PINNACLE INFRASTRUCTURE CONSULTING

COMPANY PROFILE

Office Address:
Pinnacle Infrastructure Consulting
1/174, Gomti Vihar Colony, Near Lamartinier Boys School,
Lucknow-226001
E-mail: pinnacleinfraconsult@gmail.com
Mob:- 9910393180, 9554989968

Lab Address:
Pinnacle Infrastructure Consulting
B-94 Shri Ramchandra Mission, Gate No.3,
IIM Road, Lucknow-226013
Mob: 9120225581

ABOUT US

We, at Pinnacle Infrastructure Consulting, are fully adept at conducting the full range of Soil investigations, Data Review & Interpretation, and Engineering analyses pertaining to the Geo-technical domain.

With a line-up of state-of-the-art equipment and other allied resources, we provide a comprehensive suite of services, which includes Geotech Investigation, Material Testing, Plate Load Test, Pile Load Test, Electrical Resistivity, Concrete/Bituminous Mix Proportioning, Topography Survey by Total Station, DGPS, Compressive Strength Test by Rebound Hammer (NDT), TRL Dynamic Cone Penetration Test.

CORE TEAM

Mr. Deep Joshi: - He holds a degree in Masters in Business Law having rich experience of 20 years in Tendering, Business development, bid process management, overall supervision and maintenance related to day-to-day activities.

Mr. Mayank Rajpal: - He hold degree in Civil Engineering and Masters in Transportation Planning having vast experience in Traffic Engineering and Planning, DPR projects and Geotechnical Engineering Projects. He specialized in developing concept designs, providing solutions for Geotechnical testing and Design. He has good managerial, Interpersonal Communications and teamwork skills.

Mr. Abhinav Singh Chauhan: - He holds degree in Civil Engineering and Post Graduate Degree in Masters in Transport Planning having more than 12 years of experience in Highway Projects. He was honored with **Champions of Change Award** by Bharat Ratna, Former President of India Shri Pranab Mukharjee and Former Vice President Shri Vainkaiya Naidu,

Mr. Surya Prakash: - He holds degree in Civil Engineering having rich experience of 9 years working as Quality Manager in Geotechnical laboratory. He is responsible for site investigations, analyzing and review Material/Soil samples and preparation of Test Reports.

GST REGISTRATION

सत्यमेव जयते

Government of India

Form GST REG-06

[See Rule 10(1)]

Registration Certificate

Registration Number : 09ABAFP4293M1ZP

1.	**Legal Name**	PINNACLE INFRASTRUCTURE CONSULTING			
2.	**Trade Name, if any**	PINNACLE INFRASTRUCTURE CONSULTING			
3.	**Constitution of Business**	Partnership			
4.	**Address of Principal Place of Business**	SECTOR - H, 3/966, JANKIPURAM, JANKIPURAM, LUCKNOW, Lucknow, Uttar Pradesh, 226021			
5.	**Date of Liability**				
6.	**Period of Validity**	From	17/08/2021	To	Not Applicable
7.	**Type of Registration**	Regular			
8.	**Particulars of Approving Authority**	Centre			

Signature

Signature valid
Digitally signed by DS GOODS AND SERVICES TAX NETWORK(4)
Date: 2021.08.17 14:46:15 IST

Name	Raj Kumar
Designation	Superintendent
Jurisdictional Office	Lucknow Sector-14
9. Date of issue of Certificate	17/08/2021

Note: The registration certificate is required to be prominently displayed at all places of business in the State.

This is a system generated digitally signed Registration Certificate issued based on the approval of application granted on 17/08/2021 by the jurisdictional authority.

PAN CARD

आयकर विभाग
INCOME TAX DEPARTMENT

भारत सरकार
GOVT. OF INDIA

ई– स्थायी लेखा संख्या कार्ड
e - Permanent Account Number (e-PAN) Card

ABAFP4293M

नाम / Name	PINNACLE INFRASTRUCTURE CONSULTING
निगमन/गठन की तारीख Date of Incorporation / Formation	09/03/2021

- ✓ Permanent Account Number (PAN) facilitate Income Tax Department linking of various documents, including payment of taxes, assessment, tax demand tax arrears, matching of information and easy maintenance & retrieval of electronic information etc. relating to a taxpayer.
  स्थायी लेखा संख्या (पैन) एक करदाता से संबंधित विभिन्न दस्तावेजों को जोड़ने में आयकर विभाग को सहायक होता है, जिसमें करों के भुगतान, आकलन, कर मांग, टैक्स बकाया, सूचना के मिलान और इलक्ट्रॉनिक जानकारी का आसान रखरखाव व बहाली आदि भी शामिल है।
- ✓ Quoting of PAN is now mandatory for several transactions specified under Income Tax Act, 1961 (Refer Rule 114B of Income Tax Rules, 1962)
  आयकर अधिनियम, 1961 के तहत निर्दिष्ट कई लेनदेन के लिए स्थायी लेखा संख्या (पैन) का उल्लेख अब अनिवार्य है (आयकर नियम, 1962 के नियम 114B, का संदर्भ लें)
- ✓ Possessing or using more than one PAN is against the law & may attract penalty of upto Rs. 10,000.
  एक से अधिक स्थायी लेखा संख्या (पैन) का रखना या उपयोग करना, कानून के विरुद्ध है और इसके लिए 10,000 रुपये तक का दंड लगाया जा सकता है।
- ✓ The PAN Card enclosed contains Enhanced QR Code which is readable by a specific Android Mobile App. Keyword to search this specific Mobile App on Google Play Store is "Enhanced QR Code Reader for PAN Card.
  संलग्न पैन कार्ड में एनहान्स क्यूआर कोड शामिल है जो एक विशिष्ट एंड्रॉइड मोबाइल ऐप द्वारा पठनीय है। Google Play Store पर इस विशिष्ट मोबाइल ऐप को खोजने के लिए कीवर्ड "Enhanced QR Code Reader for PAN Card" है।

Cut

आयकर विभाग
INCOME TAX DEPARTMENT

भारत सरकार
GOVT. OF INDIA

स्थायी लेखा संख्या कार्ड
Permanent Account Number Card

ABAFP4293M

नाम / Name
PINNACLE INFRASTRUCTURE CONSULTING

निगमन/गठन की तारीख
Date of Incorporation/Formation
09/03/2021

Fold

इस कार्ड के खोने/पाने पर कृपया सूचित करें/लौटाएं:
आयकर पैन सेवा इकाई, एन एस डी एल
5 वीं मंजिल, मंत्री स्टर्लिंग,
प्लॉट नं. 341, सर्वे नं. 997/8,
मॉडल कालोनी, दीप बंगला चौक के पास,
पुणे - 411 016.

If this card is lost / someone's lost card is found, please inform / return to :
Income Tax PAN Services Unit, NSDL
5th Floor, Mantri Sterling,
Plot No. 341, Survey No. 997/8,
Model Colony, Near Deep Bungalow Chowk,
Pune - 411 016.

Tel: 91-20-2721 8080, Fax: 91-20-2721 8081
e-mail: tininfo@nsdl.co.in

Electronically issued and Digitally signed ePAN is a valid mode of issue of Permanent Account Number (PAN) post amendments in clause (c) in the Explanation occurring after sub-section (8) of Section 139A of Income Tax Act, 1961 and sub-rule (6) of Rule 114 of the Income Tax Rules, 1962. For more details, click here

MSME REGISTRATION CERTIFICATE

भारत सरकार
Government of India
सूक्ष्म, लघु एवं मध्यम उद्यम मंत्रालय
Ministry of Micro, Small and Medium Enterprises

MSME
सूक्ष्म, लघु एवं मध्यम उद्यम
MICRO, SMALL & MEDIUM ENTERPRISES

UDYAM REGISTRATION CERTIFICATE

UDYAM REGISTRATION NUMBER	UDYAM-UP-50-0026398
NAME OF ENTERPRISE	M/S PINNACLE INFRASTRUCTURE CONSULTING
TYPE OF ENTERPRISE *	MICRO
MAJOR ACTIVITY	SERVICES
SOCIAL CATEGORY OF ENTREPRENEUR	GENERAL

NAME OF UNIT(S)

S.No.	Name of Unit(s)
1	M/S PINNACLE INFRASTRUCTURE CONSULTING

OFFICAL ADDRESS OF ENTERPRISE

Flat/Door/Block No.	3/966 ,	Name of Premises/ Building	keshari villa
Village/Town	lucknow	Block	lucknow
Road/Street/Lane	3/966, Sector H, Jankipuram	City	lucknow
State	UTTAR PRADESH	District	LUCKNOW , Pin 226021
Mobile	9910393180	Email:	pinnacleinfraconsult@gmail.com

DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE	09/03/2021
DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS	04/08/2021

NATIONAL INDUSTRY CLASSIFICATION CODE(S)

SNo.	NIC 2 Digit	NIC 4 Digit	NIC 5 Digit	Activity
1	42 - Civil Engineering	4210 - Construction roads and railways	42101 - Construction and maintenance of motorways, streets, roads, other vehicular and pedestrian ways, highways, bridges, tunnels and subways	Manufacturing
2	42 - Civil Engineering	4210 - Construction roads and railways	42102 - Construction and maintenance of railways and rail-bridges	Manufacturing
3	71 - Architecture and engineering activities; technical testing and analysis	7110 - Architectural and engineering activities and related technical consultancy	71100 - Architectural and engineering activities and related technical consultancy	Services
4	71 - Architecture and engineering activities; technical testing and analysis	7120 - Technical testing and analysis	71200 - Technical testing and analysis	Services

DATE OF UDYAM REGISTRATION	25/08/2021

* In case of graduation (upward/reverse) of status of an enterprise, the benefit of the Government Schemes will be availed as per the provisions of Notification No. S.O. 2119(E) dated 26.06.2020 issued by the M/o MSME.

Disclaimer: This is computer generated statement, no signature required. Printed from https://udyamregistration.gov.in & Date of printing:- 01/09/2021

For any assistance, you may contact:

1. District Industries Centre: LUCKNOW (UTTAR PRADESH)

KANPUR (UTTAR PRADESH)

BE A CHAMPION

National Accreditation Board for Testing and Calibration Laboratories

CERTIFICATE OF ACCREDITATION

PINNACLE INFRASTRUCTURE CONSULTING (TESTING DIVISION)

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

B-94, RAM CHANDRA MISSION, GATE NO. 3, IIM RAOD, LUCKNOW, UTTAR PRADESH, INDIA

in the field of

TESTING

Certificate Number: TC-11602

Issue Date: 02/05/2023 **Valid Until:** 01/05/2025

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Name of Legal Identity : PINNACLE INFRASTRUCTURE CONSULTING

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

National Accreditation Board for Testing and Calibration Laboratories

SCOPE OF ACCREDITATION

Laboratory Name : PINNACLE INFRASTRUCTURE CONSULTING (TESTING DIVISION), B-94, RAM CHANDRA MISSION, GATE NO. 3, IIM RAOD, LUCKNOW, UTTAR PRADESH, INDIA

Accreditation Standard ISO/IEC 17025:2017

Certificate Number TC-11602 **Page No** 1 of 4

Validity 02/05/2023 to 01/05/2025 **Last Amended on** -

S.No	Discipline / Group	Materials or Products tested	Component, parameter or characteristic tested / Specific Test Performed / Tests or type of tests performed	Test Method Specification against which tests are performed and / or the techniques / equipment used
Permanent Facility				
1	MECHANICAL- BUILDINGS MATERIALS	Burnt Clay Building Bricks	Dimension - Length	IS 1077
2	MECHANICAL- BUILDINGS MATERIALS	Burnt Clay Building Bricks	Compressive Strength	IS 3495 (Part 1)
3	MECHANICAL- BUILDINGS MATERIALS	Burnt Clay Building Bricks	Dimension - Height	IS 1077
4	MECHANICAL- BUILDINGS MATERIALS	Burnt Clay Building Bricks	Dimension - Width	IS 1077
5	MECHANICAL- BUILDINGS MATERIALS	Burnt Clay Building Bricks	Efflorescence	IS 3495 (Part 3)
6	MECHANICAL- BUILDINGS MATERIALS	Burnt Clay Building Bricks	Water Absorption	IS 3495 (Part 2)
7	MECHANICAL- BUILDINGS MATERIALS	Coarse Aggregate	10% Fines Value	IS 2386 (Part 4)
8	MECHANICAL- BUILDINGS MATERIALS	Coarse Aggregate	Aggregate Crushing Value	IS 2386 (Part 4)
9	MECHANICAL- BUILDINGS MATERIALS	Coarse Aggregate	Aggregate Impact Value	IS 2386 (Part 4)
10	MECHANICAL- BUILDINGS MATERIALS	Coarse Aggregate	Bulk density (Loose & Compacted)	IS 2386 (Part 3)
11	MECHANICAL- BUILDINGS MATERIALS	Coarse Aggregate	Elongation Index	IS 2386 (Part 1)
12	MECHANICAL- BUILDINGS MATERIALS	Coarse Aggregate	Flakiness Index	IS 2386 (Part 1)
13	MECHANICAL- BUILDINGS MATERIALS	Coarse Aggregate	Sieve Analysis (80mm to 2.36mm)	IS 2386 (Part 1)
14	MECHANICAL- BUILDINGS MATERIALS	Coarse Aggregate	Soundness (with Magnesium Sulphate)	IS 2386 (Part 5)
15	MECHANICAL- BUILDINGS MATERIALS	Coarse Aggregate	Soundness (with Sodium Sulphate)	IS 2386 (Part 5)
16	MECHANICAL- BUILDINGS MATERIALS	Coarse Aggregate	Specific Gravity	IS 2386 (Part 3)
17	MECHANICAL- BUILDINGS MATERIALS	Coarse Aggregate	Water Absorption	IS 2386 (Part 3)
18	MECHANICAL- BUILDINGS MATERIALS	Fine Aggregate	Bulk Density (Loose & Compacted)	IS 2386 (Part 3)

SCOPE OF ACCREDITATION

Laboratory Name : PINNACLE INFRASTRUCTURE CONSULTING (TESTING DIVISION), B-94, RAM CHANDRA MISSION, GATE NO. 3, IIM RAOD, LUCKNOW, UTTAR PRADESH, INDIA

Accreditation Standard ISO/IEC 17025:2017

Certificate Number TC-11602 **Page No** 2 of 4

Validity 02/05/2023 to 01/05/2025 **Last Amended on** -

S.No	Discipline / Group	Materials or Products tested	Component, parameter or characteristic tested / Specific Test Performed / Tests or type of tests performed	Test Method Specification against which tests are performed and / or the techniques / equipment used
19	MECHANICAL- BUILDINGS MATERIALS	Fine Aggregate	Material finer than 75 micron	IS 2386 (Part 1)
20	MECHANICAL- BUILDINGS MATERIALS	Fine Aggregate	Sieve Analysis and Fineness Modulus (10mm to 0.150mm)	IS 2386 (Part 1)
21	MECHANICAL- BUILDINGS MATERIALS	Fine Aggregate	Soundness (with Sodium Sulphate)	IS 2386 (Part 5)
22	MECHANICAL- BUILDINGS MATERIALS	Fine Aggregate	Specific Gravity	IS 2386 (Part 3)
23	MECHANICAL- BUILDINGS MATERIALS	Fine Aggregate	Water Absorption	IS 2386 (Part 3)
24	MECHANICAL- BUILDINGS MATERIALS	Fine Aggregates	Soundness (with Magnesium Sulphate)	IS 2386 (Part 5)
25	MECHANICAL- BUILDINGS MATERIALS	Fresh Concrete	Slump Test	IS 1199 (Part 2)
26	MECHANICAL- BUILDINGS MATERIALS	Hardened Concrete	Compressive Strength	IS 516 (Part 1, Section 1)
27	MECHANICAL- BUILDINGS MATERIALS	Paver Block	Compressive Strength	IS 15658 (Annexure D)
28	MECHANICAL- BUILDINGS MATERIALS	Paver Block	Dimension - Height	IS 15658 (Annexure B)
29	MECHANICAL- BUILDINGS MATERIALS	Paver Block	Dimension - Length	IS 15658 (Annexure B)
30	MECHANICAL- BUILDINGS MATERIALS	Paver Block	Dimension - Width	IS 15658 (Annexure B)
31	MECHANICAL- BUILDINGS MATERIALS	Paver Block	Water Absorption	IS 15658 (Annexure C)
32	MECHANICAL- SOIL AND ROCK	Rock	Density by Saturation and Buoyancy Technique	IS 13030
33	MECHANICAL- SOIL AND ROCK	Rock	Unconfined Compressive strength	IS 9143
34	MECHANICAL- SOIL AND ROCK	Rock	Water Content	IS 13030
35	MECHANICAL- SOIL AND ROCK	Soil	Free Swell Index	IS 2720 (Part 40)
36	MECHANICAL- SOIL AND ROCK	Soil	California Bearing Ratio	IS 2720 (Part 16)
37	MECHANICAL- SOIL AND ROCK	Soil	Consolidation test	IS 2720 (Part 15)

SCOPE OF ACCREDITATION

Laboratory Name :	PINNACLE INFRASTRUCTURE CONSULTING (TESTING DIVISION), B-94, RAM CHANDRA MISSION, GATE NO. 3, IIM RAOD, LUCKNOW, UTTAR PRADESH, INDIA		
Accreditation Standard	ISO/IEC 17025:2017		
Certificate Number	TC-11602	**Page No**	3 of 4
Validity	02/05/2023 to 01/05/2025	**Last Amended on**	-

S.No	Discipline / Group	Materials or Products tested	Component, parameter or characteristic tested / Specific Test Performed / Tests or type of tests performed	Test Method Specification against which tests are performed and / or the techniques / equipment used
38	MECHANICAL- SOIL AND ROCK	Soil	Direct shear test (Angle of Internal friction)	IS 2720 (Part 13)
39	MECHANICAL- SOIL AND ROCK	Soil	Grain Size Analysis (100mm to 75microns)	IS 2720 (Part 4)
40	MECHANICAL- SOIL AND ROCK	Soil	Liquid limit	IS 2720 (Part 5)
41	MECHANICAL- SOIL AND ROCK	Soil	Maximum Dry Density (Heavy compaction)	IS 2720 (Part 8)
42	MECHANICAL- SOIL AND ROCK	Soil	Maximum Dry Density (Light Compaction)	IS 2720 (Part 7)
43	MECHANICAL- SOIL AND ROCK	Soil	Optimum Moisture Content (Heavy compaction)	IS 2720 (Part 8)
44	MECHANICAL- SOIL AND ROCK	Soil	Optimum Moisture Content (Light Compaction)	IS 2720 (Part 7)
45	MECHANICAL- SOIL AND ROCK	Soil	Plastic limit	IS 2720 (Part 5)
46	MECHANICAL- SOIL AND ROCK	Soil	Shrinkage Limit	IS 2720 (Part 6)
47	MECHANICAL- SOIL AND ROCK	Soil	Specific Gravity	IS 2720 (Part 3, Section 1)
48	MECHANICAL- SOIL AND ROCK	Soil	Swelling Pressure	IS 2720 (Part 41)
49	MECHANICAL- SOIL AND ROCK	Soil	Triaxial Test (Angle of Internal friction)	IS 2720 (Part 11)
50	MECHANICAL- SOIL AND ROCK	Soil	Triaxial Test (Cohesion)	IS 2720 (Part 11)
51	MECHANICAL- SOIL AND ROCK	Soil	Uniaxial Compressive Strength	IS 2720 (Part 10)

National Accreditation Board for Testing and Calibration Laboratories

SCOPE OF ACCREDITATION

Laboratory Name :	PINNACLE INFRASTRUCTURE CONSULTING (TESTING DIVISION), B-94, RAM CHANDRA MISSION, GATE NO. 3, IIM RAOD, LUCKNOW, UTTAR PRADESH, INDIA		
Accreditation Standard	ISO/IEC 17025:2017		
Certificate Number	TC-11602	**Page No**	4 of 4
Validity	02/05/2023 to 01/05/2025	**Last Amended on**	-

S.No	Discipline / Group	Materials or Products tested	Component, parameter or characteristic tested / Specific Test Performed / Tests or type of tests performed	Test Method Specification against which tests are performed and / or the techniques / equipment used
Site Facility				
1	MECHANICAL- SOIL AND ROCK	Soil	Soil Density (Core Cutter Method)	IS 2720 (Part 28)

SERVICES OFFERED

- Design Services (Roads & Bridges)
- Geotechnical Investigations
- Material Testing
- Plate Load Testing
- Pile Load Testing
- Concrete Mix Design
- Topographical Survey/DGPS Survey
- Non-Destructive Testing (NDT) of Concrete structures

EQUIPMENTS LIST

Sl.No	Name of equipment
1	Laboratory CBR Apparatus (Motorised)
2	Direct Shear Apparatus (Motorised)
3	Triaxial shear Test Apparatus
4	Automatic Compression Testing Machine
5	Three Gang Bench Type Consolidometer
6	Dial Gauge 0.01X25mm
7	Brass Sieves 200 mm dia
8	Brass Sieves 200 mm dia

9	Sieves Set for Aggregate (300 mm) GI Sieve
10	Hot air Oven
11	Liquid limit apparatus
12	Plastic Limit set
13	Shrinkage limit apparatus
14	Electronic Balance (100kg)
15	Electronic Balance (600gm)
16	Electronic Balance (15kg)
17	Specific Gravity apparatus with Buoyancy balance
18	Slump test apparatus
19	Blane air apparatus
20	Vicat apparatus
21	le chatelier mould (Set of 6 moulds)
22	Cube Mould 150 mm x 150 mmX150 mm
23	Cube Mould 70.6 mm x 70.6 mm
24	Proctor mould 1000 cc with rammer 2.6 kg
25	Proctor mold 2250 cc with rammer 4.89 kg
26	CBR Mould
27	GI Tray 24X24
28	GI Tray 18X18
29	GI Tray 12X18
30	Enamel Tray 10X12
31	Enamel Bowl 5 inch
32	Sample Extractor screw

33	Aggregate Impact value apparatus
34	Aggregate crushing value apparatus
35	Cylindrical measuring for bulk density
36	Vibrating table for concrete cubes
37	Lab concrete mixture 1-1/2 cft capacity electrically operated
38	Hot plate 8 inch circular
39	Stop watch
40	Specific gravity bottle "Borosilicate" 100 ml
41	Core cutter with dolly and rammer
42	Vibrating machine for cement cube with digital display
43	Le chatelier Apparatus
44	Hydrometer
45	Humidity Chamber
46	Humidifier
47	Accelerated Water tank
48	DGPS

LABORATORY PHOTOGRAPHS

PROJECTS

Sl.No	Projects
1	Geotechnical Investigation for Improvement to 2 Lane with paved shoulder of NH-40 section from Km 131+820 to Km 151+330 (design Km 45+760 to Km 63+530) design length 17.77 km in the State of Meghalaya on EPC Mode under JICA loan Assistance (Package-IV)
2	Pakcage IV-Improvement to 2 Lane with paved shoulder of NH-40 section from Km 131+820 to Km 151+330 (Design Km 45+760 to Km 63+530) design length 17.77 Km in the state of Meghalaya on EPC Mode with JICA Loan Assistance. Plate Load test at 9 Locations.
3	Geo-technical Investigation between Rae Bareli-Akbarganj in Uttar Pradesh for New Railway Line.
4	Sub soil Investigation for Proposed construction of residential building at Rautapar, Basti, Uttar Pradesh
5	Sub soil Investigation for Proposed Construction of new Educational Block at Dr. Vimal Kumar Dwivedi Institute of pharmacy Bansi, Uttar Pradesh
6	Sub soil investigation for Proposed Construction work of Girl's Hostel in Campus of Kasturba girl's school, Gola Gorakhpur in Uttar Pradesh- UP Avas Vikas Parishad
7	Soil Investigation for Overhead Tank at FSIP BHEL Jagdishpur, Uttar Pradesh-Bharat Heavy Electronics Limited
8	Consultancy services for Detail Design including Survey for Construction of Minor bridge of Span 3X12 m Span, Approach Road and protection work at Kot Dariyamu Marg on Sasur Khaderi River in district Fatehpur under financial year 2020-21.
9	Survey and Geotechnical Investigation for Jal Jeevan Mission in Lakhimpur District (covered 100 Gram Panchayats)
10	Sub Soil Exploration and sample collection at Chainage 74.2 km and 64.2 km in Mehmoodpur, Sitapur (UP)
11	Geotechnical Investigation for Construction of 1 ROB & 3 Flyovers of National Highway No 730 at the section fom Km 133+230 to Km 134+330 Km 134+550 Km 135+650 Km 136+200 to Km 137+800 in the state of Uttar Pradesh (approxx. 3.800Km)
12	Geotechnical Investigation for proposed "Development of six lane access control Greenfield Highway of Delhi-Saharanpur-Dehradun economic corridor under Bharatmala Pariyojjna from design chainage

	56+500 (Vill-Karaunda Mahajan) to Design chainage 82+000(Vill-khyavari) in the State of Uttar Pradesh on EPC Mode(Package III)
13	Geotechnical Investigation for Construction of 6- Lane ROB at km 314.385 over existing NH-24 of Bareilly– Sitapur section on EPC basis in the State of Uttar Pradesh for proposed private railway siding of KFL Work order for Geotechnical Investigation Work in Distt- Shahjahanpur.
14	Geotechnical Investigation of Railway Line in Bolangir District, Odisha
15	Survey work for Construction of 2 lane ROB at Km 1207/12-13 near Anji Sahbad Railway Station on Moradabad-Lucknow Section
16	Conducting Topographical Survey at 3 locations in the state of Jharkhand: Mangalghat/Rajmahal, Samdaghat, Singhidalan/Rajmahal
17	Conducting Topographical Survey at 23 locations in the state of west Bengal
18	JKCCL Panna District – Carryout Final Location Survey (FLS) work for the proposed Greenfield Railway Project taking off from Devendra Nagar Station as Y-connectivity under Jabalpur division of West Central Railway
19	Geotechnical Investigation-Consultancy Services for Preparation of feasibility study and Detailed Project Report for Construction of NH-133 from Ekchari to Mahagama
20	Survey Work on Shahjahanpur Project-Lipulek Bhind Road Shahjahanpur
21	Construction of 2 lane with paved Shoulder including geometric improvement from km 16+000 to 32+500 of stretch Tarku-Ravangla of NH-510 on EPC basis under SARDP-NE Phase "A" in the state of Sikkim-Work Order for Non Destructive Test of Structures

INNOVATO SOLUTIONS

DESIGN. TESTING. CONSULTANCY.

Office: A-106, Sector 80, Phase-II Noida – 201305 (UP) Tel. No.: 0120-6253548
E-mail: innovatosolutions@gmail.com Website: www.innovatosolutions.in

Ref. No.: INN/LOA/21-22/002 Date: 15/01/2022

To,

PINNACLE INFRASTRUCTURE CONSULTING
3/966, Sector-H, Jankipuram Lucknow-226021.
Mob. No.: 9120225581.

Attn: Mr. Surya Prakash

Subject: LOA for Soil testing work between Rae Bareli - Akbar Ganj in Uttar Pradesh as per relevant IS code.

Name of work:

Geo Technical Investigation between Rae Bareli - Akbar Ganj in Uttar Pradesh for New Line.

Dear Sir,

With reference to the above subject, we agree to the finalize the rates discussed and finalized on 15th January 2022. We are pleased to award the Work order for conducting above mentioned work.

You are required to conduct the laboratory tests on collected samples as per relevant IS code at your laboratory by 16th January 2022 and complete the project activities within timeline and as per the contract term and conditions, mentioned as below:

WORK SPECIFICATION:

a) Conducting laboratory tests on collected soil samples as per relevant latest IS code

Sr. No.	Test Name	IS code (Refer the latest IS standards)
1	Moisture contents	IS 2720 part -2
2	Dry / Field Density	IS 2720 part - 29/28
3	Atterberg Limits	IS 2720 part - 5
4	Specific Gravity	IS 2720 part – 3 (Sec-I)
5	Grain size analysis including Hydrometer analysis	IS 2720 part – 4
6	Direct shear test	IS 2720 part – 13
7	Consolidation test	IS 2720 part – 15
8	Tri-axial test	IS 2720 part – 11/12

The **PINNACLE INFRASTRUCTURE CONSULTING** is responsible for conducting above mentioned all tests for all UDS/DS samples of each chainage/borehole / Points.

INNOVATO SOLUTIONS
DESIGN. TESTING. CONSULTANCY.
Office: A-106, Sector 80, Phase-II Noida – 201305 (UP) Tel. No.: 0120-6253548
E-mail: innovatosolutions@gmail.com Website: www.innovatosolutions.in

TERMS AND CONDITIONS: -

1. The labour or employees of the Contractor shall be considered for all respects, as the employee of the Contractor and not of the INNOVATO SOLUTIONS.
2. Safety and security of your belongings & workmen will be fully in your part. The Contractor cannot claim anything what so ever.
3. The Contractor shall indemnify the company against any losses and claims in respectof death/injury of any person, loss/damage of any property, defect of the works & claims.
4. The Contractor shall take all required insurance policy e.g., Workmen Compensation Policy, Machinery, Employee, Labour & damages to third party etc. before the commencement of the work and copy of the same shall be submitted at site.
5. During the execution the Contractor shall take all precautions for safety and protection of environment.
6. During the course of execution if it is found that Contractor is not able to maintain the desired progress at site and/or is failing to maintain the milestones of work programme, the Company is free to employ another Contractor/ departmental labor for accelerating and completing the balance work of Contractor's section at the risk & cost of Contractor, without any reference being made to Contractor. The Contractor cannot claim anything in this regard.

For Innovato Solutions

Partner

Authorized Signatory

Rahul Ks Gupta
(Partner)
Innovato Solutions

For PINNACLE INFRASTRUCTURE CONSULTING

Authorized Signatory

(MONIKA KRIPLANI)
(PARTNER)

INNOVATO SOLUTIONS

DESIGN. TESTING. CONSULTANCY.

Office: A-106, Sector 80, Phase-II Noida – 201305 (UP)

Ref. No.: INN/LOA/21-22/003

Date: 28/01/2022

To,

PINNACLE INFRASTRUCTURE CONSULTING
3/966, Sector-H, Jankipuram Lucknow-226021.
Mob. No.: 9120225581.
GST : 09ABAFP4293M1ZP

Attn: Mr. Surya Prakash

Subject: LOA for Soil Exploration work between Rae Bareli - Akbar Ganj - Ayodhya in Uttar Pradesh.

Name of work:

Geo Technical Investigation between Rae Bareli - Akbar Ganj - Ayodhya in Uttar Pradesh for New Line.

Dear Sir,

With reference to above subject, we agree to the finalize the rates discussed and finalized as per quotation received on 27th January 2022. We are Pleased to award the Work order for conducting above mentioned work.

You are required to mobilize the survey teams for boring at site by 29th January 2022 and complete the project activities within timeline and as per the contract term and conditions, mentioned as below:

WORK SPECIFICATION:

a) Drilling exploratory bore holes of 150 mm dia. size on land by Manual drilling through sand, silt & clay for collecting Undisturbed soil sample, Disturbed soil sample and conducting SPT as per IS 1892, 2132 & 2131 requirement.

b) All activities must be completed within agreed timeline including digging and sample collection, labelling and proper samples packaging.

c) The contractor shall ensure that the disturbed/undisturbed sampling of soils and SPT test shall be done as per IS Code(s) in presence of INNOVATO SOLUTIONS engineer(s) and the records of observations shall be maintained.

d) The layer to be tested shall be advance of the penetration of casing in that particular layer. The contractor shall ensure that casing shall not be driven into that layer until the same is sampled.

e) The contractor shall ensure that complete information about ground water and collection of water samples are indicate in the observation sheet.

f) The contractor shall make his own arrangement for carting all materials and tools required

INNOVATO SOLUTIONS

DESIGN. TESTING. CONSULTANCY.

Office: A-106, Sector 80, Phase-II Noida – 201305 (UP)

TERMS AND CONDITIONS: -

1. The labour or employees of the Contractor shall be considered for all respects, as the employee of the Contractor and not of the INNOVATO SOLUTIONS.
2. Safety and security of your belongings & workmen will be fully in your part. The Contractor cannot claim anything what so ever.
3. The Contractor shall indemnify the company against any losses and claims in respect of death/injury of any person, loss/damage of any property, defect of the works & claims.
4. The Contractor shall take all required insurance policy e.g., Workmen Compensation Policy, Machinery, Employee, Labour & damages to third party etc. before the commencement of the work and copy of the same shall be submitted at site.
5. During the execution the Contractor shall take all precautions for safety and protection of environment.
6. During the course of execution if it is found that Contractor is not able to maintain the desired progress at site and/or is failing to maintain the milestones of work programme, the Company is free to employ another Contractor/ departmental labor for accelerating and completing the balance work of Contractor's section at the risk & cost of Contractor, without any reference being made to Contractor. The Contractor cannot claim anything in this regard.

For Innovato Solutions

Authorized Signatory

For PINNACLE INFRASTRUCTURE CONSULTING

(Deep Chandra Joshi Partner)

Authorized Signatory

PINNACLE INFRASTRUCTURE CONSULTING LUCKNOW

Tel. No.: 0120-6253548 E-mail: innovatosolutions@gmail.com
Website: www.innovatosolutions.in

IS15700:2018

सर्वोत्तम प्रमाणित

उत्तर प्रदेश आवास एवं विकास परिषद

कार्यालय अधिशासी अभियन्ता
निर्माण खण्ड गोरखपुर–01
शाहपुर योजना सं0 2/3, गोरखपुर।
E-Mail:cd37gkp@upavp.com

भारतीय मानक ब्यूरो IS 15700 SQMS

पत्रांकः– / Y.14 / दिनांक .....

सेव में,

Pinnacleinfraconsult@gmail.com

मै0 पिनाकल इन्फ्रास्ट्रक्चर कन्सलटिंग
3/966, सेक्टर-एच,
जानकीपुरम, लखनऊ-226021

विषयः- कस्तूरबा गांधी बालिका विद्यालय, गोला गोरखपुर में छात्रावास हास्टल के निर्माण कार्य हेतु मृदा परीक्षण के सम्बन्ध में।

महोदय,

उपरोक्त कार्य सम्बन्धी आपके कोटेशन दिनांक 17.02.2022 मे दी गयी दर स्वीकृत कर ली गयी है। अ आपसे अनुरोध है कि निम्न विवरण के अनुसार **10** दिनों के अन्दर कार्य पूर्ण कर द्विपर्ण में बीजक एवं NABL टेस्ट रिप कार्यालय में प्रेषित करने का कष्ट करें।

क्र0सं0	विवरण	मात्रा	दर	धनराशि
1	Conducting bore 150mm dia upto 15 m deep Four Nos. by 150mm casing method, STP test as per IS: 2131 upto 20 mtr. Taking of Disturbed & Undisturbed samples as per IS Specification. Conducting laboratory tests on Disturbed soil sample for Sieve analysis & Atterbergs limit Conducting laboratory tests on Undisturbed soil samples for Sieve analysis, Atterbergs limit, Natural moisture contents, Bulk density, particle size analysis, Specific gravity, triaxial compression test and shear paramenters, Consolidation tests, as per I.S. specification of 1892-1988, 2131, 4958 (Part-1), 2132,8403,1498, 8009 and 2720 or amended a with submission of test Report in three coples upto date as per direction of E./I.. Soil testing works are to be performed at **Proposed Construction work of Girl's Hostel in Campus of Kasturba girl's school, Gola, Gorakhpur**	60.00 rmt.	600.00	36000.00
	योगः-			3600

शर्तेः-

1. जी0एस0टी0 नियमानुसार अतिरिक्त देय होगा।
2. उक्त दर में समस्त कर सम्मलित है।
3. नियमानुसार शासकीय कटौतियां की जायेगी।
4. विलम्ब की स्थिति में रू0 100.00 प्रतिदिन की दर से अर्थदण्ड देय होगा।
5. सन्तोषजनक कार्य पूर्ण होने के उपरान्त ही भुगतान किया जायेगा।
6. उपरोक्त कार्य की रिपोर्ट/ड्राइंग/गणना नियत अवधि में तीन प्रतियों में तथा पेन ड्राइव में भी देना होगा।
7. टेस्ट रिपोर्ट NABL प्रमाणित लैब से ही दी जानी होगी।

भवदीय

(अभिषेक वर्मा)
अधिशासी अभियंता

पo सं0:-220 / Y.14 / 05 दिनांक 28-02-22

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
(भारत सरकार का उपक्रम)
Bharat Heavy Electricals Limited
(A GOVERNMENT OF INDIA UNDERTAKING)
FABRICATION, STAMPING & INSULATOR PLANT
INDUSTRIAL AREA, JAGDISHPUR, DISTRICT AMETHI (UP)
Mob :- 8004927958

Letter Of Intent

Ref: BHE/FSIP/CVL/ST/01 **DT: 04/03/2022**

To,
M/s Pinnacle Infrastructure Consulting.
3/966, Sector-H, Jankipuram,
Lucknow (UP)-226016
Dear Sir,

SUB: Letter of Intent (LOI) for award of contract for Soil Investigation Test of Overhead Tank for Water supply tank at FSIP BHEL Jagdishpur

REF: 1.) Our e-mail dt. 02.03.2022 regarding Soil Investigation Test of Overhead Tank for Water supply tank at FSIP BHEL Jagdishpur
2.) Your offer submitted vide e-mail dt. 02.03.2022
With reference to the documents referred above, we are pleased to release this LOI for the subject work and accept your offer dt 02.03.2022. This LOI is being issued to you on the terms & conditions detailed herein to be read in conjunction with our offer enquiry dated 02.03.2022 except those, which have been specifically modified/clarified/confirmed by you or by us, and those, which are repugnant to what, is contained in this order.

1. **Rates/ Contract Price:** The item rates for subject work shall be as quoted by you and as mentioned in the BOQ cum Price Schedule. For entire scope of work with the quantities as indicated in BOQ as per rates quoted by you, the **Total Order Value works out to Rs. 15930/- (Rupees Fifteen Thousand Nine Hundred Thirty Only) (including GST).** However, the final contract value shall be on the basis of quantities actually executed at site against various items in the BOQ cum Price Schedule.

S.No	Description of Works	Unit	Quantity	Rate	Amount
	Vertically boring of min. 150 mm diameter bore holes through all kinds of soils by manual method, Conducting SPT in boreholes and Collection of minimum 100 mm diameter 450 mm long UDS as specified from borehole as specified in and conducting the required laboratory testing of the adequate collected samples.	Metre	15	900	13500
				GST @ 18%	2430
				Total Amount Rs	**15930**

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
(भारत सरकार का उपक्रम)
Bharat Heavy Electricals Limited
(A GOVERNMENT OF INDIA UNDERTAKING)
FABRICATION, STAMPING & INSULATOR PLANT
INDUSTRIAL AREA, JAGDISHPUR, DISTRICT AMETHI (UP)
Mob :- 8004927958

2.) **Major terms and conditions are as under:**

i. Payment Terms: Payment shall be made full and Final basis to the Contractor based on actually executed quantities during the work period after verification of the Engineer-in charge.

ii. Period of Work: Total Period of the work shall be Two (02) weeks from the date of LOI.

iii. Penalty for Delay: If the Work is not completed within the specified period and any extension thereof, the Contractor shall be liable to pay penalty for delay in completion of work @ 0.5% of Balance Work for every week of delay or part thereof, subjected to a maximum of 10% of the Contract value.

iv. Security Deposit: NIL

v. Guarantee: NIL

vi. VARIATION IN SCOPE OF WORK / DEVIATION LIMIT
BHEL reserves the right to add or delete items of scope of work depending upon the final requirement. For such addition or deletion, the Contract value shall be adjusted based on the quoted unit price. Such variation is not expected to be more than ±15% of the contract value. However, the quantities in the BOQ are tentative which may vary or deviate upto any limit provided the contract value is limited to ±15%. The price quoted by the Contractor shall be valid for such variation. Variation beyond the above limit shall be settled on mutually agreed rates.

vii. All Tools and material will be arranged by contractor.

viii. All works should be carried out strictly as per instruction of Engineer in charge.

ix. All the safety precaution will be taken by contractor at site.

x. The BHEL general terms and condition of contract will be applicable as stipulated by BHEL.

This LOI is being issued in DUPLICATE. Kindly return one copy of this LOI duly signed and stamped by you as a proof of your unequivocal acceptance.

Thanking You,

Yours faithfully,
For and on behalf of BHEL

LOI Accepted:

(M/s Pinnacle Infrastructure Consulting)

Supply Order

Office Of The Executive Engineer,
Provincial Division, P.W.D., Fatehpur

Letter No. 464 /M-12 /2022 Dated- 05 /03 /2022

To,

Pinnacle Infrastructure
Consulting Multi-Disciplinary
Consulting firm in Infrastructure Works

Subject:- Quotation for Consultancy service for Detail Design of Construction of Minor Bridge of Span 3x12 m Span, Approach road and protection work at Kot Dariyamu Marg on Sasur Khaderi River in district Fatehpur Under financial year 2020-21

Ref:- Superintending Engineer Pratapgarh-FTP Circle, PWD Pratapgarh wide letter no. 407/6m-PBH-FTP circle/2022 date. 27-01-2022

Your lowest quotation for subject has been accepted by the undersigned. Please supply the following and submit your bill in duplicate duly prereceipted with Revenue Stamp for purpose of payment to this office

S.N.	Item	Qty	Rate (Rs)	Amount
1	Consultancy fees for Survey with Total Station (Including mobilization and demobilization), Prepartion of GAD, Detail design with Structural drawings of well foundation, substructure, superstructure and related components, etc. complete to be submitted with 3 sets of drawings	1	1,43,000.00	1,43,000.00
2	Vetting charges from State/ Central Govt. Institution	1	25,000.00	25,000.00
			Total	1,68.000.00

GST shall be paid extra as per prevailing rate.

Executive Engineer
Provincial Division ,PWD
Fatehpur

Letter No. / /2022 Dated- / /2022

Copy to :1- Assistant Engineer (III), Provincial Division PWD, Fatehpur
2-Divisional Accounts Officer, Provincial Division, PWD, Fatehpur
3- Sri Ram Lakhan/ Sri Sudhir Kumar Junior Engineer, Provincial Division PWD, Fatehpur

Executive Engineer
Provincial Division ,PWD
Fatehpur

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Proj. ID: 2360
502:566:22/687
14th April 2023

By E-mail

Mr. Deep Joshi,
Director,
Pinnacle Infrastructure Consulting,
Office 3/966, Sector – H,
Jankipuram, Lukcnow – 226021
Telephone: 99103 93180
E Mail: pinnacleinfraconsult@gmail.com
PAN; ABAFP4293M

Dear Mr. Deep Joshi,

Sub.: JKCCL Panna District – Carryout Final Location Survey (FLS) work for the proposed Greenfield Railway Project taking off from Devendra Nagar Station as Y-connectivity under Jabalpur division of West Central Railway – Issue of WO

Ref.: Pinnacle Infra Quotation No.: PIC/QUOTE/05/2023 Dt.: 03.04.23

This is with reference to your quotation and further negotiation we had with you; we are placing the WO to carry out the Final Location survey for the proposed alignment for the above-mentioned Project as per the details given below:

1. **Scope of Work:**

   Location: JK Cement Panna Plant, to Devendra Nagar, Madhya Pradesh

   Railway Line Drone Survey 60 KM approx.

   50m from center line each side, total 100m strip will be covered.

   Work shall be carried out as per the scope of work, refer ANNEXURE I.

2. **Total WO price:**

   The basic work order price for the scope of services mentioned above shall be **Rs. 12,00,000/- (Twelve Lakh Rupees only) plus GST**. TDS as applicable shall be deducted from the bills submitted by you. Prices are inclusive of cost of necessary tasking, manpower charges, transportation, overheads, and other costs as applicable unless otherwise specified.

3. **Effective Date of Contract:**

   Contract shall become effective from the date of WO.

4. **Deliverables:**

   a) The agency will deliver all the outputs as per directions of the Engineer in desired formats.
      i. Classified Point Cloud in LAS (.las) format (Soft Copy format)

ii. Three-dimensional topographic survey drawing of the corridor on a scale of 1:1000 or as directed.

b) Contour map at 0.5 m interval for 100m corridor width on either side of alignment (50 meters)

c) Digital Surface Model (DSM)/ Digital Elevation Model (DEM)/Digital Terrain Model from topographic survey data.

d) Digital Orthophotos of 5cm GSD resolution (In tiles and seamlessly mosaicked over the survey area).

e) soft copy of all deliverables to be provided to K-Rail in a separate Hard disk.

f) Digital Elevation Model (DEM file format of the entire stretch.

File format shown below,

Sl. No	Description	File format
1	UAV / Drone raw data	.JPEG (uncompressed)
2	Ortho Imagery data	. Geo Tiff & ECW
3	Digital Elevation model (DEM)	. Geo Tiff & X, Y, Z
4	Digital Surface Model (DSM)	. Geo Tiff & X, Y, Z
5	3D Topo drawing plan – Dwg. .Shp	. Dwg

f) Digital Orthophotos of 5 cm GSD resolution should also be of the same divided area in ECW Format (.ecw) and delivered against each DEM.

5. Payment terms of BARSYL to Pinnacle Infrastructure Consulting:

S. No.	Milestone Description	Percentage payment of agreement value	Percentage payment – Milestone basis	Milestone value + GST (Rs.)
1)	Mobilization advance	15%	15%	1,80,000
2)	a. Submission of draft topographic survey data (AutoCAD/Acceptable format) – 25 Km of Alignment length.	65%	20%	1,56,000
	b. Submission of draft topographic survey data (AutoCAD/Acceptable format) – 25 Km of Alignment length.		40%	3,12,000
	c. submission of final topographic survey data (AutoCAD/ Acceptable format) – remaining of alignment length.		40%	3,12,000
3)	on approval of final topographic plan from JKCCL & Railways	25%	25%	2,40,000
	Grand Total	**100%**	**12,00,000**	

(Above payment shall be processed on receipt of respective milestone from JKCCL).

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All above payment milestones shall be paid within 14 working days after submission of clear invoices duly signed by Barsyl coordinator.

6 **Special Conditions of Contract:**

a. *The Letter of Intent is being sent to you through e-mail and you are requested to send us without delay one copy of the letter duly signed and stamped, as a token of your acceptance / acknowledgement.*
b. *GST will be paid by BARSYL as per Finance Act on production of proof of GST Registration No. - GST payment. (Payment shall be processed on receipt of respective milestone from JKCCL). Mention milestone details including the numbers (1&4) for the interim payment. Also mention milestone number in the original contract for every payment including name and numbers. TDS shall be deducted as per existing rules of I.T. mention the TDS rate as 10%.*
c. *TDS shall be deducted as per existing rules of I.T.*
d. *Invoice should contain the following particulars-BARSYL address, Invoice reference number & date, description of services, basic value, GST (if charged), total invoice value (both in numbers & words), PAN No., and GST registration no., It should also include Bank Account and RTGS details. Copies of PAN and GST Registration must be enclosed for first payment.*
e. *The above price inclusive of all expenses towards man, equipment, traveling, boarding, lodging etc. and no charge shall be paid extra.*
f. *Total approximate scope of work is 60 km.*
g. *BARSYL reserves the right to terminate the contract without any reason/prior notice. The date of validity of WO is 30th April 2023. Any extension shall be subject to your performance and extent of worked carried out.*
h. *Not to disclose or directly or indirectly divulge to any person (except as required by law) without BARSYL's prior written consent for the duration of this agreement or at any time after the Termination date the nature of the service or the instructions or the content of this agreement.*
i. *"If the specified job is not performed by you within the specified time or the work done by you is not meeting our requirements or not to our satisfaction or not to the satisfaction of our Client, and the same is not rectified or corrected or redone by you within the specified time at free of cost, BARSYL is reserving a right to appoint another Topographic Consultant to complete the job and the differential additional cost to be incurred by us in this regard, if any, to be borne by you".*
j. *Any dispute or claim arising out of or in connection with this agreement shall be, governed by, and construed in accordance with Indian Laws and to the exclusive jurisdiction of the courts of Hyderabad, India.*

For further guidance and mobilization at site coordinate with following:

- **BARSYL HO: Mr. Prince Tyagi – 93405 22920**
- **BARSYL HO: Mr. Ganesh Kumar. K – 98491 84941**

Please sign the duplicate copy of this Letter of Intent as a token of acceptance of the terms and conditions contained therein and send the same immediately.

Thanking you,

14/04/23		
Linga Prasad. K	**Sanjay Kandhari**	**Venkata Kumar**
AGM – Operations	**Head – Finance & Accounts**	**President – Operations**

Consultant Signature

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I/We hereby understand the detailed SoW provided by Barsyl and I/We agree to take up the assignment.

Mr. DEEP JOSHI,

(Sub-consultant appointed for the associated for Carryout out topographic survey work for the proposed Railway terminal taking-off from Devendra Nagar Station under Jabalpur division of West Central Railway)

7. Enclosure:

a. Annexure I: Surveyors Detailed Scope of Work
b. KMZ file of the stations to be surveyed.

8. Consultant Bank Details:

a.	**A/C Name:**	S.S.P. E
b.	**PAN No.:**	AGOPD3468K
c.	**Bank:**	Bank of Baroda
d.	**Account No.:**	10480200000168
e.	**IFSC Code:**	BARB0SERMP
f.	**Branch:**	SERAMPORE

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ANNEXURE - I

SCOPE OF WORK FOR DETAILED TOPOGRAPHIC SURVEY

The detailed scope of work for the proposed topographic survey at Panna District is as follows:

Description of Job
Detailed topographical Survey shall be done to show all the visible details of ground using Drone Photogrammetric technology, Total Station or DGPS with RTK mode along the corridor. The work will involve carrying out a detailed Topographic Survey along the alignment 100 m wide all details and other ground features. The details and methodology of Topographical Survey required to be done for entire corridor will be as under. • Establishment of Ground Control Points by DGPS with RTK Instrument X, Y, Z Coordinates based on reference Railway BM. • The accuracy of coordinates shall be arrived by collecting 4 hours DGPS data in any one Ground Control point and then converted to the UTM coordinate system for the purpose of making all deliverables. The 'Z' Coordinates values of these reference control points shall be checked by the contractor by transferring the 'Z' coordinates from the nearest Railway BM. • The contractor shall establish a primary control network using DGPS at intervals of 5 km and secondary RTK points at intervals of 1 km all along the alignment with x, y, and z values on permanent structures or as per project and site requirements. • All levels shall be taken with respect to Railway benchmarks at every km on control points with x,y,z values. • locations as per direction from Engineer as per requirement during surveys. • The survey should cover ROW (and show setback as well) inclusive of all the roads, road/rail track showing important structures with their height, all the bye lanes, footpaths, dividers / central verges, roads, railway tracks, trees, manholes & other structures, nallahs, storm water drains, H.T., L.T. Transmission lines, Telephone lines, vertical clearance of OH utilities etc. Bridges, ROBs/RUBs/FOBs with type and spans, ponds, HFL (with location) of streams/nallahs, level crossing with their type, traction masts, signal posts, location box etc. • Spot / Ground levels shall be taken at 1-meter Intervals in longitudinal as well as transverse direction (with grid and duly marked on the drawing) and at sudden change of levels and other features etc. • Details of open drains, nallahs, with HFL's. **Drone Photogrammetry Survey Specifications:** **General:** Carrying out Drone base engineering grade Aerial Survey from Devendra Nagar and JK Cement, Panna Plant and approach's using stereo photogrammetry technology including Collection of High Resolution Aerial Imagery of minimum 5 cm GSD with 8 bits resolution by Drone, performing Aerial triangulation, Digital Terrain Modelling, 3D topographical mapping & High Resolution Orthophoto mosaic generation for collection of the details of all existing assets including Picking up of natural and manmade features covering the entire corridor. **Low Altitude Aerial Mapping** Survey grade "Unmanned Aerial Vehicle (UAV)" shall be used for taking high resolution "Down Looking" images from an onboard calibrated camera. All the

Photographs should be precisely geo-referenced by GPS, Glonass, etc. for accurate aerial triangulation process. These photographs are to be processed using the 3D stereo photogrammetry technology to produce accurate high-resolution GIS ready mosaiced orthophotos. It is required that the relevant routes, areas & features are clearly visible in the output orthophoto after processing.

Data Acquisition/Image Capturing

Nadar (90 degree to the ground) aerial imagery to be captured from the UAS (Drone) suitable for aerial survey with onboard GNSS (Global Navigation Satellite System) (GPS, Glonass, etc.) which may be SBAS or RTK (Real Time Kinematics) assisted. IMU (Inertial measurement unit) integrated with High Resolutions calibrated camera. The camera system fitted with Gimbal is to be geotagged based on the precise location by GNSS for further photogrammetric processing.

The Flight planning to be done using the photogrammetry flight planning application ensuring following:

I. **Area Coverage:** Flight lines need to be planned for whole length of the route including but not limited to Track. Level crossing important/Major/Minor Bridges. ROB/RUB, Stations, Yard, Depot, Buildings & Structures, Land, encroachments, roads, etc.

II. Re-collection of the images to be done in case train is passing or standing on the main line, it is most important that the main track is 100% visible without obstruction of the train.

III. Camera Resolution should be 20 MP to achieve clear ground details.

IV. Resolution: The final Orthophotos should have 5 cm GSD (Ground Sample Distance) distance measured on the ground between pixel centers in an image.

V. Angle: 90 degrees to the ground or Nadir angle to be used unless specified for specific purpose.

VI. Overlap: 60% forward and 40 % lateral/strip overlap in the captured images.

VII. Flying Height: A very low altitude flight height of less than 90m -120m to be used as per flying guidelines and civil Aerospace restrictions in India.

VIII. Live Check: Live picture should be available at control station while doing the survey to capture the relevant project details precisely with right context.

IX. Photographic conditions
- Ground must be free from fog, haze, dust, and smoke.
- Data to be collected in good light conditions.
- No train on main line

X. Image Quality
- Should be clear, free from blurring and should be sharp in detail.
- No "Warping" or "image smear" or "Stretched" areas should be there in images.
- No inconsistencies should be there in lone and density between adjacent images.

XI. Calibration of camera: Camera calibration process shall be done to know the essential camera parameter for photogrammetry processing such as calibrated focal length, Principal point offset, Camera Lens distortion (radial and symmetric), pixel size, each photo size.

Data Processing

Images captured from UAV (Drone) to be processed using professional stereo photogrammetry software to develop the final high resolution, scale corrected, distortion free ortho tiles & mosaic with map details. Following are the steps.

I. Aerial Triangulation of the images in the 3D stereo photogrammetry system to ensure accurate positional accuracy (Aerial Triangulation represents the mathematical process of establishing precise and accurate relationships between the individual image Ground).
II. Generation of digital terrain model (DTM) in stereo photogrammetry workstation to ensure correct ground height for ortho rectification process.
III. Orthophoto shall be developed by process of Orthophoto rectification using the corrected DTM.
IV. Seamline editing should be done to minimize the temporal tone effect & feature angle defects.
V. Seasonal and temporal difference should not show difference should not show differences across image joining lines.
VI. Orthophoto should be radiometrically (contrast color) and geometrically corrected to enable adjacent image tiles to be displayed simultaneously without obvious distinctions between them.
VII. Orthophoto must be free from fog, haze, dust, and smoke.
VIII. Orthophoto should be free from smear, wrap, hot spots and stretch area.
IX. Orthophoto should be clear, free from blurring and should be sharp in detail.
X. Important Major features including Existing Track, level crossing, Important/Major/Minor Bridges, LHS, ROB/RUB, Railway Stations, yard, depot, All Buildings & Structures, Land, roads, etc. on and along the railway boundaries should be clearly visible, free from distortions.

Terms of Reference:

1. Accommodation:
   - Accommodation shall be taken care by **Pinnacle Infrastructure Consulting**
2. Travelling & Transportation cost:
   - Travel (to & from) shall be taken care by the **Pinnacle Infrastructure Consulting** at their own cost. No travelling arrangements will be provided by Barsyl.
   - Transportation cost during survey shall be taken care by the **Pinnacle Infrastructure Consulting** firm at their own cost. No transportation arrangements will be provided by Barsyl.
3. Personnel Contact details:
   - The Surveyor shall share the contact details, photo identity cards of the personnel engaged in the assignment, same shall be submitted to plant authorities to obtain inplant permissions.
4. Safety at work site:
   - It is the responsibility of the Surveyor to ensure that all the team members conducting topographic survey follow utmost safety during the ongoing traffic and shall wear relevant safety equipment.
   - Barsyl is not responsible for any loss of Consultant's equipment during transit or working etc.

*** * End of the WO * ***

LETTER OF INDENT

LOI.No.: -LOI-JJ-SBC-04HUGEL-22-23 **Dated: -1st Dec-2022**

Customer Address:	**Vendor Address:**
Hugel Infra Private Limited First Floor, Shop no.-11, S2S Square, Garh Road, Meerut-Uttar Pradesh PIN No-250004 **State: Uttar Pradesh** **GST No.- 09AAHCM8188M2ZI**	**PINNACLE INFRASTRUCTURE CONSULTING** Sector-H,3/966,JANKIPURAM,LUCKNOW,Uttar Pradesh , 226021 **State: Uttar Pradesh** **GST No.- 09ABAFP4293M1ZP**

Subject: LOI for soil testing at sites for JJM Project for Sultanpur district in state of Uttar Pradesh.

Dear Partner,

We are pleased to offer you (**PINNACLE INFRASTRUCTURE CONSULTING**), herein after referred to as 'Contractor') this LOI for soil testing for JJM Project for Sultanpur district instate of Uttar Pradesh on the terms and conditions mentioned hereunder.

Soil Testing Scope of work & Completion Schedule:

Sr. No.	Block Description	Nos Of GP's	Completion Date
1	Sultanpur	As per requirement	31-Dec-22

CONTRACTOR SCOPE OF WORK

- As mentioned in Itemized detail description.

SPECIFICATIONS, DRAWINGS AND CODES:

The work shall have to be carried out strictly in conformity with the drawings, technical specifications, relevant standard codes and direction of Engineer-in-charge of SWSM/DWSM.

PAYMENT TERM:

1. 100% payment shall be made (After 21 working days from the date of invoice submitted) against invoice along with NOC's and report submitted along with site photographs and SWSM approval.

Sr. No.	Item Description	District Name	Nos. of GP's	Qty.
1	Making 3 Nos of 150mm nominal diameter bore holes each having depth of 15 mt at various locations of building /structure in all types of soils using suitable approved method of boring including ,cleaning providing casing pipe as required or as directed, performing standard Penetration Tests(As per IS:2131) at every 1.5m intervals when there is no cohesive soil or at every 3.0m when there is cohesive soil and at change of strata collection of water samples and disturbed soil samples ,observations such as ground water etc., collection of undisturbed soil samples at every 3.0m intervals and at change of strata transportation of all the collected samples to the laboratory and back filling of bore holes on completion of the same . Also recommend the OHT foundation design .	Sultanpur	As per requirement	As per the Site requirement

Tentative cost of the work order would not be more than Rs. 15 Lacs. (No of Gram Panchayat may vary as per the requirement of client).

For Hugel Infra Pvt ltd .
HUGEL INFRA PRIVATE LIMITED
Authorised Signatory

TAXES: Contract prices include TDS as applicable & GST extra as applicable**.**

For PINNACLE INFRASTRUCTURE CONSULTING

Authorized Signatory

Ref No: OA/WORK ORDER/PIC/22-23/***015***
Date: 21st July 2022

To,
Pinnacle Infrastructure Consulting
3/966, Sector H, Jankipuram,
Lucknow-226021,
Uttar Pradesh, India

Kind Attention: Mr. Deep Joshi

Sub: Work Order for Exploratory drilling of boreholes down to required depth, drilling of 150mm dia. boreholes in all type of soils except hard rock & large boulders (boulder core more than 30cm) including refilling, reinstating surface and disposing of surplus material including use of mechanical rigs with power operated winches as well as percussion/chiseling tool for advancing through occasional seams of hard strata to be employed, where necessary in Dry area.

Ref: Your quotation through email on dtd: 08.07.2022

Dear Sir,

With reference to your quotation and subsequent to our discussions on 08.07.2022, we are pleased to place the work order with the following scope of work term and conditions.

(a) Scope of Work:

(i) Detailed BOQ enclosed at **Annexure-I**

(ii) Detailed Technical Specification enclosed at **Annexure-II**

(b) Deliverable:

(i) Each bore log data to be submitted immediately on completion of each bore log.

(ii) Geo-technical Investigation report with test results to be submitted in five (5) hard copies and one soft copy in editable format.

(c) Payment Terms:

Total fee payable for the works mentioned at para-1.0 above id **INR 23,03,200.00 (Indian Rupees Twenty Three Lakhs three thousand and two hundred only).** In addition to the above GST shall be paid extra. The payment will be made as per the following stages:

S.No	Activity	% of payment
1	On Mobilization of Geo-tech team and start of field work	10%
2	After completion of 50% work at site and submission of field report	10%
3	After completion of 100% work at site and submission of field report	10%
4	After submission of Draft Geo-tech Report	20%
5	After submission of Final Geo-tech Report by complying the observations of ODRA Associates Pvt. Ltd.	20%
6	After acceptance of Geo-tech report from concerned Zonal Railway	20%
7	After final approval consent from Railway	10%

(d) Time Frame:

The contractor has to complete the Geo-technical investigation of the location and submit the report within one and half months (1.5) from the date of start of the field activity.

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(e) General Term and Condition:

(i) During the contract, ODRA Associates Pvt. Ltd. will not permit to increase any charges beyond the Work Order value.

(ii) The rate quoted for carrying out the entire assignment are inclusive of all material, labour, plant machineries etc,. No, additional amount shall be paid extra for completion of work as per scope of service.

(iii) For any reason M/s Pinnacle Infrastructure Consulting agency shall not stop or demobilized the team from the site. (Except due to natural calamities)

(iv) Any local problem arise during field work shall be sorted out by M/s ODRA Associates Pvt Ltd in consultation with Railways and in association with M/s Pinnacle Infrastructure Consulting agency.

(v) M/s ODRA Associates Pvt Ltd reserves the right to terminate the agency without any reason/Pier notice.

(vi) The payment will be released after approval of concern ODRA representative as mentioned below.

(vii) Remuneration in the work order is inclusive mobilization of team, Boarding, Lodging Transportation & Demobilization.

- Please sign the duplicate copy of this work order as a token of acceptance of the Term and Condition contained therein and send the same to the undersigned.
- For mobilizing Geo-tech team at site, filed related activities, daily progress report, difficulties in site you will contact the following person whose contact details is mentioned below:

Name: Mr. Jeevan Kumar Nanda

Designation: Asst. Manager (Civil)

Contact No: +91-89088 88878

Mail id: jeevanodra@gmail.com

Yours faithfully,

For ODRA Associates Pvt. Ltd.

ODRA ASSOCIATES Pvt. Ltd. BBSR

(Samiran Haldar)
Director

Annexure-I

BOQ FOR GEO-TECHNICAL INVESTGATION IN BOLANGIR DISTRICT - MANUAL METHOD-REVISED

S.No.	Description	Unit	Quantity	Rate	Total Amount
1	0 to 10 m	Meter	1200	**950.00**	**11,40,000.00**
2	Extra for 150mm dia. bore in hard Rock/large Boulder at all levels	Meter	360	**3000.00**	**10,80,000.00**
	Drilling of NX size borehole (75mm dia.) inall types of hard rock and collection of rock core samples from boreholes and preserving in boxes				
3	0 to 10 m	Meter	319		
4	Taking out 100mm dia. & 450mm long undisturbed samples of soil from bore holes, including provision of air tight containers for packing and, labeling incl. transporting the samples to laboratory. Piston sampler shall be used for extracting undisturbed samples where necessary. Samples shall be collected as per IS: 2720.	Each	1189		
5	Taking out 100mm dia. & 450mm long disturbed samples of soil from bore holes, including provision of air tight containers for packing, labeling and transporting the samples to laboratory. Samples shall be collected as per IS: 2720.	Each	1189		
6	Conducting standard penetration test as per IS:2131 at approximate1.5m intervals in bore holes, as directed by the Engineer in charge	Each	1189		
7	Collection of water samples at required intervals	Each	106		
	Conducting laboratory Tests on collectedsoil samples as per relevant IS code				
8	Moisture Content / Dry Density	Each	1330		
9	Atterberg Limits	Each	1330		
10	Specific Gravity	Each	1330		
11	Grain size analysis including Hydrometer analysis	Each	1330		
12	Direct Shear Test	Each	266		
13	Natural Density	Each	1330		
14	Consolidation Test	Each	266		
15	Tri-axial Test	Each	266		
16	Density Test	Each	532		
17	Water Absorption & Porosity	Each	532		
18	Hardness	Each	532		
19	Unconfined Compression Test	Each	532		
20	Point Load Test	Each	532		
21	Modulus of Elasticity	Each	532		

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22	Abrasion Testing	Each	532		
23	Conducting chemical analysis of ground water samples to determine suitability for concreting and aggressiveness in relation to attack on concrete / reinforcement including determination ofpH value	Each	532	**100.00**	**53,200.00**
24	Preparation and submission of Final report giving complete and comprehensive record of investigations,laboratory test reports and calculationsin approved format	Each	1	**30000.00**	**30,000.00**
	Total				**23,03,200.00**

(Rupees Twenty-three lakhs Three thousand Two hundred only)

Yours faithfully,

For **ODRA Associates Pvt. Ltd.**

(Samiran Halder)
Director

TECHNICAL SPECIFICATION

1.0 GENERAL

1.1 This specification covers the technical requirements for a detailed "Geo-technical investigation and submission of a detailed geo-technical report". The detailed geo-technical investigation shall be carried out at land & river bed to provide the designer with sufficiently accurate information both general and specific about the substrata profile and relevant soil and rock parameters at site on the basis of which the foundation for various structure can be designed rationally.

2.0 SCOPE

2.1 The work shall include mobilization of all necessary equipments, providing necessary engineering supervision and technical personnel, skilled and unskilled labours, arranging water for drilling and working platform for river drilling etc. as required to carry out the entire field as well as laboratory investigation, analysis and interpretation of test data collected and preparation of a geo-technical report.

2.2 The contractor shall make his own arrangements for locating the bore hole position, trial pits and other field tests as per the drawings/sketches supplied to him and for determining the reduced levels at these locations with respect to bench mark indicated by the engineer-in-charge. Two established reference lines will be indicated by the engineer-in-charge.

2.3 All the field data shall be recorded in the performa recommended in Indian Standard Codes and the field records shall be countered signed by the engineer-in- charge. The contract shall submit two copies of the field bore logs to the engineer-in-charge soon after the completion of each bore hole. All the investigations are to be carried out by the contractor as per the priority requirements of the engineer-in-charge.

2.4 The contractor shall intimate the engineer-in-charge giving reasons if any additional specific tests necessary to be carried out duly considering local sub-soil conditions before starting of such tests.

2.5 Whenever the contractor is unable to extract undisturbed samples he should immediately inform the engineer-in-charge.

2.6 All the laboratory test data shall be recorded in the proforma recommended in the Indian Standard Codes and a copy of these shall be sent to the engineer-in-charge every week/during the progress of laboratory testing. During the progress of work, the owner/engineer-in-charge may be present at the laboratory where the contractor is arranging for execution of the laboratory tests.

2.7 The contractor shall recommend the proposed slope in Embankment and Cutting in different type of soil/rock along the alignment.

3.0 TENDER DRAWING / LIST

3.1 The location, extent and depth of bore holes and field tests/area(s) indicated in the list is subject to change that may be necessary during actual execution of the work. No claim whatsoever shall be entertained for differences between the location, extent and depth/area(s) etc. of boreholes/tests indicated on the drawing/list and those shown on the tender drawings. The work shall be carried out as per the instructions of the engineer-in-charge.

3.2 The contractor must visit the site prior to submitting his quotations to acquaint himself fully with the nature, type, scope of work and involvement therein. The rates quoted shall remain firm during the entire period of execution till completion of the work and any additional claim for lack of knowledge shall not be entertained.

4.0 GENERAL REQUIREMENTS

4.1 In areas which have already been developed, the contractor shall take advantage of existing local knowledge, record of trial pits, bore holes etc. in the vicinity and the type of foundations adopted and behaviour of existing structures particularly those of similar nature to the ones proposed for this project.

4.2 The contractor shall make use of information gathered from quarries, unlined wells, cuttings from nearby areas etc. The general topography of the near by areas will often give some indication about the variation of the soil conditions which are likely to exist.

4.3 The contractor shall gather data regarding the removal of overburden by excavation, erosion or land slides in the areas which may give an idea of the amount of reconsolidation that the soil strata has undergone. Similarly data regarding recent fill shall also be studied to determine the characteristics of the fill as well as the original strata.

4.4 The water level in streams and watercourses if any in the neighborhood shall be noted. Reliable information regarding ground water level shall also be gathered from water level in the near by wells.

4.5 It is essential that the equipments/instruments are properly calibrated at the commencement of the work so that they represent true values and submit the test reports to the engineer-in-charge. If the engineer-in-charge so desires, the contractor shall arrange for having the instruments tested in presence of the engineer at an approved laboratory at the contractor's cost and the test reports shall be submitted to the engineer-in-charge.

5.0 CODES AND STANDARDS

5.1 All standards, specification and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions.

5.2 In case of conflict between this specification and those (IS codes/RDSO's guideline and standards etc.) referred to herein the former shall prevail.

5.3 All work shall be carried out as per the specification and the following standards and codes / RDSO's guidelines.

IS: 1080	Code of practice for design and construction of simple spread foundations
IS:1498	Classification and identification of soils for general engineering purposes
IS:l892	Code of practice for subsurface Investigation for foundation
IS:l904	Code of practice for design and construction of foundations in soils: General requirements
IS:2131	Method of standard penetration test for soils
IS:2132	Code of practice for thin walled tube sampling of soils
IS:2720	Method of test for soils (Relevant parts)

IS:2809	Glossary of terms and symbols relating to soil engineering
IS:2810	Glossary of ternis relating to soil dynamics
IS:2911	Code of practice for design and construction of pile foundations (Relevant parts)
IS:2950	Code of practice for design and construction of rafi foundation Part-I
IS:4078	Code of practice for indexing and storage of drill cores
IS:8009	Code of practice for calculation of settlement of foundation Part-I & II
IS:8763	Guide for undisturbed sampling of sand
15:8764	Method for determination of point load strength index of rocks
15:9143	Method for determination of unconfined compressive strength of rock materials
IS:9179	Method for preparation of rock specimen for laboratory testing
15:9640	Specifications for split spoon sampler
15:4453	Code of practice for exploration by pits, trenches, drifts and shafts
IS:4464	Code of practice for presentation of drilling information and core description in foundation investigation
IS:5249	Method of test for determination of in-situ dynamic properties of soil
IS:5313	Guide for core drilling observations
IS:6403	Code of practice for determination of allowable bearing pressure on shallow foundation
IS:6935	Method of determination of water level in a bore hole IS:ll229 Specifications for shear box testing of soils
IS:12070	Code of practice for design and construction of shallow foundations on rocks.
	RDSO guidelines for earthwork in railway projects (Guideline No. GE: G-1)
	For slope stability analysis, RDSO's circular no. GT/SPEC/007/Rev 0/1991 (earlier circular no. 20 dt 4.9.91)

6.0 FIELD INVESTIGATION- SOIL

6.1 Trial Pit

6.1.1 Trial pits shall be of 3m x 3m size or any suitable size so as to permit easy access for visual examination of walls of the pit and to facilitate sampling and in-situ testing operations. Pits shall be excavated upto a maximum depth of 3m below ground level or as per the directions of the engineer-in-charge. Precautions shall be taken to ensure the stability of pit walls including provision of shoring if necessary as per 15: 4453. Precautions shall be taken to prevent surface water draining into the pit. Arrangements shall be made for dewatering if the pit is extended below water table. Trial pits shall be kept dry and a ladder shall be provided for easy access to the bottom of the pit. In-situ tests shall be conducted and undisturbed samples shall be collected immediately on reaching the specified depth so as to avoid substantial changes in moisture content of the subsoil. Arrangements shall be made for barriers, protective measures and lighting necessary for the period the pits remain open.

6.1.2 A note on the visual examination of soil strata shall be prepared. This should include the nature, colour, consistency and visual classification of the soil, thickness of soil strata, thickness of expansive soil & ground water table if any etc.

6.1.3 Undisturbed samples shall be collected at lm, 2m depth and at the termination depth in all the pits.

6.2 Boring

6.2.1 General Requirements

(a) Bore holes shall be drilled at specified locations to obtain information about the sub- soil profile, its nature, strength and to collect soil samples for strata identification and conducting laboratory tests. The minimum diameter of the boreholes shall be 150mm and boring shall be carried out in accordance with the provisions of IS:1892 and as per this specification.

(b) All bore holes shall extend up to the depths shown on enclose list or as directed by the engineer-in-charge. If the strata with standard penetration test (SPT) 'N' value greater than 100 for 30cm penetration with characteristics of rock is met with earlier, the borehole shall be advanced further by chiselling. Chiselling shall be continued for a maximum depth of 20 cm or upto 2 hours whichever is earlier. During chiselling rock fragments/rock cores shall be collected. Identification of rock strata shall be on the basis of visual examination of SPT sample and rock fragments. After it is established that rock is met with, the borehole shall be advanced further by drilling in rock as specified in clause 7.0 and cores shall be collected. When the borehole is terminated in soil strata, an additional standard penetration test shall be carried out at the termination depth.

(c) Casing pipe shall be used in the borehole to support its sides when side fall is suspected to occur inside the borehole. When casing pipe is used, it shall be ensured that its bottom end is at all times 15 cm above the bottom of the borehole. In case of cohesion less soils the advancement of the casing pipe shall be such that it does not disturb the soil to be tested or sampled. The casing shall be advanced by slowly turning the casing pipe and not by driving.

(d) In-situ tests and collection of undisturbed samples (UDS) shall be carried out at regular intervals and at change of strata or as decided by the engineer-in-charge. Representative disturbed and undisturbed samples shall be preserved for conducting

various tests in the laboratory. Water table in the borehole shall be carefully recorded and reported. No water/drilling mud shall be added while boring above ground water table. For cohesion less soil below water table, the water level in the borehole shall all times be maintained at slightly above the water table.

(e) The borehole shall be cleaned using suitable tools up to the depth of testing or sampling ensuring that there is minimum disturbance of soil at the bottom of the borehole. The process of jetting through an open tube sampler shall not be permitted. In cohesive soils, the borehole may be cleaned using a bailer with a flap valve. Gentle circulation of drilling fluid shall be done when rotary mud circulation boring is adopted.

(f) On completion of the borehole, the portion drilled in soil shall be backfilled with sand unless other wise directed by the engineer-in-charge.

(g) Wash boring shall not be adopted.

6.2.2 Auger Boring

Auger boring can be adopted in soft to stiff cohesive soils above water table. Augers shall be of helical or post hole type, which may be manually or power operated. While boring care shall be taken to minimize the disturbance to the deposits below the bottom of the borehole. The cuttings brought up by the auger shall be carefully examined in the field and the description of all the strata shall be duly recorded in the field bore log as per IS: 1498. No water shall be used while auger boring.

6.2.3 Shell and Auger Boring

Shell and Auger boring can be used in all types of soil free from boulders. For cohesion less soil below ground water table, the water level in the bore hole shall always be maintained at or above the ground water level. The use of chisel bit shall be permitted in hard strata with SPT-N value greater than 100. Chisel bits may also be used to extend the borehole through local obstruction such as old construction, boulders, rocky formations etc. All other requirements in clause 6.1.2 shall apply for this type of boring also.

6.2.4 Percussion Drilling

This method can be adopted in soil with gravel and boulders when the boring has to be done at a faster rate. This method consists of breaking of the strata by repeated blows from a chisel or drilling bit and bailing out the debris at intervals by adding water into the borehole. This method is not suitable for careful and very reliable sampling operation because of the disturbance caused during boring. This method shall not be adopted unless otherwise specified or permitted by the engineer-in-charge.

6.2.5 Rotary Mud Circulation Drilling

This method can be used in all types of soil below water table. In this method boring shall be done by rotating the bit fixed at the bottom of the drill rod. Proper care shall be taken to keep a firm contact between the bit and the bottom of the borehole. Bentonite or mud laden fluids shall be used as the drilling fluid to serve as the protective surface inside the borehole.

6.3 Standard Penetration Test (SPT)

This test shall be conducted in all types of soil strata met within the bore hole to find the variation in the soil stratification by correlating with the number of blows required for unit penetration of a standard penetrometer. This test shall be conducted at 3 m intervals, at every change of strata, at depths wherever undisturbed soil samples could not be collected and as per the directions of the engineer-in-charge. The stalling depth of performing SPT shall be 1 m or 2.5m depth below ground level. This depth shall be staggered in alternate

boreholes. The depth interval between the top level of standard penetration test and to that of (next) undisturbed sampling shall not be less than 1 m. The specification for equipments and other accessories, procedure for conducting the test, presentation of test results and collection of disturbed soil samples etc. shall conform to IS: 2131.

This test shall be carried out by driving a standard split spoon sampler in the borehole by means of a 650 N hammer having a free fall of 0.75 m. The sampler shall be driven using the hammer for 450 mm penetration. While driving, the number of blows for every 150 mm penetration and the penetration for every 50 blows shall be recorded. The number of blows for the last 300mm drive shall be reported as 'N' value. This test shall be discontinued when the blow count is equal to 100 and the penetration shall be recorded. Refusal shall be considered to be met with when the blow count is equal to 100. At the location where the test is discontinued, the penetration and the corresponding number of blows shall be reported. Sufficient quantity of disturbed soil samples shall be collected from the split spoon sampler for identification and laboratofy testing. The samples shall be visually classified & recorded at the site and shall be properly preserved and labelled for future identification & testing.

6.4 **Sampling**

6.4.1 General

(a) Sufficient number of soil samples shall be collected for reliable estimation of soil properties. The samples collected shall be either disturbed or undisturbed. Disturbed soil samples shall be collected for field identification and conducting laboratory tests such as sieve analysis, index properties, specific gravity, chemical analysis etc. Undisturbed samples shall be collected to estimate physical, strength and settlement properties of the soil.

(b) All the accessories required for sampling and the method of sampling shall conform to IS: 2132. All disturbed and undisturbed samples collected in the field shall be classified at site as per IS: 1498.

(c) All the samples shall be identified with date, bore hole or trial pit number, depth of sampling etc. It is also essential to mark an arrow pointing towards the top surface of the undisturbed sample, as the soil was in-situ. Care shall be taken to keep the undisturbed soil samples and box samples vertically with the arrow directing upwards. The tube samples shall be properly trimmed at both ends and suitably sealed with molten paraffin wax at both ends immediately after extracting the samples from the bore hole/trial pit and suitably capped on both sides.

(d) When the contractor fails to collect undisturbed soil sample at a specified depth, the borehole shall be advanced by 0.50 m and shall be performed with a standard penetration test. The reason for not obtaining the undisturbed soil sample shall be indicated in the bore log.

(e) Precaution shall be taken to ensure that there shall not be any change in moisture content and disturbance of the soil samples and they shall be placed in a temporary store at the end of the day'i work. All the samples shall be kept over a bed of sand, jute bags, saw dust etc. and covered over the top with similar material. The bed and top cover shall be kept moist till they are properly packed in wooden boxes. The contractor shall be responsible for packing and transporting of all the samples from

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site to the laboratory within seven days after sampling with proper protection against loss and damage.

(f) All the samples shall be suitably packed in wooden boxes using sand, saw dust etc. all around the samples before transporting to the laboratory for testing.

6.4.2 Disturbed Samples

(a) Disturbed soil samples shall be collected from cuttings and from split spoon sampler in boreholes at regular intervals to provide complete description of soil profile and its variation. The samples shall be immediately stored in airtight jars or polythene bags and labeled with borehole/trial pit number and depth.

(b) In elevated areas, if superficial material is available in plenty, then bulk samples from a depth of about 0,5m below ground level shall be collected to establish all required properties to use it as a fill material. Disturbed samples weighing about 250N shall be collected at shallow depths and immediately stored in polythene bags as per IS: 1892. The bags shall be sealed properly and shall he kept wooden boxes.

6.4.3 Undisturbed Samples

In each borehole undisturbed ample (UDS) shall be collected at regular intervals of 3m and as directed by the engineer-in-charge. The starting depth of collecting UDS shall be either 2.5m (Where starting depth of SPT is 1m) or 1m (where starting depth of SPT is 2.5m) depth below ground level and as directed by the engineer-in-charge. The stalling' depth shall be staggered in alternate boreholes. Undisturbed samples shall be of 100mm diameter and overall length 600mm length. Samples shall be collected in such a manner that the structure of soil and its moisture content do not get altered. - The specification for the accessories required for sampling and the sampling procedure shall conform to IS: 1892 and IS: 2132. Undisturbed sampling in sand shall be done using compressed air technique as mentioned in IS: 8763. Thin walled sampler shall be used to collect undisturbed samples by pushing the tube into the soil. The sampling tube shall have a smooth finish on both surfaces and minimum effective length of 450mm. The area ratio of sampling tubes shall be less than 12.5%. However in case of very stiff soils, area ratio upto 20% shall be permitted.

a) Undisturbed Sampling in Cohesive Soil

Undisturbed samples in soft to stiff cohesive soils shall be obtained using a thin walled sampler. In order to reduce wall friction, suitable precautions such as oiling the surfaces shall be taken. The borehole shall be cleaned and the depth of sampling below ground level shall be noted. The sampler shall then be attached to the bottom of boring rods and lowered into the borehole. The sampler shall be pushed into the clay layer by hand or by jacking and soil samples of specified length shall be collected without disturbing soil. The distance by which the sampler penetrates into the soil strata shall be checked. Care shall be taken to ensure that the sampler is not driven too far as this will compress the soil. The sampler shall be rotated to break the core at bottom of the sampler and then steadily drawn up.

b) Undisturbed Sampling in Cohesion less Soils

Undisturbed samples in cohesion less soils shall be obtained as per the procedure given in IS: 8763. Compressed air sampler shall be used to take the samples of cohesion less soil below water table. Precautions shall be taken to clean the borehole before sampling. Thin walled tube samplers of 60mm internal diameter shall be used.

The height and other dimensions of the sampler shall be recorded before use. Proper care shall be taken to maintain the water level in the borehole slightly above the ground water table before and during sampling operations. Immediately after the sample is obtained, the ends of the sample shall be waxed and capped to avoid moisture content changes.

6.4.4 Relaxation During Sampling

a) The sampler shall be pushed into the soil and driving of sampler shall be resorted to only when it cannot be pushed into the soil. This shall be done only with the permission of the engineer-in-charge and all the details about the same shall be recorded in the bore logs.

b) In clays when 'N' value is greater than 50, the undisturbed sampling may be replaced by standard penetration test.

6.5 Ground Water

6.5.1 The ground water table shall be measured in boreholes as per IS: 6935 or as per the instructions of the engineer-in-charge.

6.5.2 Sub soil water samples shall be collected for carrying out chemical analysis. Representative samples of ground water shall be collected when it is first encountered in boreholes before the addition of water to aid boring or drilling.

7.0 FIELD INVESTIGATION-ROCK

7.1 Rock Drilling

Drilling in rock shall be done at specified locations or as per the directions of the engineer-in-charge. Before commencing drilling, it shall be proved that characteristics of rock have been met with as mentioned in clause 6.1.1(b). The starting depth of drilling in rock as mentioned in clause 6.1.1(b) shall be certified by the engineer-in-charge. The portion drilled in rock shall be backfilled with 1 part of cement : 3 part of sand (1:3) grout unless otherwise directed by the engineer-in-charge.

7.1.1 Equipment

Core drilling shall be done by rotary motion using Tungsten carbide/diamond bit. The feed or thrust to the drilling bit shall be actuated by hydraulic system. The rotary core drilling equipment and procedure for drilling shall conform to IS: 6926. The equipment shall be provided with necessary facilities to regulate the spindle speed, bit pressure and water pressure during core drilling to get a good core recovery.

Drilling shall be carried out with Nx size Tungsten carbide /diamond tipped drill bits or impregnated diamond bits depending on the type of rock encountered. Double tube swivel core barrel of Type B conforming to IS: 6926 shall be used to ensure a good core recovery and to pick up cores from all layers of rock. Suitable core catchers shall be used to ensure continuous and good core recovery.

6926. The equipment shall be provided with necessary facilities to regulate the spindle speed, bit pressure and water pressure during core drilling to get a good core recovery.

Drilling shall be carried out with Nx size Tungsten carbide /diamond tipped drill bits or impregnated diamond bits depending on the type of rock encountered. Double tube swivel core barrel of Type B conforming to IS: 6926 shall be used to ensure a good core recovery and to pick up cores from all layers of rock. Suitable core catchers shall be used to ensure continuous and good core recovery.

7.1.2 Procedure

a) The drilling fluid shall be clean water. Circulation of drilling fluid shall be started before the core barrel reaches the bottom of the hole to prevent cuttings or sludge from entering the core barrel at the start of coring. Drilling fluid shall be circulated continuously down the hollow rods and the sludge conveying the rock cuttings to the surface shall be collected.

b) When drilling through soft/weathered /fractured rock, water circulation must be reduced so as to avoid shattering/breaking of core.

c) The rotational speed of the bit (spindle speed), the amount of downward pressure applied on the bit (bit pressure) and water pressure shall be suitably adjusted and properly monitored so that the core is collected with least disturbance and to avoid shearing of the core from its base. Bit speed, bit pressure, water pressure for the type of bit for various rock types shall be as per Appendix A of IS: 6926.

d) No drill run shall exceed 0.75m in length. This can be increased to 1.5m provided the core recovery observed is more than 80% in two successive 0.75m drill runs and on approval from the engineer-in-charge. If the core recovery is less than 20% the SPY shall be performed before commencing the next drill run as explained in clause 6.2.

e) If at any time blocking of the bit or grinding of the core is observed, the core barrel shall be immediately withdrawn from the borehole regardless of the length of drill run completed.

7.1.3 Observations

a) The colour of return water at regular intervals, the depth at which any change of colour of return water is observed, the depth of occurrence and amount of flow of hot water if encountered shall be recorded.

b) The depths through which a uniform rate of penetration was maintained, the depth at which a marked change in rate of penetration or sudden fall of drill rod occurs due to gap joint, the depth at which any blockage of drill bit causing core loss if any etc. shall be recorded.

c) Any heavy vibration or torque noticed during drilling should be recorded together with the depth of occurrence.

d) Special conditions like the depth at which grouting was done during drilling, presence of artesian conditions, loss of drilling fluid, observation of gas discharge with return water etc. shall also be observed and recorded.

7.1.4 Core Samples

a) Core samples shall be extracted by the application of continuous pressure at one end of the core with the barrel held horizontally without vibration. Friable cores shall be extracted

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from the barrel directly into a suitable sized half round plastic channel section. Care shall be taken to maintain the direction of extrusion of sample same as that while coring to avoid stress reversal.

b) Immediately after withdrawal from the core barrel, the cores shall be placed in a tray and transferred into boxes specially prepared for the purpose. The boxes shall be made from seasoned timber or any other durable material and shall be indexed on top of the lid as per IS: 4078. The cores shall be numbered serially and arranged in the boxes in a sequential order. The description of the core samples shall be recorded as per IS: 4464. Where no core is recovered, it shall be recorded as specified in the continuous record of core recovery and RQD in the core log as per IS: 11315, Part-II.

c) The basic information for the description of rocks shall cover i) degree of weathering ii) discontinuity spacing iii) strength iv) colour v) grain size vi) structural condition, the mineralogy of the grains and cementing material vii) rock name, special features like major joint planes, features/laminations, faults etc.

7.2 Standard Penetration Test

The relevant hardness of rocks shall be tested in boreholes after every drill run of 0.75m in rock if core recovery observed in less than 20% or as directed by the engineer-in-charge. The testing equipment and arrangement shall be conforming to IS: 2131. The number of blows for each 15mm penetration to a total penetration of 450mm shall be recorded. Penetration for every 50 blows shall be recorded and the test shall be stopped at a total of 100 blows.

During drilling operation, observation on return water, rate of penetration etc. shall be recorded in a proforma as given in IS: 5313, Appendix-A.

8.0 LABORATORY INVESTIGATION

8.1 Essential Requirements

a) All laboratory tests shall be conducted in an approved SEC (Railway) laboratory using approved apparatus complying with the requirements and specifications of Indian Standards or other approved standards for this class of work. It shall be checked that the apparatus are in good working condition before starting the laboratory tests. Calibration of all the instruments and their accessories shall be done carefully and precisely.

b) Depending on the type of sub strata encountered, appropriate laboratory tests shall be conducted on soil and rock samples collected in the field. Laboratory tests shall be scheduled and performed by qualified and experienced personnel who are thoroughly conversant with the work. Tests indicated in the schedule of items shall be performed on soil, rock and water samples as per relevant IS Codes. One copy of all the laboratory test data records shall be submitted to the owner progressively every week. Laboratory tests shall be carried out concurrently with field investigation since initial laboratory test results could be useful in planning at later of fieldwork. The contractor shall prepare a schedule of laboratory tests and the same shall be submitted and got approved by the engineer-in-charge before starting of laboratory tests.

c) All samples whether undisturbed or disturbed shall be extracted, prepared and examined by competent personnel properly trained and experienced in soil sampling, examination, testing and in using the apparatus as per the specified standards.

d) Undisturbed soil samples retained in liners or seamless tube samplers shall be taken out without causing any disturbance to the samples using suitably designed extruder just prior to actual testing. If the extruder is horizontal, proper support shall be provided to prevent the sample from breaking. For screw type extruders the pushing head shall be free from the screw shaft so that no torque is applied to the soil sample in contact with the pushing head. For soft clay samples, the sample tube shall be cut by means of a high speed hacksaw to specified test length and placed over the mould before pushing the sample into it with a suitable piston.

e) While extracting a sample from a liner or tube care shall be taken to see that its direction of movement is the same as that during sampling to avoid stress reversal.

f) On all undisturbed soil samples tested for bulk density, water content, grain size distribution, liquid limit and plastic limit tests shall also be performed.

g) On all rock samples tested for unconfined compression test, bulk density and water content tests shall also be performed.

8.2 Tests

Tests as indicated in this specification and as called for by the engineer-in-charge shall be conducted. These tests shall include but not be limited to the following.

a) Tests on Undisturbed and Disturbed Soil Samples
   - Visual and engineering classification
   - Sieve analysis and hydrometer analysis
   - Liquid and Plastic limits
   - Specific gravity
   - Chemical analysis
   - Proctor compaction test

b) Test on Undisturbed Soil Samples
   - Bulk density and moisture content
   - Relative density (for sand)
   - Unconfined compression test
   - Box shear test
   - Triaxial shear tests (depending on the type of soil and field conditions on undisturbed or remoulded samples)

     Unconsolidated undrained

     Consolidated drained

     with pore pressure measurement
   - One dimensional consolidation test

c) Tests on Rock Samples
   - Visual classification

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- Moisture content, porosity and density
- Specific gravity
- Hardness
- Unconfined compression test (both at saturated and at insitu water content)
- Point load strength index

d) Chemical Test and analysis of Subsoil and Sub-soil Water

Chemical test shall be conducted on soils and water samples as per relevant BIS latest revisions to report the following

a) PH value.
b) Chlorides in ppm & percentage.
c) Sulphates in ppm and percentage and expressed as SO3 & SO4.

e) Water samples

- Samples of ground water shall be obtained from each bore hole when first encountered or unless specified otherwise.
- At the specified depth, water shall be bailed or pumped out, so that fresh ground water flows in to the bore hole. Care shall be taken in avoiding any contamination with surface water at any time. Water samples shall be collected in 5 liter polythene or glass container and labeled properly.

f) Filed Permeability Tests

Field permeability tests shall be conducted to determine the water percolation capacity of overburden soil. The specifications of the equipment required for the tests and the procedure of testing shall be in accordance with the IS 5529 Part – 1 with latest correction.

(i) Constant Head Method

This test shall be conducted in boreholes where soils have high permeability. Water shall be allowed into the bore hole through a metering system ensuring gravity flow constant head so as to maintain a steady water level in the bore hole and reference mark shall be done at a convenient level which can be easily seen in the casing pipe to note down the fluctuations of water level. The fluctuations shall be counteracted by varying the quantity of water flowing into the bore hole. The evaluation of water shall be observed at every 5 minute interval. When 3 consecutive readings show constant value, the necessary observations such as flow rate, evaluation of water surface above test depth, diameter of casing pipe etc, shall be made and recorded as per the proforma recommended in IS: 5529 Part – I Appendix – A with latest corrections.

(ii) Falling Head Method

This method shall be adopted for soils of low permeability and which can stand without casing. The test section shall be sealed at the bottom of bore hole and a packer at the top of the test section. If the test has to be conducted at an intermediate section of a bore hole, then double packers shall be used. Access to the test section through the packers shall be by means of a pipe which shall extend to above the ground level. Water shall be filled in the pipe up to the level marked just below the top of the pipe and water allowed to drain into the test section. The water level in the pipe shall be recorded at regular intervals as mentioned in IS: 5529 Part –I Appendix – B with latest corrections. The test shall be repeated till constant records of water level are achieved.

9.0 REPORT

9.1 General

a) On completion of all the field and laboratory works, the contractor shall submit a draft report containing geological information of the region, procedure adopted for investigation, field observations, summarized test data, conclusion and recommendations. The report shall include detailed bore logs, sub-soil profile, field test results, laboratory observations and test results in both tabular as well as graphical forms, practical and theoretical considerations for the interpretation of test results, the supporting calculations for the conclusions drawn etc. Initially, the contractor shall submit three copies of the report in draft form for the owner's review.

b) The contractor shall recommend proposed slope both in cutting & formation in different types of soil! rock and all calculation data & curves.

c) After review of the draft report, the employer's comments will be intimated to the contractor. The contractor shall incorporate the comments and after getting the amendment draft report approved, required copies of the detailed final report shall be submitted to authority. Any expenditure on account of redrafting, finalizing the report etc. shall be deemed to have been included in the quoted rates.

d) The detailed final report based on field observations, insitu and laboratory tests shall encompass theoretical as well as practical considerations for foundation of different type of structures envisaged in the area under investigation. The contractor shall acquaint himself about the type of structures, foundation loads and other information required from the engineer-in-charge.

9.2 Data to be Furnished

The report shall also include but not be limited to the following:

a) A set of longitudinal and transverse soil/rock profiles connecting various boreholes in order to give a clear picture of the variation of the subsoil strata as per.

b) Water level contours and rock level contours

c) Plot of standard penetration test 'N' values (both uncorrected and corrected) with depth for identified areas.

d) If piling is envisaged the following shall be furnished with comprehensive supporting calculations.

- Type of pile and reasons for recommending the same duly considering the sub strata characteristics.
- Suitable founding strata for the pile.
- Estimated length of pile for suitable dia or as per railway norms. End bearing and frictional resistance shall be indicated separately. Safe lateral and tensile load carrying capacities of pile with supporting calculations.
- Magnitude of negative skin friction if any

e) Suitability of locally available soils at site for filling and back filling purposes. -

f) If expansive soil is met with, then recommendation on removal or detainment of the same under the structure etc. shall be given. In the latter case, detailed specifications of any special treatment required including specifications of any special treatment required including specification for materials to be used, construction method, equipments to be deployed etc. shall be furnished.

g) Protective measures based on chemical nature of soil and ground water with due regard to the potential deleterious effects on concrete, steel and other building materials etc. Remedial measures for sulphate attack and acidity shall be dealt in detail.

h) Susceptibility of sub soil strata to liquefaction in the event of earthquake. If so, recommendation for remedial measures.

i) Identification of any other potential geo-technical problems & their remedial measures.

j) Description of measures required for erosion control.

k) Identification of corrective measures required for the improvement of sub surface conditions such as removal of poor sub soil/material and in-situ densification etc. If ground improvement is recommended then its detailed specification, specification for the materials to be used, construction method, equipments to be deployed etc. shall be furnished.

l) Soil classification curves including Table indicated D -10, D -30, D-60 size, uniformity coefficient etc. these figures should be made on Graph Sheets and submitted to clients on hard copies

m) Mohr's circle diagrams drawn on the basis of data obtained from shear strength tests shall be enclosed.

n) Aggressiveness of soil and soil water to reinforced concrete and steel and other building material.

o) Any other information of special significance encountered during investigations and likely to have a bearing on design and construction.

p) Reduced levels and coordinates of boreholes shall be tabulated with reference GTS BM with an accuracy of + or – 2mm. The depth of water table with respect to ground shall also be given.

q) Final report shall be submitted only after incorporation of comments by the Client.

r) All the locations of boreholes points shall be marked on drawing and give horizontal, Co-ordinates and reduced levels, the payment of which will be made as per the BOQ. The Reduced levels of the top of Bore-holes shall be inter linked with the GTS Bench Marks

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with an accuracy of + or - 2mm in Coordination with the Agency doing the detailed Filed Survey.

s) Results of all laboratory tests summarized (i) for each sample as well as (ii) a consolidated table giving the layer wise soil and rock properties. All the relevant charts, tables, graphs, figures, supporting calculations, conclusions and photographs of representative rock cores and trial pits shall be furnished.

t) For all triaxial shear tests, stress vs strain diagrams as well as Mobr's circle envelopes shall be furnished. The value of modulus of elasticity 'E' shall be furnished for all tests along with relevant calculations.

u) For all consolidation tests the following curves shall be furnished.

e vs log $_{p}$

Compressive vs square root of t (depending upon shape of the plot for proper determination of coefficient of consolidation).

The point showing the initial (eo, P0) of the soil shall be marked on the curves.

v) Values of compression index, coefficient of volume compressibility shall be furnished. The procedure adopted for calculating the compression index from the field curve and settlement of soil strata shall be clearly specified.

9.3 Recommendations

Recommendations shall be given abutment /pier duly considering the type of soil/rock, structure, foundation type and ground water table etc. in the bridge location. The recommendations shall include but not be limited to the following.

a) Type of foundation to be adopted for proposed bridge duly considering the sub strata characteristics, water table, total settlement permissible for the structural load and any other loads.

b) For shallow foundations the following shall be indicated with comprehensive supporting calculations.

c) Net safe bearing pressure for isolated square/rectangular footings of sizes (2m X 2m) or (3m X 3m) at different founding depths of 1 .5,2m for minor bridges and 3m & 4m for major bridges below ground level considering both shear failure and settlement criteria giving reasons for the type of shear failure adopted in the calculation.

d) If required net safe bearing pressure for raft foundation of widths greater than 6m at 2, 3, 4 & 5m below ground level considering both shear failure and settlement criteria.

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CIN- U45309OR2019PTC03
PAN- AADCO0821F

Ref No: OA/Work Order/JSW-Nagaur/22-23/***024***
Date: 31.10.2022

To,
Pinnacle Infrastructure Consulting
3/966, Sector H, Jankipuram,
Lucknow – 226 021
Uttar Pradesh, India

Kind Attention: Mr. Deep Joshi

Sub: Work Order for Geotechnical Investigation for Nagaur Project-Power Winch/Calyx.

Ref: Telephonic discussion with Mr. Samiran Haldar

Dear Sir,

With reference to the subject work and subsequent discussions had with Mr. Samiran Haldar, we are pleased send the work order of Geotechnical Investigation for the Nagaur Project-Power Winch/Calyx.

The work to be carried as per the technical specification attached at **Annexure-I**

Detailed BOQ, Time Schedule and Payment terms are furnished in below table. You are requested quote your best price for taking up the job.

1. Time Schedule:

SL No.	Deliverables	In No. of days from the date of mobilization i.e., 'D'
1	Mobilisation and Exploratory drilling of boreholes down to required depth, drilling of 150mm dia. boreholes in all type of soils except hard rock & large boulders (boulder core more than 30cm) including refilling, reinstating surface and disposing of surplus material including use of mechanical rigs with power operated winches as well as percussion/chiselling tool for advancing through occasional seams of hard strata to be employed, where necessary in Dry area	(D+6)
2	Completion of field activity and collection of sample from site	(D+12)
2	Submission of all the Soil Investigation Reports of the complete Bypass alignment as per relevant Codal Provisions.	(D+7)

2. Fees Structure:

S. No.	Payment Terms	Payment in percentage (%)
1	Mobilization Advance after deputing team at site along with equipment	10%
2	Completion of Field activity to the satisfaction of Engineer-in-charge	20%
3	Submission of Draft Geo-tech Report	30%
4	Submission of Final Geo-tech Report	30%
5	Acceptance of Report from Client and Railway	10%

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3. Bill of Quantity

Sl. No.	Description	Unit	Quantity	Rate (Rs)	Amount (Rs)
1	0 to 10 m	Meter	160	1350	216000
2	Extra for 150mm dia. bore in hard Rock/large Boulder at all levels	Meter	40	3500	140000
3	Drilling of NX size borehole (75mm dia.) in all types of hard rock and collection of rock core samples from boreholes and preserving in boxes				
4	0 to 10m	Meter	40	3900	156000
5	Taking out 100mm dia. & 450mm long undisturbed samples of soil from bore holes, including provision of air tight containers for packing and, labeling incl. transporting the samples to laboratory. Piston sampler shall be used for extracting undisturbed samples where necessary. Samples shall be collected as per IS:2720.	Each	44	0	0
6	Taking out 100mm dia. & 450mm long disturbed samples of soil from bore holes, including provision of air tight containers for packing, labeling and transporting the samples to laboratory. Samples shall be collected as per IS:2720.	Each	44	0	0
7	Conducting standard penetration test as per IS:2131 at approximate1.5m intervals in bore holes, as directed by the Engineer in charge	Each	155	0	0
8	Collection of water samples at required intervals	Each	10	300	3000
Conducting laboratory Tests on collected soil samples as per relevant IS code					
9	Moisture Content / Dry Density	Each	80	0	0
10	Atterberg Limits	Each	80	0	0
11	Specific Gravity	Each	80	0	0
12	Grain size analysis including Hydrometer analysis	Each	80	0	0
13	Direct Shear Test	Each	22	0	0
14	Natural Density	Each	80	0	0
15	Consolidation Test	Each	22	0	0
16	Unconfined Compression Test	Each	22	0	0
17	Tri-axial Test	Each	22	0	0
Conducting Laboratory tests on collected ROCK SAMPLES as per relevant IS code					
18	Density Test	Each	13	0	0
19	Water Absorption & Porosity	Each	13	0	0
20	Hardness	Each	13	0	0
21	Unconfined Compression Test	Each	13	0	0
22	Point Load Test	Each	13	0	0
23	Modulus of Elasticity	Each	13	0	0
24	Abrasion Testing	Each	13	0	0
25	Conducting chemical analysis of ground water samples to determine suitability for concreting and aggressiveness in relation to attack on concrete / reinforcement including determination of pH value	Each	11	1250	13750
26	Preparation and submission of Final report giving complete and comprehensive record of investigations, laboratory test reports and calculations in approved format	Each	1	30000	30000
TOTAL					**5,58,750**

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4. General Terms & Conditions:

4.1. M/s ODRA Associates Pvt. Ltd. will not be responsible to take any statutory approval from local bodies/ Labour License etc.

4.2. M/s ODRA Associates Pvt Ltd. will pay GST at applicable rate during the currency of the contract in addition to the fees on submission of proof. Any other taxes, which are levied as per the statutory provision at the time of billing would also be borne by M/s ODRA Associates Pvt Ltd.

4.3. Fees payable to M/s Pinnacle Infrastructure Consulting shall cover the statutory/inspection charges i.e., Development Fees, Processing Fees etc.

4.4. Miscellaneous/Incidental expenses, travelling expenses, lodging and boarding charges, will be borne by M/s Pinnacle Infrastructure Consulting.

4.5. Site clearances or Site hindrances will be cleared by M/s ODRA Associates Pvt Ltd during the Soil sampling work.

4.6. After acceptance of The Final report and clearing all the payment to the second party, this agreement will be closed automatically.

We are looking forward for your affirmative response.

Thanking You.

Yours faithfully,

For M/s. **ODRA Associates Pvt Ltd**

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(P.Pradhan)
Asst. Manager

TECHNICAL SPECIFICATION

1.0 GENERAL

1.1 This specification covers the technical requirements for a detailed "Geo-technical investigation and submission of a detailed geo-technical report". The detailed geo-technical investigation shall be carried out at land & river bed to provide the designer with sufficiently accurate information both general and specific about the substrata profile and relevant soil and rock parameters at site on the basis of which the foundation for various structure can be designed rationally.

2.0 SCOPE

2.1 The work shall include mobilization of all necessary equipments, providing necessary engineering supervision and technical personnel, skilled and unskilled labours, arranging water for drilling and working platform for river drilling etc. as required to carry out the entire field as well as laboratory investigation, analysis and interpretation of test data collected and preparation of a geo-technical report.

2.2 The contractor shall make his own arrangements for locating the bore hole position, trial pits and other field tests as per the drawings/sketches supplied to him and for determining the reduced levels at these locations with respect to bench mark indicated by the engineer-in-charge. Two established reference lines will be indicated by the engineer-in-charge.

2.3 All the field data shall be recorded in the performa recommended in Indian Standard Codes and the field records shall be countered signed by the engineer-in- charge. The contract shall submit two copies of the field bore logs to the engineer-in-charge soon after the completion of each bore hole. All the investigations are to be carried out by the contractor as per the priority requirements of the engineer-in-charge.

2.4 The contractor shall intimate the engineer-in-charge giving reasons if any additional specific tests necessary to be carried out duly considering local sub-soil conditions before starting of such tests.

2.5 Whenever the contractor is unable to extract undisturbed samples he should immediately inform the engineer-in-charge.

2.6 All the laboratory test data shall be recorded in the proforma recommended in the Indian Standard Codes and a copy of these shall be sent to the engineer-in-charge every week/during the progress of laboratory testing. During the progress of work, the owner/engineer-in-charge may be present at the laboratory where the contractor is arranging for execution of the laboratory tests.

2.7 The contractor shall recommend the proposed slope in Embankment and Cutting in different type of soil/rock along the alignment.

3.0 TENDER DRAWING / LIST

3.1 The location, extent and depth of bore holes and field tests/area(s) indicated in the list is subject to change that may be necessary during actual execution of the work. No claim whatsoever shall be entertained for differences between the location, extent and depth/area(s) etc. of boreholes/tests indicated on the drawing/list and those shown on the tender drawings. The work shall be carried out as per the instructions of the engineer-in-charge.

3.2 The contractor must visit the site prior to submitting his quotations to acquaint himself fully with the nature, type, scope of work and involvement therein. The rates quoted shall remain firm during the entire period of execution till completion of the work and any additional claim for lack of knowledge shall not be entertained.

4.0 GENERAL REQUIREMENTS

4.1 In areas which have already been developed, the contractor shall take advantage of existing local knowledge, record of trial pits, bore holes etc. in the vicinity and the type of foundations adopted and behaviour of existing structures particularly those of similar nature to the ones proposed for this project.

4.2 The contractor shall make use of information gathered from quarries, unlined wells, cuttings from nearby areas etc. The general topography of the near by areas will often give some indication about the variation of the soil conditions which are likely to exist.

4.3 The contractor shall gather data regarding the removal of overburden by excavation, erosion or land slides in the areas which may give an idea of the amount of reconsolidation that the soil strata has undergone. Similarly data regarding recent fill shall also be studied to determine the characteristics of the fill as well as the original strata.

4.4 The water level in streams and watercourses if any in the neighborhood shall be noted. Reliable information regarding ground water level shall also be gathered from water level in the near by wells.

4.5 It is essential that the equipments/instruments are properly calibrated at the commencement of the work so that they represent true values and submit the test reports to the engineer-in-charge. If the engineer-in-charge so desires, the contractor shall arrange for having the instruments tested in presence of the engineer at an approved laboratory at the contractor's cost and the test reports shall be submitted to the engineer-in-charge.

5.0 CODES AND STANDARDS

5.1 All standards, specification and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions.

5.2 In case of conflict between this specification and those (IS codes/RDSO's guideline and standards etc.) referred to herein the former shall prevail.

5.3 All work shall be carried out as per the specification and the following standards and codes / RDSO's guidelines.

IS: 1080	Code of practice for design and construction of simple spread foundations
IS:1498	Classification and identification of soils for general engineering purposes
IS:l892	Code of practice for subsurface Investigation for foundation
IS:l904	Code of practice for design and construction of foundations in soils: General requirements
IS:2131	Method of standard penetration test for soils
IS:2132	Code of practice for thin walled tube sampling of soils
IS:2720	Method of test for soils (Relevant parts)

IS:2809	Glossary of terms and symbols relating to soil engineering
IS:2810	Glossary of ternis relating to soil dynamics
IS:2911	Code of practice for design and construction of pile foundations (Relevant parts)
IS:2950	Code of practice for design and construction of rafi foundation Part-I
IS:4078	Code of practice for indexing and storage of drill cores
IS:8009	Code of practice for calculation of settlement of foundation Part-I & II
IS:8763	Guide for undisturbed sampling of sand
15:8764	Method for determination of point load strength index of rocks
15:9143	Method for determination of unconfined compressive strength of rock materials
IS:9179	Method for preparation of rock specimen for laboratory testing
15:9640	Specifications for split spoon sampler
15:4453	Code of practice for exploration by pits, trenches, drifts and shafts
IS:4464	Code of practice for presentation of drilling information and core description in foundation investigation
IS:5249	Method of test for determination of in-situ dynamic properties of soil
IS:5313	Guide for core drilling observations
IS:6403	Code of practice for determination of allowable bearing pressure on shallow foundation
IS:6935	Method of determination of water level in a bore hole IS:ll229 Specifications for shear box testing of soils
IS:12070	Code of practice for design and construction of shallow foundations on rocks.
	RDSO guidelines for earthwork in railway projects (Guideline No. GE: G-1)
	For slope stability analysis, RDSO's circular no. GT/SPEC/007/Rev 0/1991 (earlier circular no. 20 dt 4.9.91)

6.0 FIELD INVESTIGATION- SOIL

6.1 Trial Pit

6.1.1 Trial pits shall be of 3m x 3m size or any suitable size so as to permit easy access for visual examination of walls of the pit and to facilitate sampling and in-situ testing operations. Pits shall be excavated upto a maximum depth of 3m below ground level or as per the directions of the engineer-in-charge. Precautions shall be taken to ensure the stability of pit walls including provision of shoring if necessary as per 15: 4453. Precautions shall be taken to prevent surface water draining into the pit. Arrangements shall be made for dewatering if the pit is extended below water table. Trial pits shall be kept dry and a ladder shall be provided for easy access to the bottom of the pit. In-situ tests shall be conducted and undisturbed samples shall be collected immediately on reaching the specified depth so as to avoid substantial changes in moisture content of the subsoil. Arrangements shall be made for barriers, protective measures and lighting necessary for the period the pits remain open.

6.1.2 A note on the visual examination of soil strata shall be prepared. This should include the nature, colour, consistency and visual classification of the soil, thickness of soil strata, thickness of expansive soil & ground water table if any etc.

6.1.3 Undisturbed samples shall be collected at lm, 2m depth and at the termination depth in all the pits.

6.2 Boring

6.2.1 General Requirements

(a) Bore holes shall be drilled at specified locations to obtain information about the sub- soil profile, its nature, strength and to collect soil samples for strata identification and conducting laboratory tests. The minimum diameter of the boreholes shall be 150mm and boring shall be carried out in accordance with the provisions of IS:1892 and as per this specification.

(b) All bore holes shall extend up to the depths shown on enclose list or as directed by the engineer-in-charge. If the strata with standard penetration test (SPT) 'N' value greater than 100 for 30cm penetration with characteristics of rock is met with earlier, the borehole shall be advanced further by chiselling. Chiselling shall be continued for a maximum depth of 20 cm or upto 2 hours whichever is earlier. During chiselling rock fragments/rock cores shall be collected. Identification of rock strata shall be on the basis of visual examination of SPT sample and rock fragments. After it is established that rock is met with, the borehole shall be advanced further by drilling in rock as specified in clause 7.0 and cores shall be collected. When the borehole is terminated in soil strata, an additional standard penetration test shall be carried out at the termination depth.

(c) Casing pipe shall be used in the borehole to support its sides when side fall is suspected to occur inside the borehole. When casing pipe is used, it shall be ensured that its bottom end is at all times 15 cm above the bottom of the borehole. In case of cohesion less soils the advancement of the casing pipe shall be such that it does not disturb the soil to be tested or sampled. The casing shall be advanced by slowly turning the casing pipe and not by driving.

(d) In-situ tests and collection of undisturbed samples (UDS) shall be carried out at regular intervals and at change of strata or as decided by the engineer-in-charge. Representative disturbed and undisturbed samples shall be preserved for conducting

various tests in the laboratory. Water table in the borehole shall be carefully recorded and reported. No water/drilling mud shall be added while boring above ground water table. For cohesion less soil below water table, the water level in the borehole shall all times be maintained at slightly above the water table.

(e) The borehole shall be cleaned using suitable tools up to the depth of testing or sampling ensuring that there is minimum disturbance of soil at the bottom of the borehole. The process of jetting through an open tube sampler shall not be permitted. In cohesive soils, the borehole may be cleaned using a bailer with a flap valve. Gentle circulation of drilling fluid shall be done when rotary mud circulation boring is adopted.

(f) On completion of the borehole, the portion drilled in soil shall be backfilled with sand unless other wise directed by the engineer-in-charge.

(g) Wash boring shall not be adopted.

6.2.2 Auger Boring

Auger boring can be adopted in soft to stiff cohesive soils above water table. Augers shall be of helical or post hole type, which may be manually or power operated. While boring care shall be taken to minimize the disturbance to the deposits below the bottom of the borehole. The cuttings brought up by the auger shall be carefully examined in the field and the description of all the strata shall be duly recorded in the field bore log as per IS: 1498. No water shall be used while auger boring.

6.2.3 Shell and Auger Boring

Shell and Auger boring can be used in all types of soil free from boulders. For cohesion less soil below ground water table, the water level in the bore hole shall always be maintained at or above the ground water level. The use of chisel bit shall be permitted in hard strata with SPT-N value greater than 100. Chisel bits may also be used to extend the borehole through local obstruction such as old construction, boulders, rocky formations etc. All other requirements in clause 6.1.2 shall apply for this type of boring also.

6.2.4 Percussion Drilling

This method can be adopted in soil with gravel and boulders when the boring has to be done at a faster rate. This method consists of breaking of the strata by repeated blows from a chisel or drilling bit and bailing out the debris at intervals by adding water into the borehole. This method is not suitable for careful and very reliable sampling operation because of the disturbance caused during boring. This method shall not be adopted unless otherwise specified or permitted by the engineer-in-charge.

6.2.5 Rotary Mud Circulation Drilling

This method can be used in all types of soil below water table. In this method boring shall be done by rotating the bit fixed at the bottom of the drill rod. Proper care shall be taken to keep a firm contact between the bit and the bottom of the borehole. Bentonite or mud laden fluids shall be used as the drilling fluid to serve as the protective surface inside the borehole.

6.3 Standard Penetration Test (SPT)

This test shall be conducted in all types of soil strata met within the bore hole to find the variation in the soil stratification by correlating with the number of blows required for unit penetration of a standard penetrometer. This test shall be conducted at 3 m intervals, at every change of strata, at depths wherever undisturbed soil samples could not be collected and as per the directions of the engineer-in-charge. The stalling depth of performing SPT shall be 1 m or 2.5m depth below ground level. This depth shall be staggered in alternate

boreholes. The depth interval between the top level of standard penetration test and to that of (next) undisturbed sampling shall not be less than 1 m. The specification for equipments and other accessories, procedure for conducting the test, presentation of test results and collection of disturbed soil samples etc. shall conform to IS: 2131.

This test shall be carried out by driving a standard split spoon sampler in the borehole by means of a 650 N hammer having a free fall of 0.75 m. The sampler shall be driven using the hammer for 450 mm penetration. While driving, the number of blows for every 150 mm penetration and the penetration for every 50 blows shall be recorded. The number of blows for the last 300mm drive shall be reported as 'N' value. This test shall be discontinued when the blow count is equal to 100 and the penetration shall be recorded. Refusal shall be considered to be met with when the blow count is equal to 100. At the location where the test is discontinued, the penetration and the corresponding number of blows shall be reported. Sufficient quantity of disturbed soil samples shall be collected from the split spoon sampler for identification and laboratofy testing. The samples shall be visually classified & recorded at the site and shall be properly preserved and labelled for future identification & testing.

6.4 **Sampling**

6.4.1 General

(a) Sufficient number of soil samples shall be collected for reliable estimation of soil properties. The samples collected shall be either disturbed or undisturbed. Disturbed soil samples shall be collected for field identification and conducting laboratory tests such as sieve analysis, index properties, specific gravity, chemical analysis etc. Undisturbed samples shall be collected to estimate physical, strength and settlement properties of the soil.

(b) All the accessories required for sampling and the method of sampling shall conform to IS: 2132. All disturbed and undisturbed samples collected in the field shall be classified at site as per IS: 1498.

(c) All the samples shall be identified with date, bore hole or trial pit number, depth of sampling etc. It is also essential to mark an arrow pointing towards the top surface of the undisturbed sample, as the soil was in-situ. Care shall be taken to keep the undisturbed soil samples and box samples vertically with the arrow directing upwards. The tube samples shall be properly trimmed at both ends and suitably sealed with molten paraffin wax at both ends immediately after extracting the samples from the bore hole/trial pit and suitably capped on both sides.

(d) When the contractor fails to collect undisturbed soil sample at a specified depth, the borehole shall be advanced by 0.50 m and shall be performed with a standard penetration test. The reason for not obtaining the undisturbed soil sample shall be indicated in the bore log.

(e) Precaution shall be taken to ensure that there shall not be any change in moisture content and disturbance of the soil samples and they shall be placed in a temporary store at the end of the day'i work. All the samples shall be kept over a bed of sand, jute bags, saw dust etc. and covered over the top with similar material. The bed and top cover shall be kept moist till they are properly packed in wooden boxes. The contractor shall be responsible for packing and transporting of all the samples from

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site to the laboratory within seven days after sampling with proper protection against loss and damage.

(f) All the samples shall be suitably packed in wooden boxes using sand, saw dust etc. all around the samples before transporting to the laboratory for testing.

6.4.2 Disturbed Samples

(a) Disturbed soil samples shall be collected from cuttings and from split spoon sampler in boreholes at regular intervals to provide complete description of soil profile and its variation. The samples shall be immediately stored in airtight jars or polythene bags and labeled with borehole/trial pit number and depth.

(b) In elevated areas, if superficial material is available in plenty, then bulk samples from a depth of about 0,5m below ground level shall be collected to establish all required properties to use it as a fill material. Disturbed samples weighing about 250N shall be collected at shallow depths and immediately stored in polythene bags as per IS: 1892. The bags shall be sealed properly and shall he kept wooden boxes.

6.4.3 Undisturbed Samples

In each borehole undisturbed ample (UDS) shall be collected at regular intervals of 3m and as directed by the engineer-in-charge. The starting depth of collecting UDS shall be either 2.5m (Where starting depth of SPT is 1m) or 1m (where starting depth of SPT is 2.5m) depth below ground level and as directed by the engineer-in-charge. The stalling' depth shall be staggered in alternate boreholes. Undisturbed samples shall be of 100mm diameter and overall length 600mm length. Samples shall be collected in such a manner that the structure of soil and its moisture content do not get altered. - The specification for the accessories required for sampling and the sampling procedure shall conform to IS: 1892 and IS: 2132. Undisturbed sampling in sand shall be done using compressed air technique as mentioned in IS: 8763. Thin walled sampler shall be used to collect undisturbed samples by pushing the tube into the soil. The sampling tube shall have a smooth finish on both surfaces and minimum effective length of 450mm. The area ratio of sampling tubes shall be less than 12.5%. However in case of very stiff soils, area ratio upto 20% shall be permitted.

a) Undisturbed Sampling in Cohesive Soil

Undisturbed samples in soft to stiff cohesive soils shall be obtained using a thin walled sampler. In order to reduce wall friction, suitable precautions such as oiling the surfaces shall be taken. The borehole shall be cleaned and the depth of sampling below ground level shall be noted. The sampler shall then be attached to the bottom of boring rods and lowered into the borehole. The sampler shall be pushed into the clay layer by hand or by jacking and soil samples of specified length shall be collected without disturbing soil. The distance by which the sampler penetrates into the soil strata shall be checked. Care shall be taken to ensure that the sampler is not driven too far as this will compress the soil. The sampler shall be rotated to break the core at bottom of the sampler and then steadily drawn up.

b) Undisturbed Sampling in Cohesion less Soils

Undisturbed samples in cohesion less soils shall be obtained as per the procedure given in IS: 8763. Compressed air sampler shall be used to take the samples of cohesion less soil below water table. Precautions shall be taken to clean the borehole before sampling. Thin walled tube samplers of 60mm internal diameter shall be used.

The height and other dimensions of the sampler shall be recorded before use. Proper care shall be taken to maintain the water level in the borehole slightly above the ground water table before and during sampling operations. Immediately after the sample is obtained, the ends of the sample shall be waxed and capped to avoid moisture content changes.

6.4.4 Relaxation During Sampling

a) The sampler shall be pushed into the soil and driving of sampler shall be resorted to only when it cannot be pushed into the soil. This shall be done only with the permission of the engineer-in-charge and all the details about the same shall be recorded in the bore logs.

b) In clays when 'N' value is greater than 50, the undisturbed sampling may be replaced by standard penetration test.

6.5 Ground Water

6.5.1 The ground water table shall be measured in boreholes as per IS: 6935 or as per the instructions of the engineer-in-charge.

6.5.2 Sub soil water samples shall be collected for carrying out chemical analysis. Representative samples of ground water shall be collected when it is first encountered in boreholes before the addition of water to aid boring or drilling.

7.0 FIELD INVESTIGATION-ROCK

7.1 Rock Drilling

Drilling in rock shall be done at specified locations or as per the directions of the engineer-in-charge. Before commencing drilling, it shall be proved that characteristics of rock have been met with as mentioned in clause 6.1.1(b). The starting depth of drilling in rock as mentioned in clause 6.1.1(b) shall be certified by the engineer-in-charge. The portion drilled in rock shall be backfilled with 1 part of cement : 3 part of sand (1:3) grout unless otherwise directed by the engineer-in-charge.

7.1.1 Equipment

Core drilling shall be done by rotary motion using Tungsten carbide/diamond bit. The feed or thrust to the drilling bit shall be actuated by hydraulic system. The rotary core drilling equipment and procedure for drilling shall conform to IS: 6926. The equipment shall be provided with necessary facilities to regulate the spindle speed, bit pressure and water pressure during core drilling to get a good core recovery.

Drilling shall be carried out with Nx size Tungsten carbide /diamond tipped drill bits or impregnated diamond bits depending on the type of rock encountered. Double tube swivel core barrel of Type B conforming to IS: 6926 shall be used to ensure a good core recovery and to pick up cores from all layers of rock. Suitable core catchers shall be used to ensure continuous and good core recovery.

6926. The equipment shall be provided with necessary facilities to regulate the spindle speed, bit pressure and water pressure during core drilling to get a good core recovery.

Drilling shall be carried out with Nx size Tungsten carbide /diamond tipped drill bits or impregnated diamond bits depending on the type of rock encountered. Double tube swivel core barrel of Type B conforming to IS: 6926 shall be used to ensure a good core recovery and to pick up cores from all layers of rock. Suitable core catchers shall be used to ensure continuous and good core recovery.

7.1.2 Procedure

a) The drilling fluid shall be clean water. Circulation of drilling fluid shall be started before the core barrel reaches the bottom of the hole to prevent cuttings or sludge from entering the core barrel at the start of coring. Drilling fluid shall be circulated continuously down the hollow rods and the sludge conveying the rock cuttings to the surface shall be collected.

b) When drilling through soft/weathered /fractured rock, water circulation must be reduced so as to avoid shattering/breaking of core.

c) The rotational speed of the bit (spindle speed), the amount of downward pressure applied on the bit (bit pressure) and water pressure shall be suitably adjusted and properly monitored so that the core is collected with least disturbance and to avoid shearing of the core from its base. Bit speed, bit pressure, water pressure for the type of bit for various rock types shall be as per Appendix A of IS: 6926.

d) No drill run shall exceed 0.75m in length. This can be increased to 1.5m provided the core recovery observed is more than 80% in two successive 0.75m drill runs and on approval from the engineer-in-charge. If the core recovery is less than 20% the SPY shall be performed before commencing the next drill run as explained in clause 6.2.

e) If at any time blocking of the bit or grinding of the core is observed, the core barrel shall be immediately withdrawn from the borehole regardless of the length of drill run completed.

7.1.3 Observations

a) The colour of return water at regular intervals, the depth at which any change of colour of return water is observed, the depth of occurrence and amount of flow of hot water if encountered shall be recorded.

b) The depths through which a uniform rate of penetration was maintained, the depth at which a marked change in rate of penetration or sudden fall of drill rod occurs due to gap joint, the depth at which any blockage of drill bit causing core loss if any etc. shall be recorded.

c) Any heavy vibration or torque noticed during drilling should be recorded together with the depth of occurrence.

d) Special conditions like the depth at which grouting was done during drilling, presence of artesian conditions, loss of drilling fluid, observation of gas discharge with return water etc. shall also be observed and recorded.

7.1.4 Core Samples

a) Core samples shall be extracted by the application of continuous pressure at one end of the core with the barrel held horizontally without vibration. Friable cores shall be extracted

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from the barrel directly into a suitable sized half round plastic channel section. Care shall be taken to maintain the direction of extrusion of sample same as that while coring to avoid stress reversal.

b) Immediately after withdrawal from the core barrel, the cores shall be placed in a tray and transferred into boxes specially prepared for the purpose. The boxes shall be made from seasoned timber or any other durable material and shall be indexed on top of the lid as per IS: 4078. The cores shall be numbered serially and arranged in the boxes in a sequential order. The description of the core samples shall be recorded as per IS: 4464. Where no core is recovered, it shall be recorded as specified in the continuous record of core recovery and RQD in the core log as per IS: 11315, Part-II.

c) The basic information for the description of rocks shall cover i) degree of weathering ii) discontinuity spacing iii) strength iv) colour v) grain size vi) structural condition, the mineralogy of the grains and cementing material vii) rock name, special features like major joint planes, features/laminations, faults etc.

7.2 Standard Penetration Test

The relevant hardness of rocks shall be tested in boreholes after every drill run of 0.75m in rock if core recovery observed in less than 20% or as directed by the engineer-in-charge. The testing equipment and arrangement shall be conforming to IS: 2131. The number of blows for each 15mm penetration to a total penetration of 450mm shall be recorded. Penetration for every 50 blows shall be recorded and the test shall be stopped at a total of 100 blows.

During drilling operation, observation on return water, rate of penetration etc. shall be recorded in a proforma as given in IS: 5313, Appendix-A.

8.0 LABORATORY INVESTIGATION

8.1 Essential Requirements

a) All laboratory tests shall be conducted in an approved SEC (Railway) laboratory using approved apparatus complying with the requirements and specifications of Indian Standards or other approved standards for this class of work. It shall be checked that the apparatus are in good working condition before starting the laboratory tests. Calibration of all the instruments and their accessories shall be done carefully and precisely.

b) Depending on the type of sub strata encountered, appropriate laboratory tests shall be conducted on soil and rock samples collected in the field. Laboratory tests shall be scheduled and performed by qualified and experienced personnel who are thoroughly conversant with the work. Tests indicated in the schedule of items shall be performed on soil, rock and water samples as per relevant IS Codes. One copy of all the laboratory test data records shall be submitted to the owner progressively every week. Laboratory tests shall be carried out concurrently with field investigation since initial laboratory test results could be useful in planning at later of fieldwork. The contractor shall prepare a schedule of laboratory tests and the same shall be submitted and got approved by the engineer-in-charge before starting of laboratory tests.

c) All samples whether undisturbed or disturbed shall be extracted, prepared and examined by competent personnel properly trained and experienced in soil sampling, examination, testing and in using the apparatus as per the specified standards.

d) Undisturbed soil samples retained in liners or seamless tube samplers shall be taken out without causing any disturbance to the samples using suitably designed extruder just prior to actual testing. If the extruder is horizontal, proper support shall be provided to prevent the sample from breaking. For screw type extruders the pushing head shall be free from the screw shaft so that no torque is applied to the soil sample in contact with the pushing head. For soft clay samples, the sample tube shall be cut by means of a high speed hacksaw to specified test length and placed over the mould before pushing the sample into it with a suitable piston.

e) While extracting a sample from a liner or tube care shall be taken to see that its direction of movement is the same as that during sampling to avoid stress reversal.

f) On all undisturbed soil samples tested for bulk density, water content, grain size distribution, liquid limit and plastic limit tests shall also be performed.

g) On all rock samples tested for unconfined compression test, bulk density and water content tests shall also be performed.

8.2 Tests

Tests as indicated in this specification and as called for by the engineer-in-charge shall be conducted. These tests shall include but not be limited to the following.

a) Tests on Undisturbed and Disturbed Soil Samples
   - Visual and engineering classification
   - Sieve analysis and hydrometer analysis
   - Liquid and Plastic limits
   - Specific gravity
   - Chemical analysis
   - Proctor compaction test

b) Test on Undisturbed Soil Samples
   - Bulk density and moisture content
   - Relative density (for sand)
   - Unconfined compression test
   - Box shear test
   - Triaxial shear tests (depending on the type of soil and field conditions on undisturbed or remoulded samples)

     Unconsolidated undrained

     Consolidated drained

     with pore pressure measurement
   - One dimensional consolidation test

c) Tests on Rock Samples
   - Visual classification

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- Moisture content, porosity and density
- Specific gravity
- Hardness
- Unconfined compression test (both at saturated and at insitu water content)
- Point load strength index

d) Chemical Test and analysis of Subsoil and Sub-soil Water

Chemical test shall be conducted on soils and water samples as per relevant BIS latest revisions to report the following

a) PH value.
b) Chlorides in ppm & percentage.
c) Sulphates in ppm and percentage and expressed as SO3 & SO4.

e) Water samples

- Samples of ground water shall be obtained from each bore hole when first encountered or unless specified otherwise.
- At the specified depth, water shall be bailed or pumped out, so that fresh ground water flows in to the bore hole. Care shall be taken in avoiding any contamination with surface water at any time. Water samples shall be collected in 5 liter polythene or glass container and labeled properly.

f) Filed Permeability Tests

Field permeability tests shall be conducted to determine the water percolation capacity of overburden soil. The specifications of the equipment required for the tests and the procedure of testing shall be in accordance with the IS 5529 Part – 1 with latest correction.

(i) Constant Head Method

This test shall be conducted in boreholes where soils have high permeability. Water shall be allowed into the bore hole through a metering system ensuring gravity flow constant head so as to maintain a steady water level in the bore hole and reference mark shall be done at a convenient level which can be easily seen in the casing pipe to note down the fluctuations of water level. The fluctuations shall be counteracted by varying the quantity of water flowing into the bore hole. The evaluation of water shall be observed at every 5 minute interval. When 3 consecutive readings show constant value, the necessary observations such as flow rate, evaluation of water surface above test depth, diameter of casing pipe etc, shall be made and recorded as per the proforma recommended in IS: 5529 Part – I Appendix – A with latest corrections.

(ii) Falling Head Method

This method shall be adopted for soils of low permeability and which can stand without casing. The test section shall be sealed at the bottom of bore hole and a packer at the top of the test section. If the test has to be conducted at an intermediate section of a bore hole, then double packers shall be used. Access to the test section through the packers shall be by means of a pipe which shall extend to above the ground level. Water shall be filled in the pipe up to the level marked just below the top of the pipe and water allowed to drain into the test section. The water level in the pipe shall be recorded at regular intervals as mentioned in IS: 5529 Part –I Appendix – B with latest corrections. The test shall be repeated till constant records of water level are achieved.

9.0 REPORT

9.1 General

a) On completion of all the field and laboratory works, the contractor shall submit a draft report containing geological information of the region, procedure adopted for investigation, field observations, summarized test data, conclusion and recommendations. The report shall include detailed bore logs, sub-soil profile, field test results, laboratory observations and test results in both tabular as well as graphical forms, practical and theoretical considerations for the interpretation of test results, the supporting calculations for the conclusions drawn etc. Initially, the contractor shall submit three copies of the report in draft form for the owner's review.

b) The contractor shall recommend proposed slope both in cutting & formation in different types of soil! rock and all calculation data & curves.

c) After review of the draft report, the employer's comments will be intimated to the contractor. The contractor shall incorporate the comments and after getting the amendment draft report approved, required copies of the detailed final report shall be submitted to authority. Any expenditure on account of redrafting, finalizing the report etc. shall be deemed to have been included in the quoted rates.

d) The detailed final report based on field observations, insitu and laboratory tests shall encompass theoretical as well as practical considerations for foundation of different type of structures envisaged in the area under investigation. The contractor shall acquaint himself about the type of structures, foundation loads and other information required from the engineer-in-charge.

9.2 Data to be Furnished

The report shall also include but not be limited to the following:

a) A set of longitudinal and transverse soil/rock profiles connecting various boreholes in order to give a clear picture of the variation of the subsoil strata as per.

b) Water level contours and rock level contours

c) Plot of standard penetration test 'N' values (both uncorrected and corrected) with depth for identified areas.

d) If piling is envisaged the following shall be furnished with comprehensive supporting calculations.

- Type of pile and reasons for recommending the same duly considering the sub strata characteristics.
- Suitable founding strata for the pile.
- Estimated length of pile for suitable dia or as per railway norms. End bearing and frictional resistance shall be indicated separately. Safe lateral and tensile load carrying capacities of pile with supporting calculations.
- Magnitude of negative skin friction if any

e) Suitability of locally available soils at site for filling and back filling purposes. -

f) If expansive soil is met with, then recommendation on removal or detainment of the same under the structure etc. shall be given. In the latter case, detailed specifications of any special treatment required including specifications of any special treatment required including specification for materials to be used, construction method, equipments to be deployed etc. shall be furnished.

g) Protective measures based on chemical nature of soil and ground water with due regard to the potential deleterious effects on concrete, steel and other building materials etc. Remedial measures for sulphate attack and acidity shall be dealt in detail.

h) Susceptibility of sub soil strata to liquefaction in the event of earthquake. If so, recommendation for remedial measures.

i) Identification of any other potential geo-technical problems & their remedial measures.

j) Description of measures required for erosion control.

k) Identification of corrective measures required for the improvement of sub surface conditions such as removal of poor sub soil/material and in-situ densification etc. If ground improvement is recommended then its detailed specification, specification for the materials to be used, construction method, equipments to be deployed etc. shall be furnished.

l) Soil classification curves including Table indicated D -10, D -30, D-60 size, uniformity coefficient etc. these figures should be made on Graph Sheets and submitted to clients on hard copies

m) Mohr's circle diagrams drawn on the basis of data obtained from shear strength tests shall be enclosed.

n) Aggressiveness of soil and soil water to reinforced concrete and steel and other building material.

o) Any other information of special significance encountered during investigations and likely to have a bearing on design and construction.

p) Reduced levels and coordinates of boreholes shall be tabulated with reference GTS BM with an accuracy of + or – 2mm. The depth of water table with respect to ground shall also be given.

q) Final report shall be submitted only after incorporation of comments by the Client.

r) All the locations of boreholes points shall be marked on drawing and give horizontal, Co-ordinates and reduced levels, the payment of which will be made as per the BOQ. The Reduced levels of the top of Bore-holes shall be inter linked with the GTS Bench Marks

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with an accuracy of + or - 2mm in Coordination with the Agency doing the detailed Filed Survey.

s) Results of all laboratory tests summarized (i) for each sample as well as (ii) a consolidated table giving the layer wise soil and rock properties. All the relevant charts, tables, graphs, figures, supporting calculations, conclusions and photographs of representative rock cores and trial pits shall be furnished.

t) For all triaxial shear tests, stress vs strain diagrams as well as Mobr's circle envelopes shall be furnished. The value of modulus of elasticity 'E' shall be furnished for all tests along with relevant calculations.

u) For all consolidation tests the following curves shall be furnished.

e vs log $_{p}$

Compressive vs square root of t (depending upon shape of the plot for proper determination of coefficient of consolidation).

The point showing the initial (eo, P0) of the soil shall be marked on the curves.

v) Values of compression index, coefficient of volume compressibility shall be furnished. The procedure adopted for calculating the compression index from the field curve and settlement of soil strata shall be clearly specified.

9.3 Recommendations

Recommendations shall be given abutment /pier duly considering the type of soil/rock, structure, foundation type and ground water table etc. in the bridge location. The recommendations shall include but not be limited to the following.

a) Type of foundation to be adopted for proposed bridge duly considering the sub strata characteristics, water table, total settlement permissible for the structural load and any other loads.

b) For shallow foundations the following shall be indicated with comprehensive supporting calculations.

c) Net safe bearing pressure for isolated square/rectangular footings of sizes (2m X 2m) or (3m X 3m) at different founding depths of 1 .5,2m for minor bridges and 3m & 4m for major bridges below ground level considering both shear failure and settlement criteria giving reasons for the type of shear failure adopted in the calculation.

d) If required net safe bearing pressure for raft foundation of widths greater than 6m at 2, 3, 4 & 5m below ground level considering both shear failure and settlement criteria.

ODRA Associates Pvt. Ltd. BBSR

almondz
the Infrastructure Specialist

Almondz Global Infra-Consultant Limited

Ref : Almondz/JH/WO/03 **Date**: 12.07.2023

To,

The General Manager.
Pinnacle Infrastructure
3/966, sector-H, Jankipuram
Lucknow-226021

Sub: Consultancy Services for preparation of Feasibility study and detailed project report for construction of NH-133 section from Ekchari to Mahagama (Tentative Length 40 Km) in the state of Jharkhand
Reg - Work order for Geotechnical Investigation

Ref : Your Quotation no.PIC/Quote/38/2023 dated 10.07.2023

Dear Sir,

As negotiated and discussed we are pleased to place this order for the subject work as follows.

A. The rates for the above work will be as follows:

Sl.no.	Item description	Quantity (Tentative)	Unit	Rate	Amount
1	Mobilization and demobilization of machinery from Lucknow (Lab) to site and back	1	LS	38000	38,000
2	Inter shifting of machine from one location to other	3	Nos.	2,000	6,000
3	Vertically boring of min. 150 mm diameter bore holes through all kinds of soils through manual method, Conducting SPT in boreholes and Collection of minimum 100 mm diameter 450 mm long UDS as specified from borehole as specified in and conducting the required laboratory testing of the adequate collected samples including report clearly mentioning the Safe bearing capacities, founding levels and type of foundation.	80 m	Per running meter	1050	84,000
4	Report writing	1	Job	10,000	10,000
	Total				**1,38,000**
				GST @18%	**24,840**
	Grand Total				**1,62,840**

Infrastructure Consulting Testing Division

Regd. Office : F -33/3, Okhla Industrial Area Phase - II, New Delhi - 110 020, India. Tel. : +91 11 4350 0700, 4151 6800 Fax : +91 4350 0735. Website : www.almondzglobalinfra.com
CIN : U7410DL2013PLC262069 • Email : delhi@almondz.com

Note: For Hard rock with an ultimate crushing strength 12.5 Mpa or above, the depth of foundation shall be 0.6m below Rock Surface and 1.50 mt for all Other Cases.

B. GENERAL & TECHNICAL TERMS:-

1. In the above table through estimation of Drilling quantities, SPT tests to be conducted or any other items to be executed at site is done, the actual quantities executed at site shall be taken for billing. (refer attached TOR)
2. Water required for drilling and domestic purpose shall be arranged by **Pinnacle Infrastructure Consulting**. Location problems any or all shall be settled by AGICL before the machines reach at site.
3. All work executed shall be supervised by **AGICL** Personnel jointly (if possible) so as to avoid any discrepancy in the future. Depth of bore hole shall be verified by AGICL Engineer at site.
4. All the locations shall be marked by **AGICL** personnel at site. You shall drill the bore holes at the locations given by AGICL.
5. All required permissions from concerned authorities shall be sought by **AGICL**.
6. All boreholes are land bores and Marine Investigation is not anticipated.
7. The work will be taken up on priority and finished by 10.08.2023
8. Your firm will depute experience professional for proper site supervision on data collection. Please inform the progress on daily basis.
9. Before dispatching the machinery, please check all the parts and component before land so that they can work at site without interruption.
10. Geotechnical report must be signed by qualified geotechnical expert i.e. M. Tech (Geotechnical) with at least 10 years experience.
11. The report shall be submitted with the same name through which the NABL certification is taken by the firm, The original bore log sheets to be submitted

C. PAYMENT TERMS:-

Mobilization	**20 %**
Completion of 100% field work	**20 %**
Submission of draft report	**20 %**
Submission of final report	**30 %**
Approval from AGICL Client	**10%**

D. Confidentiality Agreement:

(i) You have to safeguard and hold in confidence all and/or any other information/data provided by the Company in connection with the assignment and undertake to use such information solely for the purpose of carrying out the assignment as outlined in this letter.

Pinnacle Infrastructure Consulting Testing Division Lucknow

ALMONDZ GLOBAL INFRA CONSULTANT LIMITED

Confidential Information includes all information and materials belonging to, used by, or in the possession of the Company relating to its processes, services, technology, inventions, patents, ideas, concepts, contracts, financial information, developments, business strategies, pricing, current and prospective customers, marketing plans, and trade secrets of every kind and character. You have to exercise reasonable prudence and due diligence towards fulfilling the responsibilities arising out of the duties from the assignments.

(ii) Any advice rendered by AGICL pursuant to the agreement, in any form, shall be treated as Confidential during the terms of this agreement and will be used for arriving at any decision relating to and ascertaining the viability of and carrying out the Assignment. With regard to disclosures to other consultants, such disclosures shall not be made in any manner whatsoever without the prior written approval of AGICL, unless it is required to do so by law or by any government authority.

(iii) You have to provide full disclosure of all the factors and information that could affect the assignment as well as supply all the data and information that may be necessary and in satisfactory form and content to AGICL to undertake the project in a timely and expeditious manner.

Please confirm your agreement to the terms of this letter and send a accepted copy of this work order and proceed to carry out the above assignment. In case you require any further information or clarifications, please feel free to contact the undersigned.

Thanking you,
Your truly,
For **Almondz Global Infra - Consultants Limited**
[A Wholly Owned Subsidiary of Almondz Global Securities Limited]

[Authorized Signature]

Enclosed : TOR

Pinnacle Infrastructure Consulting
Testing Division
Lucknow

S&P INFRASTRUCTURE DEVELOPERS (P) LTD.

CIN : U45203DL2000PTC105919

Strength Sincerity Potential Infinite

Ref No: - S&P/WO/16/2023 Date:- 17.08.2023

To
Pinnacle Infrastructure Consulting
3/966, Sector – H
Jankipuram, Lucknow
Uttar Pradesh- 226021
Mob:-+91-9910393180
E-mail :- pinnacleinfraconsult@gmail.com
GSTIN.- 09ABAFP4293M1ZP

Sub : Construction of 2 Lane with paved shoulder including geometric improvement from Km 16+000 to 32+500 of Stretch Tarku-Ravangla of NH-510 on EPC basis under SARDP-NE Phase "A" in the state of Sikkim. **Reg:- Work Order for Non-Distractive Test of Structures.**

Kind Attention : Mr. Deep Joshi.

Dear Sir,

With reference to your quotation No. PIC/S&P/Quote/39/2023 dated 27.07.2023 and subsequently discussion had held with us , I am pleased to place this work order on you for Non- Distractive Test of Structures, As per Terms and Conditions as mentioned below:-

Sl No.	Item Description	Unit	Quantity	Rate	Amount in INR
1.	Rebound Hammer Test	Nos.	44	600	26,400
2.	Ultrasonic Pulse Velocity Test	Nos.	44	1700	74,800
3.	Mobilization & De-mobilization	LS	1	25,000	25,000
				TOTAL	**1,26,200**
				Add GST 18%	22,716
				Grand Total Amount	**1,48,916**

Total Rupees One lacs Forty Eight Thousand Nine Hundred Sixteen only.

Terms & Conditions.

1. Above test quantity may increase or decrease, amounting to be billed on Pro rata basis.
2. All machineries/equipments, etc has to be arranged from your end.
3. Location works shall be identified our Engineer/Authority.
4. All safety arrangement during works for traffic and others should be arranged from your end.
5. Your staff's should reach at site within 03 days from placing of this work order or advance payment.

A. Safety & Security:

I) In case of any accident causing damage, death and / or injuries to your men & Machinery responsibility borne by you.

II) In case of you damage any of the *M/s. S&P Infrastructure Dev. Pvt. Ltd.* or other Agencies property or person while executing this work, you will be fully responsible for same for compensation.

17/08/2023

17/8/23

B. Payment:

I) 40% Mobilization Advance payment
II) 30% Completion of field works.
III) 30% Acceptance of Report.

Please sign and return us a copy of this Work Order as a token of your acceptance.

Thanking you and assuring the best of cooperation at all times.

Yours faithfully,

For S&P Infrastructure Dev. Pvt Ltd.

17/08/2023

(Abul Hussain Ahmed)
Senior Project Manager &
Authorised Signatory.

Accepted By *Pinnacle Infrastructure Consulting*
(With sign & Seal)

18/8/23

Infrastructure Consulting Testing Division

For S&P Infrastructure Developers (P) Ltd.

Authorised Signatory

S.S. Construction Co.

S S Infrazone Pvt. Ltd.

C-87, Sarojini Nagar, Housing Society, Kanpur Road, Lucknow-226008, LUCKNOW, UTTAR PRADESH, INDIA, PIN Code:226008

WORK ORDER

To,
Pinnacle ~~Infra Pvt.Ltd~~ Infrastructure Consultancy Pvt.

Work Order No.	: BUWOJ/00001/23-24
Work Order Date	: 10/08/2023
Company GSTIN	: 09AASCS1068B1Z8
Company PAN	: AASCS1068B

Contractor PAN	: ~~GKNPM1068D~~ ABAFP4293M / ABAFP4293M Pvt.
Contractor GSTIN	: 09ABAFP4293M1ZP
Contact Person :	:
Contact No	:
Email Id	:
Subject	: Survey Work on Shahjahanpur Project
Project	: Lipulek Bhind Road Shahjahanpur Lipulek Bhind Road (SH-29), from Ch.-468.750 to 497.050, SHAHJAHANPUR, UTTAR PRADESH, INDIA, PIN Code:209621
Sub Project	: Shahjahanpur Lipulek Bhind Road

Dear Sir,

With reference to your quotation and subsequent discussion/negotiation you had with us for the above mentioned work. we are pleased to issue the Work Order in your favour for the same at above mentioned project at the mutually agreed rates and terms & conditions

Scope of Work :

Survey Work on Shahjahanpur Project

Work Type Road Construction Work

Contract Sum Rs. 114800 (Rupees One Lac Fourteen Thousand Eight Hundred Only)

Completion Date 31/Aug/2023

Remarks :

1) 40% as Mobilization Advance
2) 45% payment after completion of 100% field work
3) 15% payment after submission of data
4) Transportation, Accommodation, Food is inclusive
5) The client shall arrange all the necessary permissions and approvals for doing survey

Thanking you,

Yours faithfully,

For S S Infrazone Pvt. Ltd.

Authorised Signatory

SCHEDULE OF ITEMS

S S Infrazone Pvt. Ltd.
C-87, Sarojini Nagar, Housing Society, Kanpur Road, Lucknow-226008, LUCKNOW, UTTAR PRADESH, INDIA, PIN Code:226008

GSTIN : 09AASCS1068B1Z8
GST Location : UTTAR PRADESH

Work Order No	Work Order Date	Completion Date	Revision No & Date	Defect Liability Period	Payment Mode As per Agreed Terms
BUWO/J/00001/23-24	10-Aug-2023	31-Aug-2023	0,	0 (Months)	

Vendor Name : Pinnacle ~~Infra Pvt Ltd~~ Infrastructure Consulting
Vendor Code :
...
...
Contact Person :
Contact No :
Email Id :
PAN : ~~BKNPM4068D~~ ABAFP4293M
PF REG No :
ESI No :
GSTIN : 09ABAFP4293M1ZP GST Location : UTTAR PRADESH

Project : Lipulek Bhind Road Shahjahanpur
Address : Lipulek Bhind Road (SH-29), from Ch.-468.750 to 497.050, SHAHJAHANPUR, UTTAR PRADESH, INDIA, PIN Code:209621
Sub Project : Shahjahanpur Lipulek Bhind Road
Indent No :

Work Type : Road Construction Work
NFA No. & Date :
Work Details : Survey Work on Shahjahanpur Project

SNo	Work Description	UOM	Activity Code	Milestone	Quantity	Rate (Rs.)	Amount (Rs.)
1	**Sub Project : Shahjahanpur Lipulek Bhind Road**						
1	Survey work providing I-section , cross section E/W quantity at 50m Internal and collecting details of culverts & MNBS. Survey Work	KM	1		28.00	4,100.00	114,800.00
	Total of Sub Project : Shahjahanpur Lipulek Bhind Road						**114,800.00**

Billing Term	Remarks	Percentage(%)	Amount (Rs.)
BASIC		**0**	**114,800.00**
CGST	HSN:-90153090 - SURVEY INSTRUMENTS	9	10,332.00
SGST		9	10,332.00
Gross		**0**	**135,464.00**
TDS	TDS ON PROFESSIONAL/CONSULTANCY/TECHNICAL/ROYALTY	10	11,480.00
Net		**0**	**123,984.00**

Gross Amount in Words	One Lac Thirty Five Thousand Four Hundred Sixty Four Only
Remarks	1) 40% as Mobilization Advance 2) 45% payment after completion of 100% field work 3) 15% payment after submission of data 4) Transportation, Accommodation, Food is inclusive 5) The client shall arrange all the necessary permissions and approvals for doing survey

		For : S S Infrazone Pvt. Ltd.	Accepted By
Prepared By	Checked By	Authorised Signatory	Pinnacle ~~Infra Pvt Ltd~~ Infrastructure Consulting

10/08/2023 18:54:36

TERMS & CONDITION

S S Infrazone Pvt. Ltd. C-87, Sarojini Nagar, Housing Society, Kanpur Road, Lucknow-226008, LUCKNOW, UTTAR PRADESH, INDIA, PIN Code:226008			Project : Lipulek Bhind Road Shahjahanpur Lipulek Bhind Road (SH-29), from Ch.-468.750 to 497.050, SHAHJAHANPUR, UTTAR PRADESH, INDIA, PIN Code:209621		
Work Order No	**Order Date**	**Commencement Date**	**Completion Date**	**Work Type**	**Payment Mode**
BUWOJ/00001/23-24	10/08/2023	10/08/2023	31/08/2023	Road Construction Work	As per Terms & Condition

Code	Details
TandC	Terms & Conditions:
TandC	1. No price escalation shall be paid due to any reason to Pinnacle Infrastructure Consulting. 2. Payment will be made from Bank through RTGS/NEFT only; no cash payment will be made for any work. 3. Deduction of necessary income tax (TDS) shall be made from payment for carrying out the work under this contract. 4. This work order comes into force on the date of its signature. 5. Either party can terminate this work order by giving 15 Days written notice to the other without assigning any reason and without payment of any compensation thereof. 6. Both the parties hereby agree that they will not, directly or indirectly, contact, deal with or otherwise become involved with any entity or any other entities or parties introduced, directly or indirectly, by or through the party, its officers, directors, agents or associates, for the purpose of avoiding any legal obligation to the parties, without the specific written approval of the other party. 7. This work order is being issued in duplicate copy, one copy of which may be returned back to our office duly signed by you as a token of your acceptance. 8. This work order shall be governed in accordance with the laws of India and Courts in Lucknow shall have exclusive jurisdiction to adjudicate disputes arising from the terms herein.

S S Infrazone Pvt. Ltd.			ACCEPTED BY
Prepared By	Checked By	Authorised Signatory	Pinnacle ~~Infra Pvt.Ltd~~ Infrastructure consulting

KITCO Ltd.
(Estd. in 1972 by IDBI & Govt. of Kerala)

Regd. Office: MM Gardens, P.B. No: 1820,
Church Landing Road,
Near Kerala Fine Arts Hall, Ernakulam 682 016.
Tel : +91-484-4129000 / 6129000
E-mail: mail@kitco.in, Web: www.kitco.in

CIN : U74140KL1972GOI002425

No: 5061 : DP 1083:RG:2022
December 01, 2022.

M/s. Pinnacle Infrastructure Consulting.
3/966, Sector-H,
Janakipuram,
Lucknow – 226021.

Letter of Award of Work

Dear Sir,

Sub: Conducting Topographical Survey at 3 locations in the state of Jharkhand: Manglaghat/Rajmahal, Samdaghat, Singhidalan/Rajmahal

Ref: Your quotation No.PIC/KITCO/Quote/30/2022 Dated 25.11.2022

With reference to the above, we are pleased to inform you that your offer received for conducting Topographic Survey for all the 3 locations finalized in the state of Jharkhand has been accepted and we hereby place this work order on you as per following terms and conditions.

The 3 finalized locations are Manglaghat/Rajmahal, Samdaghat, Singhidalan/Rajmahal.

The accepted work order value is Rs 80,000.00 (Rupees Eighty Thousand Only) excluding GST. GST at applicable rates will be paid extra against GST Invoice in the name of KITCO Ltd. with GSTN "32AAACK9991P1ZS". The accepted Bill of Quantity is enclosed as Appendix-1 to this Work Order. The actual quantity of item no. 2 of Bill of Quantity will be as per the survey report and the payment shall be made accordingly.

1. Scope of Work

The scope of work as already understood and agreed by you in the aforesaid quotation is as follows,

a) Carrying out topographical survey and preparation of plans (maps) and report of the entire area/areas indicated.

b) Carrying out bench mark (GTS/any other reference bench mark approved by the engineer-in-charge) to site/sites under survey by parallel levelling, establishing and constructing bench mark and reference pillars in the field.

c) Spot level survey of the entire area/areas at specified intervals and development of contours. Contractor shall carry out spot level surveying at an interval of 10m for contouring the area/areas. Levels shall also be taken on all traverse stations and on salient points located at random over the area (ground points). Contours are to be interpolated at 1m intervals after the above points are plotted. The contours shall not be just interpolated but properly surveyed

on the ground so that features falling between the two distributed over the entire area shall be located and levels taken so that accurate contouring can be done. At places of sharp curvature or abrupt change in direction and elevation, points selected shall be close to each other. Salient points on ridge lines and valley lines shall also be measured. Levelling operation shall always start from main/subsidiary stations whose levels are based on the bench mark established in the survey area and end on the same.

d) Providing survey instruments (Total station), construction equipment, tools & plants, materials, laborers, qualified surveyors, clearance of jungles, cutting of trees, earth work, scaffoldings, transport, supervision by competent engineers/surveyors, testing of materials, full insurance and all other incidental items as may be necessary for successful completion of the surveying , mapping and construction works, etc.

e) Furnishing all field data and scaled drawings, survey report on CD (3 copies) apart from 3 sets of hard copies as per the approved layouts.

f) Furnishing survey report as described in details in the succeeding paragraphs is also included in the scope of work.

The survey report should also cover the following.

i. General site observation such as location of drainage, trenches, overhead structures, electric lines, structures on the ground, buildings, access roads, water bodies, etc.

ii. Presence of any well and /or tube well in the site and water level in them shall also be indicated.

iii. Details of trees with their name, numbers and girths.

iv. All levels should be connected with MSL and MSL value shall be transferring from any GTS bench mark.

Existing drainage pattern of the site, possibility of water logging and high flood level of the area. Submission of draft survey reports for review/comments followed by submission of final report incorporating the comments, if any, shall be done at no extra cost.

2. Time line and Terms of Payment

The entire survey activities at site shall be completed within a period of 10 days of issue of firm work order or handing over the site whichever is later. The draft survey report shall be submitted within 15 days of issue of firm work order. Final report shall be submitted in the required manner specified above within 5 days of receiving instruction from Engineer-in-charge.

The payment shall be released at the completion of the following stages **and please note that the payment shall be released only after receipt of the fee from Inland Waterways Authority of India (IWAI) to KITCO Ltd for the subject work.**

Sl. No.	Payment Milestones	Payment (%)
1	Mobilization of survey team and required equipment	20%
2	Completion of all site activities including fixing of permanent bench marks and reference pillars.	20%
3	Upon submission of draft survey report along with the required number of soft & hard copies.	40%
4	Upon approval of final survey report and submission of required number of soft & hard copies	20%

Please acknowledge the receipt of the 'Letter of Award of Work' and return the duplicate copy of this letter duly affixed with your signature and seal as token of acceptance.

Thanking you,
Yours faithfully,

Managing Director
Kitco Ltd.

KITCO Ltd.
(Estd. in 1972 by IDBI & Govt. of Kerala)

Regd. Office: MM Gardens, P.B. No: 1820,
Church Landing Road,
Near Kerala Fine Arts Hall, Ernakulam 682 016.
Tel : +91-484-4129000 / 6129000
E-mail: mail@kitco.in, Web: www.kitco.in

CIN : U74140KL1972GOI002425

No: 5060 : DP 1083:RG:2022
December 01, 2022.

M/s. Pinnacle Infrastructure Consulting.
3/966, Sector-H,
Janakipuram,
Lucknow – 226021.

Letter of Award of Work

Dear Sir,

Sub: Conducting Topographical Survey at 23 locations in the state of West Bengal: Goraipara Ghat, Opposite of Goraipara Ghat(Nisindrapur), Taltala Ghat, Berhampore(Ghopal Ghat), Opposite of Berhampore Ghat(Khagra Ghat), Lalbagh (Sadar Ghat), Khoshbag Ghat (Opposite to Lalbagh Sadar), Narkelbari, Maganpara, Matiari (Opposite to Dainhat), Dainhat, Palasi, Ramnagar, Shankarai Ghat (Katwa), Opposite of Shankarai Ghat (Sitahati Ghat), Majherchar, Sharma Ghat, Saptorshi Ghat, Charjatrasiddhi Ghat, Guptipara Ghat, (Opposite to Shantipur), Fakirdanga, Maniknagar, Botanical Garden.

Ref: Your quotation No.PIC/KITCO/Quote/31/2022 Dated 25.11.2022

With reference to the above, we are pleased to inform you that your offer received for conducting Topographic Survey for all the 23 locations finalized in the state of West Bengal has been accepted and we hereby place this work order on you as per following terms and conditions.

The 23 finalized locations are Goraipara Ghat, Opposite of Goraipara Ghat(Nisindrapur), Taltala Ghat, Berhampore(Ghopal Ghat), Opposite of Berhampore Ghat(Khagra Ghat), Lalbagh (Sadar Ghat), Khoshbag Ghat (Opposite to Lalbagh Sadar), Narkelbari, Maganpara, Matiari (Opposite to Dainhat), Dainhat, Palasi, Ramnagar, Shankarai Ghat (Katwa), Opposite of Shankarai Ghat (Sitahati Ghat), Majherchar, Sharma Ghat, Saptorshi Ghat, Charjatrasiddhi Ghat, Guptipara Ghat, (Opposite to Shantipur), Fakirdanga, Maniknagar, Botanical Garden.

The accepted work order value is Rs 3, 64,000.00 (Rupees Three lakh Sixty Four Thousand Only) excluding GST. GST at applicable rates will be paid extra against GST Invoice in the name of KITCO Ltd. with GSTN "32AAACK9991P1ZS". The accepted Bill of Quantity is enclosed as Appendix-1 to this Work Order. The actual quantity of item no. 2 of Bill of Quantity will be as per the survey report and the payment shall be made accordingly.

1. Scope of Work

The scope of work as already understood and agreed by you in the aforesaid quotation is as follows,

a) Carrying out topographical survey and preparation of plans (maps) and report of the entire area/areas indicated.

b) Carrying out bench mark (GTS/any other reference bench mark approved by the engineer-in-charge) to site/sites under survey by parallel levelling, establishing and constructing bench mark and reference pillars in the field.

c) Spot level survey of the entire area/areas at specified intervals and development of contours. Contractor shall carry out spot level surveying at an interval of 10m for contouring the area/areas. Levels shall also be taken on all traverse stations and on salient points located at random over the area (ground points). Contours are to be interpolated at 1m intervals after the above points are plotted. The contours shall not be just interpolated but properly surveyed on the ground so that features falling between the two distributed over the entire area shall be located and levels taken so that accurate contouring can be done. At places of sharp curvature or abrupt change in direction and elevation, points selected shall be close to each other. Salient points on ridge lines and valley lines shall also be measured. Levelling operation shall always start from main/subsidiary stations whose levels are based on the bench mark established in the survey area and end on the same.

d) Providing survey instruments (Total station), construction equipment, tools & plants, materials, laborers, qualified surveyors, clearance of jungles, cutting of trees, earth work, scaffoldings, transport, supervision by competent engineers/surveyors, testing of materials, full insurance and all other incidental items as may be necessary for successful completion of the surveying , mapping and construction works, etc.

e) Furnishing all field data and scaled drawings, survey report on CD (3 copies) apart from 3 sets of hard copies as per the approved layouts.

f) Furnishing survey report as described in details in the succeeding paragraphs is also included in the scope of work.

The survey report should also cover the following.

i. General site observation such as location of drainage, trenches, overhead structures, electric lines, structures on the ground, buildings, access roads, water bodies, etc.

ii. Presence of any well and /or tube well in the site and water level in them shall also be indicated.

iii. Details of trees with their name, numbers and girths.

iv. All levels should be connected with MSL and MSL value shall be transferring from any GTS bench mark.

Existing drainage pattern of the site, possibility of water logging and high flood level of the area. Submission of draft survey reports for review/comments followed by submission of final report incorporating the comments, if any, shall be done at no extra cost.

2. Time line and Terms of Payment

The entire survey activities at site shall be completed within a period of 35 days of issue of firm work order or handing over the site whichever is later. The draft survey report shall be submitted within 45 days of issue of firm work order. Final report shall be submitted in the required manner specified above within 5 days of receiving instruction from Engineer-in-charge.

The payment shall be released at the completion of the following stages **and please note that the payment shall be released only after receipt of the fee from Inland Waterways Authority of India (IWAI) to KITCO Ltd for the subject work.**

Sl. No.	Payment Milestones	Payment (%)
1	Mobilization of survey team and required equipment	20%
2	Completion of all site activities including fixing of permanent bench marks and reference pillars.	20%
3	Upon submission of draft survey report along with the required number of soft & hard copies.	40%
4	Upon approval of final survey report and submission of required number of soft & hard copies	20%

Please acknowledge the receipt of the 'Letter of Award of Work' and return the duplicate copy of this letter duly affixed with your signature and seal as token of acceptance.

Thanking you,
Yours faithfully,

Managing Director
Kitco Ltd.

Annexure 1

Sl.No.	Description	Unit	Qty	Pinnacle Infrastructure Consulting	
				Rate	Amount
1	Mobilization and demobilization of survey personnel and equipment including all materials required and incidentals for successfully carrying out as detailed in the scope of works.	LS	1	60000	60000
2	Carrying out the survey activities including fixing of permanent benchmarks and reference pillars as detailed in the scope of works. (actual quantity as per the survey report shall be considered for payment).	Acre	24	11000	264000
3	Processing and analysis of collected data and preparation of draft report including compiling, printing and submission of specified number of copies of reports in hard and soft form as per the scope of works	LS	1	20000	20000
4	Processing and analysis of collected data and preparation of final report including compiling, printing and submission of specified number of copies of reports in hard and soft form as per the scope of works	LS	1	20000	20000
	TOTAL				3,64,000.00
	GST-18% will be charged				65,520.00
	GRAND TOTAL				4,29,520.00