Chapter 3 and the corresponding BOQ broadly contains most of the specifications and items which we are required for various works for the steel plants and mines. BOQ for civil works in **Schedule 2.2-2** has the mention of the corresponding clauses of the DSR (wherever applicable) to facilitate the furnishing of cost to the CTE department. However, the DSR clause number needs to be deleted in the final TS.

As the whole TS (except BOQ) is automatic numbered, it is expected that for each TS you will **start working from the standard TS only** and **delete the clauses of Chapter 3 and BOQ** which are not required for your specific project. However, it is recommended to please **avoid deleting** anything in Chapter 1, 2 and 4 unless it is explicitly required for your project.

**(CLIENT’S NAME)**

**(PLACE)**

**<NAME OF THE ASSIGNMENT>**

**TENDER SPECIFICATION**

**FOR**

**< PACKAGE NAME >**

**<PACKAGE NO.>**



**STEEL AUTHORITY OF INDIA LIMITED**

**CENTRE FOR ENGINEERING & TECHNOLOGY**

**RANCHI - 834002**

|  |  |
| --- | --- |
| **(MONTH, YEAR)** | **CET/………………. (TS NO.)** |

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| <Name with designation> | <Name with designation> | <Name with designation> |

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Blue with yellow background: Instructions for the respective write-up.

**“Successful bidder”** shall not be used at any place in the TS and only “**bidder”** shall be used.

1. **INTRODUCTION**
   1. **GENERAL:**
      1. (Only specific information related to project should be given like :
2. Brief about concerned plant
3. Brief about the unit to be modified/ upgraded/ new installation)
   1. **EXISTING FACILITIES**(if applicable)
      1. (Brief description of the existing system)
   2. **OVERVIEW OF THE PROJECT**(A brief overview of the project in one paragraph consisting of upgraded parameters and envisaged outputs; details w.r.t. proposed schemes shall be included in subsequent clause 1.4.2)

Example:

B.F No. 1 will be upgraded to enhance useful volume to about 1700 cum (indicative) for a hot metal production of 2900 tpd (avg.) through incorporation of latest state-of-art design furnace cooling system & refractories, cooling elements, etc.uitlilising the existing foundation.

* 1. **IMPLEMENTATION STRATEGY**
     1. The complete job of (Project name) is envisaged to be executed through ………………nos of package(s)
        + 1. (Package name and number to be specified)
     2. This tender specification pertains to (Package name and no.) to be executed on item rate basis which includes …………………… (Part of the scheme covered in this package to be broadly mentioned here)
     3. **Details of pre-shutdown and shutdown activities with duration** (if applicable)**:**
        1. Details of activities pre-shutdown as well as during shutdown and their duration shall be mentioned by the bidder in their offer and also to be shown in the implementation schedule.
     4. **Other site related details**
        1. Details of over ground facilities at erection site which may need diversion and special handling equipment to be deployed at site, if any, are to be clearly brought out by the bidder in their offer.
  2. **INTENT OF SPECIFICATION**
     1. The intent of this tender specification is to furnish required details for enabling the bidder to submit their best offers (technical & commercial) as per the scope of work mentioned at chapter 2.0, technical specifications at chapter 3.0, and commissioning &performance guarantee at chapter 4.0.
     2. This tender specification shall be read in conjunction with other documents enclosed with the NIT.
  3. **SITE VISIT AND OTHER REQUIREMENTS**
     1. The bidder shall visit the site, study drawings/ documents and discuss with the employer/ consultant, if required, regarding any technical clarification and get satisfied with respect to the nature and extent of work involved. The bidder shall also obtain first-hand information regarding location, work terrain, climate condition, railways, roads, airports and communication etc. before offering the bid for the job.
     2. All materials/ equipment/ machinery/ fabricated items used in the subject package shall be according to the specification given herein and any deviation should be clearly brought-out in schedules of exclusions and deviations attached with this TS. No mention of exclusions and deviations will mean that the bidder has accepted the scope and specification given herein.
  4. **DRAWINGS AND TECHNICAL DOCUMENTS TO BE SUBMITTED WITH THE OFFER**
     1. The Bidder shall submit along with the bid, drawings / documents / data as per the following details:
        + 1. Delivery/ commissioning schedule (Bar chart/PERT Network).
          2. Details of major construction equipment required for carrying out the job within the stipulated time which they possess, with location and details of construction equipment, which they would hire to facilitate the dismantling, and construction activities.
     2. Drawings & documents listed are minimum requirement only.
  5. **SCHEDULES TO BE DULY FILLED AND SUBMITTED WITH THE OFFER** (indicative list)

|  |  |
| --- | --- |
| 1.8-1 | Declaration of site visit |
| 1.8-2 | List of exclusions |
| 1.8-3 | List of deviations |
| 1.8-4 | Details of authorised person of bidder during tender evaluation |
| 1.8-5 | Requirement of construction water & power |

1. **SCOPE OF WORK**
   1. The bidder shall be responsible for execution of the jobs envisaged for “Name of the project” on **item-rate** basis.
   2. The scope of work shall cover procurement, supply, fabrication, transportation, insurance, storage, handling, dismantling & removal of debris, construction, erection, inspection and commissioning to the satisfaction of the employer based on detailed scope of work as enumerated in this document, drawings to be issued by employer and schedule of quantities for works as per **Schedule – 2.2-1** for Structural works and **Schedule – 2.2-2,** for Civil works.
   3. All the construction/ fabrication works shall be carried out on the basis of drawings, sketches and schemes issued by the consultant or as directed by the employer.
   4. **PROJECT DESCRIPTION**
   5. **STRUCTURAL**
      1. The broad scope of work shall include, but not limited to, the following,
         1. Dismantling
            1. *Units and the actual work in the units to be mentioned which are to be dismantled*.……
            2. *……*
            3. *……*
            4. Bidder shall prepare the scheme, sequence & method of dismantling and submit for reference. However, if there be any observation on the scheme by the employer, same shall have to be incorporated by the bidder. This has not been specifically covered in any of the items of the schedule of the item of this document but shall be suitably built-in into the relevant items of works by the bidder.
         2. New structures
            1. *Specific units with possible shutdown and interfacing requirements to be mentioned.*
            2. *Work should not be indicated only in very broad terms such as “the work includes Structural steel work, sheeting etc” but specific mention of actual work needs to be made*
            3. ……
            4. ……
         3. Modification/strengthening, re-erection& re-routing of structures
            1. *Specific units with possible shutdown and interfacing requirements to be mentioned.* ……
            2. ……
            3. ……
         4. Bidder shall prepare all detailed fabrication drawings including bill of materials based on basic design drawings, which will be issued to them, supplemented by all necessary site measurements to be taken by him as may be required to take care of the existing site conditions in their drawings. Bidder shall submit the detailed fabrication drawings to employer for reference/ information only. Employer reserves the right to mark their observation/ comments on the same and incorporation of all such comments/ observations shall be an obligation on the part of the bidder. However, such approval/ acceptance of employer shall not absolve the bidder from their responsibility of providing adequate, safe and correct structures, in adherence to the related design drawings issued to him, under their scope of work.
         5. The sequence of submission of fabrication drawings shall be in line with erection sequence so that no delay is caused on account of non-availability of fabrication drawings.
         6. The bidder shall assist site measurement and survey work as when required by the employer/ consultant for preparation of design drawing. The bidder shall verify the dimension given in the design drawings for building structures at site before preparation of fabrication drawings and erection of structures. This job of taking site measurement though is not specifically included in the schedule of quantities on this document shall be deemed to be part of scope of works and for which the cost shall deemed to be included in the quoted rates of items of works and no separate payment shall be made.
         7. The bidder shall arrange for testing like radiography or ultrasonic and also engaging third party for quality control measures. This job of making arrangements for testing is not specifically included in the schedule of quantities on this document, but shall be deemed to be part of scope of works and for which the cost shall deemed to have been included in the quoted rates of items of works and no separate payment shall be made.
         8. Erection of fabricated structures (including tools, tackles, labour, cranes handling equipment and any staging or false work required for erection), alignment, levelling, fixing, bolting / welding, inspection and testing of weld shall be under the scope of the bidder.
         9. Painting of all new and existing modified structures after suitable surface preparation as per specification with in the battery limits.
   6. **CIVIL**
      1. The broad scope of work shall include, but not limited to, the following,
         1. Dismantling
            1. *Units and the actual work in the units to be mentioned which are to be dismantled*.……
            2. ……
            3. ……
            4. Bidder shall prepare the scheme, sequence & method of dismantling and submit to employer for reference. However, if there be any observation on the scheme by the employer, same shall have to be incorporated by the bidder. This has not been specifically covered in any of the items of the schedule of the item of this document but shall be suitably built-in into the relevant items of works by the bidder.
         2. New structures
            1. *Specific units with possible shutdown and interfacing requirements to be mentioned.*
            2. *Work should not be indicated only in very broad terms such as “the work includes earthwork, PCC, RCC etc” but specific mention of actual work needs to be made*
            3. ……
            4. ……
         3. Modification/strengtheningof structures
            1. *Specific units with possible shutdown and interfacing requirements to be mentioned.*……
            2. ……
            3. ……
      2. Details of civil works are shown in the enclosed drawing **CET RN …. CE0 00 001, R=0.** This drawing is indicative of the nature and type of work involved. It is suggested that bidder should study these drawings and properly asses the nature and type of work involved at site before submission of their offers.
      3. Wherever existing drawings are not available for the units where modifications of existing structures are required, the bidder may be required to take the measurements from site of the underground and over ground concrete structures along with chipping off of the existing concrete surface to determine the reinforcement as per the requirement of engineer-in-charge. The job of taking site measurement and ascertaining reinforcement is not specifically included in the schedule of quantities on this document but shall be deemed to be part of scope of works and no extra payment on this account shall be made to the bidder and cost need to be built up in the relevant items of work of the schedule of quantities on this document.
   7. **SCOPE OF SUPPLY & SERVICES**
      1. The scope of services as enumerated below is part of the scope of work of the bidder. These may not be specifically covered in any of the items of the schedule of the item of this document but shall be suitably built-in into the relevant items of works by the bidder and no extra payment on this account shall be made to the bidder.
         1. If so required in the project, receiving of material from bidder’s stores/ employer’s stores/ designated place of the employer and transportation to site.
         2. Unloading of material at site, unpacking, cleaning up, and checking for completeness and transportation to site for erection/ construction.
         3. Transferring of centre lines and levels from standard benchmark(s), including survey. The bidder shall carry out, at its own cost, necessary precision survey to set out and check the setting of all works including foundation & anchor bolts, checking & fixing of alignment of structures/ constructions, etc., to the required tolerances using the grid reference points available in the plant site.
         4. Arranging tools, tackles, construction & erection machineries, cranes and other handling & testing equipment, scaffolding, temporary platforms, erection fixtures, skilled/ semi-skilled/ unskilled personnel etc. If the tools, tackles etc. brought to site and arranged by the bidder are not sufficient or inadequate in the opinion of the Engineer, he shall have the right to direct the bidder and the bidder shall comply with the directions and arrange to bring such additional tools, tackles etc. to the site and employ the same for the work at their own cost.
         5. Arranging and rendering equipment and personnel to employer for checking the correctness of the work in progress.
         6. The Bidder shall furnish a plan of quality assurance and quality control both in respect of site works as well as supplies, which Bidder proposes to follow for the purpose of assuring the quality of equipment and workmanship at various stages. The Quality Assurance Plan (QAP) shall be mutually discussed and approved by the Employer. The format of QAP is attached in **Annexure 2.7.1.6-1**.
         7. Inspection, testing including radiographic and ultrasonic testing of all steel structures. Submission of test certificates and data sheet from approved third party testing laboratory or manufacturer respectively. All inspection shall be done as per the format of QAP attached in **Annexure 2.7.1.6-1.**
         8. All equipment and consumables shall conform to the relevant provisions of statutory and other regulations in force.
         9. Any rectification/ modification of existing facilities required during erection.
         10. Bidder shall prepare progress report at an agreed interval, preferably monthly, and submit to employer. This progress report shall be prepared unit wise indicating items of the work as per BOQ, quantities as per issued/ fabrication drawings and the quantities executed on monthly basis in tabular and charts form.
         11. Any modification from the issued drawings during the course of execution of the project, due to site requirements, or otherwise, shall be properly documented by the bidder and at the end of the project; the bidder shall prepare the As-built drawing and submit the same to the employer.
         12. Bidder shall make site office, take connections for construction water and utilities from the designated points, make road approaches, security arrangement, parking & maintenance area of equipment & machines, storage and lab facilities and miscellaneous works etc. as per the requirement of the work, as part of the enabling activities to be carried out by the bidder. parking & maintenance area of equipment & machines, storage and lab facilities and miscellaneous works etc. as per the requirement of the work
         13. Sundry works such as making of holes, grouting, chiselling of holes/ opening through walls, ceiling, floors, steel structures, etc. including making good the same, cleaning of site periodically and at the time of final handing over.
         14. Periodic transportation including loading, unloading, stacking, handling and spreading the unserviceable material, debris & surplus excavated earth with all lift and lead unless otherwise specified.
         15. All equipment, consumables and labour required for handling, transportation, fabrication, erection and commissioning will be arranged by the bidder along with all temporary support as may be required for completion work. The Bidder shall make all necessary arrangement for equipment required for the work in fully mechanized manner at their own cost. No separate payment shall be made towards this or for mobilization of the same.
         16. The bidder shall also be responsible for co-ordination with other agencies working at the site for the successful and timely implementation of the work.
         17. Final cleaning of site after completion of the work, to the satisfaction of engineer-in-charge, shall be under the scope of the Bidder. No separate payment shall be made towards this and the cost, if any, shall be deemed to be included in the quoted rates.
         18. Sampling & testing of construction material and work done during execution of the work shall be under the scope of the Bidder. The testing shall be performed by a separate agency, approved by the Employer and the cost towards the same shall be borne by the Bidder. The cost towards the same shall be deemed to be built within the item rates quoted by the Bidder and no extra payment towards the same shall be made to the Bidder.
   8. **GENERAL**
      1. The scope of work described in this chapter may not be exhaustive and any work/ service, which may not have been specifically mentioned in this document but is necessary for completeness of the work, within the battery limits shall be deemed to be part of the scope of work of the bidder. The payment for such works shall be made as per the items of work within the schedule of the item of this document.
      2. The bidder shall use parallel flanged rolled sections, plates, sheets, reinforcement bars, pipes manufactured by Steel Authority of India Limited (SAIL) which are required for execution of all works. WPB and NPB sections, those are being manufactured by SAIL, shall be used. In case of non-availability/ non-suitability of WPB or NPB sections, tapered rolled SAIL sections or built up sections using SAIL steel shall be used. To ensure availability of steel items required for the facilities, the bidder has to give at least four (4) weeks advance intimation of such requirement. In case SAIL steel is not available within the said period, NOC shall be given by the Employer for procurement of steel from other integrated steel producers.
      3. The bidder 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 bidder. In case there are under-ground services which need to be protected and/ or diverted but are not shown in the drawing, the bidder shall be responsible to execute the same. The payment for such works shall be made as per the items of work as per the schedule of the item of this document.
      4. The work shall be executed on item rate basis as per schedule of quantities enclosed at **Schedule 2.2-1 & Schedule 2.2-2**, technical specification and drawings issued by the employer. The quantities of various items of works given in the schedule of quantities against each items are estimated and may vary due to design considerations, change of site conditions and as per requirements at site during progress of work. But this shall not have any impact on the rate of items and the terms and conditions of the contract except for the variation of the contractual amount.
      5. Bidder is advised to visit the site and ascertain by themselves the site conditions and the encumbrances likely to be faced by them during the execution of the job. Any plea for change in terms of the contract on account of site conditions at a later date shall not be entertained.
      6. Item of work, if any, not specifically mentioned in the specification and also not in the schedule of quantities on this document but required for satisfactory completion of work, shall have to be completed in all respects by the bidder. Such items shall be dealt as extra item and the rate shall be mutually agreed between bidder and employer based on the rates of similar DSR item/ rate analysis.
      7. The drawings and documents of the Employer/ Consultant shall remain fully Employer’s property and can neither be reproduced nor communicated to third party in any way, nor utilised for any other purpose, particularly for execution of what is represented on it, without a written consent of the Employer.
      8. Bidder shall organise work at site round the clock for completion of the project in time. Execution of entire work shall be carried out in such a manner that normal working is not interrupted.
      9. The responsibility of making adequate storage and handling facility for issue of material and maintaining them rests with the bidder. The Employer shall provide the space for storing the material.
   9. **EMPLOYER’S OBLIGATION** 
      1. Construction & drinking water shall be supplied free of cost by the employer to the bidder at a single point within a distance of 300 m from the battery limit. The bidder shall make its own arrangements to lay and maintain necessary distribution lines, valves, etc., from this point at its own cost. The bidder shall be responsible to store water in sufficient quantities to meet its requirements and ensure that there is no wastage of water. Quantum of supply will depend on availability and no claim for shortfall shall be allowed by the employer.
      2. The employer will supply power one point within 300 meters of battery limit, for construction & erection free of charge. The bidder shall make its own arrangements to lay and maintain necessary distribution lines and wiring at its own cost. Electrical power for fabrication work, if any, envisaged at site shall be supplied, metered and charged at the rate prevailing from time to time. The bidder shall ensure that the electrical equipment employed by the bidder will be such that the aggregate power factor does not fall below 0.8 at the Employer’s terminal point. The electrical installations for construction power shall conform to Indian Electricity Rules. The bidder will employ electricians having valid electrical licence for carrying out the installations as well as for maintenance. The bidder shall be responsible for all damages, losses, etc., if it is due to the bidder negligence, improper installation, operation and/ or maintenance of bidder part of installations.

***Only one of the clause no 2.9.2 and 2.9.3 as the case may be***

* + 1. Bidder shall note that the area location where the work is to be carried out is at remote location, thus the bidder shall arrange the construction power and water on their own and the employer shall not provide any construction power or water to the bidder. The cost for the same is deemed to be included in the quoted rates of various items and no separate payment will be made towards this.
  1. **SAFETY**
     1. The Bidder shall abide by the safety rules by State Government & Central Government as in force from time to time.
  2. **RISK ASSESSMENT**
     1. The Bidder shall identify any hazard/risk which may result in fatal accident/severe damage to human health and safety, damage to equipment and material resulting in loss of time and having cost implication. The Bidder shall carry out the above assessment and formulate appropriate action plan to prevent such incidents. This action plan shall be submitted to the Employer before start of the work.
  3. **SAFETY CODE FOR BIDDERS**
     1. The Bidder shall ensure that “Safety Code for Bidders” as per IPSS: 1-11-011-14 is implemented in totality during execution of contract. The safety code also covers the following:
        1. MOU between the Employer & Bidder for safe execution of contract works.
        2. General Terms and Conditions of including legal and penal action, dealing with accidents, site clearance etc.
        3. Formats for safety induction, works clearance, injury on works, notice of fatal accident.
        4. IPSS: 1-11-011-14 can be accessed / downloaded from <http://www.sail.co.in/IPSS/ipss_home.asp>
  4. **IMPLEMENTATION SCHEDULE**
     1. The Bidder shall complete the work in all respect, **within 11 (eleven) months** from the effective date of contract. Work shall be deemed to be completed after issue of completion certificate by the Employer.

1. **TECHNICAL SPECIFICATION**
   1. **BASIC DESIGN AND SITE CONDITION:**
      1. **Climatic conditions**

Local climatic conditions are as follows

|  |  |
| --- | --- |
| Height above mean sea level |  |
| Maximum temperature |  |
| Minimum temperature |  |

* + 1. **Communication**

Postal, telephone, fax and Internet facilities are available at <Plant name>.

* + 1. **Local Conditions**

The bidder, before submitting their bid, shall visit the site and ascertain the local conditions, labour rules, availability of approach roads/paths, traffic restrictions, and all obstructions in the area and also ascertain all site conditions and shall allow for any extras likely to be incurred due to all such conditions in their quoted prices. After the award of work, no additional claims will be entertained on these accounts under any circumstances, whatsoever.

* + 1. **Setting out and levelling**

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

* + 1. **Safety**

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

|  |  |  |
| --- | --- | --- |
| IS: 3764-1992 | : | Safety Code for excavation work |
| IS: 4081-2013 | : | Safety Code for drilling and blasting operations |
| IS: 4138-1977 | : | Safety Code for working with compressed air |
| IS: 7923-1985 | : | Safety Code for working with Constructions machinery |

* + 1. **Keeping work free from water**

The Bidder shall provide and maintain at their own cost pumps and other equipment to keep the works free from water and continue to do so until the handing over of the works

* + 1. **Rubbish**

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

* + 1. **Bench Marks, Reference Pillars etc.**

The Bidder shall protect all benchmarks, and reference pillars/lines including ground water gauges from damage or movement during working. In case of any damage the same shall have to be restored to its original condition without additional cost to the Employer

* + 1. **Standards & Codes**

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

* + 1. **Design Philosophy**

Work shall be carried out as per drawings prepared by Consultant/Engineer. For Civil Works complete detailed /construction drawings will be issued by Consultant/Engineer. However, Dismantling shall be done as per drawings/sketches issued by the Employer or as per the direction of EIC.

* 1. **STEEL STRUCTURAL WORKS**
     1. **Material Specification**
        1. Structural Steel
           1. All structural steel shall be of tested quality. Structural steel conforming to IS 2062: 2011 grade E250A (for rolled sections and plates up to 20mm thickness) or grade E250 BR (for plates above 20mm thickness) shall be used.
           2. High strength steel shall conform to IS 2062: 2011 / SAILMA.
           3. Rolled steel sections shall be as per IS 808: 1989 and parallel flange rolled steel sections shall be as per IS 12778: 2004.
           4. Rainwater gutters shall conform to E 250 Cu. Fixing of rainwater gutters & down pipes for roof drainage shall conform to IS 2527:1984.
           5. Chequered plates shall conform to IS 3502: 2009.
           6. Skelp plates shall conform to IS 10748: 2004.
           7. All steel gratings, to be used over walkways and stair treads in open areas, shall be galvanized as per IS 4759: 1996.
           8. Crane rail section shall be as per IS 3443: 1980. Fixing plates for crane rail shall be of grade 60Si7 as per IS 3195: 1992.
           9. Steel tubes wherever used shall be as per IS 1161: 2014, yield strength 240 MPa and grade medium.
           10. Steel used for construction exposed to weather or other corrosive influences shall not be less than 8 mm in thickness and in construction not exposed to weather, thickness shall not be less than 6 mm. The controlling thickness as specified above, for rolled beams and channels shall be taken as the mean thickness of flange, regardless of web thickness.
           11. Material for BF shell, stove shell shall be as per IS 2002: 2009, Grade 3 or equivalent international standards.
           12. The Bidder shall submit the test certificates conforming to appropriate standards of all steel materials supplied by him and used for fabrication. All structural steel shall be free from rust, scales, lamination, cracks, fissures and other surface defects.
        2. CGS Sheeting
           1. CGS sheet shall conform to Type A (depth of corrugation 17.5 mm, pitch of corrugation 75 mm) with zinc coating of 275gm/m2 inclusive of both sides as per IS 277: 2018. Base material shall conform to structural steel grade 250.
           2. Ridging, flashing shall be made of galvanized plain sheets bent to shape. Material specification shall be similar to that of roof / wall CGS sheet.
           3. Generally 18G sheets shall be used for roof and 20G sheets shall be used for sides.
           4. The fasteners for CGS roof and side sheeting shall conform to IS 730: 1978.
           5. Fixing & laying of sheet shall be as per IS 12093: 1987.
        3. Glazing
           1. Side glazing work shall be of 6 mm thick wired glass conforming to IS 5437: 1994/ IS 3548: 1998.
           2. All glazing parts shall be securely fixed in the frame and shall be weather-proof. All glazing shall be flashed with surrounding sheeting. Glass shall be fixed with putty, suitable for structural steelwork, glazing clips, neoprene gaskets, etc. as per Indian Standard Specification IS 3548: 1988.
        4. Translucent Sheets

Glass fibre reinforced translucent sheets made from thermosetting polyester resin shall conform to IS 12866: 1989 and shall be laid as per IS 15224: 2002.

* + - 1. Al-Zn Coated Sheet
         1. Pre-painted Al-Zn coated profiled sheeting: Roof and Wall panels shall be of pre-painted Al-Zn coated trapezoidal profile. The base metal shall have minimum 550 MPa yield strength with hot dip metallic coating composed of 55% Al and balance Zn with minor addition of control elements. Thickness of base metal shall be minimum 0.45 mm and total coated thickness shall not be less than 0.5 mm. Coating mass shall be minimum 150 gm/sq.m. inclusive of both sides. Coating mass shall be minimum 60 gm/sq.m. on one surface for single spot test.
         2. Pre-painted Al-Zn coated sheet shall conform to IS 15965: 2012. The paint system shall be factory pre-painted on a continuous line. Durability class shall correspond to class 3. Flashings etc. shall be made of same material and specification as that of Roof and Walls.
         3. Sectional properties, i.e. depth and pitch of trapezoidal profile shall depend on the structural arrangement of purlins and side runners and the adequacy of sheeting work in terms of strength and suitability of application shall be substantiated by submitting necessary data and calculation.
         4. The fastener shall be fixed on crest of roof sheets for connecting with purlin. The wall cladding could be crest fixed or valley fixed as recommended by the manufacturer. All fasteners shall be strictly as per profiled sheet manufacturer’s specification and recommendations. Manufacturer's recommended installation methodology shall strictly be adopted for installation of all pre-painted Al-Zn coated profiled sheets for roof and wall cladding. Colour scheme of sheet shall be as approved by the Employer.
      2. Bolts and Nuts
         1. All bolts and nuts shall conform to IS 1363 / IS 1364 / IS 1367 9latest for each part)as applicable and unless specified otherwise shall be hexagonal. Permanent bolts shall not be less than 20 mm. All nuts shall conform to property class compatible to the property class of the bolt used.
         2. High strength friction grip bolts (HSFG bolts) shall conform to IS 3757: 1985. Nuts to be used with high strength bolts shall conform to IS 6623: 2004. Hexagonal fit bolts shall conform to IS 3640: 1982 with matching nuts and washers.
         3. Fastening bolts for transmission line towers shall conform to IS 12427: 2001. Step bolts, wherever necessary shall conform to IS 10238: 2001.
         4. Galvanizing of the bolts, nuts and washers shall be done as per IS 1367: PART 13: 1983 and IS 1573: 1986.
         5. The Bidder shall submit the test certificates conforming to appropriate standards of all steel materials.
      3. Washers
         1. Plain washers shall be made of mild steel conforming to IS 5369: 1975 unless otherwise specified. Heavy washers shall conform to IS 6610: 1972. Spring washers shall conform to type B of IS 3063: 1994. One washer shall be supplied with each bolt and in case of special types of bolts more than one washer as needed for the purpose shall be supplied. An additional double coil helical spring washer conforming to IS 6755: 1980 shall be provided for bolts carrying dynamic or fluctuating loads and those in direct tension. Tapered washers conforming to IS 5372: 1975 and IS 5374: 1975 shall be used for channels and beams respectively. Washers for high strength friction grip bolts & nuts shall conform to IS 6649: 1985.
         2. The Bidder shall submit the test certificates conforming to appropriate standards of all steel materials.
    1. **Welding** 
       - 1. The welding and the welded work shall generally conform to IS 816: 1969 and IS 9595: 1996 unless otherwise specified. As much work as possible shall be welded in shops and the layout and sequence of operations shall be so arranged as to eliminate distortion and shrinkage stresses. Electrodes shall conform to IS 814: 2004. The Bidder shall submit manufacturer’s test certificates as and when called for.
         2. All electrodes shall be kept under dry conditions. Any electrodes damaged by moisture shall not be used. Any electrode which has part of its flux coating broken away or is otherwise damaged, shall be rejected. Any electrode older than six (6) months from the date of manufacture shall not be used. Bidder shall submit batch certificate for electrode.
         3. The edges shall be prepared with an automatically controlled flame-cutting torch correctly to the shape, size and dimensions shown in the design and fabrication drawings.
         4. The welding surfaces shall be smooth, uniform and free from notches, loose scale, slag, rust, grease, moisture or any other foreign material.
         5. The welding procedure shall be arranged by the Bidder to suit the details of the joints as indicated on the drawings and the position at which welding has to be carried out. Welding procedure shall cover the following: type and size of electrodes, current and (for automatic welding) arc voltage, length of run per electrode or (for automatic welding) speed of travel, number and arrangement of runs in multi run welds, position of welding, preparation and set up of parts welding sequence, pre or post heating, any other relevant information. The welding procedure shall be so arranged that the distortion and shrinkage stresses are reduced to a minimum and that the welds meet the specified requirement of quality. The Bidder shall employ a competent welding supervisor to ensure that the standard of workmanship and the quality of the materials comply with the requirements laid down in this specification.
         6. Any weld found defective shall be cut by using either chipping hammer or gouging torch in such a manner that adjacent material is not injured in any way.
         7. Fusion faces and the surrounding surfaces within 50mm of welds shall be free from all mill scale and free from oil, paint or any substance, which might affect the quality of the welds or impede the quality/progress of welding. They shall be free from irregularities, which would interfere with the deposition of the specified size of weld or be the cause of defects. All mill scale within 50mm of welds shall be removed prior to welding by thorough power wire brushing or by other approved methods.
         8. Parts to be welded shall be properly assembled and held firmly in position by means of jigs and clamps or suitable arrangements prior to and during welding.
         9. After making each run of welding all slag shall be thoroughly removed and the surface cleaned.
         10. Welded joints should satisfy the following requirements

Strength-quality with parent metal.

Absence of defects.

Corrosion resistance of the weld shall not be less than that of parent material in aggressive environment.

* + - 1. Criteria for test of weld:
         1. Visual examination: 100% of the welded joints for fillet welds and butt welds.
         2. Ultrasonic method: 100% for all butt-welded joints.
         3. Radiography examination: 2% of length of butt welds made by manual or semi-automatic machine. *1% of length of butt welds if made by automatic welding machine.*

The Bidder shall engage a reputed or any Government test agency having Level II Ultrasonic and Radiography examination certificate holder inspector to carry out the Ultrasonic or X- ray examination tests. The third party shall carry out tests, interpret test results and recommend necessary rectification measures. Bidder shall carry out the rectification work as recommended by the test agency to ensure defect free welding. Bidder shall obtain certificates from the testing agency certifying defect free welds and submit to the Employer.

* + - 1. Tests:
         1. Visual Examination

The Bidder shall conduct visual examination and measurement of the external dimensions 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 instrument, which has an accuracy of ± 0.1 mm or by weld gauges. Welded joints shall be examined from both sides.

The Bidder shall examine the following during the visual checks:

Correctness and shape of the welded joints, incomplete penetration of weld metal, influx, burns, un-welded craters, under cuts, cracks in welded spots and heat affected zones, porosity in welds and spot welds, compression in welded joints as a result of electrode impact while carrying out contact welding, displacement of welded element. All defects observed shall be made good.

The Bidder shall document all data as per standard practices.

The Bidder shall submit the test certificates conforming to appropriate standards of all steel materials.

* + 1. **Galvanisation**

Zinc coating applied by hot-dip galvanizing on structural steel sections, plates etc shall be as per IS 4759: 1996. Threaded fasteners shall be galvanized to conform to the requirements of IS 1367: PART 13: 1983. The zinc coating shall be uniform, adherent, reasonably smooth and free from such imperfections as flux, ash bare patches, black spots, pimples, lumpiness, runs, rust stains, bulky white deposits and blisters.

* + 1. **Type of Structures**

Generally steel structures shall be of welded beam column type construction. Steel structures shall generally be fabricated at shop according to the assembly requirements.

Splices in structures required for transportation, assembly and erection facilities should be developed by cover plates/angles, bolts and for plates by butt-welding.

* + 1. **General Provision**
       1. Type of Structures

Generally steel structures shall be of welded beam column type construction. Steel structures shall generally be fabricated at shop according to the assembly requirements.

* + - 1. Splices in structures
         1. Shop splice**:**

Where shop splices in plates are necessary due to non-availability of plates in required lengths, full penetration defect free sound butt welds shall be made. Shop splice in rolled steel angle, joists and channels shall be developed by fillet welding and cover plates/angles etc**.**

* + - * 1. Site splice:

Site splice for members required due to transportation, assembly and erection facilities shall be developed by fillet welds and cover plates and angles or high strength friction grip bolts. In case, butt welding in plates is employed for site splice, the same shall be sound, defect free and of full penetration.

* + - 1. Measurement
         1. Measurement for structural steel work shall be made on the calculated weights of steel work as determined from the dimensions given on the drawings or any approved amendments thereto. In the case of mild steel plates, the calculated weights shall be based on 78.50 kg per sq. m. of metal 1 cm thick and in the case of mild steel standard rolled sections and rods the weight shall be calculated on the basis of weight per meter run specified in IS 808 : 1989 and IS 12778: 2004.
         2. The weights of all plates and sheets shall be calculated using the actual dimensions shown in the drawings with deductions for skew cuts and openings irrespective of their size. However, no deductions shall be made for skew cuts for gussets, rolled sections and holes for bolts. The weight for gussets shall be calculated from its overall dimensions.
         3. No additional weight for weld metal deposited shall be allowed in the measurements. No deduction shall be made for bolt holes. No measurement shall, however be made for erection bolts and nuts.
         4. The cost of painting, temporary erection cleats, marking, packing and delivery to site shall be included in the rates quoted in the bill of quantities.

The weights, to which the rates quoted shall be applicable, shall be as shown on the approved /accepted materials lists and no allowance for wastage shall be permitted.

* + 1. **Fabrication**
       1. Standard

All fabrication of structural steel works shall be in accordance with IS 800: 2007, tower structures shall conform to IS 802: PART 2: 1978 and as per the approved drawings unless otherwise specified. The tolerances of fabrication of steel structures shall be in accordance with IS 800: 2007 and IS 7215: 1974 unless otherwise specified. Safety measures during fabrication shall be as specified in IS 800: 2007.

* + - 1. Type of Construction

The steel structures shall generally be of shop-welded construction. Site connections shall generally be provided by any of the following methods:

* + - * 1. Welding with erection bolts.
        2. Bolting with turned and fitted or HSFG bolts.
        3. Bolting with black or HT bolts.

Where erection bolts are used, a run of weld shall be provided around the bolt head and nut.

Elements shall be fabricated in largest possible sizes optimal with transport requirements to minimize site work.

Important members shall be assembled under control assembly in manufacturing shop to prevent mismatch at site

* + - 1. Storing of Materials

All materials shall be stored properly on skids, above the ground. It shall be kept clean and properly drained. Structural steel shall be so stored and handled that members are not subjected to excessive stresses and damage. Girders and beams shall be placed upright and stored. Long members such as columns and chords shall be supported on closely spaced skids to prevent damage from deflection.

* + - 1. Workmanship
         1. General

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 similar parts shall be strictly interchangeable.

* + - * 1. Templates

Templates used throughout the work shall be of steel.

* + - * 1. Straightening

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

* + - * 1. Clearance

The erection clearance for cleated ends of members connecting steel to steel should not be greater than 2mm 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 the greater clearance is necessary, suitably designed seating or connections shall be provided.

* + - * 1. Shearing, flame cutting and planning

Shearing or flame cutting may be used at the Bidder’s option provided that a mechanically controlled cutting torch shall be used for the flame cutting and that the resulting edge shall be reasonably clean and straight. Sheared members shall be free from distortion at sheared edges. Special care shall be taken to remove the burnt edges of high tensile steel when flame cutting method is employed. When gas cutting is adopted, the flame cut edges shall be machined to a depth of 3 to 5mm depending on the thickness of the member.

Chipping of angle flanges and edges of plates wherever necessary shall be done without damaging the parent metal. Chipped edges shall be ground to a neat finish and sharp corners and hammered rough faces shall be rounded off.

The edges and ends of all flange plates and web plates of plate girders and built-up columns, of plates forming chords or web members of lattice girders, and 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 ground to plane finish. Edge preparation for welding may be done by machine controlled flame cutting with edges free of burrs, clean and straight. 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 ends of all built-up girders and of all columns shall be faced in an end-milling machine after the members have been completely assembled. Bearing edges of bearing stiffeners of built up girders, column caps and bases shall be machined.

* + - * 1. Holing:

Holes for bolts shall be drilled to conform to clause 10 of ARE 7215: 1974. All holes, except as stated hereunder, shall be drilled to the required size or sub-punched 3mm less in diameter and reamed thereafter to the required size. Thickness of the material for sub-punching shall not be greater than 16mm. All matching holes for bolts shall register with each other so that a gauge of 1.5 mm or 2 mm less in diameter than the hole can pass freely through the members assembled for bolting in the direction at right angle to such members. All holes for turned and fitted bolts shall be drilled undersize by one mm and after assembly reamed, to a tolerance of +0.13mm, -0mm unless otherwise specified. When the number of members to be bolted in an assembly exceeds three or the total thickness is 90 mm or more the holes shall be drilled or reamed in position after assembly. The parts shall be firmly bolted together during such block drilling and taken apart for removal of burrs after drilling.Drillingdoneduringassemblytoalignholesshallnotdistortthemetalorenlargetheholes.

Holes for turned and fitted bolts shall be drilled to a diameter equal to the nominal diameter of the shank subject to specified tolerance. Preferably, parts to be connected with close tolerance bolts shall be firmly held together by clamps and the holes drilled through all the thicknesses at one operation and subsequently reamed to size. All holes not drilled through all thicknesses at one operation shall be drilled to a smaller size and reamed out after assembly. Where this is not practicable, the parts shall be drilled and reamed separately through steel jigs.

Holes in adjacent part shall match sufficiently well to permit easy entry of bolts. If necessary, holes except over size or slotted hole may be enlarged to admit bolts by moderate amount of reaming.

Hand flame or gas cut hole is strictly not permitted.

* + - * 1. Assembly:

All segments in each course of stove & furnace shell shall be control assembled at shop to ensure the accuracy of each segment and the course as a whole. Control assembly shall be carried out for at least two courses at a time starting with the bottom most courses. After the control assembly is accepted, the bottom most course will be transferred for final erection and control assembly shall be continued for next courses. This assembly check shall be carried out in presence of the Employer. Suitable fixtures, clamps and clips are to be used during assembly and final welding during erection.

ii) All parts assembled for bolting shall be in close contact over the whole surface and all bearing stiffeners shall bear tightly at both top and bottom without being drawn or caulked. The component parts shall be so assembled that they are neither twisted nor otherwise damaged. Specified cambers, if any, shall be provided.

iii) All parts of bolted and welded members shall be held firmly in position by means of jigs or clamps while welding. No drifting of holes shall be permitted except to draw the parts together and no drift used shall be larger than the nominal diameter of bolt. Drifting done during assembling shall not distort the metal or enlarge the holes.

Trial assemblies shall be carried out at the fabrication stage to ensure accuracy of workmanship and these checks shall be witnessed by the Employer.

* + - * 1. Machining of Butts, Caps and Bases

Butt joints of struts and compression members depending on contact for stress transmission shall be accurately machined and close butt over the whole section. Care shall be taken that connecting angles or channels are fixed with such accuracy that they are not reduced in thickness by more than 0.8mm.

* + - * 1. Shop Assembly

The steel work shall be temporarily shop assembled as necessary so that accuracy of fit may be checked before dispatch. The parts shall be shop assembled with a sufficient number of parallel drifts to bring and keep the parts in place.

Since parts drilled with templates should be similar and so interchangeable, such steel work may be shop erected in part only as agreed by the Employer.

* + 1. **Erection**
       1. For erection of steel structures, IS 800: 2007 shall be followed and erection shall be carried out ensuring best workmanship, with specified standard limits and tolerances. The tolerances in erection of steel structures shall conform to IS 12843: 1989. Safety measures during erection shall be as specified in IS 800: 2007.
       2. Before the erection of structures, centrelines and level pads are to be fixed on the foundation as per drawing. The Bidder shall also check centrelines 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 the Engineer. The Bidder shall satisfy himself fully regarding correctness of the foundation before installing the fabricated structures on the foundation blocks.
       3. For fabrication and erection tolerances of blast Furnace Shell and stove shell the following may be followed unless otherwise specified.

| **Sl.No** | **Description** | **Tolerance** |
| --- | --- | --- |
| 1 | Out of roundness (largest difference in diameter) of the cylinder (shell structures). | 0.003 times the designed diameter of cylinder |
| 2 | Displacement of the centre of the shaft cylinder with respect to mantle ring or lower level of bosh (shell structures). | 0.002(H-h), not exceeding 30 mm, where h= ht. Of mantle ring or lower level of bosh (for BF without mantle ring) & H=Height from bottom up to the regulated height. |
| 3 | Displacement of top throat flange with respect to the centre of mantle ring or lower level of bosh (shell structures). | 30 mm |
| 4 | Level difference at any point of top level of the ring flange(shell structures). | 3 mm |
| 5 | Edge level of notch in shaft shell for horizontal coolers(shell structures). | + 2 mm |

* + - 1. Erection marking

1) Each fabricated member whether assembled prior to dispatch or not so assembled, shall bear an erection mark, which will help to identify the member and its position in respect of the whole structure, to facilitate re-erection at site.

2) These erection marks shall be suitably incorporated in the shop detail and correction drawings.

* + 1. **Dismantling**

The Bidder shall ensure that during dismantling of any structural assembly, the stable equilibrium of balance structures is not disturbed.

(Specific method of dismantling has to be mentioned if steel structures are proposed to be reused)

* + - 1. Sequence of Dismantling and Stacking

The Bidder shall prepare the sequence of dismantling to be employed and submit it to the Employer for reference.

* + 1. **Painting**
       1. Surface preparation:
          1. The grade of surface preparation shall be strictly in accordance with paint manufacturer's recommendations and specifications.
          2. All surfaces shall be cleaned of loose substance and foreign materials e.g. dirt, rust, scale, oil, and grease, welding flux etc. so that the prime coat adheres to the original metal surface. Any oil, grease, dust or foreign matter deposited on the surface after preparation shall be removed and care shall be taken so that the surface is not contaminated with acids, alkalis or other corrosive chemicals. The primer coat shall be applied immediately after the surface preparation is completed. Surface preparation shall be either by hand tool cleaning or by power tool cleaning or by solvent cleaning, required for execution of the job.
       2. Paint application
          1. Paint shall be applied strictly in accordance with paint manufacturer's recommendations and specifications.
          2. Any over coating shall be done only when previously applied coat has become hard dry.
          3. The work shall generally follow IS 1477 (Part 2) : 1971. Prior approval of the Employer shall be taken in respect of all primers and/or paints before their use in the works.
          4. Paint shall generally not be applied when the ambient temperature is 10 degree C and below for paints which dry by chemical reaction. The temperature requirements specified by the manufacturer shall be met with. Also paint shall not be applied in rain, wind and fog or at relative humidity of 80% and above or when the surface temperature is below dew point resulting condensation of moisture. Any wet paint exposed to damaging weather conditions shall be inspected after drying and the damaged area repainted after removal of the paint.
          5. Each coat of paint shall be continuous, free of pores and of even film thickness without thin spots. The film thickness shall not be so great as to affect detrimentally either the appearance or the service life of the paint. Each coat of paint shall be allowed to dry sufficiently before application of the next coat to avoid damages such as lifting or loss of adhesion. Undercoats having glossy surface shall be roughened by mild sand papering to improve adhesion of subsequent coat. Successive coats of same colour shall be tinted, whenever practical, to produce contrast and help in identifying the progress of work
       3. Painting Specification
          1. Painting of covered building structures

Two coats of air drying phenolic modified alkyd composition with zinc phosphate as a primer with total dry film thickness of 80 microns (40 microns/coat) shall be applied. One coat of primer shall be applied at shop before despatch. The other coat shall be applied after erection at site.

Final paint of two coats of air drying high gloss phenolic alkyd modified synthetic enamel paint suitably pigmented with total dry film thickness 50 microns(25 microns/coat) shall be applied. The finish paint shall be applied over the primer coat at site.

* + - * 1. Painting of uncovered structures

Two coats of air drying phenolic modified alkyd composition with zinc phosphate as a primer with total dry film thickness of 80 microns (40 microns/coat) shall be applied. One coat of primer shall be applied at shop before despatch. The other coat shall be applied after erection at site.

The intermediate coat shall be high build phenolic based paint with micaceous iron oxide (MIO).The dry film thickness shall be not less than 75 microns.

Final paint shall be two coats of air drying high gloss phenolic alkyd modified synthetic enamel paint suitably pigmented with total dry film thickness 50 microns(25 microns/coat) shall be applied. The finish paint shall be applied over the primer coat at site.

* + - * 1. Painting of existing structures

All existing structures to be re used after modification/ strengthening shall be given single coat (DFT=150 micron) of high build surface tolerant epoxy mastic coating and two coats of epoxy high build coating as finishing coat (DFT/ coat=100 micron).

* + - * 1. Painting of Furnace Shell

Painting shall be done both on inside and outside surface.

One coat of zinc silicate primershall be applied having dry film thickness of 60 micron. After erection of shell, two coats single packsilicone resin based heat resisting aluminium coatinghaving dry film thickness of 25 micron/coat shall be applied.

* + - * 1. Painting of Stove Shell

One coat (DFT 20 micron) of heat resistant finished paint (F-9 as per IPSS:1-07-064-03) on outside surface of shell segment after fabrication and two coats of heat resistant finished paint (F-9 as per IPSS:1-07-064-03) after erection shall be applied.

One coat of epoxy primer (P-5 as per IPSS:1-07-064-03) of DFT 40 micron (min) thickness on the inside face of shell segment after fabrication and one coat (P-5 as per IPSS:1-07-064-03) after erection shall be applied.

Surface preparation for the above shall be St-2 standard as per IPSS:1-07-064-03.

* + - * 1. Painting of Chimney

Inner surface of the chimney up to 3m height from base shall be given two coats of (DFT/coat=40 microns) a air drying phenolic modified alkyd composition with zinc phosphate as a primer and three coats of (DFT/coat=40 microns) a heavy duty air drying anti-corrosive black bituminous paint as finishing coat. Rest of the height of the chimney at the inner side shall be given one coat of heavy duty zinc dust rich silicate (DFT/coat = 60 micron) as primer paint and three coats of a heat resistant silicon resin based paint with leafing aluminium / graphite powders as finishing coat (DFT/ coat=20 micron).Top two courses of the chimney at the outer side shall be given two coats (DFT/coat=40 microns) of a air drying epoxy polyamide resin based red oxide zinc phosphate as primer, one intermediate coat of a single pack high build phenolic based paint with micaceous iron oxide (DFT/coat =75 micron) and two coats (DFT/coat=40 microns) of air drying epoxy polyamide enamel suitably pigmented as finishing coat. Rest of the outer surface of the chimney shall be painted as per specification mentioned for uncovered structure. Intermediate/ finishing paint shall be applied only after completion of erection.

* + - * 1. Painting in Slag Granulation Area

The painting on outside surface of Stack and support structure & hood over Granulation Tank, hood over drum (outside) shall be done as per painting specifications given below:

Sand blasting SA 2.5 as per Swedish Standard SIS-05-59-1967 or equivalent.

One coat of self-curing solvent based inorganic zinc silicate primer having 100 micron DFT shall be given at fabrication shop.

One coat of high solid coal tar epoxy coating having 160 micron DFT shall be done at site before erection.

Painting is to be done on inside of hood over Granulation tank, inside of stack, hood over drum (inside) & steel structures inside granulation tank as and Drum as per specification given below:

Sand blasting SA 2.5 as per Swedish Standard SIS-05-59-1967 or equivalent.

One coat of high solid epoxy coating with dry film thickness 100 micron shall be given at fabrication shop.

One coat of amine cured coal tar epoxy with dry film thickness 300 micron to be given at erection at site.

Painting of outside structures in the area of Granulation Tank & Dewatering Drum shall be as per specification given below:

Surface shall be prepared by power tool or hand tool cleaning corresponding to St-2 quality.

Two coats of red oxide zinc chromate primer with dry film thickness 60 microns. One coat of primer shall be applied at shop before despatch. The other coat shall be applied after erection at site.

Two coats of finish paint (synthetic enamel or aluminium) with total dry film thickness 100 micron. The finish paint shall be applied over the primer coats at site.

Stainless steel & Creusabro items shall not be painted.

Contact surfaces of structure supporting slab or wall or encased in concrete shall not be painted.

* + - * 1. Painting of water tanks:

Internal surface:

First coat shall be epoxy resin primer enriched with zinc having DFT of 40 microns. Final paint shall be two coats of high build high performance catalysed epoxy resin paint mainly meant for sustained water immersion service having DFT/coat of 200 microns.

External surface:

First coat shall be epoxy resin primer enriched with zinc having DFT of 40 microns. Second coat shall be high build catalysed epoxy resin pigmented with MIO having DFT of 100 microns. Final two coats shall be catalysed epoxy resin suitably pigmented having DFT of 60 microns per coat.

* + 1. **Testing & Commissioning**

Testing and commissioning of steel structures shall be in accordance with IS 800: 2007.

* 1. **CIVIL MATERIAL SPECIFICATIONS**
     1. **Dismantling**
        1. The dismantling of civil works shall be carried out with utmost care so that the adjacent structures, which are not to be dismantled, do not get damaged. However, if any existing structures get damaged during dismantling, the Contractor shall carry out the rectification and restoring of the entire structures at their own cost.
        2. The Contractor shall assess the entire dismantling work and decide accordingly the resource to be employed by him so that the work can be executed in the stipulated time frame. The sequence of dismantling work shall be in reverse order of the sequence of construction.
        3. Safety and environmental stipulations mentioned in tender document, prevailing guidelines of State & Central authorities and Instructions of the employer shall be strictly followed during dismantling and debris transportation & handling.
        4. The Contractor shall obtain the necessary clearance certificates from Employer for the arrangement of dismantling work at every stage.
        5. The dismantled material shall be first stacked near site within a lead of 200m and thereafter disposed off up to 500m at designated place by employer within the plant boundary.
        6. All serviceable material got out of dismantling shall be stacked and transported to scrap yard/dump yard/stores as per the instruction of the employer within plant boundary a lead of 2 Km
        7. Dismantling shall be done preferably in such piece size length as will facilitate easy transportation and disposal of those items to dumping yard /storage yard/ employer’s store.
        8. Chiselling, Pneumatic hammer, Breakers, concrete cutter, diamond wire sawing and other suitable means shall be adopted in general shall be used for dismantling of RCC. The dismantling method shall be adopted based on the extent, accuracy & volume of the dismantling work and also the site condition, available debris evacuation route and safety of the adjacent structures/ facilities which are not to be disturbed during dismantling.
     2. **Excavation and Back Filling**
        1. Stripping

The Bidder shall strip the surface of the site prior to the commencement of excavation to remove soil containing vegetation/ organic matters and transportation of such soil to separate spoil dumps in the allotted site/areas including handling within the plant boundary. The Bidder shall not remove any tree without prior permission of the employer.

* + - 1. Excavation for foundations and Trenches
         1. Bidder shall refer the physical site & information available with the employer regarding over ground facilities, underground facilities & adjacent facilities and plan the excavation activities accordingly before commencement of excavation work. In case of non-availability of information regarding underground facilities, test pits/ peripheral trenches up to 2.0 m depth from existing ground level (EGL)/ up to top of rock shall be made manually as per the direction of the employer.
         2. In case of large quantity of excavated earth for stacking with respect to available space at work site, employer will allocate a temporary space for stacking the excavated earth within the plant boundary. The bidder shall transport and handle the excavated earth including leveling sorting, loading & unloading.
         3. The Bidder shall excavate at various levels including hard rock to remove materials of any nature or description, which may be encountered. Side slopes, benching and/or shoring/strutting for excavation work shall be sole responsibility of the Bidder. The bed of the excavation shall be properly dressed and made level. All mud and slush shall be removed before taking up concreting work. The last 150 mm of excavation shall be done just prior to laying of concrete. The excavated materials shall not be placed within 1.5 m from the edge of any excavation. The Bidder shall take suitable precautions to prevent ingress of water into the excavated areas during construction.
         4. The Bidder shall account for all excavated rock, if any. Bidder shall stack excavated rock and if the Bidder for their works requires serviceable boulders, it may be issued based on stack measurement less 40% for voids at the rate to be decided by the Employer.
         5. In case of exposure/ close proximity of existing adjacent underground facilities/ foundation during execution, the excavation for proposed/ new facilities/ foundation shall not be extended below the bottom level of existing facilities/ foundations. The bidder must inform the employer, consultant and designer with site sketches for modification of the new facilities/ foundation. However, for unavoidable situation, the bidder/designer shall prepare the protection scheme of existing adjacent facilities/ foundation and get it approved by the employer before taking up further excavation.
         6. The surplus excavated materials and excavated unserviceable materials from rock excavation shall be transported and disposed off by the Bidder in spoil dumps or fill areas as directed by the Employer.
         7. If the Bidder excavates to levels lower than those shown on the drawings, Bidder shall fill up such extra depth at their own cost to the proper level with lean concrete of grade M-10B.
         8. Should the bottom of any excavation appear to be soft, unsound or unstable, the Bidder shall excavate the same to required depths and the Bidder with lean concrete of grade M-10B5 shall fill up the extra depth.
         9. The Bidder shall take all precautions against slips and falls in the excavation. No extra payment will be made for removal of slips and for back filling the space with materials as directed by the Employer.
         10. The excavation shall be kept free from water by pumping on continuous basis by the Bidder at their own expense. In small pits water may be bailed out with buckets. Pumping of water shall be carried out either directly from the excavation or from sumps made outside the excavation as directed. Adequate care shall be taken to prevent movement of water through freshly laid concrete or masonry work. Further, in case of closely located existing facilities/ foundation, the effect of pumping shall be monitored continuously for movement of soil from under the existing facilities/ foundation and pumping shall be stopped immediately, if the same is noticed.
         11. If any excavation for foundation gets filled up with water due to rain, seepage or for any reason, the water shall be removed and bottom of the excavation shall be completely cleared of all silt/slush by the Bidder at their own expense.
         12. All water pumped or bailed out during de-watering of pits and trenches shall be disposed off suitably through properly laid channels or pipes. Disposal of water shall be carried out in such a way that no inconvenience or nuisance is caused to the work in progress in the area or to other agencies working in the area or cause damage to property and structures nearby.
      2. Back Filling
         1. Materials

Suitable materials obtained from excavation of foundations shall be used as far as possible for back filling. Earth used for filling shall be free from organic and other objectionable matter. All clods of earth shall be broken or removed. If sufficient amount of suitable materials are not available at site to complete filling work, then earth shall be brought to site from outside by the Bidder as directed by the Employer at their own cost.

* + - * 1. Filling around foundations with earth

Before commencement of back filling, the Bidder shall remove from the space around foundations all accumulated water and slush, shoring and formwork, all debris, brickbats, bits of timber, cement bags and all other foreign materials. Filling shall be carried out in uniform horizontal layers, each layer not exceeding 200 mm in thickness. Each layer shall be watered, rammed, and thoroughly compacted before the next layer is deposited.

* + - * 1. Plinth filling and special compaction with earth

Plinth filling or filling where special compaction is required shall be carried out in uniform horizontal layers, each layer not exceeding 150 mm in thickness. Each layer shall be well watered and compacted by mechanical means. The Bidder shall take core samples for each layer, determine the dry density and maintain logs. The minimum dry density to be achieved shall be 95% of maximum dry density as obtained by Standard Proctor Test. Tests shall be conducted by the Bidder as directed by the Employer at their own cost.

* + - * 1. Removal of heaps & Mounds

Immediately upon completion of each phase of work, the Bidder shall at their own cost clear the mounds or heaps of earth which may have been raised or made and remove all earth and rubbish which may have become surplus in the execution of works, as directed.

* + - * 1. Filling with sand

Filling with sand shall be carried out in uniform horizontal layers, each layer not exceeding 200 mm in thickness with approved river sand and each layer to be watered and compacted mechanically to a well compacted mass.

* + 1. **Piling**
       1. The materials and workmanship will conform to the provisions of the following codes and standard specifications in particular mentioned hereinafter.

IS: 456-2000: Code of Practice for plain & reinforced concrete.

IS: 2911(part –I/section 2)-2010 : Code of practice for design & Construction of bored cast-in-situ pile foundations.

* + - 1. Materials & Workmanship
         1. Concrete

Minimum grade of concrete of grade M 25C will be used for all piles.

* + - * 1. Sequence of piling

Individual piles and pile group will be driven in such a sequence that the adjacent piles already installed are not disturbed, nor their carrying capacity reduced: by subsequent driving operation.

* + - * 1. Driving / Boring

For bored piles, boring will proceed by alternately driving the casing and extracting the bored material with the boring tools. While boring in soft material is liable to cavitation, boring tools will not be operated at level below the toe of the casing. Care will be taken to ensure that the volume of water added to the bore will not be more than the minimum requirement for the operation of the boring tools.

The casing will be driven down through the soft material to penetrate a hard stratum not subjected to cavitation and will be sealed in this material as far as possible. Thereafter the boring will be continued by means of the boring tools until the approved bearing layer is reached The bearing layer will consist of sound materials capable of safely sustaining the load imposed by the pile and will be consistent in quality for a depth of minimum 300 mm. in the pile bore.

Immediately before concreting the borehole will be cleaned of all the loose materials, debris and all the water will be removed by pumping and bailing. Concrete will be so placed as to fill the entire volume of the borehole without the formation of voids caused by the faulty compaction or entrapped air. Great care will be taken to ensure that the fluid alluvial soil does not penetrate between batches of the concrete.

Concrete will not normally be placed through water and in unavoidable cases such concreting will be done with necessary precautions. The ground water will be balanced by adding fresh water to the bore and the concreting will be placed by means of an enclosed placer or by tremie pipe. In case of bored piles after the uncased portion of the bottom of the bore has been concreted, further concrete is to be added. The sequence of placing concrete and withdrawing the casing will be so arranged that the head of concrete above the bottom of casing is never less than 3 metres. Once the concreting of the pile is commenced the work will proceed without interruption until the pile is completed.

Concreting of the pile will continue until the pile is fully formed up to a level not less than 600 mm. above the soffit of the pile cap. Extraction of casing will be done in such a way that no necking or shearing of the concrete in the shaft takes place.

* + - * 1. Trimming of pile heads

Completed pile will be trimmed to the cut-off levels as shown on the drawings when sound concrete has been formed. In the event of trimming being carried below the cut-off level, the pile will be made up to the correct cut-off level with concrete of the same quality as used in the piles. Reinforcement will be exposed for the full bond length appropriate to the diameter of the bar and projected in the pile-cap. The minimum distance of keying of the pile into pile cap will be 50 mm. All concrete and cement will be removed from the bars, which will also be wire- brushed to remove any loose rust, "dirt and scale.

* + - * 1. Lengthening of Piles

Where it is necessary to increase the length of any pile after it has been driven, the head of the pile will be cut-off to expose the reinforcement for a full bond length of the bars to lap with the new bars. The exposed surface of the concrete will be hacked to form a key, brushed to remove loose material and covered with 25 mm. thick cement mortar (1: 2 mix,) immediately before the new concrete is placed.

* + - 1. Load Test

The longest practicable time will be allowed to escape between driving and testing to allow the recovery of soil conditions around the pile and it will not be less than two weeks.

The gross settlement under test load of any pile will not exceed 12 mm. in case of 150% working load tests, and 20 mm. in case of 200% working load tests.

* + - 1. Standard of Acceptance

The piles will be accepted as satisfactory only when the work has been executed in accordance with, this specification and the Standards stated hereinafter:

* + - * 1. The head of the pile will be within 65 mm. of the specified position on the drawings.
        2. The pile will not be out of plum by more than 1 in 100.
        3. The toe of the pile will be as per the drawings.
        4. The total volume of concrete will not be less than 10% and not more than 40% greater than the calculated volume. The calculated volume for this purpose will be the cross-sectional area inside the casting multiplied by the length of the shaft. The concrete will show the specified strength as indicated by the cube-test results.
        5. The results of the load tests carried out in accordance with the contract and with specifications for load testing will be satisfactory.
      1. Defective piles

If an individual pile fails to meet the requirements specified in clause above such pile may be deemed to be defective. When any pile is found defective; one or more of the following remedial measures will be carried out:

* + - * 1. Replacement of defective piles.
        2. Driving additional piles.
        3. Alteration in design of pile caps.
      1. Recording of Data

For each pile, a record of the following data will be kept

* + - * 1. The date and time of commencement and finishing of the driving operation.
        2. The particulars of the equipment and method of driving.
        3. The location and type of the pile, with a reference to approved drawings.
        4. The diameter of the pile.
        5. The length and cut-off level of the pile.
        6. The quantities of concrete, reinforcement, cement and w/c ratio used.
        7. The sequence of the driving in pile groups.
      1. The test load and settlement for test piles as required under clause of load testing.
    1. **Plain And Reinforced Concrete Work**
       1. Materials
          1. Cement

1. Ordinary Portland cement shall conform to Is:269: 2015 / IS: 8112-1989/ IS:12269-1987.
2. Portland Pozzolana cement shall confirm to IS:1489-1991
3. Portland blast furnace slag cement shall conform to IS: 455-1989. Sampling &testing, as specified in the relevant code, is to be carried out on cement samples from time to time. Frequency of these tests shall be increased during monsoon period.
   * + - 1. Aggregates

All aggregates shall conform to IS: 383-2016. Sampling & testing of aggregate shall be carried out as per the provisions of the code.

* + - * 1. Reinforcement

Reinforcement bars shall be SAIL steel. In case of non-availability of SAIL steel, steel bars from non-SAIL integrated steel plants shall be used after prior permission of the employer.

Cold twisted steel bars or TMT bars conforming to IS: 1786-2008,shall be used as per drawings. However, MS round bars conforming to IS: 432-1982 or IRC mesh fabric reinforcement conforming to IS: 1566-1982 can also be used if specifically required and indicated in the drawings. The binding wire shall be 20 SWG approved annealed iron wire.

All such material shall be free from oil paint and rust coatings. Manufacturer’s certificate or test certificates for compliance of provisions of IS:1786-2008 shall be submitted for non-SAIL product.

* + - * 1. Shuttering& Scaffolding

In general, material for shuttering & scaffolding shall be steel and/or ply boards only, as per IS:14687-1999. However, other material as specified in the code may be used for specific purposes.

Hot dip galvanized steel deck sheet from approved manufacturer shall be used as permanent shuttering only (not as composite construction) in accordance with manufacturer’s specifications/ guidelines & site requirement. Manufacturer’s guarantee for withstanding the specific use for the project is to be submitted by the bidder.

* + - * 1. Water

Water shall be clean and of potable quality as per clause 5.4 of IS:456-2000.

* + - * 1. Admixtures

Concrete admixtures confirming to IS:9103-1999 shall be used as per requirements. The admixtures shall be of approved make and shall be used as per the manufacturer’s specifications/ guideline. Bidder has to submit the datasheet of the approved product before use.

* + - * 1. Concrete Joints

Joints in concrete shall be taken care in accordance with SP:62-1997. However, material for joint filler shall be as per durability requirement, aesthetic requirement, serviceability condition and technological requirement.

* + - 1. Workmanship
         1. Concrete

Production and control of concrete shall be as per IS: 456-2000. The grades of concrete shall be as indicated in the drawing. The Bidder shall at their own cost, grade the aggregates and control the water cement ratio, design the different mixes to required strength and workability. The design mix shall conform to the requirement of IS: 456-2000 and recommended guidelines in SP: 23-1982. The minimum cement content and maximum water cement ratio of concrete work shall conform to the requirements of durability of concrete for moderate exposure as indicated in Table-5 of IS: 456-2000. All concrete shall be machine mixed, and no hand mixing shall be permitted.

The maximum size of aggregates used shall be as indicated in the drawings and IS: 456-2000. Where reinforcement is too closely spaced for the maximum size of stone in a range, the largest suitable range shall be used. Before commencement of work, the Bidder shall submit to the Employer for approval complete details of the tests for design mixes together with the grading analysis and mix design calculations. No concrete shall be placed on site until the Employer has approved the mix design.

Where nominal mixed concrete as defined by IS: 456-2000 is permitted by the Employer for any specific reason, the proportion of the materials shall be as indicated in IS: 456-2000. The water cement ratio shall not exceed those specified in IS: 456-2000. If the quantity of water is required to be increased for better workability, the cement content also shall be increased proportionately so that the water cement ratio as specified in IS: 456-2000 is not exceeded.

* + - * 1. Mixing

Except where nominal mix concrete as defined in IS: 456-2000 is permitted by the Engineer to be used, all components of concrete shall be proportioned by weight using weigh batches for each grade of concrete. Mixing shall be carried out in mechanical mixers and preferably a batch mixing plant shall be used. Batches shall not exceed the capacity, which can be mixed efficiently as determined by the mixer efficiency test, and peripheral speed shall conform to the manufacturer's recommended rate but should not vary by more than ±10%. Mixing shall continue until the mass is uniform in colour and consistency but in no case net minimum mixing time shall be less than 1.5 minutes. Net minimum mixing time shall begin when all ingredients including water is in the mixer. Excessive mixing shall be avoided. Mixers shall be operated only by trained operators. Weigh batches shall be placed level during use and the hoppers shall be loaded evenly.

* + - * 1. Consistency

Consistency of concrete shall be controlled as per IS: 456-2000 and the Bidder shall carry out slump tests in accordance with IS: 1199-1959.

* + - 1. Work tests

Over the full period of construction, the Bidder shall carry out works tests of concrete cubes at their own cost. Sampling, making up, curing and testing of specimen shall conform to IS: 456-2000, IS: 516-1959 and IS: 1199 -1959. The number of specimen to be tested and their criteria for acceptance shall be according to IS: 456-2000. Frequency of work tests shall be as per IS:456-2000.

No cost towards sampling & work tests including transportation, if any, will be paid separately by the employer.

* + - 1. Reinforcement
         1. Workmanship shall conform to IS: 2502-1963. All reinforcement shall be free from loose mill scale, rust, oil, grease and paint, etc. Reinforcement shall not be bent or straightened in a manner that will injure the material, and all bars shall be bent cold.
         2. Reinforcement bars shall be placed and maintained accurately in the position as shown in the drawings. The correct cover to the reinforcement shall be maintained by use of pre-cast concrete blocks.
         3. The bar bending details of reinforcement bars shall be in accordance to SP:34-1987 unless specifically indicated in the drawings.
         4. All intersections of longitudinal and transverse bars of stirrups and all laps shall be securely tied together with approved binding wire. The binding wire shall be so placed that it touches all the four corners of the intersection and the two ends shall be looped with pliers and the end should be turned into the body of the concrete.
         5. Welded joints may be used in cases of important connections. Tests shall be made at the cost of the Bidder to prove that the joints have reached the strength of the bars connected. Welding shall be done in accordance with IS: 2751-1979 & SP:34-1987.
      2. Embedments
         1. All embedment shall be accurately set and rigidly fastened. Anchor bolts shall be set to template and firmly secured in vertical and horizontal line at required positions. Water stops shall be secured against displacement during the placing of concrete. The joints for G.S. sheet water stops shall be soldered watertight and those of PVC and rubber shall be joined by cementing and vulcanizing. Expansion joint fillers shall be for the full depth of slabs or full width in walls and shall be cemented with bituminous cement against previously placed concrete. The ends shall be butted tight and the upper edge set flush with finished slabs.
         2. Anchor holes and anchor bolts shall be protected by covering suitably.
      3. Placing of concrete
         1. Transporting concrete

Concrete shall be transported from the mixing plant to the forms as rapidly as possible by means that will prevent segregation or flash set in the concrete during hot weather. The containers shall be such as to prevent large evaporation. At the time of placing concrete in very hot weather, care shall be taken to see that the temperature in wet concrete does not exceed 38°C. Before placing the concrete, all formwork, embedment and reinforcement shall be checked for completeness, location, dimension, square and plumb. All chips and sawdust or other foul matter shall be removed from within the forms. The base surface shall be well moistened and puddles wiped out. Placing equipment and accessories shall be kept clean and free of partially set grout and concrete, and maintained in proper working order. Suitable walk cradles shall be placed over the reinforcement when the concrete is placed by manual transportation.

* + - * 1. Placing

Concrete shall be placed within a maximum period of 25 minutes of its removal from mixer. No concrete shall be placed until the place of deposit has been inspected and approved by the Engineer. In general, placing shall be direct, by transporting buckets. Where it is necessary to deposit the concrete at level differences of more than 1.5 m, short chutes shall be used. Short chutes and hoppers shall be so designed and installed that segregation will not take place. In cases where chutes are impracticable due to excessive drop to placing level, hoppers and sectional tubes (elephant trunks) shall be used. Concreting in open shall not be allowed during rains unless all precautions have been taken by the Bidder and permission has been given by the Engineer.

* + - * 1. Construction joints

Construction joints shall be located such that they do not impair the strength of the structure. In walls and columns, height of each lift shall not generally exceed 1.5 m unless otherwise specified in the drawings. Method of forming all construction joints shall conform to the provision of IS: 456-2000. All construction joints in the underground structures shall be provided with rubber or PVC water bars. The surface of previously placed concrete at the construction joint shall be thoroughly hacked to expose the coarse aggregates of previously placed concrete and cleaned with wire brush and water to remove all laitance. Immediately before placing fresh concrete, such prepared surface shall be coated with a thin layer of cement slurry.

* + - * 1. Expansion joints

Expansion joints shall be provided at locations as shown in drawings or as per IS code. Details of expansion joints shall be as shown in the drawing and all materials like polysulphide, bitumen impregnated fiber board, PVC water bar, metal (aluminum/copper/GI) sheetetc. shall be of approved make and quality. Bidder shall ensure that all expansion joints are 100% watertight. If concrete is found to leak at construction/ expansion joints or at other places, the Bidder shall carry out necessary remedial measures at their own cost such as pressure grouting etc., immediately to make the structure watertight.

* + - * 1. Compaction

Concrete in general shall be consolidated by vibration using high frequency mechanically driven vibrators. Consolidation of concrete by immersion vibrators shall be done strictly in accordance with the IS:3558-1983

* + - 1. Grouting bases of machine, columns, foundation bolts, etc.
         1. Level pads

For preparing the level pads, the top of the foundation concrete shall be chipped off to remove laitance formed on the concrete surface, and all loose materials shall be thoroughly cleaned and the surface is wetted before the grouting. In case level pads are constructed they shall be of cement concrete with one grade higher than the mother concrete with 6mm nominal size stone aggregates in conformity with the grouting requirements with 6 mm size ballast. The top of the level pads shall be finished & fine and true to level.

* + - * 1. Grouting:

Before placing the grout, the concrete surface shall be thoroughly cleaned with compressed airand/or water jet. The surface shall be thoroughly wetted with water for several hours. Grout concrete/ readymade grouting compound shall be of grade as per item of work/drawing. Before placing the grout all free water shall be removed and the flat surface shall be treated with thin cement slurry/ as per manufacturer’s specifications.

The quantity of mixing water shall be minimum commensurate with the workability, compaction, and filling of the grout in all corners and crevices. The grout shall be evenly spread and compacted by rodding or a vibrator until the whole of the space is completely filled with concrete. The grout shall be carefully observed for initial settlement. If any settlement is observed, further grout is to be poured and rodded.

For base plate having ribs underside the base plate, proper care is to be taken to ensure filling of the cavities between the ribs.

In case of wide base plates or bedplates having ribs underside, it may be necessary to do pressure grouting.

Thickness of readymade grouting compound in one operation shall not exceed the manufacturer’s specifications.

In case,loosely held / cracked grouting layer is observed, the grouting shall be removed completely and re-grouting shall be done.

* + - * 1. Curing

The grout must not dry out after it is placed in position. The surface shall be kept moist with wet sacks for at least seven days.

* + - 1. Curing and protecting

Curing of concrete with water shall comply with IS: 456-2000. The Bidder shall keep the exposed surfaces of concrete in a constantly wet condition for at least 7 days from the date of placing the concrete. Curing compound may be used subject to approval by the Engineer. Finished floor and concrete shall be protected carefully until completely set. Protection of concrete against extreme weather conditions shall comply with the Code.

* + - 1. Repairing and patching

Pockets honey combing and other defects, which may be formed due to segregation, improper vibration and any other reason whatsoever shall be completely repaired to the satisfaction of the Engineer. The voids, if any, shall be properly keyed and reinforced, if necessary. The face shall be tightly formed and arranged for providing a head in the concrete. The cavities shall be filled with the same concrete as used for the structure and thoroughly rodded or vibrated where possible. The filled hopper shall be left in place until shrinkage has taken place and the concrete sets sufficiently to stay in place. While still `alive', the upper part of form hopper shall be removed and excess concrete struck off and finished with wooden flat or trowel to match existing concrete. Any fins or unsightly grout runs or bulges shall be removed from the surfaces exposed to view. The rod holes shall be finished with cement or grouted to match the existing surface as closely as possible. No cement wash shall be used unless particularly called for in the drawings.

* + - 1. Tolerances

Tolerance is a specified permissible variation from lines, grades or dimensions given in drawings. No tolerances specified for horizontal or vertical building lines or footings shall be construed to permit encroachment beyond the legal boundaries. Unless otherwise specified, the tolerances shall be as per IS:456 – 2000 or technological requirement, whichever is stringent.

* + - 1. Form Work

Shuttering & form works for Concrete shall conform to IS: 456 – 2000 and IS:14687-1999.

* + 1. **Boulder Soling**
       1. Work included

The Bidder shall furnish materials, labour, plant, equipment and tools to complete the work as specified and/or as shown in drawings.

* + - 1. Materials
         1. Stone: The boulder for soling shall be granite, trap, basalt, or similar hard stone as approved by the Engineer. Stone shall be free from cavities, patches of soft materials, cracks etc. Soling stones shall generally be 250 mm thick. The other dimensions shall be 300 to 375 mm unless otherwise specified.
         2. Sand: The sand shall be of approved river or pit sand conforming to IS: 383-2016
         3. Ballast: The stone ballast shall be of durable, tough, close and hard texture. Each piece shall be square and sharp. No round or oblong pebbles or angular chips or flakes or soft sand stones shall be used.
      2. Workmanship
         1. The sub-grade shall be dressed to correct level and shall be rammed or rolled to proper consolidation before laying the soling.
         2. The stones shall be placed absolutely close to each other. The thickness up to 250mm thickness shall be made up in one layer and thickness beyond 250 mm thickness shall be provided in two or more layers only. The crevices between the stones shall be hand packed with stone ballasts which shall be hammered into positions so as to completely fill-up the crevices. No stone, after packing, shall move or tilt in any direction when walked over or pushed with hand. The soling shall be watered and rolled with a power roller.
         3. Selected moorum of approved quality shall be laid over the rolled surface to a thickness of 25 mm and brushed into surface voids and well watered and rammed. The operation shall be continues till the moorum layer stops disappearing from the top
    1. **Brick Masonry Work**
       1. Materials
          1. Cement Mortar

Cement mortar shall be as specified above in design specification.

* + - * 1. Brick

The brick used shall be of class 5-designation flyash / fuel ash bricks conforming to IS:12894-2002 / IS 13757 : 1993 shall be whole, free from cracks, well-shaped and uniform in size. The sampling & testing of brick shall be as per the respective BIS standard.

In case of non-availability of flyash bricks within 100 kms radius of the work site, burnt clay bricks of class designation 5 confirming to IS:1077-1992 shall be used after prior permission of the employer.

* + - 1. Scaffolding
         1. Scaffolding shall conform to IS 2212: 1991 and shall be designed to withstand the loads and to ensure complete safety of workmen and materials. Bamboos shall not be used in scaffolding.
         2. The scaffolding should be double, i.e. it shall have two sets of stands to avoid putlog holes. Where this is not possible, the inner end of the scaffolding poles shall rest in a hole provided in a header course only. Only one header for each pole shall be left out. Holes, if provided, shall be filled in and made good by the Bidder to ensure that the surface does not give any unsightly appearance.
      2. Cleaning

The Bidder shall carry out work in as clean a manner as possible and shall remove excess materials and mortar droppings and rubbish, daily. Where brick walls and stone masonry are to receive plaster, the joints shall be cleaned of excess mortar and raked to a depth of 12 mm and the surface shall be brushed clean.

* + - 1. Workmanship
         1. The whole of the brickwork from soaking to laying shall be carried out by the Bidder in a uniform manner as per IS 2212: 1991.
         2. The Bidder shall set out and build all brickwork to the dimensions, thickness and heights shown in the drawings. The Bidder shall build all brickwork in English bond and half brick walls and casing to pipes, chases etc. in stretcher bond. Brickbats shall not be used except where required for bond.
         3. The masonry mortar in proportions as specified in design specification shall be prepared and laid as per IS:2250-1981.The Bidder shall lay bricks in full mortar beds with shoved joints. The joints shall not exceed 10 mm in thickness and shall be full of mortar, close, well finished and neatly struck. The vertical joints in any course shall not be nearer than a quarter of a brick length from those in the course below. All joints shall be of same width except for small variations to maintain bond. The brickwork shall be laid plumb and true to line and level. No portion of brickwork shall be raised more than 1.0 m above another at one time. If the mortar in any course has begun to set, the joint shall be raked out before another course is laid.
         4. The top most course of brickwork under a reinforced concrete beam shall be wedged against reinforced concrete surface and the joint well filled with mortar. The Bidder shall flush up all joints thoroughly with mortar as the work proceeds.
         5. The brickwork as it progresses shall be thoroughly watered on its faces and top. New work shall be properly bonded with the old work. New surface of unfinished work shall be cleaned and thoroughly watered before joining new work to it.
         6. Walls whose thickness is less than a full brick length shall be reinforced with wire netting of width equal to that of the wall at every third layer. The laying of wire netting shall be continuous.
      2. Curing

The Bidder shall keep wet all brickwork for seven days after laying.

* + 1. **Plaster Work**
       1. Materials

Mortar for plaster work shall be as specified above in this specification.

* + - 1. Workmanship
         1. All plasterwork shall be carried out according to IS 1661: 1972. The thickness and proportion of cement plaster shall be as specified in the design specification & drawing. Where the thickness of plaster is 20 mm or more, it shall be done in two operations (coats).
         2. The surface to be plastered shall be cleaned of all extraneous matter and rubbish. Brickwork joints shall be raked and concrete surface shall be roughened by chipping or hacking. Any shuttering materials adhering to the concrete shall be removed. The surface shall be thoroughly watered and soaked, aerated and all putlog holes shall be closed before starting plastering operation.
         3. Plaster pads of required thickness of plaster for correctness of plumb, line and level shall be established by the Bidder before starting plaster work.
         4. For one coat plaster work, the plaster shall be laid slightly thicker than the specified thickness and the surface then levelled with a flat wooden rule to the required thickness. The plaster shall be well pressed into the joints and the surface finished for getting smooth and even surface.
         5. Where two coats plaster work is specified, the first coat shall be applied as described above except that the surface shall be left rough and keys formed for the application of second coat. The second coat shall be applied a day or two after the first coat has set, but the first coat shall not be allowed to dry. The second coat shall consist of mortar ground very fine and shall be laid on with a wooden rule to specified thickness, rubbed smooth and levelled and the surface plastered completely the same day. The levelling shall be continued till the plaster is dry and all moisture which exudes from the plaster shall be wiped out with fine cloth. The surface shall be kept dry until exudation of moisture ceases, during the process of rubbing.
      2. Curing

After the completion of plastering works, it shall be cured by adequate watering for a period of seven days.

* + 1. **Mortar for Masonry and Plaster Work**
       1. Materials
          1. Cement

Cement used shall conform to IS 269: 2015 or IS 455: 1989.

* + - * 1. Sand

The sand used shall be of approved quality river or pit sand and it shall conform to IS 1542: 1992 for plaster and to IS 2116: 1980 for masonry mortar. Sand for the mortar shall be evenly graded from coarse to fine and shall be free from loam, clay, dust and any other organic or foreign matter.

* + - * 1. Water

Water shall be clean and of potable quality.

* + - * 1. Mortar Proportion

The proportion of cement and sand for mortar shall be as specified in the technical specification/drawing/schedule of quantities.

* + - 1. Workmanship
         1. The workmanship shall conform to IS 2250: 1981 for preparation of masonry mortars and to IS 1661: 1972 for plaster.
         2. Mortars shall be used within one hour of the first contact of cement with water. All materials remaining after this period shall be discarded. Mortars that have started to set shall not be re-tempered
    1. **White Washing, Colour Washing and Painting**
       1. Materials
          1. Lime

White wash shall be prepared from shell (fat) lime conforming to IS 712: 1984.

* + - * 1. Colour

Colour used for colour wash shall be of approved colour as specified and as indicated in the drawings or as approved by the Engineer.

* + - * 1. Weather Proof Exterior Paint

Cement paint shall be of approved brand and quality. It shall be applied strictly in accordance with the manufacturer's instructions.

* + - * 1. Gum and blue pigment

Gum and blue pigment for white wash shall be of best quality and of approved one.

* + - * 1. Water

Water shall be clean and of potable quality.

* + - * 1. Paint

Paints shall conform to relevant Indian Standards and shall be of approved brands. Only ready mixed paints shall be used for the work, unless otherwise approved by the Engineer. The materials for succeeding coats on any one surface shall be product of the same manufacturer supplying the first coat for that particular surface. Aluminium paint shall conform to IS 2339: 1963.

* + - * 1. Brushes

Brushes shall be of type and size suitable for the work, conforming to IS 487: 1997. Rags or inferior quality brushes shall not be used on the work.

* + - 1. Workmanship
         1. White Washing And Colour Washing

Slaking

Slaking of lime shall conform to IS 1635: 1992. The lime shall be placed about 300 mm deep in a drum with about 1200 mm deep water standing in the drum. Lime shall be added to the water and not water to the lime. The lime in water shall then be vigorously stirred. Lime shall be considered to be completely slaked when the temperature of the lime and water shall cease to rise and any further addition of water shall not produce any further chemical action or heat. Water shall then be allowed to stand on for 12 hours or more until the normal temperature is restored.

Mixing

The slaked lime shall be dissolved in a tub with sufficient quantity of water and shall be well mixed to give a thin creamy consistency. It shall then be strained through a clean coarse cloth and gum dissolved in hot water shall be added to it at the rate of 2 kg for each cubic metre of lime and ultramarine blue added to the mixture in small proportion just sufficient to give a very light bluish tint.

Colour wash shall be prepared in the same way as for the white washing except that necessary amount of colouring matter shall be added to lime mixture in this case. No blue shall be added to lime mixture in case of colour wash.

Preparation of surface

Before the wash is laid, the surface shall be well cleaned and brushed. After cleaning the surface, all holes, cracks and patches shall be made good with approved materials.

Whitewashing

White wash shall be applied with brush, each coat consisting of vertical stroke from top downwards followed by opposite stroke upwards over the first stroke and horizontal stroke from left to right followed by stroke from right to left. Each coat must be allowed to dry, before the next coat is applied. On completion, the surface when it becomes dry, shall present a uniform white appearance. When dry, no coat of white wash shall show any patches, hair cracks or strokes nor shall it come off when rubbed with hand. White wash shall be done in three coats. Doors and windows, floors etc., must be protected from whitewash splashes. Any splashes and droppings shall be removed and cleaned immediately.

Colour washing

Colour wash shall be applied in the same manner as specified for white wash. During application, the solution shall be stirred continuously and wash shall be applied with care to avoid any cut shade or brush marks on the walls when the work is completed. For all new work, the surface to be colour washed shall first be treated with a priming coat of lime wash. Unless otherwise specified, two coats of white wash shall be first applied before colour wash is applied. The colour wash, whether applied inside or outside of a building shall be of uniform tint and shade. Any splashes and droppings shall be removed and cleaned immediately.

* + - * 1. Weather Proof Exterior Paint

Preparation of surface

Before painting is commenced on a surface, all dirt, oil, grease, effloresce etc. shall be completely removed. Traces of oil, if any from forms remaining on concrete work, shall be removed completely by abrasive stone. Effloresce on concrete surface shall be removed by wetting the surface and then scrubbing with 20% solution of muriatic acid. The surface shall be finally prepared a per instruction of manufacturer.

Mixing

As per manufacturer’s specifications.

Application

The cement paint shall be applied in two coats as per manufacturer’s specifications.

* + - * 1. Painting

Ready mixed paint

Only ready mixed paints of approved brands shall be used. The product shall be such, when applied, it shall spread evenly in a thin coat and flow on smoothly and shall dry quickly forming a tough durable film without showing any brush marks or cracks.

Preparation of surface

The surface of steelwork to be painted shall be cleaned free of dirt, oil, rust, mill scale and be thoroughly dry before painting. Cleaning, degreasing, derusting and descaling wherever necessary shall be carried out as specified in IS 1477 (part 1): 1971.

The surface of woodwork to be painted shall be cleaned and rendered dry, free of dirt, grit and grease and shall be rubbed smooth with the appropriate quality of sand paper. All knots patches and sappy spot shall be touched up with shellac varnish.

Painting steel work

Painting of steel work shall be carried out as per general specification for painting and as approved by the Engineer.

* + 1. **Cast-in-Situ Cement Concrete Floor and Skirting Finish**
       1. Materials
          1. Cement

Cement shall conform to IS:269-1989 or IS:455-1989.

* + - * 1. Aggregates

The aggregates shall conform to IS:383-2016. Coarse aggregates shall be approved broken stone of size 12 mm and down.

* + - * 1. Water

Water shall be clean and of potable quality.

* + - * 1. Divider

Glass strips or Aluminium strips used shall be 2 mm thick and the depth will be equal to the thickness of the floor finish.

* + - * 1. Colouring pigment

Pigments, synthetic or otherwise, used for colouring shall have permanent non-fading colour and shall not contain matters detrimental to concrete. The pigment shall be of approved brand and tints shall be uniform.

* + - 1. Workmanship
         1. Generally workmanship shall conform to IS:2571-1970 - Code of Practice for laying in situ concrete floors.
         2. Before in situ concrete floor finish is laid, the surface of the base concrete shall be thoroughly cleaned of loose materials, dirt and laitance by steel wire brushing. Where the base concrete is hardened so much that roughening of surface by wire brush is not possible, the entire surface shall be roughened by chipping or hacking and cleaned. The surface shall be then soaked with water for 12 hours before laying the topping. The surplus water shall be mopped up, neat cement slurry spread and the concrete for the topping deposited in suitably divided panels as specified below. The thickness shall be as indicated in the Technical Specification/drawing and the mix shall be M-25C concrete and as stiff as possible consistent with workability so as to prevent accumulation of excess water or laitance. After thorough consolidation the topping shall be struck off level and surface floated with a wooden float. It shall be tested with a straight edge and mason's spirit level to detect any inequalities and any undulations found shall be made good immediately.
         3. The area requiring finish shall be divided into suitable panels so as to reduce the risk of cracking. No dimension of a panel shall exceed 2 m. Flooring shall be laid in alternate panels, the intermediate panels being filled in after one or two days.
         4. After the concrete has been fully compacted it shall be finished by trowelling or floating. Finishing operation shall start shortly after the compaction of concrete and shall be spread over a period of one to six hours depending upon the temperature and atmospheric conditions. The surface shall be trowelled three times at intervals so as to produce a uniform and hard surface. The object of trowelling is to produce as hard and close knit a surface as possible. Immediately after laying only just sufficient trowelling shall be done to give a level surface. Sometime after the first trowelling, the duration being guided by temperature and rate of set of cement, the surface shall be re-trowelled to close any pores in the surface and to draw out and mop up any excess water in concrete or laitance, which shall not be trowelled back into the topping. The final trowelling shall be done well before the concrete has become too hard but at such a time that considerable pressure is required to make any impression on the surface. Trowelling with dry cement or a dry cement and fine aggregate mix on the surface shall not be permitted.
      2. Curing

As soon as the surface has hardened, it shall be kept continuously moist for at least fifteen (15) days by impounding water on it.

* + 1. **Granolithic Bedding and Floor Hardener Finish (Ironite Flooring)**
       1. Work Included

The Bidder shall furnish materials, labour, plant, equipment and tools to complete the work as specified and/or as shown in the drawings.

* + - 1. Materials
         1. Cement: Cement shall conform to IS 269-1989 or IS 455-1989.
         2. Coarse aggregates: It shall be of approved broken graded stone of size 10 mm and down, conforming to IS 383-1970.
      2. Sand: The sand shall be approved river or pit sand shall conform to IS 383-1970.
         1. Floor hardener: It shall be of best quality heavy duty metallic hardener -Ironite or approved equivalent.
         2. Water: Water shall be clean and of potable quality.
      3. Proportion of Mix:

The proportion of mix for granolithic bedding shall be 1 part of cement, 1 part of sand and 2 parts of granite chipping. The mix for the floor hardener shall be in accordance with the manufacturer's specification.

* + - 1. Workmanship
         1. The thickness of granolithic finish shall be 25 mm and shall be laid in accordance with IS 5491-1969 -Code of Practice for laying in-situ granolithic concrete floor toppings. The surface of the base concrete shall be thoroughly hacked or chipped to remove laitance, well saturated with water and cleaned. Immediately before laying granolithic finish, any excess water shall be removed and the surface of the base concrete shall be covered with a thin layer of cement slurry well brushed in. Just sufficient water shall be added to the ingredient of granolithic mix to obtain enough plasticity. The mix shall be laid over the freshly grouted base in suitably divided panels and evenly well tamped into place, screeded and lightly floated to required levels. No dimensions of a panel shall exceed 2 m.
         2. When the granolithic finish has partially dried, approved floor hardener mix shall be applied on the granolithic finish in two or more coats and finished evenly with a trowel. Each coat shall be applied before the previous coat dries. Workmanship for floor hardener finish shall conform to manufacturer's specification. The thickness of the floor hardener topping shall be 15 mm minimum.
      2. Curing
         1. The finished surface after hardening shall be cured for a minimum period of seven (7) days by impounding water on the finished surface.
    1. **Vitrified Tiles**
       1. Vitrified floor tiles in different sizes (thickness 8mm, with water absorption less than 0.08% and conforming to IS:15622-2006 & IS:13712-2006 of approved make and shades to be fixed at office building only. Any other vitrified floor tiles required in different sizes (thickness 12mm) with water absorption less than 0.5% conforming to IS:15622-2006 & IS:13712-2006 of approved make and shades
    2. **White Glazed Vitreous Tile in Dado**
       1. Work Included

The Bidder shall furnish materials, labour, plant, equipment and tools to complete the work as specified and/or as shown in the drawings.

* + - 1. Materials
         1. White vitreous tiles: The white vitreous tiles shall be flat and glazed on the top surface. They shall be generally 150 mm x 150 mm in size with a thickness of about 5 mm unless otherwise approved by the Engineer. They shall conform to IS 777-1988 in all other respects. The Bidder shall submit to the Engineer for approval samples of tiles which Bidder proposes to use in the work and all tiles used shall be similar to the approved samples.
         2. Ordinary or white portland cement: The cement shall conform to IS 269-1989 and IS 455-1989.
         3. Sand: The sand used shall be of approved river or pit sand, conforming to IS 383-1970.
         4. Water: Water used shall be clean and of potable quality as per Clause 4.3 of IS 456-2000.
      2. Workmanship

The tiles shall be laid on 19 mm thick bedding of (1:3) cement sand mortar. Before laying each tile shall be covered on the back side with neat cement slurry and glue (araldite) and fixed to the bedding mortar. The tiles shall be gently tapped to the bedding mortar with a wooden mallet. The fixing shall be done from bottom upwards. Each tile shall be fixed as close as possible to the one adjoining and any difference in the thickness of the tiles shall be evened out in the cushioning mortar so that all the tile faces are set in conformity with one another. All joints shall be filled and white cement grout and surface shall be cleaned and cured

* + 1. **Damp proof course**
       1. Work included

The Bidder shall furnish materials, labour, plant, equipment and tools to complete the work as specified and/or as shown in drawings.

* + - 1. Materials
         1. Cement: Cement shall be as per concrete specification..
         2. Aggregates: All aggregates shall conform to IS: 383-2016. Sampling & testing of aggregate shall be carried out as per the provisions of the code.
         3. Waterproofing compound: It shall be of approved quality and make.
         4. Water: Water shall be clean and of potable quality.
         5. Bitumen: Bitumen shall conform to IS 3384-1986.
      2. Thickness and proportion

Unless otherwise specified in the technical specification, the damp proof course shall be 40 mm thick with 1:1.5:3 concrete with 6 mm and down graded stone coarse aggregate with approved water proofing compound, mixed in the proportion as specified by the manufacturer.

* + - 1. Workmanship

The masonry surface shall be levelled and joints shall be raked to receive the damp proof course. Damp proof course shall be provided at positions shown on the drawings. It shall be laid for the full width of the wall. The top surface shall be kept rough or ribbed for proper adhesion with the mortar for masonry coming over it. All other surfaces of the damp proof course shall be finished fair and smooth. After the surface has partially set hot bitumen shall be applied in two coats at the rate of 1.7 kg/m2 per coat and dry sand spread over it.

* + 1. **Waterproofing with Non-Shrink Polymeric Waterproof Grouting Compound**
       1. Work included

The Bidder shall furnish materials, labour, plant, equipment and tools to complete the work as specified and/or as shown in drawings.

* + - 1. Materials
         1. Cement: Ordinary Portland cement shall conform to IS 269-1989 & Portland blast furnace cement shall conform to IS 455-1989.
         2. Aggregates: All aggregates shall conform to IS 383-1970. Fine aggregates shall be approved river or pit sand.
         3. Cement waterproofing compound: All cement water proofing compound shall conform to IS 2645-1975 and shall be of approved quality.
         4. Solvent less resin: High build polymeric surfacing which forms a thick resilient and flexible membrane on concrete with high resistance to oil and water.
         5. Nozzle: 12 mm diameter threaded GI pipes of suitable length plugged at both ends.
         6. Super plasticiser: High range water reducing admixture and integral cement waterproofed for concrete. Super plasticiser shall conform to ASTM C-194 type F, IS 9103-1979 & IS 2645-1975.
      2. Waterproofing of underground structures:

Waterproofing shall be carried out as per the manufacturer's specification and as stated below:

* + - * 1. Raft

a) The sub-base of the underground structure shall be cleaned of all dirt and kept dry by continuous pumping of water. 20 mm thick plaster with cement sand mortar 1:3 mixed with cement waterproofing compound as per manufacturer's specification shall be laid on top of the sub-base.

b) The plastered surface shall then be painted with two (2) coats of approved solvent-less resin to form a thick resilient and flexible resinous membrane over the plastered surface.

c) Threaded nozzles of 12 mm diameter and of suitable length shall be placed and fixed in a grid pattern of maximum 1.5 m centre to centre over the whole raft by means of drilling hole & fixing nozzles by quick setting mortar. Nozzles shall also be fixed along the construction joint, if any, at regular intervals not exceeding 1.5 m c/c. Adequate precaution shall be taken to keep the nozzle vertical while fixing.

Approved non-shrink polymeric waterproof grouting compound mixed with cement slurry shall be injected through the nozzles under pressure by pump as per instruction of the manufacturer. When the injection operation is over, the nozzle shall be cut & sealed with epoxy based sealing agent as per manufacturer's specification and instruction.

* + - * 1. Vertical wall

The exterior surface of the concrete shall be plastered with 12 mm thick cement sand plaster 1:3 & mixed with approved cement waterproofing compound conforming to manufacturer's specification. The plastered surface shall then be finished smooth with a neat coat of cement slurry and painted with two (2) coats of approved solventless resin to form a thick resilient and flexible resinous membrane over the plastered surface.

b) 12 mm diameter threaded nozzle of suitable lengths shall be placed and fixed in a grid pattern of maximum 1.5 m centre to centre over the entire surface by means of drilling hole & fixing nozzles by quick setting mortar. Nozzles shall also be fixed along the construction joint, if any, at regular intervals not exceeding 1.5 m c/c. Adequate precaution shall be taken to keep the nozzle horizontal while fixing.

Approved non-shrink polymeric waterproof grouting compound mixed with cement slurry shall be injected through the nozzles under pressure by pump as per the manufacturer's instruction. When the injection operation is over, the nozzle shall be cut & sealed with epoxy based sealing agent as per manufacturer's specification and instruction.

* + 1. **Waterproofing of Roof**
       1. Work Included

The Bidder shall furnish materials, labour, plant, equipment and tools to complete the work as specified and/or shown in drawings.

* + - 1. Materials
         1. 4mm thick Atactic Polypropylene modified plastomeric (APP) bitumen based membrane with glass fiber reinforcement (minimum 50gsm), finished on both sides with a thermo fusible high molecular high density polyethylene (HDPE) film and mineral finished on top surface.
         2. Bonding material: It shall consist of blown type bitumen conforming to IS 702-1988 or residual bitumen conforming to IS 73-1992 or a mixture thereof.
      2. Waterproofing of roof surface
         1. Screeding of grade M20 with minimum 25mm thick on ends and sloping towards the ridge with min slope of 1:60 shall be laid as base for laying the APP felt.
         2. Thereafter APP shall be laid as per the manufacturer’s specification. Minimum overlaps of 100 mm shall be provided at the end and the sides of strips of felt. All overlaps shall be firmly bonded with hot bitumen and torching shall be done. Any entrance of air during rolling shall be strictly avoided.`
         3. In case of roofs with parapets, a chase 75mm deep shall be cut in the parapet at about 150 mm above the roof level and the APP shall be laid as flashings in widths with a minimum overlap of 100 mm. The lower edge of flashing shall overlap the felt laid on flat portion of the roof and the upper edge of the flashing shall be tucked into the chase made in the parapet. After the flashings have been properly bonded, the chase shall be cleaned and shall be filled up with cement mortar (1:4) flush with the face of the wall and allowed to set by adequate curing.
         4. In case of drain mouths, waterproofing shall be done as specified for the roof excepting that the treatment shall be carried inside the drain pipes overlapping at least 100 mm.
         5. For gutters, a bituminous priming coat shall first be applied. Over this, specified number of layers of felt shall be laid and bonded together with hot bitumen and finally painted with a coat of hot bitumen at not less than 1.5 kg/m2. The felt layers laid separately in the gutters shall be overlapped with the corresponding layers on the roof proper. The felt treatment shall be carried down in to the outlet pipes to a minimum depth of 100 mm.
         6. The Bidder shall obtain approval from the engineer regarding the specialized agency to be engaged by the Bidder for carrying out the waterproofing work.
    1. **False Floor (Cavity Floor)**
       1. Materials
          1. Floor Jacks: The jack shall be made out of 25 mm diameter MS rods welded to 6 mm thick MS plate of size 100 mm x 100 mm. The top part of the jack shall be threaded and provided with double check nuts and washers to provide for level adjustment of 50 mm minimum. All MS members shall be galvanised as per recommended practice for hot dip galvanising of iron and steel specified in IS 2629-1985 while threaded portion should be hot dip galvanised as per IS 1340-1977. Chromating treatment conforming to IS 1340-1977 should be employed for providing protection to the coated surfaces. The jack head shall be of standard pressure die cast aluminum-zinc alloy component of proper composition.
          2. Stringers: The stringers for supporting the false floor panels shall be made of 40 mm x 40 mm 3.15 mm thick cold formed steel plates and be finished with electroplated coatings of cadmium conforming to IS 1572-1986. Chromating treatment conforming to IS 1340-1977 shall be employed for providing protection to coated surfaces.
          3. Floor panels shall be 35 mm thick un-veneered teak wood particle board bonded with BWP type phenol formaldehyde synthetic resin generally conforming to IS 3087-1985 similar to `Anchor Nova Teak Super' or any other approved equivalent.
          4. All the four edges of the floor panels shall be fitted with edge lipping made of teak wood or rigid PVC of suitable thickness or in combination of teak wood lipping and hard PVC Z beading to protect from damage during installation and removal of panels, and also to protect from moisture absorption.
          5. 22 gauge galvanised iron sheets shall be fixed to the underside of floor panels for moisture resistance as well as to further improve fire resistance quality.
          6. Top of the floor panels shall be provided with 2 mm thick homogeneous PVC sheets conforming to IS 3462-1986 and having anti-static property similar to "Anstat" of Premier Vinyl Flooring Limited or any other approved equivalent.
       2. Workmanship

Entire workmanship shall be carried out in strict accordance with the specification. Rigidity, steadiness and leveling of the false floor system shall be ensured. Painting work for wood surfaces, floor and walls, fixing of PVC sheets on floor panels shall be in accordance with the instructions of the relevant manufacturers

* + 1. **False Ceiling**
       1. False Ceiling with Coloured Aluminium Strip Modular Panels
          1. Materials

Ceiling panels, panel carriers, runner couplers, panel end caps, etc. including their finishes and suspension arrangement shall be as per the approved manufacturer's specifications.

* + - * 1. Suspension systems:

The suspension systems shall be concealed and fully adequate for the spans involved. All runners, fittings, suspenders shall be either galvanised or painted as per manufacturer's specification. The whole of the ceilings shall be firmly and securely fixed against the walls.

The suspension system shall include all necessary supports for light fittings, ventilation grills, etc.

The acoustical/thermal insulation where required shall be of non combustible, resilient, flexible and resin bonded mat of fibre glass of suitable thickness and quality to cater to technological requirement.

* + - * 1. Workmanship:

All ceiling panels shall be fixed in accordance with the instructions of the relevant manufacturer.

All abutments, perimeter of cut edges shall be neatly finished with edge trimmer as per details of the relevant manufacturer.

* + - 1. Standard Aluminum False Ceiling with Anodised Aluminum T-bar Inter-Locking Ceiling System.
         1. Materials

Particle board ceiling tiles shall be un-veneered teak wood particle board bonded with BWP grade phenol formaldehyde synthetic resin of approved make and shall conform to IS 3087-1985 exterior grade. Back side and all the edges of the boards shall be provided with a protective coat of epoxy based paint over a coat of primer to prevent moisture absorption.

Minimum thickness of ceiling tiles shall be 12 mm.

The frame work for the false ceiling system shall be of approved make and quality and consist of anodised aluminum main Tees of size 23.5 mm X 23.5 mm X 1.6 mm and wall angles of size 25 mm X 25 mm X 1.6 mm.

Suspension arrangement including adjustable hooks, suspenders, etc. shall be concealed and adequate for the spans involved. Hangers supporting the anodised aluminum framework shall be galvanized. The whole of the ceiling shall be firmly and securely fixed against the walls.

The suspension system shall include all necessary support for light fittings, ventilation grills, etc.

The acoustical/thermal insulation where required shall be as described in the code.

* + - * 1. Workmanship

Entire ceiling system including suspension arrangement, frame work of grid system, levelling of false ceiling, panels, alignment of light fitting and ventilation grills shall be carried out as per the instruction of the relevant manufacturers.

* + - 1. Gypsum Board False Ceiling
         1. Material

Frame Work: special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277.

Board : 12.5 mm thick tapered edge Glass Reinforced Gypsum (GRG) board conforming to IS: 2095- (Part 3)-1996

* + - * 1. Workmanship:

Frame Work consisting of special sections and , power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277 with angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37mm, at 1200 mm centre to centre, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm centre to centre, to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm centre to centre, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm centre, with 25mm long dry-wall screws @ 230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry-wall screws of size 3.5 x 25 mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of the board with recommended jointing compound , jointing tapes , finishing with jointing compound in 3 layers covering up to 150 mm on both sides of joint and two coats of primer suitable for board, as per manufacturer's specification.

Openings for light fittings, grills, diffusers, cutouts, trap doors (door inclusive) etc made with frame of perimeter channels suitably fixed shall be provided.

Two cots of acrylic emulsion/ plastic paint shall be applied to complete the false ceiling work.

(The section/ flange dimensions as mentioned above are the minimum dimensions and in case of non-availability, higher sections shall be used as per manufacturer’s specification)

* + 1. **Timber Doors, Windows, Joinery and Ironmongery**
       1. Work Included

The Bidder shall furnish materials, labour, plant, equipment and tools to complete the work as specified and/or as shown in the drawings.

* + - 1. Materials
         1. Timber: Unless otherwise specified, all timber used in the work shall be as specified in IS 1003-1991 and IS 4021-1983 and shall be of Class-1, Grade-1 only.

Timber shall be of specified type, properly seasoned and shall be sawed square, straight and true and shall be free from decay or insect attack, unsound sapwood, shakes, checks, waned edges, pitch pockets and knots. Cutting and plugging of knots either sound or unsound will not be allowed.

* + - * 1. Fixings: Nails, screws and bolts for use as fixings shall comply with the following standards:

IS 723-1972 : Nails

IS 451-1999 : Screws

IS 1363-1992 : Bolts

IS 1120-1975 : Rag bolts and coach screws

IS 4907-1968 : Timber connectors

* + - * 1. Adhesive: Adhesives used for jointing shall comply with IS 848-1974, type BWP.
        2. Plywood: Plywood shall conform to the requirements of IS 303-1989, BWP bonded type and shall be of thickness not less than 4 mm. Plywood face veneers shall conform to IS 1328-1996, Grade-1. Plywood adhesives shall conform to IS 848-1974.
        3. Plywood shall be obtained from an approved manufacturer to the correct thickness specified. The Bidder will not be permitted to make up the required thickness by gluing together sheets of thinner thickness.
        4. Face Veneers: Face veneers shall be hard, durable and capable of being finished easily to a smooth surface. They shall be free from knots, beetle holes, splits, dots, glue stains, filling or any other defects.
        5. Face veneers shall be applied to one or more sides as shown on the drawings.
        6. Block board and Lamin board: Block board and lamin board shall comply with IS 1659-1990, Grade-1. The face veneer of boards selected for varnishing or staining shall conform with the requirements for a Grade-1 veneer on the exposed faces. In other cases the boards shall be finished on both faces with a Grade-2 veneer. Grades of veneer shall be as described in IS 1328-1996
        7. Decorative laminated plastic sheets: Decorative laminated plastic sheets shall comply with IS 3794-1966, Class-1 sheet.
        8. Hardboards: When used for panelling in door shutters, the hardboards shall be of tempered quality conforming to the requirements of IS 1658-1977.
        9. Builder's hardware: Builder's hardware shall conform to the relevant Indian Standards. They shall be of the best quality and complete with all necessary screws, bolts, plugs and other fittings. The finish on all the exposed faces of lever handles, plates and fittings shall be of anodised aluminium.
        10. Locks: All locks shall differ and locks shall be suited to provide an overall master key and individual keys, in duplicate.
        11. Flush doors: Solid core flush door shutters shall be 35 mm thick and shall comply with IS 2191-1983 and 2202-1991. Flush doors shall be faced both sides with teak veneer.
        12. All doors shall be shop prepared for taking mortise locks and latches.
        13. Lining, architrave and skirting: These shall be of timber to suit the locations and finishing conditions under which they are fixed. The locations and sizes shall be as indicated on the drawings.
      1. Moisture Content

The moisture content of all timber fixed shall be suitable for the conditions and locations in which it is fixed (air-conditioning systems which may be employed in certain areas are to be taken into account). The limits of moisture content should not exceed those specified in clause 4.1.2 of IS 1003-1991 generally and those specified in clause 5.1.3 of IS 2191-1983 when used for manufacturing flush doors.

* + - 1. Workmanship
         1. General

All work shall be fixed straight and true. Construction and workmanship, dimensions, tolerances, finish, inspection and test for all doors and windows and ventilators and any other woodwork shall be as specified in IS 1003-1991.

Timber buried in ground and the portions of woodwork embedded in or resting on walls shall be treated with boiling coal tar or other approved protective materials. All steel work embedded in masonry or exposed shall be suitably protected against rust.

All woodwork must be inspected and approved before being put into place. In no case shall the woodwork be painted or otherwise treated before it is approved.

All woodwork in building shall, after it has been approved, be treated with a priming coat of approved paint before being fitted in position. The succeeding coats of paint or other finish shall be applied after the woodwork is fixed in position.

* + - * 1. Door frames and linings

Timber door frames and linings shall be properly framed and glued together with through tenon joints.

Door frames built into walls shall be secured by means of holdfasts made of 40 mm X 6 mm galvanised mild steel flats 225 mm long, one end bent up and twice drilled for wood screw fixing and the other end split and fish tailed. The holdfast shall be screwed to the frames with sheradized (zinc coated) screws. Galvanised mild steel dowels 12.5 mm diameter shall be provided at the foot of all door frames. The dowel shall be housed 50 mm into the timber and their length shall be sufficient to ensure a minimum of 50 mm penetration into a pocket formed in the concrete slab irrespective of floor finishes.

* + - * 1. Fittings

In connection with all fittings such as counters and cupboards the doors, frames, drawers, rails, framing, etc. shall be properly and accurately framed together.

* + - * 1. Sundries

Architraves and cover beads where required shall be wrought and rounded and pinned on to frame. Rails for hat and coat hooks and the like shall be wrought and chamfered, plugged and screwed to walls. Glazing beads where required shall be wrought splayed and rounded and shall be neatly mitred and fixed small bradsor lost-head nails.

* + - * 1. Scribing

All joinery such as architrave, beads, etc. required to fit against the contour or irregular surfaces shall be accurately scribed to ensure a close butt connection.

* + - * 1. Surface continuity

Continuity must be maintained throughout, in particular, in jointed panels each piece shall be of the same species. Joinery for staining and polishing shall have all surface of the same species and character of grain.

* + - * 1. Fixing to walls

This shall be carried by the following means:

An approved patent fibre plug fixed in accordance with the manufacturer's instructions.

An approved plastic filling used in accordance with the manufacturer's instructions.

Hardwood plugs set in the wall so that fixing to them is across the grain. Softwood plugs shall not be used.

* + - * 1. Jointing

All carpentry shall be properly framed and glued together and all timbers shall be jointed by housings, mortising, tenoning in an approved manner.

* + - * 1. Preservative treatment

All sawed softwood or hardwood and all grounds and plugs together with all wrought softwood and hardwood shall be impregnated with an organic solvent or water borne type preservative complying with the recommendations of IS 401-1982 for pressure impregnating. All timbers shall be impregnated following final machining and cut ends of all timbers shall be effectively sealed with an approved sealant.

* + - * 1. Joiner's work

Joinery shall be manufactured in such a manner that the workmanship conform with IS 1003-1991 for doors and windows and IS 3845-1966 for furniture except where varied by this specification. Joinery timber shall be sawn out as early as possible so that the shrinkage may take place before being jointed and fixed in the work. The timber shall be accurately worked to details and put together in the best possible manner.

Framed work shall be properly mortised and tenoned, wedged, glued and cramped together and doweled where necessary.

The use of nails for fixing any item of joinery will not be permitted. Springs may be used for glazing where necessary.

All screws and bolts shall be countersunk and pelleted and all springs punched and puttied.

Planed surfaces which are to be polished or painted shall be finished smooth and hand finished with fine sand paper.

* + - * 1. Surface finish

Surface shall be prepared, painted, stained, and/or polished and finished in accordance with the relevant clauses of this specification.

* + - * 1. Ironmongery

All fittings shall conform to relevant IS specifications and shall be of approved make and quality.

Ironmongery shall be fixed solidly to all doors, cupboards and panels and in accordance with the manufacturer's instructions.

Hinges shall be carefully housed or let into doors and frames. Door stops shall be plugged and screwed to floors.

Ironmongery shall be carefully wrapped and protected until completion.

The Bidder shall allow for removing and re-fixing of fittings during any painting operations.

Metal sockets shall be provided to all tower, barrel and drop bolts where the shoots enter brick masonry, stone masonry or concrete. These shall be securely fixed flush with the surface into g and cemented. Mortise plates shall be used over holes in woodwork.

On completion, all locks, catches and similar items of ironmongery shall be properly cleaned, tested and oiled. All keys shall be clearly labelled with metal or hardboard tags of approximate size 50 mm X 20 mm securely fixed to the keys and handed over to the Employer. Keys shall be handed over in duplicate.

* + 1. **Flush Doors With Steel Door Frames- General Purposes**
       1. Material

1. Door frames:

Door frames shall be of mild steel confirm to IS: 4351-2003.

1. Door shutters:

Decorative type solid core (of block board) door shutter confirming to IS:2202 (Part-1)-1999.

1. Commercial plywood, cross band & face veneer:

The commercial plywood cross band and face veneer shall confirm to IS:710-2010

1. Fittings:

Aluminium tower bolts confirming to IS:204(Part-2)-1992.

Aluminium aldrop confirming to IS:2681-1993.

Aluminium door handles confirming to IS:208-1996.

Aluminium door stoppers confirming to IS:1823-1980

* + - 1. Workmanship
         1. The Pressed steel door frames of shall be strictly in accordance with IS: 4351-2003. The frame shall be of profile C manufactured from commercial mild steel sheet of 1.60 mm thickness, including steel hinges, jamb, lock jamb, bead and if required angle threshold of mild steel angle of section 50x25 mm, or base ties of 1.60 mm, pressed mild steel welded, steel. butt hinges as per IS:1341, lock strike-plate, mortar guard and shock absorbers as specified and applying a coat of approved steel primer after pre-treatment of the surface and fixing with adjustable lugs with split end tail to each jamb. All material & workmanship must be as per BIS standards.
         2. Flush door shutters of decorative type with core of block board construction & frame of 1st class hard wood and well matched teak 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters (minimum 30 mm thick door shutter) including ISI marked Stainless Steel butt hinges with necessary screws. All material & workmanship shall be as per IS standards.
         3. Each door shall be provided with 2 nos. of 200mm long aluminium barrel type tower bolts, 1 nos. of aluminium aldrop of size 300 mm, 2 nos. of 150 size aluminium door handles, aluminium door stoppers.
         4. The doors shall tested as per IS:4020 (Part 1 to 16)-1998 and final finishes shall be as per the satisfaction of executing authority.
    1. **Metal Doors & Windows**
       1. Materials
          1. Steel doors, windows and ventilators: Steel doors, windows, ventilators and their fittings for residential and office buildings shall conform to IS 1038-1983 and be of the size and type shown on the drawings.
          2. Steel doors / Air tight steel doors for industrial buildings shall be made as per the drawings specified by the Employer.
          3. Steel windows for industrial buildings shall conform to IS 1361-2000 and shall be of the specified type and size.
          4. External doors shall be provided with threshold as shown in IS 1081-1960 and the internal doors with an approved size base tie bar in lieu of threshold.
          5. Unless otherwise specified, coupling section shall be of mild steel. Handles, peg stays and pivots shall be of leaded tin bronze (gun metal). Hinges for side-hung shutters shall be of projecting non-friction type, unless otherwise specified. Weather bars shall not be provided unless specifically indicated on the drawings. The type, size, number and position of fixing lugs shall conform to IS 1038-1983. The steel doors, windows and ventilators shall be painted with one coat of red oxide zinc chromate primer, conforming IS 2074-1992 before they are fixed. Final painting shall be done with two coats of ready mixed approved flat oil paint of approved colour.
          6. Structural steel materials shall conform to IS 1977-1975.
       2. Workmanship

Steel doors, windows and ventilators shall be fixed plumb in line and level. Fixing and glazing of metal doors, windows and ventilators shall be in accordance with IS 1081-1960 Code of practice for fixing and glazing of metal doors, windows and ventilators.

* + 1. **MS Door Frame**
       1. MS door frames 125X60 shall be filled with cement mortar (1:6) for doors including providing hold fasts (of size 25mmX3mm, 250 long made of MS, 6 nos in each door), applying a coat of primer and two coats of finishing paint over the surface of approved quality and colour. The frame shall be 1.25mm thick hollow section. The rate includes fixing the frame with screws and embedding in cement concrete block (1:2:4) and the cost of MS frame, hold fast, concrete etc. complete in all respect.
    2. **Poly-Vinyl Chloride Doors & Door frames- Kitchen, Toilet & Bath Purposes**
       1. Door Frames

Factory made uPVC door frame, made of uPVC extruded sections, of size 65 mm x 55 mm with wall thickness 2.0 mm (± 0.2 mm), corners of the door frame to be mitred cut and jointed with plastic brackets and stainless steel screws, reinforcing hinge side, vertical of the frames with PVC profile of Size 28 mm x 30 mm having wall thickness 2 mm (±0.2 mm), including providing & fixing 3 nos. of 125 mm long stainless steel hinges to the frame, fixing the frame with jamb with required number & size of anchor dash fasteners, all complete as per manufacturer's specification and direction of Engineer-in-charge.

* + - 1. Door shutters and Styles

24 mm thick factory made PVC door shutters made of styles and rails of a uPVC hollow section of size 59x24 mm and wall thickness 2 mm (± 0.2 mm) with inbuilt edging on both sides. The styles and rails mitred and joint at the corners by means of M.S. galvanised/ plastic brackets of size 75x220 mm having wall thickness 1.0 mm and stainless steel screws. The styles of the shutter reinforced by inserting galvanised M.S. tube of size 20x20 mm and 1 mm (± 0.1 mm) wall thickness. The lock rail made up of 'H' section, a uPVC hollow section of size 100x24 mm and 2 mm (± 0.2 mm) wall thickness, fixed to the shutter styles by means of plastic/galvanised M.S. 'U' cleats. The shutter frame filled with a uPVC multi-chambered single panel of size not less than 620 mm, having over all thickness of 20 mm and 1 mm (± 0.1 mm) wall thickness. The panels filled vertically and tie bar at two places by inserting horizontally 6 mm galvanised M.S. rod and fastened with nuts and washers, complete as per manufacturer's specification and direction of Engineer-in-charge.

* + - 1. Fittings:

Each door shall be provided with 2 nos. of 200mm long aluminium barrel type tower bolts confirming to IS:204(Part-2)-1992, 1 nos. of aluminium aldrop of size 300 mm confirming to IS:2681-1993, 2 nos. of 150 size aluminium door handles confirming to IS:208-1996 and aluminium door stoppers confirming to IS:1823-1980.

* + 1. **Rolling Shutter (Hand Operated and Mechanical Gear Operated)**
       1. Rolling shutters shall be fabricated from 18 gauge steel sheet and machine rolled with 75 mm rolling centres with effective bridge depth of 12 mm lathe sections, interlocked with each other and ends locked with malleable cast iron clips conforming to IS 1038-1983.
       2. The guides shall be either rolled or pressed channel sections 75 mm deep and 25 mm wide fitted with necessary fittings and fixtures.
       3. The suspension shaft shall be formed from solid drawn 8 gauge seamless tubes of about 60 mm O.D. in 3 segments coupled with 2 pairs C.I. dog-railed flange couplings forming one complete unit eliminating deflection in the centre to a minimum.
       4. The springs shall be approved high tensile flat springs 50/60 mm width and 1.6/1.8 mm thickness hardened and tempered. These shall be fitted inside the fabricated housing at either ends which counter balance the shutter.
       5. The ball bearings shall be double row self-aligning ball bearings fitted inside C.I. housing fixed on side brackets holding the suspension shaft at either end.
       6. The suspension of the shutter curtain shall be bolted on specially fabricated cages formed from M.S. flats and plates all arc-welded.
       7. The hood cover shall be made of 20 gauge galvanized sheets with necessary stiffeners and framework to prevent sag. The bottom lock plate shall be made of 5 mm thick M.S. plate and shall be 95 mm wide reinforced with angle/T iron of suitable section with 6 mm diameter M.S. rivets interlocked with last stride of curtain.
       8. The locking arrangement shall consist of sliding bolts at both ends of the bottom plate fitted to engage with suitable receiving pockets at the bottom of the guide channels.
       9. Unless otherwise specified, for overall area of rolling shutters upto 8 sq.m. pull and push type hand-operated shutters shall be provided, for area between 8 and 12 sq.m pull and push type shutters shall be provided with ball bearings, for area larger than 12 sq.m mechanical gear type or electrically operated shutters shall be provided.
       10. Unless otherwise specified, rolling shutters shall be painted with one coat of red oxide zinc chromate primer conforming to IS 2074-1992 before they are fixed. Final painting shall be done with two coats of approved flat oil paint of approved colour.
       11. All rolling shutters shall be of approved make and shall conform to IS 6248-1979.
    2. **Aluminium sliding windows**
       1. Frame:

Aluminium work for windows, ventilators and partitions shall be with extruded built up standard tubular sections/ appropriate Z sections and other sections with powder coated aluminium (minimum thickness of powder coating 50 micron) of approved make & thickness (minimum 1.5mm thickness of elements) conforming to IS: 733-1983 and IS: 1285-2002, fixing with dash fasteners of required diameter and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminium snap beading for glazing / panelling, C.P. brass / stainless steel screws, all complete. In general the windows shall be minimum 3 track sliding windows with 2 glazed sliding shutters and one sliding shutter with mosquito net including locking system. However, for larger windows width (>1.5m), 4 track frame shall be used for additional glazed sliding shutter.

* + - 1. Shutter:

Shutters of windows & ventilators shall be powder coated aluminium (minimum thickness of powder coating 50 micron) including providing and fixing hinges, pivots, rollers etc. as per the requirement and making provision for fixing of fittings wherever required including the cost of EPDM rubber / neoprene gasket required fittings etc. The minimum thickness of shutter section element shall be 1.5mm.

* + - 1. Glazing:

Glazing in aluminium window, ventilator shutters and partitions etc. shall be provided with float glass of minimum 5 mm thickness including EPDM rubber / neoprene gasket etc.

* + - 1. Sealing:

The junction of frame & walls/ lintel/ columns/ sill/ floor shall be finished properly to ensure air tightness. The joints shall be cleaned to remove paint, POP, putty, loose materials, major undulations etc. neoprene / EPDM rubber gasket shall be inserted between the gaps. The joint shall be sealed with silicon sealant adhesive of approved make and finished properly to have smooth profile after removal of excess sealant.

* + 1. **Glazing**
       1. Materials
          1. Sheet glass

Unless otherwise specified, all glass used in the work shall be of quality approved, distortion free, transparent sheet glass conforming to IS 1761-1960 and shall be free from specks, bubbles, smokes, wanes, air holes and other defects. Unless otherwise specified, for sizes of glass above 900 mm X 900 mm plate glass shall be used. Glazing to doors shall be done with 6.3 mm thick sheet glass weighing about 15 kg/m2. Glazing to windows and ventilators shall be done with 4 mm thick sheet glass weighing about 10 kg/m2.

* + - * 1. Plate glass

Where plate glass is specified for the work, it shall be of thickness as specified with a permissible tolerance of 0.5 to 0.8 mm for polished plate glass. The transparent type glass shall have polished surface giving clear and undistorted vision.

* + - * 1. Putty

Putty for use on wooden frames shall conform to IS 419-1967 and putty for use on metal frames shall conform to IS 420-1953.

* + - * 1. Mastic

Mastic shall be of approved quality.

* + - 1. Workmanship
         1. Glazing of metal doors, windows and ventilators shall conform to IS 1081-1960 and glazing of timber doors, windows and ventilators shall conform to IS 1003-1991.
         2. All glass shall be cut according to the sizes required as per drawings. Glass shall be delivered to site in cut sizes bearing the manufacturer's name/trade mark and the quality, thickness and unit weight shall be clearly marked on the packages.
         3. The method of glazing in each case shall be according to the details as shown on the drawings. For glazing wooden doors and windows, the wooden rebate shall be well oiled to prevent oil from putty being absorbed by wood. The frame shall be cleaned thoroughly and sufficient compound applied to the rebate so that when glass is pressed into it, a back putty of not less than 2 mm thick remains. Surplus compound squeezed out at the back shall be stripped at an angle so that water is shed away. Unless otherwise specified, glass shall be secured with approved glazing clips. Where shown in the drawings, aluminum or timber glazing beads with aluminum screws shall be used.
    1. **Aluminium Double Swing Door with Floor Spring**
       1. The door frame section shall be made from 101.6 mm X 44.45 mm X 3.18 mm thick anodized aluminium section of INDAL or other approved equivalent.
       2. Door stiles, top and bottom rails, etc. shall be made as per drawing with anodized aluminium box section having wall thickness of not less than 2.5 mm. 5.5 m thick plate glass of approved quality and make shall be used as glazing. Glazing shall be fixed to the shutter frame with snap on bead of approved quality and make and neoprene gaskets. The door shall be fixed with double action floor spring securely anchored to floor and pivot for swing action.
       3. All necessary fittings and fixtures like anodized Aluminium door handle, weather strips, bolting and locking arrangements with keys in duplicate of approved quality and make shall be provided.
       4. All other works shall be executed as per the relevant code of practices brought out by Bureau of Indian Standards, manufacturers specification and prevalent sound practices in field.
    2. **Aluminium Sliding Window**
       1. Three track anodised aluminium sliding window (Hindalco, Jindal or equivalent make) shall be with bottom frame made of size 92.4X46 weighing 1.64 kg./m and side and top frame made of section 92.4X29.7 weighing 1.067 kg./m or other approved quality extruded section. Shutter shall be made with sections 39X20, 39X29 & 41X20 weighing 0.493kg./m, 0.612kg./m & 0.46kg./m respectively for vertical section, interlock section and top & bottom section including supplying and fixing 4mm thick float glass with standard glazing bead and neosprin gasket and all other fittings as per drawing, specification and direction of Engineer-in-charge. (Size and weights mentioned above are approximate only).
    3. **Aluminium Top Hung Ventilator**
       1. Anodised aluminium top hung ventilator shall be (Hindalco, Jindal or equivalent make) with "Z" type shutter of size 33.00x38.00x2.6 mm weighing 0.522 Kg/m and "H" type frame size of 33.00x38.00x2.00 mm weighing 0.500 Kg/m. Glazing shall be of 4 mm thick frosted glass including aluminium clips, handles & all other fittings etc. complete as per the direction of Engineer in charge. (Size and weights mentioned above are approximate only).
    4. **Internal Flexible Partitions**
       1. Materials
          1. Anodized aluminum sections of `INDAL' extrusions or of any other approved equivalent. Minimum wall thickness of the aluminum box section frames shall be 3.18 mm.
          2. Glass shall be 5.5 mm thick, clear sheet glass of approved quality and make.
          3. Decorative laminated particle board panels of approved make and finish. Particle board shall be conform to IS 3097:1980 exterior grade. Minimum thickness of decorative laminate shall be 1.5 mm.
          4. Minimum thickness of panels shall be 12 mm.
          5. All edges of the particle board panels shall be provided with a decorative coat of epoxy based paint over a coat of primer to prevent moisture absorption.
       2. Workmanship

All works shall be fixed straight and leveled, so as to guarantee perfect working of all components. Assembling of components and fixing of frames shall be as per the manufacturer's specification/instructions.

* + 1. **Water Supply, Sewerage & Plumbing**
       1. General
          1. All water supply, drainage and sanitary works shall be executed by a licensed or authorized plumbing supervisor or a licensed or authorized plumber and shall be in accordance with the requirements of relevant bye-laws of Municipal or other authorities in whose jurisdiction the work is being carried out
          2. For items such as earthwork, excavation, concrete, brickwork, stonework, painting etc. relevant specifications for these shall apply, unless otherwise specified
          3. Unless otherwise specified, all exposed work such as cisterns, brackets etc. shall be painted with one coat of red oxide paint and two coats of oil paint of approved colour.
          4. The diameter of pipes and fittings wherever mentioned shall be the internal diameter or nominal bore, unless otherwise specified
       2. Codes and Standards

Roof drainage system

|  |  |
| --- | --- |
| IS: 1230: 1979 | * Cast iron rain water pipes and fittings |
| IS: 2527:1984 | * Code of practice for fixing rainwater gutters and down pipes for roof drainage |
| IS: 1742:1973 | * Code of practice for building drainage. |

Pipes and fittings for sanitary, plumbing and drainage

|  |  |
| --- | --- |
| IS: 458:1988 | * + Concrete pipes with or without reinforcements |
| IS: 651:1992 | * + Salt-glazed stoneware sanitary appliances |
| IS: 771(Pt.3 to Pt6): 1979 & IS: 771(Pt.2); 1985 | * + Glazed earthenware sanitary appliances. |
| IS: 3597: 1985 | * + Method of test for concrete pipes. |
| IS: 774:1984 | * + Flushing cisterns for water coolers and urinals valve less siphon type |
| IS: 775:1970 | * + Brackets and supports for wash basins and sinks |
| IS: 781:1984 | * + Sand-cast brass screw down bib taps and stop taps for water services |
| IS: 782:1978 | * + Caulking lead |
| IS: 783:1985 | * + Code of Practice for laying concrete pipes. |
| IS: 804:1967 | * + Rectangular pressed steel tanks |
| IS: 1239(Pt.1): 1990 | * + Mild steel tube & tubular. |
| IS: 1703:1989 | * + Ball valves (horizontal Plumber type) including floats for water supply purpose. |
| IS: 1711:1984 | * + Self closing taps |
| IS: 1726:1991 | * + Cast iron manhole covers and frames intended for use in drainage works. |
| IS: 1742:1983 | * + Code of practice for building drainage |
| IS: 1795:1982 | * + Pillar taps |
| IS: 2065:1967 | * + Code of practice for water supply in buildings |
| IS: 2326:1987 | * + Automatic flushing cisterns for urinals. |
| IS: 1536:1989 | * + Centrifugally cast (spun) iron pressure pipes for water, gas and sewage. |
| IS: 1537:1976 | * + Vertically cast iron pressure pipes for water gas & sewage. |
| IS 8329: 2000 | * + Centrifugally cast (spun) ductile ironpressure pipes for WATER, GAS AND SEWAGE - SPECIFICATION |
| IS 9523: 2000 | * + Ductile iron fittings for pressure pipes for water, gas and sewage - specification |
| IS: 2470 (Pt.1 & 2) 804:1967 | * + Code of practice for design and construction of septic tank |
| IS: 2548(Pt.1 & Pt.2): 1996 | * + Plastic water-closet seats and covers |
| IS: 2556 (Pt1 to Pt.9): 1995 | * + Vitreous sanitary appliance (vitreous China) |
| IS: 2963:1979 | * + Non ferrous waste fittings for washbasins & sink |
| IS: 3004: 1979 | * + Plug cocks for water supply purposes |
| IS: 3006:1979 | * + Chemically resistant salt- glazed stoneware pipes & fittings |
| IS: 3114:1994 | * + Code of Practice for laying of cast iron pipes. – |
| IS: 3311:1979 | * + Waste plug and its accessories for sinks and washbasins. |
| IS: 4127:1983 | * + Code of Practice for laying of glazed stoneware pipes. |
| IS: 4346:1982 | * + Washers for water taps for cold water services |
| IS: 4984: 1995 | * + Specification for high-density polyethylene pipes for potable water supply |
| IS: 778: 1984 | * + Gun metal gate, globe and check valves for water services. |
| IS: 8008 (Pt. I to IV): 1976 | Specification for injection moulded HDPE fittings for potable water supplies. |
| IS 15778-2007 | Chlorinated polyvinyl chloride (cpvc) pipes for potable hot and cold waterdistribution supplies — specification |

* + - 1. Materials
         1. Materials, fittings and appliances for sanitary and plumbing work: The materials, fittings and appliances used in the work shall be as specified hereunder. The type, quantity class, size, finish and make shall be specified in the bill of quantities. The Bidder shall submit to the Engineer samples of all materials, fittings and appliances for approval well in advance of starting the work. All materials, fittings and appliances used in the work shall conform to the approved samples.
         2. Galvanized pipes and fittings: Galvanized steel pipes, fittings and accessories for water services shall be of tested quality and shall conform to relevant IS codes.
         3. Bottle trap: Bottle trap shall be of approved quality, heavy brass chromium plated trap and made particularly smooth on the inside and shall have minimum 50 mm water seal and cleaning screw at bottom.
         4. High density polyethylene pipes and fittings High density polyethylene pipes and fittings shall be of tested quality and shall conform to IS: 4984: 1985 and IS: 8008: 1976.
         5. Cast iron pipes and accessories: Cast iron pipes with socket and spigot ends shall conform you IS1230: 1979 and IS: 1729: 1979
         6. Welded Steel pipes shall confirm to IS 3589-1981.
         7. Manhole covers: Manhole covers: Manhole covers shall conform to IS: 1726: 1991.
         8. Concrete pipes: Concrete pipes shall be of non-pressure type and shall conform to IS: 458: 1988 and the type of joints shall be as indicated in the drawings.
         9. Salt-glazed stoneware pipes: Salt-glazed stoneware pipes shall conform to IS: 651: 1992 and IS: 3006: 1979.
         10. Sanitary appliances: All sanitary appliances shall be of tested quality and shall conform to IS: 2556: 1995.
         11. Non-ferrous fittings: All non-ferrous fittings shall be of tested quality and shall conform to the relevant Indian Standards.
      2. Joints
         1. Cast iron pipes: The type of jointing for C.I pipes conforming to IS: 1729: 1979 shall be socket and spigot either with molten lead or lead wool and gasket conforming to IS 782: 1978.
         2. If the joints used are spigot and socket type, the spigot shall be carefully centred in the socket by one or more laps of clean white hemp spun yard with about 25 m overlap. Sufficient yarn only shall be forced into the socket to leave a correct depth of lead for caulking. The pipe shall then be examined again for line and level and proper depth of each joint shall be tested before running at the molten lead. For pouring of molten lead a ring of hemp rope shall be wrapped round the pipe at the end of the socket and the joint shall be covered with stiff damp clay. The rope shall then be removed carefully leaving a V-shaped large hole at the top of the joint to pour the molten lead. Lead shall be poured in one operation only. After a section of convenient length of pipe has been laid, lead shall be caulked sufficiently with caulking tools and hand hammered till the excess lead removed and the joint shall be made neat and clean.
         3. The spigot shall be carefully inserted and cantered in the socket by one or more laps of thin clean hemp spun yard and shall be forced into the socket to leave a correct depth of 30 mm all-round for cement mortar. The pipe shall then be examined again for line and level and the proper depth of each joint shall be tested before inserting the cement mortar. The joints shall then be carefully filled with stiff cement and sand mortar (1: 1) and the joints shall be leveled to the edge of the socket. Each joint shall be adequately cured by covering with wet cloths and pouring water at frequent intervals.
         4. The packing ring or washer for the flanged joints shall be rubber for the full diameter of the flange with proper pipe hole and both holes cut out suitably. The packing shall be smeared with graphite paste or a mixture of red lead and white lead and shall be introduced between the flanges of both the pipes and nuts tightened in opposite pairs keeping the longitudinal axes of adjoining pipe lines in exactly the same straight line. Lead washers shall be provided along with bolts to prevent any leakage through both holes.
         5. Stoneware pipes: The type of jointing for stoneware pipes shall be socket and spigot as indicated on the drawings. The inside of the socket shall be first painted with a thin layer of cement mortar (1:2) and a gasket of yarn dipped in cement slurry shall be inserted and the socket of the pipe with a wooden caulking tool and wooden mallet in such a way that the gasket shall fully encircle the spigot with slight overlap. When the spigot end received the gasket, it shall be wrapped round with two or three turns of treated spun yarn at its end before being inserted into the socket. The rest of the joint shall then be completely filled with cement and mortar (1:1) having very little water and the joint shall be leveled to form a smooth splayed fillet at an angle of 45o. All excess of cement mortar left inside the pipe joint shall be neatly cleaned off and the joint shall be adequately cured by covering with wet gunny bags and pouring water at frequent intervals. In jointing stoneware pipes, care shall be taken that the pipes are kept concentric and the socket, especially one the underside shall be completely filled with cement mortar. Where settlement of earth is envisaged, the joint shall be made with bitumastic filler or any other material as approved by the Engineer.
         6. Concrete pipes: The type of joining for concrete pipes be packed form either side with spun yard dipped in cement slurry as specified for jointing stoneware pipes. Stiff cement mortar (1:1) shall be filled from both sides and splayed at an angel of 450 on both sides. The joint shall be adequately cured as specified for joints in stoneware pipes.
      3. Laying of pipes
         1. Cast iron pipes: The laying of cast iron pipelines shall commence only after the bottom of the trench at various points have been leveled and aligned. The sides of the trenches shall be as vertical as possible, and the width at the bottom shall be 300 mm wider than the diameter of the pipe. Where joints are made, the trench shall be widened suitably to provide room for caulking joints. Shoring and timbering shall not be used without prior approval of the Engineer. For pipes buried in the ground, the Bidder shall take care to maintain always a minimum cushion of earth over the pipes as indicated in the drawings. All pipes, water mains, cables etc. met within the course of excavation shall be carefully protected and supported. All pipes and fittings shall be sounded with a light hammer and check properly to detect any crack or blow holes before laying. The excavated material shall be thrown on one side of the trench and the pipes stacked on the other side. The inside of socket and the outside of spigot shall be thoroughly cleaned of all foreign mater before laying. The pipes shall be laid with their socket ends facing the direction the flow. The pipes shall be lowered in the trenches by a method as approved by the Engineer. The pipes shall then be jointed by caulking as specified in Joints for Cast Iron pipes. After each section of the pipeline has been laid it shall be tested for water tightness before backfilling the trench. On successful completion of testing, the trench shall be backfilled with the excavated earth in layers of 200 mm and shall be watered and rammed. Any subsidence occurring in the line of trenches after backfilling shall be repaired by the Bidder at their own cost. Where the pipelines cross roads, the sides of the trenches shall be suitably shored.
         2. Concrete pipes: The laying of concrete pipelines shall conform to clause 9 of IS: 783:1985.Pipes shall be laid true to line and grade. Laying of pipes shall always proceed upgrade of a slope.
         3. Stoneware pipes: the laying of stoneware pipelines shall commence only after the bottom of the trench at various points have been leveled as shown in the drawings. The centre line of the trench shall first be marked out on the ground and shall be excavated to correct dept, slope and width at all points. The pipes shall be carefully laid to the alignment, levels and gradients as shown on the drawings, the trench shall be excavated wide enough under the sockets to allow hands to pass for making joints. The pipes between manholes shall be laid truly in straight lines and without any vertical or horizontal deviations on a bed of concrete as shown on the drawings. While laying pipes, portion of concrete under each socket shall be dug and taken off so that the barrel of the pipe gets full support on the concrete bed. Pipes shall be haunched with concrete tangentially up to the crown of the diameter of the pipe as shown on the drawings. When it crosses under a road, the pipe shall be fully encased in concrete as shown on drawings. The Bidder shall take precautions to maintain always a minimum cushion of earth over the pipes as indicated in the drawings. All pipes shall be carefully examined with a light hammer for soundness before laying. After each section of the pipelines has been laid, the joints shall be allowed to set properly and shall be inspected and tested as directed by the Engineer. Backfilling of the trench shall be carried out only after the approval of the Engineer. After testing, the trench shall be backfilled with selected earth in layers of 200 mm and shall be watered and thoroughly rammed. All pipes, water mains, cables etc. met within the course of excavation shall be carefully protected and supported.
         4. When the pipelines cross roads, the trenches shall have vertical sides with suitable shorting. Any subsidence in the line of trenches after backfilling shall be repaired.
         5. Cast iron rainwater pipes: Cast iron rainwater pipes shall conform to IS: 1230: 1979 and IS: 1729: 1979 and shall be installed as per requirement.
         6. Cast iron rainwater pipes fixed exposed to the external walls shall conform to IS: 1230: 1979 and shall be blocked out at least 20 mm from the plastered surfaces by, means of cast iron bobbins. The rainwater pipes at the roof level shall be fitted with a cast iron bend with a masonry bell mount of suitable size fitted with a cast iron grating. The bottom of the down pipe shall be fitted with a shoe fixed 150 mm above ground/apron level of the building as shown on the drawings. The sockets and spigots of pipes and fittings shall be jointed as specified under Joints of Cast Iron joints.
         7. Cast iron rainwater pipes embedded in concrete or masonry shall conform to IS: 1729: 1979 and shall be securely fixed to wall with wooden plugs and nails. Joints of the sockets and spigots of pipes and fittings shall be as specified under Joints of Cast Iron joints
         8. Welded Steel Pipes :- Laying of welded steel pipes shall conform to IS: 5822-1970.
      4. Inspection Pits and Trap Pits
         1. Construction of pits shall commence only after the pipes have been laid in position to true line and levels as shown on the drawings and to the satisfaction of the Engineer.
         2. Inspection pits: Inspection pits shall be constructed with rubble masonry in cement mortar ( 1: 4) Half round channels of size suitable for the inlet and outlet pipe diameters shall be formed on the floor of the pit with PCC M-10. The floor to the pit shall be haunched towards the channels as shown on the drawings. Inside of pits shall be finished with cement-sand plaster (1:4) and finished smooth with cement punning. Care shall be taken to avoid unevenness on the surface and sharp bends in the channel.
         3. Intercepting/master trap pits: The pits for the glazed stoneware master trap shall be constructed as required. The construction and finishing of the pit shall be haunched towards the intercepting/master trap.
         4. Gully trap pits: Gully trap pits shall be constructed as required. The construction and finishing of the pit shall be as described above for inspection pits. The cast iron grating shall be set flush with the finished ground/apron level.
      5. Testing of Cast Iron, Soil and Waste pipelines:
         1. On completion of laying, the cast iron, soil, waste and ventilation pipelines shall be tested by the Bidder to detect leakages and any other defect in the pipelines.
         2. Test shall be conducted using proper apparatus with attachment for smoke making machine for applying smoke to the pipelines under pressure. Only cotton waste or brown paper soaked in creosote oil shall be used and fired to obtain dense and pungent smoke, while conducting smoke test, top of soil, waste and ventilation pipes shall be kept open till smoke starts coming out of the opening, the openings shall then be securely plugged with expanding rubber or any other approved plug. The floor traps and other openings for connecting sanitary fixtures shall be sealed with water or other approved plug. The entire pipeline shall be tested in suitable section as directed by the Engineer. The entire length or the pipeline including all joints under test shall be closely observed for any sign of smoke leakage. All leakages and defects shall be rectified by the Bidder to the satisfaction of the Engineer.
      6. Testing of Underground Sewer lines
         1. The drainage system shall be tested in accordance with the provision of IS: 1742: 1983. All defects and deficiencies detected during ring the test shall be promptly rectified by the Bidder to the satisfaction of the Engineer.
      7. Water Supply
         1. Jointing and laying of galvanized steel water supply pipes:

Screwed galvanized steel pipes confirming to IS: 1239: 1990 shall be jointed with screwed socket joints and screwed fittings of the same materials as that of the pipes. Any burrs remaining on the pipe ends after the treads are cut shall be removed. An approved jointing compound together with grummet of a few stands of fine yarn shall be used for jointing pipes and fittings. Any pipe treads exposed after jointing shall be painted or in the case of underground piping thickly coated with approved bituminous compound to prevent corrosion.

The depth at which the under ground water supply pipe is to be laid shall be as shown on the drawings. The service pipe passing into or beneath the building shall be laid at least 200 mm below the ground floor level and accommodate in a previously laid sleeve in the structure where it enters the building. The space between the sleeve and the pipe at its entry into the exit from the building shall be filled with a bituminous material for a minimum of 150 mm at both ends.

Piping shall not be buried in walls or floors as far as possible. However, when unavoidable, piping shall be buried for the shortest distance necessary and adequate protection shall be provided against damage

Galvanized steel piping shall be secured by iron or steel clamps and hooks when fixed on walls.

All pipe work shall be completely watertight and the joints shall be such that there are no projections of jointing materials or the like in the interior of pipes. Before the pipeline is commissioned, all piping and fittings shall be flushed clean.

Testing. After the laying and fixing of all galvanized steel water supply pipes and fittings are completed, the line shall be slowly and carefully changed with water to a test pressure of 5 kg per sq cm or the specified working pressure plus 50 % as may be prescribed by the Engineer. Care shall be taken that air in pipelines is completely exhausted while filling the pipelines with water. This pressure shall be maintained for at least one hour, unless otherwise specified. The pipe and fittings shall then be inspected for any leakage of water. Defects in pipes and fittings, if detected, shall be remedied by the Bidder.

* + - * 1. Jointing and laying of high density polyethylene water supply pipes:

All high density polyethylene pipes shall have screwed ends and shall be joined with screwed fittings of the same materials of that of the pipes. Any burrs remaining one the pipe ends after cutting threads shall be removed. If necessary, an approved jointing compound with a few strands of fine yarn may be used for jointing pipes and fittings. All exposed high density polyethylene pipes shall be installed with PVC saddles screwed on 25 mm thick wooden blocks securely fixed on walls at suitable intervals, not exceeding 1 m. Pipes wherever installed in wall chasing shall be fixed as in the case of galvanised steel pipes.

* + - * 1. Jointing of lead pipes:

Joints in lead pipes shall be wiped solder joints. Joints shall be wiped in a continuous circular motion in one direction so as to leave a neatly formed elliptical shaped joints free from tears, burrs, droppings, etc. All exposed lead pipes, excluding 25 mm in diameter, shall be secured to walls by iron clips or lead ears. The spacing of the clips shall not exceed 900 mm.

* + - * 1. Storage of water:

All tanks underground/ overhead for storage of water shall be indicated in the drawings and shall be completely water tight and properly covered with dust, light and mosquito proof cover of approved type. They shall be fitted with a ball valve of approved type, securely fixed to the tank independent of the inlet pipe. A mosquito proof overflow pipe shall be fixed to the tank with the pipe invert about 25 mm above the top of water line. Approved type of stop valve shall be provided for every outlet pipe. All outlet and inlet pipes shall be fixed and shall be shown on the drawings. Support of the tanks shall be indicated on the drawings. Inside surface of galvanised steel tanks shall be painted with anti-corrosive drinking water paints.

* + - * 1. Cleaning and disinfection

All storage tanks, water supply fitting and pipes before being put into commission shall be disinfected with liquid chlorine by the Bidder.

* + - * 1. Installation of Sanitary Appliances:

All sanitary appliances shall be fixed in position rigidly on floor and walls shall be indicated in the drawings/ bill of quantities.

* + - * 1. Water closet -pedestal type: / European type

Pedestal type water closet shall be rigidly fixed on the finished floor by means of 75 m long brass crews with suitable plugs. The flushing cistern shall be of porcelain or cast iron low level push down cistern of capacity shall be indicated in the bill of quantities. The cistern shall be supported on a pair of cast iron or rolled steel cantilever brackets firmly fixed on wall with brass crews and suitable plugs. The flush pipe from the cistern shall be 40 mm dia chromium plated brass been and fitted to the closet by means of rubber adopter. The closet shall be provided with double plastic seat cover conforming to IS: 2548: 1996 and chromium plated hinges.

* + - * 1. Urinals: Font lipped flat back type urinals shall be firmly fitted on finished wall by means of 50 mm long brass screw and suitable plugs. Height of the lip from the standing point shall be shown on the drawings. Urinals shall be fitted with cast iron automatic flushing cistern of required capacity and shall be described in the bill of quantities and in the drawings. Flushing pipes shall be of galvanised steel pipes of required sizes and connected to the urinal with 15 mm dia PVC connected fitted with brass cap and lining at one end. The joint to the inlet of urinal shall be neatly finished with putty joints.
        2. The arrangement of waster pipes and discharge to the floor trap shall be shown on the drawings. For single urinal the discharge may be direct to the floor trap through a 40 mm dia waste pipe. For a range of urinals, the discharge may be collected in a common waste pipe of 50 mm dia leading to the floor trap. Each urinal shall be connected to the common discharge pipe by 40 mm dia waste pipes. Alternatively, the discharge from each urinal through 40 mm dia pipe shall be lead to the floor trap.
        3. Wash hand basin: Wash hand basin shall be fitted in position to true level on a pair of cast iron brackets rigidly fixed on wall with 50 mm long brass screws and suitable pugs. The basin shall be fitted with 15 mm dia approved quality chromium plated pillar tap and 32 mm dia waste fittings. The type of waste pipes and their connections shall be shown in the drawings.
        4. Sink: Porcelain sink of size as indicated in the bill of on a pair of cast iron cantilever brackets firmly embedded in the wall brass waste fittings of standard size. The type of waste pipes and their connections shall be shown on the drawing.
        5. Other miscellaneous fittings (e.g. mirror, towels rails, soap cases etc.)
        6. All such fittings shall be of type and sizes shall be prescribed in the bill of quantities and shall be fitted in position true to line, level and plane.

1. **COMMISSIONING AND PERFORMANCE GUARANTEE**
   1. **GENERAL**
      1. The Bidder shall take the full responsibility of performance of all works including its related activities for materials, workmanship, construction & erection/ execution of items supplied and erected by him.
      2. Testing of concrete shall be done as per IS 456: 2000. The result of concrete cube tests shall be furnished to the Employer for interpretation & information.
      3. All manufacturers’ test certificates of all items supplied by the Bidder shall be handed over the Employer/ Engineer In-Charge.
   2. **COMPLETION CERTIFICATE**
      1. On completion of erection of all the facilities by the Bidder, inspection of the structures shall be carried out by the Employer / Engineer In-Charge to ensure that all the facilities have been supplied and erected as per contract and after erection these facilities are fit for regular use. After the inspection, a defect list will be prepared by the employer and handed over to the bidder. On liquidation of all the defects, the bidder shall again ask the employer for inspection.
      2. After satisfying himself, that all defects have been liquidated and all facilities have been supplied and erected as per the scope of work as per the contract and drawings, Employer/ Engineer In-Charge shall issue Completion Certificate.
   3. **DEFECT LIABILITY PERIOD**
      1. The defect liability period shall be for a period of 12 months after issue of Completion Certificate.
      2. Any defect during construction and erection due to faulty material or bad workmanship noted during defect liability period shall be rectified by the Bidder at their own cost. The Bidder shall guarantee the quality of materials. Manufacturers’ test certificates of all items supplied by the Bidder shall be handed over. Test certificates for RCC works, if applicable, shall be furnished.
      3. All defects noted before the expiry of the guarantee period due to faulty material or bad workmanship shall be totally liquidated to the satisfaction of the Employer/ Engineer In-Charge.
   4. **FINAL ACCEPTANCE**

After successful completion of defect liability period without any pending defect, and when all facilities erected / constructed by the Bidder have been found to be working satisfactorily for the intended purpose, final acceptance shall be deemed to have been completed and Employer/ Engineer In-Charge shall issue the Final Acceptance Certificate (FAC).

**DECLARATION OF SITE VISIT**

(To be filled up by the Bidder)

I, hereby, declare that I have visited the site to understand the site conditions, and acquainted myself with atmosphere prevalent therein. I have also understood the extent of total works involved for this package.

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|  | Signature of the Bidder: |
| Seal of company | Name: |
|  | Designation: |

**LIST OF EXCLUSIONS**

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| --- | --- | --- | --- |
| **Sl. No.** | **Reference clause of TS** | **Details of Exclusions** | **Reasons** |
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| Seal of company | Name |
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**LIST OF DEVIATIONS**

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| **Sl. No.** | **Reference clause of TS** | **Details of Deviations** | **Reasons** |
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| Seal of company | Name |
|  | Designation |

**DETAILS OF AUTHORISED PERSON OF BIDDER DURING TENDER EVALUATION**

1. Name of Project :
2. Tender No. :
3. Name & Address of Bidder :
4. Name of authorized person (TECHNICAL) :
5. Email address :
6. Mobile No. :
7. Name of alternate authorised person (TECH) :
8. Email address :
9. Mobile No. :
10. Name of authorized person (COMMERCIAL) :
11. Email address :
12. Mobile No. :
13. Name of alternate authorised person (COMM) :
14. Email address :
15. Mobile No. :

Authorised Signatory

**REQUIREMENT OF CONSTRUCTION WATER & POWER**

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| **Sl. No.** | **Description** | **Quantity** |
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|  | Signature of the Bidder |
| Seal of company | Name |
|  | Designation |

| Item No. | Description | Unit | Quantity | Rate | Amount |
| --- | --- | --- | --- | --- | --- |
| S-1 | ***Preparation of GA, marking and detail fabrication drawings*** based on design drawings supplied by the Purchaser, ***supply of all structural materials*** (including chequered plates, gratings etc.) loading, transportation, unloading to place of fabrication, ***fabrication of all structures***, welding including supply of electrodes and required all consumable as per final fabrication drawings and specifications, inspection, testing and applying one coat of specified quality primer (including supply of primer) as per specifications and delivery of fabricated structures from fabrication yard to the site of erection including handling, storing, stacking with Bidder's own tools, tackles, consumable, handling equipment, labour etc. complete as directed by the Engineer in charge. (The rate for **supply & fabrication** shall include burning losses, cutting allowances, scrap generation etc. The quantity for payment shall be as per BOM (Bill of material) of finalized fabrication drawings. No payment shall be made for rolling margins, burning losses, cutting allowances, scrap generation etc). | T |  |  |  |
| S-2 | Taking delivery of fabricated structures, as in S-1 at erection site including handling, storing, stacking, site assembly etc. ***erection*** of fabricated structures, fixing in position including alignment, levelling, securing, fixing, bolting including supply of bolts and nuts, welding, checking, gas cutting, grinding, matching with the other structures etc. at all heights complete in all respects, applying one coat of primer and two coats of finish paints (including supply of primer & finish paint) including supply of all consumables, as per specification and final GA drawings or as directed by the Engineer-in-Charge with Bidder's own tools, tackles, temporary support, scaffolding, equipment, labour etc. complete. | T |  |  |  |
| S-3 | ***Preparation of GA, marking and detail fabrication drawings*** based on design drawings supplied by the Purchaser, supply of all steel structural ***rails*** including fixtures, loading, transportation, unloading to place of fabrication, ***fabrication*** of all items, welding including supply of electrodes and required all consumable as per final fabrication drawings and specifications, inspection, testing and applying one coat of specified quality primer (including supply of primer) as per specifications (bottom half of rails below head and fixtures shall be painted) and delivery of fabricated structures from fabrication yard to the site of erection including handling, storing, stacking with Bidder's own tools, tackles, consumable, handling equipment, labour etc. complete as directed by the Engineer in charge. (The rate for supply & fabrication shall include burning losses, cutting allowances, scrap generation etc. The quantity for payment shall be as per BOM (Bill of material) of finalized fabrication drawings. No payment shall be made for rolling margins, burning losses, cutting allowances, scrap generation etc). | T |  |  |  |
| S-4 | Taking delivery of fabricated structures, as in S-3 at erection site including handling, storing, stacking, site assembly etc. ***erection*** of fabricated items, fixing in position including alignment, levelling, securing, fixing, bolting including supply of bolts and nuts, welding, checking, gas cutting, grinding, matching with the other structures etc. at all heights complete in all respects, applying one coat of primer and two coats of finish paints (including supply of primer & finish paint) including supply of all consumables as per specification (bottom half of rails and fixtures shall be painted) and final GA drawings or as directed by the Engineer-in-Charge with Bidder's own tools, tackles, temporary support, scaffolding, equipment, labour etc. complete | T |  |  |  |
| S-5 | ***Supply, laying & fixing of pre-painted Al-Zn coated profiled sheeting*** at all heights in roofs and side walls, including transporting, cutting, placing, holing, supply & fixing of all fixtures as per drawings/ specifications and as directed by Engineer in Charge with Bidder's own tools, tackles, temporary support, scaffolding, handling equipment, labour etc. complete (net laid surface area of sheeting work shall be considered for payment purpose). | Sqm |  |  |  |
| S-6 | ***Supply, laying & fixing of pre-painted Al-Zn coated plain sheet*** flashing work at ridges in roofs and corners of walls etc., including transporting, cutting, placing, holing, supply & fixing of all fixtures as per design drawings/ specifications and as directed by Engineer in Charge with Bidder's own tools, tackles, temporary support, scaffolding, handling equipment, labour etc. complete (net laid surface area of sheeting work for flashing shall be considered for payment purpose). | Sqm |  |  |  |
| S-7 | **S*upplying, laying & fixing of corrugated galvanised steel (CGS) sheet*** at all heights in roofs and sides including transporting, cutting, placing, holing, supply & fixing of all fixtures as per design drawings / specifications and as directed by Engineer in Charge with Bidder's own tools, tackles, temporary support, scaffolding, handling equipment, labour etc. complete (net laid surface area of sheeting work shall be considered for payment purpose). |  |  |  |  |
| a) | 18 G CGS sheet | Sqm |  |  |  |
| b) | 20 G CGS sheet | Sqm |  |  |  |
| c) | 22 G CGS sheet | Sqm |  |  |  |
| S-8 | ***Supplying, laying & fixing of galvanized plain steel (GPS) sheet*** with 150 mm lapping with CGS sheets on either side including transporting, cutting, bending to shape for ridging and/or corner flashing work, placing, holing and fixing in position at all heights above finished floor level, including supply & fixing of all fixtures as per design drawings / specifications and as directed by Engineer in Charge with Bidder's own tools, tackles, temporary support, scaffolding, handling equipment, labour etc. complete (net laid surface area of sheeting for flashing work shall be considered for payment purpose). |  |  |  |  |
| a) | 18 G GPS sheet | Sqm |  |  |  |
| b) | 20 G GPS sheet | Sqm |  |  |  |
| c) | 22 G GPS sheet | Sqm |  |  |  |
| S-9 | ***Supplying***, cutting, cleaning, placing and ***fixing*** in position at all heights above ground level ***6mm thick rolled wired glass*** with mesh formed with 0.56 mm diameter steel wires including supply and providing all necessary consumables like putty, round head nail, glazing pin, rubber gasket etc as per design drawings / specification and as directed by Engineer in Charge with Bidder's own tools, tackles, temporary support, scaffolding, handling equipment, labour etc. complete(net laid surface area of sheeting work shall be considered for payment purpose). | Sqm |  |  |  |
| S-10 | ***Supply***, shaping and ***fixing wooden blocks*** (Sal wood of approved quality) to be used as crane rail buffers stopper including supply and fixing with through bolts, nuts and washers as shown on the design drawings with Bidder's own tools, tackles, handling equipment, labour etc. complete. | cm3 |  |  |  |
| S-11 | ***Dismantling*,** with due care, the ***existing steelwork*** (including chequered plates, gratings, rails and fixtures etc.) as per specification and / or as per design drawing and /or as per direction of Engineer-in-charge at all heights and levels including loading, transporting, ***unloading and stacking*** the dismantled as *usable* and non-usable structures at a specified location (within plant boundary and within 10 km from site) as directed by the Engineer in charge with all tools, tackles, temporary support, scaffolding, equipment, labour complete (payment shall be made on the basis of actual measurement of dismantled structures in weigh bridge). | T |  |  |  |
| S-12 | ***Dismantling*,** with due care, the ***existing sheeting work*** as per specification and or as per design drawing or as per direction of Engineer-in-charge at all heights and levels including loading, transporting, ***unloading and stacking*** the dismantled sheet at a specified location (within plant boundary and within 10 km from site) as directed by the Engineer in-charge with all tools, tackles, temporary support, scaffolding, equipment, labour complete(net laid area of sheeting shall be considered for dismantled quantity for payment). | Sqm |  |  |  |
| S-13 | ***Re-erection,*** at a later stage of work, including strengthening / modification / making good of the same to restore it to original arrangement or as shown in final fabrication drawings, of dismantled re-useable structures, as in S-9, including all necessary handling, identification, transportation, fixing in position including alignment, securing, bolting including supply of bolts and nuts, welding, cutting, grinding, matching with the other structures etc. at all heights complete in all respects, applying one coat of primer and two coats of finish paints (including supply of primer & finish paint) including supply of all consumables, as per specification or as directed by the Engineer-in-Charge with Bidder's own tools, tackles, temporary support, scaffolding, equipment, labour etc. complete. The quantity for payment shall be as per BOM (Bill of material) of finalized fabrication drawings. (The rate for fabrication & erection shall include burning losses, cutting allowances, scrap generation etc. The quantity for payment shall be as per BOM (Bill of material) of finalized fabrication drawings. No payment shall be made for rolling margins, burning losses, cutting allowances, scrap generation etc) | T |  |  |  |

| **Item** | **Description** | **Unit** | **Qty** | **Rate** | | **Amt** | **DSR 2018** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EARTHWORK** | | | | | | |  |
| EW-1 | **Earth work in excavation**, including pumping and bailing out sub-soil water / storm water / any other water accidentally present, slush removal, slag/ scrap iron/metal removal, etc. completein all kinds of soil including the existing layers of ground which may consist of dust, dirt, rubbish, in compacted & as it is condition of thickness whatsoever both in dry & wet conditions etc., by mechanical means (Hydraulic excavator) / manual means, in all kinds of soil, in foundation trenches or drains (not exceeding 1.5 m in width or 10 sqm on plan), including dressing of sides and ramming of bottoms, lift upto 1.5 m, including getting out the excavated soil and disposal of surplus excavated soil as directed, within a lead of 50 m. | Cum |  | 252.30 | |  | 2.8.1 |
| EW-2 | **Filling available excavated earth** (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20cm in depth, consolidating each deposited layer by ramming and watering, lead up to 50 m and lift upto 1.5 m. | Cum |  | 219.65 | |  | 2.25 |
| EW-3 | **Excavating, supplying and filling of local earth** (including royalty) by mechanical transport upto a lead of 5km also including ramming and watering of the earth in layers not exceeding 20 cm in trenches, plinth, sides of foundation etc. complete. | Cum |  | 323.90 | |  | 2.25 (a) |
| EW-4 | **Transportation of surplus excavated earth** from the stacked heap and disposal of the same to location as directed by engineer in-charge, lead upto 5Km from the initial lead of 100m of item no EW-1 above with all operation such as excavation, loading, dressing and leveling of disposed off heap, all labour, materials transport tools and tackles complete. | Cum |  | 201.83 | |  | 1.1.2 (col. 8) |
| EW-5 | **Supplying and filling in plinth with sand** under floors, including watering, ramming, consolidating and dressing complete. | Cum |  | 1953.05 | |  | 2.27 |
| EW-6 | **Surface dressing** of the ground, in all kinds of soil, including removing vegetation and inequalities not exceeding 15 cm deep and disposal of rubbish, lead up to 50 m and lift up to 1.5 m. | Sqm |  | 24.35 | |  | 2.28 |
| **PILING** | | | | | | |  |
| P-1 | **Mobilization of piling rigs,** equipment, accessories, test rigs & fixtures and personnel etc., whatsoever numbers required and for Piles of all dia as per the requirements, including transportation of above to site, erection of piling rigs at site and dismantling and transportation back of the all the equipment on completion of the work, complete, in all respect to the satisfaction of Engineer-in-Charge | Lot |  |  | |  |  |
| P-2 | **Boring, providing and installation bored cast-in-situ reinforced cement concrete piles** of garde M-25 of specified diameter and length below pile cap, to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including the cost of boring with bentonite solution and temporary casing of appropriate length for setting out and removal of same and the length of the pile to be embedded in the pile cap etc. by Crawler mounted, telescopic boom hydraulic pilling Rig all complete, including removal of excavated earth with all its lifts and leads (length of pile for payment shall be measured up to bottom of pile cap).  Note: Truck Mounted rotary/TMR/Tube well boring machine shall not be used. |  |  |  | |  |  |
| a) | 600 mm dia piles | metre |  | 4225.60 | |  | 20.2A.1 |
| b) | 750 mm dia piles | metre |  | 6118.15 | |  | 20.2A.2 |
| c) | 1000 mm dia piles | metre |  | 10281.35 | |  | 20.2A.3 |
| d) | 1200 mm dia piles | metre |  | 13588.90 | |  | 20.2A.4 |
| e) | 1500 mm dia piles | metre |  | 19670.35 | |  | 20.2A.5 |
| P-3 | Boring with **hydraulic piling rigs with power units**, providing andinstalling cast in situ **single under reamed piles** of specified diameter and length below pile cap in M-25 cement concrete, to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including the cost of boring with bentonite solution and the length of the pile to be embedded in pile cap etc. all complete. (Length of pile for payment shall be measured upto to the bottom of pile cap) : |  |  |  | |  |  |
| a) | 350 mm dia piles | metre |  | 2387.40 | |  | 20.3.1 |
| b) | 400 mm dia piles | metre |  | 2951.10 | |  | 20.3.2 |
| c) | 450 mm dia piles | metre |  | 3287.30 | |  | 20.3.3 |
| d) | 550 mm dia piles | metre |  | 3689.90 | |  | 20.3.4 |
| P-4 | **Extra over single under ream** for providing additional bulbs in under reamed piles, under specified diameter(only the nos. of extra bulbs are to be paid) |  |  |  | |  |  |
| a) | 350 mm dia piles | each |  | 1931.85 | |  | 20.4.1 |
| b) | 400 mm dia piles | each |  | 2183.65 | |  | 20.4.2 |
| c) | 450 mm dia piles | each |  | 2335.50 | |  | 20.4.3 |
| d) | 550 mm dia piles | each |  | 2558.20 | |  | 20.4.4 |
| P-5 | Providing, supplying, cutting, bending, fabricating and placing in position **reinforcement cage** with **TMT/CTD** bars conforming to **IS:1786-2008**, having a minimum yield strength of 500 N/mm2 of specified diameter and helical / spiral stirrups including binding with **20 SWG** wire and welding with longitudinal reinforcement with sufficient number of 1:2 cement sand mortar cover blocks, lifting the cage and placing the same within the casing tube true to vertical with all labour, material, tools, tackles, etc., complete as per the direction of the Engineer-in-Charge. | MT |  |  | |  | 5.22A.6 |
| P-6 | **Vertical load testing of piles** in accordance with IS 2911 (Part IV) including installation of loading platform by Kentledge/Anchor piles method and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of Engineer in-charge for **Single pile upto 50 tonne Safe capacity**  **Note: 1**. Initial and Routine Load Test shall not be carried out by Dynamic method of testing.  **Note: 2**. Testing agency shall submit the design of loading platform for the approval of Engineer-in-charge. |  |  |  | |  |  |
| a) | Initial test (Test Load 2.5 times the Safe capacity) | Nos. |  | 53517.50 | |  | 20.6.1.1 |
| b) | Routine test (Test Load 1.5 times the Safe capacity) | Nos. |  | 20069.05 | |  | 20.6.1.2 |
| P-7 | **Vertical load testing of piles** in accordance with IS 2911 (Part IV) including installation of loading platform by Kentledge/Anchor piles method and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of Engineer in-charge for **Single pile above 50 tonne and upto 100 tonne Safe capacity**  **Note: 1**. Initial and Routine Load Test shall not be carried out by Dynamic method of testing.  **Note: 2**. Testing agency shall submit the design of loading platform for the approval of Engineer-in-charge. |  |  |  | |  |  |
| a) | Initial test (Test Load 2.5 times the Safe capacity) | Nos. |  | 60207.20 | |  | 20.6.2.1 |
| b) | Routine test (Test Load 1.5 times the Safe capacity) | Nos. |  | 30772.55 | |  | 20.6.2.2 |
| P-8 | **Vertical load testing of piles** in accordance with IS 2911 (Part IV) including installation of loading platform by Kentledge/Anchor piles method and preparation of pile head or construction of test cap and dismantling of test cap after test etc. complete as per specification & the direction of Engineer in-charge for **Group of two or more piles upto 50 tonne Safe capacity**  **Note: 1**. Initial and Routine Load Test shall not be carried out by Dynamic method of testing.  **Note: 2**. Testing agency shall submit the design of loading platform for the approval of Engineer-in-charge. |  |  |  | |  |  |
| a) | Initial test (Test Load 2.5 times the Safe capacity) | Nos. |  | 66896.90 | |  | 20.6.3.1 |
| b) | Routine test (Test Load 1.5 times the Safe capacity) | Nos. |  | 39469.15 | |  | 20.6.3.2 |
| P-9 | Cyclic vertical load testing of pile in accordance with IS Code of practice IS:2911 (part IV) by Kentledge method including preparation of pile head etc for **Single pile** |  |  |  | |  |  |
| a) | Upto 50 tonne Safe capacity pile. | Nos. |  | 20069.05 | |  | 20.7.1.1 |
| b) | Above 50 tonne and upto 100 tonne Safe capacity pile | Nos. |  | 30772.55 | |  | 20.7.1.2 |
| P-10 | Cyclic vertical load testing of pile in accordance with IS Code of practice IS:2911 (part IV) by Kentledge method including preparation of pile head etc for **Group of two or more piles** upto 400 tonne Safe capacity of group |  |  | 39469.15 | |  | 20.7.2.1 |
| P-11 | Lateral load testing of single pile in accordance with IS Code of practice IS : 2911 (Part IV) for determining safe allowable lateral load on pile : |  |  |  | |  |  |
| a) | Upto 50 tonne capacity pile. |  |  | 20069.05 | |  | 20.8.1 |
| b) | Above 50 tonne and upto 100 tonne capacity pile |  |  | 31575.35 | |  | 20.8.2 |
| **CONCRETE** | | | | | | |  |
| C-1 | Providing and laying in position cement concrete of specified grade excluding the cost of centering and shuttering - All work up to plinth level : |  |  |  | |  |  |
| a) | 1:1½:3 (1 Cement: 1½ coarse sand (zone-III) : 3 graded stone aggregate 20 mm nominal size) | Cum |  | 7210.55 | |  | 4.1.2 |
| b) | 1:2:4 (1 cement : 2 coarse sand (zone-III) : 4 graded stone aggregate 20 mm nominal size) | Cum |  | 6788.60 | |  | 4.1.3 |
| c) | 1:3:6 (1 Cement : 3 coarse sand (zone-III) : 6 graded stone aggregate 20 mm nominal size) | Cum |  | 6259.10 | |  | 4.1.5 |
| d) | 1:5:10 (1 cement : 5 coarse sand (zone-III): 10 graded stone aggregate 40 mm nominal size | Cum |  | 5520.30 | |  | 4.1.10 |
| C-2 | Providing and laying cement concrete in retaining walls, return walls, walls (any thickness) including attached pilasters, columns, piers, abutments, pillars, posts, struts, buttresses, string or lacing courses, parapets, coping, bed blocks, anchor blocks, plain window sills, fillets, sunken floor etc., up to floor five level, excluding the cost of centering, shuttering and finishing: |  |  |  | |  |  |
| a) | 1:1½:3 (1 cement : 1½ coarse sand (zone-III) : 3 graded stone aggregate 20 mm nominal size). | Cum |  | 8976.45 | |  | 4.2.2 |
| b) | 1:2:4 (1 Cement : 2 coarse sand (zone-III) : 4 graded stone aggregate 20 mm nominal size) | Cum |  | 8554.50 | |  | 4.2.3 |
| c) | 1:3:6 (1 cement : 3 coarse sand (zone-III) : 6 graded stone aggregate 20 mm nominal size) | Cum |  | 8025.00 | |  | 4.2.5 |
| d) | 1:5:10 (1 cement : 5 coarse sand (zone-III) : 10 graded stone aggregate 40 mm nominal size) | Cum |  | 7273.25 | |  | 4.2.8 |
| C-3 | Centering and shuttering including strutting, propping etc. and removal of form work for : |  |  |  | |  |  |
| a) | Foundations, footings, bases for columns | Sqm |  | 284.85 | |  | 4.3.1 |
| b) | Retaining walls, return walls, walls (any thickness) including attached pilasters, buttresses, plinth and string courses fillets, kerbs and steps etc. | Sqm |  | 609.30 | |  | 4.3.2 |
| c) | Suspended floors, roofs, landings, balconies and access platform | Sqm |  | 693.05 | |  | 5.9.3 |
| d) | Lintels, beams, plinth beams, girders, bressumers and cantilevers | Sqm |  | 552.05 | |  | 5.9.5 |
| e) | Columns, Pillars, Piers, Abutments, Posts and Struts | Sqm |  | 733.70 | |  | 5.9.6 |
| C-4 | Providing and laying damp-proof course 40mm thick with cement concrete 1:2:4 (1 cement : 2 coarse sand (zone-III): 4 graded stone aggregate 12.5mm nominal size). | Sqm |  | 347.90 | |  | 4.10 |
| C-5 | Steel reinforcement for R.C.C. work including straightening, cutting, bending, placing in position and binding all complete upto plinth level.  Hot rolled deformed bars | Kg |  | 83.50 | |  | 5.22.4 |
| C-6 | Providing and laying in position machine batched and machine mixed design mix M-25 grade cement concrete for reinforced cement concrete work, using cement content as per approved design mix, including pumping of concrete to site of laying but excluding the cost of centering, shuttering, finishing and reinforcement, including admixtures in recommended proportions as per IS: 9103 to accelerate, retard setting of concrete, improve workability without impairing strength and durability as per direction of Engineer-in-charge.  (Note :- Cement content considered in this item is @ 330 kg/cum. Excess/ less cement used as per design mix is payable/recoverable separately). |  |  |  | |  |  |
| a) | All works upto plinth level | Cum |  | 7997.30 | |  | 5.33.1 |
| b) | All works above plinth level upto floor V level | Cum |  | 9400.85 | |  | 5.33.2 |
| C-7 | Extra for providing richer mixes at all floor levels.  Note:- Excess/less cement over the specified cement content used is payable /recoverable separately. |  |  |  | |  |  |
| a) | Providing M-30 grade concrete instead of M-25 grade BMC/ RMC. (Note:- Cement content considered in M-30 is @ 340 kg/cum) | Cum |  | 69.75 | |  | 5.34.1 |
| b) | Providing M-35 grade concrete instead of M-25 grade BMC/ RMC. (Note : Cement content considered in M-35 is @ 350 kg/ cum) | Cum |  | 139.45 | |  | 5.34.2 |
| c) | Providing M-40 grade concrete instead of M-25 grade BMC/ RMC.(Note : Cement content considered in M-40 is @ 360 kg/ cum) | cum |  | 209.20 | |  | 5.34.3 |
| C-8 | Providing and placing in position precast reinforced cement concrete waffle units, square or rectangular, as per design and shape for floors and roofs in 1:1½:3 (1 Cement : 1½ coarse sand (zone-III) : 3 graded  stone aggregate 10 mm nominal size), including flush or deep ruled pointing at joints in Cement mortar 1:2 (1 Cement : 2 Fine sand), making necessary holes of required sizes for carrying through service lines etc., providing steel hooks for lifting etc, form work in precasting, handling, hoisting, centering and erection complete for all floor levels but, excluding the cost of reinforcement. | Cum |  | 25483.10 | |  | 5.36 |
| **BRICKWORK** | | | | | | |  |
| B-1 | Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundation and plinth in: |  |  |  | |  |  |
| a) | Cement mortar 1:4 (1 cement : 4 coarse sand) | Cum |  | 6376.25 | |  | 6.1.1 |
| b) | Cement mortar 1:6 (1 cement : 6 coarse sand) | Cum |  | 6157.45 | |  | 6.1.2 |
| B-2 | Brick work with common burnt clay modular bricks of class designation 7.5 in foundation and plinth in: |  |  |  | |  |  |
| a) | Cement mortar 1:4 (1 cement : 4 coarse sand) | Cum |  | 5495.15 | |  | 6.2.1 |
| b) | Cement mortar 1:6 (1 cement : 6 coarse sand) | Cum |  | 5302.60 | |  | 6.2.2 |
| B-3 | Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level in all shapes and sizes in : |  |  |  | |  |  |
| a) | Cement mortar 1:4 (1 cement : 4 coarse sand) | Cum |  | 7809.25 | |  | 6.4.1 |
| b) | Cement mortar 1:6 (1 cement : 6 coarse sand) | Cum |  | 7590.45 | |  | 6.4.2 |
| B-4 | Extra for brick work / AAC block masonry / Tile brick masonry in superstructure above floor V level, for each four floors or part thereof by mechanical means. | Cum |  | 236.65 | |  | 6.5 |
| B-5 | Half brick masonry with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in foundations and plinth in : |  |  |  | |  |  |
| a) | Cement mortar 1:3 (1 cement : 3 coarse sand) | Sqm |  | 798.25 | |  | 6.12.1 |
| b) | cement mortar 1:4 (1 cement : 4 coarse sand) | Sqm |  | 773.75 | |  | 6.12.2 |
| B-6 | Half brick masonry with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor  V level. |  |  |  | |  |  |
| a) | Cement mortar 1:3 (1 cement : 3 coarse sand) | Sqm |  | 956.60 | |  | 6.13.1 |
| b) | cement mortar 1:4 (1 cement : 4 coarse sand) | Sqm |  | 932.10 | |  | 6.13.2 |
| B-7 | Extra for half brick masonry in superstructure, above floor V level for every four floors or part thereof by mechanical means. | Sqm |  | 20.95 | |  | 6.14 |
| B-8 | Extra for providing and placing in position 2 Nos 6mm dia. M.S. bars at every third course of half brick masonry. | Sqm |  | 80.10 | |  | 6.15 |
| **FINISHING** | | | | | | |  |
| F-1 | 12 mm cement plaster of mix : |  |  | |  |  |  |
| a) | 1:4 (1 cement: 4 fine sand) | Sqm |  | | 266.85 |  | 13.1.1 |
| b) | 1:6 (1 cement: 6 fine sand) | Sqm |  | | 254.25 |  | 13.1.2 |
| F-2 | 15 mm cement plaster on the rough side of single or half brick wall of mix : |  |  | |  |  |  |
| a) | 1:4 (1 cement: 4 fine sand) | Sqm |  | | 307.90 |  | 13.2.1 |
| b) | 1:6 (1 cement: 6 fine sand) | Sqm |  | | 292.85 |  | 13.2.2 |
| F-3 | 20 mm cement plaster of mix : |  |  | |  |  |  |
| a) | 1:4 (1 cement: 4 fine sand) | Sqm |  | | 365.25 |  | 13.3.1 |
| b) | 1:6 (1 cement: 6 fine sand) | Sqm |  | | 345.65 |  | 13.3.2 |
| F-4 | 12 mm cement plaster of mix : |  |  | |  |  |  |
| a) | 1:4 (1 cement: 4 coarse sand) | Sqm |  | | 276.15 |  | 13.4.1 |
| b) | 1:6 (1 cement: 6 coarse sand) | Sqm |  | | 263.55 |  | 13.4.2 |
| F-5 | 15 mm cement plaster on the rough side of single or half brick wall of mix : |  |  | |  |  |  |
| a) | 1:4 (1 cement: 4 coarse sand) | Sqm |  | | 318.95 |  | 13.5.1 |
| b) | 1:6 (1 cement: 6 coarse sand) | Sqm |  | | 303.90 |  | 13.5.2 |
| F-6 | 20 mm cement plaster of mix : |  |  | |  |  |  |
| a) | 1:4 (1 cement: 4 coarse sand) | Sqm |  | | 379.70 |  | 13.6.1 |
| b) | 1:6 (1 cement: 6 coarse sand) | Sqm |  | | 360.10 |  | 13.6.2 |
| F-7 | 6 mm cement plaster of mix : |  |  | |  |  |  |
| a) | 1:3 (1 cement : 3 fine sand) | Sqm |  | | 227.35 |  | 13.16.1 |
| F-8 | White washing with lime to give an even shade : |  |  | |  |  |  |
| a) | New work (three or more coats) | Sqm |  | | 28.55 |  | 13.37.1 |
| F-9 | Distempering with dry distemper of approved brand and manufacture (two or more coats) of required shade on new work, over and including water thinnable priming coat to give an even shade. | Sqm |  | | 117.75 |  | 13.40 |
| F-10 | Applying one coat of water thinnable cement primer of approved brand and manufacture on wall surface : |  |  | |  |  |  |
| a) | Water thinnable cement primer | Sqm |  | | 60.00 |  | 13.43.1 |
| F-11 | Finishing walls with Acrylic Smooth exterior paint of required shade : |  |  | |  |  |  |
| a) | New work (Two or more coat applied @ 1.67 ltr/10 sqm over and including priming coat of exterior primer applied @ 2.20 kg/10 sqm) | Sqm |  | | 164.70 |  | 13.46.1 |
| F-12 | Applying priming coat: |  |  | |  |  |  |
| a) | With ready mixed pink or Grey primer of approved brand and manufacture on wood work (hard and soft wood) | Sqm |  | | 57.05 |  | 13.50.1 |
| b) | With ready mixed aluminum primer of approved brand and manufacture on resinous wood and plywood | Sqm |  | | 57.55 |  | 13.50.2 |
| c) | With ready mixed red oxide zinc chromate primer of approved brand and manufacture on steel galvanized iron/ steel works | Sqm |  | | 50.70 |  | 13.50.3 |
| d) | With ready mixed red oxide zinc chromate primer of approved brand and manufacture on steel work (second coat) | Sqm |  | | 27.20 |  | 13.50.4 |
| F-13 | Finishing with Epoxy paint (two or more coats) at all locations prepared and applied as per manufacturer’s specifications including appropriate priming coat, preparation of surface, etc. complete. |  |  | |  |  |  |
| a) | On steel work | Sqm |  | | 189.75 |  | 13.52.1 |
| b) | On concrete work | Sqm |  | | 189.40 |  | 13.52.2 |
| F-14 | Wall painting with acrylic emulsion paint of approved brand and manufacture to give an even shade : |  |  | |  |  |  |
| a) | Two or more coats on new work | Sqm |  | | 128.65 |  | 13.60.1 |
| F-15 | Painting with synthetic enamel paint of approved brand and manufacture to give an even shade : |  |  | |  |  |  |
| a) | Two or more coats on new work | Sqm |  | | 121.55 |  | 13.61.1 |
| F-16 | Painting with aluminum paint of approved brand and manufacture to give an even shade. |  |  | |  |  |  |
| a) | Two or more coats on new work | Sqm |  | | 112.25 |  | 13.63.1 |
| F-17 | Painting with black anti-corrosive bitumastic paint of approved brand and manufacture to give an even shade : |  |  | |  |  |  |
| a) | Two or more coats on new work | Sqm |  | | 106.05 |  | 13.65.1 |
| F-18 | Providing and applying white cement based putty of average thickness 1 mm, of approved brand and manufacturer, over the plastered wall surface to prepare the surface even and smooth complete. | Sqm |  | | 115.15 |  | 13.80 |
| **DISMANTLING AND DEMOLISHING** | | | | | | | |
| D-1 | Demolishing cement concrete manually/ by mechanical means including disposal of material within 50 meters lead as per direction of Engineer - in - charge. |  |  | |  |  |  |
| a) | Nominal concrete 1:3:6 or richer mix (i/c equivalent design mix) | Cum |  | | 1737.45 |  | 15.2.1 |
| b) | Nominal concrete 1:4:8 or leaner mix (i/c equivalent design mix) | Cum |  | | 1072.80 |  | 15.2.2 |
| D-2 | Demolishing R.C.C. work manually/ by mechanical means including stacking of steel bars and disposal of unserviceable material within 50 metres lead as per direction of Engineer - in- charge. | Cum |  | | 2534.70 |  | 15.3 |
| D-3 | Demolishing brick work manually/ by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 meters lead as per direction of Engineer-in-charge. |  |  | |  |  |  |
| a) | In cement mortar | Cum |  | | 1469.90 |  | 15.7.4 |
| D-4 | Dismantling doors, windows and clerestory windows (steel or wood) shutter including chowkhats, architrave, holdfasts etc. complete and stacking within 50 meters lead : |  |  | |  |  |  |
| a) | Of area 3 sq. meters and below | each |  | | 274.50 |  | 15.12.1 |
| b) | Of area beyond 3 sq. meters | each |  | | 375.65 |  | 15.12.2 |
| D-5 | Taking out doors, windows and clerestory window shutters (steel or wood) including stacking within 50 meters lead : |  |  | |  |  |  |
| a) | Of area 3 sq. meters and below | each |  | | 106.55 |  | 15.13.1 |
| b) | Of area beyond 3 sq. meters | each |  | | 140.70 |  | 15.13.2 |
| **RAILWAY WORKS** | | | | | | |  |
| RL-1 | Supplying, laying and linking of B.G. straight or curve track complete with 60 kg. rails on pre-stressed mono block concrete sleepers (for 60 kg /m rail) as per RDSO drawing No. T-2496 or 4186 and IRS Specification T-39, with latest alterations, if any) M+7 (Type-II track) density with all standard fittings (as per RDSO standard and IRS Specification, with latest alterations, if any) on straight and on curves. In sharp curves the tracks shall be laid with staggered joints to M+7+1 sleeper density. The work shall ensure correct spacing of sleepers, fixing & tightening of Fish bolts & nuts and maintaining proper gauge, alignment, level (both cross & longitudinal ), expansion gap at rail joints, super elevation where necessary and with one initial thorough packing. The rate should be inclusive of de-kinking of rails as required, cutting of rails as required on straight and curve track for squaring of joints, drilling holes on web of rail square to rail surface by using proper template for fish plated joints, champhering of drilled holes, greasing and oiling of fish plates & fish bolts and nuts and at fishing zone of the rail ends including supply of grease oil etc. Sleeper spacing, versine, super elevation etc shall also be marked by the Bidder with white paint at their own cost. The work has to be carried out as per the specification and direction of the  Engineer-in-charge at site. The unit of track metre consists both sides rails, sleepers and all there fittings required there of including provision of reference pillar at 100m apart on cess of the formation. | RM |  | | 90000.00 |  |  |
| RL-2 | Subsequent packing (3 nos) for newly laid track (as mentioned in RL-1 above) to bring to a good geometry to confirm to specified line and levels and parameters as per specification and drawings and boxing to final profile as specified. The rates shall include any lifting, lowering and aligning of track as required. | RM |  | | 70.00 |  |  |
| RL-3 | Supplying, assembling, linking and laying in position B.G turnouts on specified sleepers including approach and exit sleepers and hand lever box to correct alignment and gauge complete with fittings & fastenings. This includes switches lead rails, stock rails both straight and curve, CMS crossing and standard fittings ensuring correct spacing of sleepers fixing and tightening of Fish bolts and nuts and maintaining proper gauge, expansion gap at rail joints and with one initial through packing . The rate should be inclusive of de-kinking of rails as required, bending of stock rails, cutting of rails to required standard size and drilling holes on web of rails square to rail surface by using proper template (for fixing fishplates, distance block, stretcher bars), greasing and oiling of fish plates & fish bolts and nuts and at fishing zone of the rail ends including supply of grease, oil etc. complete in all respects. Sleeper spacing shall also be marked by the Bidder with white paint at their own cost. |  |  | |  |  |  |
| a) | 1 in 8. ½ points and crossing (CMS) with 60 kg (IRS- T -12) 1st quality rails inclusive of lead rails on PSC sleeper layout as per RDSO Drg. No. T-4865, 4966 & 4967 including Henry William box type self-reversing or spring joint lever type self reversing hand lever (steel handle) to RDSO Drg. No. MA-3040 with point connecting rods, leading and following stretcher bars with all fittings & fastenings complete including PSC sleepers for 60 Kg/m rail also. | Set |  | | 1110000.00 |  |  |
| RL-4 | Subsequent packing (3 nos) for newly laid turnout with stone ballast to bring points & crossing and the tracks on approaches to a good geometry to confirm to specified line and levels and parameters as per specification and drawings and L-crossing to final profile as specified. The rates shall include any lifting and shifting, lowering, and aligning of track as required. | Set |  | | 87.00 |  |  |
| RL-5 | Dismantling of existing railway track work with all permanent way materials like rails, sleepers, fittings, check rails, switches, stretcher bars, lever bars, fittings and fastenings. The rate should be inclusive of cutting of rails, fish plates, bolts & nuts, if necessary, for dismantling of track. Released materials should be segregated and are to be kept separately i.e. Rails, Sleepers, fastenings etc. by the side of the track and handed over to stores as per direction of the Engineer-in-Charge. |  |  | |  |  |  |
| a) | B.G.Track of 60 kg/52kg/90R | RM |  | | 1500.00 |  |  |
| b) | Turnouts of 60 kg/52 kg/90R either LH & RH | Set |  | | 8000.00 |  |  |
| RL-6 | Removal of ballast from the existing tracks & turnouts up to a depth of 300 mm below sleeper and staking the same on cess of the formation or toe of the bank or at a suitable place as per the direction of Engineer-in-Charge. The rate includes all cost of lead, lift, and other incidental charges complete as applicable. The rate also includes levelling of ground, if necessary, where the ballast is to be stacked. | Cum |  | | 130.00 |  |  |
| RL-7 | Screening of the stacked ballast removed from the tracks/turnouts (as obtained from item no. RL-6 above) and re-stacking the usable ballast and disposal of unserviceable materials at a place identified by Engineer-in-Charge within plant. | Cum |  | | 300.00 |  |  |
| RL-8 | Earthwork in excavation for railway tracks (including mix of ballast & earth ) in box cutting, drains, pits, culverts/bridge etc. in all kinds of soils and including all lifts, in both wet and dry conditions, dewatering of surface and subsurface water, shoring, planking and shutting (if required) including backfilling with approved earth and compacting in layers of 15 cm as directed by Engineer-in-Charge with watering, ramming and compacting thoroughly each layer around foundation, structures, plinth including floor etc. disposal/stacking of surplus excavated soil etc. within a lead of 500 M and per specifications & direction of the engineer. | Cum |  | | 150.00 |  |  |
| RL-9 | Supplying transporting to site and spreading stone ballast below BG Railway track and turnouts including packing and boxing under sleepers with all materials, labour, tools, tackles etc. complete and as per drawing, IS/IR specification and direction of Engineer in charge |  |  | |  |  |  |
| a | 40 mm gauge ballast below BG railway track | Cum |  | | 1415.00 |  |  |
| b | 25 mm gauge ballast below point and crossings for BG railway track | Cum |  | | 1415.00 |  | ` |
| **RIGID PAVEMENT** | | | | | | |  |
| RO-1 | Preparation and consolidation of **sub grade** with power road roller of 8 to 12 tonne capacity after excavating earth to an average of 22.5 cm depth, dressing to camber and consolidating with road roller including making good the undulations etc. and re-rolling the sub grade and disposal of surplus earth with lead upto 50 metres. | m2 |  | | 156.75 |  | 16.1 |
| RO-2 | Construction of **200 mm compacted thick granular sub-base** by providing close graded Material conforming to specifications, mixing in a mechanical mix plant at OMC, carriage of mixed material by tippers to work site, for all leads & lifts, spreading in uniform layers of specified thickness with motor grader on prepared surface and compacting with vibratory power roller to achieve the desired density, complete as per specifications and directions of Engineer-in-Charge. | m3 |  | | 2571.70 |  | 16.78.1 |
| With material conforming to Grade-I (size range 75 mm to 0.075 mm) having CBR Value-30 |
| RO-3 | Providing, laying, spreading and compacting graded stone aggregate (size range 53 mm to 0.075 mm) to **wet mix macadam (WMM) specification of compacted thickness 150 mm** including premixing the material with water at OMC in for all leads & lifts, laying in uniform layers with mechanical paver finisher in sub- base / base course on well prepared surface and compacting with vibratory roller of 8 to 10 tonne capacity to achieve the desired density, complete as per specifications and directions of Engineer-in-Charge. | m3 |  | | 2641.40 |  | 16.79 |
| RO-4 | Extra cost for additional cement @ 50 kg/m3 of WMM i.e approx. 3.5% by volume | T |  | | 7149 |  | 0367 + 2209 |
| RO-5 | Providing and applying **tack coat** using bitumen emulsion conforming to IS: 8887, using emulsion pressure distributer including preparing the surface & cleaning with mechanical broom. On bituminous surface @ 0.25kg/sqm | m2 |  | | 11.85 |  | 16.31.1.1 |
| RO-6 | **Crack Relief Interlayer of Aggregate -** 100 mm thick bitumastic sheet with hot bitumen of approved quality, using stone chippings (60% with 12.5 mm nominal size and 40% with 10 mm nominal size) @ 2.60 cum per 100 sqm and coarse sand @ 2.60 cum per 100 sqm of road surface and with bitumen @ 56 kg/cum of stone chippings and @ 128 kg/cum of sand over a tack coat with hot straight run bitumen, including consolidation with road roller of 8 to 10 tonne etc. complete. (tack coat to be paid separately) : With Refinery Modified Bitumen CRMB 55 conforming to IRC: SP : 53 | m2 |  | | 431.45 |  | 16.39.3 |
| RO-7 | Providing and applying **seperation membrane of impermeable plastic sheeting 125 micron thick** as per the direction of Engineer in charge all material and labor complete. | m2 |  | | 15 |  | 0323 + Rs 03 |
| RO-8 | "Providing and laying design mix cement concrete of **250 mm thick M-40 grade,** in roads/ taxi tracks/ runways, using cement content as per design mix, using coarse sand and graded stone aggregate of 40 mm nominal size in appropriate proportions as per approved & specified design criteria, providing dowel bars with sleeve/ tie bars wherever required, laying at site, spreading and compacting mechanically by using needle and surface vibrators, levelling to required slope/ camber, finishing with required texture, including steel form work with sturdy M.S. channel sections, curing, making provision for contraction/expansion, construction & longitudinal joints ( 10 mm wide x 50 mm deep) by groove cutting machine, providing and filling joints with approved joint filler and sealants, complete all as per direction of Engineer-in-charge (Item of joint fillers, sealants, dowel bars with sleeve/ tie bars to be paid separately). | m3 |  | | 8891.80 |  | 16.43.1 + 5.34.3 - 5.34.1 |
| RO-9 | Extra for providing and mixing hardening compound of approved quality as per manufacturer's specification in cement concrete. | Litre |  | | 50.85 |  | 16.44 |
| RO-10 | Providing and fixing in position pre-moulded joint filler in expansion joints. | per cm depth per cm width per m length |  | | 3.10 |  | 16.45 |
| RO-11 | Providing and laying in position bitumen hot sealing compound for expansion joints etc. Using grade 'A' sealing compound. | per cm depth per cm width per m length |  | | 3.30 |  | 16.46.1 |
| RO-12 | Steel reinforcement (Thermo-Mechanically Treated bars of grade Fe-500D or more) for R.C.C. work/dowel bars including straightening, cutting, bending, placing in position and binding all complete upto plinth level. | Kg |  | | 83.50 |  | 5.22.6 |
| RO-13 | Providing and applying **tack coat** using bitumen emulsion conforming to IS: 8887, using emulsion pressure distributer including preparing the surface & cleaning with mechanical broom. On bituminous surface @ 0.25kg/sqm | m2 |  | | 8.05 |  | 16.31.1.2 |
| RO-14 | **2.5 cm premix carpet surfacing** with 2.25 cum and 1.12 cum of stone chippings of 13.2 mm and 11.2 mm size respectively per 100 sqm and 52 kg and 56 kg of hot bitumen per cum of stone chippings of 13.2 mm and 11.2 mm size respectively, including a tack coat with hot straight run bitumen, including consolidation with road roller of 6 to 9 tonne capacity etc. complete (tack coat to be paid for separately). | m2 |  | | 207.75 |  | 16.33.1 |
| RO-15 | Providing and laying **seal coat** over prepared surface of road with bitumen heated in bitumen boiler fitted with the spray set spraying using 98 kg of bitumen of grade VG - 10 and blinding surface with 0.90 cum of stone aggregate of 6.7 mm size (Passing 11.2 mm sieve and retained on 2.36 mm sieve) per 100 sqm of road surface, including rolling and finishing with power road roller all complete. | m2 |  | | 99.15 |  | 16.41 |
| **FLOORING** | | | | | | |  |
| F-1 | Cement concrete flooring 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate) finished with a floating coat of neat cement, including cement slurry, but excluding the cost of nosing of steps etc. complete.  40 mm thick with 20 mm nominal size stone aggregate | sqm |  | | 498.35 |  | 11.3.1 |
| F-2 | 52 mm thick cement concrete flooring with concrete hardener topping, under layer 40 mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) and top layer 12mm thick cement hardener consisting of mix 1:2 (1 cement hardener mix : 2 graded stone aggregate 6 mm nominal size) by volume, hardening compound mixed @ 2 litre per 50 kg of cement or as per manufacturer's specifications. This includes cost of cement slurry, but excluding the cost of nosing of steps etc. complete. | sqm |  | | 787.50 |  | 11.4 |
| F-3 | 62 mm thick cement concrete flooring with concrete hardener topping, under layer 50 mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20mm nominal size) and top layer 12mm thick cement hardener consisting of mix 1:2 (1 cement hardener mix : 2 graded stone aggregate, 6mm nominal size) by volume, hardening compound mixed @ 2 litre per 50 kg of cement or as per manufacture’s specifications. This includes cost of cement slurry, but excluding the cost of nosing of steps etc. complete | sqm |  | | 854.30 |  | 11.5 |
| F-4 | Cement plaster skirting up to 30 cm height, with cement mortar 1:3 (1 cement : 3 coarse sand), finished with a floating coat of neat cement. 18 mm thick | sqm |  | | 521.15 |  | 11.6.1 |
| F-5 | 40 mm thick marble chips flooring, rubbed and polished to granolithic finish, under layer 28 mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 12.5 mm nominal size) and top layer 12 mm thick with white, black, chocolate, grey yellow or green  marble chips of sizes from 7 mm to 10 mm nominal size, laid in cement marble powder mix 3:1 (3 cement : 1 marble powder) by weight in proportion of 2:3 (2 cement marble powder mix : 3 marble chips) by volume, including cement slurry etc. complete : |  |  | |  |  | 11.11 |
| a) | Dark shade pigment with ordinary cement | sqm |  | | 909.85 |  | 11.11.1 |
| b) | Light shade pigment with white cement | sqm |  | | 970.10 |  | 11.11.2 |
| c) | Medium shade pigment with 50% white cement and 50%  ordinary cement | sqm |  | | 933.15 |  | 11.11.3 |
| d) | White cement without any pigment | sqm |  | | 923.40 |  | 11.11.4 |
| e) | Light shade pigment with ordinary cement | sqm |  | | 902.25 |  | 11.11.5 |
| f) | Ordinary cement without any pigment | sqm |  | | 855.55 |  | 11.11.6 |
| F-6 | Marble chips skirting up to 30 cm height, rubbed and polished to granolithic finish, top layer 6 mm thick with white, black, chocolate, grey, yellow or green marble chips of sizes from smallest to 4 mm nominal size, laid in cement marble powder mix 3:1 (3 cement : 1 marble powder) by weight in proportion of 4:7 (4 cement marble powder mix : 7 marble chips) by volume :  18 mm thick with under layer 12 mm thick in cement  plaster 1:3 (1 cement : 3 coarse sand) : |  |  | |  |  | 11.12 |
| a) | Dark shade pigment with ordinary cement | sqm |  | | 1398.20 |  | 11.12.1.1 |
| b) | Light shade pigment with white cement | sqm |  | | 1428.30 |  | 11.12.1.2 |
| c) | Medium shade pigment with 50% white cement  and 50% ordinary cement | sqm |  | | 1409.90 |  | 11.12.1.3 |
| d) | White cement without any pigment | sqm |  | | 1406.80 |  | 11.12.1.4 |
| e) | Light shade pigment with ordinary cement | sqm |  | | 1394.40 |  | 11.12.1.5 |
| f) | Ordinary cement without any pigment | sqm |  | | 1370.70 |  | 11.12.1.6 |
| F-7 | Providing and fixing glass strips in joints of terrazo/ cement concrete floors. |  |  | |  |  | 11.13 |
| a) | 40 mm wide and 4 mm thick | m |  | | 75.15 |  | 11.13.1 |
| F-8 | Crazy marble stone flooring, including filling the gaps with light shade pigment with white cement marble powder mixture (3 parts of white cement : 1 part of marble powder) by weight in proportion of 4:7 (4 cement marble powder mix : 7 white, black or white and black marble chips of sizes from 1 mm to 4 mm nominal size by volume), with under layer 25 mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand :4 graded stone aggregate 12.5 mm nominal size), including rubbing, polishing and cement slurry etc. complete :  18 mm thick crazy marble stone white, black or as specified | sqm |  | | 1329.25 |  | 11.15.1 |
| F-9 | Precast terrazo tiles 22 mm thick with graded marble chips of size upto 12 mm, laid in floors, and landings, jointed with neat cement slurry mixed with pigment to match the shade of the tiles, including rubbing and polishing complete, on 20 mm thick bed of cement mortar 1:4 (1  cement:4 coarse sand) : |  |  | |  |  |  |
| a) | Light shade pigment using white cement | sqm |  | | 1238.60 |  | 11.16.1 |
| b) | Medium shade pigment using 50% white cement and 50%  ordinary cement | sqm |  | | 1189.10 |  | 11.16.2 |
| c) | Dark shade pigment using ordinary cement | sqm |  | | 1147.00 |  | 11.16.3 |
| d) | Ordinary cement without any pigment | sqm |  | | 1091.55 |  | 11.16.4 |
| F-10 | Extra if terrazo tiles are laid in treads of steps not exceeding 30 cm in width. | sqm |  | | 90.05 |  | 11.17 |
| F-11 | Precast terrazo tiles 22 mm thick with graded marble chips of sizes upto 12 mm, in skirting and risers of steps not exceeding 30 cm in height, on 12 mm thick cement plaster 1:3 (1 cement : 3 coarse sand), jointed with neat cement slurry mixed with pigment to match the shade of the tiles, including rubbing and polishing complete with tiles of : |  |  | |  |  |  |
| a) | Light shade pigment using white cement | sqm |  | | 1865.40 |  | 11.18.1 |
| b) | Medium shades pigment using 50% white cement and 50% ordinary cement | sqm |  | | 1805.85 |  | 11.18.2 |
| c) | Dark shade pigment using ordinary cement | sqm |  | | 1757.45 |  | 11.18.3 |
| d) | Ordinary cement without any pigment | sqm |  | | 1687.55 |  | 11.18.4 |
| F-12 | Providing and fixing 10 mm thick acid and/or alkali resistant tiles of approved make and colour using acid and/or alkali resisting mortar bedding, and joints filled with acid and/or alkali resisting cement as per IS : 4457, complete as per the direction of Engineer-in- Charge. |  |  | |  |  |  |
| a) | In flooring on a bed of 10 mm thick mortar 1:4 (1 acid proof cement : 4 coarse sand) |  |  | |  |  | 11.21.1 |
| b) | In dado/skirting on 12 mm thick mortar 1:4 (1 acid proof  cement : 4 coarse sand) |  |  | |  |  | 11.21.2 |
| F-13 | Kota stone slab flooring over 20 mm (average) thick base laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab, including rubbing and polishing complete with base of cement mortar 1 : 4 (1 cement : 4 coarse sand) : |  |  | |  |  |  |
| a) | 25 mm thick | sqm |  | | 1531.85 |  | 11.26.1 |
| F-14 | Kota stone slabs 20 mm thick in risers of steps, skirting, dado and pillars laid on 12 mm (average) thick cement mortar 1:3 (1 cement: 3 coarse sand) and jointed with grey cement slurry mixed with pigment to match the shade of the slabs, including rubbing and polishing complete. | sqm |  | | 1810.05 |  | 11.27 |
| **CERAMIC GLAZED TILES** | | | | | | |  |
| F-15 | Providing and laying Ceramic glazed floor tiles of size 300x300 mm (thickness to be specified by the manufacturer) of 1st quality conforming to IS : 15622 of approved make in colours such as White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick cement mortar 1:4 (1 Cement : 4 Coarse sand), Jointing with grey cement slurry @ 3.3 kg/sqm including pointing the joints with white cement and matching pigment etc.,complete. |  |  | |  |  | 11.37 |
| F-16 | Providing and fixing 1st quality ceramic glazed floor tiles conforming to IS : 15622 (thickness to be specified by the manufacturer ) of approved make in all colours, shades except burgundy, bottle green, black of any size as approved by Engineer-in-Charge in skirting, risers of steps and dados over 12 mm thick bed of cement Mortar 1:3 (1 cement: 3 coarse sand) and jointing with grey cement slurry @ 3.3kg per sqm including pointing in white cement mixed with pigment of matching shade complete. | sqm |  | | 927.90 |  | 11.37A |
| F-17 | Providing and laying Ceramic glazed floor tiles of size 300x300 mm (thickness to be specified by the manufacturer), of 1st quality conforming to IS : 15622, of approved make, in all colours, shades, except White,  Ivory, Grey, Fume Red Brown, laid on 20 mm thick bed of cement mortar 1:4 (1 Cement : 4 Coarse sand), jointing with grey cement slurry @ 3.3 kg/ sq.m including pointing the joints with white cement and matching pigments etc., complete. | sqm |  | | 996.70 |  | 11.38 |
| F-18 | Providing and laying rectified Glazed Ceramic floor tiles of size 300x300 mm or more (thickness to be specified by the manufacturer), of 1st quality conforming to IS : 15622, of approved make, in colours White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick cement mortar 1:4 (1 Cement: 4 Coarse sand), jointing with grey cement slurry @ 3.3 kg/  sqm including grouting the joints with white cement and matching pigments etc., complete. | sqm |  | | 1088.40 |  | 11.39 |
| F-19 | Providing and laying rectified Glazed Ceramic floor tiles of size 300x300 mm or more (thickness to be specified by the manufacturer), of 1st quality conforming to IS : 15622, of approved make, in all colours, shades, except White, Ivory, Grey, Fume Red Brown, laid on 20 mm thick Cement Mortar 1:4 (1 Cement : 4 Coarse sand), jointing with grey cement slurry @ 3.3 kg/ sqm including pointing the joints with white cement and matching pigments etc., complete. | sqm |  | | 1170.70 |  | 11.40 |
| **VITRIFIED FLOOR TILES** | | | | | | |  |
| F-20 | Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS: 15622, of approved make, in all colours and shades, laid on 20mm thick cement mortar 1:4 (1 cement : 4 coarse sand), jointing with grey cement slurry @ 3.3 kg/ sqm including grouting the joints with white cement and matching pigments etc., complete. |  |  | |  |  | 11.41 |
| a) | Size of Tile 500x500 mm | sqm |  | | 1267.80 |  | 11.41.1 |
| b) | Size of Tile 600x600 mm | sqm |  | | 1500.55 |  | 11.41.2 |
| c) | Size of Tile 800x800 mm | sqm |  | | 1758.70 |  | 11.41.3 |
| d) | Size of Tile 1000x1000 mm | sqm |  | | 2499.25 |  | 11.41.4 |
| F-21 | Fixing glazed/ Ceramic/ Vitrified floor tiles with cement based high polymer modified quick-set tile adhesive (Water based) conforming to IS: 15477, in average 3mm thickness. | sqm |  | | 587.20 |  | 11.43 |
| F-22 | Crazy ceramic tile flooring, with under layer 12 mm thick cement mortar 1:4 (1 cement: 4 coarse sand), with joints not exceeding 5 mm, including filling the gaps with ordinary cement mixture & mixing with synthetic  polyester fibre, triangular in shape having specific gravity of 1.34 to 1.40, cross section size ranging from 10 to 40 micron & length upto 6 mm , mixing fibre @ 125 grams per 50 kg of cement in cement mortar, including providing and mixing water proofing material in mortar @ 1 kg per 50 kg of cement, all complete as per direction of Engineer-in-charge. | sqm |  | | 735.65 |  | 11.44 |
| F-23 | Providing and laying Vitrified tiles in different sizes (thickness to be specified by manufacturer), with water absorption less than 0.08 % and conforming to I.S. 15622, of approved make, in all colours & shade, in skirting, riser of steps, over 12 mm thick bed of cement mortar 1:3 (1 cement: 3 coarse sand), jointing with grey cement slurry @ 3.3 kg/sqm including grouting the joint with white cement & matching pigments etc. complete. |  |  | |  |  | 11.46 |
| a) | Size of Tile 500x500 mm | sqm |  | | 1313.10 |  | 11.46.1 |
| b) | Size of Tile 600x600 mm | sqm |  | | 1545.85 |  | 11.46.2 |
| c) | Size of Tile 800x800 mm | sqm |  | | 1806.80 |  | 11.46.3 |
| d) | Size of Tile 1000x1000 mm | sqm |  | | 2547.35 |  | 11.46.4 |
| F-24 | Providing and laying Vitrified tiles in different sizes (thickness to be specified by the manufacturer), with water absorption less than 0.08% and conforming to IS: 15622, of approved brand & manufacturer, in all colours and shade, in skirting, riser of steps, laid with cement based  high polymer modified quick set tile adhesive (water based) conforming to IS: 15477, in average 6 mm thickness, including grouting of joints (Payment for grouting of joints to be made separately). |  |  | |  |  |  |
| a) | Size of Tile 500x500 mm | sqm |  | | 1501.25 |  | 11.47.1 |
| b) | Size of Tile 600x600 mm | sqm |  | | 1734.00 |  | 11.47.2 |
| c) | Size of Tile 800x800 mm | sqm |  | | 1994.95 |  | 11.47.3 |
| d) | Size of Tile 1000x1000 mm | sqm |  | | 2735.50 |  | 11.47.4 |
| F-25 | Providing and laying Vitrified tiles in floor with different sizes (thickness to be specified by the manufacturer), with water absorption less than 0.08% and conforming to IS:15622, of approved brand & manufacturer, in all colours and shade, laid with cement based high polymer modified  quick set tile adhesive (water based) conforming to IS : 15477, in average 6 mm thickness, including grouting of joints (Payment for grouting of joints to be made separately). | sqm |  | |  |  | 11.49 |
| a) | Size of Tile 500x500 mm | sqm |  | | 1377.20 |  | 11.49.1 |
| b) | Size of Tile 600x600 mm | sqm |  | | 1609.95 |  | 11.49.2 |
| c) | Size of Tile 800x800 mm | sqm |  | | 1870.90 |  | 11.49.3 |
| d) | Size of Tile 1000x1000 mm | sqm |  | | 2611.45 |  | 11.49.4 |
| F-26 | Providing and laying machine cut, mirror polished Marble stone flooring, in required design (Simple geometrical, abstract etc.) and in patterns in combination with Italian marble stones of different colours, shades and finished surface texture etc., in linear portions of the building, all complete as per the architectural drawings, with 18 mm thick stone slab laid over 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand) laid and jointed with white cement slurry @ 4.4 kg/sqm, including pointing with white cement slurry admixed with pigment to match the marble shade, including rubbing, curing and polishing etc. all complete as specified and as directed by the Engineer-in-Charge.  18 mm thick Italian Marble stone slab, Perlato, Rosso verona, Fire Red or Dark Emperadore etc. | sqm |  | | 6276.05 |  | 11.52.1 |
| F-27 | Providing and fixing removable raised/false access flooring with system and its components of approved make for different plenum height with possible height adjustment upto 50 mm, comprising of modular load  bearing floor panels supported on G.I. rectangular stinger frame work and G.I. Pedestal etc. all complete, as per the architectural drawings, as specified and as directed by Engineer-in-charge consisting of: | sqm |  | |  |  | 11.54 |
| F-27 (a) | Providing at required spacing to form modular framework, pedestals made out of GI tube of thickness minimum 2 mm and 25 mm outer diameter, fully welded on to the G.I. Base plate of size 100mm x 100mm x 3mm at the bottom of the pedestal tube, G.I. pedestal head of size 75mmx75mmx3.5 mm welded with GI fully threaded stud 16mm outer diameter with two GI Check nuts screwed on the stud for level adjustment upto 50mm, locking and stabilizing the pedestal head in position at the  required level. The pedestals shall be fixed to the subfloor (base) through base plate using epoxy based adhesive of approved make or the machine screw with rawl plug. |  |  | |  |  |  |
| F-27 (b) | Stringers system in all steel construction hot dipped galvanized of rectangular size 570x20x30x0.80mm thick having holes at both ends for securing the stringers on to the pedestal head using fully threaded screws ensuring maximum lateral stability in all directions, the grid formed by the pedestal and stringer assembly shall receive the floor panel, this system shall provide adequate solid, rigid support for access floor panel, the system shall provide a minimum clear uninterrupted clearance between the bottom of the floor for electrical conduits and wiring etc. all complete as per the architectural drawings, as specified  and as directed by the Engineer-in-charge. |  |  | |  |  |  |
| F-27 (c) | Providing and fixing Access Floor panel of 600x600x32 mm medium grade Filled Steel anti static high pressure Lamination of 800H grade (FS800H). Access Floor panel shall be steel welded construction with an enclosed bottom pan with uniform pattern of 64 hemispherical cones. The top and bottom plates of Steel Gauges: top 0.6 mm and bottom 0.7 mm fused spot welded together (minimum 64 welds in each dome and 20 welds along each flange). The panel should be Corroresist epoxy  coated for lifetime rust protection and cavity formed by the top and bottom plate is filled with Pyrogrip noncombustible Portland cementitious core mixed with lightweight foaming compound. The access floor shall be factory finished with Anti-static High Pressure laminate with Non  Warp technology upto 1mm thickness for superior adhesion and Surface flatness within 0.75mm.The panel is to withstand a Concentrated Load of 363 kgs applied on area 25mm x 25mm without collapse in the centre of the panel which is placed on four steel blocks. The panel will withstand and Uniformly Distributed Load (UDL) minimum 1250 kg/sqm and an impact load of 50kg all complete as per the approved manufacturers specification and as per the direction of Engineer-in-charge. All specification must be printed on the side of the panel to ensure the quality of the product. |  |  | |  |  |  |
| a) | 300 mm Finished Floor Height (FFH) | sqm |  | | 5075.00 |  | 11.54.1 |
| b) | 450 mm Finished Floor Height (FFH). | sqm |  | | 5364.30 |  | 11.54.2 |
| F-28 | Providing and laying flamed finish Granite stone flooring in required design and patterns, in linear as well as curvilinear portions of the building all complete as per the architectural drawings with 18 mm thick stone slab over 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand) laid and jointed with cement slurry and pointing with white cement slurry admixed with pigment of matching shade including rubbing, curing and polishing etc. all complete as specified and as  directed by the Engineer-in-Charge : Flamed finish granite stone slab Jet Black, Cherry Red,  Elite Brown, Cat Eye or equivalent. | sqm |  | | 2476.45 |  | 11.55.1 |
| F-29 | Providing and laying Polished Granite stone flooring in required design and patterns, in linear as well as curvilinear portions of the building all complete as per the architectural drawings with 18 mm thick stone slab over 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand) laid and jointed with cement slurry and pointing with white cement slurry admixed with pigment of matching shade including rubbing , curing and polishing etc. all complete as specified and as directed by the Engineer-in-Charge.  Polished Granite stone slab jet Black, Cherry Red, Elite Brown, Cat Eye or equivalent. | sqm |  | | 3526.60 |  | 11.56.1 |
| **DOOR, WINDOWS AND ROLLING SHUTTER** | | | | | | |  |
| D-1 | Providing and fixing ISI marked flush door shutters conforming to IS :2202 (Part I) decorative type, core of block board construction with frame of 1st class hard wood and well matched teak 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters. |  |  | |  |  |  |
| a) | 35 mm thick including ISI marked Stainless Steel butt hinges with necessary screws | sqm |  | | 3023.95 |  | 9.20.1 |
| b) | 30 mm thick including ISI marked Stainless Steel butt hinges with necessary screws | sqm |  | | 2756.35 |  | 9.20.2 |
| c) | 25 mm thick (for cupboard) including ISI marked nickel plated bright finished M.S. Piano hinges IS : 3818 marked with necessary screws | sqm |  | | 2464.70 |  | 9.20.3 |
| D-2 | Providing and fixing ISi marked oxidised M.S. door latches conforming to IS:5930 with screws etc. complete : |  |  | |  |  |  |
| a) | 300x20x6 mm each 81.75 | each |  | | 81.75 |  | 9.65.1 |
| b) | 250x20x6 mm each 68.40 | each |  | | 68.40 |  | 9.65.2 |
| D-3 | Providing and fixing bright finished brass tower bolts (barrel type) with necessary screws etc. complete : |  |  | |  |  |  |
| a) | 250x10 mm each 373.65 | each |  | | 373.65 |  | 9.74.1 |
| b) | 200x10 mm each 299.85 | each |  | | 299.85 |  | 9.74.2 |
| c) | 150x10 mm each 231.65 | each |  | | 231.65 |  | 9.74.3 |
| d) | 100x10 mm each 159.65 | each |  | | 159.65 |  | 9.74.4 |
| D-4 | Providing and fixing bright finished brass door latch with necessary screws etc. complete : |  |  | |  |  |  |
| a) | 300x16x5 mm each 272.40 | each |  | | 272.40 |  | 9.75.1 |
| b) | 250x16x5 mm each | each |  | | 259.00 |  | 9.75.2 |
| D-5 | Providing and fixing bright finished brass handles with screws etc. complete: |  |  | |  |  |  |
| a) | 125 mm | each |  | | 204.65 |  | 9.81.1 |
| b) | 100 mm | each |  | | 189.45 |  | 9.81.2 |
| c) | 375 mm | each |  | | 149.35 |  | 9.81.3 |
| D-6 | Providing and fixing aluminium extruded section body tubular type universal hydraulic door closer (having brand logo with ISi, IS : 3564, embossed on the body, door weight upto 36 kg to 80 kg and door width from 701 mm to 1000 mm), with double speed adjustment with necessary accessories and screws etc. complete. | each |  | | 851.60 |  | 9.84 |
| D-7 | Providing and fixing chromium plated brass 100 mm mortice latch and lock with 6 levers and a pair of lever handles of approved quality with necessary screws etc. complete. | each |  | | 806.45 |  | 9.88 |
| D-8 | Providing and fixing chromium plated brass handles with necessary screws etc. complete: |  |  | |  |  |  |
| a) | 125 mm | each |  | | 226.10 |  | 9.92.1 |
| b) | 100 mm | each |  | | 198.85 |  | 9.92.2 |
| c) | 75 mm | each |  | | 178.75 |  | 9.92.3 |
| D-9 | Providing and fixing aluminium hanging floor door stopper, ISI marked, anodised (anodic coating not less than grade AC 10 as per IS : 1868) transparent or dyed to required colour and shade, with necessary screws etc. complete. |  |  | |  |  |  |
| a) | Single rubber stopper each 33.95 | each |  | | 33.95 |  | 9.101.1 |
| b) | Twin rubber stopper | each |  | | 62.05 |  | 9.101.2 |
| D-10 a) | Providing and fixing to existing door frames. 24 mm thick factory made PVC door shutters made of styles and rails of a uPVC hollow section of size 59x24 mm and wall thickness 2 mm (± 0.2 mm) with inbuilt edging on both sides. The styles and rails mitred and joint at the corners by means of M.S. galvanised/ plastic brackets of size 75x220 mm having wall thickness 1.0 mm and stainless steel screws. The styles of the shutter reinforced by inserting galvanised M.S. tube of size 20x20 mm and 1 mm (± 0.1 mm) wall thickness. The lock rail made up of 'H' section, a uPVC hollow section of size 100x24 mm and 2 mm (± 0.2 mm) wall thickness, fixed to the shutter styles by means of plastic/galvanised M.S. 'U' cleats. The shutter frame filled with a uPVC multi-chambered single panel of size not less than 620 mm, having over all thickness of 20 mm and 1 mm (± 0.1 mm) wall thickness. The panels filled vertically and tie bar at two places by inserting horizontally 6 mm galvanised M.S. rod and fastened with nuts and washers, complete as per manufacturer's specification and direction of Engineer-in-charge. (For W.C. and bathroom door shutter). | sqm |  | | 1760.70 |  | 9.118.1 |
| D10 b) | 30 mm thick factory made Polyvinyl Chloride (PVC) door shutter made of styles and rails of a uPVC hollow section of size 60x30 mm and wall thickness 2 mm (± 0.2 mm), with inbuilt decorative moulding edging on one side. The styles and rails mitred and joint at the corners by means of M.S. galvanised/ plastic brackets of size 75x220 mm having wall thickness 1.0 mm and stainless steel screws. The styles of the shutter reinforced by inserting galvanised M.S. tube of size 25x20 mm and 1 mm (± 0.1 mm) wall thickness. The lock rail made up of 'H' section, a uPVC hollow section of size 100x30 mm and 2 mm (± 0.2 mm) wall thickness fixed to the shutter styles by means of plastic/ galvanised M.S. 'U' cleats. The shutter frame filled with a uPVC multi-chambered single panel of size not less than 620 mm, having over all thickness of 20 mm and 1 mm (± 0.1 mm) wall thickness . The panels filled vertically and tie bar at two places by inserting horizontally 6 mm galvanised M.S. rod and fastened with nuts and washers, complete as per manufacturer's specification and direction of Engineer-in-charge. | sqm |  | | 1978.65 |  | 9.118.2 |
| D10 c) | 25 mm thick PVC flush door shutters made out of a one piece Multi chamber extruded PVC section of the size of 762 mm X 25 mm or less as per requirement with an average wall thickness of 1 mm (± 0.3 mm). PVC foam end cap of size 23x10 mm are provided on both vertical edges to ensure the overall thickness of 25 mm. M.S. tube having dimensions 19 mm x 19 mm and 1.0 mm (± 0.1 mm) is inserted along the hinge side of the door. Core of the door shutter should be filled with High Density Polyurethane foam. The Top & Bottom edges of the shutter are covered with an end-cap of the size 25 mm X 11 mm. Door shutter shall be reinforced with special polymeric reinforcements as per manufacturer’s specification and direction of Engineer-in-charge to take up necessary hardware and fixtures. Stickers indicating the locations of hardware will be pasted at appropriate places. | sqm |  | | 2582.30 |  | 9.118.3 |
| D-11 | Providing and fixing factory made P.V.C. door frame of size 50x47 mm with a wall thickness of 5 mm, made out of extruded 5mm rigid PVC foam sheet, mitred at corners and joined with 2 Nos of 150 mm long brackets of 15x15 mm M.S. square tube, the vertical door frame profiles to be reinforced with 19x19 mm M.S. square tube of 19 gauge, EPDM rubber gasket weather seal to be provided through out the frame. The door frame to be fixed to the wall using M.S. screws of 65/100 mm size, complete as per manufacturer’s specification and direction of Engineer in-Charge. | m |  | | 391.65 |  | 9.119 |
| D-12 | Providing and fixing in position collapsible steel shutters with vertical channels 20x10x2 mm and braced with flat iron diagonals 20x5 mm size, with top and bottom rail of T-iron 40x40x6 mm, with 40 mm dia steel pulleys, complete with bolts, nuts, locking arrangement, stoppers, handles, including applying a priming coat of approved steel primer. | sqm |  | | 8670.50 |  | 10.3 |
| D-13 | Providing and fixing 1mm thick M.S. sheet door with frame of 40x40x6 mm angle iron and 3 mm M.S. gusset plates at the junctions and corners, all necessary fittings complete, including applying a priming coat of approved steel primer. |  |  | |  |  | 10.5 |
| a) | Using M.S. angels 40x40x6 mm for diagonal braces sqm 4428.15 | sqm |  | | 4428.15 |  | 10.5.1 |
| b) | Using flats 30x6mm for diagonal braces and central cross piece | sqm |  | | 4278.15 |  | 10.5.2 |
| D-14 | Fixing standard steel glazed doors, windows and ventilators in walls, including fixing of float glass panes with glazing clips and special metal sash putty of approved make, or metal beading with screws, (only steel windows, glass panes cut to size and glazing clips or metal beading with screws, shall be supplied by department free of cost. |  |  | |  |  | 10.10 |
| a) | Fixing with 15x3 mm lugs 10 cm long embedded in cement concrete block 15x10x10 cm of C.C. 1:3:6 (1 Cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) | kg |  | | 63.00 |  | 10.10.1 |
| b) | Fixing with carbon steel galvanised dash fastener of required dia and size (to be paid for separately) | kg |  | | 31.65 |  | 10.10.2 |
| D-15 | Providing and fixing T-iron frames for doors, windows and ventilators of mild steel Tee-sections, joints mitred and welded, including fixing of necessary butt hinges and screws and applying a priming coat of approved steel primer. |  |  | |  |  | 10.13 |
| a) | Fixing with 15x3 mm lugs 10 cm long embedded in cement concrete block 15x10x10 cm of C.C. 1:3:6 (1 Cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size). | kg |  | | 106.45 |  | 10.13.1 |
| b) | Fixing with carbon steel galvanised dash fastener of required dia and size (to be paid for separately) kg 101.65 | kg |  | | 101.65 |  | 10.13.2 |
| RS-1 | Supplying and fixing rolling shutters of approved make, made of required size M.S. laths, interlocked together through their entire length and jointed together at the end by end locks, mounted on specially designed pipe shaft with brackets, side guides and arrangements for inside and outside locking with push and pull operation complete, including the cost of providing and fixing necessary 27.5 cm long wire springs manufactured from high tensile steel wire of adequate strength conforming to IS: 4454 - part 1 and M.S. top cover of required thickness for rolling shutters. |  |  | |  |  | 10.6 |
| a) | 80x1.25 mm M.S. laths with 1.25 mm thick top cover | sqm |  | | 2944.10 |  | 10.6.1 |
| b) | 80x1.20 mm M.S. laths with 1.20 mm thick top cover | sqm |  | | 2803.65 |  | 10.6.2 |
| c) | 80x0.90 mm M.S. laths with 0.90 mm thick top cover | sqm |  | | 2654.25 |  | 10.6.3 |
| RS-2 | Providing and fixing ball bearing for rolling shutters | each |  | | 419.85 |  | 10.7 |
| RS-3 | Extra for providing mechanical device chain and crank operation for operating rolling shutters. |  |  | |  |  |  |
| a) | Exceeding 10.00 sqm and upto 16.80 sqm in the area sqm 1106.55 | sqm |  | | 1106.55 |  | 10.8.1 |
| b) | Exceeding 16.80 sqm in area | sqm |  | | 1106.55 |  | 10.8.2 |
| RS-4 | Extra for providing grilled rolling shutters manufactured out of 8 mm dia M.S. bar instead of laths as per design approved by Engineer-in- charge, (area of grill to be measured). | sqm |  | | 668.95 |  | 10.9 |
| W-1 | Providing & fixing fly proof wire gauze to windows, clerestory windows & doors with M.S. Flat 15x3 mm and nuts & bolts complete. |  |  | |  |  | 10.29 |
| a) | Galvanised M.S. Wire gauze with 0.63 mm dia wire and 1.4 mm aperture on both sides | sqm |  | | 709.30 |  | 10.29.1 |
| b) | Stainless steel (grade 304) wire gauze of 0.5 mm dia wire and 1.4 mm aperture on both sides | sqm |  | | 929.55 |  | 10.29.2 |
| W-2 | Providing & fixing glass panes with putty and glazing clips in steel doors, windows, clerestory windows, all complete with : |  |  | |  |  |  |
| a) | 4.0 mm thick glass panes | sqm |  | | 900.55 |  | 10.30.1 |
| b) | 5.5 mm thick glass panes | sqm |  | | 1194.85 |  | 10.30.2 |
| W-3 | Providing and fixing aluminium work for doors, windows, ventilators and partitions with extruded built up standard tubular sections/ appropriate Z sections and other sections of approved make conforming to IS: 733 and IS: 1285, fixing with dash fasteners of required dia and size, including necessary filling up the gaps at junctions, i.e. at top, bottom and sides with required EPDM rubber/ neoprene gasket etc. Aluminium sections shall be smooth, rust free, straight, mitred and jointed mechanically wherever required including cleat angle, Aluminium snap beading for glazing / paneling, C.P. brass / stainless steel screws, all complete as per architectural drawings and the directions of Engineer-in-charge. (Glazing, paneling and dash fasteners to be paid for separately) : |  |  | |  |  |  |
|  | For fixed portion | kg |  | |  |  | 21.1.1 |
| a) | Anodised aluminium (anodised transparent or dyed to required shade according to IS: 1868, Minimum anodic coating of grade AC 15) kg 423.95 | kg |  | | 423.95 |  | 21.1.1.1 |
| b) | Powder coated aluminium (minimum thickness of powder coating 50 micron) | kg |  | | 456.30 |  | 21.1.1.2 |
| c) | Polyester powder coated aluminium (minimum thickness of polyester powder coating 50 micron) | kg |  | | 464.70 |  | 21.1.1.3 |
| W-4 a) | For shutters of doors, windows & ventilators including providing and fixing hinges/ pivots and making provision for fixing of fittings wherever required including the cost of EPDM rubber / neoprene gasket required (Fittings shall be paid for separately) | kg |  | |  |  | 21.1.2 |
| b) | Anodised aluminium (anodised transparent or dyed to required shade according to IS:1868, Minimum anodic coating of grade AC 15) | kg |  | | 513.40 |  | 21.1.2.1 |
| c) | Powder coated aluminium (minimum thickness of powder coating 50 micron) | kg |  | | 546.35 |  | 21.1.2.2 |
| d) | Polyester powder coated aluminium (minimum thickness of polyester powder coating 50 micron) | kg |  | | 554.95 |  | 21.1.2.3 |
| W-5 | Providing and fixing 12 mm thick prelaminated particle board flat pressed three layer or graded wood particle board conforming to IS: 12823 Grade l Type ll, in panelling fixed in aluminum doors, windows shutters and partition frames with C.P. brass / stainless steel screws etc. complete as per architectural drawings and directions of engineering- charge. |  |  | |  |  | 21.2 |
| a) | Pre-laminated particle board with decorative lamination on one side and balancing lamination on other side | sqm |  | | 997.70 |  | 21.2.1 |
| b) | Pre-laminated particle board with decorative lamination on both sides | sqm |  | | 1046.90 |  | 21.2.2 |
| W-6 | Providing and fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of engineer-in-charge .  (Cost of aluminium snap beading shall be paid in basic item): |  |  | |  |  | 21.3 |
| a) | With float glass panes of 4.0 mm thickness (weight not less than 10 kg/ sqm) | sqm |  | | 999.60 |  | 21.3.1 |
| b) | With float glass panes of 5 mm thickness (weight not less than 12.50 kg/ sqm) | sqm |  | | 1296.40 |  | 21.3.2 |
| c) | With float glass panes of 8 mm thickness (weight not less than 20 kg/ sqm) sqm 1462.35 | sqm |  | | 1462.35 |  | 21.3.3 |
|  | | | | | | |  |
| **WATER SUPPLY** | | | | | | |  |
| WS-1 | Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply, including all CPVC plain & brass threaded fittings, i/c fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes & fittings with one step CPVC solvent cement and the cost of cutting chases and making good the same including testing of joints complete as per direction of Engineer in Charge. Concealed work, including cutting chases and making good the walls etc |  |  | |  |  |  |
| a) | 15 mm nominal outer dia Pipes | metre |  | | 409.65 |  | 18.8.1 |
| b) | 20 mm nominal outer dia Pipes | metre |  | | 478.15 |  | 18.8.2 |
| c) | 25 mm nominal outer dia Pipes | metre |  | | 561.95 |  | 18.8.3 |
| d) | 32 mm nominal outer dia Pipes | metre |  | | 679.15 |  | 18.8.4 |
| WS-2 | Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes, having thermal stability for hot & cold water supply including all CPVC plain & brass threaded fittings This includes jointing of pipes & fittings with one step CPVC solvent cement, trenching, refilling & testing of joints complete as per direction of Engineer in Charge. |  |  | |  |  |  |
| a) | 15 mm nominal outer dia Pipes | metre |  | | 202.85 |  | 18.9.1 |
| b) | 20 mm nominal outer dia Pipes | metre |  | | 253.70 |  | 18.9.2 |
| c) | 25 mm nominal outer dia Pipes | metre |  | | 326.65 |  | 18.9.3 |
| d) | 32 mm nominal outer dia Pipes | metre |  | | 413.70 |  | 18.9.4 |
| e) | 40 mm nominal outer dia Pipes | metre |  | | 536.75 |  | 18.9.5 |
| f) | 50 mm nominal outer dia Pipes | metre |  | | 791.65 |  | 18.9.6 |
| g | 62.50 mm nominal inner dia Pipes | metre |  | | 1552.30 |  | 18.9.7 |
| h) | 75 mm nominal inner dia Pipes | metre |  | | 1965.85 |  | 18.9.8 |
| i) | 100 mm nominal inner dia Pipes | metre |  | | 2779.55 |  | 18.9.9 |
| j) | 150 mm nominal inner dia Pipes | metre |  | | 5821.85 |  | 18.9.10 |
| WS-3 | Providing and laying Double Flanged (Screwed/ Welded) Centrifugally (Spun) Ductile Iron Pipes of Class K - 9 conforming to IS : 8329 : |  |  | |  |  |  |
| a) | 100 mm dia Ductile Iron Double Flanged | metre |  | | 1532.35 |  | 18.73.1 |
| b) | 150 mm dia Ductile Iron Double Flanged | metre |  | | 2298.80 |  | 18.73.2 |
| c) | 200 mm dia Ductile Iron Double Flanged | metre |  | | 2901.25 |  | 18.73.3 |
| d) | 250 mm dia Ductile Iron Double Flanged | metre |  | | 4115.55 |  | 18.73.4 |
| e) | 300 mm dia Ductile Iron Double Flanged | metre |  | | 5287.10 |  | 18.73.5 |
| f) | 350 mm dia Ductile Iron Double Flanged | metre |  | | 6657.10 |  | 18.73.6 |
| g) | 400 mm dia Ductile Iron Double Flanged | metre |  | | 8541.30 |  | 18.73.7 |
| h) | 450 mm dia Ductile Iron Double Flanged | metre |  | | 9005.15 |  | 18.73.8 |
| i) | 500 mm dia Ductile Iron Double Flanged | metre |  | | 12707.10 |  | 18.73.9 |
| j) | 600 mm dia Ductile Iron Double Flanged | metre |  | | 16832.40 |  | 18.73.10 |
| k) | 700 mm dia Ductile Iron Double Flanged | metre |  | | 19933.70 |  | 18.73.11 |
| WS-4 | Providing and fixing C.P. brass long body bib cock of approved quality conforming to IS standards and weighing not less than 690 gms. |  |  | |  |  |  |
| 15 mm nominal bore | each |  | | 552.35 |  | 18.51.1 |
| WS-5 | Providing and fixing C.P. brass stop cock (concealed) of standard design and of approved make conforming to IS:8931 |  |  | |  |  |  |
|  | 15 mm nominal bore | each |  | | 606.25 |  | 18.52.1 |
| WS-6 | Providing and fixing C.P. brass angle valve for basin mixer and geyser points of approved quality conforming to IS:8931 |  |  | |  |  |  |
|  | 15mm nominal bore | each |  | | 532.00 |  | 18.53.1 |
| WS-7 | Providing and fixing gun metal gate valve with C.I. wheel of approved quality (screwed end) : |  |  | |  |  |  |
| a) | 25 mm nominal bore | each |  | | 497.15 |  | 18.17.1 |
| b) | 20 mm nominal bore | each |  | | 460.20 |  | 18.17.1A |
| c) | 32 mm nominal bore. | each |  | | 581.25 |  | 18.17.2 |
| d) | 40 mm nominal bore | each |  | | 678.40 |  | 18.17.3 |
| e) | 50 mm nominal bore | each |  | | 869.20 |  | 18.17.4 |
| f) | 65 mm nominal bore | each |  | | 1488.10 |  | 18.17.5 |
| g) | 80 mm nominal bore | each |  | | 2217.90 |  | 18.17.6 |
| WS-8 | Providing and placing on terrace (at all floor levels) polyethylene water storage tank, IS : 12701 marked, with cover and suitable locking arrangement and making necessary holes for inlet, outlet and overflow pipes but without fittings and the base support for tank | per litre |  | | 8.80 |  | 18.48 |
| WS-9 | Providing and fixing ball valve (brass) of approved quality, High or low pressure, with plastic floats complete : |  |  | |  |  |  |
| a) | 15 mm nominal bore | each |  | | 338.70 |  | 18.18.1 |
| b) | 20 mm nominal bore | each |  | | 386.40 |  | 18.18.2 |
| c) | 25 mm nominal bore | each |  | | 394.00 |  | 18.18.3 |
| **SANITARY INSTALLATIONS** | | | | | | |  |
| SI-1 | Providing and fixing water closet squatting pan (Indian type W.C. pan ) with 100 mm sand cast Iron P or S trap, 10 litre low level white P.V.C. flushing cistern, including flush pipe, with manually controlled device (handle lever) conforming to IS : 7231, with all fittings and fixtures complete, including cutting and making good the walls and floors wherever required: |  |  | |  |  | 17.1 |
| SI-2 | White Vitreous china Orissa pattern W.C. pan of size 580x440 mm with integral type foot rests each 5421.50 | each |  | | 5421.50 |  | 17.1.1 |
| SI-3 | Stainless Steel AISI-304(18/8) Orissa pattern W.C. pan of size 585x480 mm with flush pipe and integrated type foot rests | each |  | | 9836.70 |  | 17.1.2 |
| SI-4 | Providing and fixing white vitreous china pedestal type water closet (European type W.C. pan) with seat and lid, 10 litre low level white P.V.C. flushing cistern, including flush pipe, with manually controlled device (handle lever), conforming to IS : 7231, with all fittings and fixtures complete, including cutting and making good the walls and floors wherever required : |  |  | |  |  |  |
| a) | W.C. pan with ISI marked white solid plastic seat and lid |  |  | | 5260.95 |  | 17.2.1 |
| b) | W.C. pan with ISI marked black solid plastic seat and lid |  |  | | 5140.55 |  | 17.2.2 |
| SI-5 | Providing and fixing white vitreous china pedestal type water closet (European type) with seat and lid, 10 litre low level white vitreous china flushing cistern & C.P. flush bend with fittings & C.I. brackets, 40 mm flush bend, overflow arrangement with specials of standard make and mosquito proof coupling of approved municipal design complete, including painting of fittings and brackets, cutting and making good the walls and floors wherever required : |  |  | |  |  |  |
| a) | W.C. pan with ISI marked white solid plastic seat and lid each | each |  | | 6685.00 |  | 17.3.1 |
| b) | W.C. pan with ISI marked black solid plastic seat and lid | each |  | | 6564.60 |  | 17.3.2 |
| SI-6 | Providing and fixing white vitreous china flat back or wall corner type lipped front urinal basin of 430x260x350 mm and 340x410x265 mm sizes respectively with automatic flushing cistern with standard flush pipe and C.P. brass spreaders with brass unions and G.I clamps complete, including painting of fittings and brackets, cutting and making good the walls and floors wherever required : |  |  | |  |  |  |
| a) | One urinal basin with 5 litre white P.V.C. automatic flushing cistern | each |  | | 4982.25 |  | 17.4.1 |
| b) | Range of two urinal basins with 5 litre white P.V.C. automatic flushing cistern | each |  | | 7677.75 |  | 17.4.2 |
| c) | Range of three urinal basins with 10litre white P.V.C. automatic flushing cistern | each |  | | 10605.30 |  | 17.4.3 |
| a) | Range of four urinal basins with 10 litre white P.V.C. automatic flushing cistern | each |  | | 14648.50 |  | 17.4.4 |
| SI-7 | Providing and fixing one piece construction white vitreous china squatting plate with an integral longitudinal flushing pipe, white P.V.C. automatic flushing cistern, with fittings, standard size G.I. / PVC flush pipe for back and front flush with standard spreader pipes with fittings, G.I clamps and C.P. brass coupling complete, including painting of fittings and cutting and making good the walls and floors etc. wherever required : |  |  | |  |  |  |
| a) | Single squatting plate with 5 litre P.V.C. automatic flushing cistern | each |  | | 7240.55 |  | 17.6.1 |
| b) | Range of two squatting plates with 5 litre P.V.C. automatic flushing cistern | each |  | | 10572.45 |  | 17.6.2 |
| c) | Range of three squatting plates with 10 litre P.V.C. automatic flushing cistern | each |  | | 13931.70 |  | 17.6.3 |
| d) | Range of four squatting plates with 10 litre P.V.C. automatic flushing cistern | each |  | | 16718.80 |  | 17.6.4 |
| SI-8 | Providing and fixing wash basin with C.I. brackets, 15 mm C.P. brass pillar taps, 32 mm C.P. brass waste of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever require: |  |  | |  |  |  |
| a) | White Vitreous China Wash basin size 630x450 mm with a pair of 15 mm C.P. brass pillar taps | each |  | | 3087.70 |  | 17.7.1 |
| b) | White Vitreous China Wash basin size 630x450 mm with a single 15 mm C.P. brass pillar tap | each |  | | 2751.30 |  | 17.7.2 |
| c) | White Vitreous China Wash basin size 550x400 mm with a pair of 15 mm C.P. brass pillar taps | each |  | | 2846.90 |  | 17.7.3 |
| d) | White Vitreous China Flat back wash basin size 550x400 mm with single 15 mm C.P. brass pillar tap | each |  | | 2510.45 |  | 17.7.4 |
| e) | White Vitreous China Angle back wash basin size 600 x480 mm with single 15mm C.P. brass pillar tap | each |  | | 2751.30 |  | 17.7.5 |
| f) | White Vitreous China Angle back wash basin size 400 x400 mm with single 15 mm C.P. brass pillar tap | each |  | | 2349.90 |  | 17.7.6 |
| SI-9 | White Vitreous China Flat back wash basin size 450x300 mm with single 15mm C.P. brass pillar tap | each |  | | 2196.05 |  | 17.7.7 |
| SI-10 | White Vitreous China Surgeon type wash basin of size 660x460 mm with a pair of 15 mm C.P. brass pillar taps with elbow including operated levers | each |  | | 4052.35 |  | 17.7.8 |
| SI-11 | White Vitreous China Surgeon type wash basin of size 660x460 mm with single 15 mm C.P. brass pillar taps with elbow operated levers ISI Marked | each |  | | 3417.55 |  | 17.7.9 |
| SI-12 | Stainless Steel AISI-304(18/8) Round basin 405x355 mm with single 15 mm C.P. brass pillar tap. | each |  | | 3788.20 |  | 17.7.10 |
| SI-13 | Stainless Steel AISI-304(18/8) Wash basin 530x345 mm with single 15 mm C.P. brass pillar tap | each |  | | 4457.15 |  | 17.7.11 |
| SI-14 | Providing and fixing wash basin with C.I. brackets, 15 mm dia CP Brass single hole basin mixer of approved quality and make, including painting of fittings and brackets, cutting and making good the walls wherever required:-White Vitreous China Wash basin size 550x400 mm with a 15 mm CP Brass single hole basin mixer | each |  | | 4403.80 |  | 17.7A |
| SI-15 | Providing and fixing wash basin with C.I. brackets, 15 mm PTMT pillar cock, 32 mm PTMT waste coupling of standard pattern, including painting of fittings and brackets, cutting and making good the walls wherever required. White Vitreous China Flat back wash basin size 550x400 mm with single 15 mm PTMT pillar cock. | each |  | | 2398.70 |  | 17.7B |
| SI-16 | Providing and fixing kitchen sink with C.I. brackets, C.P. brass chain with rubber plug, 40 mm C.P. brass waste complete, including painting the fittings and brackets, cutting and making good the walls wherever required: |  |  | |  |  |  |
| a) | White glazed fire clay kitchen sink of size 600x450x 250 mm | each |  | | 3163.25 |  | 17.9.1 |
| SI-17 | Providing and fixing Stainless Steel A ISI 304 (18/8) kitchen sink as per IS:13983 with C.I. brackets and stainless steel plug 40 mm, including painting of fittings and brackets, cutting and making good the walls wherever required : |  |  | |  |  |  |
| a) | Kitchen sink with drain board | each |  | |  |  | 17.10.1 |
| b) | 510x1040 mm bowl depth 250 mm | each |  | | 5155.95 |  | 17.10.1.1 |
| c) | 510x1040 mm bowl depth 225 mm | each |  | | 5851.70 |  | 17.10.1.2 |
| d) | 510x1040 mm bowl depth 200 mm | each |  | | 5584.10 |  | 17.10.1.3 |
| e) | 510x1040 mm bowl depth 178 mm | each |  | | 5182.70 |  | 17.10.1.4 |
| f) | Kitchen sink without drain board | each |  | |  |  | 17.10.2 |
| g) | 610x510 mm bowl depth 200 mm | each |  | | 3631.55 |  | 17.10.2.1 |
| h) | 610x460 mm bowl depth 200 mm | each |  | | 2828.75 |  | 17.10.2.2 |
| i) | 470x420 mm bowl depth 178 mm | each |  | | 2628.10 |  | 17.10.2.3 |
| SI-18 | Providing and fixing white vitreous china water closet squatting pan (Indian type) : |  |  | |  |  |  |
| a) | Long pattern W.C. pan of size 580 mm | each |  | | 1541.05 |  | 17.13.1 |
| b) | Orissa pattern W.C. pan of size 580x440 mm | each |  | | 2544.50 |  | 17.13.2 |
| SI-19 | Providing and fixing P.V.C. low level flushing cistern with manually controlled device (handle lever) conforming to IS : 7231, with all fittings and fixtures complete. |  |  | |  |  |  |
| a) | 10 litre capacity - White | each |  | | 999.95 |  | 17.18.1 |
| b) | 10 litre capacity - coloured | each |  | | 971.40 |  | 17.18.2 |
| c) | Providing and fixing white vitreous china flat back or wall corner type lipped front urinal basin of 430x260x350 mm or 340x410x265 mm sizes respectively. | each |  | | 1299.75 |  | 17.23 |
| SI-20 | Providing and fixing kitchen sink including making all connections excluding cost of fittings. White glazed fire clay sink of size 600x450x250 mm | each |  | | 1853.65 |  | 17.26.1 |
| SI-21 | Providing and fixing P.V.C. waste pipe for sink or wash basin including P.V.C. waste fittings complete. |  |  | |  |  | 17.28 |
|  | Semi-rigid pipe |  |  | |  |  |  |
| a) | 32 mm dia each 87.70 | each |  | | 87.70 |  | 17.28.1.1 |
| b) | 40 mm dia each 98.40 | each |  | | 98.40 |  | 17.28.1.2 |
|  | Flexible pipe | each |  | |  |  | 17.28.2 |
| a) | 32 mm dia each 101.10 | each |  | | 101.10 |  | 17.28.2.1 |
| b) | 40 mm dia each 101.10 | each |  | | 101.10 |  | 17.28.2.2 |
| SI-23 | Providing and fixing mirror of superior glass (of approved quality) and of required shape and size with plastic moulded frame of approved make and shade with 6 mm thick hard board backing : |  |  | |  |  |  |
| a) | Circular shape 450 mm dia each 1242.00 | each |  | | 1242.00 |  | 17.32.1 |
| b) | Rectangular shape 453x357 mm each 1120.25 | each |  | | 1120.25 |  | 17.32.2 |
| c) | Oval shape 450x350 mm (outer dimensions) each 1185.60 | each |  | | 1185.60 |  | 17.32.3 |
| d) | Rectangular shape 1500x450 mm | each |  | | 1786.55 |  | 17.32.4 |
| SI-24 | Providing and fixing toilet paper holder : |  |  | |  |  |  |
| a) | C.P. brass each 583.75 | each |  | | 583.75 |  | 17.34.1 |
| b) | Vitreous china each | each |  | | 426.15 |  | 17.34.2 |
| SI-25 | Providing and fixing soil, waste and vent pipes : |  |  | |  |  |  |
|  | 100 mm dia |  |  | |  |  | 17.35.1 |
| a) | Sand cast iron S&S pipe as per IS: 1729 metre 1008.20 |  |  | | 1008.20 |  | 17.35.1.1 |
| b) | Centrifugally cast (spun) iron socket & spigot (S&S) pipe as per IS: 3989 | m |  | | 1092.20 |  | 17.35.1.2 |
| c) | Hubless centrifugally cast (spun) iron pipes epoxy coated inside & outside IS:15905 | m |  | | 1051.75 |  | 17.35.1.3 |
|  | 75 mm diameter : |  |  | |  |  | 17.35.2 |
| a) | Sand cast iron S&S pipe as per IS: 1729 | m |  | | 923.25 |  | 17.35.2.1 |
| b) | Centrifugally cast (spun) iron socketed pipe as per IS: 3989 |  |  | |  |  |  |
| c) | Hubless centrifugally cast (spun) iron pipes epoxy coated inside & outside IS:15905 | m |  | | 859.55 |  | 17.35.2.3 |
| SI-26 | Providing and fixing PTMT liquid soap container 109 mm wide, 125mm high and 112 mm distance from wall of standard shape with bracket of the same materials with snap fittings of approved quality and colour, weighing not less than 105 gms. | each |  | | 158.55 |  | 17.71 |
| SI-27 | Providing and fixing PTMT towel ring trapezoidal shape 215 mm long,200 mm wide with minimum distances of 37 mm from wall face with concealed fittings arrangement of approved quality and colour, weighing not less than 88 gms. | each |  | | 228.20 |  | 17.72 |
| SI-28 | Providing and fixing PTMT towel rail complete with brackets fixed to wooden cleats with CP brass screws with concealed fittings arrangement of approved quality and colour. |  |  | |  |  |  |
| a) | 450 mm long towel rail with total length of 495 mm, 78 mm wide and effective height of 88 mm, weighing not less than 170 gms | each |  | | 555.35 |  | 17.73.1 |
| b) | 600 mm long towel rail with total length of 645 mm, width 78 mm and effective height of 88 mm, weighing not less than 190 gms. | each |  | | 595.5 |  | 17.73.2 |
|  | | | | | | |  |
| SI-29 | Providing and fixing 600x120x5 mm glass shelf with edges round off, supported on anodised aluminium angle frame with C.P. brass brackets and guard rail complete fixed with 40 mm long screws, rawl plugs etc., complete | Each |  | | 841.80 |  | 17.33 |
| SI-30 | Providing and fixing PTMT soap Dish Holder having length of 138mm, breadth 102mm, height of 75mm with concealed fitting arrangements, weighing not less than 106 gms | each |  | | 130.50 |  | 18.65 |
| SI-31 | Providing and fixing bend of required degree with access door, insertion rubber washer 3 mm thick, bolts and nuts complete Sand cast iron S&S as per IS - 3989 | each |  | | 461.65 |  | 17.38.1.2 |
| SI-32 | Supplying, fitting and fixing along with all standard fittings, approved quality **CP health faucet** and two way bib cock with 1m PVC tube & swivel hook, complete including making good the walls damaged during installation. | each |  | | 1180.00 |  | Previous Assign. |
| SI-33 | Supplying, fitting and fixing 125 mm dia **C.P. brass grating covers** with PVC floor traps including cutting the floor wherever necessary and making good the damage, all material and labour complete. | each |  | | 658.00 |  | Previous Assign |
| Sl-34 | Providing and fixing PTMT swivelling shower, 15 mm nominal bore, weighing not less than 40 gms. | each |  | | 111.75 |  | 18.64 |
| **DRAINAGE** | | | | | | |  |
| DR-1 | Providing and laying non-pressure NP2 class (light duty) R.C.C. pipes with collars jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc. complete : |  |  | |  |  |  |
| a) | 100 mm dia. R.C.C. pipe | m |  | | 415.75 |  | 19.6.1 |
| b) | 150 mm dia. R.C.C. pipe | m |  | | 462.60 |  | 19.6.2 |
| c) | 250 mm dia. R.C.C. pipe | m |  | | 754.45 |  | 19.6.3 |
| d) | 300 mm dia. R.C.C. pipe | m |  | | 863.65 |  | 19.6.4 |
| e) | 450 mm dia. R.C.C. pipe | m |  | | 1392.70 |  | 19.6.5 |
| f) | 500 mm dia. R.C.C. pipe | m |  | | 1656.95 |  | 19.6.6 |
| g) | 600 mm dia. R.C.C. pipe | m |  | | 1948.35 |  | 19.6.7 |
| h) | 700 mm dia. R.C.C. pipe | m |  | | 2533.05 |  | 19.6.8 |
| i) | 800 mm dia. R.C.C. pipe | m |  | | 3022.85 |  | 19.6.9 |
| j) | 900 mm dia. R.C.C. pipe | m |  | | 4090.55 |  | 19.6.10 |
| k) | 1000 mm dia. R.C.C. pipe | m |  | | 4800.35 |  | 19.6.11 |
| l) | 1100 mm dia. R.C.C. pipe | m |  | | 5393.75 |  | 19.6.12 |
| m) | 1200 mm dia. R.C.C. pipe | m |  | | 6046.80 |  | 19.6.13 |
| DR-2 | Constructing brick masonry manhole in cement mortar 1:4 ( 1 cement: 4 coarse sand ) with R.C.C. top slab with 1:1.5:3 mix (1 cement :1.5 coarse sand (zone- III) : 3 graded stone aggregate 20 mm nominal size), foundation concrete 1:4:8 mix (1 cement : 4 coarse sand (zone- III) : 8 graded stone aggregate 40 mm nominal size), inside plastering 12 mm thick with cement mortar 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement and making channels in cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) finished with a floating coat of neat cement complete as per standard design : | each |  | |  |  | 19.7 |
| DR-2 | Inside size 90x80 cm and 45 cm deep including C.I. cover with frame (light duty) 455x610 mm internal dimensions, total weight of cover and frame to be not less than 38 kg (weight of cover 23 kg and weight of frame 15 kg) : |  |  | |  |  |  |
| a) | With common burnt clay F.P.S. (non modular) bricks of class designation 7.5 | each |  | | 10905.05 |  | 19.7.1.1 |
| b) | With Sewer bricks conforming to IS : 4885 | each |  | | 10915.65 |  | 19.7.1.2 |
| DR-3 | Inside size 120x90 cm and 90 cm deep including C.I. cover with frame (medium duty) 500 mm internal diameter, total weight of cover and frame to be not less than 116 kg (weight of cover 58 kg and weight of frame 58 kg) : |  |  | |  |  |  |
| a) | With common burnt clay F.P.S. (non modular) bricks of class designation 7.5 each 22939.65 | each |  | | 22939.65 |  | 19.7.2.1 |
| b) | With Sewer bricks conforming to IS : 4885 each 22968.60 | each |  | | 22968.60 |  | 19.7.2.2 |
| c) | Inside size 120x90 cm and 90 cm deep including C.I. cover with frame (heavy duty) 560 mm internal diameter, total weight of cover and frame to be not less than 208 kg (weight of cover 108 kg and weight of frame 100 kg) : |  |  | |  |  |  |
| d) | With common burnt clay F.P.S. (non modular) bricks of class designation 7.5 each 28632.25 | each |  | | 28632.25 |  | 19.7.3.1 |
| e) | With Sewer bricks conforming to IS : 4885 | each |  | | 28657.15 |  | 19.7.3.2 |
| DR-4 | Making soak pit 2.5 m diameter 3.0 metre deep with 45 x 45 cm dry brick honey comb shaft with bricks and S.W. drain pipe 100 mm diameter, 1.8 m long complete as per standard design. |  |  | |  |  |  |
| a) | With common burnt clay F.P.S. (non modular) bricks of class designation 7.5 | each |  | | 25278.75 |  | 19.32.1 |
| DR-5 | Constructing soak pit 1.20x1.20x1.20 m filled with brickbats including S.W. drain pipe 100 mm diameter and 1.20 m long complete as per standard design | each |  | | 2608.00 |  | 19.33 |
| DR-6 | Providing and laying Non Pressure NP-3 class (Medium duty) R.C.C. pipes including collars/spigot jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc. complete |  |  | |  |  |  |
| a) | 450 mm dia RCC pipes | m |  | | 2323.90 |  | 19.35.1 |
| b) | 600 mm dia RCC pipes. | m |  | | 2984.55 |  | 19.35.2 |
| c) | 900 mm dia RCC pipes | m |  | | 4695.35 |  | 19.35.3 |
| d) | 1000 mm dia RCC pipes. (Laying by manual/ mechanical means) | m |  | | 5816.30 |  | 19.35.4 |
| e) | 1200 mm dia RCC pipes. (Laying by manual/ mechanical means) | m |  | | 7726.75 |  | 19.35.5 |
| f) | 1800 mm dia RCC pipes. (Laying by manual/ mechanical means) | m |  | | 14056.15 |  | 19.35.6 |
| DR-7 | Providing and laying Non Pressure NP-4 class (Heavy duty) R.C.C. pipes including collars/spigot jointed with stiff mixture of cement mortar in the proportion of 1:2 (1 cement : 2 fine sand) including testing of joints etc. complete |  |  | |  |  |  |
| a) | 450 mm dia RCC pipes. | m |  | | 2641.00 |  | 19.36.1 |
| b) | 600 mm dia RCC pipes. | m |  | | 3406.00 |  | 19.36.2 |
| c) | 900 mm dia RCC pipes. | m |  | | 6493.55 |  | 19.36.3 |
| d) | 1000 mm dia RCC pipes.(Laying by manual/ mechanical means) | m |  | | 8064.05 |  | 19.36.4 |
| e) | 1200 mm dia RCC pipes. (Laying by manual/ mechanical means) | m |  | | 9693.50 |  | 19.36.5 |
| f) | 1800 mm dia RCC pipes. (Laying by manual/ mechanical means) | m |  | | 19571.00 |  | 19.36.6 |
|  | | | | | | |  |
| DR-8 | Constructing brick masonry chamber for underground C.I. inspection chamber and bends with bricks in cement mortar 1:4 (1 cement : 4 coarse sand) C.I. cover with frame (light duty) 455x610 mm internal dimensions, total weight of cover with frame to be not less than 38 kg (weight of cover 23 kg and weight of frame 15 kg), R.C.C. top slab with **1:1.5:3 mix (1 cement : 1.5 Fine sand : 3 graded stone aggregate 20 mm nominal size)**, foundation concrete 1:5:10 (1 cement : **5 fine sand** : 10 graded stone aggregate 40 mm nominal size), inside plastering 12 mm thick with cement mortar 1:3 (1 cement : 3 coarse sand), finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete as per standard design: |  |  | |  |  |  |
| a) | Inside dimensions 455x610 mm and 45 cm deep for single pipe line- With class 5-designation flyash / fuel ash bricks conforming to IS:12894-2002 / IS 13757 : 1993 | Each |  | | 6061.95 |  | 19.30.1.1 |
| b) | Inside dimensions 500x700 mm and 45 cm deep for pipe line with one or two inlets With class 5-designation flyash / fuel ash bricks conforming to IS:12894-2002 / IS 13757 : 1993 | Each |  | | 6879.00 |  | 19.30.2.1 |
| c) | Inside dimensions 600x 850 mm and 45 cm deep for pipe line with three or more inlets- With class 5-designation flyash / fuel ash bricks conforming to IS:12894-2002 / IS 13757 : 1993 | Each |  | | 8079.30 |  | 19.30.3.1 |
| DR-9 | Providing, laying and jointing glazed stoneware pipes class SP-1 with stiff mixture of cement mortar in the proportion of 1:1 (1 cement : 1 fine sand) including testing of joints etc. complete : |  |  | |  |  |  |
| a) | 100 mm diameter | metre |  | | 317.05 |  | 19.1.1 |
| b) | 150 mm diameter | metre |  | | 500.20 |  | 19.1.2 |
| c) | 200 mm diameter | metre |  | | 794.25 |  | 19.1.3 |
| d) | 250 mm diameter | metre |  | | 1173.70 |  | 19.1.4 |
| e) | 300 mm diameter | metre |  | | 1607.15 |  | 19.1.5 |
| DR-10 | Providing and fixing on wall face unplasticised Rigid PVC rain water pipes conforming to IS : 13592 Type A, including jointing with seal ring conforming to IS : 5382, leaving 10 mm gap for thermal expansion, (i) Single socketed pipes-110 mm diameter | metre |  | | 305.05 |  | 12.41.2 |
| DR-11 | Making connection of drain or sewer line with existing manhole including breaking into and making good the walls, floors with cement concrete 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) cement plastered on both sides with cement mortar 1:3 (1 cement : 3 coarse sand), finished with a floating coat of neat cement and making necessary channels for the drain etc. complete : |  |  | |  |  |  |
| a) | For pipes 100 to 250 mm diameter | each |  | | 623.50 |  | 19.21.1 |
| b | For pipes 250 to 300 mm diameter | each |  | | 717.30 |  | 19.21.2 |
| c) | For pipes 350 to 450 mm diameter | each |  | | 1035.45 |  | 19.21.3 |
| DR-12 | Constructing masonry Chamber 30x30x50 cm inside, in brick work in cement mortar 1:4 (1 cement :4 coarse sand) for stop cock, with C. I. surface box 100x100 x75 mm (inside) with hinged cover fixed in cement concrete slab 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size), i/c necessary excavation, foundation concrete 1:5:10 ( 1 cement : 5 fine sand : 10 graded stone aggregate 40mm nominal size ) and inside plastering with cement mortar 1:3 (1 cement : 3 coarse sand) 12mm thick, finished with a floating coat of neat cement complete as per standard design- With class 5-designation flyash / fuel ash bricks conforming to IS:12894-2002 / IS 13757 : 1993 | each |  | | 1582.45 |  | 18.32.1 |
| DR-13 | Providing and fixing square-mouth S.W. gully trap class SP-1 complete with C.I. grating brick masonry chamber with water tight C.I. cover with frame of 300 x300 mm size (inside) the weight of cover to be not less than 4.50 kg and frame to be not less than 2.70 kg as per standard design-150 x 100 mm size P type- With class 5-designation flyash / fuel ash bricks conforming to IS:12894-2002 / IS 13757 : 1993 | each |  | | 2317.40 |  | 19.4.2.1 |
| DR-14 | Supplying and fixing C.I. cover with frame for manholes : 560 mm diameter C.I. cover (heavy duty) the weight of the cover to be not less than 108 kg | each |  | | 9000 |  | 3860 |
| **MISCELLANEOUS WORKS** | | | | | | |  |
| MISC-1 | Providing and laying APP (Atactic Polypropylene Polymer) modified prefabricated five layer, 4 mm thick water proofing membrane, black finished reinforced with glass fibre matt consisting of a coat of bitumen primer for bitumen membrane @ 0.40 litre/sqm by the same membrane manufactured of density at 25°C, 0.87 - 0.89 kg/litre and viscocity 70 - 160 cps. Over the primer coat the layer of membrane shall be laid using butane torch and sealing all joints etc., and preparing the surface complete. The vital physical and chemical parameters of the membrane shall be as under : Joint strength in longitudinal and transverse direction at 23°C as 350/300 N/5 cm. Tear strength in longitudinal and transverse direction as 60/80N. Softening point of membrane not less than 150°C. Cold flexibility shall be upto -2°C when tested in accordance with ASTM, D - 5147. The laying of membrane shall be got done through the authorized applicator of the manufacturer of membrane : 3 mm thick | sqm |  | | 683.93 |  | 14.90.1  512.95X(4/3) |
| MISC-2 | Providing and laying APP (Atactic Polypropylene Polymer) modified prefabricated five layer 4 mm thick water proofing membrane, black finished reinforced with non-woven polyester matt consisting of a coat of bitumen primer for bitumen membrane @ 0.40 litre/sqm by the same membrane manufacture of density at 25°C, 0.87-0.89 kg/ litre and viscocity 70-160 cps. Over the primer coat the layer of membrane shall be laid using Butane Torch and sealing all joints etc, and preparing the surface complete. The vital physical and chemical parameters of the membrane shall be as under : Joint strength in longitudinal and transverse direction at 23°C as 650/ 450N/ 5cm. Tear strength in longitudinal and transverse direction as 300/250N. Softening point of membrane not less than 150°C. Cold flexibility shall be upto -2°C when tested in accordance with ASTM, D - 5147. The laying of membrane shall be got done through the authorised applicator of the manufacturer of membrane : 3 mm thick | sqm |  | | 713.33 |  | 14.91.1x4/3  535.00X(4/3) |
| MISC-3 | Extra for covering top of membrane with Geotextile, 120 gsm non woven, 100% polyester of thickness 1 to 1.25 mm bonded to the membrane with intermittent touch by heating the membrane by Butane Torch as per manufactures recommendation. | sqm |  | | 99.75 |  | 14.92 |
| MISC-4 | Providing and fixing M.S. fan clamp type I or II of 16 mm dia M.S. bar, bent to shape with hooked ends in R.C.C. slabs or beams during laying, including painting the exposed portion of loop, all as per standard design complete. | each |  | | 171.15 |  | 10.17 |
| MISC-5 | Providing and fixing circular/ Hexagonal cast iron or M.S. sheet box for ceiling fan clamp, of internal dia 140 mm, 73 mm height, top lid of 1.5mm thick M.S. sheet with its top surface hacked for proper bonding, top lid shall be screwed into the cast iron/ M.S. sheet box by means of 3.3 mm dia round headed screws, one lock at the corners. Clamp shall be made of 12 mm dia M.S. bar bent to shape as per standard drawing. | each |  | | 172.25 |  | 10.18 |
| MISC-6 | Providing and fixing hand rail of approved size by welding etc. to steel ladder railing, balcony railing, staircase railing and similar works, including applying priming coat of approved steel primer. |  |  | |  |  |  |
| a) | M.S. tube | kg |  | | 145.65 |  | 10.26.1 |
| b) | E.R.W. tubes | kg |  | | 138.15 |  | 10.26.2 |
| c) | G.I. pipes | kg |  | | 158.00 |  | 10.26.3 |
| MISC-7 | Providing & fixing 12.5mm thick glass fibre reinforced gypsum board false ceiling along with suspension system including 2 & more coats of acrylic emulsion paint as per specifications. | Sqm |  | | 1365.00 |  | (DSR-12.45.2+13.6) |
| **REPAIR WORKS** | | | | | | |  |
| RE-1 | **Repairs to plaster** of thickness 12 mm to 20 mm in patches of area 2.5 sq.meters and under, including cutting the patch in proper shape, raking out joints and preparing and plastering the surface of the walls complete, including disposal of rubbish to the dumping ground, all complete as per direction of Engineer-in-Charge |  |  | |  |  |  |
| a) | With cement mortar 1:4 (1 cement : 4 fine sand) | Sqm |  | | 417.80 |  | 14.1.1 |
| b) | With cement mortar 1:4 (1cement: 4 coarse sand) | Sqm |  | | 429.60 |  | 14.1.2 |
| RE-2 | Making the **opening in brick masonry** including dismantling in floor or walls by cutting masonry and making good the damages to walls, flooring and jambs complete, to match existing surface, for **door/ window/ clerestory window,** i/c disposal of mulba/ rubbish to the nearest municipal dumping ground, all complete as per direction of Engineer-in-Charge. | sqm |  | | 932.45 |  | 14.4.1 |
| RE-3 | Renewing glass panes, with putty and nails wherever necessary including racking out the old putty: |  |  | |  |  |  |
| a) | Float glass panes of **nominal** thickness 4 mm **(weight not less than 10kg/sqm)** | Sqm |  | | 890.50 |  | 14.5.1 |
| b) | Float glass panes of **nominal** thickness 5 mm **(weight not less than 12.5kg/sqm)** | Sqm |  | | 1184.85 |  | 14.5.2 |
| RE-4 | Renewal of old putty of glass panes (length) | Rm |  | | 42.60 |  | 14.9 |
| RE-5 | Refixing old glass panes with putty and nails | Sqm |  | | 554.05 |  | 14.10 |
| RE-6 | Providing and fixing double scaffolding system (cup lock type) on the exterior side, up to seven story height made with 40 mm dia M.S. tube 1.5 m centre to centre, horizontal & vertical tubes joining with cup & lock system with M.S. tubes, M.S. tube challies, M.S. clamps and M.S. staircase system in the scaffolding for working platform etc. and maintaining it in a serviceable condition for the required duration as approved and removing it thereafter. The scaffolding system shall be stiffened with bracings, runners, connection with the building etc. wherever required for inspection of work at required locations with essential safety features for the workmen etc. complete as per directions and approval of Engineer-in-charge. The elevational area of the scaffolding shall be measured for payment purpose .The payment will be made once irrespective of duration of scaffolding.  Note: - This item to be used for maintenance work judicially, necessary deduction for scaffolding in the existing item to be done. | sqm |  | | 257.95 |  | 14.72 |
| RE-7 | Cutting holes of required size in brick masonry wall for fixing of exhaust fan including providing and fixing 300 mm dia PVC pipe conforming BIS-12818 and making good the same etc. complete as per direction of Engineer-in-charge. | Each |  | | 220.40 |  | 14.81 |