

'कर्म लोका लोका द्दि] द्दि] मित एम] उ; विकर्म त्कर्म & 342005
Arid Forest Research Institute Campus, Krishi Upaj Mandi, New Pali Road, Jodhpur 342005
Phone 0291- 2722090 (SA Direct), 2722091 (Gen) e-mail: circlejdh.asi@gmail.com

Tender no. 40/2015-16 F.No. 04/109/Jdh/Bastion/B.Fort/2014-15-W
NOTICE INVITING LIMITED TENDER

The undersigned on behalf of President of India invites sealed limited tenders for the following work from reputed investigation/technical agencies:

Sl.No	Name of Work	Estimated amount	EMD
1.	Geotechnical Investigations at Bhatner fort, Hanumangarh	Rs. 1,50,000/-	Rs.10000/-

Terms and Condition

1. The details of tender will be published in the office web site <http://www.asijodhpurcircle.in/>. The tender can only downloaded from the above site. No sale of tender will be done at the office.
2. The cost of tender application will be Rs.500/- (Five hundred only) and is non-refundable. All downloaded applications must accompany with a DD for Rs.500/- (Five hundred only) drawn in favour of the Superintending Archaeologist, Archaeological Survey of India, Jodhpur Circle, Payable at Jaipur.
3. The EMD should be in the form of DD from a scheduled bank in favour of the Superintending Archaeologist, Archaeological Survey of India, Jodhpur Circle, payable at Jaipur.
4. The duly filled in tenders along with supporting documents should be submitted on or before 1500 hrs on 29.01.2016. The received tenders will be opened at 1530 hrs on the same date. The tenders received late will not be excepted and opened.
5. **The cover should be superscribed with Tender no. 40/2015-16 F.No. 04/109/Jdh/Bastion/B.Fort/2014-15-W and addressed to The Superintending Archaeologist, ASI, Jodhpur Circle.**
6. The tender form should be duly forwarded in the letter head of the firm.
7. ***The tendering agency should be a reputed investigation agency and should have carried out similar works. Please attach a profile of the company giving the list of works done so far and enclose few copies of orders and reports as supporting documents.***
8. The rate quoted should be for the complete investigations as listed in the attached sheet and it should be carried out in the manner given therein.
9. The rate should include all expenses. No request for any expenses like boarding lodging and other incidental charges will be entertained later.
10. The successful testing agency has to arrange for all equipments and technical personal. The liability of ASI is limited to indication of location for sample collection.

11. The final report will be submitted to ASI and will be exclusive property of ASI. The testing agency should not use it for any research /academic / commercial purposes.
12. The report will be vetted for accuracy and complicity by experts of IIT, Chennai. Upon their certification, the complete payment will be made to the successful agency through bank transfer. Necessary TDS, if any, will be deducted at the time of payment.
13. The successful agency may contact the nominated person from IIT Chennai get brief from him about the details of investigation.
14. The investigations should be completed within 30 days from the award of orders.
15. The undersigned reserve the right to accept or reject or cancel any tenders without giving any reasons.

I/We hereby certify that we have read the terms and condition and the technical note attached herewith giving the details and nature of the investigations to be carried and agree to abide by it. No separate agreement will be signed in this regard.

Signature of Authorised signatory with seal

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ITEMWISE LIMITED TENDER FOR EXECUTION OF WORK

Date of Opening: 29.01.2016

Name of Work: Geotechnical Investigations at Bhatner Fort, Hanumangarh, Rajasthan

I/We hereby tender for execution of work for the President of India described in the under mentioned memorandum according to the specification within the time specified and at the rates specified therein subject to the conditions of the contract.

MEMORANDUM

1. Earnest Money: Rs. 10,000/-
2. ESTIMATED COST: 1,50,000/- Approx)
3. PLACE OF INVESTIGATION: Bhatner fort, Hanumangarh Dist Hanumangarh

PROFILE OF THE AGENCY

Sl.No	Description	DD No and date	Name of Bank	Amount Rs
1	EMD			
2	Cost of application			

1.	Name of the firm participating in the bid	
2.	Details of incorporation (Year and Place) (State Sole Proprietor, Partnership, Private Limited or Limited Firm) Attach Certificate of Incorporation	
3.	Whether any Legal/Arbitration proceedings are instituted against the agency on the Agency has lodged any	

	claim in connection with works carried out by them if yes, please give details.	
4.	Address	
5.	Telephone No: Mobile No:	
6.	E-mail address:	
7.	TIN or Service Tax registration Attach registration certificate	
8.	PAN Attach PAN card copy	
9.	Details of investigation carried out so far in the last three years	
	2012-13	
	2013-14	
	2014-15	
10.	List of Documents in support of the above	Attach a separate sheet

Attach duly signed separate sheets if required.

FINANCIAL BID

S.No	Description or specification of items of material to be supplied	Estimated quantity	Time allowed supply	Rate inclusive of all taxes In figures and words	Unit
1	Conducting Geotechnical Investigations at Bhatner Fort, Hanumangarh, Rajasthan as per the note attached herewith	Job Work	30 days		Job

Certified that no relatives of any members of my firm are employees of Archaeological Survey of India in any capacity.

Signature of authorized signatory with seal

Dated the 2014

Should this tender be accepted, I/We hereby agree to abide by and fulfil all the terms and provisions of the said conditions annexed hereto so far as applicable, and/or in default thereof to forfeit and pay to the President of India or his successor in office

the sum of money mentioned in the said conditions. A sum of Rs. _____* is herewith forwarded in DD/FDR as earnest money. If I/We fail to commence the work to specified in the above memorandum I/We agree that the said President or his successors in office shall, without prejudice to any other right or remedy, shall be retained by him towards such security deposit.

Authorised signatory

Dated the 2015

The above tender is hereby accepted by me behalf of the President of India.

Dated :

Signature of the officer by whom the tender is accepted

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Terms & Condition of Tender

1. Tenders should always be placed in sealed covers (wax-sealed/tape sealed/gum sealed) with the name of the work written on the envelopes.
2. Earnest money should be submitted in the form of Demand Draft drawn in favour of the Superintending Archaeologist, Jodhpur Circle on a Scheduled Bank /FDR duly pledged in favour of the Superintending Archaeologist, Jodhpur Circle must accompany each tender.
3. Special care should be taken to write the rates and amounts in figures as well as in words and in such a way that interpretation is not possible. In case of figures the words 'Rs'. should be written before the figures of rupees and word 'p' after the decimal figures and in case of words the words Rs Proceeds and the word paisa should be written at the end. Unless the rate is in whole rupees and not followed by the word 'ONLY', it's should invariably be up to two decimal places. While quoting the rates in the schedule of quantities the rate in words should be written closely following the figure and it would not be written in the next line.
4. The firm should quote the rate and amount in figure as well as in words. The amount for each item should be worked out and the total for all items should be given.
5. Rates quoted by the firm in item rate tender in figures and words shall be accurately filled in so that there is no discrepancy in the rates written in figures and words.
6. Whenever the rates quoted by the firm in figures and in words tally but the amount is not worked out correctly, the rate quoted by the firm will be taken as correct and not the amount.
7. The rate quoted should include all VAT/Sales tax etc. ASI will not entertain any claim whatsoever in this regard.
8. In case firm's signature on tender is fixed in an Indian Language, the rate/ amount/ percentage above or below should also be written in the same language. In the case of illiterate firms the rates/percentage should be attested by a witness.
9. The tender should be signed by the firm/authorised signatory in case of a firm. All tenders should have the signature of a witness. The seal of the firm/firm should be fixed below the signature.
10. All corrections/over writings in case of rate/amount/ percentage etc. should be duly

attested with signature of the firm/ authorised signatory.

11. The discretion of acceptance of a tender, will rest with the Circle/Branch Officer/Regional Director/ Director General, A.S.I who does not bind himself to accept the lowest tender, and reserve to himself the authority to reject any or all of the tenders received, without the assigning any reason. Any tender, in which any of the prescribed conditions are not fulfilled or are incomplete in any respect is liable to be rejected.
12. Canvassing in connection with tenders is strictly prohibited and the tender submitted by the firms who resort to canvassing is liable to be rejected.
13. On the issue of the work order, the firm will execute the work. If he fails to do so within the stipulated time or he withdraws afterwards, his EMD will be forfeited in full.
14. No enhancement of rates for any reason will be permitted after opening of the tender.
15. On acceptance of the tender, the name of the accredited representative(s) of the firm who would be responsible for taking instructions for the Circle/Branch Officer shall be communicated to the Circle/Branch Officer.
16. The firm shall not be permitted to tender for works in the Archaeological Survey of India, Circle/Branch Office (Responsible for award and execution of contracts) in which his near relative is posted as an officer in any capacity.

Signature of the firm

Authorised signatory with seal

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I. GEOTECHNICAL INVESTIGATIONS AT BHATNER FORT, HANUMANGARH, HANUMANGARH

Scope of investigation:

A minimum of 3 borehole investigations using SPT (standard penetration test) or VST Vane shear test must be carried out at the site, up to a depth of 30 metres or bedrock layer, whichever is encountered first. Standard soil classification tests have to be carried out on the extracted soil samples from the boreholes. A detailed bore log must be provided for each site, outlining

- (a) depth from ground level,
- (b) soil profile,
- (c) field description, (
- (d) depth of samples collected, (e) SPT/VST blow counts with test depth,
- (f) RD/consistency and (g) Depth of ground water table.

The standard soil classification tests should address the following parameters:

- (a) Grain size distribution curves at various depths from different boreholes;
- (b) Sample depth, sample type, visual identification, SPT value and soil classification;
- (c) Natural moisture content;

The following, wherever applicable:

- (d) Liquid limit;
- (e) Plastic limit;
- (f) Plasticity index;
- (g) Liquidity index;
- (h) Differential free swell index;

And

- (i) Specific gravity;
- (j) Percentages of gravel, coarse, medium and fine sand, silt and clay

The test report should also give:

- (a) Design N"
- (b) Angle of friction
- (c) PI
- (d) Shear strength
- (e) Compressibility

Boreholes - Total 5 nos

The minimum 3 boreholes required should be executed at the following locations (photos attached):

- (1) At the main entrance to the fort, possibly in the landscaped area in front of the first gate;
- (2) In the vicinity of the final gate (arched entrance temporarily supported); it can be in the area with grass, if not in the paved area;
- (3) In the courtyard (after removal of paving material in the area of the borehole).

Additional boreholes (at least 2) can be done at other locations within the fortification, to provide an understanding of the soil retained by the bastions. Care should be taken that such drilling is not in close proximity of the bastions themselves.

Dr. Arun Menon, IIT Chennai

GENERAL SPECIFICATIONS FOR SUBSOIL INVESTIGATION

The investigations shall be carried out as per latest version of Indian Standards IS 1892. Particularly the following points are to be carefully observed.

1. LOCATIONS

All the investigations shall be carried out at locations shown in the drawing (or prescribed textually). Boring contractor shall arrange to mark these locations on the site and get them approved by site engineer. If there is any site obstruction at given location, the location may be shifted by a maximum of 3 to 5 m, to a convenient location. If it is necessary to shift by more than 3 to 5 m, the same may be done in consultation with the site engineer. The contractor shall prepare a scaled drawing showing all the points of investigation and submit the same along with the results.

2. GROUND ELEVATION

The reduced level of each investigation point shall be obtained and reported. Other information like highest/lowest water levels, maximum flood water level etc., if relevant shall be reported.

3. EQUIPMENT

Before starting the investigations, all the equipment shall be carefully inspected to make sure that they are as per the relevant IS specifications and in good working conditions. Following points may be particularly observed:

1. The drilling equipment shall be rotary drill (Calyx type) or heavy duty shell and auger capable of making a bore hole of minimum 150 mm diameter. The drilling rods should be standard 'A' selection with 41 mm outer diameter and square threaded ends.
2. The drilling rods shall not have any bends; the inside should be clear without any blockage and should remain vertically when connected together or with any test equipment.
3. The cutting edge of the standard penetration spoon and disturbed sampling tube should be free from any bends/damage and shall have dimensions as per specifications.
4. The undisturbed sampling tube shall have minimum 100 mm diameter and area ratio within 10% for soft clay and 15% for others. The undisturbed tube connector shall have a non-return ball valve and slush tube.
5. The hose pipe and swivel shall be in good condition with proper joints to ensure no leakage and effective circulation of Bentonite slurry.

4. DRILLING OPERATIONS

To the extent possible, only shell and auger equipment shall be used to advance the borehole till ground water is met with. This will ensure that disturbed samples collected are

representative samples and the natural moisture content is not altered. If shell and auger boring is difficult, at least few bore holes shall be made with this method up to G.W.T and for remaining boring, rotary drill with bentonite circulation may be used. The type of boring and depth up to which the method is adopted shall be clearly shown in each bore profile. After rotary drill is used, only SPT spoon samples shall be collected as disturbed samples. Drilling with wash boring or percussion method is not acceptable.

4.1 Stabilization of Borehole A casing pipe of 150 mm diameter and minimum 1.5 to 2 m length shall be provided at top to prevent caving-in of the soil. The tip of the casing pipe shall be kept always ahead of the borehole bottom. 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 bore hole without casing pipe, boring can be done beyond the casing pipe with the prior approval of the site engineer.

4.2 Bentonite Slurry With rotary drilling the stabilization is to be achieved by Bentonite slurry of approved quality.

4.3 Water/Bentonite Level in Bore Hole after the G.W.T. is reached, during boring operation the level of water/bentonite slurry shall be always maintained minimum 1 m above the G.W.T. or up to the ground level. The level at which the G.W.T. is met with shall be recorded.

4.4 Records of Borings While recording bore logs, all necessary information as shown in Fig. 1 shall be furnished. During boring operation, the excavated soil from auger or the wash sample (in case of rotary drill) shall be continuously inspected and the level of change in strata recorded to nearest 5 cm level. Extreme care is to be taken to see that thin (but significant for the foundation behaviour) layers are not missed. For example a thick pervious layer in an impervious deposit or thin clay layers in granular deposits are to be carefully recorded.

5. SOIL SAMPLES

In general, every meter length of the bore hole for the first 6 m depth and every 2 m subsequently shall have a soil sample (disturbed/undisturbed) or specified in-situ test results. A sample or in-situ test shall be attempted at beginning of each layer. The depth and type of sample collected shall be marked in respective bore holes with levels of sampling.

5.1 Disturbed Representative Samples only the cuttings from auger (when it is operated above water table without addition of water) and standard penetration test spoon samples shall be collected as disturbed samples. Washed samples from rotary boring or auger samples below water table should not be collected. A minimum quantity of 1 to 1.5 kg of samples shall be placed in a thick polyethylene bag and the bag shall be squeezed to remove the excess air in the bag and mouth sealed by heat welding or tied with thread/rubber bands. The samples packed as above shall be placed in another polyethylene bag of the

same size. Alternately, airtight plastic containers may also be used. A small label indicating the sample details shall be pasted. The label shall contain information like Borehole number, location/coordinates, type of boring method, method of collecting sample, depth of sample, type of sample, date and signature of the supervisor. 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.

5.2. Undisturbed Samples Undisturbed sampling tube shall be min. 100 mm diameter, and 30 cm long of good quality steel seamless tube, and preferably with a threaded cutting edge as per IS 1892 – 1979. Before connecting the sampling tube, the inside surface shall be cleaned. A coat of oil shall be applied only on outer surface to ensure that soil does not offer frictional resistance at the time of withdrawal. No oil shall be applied on inner surface which otherwise may result in slippage of the sample. The tube shall be connected to drill rod only with adopter having non-return ball valve. The alignment of sampling tube and drilling rods shall be checked before lowering the tube. Before lowering the sampling tube, the bore hole shall be thoroughly cleaned by circulating bentonite for minimum 5 minutes. The sampling tube shall be then lowered and penetrated for full length either by static force (in case of soft deposits) or using SPT hammer. The number of blows required for full penetration shall be recorded for relative comparison of the strata. For withdrawing the tube, first give 2 or 3 rotations to the drilling rods so that the bottom end of the sample gets separated from the soil mass. Slowly lift the drill rods out without jerks. Minimum 50 mm soil shall be scooped out from either ends and the surface levelled without much disturbance. The actual length of the soil sample shall be recorded. Both ends of the tube shall be then sealed immediately by pouring hot wax of 10 mm thickness. Minimum one undisturbed sample shall be obtained from each cohesive layer and for thick layers, the UD samples shall be taken at every 3 m intervals. UD samples need not be taken from cohesionless soils.

5.3. Water Samples In case of coastal areas or in the areas polluted by industrial effluents where high sulfate or chloride contents are expected, water samples shall be collected from at least 3 bore holes for chemical analysis. The sample shall be collected in a plastic container (about 500 ml) with airtight cover. No water or bentonite should be used before collecting water samples. 5.4. Packing and Transporting All the samples collected shall be packed in a wooden box with proper packing to ensure that they do not get damaged. During transportation to the test laboratory, care shall be taken to minimize disturbance.

6. IN-SITU TEST

Two types of in-situ tests are generally carried out in bore holes, namely; Standard Penetration Test (SPT) and Vane Shear test. The Vane shear tests are carried out only in cohesive soil layers without appreciable Sand/Gravel whereas the Standard Penetration Tests are carried out in all the deposits.

6.1. Standard Penetration Test The test shall be carried out as per latest version of IS 2131. Following points are to be particularly observed.

- i. All equipment shall conform to IS: 2131 and IS: 9640.
- ii. Casing shall not be driven below the level of test. If the strata cannot stand without casing, the casing may be penetrated by slow rotation and static force from top. Driving of casing pipe with tip at test level can disturb the deposit.
- iii. While advancing the bore holes to test elevation, only side discharge bit shall be permitted. After reaching test location, the bore hole shall be cleaned by continuous circulation of bentonite for minimum 5 minutes.
- iv. The SPT hammer shall be operated manually and not with a power winch. This will ensure free fall of hammer. Throughout the test, care shall be taken to ensure that the threaded joints are tight. If they are getting loosened during driving, the same shall be tightened as and when required so that energy loss due to rod vibration is minimized.
- v. The spoon shall be driven first for 15 cm and the number of blows noted as seating drive. The spoon shall be further driven by 30 cm noting number of blows for each 15 cm penetration. The total blows required for second and third 15 cm penetration shall be termed as penetration resistance N. Where full 45 cm penetration of the spoon is not possible, a minimum of 50 blows shall be applied and the actual penetration for 50 blows recorded to extrapolate the N value.
- vi. After extracting and opening the Split Spoon Sampler, the actual length of sample recovery, actual driven length, length of slush shall be noted. After removing slush, the remaining sample is packed as specified earlier.

6.2. Vane Shear Test

The test shall be carried out as per latest version of IS: 4434 in cohesive soil of soft to medium consistency (i.e. with standard Penetration Value $N < 8$) only. The general guidelines given to clean the bore hole for SPT shall be followed for vane shear test also. Following points shall be observed:

- i. The torque applicator should be in a good working condition and calibrated recently.
- ii. The equipment shall be mounted firmly over centre of the bore hole and fixed to the ground firmly by spikes. The rate of rotation shall be maintained at 0.1 degree per second.
- iii. The vane blade shall have length to diameter ratio of 2 and the blades shall be in good condition free from damage/rusting. The diameter of vane blade shall be chosen depending on approximate shear strength of the strata as given below. Approximate Shear Strength (kN/m²) Approximate SPT(N) Value Recommended Vane Diameter (mm) < 10 0 100 10 to 40

1 to 3 75 40 to 60 3 to 6 50 60 to 100 6 to 8 38 > 100 > 8 Vane Test not recommended
Important: No hand operated torque shall be used in place of table mounted torque device.

7. RECORDING OF TEST DATA

All the in-situ tests carried out and samples collected shall be recorded in the respective bore logs against the respective depth. The results may be given in numerals or graphical plots.

Dr S.R. Gandhi, IIT Chennai