

Subsection 10.05 Jacking, Boring or Tunneling Pipe

I. Scope: This Subsection shall govern for furnishing and installing of pipe by the methods of jacking, boring or tunneling as shown on the plans and in accordance with this subsection.

II. Materials: Pipe may be either corrugated metal pipe of the size, type, design and dimension shown on the plans, or reinforced concrete pipe, conforming to the special requirements for jacking, boring or tunneling Reinforced Concrete Pipe, of the size, strength and dimension shown on the plans, or other types as may be specified by the Engineer or shown on the plans.

III. Construction Methods:

A. General: If the grade of the pipe at the jacking, boring, or tunneling end is below the ground surface, suitable pits or trenches shall be excavated for the purpose of conducting the jacking, boring or tunneling operations and for placing end joints of the pipe. Excavations greater than 5 feet in depth shall be protected as specified in Subsection 5.03, "Trench Protection."

Where pipe is required to be installed under railroad embankments, highways, streets, or other facilities by jacking, boring or tunneling methods, construction shall be made in such a manner that will not interfere with the operation of the railroad, street, highway, or other facility, and shall not weaken or damage any embankment or structure.

Pipe damaged in jacking, boring or tunneling operations shall be repaired in place to the satisfaction of the Engineer. Pipe damaged beyond repair will be removed and replaced. Repair or removal and replacement of damaged pipe will be done at the Contractor's expense.

The pits or trenches excavated to facilitate jacking, boring or tunneling operations shall be backfilled immediately after the installation of the pipe has been completed.

B. Jacking: Heavy duty jacks suitable for forcing the pipe through the embankment shall be provided. In operating jacks, even pressure shall be applied to all jacks used. A suitable jacking head and suitable bracing between the jacks and the jacking head shall be provided so that pressure will be applied to the pipe uniformly around the ring of the pipe. Joint cushioning material of plywood or other material may be used as approved by the Engineer. Plywood cushioning material shall be 1/2 inch minimum thickness for pipe diameters 30 inches and less and 3/4 inch minimum thickness for pipe diameters greater than 30 inches. Cushioning rings may be made up of single or multiple pieces. A suitable jacking frame or back stop shall be provided. The pipe to be jacked shall be set on guides, properly braced together, to support the section of the pipe and to direct the pipe in the proper line and grade.

The whole jacking assembly shall be placed so as to line up with the direction and grade of the pipe. In general, the embankment material shall be excavated just ahead of the pipe, the material removed through the pipe, and the pipe forced through the embankment with jacks, into the space thus provided.

The Contractor shall furnish for the Engineer's approval, a plan showing the proposed method of jacking. The plan shall include the design for the jacking head, jacking support or back stop, arrangement and position of jacks, pipe guides, etc., complete in the assembled position.

The excavation for the underside of the pipe, for at least one-third of the circumference of the pipe, shall conform to the contour and grade of the pipe. Over-excavation to provide not more than 2 inches of clearance may be provided for the upper half of the pipe. This clearance shall be tapered to zero at the point where the excavation conforms to the contour of the pipe. Over-excavation in excess of 1 inch shall be pressure grouted the entire length of the installation.

The distance that the excavation shall extend beyond the end of the pipe depends on the character of the material, but shall not exceed 2 feet. This distance shall be decreased when directed by the Engineer.

Preferably, the pipe shall be jacked from the low or downstream end. The final position of the pipe shall not vary from the line and grade shown on the plans, or established by the Engineer, by more than 1 inch in 10 feet. The variation shall be regular and in one direction and the final flow line shall be in the direction shown on the plans.

The Contractor may use a cutting edge of steel plate around the head end of the pipe extending a short distance beyond the end of the pipe with inside angles or lugs to keep the cutting edge from slipping back onto the pipe.

When jacking of pipe has begun, the operation shall be carried on without interruption, insofar as practicable, to prevent the pipe from becoming firmly set in the embankment.

C. Boring: The boring shall proceed from a pit provided for the boring equipment and workers. The location of the pit shall be approved by the Engineer. The boring shall be done mechanically either using a pilot hole or by the auger method.

When the pilot hole method is used an approximate 2 inch pilot hole shall be bored the entire length of the crossing and shall be checked for line and grade on the opposite end of the bore from the work pit. This pilot hole shall serve as the centerline of the larger diameter hole to be bored.

When the auger method is used, a steel encasement pipe of the appropriate diameter equipped with a cutter head to mechanically perform the excavation shall be used. Augers shall be of sufficient diameter to convey the excavated material to the work pit.

Excavated material shall be disposed of by the Contractor, as approved by the Engineer. The use of water or other fluids in connection with the boring operation will be permitted only to the extent necessary to lubricate cuttings; jetting will not be permitted.

In unconsolidated soil formations, a gel-forming colloidal drilling fluid consisting of at least 10% of high grade carefully processed bentonite may be used to consolidate cuttings of the bit, seal the walls of the hole, and furnish lubrication for subsequent removal of cuttings and immediate installation of the pipe.

Allowable variation from line and grade shall be as specified in Section III.B. "Jacking." Overcutting in excess of 1 inch shall be remedied by pressure grouting the entire length of the installation.

D. Tunneling: Where the characteristics of the soil, the size of the proposed pipe, or the use of monolithic sewer would make the use of tunneling more satisfactory than jacking or boring; or when shown on the plans, a tunneling method may be used, with the approval of the Engineer.

When tunneling is permitted, the lining of the tunnel shall be of sufficient strength to support the overburden. The Contractor shall submit the proposed liner method to the Engineer for approval. Approval by the Engineer shall not relieve the Contractor of the responsibility for the adequacy of the liner method.

The space between the liner plate and the limits of excavation shall be pressure-grouted or mud-jacked.

Access holes for placing concrete shall be spaced at maximum intervals of 10 feet.

E. Joints: If corrugated metal pipe is used, joints may be made by field bolting or by connecting bands, whichever is feasible. If reinforced concrete pipe is used, the joints shall be in accordance with Subsection 5.01 Storm Sewer Pipe."

IV. Measurement: This item will be measured by the linear foot between the ends of the pipe along the flow line.

V. Payment

The work performed and materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Jacking or Boring Pipe", or "Jacking, Boring or Tunneling Pipe" of the type, size, and strength or design specified.

This price shall be full compensation for excavation, grouting, backfilling and disposal of surplus material; for furnishing all materials, including pipe liner materials required for tunnel operations; for all preparation, hauling and installing of pipe and pipe liner materials; and for all labor, tools, equipment and incidentals necessary to complete the work except that

protection methods for excavations greater than 5 feet in depth shall be measured and paid for as required under "Trench Excavation Protection."

LAST PAGE OF THIS SUBSECTION