

# ADDENDUM No. 1

ITB No. 4439

## Orchard Hills Water Main Extension

**Due: Thursday, June 2, 2016 at 2:00 P.M. (local time)**

The following changes, additions, and/or deletions shall be made to the Invitation to Bid for Orchard Hills Water Main Extension, ITB No. 4439, on which proposals will be received on/or before Thursday, June 2, 2016 at 2:00 P.M.

The information contained herein shall take precedence over the original documents and all previous addenda (if any), and is appended thereto. **This Addendum includes 17 pages.**

**Bidder is to acknowledge receipt of this Addendum No. 1, including all attachments (if any) in its bid by so indicating on page ITB-1 of the Invitation to Bid Form. Bids submitted without acknowledgement of receipt of this addendum will be considered nonconforming.**

**The following forms provided within the ITB Document must be included in submitted bids at bid opening.**

- **City of Ann Arbor Prevailing Wage Declaration of Compliance**
- **City of Ann Arbor Living Wage Ordinance Declaration of Compliance**
- **Vendor Conflict of Interest Disclosure Form**
- **City of Ann Arbor Non-Discrimination Ordinance Declaration of Compliance**

**Bids that fail to provide these completed forms listed above upon bid opening will be rejected as non-responsive and will not be considered for award.**

### I. CORRECTIONS/ADDITIONS/DELETIONS

Changes to the Bid documents which are outlined below are referenced to a page or Section in which they appear conspicuously. The Bidder is to take note in its review of the documents and include these changes as they may affect work or details in other areas not specifically referenced here.

#### Section/Page(s)

#### Change

Specification Section 02446

1.2 Submittals, A., 1.

1. CONTRACTOR's qualification information as described in Subsection 4-4 **1.3**.

Specifications Section 02446

1.5 Measurement and Payment Procedures

2. The "12" ~~Storm Sewer~~, DR 11 HPDE, Directional Drill" pay item will be paid by the horizontally measured lineal feet (LF) of water main installed by directional drilling method measured along the axis of the ~~storm sewer~~ **water main**. The unit price shall include complete furnishing of all labor, materials and equipment for the installation of ~~storm sewer~~ **water main** by directional drilling method

Specifications Section 02446  
3.5 Guided Drilling, A., 4

3. Equipment set-up requirements at the designated locations shall be determined by the CONTRACTOR and submitted to the ENGINEER per the requirements of Subsection ~~4.3~~ 1.2.

**ATTACHED IS THE PRE-BID MEETING ATTENDANCE SHEET**

**ATTACHED ARE THE SOIL BORING LOGS FOR SB1 AND SB2 AS SHOWN ON THE PLANS**

## **II. QUESTIONS AND ANSWERS**

The following Questions have been received by the City. Responses are being provided in accordance with the terms of the ITB. Respondents are directed to take note in its review of the documents of the following questions and City responses as they affect work or details in other areas not specifically referenced here.

**Question 1:** Will data logging of the fusion joints be required?

**Answer 1:** Yes, per specification Section 02446 Subsection 3.3 Joining of High Density Polyethylene (HDPE) Pipe paragraph E. and paragraph H., 4.

**Question 2:** What is the proper sequence of water main?

**Answer 2:** For this project, the new water main is separated from the existing water main by the existing gate valve in well therefore EITHER METHOD of testing is acceptable as outlined in specification Section 02500, Subsection 14 depending on Contractor's preferred method of installation and connection to existing water main. However, per specification section 02500, subsection 16 Flushing and Swabbing, the City's preferred method for pushing the pig through the main is the Connected Water Main Sequence.

**Question 3:** Will the new water main need to have a poly-pig pushed through?

**Answer 3:** Yes, a poly-pig shall be used meeting the material and installation requirements of specification Section 02500, Subsection 16. Additionally, the poly-pig should be in place prior to the connection to the existing water main.

**Question 4:** Will a meter be required from the City for the water main testing?

**Answer 4:** The initial flushing of the main to push the swab (poly-pig) through the main will be unmetered. All other testing and any water used for the directional drilling operation should be done using 1" corporation that will be installed on the existing water main inside the existing gate valve well. Contractor will be required to obtain a meter and backflow prevention assembly from the City for all water pulled from 1" corporation.

**Question 5:** Is fusible PVC pipe an acceptable alternative to the fusible HDPE pipe?

**Answer 5:** No. Due to the alignment fusible PVC is NOT an acceptable alternative to the HDPE pipe.

**Question 6:** Is there an Engineers Estimate of Probable Construction Costs available for this project?

**Answer 6:** No. For bidding purposes, an EEOPCC is NOT available for this project.

**Question 7:** When pulling back, the reamer may try and wander off the proposed alignment at the bend will this be acceptable?

**Answer 7:** Some wandering off the proposed alignment will be allowed, however the new water main MUST remain in the 30 foot wide easement. If the Contractor anticipates the reamer to wander at the bend, the Contractor may choose to push rods out slightly off the proposed alignment at the bend to ensure that the proposed water main remains in the easement after pulling back.

Offerors are responsible for any conclusions that they may draw from the information contained in the Addendum.

## SECTION 02446

### WATER MAIN HORIZONTAL DIRECTIONAL DRILLING

#### **PART 1 - GENERAL**

##### **1.1 SUMMARY**

- A. The CONTRACTOR shall furnish all labor, materials and equipment required to construct water main by directional drilling method, and all necessary appurtenant work as herein specified.
- B. Directional drilling is a trenchless construction method. A high-pressure fluidjet steerable toolhead that uses a mixture of bentonite clay and water is launched and guided through the soil to create a pilot tunnel. Upon reaching the pit dug at the section location, the toolhead is removed and a reamer with the HDPE pipe attached is joined to the arm swing and pull back through the tunnel. A vacuum spoils extraction system removes any excess spoils generated during the installation.
- C. The work shall include, but not necessarily be limited to, the following: the installation of HDPE pipe and connections to existing and proposed water main structures.
- D. This work shall consist of using the directional drilling method of placing pipe for use as a water main. All work shall be completed in accordance with the Michigan Department of Environmental Quality (MDEQ) Permit for the Construction of Water Supply Systems, the project plans, as specified herein, and as directed by the ENGINEER.

##### **1.2 SUBMITTALS**

- A. The CONTRACTOR shall submit the following:
  - 1. CONTRACTOR's qualification information as described in Subsection 4-4 **1.3**.
  - 2. A list of field supervisory personnel and their experience with guided drilling operations. At least one of the field supervisors listed must be at site and be responsible for all work at all times when guided drilling operations are in progress. Guided drilling operations will not be allowed to proceed until the resume(s) of the CONTRACTOR's field supervisory personnel have been received and reviewed by the ENGINEER.
  - 3. Manufacturer's technical data, catalog data showing complete information on material composition, physical properties, and dimension of pipe and fittings. Also, the manufacturer's recommendation for handling, storage and repair of pipe and fittings if damaged.
  - 4. Written procedures to detail the proposed method of installation. This shall include, but not be limited to, size, capacity and setup requirements of equipment; location and sighting of drilling and receiving pits; method of dewatering; method of fusion and type of equipment for joining HDPE pipe; type of cutting tool head; entry and exit angles; method of monitoring and controlling line and grade; shoring and bracing; method of abandonment of pilot hole and adjacent utility investigations.

5. Material Safety Data Sheets (MSDS) for bentonite drilling mud products; product handling procedures; special precautions required; method of mixing and application and method of removing spoils material.
6. Sufficient material shall be submitted to show that materials and equipment proposed for use in the work are acceptable and complied with the Contract Specifications. All Drawings, catalog cuts and other descriptive data covering several related items in the same system shall be submitted at the same time in order that their complete integrated applicability in the entire system be adequately reviewed.
7. If the CONTRACTOR determines that modifications to the method and equipment as stated in the original submittal are necessary during construction, the CONTRACTOR shall submit a plan describing such modifications, including the reasons for the modification.
8. Fusion joint data and fusion technician data indicating conformance with this specification and applicable standards, including written documentation regarding any intended variances from this specification and applicable standards. This will include fusion joint warranty information and recommended project specific fusion parameters, including criteria logged and recorded by data logger.
9. The following product data and information is required from the CONTRACTOR:
  - a. Directional drilling equipment information and certification indicating the applicability of equipment commensurate with the size and scope of the project.
  - b. Directional drilling operator certification and references, project scope and CONTRACTOR's contact information for the experience commensurate with the size and scope of the project.
  - c. Shop Drawings include for each drilling installation any excavation locations, interfering utilities, excavation dimensions, bore dimensions and locations, project specific soil conditions, stress calculations and traffic control schematics. ENGINEER shall approve all Shop Drawings prior to construction.
  - d. A project safety and contingency plan which shall include, but shall not be limited to, drilling fluid containment and cleanup procedures, equipment and plan for compromised utility installations including electrical and power lines, water, wastewater and any other subsurface utility.
  - e. At least two weeks prior to the start of work, the CONTRACTOR shall submit his drilling schedule identifying daily work hours and working dates for each installation.
  - f. Information about the drilling fluid to be used, including product information, material specifications, and handling procedures; material safety data sheet and special precautions required; methods of mixing and application; and disposal plan.

10. As-recorded fusion report for each fusion joint performed on the project, including joints that were rejected. Submittals of the Fusion Technician's joint reports are required as requested by the OWNER or ENGINEER. Specific requirements of the Fusion Technician's joint report shall include:
  - a. Pipe Size and Dimensions
  - b. Machine Size
  - c. Fusion Technician Identification
  - d. Job Identification Number
  - e. Fusion Number
  - f. Fusion, Heating, and Drag Pressure Settings
  - g. Heat Plate Temperature
  - h. Time Stamp
  - i. Heating and Cool Down Time of Fusion
  - j. Ambient Temperature
  
11. As-recorded plan and profile data for the actual alignment of the installed pipeline.
  - a. The as-recorded plan will reflect horizontal offset from the baseline and depth of cover, a maximum of every 25 feet and at all changes in direction, whichever is less.
  - b. All fittings, valves, or other appurtenances will also be referenced and shown.
  - c. This document, along with tracking log sheets, should they be used, shall be provided to the OWNER and/or ENGINEER. Tracking log sheet data, should it be employed, shall include any and all that apply, including positions, roll angle, tilt angle, depth, and hydraulic pull back force measured.
  - d. As-recorded plans shall show any deviations from the original plans.

### **1.3 QUALITY ASSURANCE**

- A. It is preferred that the directional drilling CONTRACTOR shall have actively engaged in the installation of pipeline using guided drilling for a minimum of three years with at least 10,000 feet of guided drilling installation in the last year to include 6" to 24" diameter projects similar in scope and value to this project and submit proof of projects and references. Information submittal shall include, but not be limited to, date and duration of work, location, pipe information (i.e. length, diameter, depth of installation, pipe material, etc.), project OWNER information (i.e. name, address, telephone number, contact person, etc.), and the contents handled by the pipeline (water, wastewater, conduit, gas, etc.).
  
- B. Directional drilling shall be performed by personnel fully trained in the use joint fusion methods recommended for HDPE pipe connections. Personnel directly involved with installing the HDPE pipe shall receive training in the proper installation methods. The directional drilling CONTRACTOR shall provide a certification of training for each new crew member.

## 1.4 SITE CONDITIONS

- A. Drilling operations must not interfere with, interrupt or endanger surface and activity upon the surface. The placement of directional drill equipment or supplies shall be a location that will not interfere with traffic or with the use of the adjacent property.
- B. When rock stratum, boulders, underground obstructions, or other soil conditions that impede the progress of drilling operations are encountered, the CONTRACTOR and ENGINEER shall review the situation and jointly determine the feasibility of continuing drilling operations, making adjustments or switching to an alternative construction method.

## 1.5 MEASUREMENT AND PAYMENT PROCEDURES

- A. The "12" Storm Sewer, DR 11 HPDE, Directional Drill" pay item will be paid by the horizontally measured lineal feet (LF) of water main installed by directional drilling method measured along the axis of the storm sewer. The unit price shall include complete furnishing of all labor, materials and equipment for the installation of storm sewer by directional drilling method, including obstruction removal, preliminary testing, excavations for launching and receiving pits, guided drilling equipment, pilot hole boring, insertion of carrier pipe, pipe fittings, drilling fluid, spoils disposal, adaptors, sand backfill and compaction for launching and receiving pits. This item shall also include connections, temporary bracing, temporary marker, plugging, dewatering, shoring and sheeting, spoils disposal, backfilling, compaction, clearing, grubbing, anchor blocks, submittals and other work incidental thereto.

## PART 2 - PRODUCTS

### 2.1 POLYETHYLENE PIPE (HDPE) AND FITTINGS

- A. All materials shall meet the requirements as specified herein.
  - 1. High Density Polyethylene (HDPE) pipe shall meet the requirements of AWWA C906 and be approved for use with potable water under ANSI/NSF Standard 14. All pipes shall be manufactured from high density PE 4710 resin, having a dimension ratio (DR) of 11 or less and a minimum interior working water pressure 200 psi. The DR is calculated as the outside diameter of the pipe divided by the minimum wall thickness. The AWWA C906 and NSF identifications must appear on the exterior wall print line of any HDPE pipe proposed for potable use and installation.
  - 2. All HDPE pipe shall have a Ductile Iron Pipe Sized (DIPS) inside diameter (ID).
  - 3. The mechanical adaptor shall be as recommended by the manufacturer, meet the requirements of AWWA C906, be approved for use with HDPE pipe, and be approved by the ENGINEER.
  - 4. All fittings and mechanical joints shall meet the requirements of AWWA C906 and be approved for use with HDPE pipe and potable water under ANSI/NSF Standard 14.

5. Concrete used for thrust blocks (reaction blocking) or concrete encasement of the flex restraints shall be Grade S2 concrete meeting the requirements of the section 701 of the Michigan Department of Transportation 2012 (MOOT) Standard Specifications for Construction. Type MR, F, and/or G Admixtures shall not be used.
6. A drilling fluid of water and bentonite or a polymer must be used to lubricate and line the drilled hole.
7. Provide flowable fill in accordance with the City of Ann Arbor Standard Specifications for Construction.

## **PART 3 - EXECUTION**

### **3.1 PIPE DELIVERY, STORAGE AND HANDLING**

- A. Delivery, storage and handling of pipe shall be in accordance with manufacturer's recommendations.
- B. The pipe manufacturer shall package the pipe in a manner designed to deliver the pipe to the project site neatly, intact, and without physical damage. The transportation carrier shall insure the pipe is properly supported, stacked, and restrained during transport such that the pipe is not physically damaged.
- C. Pipe shall be stored on clean, level ground to prevent undue scratching or gouging. If the pipe must be stacked for storage, such stacking shall be done in accordance with the pipe manufacturer's recommendations. The pipe shall be handled in such a manner that it is not pulled over sharp objects or cut by chokers or lifting equipment.
- D. HDPE pipes with gashes, nicks, abrasions or any such physical damage which may have occurred during storage or handling which are wider or deeper than 10% of the pipe wall thickness shall not be used and must be cut out and removed from the construction site.
- E. Fused segments of pipe shall be handled so as to avoid damage to the pipe. Chains or cable type chokers must be avoided when lifting fused sections of pipe. Nylon slings are preferred. Spreader bars are recommended when lifting long fused sections.
- F. HDPE pipe shall be inspected for damage immediately prior to joining. Damage will consist of: (1) serious abrasion, cutting, or gouging of the outside surface extending to more than 10% of the wall thickness in depth, (2) kinking due to excessive or abrupt bending, (3) flattening, particularly if localized over short lengths of the pipe amounting to more than 5% of the original diameter, and (4) any abrasion or cutting of the inside surface. Damaged portions shall be cut out and discarded.

### **3.2 METHODS OF CONSTRUCTION**

- A. A minimum of fourteen (14) calendar days prior to beginning actual drilling operations, the CONTRACTOR shall submit a Directional Drilling Plan for review and acceptance by the ENGINEER. The plan shall indicate entrance and exit locations, stationing, depth of cover, and curve data. The plan shall also describe the method to be used for handling drilling fluid and emergency procedures for containing fluids in cases of accidental discharge. Work shall not commence on any directional drilling activities until such time as the Directional Drilling Plan has been



accepted by the ENGINEER. Contract time shall continue during the review period of the Directional Drilling Plan.

- B. As the drilling proceeds the CONTRACTOR shall create an accurate as-built record of the alignment and elevation of the pipe with stationing.
- C. Prior to beginning drilling operations the CONTRACTOR shall prepare the entrance and exit locations and provide adequate supplies of drilling fluid, dewatering equipment, drill rods, and boring equipment to ensure a continuous operation when drilling begins.
- D. The CONTRACTOR shall be responsible for any sheeting and shoring, dewatering with well points where necessary, and determining types of subsurface materials, which may be found, and determining their effect on subsequent construction operations.
- E. The minimum depth of cover at any location shall be 4 feet and the maximum depth of cover at any location shall not exceed 15 feet. Depth of cover is measured from the finished grade to the top of the pipe.
- F. All HDPE pipe joints shall be fusion welded butt joints.
- G. The method of installation shall consist of drilling or jacking a steerable rod with equipment capable of continuous, accurate monitoring of the drill bit location. Upon reaching the exit point, the CONTRACTOR shall attach a cone or wing cutter to the rod which when pulled back will obtain the required diameter.
- H. The diameter of the cone or wing cutter shall not exceed the diameter of the HDPE pipe by more than one and one half (1) times. When the diameter of the cone or wing cutter is more than 2" larger than the pipe diameter, flowable fill shall be pumped into the void between the pipe and the drill hole to displace the drilling fluid. The method of placement of the flowable fill shall be approved prior to the issuance of the permit to place pipe.
- I. The HDPE pipe shall be connected to the rods per the manufacturer's specifications to be pulled back through the hole.
- J. Due to the fact that linear dimensions will vary with temperature change, connections to HDPE pipe shall not be made until it has reached an equilibrium temperature with its surrounding environment.
- K. Restrained connections to conventional ductile iron water main, valves, or appurtenances shall be made using a mechanical joint adaptor with a stainless steel stiffener inserted, unless otherwise shown on the plans. All mechanical joints shall be in accordance with AWWA/ANSI C111/A21.11 and include the Mega-Lug Joint Restraint System manufactured by EBAA Iron Sales, Inc. or the Ford Valve Box Company Uni-flex Retainer (UFR 1400-D-x style.)
- L. All HDPE pipe shall be properly aligned at all transitions to conventional ductile iron pipe. A detectable tracer wire (copperhead 12 AWG vs extra strength hand drawn 1150# wire with a blue jacket) adequate for future location efforts shall be installed the entire length of the pipeline and shall terminate in the gate wells located at each end of the water main installation, or as directed by the ENGINEER.

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ORCHARD HILLS WATER MAIN EXTENSION

### 3.3 JOINING OF HIGH DENSITY POLYETHYLENE (HDPE) PIPE

- A. Sections of HDPE shall be assembled and joined by the butt fusion process into continuous lengths on the job site above the ground. The joining method shall be the heat fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations and ASTM Standard D2657 Practice for Heat-Joining of Polyolefin Pipe and Fittings. The heat fusion equipment used in the joining procedures shall be capable of meeting all conditions recommended by the pipe manufacturer. Hot fusion joining of HDPE end sections and fittings may be performed in the excavations.
- B. Where the polyethylene pipe is connected with fittings or valves, an HDPE mechanical joint adapter or flange adapter shall be fused to the end of the HDPE pipe and the connection made with restrained mechanical joint components or flange. Refer to the manufacturer's recommendations. Where the electrofusion flex restraint is specified, the required Flex Restraint Saddles shall be attached to the pipe by electrofusion or a thrust-isolator shall be heat-fused to the pipe.
- C. All joints shall be inspected by the ENGINEER before the pullback. The pipeline shall be joined on site in appropriate working lengths near the exit pit. In determining the maximum pulling length, the CONTRACTOR shall consider the physical condition at the job site and limitations of his equipment.
- D. Fusible pipe will be fused by qualified fusion technicians, as documented by the pipe supplier. Training records for qualified fusion technicians shall be available to OWNER or ENGINEER upon request.
- E. Each joint fusion shall be recorded and logged by an electronic monitoring device (data logger) affixed to the fusion machine. Joint data shall be submitted as part of the As-Recorded information, in accordance with this specification.
- F. The fusible pipe will be installed in a manner so as not to exceed the recommended bending radius.
- G. Where fusible pipe is installed by pulling in tension, the recommended Safe Pulling Force, according to the pipe supplier, will not be exceeded.
- H. Only appropriately sized, and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. Fusion machines must incorporate the following properties, including the following elements:
  - 1. HEAT PLATE – Heat plates shall be in good condition with no deep gouges or scratches within the pipe circle being fused. Plates shall be clean and free of any contamination. Heater controls shall properly function, and cord and plug shall be in good condition. The appropriately sized heat plate shall be capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused, per the pipe supplier's recommendations.
  - 2. CARRIAGE – Carriage shall travel smoothly with no binding at less than 50 psi. Jaws shall be in good condition with proper inserts for the pipe size being fused. Insert pins shall be installed with no interference to carriage travel.
  - 3. GENERAL MACHINE – Overview of the machine body shall yield no obvious defects, missing parts, or potential safety issues during fusion.

4. DATA LOGGER – The current version of the pipe supplier’s recommended and compatible software shall be used. Protective case shall be utilized for the hand held wireless portion of the unit. Data logger operations and maintenance manual shall be with the unit at all times. If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.
- I. Other equipment specifically required for the fusion process shall include the following:
    1. Pipe rollers shall be used for support of pipe to either side of the machine.
    2. A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement and/or windy weather.
    3. Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.
    4. Facing blades specifically designed for cutting HDPE pipe.
  - J. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. The fusion data logging and joint report shall be generated by software developed specifically for the fusion of HDPE pipe. The software shall include dimensional data and interfacial pressure relationships that are specific to HDPE pipe. Data not logged by the data logger shall be logged manually and be included in the fusion technician’s joint report.

### **3.4 EXCAVATION AND PITS**

- A. Excavate required pits in accordance with CONTRACTOR’s proposed working Drawings.
- B. Dewatering of pits and excavations shall meet the requirements of the City of Ann Arbor Standard Specifications. When water is encountered, the CONTRACTOR shall provide a dewatering system of sufficient capacity to remove water, keeping any excavations free of water until the backfill operation is in progress.

### **3.5 GUIDED DRILLING**

- A. Equipment
  1. The drilling equipment shall be capable of placing the HDPE pipeline within the proposed line and grade without inverted slopes.
  2. The drilling equipment shall have a minimum rating of pullback, torque and mud flow which is capable of installing the type of pipe of proposed diameter and length. Submit the drilling equipment data to the ENGINEER for review.
  3. The guidance system shall have the capability of measuring inclination, roll and azimuth. The guidance system shall have an independent means to ensure the accuracy of the installation. The CONTRACTOR shall demonstrate a viable method to eliminate accumulated error due to the inclinometer (pitch or accelerometer). The guidance system will be capable of generating a plot of the borehole survey for the purpose of an as-built Drawing. The CONTRACTOR shall also prepare to provide alternative methods such as gyroscoping, ground penetrating radar or “intelligent” pigs to determine the as-built position.

4. Equipment set-up requirements at the designated locations shall be determined by the CONTRACTOR and submitted to the ENGINEER per the requirements of Subsection 1.3.

B. Pilot Hole Boring

1. The entry angle of the pilot hole and the boring process shall maintain a curvature that does not exceed the allowable bending radius of HDPE pipe respectively.
2. Alignment Adjustments and Restarts
  - a. The CONTRACTOR shall follow the pipeline alignment as proposed on the Drawings. If adjustments are required, the CONTRACTOR shall notify the ENGINEER for approval prior to making the adjustments.
  - b. In the event of difficulties at any time during boring operations requiring the complete withdrawal from the tunnel, the CONTRACTOR shall be allowed to withdraw, abandon the tunnel and begin a second attempt at a location approved by the ENGINEER, or at the option of the CONTRACTOR and with the approval of the ENGINEER.
3. The number of access pits shall be kept to a minimum and the equipment must be capable of boring the proposed length in a single bore.

C. Installing Pipe

1. After the pilot hole is completed, the CONTRACTOR shall install a swivel to the reamer and commence pullback operations. Pre-reaming of the tunnel may be necessary and is at the option of the CONTRACTOR.
2. Reaming diameter shall not exceed 1.4 times the diameter of the pipe being installed. When the reamer exceeds allowable diameter, a flowable fill or suitable grout shall be pumped into the void between the HDPE pipe and drill pilot hole displacing the drilling fluid. The flowable fill or suitable grout material and method of placement shall be approved by the ENGINEER prior to installation of pipeline.
3. The HDPE pipe being pulled into the tunnel shall be protected and supported so that it moves freely and is not damaged by stones and debris on the ground during installation. Damaged portions of pipe shall be cut out and discarded.
4. Pullback forces shall not exceed the allowable pulling forces for the HDPE pipe.
5. The CONTRACTOR shall allow sufficient length of HDPE pipe to extend past the termination point to allow connections to adjacent pipe sections or structures. Stretching of about 1% of the total length pull will often be observed. Additionally, HDPE pipe length change due to temperature change may be observed. This can be as much as 1 in./100 ft./10°F difference in temperature between the pipe before and after installation. Pulled pipes shall be allowed 24 hours of stabilization prior to making tie-ins. The length of extra HDPE pipe will be at CONTRACTOR's discretion.

D. Drilling Fluid and Spoils Disposal

1. Bentonite clay drilling fluid must be used on all drilling. It is not acceptable to use just water as a drilling fluid. Bentonite clay mixture shall meet the manufacturer's requirements for the soil conditions encountered.
2. Disposal of excess drilling fluid and spoils shall be the responsibility of the CONTRACTOR who must comply with all relevant regulations, right-of-way, work space and permit agreements. Excess drilling fluid and spoils shall be disposed at an approved location. The Township will not provide a disposal site. The CONTRACTOR is responsible for transporting all excess drilling fluid and spoils to the disposal site and paying any disposal costs. Excess drilling fluid and spoils shall be transported in a manner that prevents accidental spillage onto roadways. Excess drilling fluid and spoils shall not be discharged into sanitary sewers or storm drain systems, or waterways.
3. Drilling fluid returns (caused by fracturing or formations) at locations other than the entry and exit points shall be minimized. The CONTRACTOR shall immediately clean up any drilling fluid that surface through fracturing.
4. The mobile spoils removal equipment capable of quickly removing spoils from entry or exit pits and areas with returns caused by fracturing shall be present during drilling operations to fulfill the requirements of paragraphs 1 and 2 above.

**3.6 TESTING OF HDPE WATER MAIN PIPE**

- A. Hydrostatic Pressure Testing. After completion of each run, the HDPE pipe shall be hydrostatically tested by the CONTRACTOR in the presence of the ENGINEER after it has reached equilibrium temperature with the surrounding environment and prior to connections with conventional ductile iron pipe. The CONTRACTOR may elect to test both the HDPE and the Ductile Iron Pipe simultaneously. However, the Ductile Iron Pipe shall then be required to meet the testing requirements of the HDPE.

Pressure testing shall comply with (AWWA), C906 and Plastic Pipe Institute (PPI) procedures as outlined below.

B. Hydrostatic Test Procedure:

1. Stabilize the pressure in the pipe by pumping pipe pressure to 160 psi and holding it at that pressure for a period of 4 hours in order to allow the pipe to thermally stabilize.
2. After 4 hours, reduce the pressure by 10 psi, to 150 psi.
3. After 1 hour, read the pressure gauge.
4. If the pressure drops more than 5% from 150 psi, the test will be deemed a failure.
5. If test fails, correct leakage problems and retest.

- C. Disinfection and Bacteriological Testing. All disinfection and bacteriological testing shall be completed in accordance with the requirements as described in the Special Provision entitled "Water Main and Appurtenances", sub-sections "Water Main Testing", "Flushing and Swabbing", "Chlorination", and "Bacteriological Testing ." No other testing procedures or methodologies will be allowed.

END OF SECTION



CITY OF ANN ARBOR – FIELD OPERATIONS  
ORCHARD HILLS WATER MAIN EXTENSION

PRE-BID MEETING ATTENDANCE  
THURSDAY, MAY 19, 2016 10:00 AM

Name/Representing	Address	E-mail Address	Phone/Fax	
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			f	248-735-1117
FRANK JAENIG SANDALE UTILITY	10242 W. Gross River - Grosse Pointe Woods	Frank.Jaenig @HAJOCA.COM	p	517-648-2534
			f	517 627-7579
Dell Ott JOE RAICAWEXC	3640 Nicholson RD Fowlerville MI	JoeRaicawexc@hotmail.com	p	517 521-4508
			f	517 521 4393
Michael Haessler D.N. Higgins	3390 Trans Point Rd. Satic A. Ann Arbor 48108	mikeh@dnhiggins.com	p	734 996 9500
			f	
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CTI and Associates, Inc  
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Novi, MI 48377

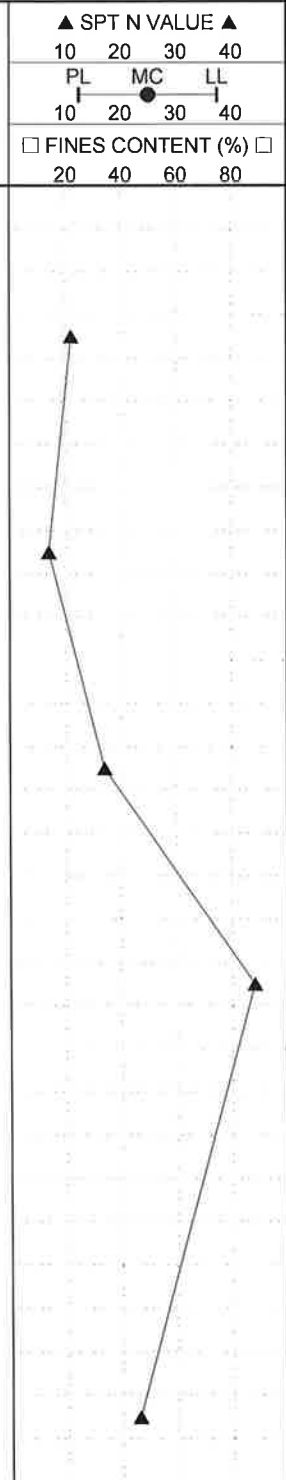
**BORING NUMBER: B-1**

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CLIENT Stantec PROJECT NAME Nichols Arboretum Water Main  
 PROJECT NUMBER 3162040011 PROJECT LOCATION Ann Arbor, MI  
 DATE STARTED 5/3/16 COMPLETED 5/3/16 GROUND ELEVATION +/-  
 DRILLING CONTRACTOR Brax Drilling GROUND WATER LEVELS:  
 DRILLING METHOD 3-1/4 inch Hollow Stem Auger ▽ DURING DRILLING 8.50 ft  
 LOGGED BY A. Rau CHECKED BY A. Spears ▽ AFTER DRILLING 8.33 ft  
 NOTES Backfilled with auger cuttings ▽ COLLAPSE DEPTH 10.50 ft

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲	
									PL	MC
0.0			6 inches of SANDY TOPSOIL						10	20
			FILL - brown, sand with gravel, moist	SS 1		4-6-5 (11)	0		10	20
2.5			FILL - brown, sandy clay with gravel and silt, trace organics, dry						20	30
			FILL - brown, sandy clay with gravel and silt, trace organics, dry	SS 2		2-4-3 (7)	1.0		10	20
5.0									20	30
			FILL - brown, sandy clay with gravel and silt, trace organics and cobbles, dry	SS 3		5-8-9 (17)			20	30
7.5									20	30
			CLAYEY SAND (SP-SC) - brown, with gravel, trace cobbles, dense to medium dense, wet	SS 4		10-21-23 (44)			20	30
10.0									20	30
									20	30
12.5									20	30
									20	30
15.0				SS 5		5-9-14 (23)			20	30

DRAFT



Bottom of borehole at 15.0 feet.





CTI and Associates, Inc  
28001 Cabot Drive Ste. 250  
Novi, MI 48377

**BORING NUMBER: B-2**

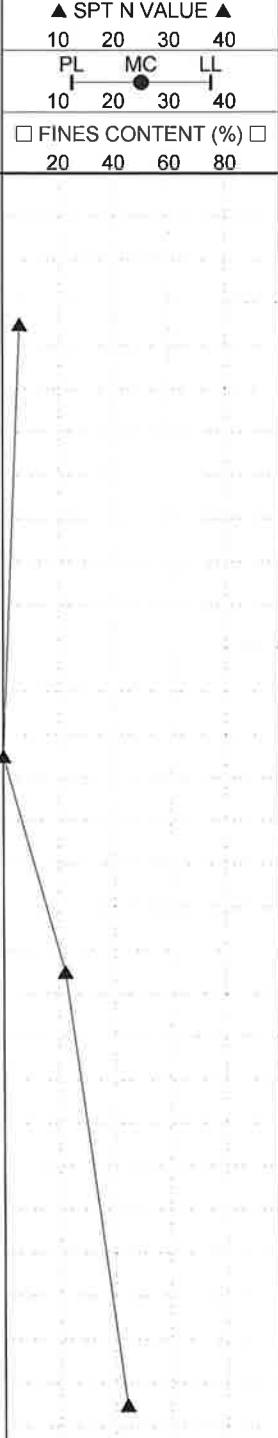
PAGE 1 OF 1

CLIENT Stantec  
PROJECT NUMBER 3162040011  
DATE STARTED 5/3/16 COMPLETED 5/3/16  
DRILLING CONTRACTOR Brax Drilling  
DRILLING METHOD 3-1/4 inch Hollow Stem Auger  
LOGGED BY A. Rau CHECKED BY A. Spears  
NOTES Backfilled with auger cuttings

PROJECT NAME Nichols Arboretum Water Main  
PROJECT LOCATION Ann Arbor, MI  
GROUND ELEVATION +/-  
GROUND WATER LEVELS:  
▽ DURING DRILLING 4.33 ft  
▼ AFTER DRILLING 3.58 ft  
▽ COLLAPSE DEPTH 10.25 ft

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf) UNC. STRENGTH (psf)	NATURAL MOISTURE CONTENT (%)	▲ SPT N VALUE ▲					
									10	20	30	40		
0.0			15 inches of SANDY TOPSOIL											
2.5			CLAYEY SAND (SW-SC) - brown, with gravel and silt, very loose, moist	SS 1		2-1-2 (3)								
5.0			SILTY SAND (SW-SM) - brown, with gravel, very loose, wet	SS 2		1-1								
7.5				SS 3		0-0-0 (0)								
10.0			SILTY SAND (SW-SM) - brown, with gravel, medium dense, wet	SS 4		8-7-4 (11)								
12.5														
15.0			CLAYEY SAND (SP-SM) - fine, brown, trace gravel, medium dense, wet	SS 5		4-10-12 (22)								

DRAFT



Bottom of borehole at 15.0 feet.