Embassy of the United States of America
Accra, Ghana

STATEMENT OF WORK

For

WATER WELL DRILLING PROJECT AT EMBASSY COMPOUND

February 1, 2023

Statement of Work for Water Well Drilling project at the Embassy Compound, U.S. Embassy Accra, Ghana

1.0 SUMMARY

The US Embassy in Accra, Ghana, has requirements for drilling a new well to include purchasing and installing the well pump and connecting the well to the water distribution pipe located at the US Embassy Accra, Ghana. The objective is to have a fully functioning water well that will supply water to the Embassy compound. In accordance with the terms and conditions set forth below, the Contractor will furnish all supervision, labor, management, facilities, supplies, equipment and material, and all required services necessary for the performance of the work. The Contractor will provide the required services to the U.S. Government as described in the requirements below.

2.0 REQUIREMENTS AND DESCRIPTION OF WORK

2.1 Continuous Verified Yield of 48-120 (NEED 310 CMD) Cubic Meters per Day (CMD). The contractor shall design and install a complete well system with sufficient integration of well components and other systems to ensure all components are matched and capable of delivering, conveying, and treating (as required) the required continuous yield from the well.

2.2 Investigations and Analysis. The contractor will investigate and analyze geotechnical, geophysical, and groundwater hydrology characteristics required to plan, locate, and construct a complete well system that will provide the required continuous yield.

2.3 A program of works with acceptable deliverables must be submitted.

2.4 Well Location Requirements. The well must be protected from the pollution of non-sanitary surroundings and should be located at the minimum distances from the structures or topographic features identified in Table 1 below:

Table 1. Minimum Well Location Distances

Structure or Topographic Feature	Minimum distance (M)
Building Foundation – Non-Treated	3
Building Foundation with Termite Treatment	15
Residential Sewer Line	15
Wastewater Treatment Plant or Sewage Lift Station	30
Individual Septic Tanks	15
Septic Tank Drainfields	30
Underground Fuel Storage Tanks	30
Cemetery	30
Non-Potable Water Well	30
Property Line	15
Storm Water Detention Basin or Infiltration Beds	15

2.5 The well will be located to the North of the Chancery building. Well site is shown in Attachment 1

2.6 Pump Specifications

The contractor shall provide a pump with footing and a protective screen sized to prevent the introduction of sand or silt into the suction line. The pump motor shall be a three-phase, 10 HP, 400 V, or higher pump. Capable of pumping water at a head pressure of 145 psi at a minimum of 40 m above the ground surface. The following model or COR approved alternate is acceptable:

MFR: Grundfos Electric
Model #: SP14-25
Electrical spec: 16A,400V ac up to 19Amps in all three phases.

The Embassy reserves the right to reject any pump that does not meet the specifications provided above.

2.7 Well Specifications

Well depth: 120m
Diameter: 6inch [Outer Dia.]
Pipe type: [Unplasticized polyvinyl chloride Casing (ASTM F480 and NSF 14, Schedule 40) or as approved by COR]
Optimum Pumping Rate:2 to 5 m^3/h
Typical Well Section: 65.15m Depth of Casing, 14.85m Depth of Screen, 80m Depth of Sump.
Typical Water Elevation: 120m Distance below the surface.
Screen Material: Type 304 Stainless steel or as approved by COR.

2.8 The contractor shall perform the following services:

2.8.1 Drill well at 120m depth and 10-inch width (diameter).

2.8.2 Preparation of UPVC and PN16 pipes infiltration and placement of filter element. The contractor is responsible for all materials.

2.8.3 Development of drilling via Development by air lift-normally rotary drilled & DTH drilled Method. Complete drilling to an estimated depth of usable groundwater and estimate safe yield for well prior to completion. Develop wells to maximum yield per meter (foot) of drawdown.

2.8.4 Fill annular space from top to bottom with concrete grout and provide permanent casing with temporary well cap. The top of the casing should be 900 mm (36 inches) above the finished grade.

2.8.5 Finalization of the project with concrete cover at the annular space extending at least one meter from well casing. Provide casing vent that extends above the top of the well casing, with pipe turned down and capped with mesh to prevent insects from entering well. Seal space between well casing and concrete with silicone sealant.

2.8.6 Connection of the well water pipe with the water distribution pipe to the tankfarm

2.8.7 Purchase of 1 pump, Grundfos,10m^3/h, 3 Phase with 2426 mm of 4x4mm^2 electric wire and installation accessories.

2.8.8 Install the pump and test for plumbness and alignment per AWWA A100. Electrical connection will be made by the US embassy.

2.8.9 Conduct final pumping tests after wells have been constructed, cleaned, and tested for plumbness and alignment.

2.8.10 Disinfection, testing, and measuring the flow of the well.

2.8.10.1 Upon completion, the well shall be disinfected in accordance with current AWWA (American Water Works Association) standards (AWWA C654 -13) for well disinfection except that the disinfectant shall remain in the well for at least twenty four hours.

2.8.10.2 Before placing the well in service, the water containing the disinfectant shall be flushed from the well. Then samples of water shall be collected and submitted for microbiological analysis until three successive daily raw water samples are free of coliform organisms.

2.8.10.3 A complete physical and chemical analysis of the water produced from a new well must be made after 36 hours of continuous pumping at the design withdrawal rate. The samples should be submitted to a certified laboratory for analyses. Water quality tests shall include those parameters and methods shown in Table 2 below.

2.8.11 **Pumphouse enclosureStructure:** Please see the drawings in the attachement

2.8.11.1 Remove foundation excavation soil for pumphouse enclosure installation.

2.8.11.2 Concreted Pad

2.8.11.2.1 A new reinforced concrete slab 1-1/2 metres below grade shall be constructed for the new well enclosure

2.8.11.2.2 Concrete pad dimensions of the well enclosure footprint shall be 2-meter x 2-meter concrete slab on grade 50cm thick with specified rebar reinforcement.

2.8.11.2.3 The Contractor shall provide structural computations for the concrete pad design, considering the following loads and actions:

- Liquid load
- Wind load.
- Flotation
- Earthquake, to meet seismic zone-3 requirements.
- Ground movements.
- Structural loads

2.8.11.2.4 Concrete shall be batched at a concrete plant and delivered by a concrete truck with a mixing drum.

2.8.11.2.5 At a minimum, the pad shall be cast in place concrete, 20-inch thick, with a single layer of #10 rebar (1 1/8-inches) on 18-inch centers each way located in the center of the slab. The new, extended slab rebar shall be dowelled into the existing slab, with a 6-inch of crushed stone under the slab for drainage. The concrete should be air-entrained (for workability) to a working pressure of 20 MPA and finished to match the existing slab. The sub-base should be prepared to eliminate any areas with a bearing capacity of less than 10 KPA or alternately proof roll the area with a loaded 9000kg 10 wheel or similar truck and over excavate, replace, and compact the sub-base. The Contractor shall recommend any additional work deemed necessary to expand the pad and tie into the existing pad, subject to COR approval.

2.8.11.3 Power to the well in enclosure and associated electrical works

1. Sub-panel with a 4-wire service near utility room (determined during the site visit)
2. Well pump house sub panel with a 4-wire service
3. Well pump house sub panel with a 4-wire service

2.8.12 Clean work site area after completion of the work each day

2.8.13 Restore work site to pre-construction conditions.

2.8.14 Monitor any discrepancies and corrective action

3.0 Deliverables:

3.1 Water Well (Borehole) with the specified casing 6-inch inside diameter PVC meeting ASTM standards for wall thickness.

3.2 Pump capable of utilizing city power AC to meet water demand specified in this SOW and maintain 40psi.

3.3 80mm HDPE supply pipe approximately 100 meters APPROVED required fittings to existing storage tank as shown on the site-plan, northeast of main chancery..

3.4 Install sample port/valve if necessary. Exact sample port/valve location shall be determined by contractors on a pre-bid walk through.

3.5 Control panel made by pump manufacturer with wire communication to float switch in water storage tank.

3.6 Pump enclosure that encapsulates the new well head built on a 2 meter x 2 meter slab on grade 50cm thick with specified rebar reinforcement. Pumphouse enclosure should be fibre glass with cover with a vent to ensure moisture-free environment

3.7 Clean-up site, remove all spoils from drill location, re-landscape the site back to its original condition, plant trees and grass as necessary.

3.8 Provide a comprehensive one-year warranty on all work done to meet specifications and performance set forth in this statement of work.

Table 2. Basic Water Quality Analyses for Well Water Samples[1]

Type	Parameter	Collection Procedures
Chemical/Physical Parameters	Arsenic Barium Cadmium Chromium Cyanide Fluoride Iron, Total Lead Manganese, Total Mercury Nitrate Nitrite Selenium Sodium Sulfate Zinc Calcium Chloride Magnesium Potassium Alkalinity Color **Conductivity[2]** Carbon Dioxide (CO_2) Dissolved Oxygen (DO) Hardness (Total and Ca) Hydrogen sulfide (H_2S) **pH[2]** **Temperature[2]** **Total Dissolved Solids (TDS)[2]** Turbidity	Samples should be collected after the well has been pumped (or bailed) long enough to remove standing water, mud and other foreign material, including development and disinfectant chemicals, so as to insure that ground water has entered the well and the sample is representative of the water in the aquifer(s) .
Bacteriological	Total and Fecal Coliform Total Plate Count	Testing for bacteriological quality is the final step in well completion. The sample is collected from the pump discharge after the well has been disinfected and the chlorine removed by pumping.

[1] Includes constituents and contaminants identified in EPA 570/9-75-001 (Manual of Water Well Construction). Additional Safe Drinking Water Act regulated parameters should be tested if water is intended to be used for human consumption as identified in EPA 816-F-09-004 (per current OBO specifications, i.e. SECTION 332100 - WATER SUPPLY WELLS, January 2012).

[2] **Field Measurement**

4.0 MATERIALS, TOOLS AND PERSONNEL

As requested under this contract, the contractor shall provide all the materials, tools and equipment for proper installation of the well and connection of the pump. The inbound and outbound shipping cost for the tools or equipment is the responsibility of the contractor.

G.2 calls for the contractor to have its own medical insurance and any other type of insurance required by local laws. The contractor shall also set up a Medical Evacuation Plan in case of a real emergency during the period of performance.

The contractor is required per Section G.5 to provide in advance the names and National Identification Number of all personnel who will access the site. The contractor is also required to provide all vehicle ID plates or equipment ID plates with all drivers' names 3 days prior to access to the site.

The contractor should designate a point of contact or a supervisor with phones numbers to contact during the period of performance.

The contractor will not be allowed to bring any electronic devices or cellular phones exception for their supervisor and this should be approved in advance.

All materials and equipment to be use as part of the project shall be approved by the COR before acceptance.The U.S Embassy has the right to reject any material or equipment it deem as not meeting its specification.

5.0 WRITTEN REPORT

The contractor is required to provide the following written reports:

a) Field documentation report to include:
   i. Casing material, diameter, and depth below grade
   ii. Screen material, construction, diameter, and opening size
   iii. Pumping test with static water level, maximum safe yield, and drawdown at maximum yield
   iv. Well log indicating strata encountered.
b) Operation and Maintenance information for each well pump, **[valves, motors, and well screen]** to include in emergency, operation, and maintenance manuals.
c) List of recommendations for repair and improvements with proposed costs to ensure the well is performing per the original design.
d) Copy of all inspection and test results (hydrostatic, water quality analysis, performance test data).
e) Debrief to Embassy point of contact.
f) List of immediate safety issues

6.0 **ATTACHMENTS:**

6.1 Attachment #1: Site Map well location

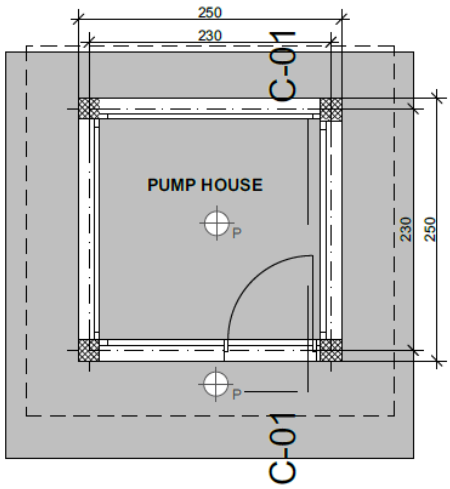
END SOW

ATTACHMENT 1
SITE MAP WELL LOCATION

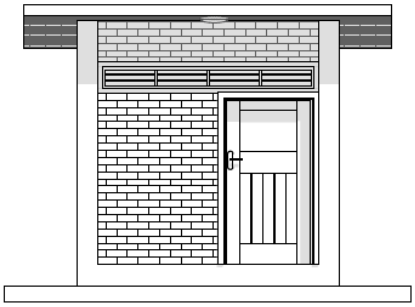
ATTACHMENT #2

Pump house

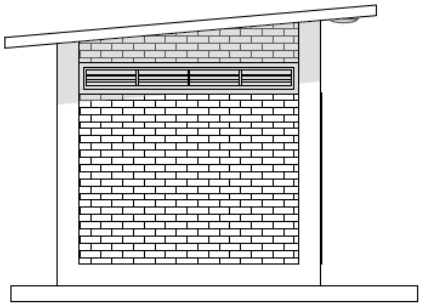
REZ DE CHAUSSE



FACADE PRINCIPAL



VUE DE GAUCHE



VUE DE DERRIERE