



“Engagement of Agency for Geotechnical Investigation Work for 12.576 Km Elevated Viaduct from Canal Road to Badrabad Dead End (from Chainage 6904.984 to 19481.228) of Ahmedabad Metro Rail Project-Phase -III (B)”

TENDER NO.: GMRC/GEOTECH/PH-3(B)/2026

VOLUME - II

Spock of Work (SOW)

Gujarat Metro Rail Corporation (GMRC) Limited

(SPV of Govt. of Gujarat and Govt. of India)

Formerly known as Metro Link Express for Gandhinagar and Ahmedabad (MEGA) Co. Ltd.

Block No.1, First Floor, Karmayogi Bhavan, Behind Nirman Bhavan,

Sector 10/A, Gandhinagar: 382010,

Gujarat, India

Corporate Identification No (CIN): U60200GJ2010SGC059407

Scope of work:

1. The contractor shall carry out Geotechnical Investigation along the of Elevated Viaduct from Canal Road (Chainage 6904.984) to Badrabad dead End (Chainage 19481.228) Ahmedabad Metro Rail Project-Phase -III with time duration of 4 months.
2. The scope of the work for the above mentioned work shall encompass all of the following activities:
 - i. Drilling bore holes using Hydraulic rotary drilling rigs by wash boring method as per the directions of Engineer-in-Charge and as detailed in Technical Specifications and Schedule.
 - ii. Trial Trench excavation to be carried for the identification of utilities, at their own cost. If any utilities are damaged while boring. It is the responsibility of contractor to restore in consultation with concerned authorities at the contractor's risk and cost.
 - iii. Conducting Standard Penetration Tests in bore holes at regular intervals.
 - iv. Collecting undisturbed soil samples from bore holes at regular intervals subject to a minimum of two per bore hole as per I.S. Codes of practice.
 - v. Recording of water table level in the bore holes after completion of boring.
 - vi. Collecting rock core samples from bore holes and record the Rock Quality Designation (RQD) and Core Recovery (CR)
 - vii. Conduct all necessary laboratory tests on the samples collected as per Schedule and Technical specifications.
 - viii. Survey of bore holes for elevation and plotting of boreholes locations in plan.
 - ix. Preparation of report summarizing the details of soil / rock classifications, analysis of test data and recommending the type of foundations to be adopted for the proposed Viaduct / Underground /At-grade sections.
 - x. Providing core boxes, bottles etc., to preserve soil and rock samples.
 - xi. The scope of assignment shall also, inter-alia, include but not be limited to the following.
 - a) Site clearance and dismantling of obstructions before commencement of assignment.
 - b) After drilling the bore holes shall be filled up to the desired level and site shall be cleaned up and surface shall be restored to its original condition as per specifications immediately after the assignment.
 - c) Plate load test (As per IS-1888-1982; Method of Load Test on Soils) need to be carried out wherever shallow foundations at the depth of 2m to 3m, as per the direction and requirement of GMRC, for which payment shall be done as per the provision of the contract.
 - d) Recommendations for soil stabilization at the marshy land location as per the soil investigation report.
 - e) Unconfined compression test on clay samples is to be carried out as per IS 2720 X 1973.

- f) All the tests to be carried out at Ahmedabad based NABL accredited laboratory. All test reports shall have seal and signature of the qualified Geo Technical expert.
- g) Contractor to deploy Personnel (including Geo Technical expert) and Equipment & Machinery consistent with the requirements for completing the assignment.
- h) All equipment provided shall be of proven efficiency and shall be approved by the Engineer for their fitness and efficiency before commencement of assignment. Any additional equipment or machinery at any stage is required; the contractor has to mobilize the same to complete the assignment. No equipment will be removed from the site without the permission of the Engineer.
- i) The assignment covers the supply digital record of project events in digital format (DVD/Flash Drive) including coloured photographs mounted on albums to serve as a permanent record of the assignment needed for an authentic documentation, as approved by the Engineer. Supply of project record in digital format in two copies including video recordings updated on monthly basis throughout the investigation period shall be submitted to GMRC. This item is not a payable item and it is incidental to the assignment.
- j) The necessary approvals from Traffic Police and concerned departments to be obtained by the consultant/Agency. However, GMRC will facilitate the agency for obtaining the permission. The consultant/Agency will ensure the identification of utilities by trial trenching before starting of borehole assignments. After completion of the boreholes/trial trenches, the excavated portion of the road/footpath to be reinstated by the consultant/Agency. The Geo-technical agency shall ensure all necessary safety measures during the investigation.
- k) Variation in Quantity of Items Covered by the Bill of Quantities (pricing document): The quantities of items shown in the Bill of Quantities are approximate and liable to vary during the actual execution of the Assignment. The Consultant shall be bound to carry out and complete the stipulated assignment, irrespective of the variations in individual items specified in the Bill of Quantities.
- l) Survey coordinates for the bore hole locations at site shall be provided by GMRC.

TECHNICAL SPECIFICATIONS

SOIL INVESTIGATIONS:

1) Boreholes

- a) Boreholes shall be drilled at specified locations as per alignment of tender drawing to obtain information about the sub-surface soil, and to collect soil and rock samples for strata identification and laboratory testing. The minimum diameter of borehole shall be 150mm in soil and NX size (75 mm approx.) in rock and the boring shall be carried out in accordance with the provisions of IS 1892 and as per specifications. Bore holes shall be advanced using water only. If any slush is there, the same should be cleaned during and after completion of boring. Casing may be required to maintain the sides of the boreholes in a stable condition. Rock boring shall be carried out using a double core barrel / triple tube having a diamond to get higher Core recovery.
- b) Use of Bentonite slurry/Polymer for drilling is prohibited. However, use of polymer or equivalent material shall be permitted after approval by Engineer/GMRCL.
- c) All boreholes of Elevated corridor shall extend up to a depth as directed by the Engineer. When the boreholes are to be terminated in soil strata, the Standard Penetration Test shall be carried out at the termination depth and Recorded.
- d) Casing shall be used in the boreholes to support its sides, if required. When casing is used it shall be ensured that its bottom end is, at all times, within 150mm above the bottom of the borehole. In case of cohesion less soil, the advancement of the casing 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. Casing can be withdrawn after inspection of bore hole by the Engineer with his approval. No extra payment shall be made for providing the casing or its withdrawal, etc.
- e) In-situ tests shall be carried out in accordance with the approved methodology. Disturbed and undisturbed soil/rock samples shall be retrieved from the boreholes at specified intervals, as per the Engineer requirement the number of tests shall be carried out. Representative samples shall be sealed, labelled, and preserved in suitable containers for subsequent identification and classification tests in the laboratory. The groundwater table level in each borehole shall be measured at the time of drilling, and any variations shall be carefully recorded in the drilling log.

- f) The borehole shall be cleaned, using suitable tools up to the depth of testing or sampling, ensuring that there is minimum disturbance of the soil at the bottom of the borehole. The process of letting through an open tube sample shall not be permitted. In cohesive soils, the borehole may be cleaned by using a bailer with a check valve.

2) Rotary Drilling

- a) Only Hydraulic rotary drilling rigs shall be permitted for boring. In this method, boring shall be done by rotating the bit fixed at the bottoms of the drill rod. Proper care shall be taken to maintain contact between the bit and the bottom of the borehole at all times.
- b) As a rule, only Hydraulic rotary drilling rigs shall be permitted for the assignment. However, in very congested areas, where space is limited and logistics of transport of hydraulic rigs is highly problematic, Calyx drilling rig may be permitted to be used, purely at the discretion of the Engineer as an exception, at the same rates, terms and conditions. However, Engineer's decision in this regard shall be final.

3) Water Level Measurement

The water level in the borehole shall be carefully recorded and reported, when first encountered whilst drilling, the water level shall be measured every morning before recommencement of the drilling activities.

4) Standard Penetration Tests

SPT shall be conducted in all types of deposits at 3.0m intervals or at change of strata. The tests shall be carried out by driving a standard split spoon by means of 63.5 kg hammer (140 lbs) having a free fall of 76 cms (30 inches). Detailed procedure for testing as specified in IS 2131 shall be followed. The samples obtained in this split spoon shall be placed in an airtight jar or equivalent, labelled and preserved for identification tests in the laboratory.

5) Water Samples

- a) Samples of ground water shall be obtained from each bore hole when first encountered or unless specified otherwise.
- b) At the specified depth, water shall be pumped out so that fresh ground water flows into the borehole and the water sample to be collected as near to the bottom of the bore hole as possible. Care shall be taken in avoiding any contamination with surface water at any time. Water samples shall be collected in glass container of required capacity and labelled properly.

6) Field Permeability Tests

Field permeability / percolation tests shall be conducted to determine the water percolation in overburden soil / rock. Specifications of the equipment required for the tests and the procedure of testing shall be in accordance with IS 5529 Part-1.

a) Constant Head Method

This test shall be conducted in boreholes where soils have high permeability. Water shall be allowed into the borehole through metering system ensuring gravity flow constant head so as to maintain a steady water level in the borehole and reference make 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 borehole. The evaluation of water shall be observed at every 5 minute intervals. 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.

b) 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 borehole and a packer at the top of the test section. If the test has to be conducted at an intermediate 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-1. The test shall be repeated till constant records of water level are achieved.

7) Sampling

- a) Sufficient number of soil samples shall be collected. Disturbed soil samples shall be collected for field identification and conducting tests such as sieve analysis, Index properties, i.e. plastic & liquid limits, chemical analysis, etc. Undisturbed samples shall be collected to estimate moisture content, density, the physical strength and settlement properties of the soil.
- b) All accessories required for sampling and the methods of sampling shall conform to IS 2132 and IS 1892.
- c) All disturbed and undisturbed samples shall be collected at site as per IS: 1498/1970.
- d) All samples shall be identified with date, borehole number, and depth of sample etc., the tube samples shall be properly trimmed at the ends, waxed and suitably capped.

Soil samples shall be transported to the laboratory at the end of each working day with proper protection against loss and damage.

I. Disturbed Soil Samples

Disturbed soil samples shall be collected in boreholes at regular intervals. Samples, weighing approximately 1 kg shall be collected in boreholes at 3.0m intervals and change of strata or strata from a depth of 0.5m below ground level and at every identifiable change of strata to supplement the boring records. Samples shall be immediately stored in air-tight containers or equivalent and which shall be filled to capacity as much as possible.

II. Undisturbed Soil Samples

In each borehole, undisturbed soil samples shall be collected at regular intervals of 3m and at every change of strata subject to a minimum of two samples in each borehole. Undisturbed samples shall be of 100 mm dia and 450 mm length. Samples shall be collected in such a manner that the structure of the soil and the moisture content do not get altered. The collection of undisturbed samples may be stopped if SPT 'N' > 60. The specifications for the accessories required for sampling and the sampling procedure shall conform to IS: 1892 and IS: 21321. The undisturbed sample shall be immediately followed by SPT test, after the borehole has been cleaned.

III. 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 the wall friction, suitable precautions, such as oiling the surfaces, shall be taken. Undisturbed samples in very loose saturated sandy and silty soils and very soft clays shall be obtained by using a piston sampler, consisting of a sampling cylinder and piston system.

In soft clays and silty clays, with water standing in casing pipe, piston sampler shall be used to collect undisturbed samples. During this method of sampling, expert supervision is called for. Accurate measurements of the depth of sampling, height of sampler, stroke and length of sample recovered shall be recorded on the field log. After the sampler is pushed to the required depth, both the sampler cylinder and piston system shall be drawn up together, ensuring that there shall not be any disturbance to the sample which shall then be protected from changes in moisture content.

The ends of the tubes will be waxed and provided with caps. All samples must be transported to the laboratory at the end of each working day. The tubes shall be clearly marked to indicate the type of the sample.

8) Chemical Tests

Chemical tests shall be conducted on soils and water samples as per relevant BIS (latest revisions) to report the following:

- PH value
- Chlorides in ppm & percentage
- Sulphates in ppm and percentage

9) Presentation of Drilling Information and Core Description

Daily drilling reports confirming to IS: 4464 shall be prepared and submitted to the Engineer. Within 24 hours of completion of each borehole a field borehole log shall be prepared by a competent engineering geologist or geotechnical engineer. The log will include description of the materials encountered and shall include the observations made during drilling including the samples obtained along with the depth, SPT. N-Value and relevant information. This shall conform to IS: 4464 and shall be submitted in triplicate to the Engineer-in-charge. The contractor must seek the approval of the Engineer for the borehole log format. On completion of all drilling and test, a factual report shall be prepared (see clause 5.0).

ROCK INVESTIGATION

10) Drilling

Rotary core drilling shall be adopted by open holing through soft materials, or by drilling ahead in soft ground boring which has already been made. The substrata to be cored, may be soft, or may contain mixture of hard rock and soft weathered rocks. The drilling equipment used shall have an adequate capacity so as to ensure that required depths are reached and good quality rock core is recovered. The drilling equipment shall be hydraulically operator. The equipment, method and the procedure for drilling shall conform to IS:1892. Drilling shall be carried out using NX size diamond tipped drill bits only, a double core barrel with core catchers shall be used to ensure continuous and good core recovery. Core barrels and core catchers shall be used for breaking off the core and retaining it when the rods are withdrawn, double tube core barrels shall only be permitted. Water shall be circulated continuously down the hollow ratio shall be aimed at in order to get a satisfactory undisturbed sample. Core of 1.5m length shall be aimed at. If the Engineer determines that poor core recovery is due to the inability of the drilling crew, a new borehole will be drilled at no cost to the client. No drilling run shall exceed 1.5m in length. If the core recovery is less than 80% in any run, the Engineer shall be informed and the length of subsequent run shall be reduced to 0.75m. Prior to commencement of the drilling operations, the rig shall be properly weighted down, or anchored, so as to minimize vibrations and ensure maximum core recovery. Full observations in respect of the colures and nature of the return drill water, water loss and permeability, speed of drilling, core loss and other relevant details, shall be described a per relevant IS codes.

- 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 depth through which a uniform of penetration was maintained, the depth at which marked change in rate of penetration or sudden fall of drill rod occurs, the depth at which any blockage of drill bit causing core loss, if any, shall be recorded.
- c) Any heavy vibration or torque 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, observations of gas discharge with return water etc., shall also be observed and reported.

11) Extraction and Storing of Core Samples

Core samples shall be extracted by the application of a continuous pressure at one end of the core with the barrel held horizontally without vibration. Friable cores shall be extracted from the barrel directly into suitable sized half round plastic channel section. Core shall be taken to maintain the direction of extrusion of sample same as while coring. Immediately after withdrawal from the core barrel, the cores shall be placed in a tray and transferred to boxed specially prepared for the purpose. The boxes with a study cover shall be made from Aluminum or any other suitable 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 when core is recovered, it shall be recorded as specified in the standard and the engineer should be informed so that remedial measures can be implemented. Continuous record of Core recovery and RQD to be mentioned in the log as per identifiable manner and transported and handed over to the Engineer on completion of each bore hole. All core boxes shall be photographed and the photos attached to the report. The photographs shall show the rock core box clearly labelled indicating project name, borehole number, and depth stored in the core box and the serial number of the box for the bore hole (e.g. box 2 of n).

12) Laboratory Testing

Laboratory testing consisting of determination of index properties and engineering properties of soil and rock samples and chemical analysis of soil and ground water as per IS codes shall be done. Analysis of tests results and preparation of detailed report incorporating field and laboratory test data, stratigraphy with RL of boreholes and recommendations for appropriate foundation system.

The following laboratory tests are to be conducted on soil, water and rock samples collected from bore holes:

Test on soil samples:

- i. In-situ density and moisture content.
- ii. Grain size analysis
- iii. Natural moisture content
- iv. Liquid limit, Plastic limit
- v. Specific gravity
- vi. Tri-axial compressive strength
- vii. Direct shear
- viii. Unconfined compressive strength
- ix. Consolidation
- x. In-situ permeability
- xi. Chemical analysis to determine chlorides and sulphates.

Test on Rock samples:

- i. Density
- ii. Water absorption
- iii. Specific Gravity
- iv. Hardness
- v. In-situ Percolation
- vi. Crushing Strength
- vii. Shear Strength
- viii. Point Load Index
- ix. Modulus of elasticity

Tests on water samples:

Chemical analysis to determined pH, chlorides and sulphates. The above tests have to be carried out as per guidelines given in the relevant Indian and International Standards. At the completion of the borehole the field log should be submitted to the Engineer along with testing schedule within 24 hours.

The contractor shall obtain the consent / approval for Engineer for the proposed testing schedule before proceeding for testing. The Contractor shall intimate the date, time and place of the testing samples well in advance so that the Engineer, if he so desires, may visit to witness the tests in the laboratory.

Necessary laboratory tests shall be conducted on selected samples in consultation with the Engineer. For this purpose, all undisturbed samples shall be entered in the preform shown in relevant IS Codes and submitted, in triplicate, to the Engineer with records of the field bore logs. All tests shall be performed as per IS: 2720 (relevant parts) and as per the directions of the Engineer as directed.

13) Testing of Rock Samples

Selected core samples shall be tested in the laboratory. In each borehole, the rock samples shall be tested at regular interval of 3.0m and at every change of strata subject to a minimum of three samples in each borehole. Test samples shall be chosen so as to include joints, fissures etc., as far as possible.

Point Load Test on Rock Cores

Intact samples of minimum 50 mm diameter and length equal to 1.5 times the diameter should be tested on a Point Load Tester and its Point load index shall be determined. The Uniaxial Compressive Strength (UGS) of the sample should be calculated from the Point load index. The index as well as the UGS should be reported.

Uniaxial Compressive Strength of Intact Rock Samples: Intact rock cores of minimum NX size and length 2.5 to 3 times the diameter should be tested for its uniaxial compressive strength. This test should be conducted on perfectly cylindrical samples. Which shall be polished and conform to Indian Standard Code of Practice. The UGS of the sample should be reported along with the diameter and length of the sample.

14) Laboratory Tests

Tests as indicated in the specifications and as called for by the Engineer, shall be conducted as per the Bill of Quantities.

Direct shear and Triaxial tests shall both be conducted at same depth for same material obtained from one sampler at least at two locations in each bore hole to find out the values of cohesion and the angle of shearing resistance. The tests shall be carried out, for all conditions and their specific engineering significance should be maintained. However, conditions of test i.e., unconsolidated undrained, consolidated drained etc., shall be as per specific instructions of the Engineer.

The analysis of above data shall include calculations for self-standing height, de-watering requirements including capacity of pumps and number of pumps and shall be included in report in detail.

All soil testing as directed by Engineer shall be conducted in a Laboratory holding current accreditation under ISO / Bureau of Indian Standards.

15) Report

Intermediate Reports in four copies on completion of every 10 boreholes and Final Report in four copies on completion the assignment in all respects shall be submitted incorporating the following.

A complete description of the soils and rocks encountered, along with insitu test results and the samples types of depths.

Procedure of investigation employed.

Detailed bore hole logs, laboratory and field test results, both in tabular as well as in graphical form, and a plot showing locations and reduced levels of bore holes and other tests.

Soil classification curves including Table indicating D-10, D-30, D-60 size uniformity coefficient etc., these figures should be made on Auto Cad and submitted to GMRCL on pen drive / CD.

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

Aggressiveness of soil and soil water to concrete, steel and other building materials. Any other information of special significance encountered during investigations and likely to have a bearing on design and investigation. Reduced levels and coordinates of bore holes shall be tabulated. The depth of water table with respect to ground shall also be given.

Detailed report giving recommendations for type of foundation, analysis of bore logs & test results along with Safe Bearing Capacity values, Soil stabilization measures. Final report shall be submitted only after incorporation of comments by the Engineer.

Four copies of report including all figures shall be given to GMRCL. Computer pen drive/CDs for this report and figures shall be submitted by contractor to GMRCL. Any data supplied by GMRCL shall not be used for any other purpose other than it is meant for.

The data, reports and figures generated out of this assignment shall be the sole property of GMRCL and the contractor shall give an undertaking that he shall not use this for any other purpose. No computer back-ups shall be kept by him.

All the location of bore hole points shall be marked on drawing giving horizontal coordinates and reduced levels. The reduced levels of the top of bore holes shall be inter linked with the GTS Bench Marks in Co-ordination with the Bidder during the detailed Field Survey.

Safety Requirements to be followed under the Contract:

1. Barricading and Work-Zone Management: Adequate and sturdy barricading shall be provided around all work areas to prevent unauthorized access. Barricades must be reflective, stable, and maintained regularly to ensure visibility during day and night. Signage's indicating "Work

- in Progress,” “Restricted Area,” and directional warnings must be displayed at all times. Open excavations, edges, and hazardous zones shall be continuously monitored and re-secured after material movement.
2. The Contractor shall ensure smooth and safe traffic movement at all times and shall provide adequate traffic marshals, proper barricading, and necessary signage in accordance with approved traffic management plans.
 3. Injury Prevention and Incident Management: All incidents, near-misses, and unsafe conditions must be reported immediately to the Safety Officer and recorded in the Incident Register. First-aid facilities and trained first-aiders shall be available at site at all times. Emergency contact numbers and evacuation routes shall be displayed prominently across the site. Corrective and preventive actions (CAPA) shall be implemented after every incident.
 4. Housekeeping and Site Cleanliness: Site shall be kept clean and free of debris at all times to avoid slips, trips, and falls. Materials must be stacked in a safe, stable, and designated manner. Pathways and access routes should remain unobstructed. Waste shall be segregated and disposed of as per environmental guidelines.
 5. Lifting Appliances and Lifting Gear: All cranes, lifting equipment, wire ropes, slings, and shackles must have valid third-party inspection certificates. Pre-use inspection shall be carried out daily by a competent person. No lifting activity shall be carried out without an approved lifting plan and supervision by a certified lifting supervisor. Overloading of lifting appliances strictly prohibited.
 6. Site Electrical Safety: All temporary electrical installations must comply with IS/IEC safety standards. Only authorized and licensed electricians shall operate or modify electrical panels. Use of ELCBs/RCCBs is mandatory on all temporary power circuits. Cables shall be routed properly, elevated where necessary, and protected from mechanical damage. Regular insulation-resistance testing must be carried out and recorded.
 7. Hand Tools and Power Tools: Tools shall be in good working condition, free from defects, and used only for their intended purpose. Power tools must have proper grounding and intact protective guards. Damaged or faulty tools shall be removed from service immediately. Users must be trained and competent in operating the tools safely.
 8. Labour Welfare Measures: Clean drinking water, sanitation facilities, rest shelters, and first-aid centers must be provided. Adequate lighting, especially in night shifts, must be ensured. Workers shall undergo regular health check-ups as mandated. Availability of emergency transportation (ambulance/vehicle) must be ensured.
 9. Personal Protective Equipment (PPE): Mandatory PPE includes safety helmet, safety shoes, reflective jacket, gloves, and safety goggles. Additional PPE like harnesses, ear protection,

welding shields, or respirators must be provided based on task-specific risks. All workers must be trained in correct usage and maintenance of PPE. Non-compliance with PPE guidelines shall attract disciplinary action.

The following table indicates the Safety, Health and Environment violation (unsafe act / unsafe condition) and charges to be recovered from contractors.

S. No.	Topic	Unsafe Act/Unsafe Condition	Amount of Penalty
1	Housekeeping	i) Surrounding areas of drinking water tanks/taps not hygienically cleaned/maintained ii) Office, stores, toilet/urinals not properly cleaned and maintained iii) Openings unprotected iv) Excavated earth not removed within a reasonable time v) Wooden scraps, empty wooden cable drums lying scattered vi) Water stagnation leading to mosquito breeding	Rs. 5,000/- per single violation Compounded to a maximum of Rs. 25,000/-at any single instance.
2	Barricading and traffic management	i) Unprotected work without barricading ii) Non- deployment of traffic marshals	Rs. 5,000/- per single violation Compounded to a maximum of Rs. 25,000/-at any single instance.
3	Lifting appliance and gear	i) Non availability of fitness certificate. ii) Documents not displayed on the machine or not available with the operator. iii) Maximum Safe Working Load not written on the machine. iv) Automatic safe load indicator not provided or not in working condition. vii) Non compliance of any of the items mentioned regarding rigging requirements. viii) Absence of portable fire extinguisher in driver cabin ix) Fail to guard hoist platform x) No fencing of hoist rope movement area iv) Hoist platform not in the horizontal position.	Rs. 25,000/- per single violation compounded to a maximum of Rs. 50,000/-at any single instance.
4	Injury and incidence	i) Fatal accidents ii) Injury accidents iii) Abnormal delay in reporting accidents or wilful suppression of information about any accidents/dangerous occurrence. iv) Delay in informing about any	i. Rs. 2,00,000/- for first fatality and Rs. 5,00,000/- for every subsequent fatality ii. Rs. 1,00,000 for first grievously injured person and Rs. 2,00,000 for every subsequent grievously

		accidents/dangerous incidents	injured per son (Grievous injury as defined by Workmen Compensation Act) iii. Rs. 50,000/- For items iv) Rs. 50,000/- for first violation and Rs. 1,00,000/- for subsequent violations
5	Site Electrical safety	i) Exposed electric lines (fermentative damage) and circuits in the workplace ii) Inserting of bare wires into the socket iii) Improper grounding for the electrical appliances iv) Electrical cables running on the ground	Rs. 5,000/- per single violation compounded to a maximum of Rs. 25,000/-at any single instance
6	Hand tools and Power tools		Rs. 5,000/- per single violation
7	PPE	i) Not having ii) Not wearing (or) using and kept it Elsewhere iii) Using damaged one iv) Using wrong type v) Using wrong colour helmet or helmet without logo vi) Using for other operation (.e. Using safety helmet for storing materials or carrying water from one place to other) vii) Not conforming to BIS standard	From item i) to vi) Rs. 2000 per single violation. For item vii) Rs. 5,000/- for first violation and Rs. 10,000 for subsequent violations.
8	Labour Welfare Measures	i) Non adherence of Labour welfare provisions of BOCWA ii) Fail to register establishment and display the registration certificate at workplace iii) Absence of workers register and records iv) Absence of muster roll and wages register v) Fail to display an abstract of BOCWA and BOCWR	Rs. 5,000/- per single violation compounded to a maximum of Rs. 25,000/-at any single instance

9	Occupational Health	<ul style="list-style-type: none">i) Fail to conduct Medical examination to workersii) Workers not having ID cardiii) Inadequate number of toiletsiv) Absence of water facilities for toilets and washing placesv) Absence of drinking watervi) Absence of first-aid person in work sitevii) Absence or inadequacy of first-aid boxviii) First-aid box not satisfy the minimum Indian standardix) Drink and drive or work	Rs. 5,000/- per single violation compounded to a maximum of Rs. 25,000/- at any single instance
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Appendix-1

1. The Contractor will be required to achieve the Mile stones to be calculated from the respective 'Date of commencement of assignment for each of the following contract packages.
2. ENTIRE ASSIGNMENT

Description	Duration in Months from D
Completion of entire assignment	D + 04 Months

Note: D= Date as specified in LOA.

3. Contractor to Deploy Equipment & Machinery consistent with the requirements for the completion of the Assignment.
4. MILESTONES:

SI No	Deliverables	Number of days/months from ' D '
1	Inception Report	15 days from the date of commencement of assignment.
2	Intermediate Reports	After completion of every 10 boreholes
3	Completion of field assignment submission of Draft Report	110 days from the date of commencement of assignment.
4	Submission of Final Report	04 Months from the date of commencement of assignment.

5. The Contractor shall complete the milestones and associated works as specified above. Failure to achieve the specified milestones or complete the works within the stipulated timelines shall render the Contractor liable for a penalty as determined by Employer, maximum up to ten percent (10%) of the Contract Value.