

Geo Technical Investigation- Request for Tenders for Geo-Technical Investigation of Science City, Dehradun

Sealed tenders/proposals for Geo Technical Investigation of the ground for specific purposes at Science City, Dehradun site are invited from experienced/competent agencies as per details below:

General:

Who can Apply:

Agencies having proven experience of atleast 5 years in similar work of Minimum 8 Lakh in a single project, preferably in Govt/Autonomous/PSU's may only apply. Attested copies of experience certificates to be attached.

Project brief

The project consists of the following:

- Space Odyssey having G+2 floors with a semi-spherical roof
- Amphitheater connected with Kitchen, Cafeteria at the 2nd floor
- Convention Center having G+2 floors with an inclined roof
- Entry Plaza
- Science Exploration Hall-1 having Lower Ground + Ground + 2 floors.
- There is an existing Science Exploration Hall-2 in vicinity.

Scope of Works:

The works comprise soil investigation, testing & reporting as generally described in the enclosed Tech. Specifications – **Annexure- A** & **BOQ- Annexure- B**

The foundation depth will be approximately 3.0 meter below existing ground level. The report shall be submitted in two stages.

Stage 1 consisting of an inception report indicating a minimum General soil profile, Groundwater table, N-values, SBC in general, other key physical and engineering properties, recommendations, precautions etc.

The inception report shall be submitted at the earliest possible but not later than 6 weeks from start of site activity or 1 week prior to completion of site activity, whichever is earlier.

Stage 2 consisting of detailed report including all test results, calculations, bore log details, grain size analysis, chemical analysis results, recommendations.

The detailed report shall be submitted at the earliest possible, but not later than 3 weeks from the day of completion of site activities. The report shall cover the precautions to be taken in view of unequal loading of office block and retail block. No separation joint is proposed. The report shall cover the precautions to be taken in view of unequal loading of office block and retail block. No separation joint is proposed.

The contractor shall examine the site and satisfy himself regarding the space available for his site office, staff and labour toilets, storage of materials, mechanical equipment/ vehicles in consultation with Architect. Any additional space required by the Contractor shall be arranged by him at his own cost.

The measurements shall be recorded on daily basis and got signed from Architect

Carting away *Malwa* from site

The contractor shall remove the waste material / debris during and on completion of work outside the premises to any place designated by the local authorities from site using mechanical transport. **Nothing extra shall be payable in this regard.**

Water & Power Supply

Water & Power supply shall be supplied by client from a particular point. The Contractor shall make his own arrangement for electrical & water distribution to the location of boring.

The contractor shall arrange his own DG sets, if required, at no extra cost.

Safety & Security

The contractor must note that Safety standards shall be maintained and strictly followed at no extra cost. **The safety of public is of utmost importance.**

Ensure, that all plant, equipment and tools brought on to the site will be in safe condition and have recently been checked, that all personnel using the equipment and tools have been trained in their safe operation.

The contractor shall provide security guards to protect his material, equipment and restrict access to the site of un-authorized personnel 24 hours a day.

The contractor shall provide everything necessary such as **fencing, watching and lighting** not only for proper execution and protection for the said work but also for protection of the public and the safety of services, drains and all other erections, matters or things.

Escalation

The contract is escalation free in the entire duration of the contract and authorized extension period if any. No claims for any escalation shall be entertained under any circumstances.

The contractor shall ensure the completion of work in accordance with the agreed schedule.

Penalty:

In case of non-completion of the work within stipulated time, a penalty of 2 % per week of delay (maximum of 10% of work value) shall be levied.

Dispute Resolution :

In case of any dispute matter shall be referred to arbitration and shall be settled as per current Arbitration Act, subject to Dehradun jurisdiction.

Owner:

**Uttarakhand State Council for Science and Technology (UCOST)
Vigyan Dham, Jhajra, Dehradun (Uttarakhand)- 248015**

Person: Dr Piyush Joshi, (Mob.: 8447564588)

Project Architect:

Chelsea West Associates Pvt. Ltd.
418, Mandakini Enclave, New Delhi – 110019
Contact Person: Viplav Arora (9015543595)

Structural Consultant

Optimal Consultancy Services Pvt. Ltd

A-49, Sector 2, Noida
Tel : 0120 – 4216630, 4150420

Contact Person :- Mr. Nitin Dhariyal (9891229080)

Object of investigation:

- i) To determine the net and gross bearing capacity of the soil at the foundation level. Also, to determine the type of foundation best suited to carry the expected loads.
- ii) To determine the ground water table and the expected variations therein.

- iii) To determine the likely effect of soil and ground water on the concrete & steel structure.
- iv) To determine the expected short and long term settlement of the foundation.
- v) And to give recommendations on whether the excavated material may be used for the purpose of backfilling.
- vi) To check whether there is any possibility of soil liquefaction under seismic conditions.
- vii) To determine the value of modulus of sub grade reaction of soil (K).

Tests

Minimum tests required:

The tests shall include, but not be limited to, the following –

- i) Carry out **17 Nos.** of Bore Holes as indicated in the enclosed drawing of bore holes up to a depth as indicated in the drawing or up to refusal
- ii) Carry out standard penetration tests at intervals of 1.5m (please note that additional bore holes may be ordered if the soil shows great variation in the investigated bore holes).
- iii) Collecting disturbed and undisturbed samples of the soil and carry out laboratory investigations to establish engineering properties of soil. On rock core samples, Uni-axial or Tri-axial compression tests shall be carried out and RQD test shall be carried out
- iv) In case, the standard penetration test cannot be carried out, then a plate load test shall be carried out preferably at the level of foundation strata.
- v) Carry out chemical analysis on soil samples and ground water.
- vi) Record all observations and submit a report substantiated with calculations, based on field and laboratory observations.
- vii) Additional tests as required by the Geo Technical Investigation to arrive at conclusions shall be carried out subject to prior approval.

Additional Tests on Rocks:

- i) **General:** Wherever Refusal Stratum is encountered and SPT tests cannot be conducted Rock Drilling shall be done for at least 3.0M.

The equipment, method and the procedure for drilling operation shall conform to IS 1892. Rotary core drilling technique with continuous core recovery should be adopted for drilling through rock. The behavior of rock mass is governed more significantly by the nature of fractures in the rock than by the type and hardness of the material composing the rock itself. Hence, good drilling technique should be adopted to obtain an intact sample truly representative of the in-situ material and for achieving highest percentage of recovery possible. The casing and core barrel to be used shall be of designation NX.

- ii) Tests: Following Minimum Test shall be carried out:
- Unconfined Compression Tests
 - Rock Quality Designation
- iii) Object of Investigation The principal object of investigation is to get clear and specific recommendation on the Allowable Bearing Capacity for Foundations. The recommendation shall be substantiated by calculations.

Report

The report shall comprise of:

Introduction: Stating the terms of reference of the investigation, scope and the object of investigation, and limitations, if any.

General Description of the Site: Description of general configuration and surface features of the site, noting the presence of any trees, hedges, old buildings, cellars, quarries, mine shafts, marshy ground, ponds, water courses, filled areas, roads and tracks and any useful information derived from historical records on previous usage of the site. Other observations should cover such factors as flooding, sea or wind erosion, subsidence, history of earthquake, slope stability or phenomena recently observed which would influence the decision on foundations of the structures.

General Geology of the Site: Notes should be given on general geology of the site comparing previously available published information with conditions found in the boreholes. Attention should be drawn to any known faults, quarries, springs, swallow holes, mines or shafts, or other features, which will have a bearing on foundation works.

Description of Soil Condition Found in Borehole and Trial Pits: This is a general description of conditions with reference to the configuration of the ground and variation in the level of the various strata and the ground water table.

Field and Laboratory Test Results: Should be limited to brief mention of various types of tests which were made and attention drawn to any results which are unusual or of particular significant. A table of results, which charts and diagrams shall follow.

Discussions of Results of Investigations in Relations to Foundation Design and Construction: The recommendation of foundation design must be based on the facts stated in report. Various possible alternatives of types of foundation shall be discussed and wherever more than one alternative is feasible Advantages and Disadvantages of types of foundations in relation to bearing pressures and expected settlements shall be discussed. The advantages, which are likely to be gained by going deeper, shall also be discussed. Also provide bored cast in situ pile capacity (skinfriction + bearing) in case of Top down construction.

Conclusion: The conclusion or a set of conclusions could be given based on the Geo Technical Investigation which would help the structural engineer assess the bearing capacity of the foundation strata and the expected short term and long term settlements.

Draft Report: A draft report shall be given satisfying the object of investigation based on field and laboratory tests fully substantiated by calculations.

Final Report: Clarification and observations on draft report shall be incorporated in the final report.

5.0 Technical Specifications:

Technical Specification for carrying out soil investigations are enclosed as

Annexure – A to this document.

6.0 Terms of payment:

As per office norms and regulations.

7.0 Time:

The job is extremely urgent. Those who can mobilize within 3 days at site after the order shall only respond.

The expected time schedule shall be as follows:

0 – 3 days	Mobilisation
4 – 20 days	Field tests
21 –28days	laboratory tests & draft report
29 - 30 days	final report

- 8.0 Please send us your tender/proposal in sealed envelope mentioning the name of the project – “Soil Investigation Work “on or before **12 Days of publishing of the tender i.e. 3PM of July 22, 2023.** All proposals, duly superscribed **”tender for Geo- technical Investigation”** and shall be submitted in one envelope consisting of two separate envelopes **“Part A”** and **“Part B”** and addressed to:

Director General

Uttarakhand State Council for Science and Technology

Vigyan Dham, Jhajra,

Dehradun (Uttarakhand)-248015

ANNEXURE - A
TECHNICAL SPECIFICATIONS

All subsurface soil investigation shall be carried out in accordance with the requirements of the Bureau of Indian Standard codes of practice listed but not limited to the following.

- IS1892 Code of practice for subsurface investigations for Foundations.
- IS1498 Classification and identification of soils for General Engineering purposes.
- IS6403 Code of practice for determination of bearing capacity of shallow foundations.
- IS2911 Code of practice for design and construction of pile foundations.
- IS2131 Method for Standard penetration Test for Soils.
- IS4968 Method for subsurface sounding for soils.
- IS2720 Method of test for soils. Part 1 to Part 41

- 2.0 Drawing enclosed showing the layout, proposed 17 Nos. boreholes & their depth.
- 3.0 Unless noted otherwise, borehole termination criteria shall be 30/15 mts as indicated in the drawing or refusal strata whichever is greater in depth.
- 4.0 The Standard Penetration Tests (SPT) and Tri-axial Shear Tests in any Bore hole shall be conducted at every 3.0 mts.
- 5.0 Where CBR test is specified, the test shall be conducted at 0.5m below the natural ground level.
- 6.0 All the locations / levels shall be fixed with respect to fixed references (Line / Point / Benchmark) identified by the Project Architect.
- 7.0 The bidder shall conduct a Site Reconnaissance. Subsequently, the bidder shall propose a detailed programme of field investigation.
- 8.0 The bidder shall confirm the locations & the depths of various boreholes for geo-technical survey based on his site reconnaissance data and the type of proposed structure. The bidder may also advise on the need to change the numbers and locations of boreholes. The bidder shall note that the cost towards site reconnaissance shall be entirely borne by him.
- 9.0 The bidders shall quote item rates in the attached Bill of Quantities and final lump sum quote with taxes in "Part-B". The bidder shall specify in this schedule, the minimum required "Quantity" against each item enabling him to fulfill the scope of this soil investigation work.
The inception report shall be submitted on completion of field work and shall contain the following information in brief,
 - a) General soil profile
 - b) Ground water table

- c) N- Values
- d) SBC in general
- e) Modulus of sub grade reaction.
- f) Calculation for liquefaction potential.
- g) recommendations (indicative)
- h) precautions

The bidder shall submit a detailed technical investigation report including but not limited to the following:

- a. General Brief about the soil investigation, testing and reporting
- b. A brief about Field Operations performed and the equipment used for investigation
- c. Laboratory testing
- d. Sub-soil conditions giving details about depth, thickness and composition of soil / rock strata, which will be appreciably stressed by intended construction.
- e. Net and Gross SBC shall be furnished at 1.5m, 3.0m, 4.5m, 6.0m below EGL and at basement bottom.
- f. Depth of ground water, dense soil or rock strata that could affect the construction and performance of the proposed structure. The report shall also contain information based on the investigation the extent of fluctuation in ground water table.
- g. Test findings and interpretations regarding foundation levels, soil bearing capacity, settlement, chemical tests on soil and water, etc.
- h. Summary, conclusions and recommendations regarding:
 - the type of foundation, founding depth
 - allowable bearing capacity (Net & Gross)
 - Lateral earth pressures for design of retaining walls (Active Pressure, Earth at rest).
 - Lateral earth pressures for retentions systems (Active, Earth at Rest and Passive).
 - Liquefaction potential
 - Modulus of sub-grade reaction.
- i. Test data sheets for the following:
 - i) Bore log data sheets
 - ii) Laboratory test result
 - iii) Strength test results
 - iv) E-log P Curves

- v) Grain Size curves
- vi) Any other relevant data.

j. Expected thickness of the beds which includes:

- i. Over burden of the beds
- ii. Weathered Zone

k. The report shall also contain information on ground water conditions based on investigation.

12.0 Furnishing of any additional information not specifically mentioned but required to complete the works shall be deemed to be included in the rates.

13.0 Copies of data collected, details of calculations/tests carried out shall be made available to the Consultants.

14.0 Identification and handing over of all site references such as locations of BH, marking etc. in good conditions shall term part of work completion.

15.0 In case refusal strata not encountered within the depths stated above; further investigation shall be done as directed by Project Architect.

ANNEXURE – B

BOQ for Soil Investigation					
PROJECT NAME : Science City, Dehradun					
GEO-TECHNICAL INVESTIGATION					
BILL OF QUANTITIES & Estimate					
Item No.	Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1	Mobilization of necessary equipment men and materials etc., including setting up at all locations (Total for all boreholes & DC test locations)	LS	1	22370	22370
2	<p>Boring in all types soil including clay at all depths including Conducting required tests as per “a to f” below & Point No. 3.1,</p> <p>06 Nos. upto 30m or refusal. Incase refusal is shallower than 30m then rotary drilling upto 30m.</p> <p>11 nos. upto 15m or refusal. Incase refusal is shallower than 15m then rotary drilling upto 15m.</p>	Mtr	345	2200	759000
	Nothing extra shall be payable for conducting these tests.				
(a)	Conducting SPT till refusal at 3.0 mts interval and as directed in boreholes using 51 mm dia, split spoon sampler for depth	Nos.	115	360	35280
(b)	Grain Size analysis				
(c)	Atterberg limits (Liquid Limit, Plastic Limit and plasticity index, shrinkage limit and	Nos.	17	1500	25500

	shrinkage ratio) 01 nos..for each bore hole				
(d)	Densities / specific gravities (Field density and natural moisture content of undisturbed soil samples) 01 nos. for each bore hole	Nos.	17	1500	25500
(e)	Analysis				
	a) Chemical Analysis of soil giving contents of sulphates, chlorides and pH. 01 nos. in each bore hole	Nos.	17	1500	25500
	b) Water Analysis (Physical / Chemical) 01 nos. in each bore hole	Nos.	17	1610	27370

Item No.	Description	Unit	Quantity	Rate (Rs.)	Amount (Rs.)
1.	Triaxial Shear test of undisturbed samples collected at every 3.0m depth for each bore hole. (Operated for item No. 2).	Nos.	17	1600	27200
2..	Extra above Item no. 2 for drilling in Hard strata after refusal to obtain soil classification and soil profile.				
	a) Weathered rock	Mtr	QRO		
	b) Hard rock	Mtr	QRO		
3..	Dynamic Cone Penetration (DCP) test shall be 10 m below from bottom of foundation	Nos	QRO		
4..	Backfilling of borehole with Bentonite / Mud-cement grout	Nos	17	620	10540

5..	Preparation and submission of preliminary and final reports on the Geo technical investigation in 3 sets	LS	5000	5000
Sub TOTAL estimated cost				9,63,260*
In Words		Nine Lakhs Sixty-three thousand & two sixty only		
Note:				
1. Malwa removal is included in above rates, nothing extra is payable on this account				
*Lumpsum Quote with taxes to be submitted in "PART B"				