



PROJECT TITLE:

**EXPLORATORY/ DRILLING OF PRODUCTION WELL**

LOCATION:

**LEYSON COMPOUND BRGY. CONEL, GENERAL SANTOS CITY**

OWNER:

**GENERAL SANTOS CITY WATER DISTRICT**

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## **S P E C I F I C A T I O N S**

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### **1.0 SCOPE OF WORK**

The work includes **The Exploratory / Drilling of Production Well at Leyson Compound Brgy. Conel, General Santos City**

### **2.0 BIDDER'S QUALIFICATION**

- a.) Similar contract should be projects with civil, piping and structural steel works in any Government or Private Institutions duly supported by a satisfactory CPES rating and or /an owner's certificate of acceptance in Two (2) years from the date of submission and receipts of bids.
- b.) Bidders under Small A and Small B category who do not have completed contracts are allowed to participate if the cost is not more than the ARCC under their PCAB registration.
- c.) Contractor's PCAB shall be unexpired upon submission and related projects shall be Water supply and PCAB classification of SP-WD (Well-Drilling Work) and GE-4 (Water Supply).
- d.) All bidders are required to have a valid Certificate of Well Driller Registration from the National Water Resources Board (NWRB). The certification guarantees that the contractor has complied with the qualifications and regulations to perform drilling operations for groundwater production.  
Not submitting a valid certification will lead to disqualification from the bidding process.
- e.) *"The prospective bidder must ensure that the personnel to be assigned to the contract are in full-time capacity and are not presently designated in other ongoing contracts."* This is in reference to Section 23.4.2.5 of the Revised Implementing Rules and Regulations (IRR) of RA 9184, which requires bidders to submit a sworn statement or affidavit that the personnel assigned are available for the duration of the project. To comply, bidders with ongoing projects must assign a separate set of key personnel and provide a Notarized Undertaking during post qualification that the listed personnel are not currently involved in other awarded GSCWD projects. Failure to do so shall be grounds for disqualification.
- f.) *"The prospective bidder must not have a negative slippage of more than 15% in its ongoing government contracts."* This aligns with the standard eligibility requirements and evaluation criteria under RA 9184 and its IRR. In line with this, all bidders with ongoing projects must not have a percentage slippage exceeding negative fifteen percent (-15%) in any of their current government projects. Failure to meet this requirement will result in disqualification from the bidding process.

### **3.0 LAWS, LICENSES, SAFETY AND OTHER REQUIREMENTS**

#### **a. Permit and Licenses**

The procurement and payment of all necessary permits such as Zoning, Building, Electrical, Mechanical, Plumbing, Sanitary, etc., in the project implementation shall be the responsibility of the Owner.



a. **Inspection of Project Site**

The Contractor shall inspect the site of the work in order to satisfy themselves by personal examination and/or by such other means as they may prefer, of the location of the proposed work and the actual visualization of the work to be done. He should be aware of the conditions which might affect the execution of this contract and has made provisions therefore in his bid.

c. **Public Safety and Health Regulations**

The Contractor shall comply with safe work practices and all health and safety regulations of the state and the locality. Furnish protective and lifesaving equipment for persons working at the site and provide a **Contractor's All Risk Insurance third party liabilities and Personal Accident Insurance for all his workers.**

Coverages: (Per Person in 1 Year)	Limit of Cover
Accidental Death & Disablement (AD&D)	Php 100,000.00
Unprovoked Murder & Assault (UM&A)	Php 50,000.00
Accidental Medical Reimbursement (AMR)	Php 30,000.00
Burial Benefit due to Accident	Php 30,000.00

Whenever necessary, it shall furnish, erect and maintain fences, barricades, lights, signs and other devices as are necessary to prevent accidents and avoid damage or injury to the public. The Contractor shall be liable to all claims and/or liabilities arising during the public implementation.

Should the Contractor fail to faithfully observe the Safety Provisions herein specified, the Owner may exercise remedial rights as stipulated under this contract.

d. **Laws and Regulations**

The Contractor shall observe and comply National, Provincial and Local laws, ordinances, and regulations, which on the manner affect those engaged or employed on the work, the material used in the work, or in the conduct of the work.

The Contractor shall indemnify and save harmless the Owner against all claims or liabilities arising from violation of any such laws, ordinance, order, or regulation, whether by itself or by its employees.

e. **Third Party Liability**

The Owner shall in no case be held civilly or criminally liable due to the act or omission of the Contractor during the contract period or during the implementation of the required work thereof. Any liability that may arise to the third party shall be the sole responsibility of the contractor.

4.0 **Preliminary Site Inspection**

The Contractor is encourage to conduct an ocular inspection of the site in order to be familiar of the location.

5.0 **GENERAL**

5.1 **Technical Definition**

5.1.1 *Borehole* means any drilled section of boring before completion as defined in well below.

5.1.2 *Casing* means non-slotted or non-perforated lining tubes.

5.1.3 *Development Equipment* means high velocity jetting tool, surge plunger and all other equipment needed to develop the well.

5.1.4 *Diameters* mean nominal diameters unless otherwise stated.

5.1.5 *Drilling Rig* means drilling equipment and the auxiliary equipment for its operation.

5.1.6 *Drilling Unit* as defined in Clause 2.2 under this section (*Equipment*)

5.1.7 *Final Well Design* means the drawing and description prepared by the Engineer upon completion of the drilling of the pilot hole and geophysical borehole logging specifying the final well construction.

5.1.8 *Lining materials* means any casing, screen, slotted lining or perforated lining tube whether permanently or temporarily installed in the borehole.

5.1.9 *Pumping Unit* as defined in Clause 8.7 under this Section (*Definition of "Pumping Unit"*).

5.1.10 *Screen* mean continuous wire wound stainless.



- 5.1.11 *Tentative Well Design* means the contract drawing showing the estimated quantities of the work.
- 5.1.12 *Well* means any completed hole in which all lining material has been set, all grouting completed and all temporary lining removed.
- 5.2 **Technical Standards**  
All materials or workmanship shall comply with the specifications. Other standards equal or superior to those enumerated in this specification, shall be acceptable, subject to the approval of the Resident Engineer.
- 5.3 **Water and Power Supply**  
Contractor must ensure sufficient water (mobile/fixed tanks) and lighting at drilling site. Power connection/supply is also the contractor's responsibility, with costs covered by existing bid rates.
- 5.4 **Storage of Inflammables**  
The Contractor shall comply with all local authority regulations applicable to the use and storage of diesel oils, petrol, paraffin and other inflammable fuels used by him on the site, and shall ensure that adequate precautions are taken against fire.
- 5.5 **Boundaries of Work**  
The Owner shall provide land or rights-of-way for the work specified in this Contract and make suitable provisions for ingress and egress, and the Contractor shall not enter or occupy with men, tools, equipment or material, any ground outside the property of the Owner without the written consent of the Owner of such property. Other Contractors and employees or agents of the Owner may, for all necessary purposes, enter upon the work premises used by the Contractor, and the Contractor shall conduct his work so as not to impede unnecessarily any work being done by others on or adjacent to the site.
- 5.6 **Temporary Buildings for Use by Contractor/Inspectors**  
The Contractor shall provide at the site of the works such temporary buildings, tanks, workshop, etc., as may be necessary and proper for his general use in connection with the works, and for the use of persons employed by him. The nature of the buildings, tanks, etc. and the positioning of them shall be subject to the prior approval of the Engineer and the relevant authorities. The Contractor shall also provide the Owner's Resident Engineer with a temporary office at the project work site. The said office shall be weatherproof building field office or "Payag".
- 5.7 **Shop Drawings**  
5.7.1 The Contractor shall if requested by the Engineer prior to start of each operation, produce for the Engineer's approval shop drawings showing details of technical operations such as test of plumbness and alignment, the method of the slotted casing production, if so required, the methods of placement of formation stabilizer and/ or cement grout, the arrangement for well testing, the method for well development and all other drawings pertinent to the well drilling, well construction operations and well development as requested by the Engineer.  
5.7.2 Shop drawing shall be completed with respect to the dimensions, design criteria, materials, method of construction and the like to enable the Engineer to review the information as required.
- 5.8 **Well Head Protection**  
5.8.1 At all times during the progress of the work, the Contractor shall protect the well in such manner as to effectively prevent either tampering with the well or the entrance of foreign matter into it, and upon its completion he shall provide and install a well head cap satisfactory to the Engineer.  
5.8.2 If Contractor's negligence contaminates the well, they must fix it at their expense. This includes providing casings, seals, or anything else needed to remove contaminants or unwanted water.



### 5.9 Site Preparation and Reinstatement

The Contractor shall prepare the site, provide all necessary tanks and pits and make all necessary arrangements for erecting and dismantling the drilling unit and shall reinstate the site on completion of such phase of work to the satisfaction of GSCWD Engineer.

## 6.0 WELL DRILLING

### 6.1 Preliminary Well Design Details

DESCRIPTION	DETAILS
DEPTH	200meters
BLANK CASING	400mmØ&300mmØ, 9mm thick Spiral Welded Steel Pipe.
BOREHOLE	600mmØ
WELL SCREEN	Stainless Steel Continuous Slot Wedge Wire wound, SLOT 60/ SIZE 1.5mm/300mmØ
CASING CENTRALIZERS	PLACED EVERY 12m
GRAVEL PACK DIAMETER	4-5mm
CEMENT GROUT	25meters

### 6.2 Scope

- 6.2.1 The Contractor shall provide and operate one or more mobile drilling Units required completing the works within the contract period
- 6.2.2 The Contractor shall provide all auxiliary equipment, lubricants, fuels and spares necessary to keep the drilling rig(s) in continuous operation.

### 6.3 Equipment

- 6.3.1 The drilling rig(s) together with all auxiliary equipment and personnel shall be defined as the drilling Unit(s).
- 6.3.2 All rigs shall have sufficient capacity to drill the specified borehole(s) in the diameters specified in the tentative well design(s) to a depth which is min. 25% higher than indicated in the Contract Drawings.
- 6.3.3 Payments of drilling will be by the linear meter of borehole as measured after removal of drill string. The rates set against drilling items in the Bid Form shall be deemed to include all equipment, personnel, fuels and lubricants and the accessories required for operation of the drilling Unit.
- 6.3.4 Drilling rig equipment shall be either driven by an electric motor or a diesel engine.
- 6.3.5 The Contractor shall provide the following minimum equipment intended for the project. During Post-Qualification, GSCWD shall conduct inspection to verify the availability and working condition of the listed equipment. Absence of any one of the required equipment is ground for disqualification.

Quantity	Description of Equipment
1	Rotary Drilling Rig
2	15kVA Welding machine
1	25kVA Welding Genset

1	250Kva Generator Set
1	Boom Truck / Truck
1	Mud Pump
1	E-Log Equipment
1	Set of Jetting Tools
1	Set of Surging / Bailing tools
1	Air Compressor
1	Submersible pump with Minimum of 70Lps capacity.
1	Not less than 125Hp submersible motor with motor controller suitable for the project.
1	Submersible Cable
1	Camera/Logging Equipment

The Contractor shall be required to include the list of their equipment in the technical documents and specify whether the same is leased or owned. The Contractor shall provide a Memorandum of Agreement or Lease Contract if leased. The bidder shall attach official receipts or sales invoices for owned equipment. Affidavits or any form of Certification executed under oath shall not be accepted and is grounds for disqualification. During post-qualification, GSCWD shall conduct an inspection to verify the availability of the listed equipment. The absence of any one of the required equipment is grounds for disqualification.

#### 6.4 Drilling Method

- 6.4.1 All drilling shall, unless otherwise specified in the special provisions, be performed with the rotary drilling method.
- 6.4.2 The Contractor shall drill the hole to such depth and with such a diameter, which shall enable an easy installation of casing and screen and placement of gravel envelope with a uniform thickness as specified, if required. During drilling of the hole, the Contractor shall ensure that the natural permeability of the yielding strata near the well bore is not irreversibly reduced due to the drilling method employed.

#### 6.5 Strata Sampling / Material Testing

- 6.5.1 Strata samples (washed and unwashed) shall be taken at one-meter intervals or more frequent if the formation penetrated changes. Samples shall be placed in plastic or other appropriate bags on which or in which the sampling depth and the date of sampling is written in such a manner that it is permanently readable.
- 6.5.2 The sampling procedure must provide that all the fraction of the penetrated strata is present in the sample.
- 6.5.3 Each sample shall be placed in a wooden box with space for storage of one sample and the sampling depth shall be written on the box.
- 6.5.4 A record of samples taken with the details described above shall be submitted to the Engineer every day.
- 6.5.5 Payment for sampling shall be deemed to be included in the rates entered for drilling in the Bid Form.



## 6.6 Drilling Mud

- 6.6.1 Bentonites, if used, shall be of premium quality in accordance with API Standard 13A with 150 kg/cu.m of make-up water yielding a mud **with a viscosity of between 35 and 40 seconds using a Marsh funnel and a mud weight of less than 1.10 kg/l (9.2 lbs/US gal.)**.
- 6.6.2 Make-up water shall be treated with caustic soda (soda ash) to maintain the pH between 8.0 and 9.0 prior to mixing mud.
- 6.6.3 During drilling with mud, the Contractor shall perform hourly measurements of the following mud characteristics:
- pH value
  - Funnel viscosity
  - Specific gravity
  - Sand content
  - Filtration loss
  - Filter cake thickness
  - Mud viscosity
  - Conductivity Measurement
- 6.6.4 The drilling Contractor shall maintain a drilling fluid Log showing the date, time depth, Marsh Funnel viscosity, drilling fluid weight and PH, and all shall record any drilling fluid additives used, including time introduction as well as other pertinent comments. The recorded mud characteristics shall not exceed the following values, without prior approval of the Engineer:

Specific gravity	9.5 lb/gal
Sand content	4%
Filtration loss	10 ml
Filter cake	1.5 Mm

- 6.6.5 It is the Contractor's responsibility to assure that equipment for measuring fluid properties shall be available at the drilling site.

## 7.0 WORKING HOURS

All work from start of drilling of the borehole until completion of well development shall be within reasonable hours of the day except during test pumping, installation of well casing and screen, and subject to existing local ordinances.

The contractor shall provide the following minimum number of man power intended for the project.

Quantity	List of Man Power
1	Project Engineer
1	Safety Officer
2	Drilling Operator/ Operator
1	Truck driver
1	Boom Truck driver

3	Helper
1	Well Camera Operator
2	Welder
1	Mason
1	Carpenter

The bidder shall submit its organizational structure for the project including unexpired licenses of professionals to be assigned and stipulate specific functions wherein One (1) professional can hold only up to Two (2) key positions. The personnel listed in the bid must be the same individuals performing the designated tasks on-site. If there are any changes during the time of implementation to the assigned personnel, the bidder must notify GSCWD with a formal written request outlining those changes. This process ensures accountability and clarity regarding who is responsible for each function throughout the project. Welders shall also submit unexpired corresponding National Competency (NC) certificate from TESDA. Original document must be available and presented during the conduct of post-qualification. The absence of needed documents is subject to disqualification.

## **GEOPHYSICAL LOGGING**

### **8.1 Scope**

The Contractor shall perform geophysical logging as specified in the Special Provisions.

### **8.2 Equipment**

- 8.2.1 The geophysical logs may be recorded either by automatic recording on a chart strip or by manual reading of recorded values. In case the logs are recorded by the manual method, readings shall be taken per min. 1.0 m of borehole length.
- 8.2.2 The recorded logs shall be submitted to the Engineer immediately upon completion of logging as plots of recorded characteristics versus depth for his approval. In case of disapproval by the Engineer, the logs shall be repeated immediately.

### **8.3 Logs**

Geophysical logging shall comprise the following logs:

- a. Resistivity log (16" and 64")
- b. Self-potential log (SP)

## **9.0 WELL CASING**

### **9.1 Scope**

The Contractor shall provide and install the well casing specified in the Contract Drawings and any temporary casing required during the work.

### **9.2 Casing Material**

- 9.2.1 The Contractor shall, before commencement of the work, submit for the approval to the GSCWD Engineer the following details of all casing:
  - a. Type of materials
  - b. Internal and external diameters
  - c. Wall thickness
  - d. Method of jointing
- 9.2.2 All permanent casing material shall be spiral welded pipe and of new stock unless otherwise specified in these documents.
- 9.2.3 The Contractor shall assume responsibility for any casing failure and shall correct, as approved by the Engineer, any casing failure at no cost to the Owner. In the event that the Contractor cannot correct a casing failure, the Contractor shall replace the casing with material complying with the specifications, or if necessary, better casing as approved by the Engineer at no extra cost to the Owner.

### **9.3 Lining Installation**

- 9.3.1 Lining materials shall be assembled and located in the well at the required depth in a continuous operation. The lining material shall be set concentric within the borehole by centralizing bars unless otherwise agreed with the Engineer.



- 4.3.2 If the lining jams or is lost before it is set to the specified depth, the Contractor shall endeavor to remove the lining material from the well or, if unable to effect removal, shall re-drill the well and replace the lining material at his own expense.

#### **9.4 Lining Materials Accessories**

- 9.4.1 The Contractor shall provide as necessary the following accessories to set the lining materials to the required depth:
- a. Centralizers to be affixed to the lining material at intervals of 12 meters to locate the lining material in the center of the drill hole;
  - b. Supporting clamps, equipment and tools;
  - c. Reducing cones and connecting piece;
  - d. Casing hangers;
  - e. All other necessary equipment.
- 9.4.2 Except where expressly provided, all accessories shall be deemed to be included in the Bid Form for the provision and insertion of lining material.

#### **9.5 Testing for Plumbness and Alignment**

- 9.5.1 All boreholes shall be constructed, plumb and true to line as defined herein. To demonstrate the compliance of his work with the requirement, the Contractor shall furnish all labor, tools and equipment and shall provide the detailed drawings and the description of the tests to the satisfaction of GSCWD Engineer.
- 9.5.2 Tests for plumbness and alignment must be made after the complete construction of the well and before its acceptance. The Contractor, however, may make additional tests, during the performance of the work. No specific payments shall be made for making these tests. Should the results of the test for plumbness and alignment show that plumb bob of dummy fails to move freely throughout the length of the lining or borehole to a depth of the lowest anticipated pump setting and should the well vary from the vertical in excess of two thirds of the smallest inside diameter of that part of the well being tested or beyond the limitations of this test, the plumbness and alignment of the well shall be corrected by the Contractor at his own expense. Should the Contractor fail to correct such faulty alignment of plumbness, the GSCWD Engineer may refuse to accept the well and the Contractor shall drill a new well without charge to the Owner.

### **10.0 WELL SCREENS**

#### **10.1 Scope**

The Contractor shall provide and install the well screens specified in the Contract Drawings, unless otherwise specified in the Special Provisions.

#### **10.2 Types of Screens**

- 10.2.1 The type of screens shall be as specified in the tentative well design and the Special Provisions.
- 10.2.2 Slotted screens, if specified for installation, shall be so fabricated as to ensure the maximum yield of the well and to prevent clogging and encrustation and shall be free from jagged edges and irregularities that may accelerate clogging or corrosion.

#### **10.3 Responsibility for Malfunction**

- 10.3.1 The Contractor shall assume full responsibility for any malfunction of the screen caused by inadequate installation procedure and shall undertake any correction as approved by the GSCWD Engineer at no extra cost for the Owner.
- 10.3.2 The screen must have no change of alignment at any of its joints after installation. If requested by the Engineer, the Contractor shall submit for approval by the Engineer the design and method of construction and installation of the screen.
- 10.3.3 In the event that the Contractor cannot correct a screen failure, the Contractor shall replace the screen with material complying with the specification of this Contract at no extra cost for the Owner.

#### **10.4 Screen Strength**

The screens shall have adequate strength to resist the external forces that may be applied during and after installation.

#### **10.5 Screen Accessories**

All fittings, packers, couplings, joints, plug and seals used during installation of well screen together with the installation procedure, shall be to the approval of the GSCWD Engineer.



## **11.0 FORMATION STABILIZER/GRAVEL PACK**

### **11.1 Scope**

The Contractor shall provide and install formation stabilizer, or gravel pack if specified in the Contract Drawings and the Special Provisions.

### **11.2 Materials**

- 11.2.1 The formation stabilizer/gravel pack material shall consist of well-rounded, water worn siliceous grains. Angular chippings or road stone must under no circumstances be used as formation stabilizer/gravel pack material.
- 11.2.2 The Contractor shall, during the mobilization period, submit it to the GSCWD Engineer for his approval, samples of the formation stabilizer he proposes to use, stating the source of the formation stabilizer, quantities available, rate of delivery and any other information requested by the GSCWD Engineer.

### **11.3 Method of Installation**

- 11.3.1 The method of placing the formation stabilizer/gravel pack in the annulus shall be such that separation of the gravel and bridging is avoided.
- 11.3.2 The formation/stabilizer/gravel pack shall immediately upon completion of lining installation, be placed in the annulus between the borehole and the lining, in the screened section(s) of the lining, as specified in the final well design.
- 11.3.3 Since the borehole shall be drilled by the rotary method, installation of formation stabilizer/gravel pack shall be done by circulation of the drilling mud.

## **12.0 WELL DEVELOPMENT**

### **12.1 Scope**

- 12.1.1 The scope shall consist of surging with plunger, deflocculation, and bailing, water jetting and airlifting.
- 12.1.2 The Contractor shall furnish compressors, surge plungers, jetting tools, electric generators, chemical and any other equipment required for satisfactory well development as directed by the Engineer.
- 12.1.3 Development shall, since the rotary drilling method is applied, comprise deflocculation, high velocity jetting in continuous slot screens, surging with plunger in slotted screens, unless otherwise, specified in the Special Provisions.

### **12.2 Expected Yield**

The Contractor shall develop the well to its maximum expected yield, as specified in the Special Provisions.

### **12.3 Surging with Plunger**

- 12.3.1 Upon completion of installation of lining or formation stabilizer/gravel pack, the Contractor shall develop the well by 12 hours mechanical surging with a valve-type surge plunger approved by the GSCWD Engineer.
- 12.3.2 Before start of surging and with one-hour intervals during the surging operation, the depth to the well bottom and to top of gravel pack shall be recorded.
- 12.3.3 Surging shall be continued until accumulation of sediments in the sump pipe, during a one hour period surging operation, is negligible.

### **12.4 Deflocculation**

- 12.4.1 Upon completion of installation of lining or formation stabilizer/gravel pack, the drilling mud shall immediately be displaced from the well by pumping clean water into the sump pipe.
- 12.4.2 Mud displacement shall immediately be followed by injection and/or jetting through the screened section with polyphosphate solution to deflocculates the mud cake on the borehole wall. The concentration of the polyphosphate solution shall be 3.0 percent by weight of the quantity of water in the borehole. The well shall then be left for 12-24 hours before developing is continued, to allow the polyphosphate to react; however, if the drilling mud viscosity during drilling had been or had exceeded 40 seconds, the percentage of the polyphosphate solution shall be increased proportionately with the increase of viscosity.

### **12.5 High Velocity Jetting**

- 12.5.1 After the deflocculation material has been allowed to work for 12-24 hours, all sections screened with continuous slot screens shall be developed by high velocity jetting.
- 12.5.2 The jetting tool shall be equipped with two or four nozzles. The nozzle design shall be such that it produces a concentrated jetting action. The tool shall be presented to the Engineer for approval before start of drilling operation.



- 12.5.3 The jetting tool shall be supplied with water through a high-pressure pump capable of producing a nozzle velocity of 40 meter per second. The pump shall be equipped with suitable pressure gauge on the discharge side to facilitate monitoring of nozzle velocity.
- 12.5.4 The development shall be carried out by slowly rotating the jetting tool and gradually lowering it in order to cover the entire surface of the screen.
- 12.5.5 At the same time as the high velocity jetting is performed, the well shall be discharged with a discharge rate slightly higher than the discharge rate from the jetting tool.
- 12.5.6 Each section of the screen shall be jetted until the return water is free from drilling mud, but no section shall be jetted less than 15 minutes per meter of screen.

#### 12.6 Airlifting

- 12.6.1 The contractor shall use the "open casing or Back-blow" method.
- 12.6.2 The air compressor shall be capable of producing 120 cfm at a pressure of 100 psi to 150 psi.
- 12.6.3 Minimum size of airline shall be at 4 inches diameter.

#### 12.7 Well Cleaning

Upon completion of the development operations, the Contractor shall demonstrate to the satisfaction of the GSCWD Engineer that the bottom of the well is clear of all sand, mud and other foreign materials.

#### 12.8 Freedom from Sand

- 12.8.1 The Contractor shall develop the well by the methods specified until the water pumped from the well is substantially free from sand and until the turbidity is less than 5 on the Silica Scale described in the Standard Methods of Water Analysis (latest edition as published by AWWA, APHA and WPCT).
- 12.8.2 The water pumped from the well shall not contain an amount of fine material in excess of 1.0 mg per liter when the well is pumped at its maximum expected yield. The Contractor shall furnish the equipment for measurement of the sand content.

#### 13.0 DOWN THE HOLE CAMERA LOGGING

After the well development, the contractor shall perform down-the-hole camera to ensure that the well is clear of any mud, bentonite and other materials for the satisfaction of the owner. Any problem that may occur, the contractor shall repeat the well rehabilitation at contractor's expense.

#### 14.0 ACCEPTANCE OF DEVELOPMENT

- 14.1 The development by the specified methods shall be repeated and continued until the well is thoroughly developed in accordance with the criteria specified.
- 14.2 If the well yield after the well has been confirmed sand-free is still below the yield, which is considered acceptable for the penetrated aquifer, then the Engineer may instruct the Contractor to perform further development at contractor's expense.

#### 15.0 WELL TESTING

##### 15.1 Scope

The Contractor shall provide all personnel and labor, instrumentation and water level indicators and operate a pumping Unit for the following purposes:

- a. Step-drawdown pumping tests on the completed well in accordance with the standard methods or as directed by the Engineer.
- b. Constant discharge pumping test on the completed well in accordance with the standard methods or as directed by the Engineer.

##### 15.2 Equipment Capacity

- 15.2.1 The Contractor shall provide and operate pumping machinery capable of carrying out the specified pumping and shall provide adequate controls to allow discharge rates to be kept constant at varying pumping water levels and to permit pumping with a variation of not more than 5% of the designated discharge rate during any period of yield or aquifer testing.
- 15.2.2 The pumping Unit set shall be able to deliver a minimum discharge rate of **70lps at minimum pump setting of 60 meters** or as directed by the GSCWD Engineer.

##### 15.3 Equipment Operation

- 15.3.1 The Contractor shall supply and operate all equipment and accessories necessary for installation and removal of pumps.
- 15.3.2 The Contractor shall maintain on site sufficient fuels, lubricants, spares and other accessories needed to run the pumping unit for whatever period may be specified by the Engineer.



- 15.3.3 The Contractor shall provide sufficient competent personnel including a qualified fitter and electrician, as may be necessary to install and operate the Pumping Unit.

#### 15.4 Control of Discharge Rate

The Contractor shall, during the pumping tests, provide a suitable gate valve on the discharge pipeline to facilitate easy control of the discharge rate.

#### 15.5 Water Level Sounding Pipe

15.5.1 The Contractor shall provide and install a temporary tube of at least one (1) inches diameter from the top of the well to 2 m above the pump bowl assembly to facilitate easy measurements of water level. The tube shall be open only at the bottom and top.

15.5.2 Payments for providing, installing and removing the tube shall be deemed to be included in the rates given for pumping tests.

#### 15.6 Discharge Rate Monitoring

Discharge rates shall be measured using Piezometer and manually recorded.

#### 15.7 Equipment Breakdown during Pumping

1. The pumping must be continuous and at a constant rate during the test pumping. The Engineer will instruct the Contractor as to the expected maximum duration of each pumping test before start to each test.
2. If pumping is interrupted or the discharge rate fluctuates by more than 5% of the designated discharge rate, the test may be repeated after a period of recovery determined by the Engineer.
3. In any pumping test is interrupted because of equipment breakdown or inadequate supervision or discharge control, no payments will be made for any pumping period before recommencing the test.

#### 15.8 Duration of Tests

15.8.1 The **step drawdown pumping tests** shall be performed on **5 steps with duration of 1 hour each**.

15.8.2 The **constant discharge pumping tests** shall be performed for a period of **Three (3) days or 72 hours**, unless otherwise specified in the special provisions or unless otherwise instructed by the Engineer.

#### 16.0 Water Quality Testing

Water quality testing such as Bacteriological Testing, Physical and Chemical analysis, Pesticide and Heavy Metal Testing shall be conducted by accredited laboratory. All expenses shall be covered by the contractor.

#### 17.0 CEMENT GROUTING

##### 17.1 Scope

The Contractor shall, unless otherwise specified in the special provisions, provide the cement and mixing equipment required for the mixing of the grouting indicated in the Tentative Well Design and shall place the cement grout as specified.

##### 17.2 Grouting Material

Cement grout shall consist of a mixture of 95 % Portland Cement, 5% Bentonite, Sand and clean water, mixed in the proportion of 52.50 kilogram of Portland Cement/Bentonite to maximum 30 liters of water. All cement shall, unless otherwise specified in the Contract Documents, conform to the "Specifications for Portland Cement" (*ASTM C150 latest revision*).

#### 18.0 WELL COMPLETION

##### 18.1 Scope

The Contractor shall provide and operate all equipment necessary to restore the site as near as possible to its condition before commencement of drilling and shall furnish and install a well head cap as specified in the Contract Drawings.

##### 18.2 Site Restoration

The site shall be restored to a condition as neatly possible to that, which existed before the well drilling and testing activities commenced. This work shall include, but not limited to restoration of fences and structures, removal of drill cuttings, leveling of the disturbed ground surfaces and replacement or compensation for the destroyed plants and landscaping.

##### 16.3 Well Head Capping

The well head shall be completed with a well head assembly fully welded to the upper casing as well as a water level sounding tube with screw cap in order to prevent any unauthorized tampering of the well.



## **9.0 SUBMITTAL OF REPORTS AND BOREHOLE DATA**

- 19.1 The Contractor shall submit to the Engineer daily records in duplicate containing the following information:
- a. Site
  - b. Date
  - c. Description of each stratum encountered
  - d. Depth below ground of each change of stratum
  - e. Depths and details of all disturbed samples.
- 19.2 The Contractor will be required to keep a record of penetration rate, mud losses and mud conditions.
- 19.3 At the end of the well construction and before final payments is made, the Contractor shall submit to the GSCWD Engineer a report containing the following information:
- a. Total depth of the well
  - b. Description of the strata encountered
  - c. The sizes and the lengths/specifications of the casing installed
  - d. The date of the start and the completion of the well construction
  - e. The locations and the description of the casing perforations or the well screen placement.
  - f. The locations of the gravel, the size of gravel, if applicable, and the amount of cement grout installed.
  - g. Records of discharge rates and drawdown during well development together with description of the methods of development.
  - h. The well yield (expressed as discharge rate and drawdown), the dates and the duration of the test(s)
  - i. The methods of measuring the discharge rate and the drawdown.
- 19.4 The cost of records shall be deemed to be included in the contract rates.

## **20.0 CONTRACTOR'S PERFORMANCE**

Liquidated Damage shall apply if the Contractor fails to meet the project completion date as per RA 9184. However; if the Contractor incurred more than 15% negative slippage upon the expiration of contract, a suspension will be imposed to the Contractor together with the Liquidated Damages.

### **21.0 Final Inspection**

All Materials furnished and all work performed under the Contract shall be subject to inspection by the Owner. The Contractor shall be held strictly to the true intent of the Specifications and Drawing in regard to quality of materials, workmanship and diligent execution of the Contract. Work done in the absence of prescribed inspection may be required to be removed and replaced under the proper inspection; and the entire cost of removal and replacement, including the cost of all materials which may be used in the work shall be borne by the Contractor. The cost of carrying out the normal inspection and testing for materials should be at the Contractor's expense.

## **22.0 SPECIAL PROVISION**

### **1. LIQUIDATED DAMAGES**

The Contractor shall pay liquidated damages to the Owner if he fails to complete the work within the time agreed upon. It is understood that said payment is not a penalty but a fixed sum representing the liquidated damages for each calendar day of delay.

Computation of the said liquidated damages shall conform to the provision of RA 9184(GPPB Resolution No. 02-2020) Harmonizing the rules on imposition of liquidated damages.

Note:

In computing for liquidated damages, the Procuring Entity determines the usability of the project. A project or portion thereof may be deemed usable when it starts to provide the desired benefits as certified by the targeted end-users and the concerned Procuring Entity.

Liquidated damages is an amount equal to at least one tenth (1/10) of one (1) percent of the cost of the unperformed portion of the works for everyday of delay.

If the project is rendered unusable after the expiry date, it shall be considered as unperformed, hence the Liquidated Damages shall be computed based on the total contract price.

### **2. Time Extension**

The Contractor may be entitled to an extension of Contract time;

- a. If the work has been suspended by the Owner in whole or in part.
- b. Under force majeure (i.e. flood, blockade, earthquake, civil disorder, etc.) provided, in either case, the Contractor be not at fault and is not negligent under the terms of the contract.



No extension of Contract time whatsoever shall be granted to the Contractor due to non-availability of equipment or materials to be furnished by the Contractor, labor problems and such other cause for which the Government is not directly responsible, or when the affected activities do not fall within the critical path of the network.

To receive consideration, a request for time extension must be made in writing to the Owner through the Engineer stating therein the reason for said request and must be received by the Owner at least **Thirty (30) days prior to the expiration of the Contract time**. Failure to observe this reglementary period shall be a ground for outright denial of the request for time extension.

### 3. Variation in Quantities


Bidders are reminded that the quantities are estimated and are for the purpose of comparing bids. The successful bidder shall complete all work items at the unit prices quoted in his bid, regardless of the variation between bid quantities and actual quantities required for completion of the work. Payment will be based on actual quantities furnished, installed or constructed.

#### 23.0 Contract Duration


The Contractor shall perform all scope of works within the period of **One Hundred eighty (180) Calendar days**. Liquidated Damages (LD) shall be imposed for each day of delay as provided by the IRR of RA 9184.

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