

**BOCAUE WATER DISTRICT**

**TERMS OF REFERENCE**

**FOR**

**PIPE INSTALLATION PROJECT USING  
HORIZONTAL DIRECTIONAL DRILLING METHOD  
AT PROVINCIAL ROAD, BRGY. BUNDUCAN & MC  
ARTHUR HIGHWAY, BRGY. WAKAS, BOCAUE,  
BULACAN**

**(2020-09-02)**

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**TERMS OF REFERENCE FOR BOCAUE WATER DISTRICT'S  
PIPE INSTALLATION PROJECT USING HORIZONTAL DIRECTIONAL DRILLING METHOD AT  
PROVINCIAL ROAD BRGY. BUNDUCAN& MC ARTHUR HIGHWAY, BRGY. WAKAS, BOCAUE,  
BULACAN**

**I. PROJECT NAME**

The project shall be known as **Bocaue Water District's PIPE INSTALLATION PROJECT USING HORIZONTAL DIRECTIONAL DRILLING METHOD AT PROVINCIAL ROAD BRGY. BUNDUCAN & MC ARTHUR HIGHWAY, BRGY. WAKAS, BOCAUE, BULACAN**

**1.1 PROVINCIAL ROAD, BRGY. BUNDUCAN & MC ARTHUR HIGHWAY, BRGY. WAKAS, BOCAUE, BULACAN.**

**II. PROJECT DESCRIPTION**

2.1 The Project involves the supply and installation of 195 Meters- 250 mm HDPE Pipes SDR 11 using Horizontal Directional Drilling Method at Provincial Road, Brgy. Bunducan & 120 Meters -150 mm HDPE Pipes at Mc Arthur Highway, Brgy. Wakas, Bocaue, Bulacan.

**III. PROJECT COMPONENTS**

**3.1 Scope**

Horizontal Directional Drilling (HDD) Method statement will cover the activities from site clearing/ layout. Pipe installation using HDD method, demolition and restoration of pavements up to handover activities at Bocaue. The major activities are as follows:

- 3.1.1 Mobilization of crew and equipment to the project site
- 3.1.2 Concrete Cutting
- 3.1.3 Concrete Breaking
- 3.1.4 Excavation (Concrete, Soil and Rock)
- 3.1.5 Pipe laying using HDD method
- 3.1.6 Pilot Testing
- 3.1.7 Backfilling and compaction
- 3.1.8 Disinfection
- 3.1.9 Pavement Restoration
- 3.1.10 Demolition of Crew and Equipment

**3.2 Purpose**

3.2.1 Pipe laying by HDD method at Provincial Road, Brgy. Bunducan & McArthur Highway, Brgy. Wakas, Bocaue, Bulacan

**3.3 Definitions**

3.3.1 Bocaue Water District- BWD

3.3.2 Horizontal Directional Drilling-HDD

### **3.4 Materials**

3.4.1 150 mm & 250 mm diameter HDPE and fittings approved by Bocaue Water District

3.4.2 Backfill/sub base & base course conforming to the requirement of existing road condition.

### **3.5 Resources**

#### **3.5.1 List of Personnel**

Project Engineer in-Charge

Certified HDD Equipment Operator

Lead Man/Charge hand/Foreman

Safety Officer

Pipe Fitters

Trucker

Mudman

#### **3.5.2 Equipment/ Tools**

All tools and equipment are to be checked and certified in good working condition by Safety Team such as follows:

- a. HDD Machine with recycling plant
- b. Back hoe with concrete breaker
- c. Generator sets
- d. Flood lights
- e. Welding Machine (if required)
- f. Hydrotest equipment (if required)
- g. Plate compactor for road restoration
- h. Hand tools
- i. Mini dump truck
- j. Water Tank
- k. Vacuum truck
- l. Service vehicle: Double Cab
- m. Butt Fusion Machine

### **3.6 Responsibility**

3.6.1 The Contractor is responsible for providing adequate personnel to perform the work in accordance with specification requirements.

3.6.2 **Project Manager**- nominated Contractor Manager is overall responsible for the implementation of this method statement with detail activities as delegated to the Construction.

3.6.3 **Drilling Manager**- will ensure that the work will be executed according to plan.

3.6.4 **Site Engineer**- Contractor's Site Engineer with Foreman and Surveyors will ensure that all works are carried out according to Specifications and drawing line and levels and as stated in this method statement.

3.6.5 **Safety Officer**- Contractor's Safety Officer along with his team Safety Officers will ensure implementation of all safety procedures and precautions, safety measures related to the nature of works being carried out and in accordance to the Health Safety and Environment (HSE) plan.

### 3.7 Actions and Methods

3.7.1 Pipe laying by HDD Method

3.7.2 Cutting, Breaking and Excavation of HDD Entry and exit pits, test pits and setback pits. Entry and Exit pits measures L:1 x W:1.

3.7.3 Mobilization of the following equipment to the drilling site of BWD:

1. HDD Machine & HDD Support Equipment

2. HDD Drilling Team & Technical Support Manpower

3. HDD Logistics and Materials

3.7.4 Measurement and Marking of HDD Entry and Exit pits

3.7.5 Set-up of the HDD Machine, HDD Technical Support Equipment, Barriers and Bollards of the drilling site.

3.7.6 Calibration of HDD Transmitter and Receiver.

3.7.7 Individual Pilot Drilling for 150 mm & 250 mm diameter HDPE Pipeline following the prescribed Bore Pathway. The Drill blade is fastened to the Sonde Housing. And the Sonde Housing is equipped inside with a Transmitter. Pilot drilling starts from the HDD Entry pit at the drilling site.

During the pilot drilling, the transmitter located underground emits radio frequency signals to the receive handheld by the Tracker above ground. This enables the Tracker to determine the location, depth, pitch and alignment of the drill head underground until the target HDD Exit pit is reached.

3.7.8 Individual Pullback Reaming procedure for 150 mm & 250 mm diameter HDPE Pipeline: Once the HDD Exit pit is reached. The drill head is replaced with a reamer. Pullback reaming procedure with a reamer starts from HDD Exit pit to the HDD Entry pit.

Pullback reaming procedure is to increase the diameter of the pilot tunnel hole from its initial size of 75 mm to the required diameter of the tunnel hole in order to accommodate 150 mm & 250 mm diameter HDPE water pipeline. After the 1<sup>st</sup> reaming, several reaming passes are done with successively increasing sizes of

reamers in order to gradually increase the diameter of the tunnel holes to accommodate 150 mm & 250 mm diameter HDPE pipeline. Then the last reaming pass immediately prior to pipeline pulling is finally done to clear and clean completely the tunnel hole in order to ensure successful pipeline pulling.

It is noted that during the reaming procedure, it is the judgment call of the HDD Team (Project Engineer or Project In-Charge, Tracker, Driller) to determine how many reaming process are to be done per reamer size based on the soil type conditions, stability of the tunnel hole and cleanliness of the tunnel hole.

During the pullback reaming, the reamer pulverizes the soil into a soft, fine liquid material (also called slurry or sludge). These soil cuttings that settle at the bottom and along the entire length of the tunnel hole (sedimentation) are constantly being flowed out at the HDD Exit and HDD Entry pits during the reaming process. Consequently the tunnel hole is being continually cleaned and cleared of soil/adobe/rock cuttings that can block the smooth passage of the HDPE Pipe during the pipeline pulling.

Also during the reaming process, bentonite and other drilling fluids additives are utilized. Bentonite acts as stabilizer by adhering to the inner walls of the tunnel hole. This action seals the fractures or cracks of the inner walls of the hole and preserves its integrity.

Consequently, a cave-in or collapse of the tunnel hole is prevented. This will also prevent hydro-lock that can halt or stop the successful completion of HDPE pipeline pulling.

Thirdly, these drilling fluids additives cause the viscosity of the bentonite mud to be higher. Increased viscosity makes bentonite mud much denser. The denser the mud, the greater is the buoyancy effect of mud. With higher buoyancy, the HDPE pipeline float freely within the hole and will not settle at the bottom floor of the tunnel hole. So, when pipe pulling is done, the HDPE will not scratch the inner wall surfaces of the tunnel hole, thereby preventing damage to its outer wall surfaces.

Fourthly, drilling detergents if necessary, may be added to the mud mix. These detergents cause the outer wall surfaces of the HDPE pipeline to be slippery. This aids in the prevention of HDPE pipeline from being stuck inside the tunnel during pipe pulling. Thus, lubrication effect of detergents greatly facilitates the pipe pulling process to be very smooth, light and easy.

All of the above mentioned factors- the enlarged size of the tunnel hole, the greater the buoyancy effect of the dense bentonite mud, the clearing and cleaning of the tunnel hole of soil cuttings and the lubrication effect of drilling detergents- have a synergistic effect that significantly lessens the friction of HDPE pipeline against the inner walls of the tunnel hole during pipe pulling. As a result, the tensile strength of HDPE pipeline is not compromised.

And so, stresses and the pressures created during pipe pulling are considerably minimized. This result leads to a successful HDPE pipeline pulling.

### **3.7.9 Supply and Delivery**

Supply and Delivery of 150 mm & 250 mm diameter HDPE Pipe (PE 100 : SDR 11) to the project site.

#### **3.7.10 Provision and Delivery of Butt-fusion Welding Machine**

Provision and delivery of butt-fusion welding machine to the drilling site after pilot drilling.

#### **3.7.11 Butt-fusion Welding Procedure**

For every 150 mm & 250 mm diameter HDPE pipeline up to the required HDD length at drilling site.

#### **3.7.12 Set up and Preparation**

Set up and preparation of 150 mm & 250 mm diameter HDPE Pipes at drilling site.

#### **3.7.13 HDPE Pipeline Pulling**

HDPE pipeline pulling for every 150 mm & 250 mm diameter HDPE pipe at drilling site: The front end of butt-fused 150 mm & 250 mm diameter HDPE pipeline is attached to a puller that is connected to the drill rods. Then, the HDPE pipeline is gradually inserted or pulled into a tunnel hole of the HDD exit pit. Once this has been achieved, pipe pulling has been successfully done.

#### **3.7.14 After HDPE Pipeline Pulling**

A hydro test of HDD installed HDPE Pipeline is conducted to make sure that the HDPE pipeline was not damaged during pipe pulling and that there is no leak.

#### **3.7.15 Demobilization**

Demobilization of HDD machine & Technical Support Equipment, HDD Drilling Team & Technical Support Manpower and HDD Logistics & Materials from Bocaue Water District's project site to Contractor's equipment yard is done after passing all the hydro test at the drilling site.

#### **3.7.16 Collection and Hauling of Soil Cuttings/Sludge**

Collection and hauling of soil cuttings/ sludge from the Entry and Exit pits and procurement of continuous water supply are being done throughout the entire HDD operations at drilling site.

#### **3.7.17 Dumping of Soil Cuttings/ Sludge**

Dumping of soil cuttings/ sludge at the temporary dump site throughout HDD operations

#### **3.7.18 Flushing/ Cleaning, Chlorination and Bacti-test**

Flushing/Cleaning, Chlorination and Bacti-test of the HDD installed 150 mm & 250 mm HDPE pipeline.

#### **3.7.19 Backfill and Permanent Restoration**

Backfill and Permanent Restoration of all pits (Setback Entry & Exit Pits, HDD Entry pits and HDD Exit pits). Fill and base materials will be placed in layers and properly compacted to make sure settlement will not occur after restoration of existing pavement finished.

#### **3.7.20 Concrete Pouring**

Concreting activities shall be performed on pavements to be restored and other necessary sub-structures.

Upon completion of backfilling activities, the base shall then be cleaned and sprayed with water to make sure that granular material will not absorb the moisture of the concrete. Once done, final inspection shall be done prior to pouring. Concrete mixtures shall be poured directly by a transit mixer on the pavement and structures subject for restoration.

### **3.8 Quality Assurance and Quality Control**

All the works described in this document shall follow the procedure of the Bocaue Water District which hereby the OWNER and the end user. Undertakings to be taken at Bocaue Water District will serve as verification and acceptance of the completed works.

### **3.9 Environment , Health and Safety**

#### **3.9.1 Environment**

Pipe laying using HDD will have an impact on the immediate surroundings. The Contractor must be identified the following impact in the said activity:

- Dust accumulation
- Noise
- Smoke Emission
- Siltation

The Contractor shall mitigate the negative effect of the Installation of HDPE pipe using Horizontal Directional Drilling (HDD) Technology on the environment by observing the following:

- Constant supply of water during dry and hot days to lessen dust production.
- Noisy activities shall be minimized that will not affect the residents.
- All equipment with exhaust shall undergo frequent preventive maintenance.
- All vehicles shall have a valid registration from governing agency.
- Barriers and perimeter enclosure shall be installed prior the start of activity to lessen visual impact of the construction activity.
- All activities near natural and manmade waterways shall be protected from excessive siltation.
- Housekeeping shall be done on daily basis and waste segregation shall be done.
- Chlorination will be as per Bocaue Water District's Standards.
- The Chlorine solution shall be drained through the draw-off valve into a storm-sewer line.
- Clean water shall be used to flush the disinfected pipeline.

#### **3.9.2 Health and Safety**

HDPE Pipe installation using HDD Technology poses health and safety risk for the immediate personnel involved in the community, The following are the identified risk and potential hazards:

- Dust
- Poor Illumination



- Open Excavation
- Moving Equipment
- Suspended Materials
- Existing Utilities

The Contractor shall mitigate the negative effect of the HDPE Pipe installation using HDD Technology on the health and safety by observing the following:

- Ensure that all manpower had underwent required Health, Safety and Environment(HSE) training/induction prior the start of the work.
- Ensure all necessary clearances/ permits has been obtained prior the start of the work.
- All manpower will wear mandatory PPE as required in each type of work.
- Constant water supply to lessen dust production.
- Installation of adequate lightings when working during night shift.
- Installation of hard barricade and signage on open excavations. Provide cover plates if necessary.
- Installation of perimeter enclosure to segregate moving equipment from the general public. All moving equipment shall have an assigned rigger or spotter.
- Pre- lifting planning and permits prior to any lifting activities.
- Check the as-built of the existing utilities.

### **3.10References**

The procedure will refer to the following:

- Bocaue Water District Approved Proposed Pipeline Project's Plan
- Bocaue Water District Procedure

### **3.11 Records**

The Contractor will keep detailed records of all activities, permits, correspondence and other related documents as required by the Contract and Plans. The Contractor will provide a copy of the said detailed records to Bocaue Water District.

### **3.12 Annexes**

**Annex 1- Project Location Plan**

**Annex 2- Approved Proposed Plan**

**Annex 3- Entry and Exit Pit Plan**

**IV. AUTHORIZATION/ WARRANTY REQUIREMENTS**

- 4.1 All technologies/ programs/ designs to be used by the Contractor should have prior written authorization to use from technology owners.
- 4.2 Warranty shall be governed under **Section 62. Warranty** of RA 9184, otherwise known as The Government Procurement Reform Act.

**V. CONSTRUCTION/ INSTALLATION /DELIVERY PERIOD**

- 5.1 The Contractor shall complete the works **withinthirty (30) calendar days** from the effective date of Contract stated on the Notice to Proceed.

**VI. BID DOCUMENT FEE**

6.1 The Bid Documents cost shall be **five thousand pesos (P5,000.00)** which shall be non-refundable and shall be paid by the Bidder upon withdrawal of the Documents from Bocaue Water District.

**VII. ELIGIBILITY REQUIREMENTS**

**7.1** The Contractor or any of its partners or key personnel must have directly or indirectly engaged in Horizontal Directional Drilling Technology/ Method in the last three (3) years supported by documents related thereto proven to be effective as supported by a certificate of acceptance issued by its users or recipients.

**7.2** The Contractor shall comply with the Eligibility Requirements under Section 23 of RA 9184.

**7.3 Company Profile and Organization**

\* Organizational Chart of the Contractor

\* Key personnel of the project must demonstrate a minimum of 3years experience in related HDD Technology and construction of similar projects.

**7.4 Financial Capability**

\* The Contractor must have a financial capability for the Bocaue Water District's Pipe Installation Project using HDD Method.

\* The Contractor shall obtain a letter of expression of financial support from the bank for the project, as shown by Certificate(s) of Commitment specific to the contract at hand issued by a licensed Commercial bank to extend the Contractor a credit line or a cash deposit certificate certifying a hold-out on cash deposit in an amount equal to the ten (10)percent of the Approved Budget for the Contract (ABC).

\* In the alternative to the foregoing, the Contractor should have a Net Financial Contracting Capacity (NFCC) computed in accordance with the Implementing Rules and Regulations (IRR) of the Republic Act (R.A.) 9184 equal to the Approved Budget of the Contract (ABC).

## **7.5 Project Proposal**

- \* The Contractor shall provide the description of financing , construction and management of the project.
- \* The Contractor shall provide the description and methodology of the HDD Technology.
- \* The Bid expressed in Philippine Peso inclusive of taxes.

## **VIII. BONDS AND SECURITY**

**8.1** Section **27** of the Revised Implementing Rules and Regulations of RA 9184

## **IX. RIGHT TO REJECT ANY OR ALL PROPOSALS**

**9.1** The **Head of the Procuring Entity (HOPE)** reserves the right to reject any or all proposals. The **Head of the Procuring Entity (HOPE)** also reserves the right to reject the proposal of any contractor/supplier who submitted fraudulent, suppressed, or incomplete information.

## **X. BIDDING RULES**

**10.1** Republic Act 9184

## **XI. BASIS OF AWARD**

**11.1** Lowest Calculated Responsive Bid

Prepared by:

**(SGD.) ENGR. ROBERTA U. SANTOS**

Division Manager-B, Production & Engineering

Approved by:

**(SGD.) ENGR. RICARDO B. PEREZ**

General Manager

