

PIPE AND PIPE LAYING

Section 14

14.01 GENERAL

The Contractor shall furnish all labour, materials, tools and equipment necessary to construct the crossings, fittings and appurtenances at the points and to the lines, grades and elevations shown on the drawings or designated by the Engineer and as specified herein.

14.02 PIPE SPECIFICATIONS

This section of these specifications is supplementary to, and shall be read together with the latest revisions of the following A.W.W.A. Specifications:

- C-202-49 - Standard Specifications Steel Water Pipe of sizes up to but not including 30 inch
- C-203-57 - Coal tar enamel protective coatings for Steel Water Pipe
- C-206-57 - Field Welding of Steel Water Pipe Joints

14.03 STEEL PIPE - GENERAL REQUIREMENTS

Wall thicknesses shall be as stated in Clause 10.03.

Steel plate shall conform to specifications for low and intermediate tensile strength carbon steel plates of structural quality, A.S.T.M. Designation A-283, Grade B or C of latest revision.

14.04 INTERIOR OF STEEL PIPE

The steel pipe section shall be thoroughly cleaned of all loose mill-scale, loose rust, rust, dirt, oil or other foreign matter by sand or grit blasting, as specified under Section 3.2 of A.W.W.A. Specification C-203-57.

14.05 EXTERIOR COATING OF STEEL PIPE IN TRENCH

All steel pipe sections and special sections shall be cleaned, primed, coated with coal tar enamel and wrapped with fibrous glass mat and bonded asbestos felt wrap in accordance with the requirements of A.W.W.A. Specification C-203-57, Standard for Coal Tar Enamel Protective Coatings for Steel Water Pipe, except as modified herein.

Specifically, the exterior coating shall comply with the requirements of Section A-1.4, Coal Tar Enamel, Fibrous Glass Mat and bonded Asbestos Felt Wrap, together with an exterior wrap of Kraft paper as specified in Section A-2.2 of the Appendix to the above-mentioned A.W.W.A. Specification. The resultant construction of this exterior protection shall be:

- 1) Coal Tar Primer
- 2) Coal Tar Enamel (3/32" plus or minus 1/32" thick)

- 3) Fibrous Glass Mat
- 4) Coal Tar Enamel (1/32" minimum)
- 5) Bonded Asbestos Felt
- 6) Kraft paper wrap

The exterior coating shall be applied in accordance with these specifications and in accordance with the manufacturer's best practice, by experienced men in the employ of the coating manufacturer.

The exterior coating shall be neatly cut back six inches from each end of each pipe or special to permit field welding. The ends of each length of pipe or special thus left uncoated and unwrapped shall be primed with coal tar enamel.

14.06 HANDLING ENAMELED PIPE

Coal tar enamel-coated pipe shall at all times be handled with equipment such as stout, wide canvas slings and wide padded skids designed to prevent damage to the coating. Bare cables, chains, hooks, metal bars or narrow skids shall not be permitted to come in contact with the coating. All handling and hauling equipment shall be approved by the Engineer before use, but this approval shall not relieve the Contractor of any responsibility for the protection of the pipe. Coated pipe shall not be placed directly on rough ground but shall be supported in an approved manner which will protect the coating against injury whenever stored at trench site or elsewhere.

Any pipe section that become damaged shall be repaired as directed by the Engineer, if in his opinion a satisfactory repair can be made. Otherwise, it shall be replaced with an undamaged section at the expense of the Contractor.

Particular attention and care shall be taken when handling or transporting pipe in cold weather.

14.07 LAYING STEEL PIPE

Proper equipment, tools and facilities satisfactory to the Engineer, shall be provided and used by the Contractor for the safe and convenient prosecution of the work. Pipe shall be handled with care at all times to avoid damage. Any damage shall be repaired or replaced to the satisfaction of the Engineer.

For welded joints the pipe shall be jointed by plain butt welds to form a single unit between the points shown on the plan. Welding shall conform to the requirements of the A.W.W.A. Specification C-206-57 "Field Welding of Steel Water Pipe Joints," except that testing for water tightness shall conform with these specifications. Any damage to the exterior coating and wrapping from moving, handling, welding or other operations shall be repaired to provide complete protection to the satisfaction of the Engineer. The pipe shall be protected by applying an exterior coating as specified in Clause 14.05 of these Specifications. The entire pipe shall be tested with a "Holiday" tester before it is lowered into the trench.

14.08 TRENCHING UNDER THE RIVER

The trenching under the river level shall be done to such depths that the pipe can be laid on a uniform grade with continuous bedding in the bottom of trench, true to line and grade as shown on the plans or as determined on the job and approved by the Engineer.

After the trench is excavated, the Contractor shall by soundings show whether the trench is accurately prepared and whether the depth of trench is such that the cover over the pipe at all points when backfilled is as shown on the plans.

14.09 PIPE LAYING UNDER WATER

The section of the river crossing which will be under water shall be placed taking every precaution against possible damage to the tar coating and wrapping. Any damage to pipe or coating shall be repaired or replaced to the satisfaction of the Engineer. The pipe shall be fabricated by the Contractor to fit the contour of the trench, modified by any change in shape which subsequently may be found to be desirable and approved by the Engineer. Note, however, that no pipe shall be handled when the temperature is lower than -5°F.

Anchor blocks shall be placed where shown on the drawings, and securely fastened in place before lowering the pipe into the trench. After the pipe is placed in the trench, it shall be checked by the Contractor to show that it is properly located within the trench and is properly bedded throughout its length. If necessary, the pipe shall be shifted so that it will occupy its intended position, both as to line and grade. An accurate record shall be made of the final position of the pipe.

14.10 TESTING PIPE LAID UNDER WATER

Before backfilling the trench around the pipe, the Contractor shall test the entire lengths of steel pipe for water tightness by installing bulkheads at each end and providing a tap by means of which water pressure can be applied to the pipe. The test pressure shall be 10 p.s.i. in the Assiniboine River Crossing and 20 p.s.i. in the Sturgeon Creek Crossing and this pressure shall be maintained for a period of at least four hours. The line shall be bottle tight. If the line is not tight, the Contractor shall take whatever steps are necessary to furnish a watertight crossing. Air shall not be used for testing.

14.11 BACKFILLING TRENCH UNDER WATER

The trench shall be backfilled to an elevation level with the original bottom using sand and gravel for filling material. Maximum stone size shall be 3".

Extreme care shall be used in placing the backfill so as not to disturb the alignment or grade of the pipe at any location. The fill shall be brought up simultaneously and evenly on both sides of the pipe and over the top, before filling to the edge of the trench so as not to create any side pressure which might tend to crowd the pipe either laterally or vertically.

Soundings shall be made during backfilling, to see that no movement of the pipe takes place, and that the trench is completely backfilled.

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14.12 CAST IRON FITTINGS

Cast iron fittings for bends and special connections shall conform to A.W.W.A. Specification C 110-52 where applicable to these larger sizes. Castings shall be uniform in quality, free from blow-holes, porosity, hard spots, shrinkage defects, cracks, warps or other defects and shall be smooth and well cleaned, true to pattern and of workmanlike finish.

Any deflection either horizontal or vertical in excess of $4^{\circ} 30'$ shall be made by means of a special fitting, unless otherwise specified or permitted. Deflections of lesser degree and curvature may be made by means of deflecting straight pipe using short lengths of pipe where necessary.

Special ends shall be provided on the cast iron fittings where required to connect with valves or with other types of pipe. Details of the special ends shall be submitted to the Engineer for approval before fabrication.

14.13 PIPE LAYING GENERAL

For normal pipe bedding, the bottom of the trench shall be trimmed in conformity with the requirements of the section titled EXCAVATION.

The pipe shall be bedded and partially backfilled with gravel in conformity with the requirements of the section titled PIPE BEDDING AND BACKFILL. It is essential that the pipe bedding material be placed immediately after the trench bottom shall have been prepared, so that the soils are not permitted to dry out. Furthermore, the pipe shall be laid and backfilled as quickly as possible so as to leave no more trench open at one time than is absolutely essential.

No pipe or fittings shall be installed until sufficient trench has been completely excavated to assure that no unforeseen obstructions of any kind are likely to be encountered. No pipe or fittings shall be brought into position until the preceding length has been thoroughly embedded and secured in place.

The trench section in which the pipe is being laid shall be kept free from water, and no portion of any joint shall be made under water.

14.14 FROST

No pipe shall be laid upon a foundation into which frost has penetrated, nor at any time when the Engineer shall deem that there is danger of the formation of ice or the penetration of frost at the bottom of the excavation.

14.15 HANDLING PIPE

The sewer pipe shall be carefully lowered into the trench by crane or other approved means. The pipe shall be laid directly on the sand bedding material at the bottom of the trench. No blocking will be permitted and the pipe bed shall be such that it forms a continuous

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solid bearing for the full length of the pipe except at the mid-point of each pipe and at the joints. A small groove shall be left at the mid-point of the pipe to facilitate removal of the sling after the pipe has been laid.

14.16 LAYING CONCRETE PIPE

The concrete pipe shall be laid in accordance with the following:

- (a) All rubber gaskets for concrete pipe shall be installed on the pipe as per the specifications of the rubber gasket manufacturer.
- (b) The rubber gasket and the receiving portion of the concrete pipe shall be thoroughly cleaned of any foreign matter and shall be handled carefully to prevent damage to either jointing surface.
- (c) Immediately before the joint is to be made, the rubber gasket and the receiving portion of the concrete pipe shall be thoroughly lubricated with a lubricant recommended by the rubber gasket manufacturer.
- (d) With the joint surfaces properly cleaned and lubricated, bring pipe to proper grade and line and force joint together. On concrete pipe sizes 6 inches to 12 inches diameter, inclusive and 6 feet or less in length, if laid in a stable trench with a firm bottom, a bar having a blade on the end may be pushed into the ground, then the bar used as a lever to push the pipe home. The lever shall maintain pressure to hold pipe in place until tamped partial backfill is placed to the top of pipe to prevent joint from slipping from its tightest position.
- (e) For all concrete pipe to be jointed with a rubber gasket other than as described in Item d, a mechanical means shall be used to pull or push the pipe together and hold it in its tightest position until sufficient tamped backfill is placed to prevent the joint from slipping apart. A mechanical means shall be any arrangement of jacks, winches or power equipment that can exert sufficient pull or push without disturbing line or grade to close pipe to its tightest position until tamped partial backfill can be accomplished. No pipe shall be tamped or partially backfilled unless the mechanical force is acting to hold the joint tight.
- (f) Wherever possible, 2 or 3 lengths of pipe shall be laid and pulled tight before final backfilling is started to allow a visual inspection of the joints and tolerance for adjusting the pipe to correct line and grade.

14.17 JOINTING MATERIALS FOR FITTINGS

Where cast iron fittings are called for, the asbestos cement pipe shall be joined to the fitting by means of a short length so that a coupling is used within four (4) feet of the face of the cast iron fitting. Connection

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to the fitting shall be made using an approved type of rubber ring joint, Ring-Tite or approved equal, or the connection shall be sealed with lead.

In the case of rubber ring type joints precautions shall be taken to ensure that the rubber ring is in its proper position and this shall be checked by means of a feeler gauge.

In the case of lead joints, the joint base shall be prepared with yarning material. All hemp, jute or other yarning material shall be free from oil, grease substances and tar.

For lead joints, either braided hemp, or untarred twisted jute, or other material which has the approval of the Engineer may be used.

Lead for caulking purposes shall contain not less than 99.73 percent pure lead. Impurities shall not exceed the following limits.

	<u>Percent</u>
Arsenic, Antimony and Tin Together	0.015
Copper	0.08
Zinc	0.002
Iron	0.002
Bismuth	0.25
Silver	0.02

The producers name or identification mark shall be clearly cast or stamped upon each piece of lead.

14.18 PROCEDURE IN JOINTING FITTINGS

Wherever a single strand of braided hemp or jute, or other suitable yarning material is required in jointing, the material shall be cut to such length that the strand will reach entirely around the pipe with ends overlapping not less than two inches. Wherever more than a single strand of braided hemp or jute is required, it shall be cut to sufficient length so that the ends meet without causing overlap. These ends should meet on opposite sides of the pipe and not on the top or bottom. Successive strands of yarning materials shall be driven home separately and thoroughly packed and hammered into the joint with suitable yarning tools.

The lead shall be heated in a melting pot kept near the joint to be poured, brought to a proper temperature such that when stirred it will show a rapid change of color and that when poured into the joint space it will insure a perfect joint. Before pouring, all scum shall be removed. The joint runner shall fit snugly against the face of the bell and the outside of the pipe, and shall be dammed with clay at the pouring gate to provide for filling the joint even with the top of the bell. Each joint shall be made with one pour, filling the joint space. After cooling to the temperature of the pipe, lead joints shall be caulked by means of pneumatic tools or by hand tools, by competent workmen until thoroughly compacted, making water tight joints without over-straining the bells.

Defective joints shall be cut out and entirely replaced as directed by the Engineer.

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14.19 BULKHEADING

When pipe laying is not in progress, the ends of the pipe line shall be kept closed with suitable plywood or sheet metal bulkheads to prevent drying out of the interior of the pipe.

14.20 RIGHT-OF-WAY

The Corporation has secured easements over private property on the south bank of the Assiniboine River and over private and municipally owned property on both the northerly and southerly banks of Sturgeon Creek.

Clearing and grubbing on the easements shall be done only after securing the written permission of the Engineer. The Contractor shall exercise caution in working on and around these easements and shall protect all existing trees and growth on and adjacent to the property. It is required that damage to existing trees be kept to an absolute minimum. The Contractor shall protect and replace, if damaged, in condition satisfactory to the Engineer, all existing fences, poles, sodded areas, public or private walks or other structures on or near these easements.

The Corporation has not made any other provision for access to the site and the Contractor shall therefore make his own arrangements for any additional access he may require.

14.21 PAINING

All exposed pipe and fittings shall be thoroughly cleaned of mill scale rust, grease and other foreign matter. Cleaning shall be carefully done, using a solvent if necessary and rubbing down and finishing with clean rags.

The exposed steel surfaces shall then be given two coats of an approved red lead primer, smoothly and neatly brushed on. After this has been thoroughly dried, one coat of aluminum paint, Stephens 318, or approved equal shall be applied.