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| F.A.P. RTE. | SECTION | COUNTY | TOTAL SHEETS | SHEET NO. |
| 338/IL 59 | 2011-0351 | DUPAGE | | |
| FED.ROAD.DIST.NO. | | ILLINOIS | CONTRACT 60P42 | |
| | | FED. AID PROJECT | | |

Guided Horizontal Drilling System (HDD) (Continued)

HDPE CONDUIT PREPARATION AND INSTALLATION:

Contractor shall install the HDPE conduit in accordance with the plans for a complete job and meet the completion date as defined by the city of Naperville.

Contractor to provide sketches of each staging area required to install the conduit, store materials, and setup equipment

All sketches shall be submitted to the city of Naperville for review prior to start of work. This sketch should include approximate square feet of area to be damaged by your construction work force.

The following parameters shall be recorded during the drilling, reaming, and installation, for each push, to ensure design limits are not exceeded.

- Calibrate electronic locator or guidance instrumentation before start of project.
- Locate drill head every 10 feet (minimum)

Depth _____
Alignment _____
Azimuth _____
Pitch _____

- Record the following drilling information every 15 minutes or as necessary

Drilling fluid pressure _____
Flow rate _____
Mud weight in _____
Mud weight out _____
Rate of penetration _____
Thrust _____
Torque _____

- Pre-ream pilot hole
Record the following information every 15 minutes or as necessary

Mud weight in _____
Mud weight out _____
Rate of penetration _____
Torque _____
Depth _____
Alignment _____

- Conduit installation
Record the following information every 15 minutes or as necessary

Fluid pressure _____
Flow rate _____
Mud weight in _____
Mud weight out _____
Rate of penetration _____
Torque _____
Depth _____
Alignment _____

Guided Horizontal Drilling System (HDD) (Continued)

- Conduit quality check of conduit

Broken pieces _____
Out of round, Oval _____
End frayed _____
Slit cracked or cut _____
Belled end distorted _____
Check specification identification on HDPE conduit _____

- Verify location and depth of HDPE conduit

Record data _____

Show detail with sufficient information

Contractor to submit for the owner's review the following 4 items with his bid;

A. Technical specifications and manufacture of guide horizontal drilling system, fluid handling system, guidance and locator system, reamed diameters for various duct configurations, maximum deviations from vertical and horizontal and minimum capabilities of thrust and pullback, spindle torque, drilling fluid pressure and flow rate, provide a schedule using Microsoft Project software of latest edition

B. A work plan showing details and proposed method of construction, number of feet of one, two, three, four duct sections, or six duct sections to be installed in an eight hour day, sequence of operations to be performed, number, size and schedule of construction crew, time and hours and days to be worked in a week. Number of calendar days to complete work, pilot hole drilling procedure, reaming procedure, pulls back/conduit installation procedure, method of monitoring the drilling head and method of verifying conduit location and depth for as built drawings, plus restoration and landscaping plan

C. The contractor shall video tape the entire work area prior to starting the work. The video should document all vegetation condition of the easement and visual obstructions that the contractor will or temporarily move plus delineate with pictures the route with street names right of way and electrical equipment, address, time and date. This video shall be used to restore the work area landscaping to its original/or better condition

D. The Contractor shall identify the following;
Materials and quantities to be supplied,
Vendor names supplying materials, equipment, tools and expertise.

After the pipe is in place, cleaning pig/mandrel shall be used to remove residual water and debris. After the cleaning operation, the Contractor shall provide and run a sizing pig/mandrel to check for anomalies in the form of buckles, dents, excessive out-of-roundness, and any other deformations. The sizing pig/mandrel run shall be considered acceptable if the survey results indicate that there are no sharp anomalies (e.g. dens, buckles, gouges, and internal obstructions) greater than 5 percent of the nominal pipe diameter. For gauging purposes, dent location is those defined above which occur within a span of five feet or less. Pipe ovality shall be measured as the percent difference between the maximum and minimum pipe diameter. For gauging purposes, ovality locations are those defined above which exceed a span of five feet

See mandrel requirements at end of this specification. The Contractor shall fabricate, purchase and use mandrel to proof rod all ducts for the entire project.

All conduits shall be subject to television inspection prior to acceptance. Television inspection may be identified at the preconstruction meeting, or later during the project if the inspector has any concerns about the proper installation of the pipe. If television inspection is required by the City, Contractor shall bear all costs incurred in making the inspection and shall bear all costs incurred correcting any deficiencies found during television inspection.

Guided Horizontal Drilling System (HDD) (Continued)

Deficiencies that will require pipe removal and replacement include, but are not limited to:

- Visible damage to the pipe.
- Failure of mandrel test.
- Oval pipe.
- Open joints.
- Foreign material that cannot be removed by other means.

After installation, contractor shall mark the plan drawings or provide new drawings to accurately show the actual installation and alignment of the conduit installed. This information shall be provided to the owner.

The Contractor shall satisfy himself as to all local conditions affecting the Work, including the location of underground facilities. He shall make a thorough examination of the Drawings, Specifications, and premises so that he will be entirely familiar with the details and construction of the installation. No charge for an extra shall be allowed where such extra is due to the Contractor's lack of observation or knowledge of local conditions.

The Contractor shall give his personal attention to the faithful prosecution of the Work and shall keep the same under his personal control. He shall maintain sufficient competent supervisory personnel at the job site at all times to represent the Contractor and to supervise and be responsible for the Work and conduct it in cooperation and in coordination with all other work being done on the premises. He shall maintain on the job as many competent foremen as are required to supervise the various operations. The Contractor shall correct at his own expense all errors in the Work arising from his inaccuracy or from the inaccuracy of his employees.

Directional drilling and pipe installation shall be done only by an experienced Contractor specializing in directional drilling and whose key personnel have at least five (5) years experience in this work. Furthermore, the Contractor shall have installed directionally drilled pipe at least as large as 20 inches in diameter, have performed crossings at least 2,000 feet in length, and successfully installed at least 100,000 feet in length.

All Work shall be executed by workmen or artisans who are skilled in their work or trade, and must be done in a neat and skillful manner as specified or detailed in the Contract and in accordance with the best construction practice.

The Contractor shall furnish and be responsible for all the equipment and methods used in the construction Work. The Contractor shall supply the documentation necessary to provide a permanent record of pulling tensions and all other items as related to the installation of the HDPE conduit. The Contractor shall develop a plan that will be reviewed by the engineer.

All roadways that are humped or sunk due to directional boring work shall be fixed immediately. The Contractor is advised to use a registered surveyor to shoot street elevation grade along the Conduit route crossing the street. The surveyor should establish at least 3 elevation points prior to installing any HDPE conduit in the street. The Contractor shall submit a paving plan and a Traffic Control plan along with the Company's name that will repair the street to the City of Naperville for approval. The Contractor is advised the MINIMUM REQUIREMENT is that the entire trench width of 4 feet from curb to curb shall be removed as if it was open cut. The contractor shall repair by removing all unsuitable soil and backfilling with compacted CA6. Replace the street with 12 inches of BAM, tact coat, and then with a 2 inch wearing surface or 10 inches of 4500 psi concrete, tact coat and 2 inches of wearing surface. Then the area 35 feet either side of the repair area for the width of the Street for a depth of 2 inches shall be removed by milling and cutting all edges square. The area is then prepared for an application of a 2 inch thick asphalt-wearing surface with tact coat and finished to level and grade. The street is marked to match the previous stripping and markings The curb and gutter on both sides of the street shall be removed and reinstalled for a length to the first control joint in either direction or 20 feet total on each side or which ever is smaller. However, the final acceptance and requirements shall come from the City of Naperville's Department of Public works. The Contractor is advised the work shall be inspected and approved and the field paving work completed prior to submitting the conduit work for payment.

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| NAPERVILLE PUBLIC UTILITIES DEPARTMENT | SPECIFICATION FOR THE INSTALLATION OF HDPE CONDUIT BY THE HORIZONTAL DRILLING SYSTEM (HDD) | DATE: 02-19-08 PAGE: 16 OF 25 C30-1950 |
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|---------------------|---------------|-------------------|--------------------------------|----------------------------|----------------|--|--|
| PROJECT TITLE | | | | ROUTE 59 ROAD IMPROVEMENTS | | | |
| PROJECT DESCRIPTION | | | | DETAILS AND STANDARDS | | | |
| ENGINEER | DRAFTING DATE | MAP # | SCALE | | | | |
| BCC | 8-04-12 | 4211,4224 | N.T.S. | | | | |
| GIS DESIGN BY | DRAFTED BY | REVISIONS DATE | AT&T JOINT AGREEMENT # | PROJECT # | | | |
| DL | PSM | | N/A | EU-12 | | | |
| CHECKED BY | APPROVED BY | CAD FILE | SHEET # | | | | |
| | | 0061123001D30.DWG | 30 OF 40 | | | | |
| Naperville | | | Department of Public Utilities | | WORK REQUEST # | | |
| | | | Electric Division | | 61123 | | |