

Request for Proposal

For

INSTALLATION OF NATIONAL FLAG POST AT GANDHI MANDAP, SARANIA HILL

Design, Build and Operate Basis

**Volume II A: SCOPE OF WORK & SPECIFICATIONS FOR
CIVIL WORK**

Client:



GSCL, Guwahati, Assam

DOCUMENT NO: 10477A-CV-3000-3901

GANDHI MANDAP

INSTALLATION OF NATIONAL FLAG POST AT GANDHI MANDAP, SARANIA HILL

Design and installation of National Flag works consisting of Hardscaping and related Civil works along with Maintenance of National flag and pole for period of One years at Gandhi Mandap, sarania Hill.

VOLUME II A

TECHNICAL BID - EMPLOYERS REQUIREMENT AND SPECIFICATION OF CIVIL WORK

Employer

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1. BRIEF SCOPE OF CIVIL WORK:

The scope of this specification covers the Structural Design, manufacturing, transport, installation, testing and commissioning of the complete Flag system, using Raising and Lowering type of Flag mast Towers, including the podium/stage, Civil Foundation Works and necessary electrical works.

The contractor shall be responsible for the entire design, construction, erection, commissioning and operation and maintenance (O&M) of project for period of 1 year (365 Days) commencing from the date of completion certificate. Defects liability period shall be for period of 1 year (365 Days) commencing from the date of completion certificate.

The bidder shall have to carry out Geotechnical Investigation of site and submit the report of to client/PMC.

The bidder shall have to submit the design calculations and necessary drawings of all the work related installation of work and take the approvals from client/ PMC. The structural design shall be verified and approved by IIT structural department of equivalent reputed institutes.

The bidder shall have to take the necessary statutory approvals from respective authorities.

2. APPLICABLE CODES AND STANDARDS:**Code No.**

- | | |
|-----------------------------|--|
| a. IS 456:2000 | Plain and Reinforced concrete - Code of Practice |
| b. SABS 0225:1991 | High Mast natural frequency calculation |
| c. IS 875 Part - 3 (2015) | Wind Loading |
| d. BS EN 10025:1993 | High Tensile Steel Sheets |
| e. IS 2062 (2011) | Mild Steel |
| f. BS EN ISO 1461 | Galvanization |
| g. IS-3459(2016)/2266(2002) | Stainless steel wire rope |
| h. IS 325 (1996) | Motor |
| i. TR.NO.-7 | High masts for lighting and CCTV (2000 edition) of ILE, U.K. |

3. **DESIGN REQUIREMENTS:**

A. CIVIL

a) Design criteria:

The contractor have to decide the soil bearing capacity and founding depth as per soil investigation report provided to him. The Flag mast shall be of continuously tapered, polygonal cross section, 24 or more sided, presenting a good and pleasing appearance and shall be conforming to the standards referred to above to give an assured performance and reliable service.

Guwahati City comes under seismic zone v and wind speed in the city is 50 M/S. The flag size considered is 80 feet x 120 feet. For installation of 300 feet (91.46 M) high flag pole, enough flat surface land, i.e. about 10m x 10m is required for construction of flag foundation, which is available on Sarania Hill top. The flag pole foundation is to be designed as per available safe bearing capacity of soil at site location. Contractor shall bring 91.46 M flag pole in parts of suitable length to match his erection methodology.

b) Dynamic Loading for the Mast:

The mast structure shall be suitable to sustain an assumed maximum reaction arising from a wind speed as per IS 875 Part-III (2015) (three second gust), and shall be measured at a height of 10 meters above ground level. The design life of the mast shall be 50 years and for equipments it shall be 25 years. The force co-efficient taken for design of the polygonal structure is to be established from the wind tunnel test data.

Wind loads shall be as per IS 875 Part -III (2015).

Basis wind speed=50 m/s

K1=probability factor (risk coefficient)

K2=Terrain roughness and height factor

K3=Topography factor

K4= Importance factor for the cyclonic region

$V_z = V_b * K1 * K2 * K3 * K4$ and Design Wind Pressure

$P_z = 0.6 V_z^2$

Where, P_z = Design wind pressure in N/m² at height Z

- **Peak Gust**

A peak gust or a peak gust speed is the wind speed associated with the maximum amplitude.

- **Dynamic Effect**

Flexible slender structures and structural elements shall be investigated to ascertain the importance of wind induced oscillations or excitations along and across the direction of wind.

c) Structural components for the installation of Flag Pole:

- Type of footing will be **box footing** (open foundation) to be rested at suitable depth below N.G.L.
- Total height of the steel flag pole is 93m (305 feet) having bottom outer diameter and top outer diameter as per detailed structural analysis and design.
- The flag pole shall be fixed on a R.C.C pedestal of suitable size and depth using anchor bolts, base plate and stiffeners.
- Required number and suitable diameter bolts (8.8 grade or above) shall be used to fix Flag Pole to R.C.C pedestal.
- Grade of concrete to be used is M35 and grade of reinforcement is Fe 500.

d) Construction Methodology:

The mast shaft shall be manufactured from high tensile steel plates confirming to BS EN 10025 having minimum yield strength of 355 N/Sq.mm. Each mast shaft section shall have only one longitudinal weld and without any circumferential weld joint. Sections with more than one longitudinal weld shall not be accepted. The mast base flange shall be free from any lamination or incursion and provided with supplementary gussets between the bolt-holes to ensure elimination of helical stress concentration.

The minimum dimension of top and bottom shall be as per the design and safe structure calculation. Design certificates and warranty should be provided for minimum 25 years.

The masts sections shall be joined at site by slip-stress-fit method and minimum overlap distance shall be 1.5 times the diameter at penetration.

A door reinforced with welded steel section, vandal resistant, weather proof with Allen bolts and pad locking facility of minimum dimension 1250 mm x 250 mm shall be provided at a height 2 times the width of door from the base of mast to provide clear access to base compartment equipment's winch, motor, cable, connector etc. Concentration of stresses around door opening shall be checked. Also its behavior on vibration and deflection shall be checked. For the environmental protection of the mast, the entire fabricated mast shall be hot dip galvanized internally and externally in single dip having a uniform average thickness of 85 microns for plates more than 5 mm and 70 microns for 5 mm or less thickness. Manufacturer of Flag mast, Octagonal poles and Luminaires should preferably be same for easy maintenance.

After finalization of structural design and drawings of 91.46 M High Flag mast, contractor shall do all necessary fabrication work in his workshop. 91.46 M steel flag pole is to be casted in fabrication shop and galvanization treatment shall be carried out to all parts. Each and every part of flag pole shall be transported to Sarania Hill location (Guwahati) by means of heavy transport vehicles / Trucks.

After reaching at site location, each flag pole piece shall be assembled on the ground (keeping it horizontally) by using heavy duty cranes (450 to 500 TONE Capacity). Meanwhile contractor has to complete excavation work of foundation and casting work of R.C.C. foundation and pedestal at site. Anchor bolts are then embedded in concrete pedestal at certain depth (about 2000 mm) and concreting work shall be carried out. After proper curing of R.C.C. pedestal and footing of flag mast, erection work shall be carried out. For erection of 91.46 M steel flag mast, arrangement of heavy duty cranes (450 to 500 TONE Capacity) shall be done to lift the entire pole vertically and to place on R.C.C. Pedestal / Anchor Bolts.

e) PU Painting:

Flag mast shall be finished with Polyurethane (PU) paint over the galvanized surface after application of Etch Primer coat. PU Paint should be done at manufacturer's works, and certificate from manufacturer for same should be enclosed in the bid.

f) Detailed structural design calculations:

- One (1) Copy of a Compact Disc (CD) containing electronic files relevant to the structure's modelling, analysis and design calculations (Microsoft Excel, Staad Pro, etc.). Files submitted shall be in editable format.

- Print copy (6 Copies) of the contents as submitted in the Compact Disc.
- Contractor shall submit detailed structural design after approval from IIT.

g) Good for Construction Drawings:

- One (1) Copy of a Compact Disc (CD) containing AutoCAD files (Civil General Arrangement, Structural Dimensions and Reinforcement Details) pertaining to the structure. Files submitted shall be in editable format.
- Print copy (6 Copies) of the contents as submitted in the Compact Disc. Prints to be submitted on A1 Size Sheet as a minimum or A0 Size Sheet when required by the employer.
- Detailed drawing showing the location, number and depth of inserts shall be included for any structural steel inserts/Metal inserts in the structure such as rungs, bolted connections for ladders/railings, etc.
- Location of Construction Joints and pour sequence shall be included on the drawing for base slabs, walls and top slabs.
- Revised drawings shall be submitted by clouding at the location with the latest revision number and also show the history of revisions in a table format just above the title block.

The design considerations described hereunder establish the minimum basic requirements of plain and reinforced concrete structures, masonry structures and structural steel works. However, any particular structure shall be designed for the satisfactory performance of the functions for which the same is being constructed. The Contractor shall also take care to check the stability of partly completed structures.

- **General:**

- a. All materials required for the job will have to be arranged by the contractor meeting the relevant codes and specifications.
- b. The contractor will have to make his own arrangement to transport the required materials outside and inside the working place and leaving the premises in a neat and tidy condition after the completion of the job to the satisfaction of the GSCLs Engineer.
- c. The contractor will have to arrange for safe keeping of his materials and should provide necessary security arrangements for safe guarding the materials. GSCL will not be responsible for any claims with regard to this.
- d. The tenderers are advised to visit the site and get acquainted with the site conditions. GSCL will not provide any roads, infrastructure such as power, water, lighting etc. at site.

Vendor has to make their own arrangements for transportation of material, movement of heavy equipment at site.

- e. The tenderers should note the site conditions before quoting. The site will be offered on AS IS WHERE IS for the execution of this job and it will be sole responsibility of the vendor to ensure that they abide by the various rules. Regulations, bye-laws and other statutory requirements etc. Imposed by the Government / semi-Government and / or other local authorities governing execution of this job.

4. DETAILED TECHNICAL SPECIFICATIONS

a) Excavation

All excavation work shall be carried out by mechanical equipment unless, in the opinion of the ENGINEER, the work involved and time schedule permit manual work. Excavation for permanent work shall be taken out to such widths, lengths, depths and profiles as are shown on the drawings or such other lines and grades as may be specified by the ENGINEER. Rough excavation shall be carried out to a depth 150 mm above the final level. The balance shall be excavated with special care. Soft pockets shall be removed even below the final level and extra excavation filled up as directed by the ENGINEER. The final excavation if so instructed by the ENGINEER should be carried out just prior to laying the mud-mat. The CONTRACTOR may, for facility of work or similar other reasons excavate, and also backfill later, if so approved by the ENGINEER, at his own cost outside the lines shown on the drawings or directed by the ENGINEER. Should any excavation be taken below the specified elevations, the CONTRACTOR shall fill it up, with concrete of the same class as in the foundation resting thereon, upto the required elevation. No extra shall be claimed by the CONTRACTOR on this account.

All excavation shall be done to the minimum dimensions as required for safety and working facility. Prior approval of the ENGINEER shall be obtained by the CONTRACTOR in each individual case, for the method he proposes to adopt for the excavation, including dimensions, side slopes, dewatering, disposal, etc. This approval, however, shall not in any way relieve the CONTRACTOR of his responsibility for any consequent loss or damage. The excavation must be carried out in the most expeditious and efficient manner. Side slopes shall be as steep as will

stand safely for the actual soil conditions encountered. Every precaution shall be taken to prevent slips. Should slips occur, the slipped material shall be removed and the slope dressed to a modified stable slope. Removal of the slipped earth will not be paid for and CONTRACTOR shall take adequate precautions to avoid slips in view of the restricted plot and presence of buildings/ structures in nearby vicinity.

Excavation shall be carried out with such tools, tackles and equipment as described herein before. Blasting or other methods may be resorted to in the case of hard rock; however not without the specific permission of the ENGINEER.

b) Concrete

• General

Concrete grade shall be as designated on drawings. Concrete in the works shall be “DESIGN MIX CONCRETE” OR “NOMINAL MIX CONCRETE”. All concrete works of up to grade M15 shall be NOMINAL MIX CONCRETE whereas all other grades, M20 and above, shall be DESIGN MIX CONCRETE.

• Mix Design and Testing

For Design Mix Concrete, the mix shall be designed to provide the specific grade of concrete having the required workability and characteristic strength not less than appropriate values given in IS: 456. The design mix shall in addition be such that it is cohesive and does not segregate during placement and should result in a dense and durable concrete capable of giving the specified finish. For liquid retaining structures, the mix shall also result in watertight concrete. The CONTRACTOR shall exercise great care while designing the concrete mix and executing the works to achieve the desired result.

The minimum grade of concrete shall be as per Table 5 of IS: 456 for various exposure conditions of concrete. For various environmental conditions, refer Table 3 of IS: 456.

The minimum cement content for Design Mix Concrete shall be as per Table 5 of IS: 456 or as given below, whichever is higher.

Grade of Concrete	Minimum Cement Content
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(M)	per kg/cum of Concrete
20	300
25	300
30	320
35	345
40	360
45	400

The minimum cement content stipulated above shall be adopted irrespective of whether the CONTRACTOR achieves the desired strength with less quantity of cement. The CONTRACTOR's quoted rates for concrete shall provide for the above eventuality and nothing extra shall become payable to the CONTRACTOR on this account. Even in the case where the quantity of cement required is higher than that specified above to achieve desired strength based on an approved mix design, nothing extra shall become payable to the CONTRACTOR.

It shall be CONTRACTOR's sole responsibility to carry out the mix designs at his own cost. He shall furnish to ENGINEER for approval at least 30 days before concreting operations, a statement of proportions proposed to be used for the various concrete mixes and the strength results obtained. The strength requirements of the concrete mixes ascertained on 150 mm cubes as per IS: 516 shall comply with the requirements of IS: 456.

Grade of Concrete	Minimum Compressive Strength N/mm ² at 7 days	Specified Characteristic compressive strength N/mm ² at 28 days
M15	10.0	15.0
M20	13.5	20.0
M25	17.0	25.0
M30	20.0	30.0
M35	23.5	35.0
M40	30.0	40.0

c) Reinforcement

Reinforcement bars shall conform to IS: 432 and or IS: 1786 and welded wire fabric to IS: 1566 as shown on the drawing. Grade of Reinforcement shall be Fe500 TMT/CRS as approved by Engineer In Charge.

All reinforcement shall be clean, free from pitting, oil, grease, paint, loose mill scales, rust, dirt, dust or any other substance that will destroy or reduce bond.

The work includes supplying, cutting, bending, binding, welding and erecting in position high yield strength deformed (H.Y.S.D.) steel bars and mild steel (M.S.) bars as reinforcement for concrete of various components.

INDIAN STANDARDS FOR REFERENCE

1	IS : 226-1975	Structural steel (Standard Quality).
2	IS : 280-1978	Mild steel wire for general Engineering purposes.
3	IS : 432-1966	Mild steel and medium tensile bars and drawn steel wire for concrete reinforcement
4	IS : 432-1966(part-I)	Mild Steel and medium tensile steel bars.
5	IS : 814-1974	Covered electrodes for metal or welding of structural steel.
6	IS : 814-1974(part-I)	For welding products other than sheets.
7	IS : 814-1974(part-II)	For welding sheets
8	IS : 1139-1966	Hot rolled mild steel medium tensile steel and high yield strength steel deformed bars for concrete

Steel reinforcing bars:

a. General

- Steel reinforcing bars shall be placed in concrete where shown on the drawings or as directed by the Engineer-in-charge. The drawings issued with these specifications show only in part the requirement of reinforcement and further drawings shall be issued by the Engineer-in-charge during the course of the contract.
- As far as possible, high yield strength deformed bars conforming to IS : 1786-1979 shall be used as reinforcement. However, in case of Non-availability of such bars other steel bars conforming to IS : 432-1966 and / or IS : 1139-1966 shall be used as per the directions of the Engineer-in-charge.

b. Cutting, Bending and Binding

- a. The contractor shall be responsible for the accuracy of the cutting, bending and placing of the reinforcement as shown in the drawing. Reinforcement shall be inspected for compliance with the requirement of grade, size, shape, length splicing and locations after it has been placed. No concreting shall be started unless the reinforcement as placed in the work is finally checked, recorded and certified by the Engineer-in-charge.
- b. Before the reinforcement is placed, the surface of the bars and the surfaces of any metal bar supports shall be cleaned of the rust, loose mill scale, dirt, grease and other objectionable foreign substances. After being placed, the reinforcing bars shall be maintained in a clean condition until they are completely embedded in the concrete.
- c. Wire for binding reinforcement shall be of soft and annealed mild steel and shall conform to IS : 280-1978. The binding wire shall have tensile strength of not less than 56kg/sqmm. The wire shall have minimum diameter of 1 mm. Chairs, hangers, spacers and other supports for reinforcement, may be of concrete, metal or other approved material. Where portions of such supports will be exposed on concrete surfaces designated to receive F2 or F3 finish, the exposed portion of support shall be galvanized or coated with other corrosion resistant material without which the concreting will not be permitted. Such supports shall not be exposed on surfaces of F4 finish unless otherwise shown on the drawings. The minimum allowable clearance between parallel round bars shall not be less than 1.50 times the diameter of the larger bars and for square bars shall not be less than twice the side dimensions of the larger bars. In no case the minimum clearance between the bars shall be less than 1.50 times the maximum size of aggregate irrespective of the shape of the reinforcing bar. Bars crossing each other where required shall be secured by binding wire in such a manner that they do not slip over each other at the time of fixing and concreting. Wire used for binding reinforcement shall not be measured for payment.

c. Splicing

Where it is necessary to splice reinforcement the splices shall be made by lapping, by welding or by mechanical means.

- a. Joints or splices in reinforcing bar shall generally be made at the locations where neither shear nor bending moment is maximum, but the contractor would be permitted to take joints or splices at other position provided that such positions are approved by the Engineer-in-charge and joints and splices in adjacent bars are staggered as directed by the Engineer-in-charge. Approval of such additional splices will generally be restricted to splices not closer than 9 mtrs. in horizontal bars and 4 mtrs. in vertical bars measured between midpoint of laps.
- b. If the contractor proposes to use welded splices in reinforcing bars the equipment, the material and all welding testing procedures shall be subject to the approval of the Engineer-in-charge. The contractor shall also carry out test welds as required by the Engineer-in-charge.
- c. For welded splices for reinforcing bars conforming to IS : 1786-1979, welding shall be done in accordance with IS : 9419-1979. For reinforcing bars conforming to IS: 432 (part-I) 1966 and IS : 1139-1966 welding shall be done in accordance with IS : 2751-1966. Electrodes for manual metal arc welding shall conform to IS : 814 (part-I) 1974 and IS : 814 (part-II) 1974, mild steel filler rods for oxyacetylene welding shall conform to IS : 1278-1972 provided they are capable of giving a minimum butt weld tensile strength of 41 kg / sq mm.
- d. Reinforcing bars 28mm in diameter and larger may be connected by butt welding, provided that lapped splices will be permitted if found to be more practicable than butt welding and if lapping does not encroach on cover limitation or hinder concrete or reinforcement placing.
- e. Reinforcing bars 25mm diameter and less may be either lapped or butt welded, whichever is most practicable.
- f. Butt welding of reinforcing bars shall be performed under cover from weather and may be performed either by the gas pressure or flash pressure welding process,

or by the electric arc methods. The following requirements shall apply to all welding of reinforcing bars including butt welding and the preparation of welded reinforcement mats.

- g. Welded pieces of reinforcement shall be tested at the rate of 5% of total number of joints welded. Specimen shall be taken from the actual site of work. Strength of the weld provided shall be at least 25% higher than the strength of bar.
- h. If the contractor proposes to use mechanical couplings for reinforcing bars he shall submit samples of the proposed coupling to the Engineer-in-charge for approval not less than 30 days prior to their proposed use.

Lapped Splices

6mm	Structural Plain	30 cm
10mm	Structural Plain	50 cm
12 mm	Structural deformed	60 cm
16 mm	Structural deformed	90 cm
20 mm	Structural deformed	100 cm
25 mm	Structural deformed	125 cm
30 mm	Structural deformed	150 cm

d. Reinforcement Fabrication and Placement

Reinforcing bars supplied in the form of bent coils shall be straightened cold without damage at no extra cost. No bending shall be done when ambient temperature is below 5 Deg C. Suitable preheating may be permitted if steel bar bending is to be done at or above 0 Deg C. Bars supplied in bent coils shall be straightened only by machine. All bars shall be accurately bent gradually and according to the sizes and shapes shown on the drawings/ schedules or as directed by ENGINEER. Bar bending machines shall be used to achieve desired accuracy. Re-bending or straightening incorrectly bent bars shall not be done without approval of ENGINEER. Reinforcement shall be accurately fixed and maintained firmly in the correct position by the use of blocks, spacers, chairs, binding wire, etc. to prevent displacement during placing and compaction of concrete. The tied in place reinforcement shall be approved by ENGINEER prior to concrete placement. Spacers (PVC or Concrete) shall be of such material and design as will be durable, not lead to corrosion of the reinforcement and not cause spalling of the concrete cover. Binding wire shall be 16 gauge soft annealed wires. Ends of the binding wire shall be bent away from the concrete surface and in no case encroach into the concrete cover.

Substitution of reinforcement, laps/splices not shown on drawing shall be proposed by CONTRACTOR and approved by ENGINEER.

If permitted by ENGINEER, welding of reinforcement shall be done in accordance with IS: 2751, IS: 9417 and SP: 34 as applicable.

Tolerance on placement of reinforcement shall be as per Cl. 12.3 of IS: 456.

E. Care of Placed Reinforcement and Concrete

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

d) Masonry Works

a) Scope

This Specification covers the materials and workmanship requirements for the construction of brick masonry and rubble masonry.

This specification also defines the materials and workmanship requirements for cement pointing sand faced plaster, pebble faced plaster, neat cement punning and water proof plaster.

b) Applicable Codes and Specifications

The following codes, standards and specifications are made a part of this specification. All standards, specifications, codes of practice referred to herein shall be the latest version on the date of offer made by the Bidder.

In case of discrepancy between this specification and those referred to herein, this specification shall govern.

IS: 110	-	Ready mixed paint, brushing, grey filler, for enamels for use over primers.
IS: 280	-	Specification for mild steel wire for general engineering purposes.
IS: 426	-	Paste filler for Colour coats.
IS: 428	-	Distemper, oil emulsion, Colour as required.
IS: 1077	-	Specification for common burnt clay building bricks.
IS: 1124	-	Method of test for determination of water absorption, apparent specific gravity and porosity of natural building stones.
IS: 1200	-	Method of measurement of building and civil engineering works.
IS: 1237	-	Specification for cement concrete flooring tiles.
IS: 1346	-	Code of practice for water-proofing of roofs with bitumen felts.
IS: 1542	-	Specification for sand for plaster.
IS: 1597	-	Code of practice for construction of stone masonry: Part 1 Rubble stone masonry.
IS: 1661	-	Code of practice for application of cement and cement-lime plaster finishes.
IS: 2116	-	Specification for sand for masonry mortars.
IS: 2185	-	Specification for concrete masonry units (Parts 1, 2 & 3).
IS: 2212	-	Code of practice for brickwork.
IS: 2250	-	Code of practice for preparation and use of masonry mortars.
IS: 2395	-	Code of practice for painting Concrete, masonry and plaster surfaces (Part 1 & Part 2).
IS: 2690	-	Specification for burnt clay flat terracing tiles: Part 1 Machine made.
IS: 2691	-	Specification for burnt clay facing bricks.
IS: 2750	-	Specification for steel scaffoldings.
IS: 3036	-	Code of practice for laying lime concrete for a water-proofed roof finish.
IS: 3067	-	Code of practice of general design details and preparatory work for damp-proofing and water-proofing of buildings.
IS: 3068	-	Specification for broken brick (burnt clay) coarse aggregates for use in lime concrete.

IS: 3495	-	Method of test for burnt clay building bricks : Part 1 to 4.
IS: 5410	-	Cement paint, colour as required.

c) Brickwork

- **Materials**

Bricks

Bricks used in the works shall conform to the requirements laid down in IS: 1077. The class of the bricks shall be as specifically indicated in the respective items of work.

Bricks shall be sound, hard and homogenous in texture, well burnt in kiln without being vitrified, hand/machine molded, deep red, cherry or copper coloured, of regular shape and size & shall have sharp and square edges with smooth rectangular faces. The bricks shall be free from pores, cracks, flaws and nodules of free lime. Hand molded bricks shall be molded with a frog and those made by extrusion process may not be provided with a frog. Bricks shall give a clear ringing sound when struck and shall have a minimum crushing strength of 5N/sq.mm unless otherwise specified in the item.

Bricks which do not conform to this requirement shall be rejected. Over or under burnt bricks are not acceptable for use in the works.

Sample bricks shall be submitted to the ENGINEER for approval and bricks supplied shall conform to approved samples.

Cement Mortar

Mortar for brick masonry shall consist of cement and sand and shall be prepared as per IS: 2250. Mix shall be in the proportion of 1:5 for all brickworks, unless otherwise specified in the respective items of work. Sand for masonry mortar shall conform to IS: 2116. Sand shall be approved by ENGINEER. If so directed by the ENGINEER, sand shall be screened and washed till it satisfies the limits of deleterious materials.

For preparing cement mortar, the ingredients shall first be mixed thoroughly in dry condition. Water shall then be added and mixing continued to give a uniform mix of required consistency. Mixing shall be done thoroughly in a mechanical mixer, unless hand mixing is specifically permitted by ENGINEER. The mortar thus mixed shall be used as soon as possible or as directed by engineer in charge. Any mortar which is

partially set shall be rejected and shall be removed forthwith from the site. Droppings of mortar shall not be re-used under any circumstances.

The CONTRACTOR shall arrange for test on mortar samples if so directed by ENGINEER.

- **Workmanship**

Brick work

Brick work shall generally conform to IS 2212.

i. Laying

Brick work shall be constructed in cement mortar 1:5 or as specified. Lime shall not be used where reinforcement is provided in brick work.

Bricks shall be laid in English Bond unless otherwise specified. Half or cut bricks shall not be used except as closers to complete the bond. Closers in such cases, shall be cut to the required size and used near the ends of the wall. Header bond shall be used preferably in all courses in curved plan for ensuring better alignment.

ii. Curing

The brick work shall be constantly kept moist on all faces for a minimum period of seven days. Brick work done during the day shall be suitably marked with the date on which the work is done to monitor the curing period.

iii. Half Brick Work

Bricks shall be laid in stretcher bond. Brick work shall be constructed in cement mortar 1:4 or as specified. Half or cut bricks shall not be used except as closers to complete the bond. Closers in such cases, shall be cut to the required size and used near the ends of the wall. Header bond shall be used preferably in all courses in curved plan for ensuring better alignment.

75 mm thick RCC M15 beams with 2 numbers 8 mm dia high strength deformed bars shall be provided at a vertical spacing of 1 meter. The reinforcement shall be securely anchored at the end of the wall. The free ends of reinforcement shall be keyed into the mortar of the main work to which the half brick work is joined. Laps in reinforcement if

any shall not be less than 30 cm. Depending on the dimensions of the wall, 200 mm x 115 mm RCC mullions at every 3 metres and at corners shall be provided with reinforcement of 4 numbers 8 mm diameter high strength deformed bars. The steel in the horizontal beams in such cases will run through these mullions.

These partition walls shall be constructed in two stages. In the first stage, brick work with binders shall be constructed leaving gaps equal to and at the locations of the mullions. In the second stage mullions shall be constructed.

- **Measurement**

Measurement shall be in cu. m correct to two places of decimal for brickwork of thickness one brick i.e. 200 mm/230 mm and above. Measurement shall be in sq. m correct to two places decimal for facing brickwork and brickwork of thickness half brick i.e. 100mm/115mm and below. Measurement shall be for the quantities as actually executed duly deducting for openings, lintels, transoms/mullions etc. subject to clauses b & c given below.

No deductions shall be made for openings less than 0.1sq.m area or for embedment upto 0.1 sq. m in section.

Brick works curved in plan to a mean radius upto 6m shall be measured and paid as curved wall as a separate item of works. Brick works curved in plan to a mean radius more than 6m shall be measured and paid like a straight wall

All concrete works shall be measured and paid for separately under the respective items of work.

d) Rubble Masonry

- **Materials**

Stones for the works shall be of the specified varieties which are hard, durable, fine grained and uniform in colour (for superstructure work) free from veins, flaws and other defects. Quality and work shall conform to the requirements specified in IS: 1597 (Part-1). Test to be conducted in accordance with IS: 1124. The CONTRACTOR shall supply

sample stones to the ENGINEER for approval. Stones shall be laid with its grains horizontal so that the load transmitted is always perpendicular to the natural bed.

Cement-sand mortar for stone masonry works shall be in the proportion of 1:6 unless otherwise specified in the respective items of work.

- **Workmanship**

For all works below ground level the masonry shall be random rubble un-coursed with ordinary quarry dressed stones for the hearting and selected quarry dressed stones for the facing.

For all works above ground level and in superstructure the masonry shall be random rubble un-coursed, well bonded, faced with hammer dressed stones with squared quoins at corners. The bushings on the face shall not be more than 40 mm on an exposed face and on the face to be plastered it shall not project by more than 12 mm nor shall it have depressions more than 10 mm from the average wall surface.

The maximum thickness of joints shall not exceed 20 mm. All joints shall be completely filled with mortar. When plastering or pointing is not required to be done, the joints shall be struck flush and finished as the work proceeds. Otherwise, the joints shall be raked to a minimum depth of 20 mm by a raking tool during the progress of the work while the mortar is still green.

Through or bond stones shall be provided in walls up to 600 mm thick and in case of walls above 600 mm thickness, a set of two or more bond stones overlapping each other by at least 150 mm shall be provided in a line from face to back. In case of highly absorbent types of stones (porous lime stone and sand stone, etc.) the bond stone shall extend about two-thirds into the wall and a set of two or more bond stones overlapping each other by at least 150 mm shall be provided. Each bond stone or a set of bond stones shall be provided for every 0.5 sq.m of wall surface.

All stones shall be sufficiently wetted before laying to prevent absorption of water from the mortar. All connected walls in a structure shall be normally raised uniformly and regularly. However if any part of the masonry is required to be left behind, the wall shall

he raked back (and not saw toothed) at an angle not exceeding 45° . Masonry work shall not be raised by more than one meter per day.

Green work shall be protected from rain by suitable covering. Masonry work shall be kept constantly moist on all the faces for a minimum period of seven days for proper curing of the joints.

- **Measurement**

Measurement shall be in cu. m correct to two places of decimal. The quantities measured and paid for, shall be those as actually executed after making deductions for openings, lintels etc.

No deductions shall be made for openings less than 0.1sq.m area or for embedment upto 0.1 sq. m in section.

Brick works curved in plan to a mean radius upto 6m shall be measured and paid as curved wall as a separate item of works. Brick works curved in plan to a mean radius more than 6m shall be measured and paid like a straight wall.

e) Stone Flooring

CONTRACTOR shall do all Tiles, stone slab work etc. as per Standard specification, landscape or architectural drawing or as directed by engineer in charge.

Granite

a. General

Granite should be sourced, however, if not compliant with the requirements indicated below and LA's approval then an alternative material should be submitted for approval.

b. Granite paving shall be:

- i. Crushing strength: 55.0 MN/sq.m
- ii. mass density: 2220 kg/cu.m
- iii. water absorption: 9.6%
- iv. Acid immersion test: pass
- v. saturation coefficient: 0.64%

- All stone to be free from vents, cracks, fissures, discoloration or other defects, which may adversely affect strength, durability or appearance.
- Granite to be consistently colored. Thoroughly seasoned, dressed and worked before delivery to site in accordance with shop drawings prepared by the contractor.
- All granite shall be sourced from an approved supplier:
- Granite to be bedded on 25 mm full mortar bed, mortar mix to manufacturers recommendations, colour to consultants approval.
- All stone' to be sealed with a premium quality, durable, water based clear stone sealer. Such sealant shall be Aqua mix grout sealer applied to all faces and edges after cutting and prior to installation. A further coat of sealant shall be applied after installation. Sealant to be applied in strict accordance with manufacturer's instructions.
Aqua mix grout sealer of an approved Quality to be used.
- Contractor to allow for providing different samples of stone and for the construction of 2.0m x 2.0m panels of selected sample pieces for Consultants approval.

f) FLAG:

The Flag shall be flutter in day and night, throughout the year. The flag will be illuminated in the night by suitable lighting arrangement.

Supply of National Flag of size 120 Feet x 80 Feet in 100% knitted polyester/nylon (160/140gsm), with reinforced super strong nylon webbing on all 3 sides and rope/toggle sleeve. Bidder to take the responsibility of the flag at least for one month, replace and repair the flag as per nation code of flag . The bidder shall have to follow the guideline of national flag code during operation and maintenance period strictly.

5. **FABRICATION AND ERECTION**

a) **Scope:**

This specification covers the requirement for materials, surface preparation and application of all painting, materials, fabrication, welding, bolting and erection of steel structures.

b) **Codes and Standards:**

STEEL WORK	
IS 226	Structural steel
IS 2062	Steel for general structural purpose
IS 800	Code of practice for use of structural steel in general in steel construction
IS 806	Code of practice for use of steel Tubes in general building construction
IS 816	Code of practice for use of metal arc welding for general construction in mild steel
IS 818	Code of practice for safety and healthy requirements in electric and gas welding and cutting operations
IS 822	Code of procedure for inspection of welds
IS 1081	Code of practice for fixing and glazing of metal (Steel and aluminum) doors, windows and ventilators
IS 1161	Steel tubes for structural purposes
IS 1200 (Pt. VIII)	Method of measurements of steel work and iron works
IS 1367	Technical supply conditions for threaded steel fasteners
IS 1821	Dimensions for clearances holes for bolts and screws
IS 2074	Ready mixed paint, air drying redoxide zinc chrome priming
IS 4736	Hot – dip zinc coating on mild steel tubes
IS 4923	Hollow steel sections for structural use – specification

c) **General:**

CONTRACTOR shall submit details of welding procedures for review and approval to Technical consultant. CONTRACTOR shall supply two sets of detailed fabrication and assembly drawings. Technical consultant shall return one set of marked up and signed shop drawings to the CONTRACTOR. Shop fabrication may commence prior

to return of the signed shop drawings to the CONTRACTOR. However, CONTRACTOR is responsible for correcting any work resulting from shop drawings errors detected by Technical consultant. Approval of drawings by Technical consultant will imply that the shop drawings have been examined and appear to be in accordance with the approved for construction drawings for the accurate dimensions of components and provision of sufficient fixings for attachment of sheeting, fixtures and fittings attached to frames or trusses. CONTRACTOR shall supply one reproducible of each final shop drawing. All drawings shall be produced on A2 size sheets.

d) Materials:

a. General

All paints solvents and related materials shall be of approved manufacture to the quality of the appropriate Indian Standard.

The CONTRACTOR shall furnish all equipment necessary for the proper application of the paint. The equipment shall be compatible with the paint type.

b. Paint Material

The CONTRACTOR shall use provide and apply a good quality paint or approved by Engineer in charge.

c. Structural Steel

All structural steel shall comply with the requirements of, except hollow sections, which shall be Grade 43C. Hot rolled steel sections shall comply with IS 226-E250. All structural bolts and nuts, welding etc. unless stated otherwise, shall comply with the relevant Indian standards..

Anchor bolts shall be Grade 4.6. All anchor bolts, nuts and washers shall be hot dip galvanized. Drilled-in-concrete anchors shall be Hilt HAS stud anchor or approved Equivalent.

Hot-dip galvanizing shall be in accordance with IS 2629. Minimum coating weight shall not be less than 610 g/m².

Bolts should be of such length as to project not less than 3mm or more than 12mm beyond the nut when tightened up.

6. **EXECUTION:**

i. **General**

The CONTRACTOR shall examine the substrates, adjoining construction and the conditions under which the work is to be installed and shall not proceed with the work until unsatisfactory conditions detrimental to the proper and timely completion of the work have been corrected. Surface shall be sound and free of undulations or other visible defects.

ii. **Preparation of Surfaces**

Prepare surfaces to receive paint, thoroughly clean off grease, dirt, chalk, dust, loose materials and other substances that may interfere with proper adhesion of paint. Paint dry surface only. Fill dents, cracks, hollow places, open joints and other irregularities with an approved filler suitable for the purpose. After setting, sand to a smooth, hard finish.

Prime surfaces not more than 8 hours after cleaning.

Surface Preparation of Steel Works

Clean bare metal surfaces thoroughly of foreign matter such as mortar, plaster, grease, rust, scale and dirt before priming coat is applied.

iii. **Cutting**

1. Steel shall be cut by the most suitable and accurate method.
2. Steel of thicknesses greater than 13mm shall not be cut by shearing.
3. All slag, burrs and unnecessary sharp edges shall be removed from cut edges.
4. Unless otherwise specified, gas cut surfaces shall comply with the following:

Depth of notches < 2mm

Maximum Roughness (Rmax) \pm 200 microns over 25mm

Repair of edges cracked, notched or otherwise damaged shall be strictly subject to approval by engineering in charge.

Methods of cutting and repair shall be submitted to for approval before cutting and repair works are carried out.

iv. Holes

Holes shall be flame cut, drilled or punched, without notches, tears or ragged edges or other methods approved by engineer incharge. Holes for Bolts, rivets, pins, etc. shall be formed by drilling at a right angle to the surface of metal or, for steel thicknesses less than 13mm only, by punching. Holes for Bolts, rivets, pins, etc. shall not be enlarged by gas cutting methods.

v. Bending

Hot bending shall be carried out in red heated condition, not in the blue heated brittle range (200-400°C), with due care not to affect the quality of the steel. The inner radius for cold bending shall be at least twice the material thickness.

vi. Welding

1. Welding operations, including preparation, tack welding, inspection and testing, shall be carried out in accordance with approved welding standards.
2. Weld locations, type and dimensions shall be as shown on approved drawings. Welds shall be properly prepared for and made in accordance with applicable codes and standards.
3. Welding shall be carried out by Welders approved as per Indian standards.
4. Welding operations shall be properly protected against adverse climatic and other conditions. Welding shall not be permitted in wind exceeding 2m/s in velocity or when the presence of moisture may compromise weld quality or the safety of personnel.
5. Particular care shall be taken in starting and terminating welds to ensure consistent weld penetration and cross section and the prevention of lag inclusions, cratering, loss of base metals, cracking and other defects.

vii. Cleaning

From commencement through completion of the work, promptly remove all paint where spilled splashed or spattered. During the progress of work, keep the premises free from any unnecessary

viii. Approval of Welding Procedures and Welders

1. The CONTRACTOR shall prepare, and submit, detailed welding procedures for all welding operations. Approval testing of welding procedures shall be carried out in accordance with Indian standard codes.
2. The CONTRACTOR shall carry out approval testing of welders as appropriate, and provide certification that each welder is so qualified
Should the work of any welder subsequently produce reasonable doubt as to his skill, that welder shall be either replaced or re-tested and re-certified at the CONTRACTOR's expense.
3. Approved welding procedures shall include test and inspection procedures and take project health and safety requirements into due account.
4. Any welding not carried out in strict accordance with approved procedures, and by approved welders, shall be rejected.

ix. Welding

1. Visual inspection of all welded parts shall be performed after welding and include, but not be limited to, confirmation of the following:
2. Shapes and sizes of welds.
3. Effective weld length.
4. Adequate penetration.
5. Good fusion.
6. Continuity of beads.
7. Absence of overlap.
8. Absence of excessive undercut.
9. Filling of craters.
10. Reinforcement of weld.
11. Absence of pits, cracks, trapped slag, or blowholes.
12. Proper grinding of weld spatter.

x. Erection**General**

1. The CONTRACTOR shall submit for approval prior to the work commencing, a description of the erection methods, erection sequence, temporary works and equipment to be used for erection work.
2. All steel erection works shall be carried out strictly in accordance with approved project procedures, especially the Work Permit Procedure.
3. Erection methods shall maximize the amount of work that is performed at ground level, using proper jigs and supports to maintain dimensional accuracy, prior to steelwork being hoisted into position.
4. Approved temporary braces, bolts, etc. shall be used to stabilize steelwork Components during lifting operations, prevent deformation and damage and to ensure safety of personnel and equipment.
5. The sequence of erection shall be in accordance with the requirements of related works. In particular, the installation of grating, handrails etc.

xi. Anchor Bolts and Embedded Items

1. The CONTRACTOR shall check that all anchor bolts and embedded items required for steel erection work have been installed to correct level and position as soon as possible. If any such items are found to be missing, or set out of allowable tolerance, the CONTRACTOR shall engineer in charge and take corrective action in accordance with his instructions.
2. Anchor bolts shall not be adjusted by mechanical means without the prior approval. No heat treatment shall be permitted.
3. The CONTRACTOR shall clean all anchor bolt and embedded items of loose rust, mortar, dirt and other foreign matter, by wire brushing or other approved methods, prior to commencing erection of steelwork.

xii. Levelling and Base Support

1. The CONTACTOR shall set out and level steel erection works by optical survey methods to the approval of Engineer in charge.
2. Steel plate and cement mortar levelling pads shall be provided on foundations to support steelwork at required elevations.
3. The number of steel plates used in a levelling pad shall be minimized. No more than 1 base sheet and 2 tapered liner plates shall be used, if possible.
4. Top surfaces of foundations shall be cleaned and, where cement mortar or grout is required, properly roughened to ensure good adhesion.
5. Voids under base plates shall be fully grouted after final levelling, alignment and properly contained by formwork during casting, as required and tapered away from the base plate to prevent collection of water or other substances.
6. Unless specified or approved otherwise, final tightening of anchor bolts shall not be carried out until grout has achieved the required compressive strength.

xiii. Erection Inspection

The position, level and alignment of erected steelwork shall be confirmed to be in accordance with applicable drawings and specifications, within specified tolerances, by approved optical survey methods.

xiv. Tolerance for Erected Steelwork

The tolerance for the erected steelwork shall be as follows:

- a. Position
Permissible deviation of the erected column from it's + 5mm Specified position
- b. Linear Dimensions
Permissible deviation from specified length or width $\pm 5\text{mm}$ per 10m of length,
Maximum deviation in 30m or over + 15mm
- c. Plumb
Permissible deviation from verticals per 15m of height $\pm 5\text{mm}$
Maximum deviation in 45m or over + 15mm
- d. Levels

Unless otherwise specified the level of a beam should be taken on the top of the upper flange. Permissible deviation between the specified level and that of the erected member $\pm 3\text{mm}$

xv. Painting of Steelwork

All steelwork shall be painted in accordance with the requirements of Specification "Painting of Steelworks & Concrete Structure".

xvi. Reporting

- The CONTRACTOR shall prepare test and inspection reports, recording all results and observations, including, but not limited to, the following:
- Dimensional and Visual Inspections.
- Welding Tests and Inspections (including approval testing).
- High Strength Bolt Checks.
- Painting Inspections.
- Reports shall be submitted to, and approved by engineer in charge within 2 weeks of completion of the related test or inspection and before fabricated steelwork is delivered to site.

xvii. Shop Drawings

Shop drawings shall be based on the approved for construction drawings and give all information necessary for the fabrication of the component parts of the structure.

Information provided by shop drawing shall include, but not be limited to, the following:

- Unique identification of each member and fabricated subassembly.
- Position and dimensions of each member in the structure.
- Details of fittings, e.g. gusset plates, base plates etc.
- Joint and connection details with clear differentiation between shop and field Connections, welds and bolts.
- Weld details including location, type and size.
- Location, type and size of bolts and holes and referenced bolt list.
- Layout and details of required ladders, stairs, walkways etc.

- Material specifications.
- Shop coatings specifications.
- Details of handling and transportation provisions including packing, lifting, and support and lashing points and lifting spread requirements.

xviii. Assembly Drawings:

Assembly drawings shall include, but not be limited to, the following information required for erection work on site. All information contained on the shop drawings as may be required for erection, testing and inspection purposes. Framing elevation at each reference line and where intermediate framing is provided. Framing plan at each elevation, required erection order and methods (including handling). Site coatings specifications.

xix. Inspection and Testing:

Engineer in charge shall have free access at all times to the material testing equipment and to all parts of the steel structure which is being fabricated. CONTRACTOR shall notify in charge on the commencement date of shop work so that testing or inspection may be properly scheduled. Copies of Certified Mill Test Reports, properly correlated to the materials shall be made available by the CONTRACTOR to Engineer in charge upon request.

xx. Protection:

The CONTRACTOR shall take every precaution to avoid damage by fire and shall place paint or solvent soaked rags, waste or other materials, which might constitute a fire hazards in metal containers which shall be removed and stored at the storage area at the close of each day's work.

CONTRACTOR shall provide suitable coverings to protect the work and adjacent surfaces and objects.

CONTRACTOR shall remove or protect items such as hardware, hardware accessories, plates, lighting fixtures and similar items placed prior to painting.

Reposition or removal of the protection shall be carried out upon completion of each space. CONTRACTOR shall disconnect equipment adjacent to walls by Workmen

skilled in these trades to permit painting of wall surfaces, replace and reconnect after completion of painting.

Surfaces not requiring painting shall be protected. The CONTRACTOR shall

Maintain wrappings or other factory applied protection furnished with finishing hardware or other items provided by other trades and install in areas where painting is required, and if displaced or removed, replace for the duration of painting work.

xxi. Scaffolding, Staging, Accessibility:

Fixed scaffolding or staging shall be used as required for surface preparation and painting and will be subject to approval by EMPLOYER'S. Easy and sufficient access shall be provided for correct painting and inspection of all surfaces. It shall be such that operators will be able to stand up with body and arms free of scaffolding or staging and the structure being worked on. CONTRACTOR shall supply and maintain rigging and scaffolding equipment capable of enabling completion of the Work in accordance with Specification.

7. OPERATION & MAINTENANCE REQUIREMENTS:

a. General

The contractor shall be responsible for the entire operation and maintenance (O&M) of project for period of 1 year (365 Days) commencing from the date of completion certificate. Defects liability period shall be for period of 1 year (365 Days) commencing from the date of completion certificate.

b. Inspection And Testing Requirements

The contractor shall arrange for the inspection of the entire packaged unit of flag mast or part of that at site before installation and after installation and have the unit tested by Third Party Inspecting Agency at his own cost.

- The responsibility for inspection, testing, certification, etc. of all materials, parts lies with the contractor. The Contractor shall specify all of the inspection and testing requirements in the quality plan. Inspection and testing requirements shall be in accordance with this

specification, other applicable standards as listed in this specification and the data sheets.

- All equipment shall be inspected for compliances with Applicable codes, standards and specification, which shall also include sub-referenced standards therein.
- Contractor to furnish required copies of test certificates, Ref document, Drawings, and Instruction Manuals before equipment commissioning.
- Site acceptance test (SAT) is required to be done by contractor at no extra.
- Any defects found by the in SAT shall be rectified in Client presence. Where this is not possible or practical, check lists shall be prepared and signed by the Third Party Inspector stating all "Pending items". Copies of these lists shall be sent to the Owner to enable their subsequent checking.

c. Handover Requirements

The Well operating Flag mast with shall be handed over to Client, upon O&M period, Commissioning and satisfactory completion of site performance trials. This shall be duly documented and recorded. It is to be noted here that this date shall be considered as the date of completion of contract. All documents as listed in this volume-2A but not limited to shall be submitted to client.

8. TECHNICAL DATA SHEET:

Technical data sheet to be filled by the contractor

TECHNICAL DATA SHEET FOR 300 FT HIGH / FLAG MAST & COMPONENTS**A. HIGHMAST STRUCTURE**

Height of mast :

Permissible Projected area :

Makes :

Material construction :

Thickness (in mm) Top :

 Middle :

 Bottom :

Cross section of Mast in Polygon

(Number of sides :

Length of individual sections (in m)

 Top :

 Middle :

 Bottom :

Diameter of Flag Mast (in mm)

 Base diameter :

 Top diameter :

Type of Joint :

Length of overlap (Mtr) :

Metal protection treatment for :

Mast section

Thickness of galvanization (In Micron)

 Top :

 Middle :

Bottom :

Type of locking arrangement and door panel:

Size material & thickness of (In mm)
(Amps TPN MCB + ELCB cable termination box) :

Size of base plate (mm) :

Diameter and thickness (mm) :

Size of anchor plate & thickness (mm) :

Detail of Template :

Weight in Kgs. of 300Ft. Mast
(Including base plate door, head frame) :

Lightning protection :

B. DYNAMIC LOADING AS PER PREVAILING AT SITE

Max. Wind speed (As per IS;875; 1987) :

Ground Level :

Two factors are measured -

Factor of safety for wind load :

Factor of safety for other load :

C. FOUNDATION DETAILS

Type of foundation :

Design Load bearing capacity :

Design safety factor :

Considered wind pressure :

Considered wind speed (km/hour) :

Depth of foundation :

Average soil bearing capacity :

Numbers of foundation bolts :

DPC of foundation bolts :

Type of foundation bolts :

Bolt diameter :

D. WINCH

Make of winch :

Number of drums / winch :

Gear Ratio :

Capacity :

Operating speed :

Individual drum rotation :

Method of operation :

Lubrication arrangement :

Type of Lubricant :

Gear Material :

Tested Load per drum (Kg) :

Factor safety :

E. STAINLESS STEEL WIRE ROPE

Make :

Grade :

Number of ropes :

Construction :

Centre core material :

Diameter (mm) :

Thimbles & Terminals :

Breaking load capacity :

Factor safety

(specified not less than 5) :

F. POWER TOOL

Model (portable external /

Integral type) :

Input supply :

Wattage / HP :

Number of speeds :

Reversible / non reversible :

Operating speed :

Remote control switch :

Type :

Length of control cable :

Max. time taken for –

Raising :

Lowering :

G. TORQUE LIMITER

Model :

Lifting capacity :

Adjustable / non –adjustable :

I. Approved makes list of civil / structural works:

Sr. No.	Category	Sub Category	Brand Name
1	Cement	OPC 43/53 Grade (ISI marked)	Ambuja Cement, L&T, ACC, Birla, VIKRAM, J.K., Ultratech, Ambuja, Grasim, JK, Binani, India cement.
2	Cement	PSC (ISI marked)	Commando Cement Ltd.
3	Cement	White Cement	Ultra tech, ACC, Birla, J.K
4	Cement	Chemical Admixtures	Kerakoll, MC Bauchemie, BASF, MYK Schomburg, Pidilite, Sunanda Chemicals, Sika, FOSROC, Choksey Chemicals.
5	Cement	Expansion joint board	Supreme Industries or equivalent
6	Steel	Structural Steel	Vizag, TISCON, SAIL, Metro structure, RINL, AGRASEN ISPAT, JSW, CORUS
7	Steel	TMT Bars	TMT Bars Fe-415 /Fe-500 conforming to IS-1786:1985 (reaffirmed 2004)
8	Steel	M.S. Pipe, Tubes, Bar, Flats, Angle, Tee Sections	SAIL, TISCO
14	Ready-mix Concrete	Ready Mix Concrete	ACC, RMC, Ultra tech
15	Miscellaneous	Structural Sealant	Wacker, Dow Corning, GE
16	Miscellaneous	Polysulphide sealant	Pidilite, Chemetall-Rai
17	Miscellaneous	Bitumen Impregnated Board	Shalitex
18	Miscellaneous	Polyethylene back up rod	Supreme Ind. Ltd.
19	Miscellaneous	Epoxy	Fosroc/ STP/ CICO/ Ardex
20	Miscellaneous	Welding rod	ADVANI
21	Miscellaneous	Shear Stud/Connector	KOCO
22	Miscellaneous	Clamp, Rebar, Chemical fastener	Hilti, Fischer, Wurth
23	Miscellaneous	Anchor Fasteners / bolts	Hilti, Fischer, Halfen

24	Miscellaneous	Masking Tapes	3M, Sun Control/ Wonder Polymer
26	Miscellaneous	Dash Fasteners	SS grade, Hilti/
27	Miscellaneous	Stainless Steel Bolts, Washers and Nuts	Kundan/ Puja/ Atul
28	Miscellaneous	Stainless Steel Pressure Plate Screws	Kundan/ Puja/ Atul
29	Miscellaneous	Stainless Steel Friction Stay	Hetish, Haffle, Securistyle
30	Miscellaneous	Weather Silicon make and grade	Dow Corning/ Momenitive (GE)
31	Miscellaneous	Structural Silicon	Dow Corning/ Momenitive (GE)
32	Miscellaneous	Tensile fabric System	Ferrari, Mehler, MakMax, Akruti
33	Miscellaneous	Stainless Steel	Jindal/ SAIL/ Golden
34	Miscellaneous	Polycarbonate Sheet	Danpalon, Alcox, Polygal, V. A. Corporation, Joy Fab, Yadav Engineering
35	Miscellaneous	Adhesives & Grouts	Bal, Laticrete, KeraKoll, Pidilite

II. List of drawings:

Drawings to be submitted Contractor

Sr. No.	Drawing title
1	GENERAL NOTES DRAWING FOR R.C.C. AND STRUCTURAL STEEL WORKS.
2	R.C.C. PEDESTAL AND FOUNDATION DRAWING FOR 300 FEET HIGH FLAG POLE
3	STRUCTURAL FABRICATION AND GENERAL ARRANGMENT DRAWING OF 300 Feet FLAG POLE
4	STRUCTURAL FABRICATION AND GENERAL ARRANGMENT DRAWING OF BASE PLATE, ANCHOR BOLTS, STIFFENERS Etc.