



IOM International Organization for Migration

## **STATEMENT OF WORKS REHABILITATION OF A BOREHOLE WITH CIVIL WORKS IN WARDILE, SOUTH WEST STATE, SOMALIA**

The International Organization for Migration, Department of Health Division (MHD) invites qualified vendors to submit proposal.

The work includes:

- Rehabilitation of a borehole of depth 96m, Water level 18m, pump level \_\_\_\_\_ with 315mm diameter including pumping test, water quality testing and clearance the site
- Procurement of a 30 KVA diesel generator
- Construction of 2 50 meter cubic of elevated water tank
- Construction of a generator house
- Construction of 2 water kiosks
- Construction of a caretaker's house
- Installation of a pipeline system
- Construction of chain-link fencing
- Construction of water troughs
- Installation of a gantry

Completed request for proposal documents accompanied by copies of supporting documents are to be submitted via email to IOM [procurement@rmsomalia.org](mailto:procurement@rmsomalia.org)

For further clarification interested companies can contact [procurement@rmsomalia.org](mailto:procurement@rmsomalia.org)

<b>Opening Date for proposals:</b>	19 <sup>TH</sup> MAY 2017
<b>Closing Date:</b>	5 <sup>TH</sup> JUNE 2017 (17:00 Hrs)
<b>Eligible Parties:</b>	Local drilling and construction companies as described in the technical specification under clause 1
<b>Eligible Proposals:</b>	Proposals that are in accordance with the attached Guidelines
<b>Expected to finish the work:</b>	120 days after signing the contracts
<b>Ref No.:</b>	SOM/17/05/030

The following documents are attached

- Annex 1. Acceptance letter from the vendors
- Annex 2. Technical specification and procedures for drilling
- Annex 3. BOQ for rehabilitation of the borehole and construction of civil works
- Annex 4. Typical borehole design
- Annex 5. Borehole "Passport"

# **ANNEX 1: ACCEPTANCE LETTER FROM THE VENTORS**

The Vendors have read the Technical Specifications and Procedures for the rehabilitation of Boreholes. The Vendor agrees to implement the contract, if awarded, following the specifications and procedures as outlined in this document.

<p><b>SIGNED FOR AND ON BEHALF OF VENTOR:</b></p> <p><b>Registered names of the Vendor:</b></p> <p><b>Representative Name:</b></p> <p><b>Designation :</b></p> <p><b>Signature:</b></p> <p><b>Date:</b></p> <p><b>Telephone Numbers:</b></p> <p><b>E-mail address:</b></p> <p><b>Seal / Stamp:</b></p>
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## **ANNEX 2: The Technical Specifications and Procedures**

### **1. LEGAL REQUIREMENTS**

The service provider should be a local Drilling and Construction company legally registered in Somalia (Ministry of interior and national security and Wardile Administration). They should have good understanding and working relationship with the relevant line ministries, local authorities Specially Daynille district and communities and/or other NGOs working in the area. They should have an office in Wardile and organizational profile. They should have extensive experience in borehole rehabilitation and construction of civil works in Somalia especially in South- Central Somalia.

The Service provider who neglects or fails to comply with any order or requirement given or imposed on these technical specifications shall be guilty of default to the contract. Pertinent issues in the schedule with respect to construction of boreholes are here below described:

### **2. REHABILITATION SITE**

The service provider shall rehabilitate the boreholes at the exact location designated by IOM or the site master plan prepared. IOM, in collaboration with site planning working group and local authorities in Wardile is responsible for providing all land, way-leaves and easements for the permanent works. The service provider shall liaise with the local authorities for the said permission and easements. The service provider shall be deemed to have fully informed himself as to the suitability of the roads or tracks to the sites and shall exercise due care in the use of such roads and shall make good any damage caused by their use. The service provider shall provide such temporary tracks to the actual borehole location as are necessary, with as little as possible interference with existing fences and cultivated land. Compensation for damage to crops, fences, etc. will not be the IOM's responsibility.

### **3. ENVIRONMENTAL PROTECTION OF THE SITE**

Care must be taken in the handling and storage of all fluids, oils, greases and fuel on site to avoid any degradation. The service provider shall dispose of any toxic materials, fluid and other additives, cuttings and discharged water in a manner approved by the drilling master so as not to create damage to public and private property.

### **4. SUBMISSION OF SAMPLES**

Before incorporating in the permanent works any materials or products, which he supplies under the contract, the service provider shall submit to the IOM technical supervisor of the rehabilitation for his approval a sample of each respective material or product and such samples shall be delivered to and kept by him for reference.

All the respective types of materials and products used in the works shall be at least equal in quality to the approved samples. Each and every sample shall be a fair average of the bulk material or of

the product that it represents. The IOM technical supervisor may decide the method by which each sample to be taken from bulk shall be obtained.

## **5. WORKMANSHIP**

The service provider is expected to carry out all the works as instructed by the IOM technical supervisor in a thorough and workman-like manner, and up to current professional standards. He shall carry out operations with the efficiency and dispatch in accordance with the terms of the contract and to the satisfaction of the IOM technical supervisor. For this purpose the service provider shall use suitable machinery and gear, and supply efficient and experienced staff.

## **6. STANDARDS**

The materials used for the construction must conform to internationally recognized standards e.g. ISO Standards current at the date of tender. The service provider shall submit the standards for the materials he proposes at the time of tender.

## **7. CONTRACTOR'S PLANT AND EQUIPMENT**

All machinery, equipment and materials to carry out the rehabilitation, test pumping, well-head construction, etc. as specified in the BoQ are to be mobilized to the site. Test Pumping equipment should be independent from the drilling rig (s). At the start of the contract the IOM technical supervisor will verify the specifications and state of repair of all major items of plant. He shall have the right to order the removal and/or replacement of any plant that in his opinion is insufficient or unsatisfactory.

## **8. SITE AGENT**

The service provider shall ensure that during the full construction period, a capable site agent shall be present on site.

## **9. SUPERVISION OF CONTRACT**

The contract is to be supervised by the IOM appointed technical person. The technical supervisor will work closely with service provider and can be part to the service provider but report to IOM directly.

## **10. TEMPORARY CASING**

Installation and diameter of any temporary casing required for the construction of the boreholes will be left to the service provider so long as the finished product meets the borehole specifications.

Cost for supply, installation and removal of temporary casing shall be borne entirely by the service provider. The service provider shall not claim any casing that is not retrievable and left in the borehole.

## *11. WATER SUPPLY FOR REHABILITATION/DEVELOPMENT*

The service provider shall make his own arrangements for obtaining, storing, transporting and pumping of water required for drilling/development purposes, and for use by the drilling crew at their campsite. The costs for the same are deemed to be included in the BoQ rates.

## *12. VERTICALITY*

The Service provider will conduct a vertically test during and after rehabilitation by approved methods to demonstrate that the departure from the verticality does not exceed 3 in 100 between ground level and the base of the borehole. If this departure is exceeded, the Service provider shall make the necessary corrections to the approval of the technical supervisor without additional payment. If the error cannot be corrected, drilling shall cease, and a new borehole shall be drilled at a position nearby as shall be indicated by the technical supervisor. No payment shall be made for the alternative drilling and the sealing of the abandoned borehole or for moving to the alternative point.

## *13. GRAVEL PACK*

The Service provider shall supply suitable gravel pack. The gravel pack shall consist of well-rounded particles of uniform grading with 90% siliceous material and conform to the 1 – 2 mm diameter. There shall be no clay, shales, silt, fines, excessive amounts of calcareous materials and no crushed rock. The service provider shall be required to submit samples of the material prior to delivery of the supply to be analyzed.

The gravel shall be washed before installation. Sufficient amount of gravel pack shall be installed to completely cover the uppermost screen and yonder by an additional 2-metres to allow for settling. A good supply of water should be introduced with the gravel to prevent bridging. The gravel pack shall be capped with a 2-metre vertical column of clay seal to prevent any seepage that may contaminate aquifers with subsequent pollution of ground water

The annular space above the clay seal shall be back filled with inert drill-cuttings. The quantity of the gravel pack and backfill to be installed shall be measured using a suitable volumetric method as approved by the Technical supervisor.

## *14. SANITARY SEAL*

To provide an effective seal to the entry of contaminants, up to 2.0-metres depth of the borehole from the surface shall be grouted using cement slurry 1.85-2.15 kg / liter. Grout is to be injected, by a method approved by the technical supervisor, into the annulus between the casing and the wall of the hole. In addition, any aquifer bearing saline or poor quality water shall also be sealed.

## 15. DEVELOPMENT AND CLEANING OF BOREHOLE

The Service provider shall carry out development and cleaning of borehole by airlifting and air jetting methods upon completion of the rehabilitation and installation of casing and gravel pack. This shall be done to remove silts, clays and fluid residues deposited on the borehole wall and adjacent portions of the aquifer during the rehabilitation process.

If organic drilling fluids are used, they shall be broken down chemically according to the manufacturer's recommendations before or during development. Cleaning shall be carried out by airlift pumping, airlift surging, and backwash or jetting. Clay disaggregation by means of sodium hexametaphosphate (Calgo) treatment might be necessary.

Development of boreholes shall be done by airlifting and shall be effective from the depth at which water is encountered to the bottom of the borehole. Development shall continue until the water is completely free from fine particles, as to be decided by the technical supervisor. Upon completion of development, any accumulation of material shall be removed from the bottom of the borehole by airlifting.

## 16. TEST PUMPING

Establishing Aquifer Parameters by Borehole Test Pumping

Test pumping of borehole enables measures of aquifer and Borehole parameters. The British Standard BS 6316: 1992 Code of Practice for Test Pumping of Water Wells prescribes the following elements of test pumping;

- a) A period of recovery after production pumping/development;
- b) A pre-test (calibration, typically 2 to 3 hours);
- c) A period of recovery after pre-test
- d) A step draw-down test (typically five steps, each of 2 hours duration; total 10 hours);
- e) A period of recovery after step draw-down test
- f) A constant discharge test (typically 48 hours); and
- g) A recovery test (typically 24 hours).

### **Analysis of Test Results**

Step drawdown test results will be analyzed to determine:

- I. The turbulent pressure losses at the well face, and
- II. An estimate of the aquifer's transmissivity to determine a suitable pump rate for the constant discharge test.

The constant discharge test results will be analyzed to determine:

- a) Whether the aquifer is confined, unconfined or semi-confined;

- b) The aquifer's transmissivity; and where measurements from an observation well are also available, the aquifer's storage coefficient.

The service provider shall perform test pumping to establish well performance and yield of the borehole. A test-pumping unit shall be provided for the testing of the borehole. The method for varying the discharge rate of the pumps used will depend on the type of the pump used. The service provider shall provide a suitable means of achieving the rate of flow specified. Test pumping should start at least 12 hours after completion of development and cleaning of the borehole. Sufficient time shall be allowed for the recovery of water levels between each type of test. This shall be at the discretion of the technical supervisor.

Discharge measurements shall be made by volumetric method or otherwise approved calibrated measuring device. During the test pumping, the discharged water must be handled and disposed of in an appropriate manner to a point of overland drainage sufficiently far from the well to prevent recharge. The water shall be diverted over a distance of at least 100-metre from the wellhead. This condition may not be required for confined aquifers but approval to vary this distance must be obtained from the technical supervisor.

During all test-pumping operations, once the flow rate has been determined and preliminary adjustments made, the measured discharge rate shall be maintained within 5% of the required rate for the duration of the test.

Failure of the pump operation during the tests shall require abortion of the whole test and the test shall be repeated after recovery of the water level. No pay shall be made for aborted tests nor for standing time during water level recovery after aborted tests. Test pumping comprises the following activities:

- I. **Calibration Test:** - The borehole shall be subject to calibration test to establish the approximate yield and draw down characteristics and to decide upon pumping rates for step draw down or constant discharge tests. The total duration of calibration test shall not exceed 2 hours.
- II. **Step draw down Test:**- The step draw down test shall comprise pumping the well at three to five separate discharge rates as shall be specified by the Engineer. Each discharge rate shall be pumped for a period of one hour. The change from one pumping rate to the next shall be effected without stopping the pump, but by means of regulating a gate valve in the discharge pipe, or by any other means to be approved by the technical supervisor. The change from one step to the next shall take place in the shortest time possible.  
During each step of the draw down test, water levels and discharge measurements shall be taken at appropriate time intervals as shall be instructed by the technical supervisor, while at the same time electrical conductivity (EC) readings shall be taken.  
After completion of the last step, the borehole will be tested at a constant discharge for 24 hours (as explained below) after which a recovery test is to be undertaken. For very low yielding boreholes (<3 m<sup>3</sup>/h), the technical supervisor may waive the requirement of step draw down test.  
**Constant Discharge Test:** - Separate constant discharge test for maximum duration of twenty-four (24) hours of pumping and twelve (12) hours of recovery shall be implemented at the end of the last step of the step drawdown test. The discharge rate at which the well is to be pumped shall be specified prior to the test. During the test, water level and discharge measurements shall be taken at the same time intervals as for the step draw down test.  
Test pumping data from all tests conducted from the borehole shall be supplied to the technical supervisor. These will show dates, water levels, discharge rates, EC values, times of starting and stopping the pumping, change in discharge, weather and other conditions that could affect the test data.

The total duration of the tests shall not exceed 36 hours and 12 hours recovery, unless with the written instructions of the technical supervisor. No payment shall be made by the IOM for recovery after the calibration test and the step drawdown test.

## *17. WATER LEVEL OBSERVATIONS*

The Service provider shall supply appropriate electric contact level gauges for measuring water levels in the boreholes to the nearest 10-millimetre at pre-determined intervals. Wellhead arrangements shall permit these gauges to be inserted and passed freely. Hereto the Service provider shall be required to install a dipping tube, minimum 19-millimetre internal diameter (ID) lowered approximately 1-metre above the pump intake or approximately 2-metres below anticipated maximum draw down level. Other methods for measuring water levels are subject to the approval by the technical supervisor. Cost of water level observations is included in the BoQ rates for test pumping.

## *18. ELECTRICAL CONDUCTIVITY MEASUREMENTS*

The Service provider shall have an operational EC meter on site to take electrical conductivity readings whenever required during drilling, development and test pumping. Costs of taking these readings are included in the rates for drilling, development and test pumping.

## *19. RECORDS*

The Service provider shall keep daily activity records for each borehole. Separate records shall be supplied for borehole upon completion. The records shall contain the information as specified below.

### **DAILY RECORDS**

Site Name;

Borehole Reference Number;

Date of Reporting;

Names of Drilling Team Staff;

Drilling Method;



Bore Diameter and depth, including diameter changes and their corresponding depths;  
Depth of the Bore at the start and end of shift/working day;  
Depth and size of casing at start and end of shift/working day;  
Description of rocks drilled with depths of transitions encountered;  
Depths of water struck levels;  
Depth of main aquifer;  
Estimated yield of airlift measurement when drilling and developing with air;  
Time log (min / meter), for penetration rates for given type of bit and standby time due to breakdown;  
Depth intervals at which each formation samples are taken;  
Records of components and quantities used or added to the drilling or air;  
Water level at the start of each working day;  
EC measurements;  
Problems encountered during rehabilitation;  
Details on installation in the borehole (if any);  
Depth and description of well plain and screen casing, and  
Details of work to be invoiced at hourly rates (e.g. test pumping).

A copy of the daily record shall be made available daily to the technical supervisor for signature, including any other pertinent data as may be requested by the technical supervisor.

## **BOREHOLE COMPLETION RECORDS**

The borehole completion record should include the following.

Driller's log;

Copy of Hydro-geological/Geophysical Survey Report

Copy of standard chemical water quality test, and

Borehole design and installation details (as-built drawing).

A copy of borehole completion record shall be made available to and approved by the technical supervisor on completion of each borehole.

## **20. WATER SAMPLING**

Water samples for testing the chemical water quality will be taken by the Service provider at the end of the test pumping. The Service Provider shall take the samples to a qualified laboratory for bacteriological and chemical analyses. OM will assist and bear the cost of the analysis and related charges.

## **21. CAPPING THE BOREHOLE**

During borehole construction, installation, development and test pumping, the Contractor shall use all reasonable measures to prevent entrance of foreign matter into the borehole. The Service provider shall be responsible for any objectionable materials that may fall into the borehole and any

effect it may have on water quality and/or quantity until completion of works and acceptance by the technical supervisor and/or the IOM.

## 22. ACCEPTANCE OF BOREHOLES

The boreholes shall only be accepted by the technical supervisor and the IOM upon satisfactory completion of all borehole construction operations as per the technical specifications and the service provider provided borehole "passport". IOM have the right to denied to accept the borehole if it the quality of the service are under substandard and service provider denies to improve it.

## 23. LOSS OF EQUIPMENT

Any equipment lost down a borehole must be removed or the borehole will be considered a lost bore. A replacement borehole will have to be constructed and tested at the Contractor's expense.

## 24. LOST BORE

Should any incident to the plant, behavior of the ground, jamming of tools or casing, or any other cause prevent the satisfactory completion of the works, a borehole shall be deemed lost and no payment shall be made for that bore or for any materials not recovered there from, nor for any time spent during drilling or while attempting to overcome problems.

In the event of a lost bore, the Service provider shall permanently seal the bore and construct a borehole immediately adjacent to the lost bore or at a site indicated by the Engineer. The option of declaring any bore lost shall rest with the service provider, subject to the approval of the technical supervisor.

The abandoned borehole shall be treated as follows.

The Service provider may salvage as much casing from the bore as possible and use it in the alternative borehole with the approval by the technical supervisor;

Salvaged materials shall be property of the service provider;

The lost bore shall be sealed by concrete, cement grout, or neat cement, and shall be placed from bottom upwards by methods that avoid segregation or dilution of materials, and

The upper two (2)-meters of the bore shall be backfilled with native topsoil. Sealing of the bore shall be done in such a manner as to avoid accidents and to prevent it from acting as a vertical conduit for transmitting contaminated surface or subsurface waters into the water bearing formations.

## 25. STANDBY TIME

In the event of delays occurring as a result of action or inaction by the technical supervisor for which the Service provider would be entitled to claim standby time, the service provider should notify the technical supervisor immediately in writing that such claims are becoming applicable.

## 26. CONSTRUCTION OF WELLHEAD

The service provider shall, on completion of each borehole, cap the top of the borehole with a 5-mm-thick mild steel blank flange. The blank flange shall be 300-mm above the ground level and be

spot-welded to the 2-m long mild steel casing coated internally and externally with two coats of non-toxic bitumen or epoxy paint to the approval of the technical supervisor.

This casing shall fit neatly over the uPVC casing and be permanently grouted in at the time of completion of the borehole . Prior to, during and after the construction of the wellhead, the service provider must ensure that no debris whatsoever falls into the borehole.

## *27. WELL DISINFECTION*

Disinfection of the borehole shall be carried out by the service provider before demobilization from the site. This shall be done by placing a chlorine solution into the well so that a concentration of at least 50 mg/l of available chlorine exists in all parts of the borehole at static conditions. All the borehole surfaces above the static water level shall be completely flushed with the solution. The solution shall remain in the borehole for a minimum of 2 hours before pumping the borehole to waste.

## *28. CLEARING THE SITE*

On completion of each borehole, the site must be left clean and free from all debris, hydrocarbons and waste, and all pits filled to the approval of the technical supervisor. A site not delivered clean may render the borehole unacceptable.

## *29. STANDARD BOREHOLE DESIGN*

Top section of 2.0-m drilled at 400-mmØ and 375-mmØ OD, 5-mm wall-thickness, mild steel temporary casing installed and grouted. Borehole drilled at 311.15-mmØ to final depth of 200m. Install 203-mmØ OD uPVC, 9-mm (minimum) wall-thickness, plain and screen casing. Screened sections adjacent to the aquifer zones at depths as instructed by the technical supervisor. In case there is a need to drill deeper more than 200 m, the service provider should request approval from the technical supervisor. The screened sections to be gravel packed and sealed on top with clay seal

## **ANNEX 3: BILL OF QUANTITIES (BoQ)** **(Refer to attached)**

### **PREAMBLE TO BILL OF QUANTITIES**

This bill of quantities (BoQ) forms part of the contract service documents and is to be read in conjunction with the agreement and the technical specification.

Item descriptions generally identify the **component** of the Works, **and not tasks to be carried out** by the service provider. The rate shall include for all activities to achieve the identified component. The rates for items D1, D2 and D3 for example should include provision of water for drilling, diesel, petrol, oils, greases, verticality tests, boreholes yield estimates, etc.

The items and quantities have been classified in accordance with the systematic stage in drilling. Installation, development and test pumping and wellhead completion separately detailed descriptions of work and materials are not necessarily included in item description, and reference must be made to technical specification and standard borehole design for this information.

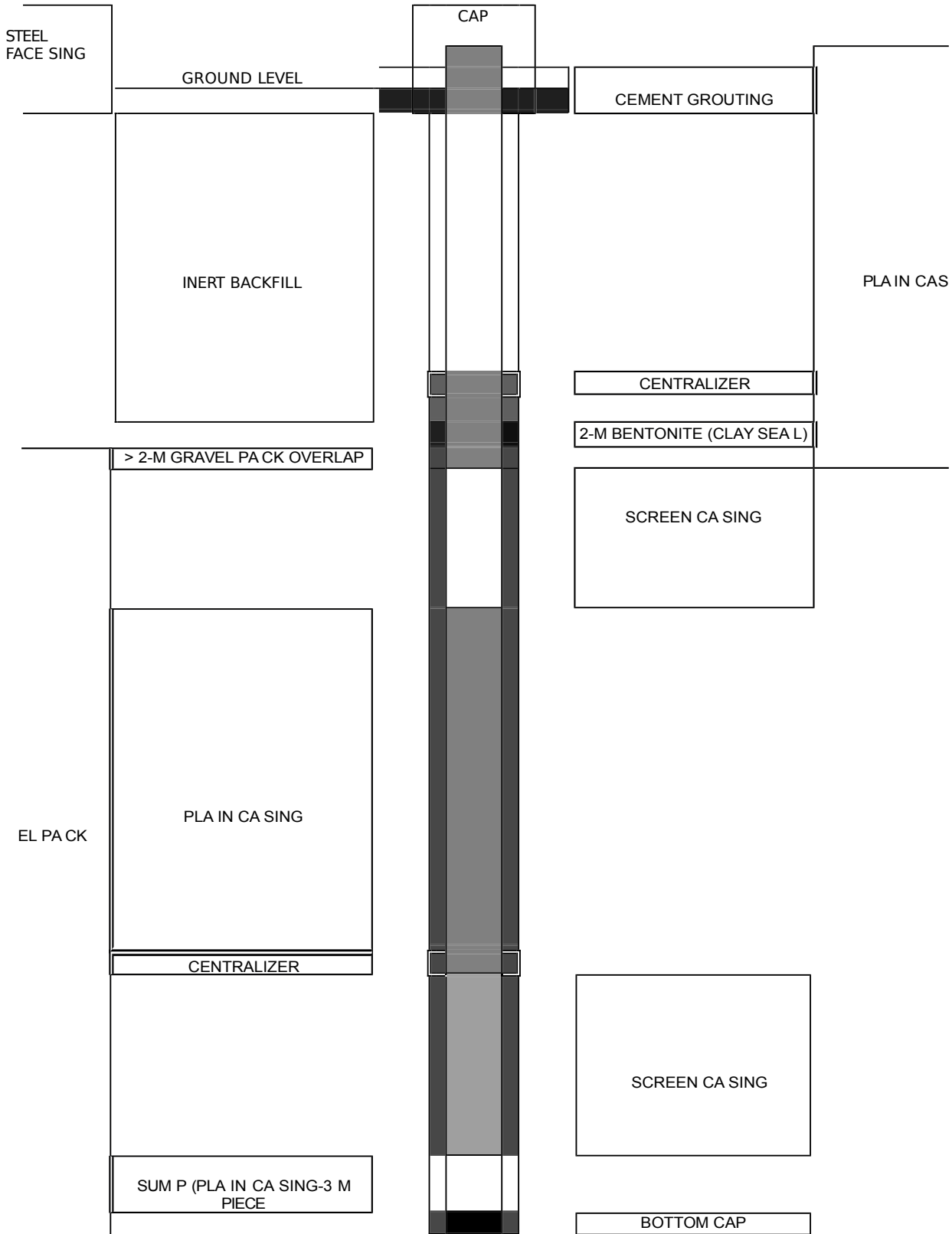
Each and every item in the BoQ and the rates should be priced. The cost of any item left unpriced shall be deemed to be covered by the rates or prices included for other items.

Unit rates and prices shall be stated in figures. In cases of discrepancy between the quantity times unit rate and total for any item, the unit rates stated shall be binding and apparent errors in the total, extended amount for addition shall be amended accordingly.

The following units of measurement and abbreviation has been used in the BoQ:

<b>Unit</b>	<b>Abbreviation</b>
Inch	"
Foot/feet	ft
Millimeter(s)	mm
Meter(s)	m
Kilometer(s)	km
Square meter(s)	m <sup>2</sup>
Cubic meter(s)	m <sup>3</sup>
Kilogram(s)	kg
Ton(s)	t
Liter(s)	l
Number(s)	nr
Minute(s)	min
Hour(s)	h
Week(s)	Wk
Year(s)	yr.

# ANNEX 4. TYPICAL BOREHOLE DESIGN (NOT SCALED)



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## ANNEX 5: Borehole “Passport”

<b>Client : IOM</b>	<b>WASH Project</b>	<b>Project code:</b>
<b>Contract N°:</b>	<b>Execution schedule:</b>	<b>GPS Coordinates:</b>
<b>Region:</b>	<b>District:</b>	<b>Community name:</b>
<b>Borehole ID:</b> <i>(code of the borehole)</i>	<b>Date of the intervention:</b>	
<b>Borehole Specification</b>		
Diameter of casing		
Type of casing (metallic, UPVC)		
Depth of borehole		
Depth of casing		
Level of screen(s)		
Height of sand trap		
Bottom cap (yes/no)		
Completion date of drilling		
<b>Pump Specification</b>		
Pump type and brand		
Serial No. of the cylinder		
Serial No. of the pump stand		
<b>Hydrological Specification</b>		
Static level of water		
Drawdown		
Recovery time		
Yield (liters / hour)		
Water quality testing	<i>( IOM WASH team will advise parameters to test )</i>	

The document will be signed off by the entities responsible of the drilling the Client (IOM), the service provider (Contractor) and Representative of the Government



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IOM International Organization for Migration