



Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
NUEVA ECIJA 1st
DISTRICT ENGINEERING OFFICE
REGIONAL OFFICE III
Talavera, Nueva Ecija

TERMS OF REFERENCE (TOR)

24CSCF00.1

**CONSULTING SERVICES FOR THE CONDUCT OF
SOIL/GEOTECHNICAL INVESTIGATION FOR THE
PROPOSED CONSTRUCTION/ REHABILITATION
/UPGRADING OF VARIOUS BRIDGES PROJECTS
WITHIN 2nd LEGISLATIVE DISTRICT OF NUEVA
ECIJA**

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CONSULTING SERVICES FOR THE CONDUCT OF SOIL/GEOTECHNICAL INVESTIGATION FOR THE PROPOSED CONSTRUCTION/ REHABILITATION / UPGRADING OF VARIOUS BRIDGES PROJECTS WITHIN 2nd LEGISLATIVE DISTRICT OF NUEVA ECija

I. INTRODUCTION

A. BACKGROUND

The Department of Public Works and Highways is primarily responsible for the implementation of various bridge projects in order to address the problems encountered by many people. Such structures will link the cities or towns that will improve the mobility of people as well as the materials, and it will gain more importance in the overall growth of a nation.

B. OBJECTIVE

To conduct geotechnical and geological investigation of proposed construction of bridge to determine the nature of stratum of each structure and engineering properties of soil and rock as basis in the design and mode of construction for the proposed bridge structure.

C. PROJECT SCOPE

The proposed projects are the subject of subsurface soil exploration work including Geotechnical Report.

Name of Project	Depth (m.)	Number of Bored Hole
1. Construction of Bridge, Sitio Kaigurutan Parista, Lupao, Nueva Ecija	30.0	2.0
2. Construction of Bridge, Villa Boado, Talugtug, Nueva Ecija	30.0	2.0
3. Rehabilitation of Bridge, Agbanawag, Rizal, Nueva Ecija	30.0	2.0
4. Construction of Bridge, Villa Santos, Muñoz, Nueva Ecija	30.0	2.0
5. Construction / Upgrading of Bridge, Cabisuculan, Muñoz, Nueva Ecija	30.0	2.0
	TOTAL	10.00

II. SCOPE OF SERVICES

A. GENERAL

1. The Consultant shall be responsible for carrying out the necessary subsurface Soil exploration works in respect to the project stated.
2. After the receipt of Notice to Proceed (NTP), the consultant shall coordinate with the Planning and Design Section, Nueva Ecija 1st District Engineering Office particularly on the site of the project.
3. Upon completion of the subsurface exploration work activities, the Consultant shall submit their final report containing geotechnical/geological reports to Nueva Ecija 1st District Engineering Office.
4. The Consultant shall be responsible for the reliability of the report presented.

B. THE SERVICES

1. *Subsurface Soil Exploration Works*

A. LOCATION

Before the conduct of Subsurface Soil Exploration Works, The Consultant shall coordinate with the Nueva Ecija 1st District Engineering Office, for proper coordination on the location of the project.

B. SCOPE OF PROJECT

The consultant shall provide all the labor, instrument/equipment materials and supplies, vehicles, bunkhouses, etc., necessary to perform satisfactorily the subsurface exploration herein required, viz:

- a. Drilling and sampling
- b. Standard Penetration Test (SPT)
- c. Water Level Measurements
- d. Laboratory Testing and Analysis
- e. Preparation and submission of Reports

The Consultant shall be held solely responsible for the result of this boring/drilling exploration and other activities under terms of Reference.

C. DETAILED EXPLORATION REQUIREMENTS / SPECIFICATIONS

Drilling and Sampling

1. Location and Number

Please refer to the above Scope of Work for the number of borehole opposite the name of the project, the location is shown on the plan with coordinates.

2. Depth of Borings

Please refer to the above Scope of Work for the number of borehole opposite the name of the project

3. Procedure

In sand, clay and slit materials, the boreholes shall be advanced by the wash boring method in between sampling sections using side discharged chopping bits. Whenever necessary, N-size casings shall be utilized. The washed section shall be cleaned thoroughly before each sampling run ensuring, however, that the underlying soil is not disturbed.

Sampling shall be done at one-meter interval from the river bed to hard strata using 50 cm. Split spoon sampler. In a soft cohesive layer, disturbed sample using thin walled tube samplers shall be obtained hydraulically.

Core drilling shall be carried out by a diamond rotary drill method in gravelly on rock formation. Core samples shall be undertaken wherever solid information is encountered.

Cores shall be placed in core boxes arranged and labelled in accordance to depth as soon as these are extracted from the boreholes.

4. Equipment

a. Drilling Machine

The consultant shall utilize at least two (2) drilling machine and set them up at the project site. The drilling machine shall be in good working condition and shall be of such capacity as to maintain satisfactory progress of work.

b. Bits

The Consultant shall have an example supply of different types of bits to adapt to varying conditions. Bottom discharge and stepped bits shall also be available.

C. Core Barrels

Double tube swivel type core barrels in good condition and obtaining maximum core recovery shall be used.

d. Casing

The consultant shall, at his own expense and responsibility, provide casings as required to ensure the stability of the borehole walls. The casings shall be at least of N-size and shall be in good condition. After a hole has been finished the casings shall be retrieved.

5. Handling and Core of Samples

The Consultant shall provide all the materials, equipment and labor necessary for preserving samples.

Standard Penetration Test (SPT)

The test shall be carried out through ordinary soil encountered to the depths specified above. Standard penetration test shall be performed using 5.0 cm. (2.0 in.) outside diameter split spoon sampler, driven by a 63.6 kg. (140 lbs.) Hammer falling 76.0 cm (30 in.) at 1.50-meter interval or closer if necessary.

Water Level Measurement

The water level shall be measured daily (before and after) whenever encountered in a borehole.

Laboratory Testing Analysis

The preparation of samples for testing shall be made in accordance with AASHTO. The following test shall be made on samples obtained from boring, drilling.

1. Split-Spoon Analysis
 - a. Visual Soil Description
 - b. Mechanical Analysis, AASHTO Designation T88
 - c. Liquid Limit, Plastic Limit and Plasticity Index, AASHTO Designation T89 and T90
 - d. Group Index and Soil Classification, use Unified Soil Classification

C. REPORT OUTPUTS/DELIVERABLES

1. Final Report

The Consultant shall prepare the FINAL REPORT containing geological/geotechnical reports & analysis in three (3) bound copies in the form and substance to be submitted to Nueva Ecija 1st District Engineering Office together with the detailed engineering plans, **forty (40) calendar days** from the commencement of work and/or at the termination of the contract. The final report shall not be limited to the following.

- a. Field Investigation and Methodology
- b. Borehole Drilling and Sampling
- c. Laboratory Testing
- d. Final Boring Logs (BL)
- e. Final Laboratory Test Results (FLTR)
- f. Borehole Location Plan with Coordinates (Geotagged)
- g. Soil Profile along structures shoeing boring/ drilling logs
- h. Soil Liquefaction Investigation Report
- i. Soil Bearing Capacity
- j. Detailed discussion of the result of geological/geotechnical investigation and laboratory testing
- k. Recommendation (Foundation Type and required geotechnical parameter for design- Angle of Friction, Cohesion, Unit Weight of Soil, Sieve Analysis of Grain Size, Modulus of Elasticity of Soil, Poisson's Ratio).
- l. Elevation of normal ground level
- m. Elevation of water table

Other Data to be submitted by the Consultant along with the Final Report are the following:

Boring Logs

1. Job, boring, hole number, date, time, boring/drilling, foreman, supervisor
2. Weather condition
3. Depth of Boring at start of the day
4. Water level in casing at start of the day
5. Method of Penetration and flushing system
6. Description of soil strata encountered
7. Depth of soil boundaries

8. Size, type and depth of samples and sample number
9. Type and depth of in-situ test
10. Standard Penetration Test Resistance, "N" Value
11. Recovery ratios of samples
12. Detailed notes on boring / drilling procedure, casing sizes and resistance to driving, description of wash water or spoil from boring / drilling tools
13. Depth of boring at end of the day
14. Other relevant information such RQD, percent core recovery, angle of friction etc.

Photographs

Photographs showing the borehole drilling and sampling at each proposed site shall be taken by the consultant and incorporated in the report, photographs shall be taken at each borehole location depicting the following:

1. Geotagged location of boring logs
2. Equipment used
3. Core drilling operation
4. Water level measurements
5. Performance of SPT and Shelby tube sampling
6. All cores in the core boxes, SPT and Shelby tube samples
7. Date photographs was taken

III. IMPLEMENTATION

A. KEY EXPERTS' QUALIFICATION AND REQUIREMENTS

The following experts/professionals and their member shall be required to carry out the Consulting Services for the project and should have appropriate educational degree, relevant training and adequate years of experience in the conduct of sub-surface soil exploration.

Position/Key Staff	No. of Staff	Detailed Tasks/ Responsibilities	Required Qualifications
Team Leader	1	<ul style="list-style-type: none"> • Overall guidance, direction, supervision and coordination of members of the Team • Collection and evaluation of geological information on the project sites • Study and determination of items and method of soil investigation and laboratory test 	<ul style="list-style-type: none"> • BS in Civil Engineering; MS or Doctoral degree Major in Geotechnical Engineering is an advantage; • Duly licensed/ registered civil engineer; • At least 10-year experience on soil, sub-surface and geotechnical survey and study of roads, bridges and related structures;

Materials Engineer	1	<ul style="list-style-type: none"> • Assist the Team Leader in the conduct of Soil Exploration/Investigation • Collection and evaluation of geological information on the project sites • Study and determination of items and method of soil investigation and laboratory test • Perform necessary subsoil investigations on representative sections of the road with samples to be taken at suitable intervals • Investigate the physical properties of materials to facilitate the design of structures 	<ul style="list-style-type: none"> • BS in Civil Engineering; MS or Doctoral degree is an advantage; • Duly licensed/registered civil engineer; • At least 5-year experience on soil, sub-surface and geotechnical survey and study of roads, bridges and related structures;
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The Consultant shall provide technical and administrative support staff as may require.

B. CONTRACT PERIOD

The consultant's contract period for undertaking the detailed engineering design shall be **forty (40) calendar days** and the Consultant shall commence work after receipt of Notice to proceed.

C. ASSISTANCE TO BE PROVIDED BY THE CLIENT

The DPWH shall ensure that the Consultant has access to all relevant information necessary to the performance of the above services. The Consultant is expected to provide office space and equipment and all other resources for completing the service.

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