specified places and times mutually arranged. Progress of Work in certain areas might have to be expedited as required by ENGINEER/OWNER.

E. The use or sale of ardent spirits or other intoxicating beverages upon the work spot and any other unlawful activities are strictly forbidden and CONTRACTOR shall strictly comply with these conditions.

F. Except where otherwise specified, CONTRACTOR, shall pay all tollage and other royalties, rent and other payments or compensation (if any) for getting stone, sand, gravel, clay or other materials required for the Work or temporary works or any of them.

G. All operations necessary for the execution of the Work and for the construction of any temporary works shall so far as compliance with requirements of the CONTRACT permits, be carried on so as not to interfere unnecessarily or improperly with the public convenience or the access to use and occupation of public or private roads, railway tracks and footpaths or to or of properties whether in the possession of OWNER or any other person and works of other Contractors and CONTRACTOR shall save harmless ENGINEER/OWNER and indemnify ENGINEER/OWNER in respect of all claims, demands, proceedings, damages, costs, charges and expenses whatsoever arising out of or in relation to any such matters.

H. CONTRACTOR shall use every reasonable means to prevent any of the highways or bridges communicating with or on the routes to project from being subjected to extraordinary traffic of CONTRACTOR or any of his sub-contractors and in particular, shall select routes and use vehicles and restrict and distribute loads so that any such extraordinary traffic as will inevitably arise from the moving of plant materials and equipment from and to the project shall be limited so far as reasonably possible and so that no unnecessary damage or injury may be occasioned to such
highways and bridges. Damages, if any, shall be rectified by the CONTRACTOR at his own cost.

I. Where the nature of the work is such as to require the use by CONTRACTOR of waterborne transport, the foregoing provisions of this clause shall be construed as though highway included a lock, dock, seawall or other structural related to a waterway and vehicles included craft and shall have effect accordingly.

J. CONTRACTOR shall, in accordance with the requirements of ENGINEER/OWNER, afford all reasonable facilities for any other contractors employed on the project and their workmen and for the workmen of OWNER and of any other properly authorised authority or statutory body, who may be employed in the execution on or near the location of any work not included in this CONTRACT or of any contract which ENGINEER/OWNER may enter into in connection with or ancillary to the project.

K. Should the general conduct of the work, including the premises of OWNER under occupation of CONTRACTOR lead to infringement of the Indian Penal Code, either in consequence of the riotous or illegal proceedings of CONTACTOR’s labour, supervising staff of others to such an extent as to necessitate the employment of Special Police or Magistrate, the cost of such extra force is to be defrayed by CONTRACTOR and not by ENGINEER / OWNER.

L. CONTRACTOR must take sufficient care in moving his construction plants and Equipments from one place to another so that they may not cause any damage to the property of ENGINEER/OWNER or other person particularly to the overhead and underground cables and, in the event of his failure to do so, the cost of such damages, including eventual loss of working hours on any work as estimated by OWNER/ENGINEER, is to be borne by CONTRACTOR.

M. All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archeological interest discovered on the site shall be, as between OWNER and CONTRACTOR deemed to be absolute property of OWNER and CONTRACTOR shall take reasonable precautions to prevent his workmen or any other persons from removing or damaging any such article and shall immediately, upon discovery thereof and
before removal acquaint OWNER / ENGINEER of such discovery and carry out OWNER / ENGINEER’s orders as to the disposal of the same.

58.00 GOVERNING LAWS

58.01 This CONTRACT shall be governed and interpreted in accordance with the Laws in India. Any provision, required to be included in a contract of this type by any applicable and valid law, ordinance, rule or regulation, shall be deemed to be incorporated herein.

59.00 SETTLEMENT OF DISPUTES

A. If at any time any question, disputes or difference of whatsoever nature shall arise between the Owner and the Contractor upon or in relation to or in connection with the Contract, either party may forthwith give to the other notice in writing of the existence of such question, dispute or difference and the same other than the questions, disputes or differences for the decision of which specific provisions have been made in the foregoing Articles of these conditions hereinafter referred to as “Excepted Matters” and the decision of such “Excepted Matters” according to the said provisions shall be final and binding on the Parties shall be referred to Arbitration by a sole arbitrator to be appointed by the Chairman cum Managing Director / Managing Director of the Owner or any person acting in such capacity.

B. When the Sole Arbitrator withdraws from his office for any reason whatsoever, he shall be replaced by the Chairman cum Managing Director/ Managing Director of the OWNER or any person acting in that capacity. The arbitral proceedings shall continue from that stage onwards and the earlier hearings shall not be repeated.

C. The language to be used in the arbitration proceedings shall be English.

D. The award of the arbitrator shall be final, conclusive and binding on the Parties.
E. The provisions of Arbitration and Conciliation Act, 1996 and the Rules there under and amendments thereto in force shall be applicable to this Contract.

F. The Venue of Arbitral Proceedings shall be only in Bangalore, India.

G. Only courts in Bangalore shall have jurisdiction regarding the matters relating to this arbitration.

60.00 NOTICES

60.01 Any written notices or other documents or drawing required by this CONTRACT shall be sent by Registered Post, Postage prepaid or by cable or Telex, fax, courier, charges prepaid or hand delivered and shall be forwarded to the respective Address set forth below unless another address is substituted by written notice:

FOR OWNER: 
____________________  
____________________  
____________________

FOR ENGINEER 
____________________  
____________________  
____________________

FOR CONTRACTOR: 
____________________  
____________________  
____________________

WITH A COPY TO: 
____________________  
____________________

61.00 AMENDMENTS

61.01 This CONTRACT may be amended by a writing specifically made in this behalf which shall be mutually agreed upon and duly signed by the authorised representatives of the parties hereto.
62.00 WAIVER OF BREACH

62.01 Any failure by OWNER or ENGINEER, at any time or from time to time, to enforce or require the strict keeping and performance by CONTRACTOR of any of the terms or conditions of this CONTRACT shall not constitute a waiver by OWNER or ENGINEER of a breach of any such terms or conditions and shall not affect or impair such terms or conditions in any way, or the right of OWNER or ENGINEER at any time to avail itself of such remedies as it may have for any such breach or breaches of such terms and conditions.

63.00 ENTIRE CONTRACT

63.01 This CONTRACT and any annexures attached hereto or documents referred to herein shall constitute the entire CONTRACT and understanding between the parties hereto as to the subject matter hereof and shall supersede all prior agreements/CONTRACTS, negotiations and Letter of Intent, whether written or oral, pertaining to this Work and either party shall be bound by any conditions, definitions, warranties or representations with respect to the subject matter of this CONTRACT, otherwise than as expressly provided herein.

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FORM OF BANK GUARANTEE FOR ADVANCE PAYMENT

To
The KIOCL Limited.,
Second Block, Koramangala, OR New Mangalore Port, OR Kudremukh,
Bangalore - 560 034. Panambur, Chickmagalur Dist.
Mangalore - 575010 575 142.

In consideration of KIOCL Limited (hereinafter referred to as "Company") agreeing
to pay to M/s……………………………………..(hereinafter referred to as, "Contractor")
a sum of Rs ........................................ (Rupees ..................................................)
………………………………………………………………………………...
only) as and by way of advance in terms of Order
No.............. dated................................................ (hereinafter referred to as "Contract")
on production of Bank Guarantee by the Contractor for Rs........... (Rupees…….. only)
we, ......................... (hereinafter referred to as "the Bank") do hereby covenant and
agree with the Company as follows:

1. We hereby guarantee the payment to the Company the said advance of
Rs................................. (Rupees..........................)
and interest thereon at 15.5 percent per annum from the date of demand till
payment against any loss or damage caused to or suffered or that may be
caused to or suffered by the Company by reason of any breach by the said
Contractor of any of the terms and conditions contained in the said
Contract.

2. Not withstanding anything contained hereunder, we .................................
hereby unconditionally and irrevocably undertake to pay to the Company to
the extent of Rs................. (Rupees..................)
plus interest thereon at 15.5 percent per annum from the date of demand
till payment without any demur merely on a demand from the Company
stating that the amount claimed is due by way of loss or damage caused to
or suffered or would be caused to or suffered by the Company by reason of
breach by the said Contractor of any of the terms and conditions contained
in the said Contract. Any such demand made on the Bank shall be conclusive
as regards the amount due and payable by the Bank under this Guarantee.
However, our liability under this Guarantee shall be restricted to an amount
not exceeding Rs .................. (Rupees..................)
….. only) and interest thereon as mentioned above from the date of demand
till payment

3 Our liability under this present Guarantee is absolute and unequivocal and
we undertake to pay the Company the amount so demanded
notwithstanding the Contractor raising any dispute and/or disputes or filing
any suit or proceeding before any Court or Tribunal Authority. The payment
so made by us under this Guarantee shall be a valid discharge of our liability
for payment hereunder.

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4. We………………………………further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and that it shall continue to be enforceable till all the dues of the Company under or by virtue of the said Contract have been fully paid and its claims satisfied or discharged and till the Company certifies that the terms and conditions of the said Contract have been fully and properly carried out by the said Contractor and accordingly discharges this Guarantee. Unless a demand or claim under this Guarantee is made on us in writing on or before ......................... we shall be discharged from all liability under this Guarantee thereafter.

5. This Guarantee shall not be revocable by us except with the written consent of the Company and shall continue to be enforceable till...... Should it be necessary to extend this Guarantee beyond the said date, we undertake to extend the validity of this Guarantee for such further period as may be required by the Company, and such extension shall be given one month before the expiry of the Guarantee failing which the amount covered under this Guarantee shall become forthwith payable, notwithstanding that the Contract is continuing and / or the Company has or has not terminated the Contract or preferred any claim against the Contractor.

6. We, ..............................................................................................................further agree with the Company that the Company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said Contractor from time to time or to postpone for any time or from time to time exercise of any of the powers exerciseable by the Company against the said Contractor and to forbear or enforce any of the terms and conditions relating to the said Contract and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Contractor or for any indulgence by the Company to the said Contractor or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

7. This Guarantee shall not in any way be affected due to change in our constitution or by your taking or varying or giving up any securities from the Contractor or any other person, firm or Company on its behalf or by the change in the constitution, the winding up, dissolution, insolvency or death as the case may be of the Contractor.

8. In order to give full effect to the Guarantee herein contained, you shall be entitled to act as if we were your principal debtors in respect of all your claims against the Contractor hereby guaranteed by us as aforesaid and we hereby expressly waive all our rights of suretyship and other rights, if any, which are in any way inconsistent with the above or any other provisions of this Guarantee.
9. We ............................................................ also undertake not to revoke this Guarantee during its currency except with the previous consent of the Company in writing.

Dated the ..........day of............ . 20
For ............................................................... .......
(indicate the name of Bank)

**IMPORTANT NOTE**

The following points should be taken care of while submitting the Bank Guarantee:

1. The Bank Guarantee should be on non-judicial stamp paper having a value as per Rules in force.
2. The stamp paper should be purchased in the name of the Bank, who give the Guarantee and not in the name of the Contractor.
3. The Bank Guarantee should be strictly as per the proforma.
4. The Bank Guarantee should be from any of the Nationalised Banks or Scheduled Banks.
5. If any correction is made on the Guarantee, the same should be endorsed by the Bank with its official seal.
FORM OF BANK GUARANTEE FOR SECURITY DEPOSIT

1. In consideration of KIOCL Limited (hereinafter called Company) having agreed to exempt...........(hereinafter called the said Supplier (s) / Contractor(s)) from demand under the terms and conditions of Purchase Order No.................. Dated............... made between .................... And ................ for ............. (hereinafter referred to as 'contract') of security deposit for the due fulfillment by the said suppliers(s) / Contractor (s) of the terms and conditions contained in the said contract on production of a Bank Guarantee for Rs........ (Rupees..........................only) we,.............. .................... (hereinafter referred as "the Bank") at the request of Supplier, (s) Contractor (s) do hereby guarantee the payment to the Company an amount not exceeding Rs.............. (Rupees.............only) and interest thereon at 15.5 percent per annum from the date of demand till payment against any loss or damage caused to or suffered or would be caused to or suffered by the Company by reason of any breach by the said Supplier(s)/ Contractor(s) of any of the terms and conditions contained in the said Contract.

2. We.............. do hereby unconditionally and irrevocably undertake to pay to the Company an amount to the extent of Rs. ................. (Rupees ............only) and interest thereon at 15.5 percent per annum from the date of demand till payment without any demur, merely on a demand from the Company stating that the amount claimed is due by way of loss or damage caused to or suffered or would be caused to or suffered by the Company by reason of breach by the said Supplier(s) / Contractor(s) of any of the terms and conditions contained in the said Contract or by reason of the Supplier(s)/ Contractor(s) failure to perform the said contract. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, our liability under this Guarantee shall be restricted to an amount not exceeding Rs................. (Rupees..................................................only) and interest thereon as mentioned above from the date of demand till payment.

3. Our liability under these presents is absolute and unequivocal and we undertake to pay to the Company the amount so demanded notwithstanding the Supplier(s)/Contractor(s) raising any dispute and / or disputes or filing any suit or proceeding before any Court or tribunal or other Authority. The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment there under and the Contractor(s) Supplier(s) shall have no claim against us for making such payment.
4. We.............................further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the contract and that it shall continue to be enforceable till all the dues of the Company under or by virtue of the said contract have been fully paid and its claims satisfied or discharged or till the Company certifies that the terms and conditions of the said contract have been fully and properly carried out by the said Supplier(s) / Contractor(s) and accordingly discharges this Guarantee. Unless a demand or claim under this Guarantee is made on us in writing on or before......................we shall be discharged from all liability under this Guarantee thereafter.

5. This Guarantee shall not be revocable by us except with the written consent of the Company and shall continue to be enforceable till.........................should it be necessary to extend Guarantee beyond the said date, we undertake to extend the validity of this Guarantee for such further period as may be required by the Company, and such extension shall be given one month before the expiry of this Guarantee filing which the amount covered under this Guarantee shall become forthwith payable, notwithstanding that the Contract is continuing and /or the Company has or has not terminated the Contract or preferred any claim against the Supplier(s) Contractor(s).

6. We......................... further agree with the Company that the Company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the Contract or to extend time or performance by the said Supplier(s)/ Contractor(s) from time to time or to postpone for any time or from time to time in exercise of any of the powers exercisable by the Company against the said Supplier(s) Contractor(s) and to forbear or enforce any of the terms and conditions relating to the Contract and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Supplier(s)/Contractor(s) or for any forbearance, act or omission on the part of the Company or any indulgence by the Company to the said Supplier(s)/Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties, but for this provision, have effect of so relieving us.

7. This Guarantee shall not in any way be affected due to change in our constitution or by your taking or varying or giving up any securities from the CONTRACTOR(S)/ SUPPLIERS or any other person, firm or Company on its behalf or by the change in the constitution, winding up dissolution, insolvency or death as the case may be of the CONTRACTOR(S)/SUPPLIER(S).
8. In order to give full effect to the Guarantee herein contained you shall be entitled to act as if we were your principal debtors in respect of all your claims against the CONTRACTOR(S)/ SUPPLIER(S) hereby Guaranteed by us as aforesaid and we hereby expressly waive all our rights of suretyship and other rights if any which are in any way inconsistent with the above or any other provisions of this Guarantee.

9. We.......................... also undertake not to revoke this Guarantee during its currency except with previous consent of the Company in writing.

Dated the ..............day of ...............200

For...............................................................

(Indicate the name of Bank)

**IMPORTANT NOTE**

The following Points should be taken care of while submitting the Bank Guarantee:-

1. The Bank Guarantee should be on non-judicial stamp paper having a value of Rs.200/-or as applicable in the State of Karnataka.

2. The stamp paper should be purchased in the name of the Bank, who give the guarantee and not in the name of the Supplier.

3. The Bank Guarantee should be strictly as per the profoma.

4. The Bank Guarantee should be from any of the Nationalised Bank, Scheduled Bank or any other bank Acceptable to owner

5. If any correction is made on the guarantee the same should be endorsed by the Bank with its official seal.
Form of Bank Guarantee for Earnest Money Deposit

In consideration of KIOCL Limited (hereinafter called "Company") having agreed to exempt...... ... (hereinafter called the said "Bidder") from demand under the terms and conditions of the tender documents vide No dated of Earnest Money Deposit for the due fulfilment by the said Bidder of the terms of conditions contained in the tender document on production of Bank Guarantee of Rs ..............................................................

(Rupees.................................................................) only).

1. We, .............................................. (hereinafter referred to as "the Bank") at the request of Bidder do hereby guarantee the payment to the Company an amount not exceeding ......Rs  (Rupees.............................................................. only) and interest thereon at 15.5 percent per annum from the date of demand till payment against any loss or damage caused to or suffered, would be caused to or suffered by the Company by reason of any breach by the said Bidder of any of the terms and conditions contained in the said Tender Documents.

2. We, .................................................................................. do hereby unconditionally and irrevocably undertake to pay to the Company an amount to the extent of Rs..............(Rupees .............................................................. only) and interest thereon at 15.5 percent per annum from the date of demand till payment without any demur, merely on a demand from the Company slating that the amount claimed is due by way of loss or damage caused to or suffered or would be caused to or suffered by the Company by reason of breach by the said Bidder of any of the terms and conditions contained in the said Tender Documents. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this Guarantee. However, our liability under this Guarantee shall be restricted to an amount not exceeding Rs...................... (Rupees..............................only) and interest thereon as mentioned above from the date of demand till payment.

3. Our liability under this present Guarantee is absolute and unequivocal and we undertake to pay the Company the amount so demanded notwithstanding the Bidder raising any dispute and/or disputes or filing any suit or proceeding before any court or tribunal or other Authority. The payments so made by us under this Guarantee shall be a valid discharge of our liability for payment thereunder and the Bidder shall have no claim against us for making such payment.

4. We, .............................................. further agree that the Guarantee herein contained shall remain in full force and effect during the period as required by the Company. Unless a demand or claim under this Guarantee is made on us in writing on or before.........................., we shall be discharged from all liability under this Guarantee thereafter.
5. This Guarantee shall not be revocable by us except with the written consent of the Company and shall continue to be enforceable till ................... Should it be necessary to extend this Guarantee beyond the said date, we undertake to extend the validity of this Guarantee for such further period as may be required by the Company and such extension shall be given one month before the expiry of this Guarantee, failing which the amount covered under this Guarantee shall become forthwith payable.

6. We, ................................................................. further agree with the Company that the Company shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the Tender Documents or to extend time of finalising the bid from time to time and to forbear or enforce any of the terms and conditions relating to the Tender Documents and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Bidder or for any forbearance, act or omission on the part of the Company or any indulgence by the Company to the said Bidder or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

7. This Guarantee shall not in any way be affected due to change in our constitution or by your taking or varying or giving up any securities from the Bidder or any other person, firm or Company on its behalf or by the change in the constitution, winding up, dissolution, insolvency or death as the case may be of the Bidder.

8. In order to give full effect to the Guarantee herein contained, you shall be entitled to act as if we are your principal debtors in respect of all your claims against the Bidder hereby Guaranteed by us as aforesaid and we hereby expressly waive all our rights of suretyship and other rights, if any, which are in any way inconsistent with the above or any other provisions of this Guarantee.

9. We, ................................................................. also undertake not to revoke this Guarantee during its currency except with the previous consent of the Company in writing.

Dated the ............ .... ........ day of.......................... 20

For .................................................................

(indicate the name of Bank)
IMPORTANT NOTE

The following points should be taken care of while submitting the Bank Guarantee:

1. The Bank Guarantee should be on non-judicial stamp paper having a value as per Rules in force.

2. The stamp paper should be purchased in the name of the Bank, who give the Guarantee and not in the name of the Bidder.

3. The Bank Guarantee should be strictly as per the proforma.

4. The Bank Guarantee should be from any of the Nationalised Banks or Scheduled Banks.

5. If any correction is made on the Guarantee, the same should be endorsed by the bank with its official seal.

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INTEGRITY PACT

THIS AGREEMENT is entered into between the following Parties:
KIOCL Limited, IInd Block, Koramangala, Bangalore 560 034 hereinafter referred to as “The Principal”,

and

Name & Address of the Party

...........................................................

...........................................................

...........................................................

hereinafter referred to as “The Tenderer/ Contractor”

Preamble

The Principal intends to award a contract, following its laid-down organizational procedures, for completion of Balance Civil, Structural, Sheeting and painting works in the Chrome ore Beneficiation Plant no.2 of M/s. Odisha Mining Corporation at South Kaliapani Mines, Odisha State. The Principal values full compliance with all relevant laws and regulations and the principles of economical use of resources and of fairness and transparency in its relations with its Tenderer(s) and /or Contractor(s).
In order to achieve these goals, the Principal cooperates with the renowned international Non-Governmental Organization, "Transparency International" (TI). Following TI's national and international experience, the Principal will appoint an Independent External Monitor (IEM) who will monitor the tender process and the execution of the Contract for compliance with the principles mentioned below.

**IT IS AGREED AS FOLLOWS:**

**Definitions:**

a) "**Principal**" means KIOCL LIMITED, incorporated under the Companies Act 1956, having their registered office at Koramangala, Bangalore – 560 034 and includes their successors.

b) "**Tenderer**" means the person, firm or company submitting a tender against the Invitation to Tender and includes his/ its/ their staff, consultants, parent and associate and subsidiary companies, agents, consortium and joint venture partners, sub-contractors and suppliers, heirs, executors, administrators, representatives, successors.

c) "**Contractor**" means the Tenderer whose tender has been accepted by the principal or Company whose tender has been accepted and shall be deemed to include his/ its/ their successors, representatives, heirs, executors and administrators unless excluded by the Contract.

d) "**Independent External Monitor**" means a person, hereinafter referred to as IEM, appointed, in accordance with clause 8.a below, to verify compliance with this agreement.

e) "**Party**" means a signatory to this agreement.

f) "**Contract**" means the contract entered into between the Principal and Tenderer/Contractor for the execution of work mentioned in the preamble above.

**Commitments of the Parties**

**Section 1 - Commitments of the Principal:**

The Principal commits itself to take all measures necessary to prevent corruption (inducement to violate duty assigned to its employees) and to observe the following principles;

i) No employee of the Principal, personally or through family members or any third person, will in connection with all stages of tendering or the execution of Contract,
demand or take a promise, or accept, for him/herself or any third person, any material or non-material benefit which he/she is not legally entitled to;

ii) The Principal will, during the tender process, treat all Tenderers with equity and reason. The Principal will in particular, before and during the tender process, provide to all Tenderers the same information and will not provide to any Tenderer any information/clarification through which the Tenderer could obtain an advantage in relation to the tender process or the Contract execution;

iii) The Principal will not take, directly or indirectly, any steps, which could unduly influence the functioning of IEM.

iv) If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the relevant Anti-corruption Laws of India/ guidelines of Govt. / guidelines of CVC/ guidelines of Principal, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

v) If the Principal obtains information of conduct of a bidder, contractor or sub-contractor or of an employee or a representative or an associate of a bidder, contractor or sub-contractor, which constitutes corruption, or if the Principal has a substantive suspicion in this regard, the Principal will inform the Vigilance Department of the principal.

Section 2 - Commitments of the Tenderer(s)/Contractor(s):

2.1 The Tenderer /Contractor commits himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the Contract execution;

i) The Tenderer / Contractor will not directly or through any other person(s) or firm, offer, promise or give to the Principal, or to any of the Principal’s employees involved in the tender process or the execution of the Contract or to any third person any material or immaterial benefit which he / she is not legally entitled to in order to obtain, in exchange, an advantage during the tender process or to vitiate the Principal’s tender process or the execution of the Contract.

ii) The Tenderer / Contractor will not enter with other Tenderers into any illegal agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or actions to restrict competitiveness or to vitiate the Principal's tender process or the execution of the Contract.
iii) The Tenderer / Contractor will not commit any criminal offence under the relevant Anti-corruption Laws of India; further, the Tenderer / Contractor will not use improperly, for purposes of competition or personal gain, or pass on to others, any information provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

iv) The Tenderer / Contractor of foreign origin shall disclose the name and address of the agents/representatives in India, if any. Similarly, the Tenderer / Contractor of Indian Nationality shall furnish the name and address of the foreign principals, if any.

v) The Tenderer / Contractor will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the Contract.

vi) The Tenderer/ Contractor will not take, directly or indirectly, any steps, which could unduly influence the functioning of IEM.

vii) The Tenderer / Contractor will not instigate third persons to commit offences outlined above or be an accessory to such offences.

2.2 Obligation to Ensure Compliance

a). Each Party will take all reasonable steps to ensure that the provisions of this agreement which are binding on it are complied with by all of its staff, consultants, parent and associated and subsidiary companies, agents, consortium and joint venture partners, sub-contractors and suppliers.

b). Each Party will appoint an appropriate senior manager with responsibility for ensuring that the provisions of this agreement are complied with.

Section 3 - Disqualification from tender process and exclusion from future contracts

a). If the Tenderer, before award of Contract, has committed a transgression through violation of any of the terms under section 2 above or in any other form such as to put his reliability or credibility as Tenderer into question, the Principal is entitled to disqualify the Tenderer from the tender process or to terminate the Contract, if already signed, for such reason.

b). If the Tenderer / Contractor has committed a transgression through a violation of any of the terms under section 2 above or in any other form such as to put his reliability or credibility into question, the Principal is entitled also to exclude the
Tenderer / Contractor from future Contract award processes. The imposition and duration of the exclusion will be determined by the severity of the transgression. The severity will be determined by the circumstances of the case, in particular the number of transgressions, the position of the transgressors within the company hierarchy of the Tenderer / Contractor and the amount of the damage. The exclusion will be imposed for a minimum of six (6) months and a maximum of three (3) years.

c). If the Tenderer / Contractor can prove that he has restored/ recouped the damage caused by him and has installed a suitable corruption prevention system, the Principal may revoke the exclusion before the expiry of the period of such exclusion.

d). A transgression is considered to have occurred if, in light of all available evidence, a reasonable doubt is possible.

**Section 4 - Compensation for Damages**

a). If the Principal has disqualified the Tenderer from the tender process prior to the award according to **Section 3 above**, the Earnest Money Deposit (EMD) furnished, if any, along with the offer as per the terms of the Invitation to Tender (ITT) shall be forfeited. This is apart from the disqualification of the Tenderer as may be imposed by the Principal as brought out at section **3 above**.

b). If the Principal has terminated the Contract according to **Section 3 above**, or if the Principal is entitled to terminate the Contract according to **section 3 above**, the EMD/Security Deposit furnished by the contractor, if any, as per the terms of the ITT/Contract shall be forfeited. This is apart from the disqualification of the Tenderer, as may be imposed by the Principal, as brought out at **section 3 above**.

**Section 5 - Previous Transgression**

a) The Tenderer hereby declares that no previous transgressions with respect to provisions of Integrity pact occurred in the last three (3) years with any other Company in any country or with any other Public Sector Enterprise in India and, as such, there is no case for his exclusion from the tender process.

b) The Tenderer hereby agrees that if he has made/ makes incorrect statement in regard to this aspect, he can be disqualified from the tender process or the Contract, if already awarded, can be terminated for that reason.
Section 6 - Equal treatment of all Tenderers/Contractors/ Sub-contractors

a) The Tenderer / Contractor undertakes to obtain from all sub-contractors a commitment consistent with this integrity pact, and to submit it to the Principal at the time of seeking approval of the principal for appointment of sub-contractors.

b) The principal will enter into agreements with identical conditions as that of this Integrity Pact, with all Tenderers / Contractors

c) It is essential for all tenderers / contractors to sign the Integrity Pact with the company if the value of the transaction is more than 30 lakhs. The principal will disqualify from the tender process all tenderers/ contractors who do not sign this Pact or violate its provisions.

Section 7 - Breaches of this Agreement

a) In the event that any Party believes that there is prima facie evidence that there has been a failure by a Party to comply with any provision of this agreement, such Party will take the following actions:

i) It will report full details of such suspected non-compliance to the IEM and CVO with copies to the Chief Executives of each of the Parties.

ii) If any such non-compliance has been carried out, or assisted by an individual who is a member of a professional association, and such non-compliance may constitute a breach of any disciplinary code of such professional association, such Party may report such matter to the professional association.

b) If such non-compliance may constitute a criminal offence, either in the country in which the Contract is being carried out, or in the home country of the organization or individual which carried out or assisted such non-compliance, such Party may report such matter to the appropriate criminal authorities in those territories.

c) In the event that any Party breaches any provision of this agreement, the other Parties may, in addition to the rights under this agreement, claim damages against the defaulting Party, and exercise any other rights they may have against the defaulting Party.

d) The Parties will take appropriate disciplinary or enforcement action against any of their staff, consultants, parent and associated and subsidiary companies, agents, consortium and joint venture partners, sub-contractors and suppliers who cause or assist in any breach of any provision of this agreement.
Section 8 - Independent External Monitor/Monitors (IEM)

a). The Principal, will appoint a competent and credible IEM/Number of IEMs for the duration of this agreement from the panel of IEMs appointed in consultation with the Central Vigilance Commission (CVC).

b). The IEM will assess, on an independent and objective basis, the extent to which the Parties comply with their obligations under this agreement.

c). The Parties will, after submission of a tender; after the award of any contract to them and for the duration of the contract:

   i) Allow the IEM unrestricted access to all books, records and staff relevant to such tender;

   ii) Ensure that the IEM has unrestricted access to the relevant books, records and staff of their consultants, parent and associated and subsidiary companies, agents, consortium and joint venture partners, sub-contractors and suppliers.

d). In the event that the IEM believes that there is prima facie evidence that there is a violation of this agreement, the IEM will report the same to CEO of the Principal.

e). Upon receipt of a report from the IEM, CEO of the Principal and the Board will discuss and try to agree upon the appropriate action to be taken in line with sections 3,4 & 5 above to deal with such violation.

f). The IEM has no power to inquire any of the Parties to undertake any actions. No statement by the IEM, whether oral or in writing, is binding on any of the parties. Any Party in legal or dispute resolution proceedings can use all reports and other documentation issued by the IEM. The IEM can be called as a witness in legal or dispute resolution proceedings.

g). Fee and /or any other incidentals including traveling/conveyance expenses, if any, payable to IEM shall be borne by the Principal.

h). The IEM can only be removed from his appointment, if:

   1. All parties agree in writing to remove him: or
   2. He resigns: or
   3. He is removed from his office by order of a Court having appropriate jurisdiction.

i) On completion of the term by the IEM or if the IEM is removed from his appointment or in case of death of IEM (whichever is earlier), the Principal
will appoint another IEM as per **section 8.a) above** for the remaining duration of this agreement.

**Section 9 - Duration of Agreement**

**a).** This agreement comes into force as soon as it has been signed by all the Parties have signed it. It cannot be terminated or varied except by the written agreement of all the Parties.

**b).** This agreement will expire after 12 months from the date of last payment under the respective Contract for the Contractor, and for all other Tenderers 6 months after the award of the Contract.

**Section 10 - Other Provisions**

**a).** The Principal will disqualify from the tender process all Tenderers who do not sign this Pact or violate its provisions.

**b).** Should any occasion arise entailing IEM to undertake any investigation under the provisions of this agreement, the venue for such investigation shall generally be at KIOCL Corporate Office, Kormangala, Bangalore -560 034.

**c).** This agreement is subject to Indian law. Place of performance and jurisdiction is the corporate office of the Principal. In case of any dispute, the courts at Bangalore only shall have jurisdiction.

**d).** Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.

**e).** Addresses along with other relevant details of the Chief Executives of the Parties are as given under;

| 1. **Principal:** Chairman-cum-Managing-Director, KIOCL Limited II–Block, Koramangala, BANGALORE – 560 034 INDIA. | Tel : 080-25531322(O) : 080-25531272(O) Fax : 080-25521584(O) |
| 2. **Tenderer / Contractor** | Tel: Mobile: Email: Fax: |
f). Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In that case the parties will strive to come to an agreement to their original intentions.

g). If the contractor is a partnership or consortium, all partners or consortium members must sign this agreement.

For the Principal

Place……………………

Date …………………..

Witness 1: ……………………………..
(Name & address)

Witness 2: …………………………….
(Name & address)

For the Tenderer/ Contractor

Place……………………

Date …………………..

Witness 1: ……………………………..
(Name & address)

Witness 2: …………………………….
(Name & address)
BUSINESS RULE AND TERMS & CONDITIONS OF ONLINE PRICE BIDDING CUM REVERSE AUCTION

No…………………….. Date: ------------------

Sub: Completion of Balance Civil, Structural, Sheeting & Painting works in the Chrome ore Beneficiation Plant no.2 of M/s. Odisha Mining Corporation at South Kaliapani Mines, Odisha State.

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<th>BUYER NAME</th>
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<tr>
<td>KIOCL LIMITED,</td>
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<tr>
<td>TECHNICAL SERVICES DEPARTMENT</td>
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<tr>
<td>KORAMANGALA</td>
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<tr>
<td>BENGALuru – 560 034</td>
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<tr>
<th>AUCTION TO BE CONDUCTED BY</th>
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<tbody>
<tr>
<td>M/s Bob eProcure Solutions Pvt. Ltd</td>
</tr>
<tr>
<td>#3/4, 3rd Floor, Maruthi Towers,</td>
</tr>
<tr>
<td>Hosur Main Road,</td>
</tr>
<tr>
<td>Madiwala,</td>
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<tr>
<td>Bengaluru - 560068</td>
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<tr>
<td>Mr.Marita Ravi : 080 4900213</td>
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<tr>
<td>Fax Nos : 080 49000211 / 42001251</td>
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<th>DATE OF AUCTION</th>
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<tr>
<td>Online Price Bid cum Reverse Auction Date:</td>
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<tr>
<td>Dynamic Sealed Bid Time:</td>
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<tr>
<td>Reverse Auction Time:</td>
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<td>(will be specified at later)</td>
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<td>(** Auto extension as applicable)</td>
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<tr>
<th>DOCUMENTS ATTACHED</th>
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<tr>
<td>Business rule for Online price bidding cum reverse auction (Annexure-A)</td>
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<td>Terms &amp; conditions of Online price bidding cum reverse auction Process Compliance Statement (Annexure-B)</td>
</tr>
<tr>
<td>Price Confirmation (Annexure-C)</td>
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<td>Contact Information</td>
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Note:

The bidders are requested to note that they should have a valid digital Certificate issued by any of the valid certifying authorities to participate in the online bidding. Those vendors who are not in possession of a valid digital certificate are requested to apply for the same well in advance to avoid any last minute hassles. The bidders may contact the service provider if they are not in possession of a valid digital certificate.

Note: Bidders are strictly advised not to submit price bids along with process compliance certificate.

_________________________  ___________________________
CONTRACTOR  OWNER
ANNEXURE – V(A)

BUSINESS RULES FOR ONLINE BIDDING CUM e-REVERSE AUCTION

GENERAL TERMS AND CONDITIONS

1) Against this Enquiry for the subject item/system with detailed scope of supply as per our specification, KIOCL Limited, hereinafter referred to as KIOCL, may resort to “REVERSE AUCTION PROCEDURE” i.e. ON LINE BIDDING CUM e-REVERSE AUCTION on INTERNET.

2) For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.

3) KIOCL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on Internet.

4) Business rules like event date, time, bid decrement etc. also will be communicated through service provider.

5) Vendors have to fax the process compliance form in the prescribed format provide by KIOCL Ltd., before start of online bidding cum e-Reverse auction. Without this the vendor will not be eligible to participate in the event.

6) Online bidding cum e-Reverse auction will be conducted on schedule date & time.

7) At the end of reverse auction event, the lowest bidder value will be known on the network.

8) The lowest bidder has to fax the duly signed filled-in offered price in the prescribed format as provided on case-to-case basis to KIOCL Ltd. through service provider within 24 hours of action without fail.

BUSINESS RULE FOR FINALIZATION OF THE PROCUREMENT:

KIOCL shall finalize the procurement of the item against this Tender through reverse auction mode. KIOCL has made arrangement with M/s. BOB eProcure Solutions Pvt. Ltd. (hereinafter referred to as M/s. BOB eProcure Solutions Pvt. Ltd., who shall be KIOCL’s authorized service provider for the same. Please go through the guidelines given below and submit your acceptance to the same along with your Techno CommercialBid.

1. Computerized Online bidding cum e-reverse auction shall be conducted by KIOCL, on pre-specified date, while the vendors shall be quoting from their own offices/ place of their choice. Internet connectivity shall have to be ensured by vendors themselves. In extreme case of failure of Internet connectivity, (due to any reason whatsoever may be) it is the bidders’ responsibility / decision to send fax communication immediately to M/s. BOB eProcure Solutions Pvt. Ltd. Furnishing the price the bidder wants to bid online with a request to the service provider to upload the faxed price on line so that the service provider will up load that price on line on behalf of the Bidder. It shall be noted clearly that the concerned bidder communicating this price to service provider has to solely ensure that the fax message is received by the service provider in a readable / legible form and also the Bidder should simultaneously check up with service provider about the clear receipt of the price faxed. It shall also be clearly understood that the bidder shall be at liberty to send such fax communications of prices to be uploaded by the service provider only within the closure of Bid time and under no circumstance it shall be allowed beyond the closure of Bid time / reverse auction. It shall also be noted that the service provider should be given a reasonable required time by the bidders, to upload such prices online and if such required time is not available at the disposal of the Service provider at the time of receipt of the fax message from the bidders, the service provider will not be uploading the prices and either KIOCL or the service provider are not responsible for this unforeseen circumstances.
In order to ward-off such contingent situation bidders are requested to make all the necessary arrangements/alternatives whatever required so that they are able to circumvent such situation and still be able to participate in the reverse auction successfully. Failure of power at the premises of vendors during the Reverse auction cannot be the cause for not participating in the reverse auction. On account of this, the time for the auction cannot be extended and neither KIOCL nor M/s. BOB eProcure Solutions Pvt. Ltd. is responsible for such eventualities.

2. M/s. BOB eProcure Solutions Pvt. Ltd. shall arrange to train your nominated person(s), without any cost to you. They shall also explain you, all the Rules related to the online bidding cum e-reverse auction to be adopted along with tender. You are required to give your compliance on it before start of bid process.

3. Bidding Currency in Rs.………….. Unit of measurement in …………………...

4. Bid Price: …………………………….

5. The technical & commercial terms are as per KIOCL Tender No. …………………………………

6. Validity of bids: The Bid price shall be firm specified in the tender document and shall not be subjected any change whatsoever.

7. The detailed process for online bidding cum e-reverse auction is explained below:
   The online bidding cum e-reverse auction event will be conducted in three stages :-

STAGE –I :Online Bidding

At scheduled time, the screen for On-line bidding will be launched wherein the techno-commercially qualified bidders will be allowed to submit their price through online.

The bidders would be required to quote price only on the basis of price terms indicated in their sealed price bid submitted along with techno-commercial bid.

STAGE –II :Start Bid Price for e- Reverse auction

After the expiry of the time for submission of Online bidding, the lowest Price will be frozen by the system as the Start Bid Price (SBP) for Stage – III on line bidding.

Stage – III : e-Reverse Auction

   a. In Stage III, computer screen will display Start Bid Price and which shall be visible to the all vendors participated in the initial online bidding. You will be required to start bidding after announcement of Start Bid Price and decrement amount. Also, please note that the start price of an item in e-reverse auction is open to all the participating bidders. Any bidder can start bidding, in the e-reverse auction, from the start bid price itself. If the start bid price is your own price, you still need to bid in the e-reverse auction. Also, please note that the first online bid that comes in the system during the e-reverse auction should be lesser than the auction's start bid price by one decrement or should be lesser than the auction's start bid price by multiples of decrement and so on.
   Those vendors who have participated in the Stage –I Online Bidding will only be eligible to participate in the subsequent e- Reverse Auction.

   b. Stage –I online bidding will be for 30 minutes and Online e-Reverse (no ties) Auction shall be for a period of one hour. If a bidder places a bid in the last 10 minutes of closing of the e-Reverse Auction and if that bid gets accepted, then the auction’s duration shall get extended automatically for 10 minutes, for the particular Event/Lot. Please note that the auto-extension will take place only if a bid comes in those last 10 minutes and if that bid gets accepted. If the bid does not get accepted, the auto-extension will not take place even if that bid might have come in the last 10 minutes. In case, there is no bid in the last 10 minutes of closing of e-Reverse Auction, the auction shall get closed automatically without any extension.
However, the bidders are advised not to wait till the last minute or last few seconds to enter their bid during the auto-extension period to avoid complications related with internet connectivity, network problems, system crash down, power failure, etc.

c. The weightage factor (multiplication factor), bid decrement amount shall be specified by KIOCL before start of online bidding. The bidder can bid lower than the start bid price in e-reverse auction by a bid decrement or multiple of Bid decrement.

d. Any commercial loading shall be intimated to bidders in advance and it shall be added to price during Stage – I online bidding. Only for price evaluation & Comparison of bids purpose, commercial loading if any, shall be added to the quoted price of respective bidder. However, while ordering these commercial loadings will not be considered.

e. Bidder will be able to view the following on your screen along with the necessary fields in the English Reverse (no ties) (Reverse Auction):
   a) Leading Bid in the Auction (only total price)
   b) Bid Placed by you
   c) Your Own Rank
   d) Start Bid Price & Bid Decrement value.

f. After the completion of e-Reverse (no ties), the Closing Price (CP) shall be available.

g. At the end of the e-Reverse Auction, Service Provider will evaluate all the bids (final price) submitted and final price comparative statement will be forwarded to KIOCL for further processing.

h. The bidders who have participated in the event, shall be required to submit the final prices, quoted during the e-Reverse (no ties) in Annexure – D Format after the completion of Auction to Service Provider / KIOCL duly signed and stamped as token of acceptance without any new condition other than those already agreed to before start of auction.

i. Final price received from bidder will be taken as an offer to supply as per terms and conditions of tender document. Bids once made by the bidders, cannot be cancelled / withdrawn.

j. During the Online bidding cum e-reverse auction, if no bid is received in the auction system/website within the specified time duration, then KIOCL, at its discretion, may scrap the online price bidding cum e-reverse auction process and open only sealed price bids of all technically and commercially acceptable bidders submitted earlier along with techno-commercial bids.

k. KIOCL shall be at liberty to cancel the reverse auction process / tender at any time, before ordering, without assigning any reason.

KIOCL’s decision on award of Contract shall be final and binding on all the Bidders. KIOCL shall be at liberty to cancel the reverse auction process / tender at any time, before ordering, without assigning any reason. KIOCL shall not have any liability to bidders for any interruption or delay in access to the site irrespective of the cause. Other terms and conditions shall be as per your techno-commercial offers and other correspondences till date.

Bidders are required to submit their acceptance to the terms/ conditions/ modality given above before participating in the reverse auction.

__________________________    ______________________
CONTRACTOR                        KIOCL
TERMS & CONDITIONS OF ONLINE BIDDING CUM e-REVERSE AUCTION

1) Login Name & Password: Each Bidder is assigned a Unique User Name & Password by M/s. BOB eProcure Solutions Pvt. Ltd. The Bidders are requested to change the Password after the receipt of initial Password from M/s. BOB eProcure Solutions Pvt. Ltd. All bids made from the Login ID given to the bidder will be deemed to have been made by the bidder.

2) Bids placed by bidder: The bid of the bidder will be taken to be an offer to execute the work. Bids once made by the bidder cannot be cancelled. The bidder is bound to execute the work the as mentioned above at the price that they bid. Should any bidder back out and not make the supplies at per the rates quoted, KIOCL and / or M/s. BOB eProcure Solutions Pvt. Ltd. shall take action as appropriate.

3) Lowest bid of a bidder: In case the bidder submits more than one bid, the lowest bid will be considered as the bidder’s final offer to execute the work.

4) Auction Type: 1). English Reverse No Ties.

5) Duration of auction: The duration of Reverse Auction will be for one hour. If a bidder places a bid in the last 10 minutes of closing of the e-Reverse Auction and if that bid gets accepted, then the auction’s duration shall get extended automatically for 10 minutes, for the particular Event/Lot. Please note that the auto-extension will take place only if a bid comes in those last 10 minutes and if that bid gets accepted. If the bid does not get accepted, the auto-extension will not take place even if that bid might have come in the last 10 minutes. In case, there is no bid in the last 10 minutes of closing of e-Reverse Auction, the auction shall get closed automatically without any extension. However, the bidders are advised not to wait till the last minute or last few seconds to enter their bid during the auto-extension period to avoid complications related with internet connectivity, network problems, system crash down, power failure, etc. (THIS SCHEDULE IS TENTATIVE. IF ANY CHANGE IN SCHEDULE, THE SAME SHALL BE COMMUNICATED TO YOU)

6) Bid Decrement: The minimum Bid decrement shall be available to the Bidders at the start of the auction. The bidder can view the same by clicking on the Item details at the start of the auction. The bidder can bid lower than the Lowest Bid in the auction by a decrement or multiple of the Bid decrement.

7) Visibility to bidder: The Bidder shall be able to view the following on his screen along with the necessary fields during English Reverse – No ties Auction:
   - Leading Bid in the Auction
   - Bid Placed by him
   - Your rank
8) Proxy Bids: Proxy bidding feature is a pro-supplier feature to safe guard the supplier’s interest of any Internet failure or to avoid last minute rush. The Proxy feature allows Bidders to place an automated bid against other Bidders in an auction and bid without having to enter a new amount each time a competing Bidder submits a new offer.

The bid amount that a Bidder enters is the minimum that the Bidder is willing to offer. Here the software bids on behalf of the supplier.

The proxy amount is the minimum amount that the Bidder is willing to offer. During the course of bidding, the Bidder cannot delete or change the amount of a Proxy Bid.

Bids are submitted in decrements (decreasing bid amounts). The application automates proxy bidding by processing proxy bids automatically, according to the decrement that the auction originator originally established when creating the auction, submitting offers to the next bid decrement each time a competing Bidder bids, regardless if competing bids are submitted as proxy or standard bids.

This feature can be used only once during a particular Reverse Auction and only after the L1 rate is equal to or less than the minimum bid amount that the bidder has put in the system will he get the option to manually bid for the same. In no case during the bidding till the L1 rate or less is not reached as equivalent to the minimum bid amount offered by the bidder, will the bidder get the option to manually bid for the same.

General Terms & Conditions: Bidders are required to read the “Terms and Conditions” section of the auction website using the Login IDs and passwords given to them.

Other Terms & Conditions:

1) The Bidder shall not involve himself or any of his representatives in Price manipulation of any kind directly or indirectly by communicating with other suppliers / bidders.
2) The Bidder shall not divulge either his Bids or any other exclusive details of KIOCL to any other party.
3) KIOCL’s decision on award of Contract shall be final and binding on all the Bidders.
4) KIOCL along with M/s. BOB eProcure Solutions Pvt. Ltd. can decide to extend, reschedule or cancel any Auction. Any changes made by KIOCL and / or M/s. BOB eProcure Solutions Pvt. Ltd., after the first posting will have to be accepted if the Bidder continues to access the site after that time.
5) M/s. BOB eProcure Solutions Pvt. Ltd. shall not have any liability to Bidders for any interruption or delay in access to the site irrespective of the cause.
6) M/s. BOB eProcure Solutions Pvt. Ltd. is not responsible for any damages, including damages that result from, but are not limited to negligence. M/s. BOB eProcure Solutions Pvt. Ltd. will not be held responsible for consequential damages, including but not limited to systems problems, inability to use the system, loss of electronic information etc.
Note:

All the Bidders are required to submit the Process Compliance Form duly signed to M/s. BOB eProcure Solutions Pvt. Ltd. before start of online bidding cum e-reverse auction. After the receipt of the Process Compliance form, our authorized service provider will provide the modalities to conduct online bidding cum e-reverse auction and Log in ID & Password.

______________
CONTRACTOR

KIOCL
ANNEXURE – (V) C

Process Compliance Form

(The bidders are required to print this on their company’s letter head and sign, stamp before faxing)

To
M/s. BOB eProcure Solutions Pvt. Ltd.
Bangalore – 560068.

Sub: Agreement to the Process related Terms and Conditions for the Online price bidding cum Reverse Auction

Dear Sir,

This has reference to the Terms & Conditions for the Online Price bidding cum Reverse Auction mentioned in the Tender No.……………………..Date: ……..2018, for *Completion of Balance Civil, Structural, Sheeting & Painting works in the Chrome ore Beneficiation Plant no.2 of M/s. Odisha Mining Corporation at South Kaliapani Mines, Odisha State.*

This letter is to confirm that:

1) The undersigned is authorized representative of the company.
2) We have studied the Commercial Terms and the Business rules governing the online bidding cum e-Reverse Auction as mentioned in your letter and confirm our agreement to them.
3) We also confirm that we have a valid digital certificate which will be valid for the subject tender whenever we sign on the bid submission or as specified by KIOCL Ltd’s authorized service provider.
4) We also confirm that we have taken the training on the auction tool and have understood the functionality of the same thoroughly.
5) We also confirm that we will fax the price confirmation & break up of our quoted price as per Annexure- & the price bid format in the tender document.
6) We, hereby confirm that we will honour the Bids placed by us during the auction process.
7) We hereby confirm that we have neither informed nor mentioned any price in this form and also not attached any price bid along with this form.

With regards
Signature with company seal
Name –
Company / Organization –
Designation within Company / Organization –
Address of Company / Organization –
Scan & email this document to - .

____________________  ___________
CONTRACTOR                    KIOCL
To
M/s. BOB Tech Solutions Pvt. Ltd.
Bangalore

Sub: Final price quoted during online price bidding cum reverse auction and price break up for
Completion of Balance Civil, Structural, Sheeting & Painting works in the Chrome ore Beneficiation Plant no.2 of M/s. Odisha Mining Corporation at South Kaliapani Mines, Odisha State.

Ref: 1. Tender Enquiry………………………………………….dt. ………………….2018
2. e-Auction date. ……………………………
3. Our Offer No. ………………………………….. dt.

Dear Sir,

We confirm that we have quoted final Price is as under:

SCHEDULE OF WORK(UN-PRICED)

<table>
<thead>
<tr>
<th>Sl. no.</th>
<th>Details</th>
<th>Total amount (Rs)</th>
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<tbody>
<tr>
<td>1</td>
<td>Total amount</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(i) For Civil works: Part-A and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(ii) For Structural, Painting and Sheeting works: Part-B</td>
<td></td>
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<tr>
<td></td>
<td>As per Annexure- IV of priced bid (Schedule of Items)</td>
<td>Quoted</td>
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<tr>
<td>2</td>
<td>Applicable GST</td>
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<tr>
<td></td>
<td>IGST @……………….%</td>
<td>Quoted</td>
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<tr>
<td></td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CGST@……………% and</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SGST@……………….%</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Total amount inclusive of applicable GST.</td>
<td>Quoted</td>
</tr>
</tbody>
</table>

(Rupees ........................................ Quoted.............................................)

IMPORTANT : Please quote TOTAL PRICE at the time of PRICE BIDDING
Thanking you and looking forward to the valuable order from KIOCL.

Yours sincerely,
For ___________________ Signature and Name & Company Seal
_________________  __________
CONTRACTOR OWNER
## CONTACT INFORMATION

<table>
<thead>
<tr>
<th>M/s Bob eProcure Solutions Pvt. Ltd</th>
<th>Mr. Marita Ravi : 080 4900213</th>
</tr>
</thead>
<tbody>
<tr>
<td>#3/4, 3rd Floor, Maruthi Towers, Hosur Main Road,</td>
<td>E mail: <a href="mailto:marita.ravi@bobeprocure.com">marita.ravi@bobeprocure.com</a></td>
</tr>
<tr>
<td>Madiwala,</td>
<td>Fax Nos : 080 49000211 / 42001251</td>
</tr>
<tr>
<td>Bengaluru - 560068</td>
<td></td>
</tr>
</tbody>
</table>

| KIOCL Limited,                                        | Mr. Noor Ahmed                 |
| Technical Services Department,                        | DGM (Technical Services)       |
| Koramangala,                                          | Technical Services Department  |
| BENGALURU – 575 010                                   | KIOCL Limited, Bangalore.      |
| Karnataka State                                      | Email: bgmcpts@kioclltd.com    |
|                                                       | Mobile: 8105133993            |