Government of Nepal
Ministry of Education
Purbanchal University
Morang

Terms of Reference (TOR)

For

Detailed Design of Buildings

Purbanchal University, Biratnagar

Morang

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Purbanchal University

Terms of Reference (TOR)
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1. Background

Purbanchal University (PU) came into existence by the Purbanchal University Act of 1994 and has been envisaged as a centre of academic excellence with a mandate to manage teaching/learning and research institution offering courses in the various streams. With the aim to produce human resources that helps to alleviate both in technical and in existing health problems of the society and make it better place for all, the Purbanchal University of Science and Engineering Technology (PUSET), Purbanchal University College of Medical and Allied Sciences (PUCMAS) and Girija Prasad Koirala College Agriculture and Resource Center (GPCAR) have been established as a central unit/institute of technical, medical and allied sciences under Purbanchal University. Janta Campus, Purbanchal University, Biratnagar, Morang (herein after referred to as client or "the Office"), intends to utilize services of engineering consulting firms well experienced in the fields of Detailed engineering design of building.

2. Terms of References

The objective of Terms of Reference (TOR) document is to clearly define, the scope of work all the significant aspects that need to be addressed while preparing the Detailed Design of Building.

Scope of work

The Detailed Design of Building services to be procured within the scope of this ToR are geared towards survey and design of multi-storied building structures cast-in-situ or prefabricated enclosed in **Annexure 1** shall be the starting point of this assignment. However, given that the accuracy of information in the list requires updating. It is, therefore, the responsibility of the consulting firm to update them through field verification and also include all the requirements that are missing from this list.

Upon updating database in consultation with client and site verification, detailed architectural and engineering calculations and design including cost estimate and tender document preparation is envisaged to be achieved by the consultant as output of works.

Objective and purpose

The overall objective, towards which this assignment will contribute, is to design administrative building in Janta Campus at Biratnagar and GPCAR at Goathgao, framed structure according to applicable/established norms and code in Nepal. The purpose of this assignment is to achieve architectural design using suitable Software,

engineering analysis using software SAP or STAAD Pro and detailed design leading implementation as intended by the Client.

Activities

General Considerations

The activities to be fulfilled by the Consulting Firm will be carried out in four steps: 1) Consultation with Client and site reconnaissance to better understand the requirements of Client and suitability; 2) Architectural design of Buildings; 3) Software analysis, detailed design and drawings of structures; and 4) Detailed cost estimate and Tender document preparation.

Building Design Works

Soil Survey Works

The consultant shall prepare appropriate methods and implement soil survey works for building foundation in Janta Campus and GPCAR separately in order that prevailing soil can sustain erected building. The soil survey works for erection of building upon foundation should be according to established norms in Nepal. Detailed description of soil survey works is presented in **Annexure 2** of this report.

Architectural Works

The consultant shall prepare appropriate architectural design using applicable/suitable software and drawings using applicable/established norms that suit space requirements as per Standard and Regulation/s in Nepal. The structures proposed shall be amenable to nearby existing buildings and surroundings in terms of harmony, form and function considering the institution as symbol of state of the art. The materials to be proposed to use shall be economical and meet standard norms as applicable/established in Nepal. Further, fire and emergency considerations for safe exit from institutional building must be taken into account.

Structural Analysis and Design

The structural analysis of buildings should be made using applicable/established software in Nepal. The load calculation for institutional buildings should be as per applicable/established norms and Regulation/s in Nepal. During analysis, two additional storied loads should be considered in order for future implementation. The design of structural section should further be economical and practical to implement. Therefore, consultant should bear in mind the due consideration to standard construction practices in Nepal. The consultant shall then prepare detailed methods, drawings and maps suitable to easy, effective and efficient erection of institutional buildings.

Electrical, Plumbing and Sanitation Design

The consultant shall produce detailed electrical, plumbing and sanitation design and drawings to suit space designed as per applicable/established norms and regulation/s in Nepal. Due considerations to safely disposal of rain water and waste water without harming nearby surroundings must be made by the consultant while. Further,

prevailing environmental rule and regulation of Nepal must also be followed while making design works. The proposed materials to be used must meet standard norms/practices in Nepal.

Construction Safety Plan

During construction activities for building erection, the consultant should consider and propose methods of construction safety as per rules and regulations prevailing in Nepal.

Bill of Quantity and Cost Estimate

The consultant shall clearly produce detailed quantity of items to be procured during building erection works. The cost estimate must be made based on prevailing District Rate and rate analysis. The Bill of Quantity (BOQ) and cost estimate must be prepared separately of Janta Campus and GPCAR buildings.

Implementation Plan and Tender Document

The consultant shall clearly produce erection of building implementation plan and tender documents as per Public Procurement Act and Rule prevailing in Nepal. The Tender documents must contain detailed specifications and other documents as required to achieve procurement activities in procedural form.

All the pertaining information, maps and drawings must be in suitable scale and printed at least in A3 size standard quality paper. Other reports where applicable shall be at least in A4 size standard quality paper.

Only upon timely consultation and satisfaction of client, the activities as stated above would be approved. Eventually, the consultant shall produce clear and concise documents in terms of calculations, reports, plan and drawings both in soft and hard copy to the Client.

Deliverables against the envisaged timeframes

The following table lists the deliverables against envisioned timeframe.

Steps	**Main Deliverables**	**Estimated time, days**
1	Work schedule	7
2	First consultation with Client and Recci Survey	4
3	Soil Survey output	7
4	Building Design Works	25
5	Draft final report	15
6	Tender Document Preparation	10
7	Final report	7

Required Qualification

The Consulting firm is expected to be an experienced company in provision of professional services on infrastructure-related works, engineering survey, namely institutional building. The Consulting firm will mobilize a core team of minimum of 1

Architect, 1 Structural Engineer, 1 electrical engineer, 1 environmental expert and 1 civil engineer, required qualifications of which are described below. Additional human resources (CAD operator/computer operator) may need to be mobilized by the Consultant for timely completion of the Contract.

Design Team

Team Leader/Architect

General qualifications:

- Minimum with a Masters in Architecture or equivalent, advanced degree is an asset
- Excellent computer skills (e.g., MS office, AutoCAD and other architectural computer software program)
- Fluency in English

General professional experience:

- At least 10 years of professional experience in planning and design of institutional buildings.

Specific qualification and experience:

- Professional experience of at least 2 similar work (i.e. institutional buildings)
- Experience in similar geological conditions and terrain is an asset

Structural Engineer

General qualifications:

- Masters degree in Structural/Civil engineering, advanced degree is an asset.
- Excellent computer skills (e.g., MS office, AutoCAD and civil engineering building structure analysis computer software program)
- Fluency in English

General professional experience:

- At least 5 years of professional experience in multi-storied building design

Specific qualification and experience:

- Professional experience of at least 2 similar work (i.e. institutional building)
- Experience in similar geological conditions and terrain is an asset

Civil Engineer

General qualifications:

- Bachelor degree in Civil engineering or equivalent, advanced degree is an asset.
- Excellent computer skills (e.g., MS office, AutoCAD and civil engineering building structure analysis computer software program)
- Fluency in English

General professional experience:

- At least 5 years of professional experience in multi-storied building design

Geo Technical Engineer

General qualifications:

- Masters degree in Geotechnical/Civil engineering, advanced degree is an asset.
- Excellent computer skills (e.g., MS office, AutoCAD and geotechnical engineering computer software program)
- Fluency in English

General professional experience:

- At least 5 years of professional experience in multi-storied building

Specific qualification and experience:

- Professional experience of at least 2 similar work (i.e. institutional building)
- Experience in similar geological conditions and terrain is an asset

Electrical Engineer

General qualifications:

- Masters degree in Electrical engineering, advanced degree is an asset.
- Excellent computer skills (e.g., MS office, AutoCAD and civil engineering building structure analysis computer software program)
- Fluency in English

General professional experience:

- At least 5 years of professional experience in multi-storied building

Specific qualification and experience:

- Professional experience of at least 2 similar work (i.e. institutional building)

Environmental Expert

General qualifications:

- University degree in Environment/Environmental Engineering/equivalent.
- Excellent computer skills (e.g., MS Access, GIS, computer software program)
- Fluency in English

General professional experience:

- At least 5 years of professional experience in environmental related design for institutional building.

Specific qualification and experience:

- Professional experience of at least 1 similar design works.

Manning Schedule Envisioned

S.N.		Person days
1	Team Leader/Architect	40
2	Structural Engineer	45
3	Electrical Engineer	5
4	Environmental Expert	5
5	Geo Technical Engineer	5
6	Civil Engineer	50
7	CAD Operator	50
8	Computer Operator	75

Equipment Requirements

The Consulting Firm will provide sufficient resources for completion of the design works in a timely manner. The following table lists the minimum requirements in terms of resources to be deployed by the Contractor. In their technical proposals, the bidders will need to propose a "realistic" resource schedule that demonstrates how and when such resources will be mobilized so as to meet the deadlines.

List of equipments

S.N.	Equipment (owned or hired)	Required minimum number
1	SPT/DCPT Test	1
2	Surveyor level	1

All operating costs of the equipment will be borne by the Consulting firm.

Other Considerations

Core Team: In the cases where, due to unforeseeable reasons and/or exigencies, the Consulting firm needs to replace an expert of the team, the request for replacement shall be submitted to the client in writing at least 1 week in advance, duly justifying the request for replacement. The replacing expert(s) should possess all the required qualifications, stipulated in this Terms of Reference and the qualifications of the replaced expert(s).

In the cases, where the Consulting firm fails to mobilize the required expert(s) on time and/or the expert(s) committed by the Consulting firm for execution of the activities, stipulated in this Terms of Reference, is absent a penalty per day per expert will be applied as per applied rule.

Clearance of work plans and Approval of Deliverables

The work plans should be cleared by the client. The deliverables are also to be approved by the client. It is critical that all deliverables to be submitted by the Consulting firm to the client are done so in a timely manner in written form. The approvals will be provided by the client also in writing.

Media of Submission of Deliverables

All deliverables to be submitted by the Consulting firm should be submitted to the client in hard and soft copies in at least three sets in English. The soft copies should be provided in DVDs (2). All the files in the soft copies should be free from any passwords that would prevent the reviewers and readers from opening, reviewing, editing and saving such documents. All the formulae should be visible, traceable and unlocked. All the maps/drawings and reports should be delivered by using the highest quality materials (i.e. papers). Additional clarifications will be provided to the Consulting firm at the time of signature of the Contract. The database should be installed in one of the computers of the client with the provision to install in other computers when necessary.

Payment Schedule

The payment will be made upon completion and acceptance of the deliverables as per the following schedule.

- Inception Report: 20% payment
- Draft Report: 40% payment
- Final Report: 40% payment

Annexure-1

A) Functional Requirements of Proposed Building at Janta Campus, Biratnagar

S. No.	Item	Requirements	Size (L x B)
1	Total Land Area; location		24000 sqft.; as specified by authorized person
2	No. of floors	Two	
3	Total Plinth Area (Two Storey)	Approx. 16000 sft.	
4	Class Rooms (Ground Floor)	at least 5	30’ x 20’
5	VC chamber attached to PA (First Floor) with toilet	1	50’ x 35’
6	Registrar Room attached to PA with toilet (First Floor)	1	40’ x 30’
7	Coordination room with adjoining secretariat	1	35’ x 30’
8	Planning room with adjoining secretariat	1	35’ x 30’
9	Adjoining secretariat rooms	4	20’ x 20’
10	Seminar Hall (about 900 sqft)	1	60 persons
11	Executive council meeting hall	1	10 persons
12	Education Management Information System (EMIS) wing	1	30' x 30'

13	Administration Unit with provision of space for staff, fax, photocopy machine, computer, and rest room	1	400 sqft
14	Passages		
15	Staircase		
16	Separate toilets for ladies and gents		
17	Covered pathways		

B) Functional Requirements of Proposed Building for GPCAR, Goathgao

S. No.	Item	Requirements	Size (L x B)
1	Total Land Area; Location		Sufficient; as specified by authorized person
2	No. of floors	Variable	
3	Total Plinth Area	Approx. 57000 sqft	
	Administrative Building		
4	Dean's room with attached lavatory	1	20 X 24
5	P.A. Room for dean	1	10 X 12
6	Campus Chief room with attached lavatory	1	20 X 24
7	P.A. Room for campus chief	1	10 X 12
8	Meeting room with video conference facility	1	12 X 14
9	Administrative officer including staff	1	20 X 30
10	Account officer including staff	1	20 X 12
11	Academic officer including staff	1	20 X 12
12	Exam in-charge including staff	1	20 X 12
13	Exam hall (300 capacity)	1	100 X 50
14	Evaluation room	1	20 X 36
15	Common Utility room	1	20 X 36
16	Wash room with toilet and urinary facility	2	20 X 12

17	Parking space	As appropriate	
	Department Building		
18	HOD's office with wash room facility	3	24 X 12
19	Faculty room	6	24 X 12
20	Clerical/technical staff	3	24 X 10
21	Laboratories	6	30 X 60
22	Smart lecture hall (60 capacity)	6	40 X 30
23	Auditorium	1	100 X 60
24	Library	1	30 X 72
25	Wash room with toilet and urinary facility	5	20 X 12
26	Farm stores, threshing yards including implements and tractor sheds	One Core Complex	
27	Farm implements vehicles shed	1	10 X 80
28	Field/Lab store for a)Agronomy, b) Genetics and plant breeding; c) soil science; d) horticulture; e) pesticides and chemicals	5	10 X 12
	Treatment Lab Building		
29 (A	Mist chamber	1	30 X 10
29 (B	Shade net house	1	40 X 15
29 (C	Poly green house	1	30 X 30
30	Nursery Area		0.2 Hectare
31	Vehicle Parking Facility		
	Buildings should be equipped with water harvesting facility		

Note: Administrative, department and treatment lab buildings should be planned as separate buildings in common land area.

Annexure-2

Description of Soil Survey Work

Sub-surface Investigation

Site investigation or soil explorations are done for obtaining the information about subsurface conditions at the site of proposed construction. Soil exploration consists of determining the profile of the natural soil deposits at the site, taking the soil samples and determining the engineering properties of soils. It also includes in-situ testing of soils.

Soil is used as supporting material (Foundation) for carrying the loads of the super-structure through their foundations.

The function of a properly designed foundation is to support loads resting on it without causing excessive stresses within the soil mass at any depth beneath foundation. Stresses are considered excessive if a complete rupture within the soil mass occurs (Shear failure), or if detrimental settlements result (failure due to excessive settlement). Therefore it is apparent that one of the most important steps in the solution of a foundation problem is determining underground conditions that will affect the design. Field and laboratory investigations required to obtain necessary information about geology, hydrology, and soil conditions; geotechnical properties of soil at the prospective building site, and the performance of various soil types encountered when acted upon by structural loads, water and temperature are themed as sub-surface investigations or soil exploration program.

The sub-surface investigation in our case is required to evaluate suitability of natural materials for construction purpose.

Procedure of exploration is envisaged to follow the four steps as:

1. **RECONNAISSANCE** : It includes collection of project data; Geological study at site and Site inspection
2. **PRELIMINARY EXPLORATION**: It includes depth exploration using Probing/sounding method using suitable penetrometer, extent, and composition of critical soil strata; Ground water level and its fluctuations; depth of bed rock; estimate of engineering properties of soil; and initial selection of foundation possibilities.
3. **DETAILED EXPLORATION:** Includes additional test borings; undisturbed sampling if compressible soils are encountered at critical depth; and Laboratory/Field test for information on strength and deformation characteristics are needed.
4. **ANALYSIS OF RESULTSOF EXPLORATION**: It covers evaluation of settlement characteristics of various soil layers and evaluation of bearing capacity of soil layers

Amount of Exploration

1. **Spacing of Borings:** It depends upon many factors, for example, the nature and conditions of soil. The shape, extent and type of structure, loads and sensitivity of the structure. However, borings should be so spaced as to detect the various soil layers in sequence number as well as type, to determine their extent, course and dip as precisely as possible.
2. **Depth of Borings:** Usually the depth of the borings is approximately estimated dependent upon the width and load of foundation. For strip footing and single footing a thumb role is that the boring depth should be at least 2 to 3 times the width of the foundation below the contact area or base of the footing. For mat foundation it is 1.5 times to 2 times the width. In both the above cases if sound rock in encountered at a depth earlier than width of structure, then boring should be stopped at rock level.

Reporting

The results of a soil boring are presented in the form of a boring log. A boring log should contain the following information as:

- Depth below ground surface
- Elevation of soil layers and ground water table
- Thickness of soil layers
- Graphical symbol of soil type
- Description of soil
- Position where soil samples were taken under condition of disturbed/undisturbed
- Sample Number
- Natural moisture content
- SPT Resistance
- Notes indicating position of groundwater table, encountered tree routs or other features

Boring Report

A boring report should contain, at least:

- Location plan of the project
- Location plan borings
- Description of borings
- Surface drainage conditions
- Probable source of free water
- Groundwater conditions
- Boring log drawn to scale
- Information on difficulties met with during exploration
- Soil identification and classification tests results.