

## Geotechnical Investigations in the alignment of Outer channel at VOCPT, Tuticorin

### Clarifications to queries of prospective bidders at pre-bid meeting on 9.10.2019

S.No	Reference Clause	Bidder's Observation	Clarification of NTCPWC
1	Liquidated Damages (Cl 2.11(pg 9))	Since Jack-up & supporting tug will be supplied by NTCPWC, the delay due to shifting is not in our control. So the LD clause may be deleted.	Please refer Note under Sec 3.3 & Amendment No. 2 now enclosed.
2	Completion of Project (Cl 2.14.2—pg 10)	1.The completion of the field work is entirely depending upon the efficiency of the jack up barge, the supporting tug for the shifting and their crew. 2.Kindly confirm the no. of boreholes to be done and the completion period.	Merely a statement. No remarks.  Pl refer to Sections II, IV & Amendment No. 2.
3	Scope of Work (Sec 3.3-Pg 14)	1.Please provide the specification of the Jack up barge with GA plan.  2.Is jack up fully hydraulically operated? please confirm. 3.Is moon poll located at the centre of jack up barge please confirmed.  4.Kindly let us know this specification of the supporting tug- 5.How much time will it take for shifting one bore hole location to another? 6.In case jack up barge or tug is on standby due to technical/mechanical issues can contractor claim stand by charges, what about stand by charge for men and machineries 7.Is the crew transfer boat in our scope or will NTCPWC provide?	The details including drawings are included under Section V as part of Amendment 2  Yes  Yes, the drilling rig can be positioned at the centre of this modular pontoon type jack up barge Not relevant to present work  As per tender  Refer to Note under Clause 3.3 of Section III and also BoQ  It is the responsibility of the contractor.

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4		In case rock is encountered at shallow depth what is the size of coring: P H or N.	Please refer to Amendment no. 2
5		Number of lab tests not mention in the specification. please clarify.	Please refer to Amendment number 2
		Investigation techniques not mention in BoQ	Revised and included in Amendment no. 2
	General	<p>1.Geophysical report / data</p> <p>2.Formalities for harbour entry pass :</p> <p>3.Likely award date</p>	<p>Will be shared with the successful bidder, if reqd.</p> <p>As per standard procedures prevailing at VOCPT; photo identification documents of the crew to be produced at the port.</p> <p>Within the period of validity of offer</p>

Note: The last date for submission of Bid is extended to 30.10.2019 (Wednesday) to able prospective bidders to take note of the Clarifications & Amendment 2 to the tender.

**Amendment No.2 dated 18.10.2019**

1.The following clause is issued in supersession of clauses 3.3.1 to 3.3.4,3.4 and 3.5

**3.3.1 General**

The work which comprises drilling minimum 100 mm dia boreholes up to 8m depth below the existing bed levels of the navigation channels /basin of VOCPT shall include mobilization of necessary equipment, providing necessary qualified technical personnel, skilled and unskilled labour, and such others as required to carry out field investigations and tests, laboratory tests and analysis & interpretation of data and results and preparation of a detailed soil profile report as directed by the Engineer.

**3.3.1.1 Codes and Standards**

All works shall be carried out strictly in accordance with the technical specifications unless otherwise approved or instructed by the Engineer or his representative in writing. The latest editions of one or more of the followings BIS codes of practice and guidelines to achieve best possible result. The list provided below is not exhaustive.

IS : 1892 - Code of practice for Site Investigations for foundations

IS : 2131 - Method of Standard Penetration Test for soils

IS : 2132 - Code of Practice for thin walled tube sampling of soils

IS : 10108 - Code of practice for sampling of soils by thin wall sampler with stationary piston

IS:1498 - Classification and identification of soil for general engineering Purposes

IS : 1888 - Method of load tests on soils

IS : 2720 (Part I to XXXXI)- Method of test for soils

IS : 4434 - Code of practice for In Situ Vane Shear Test for soils.

IS : 4968 (Part I to III) - Method of sub-surface sounding

IS : 5249 - Method of Test for determination of In situ dynamic properties of soils

IS : 5529 - Code of practice for In situ permeability tests

IS : 5313 - Guidelines for core drilling observations

IS : 4078 - Code of practice for indexing and storage of drill cores

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- IS : 8763 - Guide for undisturbed sampling of sands and sandy soils
- IS : 10042 - Code of practice for site investigations for foundation in gravel boulder deposits.
- IS : 2809 - Glossary of terms relating to soil engineering
- IS : 2810 - Glossary of terms relating to soil dynamics
- IS : 7422 (Part I to IV) - Symbols and abbreviations for use in geological maps, sections and sub-surface exploratory logs.
- IS : 6935 - Determination of water level in a borehole

### **3.3.2 Objects**

The primary object of this soil investigation is to ascertain the type of sub-strata such as soil, rock, etc., and their characteristics throughout the depth of each borehole. All the tests that are considered necessary in the opinion of the Engineer shall be conducted. Any additional tests/works, change in the number, location and type of specified tests, change in the diameter, depth of boreholes, samples to be collected etc., shall be carried out as directed by the Engineer.

### **3.3.3 Field Tests**

As mentioned earlier, boreholes shall be taken down to a depth of 8 M below the existing bed level for each borehole. The tentative locations of the boreholes are shown in the below drawing. The exact location of each borehole at which the soil samples collected shall be mentioned with respect to the Northing & Easting Coordinates. The contractor shall set out the location of each bore in consultation with the Engineer (or) his representative during execution.

### **3.3.4 STANDARD PENETRATION TEST (SPT)**

#### **3.3.4.1 General**

The test shall be carried out as per the latest version of IS:2131. The provisional locations are shown in drawing for the information and guidance of the Tenderer. SPT shall be carried out in the boreholes at 2 m intervals or at each change of strata/layer. The spacing shall be reduced appropriately for their inner strata.

#### **In-situ Vane Shear Tests (VSTs)**

In-situ vane shear tests shall be conducted in soft to firm clays, sensitive clays and clayey strata which are highly susceptible to sampling disturbances.

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The tests shall be conducted in accordance with IS: 4434. For vane testing instruments that do not read the torque directly a calibration curve to convert the readings to Newton metre of torque shall be provided. These calibration curves shall be checked periodically.

### **3.3.4.2 Diameter of Boreholes**

The minimum diameter of the boreholes is 100 mm and the contractor shall provide and use modern drilling equipment capable of satisfying the following requirements:

- equipment capable of taking 450 mm x 100 mm dia undisturbed samples from cohesive soil
- equipment capable of taking 100 mm minimum dia undisturbed continuous samples from soils other than rock

The boreholes shall be of sufficient dimensions so as to obtain such samples and cores and to enable the specified in-situ tests to be carried out. The diameters specified shall be obtainable at all the depths.

### **3.3.4.3 Equipment**

The equipment for conducting SPT shall conform to IS: 2131 and IS: 9640. Following points may be particularly observed:

- a) The equipment used shall be rotary drill (calyx type) and heavy-duty shell and auger capable of making a borehole of minimum 150 mm dia. The drilling rods shall be standard 'A' selection with 41 mm outer dia and square threaded ends;
- b) The drilling rods shall not have any bends, the inside shall be clean without any blockages and should maintain verticality, when connected together or with any test equipment;
- c) The cutting edge of the standard penetration spoon and disturbed sampling tube shall be free from any bends/damage and shall have dimensions as per specifications. The undisturbed sampling tube shall have minimum of 100 mm dia and area ratio shall be within 10% for soft clay and 15% for other soil types. The undisturbed tube connector shall have a non-return ball valve and slush tube. Cutting shoes shall be clean, sharp and without burred edges; and
- d) The hosepipe and swivel shall be in good condition with proper joints to ensure no leakage and effective circulation of bentonite slurry.

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### 3.3.4.4 Drilling Methods

Boreholes may be sunk to the required level by shell and auger method or by rotary drilling method or by any other method approved by the Engineer. Drilling by wash boring method or by percussion method shall not be allowed under any circumstances. Where the advance of a shell and auger borehole is obstructed by cobbles, boulders or a layer of hard cemented or other tough material, the use of chisel may be adopted to penetrate these strata. Use of chisel shall be permitted in strata where SPT-N value is greater than 100 blows per 30 cm of penetration. If the advancement of boring by chiseling is less than 20 Cm. in 4 hours time, borehole shall be advanced by coring.

In case, obstruction(s) in the form of bedrock, boulder, concrete, brickwork, timber or other natural or man-made object is/are encountered, which prevents further progress in boring by shell and auger method or by rotary, auger method, the Contractor shall attempt to break-through by chiselling, if approved by the Engineer. If little or no progress is made by chiselling, under suitable instructions from the Engineer, the contractor can use rotary coring method to drill through and obtain cores of the obstruction, in which case the cores shall have a diameter of not less than stated in the particular specifications. If the boring shows that the obstruction is bedrock, the rotary core drilling shall be continued to the depth required by the Engineer and to the diameter specified to prove the continuity and engineering characteristics of the formation. If the obstruction is found to be a boulder, ledge of a rock or other object underlain by soil, the contractor shall consult with the Engineer and confirm the use of the following lines of action:

- a) chisel out the cored borehole through obstruction, sufficient to allow shell and auger boring, in situ sampling and testing to continue below the obstruction;
- b) continue the boring by rotary core drilling to the required depth of the borehole at the diameters referred to in the particular specification. Then the contractor shall consult with the Engineer as to whether or not it is necessary to obtain undisturbed samples of the soils in a nearby borehole at the levels beneath the obstruction; and
- c) abandon the borehole and drill another one nearby to obtain the necessary samples.

In no case, any drilling mud or other material other than clean water should be introduced into

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the boreholes at depths where permeability tests are required. In case of rotary drilling, the stabilization shall be achieved by bentonite slurry of approved quality as approved by the Engineer.

During drilling operations, care shall be taken to avoid the risk of piping and any unnecessary disturbance to the material at the bottom of the hole. All precautions to ensure the identification of soils penetrated and the recovery of all samples shall be observed. At the beginning and end of each shift, the time of the day, depth of borehole, depth of casing and water level shall be recorded. Any abnormal loss or inflow of water shall also be recorded.

The tenderer shall submit full details of the main items of equipment, he proposes to use for the work and the proposed drilling method.

### **3.3.4.5 Casing:**

A casing pipe of suitable dia depending upon the borehole dia and minimum 1.5 to 2 m length shall be provided at top to prevent caving in of the soil in all boreholes. The contractor shall ensure that casings are of suitable size and are inserted in such a manner as to render them recoverable.

The bottom of the casing shall always be maintained near the bottom of the hole not more than 150 mm below the bottom of the borehole and casing shall never be driven below any level at which sampling or testing is to be commenced, until the sampling or testing at that level has been completed.

The casing shall be driven or pushed under static force. If very stiff soil or cemented strata is encountered, which is capable of maintaining the borehole without casing pipe, boring can be done beyond that level with the prior approval of the Engineer's representative.

Casing shall not be removed from any hole until written permission is given by the Engineer's representative. This permission is normally given on completion of the borehole.

The rates for boring shall include, the supply, insertion and recovery of casing and any damage, loss or delay caused by difficulty or failure in insertion or recovery of the casing.

### **3.3.4.6 Rejection of Boreholes:**

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In case, any borehole cannot be completed according to the specifications, because it has been drilled off line or caving in has occurred or because tools are jammed in the hole or for any other reasons, the Engineer may order the work to be discontinued at the location and the hole to be drilled at a nearby location to be designated by the Engineer, a fresh In which case no payment will be made by the Port for the rejected borehole.

However, should a borehole be prematurely terminated due to the presence of an obstruction, whereby the process of boring and sampling cannot be normally continued, a new bore hole shall be drilled at a location not more than 10 m away from the original location or as the Engineer's representative may decide.

Provided the Engineer's representative has been properly informed of any such situation and has given instruction for the borehole to be repeated. Payment shall be made for such prematurely terminated bore hole also to the extent executed.

### **3.3.4.7 Borehole Depth:**

All the boreholes shall be drilled to the required depth as directed by the Engineer's representative.

## **3.4 Reporting:**

The reduced level of each investigation point shall be obtained and reported. Other information like highest/lowest water levels, max flood water level etc., if relevant shall be noted. All depths shall be recorded in meters and levels shall be indicated with reference to the Chart Datum (CD). Logs of all boreholes shall be given on standard forms, providing narrative and graphical description of soils and soil strata in accordance with the relevant BIS codes details of samples taken and an account of all observations and field tests.

During drilling operations, the excavated soil from auger or the wash sample (in case of rotary drill) shall be continuously inspected by the contractor and the level of change in strata be recorded to nearest 5 cm level.

The following requirements shall be complied with in producing the final borehole logs:

- i) The logging of the soil layer penetrated shall be based on IS : 1892



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ii) All boreholes shall show:

- 1) Borehole number;
- 2) Date of boring;
- 3) Type and diameter of boring;
- 4) Diameter and depth of casing;
- 5) Description of soil layers and the levels of its boundaries;
- 6) Description of rock layers if any, and state of weathering and the levels of its boundaries;
- 7) Description of all discontinuities including sheared zones, jointing, joint spacing and joint inclination;
- 8) Percentage core recovery;
- 9) The levels and results of all in-situ testing and
- 10) A record of drillers' observations on progress of boring, rate of penetration, method of coring, type of bit and speed of rotation of bit.

### **3.5 SOIL SAMPLING**

#### **3.5.1 General**

In general soil samples shall be collected at every 2 m or at the change of strata. (Disturbed or undisturbed or specified in situ test results) sample or in- situ test shall be attempted at beginning of each soil layer. The type of sample and the depth at which collected, shall be marked in respective logs of the boreholes with levels of sampling.

#### **3.5.2 Sample Size and Frequency of Sampling:**

The number of samples to be collected for each test and their frequency shall be as per relevant IS specification.

#### **3.5.3 Disturbed Soil Sampling:**

Only the cuttings from auger (when it is operated above GWT and without addition of water) and SPT spoon samples shall be collected as disturbed samples. Washed samples from rotary boring or auger samples below GWT shall not be collected.

A minimum quantity of 1.5 Kg. of soil sample shall be collected in a thick polyethylene bag and the bag shall be squeezed to remove the excess air in the bag and the mouth sealed by heat welding or tied air tight with thread/rubber bands. To the extent possible the natural moisture content of the sample shall be determined at site itself immediately after extraction. A stove with sand bath vessel may be used in place of oven for determination of moisture content in the field.

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### **3.5.4 Undisturbed Soil Sampling:**

Undisturbed samples of 100 mm dia by 450 mm length, at two numbers, in each borehole, within cohesive materials. These samples shall be taken from the bottom of the borehole, which has to be carefully cleaned before taking the sample. Undisturbed sampling techniques shall conform to the provision made in IS : 8763 and IS : 2132.

In all cases of undisturbed sampling within boreholes, care shall be taken to ensure that the borehole water level is maintained at or above the existing GWT. An adequate water supply shall be provided at each borehole for this purpose.

The sampler tube shall be preferably forced into the bottom at a steady rate by jacking or with a block and tackle or by a similar approval method. The method of advancing the sampler and tube shall be indicated by the contractor and shall be approved by the Engineer's representative. In case of using SPT hammer for lowering the sampling tube, the number of blows required for full penetration shall be recorded.

After removing the cutting shoe and the adopter if any, with the disturbed material they contain, the visible ends of the sample shall be trimmed of any disturbed soil and subsequently tested at the top and bottom ends by pocket penetrometer. Immediately thereafter both ends shall be coated with just molten micro crystal line wax in at least 3 layers of thickness 15 mm. Any space remaining in the ends of the sample tube shall be solidly filled with damp material approved by Engineer's representative and the ends of the sample tubes shall be protected from adverse effects of the weather including excessive heat, direct exposure to the sun or drying conditions during storage.

### **3.5.5 Labelling and Packing**

All disturbed and undisturbed samples shall immediately be labelled. Labelling shall be done with indelible ink and the labels shall be durable such that deterioration with the time does not occur.

Labels shall show the following information:

- Job and number of contract;
- Date of sampling;
- Reference number of the borehole;
- Reference number of the sample as designated in bore hole record;

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- Depth of top and bottom of sample below bed level; and
- Brief description of material of sample.

The contractor shall be responsible for packing of samples and their transportation to the laboratory in such a manner that all undisturbed samples arrive in the laboratory in an undisturbed state.

### **3.6 LABORATORY TESTING**

#### **3.6.1 General:**

The following tests are envisaged but actual testing need not be limited to these tests. The contractor shall furnish the testing programme for the laboratory testing. The samples shall be tested in a laboratory, approved by the Engineer's representative. The Contractor at his own cost shall furnish test certificates demonstrating the suitability and correct calibration of all the testing equipment that is to be used for conducting the testing issued by the Indian Institute of Technology, Chennai or any other similar Institute of National repute, approved by the Engineer. The contractor shall produce these certificates before commencement of laboratory testing for Engineer's representative.

#### **3.6.2 Soil Tests:**

##### **3.6.2.1 Classification of Tests:**

The following tests shall be carried out on the samples obtained from the boreholes:-

- i) Determination of moisture content as per IS:2720 Part II;
- ii) Determination of Atterberg limits as per IS : 2720 Part V;
- iii) Determination of unit weight and specific gravity of soil particles as per IS : 2720 Part III, Section 1 & 2;
- iv) Determination of particle size distribution both by Sieve analysis and by hydrometer analysis as per IS : 7220 Part IV; and
- v) Shrinkage factors as per IS : 2720 Part VI.

##### **3.6.2.2 Chemical Tests:**

The following tests shall be carried out on the samples obtained from the boreholes:

- i) Determination of organic matter content as per IS : 2720 Part XXI;
- ii) Determination of total sulphate content as per IS : 2720 Part XXVII;
- iii) Determination of Calcium Carbonate content as per IS : 2720 Part XXIII; and

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iv) Determination of the pH value as per IS : 2720 Part 26.

### **3.6.2.3 Compaction Tests**

Determination of the maximum and minimum dry densities.

### **3.6.2.4 Engineering Properties Tests**

- i. Shear strength parameters from consolidated un drained test with measurement of pore pressure as per IS : 2720 Part XII;
- ii. Consolidated drained test as per IS : 2720 Part XI;
- iii. Unconfined compression test as per IS: 2720 Part X;
- iv. Consolidation properties as per IS : 2720 Part XV; and
- v. Swell Index of soils and swelling pressure of soils as per IS : 2720 Part XXXX and XXXXI.

### **3.6.2.5 Compatibility and Strength:**

Water content and dry density relation using heavy compaction as per IS 2720 Part VIII.

Laboratory determination of CBR as per IS : 2720 Part XVI.

### **3.6.2.6 Water Tests:**

The following tests shall be conducted on water samples collected from boreholes and surface storage points :

- i) Chemical analysis and determination of pH value as per IS : 2720 Part XXVI;
- ii) Determination of Calcium Carbonate Content as per IS : 2720 Part XXIII; and
- iii) Determination of total soluble sulphates and chlorides as per IS: 2720 Part XXVII.

## **3.7 General Procedures and Reporting:**

The above mentioned tests shall be executed and reported in accordance with relevant latest version of IS codes and guidelines. In case of non-availability of IS codes for particular testing procedures, relevant BS codes may be followed as approved by Engineer's representative.

The laboratory tests must be carried out by an ISO certified laboratory, which needs to be approved by the Engineer's representative. Results of the laboratory testing shall be plotted on standard forms. Each form shall contain records of one test only with the exception of grain size distribution curves of which not more than 2 curves from consecutive samples from one borehole may be plotted.

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The plasticity Index shall be plotted against the liquid limit on the plasticity chart of Casagrande. These plots shall be used for classification of soils and the borehole logs. When laboratory tests are carried out on only a part of a soil sample, the remainder of the soil in the sample tube or container shall be resealed as soon as possible and retained until disposal as instructed by Engineer's representative.

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**TENDER FOR "GEOTECHNICAL INVESTIGATION AT VARIOUS LOCATIONS IN THE BASIN AND CHANNELS AT KAMARAJA R PORT"**

**SECTION-V**

Item No	Description of services <u>Financial Proposal</u>	Unit	Qty	Rates (in Rs)		Amount (in Rs)
				Figures	words	
1.	<p>Mobilisation and demobilisation of all the equipment/plant (excluding Jack-up barge/facility) at site for the execution of the proposed geotechnical investigation works, set up site organisation including the costs of staff and labour and all other services, etc., complete. Shifting of all the drilling equipment, men and materials from one borehole location to the next borehole location including accurate positioning, erection/dismantling of rig.</p> <p><b>Note</b>                      1.The jack-up platform shall be mobilized and positioned at each borehole location by other agencies engaged by NTCPWC. Shifting the jack-up platform after completion of work at each borehole location to the next borehole and / or demobilization of jack up platform after completion of all works, shall also be the responsibility of NTCPWC.                      2.The contractor shall give advance notice to NTCPWC in writing and NTCPWC shall arrange to shift the Jack-up platform within 8 hours of such notice to the next borehole location. After completion of all boreholes, NTCPWC will arrange to demobilize the Jack-up platform in reasonable time. In case of any delay in shifting the Jack-up platform beyond the above 8 hours, the contractor will be allowed extension of contract period commensurate with such delay, but the quoted rates will remain unchanged.</p>	Lump sum	LS			

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	<p>3. Bidders are advised to restrict the Lump sum amount quoted under Item no. 1 of this BoQ to 15% of the overall contract value.</p> <p>-- 70% of the lump sum amount quoted for this item, subject to the above restriction, shall be released upon mobilization of all the boring equipment and successful completion of a minimum of two boreholes.</p> <p>-- The balance of the Lump sum amount quoted shall be released as demobilization subject to satisfying the conditions mentioned above.</p>				
2	<p>Shifting and positioning necessary platform and boring equipment at each borehole location for marine boreholes of not less than 100mm dia with shell and auger or rotary drill rig as per relevant specifications including all labour, tools &amp; equipment, tackles etc. complete.</p> <p><b>Note</b></p> <p>1. The jack-up platform shall be mobilized and positioned at each borehole location by other agencies engaged by NTCPWC. Shifting the jack-up platform after completion of work at each borehole location to the next borehole and / or demobilization of jack up platform after completion of all works, shall also be the responsibility of NTCPWC.</p> <p>2. The contractor shall give advance notice to NTCPWC in writing and NTCPWC shall arrange to shift the Jack-up platform within 8 hours of such notice to the next borehole location. After completion of all boreholes, NTCPWC will arrange to demobilize the Jack-up platform in reasonable time. In case of any delay in shifting the Jack-up platform beyond the above 8 hours, the contractor will be allowed extension of contract period</p>	Nos	30		

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	<p>commensurate with such delay, but the quoted rates will remain unchanged.</p> <p>3. Bidders are advised to restrict the Lump sum amount quoted under item no, 1 of this BoQ to 15% of the overall contract value.</p> <p>-- 70% of the lump sum amount quoted for this item, subject to the above restriction, shall be released upon mobilization of all the boring equipment and successful completion of a minimum of two boreholes.</p> <p>-- The balance of the Lump sum amount quoted shall be released as demobilization subject to satisfying the conditions mentioned above.</p>					
<b>3(a)</b>	<p>Making Marine Boreholes for a depth of 8m from the existing Sea bed level and dia not less than 100mm with shell and auger or rotary drill rig in all soils as per relevant specifications including boring all labour, tools &amp; equipments, tackles etc complete.</p>	Nos.	30	-	-	
<b>3(b)</b>	<p>Rebate for not drilling borehole to the stipulated level of 8m below the existing bed level at each borehole location.</p> <p>Note: Bidders shall not quote the rate for this item. The rebate will be derived on Pro-rata basis from the quoted rate for item 3(a) for the shortfall in depth.</p>	Rm				
<b>4.</b>	<p>Providing necessary equipment and conducting standard penetration test at every 2m depth or at every change of stratum whichever occurs earlier in disturbed soil as specified all details as per relevant specifications including all labour, tools, tackles and equipment etc., complete.</p>	Nos.	120			
<b>5.</b>	<p>Taking disturbed soil samples from every bore hole at every 2m depth or at every change of stratum whichever occurs earlier all details as per relevant specifications including all labour, tools, tackles and equipment etc., complete.</p>	Nos.	120			



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6.	Taking two number of undisturbed soil samples from every bore hole in cohesive soil layers, all details as per relevant specifications including all labour, tools, tackles and equipment etc complete.	Nos.	60			
7.	Taking Water Samples at 4m intervals from every borehole to determine Sulphate and Chloride Contents of Water.	Nos.	60			
8.	Taking Soil Samples at 4m intervals from every borehole to determine Sulphate, Chloride and Organic Matter Contents of soil samples	Nos.	60			
	<b>LABORATORY TEST</b>					
	The rates for all laboratory tests mentioned hereunder shall include cost of all labour, tools, tackles, equipments, transport, fuel etc all as per relevant specifications and as directed.					
9.	To determine Liquid and Plastic Limit	Nos.	60			
10.	To carry out Particle Size Analysis both by Sieve and Hydrometer	Nos.	60			
11.	To determine Specific Gravity of soil.	Nos.	60			
12.	To carryout Consolidation Test	Nos.	60			
13.	To carryout Direct Shear Test.	Nos.	60			
14.	To carry out Biaxial Compression Test including Determination of Moisture Content and Density of each specimen					
A	Un Drained (quick)Test	Nos.	60			
B	Drained Test	Nos.	60			
15.	To carry out Constant Head Permeability Test on Coarse-Grained soil	Nos.	60			
16.	To carry out Variable Head Permeability Test on fine grained soil.	Nos.	60			
17.	To determine Sulphate and Chloride Contents of Water samples taken at 4m intervals	Nos.	60			
18.	To determine Sulphate, Chloride and Organic Matter Content of Soil Samples taken at 4m intervals	Nos.	60			
19.	Data compilation and submission of Soil investigation report	Lump sum	LS			
	<b>Total</b>					

Total amount in words: Rupees \_\_\_\_\_

only

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### **Notes:**

- i. The rates quoted shall be inclusive of all other taxes (except GST), incidentals, overheads, travelling expenses, printing and binding of documents, reports, sundries and all other expenditure for execution of this service / assignment.
- ii. GST and cess thereon will be reimbursable over and above this as per the prevailing government rules.
- iii. No counter conditions should be included in the price bid. Conditional price bid is likely to be rejected.
- iv. All quantities mentioned above are tentative and subject to variation depending upon the type of soils encountered and the design requirements. The payment shall be made for the actual quantities on pro-rata basis.

### **SECTION V**

### **DRAWINGS**

**The following drawing and details are added to the list of drawings under Section -v**

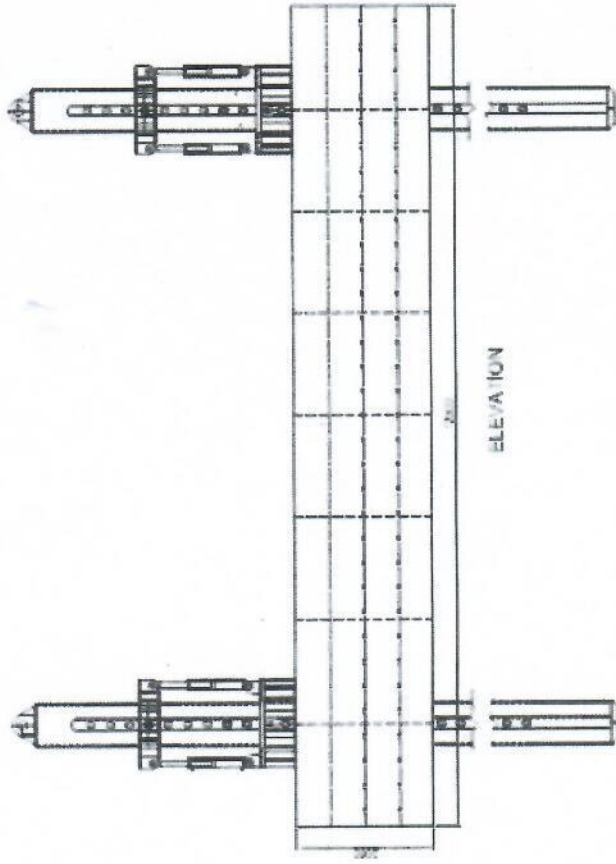
- 2.General arrangement drawings
3. Specifications of Jack-up barge .

Note: The above drawings are attached separately.

### Specifications of the Jack -up Barge

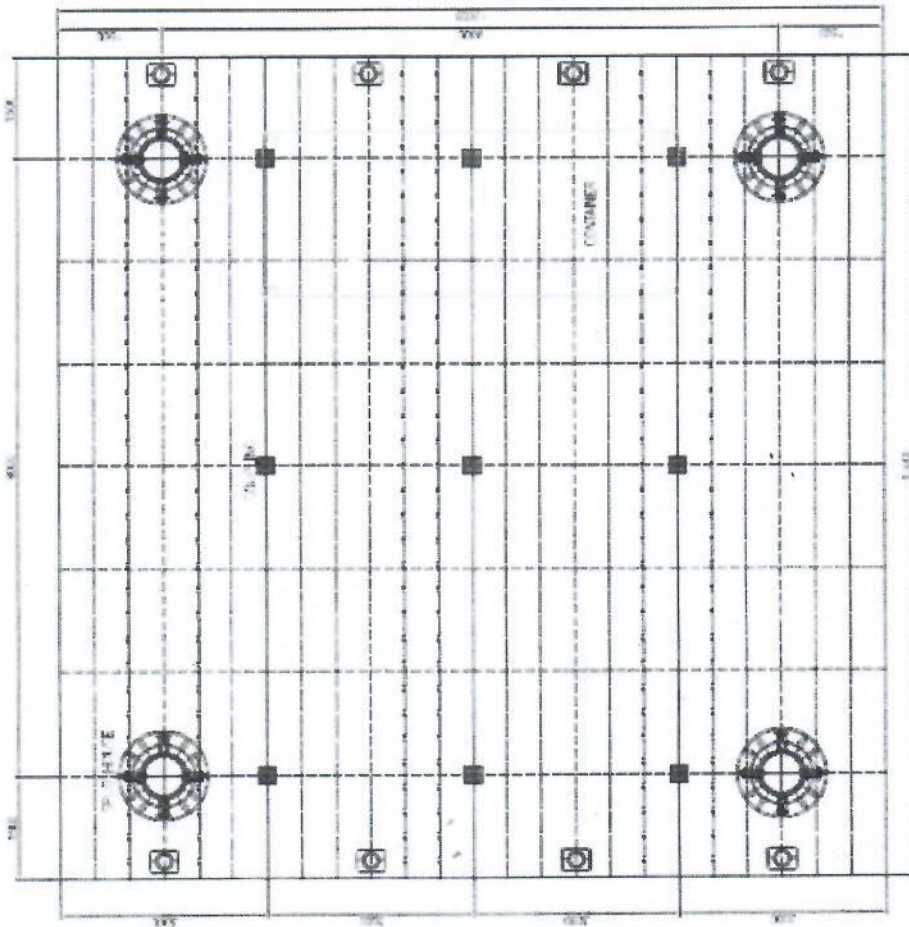
<u>1</u>	<u>Type</u>	<u>Modular Type Jack up</u>
<u>2</u>	<u>Spud Length</u>	<u>2 x 12=24m</u>
<u>3</u>	<u>Total Spuds</u>	<u>4 Nos</u>
<u>4</u>	<u>Spud Leg Diameter</u>	<u>610mm</u>
<u>5</u>	<u>Thickness</u>	<u>17.5 mm</u>
<u>6</u>	<u>Maximum water depth (For Operation)</u>	<u>18.00 m</u>
<u>7</u>	<u>Pump lowering method</u>	<u>Using Derrick Arrangement</u>

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PART NAME = D/W  
 REF LOC = 88.1  
 VIB BEAM =  
 VIB LENGTH = 15'24" P  
 SCALE SIZE = AS SHOWN  
 DATE = 09/11/08

SUB INCLUDES  
 LENGTH = 15'24"  
 HEIGHT = 15'24"  
 DEPTH = 200"  
 (200" x 30") = 4 Nos. PORTING  
 DATE = 09/11/08



JACK UP BARGE - GENERAL ARRANGEMENT DRAWING