

SECTION 02951

RAILROAD AND HIGHWAY CROSSINGS

PART 1 - GENERAL

1.01 SCOPE

The work covered by this section includes furnishing all labor, materials, and equipment required to properly complete sewer and/or water pipeline construction under railroads and Federal or State highways, as described herein and/or shown on the Drawings.

1.02 SHOP DRAWINGS AND ENGINEERING DATA

Complete Engineering data and product information shall be submitted to the Engineer in accordance with the requirements of the section entitled "Submittals" of these Specifications.

1.03 STORAGE AND DELIVERY

All materials shall be stored and protected with strict conformance to the manufacturer's recommendations and as approved by the Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Steel casing pipe for sizes 6 inches and smaller shall conform to ASTM A-120 (standard weight), of the latest standard specifications.
- B. Steel casing pipe, sizes 8 inches through 54 inches, shall be spiral or straight seam welded steel pipe conforming to the latest revisions to ASTM A-139 Grade B.
- C. All steel casing pipe shall be bituminous coated inside and out.
- D. All corrugated metal casing pipe shall be hot dipped galvanized.
- E. Corrugated metal casing pipe shall conform to the following specifications depending on the type of crossing:
 - 1. HIGHWAY
 - a. Corrugated pipe material shall conform to the latest revision of ASTM A-444 (AASHTO M218).
 - b. The pipe shall be single riveted with circumferential (annular) seams and a full circular cross section.
 - c. the corrugations shall be 2-3/4-inch pitch by 1/2-inch depth.

- d. The minimum material thickness (including galvanizing) shall be 20 gauge or as specified in the Bid Schedule.
- e. All joints shall be connected with the standard type single piece band connector of the same material and coating as the pipe.
- f. All corrugated metal pipe shall conform to the latest revision of AASHTO M 190.

2. RAILROAD

- a. Corrugated metal pipe material shall conform to the latest revision of ASTM A-444.
 - b. The pipe shall be single riveted with circumferential (annular) seams and a full circular cross section.
 - c. The pipe shall have Class I corrugations and have a minimum material thickness of 18 gauge or as specified on Drawings or Bid Schedule.
 - d. All joints shall be connected with corrugated coupling bands fabricated of the same material as the pipe.
 - e. The pipe shall be coated with a bituminous coating.
 - f. All corrugated metal pipe and Bituminous Coating shall conform to the latest revision of the American Railway Engineering Association (AREA) Manual, Volume 1, Chapter 1, Part 4.
- F. Structural steel liner plates shall be used for excavated tunnels where the casing pipe is 54 inches or greater in diameter. Liner plates shall be of the thickness shown on the Drawings. Liner plates shall be of the two-flange, lap-joint type. All liner plates shall be hot-dipped galvanized in accordance with AREA 1-4-25 or AASHTO M167 and liner plates for railroad crossings shall be bituminous coated in accordance with AREA 1-4-13. The corrugations shall be 3-1/2 inches center to center. Bolts and nuts used shall be a minimum of 5/8-inch in diameter and shall conform to the latest revision of ASTM A307 for plate thickness less than 0.209 inch, and ASTM A449 for plate thickness equal to or greater than 0.209 inch. Each plate shall have one 2-inch diameter half coupling and plug for grouting.
- G. The sand fill between the casing pipe and carrier pipe, where permitted, shall conform to the section entitled "Cast-In-Place Concrete" Part 2.02B, SECTION 03310 (Fine Aggregate) of these Specifications.
- H. The void behind the casing pipe shall be filled with sand-cement grout. The sand-cement content shall be one part Portland Cement to 3 parts fine aggregate. The water-cement ratio shall be 0.62 by weight.

PART 3 - EXECUTION

3.01 GENERAL

- A. Any solidification of embankments, boring headings, or tunnel headings or sides shall be the Contractor's responsibility and shall be done at his own expense.
- B. Bored installations shall have a bored-hole diameter essentially the same as the outside diameter of the casing pipe to be installed.
- C. The casing pipe shall be jacked into the boring as soon as possible after the boring is made. Lengths of casing pipe as long as practical shall be used. Joints between sections shall be completely welded as recommended for joining the particular type of pipe.
- D. Once the jacking procedure has begun, it should be continued without stopping until completed, subject to weather and conditions beyond the control of the Contractor.
- E. Any replacement of carrier pipe in an existing casing shall be considered a new installation, subject to the applicable requirements of these Specifications.
- F. Open cut installations, where permitted, shall be in accordance with the details and procedures shown on the Drawings. For open cut installations, corrugated metal pipe may be substituted for casing pipe.
- G. Steel liner plates shall be installed in excavated tunnels when called for on the Drawings. The liner plates shall be installed progressively as excavation proceeds. Excavation shall not continue more than 24 inches past the end of the liner plate already in place. At this time an additional section of liner shall be installed before excavation shall continue. Grout shall be placed under pressure in the annular void as the excavation proceeds. Grout should be continuously placed as close to the heading as possible, using grout stops if necessary. Grout shall be injected in the lower holes first, moving upward as the back space is filled. Threaded plugs shall be installed after filling each grout hole.
- H. Care shall be taken to ensure that casing pipe installed by the boring and jacking method will be at the proper alignment and grade.
- I. The Contractor shall maintain and operate pumps, well points, and drainage system equipment to keep work de-watered at all times.
- J. Adequate sheeting, shoring, and bracing for embankments, operating pits, and other appurtenances shall be placed and maintained to ensure that work proceeds safely and expeditiously. Upon completion of the required work, the sheeting, shoring and bracing shall be left in place, cut off, or removed, as designated or directed by the Engineer.

- K. Trench excavation; mining for tunnels; all classes and types of excavation; the removal of rock, muck, debris; the excavation of all working pits; and backfill requirements of the section entitled "Earthwork" are included under this section.
- L. Carrier pipe for all lines 6 inches and larger shall have push-on joints and fittings.
- M. After the casing pipe or tunnel liner is installed; the carrier pipe shall be installed exercising care at all times to protect the interior of the casing pipe and to maintain tight, full seated joints in the carrier pipe. The carrier pipe shall be installed at the proper line and grade without any sags or high spots.
- N. The carrier pipe shall be held concentric with the casing pipe by the use of hardwood blocks or cast iron chocks spaced radially around the pipe and secured together so that they remain firmly in place. The spacing of such blocks longitudinally in the casing pipe shall not be greater than 10 feet.
- O. Except where prohibited, sand shall be forced under pressure into the annular space between the carrier pipe and the casing pipe. This shall begin at the center of the crossing and completely fill the space to each end. Care shall be exercised at all times to maintain the carrier pipe at its proper line and grade.

3.02 RAILROAD CROSSINGS

- A. The Contractor shall secure permission from the railroads to schedule work so as not to interfere with the operation of the railroads. All work will be done under the supervision of the Engineer and the railroads involved. The Contractor will furnish the railroad with such additional insurance as may be required, cost of the same to the borne by the Contractor.
- B. The casing pipe shall extend no less than 25 feet from the centerline of outside track to the end of the pipe. The casing pipe shall extend beyond the railway right-of-way limits, if necessary, to obtain this distance.
- C. All work on railway right-of-way including necessary supporting of tracks, safety of operations, and other standard and incidental operation procedures shall be under the supervision of the appropriate authorized representative of the railway system affected, if required, and any decisions of this representative pertaining to construction and/or operations shall be final and construction must be governed by such decisions.
- D. If, in the opinion of the railway company, it becomes necessary to provide flagging protection, watchmen, removal or replacement of tracks, or the performance of any other work in order to keep the tracks safe for traffic, the Contractor shall reimburse the railroad in cash for such services, in accordance with accounting procedures agreed on by the Contractor and affected railway company before construction is started.

3.03 HIGHWAY CROSSINGS

- A. The Contractor shall be held responsible and accountable for the coordinating and scheduling of all construction work within the State Highway right-of-way.
- B. Work along or across the State Highway Department rights-of-way shall be under the supervision of the Engineer and State Highway Department Engineer.
- C. All water and sewer pipelines installed under paved roads and paved crossroads within the rights-of-way of the State Highway Department shall be encased. This includes, but is not limited to, all water and sewer service lines.
- D. For open trench cut installations, the Contractor shall make satisfactory arrangements to detour traffic around the area of highway where work is in progress, with minimum inconvenience placed on the traveling public. The Contractor shall provide suitable flagmen, watchmen, safety devices, and other services and facilities as may be required by the State Highway Department. The cost of the same shall be borne by the Contractor.
- E. All water and sewer lines shall have a minimum cover of 30 inches unless otherwise shown on the Drawings, but in no case shall the minimum cover be less than that required by the regulations of the highway agency involved.
- F. Unless otherwise shown, encasement shall extend 5 feet beyond the highway embankment or back of side ditch. On curbed portions of conventional highways, the casing pipe shall extend to the back of curb or sidewalk.
- G. For open trench cut installations, the Contractor shall be responsible for scheduling and coordinating all construction work. All work at one particular crossing shall be completed with the trench backfilled, compacted, and a temporary crushed stone surface provided for traffic before any work is started on another such crossing.
- H. All installations shall be done to leave free flows in drainage ditches, pipes, culverts, or other surface drainage facilities of the highway, street, or its connections.
- J. Where sodding is disturbed by excavation or backfilling operations, such areas shall be replaced by mulch sodding on slopes 5 percent or less. All slopes over 5 percent shall be replaced with block sodding. No separate payment shall be made for sodding which shall be included in the bid prices for installation of pipe.
- K. All trench excavation within the right-of-way, but not under pavement, shall be backfilled by tamping in 6-inch layers.
- L. All surplus material shall be removed from the right-of-way and the excavation finished flush with surrounding ground.
- M. Grout backfill shall be used for unused holes or abandoned pipes.

- N. Boring, jacking, or driving of carrier or casing pipes under existing highways shall be accomplished without jetting, sluicing, or wet-boring.
- O. No excavated material or equipment shall be placed on the pavement or shoulders of the highway without the express approval of the State Highway Department Engineer.
- P. In no instance will the Contractor be permitted to leave equipment (trucks, backhoes, etc.) on the pavement or shoulder overnight. Construction materials to be installed which are placed on the right-of-way in advance of construction shall be placed in such a manner as not to interfere with the safe operation of the highway.

END OF DOCUMENT