

## **SECTION 557 VIBRATORY PLOWING**

### **557-1 Description.**

**557-1.1 Scope of Work:** The work specified in this Section documents the approved construction methods, procedures and materials for Vibratory Plowing, also known as cable plowing.

**557-1.2 General:** Vibratory Plowing is a trenchless method for installing a product which typically consists of a cable or small conduit for later insertion of wire line products. It is a multi-stage process consisting of positioning a vibrating plow equipped with a trailing product guide which feeds the cable or conduit to the depth setting of the plow as it moves forward. The product is inserted into the ground continuously along a predetermined path and depth. Reshape any disturbance of the ground surface such as localized residual mounding or grooves, by grading and compaction. If a conduit is installed, subsequent operations may involve pulling a desired product back through the conduit. The vertical depth of installation is controlled by two factors, hydraulic adjustment of the plow shear head and the surface contours. The depth of insertion must be continually adjusted to compensate for changes in terrain to ensure compliance with depth criteria. Horizontal profiles or steering the bore is accomplished by proper orientation of a tractor which pulls the vibratory plow. Alignments are generally limited to straight sections with minor deviation unless approved by the Engineer.

### **557-2 Construction Site Requirements.**

**557-2.1 Site Conditions:** Consider vibratory plowing an excavation method and comply with all applicable provisions required of excavation methods.

(a) Ensure that subsequent excavation for manholes, hand pulls, or other service vaults, recovery pits or any other excavation is carried out as specified in Section 120.

(b) After completing installation of the product, restore the work site. Restore excavated or plowed areas in accordance with the Specifications and Design Standards.

(c) It is the plowing Contractor's responsibility for removal of excess material or debris created during the construction process as well as restoring the site to the condition which existed before construction.

(d) Exposure may be allowed for periods exceeding 14 consecutive days if the exposure is limited to 3 feet or less. Periods longer than described above may be approved by the Engineer if it will not affect maintenance or construction activities.

(e) Ensure that equipment does not impede visibility of the roadway user without taking the necessary precautions of proper signing and Maintenance of Traffic Operations.

**557-2.2 Damage Restoration:** Take responsibility for restoring any damage caused by cutting, heaving, settlement or separation of pavement at no cost to the Department.

**557-2.2.1 Remediation Plans:** When required by the Engineer, provide detailed plans which show how damage to any roadway facility will be remedied and

include this as part of the As-Built Plans Package. Remediation Plans must follow the same guidelines for development and presentation of the As-Built Plans.

### **557-3 Quality Control.**

**557-3.1 General:** Take control of the operation at all times, have a representative who is thoroughly knowledgeable of the equipment and procedures, present at the job site during the entire installation and available to address immediate concerns and emergency operations. Notify the Engineer 48 hours in advance of starting work. Do not begin installation until the Engineer is present at the job site and agrees that proper preparations have been made.

**557-3.2 Alignment:** Ensure that the plow operator maintains a true and consistent alignment. Deviation from the approved alignment more than 1 foot in either direction to avoid obstructions such as boulders, stumps or general vegetation will not be allowed unless approved by the Engineer. Document all approved deviations from the original permitted alignment.

**557-3.3 Product Locating and Tracking:** For all installations, submit sufficient information to establish the proposed strategy for compliance with the permit.

(a) Define what reference will be used to control and ensure alignment as permitted will be maintained with respect to line and grade. Also indicate the intervals for checking line and grade and maintain a record at the job site.

(b) Ensure the equipment is of adequate size and capability to install the project. This includes the equipment manufacturer's information for all power equipment used in the installation.

(c) Define the means for controlling line and grade.

Install all facilities in such a way that their location can be readily determined by electronic designation after installation. For non-conductive installations, accomplish this by attaching a minimum of two separate and continuous conductive wires (minimum 12 gauge) either externally, internally, or integrally with the product. Any break in the conductor must be connected by electrical clamp of brass or solder and coated with a rubber or plastic insulator to maintain the integrity of the connection from corrosion.

### **557-4 Documentation.**

**557-4.1 Plowing Path Report:** Furnish a Plowing Path Report to the Engineer within 14 days of the completion of each installation. Include the following information on the report:

(a) Location of project and financial project number including the Permit Number when assigned.

(b) Name of person collecting data, including title, position and company name.

(c) Contract plans station number or reference to a permanent structure within the project right-of-way.

(d) As-built placement plans showing roadway plan and profile, cross-section and plowing location and elevations every 100 feet along the alignment. Reference shown plan elevations to a Department Bench Mark when associated with a Department project, otherwise to a USGS grid system and datum, or to the top of an existing Department head wall. These plans must be the same scale in black ink on white

paper, of the same size and weight and as the Contract plans. Submittal of electronic plans data in lieu of hard copy plans may be approved by the Engineer if compatible with the Department software.

**557-4.2 As-Built Plans:** Submit the completed As-Built Plans to the Engineer within 30 Calendar days. Ensure that the plans are dimensionally correct copies of the Contract plans. Include notes on each plan stating the final plow path, facility diameter and any facility placed out of service. If the facility is a duct, note this, as well as the size and type of product to be placed within the duct as part of the permitted work. Produce the plans as follows:

(a) On the Contract plan view, show the centerline location of each facility installed to an accuracy within 1 inch at the ends and other points physically observed. Show the remainder of the horizontal alignment of the centerline of each facility installed and note the accuracy with which the installation was monitored.

(b) As directed by the Engineer, provide either a profile plan for each path, or a cross-section of the roadway at a station specified by the Engineer, or a roadway centerline profile. Show the ground or pavement surface and the crown elevation of each facility installed to an accuracy within 1 inch at the ends and other points physically observed. Show the remainder of the vertical alignment of the crown of each facility installed and note the accuracy with which the installation was monitored. On profile plans for paths crossing the roadway show the Contract plans stationing of the crossing. On the profile plans for paths paralleling the roadway also show the Contract plans stationing. If the profile plan for the path is not made on a copy of one of the Contract profile or cross-section sheets, use a 10 to 1 vertical exaggeration.

(c) If, during installation, an obstruction is encountered which prevents installation of the product in accordance with this Specification, submit a new installation procedure and revised plans to the Engineer for approval before resuming work along a new alignment. If a section of a plowing path fails without installing a product or it has been removed, show the failed section of the plow path along with the final plow path on the plans. Note the failed path as "Failed Plow Path." Do not leave any products in a failed plow path. If breakage occurs or the plow path fails, remove all products from the broken or failed section of the plow path.

(d) On all of the plans, show the crown elevation, diameter and material type of all utilities encountered and physically observed during installation. For all other obstructions encountered during a subsoil investigation or the installation, show the type of material, horizontal and vertical location, top elevation and lowest elevation observed, and note if the obstruction continues below the lowest point observed.

#### **557-5 Method of Measurement.**

Payment will be based on the length of the installation, measured in place along with the surface of the ground, completed and accepted.

#### **557-6 Basis of Payment.**

Payment will be full compensation for all work specified in this Section, including all installations, from plan point of beginning to plan point of ending (i.e. pull box) at plan depth, removal and disposal of excavated materials such as boulders, stumps, and debris, or grading and backfilling to complete restoration of the site. Bundled product

in a single plow will be paid for as a single plow based on the required vibrating plow head size. Separate payment will not be made for individual products in a bundle.

The installation of tracking conductors will be included in the cost of the plow and will not be paid for separately.

No payment will be made for a failed plow path or incomplete installations. The removal of all materials installed in a failed plow path will be at no cost to the Department.

No payment will be made for installations until the Plowing Path Report has been delivered to the Department. After the Engineer's acceptance of the Plowing Path Report, payment will be made in the amount of 70% of the unit price bid, for Vibratory Plowing. The remaining 30% of the unit price bid will be made after submittal of As-Built Plans, in accordance with 557-6.2.

Payment will be made under:

Pay Item No. 557- 1- Vibratory Plowing - per foot of aggregate product pull diameter.