

Republic of the Philippines
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
Batangas III District Engineering Office
OFFICE OF THE DISTRICT ENGINEER
Tanauan City

TERMS OF REFERENCE

**CONSULTING SERVICES FOR THE CONDUCT OF
GEOTECHNICAL INVESTIGATION / SOIL EXPLORATION**

- 1. Taal Lake Circumferential Road – Tanauan Section**
- 2. Taal Lake Circumferential Road – Agoncillo Section**
- 3. Taal Lake Circumferential Road – Balete Section**
- 4. Bugaan River**
- 5. OFW Convention and Tourism Center, Laurel, Batangas**
- 6. San Juan River**
- 7. Pansipit River**
- 8. Lipa City Mataasnakahoy Diversion Road (Nangkaan Bridge)**
- 9. Bugaan Bridge**
- 10. Construction of Multi-Purpose Building at Barangay Cutang Cawayan, Sta. Teresita, Batangas**
- 11. Multi-Purpose Sports Development Center at Barangay Pansipit, Agoncillo, Batangas**
- 12. Magapi-Sala Bridge Balete, Batangas**

I. INTRODUCTION

A. PROJECT SCOPE

The proposed project which is the subject of Soil Exploration/Geotechnical Investigation of the following namely:

Name of Project	Number of Holes	Depth
Taal Lake Circumferential Road – Tanauan Section	1 BH	15 Meters
Taal Lake Circumferential Road – Agoncillo Section	1 BH	15 Meters
Taal Lake Circumferential Road – Balete Section	1 BH	15 Meters
Bugaan River	2 BH	15 Meters
OFW Convention and Tourism Center, Laurel, Batangas	3 BH	15 Meters
San Juan River	1 BH	15 Meters
Pansipit River	1 BH	15 Meters
Lipa City Mataasnakahoy Diversion Road (Nangkaan Bridge)	3 BH	30 Meters
Bugaan Bridge	2 BH	30 Meters
Construction of Multi-Purpose Building at Barangay Cutang Cawayan, Sta. Teresita, Batangas	3 BH	15 Meters
Multi-Purpose Sports Development Center at Barangay Pansipit, Agoncillo, Batangas	3 BH	15 Meters
Magapi-Sala Bridge Balete, Batangas	2 BH	15 Meters
TOTAL	23 BORE HOLES	

II. SCOPE OF SERVICES

a. For Geotechnical Investigation Report

The Consultant shall coordinate with the Planning and Design Section and Quality Assurance Section of DPWH Batangas III District Engineering Office during the conduct of Sub-Surface Soil Exploration and Geotechnical Investigation of each proposed projects site.

The Consultant shall identify areas with geological problems and difficulties, and water bearing stratum causing subsurface discharge, which could affect the stability of the structure.

In general, the Consultant shall conduct the following:

1. Geological Survey and Investigation, consisting of, but not limited to the following:
 - a. Collection of geological information such as aerial photographs, satellite imagery, relevant geological study reports, documents and maps for the project areas.
 - b. Topographic Maps showing detailed and accurate illustration of man-made and natural features on the ground such as roads, railways, power transmission lines, contours, elevations, rivers, lakes and geographical names.
 - c. Climate hazard Map showing areas vulnerable to specific climate-related hazards, such as flooding, landslides, or extreme heat, to help inform planning, mitigation, and adaptation strategies.
 - d. Seismic hazard map showing information on earthquakes and related hazards in a specific area, aiding in risk assessment, mitigation planning, and earthquake preparedness.
 - e. Liquefaction hazard map showing areas prone to liquefaction, a phenomenon where saturated soils lose strength and behave like a liquid during earthquakes, potentially causing damage.
2. Geotechnical Investigation, consisting of, but not limited to the following:
 - a. Detailed soil investigation shall be undertaken to each site with the purpose of identifying types of sub-grade soils.
 - b. All boreholes shall be properly logged and drawn in A1 size plans showing the thickness of each layer, the color, the type and visual description of each layer, depth below the surface, depth of water level (if encountered), etc. The following laboratory tests and analysis shall be made on the samples taken. Mechanical Analysis, Specific Gravity, Atterberg Limits, and Natural Moisture Content. Classification of soils shall be made in accordance with AASHTO M145.
 - c. Sources of construction materials shall be investigated and identified to determine the adequacy of suitable materials. Samples from identified sources shall be subjected to laboratory testing.

V. IMPLEMENTATION

a. Geotechnical Investigation Output

a-1. Inception Report

The Consultant is required to submit fifteen (15) days after commencement of services. It shall outline a detailed work program and briefly describe the methodology and project schedule (GANTT and S-Curve)

Proposed to meet the terms of reference. The report shall include the initial findings as well as preliminary layout of the forms to be used for various investigations and calculations. Inception Reports shall be submitted in soft-bound copy with title of the report written at the spine.

a-2. Final Report

The Consultant shall prepare the final report in four (4) bound copies in a form and substance to be submitted to DPWH, Batangas III District Engineering Office within **Sixty (60) Calendar Days** upon receipt of the Notice to Proceed. It shall

include, but not be limited to the following:

- a. Field Investigation and Methodology
- b. Borehole Drilling and Sampling
- c. Laboratory Testing
- d. Regional Geology
- e. Soil Bearing Capacity
- f. Vicinity Maps in scale of 1:50,000
- g. Final Boring Logs (BL)
 - i. Job, Boring, Hole Number, date, time, boring/drilling foreman and supervisor
 - ii. Weather condition
 - iii. Depth of water level
 - iv. Method of penetration and flushing system
 - v. Description of soil strata encountered
 - vi. Depth of soil boundaries
 - vii. Size, type and depth of samples and sample number
 - viii. Type and depth of in situ test
 - ix. Standard Penetration Tests Resistance, 'N' values
 - x. Detailed notes on boring/drilling procedure, casing sizes and resistance to driving, description of wash water or spoil from boring/drilling tools
 - xi. Depth of boring
 - xii. Other relevant information such as RQD, percent core recovery, etc.
- g. Final Laboratory Test Results (FLTR)
- h. Borehole Location Plan in scale of 1:250
- i. Soil Profile along structures showing boring/drillings logs
- j. Recommendations if called for, such as type of proposed countermeasures/ structures to address geological/geotechnical problems and foundation type.
- k. Other relevant data
 - Photographs showing the borehole drilling and sampling at each proposed sites shall be taken by the Consultant and form part of the report. The photographs to be taken shall depict the following:
 - i. Equipment used
 - ii. Core drilling operation
 - iii. Water level measurements
 - iv. Performance of SPT sampling
 - v. All cores and SPT sample placed in core boxes
 - vi. Date photographs were taken
 - vii. Location or station

VI. PAYMENT AS TO ACCOMPLISHMENT

The Consultant is allowed to render payment as to accomplishment with the following staging cost:

Table 2. CUMULATIVE PERCENT ACCOMPLISHMENT		
No.	Activities	Cumulative Percent Accomplishment
1.)	Inception Report	15%
2.)	Borehole Drilling and Sampling	50%
3.)	Laboratory Testing	75%
4.)	Final Report	100%

VI. DURATION OF CONSULTANCY SERVICES

The Consultant's contract period for undertaking the pre detailed engineering is **60 Calendar days** and the Consultant shall commence work within seven (7) days after receipt of Notice to Proceed (NTP).

VII. SCHEDULES








Table 3. INDICATIVE SCHEDULE OF ACTIVITIES				
ACTIVITIES	QUARTERS			
	30 CD	60 CD		
A. Geotechnical Investigation Activities				
Drilling				
Laboratory and Paper Works				

Table 4. INDICATIVE SCHEDULE OF KEY PERSONNEL				
KEY STAFF	QUARTERS			
	30 CD	60 CD		
Project Manager				
Civil Engineer				
Geotechnical Engineer				
Materials Engineer				
Laboratory Technician				

VIII. MANPOWER REQUIREMENTS

Table 5. QUALIFICATION OF KEY PERSONNEL			
Position / Key Staff	No. of Staff	Detailed Tasks / Responsibilities	Required Qualifications
Project Manager	1	-To manage and monitor the status and progress of work of all sections	-BS in Civil Engineering; Doctoral or MS in related field in an added advantage - Duly licensed/ registered civil engineer - At least 5 years experience on project management

Geotechnical Engineer	1	<ul style="list-style-type: none"> - Overall guidance, direction, supervision and coordination of members of the Team - Study and determination of items and method of soil investigation and laboratory test - Perform necessary subsoil investigations on representative structure with samples to be taken at suitable spacing. 	<ul style="list-style-type: none"> -BS in Civil Engineering; Doctoral or MS in related field in an added advantage; - Duly licensed/ registered civil engineer - At least 5 years experience on soil, sub-surface and geotechnical survey and study of roads, bridges and related structures
Civil Engineer	1	<ul style="list-style-type: none"> - Collection and evaluation of geological information on the project site - Investigate the physical properties of materials to facilitate the design of structures 	<ul style="list-style-type: none"> -BS in Civil Engineering - Duly licensed/ registered geodetic/civil engineer - At least 3 years experience on soil, sub-surface and geotechnical survey and study of roads, bridges and related structures
Laboratory Technician	1	Assist the Team Leader (Geotechnical Engineer) in the collection of necessary data and information, in carrying out detailed soil investigation	<ul style="list-style-type: none"> BS in Civil Technology graduate At least 2 years' 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"> - Test and evaluate the materials use to perform necessary subsoil investigation 	<ul style="list-style-type: none"> - BS in Civil Engineering; Doctoral or MS in related field in an added advantage; - Duly licensed/ registered civil/material engineer - At least 2 years' experience on testing and evaluating materials use in performing activities in subsoil investigation

IX. ASSISTANCE TO BE PROVIDED BY THE CLIENT

In connection with the tasks of the Consultant that require inputs and assistance from other government agencies as well as local NGO's, members of the Congress and officials of the regional/provincial branches of national government agencies, 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 necessary for completing the services.

X. OUTPUT NEEDED FOR SUBMISSION:

- Project Area Description
 - Topography
 - Geologic Map
 - Climate Hazard Map
 - Seismic Hazard Map
 - Liquefaction Hazard Map
- Results and Values
 - Soil Bearing Capacity
 - Maximum Soil Bearing Capacity
- Summary of Laboratory Test Results
 - Atterberg Limits
 - Plastic and Liquid Limits
 - Plasticity Index
 - Specific Gravity Values

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