



## SECTION 734

### INSTALLATION OF PIPE BY HORIZONTAL BORING METHODS

**734.1 Description.** This work shall consist of furnishing and installing reinforced concrete pipe culvert (gasket-type) or steel pipe by horizontal boring methods underneath existing pavements at locations shown on the plans or as directed by the engineer. The minimum depth of installation shall be dependent upon the method used and the diameter of the pipe, and will require review and approval from the engineer before the start of this work.

**734.2 Material.** The class of pipe specified in the contract item will be determined for vertical load only. Additional reinforcement or strength of pipe required to withstand jacking pressure shall be determined by the contractor and shall be furnished at the contractor's expense. If pipe ramming or auger boring is the horizontal boring method specified for use, steel casing pipe shall be used. All material shall be in accordance with Division 1000, Material Details, and specifically as follows:

Item	Section
Reinforced Concrete Culvert, Storm Drain and Sewer Pipe	1026
Fiberglass-Reinforced Polymer Mortar Pipe	1075

#### 734.3 Construction Requirements.

**734.3.1** The contractor shall protect the horizontal bore work area as shown on the plans.

**734.3.2** Variations from theoretical alignment and grade for the completed pipe shall not exceed 0.5 feet (150 mm) for each 100 feet (30 m) of pipe. Pavement or ground surface heave or settlement above the installation will not be permitted. To determine if heave or settlement is occurring, the contractor shall undertake surface monitoring measurements.

**734.3.3** The excavated hole shall be no more than 0.1 foot (30 mm) greater than the outside diameter of the pipe. Sluicing and jetting with water as a primary means of soil cutting will not be permitted. When material tends to cave in from outside these limits, a metal shield shall be used ahead of the first section of pipe when pipe jacking, microtunneling or auger boring.

**734.3.4** If the excavated hole is formed by Horizontal Directional Drilling (HDD), the boring equipment used to bore the hole shall be of proper type and in proper working order to ensure the work is performed to the satisfaction of the engineer. The size of installations by the directional drilling method shall be limited to those that can be accomplished by using a 24-inch (600 mm) maximum-sized reamer, unless approved by the engineer.

**734.3.5** Holes bored by HDD shall be cleaned of excess material before pipe is jacked or pulled into place. Holes bored by the methods of auger boring, microtunnelling or pipe jacking shall be cleaned as pipe is being jacked or pushed simultaneously into place.

**734.3.6** Any areas resulting from caving or excavation outside the above specified limits shall be backfilled with a cellular concrete grout designed and produced in accordance with ASTM C 796, and with a method that will fill the voids. The excavated area around the pipe

shall be sealed with grout for a minimum distance of 3 feet (1 m) from the outside face of the fill or cut slope.

**734.3.7** If steel casing pipe to be left in place is used with this installation method, the contractor may delete the gasket type joints for the limits of the jacked pipe. Steel casing pipe shall be welded by a certified welder or shall have a mechanical means of locking pipe joints into place.

**734.3.8** Entry or exit pits or shafts shall be adequately sloped and shored prior to boring.

**734.3.9** If the horizontal boring method chosen for use is pipe jacking or microtunneling, resilient joint cushioning material shall be used between individual pipe segments during the pipe jacking or microtunneling process. This material shall be 0.5 inch (13 mm) thick for pipe diameters up to 30 inches (750 mm), and shall be 0.75 inch (19 mm) thick for pipe diameters equal to or greater than 30 inches (750 mm).

**734.3.10** If the horizontal boring method chosen for use is auger boring or pipe ramming, an adequate steel leading-edge band shall be used to protect the leading edge of the pipe from obstacles in the boring path.

**734.4 Method of Measurement.** Final measurement will not be made except for authorized changes during construction or where appreciable errors are found in the contract quantity. Where required, measurement of horizontal bore installed pipe, complete in place, will be made to the nearest foot (0.5 m) along the geometrical center of the pipe. The revision or correction will be computed and added to or deducted from the contract quantity. The length of structure may be increased by no more than 3 feet (1 m) as necessary to avoid cutting the pipe, but such increased length will not be included in the contract quantity for payment.

**734.5 Basis of Payment.**

**734.5.1** All cost for work area protection will be paid for at the contract unit price for each of the pay items included in the contract.

**734.5.2** The accepted quantities of horizontal bore installed pipe, complete in place, will be paid for at the contract unit price for each of the items included in the contract. Payment will be considered full compensation for excavation and backfilling of the jacking pits, disposal of excess excavation from boring operations, grout for filling voids, disposal of excess drilling fluids, video inspection or camera recording equipment, and any other incidental items or equipment necessary to complete the described work.