GUJARAT ENERGY TRANSMISSION

CORPORATION LTD.

SARADAR PATEL VIDYUT BHAVAN,
RACE COURSE, BARODA – 390 007.

TECHNICAL SPECIFICATIONS

CIVIL WORKS FOR
66/11 KV GIS
SUB STATION

The scope of work under this contract shall include, but not be limited to, the complete design, engineering, procurement, construction, testing, commissioning and successful handover of all civil, structural, and architectural works associated with the 66/11 kV GIS Substation in the State of Gujarat. The exact project location is specified elsewhere in the Tender Document.

1.0 GENERAL

The intent of specification covers the following.
Land acquisition, Design, engineering & construction of all civil work of 66/11 kv GIS at sub-station. All works shall be carried out in accordance with this Specification and the relevant sections of the Tender Documents. The design shall adequately consider all appli-cable service conditions, loading criteria, seismic parameters, and operational re-quirements specified herein or as stipulated in relevant Indian or International Standards.

The building and all civil works will be provided as per recommendation from the manu-facturer. Special attention shall be given to an optimized design with small space re-quirements and therefore the bidder input is essential. However, minimum crite-ria/dimention given by GETCO shall be strictly followed by bidder in their design/drawing. An overhead crane will be supplied for installation and maintenance work. The bidder shall specify the lifting height and capacity necessary for lifting of the heaviest peace during installation of maintenance. However, minimum capacity of EOT crane shall be, 5.0 M.T. for 66kv GIS building. However, capacity of crane shall be as required by GIS manufacturer which shall be approved by GETCO during detailed engineering. The Bid-der shall have to obtain required approvals of statutory authorities wherever applicable.

All civil, structural, and architectural works shall be designed and executed in ac-cordance with the latest editions, amendments, addenda, and supplements of ap-plicable Indian Standards (IS Codes). In the absence of relevant Indian Standards, ap-propriate British Standards (BS) or other internationally recognized standards shall be adopted subject to GETCO approval. In case of any discrepancy or conflict among codes, specifications, drawings, or standards, the most stringent requirement shall pre-vail.

The Contractor shall provide all necessary design services, detailed engineering, draw-ings, labour, supervision, tools and tackles, construction equipment, temporary works, materials, transportation, fuel, plants and machinery, consumables, and all incidental items required for complete and satisfactory execution of the works in ac-cordance with approved drawings, specifications, and instructions issued by GETCO.

All works shall be executed based on designs and drawings developed by the Con-tractor and approved by GETCO. Such designs shall be prepared in accordance with tender drawings, relevant IS Codes, technical specifications, and functional requirements of the substation. The Contractor shall develop detailed layouts and construction draw-ings for all buildings, structures, foundations, trenches, roads, drains, and associated fa-cilities considering operational requirements, maintenance accessibility, safety clearanc-es, future expansion provisions, and efficient utilization of available space.

The minimum requirements indicated in this Specification are intended only as guidance. The Contractor shall be fully responsible for providing a complete and functional system meeting all operational, safety, and performance requirements under this EPC Contract on a lump-sum basis.

This Specification is not intended to cover every detail of manufacturing practices or construction methodologies; however, it establishes the minimum requirements necessary to ensure satisfactory performance, durability, reliability, and safe opera-tion under the specified site conditions.

All design calculations, drawings, and documents shall be submitted by the Contractor to GETCO for review and approval in two (2) hard copies and two (2) soft copies in PDF format, duly signed and stamped by both the Bidder and the licensed Structural Design Consultant with registration details clearly indicated. In addition, editable soft copies of all drawings shall be submitted in AutoCAD format. All submitted designs, drawings, calculations, reports, and documents shall become the property of GETCO.

Also design basis document for civil and architectural work for 220/66 KV GIS AND control room Cum Administrative building, security cabin, Switchyard Foundations, Oil sump, F.P. Wall, Quarters, Store etc. shall be submitted for approval. Detailed 3D model based on approved architectural drawings for all buildings including all possible views shall be prepared and submitted.

Soft (Scan) copy of all approval letter, approved drawings dully stamped by GETCO and final “As Built” drawing in AutoCAD format shall be submitted to GETCO in pen drive for record purposes.

All works shall be executed strictly in accordance with the approved FIELD QUALITY PLAN approved drawings & GETCO`s approved technical specification for civil works (Any reference to unit rates, Schedule of Item, Bill of Quantities etc. in the Standard Technical Specification shall not be considered applicable, as the present tender is an EPC contract on a lump sum basis. Quantities and units of item shall be strictly as mentioned in BOQ of civil works). Technical specification for civil works for execution are available at the corporate office for reference.

2.0 SCOPE OF WORK

2.1.0 General

The scope of work under this contract shall include Land Acqusition, Design and construction with supply of all required materials for following items as per relevant standards, technical specifications, special conditions and tender drawings. Bidder shall submit the required design calculation, drawing for execution for approval prior to execution Items are mentioned hereunder, but not limited to, which are required for satisfactory & successful completion and commissioning of 66/11 kv GIS Sub-station at place in the state of Gujarat.The exact place is mentioned elsewhere in tender document.

This section defines the minimum scope for geotechnical investigations, detailed design, engineering, supply, construction, installation, testing, and commissioning of all Civil, Structural, and Architectural works. However, the scope shall not be limited only to the items specifically mentioned herein. The Contractor shall also execute all ancillary, incidental, and associated works necessary for complete, safe, reliable, and satisfactory operation of the Substation.

he scope shall include all related and incidental works, whether specifically indicated in the Tender Documents or not, but which are necessary for proper completion and commissioning of the entire system. The Contractor shall supply all construction materials including, but not limited to, cement, reinforcement steel, structural steel, aggregates, sand, bricks/blocks, finishing materials, embedded items, consumables, and all other materials required for complete execution of the works.

All materials shall conform to relevant IS Standards and approved specifications. Each consignment of major construction materials shall be tested at GETCO-approved laboratories or NABL-accredited laboratories as directed by GETCO. The Contractor shall bear all expenses related to sampling, testing, transportation, royalties, taxes, duties, octroi, loading/unloading, insurance, storage, handling, and other incidental charges.

The scope shall also include provision of all labour, skilled and unskilled manpower, supervisory personnel, technical experts, tools and tackles, plants and machinery, temporary works, construction equipment, consumables, scaffolding, safety arrangements, and all other resources required for execution and completion of the works.

The Contractor shall establish necessary quality assurance and quality control procedures for all materials and works. After award of the Contract, the Contractor shall submit a detailed Quality Assurance Plan (QAP), Inspection and Test Plan (ITP), and Field Quality Plan (FQP) covering all materials, manufacturing processes, construction activities, and testing procedures for GETCO's approval prior to commencement of work.

Wherever specialized equipment, systems, or proprietary construction methodologies are involved, the Contractor shall arrange supervision and technical support from the respective manufacturers/vendors as required for satisfactory execution and commissioning.

The intending bidders are advised to visit and examine the project site and surrounding areas to familiarize themselves with site conditions including, but not limited to:

- Site accessibility and approach roads
- Construction and erection access
- Existing ground levels and terrain conditions
- Availability of construction materials such as aggregates, sand, bricks, water, etc.
- Climatic and environmental conditions
- Existing utilities and obstructions
- Working space and storage facilities
- Local labour availability
- Statutory and local authority requirements

Submission of the bid shall be deemed to constitute full knowledge and acceptance of all site conditions by the Bidder. No claim whatsoever on account of lack of site information, misunderstanding of site conditions, or difficulty in execution shall be entertained after submission of the bid. Such factors shall not relieve the Contractor from executing the work strictly in accordance with the approved drawings, specifications, quality requirements, and stipulated completion schedule.

Payment or individual items shall be made strictly as per unit mentioned in the BOQ.

1. In case of L.S. (package) & Item rate, the rate and scope of work is inclusive of all works/items mentioned in the Tender drawings, BOQ description, technical specifica-

tion, approved drawings, statutory requirements, mandatory provisions, and all other requirement to complete the work in accordance with relevant IS codes and standards. The specifications are not intended to specify the complete details of various practices of manufactures/ bidders, but to specify the requirements with regard to performance, durability and satisfactory operation under the specified site conditions.

2. In case of unit like Numbers(Nos.)., RMT, SQ. METER, CU. METER etc., the payment shall be made based on the actual quantity of work executed at site.

2.2.0 The scope of work under this contract shall include but not limited to the following.

2.2.1 Site selection.

2.2.2 Site preperation.

2.2.3. Soil investigation.

2.2.4. Design ,Engineering and civil work for :-

a) **GIS Room including control room building for 66/11kv System (BASEMENT + GF + (MF)/FF + STAIR CABIN AT TERRACE)**
b) **R.C.C. Foundations for support structures for following equipment/11kv arrangement/ Transformer/Reactor foundations with marshalling work & it's track up to road with surrounding soakpit /Lighting mast/tower Gantry equipments/Lighting pole/Other Equipments required as per approved electrical lay out.**
c) **R.C.C.Oil sump.(For 15000 litre capacity) & Appropriate diameter of 'C' class G.I. piping with required fixtures, masonry chambers etc and other required arrangement as per latest relevant IS codes and standards.**
d) **RCC Cable trenches/ BIG BEN CROSSING with Galvanized racks as per respective Technical Specifications and relevant special conditions, Approved ISI Submersible Monoblock Pump of 5 H.P. Capacity, RCC water collection chamber**
e) **RCC Fire protection wall.**
f) **RCC Roads supported by WBM road,**
g) **External Water Supply System (U/G + OH tanks).**
h) **Septic Tank with Soak Pit and drainage system (External), with ISI Submersible Sewage Pump of 5 H.P. Capacity.**
i) **Supplying and spreading 'Round up"(Glyphosphate 41%SL) of approved ISI standard make or equivalent weedicide for weed control**
j) **Metal spreading with PCC.**
k) **SECURITY CABIN for 66/11kV sub station (3.0m x 3.0m clear inner dimension).**

l) **Providing and fixing approved quality Hinged Type Gate.**
m) **Filling in yard with approved quality of YELLOW EARTH as embankment/filling.**
n) **Earth work in cutting in all sorts of soil and soft/hard murrum/soft rock/hard rock.**
o) **Construction of RCC compound wall (to retain earth inside/outside substation premises as per contour map and proposed Finished ground level for 66/11kv sub station including foundations, concertina coil, structural steel & its all related required items (Note: Foundation shall be eccentric footing and which is fall within a primises.)**
p) **Tree plantation with required earthwork, manure, goober of approved quality as directed by E.I.C.**
q) **Mono rail for G.I.S. cum control room Building.**
r) **Any other civil work that is required for successful completion & commissioning of 66/11 kv GIS substation.**

2.2.1 Site Selection:

For a 66 kV Substation, the following Site Selection Criteria can be included in the Bidder's Scope of Work under the Technical Specifications section.

Site Selection Criteria

The bidder shall carry out a detailed site survey and submit a site suitability report for approval. The proposed substation location shall satisfy the following minimum requirements:

1. Land Availability

Adequate land shall be available for the complete 66 kV substation layout, future extensions, control room, roads, drainage system, transformer yard, and statutory clearances. Sufficient space shall be provided for future expansion of bays and transformers as specified.

2. Accessibility

The site shall be accessible throughout the year by motorable roads.
Suitable approach roads shall be available for transportation of heavy equipment such as power transformers, reactors, and switchgear.

3. Topography

The site shall preferably be level or require minimum cutting and filling. Areas prone to landslides, excessive erosion, or unstable slopes shall be avoided. Ground slope shall facilitate proper drainage.

4. Soil Conditions

Detailed geotechnical investigation shall be conducted. Soil shall possess adequate bearing capacity for foundations of transformers, structures, equipment, and buildings. Sites having expansive, marshy, filled-up, or highly corrosive soil shall be avoided unless suitable remedial measures are proposed.

5. Flood and Water Logging

The site shall be above the highest recorded flood level. The area shall not be prone to water logging during monsoon conditions. Adequate drainage arrangements shall be feasible.

6. Electrical Considerations

The site shall permit economical routing of incoming and outgoing transmission lines. Adequate statutory electrical clearances shall be maintained. The location shall minimize transmission line crossings and right-of-way issues.

7. Environmental Considerations

The site shall comply with applicable environmental regulations. Forest land, protected areas, wildlife sanctuaries, and environmentally sensitive zones shall be avoided as far as practicable. Necessary environmental clearances shall be identified by the bidder.

8. Groundwater and Drainage

Groundwater level shall be assessed during geotechnical investigations. The site shall allow construction of effective drainage and oil containment systems.

9. Seismic and Wind Considerations

Site suitability shall be evaluated considering applicable seismic zone and wind zone requirements as per relevant IS standards. Structures and foundations shall be designed accordingly.

10. Utility Availability

Availability of construction power, water supply, and communication facilities shall be assessed.

Permanent station service supply arrangements shall be identified.

11. Statutory and Legal Requirements

The site shall be free from legal disputes, encroachments, and land acquisition constraints. Required permissions from local authorities shall be identified and documented.

12. Safety Requirements

Adequate safety clearances from residential areas, industrial hazards, explosive storage facilities, pipelines, railways, and highways shall be maintained. The site shall permit safe operation and maintenance activities.

Bidder's Deliverables

The bidder shall submit:

- Topographical Survey Report.
- Soil Investigation Report.
- Flood Level Assessment Report.
- Site Suitability Report.
- Preliminary Substation Layout.
- Approach Road Assessment.
- Environmental and Statutory Clearance Requirement Report.

- Foundation Design Parameters derived from soil investigation.
- Applicable Standards
  - IS 1893 (Seismic Design)
  - IS 875 (Wind Loads)
  - IS 800 (Steel Structures)
  - IS 3043 (Earthing)
  - CEA Safety Regulations
  - Applicable State Transmission Utility/Discom standards

2.2.2 Site Preparation:

The BIDDER shall carry out grading and levelling of the plot area, including the boundary, to achieve the required formation level based on site conditions, involving **required** cutting and/or filling as necessary. **A contour map drawing shall be provided to GETCO for finalization of FGL.**

Final grading, including shaping the plot to the specified finished levels and ensuring proper slopes for surface drainage and landscaping, shall be completed by the BIDDER in accordance with the approved construction drawings.

The BIDDER shall also design and construct the following systems:

- Water supply system
- Storm water drainage system
- Sewage and septic tank system
- Treated effluent disposal system

All drainage and treated effluent shall be disposed of up to the designated external disposal point. This includes the design and development of any additional drain extensions beyond the disposal point, as required during detailed engineering.

2.2.3 Soil investigation (Geo Technical Investigation):

2.2.3.1 GENERAL

Bidder shall take soil investigation at their own cost and design the civil buildings and foundations for switch yard accordingly as per specification and requirement. GETCO shall pay as per quoted LUMPSUM price only.

No Extra payment for carry out the Soil investigation report shall be given to the bidder.

The BIDDER shall perform a detailed soil investigation to obtain accurate and comprehensive information about the soil profile and relevant soil parameters at the Site in order to ensure that the foundations of the various structures can be designed and constructed safely and efficiently.

A detailed geotechnical report shall be submitted by the BIDDER for GETCO's approval clearly detailing the data to be used for civil structures design.

The BIDDER may visit the site to ascertain the soil parameters. Any variation in soil data, whether discovered before or during execution, shall not be considered grounds for additional cost or for altering the terms and conditions of the contract.

This specification outlines the technical requirements for conducting a detailed geotechnical investigation and submitting a corresponding report. The investigation must yield reliable data—both general and specific—on the subsurface profile, including soil and rock parameters. Based on the Safe Bearing Capacity (SBC) reports and other test results, the worst/critical parameters must be considered for the design of all substation components.

Structures to be considered under this scope include, but are not limited to:66/11 kV GIS Building cum control room building Cum Administrative building, Store Building, Security cabin, quarters, Gantry tower foundation, cable trench, oil sump, peripheral drain, WBM/RCC road, retaining wall, compound wall, Parking shed, fire protection wall, Electrical equipment foundations, Foundation for Transformers/Reactors, foundation for vibratory equipment such as 'circuit breaker, all other related structures of the substation etc.

2.2.3.2 SCOPE OF WORK

The scope of work shall include mobilisation of necessary equipment, deploying engineering and technical personnel, skilled and unskilled labour etc. as required in carrying out detailed geo technical investigation, Laboratory investigation/ analysis & interpretation of data, preparation of detailed Geo-technical report covering specific recommendations for the type of foundations with the allowable safe bearing capacity. The work will be for different sizes of foundations at different founding strata for the various structures of the substation. All the work shall be carried out as per applicable Indian Standard Codes & amended up to date. The investigation agency shall be acquainted himself about the type of structures and their functions from the GETCO.

This specification covers drilling of boreholes with SPT test, Trial pits, chemical analysis of water, Plate load test, back filling of bore and trial pit, required laboratory tests, analysis of test results and preparation of reports and recommendations for design of various structures of substation.

The location of boreholes, trial pits & plate load tests will be approved by GETCO for which testing laboratory shall capture latitude/longitude data and shall record it jointly with GETCO field officer.

2.2.3.2.1 CODES AND STANDARDS

Unless specifically mentioned otherwise, all applicable codes and standards in their latest editions as published by the Bureau of Indian Standards and all other such as may be published by them during the currency of the contract, shall govern in respect of design, workmanship and methods & procedures of testing. Some of the relevant available codes are listed here under.

IS: 446 Presentation of drilling information and core description in foundation investigation.

IS:1498 Classification and identification of soils for general engineering purposes

IS: 1888 Method of load tests on soils

IS: 1892 Code of practice for sub-surface investigation for foundations

IS: 2131 Method of standard penetration test for soils

IS: 2132 Code of practice for thin-walled tube sampling of soils
IS: 2720 Methods of test for soils (ALL PARTS)
IS: 2809 Glossary of terms and symbols relating to soil engineering
IS: 2810 Glossary of terms and symbols relating to soil dynamics
IS: 4078 Indexing and storing of drill cores.
IS: 4968 Method of sub-surface sounding for (ALL PARTS) soils
IS: 5249 Method of test for determination of in-situ dynamic properties of soils
IS: 5529 Code of practice for in-situ permeability tests
IS: 9214 Method of determination of modules of subgrade reaction (k-value) of soils in field
IS: 10060 Code of practice for subsurface investigation for power house sites
In the event of any conflict between the requirements in the specification and the above referred codes, the former shall govern.

2.2.3.2.2 BORE HOLES

Bore holes of 150 mm diameter in accordance with the provisions of IS: 1892 up to 10 meter depth or up to refusal which ever occur earlier shall be drilled. In any case number of boreholes shall not be less than ten for EHV substation and four for 66kv Substation. By refusal it shall mean that a standard penetration blow count (N) of 100 is recorded for 30 cm penetration. Number of boreholes may be increased, in case soil strata are varying from borehole to borehole, in order to have fair idea of soil profile. In case of deep pile foundations, soil investigation is to be carried out up to 30 m depth from ground level or up to refusal whichever is earlier. In case rock is encountered, coring in all the boreholes shall be carried out up to 3 meter in rock or refusal.

During boring operation, once the rock strata is encountered, the normal method of boring operation shall have to be stopped and drilling operation shall be resorted to for determining depth and nature of rock strata, in a manner as described below.
Rotary core drilling technique with continuous core recovery should be adopted for drilling through rock. The behaviour of rock mass is governed more significantly by the nature of fractures in the rock than by the type and hardness of the material composing the rock itself. Hence, good drilling technique should be adopted to obtain an intact sample truly representative of the in-situ material and for achieving highest percentage of recovery possible.Variations in the speed of rotation, the downward pressure on the core barrel, the pressure at which the drilling fluid is introduced into the hole and the length of hole drilled (run length) prior to removal of the core are major items which must be controlled by the driller.
In general, coring should be initiated with short runs because the upper portions of rock masses are commonly highly fractured and also because the elevations of any core losses can be more accurately determined. If conditions indicate that it is possible, the length of the runs may be determined by the length of the core barrel. In zones which are highly fractured or where the barrel continuously becomes blocked, it is essential that short runs be used even though this means removal of the entire string of drilling tools every 300 mm or less. Reduced bit pressure should be resorted to when rod vibration or chatter occurs. The pressure under which the drilling fluid should be introduced into the hole shall be the minimum to be consistent with adequate removal of cuttings from the hole and proper cooling of the bit. To minimize the erosive action of the drilling fluid on

the core and thereby to improve core recovery, double tube core barrels should be used. The casing and core barrel to be used shall be of designation BX or NX.
During the drilling operation for each bore hole the Bidder shall record the rate of sinking of drill rods, ground water table elevations, if any, nature, type and sequence of rock drilled. From the recovered cores, the Contractor shall determine nature of fractures and degree of weathering of the rock for each bore hole. The Contractor shall also note and record any appreciable loss of drilling fluid throughout the entire drilling operations for each bore hole. The Contractor shall also determine the percentage recovery ratio and rock quality designation from the recovered cores for each stage of core advance and for all the bore holes.
The Contractor shall furnish all the information mentioned above fully verified and signed by the Engineer at site and submit them in triplicate to the Engineer.
The drilling operation shall be terminated either 3 metres in hard rock or 95% of core recovery whichever is later.
Standard Penetration Tests shall be performed at approximately 1.5 m interval in the borehole starting from 0.5 m below ground level onwards and at every change of stratum. The disturbed samples from the standard penetrometer shall also be collected for necessary tests. Collecting undisturbed samples of 100/75 mm diameter & 450 mm long from the bore holes at intervals of 2.5 m and at every change of stratum starting from 0.5 m below ground level onwards in clayey strata.

The depth of Water Table, if encountered, shall be recorded in each borehole. In case the soil investigation is carried out in winter/summer, the water table for rainy season shall be collected from reliable sources and recorded in the report. All samples, both disturbed and undisturbed, shall be identified properly with the borehole number and depth from which they have been taken. The sample shall be sealed at both ends of the sampling tubes with wax immediately after the sampling and shall be packed properly and transported to laboratory without any damage or loss.

The logging of the boreholes shall be compiled immediately after the boring is completed and a copy of the bore log shall be handed over to the Engineer-in-charge.

In addition to the above mentioned points, the Contractor shall also take into consideration the provisions of the latest revisions of the relevant BIS Codes of Practice along with Amendments, if any

2. 2.3.2.3 TRIAL PITS

Trial pits shall be carried at specified location given by the GETCO. The trial pits shall be 2 m x 2 m in size at base extending to 4 m depths, or as specified by the GETCO. Undisturbed samples shall be taken from the trial pits as per relevant IS CODE. **In any case number of trial pit shall not be less than five for EHV sub station and two for 66kv substation.** Precautions shall be taken to ensure the stability of pit wall, if necessary even by the provision of shoring. Arrangements shall be made for dewatering if the pit is extended below water table. In-situ tests shall be conducted and undisturbed samples obtained immediately on reaching the specified depths, so as the avoid substantial moisture changes in the subsoil.

2.2.3.2.4 PLATE LOAD TEST

Plate load test shall be conducted to determine the bearing capacity, modulus of sub grade reaction and load/settlement characteristics of soil at shallow depths by loading a plane and level steel plate kept at the desired depth and measuring the settlement under different loads, until a desired settlement takes place or failure occurs. The Specification for the equipment and accessories required for conducting the test, the test procedure, field observations and reporting of results shall conform to IS: 1888. Modulus of sub grade reaction shall be conducted as per IS: 9214. The location and depth of the test shall be as given below:

a) One each at Control Room Building location, 66kv GIS building location, transformer foundation location,Reactor foundation location, 5 mva transformer foundaion location and security cabin location at the proposed foundation depth below finished ground level for bearing capacity.
b) One at colony area Undisturbed tube samples shall be collected at 1.0 m and 2.5m depths from natural ground level for carrying out laboratory tests. The size of the pit in plate load test shall not be less than five times the plate size and shall be taken up to the specified depth. All provisions regarding excavation and visual examination of pit shall apply here. Unless otherwise specified the reaction method of loading shall be adopted. Settlement shall be recorded from dial gauges placed at four diametrically opposite ends of the test plate. The load shall be increased in stages. Under each loading stage, record of Time v/s Settlement shall be kept as specified in IS: 1888. Backfilling of the pit shall be carried out as per the directions of the GETCO. Unless otherwise specified the excavated soil shall be used for this purpose. In cases of gravel-boulder or rocky strata, respective relevant codes shall be followed for tests.

2.2.3.2.5 WATER SAMPLE

Representative samples of ground water shall be taken when ground water is first encountered before the addition of water to aid drilling of boreholes. The samples shall be of sufficient quantity for chemical analysis to be carried out and shall be stored in air-tight containers.

2.2.3.2.6 BACK FILLING OF BORE HOLES

On completion of each hole and trial pit, the Soil investigation agency shall backfill all bore holes and trial pits. The backfill material shall be the excavated material.

2.2.3.2.7 LABORATORY TEST

1. The laboratory tests shall be carried out at laboratory, progressively during the field work after sufficient numbers of samples have reached the laboratory in order that the test results of the initial bore holes can be made use of in planning the later stages of the field investigation and quantum of laboratory tests.

2. All samples brought from field, whether disturbed or undisturbed shall be extracted/prepared and examined by competent technical personnel, and the test shall be carried out as per the procedures laid in the relevant I.S. Codes and standard.

The following laboratory tests shall be carried out on collected sample.

a) Visual and Engineering Classification
b) Liquid limit, plastic limit and shrinkage limit for C-Ø soils.
c) Natural moisture content, bulk density and specific gravity.
d) Grain size distribution.
e) Swell pressure and free swell index determination.
f) California bearing ratio.
g) Consolidated drained test with pore pressure measurement.
h) Chemical tests on soil and water to determine the carbonates, sulphates, nitrates, chlorides, Ph value, and organic matter and any other chemical harmful to the concrete foundation.
i) In case of rock samples following tests shall also be conducted:
    i. Rock quality designation (RQD), RMR.
    ii. UCC test.
    iii. Point load index test.

2.2.3.2.8 TEST RESULTS AND REPORTS

The Bidder shall submit the detailed report in duplicate covering information regarding the geological detail of the site, summarised observations and test data, bore logs, conclusions and recommendations on the type of foundations supported by calculations for the recommendations. The test data shall bear the signatures of the Investigation Agency and site representative of GETCO.

The report shall include, but not limited to the following:-

a) A plan showing the locations of the exploration work i.e. bore holes, dynamic cone penetration tests, trial pits, plate load test etc. with latitude and longitude.
b) Bore logs of each bore holes clearly identifying the stratification and the type of soil stratum with depth. The values of Standard Penetration Test (SPT) at the depths where the tests were conducted on the samples collected at various depths shall be clearly shown against that particular stratum. Test results of field and laboratory tests shall be summarised strata wise as well in combined tabular form. All relevant graphs, charts tables, diagrams and photographs, if any, shall be submitted along with report. Sample illustrative reference calculations for settlement, bearing capacity, pile capacity shall be enclosed.
Sample table as Annexure-A (Tabular form only for SBC) and Annexure-B (For Tabular form only for pile capacity) is attached herewith as ready reference. However other details as mentioned in this specification shall be shown

2.2.3.2.9 RECOMMENDATIONS:

The report shall contain specific recommendations for the type of foundation for the various structures envisaged at site. The observations and recommendations shall include but not limited to the following:

a. Geological formation of the area, past observations or historical data, if available, for the area and for the structures in the nearby area, fluctuations of water table etc.
b. Recommended type of foundations for each building and structures as per scope of contract. If piles are recommended the type, size and capacity of pile and groups of piles shall be given after comparing different types and sizes of piles and pile groups.
c. Recommendation for type of foundation/treatment to be given for paver block, RCC road side drain,RCC peripheral drain, RCC cable trenches in yard, strret light pole foundation,Plinth protection, RCC steps for entrance to building etc
d. Anticipated problems during foundation construction and recommended solutions.
e. Coefficient of subgrade reaction.
f. Coefficient of earth pressure to be adopted for design of retaining structure.
g. Swelling characteristic of soil clearly indicating all swelling pressure etc
h. Allowable bearing pressure on the soil at various depths for different sizes of the foundations based on shear strength and settlement characteristics of soil with supporting calculations. Minimum factor of safety for calculating net safe bearing capacity shall be taken as 2.5.
i. Recommendation of liquefaction characteristics of soil shall be provided.
j. Recommendations regarding slope of excavations and dewatering scheme.
k. Comments on the Chemical nature of soil and ground water with due regard to deleterious effects of the same on concrete and steel and recommendations for protective measures.
l. If expansive soil is met with, recommendations on removal or retainment of the same under the structure, road, drains, etc. shall be given. In the latter case detailed specification of any special treatment required including specification or materials to be used, construction method, equipment to be deployed etc. shall be furnished.
m. Recommendations for additional investigations beyond the scope of the present work, if considered such investigation as necessary.
n. In case of foundation in rocky strata, type of foundation and recommendation regarding rock anchoring, grouting material for anchoring etc. should also be given.
o. In case of pile foundation, the details of Liner depth and thickness, Depth of fixity, scour depth etc.
p. Grade of concrete for pile to be adopted as per site condition.

ANNEXURE –A

SUMMARY OF ALLOWABLE BEARING PRESSURE BASED ON SHEAR AND SETTELEMENT CRITERION.

Depth of foundation	**Length of foundation**	**Width of foundation**	**Safe bearing capacities calculated based on shear criteria**	**Safe bearing pressure calculated based on settlement criteria**		**Allowable bearing pressure**	**Allowable bearing pressure**
				For 25mm settlement	**For 40mm settlement**	**For 25mm settlement**	**For 40mm settlement**
Meter	Meter	Meter	T/Sq.MT	T/Sq.MT	T/Sq.MT	T/Sq.MT	T/Sq.MT
0.5	1.3	1.3					
0.5	1.5	1.5					
0.5	1.7	1.7					
0.5	2.0	2.0					
1.0	1.3	1.3					
1.0	1.5	1.5					
1.0	1.7	1.7					
1.0	2.0	2.0					
1.5	1.3	1.3					
1.5	1.5	1.5					
1.5	1.7	1.7					
1.5	2.0	2.0					
2.0	1.5	1.5					
2.0	1.8	1.8					
2.0	2.0	2.0					
2.0	2.5	2.5					
2.5	1.5	1.5					
2.5	1.7	1.7					
2.5	2.0	2.0					
2.5	2.5	2.5					
3.0	3.0	3.0					
3.0	3.0	4.5					
3.0	5.0	5.0					
3.0	7.5	7.5					
3.0	8.0	8.0					

3.5	5.0	7.0					
3.5	7.5	7.5					
3.5	8.0	8.0					
3.5	9.0	9.0					
SIZE OF FOUNDATION REQUIRED BY DESIGNER AS PER SITE REQUIREMENT.							

ANNEXURE –B

SUMMARY OF PILE CAPACITY

Type of pile	Diameter	Length	Pile capacity,(T)			Depth of fixity
			Vertical	Uplift	Lateral	
	Meter	Meter	T	T	T	Meter
Bored cast in situ pile/ Under reamed pile (with single bulb or Two bulb)/precast pile/Driven (Displacement pile) pile/Cast in place pile						
	0.30	3.0				
		4.0				
		5.0				
		6.0				
		7.0				
		8.0				
		9.0				
		10.0				
	0.40	3.0				
		4.0				
		5.0				
		6.0				
		7.0				
		8.0				
		9.0				
		10.0				
	0.50	3.0				
		4.0				
		5.0				
		6.0				
		7.0				
		8.0				
		9.0				
		10.0				
	0.60	3.0				
		4.0				
		5.0				
		6.0				
		7.0				
		8.0				
		9.0				
		10.0				
	0.70	3.0				
		4.0				
		5.0				
		6.0				

		7.0				
		8.0				
		9.0				
		10.0				
	0.90	3.0				
		4.0				
		5.0				
		6.0				
		7.0				
		8.0				
		9.0				
		10.0				
DIAMETER AND DEPTH OF PILE AS REQUIRED BY DESIGNER AS PER SITE REQUIREMENT						

IMPORTANT NOTE:
Bidders are responsible for conducting soil investigation at their own cost and design the civil buildings and foundations for other structure accordingly to the specification and requirements. GETCO shall pay as per quoted LUMPSUM price only. Final decision of GETCO on results of Soil Investigation Report shall be binding to bidder.

2.2.4 Design ,Engineering and civil work for :-

a) GIS ROOM BUILDINGS INCLUDING CONTROL ROOM BUILDING FOR 66/11KV SYSTEMS

The GIS housing encompasses the complete setup, including a cable cellar with foundations for GIS and all related necessities such as ramps with platforms, staircases for access across different levels (Basement (Cable Celler Area), Ground Floor, First Floor (Mezzanine Floor), and Terrace Floor). It also involves provisions for water supply and drainage adhering to the latest relevant standards. Additionally, features like staircases with railings, steel stairs for accessing crane platforms, and cable trenches with Hot Dip Galvanized (Galvanizing shall be as per releavant IS codes and specification) racks and trays (horizontal, vertical, and inclined) are included. Glass partitions, flooring, doors, windows, ventilators, civil and structural works for EOT crane installation of approved capacity, I/S & O/S painting, misc. Civil work etc. Furthermore, waterproofing, anti-termite treatment, and compliance with Indian standards for water supply and drainage within the building are mandatory.

Payment will be released progressively based on achieving milestones outlined in the billing breakdown.

(Note: Minimum carpet area & height of GIS building shown in Tender drawing as well in Tender specification along with tender GIS housing is given along with tender to spell out requirements and enable bidders to quote. However, it is important that bidder shall study and include full requirements- functional, operational & maintenance, safety and grid code etc. which are essential and necessary for building and installing 66kV GIS as per standards in their bid.)

GIS building consist of GIS hall, Room for control & protection panels and AHU room,11kv Swichgear room, SCADA ROOM, LV room,battery room, Stair Case area, office room with ladies and Gents toilet block, Cable cellar at Basement floor etc as shown in tender drawing .GIS Building shall be RCC Framed strcutre.
(Protection of RCC structure under ground and above ground upto plinth level against corrsion and weather shall be provided as mentioned in Technical specification.The cement and steel shall also be considered accordingly.).
Type of foundation shall be decided on the basis of recommendation men-tioned in detailed soil investigation report by soil testing agency.

Please note that minimum depth of foundation from Finish Ground Level shall be as under
(1) For Normal soil strata/soft rock strata (Open footing) -- 3000mm
(2) For pile foundation -- 2000mm cutoff level
(3) For Hard rock strata - 2000mm plus anchoring of sufficient capacity(inside hard rock strata) of HILTI or Equivalent company product
The minimum Grade of concrete for building shall be M25 and for pile and pile cap shall be M30.
Dimension of GIS building shall be as mentioned in Tender drawing, Technial specifiction and relevant IS codes and standards.

The item is of LUMPSUM BASIS but payment shall be made as per actual building dimension, the conditions of which is mentioned as under.
FORMULA TO CALCULATE CUBIC METER OF ROOMS OF GIS BUILDING :
LENGTH = IN TO IN DIMENSION OF WALL OF ROOM
WIDTH = IN TO IN DIMENSION OF WALL OF ROOM
HEIGHT = DIMENSION FROM FINISHED FLOOR LEVEL TO BOTTOM OF ROOF SLAB
CUBIC METER OF ROOM = LENGTH X WIDTH X HEIGHT (AS MENTIONED ABOVE)

TOTAL CUBIC METER OF GIS BUILDING = CUBIC METER OF “CABLE CELLER(BASEMENT)” + CUBIC METER OF “GIS HALL” + CUBIC METER OF "11KV SWITCHGEAR ROOM" + CUBIC METER OF “AHU ROOM” + CUBIC METER OF “SCADA ROOM” + CUBIC METER OF “ROOM FOR CONTROL & PROTECTION PANELS” + CUBIC METER OF “L.V. ROOM” + CUBIC METER OF “BATTERY ROOM” + CUBIC METER OF “OFFICE”+ CUBIC METER OF “PASSAGE INSIDE BUILDING” +CUBIC METER OF 'STAIRCASE AREA WITH STAIR CABIN'+CUBIC METER OF 'TOILET BLOCK AT GROUND FLOOR & FIRST FIRST FLOOR'

NOTE: Please note that, quantity of cubic meter considered in this BOQ is on approximation basis. However, Payment shall be made as per actual dimension and acording to

the formula given in Tender drawing and Technical specification. Quantity of Cubic meter may decrease upto 50 % & inrease up to 25 %.
However, Scope of work and item rate shall be inclusive of all the works & items mentioned in Tender drawing,BOQ description, Technical specification and required items to complete the GIS building in all respect as per relevant IS codes and standards(latest).

GIS cum Control room building consist of GIS hall, 11kv switch gear room, SCADA room, AHU room, Office, Battery Room, LV Room, Panel Room, Passage, toilet block etc., as shown in tender drawing & as per actual requirement during detailed engineering. Dimensions of the building shall be decided by the bidder depending upon requirement and as shown in tender drawing whichever is higher. Provision for extension in future of the building shall be made. A corridor shall be provided all around GIS to facilitate maintenance of equipment. Provision for service bay shall also be made. GIS cum Control room building for electrical installations must be designed such that no water can penetrate either from roof or wall. The GIS hall shall be suitable for mounting EOT crane (Supply of EOT Crane is not part of civil work) Loading platform at entrance for GIS equipment shall be provided of minimum size of 1500mm wide of adequate capacity or as per Tender drawing & actual requirement. RCC flooring of GIS hall shall be suitable for mounting of GIS equpment as per manufacturer recommendations and as per IS codes and relevant standards. GIS Building may be/may not be attached with control room. It shall be decided on the basis of electrical lay out and site requirement. Bidder has to develop working construction drawings (plan, section, elevation, detailed structure drawings, door/window/ventilator drawing, water supply and drainage arrangement drawing, finishing schedule, foundations for GIS,cable trench etc to facilitate construction work)
Design of Building shall meet the full requirement- functional, operation and maintenance, safety and gride code etc which are essential and necessary for GIS building. Scope of work includes all related works to this design and drawing.
In order to facilitate inspection and maintenance, the structures shall be provided with climbing devices. The built up frame shall be applied with a priming coat of red oxide zinc chromate primmerbefore taken out of workshop. Separate fire escape doors shall also be provided in the GIS Building. Panels shall be kept in an air-conditioned enclosure within the GIS hall. This enclosure shall be separated from main GIS hall by providing a glazed partition made of aluminium frameand 5.5mm thick glass. In case relay room is separate from GIS building, this will be made of RCC framed structure and specification of control room building shall be followed for panel room also. Walkway shall be provided at gantrygirder level along with climbing arrangement to facilitate maintenance. All steel work shall be painted with one coat of steel primer and two coats of synthetic enamel paint after erection.

Minimum carpet area and height of GIS Hall for 66/11KV system shall be as mentioned in tis specification and tender drawings. GIS hall shall be of RCC framed structure.

NAME OF FLOOR	FUNCTIONAL PURPOSE	APPROX. CARPET AREA((m^2)
BASEMENT	CELLAR (Cables Accommodation)	355
GROUND FLOOR	AHU ROOM	18
	SCADA ROOM	43
	SWITCH GEAR ROOM	108

	CABLE SHAFT	6
	TOILET BLOCK	4
	GIS Hall	148
FIRST FLOOR	L.V.ROOM	41
	BATTERY ROOM	26
	C & P PANEL ROOM	66
	OFFICE	25
	PASSAGE	9
	TOILET BLOCK	8
TERRACE	STAIR CABIN	30
	MACHINE ROOM	16

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1. HEIGHT OF GIS ROOM, H (FROM FINISHED FLOOR LEVEL TO BOTTOM OF ROOF SLAB) = "Z" (TOP MOST PORTION OF 66 KV GIS MODULE & FLY OVER BUS DUCT HEIGHT WHICHEVER IS HIGHER) + 4000(BUS DUCT TO HOOK HEIGHT)+ (2000) + (1200) + (DEPTH OF ROOF BEAM).

NOTE: (1) CERTAIN MINIMUM REQUIREMENTS ARE INDICATED ABOVE FOR GUIDANCE PURPOSE ONLY.HOWEVER, BIDDER SHALL QUOTE THE RATES ACCORDING TO THE COMPLETE SYSTEM REQUIREMENTS FOR 66KV GIS CUM CONTROL ROOM BUILDING.)

SPECIAL NOTES FOR STRCTURAL STEEL WORK :

1. Erection of structural member, roofing sheet etc. shall be done by crane or cranes of suitable capacity. Quoted rate shall be inclusive of mobilisation and rent of crane. Manual erection by ropes /winch (gadam) shall not be allowed.
2. Use approved quality of welding rods of D & H /Advani-Oerlikon/Esab/ Gee make.
3. The bidder shall be responsible for stability of structure at all stages of its erection at site and shall take all necessary measures by additions of temporary bracings and guying to ensure adequate resistance to wind and also to loads due to erection equipment and their operations.
4. The bidder is required to make safe arrangement for frequent inspection by Engineer-in-charge or his representative for fabrication & erection work.
5. The bidder shall arrange on his own all plant and equipment, welding sets, tools and tackles, scaffolding, trestles equipment's and all other accessories and ancillaries required for carrying out erection without causing any stresses in the members which may cause deformation and permanent damage.
6. The bidder shall strictly follow at all stages of fabrication, transportation and erection of steel structures, raw materials and other tools and tackles, the stipulations contained in Indian Standard Code for safety during erection of structural steel work as per IS: 7205.
7. Supplying structural steel raw material section conforming to IS: 10748 having a minimum yield strength of 250 N/mm².
8. Fabricating, erecting and fixing in position various Inserts like angles, channels, beams, plates, etc. with necessary hold fasts including fixing with concrete or masonry surfaces to required level and alignment during concreting at all levels as per detail drawings, cleaning the surfaces after deshuttering and providing and applying two

coats epoxy primer and two coats of epoxy paint, consumables like welding rods etc. complete. Lugs for insert will be provided in this item.

9. Straightening, cutting, cleaning, fabricating, erecting, bending in required shape placing in position and connecting M.S. Structural work fabricated from HOT/ COLD rolled steel sections / HOLLOW SECTION etc. in roof trusses, Column, beams, gantry girders, bracings, catwalk for false ceiling, platforms, pipe trestles, stairs, monorails, cleats, protection angles, brackets, hangers, purlins, tie runners, sag rods, chequered plate, with threading, triangular frames for louvers, cable trays, rain water & other utilities pipe supports, ladders with or without cage, canopy, etc. including transport, loading and unloading as and when required, cutting, wastage, welding with welding rods of approved make (Shop & site) bolting, wherever necessary including cleaning and two coats of zinc chromate oxide primer & two coats of synthetic enamel paint etc. complete.
10. Fabricating, cutting to shape and size, fixing in position M.S. Chequered plates of required thickness at any level with stiffeners if required in covers for trenches, stair, steps, landing, platforms, floors and similar works etc. complete as per drawings and as directed including bolted / welded joints and connections including PACKING MATERIAL LIKE WOLL FELT BETWEEN PLATE & BEAM TO AVOID NOISE

GIS cum Control room building OF RCC FRAMED STRUCTURE :

The GIS cum Control room building shall be a RCC framed structure having minimum concrete grade of M25.

The Finished Floor level of the Ground floor Building shall be minimum EL (+) 1.0 m. i.e. one meter above Finished Ground level.

Walls and finishes:

The walls in the building shall be non-load bearing in-filled panel walls. All external and internal walls will be of Brick masonry/Block masonry. All the walls shall be supported on RCC wall beams and plinth beams such that unsupported length is not more than about 3 meter. Minimum thickness of walls shall be 230mm (one brick).The walls shall be laid in 1:4 cement: sand mortar.

- The external wall surfaces will be provided with 20 mm thick plaster in two layers, with exterior Acrylic Paint (Apex ultima or Equivalent)
- Internal plastering will be of 12 mm thick in 1:3 cement mortars. 12mm thick cement plaster shall be provided in all Ceiling/Non ceiling area of building except GIS Hall.
- Minimum 40 % of area of elevation above plinth of control cum administrative building (front and both side elevations except rear elevation) shall be covered with 6mm thick toughened coloured reflective curtain glazing with powder coated aluminium frame for better aesthetic look in elevation
- 50mm thick Damp Proof Course (DPC) shall be provided at plinth level before starting the masonry work. The DPC shall be in PCC M20 grade with water proofing compound followed by two layers of bitumen coating 85/25 grade as per IS 702.
- Height of skirting above finished floor level shall be 150mm.
- Aluminum partition wall shall be executed as per details shown as under.
  Providing and Fixing 20 micron thick colour anodized Partly panneled& partly Glazed Alu.Partition using alu. Section "JINDAL/Hindalco/BancoAluminium Ltd." as

per design out of extrutedtubuler hollow section approx size of partition frame double groove (63.50x38.1x3.20 1.95 kg/rmt), partition frame single groove (63.50x38.1x2.50 1.092 kg/rmt), glazing clip (19x17.3x.1.2 .154 kg/rmt), glazing strip/plate (44.45x5.72x3.22 0.453 kg/rmt) including fixing upper part of partition with 6 mm thk. plain/brown float glass or froasted glass as per design & of approved quality (like modigaurd/saint gobain) & lower part of the partiton with 10 mm waterproof ply fixing with 1 mm thick laminate sheet on both side of approved brand & colour (greenply/royal touch/marino/century) with alu. glazing cleat and rubber sealing/glass wool including necessary fittings like screws, angles, cleat etc and filling with appropriete silicon sealent between aluminium section members & wall/ceiling or any surface gap between wall & section etc. complete as per detail drawing and instruction of EIC.Final pattern of partition wall shall be prepared by bidder and submitted for approval of GETCO during detailed engineering.

Parapet wall

The parapet wall over the building shall be 900mm high from the finished roof level.

Plinth Protection

Entire area around the control room cum administrative building shall be provided with M20 grade PCC paving of minimum 100 mm thickness over consolidated/compacted earth(depending on soil conditions as approved by GETCO), starting from the building edge up to 750mm clear distance for the entire periphery of the building.

Roof / Floor Finishes

Roof Finish

Providing & laying water proofing treatment on terrace including applying neat cement slurry 2.75 kg./sq.mt. on cement admixed with water proofing component after cleaning the surface, Laying cement concrete with brick bat 75mm to 100mm thick with 50% of C.M. 1:5 admixed with water proofing component over 20mm thick layer of C.M. 1:5 to required slope including ramming at junction of wall and slab, after two days of proper curing applying a second coat of cement slurry, finished the surface with 20mm thick C.M. 1:4 china mosaic flooring and finally finishing flooding 75mm deep with water on terrace for a period of two week**.**

The contractor shall submit performance guarantee of the waterproofing item as mentioned in BOQ./ GETCO procedure.

(The rain water down comers shall be of uPVC conforming to IS- 4985. The number and size of down-comers shall be governed by IS -1742 and IS- 2527.

Rainwater pipes from roof shall be fixed on the outside face of the column and encased later with concrete**..**

Floor Finish

Floor finishing schedule of GIS cum Control room building shall be as per Annexure– A.

RCC Flooring of adequate thickness with epoxy hardener topping with Epoxy painting of approved make and shade.

Glazed tiles:

Providing and laying colour glazed tiles of size 300mmX200mmX8mm /300mmX450mmX8mm -JOHNSON /KAJARIA /NITTCO or its equivalent make in flooring & dado laid on bed of 12mm thick cement mortar 1:3 (1 cement: 3 course sand) &

fixing the same in cement & providing 12mm thick back coating of cement plaster in CM 1:3 for base, filling the joints with white/colour cement neatly finishing the joints curing etc. Complete if required.

RCC flooring of adequate thickness with non metallic hardener topping

Providing and applying "non metallic floor hardener using "Nito floor - hardtop" of Fosroc or "CHAPDUR" of sika or equivalent make hardtop on RCC floor after base concrete has stiffened to the point when light foot traffic leaves an imprint of about 3mm and bleed water should have evaporated. It is applied at the rate of 5 Kg./Sqm of Area as per manufacturer's specification.

RCC flooring of adequate thickness with 3mm thick self levelling epoxy flooring system(Epoxy hardener topping with epoxy panting)

i) Supply and application of 3mm thick self-levelling epoxy flooring system as specified. Prior to installation surface preparation and cleaning to be done as specified. The term “self-levelling epoxy flooring system” as mentioned in this item, will include the primers, underlays and topcoats. The Applicator/Bidder shall be responsible for providing ventilation, initial cleaning, inspection, supervision, dust control and equipment protection.
ii) The Applicator/Bidder shall check the condition and dampness of existing floor, verification of dryness to be done by testing for moisture and ascertain the need of providing moisture tolerant underlayment and propose accordingly.
iii) Concrete surface must be prepared using vacuum abrasive blast cleaning or vacuum grinding if required to remove all laitance etc to achieve open textured surface. Weak concrete must be removed and surface defects such as blowholes and voids must be fully exposed. Vacuum clean concrete to remove all dirt, dust, and other loose materials. Repairs to substrate, filling of joints and grooves and surface repairs to be carried out using appropriate product.
iv) The Applicator/Bidder shall check the concrete substrate to be suitably primed, if required for porous substrates, as per manufacturer’s recommendations, such as MC-Dur EP of MC-Bauchemie,FOSROC or SIKA or Equivalent which helps to ensure good adhesion and prevent air release, in order to achieve an even bubble free surface.
v) Supplying & laying of average 2mm self-levelling epoxy underlay flooring, such as MC-Dur Selflevel of MC-Bauchemie, FOSROC or SIKA or Equivalent over the existing concrete floor for levelling undulations etc. all complete. (Applicator to access and determine the average thickness for correction in floor level, if required)
vi) This is to be followed by application of final coat application of epoxy self-levelling flooring at 1 mm thickness, such as MC-Dur Selflevel of MC-Bauchemie, FOSROC or SIKA or Equivalent after mixing all components etc. complete including all tools and tackles as per manufacturer's specification.
vii) Colour, grades and final texture of coating system shall be approved by GETCO before starting installation. The acceptance of a sample will constitute the job standard by which installation will be allowed to proceed by GETCO.

Cable trench:
All cable trenches in control room cum administrative building/GIS building/Basement are of RCC and shall be covered with minimum 6mm thick steel chequered plate with 3mm thick PVC roll or equivalent cable trench cover of good quality with sufficient stiffeners to protect from bending.6mm thick Chequered plate shall be fixed with ISMC

channel by means of chamfered bolt in such a way that level of Bolt head top and floor level or chequered plate shall be the same. Details shall be shown in the drawing. Packing material like wool felt shall be provided between chequered plate and channel to avoid noise during walking over the chequered plate.

The contractor shall provide cable trays including necessary supports at intervals not exceeding 1.2 M as per approved drawing. The supports shall be of galvanised Angle of minimum section 50x50x6 mm and shall be properly welded with insert plates and Lugs of Flat section duly embedded in walls. The cable trays shall be of approved width and shall be made of galvanized perforated M.S. Plate having minimum thickness of 3 mm. Cable trays should be designed to accommodate all cables required in this present scope of work as well as to accommodate all cables for future bays as specified in electrical specification in proper dressed up fashion without overlapping of cables on trays.All M.S. strctures shall be galvanised.
In case of RCC cable trench to be provided below floor slab, Prestress cover shall be provided as cable trench cover which may work as permanent centering for Floor slab while casting.
For Basement room, cut out to be kept in RCC slab and appropriate arrangement for hanging cable trench of strctural steel arrangement below slab and arrangement for cable route from Basement to Slab between Basement and GF slab shall be provided. Care to be taken to see that all the arrangements provided for cable in and out system shall be aesthetically pleasant and strong enough as per relevant codes and standards.Vertical trays shall be perforated alluminum tray of required width.

Doors and windows

All the windows and ventilators of building shall be of 20 micron thick colour anodized aluminium with 6.0 mm thick glazing. Main entrance shall have aluminium framework with glazing. Doors shall be of swing type.

Alliminium door: Details of allumium 20 micron thick colour anodized door is as under.

Providing and fixing fully glazed / partly glazed double leaf 20 micron thick colour anodized aluminium door with following listed extruded section manufactured by Jindal Aluminium Ltd. & other accessories, the Alluminium sections are of HE9WP Group:

1) with door outer frame section of 63.5 x 38.1 x 3.18 mm thick weighing 1.777 kg/rmt (J4605)
2) Door shutter vertical style (meeting style) of 53.7 x 44.45 x 2.30mm thickness (J4537) weighing 1.238 Kg/m
3) Hinge side 53.7 x 44.45 x 2.30mm thickness (J4540) weighing 1.173 Kg/Rmt
4) Bottom rail of size 150 x 44.45 x 2.40mm thickness (J4538) weighing 2.376 Kg/Rmt
5) Lock rail of size 150 x 44.45 x 2.40mm thickness (J4538) weighing 2.376 Kg/Rmt
6) Top rail of size 47.62 x 44.45 x 3.18mm thickness(J4506) weighing 1.501 Kg/Rmt
7) Ventilator middle member (if required) 49.91 x 44.45 x 3.00mm thickness (J4621) weighing 1.495 Kg/ Rmt
8) Aluminium handle 127.00 x 37 x 3.65mm thickness (J4483) weighing 1.912 Kg/No.
9) Tower bolt 250mm long (J4954)
10) Aluminium bending mortice lock (J4420)

11) Top panel using 6.0mm thick Triveni or Modi or Saint Gobain make float glass fixed with PVC Clear gasket.
12) Bottom panel using with 10 mm waterproof ply fixing with 1 mm thick laminate sheet on both side of approved brand & colour (greenply/royal touch/marino/century) as approved by the Engineer - in - Charge (for partly glazed door) fixed with virgin PVC clear gasket
13) Door Closer of make approved by the Engineer - in - Charge with all other required fixtures and fastening of colour anodized with aluminium beading, with all labours and materials etc. complete as directed by EIC. Aluminium section user for fixing hinges, door closer, etc. shall be filled with country teak wood to receive screws.

Alluminium window:

'Providing, fitting and fixing Aluminum Window in position having extruded 20 micron thick colour anodized frame as per specifications, including all labour, material, equipment, handling , transportation ,accessories, conforming to IS :733 and IS:1285, fixed with metal expansion fasteners, screws or fixing clips, necessary filling up of gaps at junctions, at top & bottom and sides, with Silicon sealant /required neoprene felt for bi-metallic protection, preparation of working drawings & getting the same approved by the GETCO, aluminum cleat angle, aluminum snap-on-beading for glazing / paneling, all fittings and fixtures (like handles,aldrops, stays, etc.), C.P. brass/ stainless steel screws, fixing hinges / pivots, making provision for fixing of fittings wherever required, neoprene gasket, etc., all complete, as per specifications, drawing and instruction of Engineer. The glazing shall be 6 mm thick clear TRANSPERANT BRONZE COLOUR/WHITE TINTED FLOAT Glass. with aluminium fittings and fixtures and transparent silicon sealant glass fixing to frame as per details etc. complete for Window.

a.	**Two track window using following sections:**
i)	External frame - 63.5 x 38.1x1.95mm thick @ 1.0921Kg/m Jindal code no. 20073
ii)	Bottom frame - 61.85 x 31.75x1.20mm thick @ 0.695Kg/m Jindal code no. 20619
iii)	Top & side frame - 61.85 x 31.75 x 1.3mm thick @ 0.659 Kg/m Jindal Code no. 20681
iv)	Shutter bottom frame - 40.00 x 18.0 x 1.29mm thick @ 0.457 Kg/m - Jindal code no. 20846
v)	Shutter top & side frame - 40.0 x 18 x 1.29 mm @ 0.456 Kg/m Jindal code no. 20846
vi)	Shutter interlocking frame - 50.0 x 29.0 x1.50mm thick @ 0.697 Kg/m. jindal code no. 20531

Gap between frame of allumuinium window and wall shall be air tight and water tight.If required, Garvare or equivalent make sun control film shall be provided on glass of window to protect from sun rays

Alluminium ventilator:

'Providing, fitting and fixing Aluminum Window in position having extruded 20 micron thick colour anodized frame as per specifications, including all labour, material, equipment, handling , transportation ,accessories, conforming to IS :733 and IS:1285, fixed with metal expansion fasteners, screws or fixing clips, necessary filling up of gaps at junctions, at top & bottom and sides, with Silicon sealant /required neoprene felt for bi-metallic protection, preparation of working drawings & getting the same approved by the GETCO, aluminum cleat angle, aluminum snap-on-beading for glazing / paneling, all fittings and fixtures (like handles,aldrops, stays, etc.), C.P. brass/ stainless steel screws, fixing hinges / pivots, making provision for fixing of fittings wherever required, neoprene gasket, etc., all complete, as per specifications, drawing and instruction of Engineer. The glazing shall be 6 mm thick clear TRANSPERANT BRONZE COLOUR/WHITE TINTED FLOAT Glass. with aluminium fittings and fixtures and transparent silicon sealant glass fixing to frame as per details etc. complete for Window.

a	**Louvered type ventilator**
i)	Outer frame: 63.5 x 38.1 x 1.17 @ 0.681 Kg/m Jindal code no. 20054
b	**Fixed type window / ventilator**
	External frame - 63.5 x 38.1x1.95mm thick @ 1.092Kg/m Jindal code no. 20073
i)	Outer frame: 63.5 x 38.1 x 1.17 @ 0.681 Kg/m Jindal code no. 20054
ii)	Middle member with double groove: 63.5 x 38.10 x 1.21 @ 0.761 Kg/m Jindal code no. 20026
iii)	Glazing clips: 19.0 x 17.3 x.0.9 @ 0.124 Kg/m Jindal code no. 19360

1. Rolling shutters with manual operating arrangement according to size shall be provided in GIS room to facilitate handling and transportation of dry type transformer/GIS units.
   Providing & fixing steel rolling shutter 18 Gauge of approved make & made 80 mm wide M. S. Laths interlock together through their entire length and jointed together at the end by end locks mounted on specially designed pipe shaft with brackert plates guide channel and arrangement for inside and outside locking with push pull operation complete including the cost of hood cover and spring etc., complete as directed.
2. All doors/shutters/windows shall be provided with all standard accessories such as handles, tower bolts, locks, stoppers, floor mounted spring type door closure etc. of best quality as approved by the GETCO.

Glazing and its thickness

1. Minimum thickness of glazing shall be 6.0 mm(window/door). Glazing shall have fire rating of minimum 1 hour.

Providing & fixing M.S. Grill to all windows of the building of approved quality & design weighing 40 to 45 KG SMt. as per drawing & as directed with necessary grill door (IF REQUIRED) including welding or bolted fixtures and fastening, M.S. Flat hold fasts, 300mm. long 16mm. dia. Aldrop & 300mm. long tower bolt necessary handles etc., with 3 coats of oil painting of approved shade & tint with one coat of red oxide primer including grouted hold fast in C.C.(1:2:4) etc., complete as directed by E.I.C.

False ceiling

The Gypsum board false ceiling shall be provided in all air- conditioned area.

Providing & fixing gypsum board suspended false ceiling in the grid of 600 x 600 mm using aluminum Tees with interlock system for main (25 mm x 25 mm x 1.6 mm) or equivalent and cross tees (25 x 25 x 1.6 mm) etc complete with 6 mm adjustable suspenders and other required accessories for hanging skeleton and supported at walls by 25 x 25 x 1.6 mm anodized aluminum angles screwed with rawled plug including making arrangement for holding the skeleton from slab / roof etc. by using 6 mm bar 6 feet c/c. and using gypsum board tiles comprises non - combustible gypsum casting plaster reinforced with a glass fiber membrane resulting in a light weight , strong and prestressed panel of 12.5 mm thickness. The tiles are in their natural colour and smooth or textured finish as per manufactures specifications. The ceiling system shall be confirming to non-combustible as defined in BS- 476 part 6 & 7 including making, opening/ cutouts for electrical fittings, fixtures etc. with finishing etc. complete as directed by E.I.C.
Height of False ceiling shall be minimum 3.20 meter in LCC PANEL ROOM.

- In the basement, provision of sunk of 300 mm x 300mm x 300mm shall be provided at one corner with sufficient capacity of monoblock pump to facilitate the disposal of water outside the basement area. Item of monoblock pump of sufficient capacity with required cable and other accessories to dispose of water from basement is in the scope of bidder.

- Tender purpose drawing is attached for reference purpose only. However bidder shall quote the rates according to the complete system requirements for 66kv GIS cum control room building.

Toilet details including plumbing and sanitation(If toilet block is to be constructed attached to GIS Hall)

1. All plumbing and sanitation shall be executed to comply with the requirements of the appropriate bye-laws, rules and regulations of the Local Authority having jurisdiction oversuch matters. The Contractor shall arrange for all necessaryFormalities to be met in regard to inspection, testing, obtaining approval and giving notices etc.
2. Two toilets at each floor, one for Gents and other for ladies, shall be provided in the building. Attached toilet shall be provided with conference room, separate for Gents and ladies.
3. All water supply and drainage pipe line shall be concealed.
4. A shaft shall be provided in the Toilet area for water supply, soil and vent pipes.
5. PVC “SYNTEX” or equivalent make white color (Three layered) Roof water tank ofadequate capacity depending on the number of users for 24hours storage shall be provided. Minimum 2 Nos 1500 liter capacity shall be provided.
6. Galvanized MS pipe of medium class conforming to IS: 1239 shall be used for internal & external piping work forpotable water supply.

7. uPVC pipes conforming to IS: 4985 shall be used for sanitary works above ground level and RCCpipe shall be used for works below ground.
8. Each toilet shall have the following minimum fittings.
    a. WC (Western type) 390 mm high with toilet paper roll holder and all fittings in toilets shall be provided in toilets.of CERA or equivalent make. Providing and fixing wash down water closet (coloured) glazed earthernware make of 'CERA' model no 2035 for wall hung EWC & model no 2115 for cistern with integral 'P' or 'S' trap `cera' or equivalent make fixing with required CI chair bracket inside the floor/wall, including jointing W.C. outlet inside the rubber gasket, including seat cover model no 2325, flushing cistern tank, jet spray required length of pipe etc. complete to satisfaction curing, in true line & level & plumb etc. complete as directed by EIC.
    b. Providing and fixing White Orissa type W.C. pan of "CERA" make (no. 2071) of size 580 x 440 mm with `P' or 'S' trap (No. 9002). Including supply & fixing of concealed flush cock with necessary inlet connection upto flush cock and outlet connections in concealed manner, cutting and making good floor etc. complete. .

    c. Urinal (430 x 260 x 350 mm size) with all fittings. Providing and fixing URINAL PAN (WHITE/COLOURED) glazed earthernware make of 'CERA' model no 5001 OR 5004 & Division plate of model no 5011 `cera' make fixing with required inside the floor/wall, including jointing pvc waste pipe, waste coupliing 40 mm dia cp, pvc connection for inlet water of required length of pipe etc. complete to satisfaction in true line & level & plumb etc. complete as directed by EIC. Urinal pan shall have in built censors.
    d. Providing and fixing Oval wash basin (size 550 x 440 mm of "cera" make (no. 1025) of white colour standard quality including including inlet and outlet connections, Pillar cock, stop cock, angle cock of approved quality, C.P. Brass bottle trap, CI Brackets CP brass waste coupling, cutting & making good the wall, etc. complete. (All plumbing fixtures shall be of "Jaquar" make). providing BIB COCK WITH sensor (CODE NO. SNR-CHR-51021).
    e. Providing and fixing approved 600 mm X 450 mm Bevelled edge mirror or superior glass mounted on 6mm thick plywood sheet or plastic moulded and fixed with wooden plugs with CP brass screwws and washers, including built in glass shelevs with CP brass D bracket support and guard rail fixed to wooden plugs with CP brass screws... etc., complete.
    f. Providing and fixing CP brass TOWEL RAIL/NAPKIN RING jaquar or equivalent make model no. 1121 & 1181 complete with CP brass brackets fixed to wooden pluges with CP brass screws, 600 mm X 20 mm size.
    g. Soap holder and liquid soap dispenser.
    Providing & fixing Stainless steel liquid soap holder cum dispenser of approved make to the wall with necessary brackets, screws, washers, plugs etc. all as specified & directed.
    h. All urinals and washbasins shall be provided with built in sensors.

i. Providing and fixing CP brass Flush cock with flange of jaquar co. continental series model no 1081 or equivalent make of approved quality in each W.C including fixing in pipe line and necessary testing… etc., complete as directed by EIC
j. Providing and fixing CP brass Bib Cock with flange of jaquar co. continental series model no 037 or equivalent make approved quality including fixing in pipe line and necessary testing… etc., complete as directed by EIC.
k. Supplying, fixing & testing PVC floor trap (6 Kg/Sq cm) with solvent cement joints, including all the fittings. The work shall include wall chase and making good the same in cement mortar complete to the satisfaction of engineer-in-charge.(a) P trap 75mm & 100mm.
l. Providing and fixing Square mouth Stone ware Gully Trap grade "A" 100 x100 size "P" type of approved quality, including 230mm thick brick masonary chamber of 300 x300mm clear inside in C.M. (1:5) plastered on both sides in C.M. (1:3) with C.I cover not less than 4.5 kg and frame not less than 2.7 kg. to fixed in Cement concrete 1:2:4 including necessary excavation to required depth,1:4:8 bedding of 150mm thick etc. complete.

9. Water cooler for drinking water with adequate water storage facility shall be provided.
10. 1 no. stainless steel kitchen sink with Drain board (510 x 1040 x 178 mm bowl depth) shall be provided.
11. All fittings, fastener, grating shall be chromium plated.
12. All sanitary fixtures and fittings shall be of approved quality and type manufactured by well-known manufacturers. All items brought to site must bear identification marks of the type of the Manufacturer.
13. Soil, waste and drain pipes, for underground works shall be UPVC for areas not subject to traffic load. Heavyduty cast iron pipes shall be used otherwise.
14. Contractor shall provide septic tank and soak pit of adequate capacity to treat the sewage / sullage from the building.
15. Providing and fixing of heavy duty exhaust fan in each toilet block of size 300mm of Make GEC/KHAITAN/ CROMPTON/ BAJAJ incl. M.S. lourex shutter of Fan & necessary wall finishing works and applying bird proof net on outside wall with required arrangement for rain water sealing and necessary conection from ceiling rose as per Direction and instruction of EIC
16. Contractor shall implement all other jobs required to complete and commission the water supply and drainage arrangment of building.

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Projection over doors and windows:

Doors and windows on external walls buildings shall be provided with RCC sun-shade over the openings. Projection of sunshade from the wall shall be minimum 750 mm over window openings and 900 mm over door openings.

Finishing :

Plastic paint :

Providing and Applying Three Coats Acrylic/Luxury Emulsion paint with approved brand (like asian royal/icidulux velvet) and manufacture and of required shade on wall / ceiling surface to give an even shade over and including applying two/required coats of lapi

(sythetic oil paint & whiting chalk & varnish) for make surface smooth & even with lapi, including primer coat (cement based primer in two coats) with alkali resistance/synthetic primer of approved brand, after thoroughly brushing the surface free from water dropping and other foriegn matter and also including preparing the surface even and smooth, etc. complete as directed by EIC.

Exterior paint:

Providing & applying wall painting 2 coats with weather proof acralic emulsion APEX ULTIMA- or equivalent type paint of approved brand and manufacture and of required shade on exterior wall surface to give an even shade over and including a primary coat with alkali resistance primer of approved brand after thoroughly brushing surface to to all dirty and remains of loose powder material etc complete for all heights. A gap of 6 hrs. Should be given between 2 subsequent coats.The work should be carried out strictly as per manufacture's specification and requirement etc complete as directed by EIC.

Protection of RCC structure under ground and above ground against corrsion and weather

Proviging & Applying tar extended two component coating system based on synthesized epoxy resin and amine adduct manufacture as per technical specification of central electro chemical research (CERCI/CSIRKARAIKUDI) to achieve 400-450 microns DFT in two coats as directed. The item includes cleaning the surface before treatment as per manufacturer specification. The coating system EPCO2020TX or equivalent shall comply the CERCI technology of " comprehensive repair & protection of concrete/steel surface in wet & underwater codition". The rate shall be incusive of all materials labour equivalent scaffolding etc.

Laboratory room/Testing room:

Arrangement for stacking of various materials/kits/spare materials shall be provided. This shall be closed one and at height up to 2.0 meter height or as per requirement.

Over head crane :

Design & Engineering of civil and strcutre wok related to installations of EOT overhead crane of approved capacity & of approved make is also in the scope of bidder.

Foundations for Bus Duct support and GIS Module:

Foundations for GIS Bus duct and GIS module as per manufacturer guide line shall be provided within GIS Hall/Out side GIS hall(in switch yard) as per relevant standards and codes.

The design and detailing of foundations shall be done based on the manufacturer recommendations & loads given by GIS manufacturer , approved soil data and sub-soil conditions as well as for all possible critical loads and the combinations thereof. The Spread footings foundation or pile foundation as may be required based on soil/sub-soil conditions and superimposed loads shall be provided.

Detailed design calculations shall be submitted by the bidder showing complete details of piles/pile groups proposed to be used. Design shall consider any sub-soil water pressure that may be encountered following relevant standard strictly. Necessary protection to the foundation work, if required shall be provided to take care of any special requirements for aggressive alkaline soil, black cotton soil or any other type of soil which is detrimental/harmful to the concrete foundations.

False flooring: False flooring shall be provided if required as per system requirements.

Providing and fixing false flooring system in control room building. False flooring system shall consist of

(A) Panel:

The access –raised floor shall be having a concentrated point load of (CPL) of 3.6KN (363kg) over 25mm square & uniformly distributed load strength of 13.5KN (1350 kgs). Panel to be manufactured from steel with light weight foamed cementitious core in the size 600x600x32mm. The steel casing has to be on the top & bottom surface of the panel. Access Floor panel shall be all steel welded construction with an enclosed bottom pan of 49 hemispherical and 64 reverse cones and top plain sheet is fuse welded to form a panel and to give strength & flexural rigidity. The entire panel shall have an electro deposition of cathodic epoxy paint finish for lifetime protection on exposed surface. The panels should be non-combustible as per BS 476, part 4.

The panel shall be finished with 1.2mm high abrasion, antistatic high pressure laminate of in size 600mmx600mm with 6mm beading on all sides to provide protection of edges.

(B) Pedestal :

The pedestal shall be of all steel construction, zinc plated and the consisting of cruciform up stands and four panel locating studs, positively clipped to the steel top plate. Pedestal assembly shall provide for easy adjustment of leveling & accurately align panels to ensure lateral restrain.

The pedestal head assembly shall consist of 75x75x3mm embossed head mechanically riveted to a 75.0 mm long 16mm dia rolled formed stud and 2 check nuts for level adjustment and arresting vertical movement.

The pedestal base assembly shall consist of 30.00mm OD pipe mechanically locked on a press for perpendicularity and then welded to the base plate of 75x75x8mm thick with stiffening folds for an elevation up to 600mm.

The steel base plate of the pedestal shall be fixed onto the sub floor with epoxy pedestal adhesive & or mechanical fixing. Pedestal head shall be designed to avoid rattles or squeaks.

(C) Stringers:

An all steel rectangular stringer of 30mmx20mmx570mm length and 1.50mm thick having pre punched holes at both the ends to ensure correct alignment with pedestal heads should be applied for maximum stability.

All steel components shall be zinc electro plated. Work shall be executed as per approved drawing. Cut outs for Automation panels & other equipments installations shall be as per panel/equipment drawings. Lay out drawing along with supporting stud arrangement shall be submitted for approval at the time of detailed engineering. Rate is inclusive of providing required channel support to panels. Automation panels and other equipments shall not be supported directly on the skeleton, but it shall be supported on channel.

Hand railing of stair case **: Hand railing shall be provided in stair case as per approved design and drawing.**

Providing and fabricating and fixing 1.00 MT. high anti corrosive high grade AISI 316 Stainless Steel Railing heavy gauge materials to be used with required removable patch fitting for fixing frosted glass of standard company like modigaurd/saint gobain/ashi float as per architectural drawing & details, for the railing, in staircase, etc fabricating, hoisting fixing in position with angle cleats, anchor fasteners, holdfast etc in RCC or masonry etc. fasteners should be covered with S.S. plate with cover cap in true line level & plumb, including complete welding, clearing the welding dots with grinder machine, & buffing the same with required buffing machine & match to original & complete no pinholes kept, including buffing in smooth or matt finish as per detailed drawing to railing of approved quality, including wrap to all the members with plastic paper after buffing, after the complete finishing work completed of building remove plastics from railing, scaffolding etc. complete as directed by Engineer in charge.

Approach road to building:

Approach road from main road of substation to building is in the scope of this item and shall be of 3.0 meter wide and shall be prepared from Paver block of 75mm thick. The description of the paver block and its detail is given below.

Providing & Fixing precast rubber dye interlocking concrete block 75mm thick with concrete M-20 compressed by mechanically Pressed and as per approved design incl. 75 mm average thick layer of approved quality of river sand bellow concrete block in slope, filling the joints of the concrete block with screened sand etc. Complete including all material, labour, tools & tackles, curing for successful complication of the work as directed by EIC. However, thickness of river sand below paver block shall be decided on the basisi of soil conditions and recommendation of soil testing agency.

.Misc.:

Package includes all miscellaneous items such as Granite year plate, Acrylic sign board, Substation board as per GETCO standard,Notice board covered with Glass door etc.

Protection of RCC structure under ground against corrsion and weather considering saline atmosphere/marine environment conditions shall be provided with painting / coating of FOSROC or Equivalent company product.The cement and steel shall also considered accordingly.

b) Providing & laying RCC FOUNDATIONS FOR SUPPORT STRUCTURES FOR FOLLOWING EQUIPMENT/11KV ARRANGEMENT/TRANSFORMER/MAST etc of minimum grade M-20 for exposed work including the cost of excavation in all sorts of soil/rock/RCC, back filling with non cohesive soil/sand,lean concrete, necessary formwork (ply wood shuttering form work and adjustable tubular steel supports), scaffolding in true line and level, pouring & compacting with machine vibrator,Providing & fixing foundation bolt with templete, grouting of foundation bolts with GP-2 or equivalent high strength non-shrink type material, curing with jute bags on RCC surface etc. complete Including cost of reinforcement.

Excavation for foundations shall be in accordance with PWD Specification/ the relevant code.

(Protection of RCC structure under ground and above ground up to plinth level against corrsion and weather shall be provided as mentioned in Technical

specification.The cement and steel shall also be considered as mentioned in Techncal specification.).

Type of foundaion shall be decided on the basis of recommendation mentioned in detailed soil investigation report by soil testing agency.

Please note that minimum depth of foundation from Finish Ground Level shall be as under

(1) For Normal soil strata/soft rock strata (Open footing) -- 3000mm for Tower Gantry/Mast foundation, 2000mm for Transformer & 1500mm for Equipment support strucutre foundation

(2) For pile foundation -- 1500mm cutoff level for Tower Gantry foundation/Mast foundation/Transformer & 1000mm cutoff level for Equipment support structure foundation.

(3) For Hard rock strata - 1500mm plus anchoring of sufficient capacity(inside hard rock strata) of HILTI or Equivalent company product for Tower Gantry Foundation/Mast Foundation/Transformer & 1000mm plus anchoring of sufficient capacity(inside hard rock strata) of HILTI or Equivalent company product for Equipment support structure foundation.

Minimum Grade of concrete for pile and pile cap shall be M30.

However, Item Rate & Scope of work shall be inclusive of all the works/items mentioned in Tender drawing,BOQ description, cost of Foundation bolt as per approved drawing , cost of Rail pieces for Transformer/Reactor and rail cum road work,Technical specification and required items to complete the work as per relevant IS codes and standards/drawings.

The foundations for switch yard Structures, equipment& support structure for GIS Bus duct etc., shall be constructed as per approved layout plan of switch yard. All structural & equipment foundations shall be cast in RCC minimum grade M20. The TOC shall be 300 mm above FGL for switch yard foundation unless otherwise specified. The grouting of foundation bolts shall be done with GP-2 or equivalent high strength non-shrink type material.

1. Equipment support structure foundations for main switch yard and LT yard shall be analysed for all possible load combinations both static and dynamic, wherever applicable. However, if the dynamic load component is very less when compared to static loads and or if the requirement of plinth / pedestal size is more, then static analysis will be adopted by considering 3 times the static weight of the equipment.
2. The equipment foundations shall be checked for a factor of safety of 2.2 for normal condition and 1.65 for short circuit condition against sliding,overturning and pullout. The same factors shall be used as partial safety factor over loads in limit state design also.
3. The design and detailing of foundations shall be done based on the approved soil data and sub-soil conditions as well as for all possible critical loads and the combinations thereof. The Spread footings foundation or pile foundation as may be required based on soil/sub-soil conditions and superimposed loads shall be provided.

4. Detailed design calculations shall be submitted by the bidder showing complete details of piles/pile groups proposed to be used. Design shall consider any sub-soil water pressure that may be encountered following relevant standard strictly. Necessary protection to the foundation work, if required shall be provided to take care of any special requirements for aggressive alkaline soil, black cotton soil or any other type of soil which is detrimental/harmful to the concrete foundations.
5. If pile foundations are adopted, the same shall be cast-in-situ bored or pre-cast or under reamed type as per relevant parts of IS 2911. Only RCC piles shall be provided. Necessary initial load test shall be carried out by the bidder at their cost to establish the piles design capacity. Only after the design capacity of piles has been established, the Contractor shall take up the job of piling. Routine tests for the piles shall also be conducted as per IS-2911. All the testing work shall be planned in such a way that these shall not cause any delay in project completion.
6. This clause is as well applicable to the other RCC constructions The procedure used for the design of the foundations shall be the most critical loading combination of the steel structure and or equipment and/or superstructure and other conditions which produces the maximum stresses in the foundation or the foundation component and as per the relevant IS Codes of foundation design.
7. Work covered under this Clause of the Specification comprises the Construction of foundations and other RCC constructions for Switchyard structures, equipment supports, trenches, drains, jacking pad, pulling block, control cubicles, bus supports. Autotransformer/Reactors, marshaling kiosks, auxiliary equipment& systems buildings, tanks or for any other equipment or service and any other foundation required to complete the work
8. D.G. set plinth shall be designed as per relevant codes and standards and as per manufacture's specification and guide lines.Top of plinth shall be 300mm above TOC. Minimum depth of foundation shall be 1500mm inside Ground level.
9. In case of overlapping of 220kv GIS switch yard foundations with foundations/cable trench/any other strcutre of 220kv GIS switch yard, the foundations shall be designed accordingly to suit site conditions/requirement.The scope of work also include cost of all civil works required for the integration of 220kv Switch yard foundations with existing switch yard.& integration of existing 220kv Yard foundations with Yard foundations/cable trenches as the case may be.
10. Chemical anchoring may be used as foundation bots after consent from GETCO. Providing and supplying heavy duty injection adhesive of HILTI HIT-RE 500 or equivalent make for anchor fixing in Wet/Dry conditions. Drilling hole with double flute type drill bits to the required depth by rotary hammer drill, cleaning with brush and jet of clean air, filling resin and hardener using serrated nozzle to eliminate mixing error with standard dispenser in hole and then fixing the HAS E threaded rod, conducting occasional site inspection, executing work by authorized applicator and occasional supervision from the manufacturer's representative in India. The system should be made of two foils consisting of resin and Hardener foil pack.The system used for fixing threaded HAS-E rods. The installation and the setting instructions should be strictly followed as per the manufacturers recommendations.
11. Pull out testing for installed HILTI or equivalent bolt to be carried out in presence of company representative & certificate to be submitted. Number of bolts to be considered for pull out testing shall depend on the severity of strctures.Pull out test for minimum 2 number of bolts per pedestal shall be given by bidder.However, decision of GETCO will be final in this regard.

12. Necessary protection to the foundation work, if required shall be provided to take care of any special requirements for aggressive alkaline soil, black cotton soil or any other type of soil which is detrimental/harmful to the concrete foundations.
13. Line out & orientation of foundations shall be checked jointly by EE(civil)/DE(civil) , EE(const)/ DE(const) & Bidder on the basis of approved Electrical lay out.
14. Before concreting location and details of foundation bolt shall be checked jointly by EE(civil)/DE(civil) , EE(const) /DE(const) and bidder on the basis of approved structure drawing/manufacturer drawing.
15. Grouting below Base plate :
    Providing and laying 25 to 50mm thick Under pinning below base plate & the top surface of the foundation concrete with cement mortar in proportion of 1:3 with water cement ratio 0.4 by weight , blended with an approved free flow grout Ce-bex 100 OR Inte plast NN or GP2 or equivalent approved make as per manufacturer specification in line and level including shuttering , making top surface chamfered ,curing etc. complete as per specification & directed by Engineer in charge.
16. **Protection of RCC structure under ground and above ground against corrosion and weather**
    Proviging & Applying tar extended two component coating system based on synthesized epoxy resin and amine adduct manufacture as per technical specification of central electro chemical research (CERCI/CSIRKARAIKUDI) to achieve 400-450 microns DFT in two coats as directed. The item includes cleaning the surface before treatment as per manufacturer specification. The coating system EP-CO2020TX or equivalent shall comply the CERCI technology of " comprehensive repair & protection of concrete/steel surface in wet & underwater codition". The rate shall be incusive of all materials labour equivalent scaffolding etc.

17. Foundations for Bus Duct support and GIS Module:

    Foundations for GIS Bus duct and GIS module as per manufacturer guide line shall be provided within GIS Hall/Out side GIS hall(in switch yard) as per relevant standards and codes.

    The design and detailing of foundations shall be done based on the manufacturer recommendations & loads given by GIS manufacturer , approved soil data and sub-soil conditions as well as for all possible critical loads and the combinations thereof. The Spread footings foundation or pile foundation as may be required based on soil/sub-soil conditions and superimposed loads shall be provided.

    Detailed design calculations shall be submitted by the bidder showing complete details of piles/pile groups proposed to be used. Design shall consider any sub-soil water pressure that may be encountered following relevant standard strictly. Necessary protection to the foundation work, if required shall be provided to take care of any special requirements for aggressive alkaline soil, black cotton soil or any other type of soil which is detrimental/harmful to the concrete foundations.

22/11 KV LA/CT/CB/ISO/DOUBLE POLE STRCTURE/CABLE TERMINTION STRCTURE/BPI/HBPI/TRIPPLE POLE STRUCTURE/LTPB AS PER APPROVED ELECTRICAL LAY OUT

L.s package is considered in BOQ. Item rate includes cost of all foundations covered for 22/11kv packages which includes 22 & 11 kv 22/11 KV LA/CT/CB/ISO/DOUBLE POLE STRCTURE/CABLE TERMINTION STRCTURE/BPI/HBPI/TRIPPLE POLE STRUCTURE/LTPB AS PER APPROVED ELECTRICAL LAY OUT.

FOR TRANSFORMER OF 66KV/11KV INCLUDING RADIATOR BANK AND OTHER FOUNDATIONS (if required) AND ITS MARSHALLING WORK AND ITS TRACK UPTO ROAD INCLUDING REQUIRED RAIL PIECES.The rate includes design and construction of oil soak pit of required capacity surrounding Transformer of required capacity as per relevant standards and codes and CEA requirement & design of rail cum road.

Tender drawing is attached herewith for ready reference.

(Construction of Transformer foundation shall be cast in two stage as under.

(1) Main plinth(minimum size of Transformer plinth in plan shall be 2500 mm(L) x 2500mm(B)). Transformer plinth shall be cast in first stage as per the data given by GETCO as tentative but on higher side loading from available data of manufacturer of 20 MVA transformer .

(2) Foundations for acessories other than main plinth alongwith surrounding oil soak pit and rail cum road shall be cast in 2nd stage as per GA drawing of manufacturer of actual alloted transformer by GETCO.)

It is important that bidder shall study and include full requirements- functional,operational & mainenance, safety and grid code etc which are essential and necessary for TRANSFORMER as per standards in their bid.

However,Item Rate & Scope of work shall be inclusive of all the works/items mentioned in Tender drawing, BOQ description, Technical specification and required items to complete the work as per relevant IS codes and standards/drawings.

1. This shall be provided as per approved manufacture drawing & Tender drawing with RCC M20 grade of concrete.
2. Rail of approved quality shall be provided on both direction(i.e. parallel to X direction & parallel to Z direction as per GETCO standard.
3. Transformer/Reactor foundations shall be analysed for all possible load combinations both static and dynamic, wherever applicable. However, if the dynamic load component is very less when compared to static loads and or if the requirement of plinth / pedestal size is more, then static analysis will be adopted by considering 3 times the static weight of the equipment.
4. The guide rail as per drawing shall be grouted in the foundation. The marshalling arrangement with rail shall be provided up-to the road.The Contractor shall provide a RCC Rail cum road system integrated with the Autotransformer / Reactor foundation to enable installation and the replacement of any failed unit. The transfer track system shall be suitable to permit the movement of any failed unit fully assembled (including OLTC, bushings) with oil. This system shall enable the removal of any failed unit from its foundation to the nearest road. If trench/drain crossings are required then suitable R.C.C. culverts shall be provided in accordance with I.R.C. standard / relevant IS codes.
5. The rails shall be of prime quality 60 kg/m medium manganese steel as per Indian Railway specification T-12-96 (880Grade) and its subsequent revision.

6. This work includes radiator bank and other foundations required for commissioning of transformer/Reactor successfully.
7. Each Autotransformer/Reactor including oil conservator tank and cooler banks etc. shall be placed in a self-sufficient pit surrounded by retaining walls (Pit walls). The clear distance of the retaining wall of the pit from the Autotransformer/Reactor shall be 20% of the Autotransformer/Reactor height or 0.8m whichever is more. The oil collection pit thus formed shall have a void volume equal to 200% volume of total oil or as per site conditions in the Autotransformer/Reactor. The minimum height of the retaining walls shall be 15 cm above the finished level of the ground to avoid outside water pouring inside the pit. The bottom of the pit shall have an uniform slope towards the sump pit.While designing the oil collection pit, the movement of the autotransformer / reactor must be taken into account.The grating shall be made of MS flat of size 40mmx 5mm placed at 30mm center to center and 25mmx5mm MS flat at an spacing of 150mm at right angle to each other. Maximum length of grating shall be 2000mm and width shall not be more than 500mm. The gratings, supported on ISMB 150mm, shall be placed at the formation level and will be covered with 100mm thick layer of broken/crushed/non-crushed stone having size 40mm to 60mm which acts as an extinguisher for flaming oil.Each oil collection pit shall be drained towards a sump pit of size 1000X750mm and 500mm deep below the floor level within the collection pit whose role is to drain water and oil due to leakage within the collection pit so that collection pit remains dry.
8. Chemical anchoring may be used as foundation bots after consent from GETCO. Providing and supplying heavy duty injection adhesive of HILTI HIT-RE 500 or equivalent make for anchor fixing in Wet/Dry conditions. Drilling hole with double flute type drill bits to the required depth by rotary hammer drill, cleaning with brush and jet of clean air, filling resin and hardener using serrated nozzle to eliminate mixing error with standard dispenser in hole and then fixing the HAS E threaded rod, conducting occasional site inspection, executing work by authorized applicator and occasional supervision from the manufacturer's representative in India. The system should be made of two foils consisting of resin and Hardener foil pack.The system used for fixing threaded HAS-E rods. The installation and the setting instructions should be strictly followed as per the manufacturers recommendations.
9. Pull out testing for installed HILTI or equivalent bolt to be carried out in presence of company representative & certificate to be submitted. Number of bolts to be considered for pull out testing shall depend on the severity of strctures. Pull out test for minimum 2 number of bolts per pedestal shall be given by bidder However, decision of GETCO will be final in this regard.
10. **Protection of RCC structure under ground and above ground against corrosion and weather**
    Providing & Applying tar extended two component coating system based on synthesized epoxy resin and amine adduct manufacture as per technical specification of central electro chemical research (CERCI/CSIRKARAIKUDI) to achieve 400-450 microns DFT in two coats as directed. The item includes cleaning the surface before treatment as per manufacturer specification. The coating system EP-CO2020TX or equivalent shall comply the CERCI technology of " comprehensive repair & protection of concrete/steel surface in wet & underwater codition". The rate shall be incusive of all materials labour equivalent scaffolding etc.

c) R.C.C. Oil sump ;

RCC OIL SUMP having net storage capacity of Minimum 15000 LITRE as per attached Tender Drawing.

Appropriate diameter of 'C' class piping with required fixtures,masonry chambers etc and other required arrangement as per latest relevant IS codes and standards.

Rate is inclusive of all items required for completion of Job for full functioning of transportation of oil from tramsformer to oil sump (in case of fire of transformer) such as pipe line required from transformer plinth to oil sump, inspection chamber, valves of approved quality,diameter and make etc and as per relvant standards and codes & CEA requirements.

It is important that bidder shall study and include full requirements- functional,operational & mainenance, safety and grid code etc which are essential and necessary for TRANSFORMER/oil sump as per standards in their bid.

(Protection of RCC structure under ground and above ground against corrsion and weather shall be provided as mentioned in Technical specification.The cement and steel shall also be considered accordingly.).

Type of foundaion shall be decided on the basis of recommendation mentioned in detailed soil investigation report by soil testing agency. .

The mimimum Grade of concrete shall be M25 and Grade of concrete for pile and pile cap shall be M30.

However,Item Rate & Scope of work shall be inclusive of all the works/items mentioned in Tender drawing, BOQ description, cost of requird capacity of pump , Required pipe line form oil soak pit to oil sump including re-quired inspection chambers, valve etc, Technical specification and required items to complete the work as per relevant IS codes and standards/drawings.

1. The contractor shall design and construct one oil/water tank sump for collection of oil drained from the transformers/reactor. The sump shall also be used for collecting rain water from the oil soak pits. The water collected in the sump shall be delivered to the drainage system outside Substation area through suitable arrangement. The sump shall be provided with two manholes and air vents/explosion vents as necessary. The sides and floor of the sump shall be plastered and painted with oil bound paint. The capacity of the sump pit shall be such as to accommodate 120% of oil volume of the highest capacity transformer/reactor in the sub-station.
2. Rate is inclusive of cost of oil sump, Required pipe line form oil soak pit to oil sump including required inspection chambers, valve etc and all items & materials required for completion of job to the satisfaction of Enginner in charge.
3. The contractor shall design and construct transformer/reactor soak pit and oil/water sump on the basis of design parameters of such individual transformers/reactor to be obtained from concerned manufacturer duly approved by the GETCO.
4. The contractor shall supply, install and commission suitable sump pump of adequate capacity for pumping out oil/water from the sump.
5. For 400/220kvkv Transformer , the minimum capacity of oil sump shall be 100000 ltr.

6. For 220/66kv Transformer, the minimum capacity of oil sump shall be 50000 ltr.
7. For 66/11kv Transformer, the minimum capacity of oil sump shall be 15000 Ltr.
8. Tender drawing for oil sumps are attached with tender for reference only in which minimum capacity of sump is mentioned.However, capacity of sump may increase as per actual alloted transformer.
9. **Protection of RCC structure under ground and above ground against corrosion and weather**

   Providing & Applying tar extended two component coating system based on synthesized epoxy resin and amine adduct manufacture as per technical specification of central electro chemical research (CERCI/CSIRKARAIKUDI) to achieve 400-450 microns DFT in two coats as directed. The item includes cleaning the surface before treatment as per manufacturer specification. The coating system EPCO2020TX or equivalent shall comply the CERCI technology of " comprehensive repair & protection of concrete/steel surface in wet & underwater codition". The rate shall be incusive of all materials labour equivalent scaffolding etc.

d) RCC Cable trenches /BIG BEN CROSSING.

RCC CABLE TRENCHES/BIG BEN CROSSING with Galvanized racks as per respective Technical Specifications and relevant special conditions. Cable trench cover shall be prestressed cover of required thickness.(Minimum thickness of the prestressed cover shall be 50mm).
The mimimum Grade of concrete shall be M20 and Grade of concrete for pile and pile cap shall be M30. No seperate payment shall be made for making base if any.
(Protection of RCC structure under ground and above ground up to plinth level against corrsion and weather shall be provided as mentioned in Technical specification.The cement and steel shall also be considered accordingly.).

However,Item Rate & Scope of work shall be inclusive of all the works/items mentioned in Tender drawing, BOQ description, Cost of adequate capacity of RCC collection sump (as per site requirement) and submersible monoblock pump of 5 H.P. capacity, Technical specification and required items to complete the work as per relevant IS codes and standards.
Type of foundaion shall be decided on the basis of recommendation men-tioned in detailed soil investigation report by soil testing agency.
Payment shall be made on square meter basis.i.e. Length of cable trench x Width of cable trench (width shall be considered " out out of RCC wall of cable trench")

A. CONTROL CABLE TRENCH

a. TWO TIER CABLE TRENCH (MINIMUM INNER SIZE SHALL BE 750 MM X 1150 MM)
b. ONE TIER CABLE TRENCH (MINIMUM INNER SIZE SHALL BE 450 MM X 750 MM)

Main features of this cable trench shall be as under.

(a) Minimum thickness of RCC wall shall be 150mm thick.
(b) Top of cable trench slab shall be 300 mm above FGL.
(c) RCC slab holes shall be sealed water tight/fire proof after laying of cables.

B. 66KV POWER CABLE TRENCH

a. 66KV POWER CABLE TRENCH "TYPE.2" (MINIMUM INNER SIZE SHALL BE 1200 MM X 800MM HAVING 3 NOS OF TIER. MINIMUM REQUIRED DETAILS OF CABLE TRENCH SHALL BE AS MENTIONED IN TENDER DRAWING.)

No. of tray and cable arrangment shall be as shown in tender drawing and additional requirement of CSE shall be provideded (if required) during detailed engineering.

Note: Design of cable trench shall be done considering CSE loadings / as per site conditionC.

C. 11KV POWER CABLE TRENCH

a. TYPE-A (MINIMUM INNER SIZE SHALL BE 1000 X 1750MM)

b. TYPE-B (MINIMUM INNER SIZE SHALL BE 750 X 2100MM) Note: RMU panel shall be rested on this cable trench as shown in tender drawing. Main features of this cable trench shall be as under.

(a) Minimum thickness of RCC wall shall be 280mm thick.
(b) Top of cable trench slab shall be 1000 mm above FGL.
(c) 14 racks shall be provided.
(d) 120mm thick RCC slab shall be provided on top of cable trench.
(e) Hole of appropriate diameter shall be provided in top of slab for entry and exit of cables from RMU panel/GIS building.Hole.
(f) RCC slab holes shall be sealed water tight/fire proof after laying of cables.

c. TYPE-C (MINIMUM INNER SIZE SHALL BE 1000 X 1700MM)

Main features of this cable trench shall be as under.

(a) Minimum thickness of RCC wall shall be 150mm thick.
(b) Top of cable trench slab shall be 600 mm above FGL.
(c) RCC slab holes shall be sealed water tight/fire proof after laying of cables.
(d) 14 racks shall be provided.

D. CONTROL CABLE TRENCH/POWER CABLE TRENCH AT ROAD/CABLE TRENCH/RAIL CUM ROAD CROSSING HAVING CAPACITY TO TAKE LOAD OF MINIMUM 20MVA TRANSFORMER WITH TRAILOR

F. Supplying and Lowering the Approved ISI Submersible Monoblock Pump of 5 H.P. Capacity in Water Collection Sumps Directed Including Isi Approved Mei Type Oil Immersed Auto Transformer Starter Commissioning and Testing to Required Delivery Head (Including All Other Accessories).

However, Item rate and scope of work shall be inclusive of all the works /items mentioned in BOQ description, Cost of Electrification & other accessories required for commissioning of Pump, Tenchnical specfication and requirement to complete the work as per relevant IS codes and standards.

G. Providing adequate size RCC water collection chamber for aqumalated water including RCC Pre Cast Cover of 100mm thk, necessary excavation, bottom concreting of P.C.C. (M15) 150mm thick/225mm, RCC (M25) Raft & wall of 150mm thick/225mm, curing & submersible monoblock pump fitting arrangement etc. complete as directed by EIC.

As the water collection chamber to be supported on filled up soil, soil below chambers shall be compacted up to 95 % proctor density.

Treatment shall be provided below chamber as per soil conditions. & Design shall be done with a consideration that it is to be supported on filled up soil and hence, due care to be taken while designing and constrction as per relevant IS code and standards.

Cable trenches shall be constructed in accordance with the detailed drawings to be developed by the contractor and approved by the GETCO.

1. Cable trench shall be constructed as per approved drawing with RCC walls and RCC prestressed covers. The cable trays shall be fabricated with structural steel dully galvanized and fixed with vertical walls of cable trench with suitable grouting or with anchor bolts. The cable tray and racks shall be galvanized.The Grade of cable trench shall be M20.
2. Providing & placing minimum 50mm thick(or as per actual design requirement) & 300mm wide prestressed concrete cover (for clear span of up to 1.2 meter) in proportion (1:1:5:3) or M-20 with necessary reinforcement or 4mm dia HT steel wire-4 Nos. bars and 4mm dia. distribution bars at 150 mm C/C as per drawing & design including providing necessary M.S. bar hooks for lifting arrangement & vibrating with vibrators. Finishing all the surfaces, curing by placing in water pond for ten days etc. complete as directed by E.I.C. (The rate includes cost of all material required, labour charges, transportation, loading, unloading etc.)Reinforcement mentioned in this description is minimum requirement but it may increase as per actual design requirement. In case of clear span of more than 1.20 meter, design of prestressed cover shall be prepared for actual span and submitted for approval by bidder.
3. The contractor shall provide cable Racks/trays including necessary supports at intervals not exceeding 0.50 M as per approved drawing. The supports shall be of M.S. Angle of minimum section 50x50x6 mm and shall be properly welded with M.S. insert plates and Lugs of M.S. Flat section duly embedded in walls. All the strctural steel shall be galvnized.In addition, continuous earthing of supports etc. shall be provided as per electrical requirement and specification of cabling system. Entry of cable at main control room will be through (minimum) two nos. cable trenches of adequate size and through sufficient numbers of PVC pipes one end sealed as per approved drawing Cable trench layout should provide one separate cable trench along each bay. Width of Cable trays should be designed to accommodate all cables required in this present scope of work as well as to accommodate all cables for future bays as specified in electrical specification in proper dressed up fashion without overlapping of cables on trays.
4. Cable trenches shall be provided with appropriate slope to facilitate drainage. All cable trench bed shall have slope of 1/1000 along the run and 1/250 perpendicular to the run. All the construction joints of cable trenches i.e. between base slab to base slab, the junction of vertical wall to base slab from vertical wall to wall and all the expansion joints shall be provided with approved quality PVC water stops of approximately 230 x 6 mm size for those sections where the ground water table is expected to rise above the junction of base slab and vertical wall of cable trenches. Cable trenches shall be blocked at the ends if required with RCC wall.

5. Cable trenches at road crossing shall be designed in such a way that it can take minimum load of up to 25 mva Transformer with trailer).In such cases ,dismentalling/breaking existing RCC road/rock strata with high quality cutter etc is in the scope of this item. While dismentalling/breaking existing RCC road for cable trench/big ben crossing, care shall be taken to see that remaining RCC road is not damged.After completion of RCC cable trench/Bigben crossing, existing RCC road shall be finished in all respect.
6. Cable trench covers shall be designed for self weight of top slab + UDL of 2000 Kg/m2 + concentrated load of 200 kg at centre of span on each panel.
7. The scope of work also includes, the integration with existing control room building which may built by others & all civil works required for making entry of cable trench in to control room building as shown in lay out.

8. Special design to be developed and constructed, in case of cable trench crosses another cable trench/RCC road/Road side drain. No extra payment shall be made on this regard. Payment shall be made as mentioned in BOQ.
9. Special design & arrangement to be developed and constructed, in case CSE support strcture to be supported on cable trench as per site requirement. No extra payment shall be made on this regard. Payment shall be made as mentioned in BOQ.
10. Due to marine environment, the fabricated racks and trays shall have a minimum overall Zinc coating of 900 gm/sq. m of surface are except for plates and sections below 5 mm which shall have a minimum overall Zinc coating 610 gm/sq. m of surface area. The average Zinc coating for all sections and plates 5 mm and above shall be maintained minimum 127 microns and that for plates and sections below 5 mm shall be maintained minimum 87 microns.

11.Protection of RCC structure under ground and above ground against corrsion and weather

Providing & Applying tar extended two component coating system based on synthesized epoxy resin and amine adduct manufacture as per technical specification of central electro chemical research (CERCI/CSIRKARAIKUDI) to achieve 400-450 microns DFT in two coats as directed. The item includes cleaning the surface before treatment as per manufacturer specification. The coating system EP-CO2020TX or equivalent shall comply the CERCI technology of " comprehensive repair & protection of concrete/steel surface in wet & underwater codition". The rate shall be incusive of all materials labour equivalent scaffolding etc.

Provision of adequate capacity of sump and submersible monoblock pump of 5 H.P. is to be provided for disposal of rain water from trench considering site conditions and approved lay out. This item of pump & water collection chamber is in the scope of bidder in cable trench item as per BOQ.

e) Fire Protection Wall

RCC FIRE PROTECTION WALL in all respect with latest relavant STANDARDS & CODES and as per requirement of transformer/Reactor safety.Minimum length of fire protection wall shall be 6.00 meter and Height of Fire protection wall shall be 6.30 meter(From FGL to top of FP wall).

It is important that bidder shall study and include full requirements-functional,operational & mainenance, safety and grid code etc which are essential and necessary for TRANSFORMER/Fire protection wall as per standards in their bid.

Looking to the soil conditions, all Column/Column footing/strcture foundations shall be rested on pile foundation.However, type of foundaion shall be decided on the basis of recommendation mentioned in detailed soil investigation report by soil testing agency.

Please note that minimum depth of foundation from Finish Ground Level shall be as under

(1) For Normal soil strata/soft rock strata (Open footing) -- 3000mm

(2) For pile foundation -- 2000 mm cutoff level

(3) For Hard rock strata - 2000mm plus anchoring of sufficient capacity(inside hard rock strata) of HILTI or Equivalent company product

The minimum Grade of concrete shall be M20 and pile and Grade of concrete for pile cap shall be M30.

(Protection of RCC structure under ground and above ground up to plinth level against corrsion and weather shall be provided as mentioned in Technical specification.The cement and steel shall also be considered accordingly.).

However,Item Rate & Scope of work shall be inclusive of all the works/items mentioned in Tender drawing, BOQ description, Technical specification and required items to complete the fire protection work as per relevant IS codes and standards/drawings.

Minimum length of fire protection wall shall be 6.00 meter and Height of Fire protection wall shall be 6.30 meter(From FGL to top of FP wall).

1. Fire Protection wall for Transformer and Reactor shall be provided as per design & drawing at locations marked in approved layout plan.
2. The firewall shall have a minimum fire resistance of 4 hours. The partitions, which are made to reduce the noise level, shall have the same fire resistance.
3. The walls of the building, which are used as firewalls, shall also have a minimum fire resistance of 4 hours.
4. The firewall shall be designed to protect against the effect of radiant heat and flying debris from an adjacent fire.

5. The firewall shall extend 600 mm on each side of the Autotransformer / Reactors and 600 mm above the conservator tank or safety vent. A minimum of 2.0meter clearance shall be provided between the equipment e.g. Autotransformer/Reactors and firewalls.
6. In case of space constraints, these dimensions can be reduced as per the approval of GETCO. The building walls, which act as firewalls, shall extend at least 1 m above the roof in order to protect it.
7. The firewall will be made of reinforced concrete of minimum M20 Grade of concrete. and pile and Grade of concrete for pile cap shall be **M30**.
8. Protection of RCC structure under ground and above ground against corrsion and weather shall be provided with painting / coating of FOSROC or Equivalent company product.The cement and steel shall also considered accordingly.
9. Providing & applying wall painting 2 coats with weather proof acralic emulsion APEX ULTIMA- or equivalent type paint of approved brand and manufacture and of required shade on exterior wall surface to give an even shade over and including a primary coat with alkali resistance primer of approved brand after thoroughly brushing surface to to all dirty and remains of loose powder material etc complete for all heights. A gap of 6 hrs. Should be given between 2 subsequent coats.The work should be carried out strictly as per manufacture's specification and requirement etc complete as directed by EIC.

f) Roads, Culverts, Paving & Storm water Drains:

RCC Roads supported by WBM road (WBM road having Minimum 750mm thickness shall consist of GSB layer & WMM layer as per MORT & H specification(minimum thickness of GSB layer shall be 450mm thick but which may be increased as per design requiremnt and minimum thickness of WMM layer shall be 300mm which may increse as per design requirement) , Minimum thickness of RCC road shall be 200mm. C.D Works, 100mm thick PCC, Paving & Storm water Drains in all respect shall be provided as per latest relevant STANDARDS. Design of WBM road shall be done as per CBR value and other soil data.

Yellow earth required for embankment (other than GSB layer ,WMM layer, RCC Road etc) shall be paid seperately as per actual required on site under relevant item.The minimum Grade of concrete shall be M20.

Design of RCC road with WBM road road shall be done as per CBR value, IRC standard, relevant specifications/standards/BOQ description and other soil data.

Payment shall be paid as per actual execution. Width of road from shoulder to shoulder shall be considered for payment.

However,Item Rate & Scope of work shall be inclusive of all the works/items mentioned in Tender drawing, BOQ description, Technical specification and required items to complete the RCC road work as per relevant IS codes and standards/drawings.

RCC CROSS DRAINAGE WORK.with minimum loading of 20 MVA transformer with trailer

RCC ROAD- 3.0/4.50/6.0 METER WIDE WITH FANNING REQUIRED FOR TURNING OF 20MVA TRANSFOREMR WITH TRAILER AT JUNCTION with minimum loading of 20MVA transformer with trailer.Width of road shall be as per approved electrical lay out.

1. Yellow soil shall be provided for embankment.Embankment shall be checked for compaction upto 95% proctor density prior to start GSB layer on it.
2. Providing Granular sub base by providing coarse graded material Grading-I(unscreened gravel, metal & sand) as per relevant table as per CBR value & MORT & H gradation including conveying the materials at site works,mixing & spreading in to the grade and camber and consolidation at OMC with power vibratory roller including cost of material,labour , charges as per Government rules etc comple as directed. Minimum thickness is given in BOQ description.However, thickness shall increase if required as per actual CBR value and design parameters.(i.e. Higher value among both thickness shall be considered for execution.)
3. Providing,laying,spreading and compacting graded stone aggregate to wet mix macadam specification including premixing the material with water at OMC in mechanical mix plant carriage of mixed material by tipper to site , laying in uniform layers with paver in sub base/base corse on well preared surface and compacting with vibratory roller to achieve the desired density as per clause 406 and as directed by EIC. Minimum thickness is given in BOQ description.However, thickness shall increase if required as per actual CBR value and design parameters.(i.e. Higher value among both thickness shall be considered for execution.)

4. The road shall have minimum thickness of 300mm thick RCC (1:1.5:3 nominal mix with reinforcement (as per requirement of IS code) on the top. Below it 100mm thick PCC M20 shall be provided.
5. The concrete shall be laid and finished with screed board, vibration, vacuum Dewatering process and finishing by floating brooming with wire brush etc.
6. Also, RCC garland drain around the control room and other building shall be provided with prestressed covers. The prestressed cover shall be provided. The storm water drain shall be provided with sufficient gradient and connected up to disposal point at approved location outside the boundary limit. The quantity shall be measured as mentioned in BOQ complied with the required specifications.
7. RCC paving of 500 width on both side of road for main road from entrance gate to GIS Building & from Main road to Control room building shall be provided.
8. Open storm water RCC rectangular drains will be provided on both sides of road or one side of the road as per the layout with RCC.Perforated prestressed RCC cover shall be provided on top of drain.
9. Pre cast u shape drain can also supply as road side drain.
   Supply of Precast U Shape Drain of size 750 x 750 mm-T6 for surface storm water drain. Product should be confirming to Japanese Industrial Standards (JIS) & meeting IS requirements, having load carrying capacity - 4.8 Tonnes made by using advanced precast technology having High Performance Self Compacting Concrete of M-40 cylinder strength or M-50 Cube strength and using Fe 500D reinforcement bar. The product shall have tie shape groove of 10-20 mm width X 25 mm depth on both sides of each precast unit product for jointing two precast units. The Precast U Shape drain should have special in built insert at appropriate location for fixing De-Shackle for mechanical installation, including supply, transporta-

tion at site. Precast products shall be of Fuji or Equivalent as approved by Engineer-In-Charge.
Unloading and fixing of Fuji U Shape Drain – 750 mm X 750 mm - T6 or 750 x 600mm. for surface storm water drain. Width and Depth of each section for required quantities shall be as per BOQ.. Unloading of material at site by using mechanical hydra. Installation of the drain at site in line, level, gradient and plumb. Jointing of two precast drains with ready made block jointing cement mortar.Ensure that drain is water tight from sides.
To provide gradient at bottom of drain after installations, screed concrete shall be laid on the bottom of the U shape drain.
Average thickness of the screed concrete shall be 50 -60mm.
Afte rinstallations of drain, bonding agent shall be applied viz. Latex or equivalent make chemical upon which M25 grade concrete shall be laid down. Made with 6mm down size aggregrates.

10. The drains will have a longitudinal slope of 1 in 1000.
11. Storm water drain crossing the roads shall be of RCC Hume pipe class NP3 with RCC encasement shall be provided.
12. RCC Hume pipe of NP3 class of minimum 300mm diameter across the road shall be provided at 20 meter interval or as per requirement(which may be less than 20 meter) to pass the cables , earthing rod,water supply and drainage below the road. This shall be anticipated on the basis of approved electrical and general layout and relavant standards & site condition.
13. Polythene sheet of 125 microns shall be placed between the RCC and PCC slab.
14. Constrcution joints shall be provided as per IS recomendation.
15. Expansion joint (12mm thick) shall be provided at every 40.0 m. In addition, in case of 5.5 m wide road, expansion joint shall also be provided longitudinally at the center.
16. At cross drainage work minimum load of 400kv Transformer (500 MVA) with trailer shall be considered while designing.
17. The thickness of fill material under the RCC drain shall be such that the maximum pressure from the RCC drain(peripheral or road side) , transferred through the fill material and distributed onto the original undisturbed soil will not exceed the allowable soil bearing pressure of the original undisturbed soil. For expansive soils the fill materials and other protections etc. to be used under the foundation is to be got approved prior to execution.
18. Finished top of road crest shall be 200mm above Finished ground level(FGL).
19. The use of vibratory roller is essential for all the items where ever compaction or consolidation is to be done with rollers unless otherwise specified.

g) Water Supply System external with (U/G + OH tanks.

External Water Supply System (U/G + OH tank) including necessary fixtures,fastenings,valves etc. AS PER RELEVANT STANDARDS AND CODES.

i) Providing & installing readymade white color three layered P.V.C. water tight storage tank made from linear low density polyethylene & low density polyethylene LDPF product confirming to I.S: 10146/1982 with cover including providing & fixing one 20mm.dia. float valve ball cock ,one 20mm.dia. G.I. Waste pipe with plug one 25mm.dia.G.I.Over flow pipe of length up to 0.30 Mt. including making all connection for inlet/outlet supply with necessary fittings for outlet/ inlet etc., complete as directed by E.I.C. 1000 litre capacity.

ii) Providing & Erecting in position UNDERGROUND R.C.C. Water tank in 150mm. thick bottom slab, 120mm thick top slab & side walls 175mm. thick with clear inner dimension of 3000 X 2500 X2000mm, shuttering finishing outer exposed faces with 12mm. thick cement plaster in C.M.(1:3) & inner surfaces with 12mm. thick with water proof in C.M.(1:3) using water proofing compound, one 600 X 600mm. CI manhole cover (Heavy duty) with one over flow pipe & hole for inlet pipe giving leak proof test etc., completed as directed by E.I.C. The Rate is inclusive of making connection for inlet/outlet supply with necessary fittings for outlet/inlet, submersible monoblock of required capacity (For lifting water from under ground tank to terrace of building. Minimum 2.0 HP pump shall be used) with eletrical fiitings including censors at terrace tank and underground tank, wires, PVC water stopper and all items required to complete the work in all respect.

The minimum grade of concrete shall be M20, and the pile and pile cap shall be M30.

Tender drawing is attached for reference purpose.

However, Item Rate & Scope of work shall be inclusive of all the works/items mentioned in Tender drawing, BOQ description, Technical specification and required items to complete the RCC under ground tank work as per relevant IS codes and standards.

iii) PIPING REQD FOR ABOVE WORK OF VARYING DIAMETER (Water supply line inside the buildings is in the scope of their individual items. This item includes pipe line from water source to O.H. Tank / terrace tank of each building and water line reuired in switch yard area). Qty considered is on approximate basis. However payment shall be made as per actual execution of work.

Providing laying and joining in true line and level UPVC pipe (SCH-40) including fittings of PRINCE/ SUPRIME/ ASTRAL/ FINOLEX or equivelent make or as approved by EIC. Pipe shall be fixed on the wall with the help of clamp at every 2000mm c/c or shall be concilled or necessary excavation in trenches as directed including necessary fittings including testing of pipe and joints and fixing the same with adhesive solvant, including cost of all materials and necessary refilling the trenches, dressing etc complete.

However, Item rate and scope of work shall be inclusive of all the works /items mentioned in Tender drawing, BOQ description, Tenchnical specfication and requirement to complete the work as per relevant IS codes and standards.

Upvc pipe 40 mm Dia., 25 mm Dia., 15 mm Dia.

External Water supply system with U pvc pipe line with required fixture, fastening & required valves etc. for drinking water, service water & for earthing pits shall be provided.
Water supply:

(I) The Bidder shall carry out all the external plumbing/erectionworks required for supply of water to the GIS Cum control room cum administrative building, Yard, Type.4 quarter, Transit camp cum Guest house building beyond the Bore well etc. as per requirement.

(II) The Bidder shall carry out all the plumbing/erection works required for supply of water to fire water tank beyond the Bore well.

(III) A scheme shall be prepared by the Bidder indicating the layoutand details of water supply which shall be got approved from the GETCO before actual start of work including all other incidental items not shown or specified but as may be required for complete performance of the works.Earth pressure for all underground structures shall be calculated using co-efficient of earth pressure at rest, co-efficient of active or passive earth pressure (whichever is applicable). However, for the design of substructures of any underground enclosures, earthpressure at rest shall be considered.In addition to earth pressure and ground water pressure etc., a

(IV) surcharge load of 2T/Sq.m shall also be considered for the design of all underground structures including channels, sumps, tanks,trenches, substructure of any underground hollow enclosure etc.,for the vehicular traffic in the vicinity of the structure.Following conditions shall be considered for the design of watertank in pumps house, channels, sumps, trenches and otherunderground structures.

a) Full water pressure from inside and no earth pressure &ground water pressure & surcharge pressure from outside(application only to structures which are liable to be filled upwith water or any other liquid).

b) Full earth pressure, surcharge pressure and ground water pressure from outside and no water pressure from inside.

c) Design shall also be checked against buoyancy due to the ground water during construction and maintenance stages.Minimum factor of safety of 1.5 against buoyancy shall be ensured ignoring the superimposed loadings.The drawing for the water supply from bore-well to under ground water tank shall be developed by the bidder and submitted to GETCO for approval.80 mm dia UPVC pipe shall be provided by the bidder from the bore-well to the terrace water tank of GIS Cum control room cum administrative building.

d) Providing & installing readymade white color three layered P.V.C. water tight storage tank made from linear low density polyethylene & low density polyethylene LDPF product confirming to I.S: 10146/1982 with cover including providing & fixing one 20mm.dia. float valve ball cock ,one 20mm.dia. G.I. Waste pipe with plug one 25mm.dia.G.I.Over flow pipe of length up to 0.30 Mt. including making all connection for inlet/outlet supply with necessary fittings for outlet/ inlet etc., complete as directed by E.I.C.1000 litre capacity.

e) Providing & Erecting in position UNDERGROUND R.C.C. Water tank in M20 having 150mm. thick bottom slab, 120mm thick top slab & side walls 175mm. thick with clear inner dimension of 3000 X 2500 X2000mm, shuttering finishing outer exposed faces with 12mm. thick cement plaster in C.M.(1:3) & inner surfaces with 12mm. thick with water proof in C.M.(1:3) using water proofing compound, one 600 X 600mm. CI manhole cover(Heavy duty) with one over flow pipe & hole for inlet pipe giving leak proof test etc., completed as directed by E.I.C. The Rate is inclusive of making connection for inlet/outlet supply with necessary fittings for outlet/inlet, submersible monoblock of required capacity(For lifting water from under ground tank to terrace of control room building.Minimum 2.0 HP pump shall be used) with eletrical fiitings including censors at terrace tank and underground tank, wires, PVC water stopper and all items required to complete the work in all respect. Tender drawing is attached for reference purpose. This item of pump/censors etc is in the scope of bidder in under ground RCC water tank item and no extra payment shal be made on this regard.

f) Providing laying and joining in true line and level UPVC pipe (SCH-40) including fittings of PRINCE/ SUPRIME/ ASTRAL/ FINOLEX or equivelent make or as approved by EIC. Pipe shall be fixed on the wall with the help of clamp at every 2000mm c/c or shall be concilled or necessary excavation in trenches as directed including necessary fittings including testing of pipe and joints and fixing the same with adhesive solvant,including cost of all materials and necessary refilling the trenches,dressing etc complete.

h) <u>Septic Tank with Soak Pit and drainage system External):</u>

Septic Tank with Soak Pit and complete drainage system including inspection chamber AS PER CODES AND RELEVANT STANDARDS.

The mimimum Grade of concrete shall be M20.

However, Item Rate & Scope of work shall be inclusive of all the works/items mentioned in Tender drawing/BOQ description, Technical specification and requirement to complete the work as per relevant IS codes and standards

RCC SEPTIC TANK ON THE BASIS OF ATTACHED TENDER DRAWING.

However,Item Rate & Scope of work shall be inclusive of all the works/items mentioned in Tender drawing, BOQ description, providing and installing submersible sewage pump of 5 H.P capacity of approved quality and make as per relevant codes and standards, Technical specification and required items to complete the RCC septic tank work as per relevant IS codes and standards.

1. RCC Septic tank with soak pit shall be provided as per tender drawing with internal & external drainage system . Rate is inclusive of providing and installing submersible sewage pump of 5 H.P capacity of approved quality and make as per relevant codes and standards. This item of pump is in the scope of bidder in septic tank item and no extra payment shall be made on this regard.
2. The drawing for the Sewage system consisting of glazed stonewarepipes Grade-A with all round cement grade 1:5:10 including manholes, road crossing, gully trap connections etc. for connecting each fittings with the septic tank shall be developed by the Bidder and submitted to Engineer-in-Charge for approval before execution.
3. Manholes of suitable size as per standard design and depth shall be provided at all turning points and junction with spacing between 2 manholes not exceeding 30m.
4. Heavy duty covers shall be provided for the manholes in case it comes on the road.
5. Providing 3000mm. internal diameter & 4.0 Mt. deep soak pit including excavation in all types of soil & soft rock & B.B.C.C. (1:4:8) bedding 300mm. thick below masonry and 450mm. thick Brick Masonry in C.M.(1:6) up to 1500mm. height, 350mm. thick for further 1500mm. and 230mm.thick for remaining height honey combed, plastering in C.M.(1:3) outside up to 1.5 Mt. height and 100mm. thick R.C.C. Slab with 600X600mm. C.I .HEAVY cover with frame, with necessary reinforcement as per design & C.I. Vent pipe 1800mm.long with Bella Masonry pillar 350X350X450 plastered all around filling 40 to 50mm. size brick bats up to 1.5 Mt. depth, including 16mm. dia. M.S.`U' stages steps refilling including disposal of the surplus

excavated earth up to the lead of 300mt radius including 3 coats of white or colours wash to all exposed finished surface etc. complete as directed as directed by E.I.C.Rate is inclusive of modifying the design if required as per soil condition which is to be approved by GETCO.

6. Providing and laying 100mm internal diameter (to level or slopes) and jointing with stiff mixture of cement mortar in proportion 1:1 approved quality rigid 6 kg/cm2 PVC drainage pipe/ salt glazed stoneware pipes including testing of pipes and joints complete.
7. Providing and laying 150mm internal diameter (to level or slopes) and jointing with stiff mixture of cement mortar in proportion 1:1 approved quality salt glazed stoneware pipes including testing of pipes and joints complete.
8. Providing & laying 'A' class RCC Hume pipe of 150 mm dia. including necessary excavation, refilling the trenches, laying 150 mm thick B.B.C.C 1:4 below joints and upto half the height of joints making water tight joints in C.M. 1:1 curing etc. comp.
9. Providing & laying 'A' class RCC Hume pipe of 300 mm dia. including necessary excavation, refilling the trenches, laying 150 mm thick B.B.C.C 1:4 below joints and upto half the height of joints making water tight joints in C.M. 1:1 curing etc. comp.
10. Constructing masonary for under ground C.I. Inspection chamber and bends with bricks/blocks having crushing strength not less then 35mkg//cm 2 in Cm 1:5 C.I. cover with frame [light duty] 455 mm x 610 mm internal dimension total weight of cover with frame to be not less then 38 Kg[wt. Of cover 23 Kg and wt of frame 15 Kg] RCC top slab with 1:2:4 mix [1 cement: 2 coarse sand:4 grade stone aggregate 20mm size] foundation concrete 1:5:10 inside plaster 15mm thick with cement mortar 1:3 finished smooth a floating coat of neat cement on walls and bed concrete etc. complete Inside dimension 455mmx610mm.

i) Supplying and spreading 'Round up"(Glyphosphate 41%SL) of approved ISI standard make or equivalent weedicide for weed control in proportion of 100ml weedicide and 250 gram ammonium sulphate ,mixing with sticking agent mixed with 10 litre of clean fresh water and second spray with same treatment as stated above after two months and as per manufacturer's specification and as directed by Engineer-in charge.

However, Scope of work shall be inclusive of all the works/items mentioned in Tender drawing, BOQ description, Technical specification and required items to complete the weed control work as per relevant IS codes and standards.

Qty considered is on approximate basis. However payment shall be made as per actual execution of work as per approved Electrical lay out by GETCO.

The work must be carried out as per item description and as directed by EIC.

j) Metal spreading with micro-levelling & anti-weed treatment

Supply & Spreading black trap stone machine crushed kapchi metal 25 to 40 mm. size metal in yard in 100mm layer with 75mm thick PCC 1:5:10 underneath including watering, ramming, dressing up to one level, royalty, all Government taxes transportation etc., complete as di-

rected by E.I.C. A layer of cement slurry of mix 1:6 (1cement: 6 fine aggregate) shall be laid uniformly over cement concrete layer. The cement consumption for cement slurry shall not be less than 150 kg for every 100 sq.m. For easy drainage of water, the slope of 1:1000 is to be provided from the ridge to the nearest drain. The Scope of work includes the area grading work for maintaining required slope for metal spreading, compaction of earth etc

However, Scope of work shall be inclusive of all the works/items mentioned in Tender drawing, BOQ description, Technical specification and required items to complete the metal spreading work as per relevant IS codes and standards

Qty considered is on approximate basis. However payment shall be made as per actual execution of work as per approved Electrical lay out by GETCO.

The entire yard surfacing with 75 mm thick PCC 1:5:10 underneath 100 mm thick 25-40 mm size metal shall be provided after carrying out antiweed treatment.

11. After all the structures/equipments are erected, antiweed treatment shall be applied in the switchyard where ever stone spreading along with cement concrete is to be done and the area shall be thoroughly de-weeded including removal of roots. The recommendation of local agriculture or horticulture department may be sought where ever feasible while choosing the type of chemical to be used. The antiweed chemical shall be procured from reputed manufacturers. The doses and application of chemical shall be strictly done as per manufacturer's recommendation. Nevertheless the effectiveness of the chemical shall be demonstrated by the contractor in a test area of 10MX10M(appx) and shall be sprinkled with water at least once in the afternoon every dayafter forty eight hours of application of chemical. The treated area shall be monitored over a period of two to three weeks for any growth of weeds by theEngineer – in- charge. The final approval shall be given by Engineer – in –chargebased on the results.
12. After antiweed treatment is complete, the surface of the switchyard area shall be maintained, rolled/compacted to the lines and grades as decided by Engineer-incharge.The sub grade shall be consolidated by using half ton roller with suitable water sprinkling arrangement to form a smooth and compact surface. The roller-shall run over the sub grade till the soil is evenly and densely consolidated andbehaves as an elastic mass.
13. In areas that are considered by the Engineer-in-Charge to be too congested with-foundations and structures for proper rolling of the site surfacing material by normal rolling equipments, the material shall be compacted by hand, if necessary. Due care shall be exercised so as not to damage any foundation structures or equipment during rolling compaction.
14. The sub grade shall be in moist condition at the time PCC is placed. If necessary, it should be saturated with water for not less than 6 hours but not exceeding 20 hours before placing of cement concrete. If it becomes dry prior to the actual placing of cement concrete, it shall be sprinkled with water andit shall be ensured that no pools of water or soft patches are formed on thesurface.

15. For easy drainage of water, the slope of 1:1000 is to be provided from the ridge to the nearest drain. The ridge shall be suitably located at the centre of the area between the nearest drains. A final layer of 100mm thickness of uncrushed/crushed/broken stone of 25 TO 40MM size shall be spread uniformly over PCC layer.
16. Quantity of metal spreading shall be derived deducting all foundations,cable trench and other strcture as per actual.

k) Security cabin :

SECURITY CABIN for 66/11kV sub station (3.0m x 3.0m clear inner dimension) including foundations & its all related required items, including ramp with platform, stair case with railing, flooring as per Technical specification, door, window, ventilator etc including water proofing, anti termite treatment, water supply, drainage as per latest relevant standards and codes and as per requirement (All the fixtures and items such as Bibcock, pillar cock, stop cock, wash basin, Eurpopeon WC/Indian WC with all fixtures etc shall be of JAGUAR or equivalent approved company make) etc as per latest relevant standards.

Architect drawing shall be provided by GETCO. However, construction drawing shall be developed by bidder.

Payment will be released progressively on achieving mile stones as per billing break up given

(Note: Architecture drawing alongwith tender to spell out requirements and enable bidders to quote. However, it is important that bidder shall study and include full requirements- functional, operational & mainenance and safety etc which are essential and necessary for Security cabin as per standards and grid codes in their bid.) Security cabin shall be RCC framed structure.

(Protection of RCC structure under ground and above ground up to plinth level against corrosion and weather shall be provided as mentioned in Technical specification. The cement and steel shall also be considered accordingly)

The mimimum Grade of concrete shall be M25 and pile and pile cap shall be M30.

Please note that monimum depth of foundation from Finish ground level shall be as under

(1) For Normal soil strata/soft rock strata (Open footing) -- 2000mm

(2) For pile foundation -- 1500mm cutoff level

(3) For Hard rock strata - 1500mm plus anchoring of sufficient capacity(inside hard rock strata) of HILTI or Equivalent company product.

The item is of LUMPSUM BASIS but payment shall be made as per actual building dimension, the conditions of which is mentioned as under.

FORMULA TO CALCULATE CUBIC METER OF ROOMS OF GIS BUILDING :

LENGTH = IN TO IN DIMENSION OF WALL OF ROOM

WIDTH = IN TO IN DIMENSION OF WALL OF ROOM

HEIGHT = DIMENSION FROM FINISHED FLOOR LEVEL TO BOTTOM OF ROOF SLAB

CUBIC METER OF ROOM = LENGTH X WIDTH X HEIGHT (AS MENTIONED ABOVE)

TOTAL CUBIC METER OF SECURITY CABIN =CUBIC METER OF "SECURITY ROOM"

NOTE: Please note that, quantity of cubic meter considered in this BOQ is on approximation basis. However, Payment shall be made as per actual dimension and acording to the formula given in Tender drawing and Technical specification. Quantity of Cubic meter may decrease upto 50 % & inrease up to 25 %.

However, Item rate & Scope of work shall be inclusive of all the works/items mentioned in Tender drawing, BOQ description, Technical specification and required items to complete the Security cabin building in all respect as per relevant IS codes and standards.

Security Cabin shall be constructed as per design and drawing approved by GETCO. Architect drawing is given with this tender. Bidder has to develop working construction drawings (plan, section, elevation, detailed structure drawings, door/window/ventilator drawing, water supply and drainage arrangement drawing, finishing schedule etc to facilitate construction work) on the basis of this drawing, specification and relevant IS codes and standards.With attached toilet incl. soak pit & septic tank near main gate with RCC structure & slab as per approved design and drawing. Preparation of Drawing of water supply, drainage arrangement, septic tank and soak pit in the scope of bidder.All internal water supply and drainage is in the scope of this item.

Rate is inclusive of Gypsum board false ceiling in security officer room. Specification shall be same as mentioned in control room building.

Protection of RCC structure under ground and above ground against corrosion and weather shall be provided with painting / coating of FOSROC or Equivalent company product.The cement and steel shall also considered accordingly

Approach road to building:

Approach road from main road to building is in the scope of this item and shall be of 3.0 meter wide and shall be prepared from Paver block of 75mm thick. The description of the paver block and its detail is given below.

Providing, lyaing& laying c.c. 1:2:4 precast @ 75 MM THICK PAVERS BLOCK having compressive strength not less than 300 kg/cm2 of approved brand & quality fixing as per design/pattern & quality in Flooring & laid on 25 mm (average) base of sand with compacting with vibrator laid over and corners & joints at the end connected with wall / any vertical surface jointed with grey cement slurry/colour match shade pigment of block colour if required, including cleaning , levelling etc., complete in true line and level / slope as per approved pattern as per detailed drawing as directed by E.I.C.

I) **Providing and fixing approved quality Hinged Type Gate of 40mm dia mild steel pipe B class all round and 20mm dia Mild steel pipe at 200mm C/C and 12mm mild steel square bars at 200mm C/C alternatively (I.e. One between two pipes) vertically welded to 40mm dia pipe frame as per drawing and design with necessary brackets, hold fasts, locking arrangement on top & aldrop on**

both the side including base rail for sliding the gate having ball bearing, rollers & guide tracks of 50x6mm M.S. flat with hold fast, fabrication of side supports including fixing GETCO letter on front side etc. comp. with With three coats of approved Acid/Alkali resistant painting & one coat of red oxide primer as directed by EIC (The cost does not include the cost of reinforcement)

The rate is inclusive of :

Scope of work shall be as mentioned in Technical specification and tender drawing.

The Grade of concrete shall be M20

(Note: Tender drawing is given by GETCO and other details mentioned in Tender specification & tender drawing are given alongwith tender to spell out requirements and enable bidders to quote. However, it is important that bidder shall study and include full requirements, terrain of site etc and as per relevant standards and codes)

However, Item Rate & Scope of work shall be inclusive of all the works/items mentioned in Tender drawing, cost of fabrication work , excavation, masonry, hodfast, Bracket, rollers with double ball baring, MS road of required size with grouting for sliding the gate with hold fast arrangement, all type of concrete (RCC column, Beams, footing), reinforcement, heavy duty pvc conduite pipe to be embeded in column for lamp post, cost of decorative lamp post/dom, electrification work for Dom work as well as for complete, plaster work, painting to gate and wall, fixing GETCO letter as shown in drawing, concrete coping etc, BOQ description, Technical specification and required items to complete the sliding type Gate work as per relevant IS codes and standards.

The work must be carried out as per item description and as directed by EIC.
The gate shall be hinged and provided with sliding arrangement with ball bearing wheels, 50 x 6mm guide holdfasts for fixing in concrete for guide as well as gate. Aldrop shall be provided on both side with locking arrangement at top. General specification of fabrication shall be applicable. After gate is completely fabricated and okayed. One coat of red oxide shall be given and after erection in position and testing, 3 coats of oil painting of approved quality, brand and tint shall be applied or 3 coats of aluminum paint shall be applied according to instruction at site. All fabrication, welding etc. shall be in best workmanship like manner. For frame of 40mm dia pipe elbow shall be provided at corners. For smooth bending shall be have to be adopted by approved method. Any damage, deshaping etc. during fabrication, bending or welding shall make member for rejection. Where bending is approved smooth and uniform bending shall be for all corners.
Payment shall be made for Lump sump unit of gate provided as per drawing or per details furnished on site.

m) **Filling in yard with approved quality of YELLOW EARTH as embankment/filling. YELLOW EARTH filing in yard includes spreading, dressing in required thickness with all lead and lift (including watering, rolling and consolidation with 8 to 10 T capacity vibratory power rollers in layers of 200mm thick at O.M.C to required dry density). Including all Labor charges & approved quality of YELLOW EARTH & Govt. royalty charges etc. if applicable. Approved quality of YELLOW EARTH to be brought from outside.).**

Fill material imported for raising subgrade level /filling of yard shall consist of YELLOW EARTH (cohesive non swelling granular material). Suitability should be determined by the testing. In general materials for filling shall not contain rocks or hard lumps greater than 50 mm in maximum dimension and should have at least 80 percent passing the 9.5mm sieve and at least 5 percent passing the 0.075 mm sieve. The fill materials should be free of organics, debris, or other deleterious materials. Any imported materials shall have water-soluble sulfate and chloride contents that are less than 1000 parts per million and 500 parts per million, respectively, pH greater than 7.0 and Expansion Index less than 20.

Payment shall be made as per actual executed quantity.

Note: 25% of the successive filling amount shall be retained till lapse of one full scale monsoon and rectification of subsistence if any to the design ground level.

1.0 Murrum shall be clean, of good binding quality, and of approved quality obtained from approved pots / quarries of disintegrated rocks which contain silicon materials and natural mixture of clay of calcareous origin. In general materials for filling shall not contain rocks or hard lumps greater than 50 mm in maximum dimension and should have at least 80 percent passing the 9.5mm sieve and at least 5 percent passing the 0.075 mm sieve.

2.0 Workmanship

The relevant specifications of item shall be followed except that murrum or selected soil shall be filled in foundation and plinth in 20 cms. Layers including consolidating, ramming, watering, dressing, rolling and consolidation with 8 to 10 T rollers in layers of 200mm thick at O.M.C to required dry density etc. complete.

3.0. Mode of Measurements & Payment

3.1. The relevant specifications of item shall be followed.

3.2. The rate includes cost of collecting, carting murrum / or selected earth of approved quality with all lead and labour required for filling the same in trenches and plinth under floors.

3.3. The rate shall be for a unit of one cubic meter. The work must be carried out as per item description and as directed by EIC.

n) Earth work in cutting in all sorts of soil and soft/hard murrum/soft rock/hard rock including conveying,breaking boulders in small piece and spreading the stuff,embankment as and where directed within & any mtrs.from the end of the cutting with all required lead and lift,including watering,consolidating spreaded soil anrd rolling of filled earth work in 200 mm thick layers at OMC to required density consoladation with power roller 8 to 10 T.including filling in depressions which occur during the process,including watering of earthwork etc.as directed by EIC.(Only cutting measurement will be Paid)including throwing away the extra stuff to out side premises up to any lead etc. complete.

Payment shall be made as per actual executed quantity.

1.0. General: - Any soil which generally require close application of picks or jumpers or scarifies to loosen it, stiff clay, gravel and stone, etc. or organic soil, gravel silt, sand, turf, loam, clay, peat, etc. fall under this category.

2.0. Clearing the site

2.1. The site on which the structure is to be built shall be cleared, and all obstructions loose stone, materials, and rubbish of all kind, bush wood and trees shall be re-

moval as directed. The materials so obtained shall be property of the Government and shall be conveyed and stacked as directed within 50 m. lead. The roots of the trees coming in the sides shall be cut and coated with a hot asphalt.

2.2. The rate of side clearance is deemed to be included in the rate of earth work for which no extra will be paid.

3.0. Setting out; - After clearing the site, the Centre lines will be given, by the Engineer-in-Charge. The contractor shall assume full responsibility for alignment, elevation and dimension of each and all parts of the work. Contractor shall supply labors materials, etc., required for setting out the reference marks and bench marks and shall maintain them as long as required and directed.

4.0. Excavation; - The excavation in foundation shall be carried out in true line and level and shall have the width and depth as shown in the drawings or as directed. The contractor shall do the necessary shoring and shutting or providing necessary slopes to a safe angle, at his own cost. The payment for such precautionary measures shall be paid separately if not specified. The bottom of the excavated area shall be leveled both longitudinally and transversal as directed by removing and watering as required. No earth filling will be allowed for bringing it to level. If by mistake or any excavation is made deeper or wider than that shown on the plan or directed. The extra depth or width shall be made up with concrete of same proportion as specified for the foundation concrete at the cost of the contractor The excavation up to 1.5 m depth shall be measured under this item.

5.0. Disposal of the excavated stuff

5.1. The excavated stuff of the selected type shall be used in filling the trenches and plinth or leveling the ground in layers including ramming and watering etc.

5.2. The balance of the excavated quantity shall be removed by the contractor from the site of work to a place as directed with lead up to 50 M. and all lift.

6.0. Mode of measurements & payment

6.1. The measurement of excavation in trenches for foundation shall be made according to the sections of trenches shown on the drawing or as per sections given by the Engineer-in-Charge. No payment shall be made for surplus excavation made in excess of above requirements or due to stopping and sloping back as found necessary on account of conditions of soil and requirements of safety.

6.2. The rate shall be for a unit of one cubic meter.

Before starting the work initial level of area to be graded or road alignment shall be taken. Excavation shall be done to the required level, grade, camber as per levels given on drawing or as instructed by engineer –in-charge on site. Where area is low level area, surplus excavated stuff shall be filled, spread, dressed and consolidated properly by watering. After the area is graded or road base is prepared the same shall be got checked for corrections. Surplus earth shall be spread and dressed within a lead of 30 meters and at the places show.

Payment shall be made for the earth work done in excavation. No separate payment shall be made for the area filled up for bringing to desired level and camber. Payment shall be made on actual quantity of excavation done. Rate quoted shall be for all labor, tools, tackles etc.

o) Construction of RCC compound wall (to retain earth inside/outside substation premises as per contour map and proposed Finished ground level for 66/11kv sub station including foundations, concertina coil, structural steel

& its all related required items (Note: Foundation shall be exccentric footing/ Normal Isolated Footing and which is fall within a primises). Tender drawing shall be provided by GETCO. However, construction drawing shall be developed by bidder.

Scope of work shall be as mentioned in detailed specification and tender drawing (Note: Tender drawing is given by GETCO and other details mentioned in Tender specification are given alongwith tender to spell out requirements and enable bidders to quote. However, it is important that bidder shall study and include full requirements, terrain of site etc and as per relevant standards and codes.)

Compound wall shall be of RCC column and Beam and gap shall be filled with Brick/Block masonry & Retaining wall shall be of RCC. Height of Compound wall shall be 2.0 meter from Finished Ground level Plus concertina coil.

(Protection of RCC structure under ground and above ground upto plinth level against corrosion and weather shall be provided as mentioned in Technical specification.The cement and steel shall also be considered accordingly)

Please note that minimum depth of foundation from Finish ground level shall be as under

(1) for Normal soil strata/soft rock strata (Open footing)-2000mm.

(2) For pile foundation -1500mm cutoff level.

(3) For Hard rock strata-2000mm plus anchoring of sufficient capacity(inside hard rock strata) of HILTI or Equivalent company product.

The minimum Grade of concrete shall be M20, and the pile and pile cap shall be M30.

However,Item Rate & Scope of work shall be inclusive of all the works/items mentioned in Tender drawing, BOQ description, Technical specification, cost of fabrication work, excavation, masonry, hodfast, all type of concrete(RCC column, Beams, Retaining wall), reinforcement, 20mm thick plaster work, M.S. Grill (To be provided at every span above FGL), concertina coil, painting (as mentioned in Technical specification) to compound wall, coping, fixing etc. as shown in drawing and required items to complete the work as per relevant IS codes and standards/drawings.

Compound wall shall be constructed as per design and drawing approved by GETCO. A detail tender drawing is given with the tender. Bidder has to develop working construction drawings (plan, section, elevation, detailed structure drawings, finishing schedule etc. to facilitate construction work on the basis of this drawing, specification and relevant IS codes and standards. Preparation of Drawing & Design is in the scope of bidder. The work must be carried out as per item description, tender drawings and as directed by EIC.

p) Tree Plantation & Landscaping:

Providing and executing complete plantation and landscaping works within the substation premises as per layout mainly as peripheral green belt + small internal landscaping near buildings, including design, supply, planting, and maintenance of trees, plants, lawns, and garden features:

The scope includes preparation of landscaping design through a qualified horticulturist and obtaining approval from GETCO. The work comprises earthwork excavation for pits, trenches, and beds (0.60 m × 0.60 m), filling with selected approved garden soil, and supply and application of natural farmyard manure.The item includes supply, planting, and development of ornamental plants, shrubs, and trees such as palm trees/flowering plants, Areca palms, Christmas trees, Forcaria plants, Sopari palms, and other approved varieties. It also covers application of fertilizers, pesticides, watering, replacement of dead plants, and complete maintenance until commissioning or completion, whichever is later. Development of lawns using Doob grass is included, covering excavation (10–30 cm), debris removal, soil leveling with fertilizers, turfing, watering, weeding, mowing, and upkeep. The scope further includes providing and laying single slanted brick kerbing with excavation, proper alignment, side filling, and finishing with whitewashing and geru. Additionally, providing and developing hedges (Mehndi/Golden Duranta) including planting, trimming, shaping, and maintenance is included.
The rate shall be inclusive of all materials, labor, tools, equipment, transportation, watering arrangements-Drip Irrigation System and Sprinkler Irrigation System, and all incidental works required for complete execution and maintenance up to commissioning. All work shall conform to BOQ requirements, technical specifications, and relevant IS codes, and shall be carried out as directed by the Engineer-in-Charge.
The landscaping with flower beds at available places shall be provided. The tree plantation suitable to the prevailing environment in consultation with Horticulturist shall be provided.
The layout of the area where tree plantation is to be provided shall be decided at the time of detailed engineering.
Scope of work shall cover, but not limited to the following major items.

1. Earth work in filling for the sub grade for preparing plantation trenches, pit, beds of soil with selected garden soil of approved quality up to required level and depth including filling the earth in required layers, watering, consolidating etc., complete. Earth is to be brought from outside of GETCO premises including any royalty, Octroi etc., at the risk and cost of Contractor. The work including all equipments, plants, material, tools & tackles, labours, transportation, loading unloading etc., complete as directed by E.I.C.
2. Providing & supplying Natural selected farm yard manure, goober of approved quality including spreading as per requirement including stacking loading, unloading, transporting with all tools, tackles, labours and cost of manure etc., with proper application as directed by E.I.C.
3. Providing flowers of different types. Preparation of flower bed by digging upto 20 to 30 CM, removing debris, labour for removing grass, mixing manure, cleaning the area, spreading the selected earth levelling planting the saplers as directed including maintenance upto one year and disposing the extra surplus materials as directed by E.I.C. etc., complete with free supply of water at single point by GETCO.
4. Maintenance of flower bed including watering, weeding, grass cutting, providing and applying fertilizer / manure, spreading as per the instruction, minimum three operation or more in a month with all tool tackles labour as directed and disposing surplus materials as directed by E.I.C etc., complete with free supply of water at single point by the Board. .(**For one year from completing the work at sr.no.3 above**.)

5. Providing plantation & development of following plants/ trees/ flowers, ornamental plants and garden shrubs, small trees of plants of selected & approval name quality, size and growth in good condition. The work including cost of plants, materials, digging pit in the soil of size 0.60 x 0.60 x 0.60 mtr. Soil for planting trees, mixing of manure & refilling the pit with good earth, watering as and when required. Providing pesticides / fertilizer with twelve months of maintenance, replacement & replacing of dead plants during maintenance cleaning, removing, labours, tools & tackles transportation, loading, unloading etc., complete ad directed by the E.I.C.
    - Palm/trees/flowers Trees
    - Arica palm trees
    - Christmas tree
    - Forcaria plants
    - Sopari palm trees

6. Providing and development of lawns of approved and good quality, “Dub Grass” digging up to depth of 10 Cm. To 30 Cm. Cleaning grass removing debris, levelling the ground by providing and mixing fertilizer earth levelling the same by providing and planting selected turfing lawns as directed, watering wedding with all labours, tools, tackles with removing unwanted plants etc., with free supply of water at single point by GETCO etc., complete as directed by E.I.C.
7. Carrying out the maintenance of lawn after plantation, including application of pesticides and chemical fertilizer, as and when required in proper proportion and quality and at required interval, applications of boncides weeding, lawn cutting with grass cutter / remover as and when at regular intervals with minimum three times in a month, proper supervision steering, watering including all necessary labours, tools, tackles machines or equipments etc., complete as directed by E.I.C. Free supply of water at single point by the GETCO.(For one year from completing the work at sr.no.6 above.)
8. Providing and lying single slanted brick kerbing including necessary excavation and fixing bricks in the line and level, filling the sides, with two coats of white washing and geru with tools tackles and labour etc., complete as directed by E.I.C./as approved in electrical lay out with free supply of water at single point by GETCO.
9. Providing, planting & Development of SELECTED best quality of green / red mehndi, golden Durant hedge on both side of road including digging for excavation spreading required soil, weeding, watering manuring and anti termite application. The height and growth should be satisfactory above G.L. including trimming etc., complete as directed by E.I.C.
10. Maintenance of green or red Hedge, Mehndi or duranta etc., including required digging, trimming, watering, cutting to shape and throwing away by disposing off branches, leaves etc., as directed by E.I.C. (For one year from completing the work at sr.no.9 above.)

q) MONORAIL FOR GIS CUM CONTROL ROOM BUILDING:

Monorails, Monorail girders and fixtures shall be provided by the Bidder as well as this monorail system includes the supply and installation of all necessary components, including the monorail beam, trolley, hoist and any neces-

sary support structures as mentioned in tender drawing/as per system requirement for lifting of panels or other accessories at first floor of adequate capacity. Monorail of minimum capacity of 2.0 M.T. shall be provided.

The monorail beam will be constructed of high-strength steel and will be designed to meet the specific needs of the application. The trolley will be capable of moving along the length of the beam, while the hoist will be used to lift and lower loads.

The installation of the monorail system will be performed by trained professionals, who will ensure that the system is installed safely and according to all relevant safety standards. This may include the installation of support structures, such as columns or brackets, to ensure that the monorail system is securely attached to the building structure.

Monorails, Monorail girders and fixtures shall be provided by the Bidder as well as this monorail system includes the supply and installation of all necessary components, including the monorail beam, trolley, hoist and any necessary support structures as mentioned in tender drawing/as per system requirement for lifting of panels or other accessories at first floor of adequate capacity. Monorail of minimum capacity of 2.0 M.T. shall be provided.

The monorail beam will be constructed of high-strength steel and will be designed to meet the specific needs of the application. The trolley will be capable of moving along the length of the beam, while the hoist will be used to lift and lower loads.

The installation of the monorail system will be performed by trained professionals, who will ensure that the system is installed safely and according to all relevant safety standards. This may include the installation of support structures, such as columns or brackets, to ensure that the monorail system is securely attached to the building structure.

r) Any other civil work that is required for successful completion & commissioning of 66/11kv GIS Sub-station and all the building shown in the lay out.

s) Specific requirement :

After installation, ceiling and wall penetrations must be sealed in such a way that the fire prevention specifications applying to the buildings are fully complied with. In event of fire, escape routes, rescue routes and emergency exits must be usable and unobstructed for GIS cum Control room cum administrative building.

t) Construction of RCC Road cum RCC Water Drain Box Culvert, in consideration with the retaining wall , as per the attached tender drawing. The RCC Road cum RCC Water Drain Box Culvert is to be designed and constructed on the existing water channel, taking site conditions into account, including foundations/raft, structural steel, and all related required items.

The following points should be ensured during the design and construction of the Box Culvert:

1. The design should accommodate a minimum loading of a 20MVA Transformer (filled with oil) with a trailer.
2. The position of the existing water channel should be considered to avoid damage during construction, maintaining the in/out flow of water as per the current flow.
3. One side of the Box Culvert will function as a retaining wall for the Compound wall of RCC column and Beam. The gap will be filled with Brick/Block masonry. The height of the Compound wall shall be 2.0 meters from the Finished Ground Level (FGL) plus concertina coil. The other side will retain earth pressure between FGL to EGL in the substation premises as per the contour map and proposed Finished Ground Level for the 66/11kv substation.
4. A side shoulder in M20 grade concrete on sides of the road, 500mm wide, with specified slopes, shall be provided. The soil below the shoulder shall be properly compacted. Openings at 10m intervals shall be provided on the wall with the fixing of a M.S grill.
5. The Water Channel shall be connected with the existing channel if the path of the channel changes.

Tender drawings shall be provided by GETCO. However, construction drawings shall be developed by the bidder.

(Note: Tender drawings are provided by GETCO, and other details mentioned in the Tender specification are given along with the tender to outline requirements and enable bidders to quote. However, it is essential that the bidder studies and includes all requirements, site terrain, etc., as per relevant standards and codes.)

(Protection of RCC structure under ground and above ground up to plinth level against corrosion and weather shall be provided as mentioned in Technical specification.The cement and steel shall also be considered accordingly.).
The minimum grade of concrete shall be M20, and Concrete grade for the pile and pile cap shall be M30.
Payment shall be paid as per actual execution. RCC Road cum Water Drain Box Culvert from shoulder to Out side of Wall shall be considered for payment

However, the Scope of work shall be inclusive of all the works/items mentioned in the Tender drawing, Technical specification, and requirements to complete the work as per relevant IS codes and standards and site conditions
RCC Road cum Water Drain Box Culvert- 7.0/8.0-Meter-Wide With Fanning Required for Turning of 20MVA Transformer with Trailer at Junction with Minimum Loading of 20MVA Transformer with Trailer. Width Of Road cum Water drain box culvert Shall Be as Per Approved Electrical Layout.

Codes & Standards

The following Indian Codes and Standards shall generally be used for design of civil and structural works. In all cases, the latest revisions with amendments, if any, shall be followed.

SP: 6 ISI handbooks for structural engineers.

IS: 2062	Specification for Structural Steel (Standard quality).
IS: 456	Code of practice for plain and reinforced concrete.
IS: 800	Code of practice for general construction in steel.
IS: 806	Code of practice for use of steel tubes in general building construction,
IS: 808	Rolled steel beam, channel & angle sections
IS: 813	Scheme of symbols for welding.
IS: 816	Code of practice for use of metal arc welding for general construction in mild steel.
IS: 875	Code of practice for design loads (other than earthquake) for buildings and structures.
IS: 1038	Steel doors, windows and ventilators.
IS: 1080	Code of practice for design and construction of shallow foundations in soils (other than raft, ring and shell).
IS: 1172	Code of basic requirements for water supply, drainage and sanitation.
IS: 1230	Cast iron rain water pipes and fittings.
IS: 1346	Code of practice for water proofing of roofs with bitumen felts.
IS: 1361	Steel windows for industrial buildings.
IS: 1742	Code of practice for Building Drainage
IS: 1893	Criteria for earthquake resistant design of structure
IS: 1904	Code of practice for foundations in soil:-General requirements
IS: 1905	Code of practice for structural safety of buildings
IS: 2065	Code of practice for water supply in buildings
IS: 2074	Ready mixed paint, air drying, red oxide chrome, priming
IS: 2212	Code of practice for brick work
IS: 2470	Code of practice for installation of septic tank
IS: 2527	Code of practice for fixing rain water gutters and down pipes for roof drainage
IS: 2911	Code of practice for design & construction of pile foundation
IS: 2950	Code of Practice for design and construction of raft foundations
IS: 2974	Code of Practice for design and construction of machine foundations
IS: 3067	Code of Practice for general design details for prepatory work for damp proofing and water proofing buildings
IS: 3370	Code of Practice for concrete structures for the storage of liquids
IS: 3414	Code of Practice for design and installation of joints in buildings
IS: 3614	Fire check doors & TAC rules
IS: 4326	Code of Practice for earthquake resistant design and construction of buildings
IS: 4971	Recommendations for selection of industrial floor finishes
IS: 5624	Specification for Foundation bolts
IS: 8009	Code of Practice for calculation of settlement of foundations: (parts 1 & 2)
IS: 1829	Code practice for protection of iron and steel (Part I to III) structures for atmosphere corrosion
IS: 13301	Guidelines for design of flexible pavements

IS: 13920	Code practice for ductile detailing of reinforced concrete structure subjected to seismic force
IRC: 37	Guide lines for design of flexible pavements
IRC: 73	Geometric designs of roads
DIN: 4024	Machine foundations: - Flexible supporting structures for machine with rotating masses.
SP 16	Design Aids for Reinforced Concrete to IS: 456-1978.

(A) Design Criteria

The Soil investigation report furnished with tender document is for reference purpose only.

The bidder has to conduct geotechnical investigation and decide on the various design parameters one proposes to adopt for foundation design. No commercial implications for any variations in this regard during execution shall be entertained for Soil Test Results as well as any of foundation design.

FOR BUILDING(Control room cum administrative building, GIS building, Security cabin, etc;

I.GENERAL:

a) The buildings shall be designed:
   i. To the requirements of the National Building Code of India and the standards quoted therein.
   ii. Latest PWD (Central Public Works Department) Specifications.
   iii. Latest Industry Practices.
   iv. Local building byelaws of statutory authorities.
   v. Latest practice for earthquake resistant design.
   vi. Design shall aim cost ease of construction and maintenance, provision of efficient and comfortable services without sacrificing the unique and innovative architecture and aesthetics. The architectural treatment and external finish shall incorporate indigenous technique and materials requiring least maintenance effort.
   vii. for the specified climatic & loading conditions.
   viii. to adequately suit the requirements of the equipment and apparatus contained in the buildings and in all respects to be compatible with the intended use and Occupancy.
   ix. with a functional and economical space arrangement.
   x. to be aesthetically pleasing. Different buildings shall show a uniformity and consistency in architectural design.
   xi. to allow for easy access to equipment and maintenance of the equipment.
   xii. with, wherever required, fire retarding materials for walls, ceilings and doors, which would prevent supporting or spreading of fire.
   xiii. with materials preventing dust accumulation.
   xiv. Suitable expansion joints shall be provided in the longitudinal direction wherever necessary with provision of twin columns.

b) Suitable expansion joints shall be provided in the longitudinal direction wherever necessary with provision of twin columns.

c) Individual members of the buildings frame shall be designed for the worst combination of forces such as bending moment, axial force, shear force, torsion etc.

d) Permissible stresses for different load combinations shall be taken as per relevant IS Codes.

e) The building lighting shall be designed in accordance with the requirements of relevant section.
f) The building auxiliary services like air conditioning and ventilation systems, fire protection and detection systems and all other miscellaneous services shall be designed in accordance with the requirements specified in relevant section or elsewhere in this Specification.
g) Design services for buildings include, the design of scaffolding and safety arrangement as per requirement particularly for GIS building and Control room cum administrative building, Store building etc.

II. DESIGN LOADS

Building structures shall be designed for the most critical combinations of dead loads, super- imposed loads, equipment loads, crane load (if any), wind loads and seismic loads. Dead loads shall include the weight of structures complete with finishes, fixtures and partitions. Super-imposed loads in different areas shall include live loads, minor equipment loads, cable trays, small pipe racks/hangers and erection, operation and maintenance loads wherever these loads are expected. Equipment loads shall constitute, if applicable, all load of equipments to be supported on the building frame.

For crane loads an impact factor of 30% and lateral crane surge of 10% (lifted weight + trolley) shall be considered in the analysis of frame according to provisions of IS:875. The horizontal surge shall be 5% of the static wheel load.

The wind loads shall be computed as per IS 875 - 1987, Seismic Coefficient method/Response Spectrum method shall be used for the seismic analysis as per IS 1893 with importance factor 1.5. Wind and Seismic forces shall not be considered to act simultaneously. Floors/slabs shall be designed to carry loads imposed by equipment, cables and other loads associated with building. Floors shall be designed for live loads as per relevant IS. Cable load shall also be considered additionally for floors where these loads are expected. In addition, beams shall be designed for any incidental point loads to be applied at any point along the beams. The floor loads shall be subject to GETCO's approval. For consideration of loads on structures, IS: 875 -1987 shall be followed, the following minimum superimposed live loads shall,
however, be considered for the design.

SR.NO.	TYPE OF STRCTURE	MINIMUM LOAD TO BE CONSIDERED	REMARKS
1	RCC Roof	1.5 KN/M2	For accesible roofs
		0.75 KN/M2	For in- accesible roofs
	RCC floor	10 KN/M2	For offices
		10 KN/M2	For equipment floors or actual requirement, if higher than 10 KN/M2 based on equipment component weight and lay out plans. i.e for first floor of control room cum administrative building.
2	Stairs & balconies	5 KN/M2	
3	Toilet Rooms	2 KN/M2	

4	Chequred plate floor	4 KN/M2	
5	Walkways	3 KN/M2	

Any additional load coming in the structure shall be calculated as per IS: 875 -1987.
Seismic Zone – V shall be considered irrespective of location.
For Security cabin, Type-4 Quarter oading shall be considered as per relevant codes and standards.

III. DESIGN

a. All structures shall be designed for the worst combination of dead loads, live loads, wind loads as per IS-875, seismic forces as per IS-1893,
b. The design of steel structures for the GIS building shall be done by based on IS: 800.
c. The design of R.C.C. structures for the GIS building shall be done in accordance with IS: 456.
d. Permissible stresses for different load combinations shall be taken as per relevant IS Codes.Necessary protection to the foundation work, if required shall be provided to take care of any special requirements for aggressive alkaline soil, black cotton soil or any other type of soil which is detrimental/harmful to the concrete foundations.
e. All joints including construction and expansion joints for the water retaining structures shall be made water tight by using PVC ribbed water stops with central bulb. However, kicker type (externally placed) PVC water stops shall be used for the base slab and in other areas where it is required to facilitate concreting. The minimum thickness of PVC water stops shall be 5 mm and minimum width shall be 230 mm.
f. The protections required to be carried out for aggressive alkaline soil, black cotton soil or any other type of soil which is detrimental/harmful to the concrete foundations shall be provided.
g. Dense concrete with controlled water cement ratio as per IS-code shall be used for all underground concrete structures such as pump-house, tanks, water retaining structures, cable and pipe trenches etc. for achieving water-tightness.
h. RCC water retaining structures like storage tanks, etc. shall be designed as uncracked section in accordance with IS: 3370 (Part Ito IV) by working stress method. However, water channels shall be designed as cracked section with limited steel stresses as per IS:3370 (Part I to IV) by working stress method.
i. The procedure used for the design of the foundations shall be the most critical loading combination of the steel structure and or equipment and/or superstructure and other conditions which produces the maximum stresses in the foundation or the foundation component and as per the relevant IS Codes of foundation design. Detailed design calculations shall be submitted by the bidder showing complete details of piles/pile groups proposed to be used.
j. The thickness of fill material under the foundations shall be such that the maximum pressure from the footing, transferred through the fill material and distributed onto the original undisturbed soil will not exceed the allowable soil bearing pressure of the original undisturbed soil. For expansive soils the fill materials and other protections etc. to be used under the foundation is to be got approved by the GETCO.
k. Limit state method of design shall be adopted unless specified otherwise in specification.
l. All sub-structures shall be checked for sliding and overturning stability during both construction and operating conditions for various combinations of loads. Factors of

safety for these cases shall be taken as mentioned in relevant IS Codes or as stipulated elsewhere in the Specifications. For checking against overturning, weight of soil vertically above footing shall be taken and inverted frustum of pyramid of earth on the foundation should not be considered.

m. Earth pressure for all underground structures shall be calculated using co-efficient of earth pressure at rest, co-efficient of active or passive earth pressure (whichever is applicable). However, for the design of substructures of any underground enclosures, earth pressure at rest shall be considered.

n. In addition to earth pressure and ground water pressure etc., a surcharge load of 2T/Sq.m shall also be considered for the design of all underground structures including channels, sumps, tanks, trenches, substructure of any underground hollow enclosure etc. For the vehicular traffic in the vicinity of the structure.

o. Following conditions shall be considered for the design of water tank in pumps house, channels, sumps, trenches and otherunderground structures.

1. Water pressure from inside and no earth pressure & ground water pressure & surcharge pressure from outside (application only to structures which are liable to be filled up with water or any other liquid).
2. Full earth pressure, surcharge pressure and ground water pressure from outside and water pressure from inside.
3.Design shall also be checked against buoyancy due to the ground water during construction and maintenance stages. Minimum factor of safety of 1.5 against buoyancy shall be ensured ignoring the superimposed loadings.

p. Base slab of any underground enclosure shall also be designed for empty condition during construction and maintenance stages with maximum ground water table (GWT). Minimum factor of safety of 1.5 against buoyancy shall be ensured ignoring the superimposed loadings.

q. Ductile detailing in accordance with IS : 13920 shall be adopted for superstructure and substructure of all RCC buildings / structures

DESIGN CALCULATION AND DRAWING :

Detailed design calculations / design drawings shall be commenced by Bidder only after approval is obtained from the GETCO to the basic design criteria(Design Basis Report) submitted by the Bidder. No deviation from the approved design criteria will be permitted unless specifically approved again by the GETCO in writing, prior to its adoption.Civil scope drawings for structural system showing all equipment loads, cutouts, embedment, etc. based on approved mechanical general arrangement (GA) drawings shall be submitted by the Bidder and these shall be accompanied by detailed design calculations. Drawings and design calculations submitted without prior approval of relevant mechanical GA drawings will not be considered for review.After the approval of the Bidder's GA drawings, GETCO shall identify the structure for which detailed design calculations need to be submitted by the Bidder.Normally, GETCO shall review and approve design calculations for one typical structure /foundation of each type. However, GETCO reserves the right to call for design calculations for any additional structure and the Contractor shall have to submit these and obtain GETCO's approval. Bidder shall have to ensure that all the balance structures of the system are designed as per the approved designs of typical structures /foundation.Designs and drawings shall be submitted sequentially in a phased manner. For this purpose, design / drawing submission schedule shall be furnished by the Contractor for GETCO's review and approval. GETCO will review and furnish comments / approval to the designs and drawings. Timely submission of designs /drawings to the GETCO for review / approval is the sole responsibility of the Bidder and postal or other delays as reasons for late / non-submission

will not be entertained by the GETCO. Designs and drawings submitted by the Bidder shall be thoroughly checked and approved by the Bidder's authorized engineers before submission for approval. Any unchecked / unsigned documents will not be reviewed by the GETCO. No claim from the Bidder for extension of time or extra cost on this account shall not be entertained by the GETCO under any circumstances. No check will be specifically carried out by the GETCO to verify arithmetical / numerical accuracy of the calculations, which shall remain entirely the Bidder's responsibility.All design calculations and drawings shall be in English and shall be in SI units. All modification suggested by the GETCO to meet specification requirements and sound engineering practice shall be incorporated by the Bidder at no extra cost to the GETCO. In this respect, the decision of the GETCO shall be binding on the Bidder. Should there be a requirement for preparation of separate drawings to show enlarged details to facilitate construction / erection, then such drawings shall also be prepared by the Bidder at no extra cost. Design drawings showing typical connections and details conforming to design assumptions shall be submitted for approval of the GETCO by the Bidder. Design drawings for steel structures shall indicate structural arrangement, member size, member forces, splice location, details of base plate, anchor bolts, typical connection details, etc. so that the drawing indicates clearly all the necessary information brought out in relevant design calculations. Proposed bracing patterns shall be subject to approval by GETCO duly considering system requirement point of view. Changes in structural sections on approved drawings shall be got ratified with necessary supporting calculations and reason for the change.

Bidder shall note that all values / dimensions / elevations etc. without supporting break up of data adopted / assumed in his calculations / drawings shall be taken by GETCO to be correct unless these have been specifically indicated in the specification. Any problems later met in this regard shall be made good by the Bidder at his own cost and no extension of time on this ground shall be granted by the GETCO.

The designs shall clearly spell out the erection scheme for various structures envisaged by the Bidder and resulting additional loadings, if any, shall be duly accounted for. Before taking up actual erection work, detailed erection scheme proposed to be followed by the Bidder shall be submitted for GETCO's approval.Approval / comments conveyed by the GETCO neither relieves the Bidder of his contractual obligations and his total responsibility for correctness of dimensions,materials of constructions, loadings, quantities, design details, assembly fits, performance particulars, safety and stability of the structures including foundations / appurtenances,and conformity of supplies with the statutory laws as may be applicable, nor does it limit the GETCO's right under this contract. No change in the approved designs / drawings shall be permitted without prior written approval of the Engineer.Preparation of structural steel fabrication drawings is entirely the responsibility of the Bidder.Detailed civil construction drawings including bar bending schedule for all concrete works shall be prepared by the Bidder and submitted to the GETCO for their review and approval. Construction work at site shall commence only after obtaining written approval to the drawings by the Owner.For framed structures, computer analysis shall be adopted and the computer output listing should include all input data covering the design loads and other particulars as specified.The calculations shall be supported by all back up documents and references including explanatory sketches and general arrangement drawings.

Computer analysis will be accepted only when the trust worthiness of the program used is established to the satisfaction of the GETCO. Bidder shall submit typical hand calculations for a few important structural elements to be chosen by the GETCO to validate the computer programs used for the designs.

FOR SWITCH YARD & OTHER STRUCTURES:

The tower structures in the switchyard shall be designed as per the recommendations of IS:802.Three dimensional analysis shall be carried out for the structures like towers and gantries where as two dimensional approach may be followed for equipment support structures.Diagonal wind/inclined wind shall be considered for isolated self supporting structures like lighting and lightning masts and poles only. Other structures which are interconnected either by beams or rigid bases need not be analyzed for inclined wind loading.Short circuit forces shall be considered for the structural analysis of tower/structures. All structures and portions thereof shall be analysed and designed to sustain various loads and combinations thereof, conforming to the latest revision of applicable Indian Standards, Specifications, engineering practice and other technical requirements.. All structures shall be designed to sustain dead loads plus assigned live loads, impact load equipment, wind, seismic or other loads it is being subjected to.

LOADS

(A-1) Dead Loads

Dead load shall include the weight of all structural components and architectural appurtenances incorporated in the structures plus hung loads and any other permanent, externally applied loads including equipment dead load.

(A-2) Live Loads

Live load reductions as per provisions of IS: 875. Special use areas shall be investigated and loading revised upward as necessary. Hung loads shall be based on minimum loading equivalents of 100 Kgs. / Sqm. for piping and 50 Kgs/.Sqm. for electrical, ventilation and air conditioning. Loading due to concentrations of facilities in specific areas shall be considered.

(A-3) Equipment Loads

a. Loads (both static and dynamic) of major equipment shall be considered as per manufacturer's certified drawings. Equipment foundations shall be analysed for all possible load combinations both static and dynamic, wherever applicable. However, if the dynamic load component is very less compared to static loads and or if the requirement of plinth / pedestal size is more, then static analysis will be adopted by considering 3 times the static weight of the equipment.
b. Crane girders and supporting columns shall be designed for vertical and horizontal forces (including impact forces) as developed from the crane weights and wheel loads.

(A-4) Wind Loading

Wind loads shall be considered in accordance with Indian Standard Code IS: 875 for a basic wind speed of 50m/sec. up to height of 10 meters above mean ground level.

(A-5) Seismic Loading

Seismic Zone – V shall be considered irrespective of location. Importance factor of 1.5 shall be considered.

(A-6) Combination of Loads

a. All structures shall be analyzed for the load combinations in accordance with the requirements of IS: 456 and IS: 875 for all possible combination of loads e.g. Dead load, live load, crane loads, wind or seismic loads, soil loads and surcharge loads.

Appropriate allowable increase in permissible stresses as per IS codes, shall be taken except where as per above load combinations, load factors shall be used.

Cement & Concrete Grades

The cement shall be OPC cement with having 'C3A content 5 to 8% for all civil works.The following minimum grades of concrete as per provisions of IS: 456 and other applicable codes shall generally be used for concrete structures.Mix design for Grade M15, M20 & M25 & M30 shall be done in GETCO approved laboratory considering 'Moderate" environmental conditions irrespective of location of substation.

(B-1) M-25:

All reinforced concrete structures of GIS cum Control room cum administrative building, Store building, Security cabin, All reinforced concrete structures of Foundations for out-door GIS, switch yard equipment foundations, Foundation for tower Gantry , structural concrete for foundation of all strctures within switch yard, Transformer plinth, Foundation of Circuit breaker , Fire protection wall, reinforced concrete in Pavement etc.However, Grade of pile and pile cap for all structure shall be M 30.

(Min. cement consumption for M25 grade of concrete shall be 400 kg per cu.mt of concrete & Min, cement consumption for M30 grade of concrete shall be 450 Kg. Per cu. mt of concrete)

(B-3) M-20:

For Plinth protection.

(Min. cement consumption shall be 350 Kg. Per cmt of concrete)

(B-4) M15 :

Levelling course/Lean concrete (Min. 100 mm thick) Below footings, Tanks, base slab for drains, fill concrete etc

(Min. cement consumption shall be 300 kg. Per cmt of concrete.

(B-5) M30

All reinforced structures foundatons for pile and pile cap

(Min, cement consumption for M30 grade of concrete shall be 450 Kg. Per cu. mt of concrete)

Minimum Grade of concrete is given however higher grade of concrete shall be adopted if required as per recommendation of soil testing agency or IS code requirement as per special conditions inside ground or due to weather conditions.

Reinforcement:

All reinforcement bars shall be TMT (Thermo mechanically treated Corrosion resistant bars) Coated with Fusion bond Epoxy paint of grade Fe-500D bars confirming to IS 1786(latest revision)

Minimum Dimension of Structural Elements :

The following minimum dimensions shall be followed. However, it may increase as per design requirement or actual site requirement as per relevant standards and codes.

SR.NO.	NAME OF STRCTURAL ELE-MENT	MINIMUM THICK-NESS/WIDTH/DEPTH/DIAMETER TO BE ADOPTED IN DESIGN
1	Thickness of Suspended floor slab / roof slab / walkways / - canopy slabs etc.	125 mm
2	Thickness of Ground floor slab (non - suspended) -	150 mm
3	Thickness of Water Retaining Slab / Walls	250 mm
4	RCC Cable trenches (1 Tier & more) Launder walls and base slab	150 mm
a	wall	150mm
b	Base	150mm
c	Prestressed cover	50mm
5	For RCC cable trench at road crossing.	
a	wall	300mm
b	Base	300mm
c	Top slab	250mm
6	All footings (including raft founda-tions) -	300 mm
7	Tapered footings - (Min. at edges)	150 mm
8	Basement walls and base slab	150 mm
9	In case of Pile foundations	
a	Diameter of pile	300mm
b	Depth of pile	4500mm
c	Depth of pile cap	600mm
10	Width fo all type of beams/tie beams/roof beams/	250mm
10A	Width of Column	300 mm
11	Depth of beams	450mm
12	Depth of Lintel/Through course of building	150mm
13	Thickness of chhajah at end	100mm
14	Thickness of Grade slab	125mm
15	Thickness of RCC road	300mm
16	Thickness of WBM road	350mm

17	Thickness of lean concrete in all type of foundations either of building or switch yard strcture.	100mm
18	Thickness of floor slab of stacking platform	150mm
19	RCC wall thickness of road side drain	100mm
20	Depth of foundation below ground level for Isolated/combine d footing.	
a	For colum footing of GIS building	3000mm
b	For column footing of Control room cum administrative building/Type.4 quarter/security cabin/Store building	2500mm
c	For column footing of vehicle parking shed/Stacking platform/D.G. set/chainlink fencing post/Toilet block for labours	1500mm
d	Foundations for switch yard equipment support foundations	1500mm
e	For tower Gantrty column founda-tions	3500mm
f	For transformer/Reactor foundations	2000mm

Minimum Cover to Reinforcement

SR.NO	NAME OF STRCTURAL ELEMENT	TOP	BOTTOM	SIDES
1	Footings (Raft and Isolated)	50	75	50
2	Pile caps	50	100	50
2A	Pile	75	75	75
3	Grade beam	45	45	45
4	Columns & Pedestals	50	-	50
5	Beams above ground level	35	35	35
6	Grade slab	25	25	25
7	Lintel beams (Size < 300 x 300)	25	25	25
8	Block foundation including Transformer/Reactor foundation	50	100	50
9	Slabs & staircases	25	25	25
10	Cable trenches Base slab Roof slab	 45 15	 45 35	 45 35

	Walls	20	45	45
11	Liquid retaining Structures Base raft Side Walls (Water face) Side Walls (Soil face)	 45 45 50	45	 45 45 50
12	Surface Drains (Base slab and walls)	45	45	45

Minimum size of pedestal/column for switchyard gantry strcture /Equipment structure foundation

SR.NO	NAME OF GANTRY/EQUIPMENT	SIZE IN 'MM'
A	66KV GANTRY/EQUIPMENT/TR STRUCTURE FOUNDATION	
1	LM	400 X 400
2	LA	750X750
3	BPI/HBPI	750X750
4	TR	2500X2500

Note : Size of pedestal for switchyard Gantry or Equipment strcture shall be as mentioned in above table OR Minimum 150mm from centre of bolt on each side which ever is higher.

SUBMISSION

The following information shall be submitted for review and approval to the Employer:

1. Structural design calculations and drawing (including construction/fabrication) for all reinforced concrete and structural steel structures.
2. Fully, dimensioned concept plan including floor plans, cross sections, longitudinal sections, elevations and perspective view of each building. These drawings shall be drawn at a scale not smaller than 1:50 and shall identify the major building components.
3. Fully dimensioned drawings showing details and sections drawn to scales of sufficient size to clearly show sizes and configuration of the building components and the relationship between them.
4. Product information of building components and materials, including walls partitions flooring ceiling, roofing, door and windows and building finishes.
5. A detailed schedule of building finishes including colour schemes.
6. A door & window schedule showing door types and locations, door lock sets and latch sets and other door hardware.

Approval of the above information shall be obtained before ordering materials or starting fabrication or construction as applicable

(B) General requirements for civil works under scope of bidder:

1. Type of foundation for all type of buildings and Gantry and Equipment strcture,Transformer /Reactor ,Bus duct support strctures,Circuit breaker etc shall be decided on the basis of recommendation of soil testing agency, contour survey, technical specification, relevant IS codes and standards,approved Electrical lay out and site conditions. In case of any ambiguity, decision of GETCO will be final and binding to bidder.
2. Excavation for all builings and strctures shall be carried out in all sort of soil/hard rock/RCC for any depth and throwing away the extra stuff with in the lead of 2.0 KM radius and its dressing etc. Complete as directed by site in charge.
3. Whenever water level is met during the excavation, it shall be dewatered and water level shall be maintained below the bottom of the excavation level during excavation, concreting and backfilling. Nothing extra shall be payable by the GETCO on this account.
4. The density to which fill materials shall be compacted shall be as per, relevant IS and as per direction of GETCO. All compacted sand filling shall be confined as far as possible. Backfilled earth shall be compacted to minimum 95% of the Standard Proctor's density at OMC. The sub grade for the roads and embankment filling shall be compacted to minimum 95% of the Standard Proctor's density at OMC. Cohesion less material sub grade shall be compacted to 70% relative density (minimum).
5. Back filling of foundation trenches for all the Buildings,Gantry and strctures etc shall be done with non cohesive soil only.Back filling around the foundation shall be adequate to achieve the proctor density of 95%.
6. The foundations(for buildings/switch yard foundations) shall in no mean rest on Filled up Soil or Black Cotton Soil.
    - If filled soil encountered, foundation shall be taken 500mm below virgin soil.
    - If foundation falls on excavated trenches of adjoining foundation, than foundation shall extend upto the depth of adjoining foundation.
    - If Black cotton soil encountered at foundation depth, than foundation shall rest on compacted sand bed of 300m thick if opted for isolated/combined footing.
7. Care should be taken to remove loosened pieces of rock so as to rest the foundation on undisturbed rock mass
8. Bottom course of the foundation resting on rock shall be grouted by cement slurry before laying footing.
9. In case rock is available in small area of raft, inverted T beam of raft foundation be allowed to rest on rock and soil
10. Raft shall not overhang at any corners, else excavate the filled up soil and backfill it by lean concrete of required strength up to foundation level.
11. Concreting of all civil works under bidder scope for Grade of M30,M25 & M20 shall be done with the help of digital weigh batcher or flori (mobile concrete batching plant) only.
12. Plinth level of all buildings shall be maintained at not less than 1000 mm above the Finished Ground level(FGL). However, it may increase as per actual site condition.
13. Top of concrete for foundations of all Gantry strctures,Equipment strctures,cable trenches, Transformer plinth, Rail cum road, Masonry chambers,Big ben crossing etc shall maintained at not less than 300 mm above the Finsihed ground level(F.G.L).However, it may increase as per actual site condition. However, Top of foundation particularly for CT/PT JUNCTION BOX, LT ACDB,MLDB,WATER WORKS

DISTRIBUTION PANEL etc shall be maintained not less than 1115 mm above the Finished Ground level(FGL) .

14. Projection of PCC shall be kept minimum 150mm all around foundations of all buildings/switch yard Gantry & Equipment ,cable trench, Bus duct support strctures, circuit breaker, Transformer/Reactor etc.

15. Line out & orientation of foundations for all buildings/strcture shall be checked jointly by EE(civil)/DE(civil) , EE(const)/ DE(const) & Bidder on the basis of approved Electrical lay out.

16. Type of pile foundation (Bored cast in situ pile/ Under reamed pile (with single bulb or Two bulb)/precast pile/Driven (Displacement pile) pile/Cast in place pile) for all the buildings, Equipent & Gantry foundations, cble trench, Bus duct support strctures,circuit breakers, Transformers/Reactors etc shall be decided on the basis of soil conditions, IS codes provision, Total loads from super strcture, water level, available resources etc. However, decision of GETCO shall be final.

17. In pile foundations for Buildings/Gantry structures/Equipmenr structures/Bus duct foundations/street light foundations or any structures under scope of bidder, following shall be considered while design/execution.

a) Cement used for concrete shall be OPC with C3A content 5 to 8 %.

Concrete Grade for pile shall be M30 with minimum cement content of 450 KG per Cu.meter.

b) All reinforcement bars shall be TMT (Thermo mechanically treated Corrosion resistant bars) coated With fusion bonded epoxy paint of grade Fe-500D bars confirming to IS 1786(latest revision)

b) Concrete slump shall be 150 to 180mm (Very high degree of workability) for cast In situ pile foundations.

c) Initial and Routine pileload test shall be carried out on the piles at site to confirm the capacity worked out theoretically.

d) Integrity test to be done for all the pile before construction of pile cap/Raft as per relevant IS codes(Latest revision).

e) For design and construction, specification of IS: 2911 of relevant part shall strictly be followed.

18. All Brick/Block work shall be CM (1:6) both faces of the brick work shall be plastered in CM. The inside plaster shall be 15mm thick finished in CM (1:3) with smooth cement Neeru Finish and outside shall be finished with plaster 20mm thick in two coats with cement mortar. The brick /Block shall have min. compressive strength of 35 Kg / Cm2 for non-load bearing wall.

19. 12 mm thick cement plaster shall be provided in ceilings of all the rooms except ceiling of GIS building hall of all buildings under scope of bidder dully painted with 3 coats of plastic paint/Distemper as the case may be.

20. All building shall be provided with U-PVC rain water down takes pipes, plinth protection and drainage system connected to main storm water drain. Plinth protection shall be in the form of 750 mm wide and 100 mm thick (M25 grade) concrete laid over 230 mm thick rubble soiling, interstices filled with small stone chips and sand. The air-conditioning system shall be provided for Control Room cum administrative building, Room for control & protection panels and AHU room . The Gypsum board False Ceiling shall be provided in all air-conditioned area.

21. False flooring shall be providing at first floor whenever required as per system requirement in control room building and LCC panel room.

22. False ceiling shall be provided in all air conditioned area of Buildings.
23. The Switch Yard area will be graded and covered with metal of size 25 to 40mm. in layer of 100 mm thickness Also, the RCC/Paver block path way shall be provided in Switch Yard for approaching the equipemnts and Tower Gantry.No extra payment shall be paid on this account.

24. Plinth protection 750 mm wide shall be provided around all buildings

25. Required number of PVC service water tank of approved make and quantity shall be Provided on Control Room building. / GIS building, Security cabin, Store building.
26. Suitable Plantation shall be done as shown in approved Electrical lay out and as directed within S/S premises.

27. Angles 50x50x5 mm (minimum) with lugs shall be provided for edge protection all round cut outs/openings in floor slab, edges of drains supporting grating covers, edges of manholes supporting covers, supporting edges of manhole precast cover and any other place where breakage of corners of concrete is expected.
28. Anti-termite chemical treatment shall be given to column pits, wall trenches, foundations of all the buildings, filling below the floors etc. as per IS: 6313 and other relevant Indian Standards.
29. Layout of the roads shall be as shown in the General Arrangement drawing for the substation issued along with the tender documents. Adequate turning space for vehicles shall be provided and bend radii shall be set accordingly. Road to the Autotransformer/Reactor shall be as short and straight as Possible.
30. Construction water: The bidder has to make his own arrangement of water for construction activity at his own cost. The contractor shall be allowed to draw water from bore well/open well by making his own arrangement such as drilling, pump with all electrical accessories, pipe line & electricity to run the bore well/open well from the electric power point provided by DISCOM to them. Water shall be free of cost to the bidder. The electric consumption charges shall be borne by the bidder.

    In those cases where in bore well has been constructed at the cost of GETCO as per contract, even then no water shall be charged, however electricity connection and electricity charges till the completion of work shall be to contractor.
31. All water supply and drainage arrangement in the buildings (control room building, Type.4 quarters,Security cabin, Store building) shall be concealed as per relevant standards.
32. Electrical wiring in the buildings (control room building, Type.4 quarters, Security cabin, Store building etc.) shall be concealed as per relevant standards.
33. 20 micron thick colour anodized aluminum work for doors, windows, ventilators and partitions shall be provided and fixed in building with extruded built up standard tubular and other sections of approved make conforming to IS:733 and IS : 1285,fixed with rawl plugs and screws or with fixing clips, or with expansion hold fasteners including necessary filling up of gaps at junctions at top, bottom and sides with required PVC/neoprene felt etc and joined mechanically wherever required including cleat angle,Aluminium snap beading for glazing / panelling, C.P. brass/ stainless steel screws including glazing and fittings as specified. All doors except for toilet and kitchen shall have 100mm 6 lever CP Brass mortice latch and lock with a pair of lever handle.

. All works shall be carried out as per drawings.

- Double action hydraulic floor spring of approved brand and manufacture IS:6315 marked "hardwyn" make(Model 3000) or equivalent for doors shall be provided

and fixed at the following door including cost of cutting floors as required, embedding in floors and cover plates with brass pivot and single piece MS sheet outer box with slide plate etc. as per the direction of Engineer-in-charge. With stainless steel cover plate:

a. Main Entrance to Control Room Building */ Passage/*Scada room/staff/office room.

b. Conference Room

c. Control Room.

34. The proper coordination & execution of all interfacing civil works activities like fixing of conduits in roofs/walls/floors, fixing of foundation bolts, fixing of lighting fixtures, fixing of supports/embedment, provision of cut outs etc. Shall be the sole responsibility of the Contractor. He shall plan all such activities in advance and execute in such a manner that interfacing activities do not become bottlenecks and dismantling, breakage etc. is reduced to minimum.
35. Contractor shall comply with all the applicable statutory rules pertaining to factories act (as applicable for the State). Fire Safety Rules of Tariff Advisory Committee. Water Act for pollution control etc.
36. All building/construction materials shall conform to the best quality specified in PWD specifications if not otherwise mentioned in this specification.
37. All tests as required in the standard field quality plans have to be carried out in GETCO approved laboratory at bidders cost.
38. The contractor shall execute the work as per the standard field quality plan (FQP) attached. All testing required shall be arranged by the bidder at his own cost.
39. The Bidder shall fully apprise himself of the prevailing conditions at the proposed site. Climatic conditions including monsoon patterns, local conditions and site specific parameters and shall include for all such conditions and contingent measures in the bid, including those which may not have been specifically brought out in the specifications.
40. Polished vitrified tiles in 600x600 mm size and 10mm thick (thickness to be specified by the manufacturer) in flooring and skirting, with water absorption's less than 0.08% and conforming to IS: 15622 of approved make in all colors and shades, laid on cement mortar 20mm thick for flooring & 2mm thick for skirting 1:4 (1 cement: 4coarse sand) including grouting the joints with white cement and matching pigments etc., complete.
41. All steel structure in the sub station premises shall have a minimum overall Zinc coating of 900 gm/sq. m of surface are except for plates and sections below 5 mm which shall have a minimum overall Zinc coating 610 gm/sq. m of surface area. The average Zinc coating for all sections and plates 5 mm and above shall be maintained minimum 127 microns and that for plates and sections below 5 mm shall be maintained minimum 87 microns. However, chequered plate, cross support for panel and ch. Plate which needs to be site welded, Gate, and supports for Grating shall not be Hot dip galvanized.
42. Granite stone of approved make and shade shall be provided to sill.jams and lintel bottom of door/window/ventilator of all the buildings under scope of bidder.
43. RCC Grade slab of adequate thickness shall be provided in all rooms below respective flooring in all rooms of the building under scope of bidder.
44. GETCO shall have right to get the design approved/checked by reputed independent agency for verification of structural design. In that case it will be the responsibility of the Designer to depute their executive and furnish necessary clarification/calculations/assistance for the approval of the drawings/design calculations and

no extra payment shall be payable on this account. The designer or his competent representative shall attend all meetings in this regard without any additional cost to GETCO.

45. GETCO reserves the copy right to use all design/drawings/documents submitted by the bidder. In such cases of use of design/drawings/documents, no additional fee/compensation shall be admissible to the bidder.
46. Design services for buildings include, the design of scaffolding and safety arrangement as per requirement particularly for GIS building and Control room cum administrative building, Type.4 quarter,Store building, Security building etc is in the scope of bidder. Ply wood form work & adjustable tubular steel supports / Props shall be used for RCC slab of all buildings.
47. Providing & applying anti termite treatment to all the buildings (i.e. GIS Building,Control room building, Type.4 quarters, Store building,Security cabin etc) of the substation premises, as per IS 6313 (Part.II & II 2001) for building works in pre construction & post const. stages, using chemicals conforming to relevant IS in water emulsion and effective when applied uniformly over the area to be treated. The chemical to be used is chlorophriphos 20% EC or its equivalent. The treatment is to be carried out as per the procedure mentioned below and treated plinth surface area is to be taken for measurement. (with performance guarantee for 5 years)a)For pre construction treatment: For plinth filling & periphery holes in side plinth to be drilled 300MM C/C each having depth 1.5M and for inside plinth the hole are to be treated with diluted chemical solution, 1.5 lit. per hole, in the ratio of 1:20. For periphery i.e. out side plinth the ditch is to be treated with diluted solution 2.25 litre per rmt. In the ratio 1:20. The entire surface area is to be treated with diluted solution of dose 2.5 litres per smt. over and above as a plinth surface treatment.
    The contractor shall submit performance guarantee of the anti termite treatment item as mentioned in BOQ./ GETCO procedure.

48. Providing & laying water proofing treatment on terrace, RCC Chhajah of all RCC Buildings of the substation premises (i.e. GIS Building,Control room building, Type.4 quarters, Store building,Security cabin etc) including applying neat cement slurry 2.75 kg./sq.mt. on cement admixed with water proofing component 1kg/10sqm after cleaning the surface, Laying cement concrete with brick bat 75mm to 100mm thick with 50% of C.M. 1:5 admixed with water proofing component over 20mm thick layer of C.M. 1:5 to required slope including ramming at junction of wall and slab, after two days of proper curing applying a second coat of cement slurry, finished the surface with 20mm thick C.M. 1:4 china mosaic flooring and finally finishing the surface with trowel with white cement slurry after finishing the whole terrace shall be flooded 75mm deep with water for a period of two weeks.300 mm vata on wall shall be done. The measurements shall be given only for clear area of terrace excluding the area of vatta. The contractor shall submit performance guarantee of the waterproofing item at the rate of 20% of cost of executed quantity of item of work order for a period of 5 years from actual date of completion of work on stamp paper of appropriate value in approved format of GETCO. The agency has to give the consent to deduct the 20% of cost of executed quantity for a period of 5 years from actual date of completion from his bill and shall be withheld as a performance gaurantee for five years.
    The contractor shall submit performance guarantee of the waterproofing item as mentioned in BOQ./ GETCO procedure.
49. In case of any Extra items to be executed to complete/commisiioning the substation, the rate shall be arrived with proper justification and all basic rates shall be consid-

ered from PWD S.O.R. only. If rates are not available in PWD SOR , than market rate shall be considered. However, decision of GETCO shall be final.

50. Tender drawings:

Tender drawings are prepared and attached herewith are purely indicative & for reference purpose only which shows the certain details,arrangement, minimum requirement etc. Working drawing shall be prepared by bidder on the basis of this drawing, site condition, approved electrical lay out, soil condition, Technical specification, IS codes & standards and actual requirement and to be got approved from GETCO prior to execution of work.

The tender drawings are not intended to specify the complete details of various practices of manufactures/ bidders/requirments, but to specify the requirements with regard to performance, durability and satisfactory operation under the specified site conditions.Bidder has to quote the rates according to comlete system requirements.

Please note that dimension /details shown in the tender drawings are minimum requirement which is to be strictly followed. Bidder is required to add further details/items as per acuual requirement based on site conditions, Functional requirement, IS codes and standards, soil strata, Environmental conditions etc.

51. **Protection of RCC structure under ground and above ground against corrosion and weather to all buildings and switch yard foundations.**

Proviging & Applying tar extended two component coating system based on synthesized epoxy resin and amine adduct manufacture as per technical specification of central electro chemical research (CERCI/CSIRKARAIKUDI) to achieve 400-450 microns DFT in two coats as directed. The item includes cleaning the surface before treatment as per manufacturer specification. The coating system EP-CO2020TX or equivalent shall comply the CERCI technology of " comprehensive repair & protection of concrete/steel surface in wet & underwater codition". The rate shall be incusive of all materials labour equivalent scaffolding etc.

ANNEXTURE - A (FINISHING SCHEDULE)

Sr. no.		Type of Foundation & Structure	Wall	Wall finishing	Floor finish	Ceiling	Doors /windows/ventilator	Painting
A								
	GIS BUILDING CUM CONTROL ROOM BUILDING CUM ADMINISTRATIVE BUILDING (BASEMENT(CABLE CELLER AREA) + GF + MF/ FF + STIAIR CABIN)	Foundation as per Soil Condition with RCC framed structure. As approved by GETCO	BB/Bela Masonry in CM 1:6/ Aluminium partition (Partly Glazed and partly panelled) as per approved drawing. In all buildings	Inside: 15 mm thick Cement smooth Plaster in CM 1:3 on walls Outside: 20mm thk sand faced in two coats In all buildings	RCC Grade slab of adequate thickness shall be provided in all rooms below mentioned flooring.	15mm thick smooth cement plaster shall be provided to ceiling of slab in all rooms.False ceiling shall be provided in room as mentioned below.	Door/Window/ventilator shall be of 20 micron thick colour anodized aluminium with glazing as per specification/drawing in all rooms.	Plastic paint in three coats to be provided in all interior walls and ceiling of all rooms except Battery room & Apex ultima or equivalent paint for outside portions for complete building of approved shade and make for outside portions for complete building.

1	**SCADA ROOM**				RCC Flooring of adequate thickness with epoxy hardener topping with Epoxy painting of approved make and shade ..	Gypsum board false ceiling.		
2	**GIS ROOM**				RCC Flooring of adequate thickness with epoxy hardener topping with Epoxy painting of approved make and shade			
3	**AHU ROOM**				RCC floor-ing of			

					100mm thick with non metallic hardener topping.			
4	**LV ROOM**				RCC Flooring of adequate thickness with epoxy hardener topping with Epoxy painting of approved make and shade .			
5	**LCC AND CONTROL & PROTECTION PANEL ROOM**				RCC Flooring of adequate thickness with epoxy hardener topping with Epoxy painting of approved make and shade	Gypsum board false ceiling		

					OR Flooring suitable to CABLE ROOM as approved by GETCO			
6	**BATTERY ROOM**				Acid re-sistant non-skid tiles of 600 x 600mm on flooring and upto full height on wall.			Acid/Alkali resistant painting on walls&ceiling
7	**OFFICE & HALL FOR STAFF/DISCUSSION ROOM/RECEPTION CUM WAITING ROOM**				Vitrified ce-ramic tiles OF 600 X 600MM and 10 mm thick as per de-sign with 150 mm skirting.	Gypsum board false ceiling		
8	**STORE ROOM**				RCC floor-ing of 100mm thick with non metallic hardener topping.			

9	**TOILET BLOCK FOR GENTS AND LADIES**				Anti skid ceramic tiles for flooring and Dado of full heigh	Slab thickness as per approved design with 15mm thk plaster in CM 1:3 on ceiling	Door entrance to Room shall be 28mm thick FRP door as per spec. All windows/ventilator shall be 20 micron thick colour anodized aluminium and covered with M.S Grill from out side	Glazed tiles for full height of wall .
10	**PANTRY**				Vitrified ceramic tiles OF 600 X 600MM and 10 mm thick as per design with 150 mm skirting.			
11	**CONFERENCE ROOM WITH ATTACHED TOILET AND PANTRY(AS SHOWN IN DRAWING)**				Vitrified ceramic tiles OF 600 X 600MM and 10 mm thick as per de-	Gypsum board false ceiling		

					sign with 150 mm skirting.			
12	**STAIR CASE WITH STAIR CABIN ON TERRACE**				Granite of approved quality with non-slippery arrangement			

* In corridor/passage false ceiling shall be provided of 'Gypsum board false ceiling'.

Note: (1) China Mosaic flooring water proofing as per technical specification shall be done for the above buildings on terrace slab of the above buildings with guarantee of water proofing for at least five years from date of completion.

(2) In toilet block, there shall be approved quality of European WC with flush tank, Wash basin, Glass mirror etc for complete function of Toilet block.

(3) Steel stair case from GF of GIS building to FFof Controlroom building shall be provided.

(4) In GIS control room as the height is more, a care shall be taken for sufficient lighting and ventilation.

(5) Aesthetic view of building as a whole shall be maintained.

((7) Aluminium doors and windows shall be heavy type as per latest IS codes and practices.

(8) Leak proof test shall be given for water supply and drainage line.

(9) False flooring of approved make and pattern shall be provided in LVAC room if required.

(10) Granite stone shall be provided in all sills, jams and lintel bottom of all the door/window/ventilator of the buildings of sub staion premises.

STANDARD FIELD QUALITY PLAN (REVISED-R1)

FOR CIVIL WORKS OF GETCO PROJECTS

Sr. No.	Component/Operation & Description of Test	Sampling Plan With Basis	Ref. Document for Acceptance	Testing Agency	Specific Guideline	Approving Authority
1	**MATERIAL**					
A	**CEMENT (FROM APPROVED LIST ONLY)**					
(i) (ii) (iii)	Fineness Compressive Strength Initial & final setting time	As per mix Design requirement	IS: 456,IS: 269 IS: 8112,IS: 12269 IS: 1489	Govt. Approved Lab	The tests for cement Coarse aggre-gates & Fine aggregate shall be conducted during Mix design for Concrete. Mix design shall be subject to approval by GETCO	B-3
B	**COARSE AGGREGATES (FOR CONCRETE)**					
(I) (ii) (iii) (iv) (v) (vi) (vii) (viii) (ix)	Determination of Particle size (Sieve Analysis) Flakiness Index Crushing Value Specific Gravity Bulk Density Absorption Value Moisture Content Soundness of Aggregate Presence of deleterious materials.	As per mix Design requirement	IS: 383,IS: 2386 IS: 456	Govt. Approved Lab	In case of change of source of coarse& Fine aggregates, mix Design should be revised.	B-3
C	**COARSE AGGREGATES (FOR ROAD AND YARD)**					
(i) (ii) (iii) (iv) (v) (vi) (vii) (viii)	Particle Size Distribution Elongation Index Flakiness Index Deleterious Material Specific Gravity Water Absorption Impact Value Los Angeles Abrasion	As per relevant IS	IS ; 2386, IS : 383	Govt. Approved Lab	To be approved by GETCO	B-3

Sr. No.	Component/Operation & Description of Test	Sampling Plan With Basis	Ref. Document for Acceptance	Testing Agency	Specific Guideline	Approving Authority
	Value					
(ix)	Aggregate Crushing Value					
(x)	10% Fines value					
(xi)	Soundness					
(xii)	Alkali Aggregate Reactivi-ty					
(xiii)	Petrography					
D	**FINE AGGREGATE**					
(I)	Gradation /Determination ofParticle size	As per mix Design requirement	IS: 383,IS: 2386,IS: 456	Govt. Approved Lab	In case of change of source of coarse& Fine aggregates, mix Design should be revised.	B-3
(ii)	Specific Gravity and den-sity.					
(iii)	Moisture content					
(iv)	Absorption Value					
(v)	Bulking					
(vi)	Silt Content Test					
(vii)	Presence of deleterious materials					
E	**BURNT CLAY BRICKS**					
(i)	Dimensional tolerance	As per relevant IS	GETCO Specs. IS: 3495) (Part I to Iv)	Govt. Approved Lab	To be approved by GETCO	B-3
(ii)	Compressive Strength					
(iii)	Water Absorption					
(iv)	Efflorescence					
F	**FLY ASH LIME BRICKS**					
(i)	Dimension	As per relevant IS	GETCO Specs. IS: 3495 and IS : 12894	Govt. Approved Lab	To be approved by GETCO	B-3
(ii)	Water absorption					
(iii)	Drying Shrinkage					
(iv)	Compressive Strength					
(v)	Efflorescence					
G	**SOLID CC BLOCKS**					
(i)	Dimension	As per relevant IS	GETCO Specs. IS: 2185 Part 1	Govt. Approved Lab	To be approved by GETCO	B-3
(ii)	Block Density					
(iii)	Compressive strength					

Sr. No.	Component/Operation & Description of Test	Sampling Plan With Basis	Ref. Document for Acceptance	Testing Agency	Specific Guideline	Approving Authority
(iv) (v)	Water absorption Dry Shrinkage					
H	**BELLA STONE**					
(i) (ii)	Water absorption Compressive Strength	As per relevant IS	GETCO Specs. IS: 2386 Part 3	Govt. Approved Lab	To be approved by GETCO	B-3
I	**PRECAST CC PAVER BLOCKS**					
(i) (ii) (iii) (iv) (v) (vi)	Shape and Dimension Compressive Strength Flexural Strength Abrasion Resistance Split Tensile Strength Water absorption	As per relevant IS	GETCO Specs. IS: 15658	Govt. Approved Lab	To be approved by GETCO	B-3
J	**SOIL TO BE USED FOR BACK FILLING**					
(i) (ii) (iii) (iv) (v) (vi) (vii)	Grain Size Analysis Atterberg's limit Classification of Soil Free Swell Index Swelling Pressure Proctor Test SO_3 (Sulphate) Content	As per relevant IS	IS :2720	Govt. Approved Lab	To be approved by GETCO	B-3
K	**WATER**					
(i) (II)	Cleanliness (Visual Check) Chemical and physical properties of water for checking its suitability for construction proposes.	Random One sample per Source	IS: 456,IS: 3025 and Specification. The Water used for mixing concrete shall be fresh, clean and free from oil, acids and alkalis, organic materials, or other deleteri-ous materials IS: 456,IS: 3025 and	Contractor / GETCO Govt. Approved Lab	Each source to be Approved by GETCO	C

Sr. No.	Component/Operation & Description of Test	Sampling Plan With Basis	Ref. Document for Acceptance	Testing Agency	Specific Guideline	Approving Authority
			GETCO Specification			
L	**REINFORCEMENT STEEL(FROM AP-PROVED LIST ONLY)**					
(i)	Identification & size	Random	IS: 432,IS: 1139, IS: 1786 &GETCO Specifi-cation	Contractor should pro-duce manufac-turer's test Certifi-cate. i.e. from approved Manufacturer. Govt. Approved Lab	Approved by GETCO.	B-3
(ii)	Chemical Analysis Test	One sample per Heat				
(iii)	Tensile Test	One sample per Each size				
(iv)	Yield stress\proof stress	One sample per Each size				
(v)	Percentage Elongation Bend/Re-bend Test	One sample per Each size				
(vi)	Reverse Bend Test for HYSDWire	One sample per Each size One sample per Each size				
M	**STRUCTURAL STEEL**					
(i)	Chemical Composition	One sample per Heat	IS :2062, IS :228, IS : 1608, IS : 1599, IS : 1757, IS : 10842	Govt. Approved Lab	Approved by GETCO.	B-3
(ii)	Tensile Strength	One sample per Each size				
(iii)	Yield Strength	One sample per Each size				
(iv)	Percentage Elongation	One sample per Each size				
(v)	Bend Test	One sample per Each size				
(vi)	Impact Test	One sample per Each size				
(vii)	Y Groove Crackability Test	One sample per Each size				
(viii)	Dimensions	Random				
N	**FOUNDATION BOLTS**					
(i)	Identification & size	Random	IS : 209, IS : 2016, IS :2062, IS : 2633, IS :12427,& GETCO Specifi-cation	Govt. Approved Lab	Approved by GETCO.	B-1
(ii)	Chemical Analysis Test	One sample per Each				
(iii)	Tensile Test	One sample per Each				
(iv)	Yield stress/Proof Stress	One sample per Each				
(v)	Percentage Elongation	One sample per Each				
(vi)	Bend / Rebend	One sample per Each				
(vii)	Weight/Thickness/Uniform ity of Galvanizing	One sample per Each				
O	**PVC WATER STOPS**					

Sr. No.	Component/Operation & Description of Test	Sampling Plan With Basis	Ref. Document for Acceptance	Testing Agency	Specific Guideline	Approving Authority
(i) (ii) (iii) (iv) (v) (vi) (vii)	Tensile strength Elongation Hardness Water absorp-tion,percentage by mass Cold bend temperature at which sample does not crack Accelerated extraction test: (a) Tensile strength (b) Elongation Stability in effect of alkalis test : (a) weight increase at 7 days, % by mass (b) weight decrease by mass at 7 days, % by mass (c) Change in hard-ness at 7 days (d) Weight increase at 28 days (e) Weight decrease at 28 days **(f)** Dimension change	One sample per Each One sample per Each One sample per Each One sample per Each One sample per Each One sample per Each One sample per Each	IS : 15058, IS :8543 (Part4 / Sec 1), IS : 13360 (Part 5 / Sec 1), IS ; 9766 & GETCO Specification	Contractor should Produce man-ufacturer's test Certificate. i.e from approved Manufacturer.	Approved by GETCO.	B-3
P	**Bought out item (shown as annexure – II)** Check the bought out items are as per Tech-nical specification / IS codes before use. Ap-proval of all bought out items.	Check all the items	GETCO Specifi-cation	Joint inspec-tion By GETCO. And Contrac-tor	Approval by GETCO.	**A**
2	**WORKS**					
	GANTRY/EQUIPMENT FOUNDATION/CABLE TRENCH					
A	**BEFORE EXCAVATION**					
(i) (ii)	Checking of pegs location as Per line and alignment Checking of pit making as perDrawing & RL	100% on each Location 100% on each Location	IS: 4091,IS: 3764 &GETCO ap-proved Drawing/ specification	Contractor	Approved by GETCO.	C
B	**EXCAVATION**					

Sr. No.	Component/Operation & Description of Test	Sampling Plan With Basis	Ref. Document for Acceptance	Testing Agency	Specific Guideline	Approving Authority
(i) (ii) (iii)	Dimensional conformity Verticality/slopes & Square ness of each pit Verification of classification of foundation wherever applicable.	Each location Each location Each location	IS: 4091,IS: 3764 &GETCO approved Drawing/ Specification.	Contractor Contractor Joint inspection By GETCO. And Contractor	Approval by GETCO. (1) Foundations will not be placed on filled up soil (2) Minimum depth Of foundation will be 750 mm in Virgin soil.	B-3
C	**ANTITERMITE TREAMENT**					
(i) (ii) (iii) (iv)	Check for material to be used Check for proportion Depth and c/c distance of holes Check for pouring of required quantity of liquid in holes	100% Random Random Random	IS : 6313 & GETCO Specification	Joint inspection By GETCO. And Contractor	Approval by GETCO.	B-3
D	**P.C.C. PADDING**	For all locations	IS:456,GETCO Approved foundation Drawing & specification	Joint inspection By GETCO. And Contractor	Approval by GETCO.	C
E	**SHUTTERING (**Form work)					
	Check for materials, breakageOr damage Check for plumb, alignment Parallelism,squareness and equidistance from stubDimensional check. Check for level & height Check for rigidity of frame/tightness Cleaning and oiling Diagonal bracing if required as per drawings/site conditions. Checking of joints to avoid undue loss of cement slurry	**100%**	IS: 456,GETCO Specification/ Approved drawings.	Joint inspection By GETCO. And Contractor	Approved by GETCO.	C
F	**PLACEMENT OF REINFORCEMENT STEEL.**					

Sr. No.	Component/Operation & Description of Test	Sampling Plan With Basis	Ref. Document for Acceptance	Testing Agency	Specific Guideline	Approving Authority
(i)	Check the steel bars for rust,cracks,surface flaws,laminate etc. (Visual check)	**100%**	IS: 456,GETCO Specification/ approved drawings.	Joint inspection By GETCO. And Contractor	Approved by GETCO.	B-3
(ii)	Check as per the bar bendingSchedule before placement ofConcrete. Check cutting tolerance for bars as per check List/drawings.					
(iii)	Check whether all bent bars and lap lengths are as per approved bar bending schedule.					
(iv)	Check whether all joints & crossing of bars are tied properly with right gauge & annealed wire as per specification.					
(v)	Check for proper cover distance spacing of bars,spacers, & chairs after the reinforcement cage has been put inside the formwork.					
(vi)	Check whether lapping of bars are tied properly with right gauge and annealed wire as per specification.					
G	**PILE FOUNDATION** (Additional Tests)					

Sr. No.	Component/Operation & Description of Test	Sampling Plan With Basis	Ref. Document for Acceptance	Testing Agency	Specific Guideline	Approving Authority
(i)	Check of centre line of pile group	Each pile group	IS:2911 &GETCO Approved pile Foundation Drawings/ Specification.	Joint inspection by GETCO and Contractor	Checklist to be prepared And signed jointly	B-3
(ii)	Check pile location	Each pile				
(iii)	Temporary casing tube & permanent line also check Thickness of liner material (if applicable)	Each pile				
(iv)	Bentonite slurry (if applicable)	Each pile	GETCO Approved pile foundation Drawings/pecification			
(v)	Pile depth, level, size and alignment	Each pile				
(vi)	Chipping of pile head	Each pile				
(vii)	Pile load testing	As per GETCO GBOQ/Specifica-Tion IS: 2911				
(viii)	Integrity test for all piles	100% on each Location				
(ix)						
(x)	Anchor bolts if applicable Level, centre to centre distanceOf bolts. Visual check for galvanizing	100% on each Location				
H	**SETTING OF TEMPLATE**					
(i)	Identification	Each foundation	GETCO Approved specifications	Joint inspection by GETCO. and Contractor	Approval by GETCO	C
(ii)	Check for orientation of template to match with drawing	Each foundation				
(iii)	Check for line and level of template	Each foundation				
(iv)	Check for center line of foundation and template	Each foundation				
(v)	Check for diagonal dimensions	Each foundation				
(vi)	Check for diameter and distance of holes	Each foundation				
I	**PLACEMENT OF FOUNDATION BOLTS**					
(i)	Identification (Diameter and length)	Each foundation	GETCO Approved specifications	Joint inspection by GETCO	Approval by GETCO	C

Sr. No.	Component/Operation & Description of Test	Sampling Plan With Basis	Ref. Document for Acceptance	Testing Agency	Specific Guideline	Approving Authority
(ii)	Check the foundation bolts for rust, cracks, surface flaws, laminate etc. (Visual check)	Each foundation		and Contractor		
(iii)	Check for height of bolts above concrete level as per drawing	Each foundation				
(iv)	Check for bolt to bolt distance as per drawing	Each foundation				
(v)	Check for verticality of bolts	Each foundation				
(vi)	Check for Fixity of bolts	Each foundation				
J	**PLACEMENT OF WATER STOP**					
(i)	Check the water stops for blisters, pinholes, cracks, and embedded foreign matters (Visual Check)	Random	GETCO Approved specifications	Joint inspection by GETCO and Contractor	Approval by GETCO	B-3
(ii)	Check for width and thickness	Random				
(iii)	Line and level	100%				
(iv)	Fixity during concreting	100%				
K	**CONCRETING**					
a	**APPROVAL OF MIX DESIGN**.	For each grade of Concrete.	IS: 456 &GETCO Approved specifications	Contractor	Approval by GETCO	B-3
b	Batching, mixing & placing of concrete and compacting	Random	IS: 456 &GETCO Approved drawings And specifications	Contractor	Approval by GETCO	B-3
	Placing concrete, and compacting	Random				
c	**CONCRETE TESTING**					
	Slump test	Random	IS:456,IS:516,IS: 1199 And GETCO Specifications	Contractor	Results to be recorded and signed Jointly	B-3
	Check for quantities for cement, fine aggregate, coarse aggregate and water while batching	Random				
d	**CONCRETE CUBE TESTING**					
	Compressive Strength	Sample (Consisting of minimum 6 cubes-3 cubes for 7days and 3 cubes for 28 days test) 1-5 Cmt : 1	Is:1199,IS:456, IS:516	Govt. Approved lab	To be witnessed for important structure (slab)& Approved by GETCO	B-3

Sr. No.	Component/Operation & Description of Test	Sampling Plan With Basis	Ref. Document for Acceptance	Testing Agency	Specific Guideline	Approving Authority
		6-15 Cmt : 2 16-30 Cmt : 3 31-50 Cmt : 4 Above 50 Cmt : 4+1 additional for each additional 50 Cmt				
L	**BACKFILLING**					
	Check for thickness of Layer & watering Visual check for correction/ramming Compaction test (Percentage ofMax dry density	100%	GETCO Specifications.	Govt. Approved lab	To be witnessed & Approved by GETCO	C
M	**BRICK-WORK**					
	Mortar mix/proportion Plumb & Alignment Joints	Random Random Random	IS:2250, GETCO Specification	Joint inspection by GETCO and Contractor	Approval by GETCO	C
N	**PLASTERING**					
	Plastering thickness and evenness Mortar mix proportion	Random Random	GETCO Specification GETCO Specification	Joint inspection by GETCO and Contractor	Approved by GETCO	**C**
O	**FLOORING**					
(i) (ii) (iii) (iv)	Thickness of flooring material (Kotah stone/Vitrified tiles/glazed tiles) Mortar mix proportion Line and level Joints	Random Random 100% 100%	GETCO Specification	Joint inspection by GETCO and Contractor	Approved by GETCO	**B-3**
P	**WATERPROOFING**					
(i) (ii) (iii) (iv) (v) (vi)	Check for material to be used Cleaning of terrace Proportion of mortar Level Joints Pond Test	100% 100% Random 100% 100% 100%	GETCO Specification,.	Joint inspection By GETCO. And Contractor	Approval by GETCO	**B-3**
Q	**CURING FOR CONCRETE, MASONRY,PLASTERING ETC.**	100% on all locations	IS 5613 &GETCO Specification,.	Contractor.	Approval by GETCO	**C**
R	**ALLUMINIUM DOORS/WINDOWS**					

Sr. No.	Component/Operation & Description of Test	Sampling Plan With Basis	Ref. Document for Acceptance	Testing Agency	Specific Guideline	Approving Authority
(i)	Check for size of different members	Random	IS : 733, IS: 1285, IS : 1868, & GETCO Specification	Joint inspection By GETCO. and Contractor and test report from Manufacturer	Approval by GETCO	B-2
(ii)	Check for weight of different members	Random				
(iii)	Check for anodizing	Random				
(iv)	Check for joints of various members	Random				
(v)	Check for thickness of glass	Random				
(vi)	Fixing (line, level, plumb)	100%				
(vii)	Gap between frame and wall	100%				
S	**FALSE CEILING**					
(i)	Type of false ceiling	Random	GETCO Specification	Joint inspection By GETCO. And Contractor	Approval by GETCO	B-2
(ii)	Thickness of false ceiling panel	Random				
(iii)	Check for size and weight of different members of false ceiling skeleton	Random				
(iv)	Fixing with wall	Random				
(v)	Line and level	Random				
(vi)	Check for hangers	Random				
(vii)	Cutouts for lighting fixtures	Random				
T	**GI PIPE FOR WATER SUPPLY**					
(i)	**Check for weight as per diameter of pipe**	Random	IS : 1239 & GETCO Specification	Joint inspection By GETCO. And Contractor	Approval by GETCO	**B-3**
(ii)	**Depth of excavation for pipe line**	Random				
(iii)	**Laying of pipe line as per layout given**	Random				
(iv)	**Fixing of pipe with clamps on walls**	100%				
(v)	**Watertight ness of joints**	100%				
U	**SITE SURFACING**					
(i)	Check for layers of 200mm	100%	GETCO Specification	Contractor and Govt. approved Laboratory	Approval by GETCO	**B-3**
(ii)	Check for watering	100%				

Sr. No.	Component/Operation & Description of Test	Sampling Plan With Basis	Ref. Document for Acceptance	Testing Agency	Specific Guideline	Approving Authority
(iii)	Check for rolling	100%				
(iv)	Check for density (% Compaction)	100%				
V	**ROAD WORK**					
(i)	Visual check for material	One sample	IS383 & 2386 GETCO Specs. GETCO Specification	Contractor	Approval by GETCO	B-3
(ii)	Stacking of material	100%				
(iii)	Preparing the land for road	Random				
(iv)	Spreading of metal in required thickness	Random				
(v)	Camber	Random				
(vi)	Rolling	Random				
(vii)	Watering	Random				
W	**YARD QUARRY DUST/METAL SPREADING**					
(i)	Visual check of material	One sample	IS383 & 2386 GETCO Specs.	Contractor	Approval by GETCO	B-3
(ii)	Stacking of material	100%				
(iii)	Preparing the land upto required level	Random				
(iv)	Spreading of material of required thickness	Random				
(v)	Compaction	Random				
X	FALSE FLOORING					
(i)	Type of false flooring	Random	GETCO Specification	Joint inspection By GETCO. And Contractor	Approval by GETCO	B-2
(ii)	Thickness of false flooring panel	Random				
(iii)	Check for size and weight of different members of false flooring skeleton	Random				
(iv)	Fixing with floor	Random				
(v)	Line and level	Random				
(vi)	Check for studs	Random				
(vii)	Cutouts for panel to be supported on MS channel	Random				
Y	PERIPHERAL/ROAD SIDE DRAIN					
(i)	Alignment as per lay out	100% on each Location	As per approved drawings	contractor	Approval by GETCO	**C**

Sr. No.	Component/Operation & Description of Test	Sampling Plan With Basis	Ref. Document for Acceptance	Testing Agency	Specific Guideline	Approving Authority
(ii)	Invert level as per outlet points	100% on each Location	As per approved drawings	contractor	Approval by GETCO	**C**
(iii)	Concrete and masonry as per FQP		As per approved drawings	contractor	Approval by GETCO	**C**

:GENERAL GUIDELINES FOR IMPLEMENTATION:

1. Details of categories of check codes A,B & C including accepting and deviation dispositioning authorities are indicated at annexure-I

2. GETCO specification shall mean GETCO technical specification, approved drawings data sheets and Law provisions applicable for the specific contract.

3. Acceptance criteria and permissible limits shall be as per relevant Indian Standards and / or prevalent code of practice / GETCO specifications.

4. It is clarified that the tests indicated at column 2 of this FQP i.e. Against column "component operation & Description of test ", are only generally required to be conducted. However GETCO reserves the right to carry-out any additional tests at any stage if the situation so warrants.

5. SE (TR) of circle shall approve testing laboratory before accepting the test results from the lab.

6. SE (TR) of circle shall approve the sources for cement, coarse aggregate, fine aggregate & water before actual utilization.

7. All the testing & measuring equipments used by the contractor for testing are required to be calibrated. A Copy of valid calibration report shall be retained by GETCO based on the joint inspection.

8. Classification of foundations shall be approved by GETCO based on the joint inspection report & Soil investigation reports.

9. Zone-IV fine aggregate shall be used for nominal mix. Reinforced cement concreting work.

9.1 Zone-IV fine aggregate shall be avoided for design mix reinforced cement concreting work unless tests have been done to ascertain the suitability of proposed with the prior approval GETCO sit.

10. Bricks should be free from cracks, flaws and modules of free lime. They should have smooth rectangular faces with sharp corners and should be uniform in colour.

11. Cement

11.1 In case of cement is in the scope of the contractor, the same shall be procured from sources approved by GETCO site and got tested on sample basis for specified acceptance tests as specified in the FQP at a reputed third party lab approved by GETCO site.

11.2 The samples of cement for site testing shall be taken within three week of the delivery and all the tests shall be commenced within one week of sampling. If the cement remains in store for a period of more than Six months. All the site tests are required to repeated before usage.

11.3 The source and grade of cement shall be as per approved design mix.

12. Reinforcement steel & structural steel used in cable trenches & foundations

12.1 In case supply of steel is in the scope of the contractor, the same shall be procured from the main producers i.e. SAIL, TISCO, IISCO or Rashtriyalspat Nigam or the rerollers approved by main producers.

12.2 The results of testing of cement and reinforcement steel referred in 12.1 and 13.1 above shall be got approved from GETCO site before cement and reinforcement steel are put to use. However, in exceptional cases due to exigencies of work, GETCO site may authorize the contractor to use cement and reinforcement steel even before the test results are received. However, in all such cases, if the test results subsequently received are found to be not complying with the specified acceptance criteria, the contractor shall have to dismantle and recast all such foundations cast with such non-conforming materials at his own cost. Confirmation to this effect shall be obtained from the contractor by the project authorities beforehand in all such cases.

13. The contractor shall submit welding procedure specification (WPS) including the type of electrode used for approval of GETCO site before staring the welding work. The welder with proper certificate shall be deployed

14. Approval / acceptance of individual test results by GETCO in the course of execution of contract will neither relieve the contractor from his contractual obligations and responsibilities, nor does it limit the owner's right under the contract.

15. In case, requirement of special items like super sulphated cement, corrosive resistant reinforcement Steel (CRS) etc. arise due to site conditions, the specific approval of GETCO may be obtained before using the same and all the tests as per relevant standards shall be carried out.

16. All the materials shall be stored by the contractor in a manner affording convenient access for identification and inspection at all the times. Storage of material shall be in accordance with IS: 4032 (latest edition).

ANNEXURE-I

GUJARAT ENERGY TRANSMISSION CORPORATION LIMITED

Accepting and deviation dispositioning authorities for different Categories of checks as envisaged in field quality plan

Category	type of Check	100%Checking/ witnessing by	counter check/ surveillance check by	Accepting Authority, if Test results Are within Permissible Limit	Deviation Dispositioning Authority
A	Critical	EE (civil) of circle with Contractor's Engineer	SE(TR) Plus EE(C)	SE(TR) Plus EE(C)	CE, Corporate Office
B-1	Major	D E (Quality Deptt)	E E (Quality Deptt)	EE (Quality Deptt)	CE (Quality Deptt)
B-2	Major	EE (civil) of circle with Contractor's Engineer	SE (Civil)	SE (Civil) plus EE (C)	CE, Corporate Office
B-3	Major	DE(C)	EE(C)	EE(C)	SE(TR) Plus EE(C)
C	Minor	JE(C)	DE(C)	DE(C)	EE(C) Plus DE(C)

BOUGHT OUT ITEMS

Check the following bought out items for their specifications / IS codes before use

1. Cement.
2. Murrum or yellow earth for filling in yard or plinth.
3. Bricks/Block.
4. Reinforcement.
5. Structural steel.
6. Foundation bolts.
7. Fine aggregate.
8. Coarse aggregate for all type of concrete, WBM road and metal spreading in yard.
9. PVC water pipe line with fixtures.
10. PVC drainage pipe line with fixture.
11. PVC rain water pipe with fixture.
12. PVC casing pipe for bore well.
13. 4 mm thick flat copper cable for submersible pump
14. Teak wood for frame and shutter.
15. Aluminium door, window and ventilator.
16. FRP door.
17. Steel cup board shutter.
18. False ceiling material.
19. Glazed tiles.
20. Kotah stone and marble strips.
21. Vitrified tiles.
22. Granite or Marbo granite tiles.
23. Metallic hardener topping.
24. Epoxy coating material.
25.
26. Paver concrete block.
27. Prestressed concrete cover for cable trench.
28. Oil bound distemper.
29. Acid/Alkali resistant paint.
30. Apex ultima or equivalent exterior paint.
31. Epoxy paint for flooring in GIS room.
32. Rolling shutter.
33. Chain link fencing panel and angle.
34. Wash basin.
35. Orissa pan/European pan.
36. Glass mirror.
37. Marble year plate.
38. Towel rod for bath room.
39. Sliding gate.
40. RCC Hume pipe.(pressure/Non pressure).
41. Submersible pump for bore well.
42. Substation Sign boards.
43. Acrylic name plates.
44. MS cover for cable trench in control room/GIS room.
45. Ear thing strips.
46. Grout materials for foundation/flooring.

ANNEXURE - III
LIST OF DRAWING/DOCUMENTS TO BE SUBMITTED BY BIDDER FOR APPROVAL.
The list is indicative and not exhaustive.

Sr. No.	Subject
A	Test location plan for soil testing (showing location of Bore hole, Trial pit, Plate load test, CBR test etc)
B	Field Quality Plan
C	Design Basis Report
D	Geo Technical Investigation report.
E	Buildings (GIS Buildings,Control room building, Type.4 quarter, Store building & Security Building,Toilet block systems for labors etc)
F	**ARCHITECTURE DRAWINGS**
1	Ground/first floor plan/terrace plan as the case may be ,section (covering complete details of building), elevation of all four side,terrace plan.
	Details of
2	Lay out and details of water supply from under ground tank/ source of water to terrace tank.
3	Typical details of stainless steel railing in stair. with plan ,Elevation and other required details.
	Typical details of MS railing (Detachable & fix type) with plan ,Elevation and other required details.
4	Typical details of removable railing details at first floor balcony (wherever applicable).
5	Toilet block details showing lay out, standard height & details of wash basin, WC, flush tank, Nani trap, urinal pan, exhaust fan, towel rod, Bib cock, Glass Mirror, pillar cock,internal water supply lay out and drainage lay out, pattern of tiles in flooring and wall etc.(As per spec. and requirement)
6	Details and drawing of all type of doors,Windows, Ventilators, Curtain wall glazing as per architect drawing, Rolling shutter, sills & jams of doors/window/ventilator.
7	Finishing and flooring schedule with color scheme.
8	Details and drawing of alluminium partition wall (partly panelled and partly glazed) (wherever applicable)
9	Lay out of false ceiling (with cut out for electrical fixtures) & all required details for execution.
10	Lay out of false flooring (with cut out for panels) & with all required details for execution.(If required as per approved drawing)
G	**STRCTURE DRAWINGS FOR BUILDINGS WITH DESIGN CALCULATION & SUPPORTING DOCUMENTS**
1	Analysis & Design of Building in four volume (a) Sketches,load evaluation,design note & STAAD Input file (b) STAAD output file (column and Beam design) & Base shear calculation. (c) Foundation design calculations. (d) Design calculation for Lintel, Secondary member,Slab and stair case.
2	Lay out & Details of foundation, Ground Beam, Plinth beam, DPC course at plinth

	level.
3	Lay out & Details of Slabs for each floor
4	Lay out & Details of Beams at each floor
5	Lay out & Details of Lintels, sills, stair case and other misc details at each floor.
6	Bar bending schedule for reinforcement of all above RCC strcture.
7	Fabrication details of Girders for crane and lifting arrangement in control room and GIS room as the case may be
8	Lay out and details of RCC Gantry bracket beam details for control room and GIS room.
9	GIS floor lay out & details showing details of fixing of channel if any to be grouted in floor as per manufacturer, cable trench, misc details etc
10	Lay out and Section of RCC cable trench inside control room building and GIS Building.
11	Typical Section of yard cable trench at entry of control room/GIS building.
H	**SWITCH YARD STRCTURAL DRAWINGS WITH DESIGN CALCULATION & SUPPORTING DOCUMENTS.**
1	Foundation for each support strcture(Equipments, SF6 Air bushing,Lighening mast,DG set and Tower Gantry foundations etc) as per approved Electrical lay out.
2	Lay out and section of all type of cable trenches with road/drain crossing details and water collection sump if required as per site condition as per approved electrical lay out.
3	Section of Cable trench/power cable trench crossing Drain.
4	Section of Cable trench/power cable trench crossing another cable trench/power cable trench
3	Details of Fire protection walls
4	Foundation lay out and Details of Bus duct foundations in yard.
5	Details of Transformers with surrounding soak pit,grills and Rail cum road etc
6	Details of Reactors with surrounding soak pits,grills and Rail cum road.
7	Details of foundations of circuit breaker
8	Details of suface water drain lay out for earthing (If required)
9	Details and lay out of peripheral drain, road side drain etc as the case may be.
I	**MISC. WORK IN SUBSTATION WITH DESIGN CALCULATIONS & SUPPORTING DOCUMENTS**
1	Typical plan and section of under ground tank.
2	Typical plan and section of under ground oil sump
3	Lay out and section of RCC road.
4	Lay out of water supply and drainage arrangment with disposal point in switch yard and colony.
5	Details of septic tank and soak pit
6	Plan,section and elevation of vehicle parking shed with foundation and paver block details.
7	Lay out and details of tree plantation in sub station.
8	Lay out and details of metal spreading with sand.
9	Plan,section and elevation of Stacking platform with foundation.
10	Lay out and details for Rain water harvesting ,Recharge wells etc.
11	Layout, plan section,elevation of comopund wall with foundation and other RCC details.
12	Plan.section and elevation of motorized sub station Gate including electrification details, type of motor etc.

J	**ANY OTHER DRAWINGS/DETAILS REQUIRED FOR SUCCESSFUL COMPLETION & COMMISSIONING OF 66KV GIS SUBSTATION AS PER SCOPE OF WORK ORDER.**