

## UNHCR Sample Drilling Contract and Specification

### FOREWORD

This sample drilling contract and specifications form part of UNHCR's series of Standardized Forms and Tools for Refugee Settings which are the result of an extensive review process with WASH actors active in refugee settings. It is recognized that the standard forms and tools will require continuous review and amendment in response to changes in engineering best-practice and feedback from the field. Therefore further review will be managed by a Technical Review Committee which will meet regularly to discuss issues related to the use of the design and an annual review will be reported back to the WASH community. More urgent amendments will be reported as, and when, required.

<b>FOREWORD .....</b>	<b>1</b>
<b>PREAMBLE.....</b>	<b>3</b>
<b>1. OBJECT OF THE CONTRACT.....</b>	<b>4</b>
<b>2. VALUE OF THE WORKS.....</b>	<b>4</b>
<b>3. MODE OF PAYMENT .....</b>	<b>4</b>
<b>4. PERFORMANCE SECURITY .....</b>	<b>5</b>
<b>5. OBLIGATIONS OF THE CONTRACTOR .....</b>	<b>5</b>
<b>6. OBLIGATIONS OF THE EMPLOYER .....</b>	<b>7</b>
<b>7. COMMENCEMENT DELAYS AND LIQUIDATED DAMAGE .....</b>	<b>7</b>
<b>8. VARIATION ORDERS .....</b>	<b>8</b>
<b>9. QUALITY CONTROL OF WORKS .....</b>	<b>9</b>
<b>10. DEFECTS LIABILITY PERIOD .....</b>	<b>9</b>
<b>11. ACCEPTANCE OF WORKS .....</b>	<b>9</b>
<b>12. RETENTION.....</b>	<b>10</b>
<b>13. TERMINATION OF CONTRACT .....</b>	<b>11</b>
<b>14. FORCE MAJEURE .....</b>	<b>11</b>
<b>15. CONTRACT DOCUMENTS AND INTERPRETATION.....</b>	<b>12</b>
<b>16. LANGUAGE AND GOVERNING LAW.....</b>	<b>12</b>
<b>17. SETTLEMENT OF DISPUTES.....</b>	<b>12</b>
<b>18. EFFECTIVE DATE.....</b>	<b>12</b>
 <b>UNHCR TECHNICAL SPECIFICATION FOR BOREHOLE DRILLING .....</b>	 <b>14</b>
<b>A) GENERAL NOTES.....</b>	<b>14</b>
<b>1. UNDERSTANDING THIS SPECIFICATION .....</b>	<b>14</b>
<b>2. MATERIALS AND WORKMANSHIP .....</b>	<b>14</b>

3. STORAGE OF MATERIALS .....	14
4. SITE IN CHARGE .....	14
5. HYDROGEOLOGICAL SURVEY .....	14
6. DRILLING SITES .....	14
7. ABADONED BOREHOLE .....	14
8. CLEANING OF THE CONSTRUCTION SITE .....	15
B) BOREHOLE CONSTRUCTION REQUIREMENTS .....	15
9. BOREHOLE LOG .....	15
10. CASING AND DIAMETERS .....	15
11. CASING AND SCREEN .....	15
12. DRILLING EQUIPMENT AND DEPTH OF DRILLING .....	15
13. BOREHOLE PLUMBNESS AND ALIGNMENT .....	16
14. TEMPORARY LID.....	16
15. ARTIFICIAL GRAVEL PACK.....	16
16. SANITARY SEAL .....	16
C) BOREHOLE DEVELOPMENT AND TEST PUMPING .....	16
17. BOREHOLE DEVELOPMENT .....	16
18. PUMPING TESTS .....	16
19. BOREHOLE YIELD .....	17
D) BOREHOLE PROTECTION AND DISINFECTION .....	17
20. BOREHOLE POLLUTION .....	17
21. BOREHOLE DISINFECTION .....	17
22. WATER SAMPLES.....	17
23. SAND PARTICLE CONTENT .....	17

CONTRACT # \_\_\_\_\_

DATE \_\_\_\_\_

## CONTRACT DOCUMENT

### PREAMBLE

Whereas the **[INSERT ORGANISATION NAME]** is engaged in **[INSERT LOCATION]** in activities such as care for refugees and displaced people;

Whereas **[INSERT ORGANISATION NAME]** is planning to have **[INSERT NUMBER OF BOREHOLES TO BE DRILLED]** borehole(s) drilled with all the required labor and materials for the completion of the works including test pumping, hereinafter referred as the “WORKS” as described in this Contract, the SPECIFICATION and the BILLS OF QUANTITIES. This contract is based upon the unit prices presented in the bid document presented by **[INSERT CONTRACTOR’S NAME]**.

Whereas **[INSERT CONTRACTOR’S NAME]** has shown interest to bid for the drilling of the well and has subsequently won and is awarded the tender based on its capacity and capability to do the job.

Now therefore,

**[INSERT ORGANISATION NAME]**

Hereinafter referred to as “**EMPLOYER**”

Represented by the Director for COUNTRY PROGRAM

And

**[INSERT CONTRACTOR’S ORGANISATION]**

Hereinafter referred to as “**CONTRACTOR**”

REPRESENTED BY **[INSERT CONTRACTOR’S FULL NAME]**

have entered into an agreement on [ENTER DATE] on the following terms and conditions.

## 1. OBJECT OF THE CONTRACT

Based on the Hydrogeological and Geophysical survey already conducted for the drilling of **[ENTER NUMBER OF BOREHOLES]** in **[ENTER LOCATION]**, the EMPLOYER awards and the CONTRACTOR accepts and undertakes to perform for the account of **[INSERT ORGANISATION NAME]** all the works in all respects according to the rules of the profession, CONTRACTOR's accepted PRICED BILL OF QUANTITIES, and documents stipulated in sub-article 15.1 making an integral part hereof, as well as according to the Standard Conditions of Contract for Construction of Civil Work Projects, Ministry of Works and Urban Development.

## 2. VALUE OF THE WORKS

The total contract value of the works to be performed hereunder is **[ENTER AMOUNT]** This amount is determined on the basis of mutually reconciled required quantities unit rates and lump sum prices which include also labor from the CONTRACTOR as indicated in the CONTRACTOR's PRICED BILL OF QUANTITIES. Value Added Tax (VAT) is not included in the above referred total contract value.

The EMPLOYER will, if possible and legally justified, send to the CONTRACTOR written statements on VAT exemption from authorized Government authorities. If the EMPLOYER could not produce such official exemption document, it has to pay to the CONTRACTOR 15% (fifteen percent) VAT on the total actual amount paid for the works.

All other taxes, duties and levies of any kind related to this project shall be borne by the CONTRACTOR.

The total contract value stated in sub-article 2.1 of this contract includes also complete transportation of material and labor to the works execution site, the acceptance and keeping material until installation, that is, provisional acceptance of the facility being constructed /repaired.

The CONTRACTOR accepts that the EMPLOYER can reduce the execution of certain types of contracted works, whereas the contracted unit rates of the other works remain unchanged. However, if the decrease of the works exceeds 20% (twenty percent) of the total contract value, the case shall be handled as stipulated in sub-article 8.3 of this contract.

The EMPLOYER will not pay for any works that have not been executed in accordance with the description of the works from the accepted offer, regardless of the degree of their completion.

## 3. MODE OF PAYMENT

The payment under this contract will be made according to the following conditions:

The CONTRACTOR will submit to the EMPLOYER a bank guarantee or insurance bond equal to 20% of the total contracted amount stipulated under sub-article 2.1 within 3 (three) days after the date of the signing of the contract.

The EMPLOYER will make advance payment in favor of the CONTRACTOR's account in the amount of 20% of the total contracted amount stipulated under sub-article 2.1 which makes **[ENTER AMOUNT]** within 3 (three) days after the CONTRACTOR produces a bank guarantee or insurance bond for the same amount.

The CONTRACTOR shall submit interim payment certificates to the EMPLOYER, after the end of each month showing the actual contract value of the works executed up to the end of the month. The EMPLOYER will pay the amount indicated in the payment certificate less the 20% advance, less previous payments and less 10% for retention.

The quantities set out in the BILL OF QUANTITIES are estimated quantities of the works, and should not be taken as actual and final quantities of the works to be executed by the CONTRACTOR in fulfilment of his obligation under the contract. Each interim payment shall, therefore, be effected as per the actual works executed and measured on the basis of unit and lump sum prices agreed upon in the Priced BILL OF QUANTITIES.

The EMPLOYER will check the payment certificate for completed works, verify and pay for the indisputable value of the works within 15 (fifteen) calendar days upon receiving the CONTRACTOR's payment certificate. In case of delayed payment, the EMPLOYER shall pay bank interest, at the prevailing rate, on the defaulted amount.

#### **4. PERFORMANCE SECURITY**

Within 3 (three) days after the signature of this contract, the CONTRACTOR shall furnish to the EMPLOYER a performance security in the form of Bank guarantee or Insurance bond in the amount of 10% (ten percent) of the total contract price.

The performance security to be provided by the CONTRACTOR shall be issued by a recognized local Bank or Insurance company.

After the completion of the whole of the works and issuance of provisional acceptance certificate by the EMPLOYER, the CONTRACTOR shall extend the performance security until the expiry of the defects liability period in order to get repaid the retention money as stipulated in sub-article 11.4 of this contract.

#### **5. OBLIGATIONS OF THE CONTRACTOR**

The CONTRACTOR shall provide all the necessary qualified and experienced labor, equipment, machinery and all other material whether of temporary or permanent nature required in and for such execution, maintenance and completion of the work. The CONTRACTOR designates **[INSERT NAME]** as

its hydrogeologist, who shall be on site during all drilling, borehole development and pump-testing activities.

The CONTRACTOR shall, with due care and diligence, execute and maintain the work, provide and pay for labor including the supervision thereof, drilling equipment and drilling accessories and all other materials, whether of a temporary or permanent nature, required in and for such execution, maintenance and completion of the works.

The CONTRACTOR is obliged, to observe that all the executed works, as well as installed materials hereunder are of required quality, in all respects according to the agreed terms under this contract.

The CONTRACTOR is obliged, prior to signing the contract, to provide to the EMPLOYER samples of borehole blind casing and screen casing to be used for the works, and guarantee that all the materials installed in the works hereunder will be the same quality as the supplied sample.

The CONTRACTOR is obliged to conduct all operations and activities concerning the execution of works in all respects according to the effective regulations governing the subject matter of construction/repair of facilities according to the site situation of the works. The EMPLOYER shall bear no responsibility in case the CONTRACTOR fails to observe the regulations.

The CONTRACTOR undertakes to notify the EMPLOYER about any unforeseen circumstances and events that may hinder the completion of works within the set time schedule promptly in writing, maximum within 48 hours from the moment of appearance of the unforeseen circumstances as to consider the extension of time.

For the performance of certain works of special nature, the CONTRACTOR can avail of the service of other specialized companies, retaining thereby all liabilities stipulated hereunder, without being entitled to annexes regarding the price, or change of price in any other way. In case of engagement of subcontractors, the full liability continues to remain with the CONTRACTOR and in solidarity with the subcontractors.

The CONTRACTOR is obliged to notify the EMPLOYER in writing on the intention of engaging other contractors prior to signing of contracts with them. The maximum percentage of engagement of all subcontractors is 20% (twenty percent) of the total contract amount.

From the commencement of works to the provisional acceptance of the same by the EMPLOYER, the CONTRACTOR is obliged to insure all works, materials, tools and equipment from any possible damage or misappropriation. Otherwise, the CONTRACTOR shall be liable for any damage caused by negligence or carelessness.

The CONTRACTOR shall secure the necessary insurance coverage where he might be held accountable for compensation of damage, debt claim to any person or his/her successor, if the subject person in the capacity of passerby or



person employed by the CONTRACTOR or subcontractor for the execution of the works, or persons employed by the EMPLOYER present on site, suffers bodily injury or is killed on around the work site due to causes related to the performance of the CONTRACTOR under this contract.

The CONTRACTOR has the duty throughout the entire period of the construction/repair to keep a book of measurement and site log accurately and fully in compliance with the effective procedure.

The CONTRACTOR must provide to the EMPLOYER's authorized person, permanent supervision and control of the quantity and quality of used material, through direct insight on site, as well as by presenting for inspection the book of measurements, the site log and other available documents related to the contracted works, for the realization of the contract.

The CONTRACTOR is obligated to provide, at the EMPLOYER's request, all necessary reports that pertain to the execution and quality of the works, as well as to any other circumstances related to the execution of this contract.

The CONTRACTOR is at anytime obligated, within the defects liability period, to promptly remove all defects or irregularities on the completed works at the CONTRACTOR's own expense, upon the first written request by the EMPLOYER.

The EMPLOYER has the right to order the CONTRACTOR to either continue or discontinue drilling beyond a certain depth, under the same terms and conditions stipulated in sub-articles 2.5 and 8.3 of this contract.

## **6. OBLIGATIONS OF THE EMPLOYER**

The EMPLOYER shall cooperate and deal with the camp authorities for getting permission to use drilling water by the CONTRACTOR from available sources in the surrounding areas of the works.

The EMPLOYER shall approve payment certificates and effect payment to the CONTRACTOR as stipulated in article 3.1.5 of this contract. If payment is delayed, the EMPLOYER shall be liable to pay interest to the CONTRACTOR as stipulated in article 3.1.5 of this contract.

The EMPLOYER hereby appoints **[INSERT NAME]** as its representative who shall be responsible to inspect the works and to give decision with regard to the execution of the works from time to time, thereby dealing with CONTRACTOR or his representative.

The EMPLOYER will not be deemed liable for compensation of damages, debt claim to any person, regardless of how the damage had occurred if the CONTRACTOR suffers any damage due to theft of material, tools and equipment.

## **7. COMMENCEMENT DELAYS AND LIQUIDATED DAMAGE**

The CONTRACTOR shall start execution of the works within **XXX calendar days** from the date of signing of the contract and shall complete and hand over

the same to the EMPLOYER on or before the last day of a period of **XXX days**, such period to be counted from the date of actual commencement of the works. In the case the CONTRACTOR is late in starting the execution of the works, the EMPLOYER has the right to cancel the contract.

In the case the CONTRACTOR has not completed all the works within the term specified hereunder due to unjustified reasons, for each working day delay in the completion of the works, the CONTRACTOR shall pay to the EMPLOYER a sum equal to 0.1% of the total contract price per day as liquidated damages. However, the maximum amount of the liquidated damage shall not exceed 10% (ten percent) of the total contract price.

The CONTRACTOR shall not be responsible for delays caused by Force Majeure, or occurring due to causes acceptable to the EMPLOYER. In such cases, the CONTRACTOR shall be entitled to extension of time equal to the period lost due to such event.

In case the CONTRACTOR, is unable to complete the works, due to his fault or negligence, within the specified time indicated in article 7.1 of this contract, or if the works are in delay by more than 15 (fifteen) days from the completion time stated in sub-article 7.1, the EMPLOYER is entitled to engage another contractor until the completion of the works. The actual and borne costs related to the introduction of another contractor for the execution of the works shall be borne by the CONTRACTOR. In that case the EMPLOYER will not compensate to the CONTRACTOR any costs that might arise there from. The payment will be made only for those items of the works that have been fully completed. Any issues concerning the quantity of performed works and payments shall be settled upon mutual written agreement and the agreement will make an integral part of this contract.

If the CONTRACTOR suffers delays or incurs costs due to failure on the part of the EMPLOYER in handing over the works site, due to inaccessibility of any site and due to lack of timely decision during the work progress, the CONTRACTOR is entitled to an extension of time proportional to the time lost for the completion of the works, and is at liberty to claim from the EMPLOYER the costs incurred.

The CONTRACTOR shall not be held responsible for damages caused on the works due to delays stipulated in sub-article 7.5 of this contract. If such damages occur on the works, the CONTRACTOR is at liberty to claim from the EMPLOYER the costs he incurred to recover the damage.

## **8. VARIATION ORDERS**

The EMPLOYER or EMPLOYER's representative, may at any time or from time to time, give variation orders in writing related to addition, deletions or revisions in the works. The extra works will be measured on the basis of quantities from the measurement book, unit and lump sum prices from the CONTRACTOR's Priced Bill of Quantities, which the EMPLOYER must approve in writing before they are performed, whereon the CONTRACTOR's



and the EMPLOYER's written agreement on the variation order will be part of this contract.

The EMPLOYER will not pay any extra works that have not been approved in writing by the EMPLOYER's authorized person. This does not apply to the case of emergency, unforeseen works that must be undertaken to avoid damaging consequences to the works or to avoid the effect/consequences of Force Majeure, in which case apply the legal provisions that stipulate the obligation of just compensation for performed necessary emergency and unforeseen contingencies by the CONTRACTOR in favor of the EMPLOYER.

If the variation order results in an increase or a decrease exceeding 20% (twenty percent) of the total contract value, such variation shall be subject to the EMPLOYER and the CONTRACTOR making a written agreement without an adjustment of unit costs. However, the CONTRACTOR shall have the right for time extension proportional to the extra works.

## **9. QUALITY CONTROL OF WORKS**

The EMPLOYER has the right and the obligation to supervise the CONTRACTOR's work as well as determine whether the CONTRACTOR observes the technical regulations and constraints throughout the performance of the works. The EMPLOYER is entitled to demand from the CONTRACTOR during the progress of the works to remedy within the shortest time possible and at his own cost and eliminate any observed irregularities and consequences of poor quality work, which cannot have any impact on the extension of time of completion of the works. In that case the EMPLOYER can halt any due payments until the CONTRACTOR eliminates all the above-mentioned irregularities or deficiencies.

During the progress of the work, the EMPLOYER is entitled to demand the CONTRACTOR or independently conduct an additional check on the quality of executed works, material or equipment.

The EMPLOYER has the right, during the progress of the work, to give to the CONTRACTOR any additional drawings or plans required for the proper execution of the works. In case the CONTRACTOR requires additional drawings and plans from the EMPLOYER, the EMPLOYER must be accordingly notified in writing.

## **10. DEFECTS LIABILITY PERIOD**

The defects liability period is 365 days.

The defects liability is for the whole of the works and is counted from the date of issuance of provisional acceptance certificate by the EMPLOYER.

## **11. ACCEPTANCE OF WORKS**

When the whole of the works have been completed, the CONTRACTOR shall give a written notice to that effect to the EMPLOYER. The EMPLOYER shall, within 15 (fifteen) calendar days of the date of delivery of such notice, either

issue to the CONTRACTOR provisional acceptance certificate or give instruction in writing to the CONTRACTOR specifying all the works which, in the EMPLOYER's opinion, is required to be done or corrected before the issue of such certificate. If instructed by the EMPLOYER, to complete any remaining works or eliminate any deficiencies, the CONTRACTOR has the obligation to complete the remaining works or remedy any defects thereof. In such cases the CONTRACTOR is not entitled for extension of time and all the remaining works and remedying defects must be completed within the agreed completion time.

Within 15 (fifteen) calendar days after the CONTRACTOR completed the remaining works or elimination of any defects, as instructed, the EMPLOYER must certify and issue provisional acceptance certificate for the works under request.

Unless specifically agreed in writing, the EMPLOYER shall not use any part of the completed works before a written certificate of provisional acceptance is issued to the CONTRACTOR. The EMPLOYER shall be liable for any damage that may follow as a result of putting to use the works before issuing the provisional acceptance certificate.

The EMPLOYER, immediately after issuing provisional acceptance certificate to the CONTRACTOR, shall repay the CONTRACTOR the 10% retained amount. However, the CONTRACTOR shall extend the performance security until the expiry of the defects liability period, stipulated in sub-article 10.1 of this contract, and submit the same to the EMPLOYER to get the 10% (ten percent) retained amount repaid.

The EMPLOYER shall issue final acceptance certificate to the CONTRACTOR within 15 (fifteen) calendar days after the expiry of the defects liability period and release the performance bond, unless a written notice relating to any unfinished or defective work is given by the EMPLOYER to the CONTRACTOR before the expiry of the defects liability period. After the EMPLOYER issued to the CONTRACTOR final acceptance certificate, the CONTRACTOR is relieved from his obligation under this contract.

If the EMPLOYER fails to issue final acceptance certificate or to give notice on any defective works, within the time stipulated in sub-article 11.5 of this contract, it shall be presumed that the EMPLOYER has accepted the works and that the CONTRACTOR is relieved from any obligation under this contract.

## **12. RETENTION**

The EMPLOYER shall retain from each interim payment due to the CONTRACTOR, 10% (ten percent), until the completion of the whole of works.

On completion of the whole of the works and immediately after provisional acceptance certificate is issued by the EMPLOYER as stipulated in sub-article 11.1 and sub-article 11.2 of this contract, 10% (ten percent) of the retained

amount shall be repaid to the CONTRACTOR as stipulated in sub-article 11.4 of this contract.

### **13. TERMINATION OF CONTRACT**

Final termination of this contract will be after the expiry of the defects liability period, satisfactory completion of the works and issuance of final acceptance certificate by the EMPLOYER as stipulated in sub-article 11.5 of this contract.

This contract may prematurely be terminated, among other legally prescribed reasons, and in the following cases:-

- a) If the CONTRACTOR and the EMPLOYER are unable to perform their obligation under this contract,
- b) If there appear unforeseeable situations or force majeure that might interrupt or hinder the achievement of the project objective or its execution,
- c) If the EMPLOYER becomes bankrupt or goes into liquidation,
- d) If the CONTRACTOR becomes bankrupt or goes into liquidation,
- e) If it is clearly identified and proved by the EMPLOYER that the CONTRACTOR could not perform according to the terms and conditions under this contract.

In case of premature termination of the contract, as stipulated in sub-article 13.a, 13.b and 13.c above, the CONTRACTOR and the EMPLOYER will make agreement on mutually undertaken and unfulfilled liabilities of both parties. In case the CONTRACTOR has executed more works than the EMPLOYER paid for, the EMPLOYER is obliged to pay the balance of assets to the CONTRACTOR's bank account within 15 (fifteen) days from the date of termination of the contract, that is, rendering of the final account by the CONTRACTOR. In the case the EMPLOYER has paid for more works than have been executed by the CONTRACTOR, the CONTRACTOR is required to pay the balance of assets to the EMPLOYER's bank account within 15 (fifteen) days from the date of termination of the contract.

In case of premature termination as stipulated in sub-article 13.d, 13.e above, the CONTRACTOR shall indemnify the EMPLOYER against all damages sustained and costs or expenses incurred by him as a result of such termination.

### **14. FORCE MAJEURE**

Neither party to this contract shall be liable for any loss or damage of any nature whatsoever incurred or suffered by the other party due to delays or defaults in the performance under this contract caused by force majeure.

**15. CONTRACT DOCUMENTS AND INTERPRETATION**

The following documents shall be an integral part of the contract.

- a) This Contract,
- b) The Specification
- c) Work schedule submitted by the CONTRACTOR,
- d) Revised and accepted Priced Bill of Quantities of the CONTRACTOR for the total contracted quantity of the works,
- e) All annexes under the provision of this contract,
- f) Any written notices and written agreements under the provision of this contract,
- g) Any other written documents required under the provision of this contract.

Except otherwise provided by the contract, the provisions of this contract shall prevail over those of any other documents. But in case of ambiguities or discrepancies, the same shall be explained and adjusted by mutual consent of the EMPLOYER and the CONTRACTOR.

**16. LANGUAGE AND GOVERNING LAW**

The language of the contract is English and all correspondences under this contract shall be made in English language.

This contract shall be construed and enforced in accordance with Standard Conditions of Contract for Construction of Civil Work Projects, December 1994, by the Ministry of Works and Urban Development and in accordance national law.

**17. SETTLEMENT OF DISPUTES**

Any dispute that may arise between the EMPLOYER and the CONTRACTOR regarding the performance or non-performance of this contract whether during the progress of the work or after completion and whether before or after termination, shall be settled amicably by both parties. If the dispute cannot be amicably settled by the parties, it shall be submitted to the arbitration panel of three. Each party shall appoint one member for the arbitration panel and the two arbitrators shall appoint an umpire. The proceedings of the panel shall be conducted in accordance of the dictates of the national law. The decision of the arbitration panel shall be final and not subject to appeal.

**18. EFFECTIVE DATE**

This contract will come into force on the date of signature by both parties as sign of expression of will of the contractual parties. This contract is executed in 2 (two) copies. The CONTRACTOR and the EMPLOYER each retain one copy.

**In witness whereof** the undersigned being duly authorized have signed this agreement, on behalf of the parties hereto, at the place, on the day and year below written.

**FOR THE EMPLOYER**

**FOR THE CONTRACTOR**

\_\_\_\_\_

\_\_\_\_\_

Place: \_\_\_\_\_

\_\_\_\_\_

Date: \_\_\_\_\_

\_\_\_\_\_

**WITNESSES**

**NAME**

**SIGNATURE**

1. \_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_

2. \_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_

3. \_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_

## **UNHCR TECHNICAL SPECIFICATION FOR BOREHOLE DRILLING**

### **A) GENERAL NOTES**

#### **1. UNDERSTANDING THIS SPECIFICATION**

The following technical specifications apply to all borehole drilling activities in refugee settings. If the CONTRACTOR does not understand anything written in this specification, or in any other of the contract documents and drawings, or if he thinks that there is a mistake, he should consult a representative of UNHCR for clarification before carrying out any works.

#### **2. MATERIALS AND WORKMANSHIP**

All the work noted in this specification must be carried out to the highest standard, using only the best tools, machinery, materials and skilled workmen. Samples of all casing, screen and gravel pack material to the quality specifications given hereunder must be shown to a representative of UNHCR for written approval before starting construction.

#### **3. STORAGE OF MATERIALS**

All materials for use in the borehole construction must be stored in a safe place. If any material can be damaged by water or damp then the place must also be dry. If any materials are damaged before use they must be replaced.

#### **4. SITE IN CHARGE**

The CONTRACTOR must employ an experienced site-in-charge who must be on site to supervise the borehole construction work at all times when work is being done.

#### **5. HYDROGEOLOGICAL SURVEY**

The IRC Engineer will supply to the CONTRACTOR all the information available about the hydrogeological conditions in the area to be drilled. It should be clear that this information does not hold the UNHCR responsible for the locally different conditions at each specific drilling site or for particular problems the CONTRACTOR may encounter.

#### **6. DRILLING SITES**

The UNHCR Engineer will indicate the drilling sites and provide the required permits for the use of the land where the contract is to be carried out. The CONTRACTOR will be responsible for all the damages occurring outside the allocated land.

#### **7. ABADONED BOREHOLE**

If the CONTRACTOR is not able to finish the drilling or has to abandon the borehole due to loss of tools or any other accident or contingency, the CONTRACTOR will remove the casing or drive pipes already placed in the hole and refill it with clay or concrete, at the CONTRACTOR's expense. All material extracted from such holes will be considered the property of the CONTRACTOR. In the case of an abandoned borehole, the IRC will not pay for any of the work carried out.



**8. CLEANING OF THE CONSTRUCTION SITE**

When all construction and pump testing work is complete the CONTRACTOR must remove any rubbish, remove or flatten (as ordered by a representative of UNHCR) any piles of loose earth, and generally leave the whole area of the site clean and ready for use.

**B) BOREHOLE CONSTRUCTION REQUIREMENTS****9. BOREHOLE LOG**

The CONTRACTOR will supply a detailed borehole log of: drilling rates, the appearance of water, soil sampling details and the types of rock found, type and size of borehole casing, position, type and size of screen and other relevant borehole construction details. The CONTRACTOR will keep rock samples taken during the drilling operations in properly packed and identified sample bags and will make them available to the UNHCR Engineer upon request. The CONTRACTOR will take at least one sample every three metres of drilling and at every change in rock formation. Each sample should weigh a minimum of 500 grams. For each sample not taken, the CONTRACTOR will be fined an amount equal to 1 per cent of the total value of the borehole contract.

**10. CASING AND DIAMETERS**

The drilling of each borehole will be carried out according to the characteristics specified in the 'Table of Tentative Specifications' (at the end of this document) using the correct drilling tools, drive pipes, casing pipes, gravel packs and sanitary protection (see Article below), based on the actual characteristics of the aquifer formations. The casing pipe and sanitary seal should isolate each aquifer from other formations which are considered unsuitable for the exploitation of wholesome water. The borehole design is to be authorized by the UNHCR Engineer before the casing pipes and screens are introduced into the borehole.

**11. CASING AND SCREEN**

The CONTRACTOR will supply all casing, screen and fittings for the proper casing of the borehole. Samples of casing and screen must be shown to a representative of the IRC before installation.

**12. DRILLING EQUIPMENT AND DEPTH OF DRILLING**

The CONTRACTOR may use drilling equipment capable of drilling to a depth 25 per cent deeper than indicated in the 'Table of Tentative Specifications'. The use of cable tool, rotary or down-the-hole hammer (air percussion) rigs is acceptable. The depths indicated in the 'Table of Tentative Specifications' should only be regarded as a guide. If the actual characteristics of the boreholes being drilled justify any change in these specifications, the CONTRACTOR will request the authorization of the UNHCR Engineer for such changes to be made. In every case, if the actual characteristics of the borehole differ from those indicated in the 'Table of Tentative Specifications', a price adjustment will be made according to the actual depth of the borehole and the unit price rendered by the CONTRACTOR in the original bid submission.

**13. BOREHOLE PLUMBNESS AND ALIGNMENT**

The borehole will be tested for plumbness and alignment by means of a straight, 12 metre long, steel pipe that will be passed down the whole depth of the borehole. The maximum external diameter of the pipe will be 13 mm less than the internal diameter of the borehole casing. The pipe will be supplied by the CONTRACTOR. The test pipe should easily pass down the whole depth of the borehole. If these minimum requirements are not met, the CONTRACTOR will, if possible, correct the defects. If not, the UNHCR will reject the borehole and no payments will be made for its drilling and completion. This test should normally be made before pump testing the borehole.

**14. TEMPORARY LID**

The CONTRACTOR will take precautions against the entrance of pollutants into the borehole, including surface water, both during drilling and after completion of the borehole. For this purpose, the CONTRACTOR will provide a lid to be placed over the mouth of the borehole at any time the drilling rig is not in operation. The lid will be placed on top of the borehole on completion of borehole construction.

**15. ARTIFICIAL GRAVEL PACK**

If necessary, an artificial properly graded gravel pack will be placed in the annular space between the hole wall and the outer face of the casing according to the 'Table of Tentative Specifications'. Proper techniques will be used for the accurate placing of this pack. The gravel to be used should be clean, borehole-rounded and the grains should be hard, and of alluvial origin. The gravel size and type shall be approved by the UNHCR Engineer.

**16. SANITARY SEAL**

All the boreholes shall have a proper protective sanitary seal cast in concrete grout (one part concrete to one part sand) by the CONTRACTOR. The protective seal shall be placed from 3.5 metres below ground level to 0.25 metres above ground and will occupy an annular space between the wall and the outer face of the casing.

**C) BOREHOLE DEVELOPMENT AND TEST PUMPING****17. BOREHOLE DEVELOPMENT**

Once the borehole construction is finished, the borehole will be developed by hydraulic surging (by means of a packer piston or compressed air) for at least eight (8) hours.

**18. PUMPING TESTS**

The CONTRACTOR will have a pumping unit capable of discharging 50 per cent more water, at the borehole's pumping water level, than the maximum yield indicated for each borehole in the 'Table of Tentative Specifications'. Immediately after borehole development, the borehole will be cleaned and the pumping unit introduced into the borehole. The CONTRACTOR will communicate (three days in advance) the date the pumping test is to be carried out.

The pumping test will consist of continuously pumping the borehole at the maximum yield specified in the 'Table of Tentative Specifications' for the respective borehole or at any other rate previously defined between the CONTRACTOR and the UNHCR Engineer, according to the outcome of the drilling. The duration of the test will be 48 hours. The measuring of the dynamic water levels will be performed according to the logarithmic timescale schedule normally used for test pumping water boreholes. The CONTRACTOR will convey the pumped water at least 200 m away from the borehole such that no pumped water will be left standing within a radius of 200 m of the borehole. The CONTRACTOR will provide all the necessary equipment for this to be achieved. The CONTRACTOR will provide all the necessary equipment (weirs, pipes, gauges, etc.) for the proper measurement of discharge rates and water levels.

## **19. BOREHOLE YIELD**

After the pumping tests have been carried out, the UNHCR Engineer will decide the recommended yield for each borehole according to the test results, appropriate hydrogeological techniques and the actual needs.

## **D) BOREHOLE PROTECTION AND DISINFECTION**

### **20. BOREHOLE POLLUTION**

The CONTRACTOR will take maximum care to avoid the physical, chemical or bacteriological contamination of the borehole water during construction. If water is polluted due to the CONTRACTOR's neglect, the CONTRACTOR will be obliged to carry out all the necessary operations, at the CONTRACTOR's cost, to remove such pollutants from the borehole.

### **21. BOREHOLE DISINFECTION**

Once the borehole has been completed and tested, the CONTRACTOR will sterilize the borehole with a chlorine solution yielding at least 50 mg/l of active chlorine in all parts of the borehole. The chlorine solution may be prepared from calcium hypochlorite, sodium hypochlorite or gaseous chlorine. The chlorine solution should stay in the borehole for at least four hours at the specified concentration.

### **22. WATER SAMPLES**

The CONTRACTOR will take two water samples for laboratory analysis after completion of the long duration pumping test. One sample will be used for physical and chemical analysis. It should be put in a clean and properly sealed plastic or glass container. Its volume should not be less than 5 litres. The other sample will be used in a bacteriological analysis. The sample should be divided and placed into three separate sterilized and properly sealed containers. The volume of each container should not be less than 100 ml. The samples will be handed to the UNHCR Engineer as soon as the samples are taken.

### **23. SAND PARTICLE CONTENT**

The water drawn out of the borehole will be deemed unacceptable if it has a sand particle content of more than 5 g/m<sup>3</sup>. If the water is deemed unacceptable, the CONTRACTOR will make all necessary adjustments to the borehole structure, at the CONTRACTOR's expense, to meet this specification.