

# NEPAL ELECTRICITY AUTHORITY

(An Undertaking of Government of Nepal)



***KfW Development Bank (No.: 2015-68-112)  
Reconstruction and Improvement of Electricity in Earthquake Affected  
Districts of Rasuwa and Nuwakot  
Social Infrastructure Development Component  
Rasuwa Nuwakot Distribution System Reconstruction and Improvement  
Project***

**BIDDING DOCUMENT  
FOR**

**Construction works of Social Infrastructure  
Consisting of School, Health Post, Community Building and Cultural  
Heritage**

**Single-Stage, Two-Envelope  
Bidding Procedure**

**Issued on:** 21 June, 2019  
**Invitation for Bids No.:** NCB-REIP-SDC-2019-01  
**NCB No.:** NCB-REIP-SDC-2019-01  
**Employer:** Nepal Electricity Authority  
**Country:** Nepal

VOLUME 2 OF 3

Rasuwa Nuwakot Distribution System Reconstruction and Improvement Project  
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**PART 2 (A) – Employer's  
Requirement**  
For Social Infrastructures

# **VI. Technical Specifications & Drawing for Social Infrastructures**

## **A. Technical Specification**

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## 1. General information

1.1 The primary objective of Nepal Electricity Authority (NEA) is to generate, transmit and distribute adequate, reliable and affordable power by planning, constructing, operating and maintaining all generation, transmission and distribution facilities in Nepal's power system both interconnected and isolated.

1.2 NEA is the Executive Agency for Reconstruction & Improvement of Electricity in Earthquake Affected Districts of Rasuwa and Nuwakot Project which includes construction of the following:

**(a) Social Infrastructure Development Component**

**(b) Electrification Component works consisting of construction of new 33/11kV substations, associated 33kV, 11kV & 0.4kV line feeders**

This Technical specification covers the scope of works related to the Social Infrastructure Development works only.

1.3 The KfW, Germany, the funding agency, has appointed POWERGRID as Consultant for procurement and implementation phase of the Reconstruction & Improvement of Electricity in Earthquake Affected Districts of Rasuwa and Nuwakot Project.

1.4 The broad scope of this specification covers the following construction works.

1.5 NEA, therefore, invites bids for the following package for Social Infrastructure Development Works associated with said Reconstruction Project.

1.6 The brief scope of work for the above component is mentioned below:

- |    |  |           |
|----|--|-----------|
| 1. | New Community Building                 | – 02 nos. |
| 2. | New School Building                    | – 01 no.  |
| 3. | Reconstruction of Religious Places     | - 01 no.  |
| 4. | New Vegetable Collection Center        | - 01 no   |
| 5. | New Health Post Building               | - 01 no.  |
| 6. | Water Supply Scheme                    | - 01 no.  |
| 7. | Fencing at various location (optional) | - 11 nos. |
| 8. | Improvement of Foot Trails (optional)  | - 4 km    |

The technical specifications of services to be provided under the above packages have been specified in various sections of this volume (Volume-II). In case of any discrepancy between Section-PROJECT and other sections, Section PROJECT shall prevail over all other sections.

The scope of the work mentioned above are subject to change and addition of work scope may occur during the project implementation.

The site for the Project may be located in the Hilly Terrain with no vehicular transportation access and head loading may be required for the transportation of the construction materials.

## 2. INTENT OF SPECIFICATION

2.1.1 It is the intent of this specification to describe primary features, materials, design & performance requirements and to establish minimum standards for the work. The specification is 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.

2.1.2 These Standard Specifications, together with the Construction Standards, shall govern the performance of the Works and shall be the basis for inspection and acceptance of the Work by the Project.

2.1.3 The Standard Specifications and the Construction Standards shall be considered as mutually inclusive, and the conditions stated in each shall supplement the other as appropriate.

2.1.4 All Standard Specifications shall be followed at all times by the Contractor unless specifically accepted in writing by the Project, or unless some aspects of the work covered by these General Specifications are not required by the Scope of Work.

## 3. SCOPE OF WORKS:

3.1.1 The scope of works includes construction of social infrastructures including schools, health post, community building, religious places etc. of following scope of work **in Rasuwa & Nuwakot** districts as summarized below and as per the BOQ attached with the Bid Document.

- i. Construction of Public School Building
- ii. Construction of Health Post Building
- iii. Construction of Community Building
- iv. Reconstruction of Religious Places
- v. Construction of Vegetable Collection Center
- vi. Construction of Water Supply Scheme
- vii. Construction of fencing wall around schools (optional)
- viii. Improvement of foot trails in various location (optional)

Tentative location for the above scope has been provided at Annexure-I.

3.1.2 All the above items as per the requirement of the bid documents are to constructed in Nuwakot & Rasuwa districts.

3.1.3 The bidder shall survey all areas with all nodes, conceptualize, plan obtain all necessary clearances from all authorities and shall submit the proposal for approval of the employer before commencement of execution of the work. The time frame for all above shall not affect the entire completion schedule.

3.1.4 The bidder shall adequately plan for all tools, emergency portable means for works related in the existing infrastructure. As the work is to be performed in the infrastructures associated with the public, proper planning and co-ordination with the local community shall be planned for the smooth execution of the work. The villages in the project area are located on steep hills and material transportation may require head loading. In such a cases all the cost shall be built-in the quoted prices of the items/services and no separate price shall be payable.

3.1.5 The bidder shall identify all areas of works and earmark its distinct team comprising of experienced staffs to carry out the entire work by deploying identified manpower simultaneously at various fronts. The entire plan along with indicative deployment of the staffs is required to be submitted along with bid for owner's reference and assessment.

3.1.6 Obtaining clearances from various departments/civic agencies interaction with concerned agencies shall be done by the successful bidder on behalf of the Employer.

3.1.7 The successful bidder shall plan for adequate storage area nearby of the project site for the receipt of the material required under the project and deploying at various fronts of the site in minimum time.

3.1.8 The bidder shall carefully plan and execute various works least outage of other public services. Implications arising out due to any type of damages related to existing public services/public property/reinstatement work shall be borne by bidder himself and the employer shall not bear any claim on this account whatsoever.

3.1.9 The scope shall also include handing over of the existing removed materials during the reconstruction work of infrastructures to the identified stores of the Employer at his own cost. The successful bidder shall envisage and list out details of such type of materials to be removed in advance and intimate to Engineer in-charge of site progressively till the execution of the contract.

3.1.10 The bidder shall be responsible for safety of human & other livestock, all facilities in the surrounding and equipment during the working.

3.1.11 The soil investigation report shall be provided for the entire school area site with the recommended type and size of foundation.

#### **4. PHYSICAL AND OTHER PARAMETERS:**

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#### 4.1 Location of the site – Nuwakot and Rasuwa districts

#### 4.2 Meteorological data:

The meteorological data of the site are as under. All materials supplied under this Contract shall be suitable for the following system and site conditions.

##### (a) Climatic conditions

###### (1) Ambient temperature

- Maximum : 50 deg. C
- Minimum : 0 deg. C
- Annual average : 32 deg. C

###### (2) Wind velocity

- Maximum : 34.4m/sec

###### (3) Relative humidity

- Maximum : 100%
- Minimum : 20%

###### (4) Monsoon season : June-August

###### (5) Precipitation

- Maximum : 1,000mm/month
- Minimum : Zero/month

(b) Altitude of site : Less than 2700 m from sea level

(c) Seismic force : 0.15G

(d) Isokeraunic level : 50

#### 4.3 Soil Data

The bidder shall be responsible for carrying out the required survey and should fully satisfy himself about the nature of soil expected to be encountered prior to the submission of bid.

The unit rate quoted by the Bidder shall be irrespective of soil type such as normal soil, soft rock, hard rock and crossings such as pavements, all types of roads, rivers, canals, nallah, culverts, rail track etc. encountered during the actual installation. The Bidders are required to make their own estimates and offer a single uniform rate applicable for all kinds of soil strata and crossings.

The Employer shall not entertain any additional claims/payments for any type of soil/crossings encountered during construction. The Employer strongly recommends site visits/investigation by the Bidders (at their own cost) before submission of the bid. The contractor shall be required to carry out excavation and back filling in accordance with this specification and provide all additional items required at its own cost for proper installation not limited to those described in this specifications.

## **5. CONSTRUCTION WORK**

5.1 Before proceeding with the construction work of the infrastructures, the Contractor shall fully familiarize himself with the site conditions and general arrangements, scheme etc. Though the owner shall endeavor to provide the information, it shall not be binding for the owner to provide the same. The contractors are advised to visit the infrastructure site necessarily and acquaint themselves with the topography, site land contour and profile, site investigation, infrastructure required before submitting the offer. The contractor shall be fully responsible for arranging all equipments, materials, system and services specified or otherwise, which are required to complete the construction and successful completion of the works.

5.2 Contractor shall arrange the construction power and water required during construction at site.

5.3 Contractor shall also be responsible for the overall co-ordination with internal/external agencies, project management, loading, unloading, handling, moving to destination for successful construction of all the infrastructures under the project. However, the Owner will assist the contractor to get speedy approvals / clearances from the govt. departments.

### **Miscellaneous**

Payment to the contractor shall be made as per the actual quantity executed. However, following extra quantities shall be permitted.

### **Final Schedule**

The BOQ of the items required to be constructed under the respective packages are given in the Bid Proposal Sheets. The items and their quantities indicated therein are only provisional.

The Contractor shall construct all the items required as per the detailed engineering/ actual site requirement based on survey and they shall be paid for the actual executed quantities based on the unit rate incorporated in the contract.

Any item supplied by the contractor but not utilized shall be taken back by the contractor and payment made by the employer, if any, shall be recovered at LOA rate.

## **6. SPECIAL TOOLS AND TACKLES**



The bidder shall include in his proposal the deployment of all special tools and tackles required for construction of infrastructures. However a list of all such devices should be indicated in the relevant schedule provided in the BPS. In addition to this the Contractor shall also furnish a list of special tools and tackles for the various equipment in a manner to be referred by the Employer during the operation of these equipment.

## **7. SPECIFIC REQUIREMENT**

The bidder shall be responsible for safety of human & other live stock, all facilities in the surrounding and equipment during the working.

## **8. GENERAL REQUIREMENT**

8.1 The work shall be carried out as per the specifications. The bidders shall submit the technical requirements, data and information as per the technical data sheets provided along with bid documents. The specifications and BOQ shall be read in conjunction with the other Contract Documents. All the documents and drawings are to be regarded as mutually explanatory.

8.2 The bidders shall furnish catalogues, engineering data, technical information, design documents, drawings, etc. fully in conformity with the technical specification.

8.3 It is recognized that the Bidder may have standardized on the use of certain components, materials, processes or procedures different from those specified herein. Alternate proposals offering similar equipment based on the manufacturer's standard practice will also be considered provided such proposals meet the specified designs, standard and performance requirements and are acceptable to the Employer. Unless brought out clearly, the Bidder shall be deemed to conform to this specification scrupulously. All deviations from the specification shall be clearly brought out in the respective schedule of deviations. Any discrepancy between the specification and the catalogues or the bid, if not clearly brought out in the specific requisite schedule, will not be considered as valid deviation.

8.4 Wherever a material or article is specified or defined by the name of a particular brand, Manufacturer or Vendor, the specific name mentioned shall be understood as establishing type, function and quality and not as limiting competition.

8.5 Equipment furnished shall be complete in every respect with all mountings, fittings, fixtures and standard accessories normally provided with such equipment and/or needed for construction by applicable codes though they may not have been specifically detailed in the Technical Specifications unless included in the list of exclusions. Materials and components not specifically stated in the specification but which are necessary for satisfactory operation of the work unless specifically excluded shall be deemed to be included in the scope of the specification and shall be supplied without any extra cost. All similar standard components/parts of similar standard equipment provided, shall be inter-changeable with one another.

### **8.6 Name Plate/ Labels**

All infrastructures shall be clearly labeled. Details of name plate/ labels of major equipment shall be submitted to Employer for approval.

## **9. STANDARDS**

9.1 The works covered by the specification shall be designed, engineered, manufactured, tested in accordance with the Acts, Rules, Laws and Regulations of Nepal or equivalent international standards.

9.2 All materials shall be of best quality conforming to National building code of the Employer's country and relevant International Standards.

9.3 The works to be furnished under this specification shall conform to latest issue with all amendments of standards specified under Annexure - A of this section, unless specifically mentioned in the specification.

9.4 The Bidder shall note that standards mentioned in the specification are not mutually exclusive or complete in themselves, but intended to complement each other.

9.5 The Bidder shall also note that list of standards presented in this specification is not complete. Whenever necessary the list of standards shall be considered in conjunction with specific IS standards.

9.6 When the specific requirements stipulated in the specifications exceed or differ than those required by the applicable standards, the stipulation of the specification shall take precedence.

9.7 Other internationally accepted standards which ensure equivalent or better performance than that specified in the standards referred shall also be accepted. Copies of such standards shall be submitted by the bidder along with the bid.

9.8 In case governing standards for the equipment is different from IS, the salient points of difference shall be clearly brought out in additional information schedule along with English language version of standard or relevant extract of the same. The equipment conforming to standards other than IS shall be subject to Employer approval.

9.9 The bidder shall clearly indicate in his bid the specific standards in accordance with which the works will be carried out.

9.10 In case specification of any equipment /material is not included in this volume, the same shall be supplies as per IS Specification.

## **10. ENGINEERING DATA AND DRAWINGS**

All work shall be done according to the drawings and instructions of the Client/Consultant, and the Contractor shall arrange to test materials and/or portions of the works at his own cost in order to prove their soundness and sufficiency. If after any such test and in the opinion of the Client/Consultant any work or portion of the work is found to be defective or unsound, the Contractor shall pull down and re-execute the same at his own cost. The Contractor shall submit 4 (four) sets of drawings/ design documents /data /detailed bill of quantity and 1 (one) set of test reports for the approval of the Employer/Consultant. The contractor shall also submit the softcopy of the above documents in addition to hardcopy.

## **11. MATERIAL/ WORKMANSHIP**

## **11.1 General Requirement**

11.1.1 Where the specification does not contain references to workmanship, equipment, materials and components of the covered equipment, it is essential that the same must be new, of highest grade of the best quality of their kind, conforming to best engineering practice and suitable for the purpose for which they are intended.

11.1.2 In case where the equipment, materials or components are indicated in the specification as “similar” to any special standard, the Employer shall decide upon the question of similarity. When required by the specification or when required by the Employer the Bidder shall submit, for approval, all the information concerning the materials or components to be used in manufacture. Machinery, equipment, materials and components supplied, constructed or used without such approval shall run the risk of subsequent rejection, it being understood that the cost as well as the time delay associated with the rejection shall be borne by the Bidder.

11.1.3 Whenever possible, all similar part of the Works shall be made to gauge and shall also be made interchangeable with similar parts.

## **12. DESIGN IMPROVEMENTS / CO-ORDINATION**

12.1 The bidder shall note that the materials offered by him in the bid only shall be accepted for construction. However, the Employer or the Bidder may propose changes in the specification of the material or quality thereof and if the Employer & bidder agree upon any such changes, the specification shall be modified accordingly.

12.2 If any such agreed upon change is such that it affects the price and schedule of completion, the parties shall agree in writing as to the extent of any change in the price and/or schedule of completion before the Bidder proceeds with the change. Following such agreement, the provision thereof, shall be deemed to have been amended accordingly.

12.3 The Bidder shall be responsible for the selection of appropriate materials to provide the best construction of the infrastructure. The basic design requirements are detailed out in this Specification. The design of various components, sub-assemblies and assemblies shall be so done that it facilitates easy field assembly and maintenance.

12.4 The Bidder has to coordinate designs and terminations with the agencies (if any) who are Consultants/Bidder for the Employer. The names of agencies shall be intimated to the successful bidder.

### **13. TESTS**

#### **13.1 Acceptance**

On completion of construction of the infrastructure, each infrastructure shall be thoroughly inspected jointly by the Employer and the Bidder for correctness and completeness of construction and acceptability.

13.2 Materials, tools, plants and workmanship shall be the best of several kinds available in the market and as approved by the Client/Consultant.

13.3 The Client reserves the right to take samples, inspect and test materials throughout the duration of the work at any time, and to reject materials which are found to be unsatisfactory at any time.

13.4 The Contractor shall submit the test of the construction materials with the witness of client/consultant for the approval prior to commencement of work. Acceptance or rejection of construction materials shall be based on the results of the tests and inspections prescribed on the Specifications.

### **14. SURVEY AND STAKING**

14.1 All structures should be located at the outer limits of public property along streets or travelled ways. Structures should also be located along streets at property lines of adjacent private property.

14.2 All structures shall be so located as to reduce, to the greatest extent practicable, obstacles to pedestrian and vehicular traffic. Barriers shall be provided in accordance with instructions by the employer.

14.3 All distances between structures, and other necessary measurements of length, shall be measured to accuracy, of 0.1 meter and all angles shall be determined by transit to an accuracy of 0.1 decimal degree. All elevations shall be measured to an accuracy of 0.1 meter by means acceptable to the Project.

14.4 All measuring and staking activity shall be accomplished by personnel with experience in survey procedures, and standard survey equipment acceptable to the employer, shall be used to perform the survey work. Field survey notes covering all survey work shall be produced and maintained and shall be turned over to the Project at the time of completion of the Works. The format of proposed survey notes shall be submitted to the Project for approval.

14.5 Survey work shall include centre line and structure location and staking; determination of overhead and side clearings of other structures, wires, and obstacles; area surveys and plotting; and centre-line profiles of terrain; as directed by the Project.

### **15. SOIL INVESTIGATION**

15.1 The Contractor shall perform a detailed soil investigation at infrastructure locations as required by Client. Accurate, general as well as specific information about the soil profile and the necessary soil parameters of the Site in order that the foundation of the various structures can be designed and constructed safely and rationally. The report shall contain all soil parameters along with recommendation of soil consultant for type of foundation.

15.2 The Contractor may visit the site to ascertain the soil parameters. Field tests must be conducted covering entire area including all the critical locations.

15.3 The work shall include mobilization of necessary equipment, providing necessary engineering supervision and technical personnel, skilled and unskilled labour etc. as required to carry out field investigation as well as, laboratory investigation, analysis and interpretation of data and results, preparation of detailed Geo-technical report including specific recommendations for the type of foundations and the allowable safe bearing capacity for different sizes of foundations.

15.4 Drilling of bore holes in accordance with the provisions of IS code up to 12 m depth. For a construction area, minimum three (3) bore holes shall be done to find out the geological profile of the area. If any unconformity encountered then more bore holes shall be drilled with the approval of Engineer-in-charge for the new projects. However in case deep pile foundations are envisaged the depths have to be regulated as per codal provisions.

15.5 In cases where rock is encountered, coring in one borehole per bay shall be carried out to 3m in bedrock and continuous core recovery is achieved.

15.6 Performing Standard Penetration Tests at approximately 1.5 m interval in the bore hole starting from 1.5 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 as directed by client.

15.7 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.

15.8 The following laboratory tests shall be carried out

- a) Visual and Engineering Classification
- b) Liquid limit, plastic limit and shrinkage limit for C- $\phi$  soils.
- c) Natural moisture content, bulk density and specific gravity.
- d) Grain size distribution.
- e) Swell pressure and free swell index determination for expansive soil only.
- f) Consolidated un-drained test with pore pressure measurement.
- g) 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.
- h) Rock quality designation (RQD), RMR in case of rock is encountered

## **12. MATERIAL STORAGE**

12.1 The Contractor shall procure all materials and equipment stated in the Bill of quantities. The Contractor shall provide all labour, equipment, and vehicles to load and transport materials and equipment to the Contractor storage facilities and worksites as required. All materials and equipment turned in to the Project reclaimed after demolition of existing facilities if any shall be transported to the Project warehouse and unloaded in the same manner.

12.2. The Contractor shall be financially responsible for the secure and proper storage of materials, which are to be provided by the Project prior to construction of the infrastructures, to prevent loss or damage to any materials.

12.3 Any items of material and equipment contained in degradable packaging shall be stored under roof and protected from moisture. Other materials, except as specified in subparagraph.

12.4 Construction materials shall be stored and covered in a well-drained level area, free from accumulation of surface water.

12.5 Packaged items of material and equipment shall not be uncrated, or have packaging removed, prior to installation. The Contractor shall exercise due caution and care in the transportation, storage, and handling of all materials which are to be provided by the Project. Equipment consisting or containing, porcelain insulation should be transported and handled to avoid cracks or chipping. Lagging or other protection shall not be removed from ABC cable reels until the cable is to be installed.

## **13. EXCAVATIONS**

13.1 All excavations made for the construction or demolition, of facilities shall be accomplished in a timely manner according to the scheduled construction. Required excavations shall be opened, material installed, and backfill placed, as specified, in a continuing operation to the greatest extent practicable.

13.2 Any excavation left open during discontinuous construction which is accessible to the public or along public thoroughfare, shall be covered or barricaded with well compacted on each 150mm layer, and marked by suitable visual means, to prevent a public hazard.

13.3 Whenever water table is met during the excavation, it shall be dewatered and water table shall be maintained below the bottom of the excavation level during excavation, concreting and backfilling.

## **14. BACKFILL MATERIALS**

14.1 All excavations shall be backfilled with excavated material, or as specified for the construction. Backfill shall be free of foreign materials and shall be well tamped on each layer with excess backfill graded over the excavated area to prevent depressions resulting from eventual natural compaction. Large amounts of excess backfill shall be removed from the site by the Contractor if so directed by employer or If so directed by Project.

14.2 The Contractor shall provide suitable backfill materials for excavations where existing removed materials is insufficient, or inappropriate, to provide suitable grading of the excavated area.

## **15. EXAMINATION OF THE WORK**

### **15.1 Examination Before Covering**

No work shall be covered up or put out of view without the approval of the Client/Consultant and the Contractor shall afford full opportunity for the Client to examine and measure any work which is about to be covered up or put out of view and to examine foundation before permanent work is placed thereof.

### **15.2 Prior Intimation**

The Contractor shall give due notice to the Client whenever any such work of foundation is or are ready or about to be ready for examination, and the Client/Consultant shall without delay, unless he considers it unnecessary and advises the Contractor accordingly, attend for the purpose of examining and measuring such works.

### **15.3 INSPECTION OF WORKS**

At any time if so desired by the Employer, they shall have the power to inspect and examine any parts of the works and the Contractor shall give all facilities as required for such inspection and examination. The Contractor will make sure that the representative from the Employer is present during such inspections.

### **15.4 Unsatisfactory Works**

Should it be required by the Consultant at any times during the period of construction or reconstruction or prior to expiry of the maintenance period, that any work that has been executed with unsound, imperfect or unskilled workmanship period, that any work that has been executed with unsound, imperfect or unskilled workmanship or of a quality inferior to that contracted for or otherwise not in accordance with the Specifications the Consultant shall demand in writing specifying the fault, notwithstanding that the same may have been inadvertently passed certified and paid for the Contractor shall forthwith rectify and remove and reconstruct the work specified, in whole or in parts as the case any require, at his own expense.

### **15.5 RECORD WORKS**

The Contractor is responsible for keeping the record of the result of all the approved inspection by the Client who shall confirm the approval by signing the record prepared by the Contractor. Any record without signature of the Client shall not be valid and the Contractor shall make all the record available to the Employer for reviewing at any time. The Contractor shall maintain an order book at the site of work in which instruction shall be given to the Contractor by the Client as and when necessary. These instructions shall have to be signed by the Client and nothing else will be written on it. The Contractor shall carry out such instructions If the Contractor wants to represent anything thereof he can do so by a separate letter.

## 16. CONTRACT VARIATION

### 16.1 Contract Variation by Contractor

In no circumstance shall the Contractor make any alternation in, addition to or omission from the work as shown on the drawings except in pursuance of the written instruction of the Employer.

### 16.2 New Item during Construction

For any new item of work to be executed during construction period, the Contractor shall get approved the rate for such item(s) by the Client prior to the execution of the work. For the new item, wherever applicable, shall be valued at the rates & prices set out in the Contract.

## 17. SAFETY

17.1 The Contractor shall take all measures required to safeguard the public and private property from any hazard to life, limb, or property which may arise during the performance of the construction of the works. Such measures shall include, but not be limited to barricades, signs, newspaper announcements, traffic control by police, or other advisory and control methods deemed appropriate.

17.2 The Contractor shall provide his work force with all tools and equipment in sufficient numbers and quality to perform all aspects of the works in a safe manner. The Contractor shall provide protective headgear for all members of his workforce, and shall provide protective clothing as required for specific tasks. The Contractor shall instruct his work force in proper and safe construction techniques and shall continuously monitor compliance with safety instructions throughout the period of the Contract.

17.3 The Contractor shall maintain all tools and equipment in good working order. All mechanized equipment shall have adequate safety mechanisms and guards in place and be fully operational. Operators of such equipment shall be skilled and fully trained in the operation of such equipment.

17.4 The Contractor shall provide and maintain emergency medical supplies to cover with accidents and snakebites for his work force on a readily available basis. The Contractor shall also instruct all supervisory personnel in the action to be taken in the event of serious injury, and the sources and locations of professional medical assistance which shall be employed in such cases.

17.5 The Contractor shall apply all accidental insurance policies to his work force for an accident occurring during the working period of the construction.

For details on protection of the Environment and People and Health & Safety Measures during construction, refer checklists at **Annexure-2**.

## 18 DEMOLITION

The Contractor shall perform the removal of all existing facilities, if any, in accordance with the specific directions of the Employer. All materials removed shall remain the property of



Project and the Contractor shall deliver all salvaged materials to the Project warehouse, or as specifically directed by the Employer.

## **19 CLEANUP**

19.1 The Contractor shall ensure that all worksites shall be free of all manner of debris resulting from the construction activity. All crating, cable and conductor reels, packaging materials, conductor scraps, and other miscellaneous items are removed from the workplace. All holes resulting from removal of facilities shall be filled. If trees or bush have been cut or trimmed, all cuttings shall be removed. The worksites shall be left in clean natural conditions.

19.2 Site cleanup shall be an integral part of the Provisional Acceptance process, and no line section shall be provisionally accepted unless all cleanup work has been accomplished.

## **20 TREE CUTTING AND TRIMMING**

20.1 Any tree cutting or tree trimming authorized and directed shall be accomplished by the Contractor under the direct supervision of Project.

20.2 All cutting shall be removed by the Contractor with disposition of cutting as specified by Project.

## **21 MEASUREMENT OF WORKS**

### **21.1 Joint Measurement**

All work measurements shall be taken jointly by the Client and the Contractor.

### **22.2 Request for Measurement**

All requests for measurement shall be given by the Contractor to the Client on three days in advance and shall be in writing.

### **22.3 Failure to Attend Joint Measurement**

In case the Contractor or his representative fails to attend the measurement on the date notified by the Client, the Client shall have power to proceed with the measurement and these measurements thus taken shall be accepted by the Contractor as final and binding.

## **Annexure-I**



# Social Component Project Location

Legend



Google Earth

US Dept of State Geographer  
Image © 2018 CNES / Airbus  
Image © 2018 DigitalGlobe  
© 2018 Google

**Annexure- 2**  
**Protection of the Environment and People and Health &**  
**Safety**

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<b>Potential Impact</b>	<b>Mitigation, Management and Enhancement Measures</b>	<b>Compliance (Yes/No)</b>	<b>Please explain in case of No</b>
Protection of adjacent areas	The contractor shall establish means of protection to avoid or minimise adverse effects on vegetation, soils, groundwater and surface water, biodiversity, natural drainage and the water quality within the works area. The Contractor shall use construction methods to minimise impacts to the extent possible.		
	The Contractor shall restrict excavation activities during periods of intense rainfall. Use temporary bunding to reduce the risk of sediment, oil or chemical spills to the receiving waters.		
	The Contractor shall carry out excavation works in cut off ditches to prevent water from entering excavations.		
	The contractor shall bring work site boundaries and limits in accordance with plans agreed upon in advance. All construction activities should be carried out within boundaries.		
	The Contractor shall stay out of surrounding wetland areas.		
	<p>The Contractor shall keep distances in compliance with national regulations and as appropriate:</p> <ul style="list-style-type: none"> <li>- from any permanent water course and outside of floodable areas</li> <li>- from sensitive urban services and buildings (health centre, school, water supply for populations)</li> <li>- from any housing; cultural sites, archaeological areas, sensitive wetlands, forest reserves or any other valued ecosystem component, or on high or steep ground or in areas of high scenic value</li> <li>- Where it is not possible to keep distances, permission shall be obtained from the appropriate authorities</li> </ul>		
	The Contractor shall discourage construction workers from engaging in the exploitation of natural resources such as hunting, fishing, and collection of forest products or any other activity that might have a negative impact on the social and economic welfare of the local communities.		
	After construction, form reshaped land so that it is inherently stable, adequately drained and suitable for the desired long-term land use and allows natural regeneration of vegetation.		

<b>Potential Impact</b>	<b>Mitigation, Management and Enhancement Measures</b>	<b>Compliance (Yes/No)</b>	<b>Please explain in case of No</b>
	The Contractor shall minimize long-term visual impacts		
Selection of borrow areas, backfill material stockpile sites and access road	The Contractor shall prevent and minimize the impacts of borrow areas or areas to be excavated, backfill material stockpile locations and access roads, quarrying, earth borrowing, piling and building of temporary construction camps and access roads on the biophysical environment including protected areas and arable lands; local communities and their settlements. After termination of the works, in as much as possible restore/rehabilitate all sites to acceptable standards.		
	The Contractor shall locate stockpile areas in areas where trees can act as buffers to prevent dust pollution. Build perimeter drains around stockpile areas. Locate sediment and other pollutant traps at drainage exits.		
	The Contractor shall obtain appropriate licenses/permits from relevant authorities, including traditional authorities if appropriate, to operate quarries or borrow areas.		
	The Contractor shall deposit any excess material in areas approved by local authorities.		
	The Contractor shall take measures to avoid that stagnant water in uncovered borrow pits creates breeding grounds for mosquitoes.		
	If disposal sites for clean spoil are necessary, contractor shall locate them in areas approved by the Employer, of low land use value and where they will not result in material being easily washed into drainage channels. Whenever possible, place spoil materials in low-lying areas, compact and plant with species indigenous to the locality.		
	Pollution prevention	The Contractor for all works minimize pollution risk (e.g. liquid effluents; air emissions; noise and vibration management; vehicle and equipment maintenance and selection; fuel, oil and chemical storage and handling).	
The Contractor shall identify potentially toxic overburden and screen with suitable material to prevent mobilization of toxins.			
The Contractor shall use in as much as possible, local materials to avoid importation of foreign material and long-distance transportation			

<b>Potential Impact</b>	<b>Mitigation, Management and Enhancement Measures</b>	<b>Compliance (Yes/No)</b>	<b>Please explain in case of No</b>
Effluents	The Contractor shall contain and store construction wastewater appropriately, including sanitary water and shall not discharge untreated effluents.		
Emissions and Dust	The Contractor shall ensure compliance with national requirements for emissions.		
	The Contractor shall minimise the effect of dust on the surrounding environment resulting from earth mixing sites, asphalt mixing sites, dispersing coal ashes, vibrating equipment, temporary access roads, etc. to ensure safety, health and the protection of workers and communities living in the vicinity of dust producing activities. Use best practice to ensure minimisation of dust emissions (e.g. proper stockpiling, watering etc.) during dry and windy conditions and transportation.		
	The Contractor shall use vehicles in appropriate technical conditions and provide emissions control equipment where applicable (e.g. filters).		
	The Contractor shall switch off vehicles when not in use.		
	The Contractor shall keep speed limits on site.		
	The Contractor shall sensitise drivers with regards to all measures with regards to avoiding dust and emissions and safe driving.		
Noise and vibration	The Contractor shall avoid operations and vehicle movements at night. Sensitise drivers.		
	The Contractor shall set traffic speed limits. Sensitise drivers.		
	The Contractor shall locate stationary equipment (such as power generators) as far as possible from nearby receptors (e.g. worker resting areas, populated areas and environmentally sensitive areas).		
	The Contractor shall keep noise levels emanating from machinery, vehicles and noisy construction activities (e.g. excavation, blasting) at a minimum for the safety, health and protection of workers within the vicinity of high noise levels and nearby communities.		
Waste	The Contractor if not otherwise instructed by the Employer, identify waste management facilities and waste management contractors. Ensure disposal through waste contractors, licensed for treatment/removal/recycling of each of the waste		

<b>Potential Impact</b>	<b>Mitigation, Management and Enhancement Measures</b>	<b>Compliance (Yes/No)</b>	<b>Please explain in case of No</b>
	types, if existent.		
	The Contractor shall properly collect all wastes produced including containers, litter and any other waste generated during the construction and dispose and segregate at designated disposal sites in line with applicable government waste management regulations.		
	The Contractor shall minimise the waste production to the extent possible.		
	The Contractor shall check that areas for depositing hazardous materials such as contaminated liquid and solid materials are approved by the Employer and appropriate local and/or national authorities before the commencement of work. Use existing, approved sites over the establishment of new sites.		
	The Contractor shall bund all vessels (drums, containers, bags, etc.) containing oil/fuel/surfacing materials and other hazardous chemicals in order to contain spillage.		
	The Contractor shall remove construction waste left in stockpiles along the road, and reuse or dispose of on a daily basis.		
Vegetation	The Contractor shall limit vegetation clearing to areas within the site boundary where it is strictly necessary.		
	The Contractor shall avoid clearing mature trees and endangered species.		
	The Contractor shall not clear vegetation more than two months in advance of operations.		
Biodiversity management	The Contractor shall avoid to the extent possible areas of ecological value.		
	The Contractor shall avoid disturbances on flora and fauna and natural habitats.		
	The Contractor shall avoid forest fires.		
Erosion and sediment transport	If construction takes place on inclined surfaces/slopes, contractor shall take appropriate erosion control measures (e.g. retain trees and other vegetation, use of natural contours for roads and drainage networks, excavated drainage channels).		
	The Contractor shall appropriately store removed topsoil. After construction, use topsoil as backfill		



<b>Potential Impact</b>	<b>Mitigation, Management and Enhancement Measures</b>	<b>Compliance (Yes/No)</b>	<b>Please explain in case of No</b>
	for restoration of the area.		
	Topsoil shall not be stored in large heaps. Low mounds of no more than 1 to 2 m high are recommended.		
	4 Soils shall not be stripped when they are wet as this can lead to soil compaction and loss of structure.		
	The Contractor shall re-vegetate stockpiles to protect the soil from erosion, discourage weeds and maintain an active population of beneficial soil microbes.		
Site rehabilitation	To the extent practicable, the contractor shall reinstate construction working areas and natural drainage patterns where they have been altered or impaired after construction activities are completed. Rehabilitate the site progressively so that the rate of rehabilitation is similar to the rate of construction. Revegetate with plant species that will control erosion, provide vegetative diversity and, through succession, contribute to a resilient ecosystem. If appropriate, for larger revegetation areas consult experts.		
	The Contractor shall avoid that rehabilitated areas pose health and safety risks (such as holes, ponds).		
	The Contractor shall rehabilitate borrow areas, backfill material stockpile sites and access roads, where applicable.		
	The Contractor shall re-establish existing water flow regimes in rivers, streams and other natural or irrigation channels where they have been disrupted due to works being carried out.		
Labour conditions	The Contractor complies with labour standards as both per national laws and ILO Fundamental Conventions (e.g. prohibit child labour under minimum age; forced labour; sexual assault; discrimination; ensure non-discrimination and equal opportunities of workers; provide information to workers that is clear and understandable regarding their terms and conditions of employment; respect their rights related to hours of work, wages, overtime, benefits at the beginning of the work; ensure payment on a regular basis etc.). Grant the same rights to contracted workers, community workers		

<b>Potential Impact</b>	<b>Mitigation, Management and Enhancement Measures</b>	<b>Compliance (Yes/No)</b>	<b>Please explain in case of No</b>
	and primary supply workers.		
	The Contractor shall develop and implement labour management procedures which set out the way workers will be managed in accordance with the standards mentioned above in Paragraph above.		
	The Contractor shall establish a simple but functional complaints mechanism that all workers have access to (e.g. letter boxes which are emptied regularly) and are aware of so that they can raise workplace relevant complaints anonymously (e.g. about unfair treatment, unsafe driving).		
Local recruitment	The Contractor shall prioritise local employment and staff from local communities for the supply of goods and services to the works and local workforce, where appropriate.		
	The Contractor shall provide additional specialised training to local workforce in skills required by contractor (i.e. administrator, driving etc.).		
Transport	The Contractor shall organise carpools/buses for worker transportation where needed.		
Workers accommodation	If workers campsites need to be installed, the contractor shall ensure that accommodations provide separate toilets and locker rooms for women and men; hygiene and electrical/fire safety standards are maintained; workers have access to an adequate and convenient supply of free potable water; there are no triple deck bunks; mattresses and linens are provided.		
Meals	If applicable, the contractor shall provide for at least two meals per shift to local personnel pursuant to proper hygiene conditions. If no canteen is available, pay workers at least for a minimum of 2 meals per day per shift		
Community interaction and safety	The Contractor shall engage, communicate with and inform communities and local authorities about the works. Obtain local knowledge regarding chance finds and land acquisition matters.		
	The Contractor shall initiate an efficient grievance mechanism and timely grievance redress to allow potentially affected individuals to raise their concerns regarding damages and disturbances		

<b>Potential Impact</b>	<b>Mitigation, Management and Enhancement Measures</b>	<b>Compliance (Yes/No)</b>	<b>Please explain in case of No</b>
	caused by the Contractor or sub-contractors.		
	The Contractor shall undertake all measures necessary to avoid conflicts with local communities regarding water demands.		
	The Contractor shall abstract both surface and underground water only after consultation with the local communities and after obtaining a permit from the relevant water authority.		
	<p>In order to avoid accidents, the Contractor shall in particular related to the creation of water reservoirs/ ponds or construction site dumps, excavation areas:</p> <ul style="list-style-type: none"> <li>- Take necessary precaution measures to protect children/residents/workers from falling into ponds, excavation areas, etc.</li> <li>- Restrict access to these areas; install climbing ladders in ponds; install signs and rescue ropes and lifebuoys.</li> <li>- Prepare for emergencies and response arrangements.</li> <li>- Sensitise the population including local primary schools</li> </ul>		
Damage to people and property	The Contractor shall train workers and drivers to respect the safety and rights of neighbouring people, communities and their properties to avoid disturbances. Supervise that they respect communities' houses, cultures, animals, properties, customs and practices.		
	The Contractor shall appropriately fence, protect, light and sign-post site areas. Use hazard notices/signs/barriers to protect children and other vulnerable people from harm and prevent access to the sites to non-workers.		
Land acquisition and land take	Check if permissions for building or storing/stocking material have been obtained, including if relevant from local authorities or private landholders. Obtain confirmation that in case of necessary resettlements, people have been compensated and if applicable, have been resettled.		
Traffic management	The Contractor shall establish signage and create public awareness of increased traffic and of potential hazards caused by construction		

<b>Potential Impact</b>	<b>Mitigation, Management and Enhancement Measures</b>	<b>Compliance (Yes/No)</b>	<b>Please explain in case of No</b>
	equipment near the Project Area and laydown areas.		
	The Contractor shall reduce accidents, by minimizing vehicle movements; train drivers for driving and security and check that they have the appropriate permits for driving vehicles		
Fossils/ Archaeologic al Chance Finds	If applicable, the contractor shall establish specific procedures to manage the protection of archaeological and historical sites, chance finds and fossils.		
	The Contractor shall report all finds of cultural heritage (e.g. graves, old ceramic, old building fragments) immediately to the relevant authority and avoid construction in the vicinity of a chance find, fence the chance find and await instructions from the competent authority.		
Health and safety plan	<p>The Contractor shall develop an Occupational Health and Safety (OHS) Plan, appropriate to the impacts and risks level of the works to be carried out. Set a minimum of OHS Standards for each task. Implement prevention, protection and monitoring measures as described in the OHS Plan.</p> <p>The OHS Plan shall include at least:</p> <ul style="list-style-type: none"> <li>• Provisions to guarantee a safe and healthy work environment, taking into account inherent risks in its particular sector and specific classes of hazards in the work areas, including physical, chemical, biological, and radiological hazards;</li> <li>• Provisions of preventive and protective measures, including management and safety of hazardous materials;</li> <li>• Training of workers;</li> <li>• Documentation and reporting of occupational accidents, diseases, and incidents;</li> <li>• Emergency preparedness and response arrangements;</li> <li>• Provisions for appropriate securing of the sites and work-places (e.g. fencing, signage);</li> <li>• If appropriate: Appointment of site security personnel;</li> <li>• Road safety measures;</li> <li>• First aid and medical assistance;</li> </ul>		
Occupational	The Contractor shall document in a structured and		

<b>Potential Impact</b>	<b>Mitigation, Management and Enhancement Measures</b>	<b>Compliance (Yes/No)</b>	<b>Please explain in case of No</b>
Health and Safety (OHS)	transparent system, (e.g. a Site Accident record sheet) all accidents, dangerous occurrences and investigations.		
Reporting	The Contractor shall produce an OHS report documenting OHS performance and progress (e.g. statistics: month, number of workers, number of health and safety staff on site, number/type of OHS trainings); number of near misses, first aid cases, incidents with more than three days of absence, fatalities; summary of all accidents resulting in more than three days of absence (accident details to be enclosed in the Annex); third party incidents (e.g. community members, road traffic etc.).		
Accident reporting procedure	The Contractor shall record all health and safety related incidents (e.g. observations, accidents, witness statements) on site and follow up immediately and properly. A reportable incident includes any accident to any person on site requiring medical attention or resulting in the loss of working hours or that resulted, or could have resulted in injury, damage or a danger to the works, persons, property or the environment. If applicable, the Contractor will also notify and report of incidents of subcontractors and suppliers (in particular those for major supply items).		
	The Contractor shall inform the Employer immediately of any accident involving serious bodily injury to a member of personnel, a visitor or any other third party, caused by the execution of the works or the behaviour of the personnel of the Contractor.		
	The Contractor shall inform the Employer as soon as possible of any near-accident (or near misses) relating to the execution of the works, which, in slightly different conditions, could have led to bodily injury to people, or damage to private property or the environment.		
Personal protective equipment	The Contractor shall make sure that all workers wear Personal Protective Equipment (PPE) (hardhats, masks, safety glasses, safety boots etc. depending on project type).		
Emergency scenarios	The Contractor shall provide necessary prevention equipment on site in line with applicable		

<b>Potential Impact</b>	<b>Mitigation, Management and Enhancement Measures</b>	<b>Compliance (Yes/No)</b>	<b>Please explain in case of No</b>
prevention	regulations to respond to emergency scenarios, e.g. fire, explosion, floods, natural hazards, etc.		
	The Contractor shall immediately clean any spills and remediate contaminated areas.		
	The Contractor shall maintain high standard in housekeeping on site to avoid emergencies. Properly store construction materials and light equipment.		
	The Contractor shall train the workers to handle emergency situations.		
First-aid	The Contractor shall keep minimum first aid equipment and provisions on site (e.g. suitably stocked first-aid kits; a person, respectively an adequate number of trained first-aid helpers, inform staff and workers about first-aid arrangements).		
Access to health care and training	The Contractor shall organize for the workforce access to medical treatment within or in the vicinity of the Project Area.		
	The Contractor shall make contingency arrangements for transporting injured persons to a hospital as quickly as possible.		

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## **PROJECT MANAGEMENT SYSTEM, QUALITY ASSURANCE AND DOCUMENTATION**

This section describes the project management system, quality assurance and documentation requirements for the project.

### **1. Project Management System**

#### **1.1. General**

The Contractor shall assign a Project Manager with the authority to make commitments and decisions that are binding on the Contractor. Employer will designate a project manager to coordinate all Employer project related activities. All communications between Employer and the Contractor shall be coordinated through the Project Managers. The Project Managers shall also be assisting Employer in communicating project related information to other stake holders.

Bidder shall submit the manpower deployment plan along with the bids, describing the key roles of each person.

The role and responsibilities of contractor shall be as follows:

- a) To prepare, maintain and update project detailed Work Execution Plan for successful implementation of project, approval of sub-contractor, approval of drawings (if required), supply of materials, mobilization of men, material and equipment etc. at site for successful completion of works, Compile and up-load physical as well as financial progresses, compile the progress of works at Employer level and to assist in forwarding it to all stake holders.
- b) To actively participate with employer in resolving all issues relating to project implementation including Forest Clearances, Railway Crossings, and Payments to contractors/vendors and policy matters.
- c) To actively participate in monitoring, reviewing and analysing the physical, financial and quality assurances works' progress of construction works and also to take suitable measures on compliance of observations being raised during monitoring/review meetings with employer.
- d) To oversee the progress and compliance of the Quality Assurance Mechanism as per FQA plan / guidelines.

#### **1.2. Project Schedule**

As per the schedule the bidder shall submit a preliminary implementation plan along with the bid. The detailed project implementation schedule shall be submitted by the contractor after the award for employer's approval, which shall include at least the following activities

- (a) Surveying of site.
- (b) Documents submission and approval schedule
- (c) Dispatch Schedule
- (d) Construction Schedule

The project schedule shall include the estimated period for completion of project and its linkage with other activities.

### 1.3. Progress Report

A progress report shall be prepared by the Contractor each month against the activities listed in the project schedule. The report shall be made available to employer on a monthly basis, e.g., the 10th of each month. The progress report shall include all the completed, ongoing and scheduled activities.

### 1.4. Transmittals

Every document, letter, progress report, change order, and any other written transmissions exchanged between the Contractor and Employer shall be assigned a unique transmittal number. The Contractor shall maintain a correspondence index and assign transmittal numbers consecutively for all Contractor documents. Employer will maintain a similar correspondence numbering scheme identifying documents and correspondence that employer initiates.

## 2. Quality Assurance and Evaluation Mechanism

The contractor shall be solely responsible & accountable for assuring quality in Social Infrastructure Construction Works. Accordingly, contractor shall formulate a comprehensive Quality Assurance (QA) Plan with an objective to build a quality infrastructure under social infrastructure development works. The QA Plan shall be integral part of the contract agreement with contractor. Documentation with regard to Manufacturing Quality Plan (MQP) & Field Quality Plan (FQP) shall be maintained by bidder/Employer and kept in proper order for scrutiny during the course of project execution by Quality Monitors.

The internal quality assurance mechanism followed by EMPLOYER and the turnkey contractor shall be termed as **level-zero** of overall quality assurance plan of Infrastructure construction works.

**Quality checks under Level-Zero of QAM:** Level-zero is of utmost importance. Under this level, the turnkey contractor & EMPLOYER shall strictly perform following QA checks during the course of project execution:

- a. 100% infrastructure are to be verified for quality as per MQP/ Drawings/Technical Specifications and FQP



- b. 100% of all social infrastructures (New & Reconstructed) for quality of material as per MQP/Drawings/Technical Specifications and construction works in the field as per FQP

**FQP for construction works:** EMPLOYER shall approve a separate FQP prepared by contractor for construction works. The turnkey contractor shall adhere to this FQP while carrying out physical works.

**QA documentation:** All QA checks conducted in the field as per FQP shall be properly documented & signed by the quality engineer of the turnkey contractor & countersigned by EMPLOYER's representative. These documents shall be maintained in proper order & easily available at site for verification by Quality Monitors.

- 2.1. The contractor shall be solely responsible & accountable for assuring quality in social infrastructure development works. Accordingly, contractor shall formulate a comprehensive Quality Assurance (QA) and Inspection Plan with an objective to build Quality Infrastructure. The QA and Inspection Plan shall be an integral Part of the contract agreement with turnkey contractor. Documentation with regard to Quality Assurance Plan shall be maintained by contractor and kept in proper order for scrutiny during the course of project execution and for future reference.

### 3. Documentation

#### 3.1. GENERAL

- 3.1.1. To ensure that the proposed infrastructure conform to the specific provisions and general intent of the Specification, the Contractor shall submit documentation describing the systems to employer for review and approval. The schedule for submission/approval of each document shall be finalised during the discussions before placement of the contract, this schedule shall be in line to overall project schedule.
- 3.1.2. Each document shall be identified by a Contractor document number, the employer document number, and the employer purchase order number. Where a document is revised for any reason, each revision shall be indicated by a number, date, and description in a revision block along with an indication of official approval by the Contractor's project manager. Each revision of a document shall highlight all changes made since the previous revision.
- 3.1.3. All technical description, specifications, literature, correspondence, prints, drawings, instruction manuals, progress photographs, booklets, schedules and all supplementary data or documents furnished in compliance with the requirements of the Contract, shall become the property of the Employer and the costs shall be considered as included in the Contract price.

- 3.1.4. The Contractor shall be responsible for any time delay, misinterpretation, error and conflict during construction resulting from non-compliance with the requirements of this Specification.
- 3.1.5. The Employer shall have the right to make copies of any documents, data, reports, information etc. supplied by the Contractor in connection with the Works. The Employer shall not impart the information of these documents to any other manufacturer or competitor but he shall be free to use these for preparation of technical papers, reports etc.
- 3.1.6. All documentation shall be in English language.

### 3.2. REQUIREMENTS FOR SUBMISSION OF DOCUMENTS, INFORMATION AND DATA BY THE CONTRACTOR

- 3.2.1. The Contractor shall submit to the Employer all documents in accordance with an approved schedule of submissions and shall submit any further information (in the form of drawings, documents, manuals, literature, reports etc.) when asked by the Employer while commenting/approving any drawings/documents etc.
- 3.2.2. The documents which are subject to the approval of the Employer shall be identified by the Contractor with the stamp "FOR APPROVAL". All other documents shall be submitted to the Employer for information and shall be identified by the Contractor with the stamp "FOR INFORMATION".
- 3.2.3. The sequence of submission of the documents shall be subject to the approval of the Employer. The sequence of submissions of all documents shall be such that the necessary information is available to enable the Employer to approve or comment the document.
- 3.2.4. The Contractor shall supply 4 hard copies of all drawings and documents.
- 3.2.5. In case a "SUBSEQUENT" revision of any document is made due to any reason whatsoever, a revision of the same, highlighting the changes shall be resubmitted for the Employer's specific approval/ information.

### 3.3. DOCUMENTS FOR APPROVAL

- 3.3.1. The Employer shall be allowed fifteen (15) calendar days to approve the Contractor's submissions. The submissions for approval, shall be returned to the Contractor marked in one of the following ways :

Category I:	Approved
Category II:	Approved with Comments.
Category III:	Returned for correction.
Category IV :	For information

- 3.3.2. The first notations "I" or "II" shall be deemed to permit the Contractor to proceed with the work shown on the document, except in the case of notation "II" the work shall be done subject to the corrections indicated thereon and/or described in the letter of transmittal. The Contractor shall bear the full responsibility for proceeding with the Works prior to receipt of the release in notation "I" from the Employer.
- 3.3.3. In case of notation "II", the Contractor shall include the alterations required & resubmit the document within fifteen (15) days from date of Employer's letter of transmittal.
- 3.3.4. In case of notation "III", the Contractor shall include the alterations required and resubmit the document to the Employer, within fifteen (15) days, from date of letter of transmittal, so that such document can be returned with the notation "I" or "II".
- 3.3.5. It may also be noted that the approval/commenting by the Employer does not relieve the Contractor of any of his contractual obligations and his responsibilities for correctness of dimensions, materials, weights quantities or any other information contained therein, as well as the conformity of designs with Indian Statutory Laws and the Technical Specifications as may be applicable. The approval also does not limit the Employer's rights under the Contract.
- 3.3.6. The approved documents shall be considered as the working documents. However the Technical Specification and connected documents shall prevail over these documents in case a decision is required on interpretation.

#### 3.4. DOCUMENTS FOR INFORMATION

The Contractor shall not delay the Works pending the receipt by the Contractor of the comments on documents submitted to the Employer for information. However, the Employer shall have the right to comment on all the documents submitted by the Contractor, when, in the opinion of the Employer the document does not comply with the Contract or otherwise. The Contractor shall satisfactorily demonstrate that the information contained in the aforesaid document does meet the requirements of the Contract or revise the document in order that the information shall comply with the requirements of the Contract.

#### 3.5. REFERENCE DRAWINGS

- 3.5.1. All the detailed drawings will be provided to the Contractor.
- 3.5.2. Further work by the Contractor shall be in strict accordance with these drawings and no deviation shall be permitted without the written approval of the Employer, if so required.

### **4. Site Office Management**

- 4.1 The contractor and / or sub-contractors as proposed by the bidder as per GCC shall establish and maintain throughout the period of the performance of the contract a site office to serve as a base for all the operations necessary to

perform the works and shall maintain adequate store facilities for storing materials and equipment issued by the employer. In case the above-mentioned facilities and establishments are not found satisfactory during the site verification, the employer shall have right to instruct the contractor for rectification of the same.

## 5. Contractor's key personnel and workforce

- 5.1 The contractor shall have experienced and qualified administrative, accounting and store keeping staffs capable to undertake respective jobs. An office manager with adequate qualification and experience to run such establishment efficiently must head the site office. The contractor shall employ only experienced, competent and skilled office staff as required in the tender document.
- 5.3 The site and field staff as approved by the employer shall be made available for the entire construction period of the project. All the staff and workforce of the contractor shall be issued identity cards jointly certified by the contractor and the employer. Replacement of any such staff or site personnel must not be made without prior permission of the employer.
- 5.4 The contractor is required to pay salary and wages of his staff and workforce at an interval not exceeding a month. The rate of wages payable to the labours shall not be less than as prescribed by the labour law of Nepal.

## 6. Tools and Equipment

- 6.1 The Contractor shall have owned, leased or hired tools and equipment for successful execution of the work. Prior to beginning of the work the contractor shall show these items in his possession. In case of the heavy tools equipment and vehicles the contractor is required to submit the source of these items with credible documents such as contract papers conforming their availability at the time of the execution of the works.
- 6.2 The employer shall examine to verify the availability of all such tools and equipment before commencement of the work. The contractor shall be allowed to start his work only after verification of such tools and equipment in satisfaction of the employer. No tools and equipment shall be provided by employer.

The contractor shall have following tools and equipment for the execution of the contract:

SN	Description of Tools and Equipment	Unit	Quantity
1	General Purpose Truck (Minimum 10 Ton capacity) suitable for hilly terrain	Nos.	1
2	Concrete Mixture	Nos.	2

## **7. Approval of Drawings**

- 7.1 The contractor shall update and revise all plan and profile drawings provided to him by the employer after performing check survey of each of the segment of the scheme.
- 7.2 The contractor must get approval from the employer in writing before he starts execution of construction of any of the segment of work. If the contractor executes any work without the employer's prior approval, he may be asked to revise the same without paying any compensation to him.

## **8. Extra Work**

- 8.1 Extra work and goods supply shall be performed in accordance with written directives as issued by the Project to the Contractor.
- 8.2 Extra work or goods supply for which there are applicable unit prices will be paid for at such unit prices.
- 8.3 Where there are no applicable contract unit prices, the price to be paid by the Project to the Contractor for extra works shall be fixed through negotiation between Employer and the Contractor based on:
  - 8.4 The GoN norms and respective district rate approved by the District Rate Fixation Committee in case of extra works to be performed
  - 8.5 The prevailing market rate of the goods, in case of extra goods to be supplied. In no case, such price shall exceed Project's cost estimates for the item.
- 8.6 Nothing in this Clause shall excuse the Contractor from proceeding with the extra work as directed in writing by the Project.
- 8.7 Any variation in the quantities of unit price construction units, within the ranges stated in the Special Conditions of Contract, Clause 1.3, from nominal bid quantities of such unit price construction units shall not be construed as Extra Work.

## **9. Materials**

- 9.1 Major construction materials for construction of the Works shall be identified by the Contractor.
- 9.2 All materials and equipment of the Project shall be located at the Project's or such other areas where they are being stored. During issue and handling over of these materials it shall be the Contractor's responsibility to load all of them and provide all necessary lifting and handling equipment, labor and suitable transport as required to transport the various items of materials and equipment to the Contractor's site of storage and operations.
- 9.3 The listing of materials shall show the limiting allowance for breakage and scrap and material unit prices, which may be applied to the contractor's accountability to the Project for all materials and equipment issued by the Project.
- 9.4 Accountability for all materials and equipment issued by the project shall be based on the material lists associated with the various construction drawings contained in the Construction Standards and the allowances referenced in

clause 3 above. At the time of final material accounting, any deficit in the Contractor's material account shall be charged to the Contractor at the unit price rates enlisted by the project during handing over of the materials to the Contractor.

- 9.5 If the Contractor fails to account for all materials and equipment issued by the Project as set forth in clause 4 above, the Contractor shall be charged for the missing materials or equipment. The Project shall have the right to withhold money due or to become due to the Contractor, as reimbursement for the deficit in the Contractor's material.
- 9.6 Prior to the rehabilitation work, representative of the Project office \ and the contractor shall jointly inspect the materials to be dismantled and list down such materials. It shall be the contractor's responsibility to dispose those goods appropriately and get receipt. Such receipts shall be enclosed with the subsequent invoices claimed by the contractor.

## **10. Local Materials**

- 10.1 Certain minor items of materials, including civil materials, required by the Construction Standards are designated Local Materials in the Standards and shall be furnished and installed by the Contractor as part of the completed unit of construction.
- 10.2 The contractor shall include the cost of such items of materials in his quoted construction unit prices and no other payments for such materials shall be made to the contractor.
- 10.3 The project, may, at it option, require the project's approval of any or all Local Materials prior to procurement of such items by the Contractor.
- 10.4 It shall be the Contractor's responsibility to determine his requirements for any items of Local Material in a timely manner and make procurement accordingly. No delays shall be allowed, and no exceptions made to the required use of Local Materials due to the unavailability of such materials.

## **11. Construction Time Schedule**

- 11.1 Before the commencement of construction works the contractor shall be required to submit a detail construction time schedule showing details of each event of construction of different components of works so as to complete the whole work within the time frame as per the requirement of the contract. The contractor's proposal shall be examined by the employer to ensure his ability to perform the work in time and approval shall be given with any modification, if necessary, in satisfaction of the employer.
- 11.2 If the contractor fails to execute the any component of work within the period specified in the construction schedule, the employer shall have right to warn the contractor to make up for such delay in time. In case the contractor fails to overcome delay in different components of the works instead of repeated reminders by the employer, he shall be made fully responsible for any delay in final time schedule and no consideration shall be made for any extension of construction period for the whole work.

## **12. Measurement of work and material**

- 12.1 The contractor after completion of work of any segment of work as per approved drawing of the project shall submit detail work measurement in structure data sheet (SDS) as per the format Sheet-1 in this section of the tender document.
- 12.2 Measurement of the work performed by the contractor shall be jointly checked by the contractor and the staff deputed by the employer. In case of any discrepancy or dissatisfaction of employer staff the contractor shall be notified for making corrections for the same and the contractor shall have to submit his revised measurement schedule.
- 12.3 The contractor shall be issued materials based upon the requirements to perform his work conveniently. The contractor is required to submit detail of materials measurement in material data sheet (MDS) for each of the segment as per the prescribed format Sheet-3 in this section of the tender document. The contractor shall assess quantity of each and every item of materials from the material data sheet. Small items such as binding wire, nails, binding tape etc. could be assessed on flat basis.
- 12.4 While submitting running bill the contractor must submit details of quantity of materials issued to him, quantity consumed as assessed from the material measurement sheet and quantity in his possession. Materials issued, used and in contractor's possession must be reconciled as per the prescribed format Sheet-3 in this section of the tender document. The materials in possession of the contractor shall be the opening material balance for the next running bill. The contractor shall also submit copies of store vouchers showing details of materials issued to him. Statement of materials submitted shall be checked and certified by the employer before payment of each of the running bill.

## **13. Workmanship and quality of work**

- 13.1 The contractor shall be attentive to maintain workmanship and quality of work while performing the work and shall obey to all the instructions of the field staff of the project time to time in this regard.
- 13.2 Special items such as concrete works must be performed in presence of the project field staff. In case of the concrete works the project staff shall assess quantity of cement and steel to be used for each of the job and this must be followed for performing the job. Sand and aggregate must be supplied as per the standard specification of the tender document. The project field staff shall check quality of such materials and the contractor shall use the same after his approval. Curing of concrete works must be carried as per standard practice. The field staff shall have right to ask the contractor to repeat concrete works in case of his failure to execute the job as above or in his absence.
- 13.3 Each and every item of the standard data sheet (SDS) shall also be checked by the project staff for the satisfaction of quality of workmanship as per the prescribed specification of the tender document. In case of failure of the contractor to execute any item of the work as per proper workmanship or quality, the project shall have right to ask the contractor to revise or remedy such work at the cost of the contractor.

## **14. Acceptance work**

- 14.1 Final acceptance of work shall be issued only after completion of whole work of the contract as per the specification.



## 1. General

The provisions of this section of specification shall only be applicable to the extent of scope of works. The intent of specification covers the following:

The primary objective of Nepal Electricity Authority (NEA) is to generate, transmit and distribute adequate, reliable, and affordable power by planning, constructing, operating and maintaining all generation, transmission and distribution facilities in Nepal's power system both interconnected and isolated.

NEA is Executive Agency for Reconstruction & Improvement of Electricity in Earthquake Affected Districts of Rasuwa & Nuwakot Project which includes construction of the following:

- a) Social Infrastructure Development Component
- b) Electrification Component works consisting of construction of new 33/11 kV substations, associated 33kV, 11kV & 0.4kV line feeders.

This Technical specification covers the scope of works related to the Social Infrastructure Development works only.

The KfW, Germany, the funding agency, had appointed Power Grid Corporation of India Limited in association with Jade Consult Pvt. Ltd. as consultant for Procurement and Implementation Phase of the Reconstruction and Improvement of Earthquake Affected Districts of Rasuwa & Nuwakot Project.

The broad scope of this specification covers the following construction works. NEA, therefore, invites bid for the following package for Social Infrastructure Development works associated with said Reconstruction project.

The brief scope of work for the above component is mentioned below:

- |   |          |
|---|----------|
| 1. New Community Building                 | -02 nos. |
| 2. New School Building                    | -01 nos. |
| 3. Reconstruction of Religious places     | -01 nos. |
| 4. New Vegetable Collection Centre        | -01 nos. |
| 5. New Health Post Building               | -01 nos. |
| 6. Water Supply Scheme                    | -01 nos. |
| 7. Fencing at various location (optional) | -11 nos. |
| 8. Improvement of Foot Trails (optional)  | -4 km.   |

The scope of work mentioned above are subjected to change and addition of work scope may occur during the project implementation.

Design, engineering, and construction of all civil works at different villages of Rasuwa and Nuwakot. All civil works shall also satisfy the general technical requirements specified in other Sections of this Specification and as detailed below. They shall be designed to the required service conditions/loads as specified elsewhere in this Specification or implied as per National/ International Standards.

The work shall be carried out according to the design/drawings provided by the Client and to the Contractor by the Owner.

All civil works shall also satisfy the general technical requirements specified in other Sections of this Specification and as detailed below. They shall be designed to the required service conditions/loads as specified elsewhere in this Specification or implied as per National/ International Standards.

All civil works shall be carried out as per applicable Nepal Laws, Standards and Codes. All materials shall be of best quality conforming to relevant Indian Standards and Codes or equivalent International codes.

The Contractor shall furnish all design, drawings, labour, tools, equipment, materials, temporary works, constructional plant and machinery, fuel supply, transportation and all other incidental items not shown or specified but as may be required for complete performance of the Works in accordance with approved drawings, specifications and direction of Employer.

The work shall be carried out according to the design/drawings to be developed by the Contractor. The attached tender drawings are tentative for bidding purpose. For all buildings, structures, foundations etc. necessary layout and details shall be developed by the Contractor keeping in view the functional requirement of the school building etc. facilities and providing enough space and access for operation, use and maintenance based on the input provided by the Owner. Certain minimum requirements are indicated in this specification for guidance purposes only.

The rate quoted by the bidder for all type of civil work shall be firm irrespective of the type of terrain and depth of filling.

However, the Contractor shall quote according to the complete requirements.

## **2. GEOTECHNICAL INVESTIGATION**

- 2.1 The Contractor shall perform a detailed soil investigation to arrive at sufficiently accurate, general as well as specific information about the soil profile and the necessary soil parameters of the School Buildings. So, that the foundation of the School buildings can be designed and constructed safely and rationally. Safe Bearing Capacity of the other Social Infrastructure can be taken as 63.60 KN/m<sup>2</sup> for 1.5 m foundation depth for all width detailed design and Construction.
- 2.2 The Contractor should visit the site to ascertain the soil parameters before submitting the bid. The topography is uneven steeply sloping at few places requiring cutting and filling operations including slope stability and protection measures (if slopes encountered). Any variation in soil data shall not constitute a valid reason for any additional cost & shall not affect the terms & condition of the Contract. Tests must be conducted under all the critical locations.

### 3. SCOPE OF WORK

This specification covers all the work required for detailed soil investigation and preparation of a detailed report. The work shall include mobilization of necessary equipment, providing necessary engineering supervision and technical personnel, skilled and unskilled labor etc. as required to carry out field investigation as well as, laboratory investigation, analysis and interpretation of data and results, preparation of detailed Geo-technical report including specific recommendations for the type of foundations and the allowable safe bearing capacity for different sizes of foundations at different founding strata for the various structures of the substation. The Contractor shall make his own arrangement for locating the co-ordinates and various test positions in field as per the information supplied to him and also for determining the reduced level of these locations with respect to the benchmark indicated by the Owner/Engineer.

All the work shall be carried out as per latest edition of the corresponding Indian Standard Codes.

#### 3.1 Bore Holes

Drilling of bore holes of 150 mm dia. in accordance with the provisions of IS: upto 10 m depth or to refusal which ever occur earlier. (By refusal it shall mean that a standard penetration blow count (N) of 100 is recorded for 30 cm penetration). For school building Area, minimum three (3) bore holes shall be done to find out the geological profile of the area. If any unconformity encountered then more bore holes shall be drilled with the approval of Engineer-in-charge for the new projects. However in case deep pile foundations are envisaged the depths have to be regulated as per codal provisions. In cases where rock is encountered, coring in one borehole per bay shall be carried out to 1.5 M in bedrock and continuous core recovery is achieved.

Performing Standard Penetration Tests at approximately 1.5 m interval in the borehole starting from 1.5 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 boreholes at intervals of 2.5 m and every change of stratum starting from 1.0 m below ground level onwards in clayey strata.

The depth of Water table shall be recorded in each borehole.

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 the Contractor's 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.

### 3.2 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 airtight containers.

### 3.3 Back Filling of Bore Holes

On completion of each hole, the Contractor shall backfill all bore holes as directed by the Owner. The backfill material can be the excavated material and shall be compacted properly.

### 3.4 Laboratory Test

1. The laboratory tests shall be carried out 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 out in the relevant I.S. Codes.

The following laboratory tests shall be carried out

- a) Visual and Engineering Classification
- b) Liquid limit, plastic limit and shrinkage limit for C-□ soils.
- c) Natural moisture content, bulk density and specific gravity.
- d) Grain size distribution.
- e) Swell pressure and free swell index determination for expansive soil only.
- f) Consolidated un-drained test with pore pressure measurement.
- g) 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.
- h) C.B.R value
- i) Rock quality designation (RQD), RMR in case of rock is encountered

### 3.5 Test Results and Reports

- 3.5.1 The Contractor shall submit the detailed report in two (2) copies wherein information regarding the geological detail of the site, summarized observations and test data, bore logs, and conclusions and recommendations on the type of foundations with supporting calculations for the recommendations. Initially the report shall be submitted by the Contractor in draft form and after the draft report is approved, the final report in two (3) copies shall be submitted. The test data shall bear the signatures of the Investigation Agency, Vendor and also site representative of Consultant.
- 3.5.2. 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 etc.
- b) Bore Logs: 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 summarized 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.

### 3.6 Recommendations

The report should contain specific recommendations for the type of foundation for the various structures envisaged at site. The Contractor shall acquaint himself about the type of structures and their functions from the Owner. 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. Slope stability characteristics and landslide history of the area shall be specifically highlighted. Remedial measures to be adopted shall also be given.
- b) Recommended type of foundations for various structures. 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) 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 3.0 (three). Recommendation of liquefaction characteristics of soil shall be provided.
- d) Recommendations regarding slope of excavations and dewatering schemes, if required. Required protection measures for slope stability for cut & fill slopes of switchyard and approach road with stone pitching/retaining walls shall be clearly spelt out. Calculation shall also be provided for stability adequacy.
- e) 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.
- f) If expansive soil is met with, recommendations on removal or retaining 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, equipments to be deployed etc. shall be furnished. Illustrative diagram of a symbolic foundation showing details shall be furnished.

- g) Recommendations for additional investigations beyond the scope of the present work, if considered such investigation as necessary.

#### **4.0 SITE PREPARATION**

The contractor shall be responsible for proper leveling of switchyard site as per layout and levels of switchyard finalized during detailed engineering stage. The Contractor at his own cost shall make the layout and levels of all structure etc from the general grids of the plot and benchmarks set by the Contractor and approved by the Owner. The Contractor shall give all help in instruments, materials and personnel to the Owner for checking the detailed layout and shall be solely responsible for the correctness of the layout and levels. Site leveling shall be in the scope of the contractor. Bidder may decide the level of the sites. However, the level shall be such that it is 300 mm higher than the highest flood level (HFL) of the site. If HFL is not available, then nearby road level shall be assumed as HFL.

#### **5.0 SCOPE OF WORKS**

This clause covers the design and execution of the work for site preparation, such as clearing of the site, the supply and compaction of fill material, slope protection by stone pitching/retaining walls depending on the site location & condition, excavation and compaction of backfill for foundation, road construction, drainage, trenches and final topping by brick soling/stone filling.

##### **5.1 General**

- 1) The Contractor shall develop the site area to meet the requirement of the intended purpose. The site preparation shall conform to the requirements of relevant sections of this specification or as per stipulations of standard specifications. Contractor shall also carry out necessary protection of slope of switchyard area and approach road.
- 2) The fill material if required shall be suitable for the above requirement. The fill shall be such material and the site so designed as to prevent the erosion by wind and water of material from its final compacted position or the in-site position of undisturbed soil.
- 3) Material unsuitable for founding of foundations shall be removed and replaced by suitable fill material and to be approved by the Owner.
- 4) Backfill material around foundations or other works shall be suitable for the purpose for which it is used and compacted to the density described under Compaction. Excavated material not suitable or not required for backfill shall be disposed off in areas as directed by owner upto a maximum lead of 1 km.

##### **5.2 Excavation and backfill**

1. Excavation and backfill for foundations shall be in accordance with the relevant code.
2. Whenever water table is met during the excavation, it shall be dewatered and water table shall be maintained below the bottom of the excavation level during excavation, concreting and backfilling.

3. When embankments are to be constructed on slopes of 15% or greater, benches or steps with **horizontal** and vertical faces shall be cut in the original slope prior to placement of embankment material. Vertical faces shall measure not more than 1 m in height.
4. Embankments adjacent to abutments, culverts, retaining walls and similar structures shall be constructed by compacting the material in successive uniform horizontal layers not exceeding 20 cm in thickness (of loose material before compaction). Each layer shall be compacted as required by means of mechanical tampers approved by the Owner. Rocks larger than 10 cm in any direction shall not be placed in embankment adjacent to structures.
5. Earth embankments of roadways and site areas adjacent to buildings shall be placed in successive uniform horizontal layers not exceeding 20 cm in thickness in loose stage measurement and compacted to the full width specified. The upper surface of the embankment shall be shaped so as to provide complete drainage of surface water at all times.
6. The land required for borrowing earth shall be arranged & selected by contractor. The identified land shall be got approved by site in charge. The quoted rates shall include cost of earth, taxes, duties, royalty, compensation for the land identified for borrow earth. The rate shall also be inclusive of all leads, lifts, ascent, descent and testing required for completion of work in all respect.
7. The ground levels for all measurements shall be taken at every 5 meter distance in uniformly sloping ground and at closer distance where pits/undulations are met with. In fairly leveled area, levels shall be taken at 15 meter apart at the discretion of Engineer in Charge. The ground levels shall be recorded and plotted on plans. The same is signed by the contractor and the Engineer in Charge before the earth work is started. All labor, material, tool, equipment etc required for the above work shall be arranged by the contractor at his own cost.

### 5.3 Compaction

1. The density to which fill materials shall be compacted shall be as per relevant IS and as per direction of Owner. All compacted sand filling shall be confined as far as practicable. 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).
2. At all times unfinished construction shall have adequate drainage upon completion of the road's surface course, adjacent shoulders shall be given a final shaping, true alignment and grade.
3. Each layer of earth embankment when compacted shall be as close to optimum moisture content as practicable. Embankment material, which does not contain sufficient moisture to obtain proper compaction, shall be wetted. If the material contains any excess moisture, then it shall be allowed to dry before rolling. The rolling shall begin at the edges overlapping half the width of the roller each time and progress to the center of the

road or towards the building as applicable. Rolling will also be required on rock fills. No compaction shall be carried out in rainy weather.

#### **5.4 Requirement for fill material under foundation**

All foundations shall rest below virgin ground level and the minimum depth of foundation below the virgin ground level shall be at least 1000 mm.

### **6.0 FOUNDATION /RCC CONSTRUCTION**

#### **6.1 General**

1. Work covered under this Clause of the Specification comprises the design and construction of foundations and other RCC constructions for new community building, new school building, Reconstruction of Religious places, new vegetable collection center, new health post building, water supply scheme etc or service and any other foundation required to complete the work. This clause is as well applicable to the other RCC constructions.
2. Concrete shall conform to the requirements mentioned in IS: 456 and all the tests shall be conducted as per relevant Indian Standard Codes as mentioned in Standard field quality plan appended with the specification  

A minimum grade for PCC (1:4:8) and RCC (1:1.5:3) shall be used for all structural/load-bearing members as per latest IS 456.
3. If the site is sloppy, the foundation height will be adjusted to maintain the exact level of the top of structures to compensate such slopes.
4. The building plinths shall be minimum 500 mm above finished ground level respectively.
5. Minimum 75mm thick lean concrete shall be provided below all underground structures, foundations, trenches etc. to provide a base for construction.
6. 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 as may be required based on soil/sub-soil conditions and superimposed loads shall be provided.

#### **6.2 Design**

Foundations shall be of reinforced cement concrete for New Community Building, New School Building, Reconstruction of Religious places, New Vegetable Collection Centre, New Health Post Building, Water Supply Scheme, Fencing at various location (optional). Design requirement shall be fulfilled by the contractor and furnished for approval as specified in the scope of work. The design and construction of RCC/ PCC / Masonry structures shall be carried out as per IS: 456 and relevant IS code/CBIP manual/NBC etc



2. Limit state method of design shall be adopted unless specified otherwise in the specification.
3. For detailing of reinforcement IS: 2502 and SP: 34 shall be followed. Cold twisted deformed bars ( $F_y=500 \text{ N/mm}^2$ ) conforming to IS: 1786 shall be used as reinforcement. However, in specific areas, mild steel (Grade I) conforming to IS: 432 can also be used. Two layers of reinforcement (on inner and outer face) shall be provided for wall & slab sections having thickness more than 150 mm. Clear cover to reinforcement towards the earth face shall be minimum 40 mm.
4. RCC water retaining structures like storage tanks, etc. shall be designed as un-cracked section in accordance with IS: 3370 (Part I to 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.
5. 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 isolated /combined footings proposed to be used.
6. Design shall consider any sub-soil water pressure that may be encountered following relevant standard strictly.
7. 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/masonry foundations.
8. RCC columns /pedestals shall be provided with rigid connection at the base.
9. 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.
10. 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).
11. In addition to earth pressure and ground water pressure etc., a surcharge load of  $1 \text{ T/Sq.m}$  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.
12. Following conditions shall be considered for the design of water tank in pumps house, channels, sumps, trenches and other underground 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 up with 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.
  - d) Providing and applying integral crystalline slurry of hydrophilic in nature for waterproofing treatment to the RCC structures, water tanks, prepared by mixing in the ratio of 5: 2 (5 parts integral crystalline slurry : 2 parts water) for vertical surfaces and 3: 1 (3 parts integral crystalline slurry : 1 part water) for horizontal surfaces and applying the same from negative (internal) side with the help of synthetic fiber brush. The material shall meet the requirements as specified in ACI-212-3R-2010 i.e by reducing permeability of concrete by more than 90% compared with control concrete as per DIN 1048 and resistant to 16 bar hydrostatic pressure on negative side. The crystalline slurry shall be capable of self-healing of cracks up to a width of 0.50mm. The work shall be carried out all complete as per specification and the direction of the engineer-in-charge. The product performance shall carry guaranteed for 10 years against any leakage.
  - e) For vertical surface two coats @0.70 kg per sqm per coat sqm.
  - f) For horizontal surface one coat @1.10 kg per sqm. sqm
  - g) Extra for providing and mixing water proofing material in cement concrete work in doses by weight of cement as per manufacturer's specification
13. The foundations shall be proportioned so that the estimated total and differential movements of the foundations are not greater than the movements that the structure or equipment is designed to accommodate.

### 6.3 Admixtures & additives

1. Only approved admixtures shall be used in the concrete for the Works. When more than one admixture is to be used, each admixture shall be batched in its own batch and added to the mixing water separately before discharging into the mixer. Admixtures shall be delivered in suitably labeled containers to enable identification.
2. Admixtures in concrete shall conform to IS: 9103. The water proofing cement additives shall conform to IS: 2645. Owner shall approve concrete Admixtures/ Additives.
3. The Contractor may propose and the Owner may approve the use of a water-reducing set-retarding admixture in some of the concrete. The use of such an admixture will not be approved to overcome problems associated with inadequate concrete plant capacity or

improperly planned placing operations and shall only be approved as an aid to overcoming unusual circumstances and placing conditions.

4. The water-reducing set-retarding admixture shall be an approved brand of Lignosulphonate type admixture.
5. The waterproofing cement additives shall be used as required / advised by the Owner.

## **7.0 BUILDINGS - GENERAL REQUIREMENTS**

### **7.1 General**

The scope for new building includes the design, engineering and construction including anti-termite treatment, plinth protection, DPC of Building including sanitary, water supply, and electrification etc. of buildings. The buildings shall be of RCC framed structure of concrete of M20 grade (Min.). Following design criteria shall be adopted for design purposes for new substation.

The layout of the Social Component Infrastructure shall be finalized as per detailed engineering to suit project requirements

The brief scope of work for the above component is mentioned below:

- |   |          |
|---|----------|
| 1. New Community Building                 | -02 nos. |
| 2. New School Building                    | -01 nos. |
| 3. Reconstruction of Religious places     | -01 nos. |
| 4. New Vegetable Collection Centre        | -01 nos. |
| 5. New Health Post Building               | -01 nos. |
| 6. Water Supply Scheme                    | -01 nos. |
| 7. Fencing at various location (optional) | -11 nos. |
| 8. Improvement of Foot Trails (optional)  | - 4 km.  |

- The school building should be double story and one single storied building along with RCC staircase to access first floor.
- The details given in tender drawings shall be considered along with details available in this section of the specification while deciding various components of the building.
- The reconstruction of religious infrastructure should have their own norms, aesthetic, arts and cultural ancient values. The wooden parts of that building should be carved as per the norms and cultural values of that locality.

- Doors and windows on external walls of the buildings (other than areas provided, with insulated metal claddings) shall be provided with RCC sunshade over the openings with 500 mm projection on either side of the openings. Projection of sunshade from the wall shall be minimum 450 mm over window openings and 750 mm over door openings.
- 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.
- Anti-termite chemical treatment shall be given to column pits, wall trenches, foundations of buildings, filling below the floors etc. as per IS: 6313 and other relevant Indian Standards.
- Items/components of Social Infrastructure not explicitly covered in the specification/BOQ but required for completion of the project shall be deemed to be included in the scope. However, bidder/contractor shall visit temple place to be reconstructed and verify the scope of work and items in BOQ. If any additional item required it may communicated to the owner.
- Bricks having minimum 75kg/cm<sup>2</sup> compressive strength can only be used for masonry work. Contractor shall ascertain himself at site regarding the availability of bricks of minimum 75kg/cm<sup>2</sup> compressive strength before submitting his offer.
- Minimum headroom of 3 M below soffit of beams/false ceiling shall be considered for rooms. The roof shall have four side sloping roof or flat roof as finalized during detailed engineering.
- The scope of work mentioned above are subjected to change and addition of work scope may occur during the project implementation.

## 7.2 Design

- a) The buildings shall be designed:
  1. To the requirements of the National Building Code of Nepal, and the standards quoted therein.
  2. For the specified climatic & loading conditions.
  3. 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.

4. With a functional and economical space arrangement.
5. For a life expectancy of structure, systems and components not less than that of the equipment, which is contained in the building, provided regular maintenance is carried out.
6. Be aesthetically pleasing. Different buildings shall show a uniformity and consistency in architectural design.
7. To allow for easy access to equipment and maintenance of the equipment.
8. With, wherever required, fire retarding materials for walls, ceilings and doors, which would prevent supporting or spreading of fire.
9. Suitable expansion joints shall be provided in the longitudinal direction wherever necessary with provision of twin columns.
10. 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.
11. Permissible stresses for different load combinations shall be taken as per relevant IS Codes.
12. The building lighting shall be designed in accordance with the requirements of relevant section.

### **7.2.1 Design loads**

Building structures shall be designed for the most critical combinations of dead loads, super-imposed loads, wind loads, seismic loads, and temperature loads.

Dead loads shall include the weight of structures complete with finishes, fixtures and partitions and should be taken as per IS: 1911.

The wind loads shall be computed as per IS 875, Seismic Coefficient 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.

For consideration of loads on structures, IS: 875 shall strictly adhere to. Any other load coming in the structure, not mentioned in IS 875 shall be calculated as per relevant IS code and NBC.

### **7.2.2 Submission**

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

1. Design criteria shall comprise the codes and standards used, applicable climatic data including wind loads, earthquake factors maximum and minimum temperatures applicable to the building locations, assumptions of dead and live loads, including equipment loads, impact factors, safety factors and other relevant information.

2. Structural design calculations and drawing (including construction/fabrication) for all reinforced concrete and structural steel structures.
3. 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 1:75 and shall identify the major building components.
4. 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.
5. Product information of building components and materials, including walls partitions flooring ceiling, roofing, door and windows and building finishes.
6. A detailed schedule of building finishes including colour schemes.
7. 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.

### **7.2.3 Finish Schedule**

- (a) The finishing schedule is given in subsequent clauses.

### **7.2.4 Flooring**

Flooring in various rooms of various buildings shall be as for detailed schedules.

### **7.2.5 Tile Works**

Tiles shall be laid in accordance to IS specifications and instructions of manufacturer. Tiles shall be fixed with approved tile adhesive. Floor to receive tiles shall be wire brushed cleaned, wetted and mopped. Cement concrete screed of about 28 mm thickness shall be spread over the area uniformly and compacted with 2-3 meter straight edge to achieve dead uniform levels or slopes as required. Surface shall be allowed to harden for 7 days. Tiles shall be fixed by using tile adhesive (cement based) as specified by approved manufacturer about 3-6 mm on floor. Adhesive well combed and tile fixed with twist method to correct position. Tiles shall be positioned by tapping with wooden hammer and level checked with straight edge 2-3 meter long. Joints shall be as specified by tile manufacturer or as thin as possible.

Providing and laying Anti-skid vitrified tiles in different sizes (thickness to be specified by manufacturer) with water absorption less than 0.08% and conforming to IS: 15622, of approved make, in all color and shades, laid on 20 mm thick cement mortar 1:4 (1 cement: 4 coarse sand), joining with grey cement slurry @ 3.3kg/sq.m including grouting the joints with white cement and matching pigments etc., complete size of tile 300X600.

## **7.2.6 Screeding and Punning**

### **7.2.6.1 Scope of work:**

The work covered under this specification consists of providing and laying at levels and floors, flooring of different types, strictly in accordance with these specifications and relevant drawings.

### **7.2.6.2 Materials:**

The maximum size of coarse aggregate shall be 10mm. The fine aggregate shall consist of properly graded sand. Concrete shall be mixed preferably by machine, and hand mixing shall be avoided as far as practicable.

### **7.2.6.4 Preparation of Base:**

The base concrete surface shall be thoroughly chipped to remove laitance, caked mortar, loose sand, dirt etc. cleaned with wire brush and washed clean and watered until no more water is absorbed.

### **7.2.6.5 Mixing:**

The topping concrete shall be of mix of one part of cement, two parts of sand and 4 parts of well graded stone chips of 10mm maximum size. The ingredients shall be thoroughly mixed with just sufficient water to the required plasticity, having water cement ratio not more than 0.4.

### **7.2.6.6 Laying:**

The free water on the surface of the base shall be removed and a coat of cement slurry to the consistency of thick cream shall be brushed on the surface. On this fresh grouted base, the prepared cement concrete shall be laid immediately after mixing. The concrete shall be spread and leveled carefully. The concrete shall be compacted and brought to the specified levels by means of a heavy straight edge resting on the side forms and down ahead with a sawing motion in combination with a series of lifts and drops alternatively with small lateral shifts, either mechanically or manually as directed by the Engineer-in-charge.

### **7.2.6.7 Finishing the surface:**

After the concrete has been fully compacted, it shall be finished by toweling or floating. Finishing operations shall start shortly after the compaction of concrete and shall be spread over a period of one to six hours depending upon the temperature and atmospheric conditions. The surface shall be troweled intermittently at intervals for several times so as to produce a uniform and hard surface.

## **7.2.7 Walls**

Buildings shall be of framed superstructure. All walls shall be non-load bearing walls. Min. thickness of external walls shall be 230 mm (one brick) with 1:6 cement sand mortar.

## **7.2.8 Plastering**

All internal walls shall have minimum 12mm and 15 mm thick 1:6 cement sand plaster on either side of wall. The ceiling shall have wall putty.

## **7.2.9 Painting**

All external surfaces shall have 18 mm cement plaster with weather coat paint. The paint shall be antifungal quality of reputed brand suitable for masonry surfaces for high rainfall zone. Inner wall surface should have two (2) coat emulsion Paint with primer paint. White cement primer shall be used as per manufacturer's recommendation. Approved paints, oils or varnishes shall be brought to the site of work by the contractor in their original containers in sealed condition.

### 7.2.9.1 Painting, Priming coat on Wood, Iron or Plastered Surfaces

#### **Primer**

The primer for wood work, iron work or plastered surface shall be as specified in the description of the item.

Surfaces Primer to be used

- a) Wood work (hard and soft wood) Primer conforming to IS 3536 – 1966
- b) Resinous wood and ply wood with Aluminum Primer
- c) Iron & Steel, aluminum and galvanized steel work with zinc chromate primer conforming to IS 104-1962
- d) Plastered surfaces, cement brick work, Asbestos surfaces for oil bound distemper and paint  
Cement primer

The primer shall be ready mixed primer of approved brand and manufacture.

#### **Preparation of Surface**

##### **Wood work:**

The wood work to be painted shall be dry and free from moisture.

The surface shall be thoroughly cleaned. All unevenness shall be rubbed down smooth with sand paper and shall be well dusted.

The surface treated for knotting shall be dry before painting is applied. After the priming coat is applied, the holes and indentation on the surface shall be stopped with glaziers putty or wood putty (for specifications for glaziers putty and wood putty – refer as mentioned herein before). Stopping shall not be done before the priming coat is applied as the wood will absorb the oil in the stopping and the latter is therefore liable to crack.

##### **Iron and Steel Work:**

All rust and scales shall be removed by scrapping or by brushing with steel wire brushes.

Hard skin of oxide formed on the surface of wrought iron during rolling which becomes loose by rusting, shall be removed. All dust and dirt shall be thoroughly wiped away from the surface.

If the surface is wet, it shall be dried before priming coat is undertaken.

##### **Plastered Surface:**

The surface shall ordinarily not be painted until it has dried completely. Trial patches of primer shall be laid at intervals and where drying is satisfactory, painting shall be taken. Before primer is applied, holes and undulations, shall be filled up with plaster of Paris / putty and rubbed smooth.

##### **Application:**

The primer shall be applied with brushes, worked well into the surface and spread even and smooth. The painting shall be done by crossing and laying off as described herein after.



**a) Painting with Acrylic Emulsion/Plastic Emulsion Paint/Weather coat**

This shall be polyvinyl based Acrylic / plastic emulsion paint of approved manufacture of the required shade conforming to IS 5411-1969.

**b) Putty:**

Plaster filler to be used for filling up (putting) uneven surfaces, small cracks and holes etc. shall be of approved compound and as per recommendations of the manufacturers. No oil based putty shall be used. The putty should be made from a mixture of whiting and plastic emulsion paint or as per manufacturer recommendations.

**c) White washing:**

The white wash shall be applied with brushes or by spray in the specified number of coats. The operation for each coat in the case of brush application shall consist of a stroke of the brush given from the top downwards, another from the bottom upwards over the first strike, and similarly one stroke horizontally from the right and another from the left before it dries. Each coat shall be allowed to dry before the next one is applied. Further reach coat shall be inspected and approved by the Engineer-in-charge before the subsequent coat is applied. No portion of the surface shall be left out initially to be patched up later on.

For new work, three or more coats shall be applied till the surface present a smooth and uniform finish through which the plaster does not show. The finished dry surface shall not show any sign of cracking and peeling nor shall it come off readily on the hand when rubbed.

For old work, after the surface has been prepared as described hereinbefore, a coat of white wash shall be applied over the patches and repairs. Then a single coat or two or more coats of white wash as stipulated in the description of the item shall be applied over the entire surface. The white washed surface should present a uniform finish through which the plaster patched do not appear. The washing on ceiling should be done prior to that on walls.

**7.2.10 Finishing**

All external surfaces shall have 18 mm cement plaster in two coats, under layer 12 mm thick cement plaster 1:5 and finished with a top layer 6 mm thick cement plaster 1:6 (DSR 13.19) with water proofing compound. The paint shall be antifungal quality of reputed brand suitable for masonry surfaces for high rainfall zone. White cement primer shall be used as per manufacturer's recommendation.

**7.2.11 GRILLS/RAILING****7.2.11.1 General**

The contractor shall submit the drawings shall show all dimension, details of construction, installation relating to the adjoining work.

**7.2.11.2 Materials**

All structural steel shall conform to IS 226-1963 sections for grills and shall be free from Loose mill scales, rusts, pitting or any other defects affecting its strength and durability.

**7.2.11.3 Fabrication**

The grills shall be fabricated to the design and pattern shown in the drawings. All joints shall be made in best workman like manner with slotting and welding as required to the specified size and shape. The edge of the M.S. flats shall be suitably mitred before welding to get the desired shape. The joints shall be filled to remove excess stay after welding screws, nuts, washers, bolts, rivets and any other miscellaneous fastenings devices shall be of steel and shall be provided by the contractor.

Manufactured M.S. Grills then be fixed in between the posts, balusters, M.S. frame work etc. to correct alignment. Any undulations, bends etc. found shall be rectified by the contractor at his own cost. The complete assembly of grill / railing so fixed shall be firm and there shall not be any lateral movements.

#### **7.2.11.4 Samples**

Samples of grill and railings shall be submitted for approval of the Engineer-in-charge and to be got approved before taking up for mass fabrication.

#### **7.2.11.5 Installation**

The approved grills shall be fixed in position where specified and shown in drawings including in masonry walls, teakwood frames, hand railings etc. Any damages to walls, frames etc. caused during fixing the grills shall be made good by grouting with cement mortar/packing/repairing properly at the contractors cost.

#### **7.2.11.6 Painting**

Painting shall be done as per the specification specified under painting.  
**Finishing / Painting/Polishing for railing:**

Hand rail shall be polished with wax polish / French polish / melamine with two or more coats over one coat of primer or painted with two coats of synthetic enamel paint / flat oil paint of approved make and shade over one coat of approved primer. M.S. grills, balusters, etc. also to be painted as per specifications specified under Painting/ Polishing.

#### **7.2.12 Steel Rolling Shutter**

Measurement for payment of Steel Rolling Shutter will be in square meter as mentioned in BOQ. The unit rate shall cover the cost of manufacturing, materials, labors, tools, equipment's, transporting, erection, painting etc., all complete to the satisfaction of Employer.

#### **7.2.13 Door and windows**

Doors and windows should be hard, strong and durable which is specified on BOQ. The quality of door and windows should be strong, hard and durable with showing cultural wooden carved arts and aesthetic ancient beauty for religious building. The details of door and windows of each buildings shall be as per tender drawing with relevant IS code and cultural arts and aesthetic and ancient beauty.

#### **7.2.14 Toilet/Bathroom finishing with necessary fittings**

##### **7.2.14.1 General**

The Contractor shall furnish, install, maintain and operate all necessary sanitary appliances and other materials for one complete set Toilet with urinals and sunken slab along with the water proofing treatment shall be provided.

The Contractor is required to submit all the detail layout plan showing breakdown of all items, fittings, accessories and other to the Engineer for his approval. Selection, installation and maintenance of sanitary appliances shall be in accordance with good practice. All sanitary appliances and fittings shall be carefully examined for defects before they are installed and also in the completion of work. The Contractor shall inform to the Engineer from time to time prior to installation and execution of work at least 7 days before fitting after getting approval for the make of appliances.

All such work shall be as per specification, drawing and direction of Engineer and complete in all respect in position, level dimension, with all necessary fixtures, clamps, connections, etc. including cutting, bending, grooving, installation and re-installation of civil works as per specification with materials or as directed by the Engineer. Contractor shall make arrangement of toilet/bathroom as per tender drawing. Tentative quantity of fixtures/accessories shall decide as per requirement and number of users.

#### **7.2.14.2 Sanitary works and fixtures**

The work shall cover providing and installing sanitary works and fixtures complete set with all necessary fitting, internal and external for fixing at positions of the building including cutting and making good the damages groove to its original finish and ready for operation after testing.

##### **Materials**

All sanitary fittings shall be of good quality as approved by the Engineer. Alternatively a schedule of other manufacturer's, fittings may be submitted for approval of the Engineer.

##### **Fittings**

#### **1. European Low level W.C. Suite**

(a) The W.C. shall be white vitreous China (Commode), "P" or "S" Trap with flush bend with heavy pattern hinged back plastic seat and flexible plastic cover connector.

(b) Low level flushing tank for the W. C. shall be of porcelain Vitreous China low down type, 10 liters vitreous China with waste water preventer, syphon ball valve, flush bend, C. P. type stopcock 12 mm diameter, flexible connecting pipe with necessary hinged, buffers, screws, stand, etc. fitting and fixing with brackets all complete as directed by the Engineer.

#### **2. Asian W. C.**

The W. C. shall be of white vitreous China Orissa pattern with 100 mm dia H. C. C. syphon with vent arm S or P trap with ISI mark nit. The Orrisa pattern pan shall be fitted with C. P. flush valve of standard make.

#### **3. Urinals**

The urinals shall be of white vitreous China flat back type urinals with chrome plated spreader pipes and necessary C. P. fittings with all hangers, white vitreous China division wall hanger and screws, vitreous China automatic flushing cistern of suitable capacity for number of urinal.

#### **4. Wash Basin**

The wash basin shall be of white vitreous China Lavatory basin of size 560 mm x 456 mm with one or double trap as per direction, 32 mm chrome plate waste pipe 1 meter chain stay and plug, pair of C. P. built in brackets, 32 mm C. P. Bottle trap, "S" or "P" trap, 12 mm lead connecting 5 m long with both end coupling joint. All necessary bib-cock, stopcock, mixture, shower and other related accessories to complete the bathroom and toilet shall be supplied by the Contractor as approved by the Engineer.

#### **5. Paper Holder**

The toilet paper holder shall be of white glazed porcelain clay box type or C. P. wall mounted type as per directed by Engineer.

#### **6. Soap Disc**

The soap disc shall be of white glazed porcelain or C. P. wall mounted as per directed by Engineer.

#### **7. Glass self**

The glass self shall be specified size with C. P. guard rail and bracket with C. P., screws. The glass shall be 6 mm thick with edge round off or as directed by the Engineer.

#### **8. Towel Rail**

Towel rail shall be one arm, two or multiple arm fixed on wall and it shall be C. P.

#### **9. Paper Holder**

The mirror shall be of at least 6 mm thick silver backed, best quality as approved by the Engineer. The mirror shall be with backlight frame. Bathroom mirror shall be (600 x 450 x 6 mm thick) hard board backing.

### **7.2.16 Water tank**

PVC syntax or equivalent make Roof water tank of adequate capacity depending on the number of users for 24 hours storage shall be provided. Minimum 1 Nos. 500 liters capacity shall be provided in each building/location as per requirement. For School building syntax tanki Two (2) Nos of minimum capacity 1000 liters shall be provided. Water storage tanks shall be provided with a stop valve or stop cock at every outlet other than overflow pipe, and shall be fitted with copper strainer. Outlet pipe shall be as per drawing or as directed by the Engineer.

The fixing and fitting of the sanitary wares and fixtures to the plate shall be in accordance with the good practice.

## **8. WATER SUPPLY AND SANITATION**

### **8.1 Water Supply**

This section covers the basic requirements for water supply and general requirement of plumbing connection to water supply to water systems from the approved water source at different villages of Rasuwa and Nuwakot.

All pipe work shall be so laid or fixed and maintained as to be as to remain watertight thereby avoiding waste of water and the risk of contamination of water conveyed.

Underground pipe shall be laid in such a way that it is unlikely to be damaged by frost or traffic loads and vibrations. Special precautions shall be taken to avoid damage to the piping by corrosion, water hammering. No bend shall be made abrupt to avoid friction loss.

#### **8.1.1 Laying of Main Pipes**

The mains and pipes on site shall be laid in accordance with good standard practice. The work shall cover all materials required for such pipes & fittings. The work shall include line marking, level marking, excavation and laying filling with excavated materials, tying and clamping, jointing of pipes, groove cutting, fixing with couplings, T-bend, etc. complete with testing and ready for operation.

#### **8.1.2 Materials**

The pipes shall be galvanized mild steel seamless screwed and socketed tubes conforming to the requirements of IS: 1239-1938 or as approved by the Engineer. All fittings for pipe shall be HDPE material. All pipes shall be tested before use in laying. In general the pipe diameter shall be in the range of 15-100 mm as specified in the drawings or as directed by the Engineer. Stop-cock, valve, etc. shall be of appropriate diameter and capacity made from gun metal of approved quality. Jointing of pipes shall be as per good practice and or as directed by the Engineer.

### **8.2 Construction Water Supply**

- i) Contractor shall make its own arrangement for construction water.
- ii) The contractor shall carry out all the plumbing/erection works required for supply of water in School building, Health post and Community Building.
- iii) The details of tanks, pipes, fittings, fixtures etc for water supply are given elsewhere in the specification under respective sections as per requirement.
- iv) A scheme shall be prepared by the contractor indicating the layout and details of water supply which shall be got approved by the Owner 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.

### 8.3 Sewerage System

- (i) Sewerage system shall be provided for Community building, Health post and School building.
- (ii) The Contractor shall construct septic tank and soak pit, man hole suitable for 150 users for School building, 20 user for Community building and 10 user for Health post.
  - (i) The septic tank and soak pit shall be constructed as per enclosed drawing no. C/DMD/006-Rev-0.

### 8.4 Roof

Providing and laying in situ five course water proofing treatment with APP (Atactic Polypropylene) modified polymeric membrane over roof consisting of first coat of bitumen primer @0.40 kg per sqm, 2nd & 4th courses of bonding material @1.2 kg/sqm, which shall consist of blown type bitumen grade 85/25 conforming to IS: 702, 3rd layer of roofing membrane APP modified Polymeric membrane 2.0 m thick of 3.00kg/sqm weight consisting of five layer of prefabricated with center core as 100 micron HMHDPE film sandwiched on both sides with Polymeric mix and Polymeric mix is protected on both sides with 20 micron HMHDPE . 5th, the top most layer shall be finished with brick tiles of class designation 10 grouted with cement mortar 1:3 (1 cement : 3 fine sand) mixed with 2% integral water proofing compound by weight of cement over a 12 mm layer of cement mortar 1:3 (1 cement : 3 fine sand) and finished neat. Grading roof for water proofing treatment with 22.14.1 Cement concrete 1:2:4 (1 cement: 3 coarse sand: 4 graded stone aggregate 20 mm nominal size).

The whole terrace so finished shall be flooded with water for a minimum period of two weeks for curing and for final test. All above operations to be done in order and as directed and specified by the Engineer-in-charge.

### 8.5 Screeding and Punning

#### 8.5.1 Scope of work:

The work covered under this specification consists of providing and laying at levels and floors, flooring of different types, strictly in accordance with these specifications and relevant drawings.

#### 8.5.2 Materials:

The maximum size of coarse aggregate shall be 10mm. The fine aggregate shall consist of properly graded sand. Concrete shall be mixed preferably by machine, and hand mixing shall be avoided as far as practicable.

#### 8.5.3 Preparation of Base:

The base concrete surface shall be thoroughly chipped to remove laitance, caked mortar, loose sand, dirt etc. cleaned with wire brush and washed clean and watered until no more water is absorbed.

#### 8.5.4 Mixing:

The topping concrete shall be of mix of one part of cement, two parts of sand and 4 parts of well graded stone chips of 10mm maximum size. The ingredients shall be thoroughly mixed with just sufficient water to the required plasticity, having water cement ratio not more than 0.4.

**8.5.5 Laying:**

The free water on the surface of the base shall be removed and a coat of cement slurry to the consistency of thick cream shall be brushed on the surface. On this fresh grouted base, the prepared cement concrete shall be laid immediately after mixing. The concrete shall be spread and leveled carefully. The concrete shall be compacted and brought to the specified levels by means of a heavy straight edge resting on the side forms and down ahead with a sawing motion in combination with a series of lifts and drops alternatively with small lateral shifts, either mechanically or manually as directed by the Engineer-in-charge.

**8.5.6 Finishing the surface:**

After the concrete has been fully compacted, it shall be finished by toweling or floating. Finishing operations shall start shortly after the compaction of concrete and shall be spread over a period of one to six hours depending upon the temperature and atmospheric conditions. The surface shall be troweled intermittently at intervals for several times so as to produce a uniform and hard surface.

**9. MISCELLANEOUS****9.1 Pinnacle (Gajur):**

Products should be manufactured using high quality of raw material. The Pinnacle should reflect a clearly distinctive basic principle that represents a particular culture, arts and era of that locality.

**9.2 Electrical Fixtures:**

The electrical fixtures consist of the lightning fixtures, switches, distribution boards and receptacles. These fixtures shall be as enough to fulfill the lighting requirement. The fixtures shall be of best quality and from renowned brand prior approval from Employer shall be taken before purchase and installation of the fixtures. The Installation of Electrical fixtures and accessories shall be in Community building, School building, Religious places, Vegetable collection center, Health post building shall be as per approved construction drawing provided to the contractor.

**9.3 Fencing:****9.3.1 Product materials for fencing**

The minimum requirements are as follows:

**9.3.2 Chain Link fence fabric in accordance to IS-2721**

- |    |                            |   |             |
|----|----------------------------|---|-------------|
| 1. | Size of mesh               | : | 75 mm       |
| 2. | Nominal wire size          | : | 3.15 mm dia |
| 3. | Width of chain link        | : | 2000 mm     |
| 4. | Class of zinc coating      | : | medium      |
| 5. | Zinc coated after weaving. |   |             |

### 9.3.3 Posts

	Angle Section
Intermediate	: L 50 x 50 x 6
Straining posts	: L 65 x 65 x 6
Stay post	: L 50 x 50 x 6

1. All structural steel shall conform to IS: 2062 and shall be painted with a coat of approved steel primer and two coats of synthetic enamel paint.
2. The Chain Link fabric shall be fixed to the post at the top and bottom of the fence by welding/fixing 50 mm MS flat all through its length.
3. Fencing top shall be either of galvanized barbed wire or tape. Barbed wire shall conform to IS: 278.
4. The barbed wire may consist of not more than two splices per reel. The barbed wire shall be formed by twisting two line wires, one containing the barbs. The barbed wire shall be designated as A-4 IS: 278 and shall be galvanized.
5. Above chain link, 3-rows (6 nos) of barbed tape/wire shall be provided in each arm of the Y shaped barbed arm at top.
6. With barbed tape/wire above the chain link fence, the total fence height shall be minimum 2500 mm above finished gravel level.
7. Barbed tape/wire arms shall be same as intermediate and straining post.
8. Tension wire: single strand, high tensile, galvanized steel wire, 4 mm diameter.
9. Fittings and hardware: cast aluminum alloy or galvanized steel, malleable or ductile cast iron turnbuckles to be drop forged.
10. For every 50 reels or part there of samples of the barbed wire/tape and the individual line wires shall be put to tensile test and in case of failure to conform to the tensile properties given below, two additional tests of each kind shall be made on the samples cut from other reels.
11. GI chain link mesh shall be as per IS: 2721. Mesh size 75 mm and nominal wire size shall be 3.15 mm diameter.

#### Tensile properties

Tensile strength of line wire	:	40 to 60Kgs/Sq.mm
Minimum Breaking load of	:	375Kgs.
Complete barbed wire/tape		

On the results of these additional tests, the whole or portion of the barbed wire/tape shall be accepted or discarded by the Purchaser, as the case may be.

### 9.3.4 Installation

1. Contractor shall submit the fencing drawing Fence shall be installed along lines shown on approved drawings.
2. Post holes shall be excavated by approved methods.



3. Intermediate posts shall be spaced 2.5 m apart measured parallel to ground surface.
4. Straining posts shall be installed at equal intervals not exceeding 25.0 m.
5. Straining posts shall be installed at sharp changes in grade, at corners, at change of direction and where directed.
6. All corner post will have two-stay post and every tenth post will have a transverse stay post.
7. Posts shall be set in 1:2:4 plain cement concrete Blocks of minimum dimension 400 mm x 400 mm x 1000 mm deep Concrete work shall conform to relevant clause. Post shall be braced and held in plumb position and true alignment and elevation until concrete has set.
8. Fence fabric shall not be installed until concrete has cured a minimum of 7 days.
9. Bottom and top of the fence fabric shall be fixed with MS flats of 50 mm x 6mm (min).
10. Fence fabric shall be laid out with barbed edge on top, stretched tightly and shall be fastened to intermediate, post gate and straining post with 50 x 6 flats.
11. Fabric shall be secured to tension wires with tie wires at 400 mm intervals. Tie wires shall be given not less than two twists.
12. Barbed tape shall be spliced with standard wire splices.
13. Barbed tape shall be stretched to have uniform tension.
14. Barbed tape shall be attached to barbed wire arms with approved metal clips.
15. Toe wall of one Brick/Random Rubble masonry, with notches over 75 mm thick PCC (1:4:8) shall be provided below all fencing and shall be minimum 200 mm above and 200 mm below finished ground level. All exposed surfaces of brick toe wall shall be provided with 1:6 cement sand plaster and coated with two coats of colour wash with a base coat of white wash with lime. Rubble masonry toe wall shall be with raised & cut pointing and 50 mm PCC (1:2:4) band coping.
16. Proper earthing shall be done for fencing also.

#### 9.4 Marble Works

Marble stone flooring with 18 mm thick marble stone, as per sample of marble approved by Engineer-in-charge, over 20 mm (average) thick base of cement mortar 1:4 (1 cement : 4 coarse sand) laid and jointed with grey cement slurry, including rubbing and polishing complete with : Raj Nagar plain.

#### 9.5 MISCELLANEOUS

- a) 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.
- b) Provisions for fire proof doors, no. of staircases, fire separation wall, plastering on structural members (in fire prone areas) etc. shall be made according to the recommendations of Tariff Advisory Committee.
- c) Statutory clearance and norms of State Pollution Control Board shall be followed as per Water Act for effluent quality from plant.
- d) Requirement of sulphate resistant cement (SRC) for sub structural works shall be decided in accordance with the Indian Standards based on the findings of the detailed soil investigation to be carried out by the Bidder.
- e) Foundation system adopted by Bidder shall ensure that relative settlement and other criteria shall be as per provision in IS: 1904 and other Indian Standards
- f) All water retaining structures designed as un-cracked section shall also be tested for water tightness at full water level in accordance with clause no. 10 of IS: 3370 (Part-I).
- g) Construction joints shall be as per IS: 456.
- h) All underground concrete structures like water retaining structures etc. shall have plasticizer cum water proofing cement additive conforming to IS: 9103. In addition, limit on permeability as given in IS: 2645 shall also be met with. The concrete surface of these structures in contact with earth shall also be provided with two coat of bituminous painting for water/damp proofing. In case of water leakage in the above structures, Injection Method shall be applied for repairing the leakage.
- i) All building/construction materials shall conform to the best quality specified in CPWD specifications if not otherwise mentioned in this specification.
- j) All tests as required in the standard field quality plans have to be carried out.

## **Chapter 4**

# **Drawings for Social Development Component**

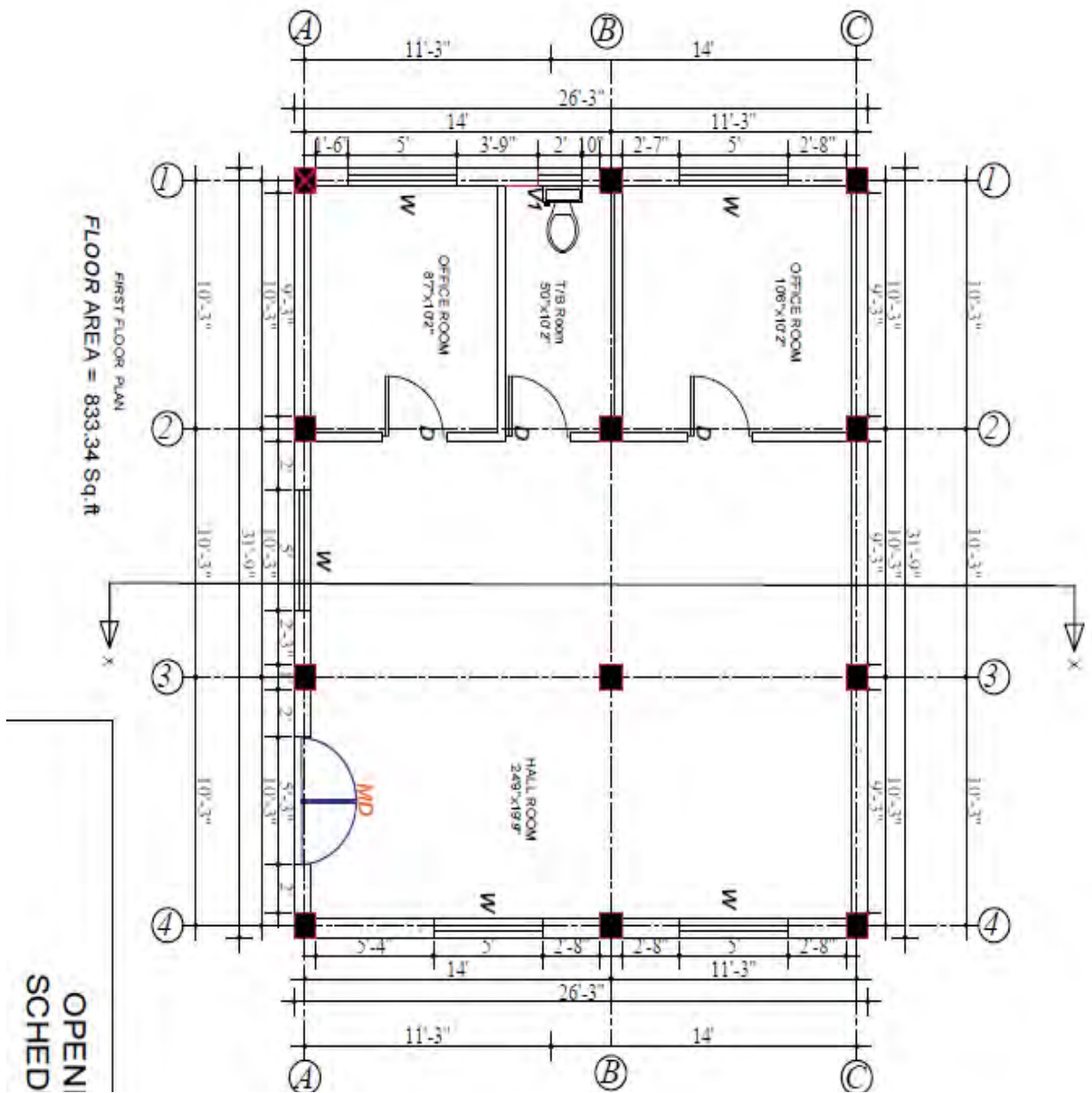
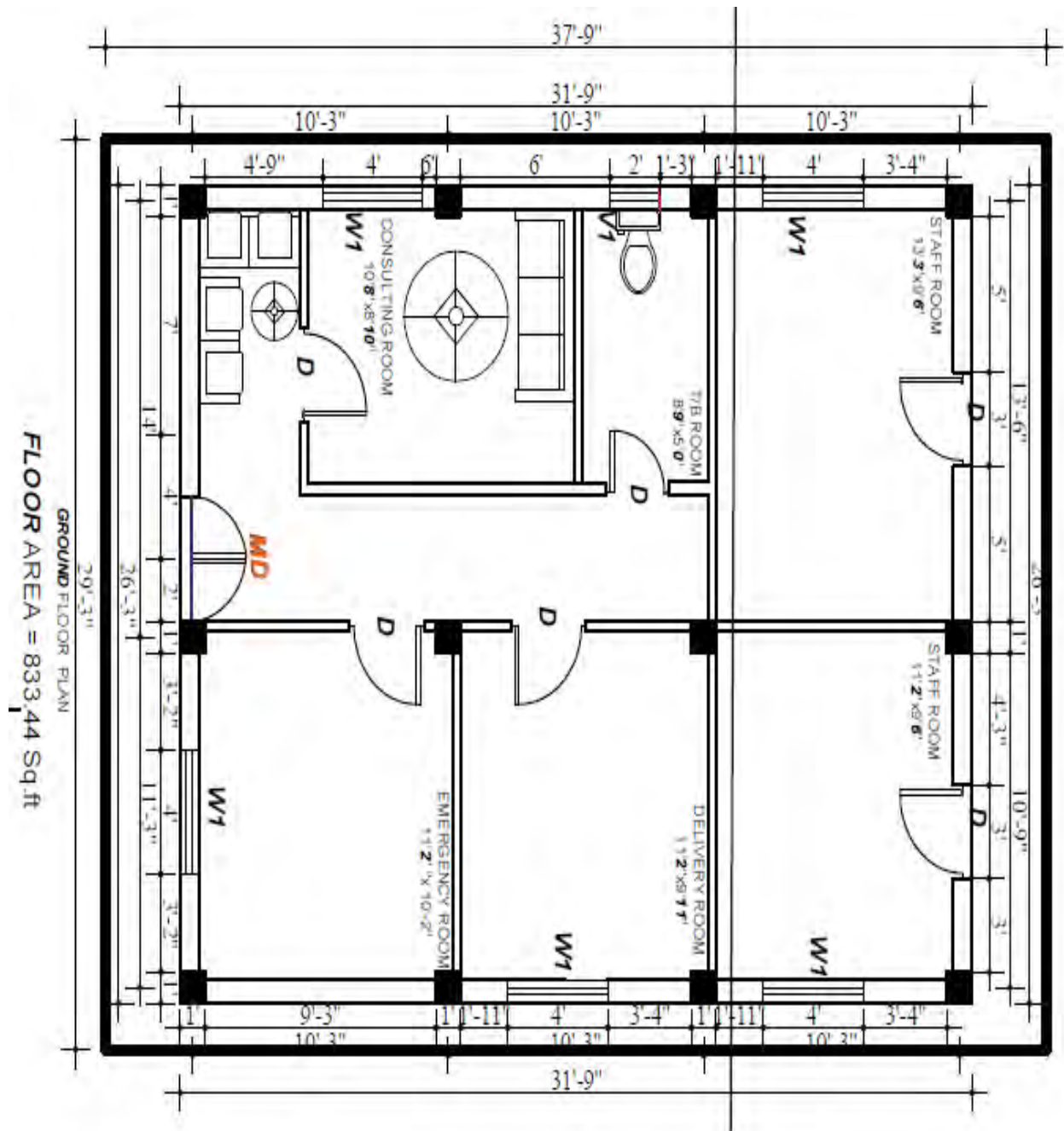


Fig: Plan for Community Building



**Fig: Plan for Health Post Building**

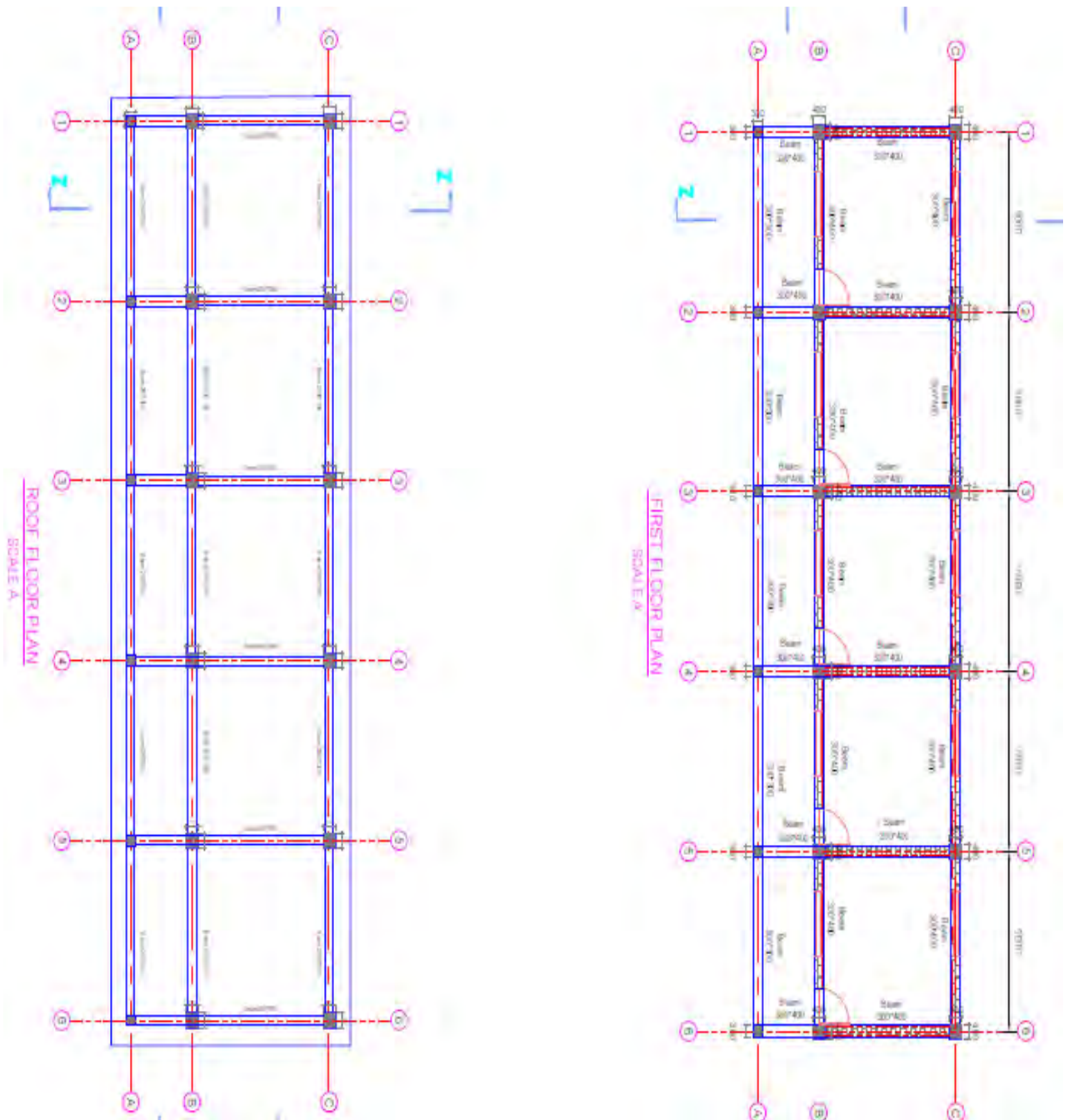
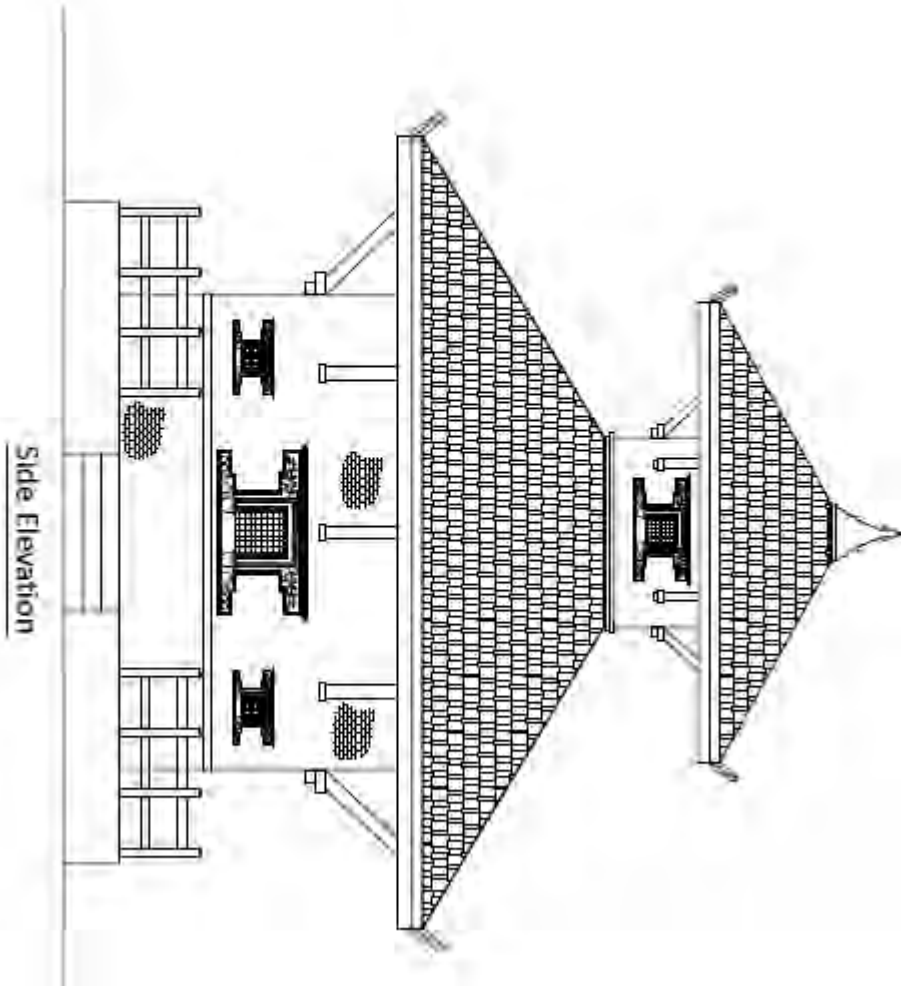
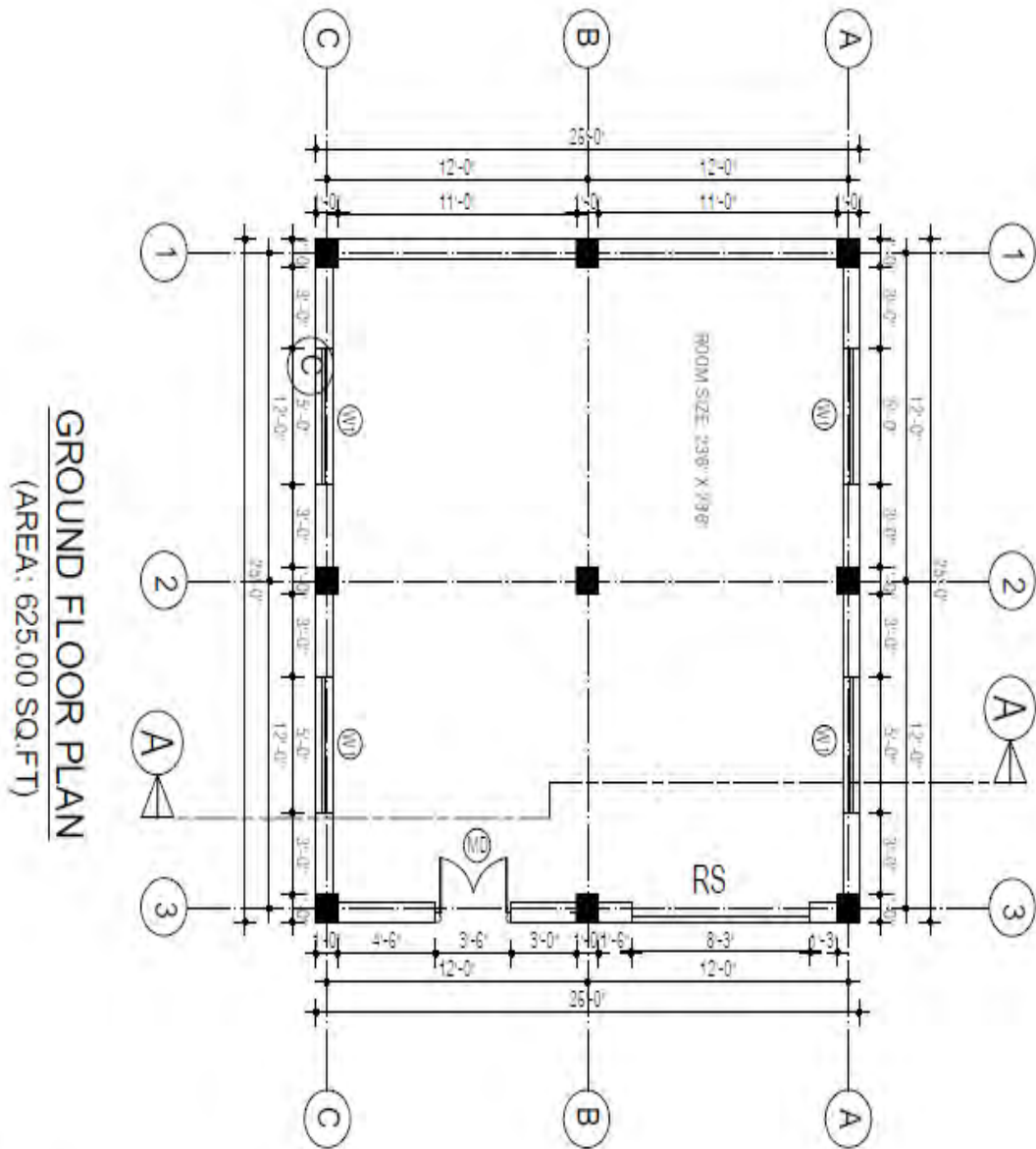


Fig: Plan for School Building



**Fig: Layout for Temple**



**Fig: Plan for Vegetable Collection Centre**



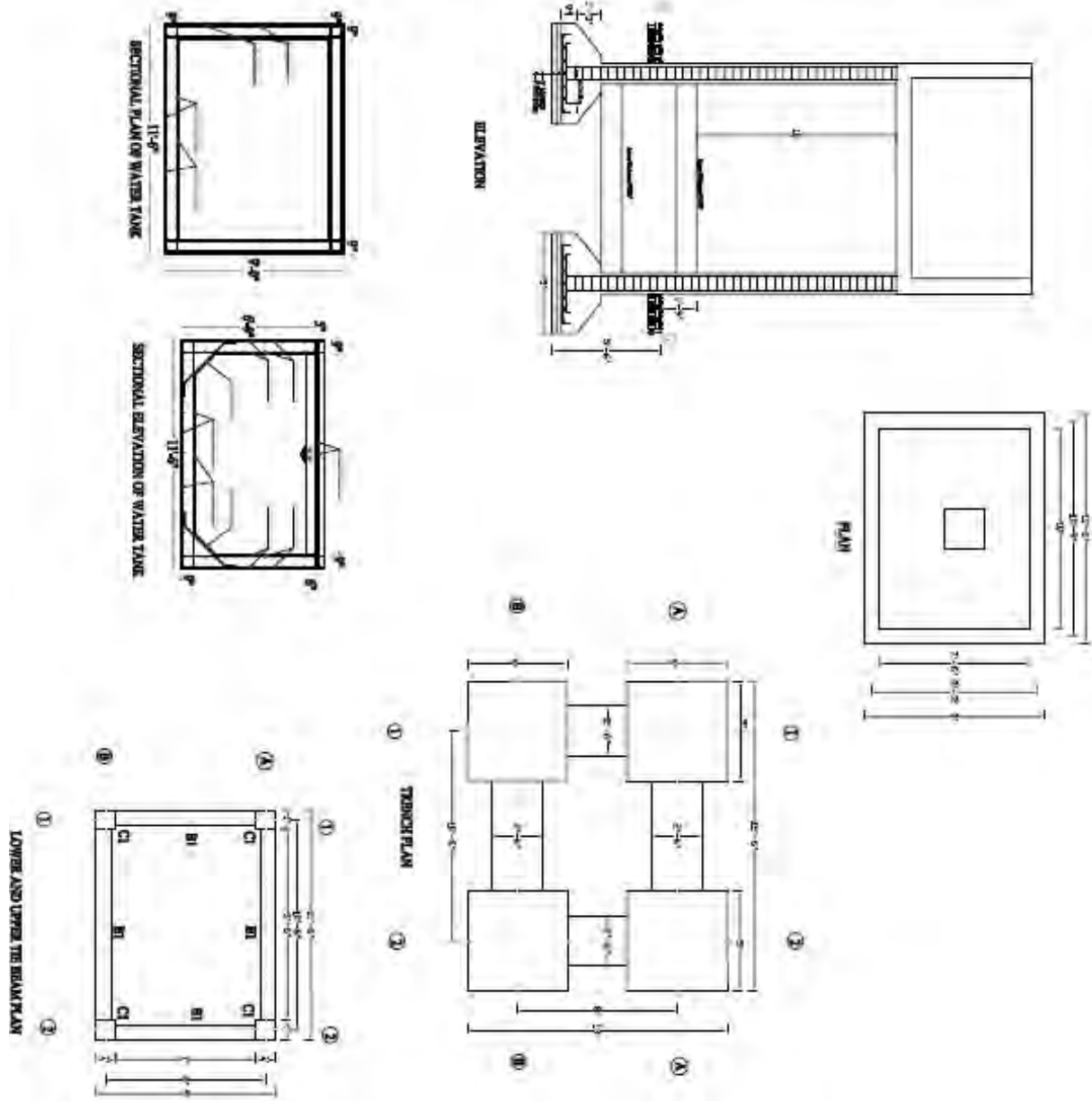


Fig: Plan for Water Supply Scheme Tank