

PROPERTY  
OF THE  
WATER & WASTE DEPARTMENT  
RESOURCE CENTRE  
1500 PLESSIS ROAD

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*SPEC TA 180 5655 1964 NO.06*  
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SPECIFICATION W 6-64

THE METROPOLITAN CORPORATION OF GREATER WINNIPEG  
WATERWORKS AND WASTE DISPOSAL DIVISION

CONTRACT NO. 200

SPECIFICATIONS FOR

*T.P. ✓*  
SUPPLY AND INSTALLATION OF PIPE

FOR

CHARLESWOOD-ASSINIBOIA FEEDERMAIN RIVER CROSSING

10 Fort Street,  
Winnipeg 1, Man.  
July 14, 1964.

N. S. Bubbis,  
Director

COVER PAGE

THE METROPOLITAN CORPORATION OF GREATER WINNIPEG

WATERWORKS AND WASTE DISPOSAL DIVISION

This is exhibit " A " referred to  
in the *agreement*  
Between *Nelson River Construction*  
*Limited* and the Metropolitan Corporation of  
Greater Winnipeg dated the *27th*  
day of *August*, A. D. 196*2*

GENERAL CONDITIONS  
of Contract for Work Specified Below

*[Handwritten Signature]*  
*[Handwritten Initials]*

SUPPLY AND INSTALLATION OF PIPE FOR  
CHARLESWOOD-ASSINIBOIA FEEDERMAIN RIVER CROSSING

Tenders close 12:01 p.m., Winnipeg Time, August 18, 1964

at

Metro Offices  
10 Fort Street, Winnipeg 1, Manitoba.

Sum fixed for liquidated damaged - \$50.00 per day (See Cl. 8.07)

Certified cheque or bid bond payable to the Corporation must  
accompany tender (Clause 2.04)

A deposit of \$10.00 required for plans and specifications.  
(See Clause 2.01)

July 14, 1964.

N. S. Bubbis,  
Director.

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Specification W 6-64SUPPLY AND INSTALLATION OF PIPE FOR  
CHARLESWOOD-ASSINIBOIA FEEDERMAIN RIVER CROSSINGClause10.01 GENERAL

The General Conditions, together with the following Special Provisions and the drawings accompanying these specifications shall govern the supply of all labor, tools, equipment and material (except the material listed below to be supplied by the Corporation) necessary for the construction, complete in every respect and ready for operation of the Charleswood-Assiniboia Feedermain River Crossing.

10.02 SITE OF WORK

The Charleswood-Assiniboia Feedermain River Crossing will begin on the south side of the Assiniboine River at Berkley Street North and extend across the Assiniboine River to a meter pit at Assiniboine and Rouge Road, where the steel pipe will terminate. From the meter pit north up Rouge Road, the feedermain will be of prestressed concrete pipe and will terminate as shown on the drawings.

10.03 WORK TO BE DONE

The work to be done under this contract consists of the supply and installation of approximately 785 linear feet of 24" O.D. steel pipe and the installation of approximately 208 linear feet of prestressed concrete pipe together with all specified appurtenances.

10.04 DRAWINGS

The following drawings form part of this specification:

- D-1108 - Charleswood-Assiniboia Feedermain River Crossing  
Plan-Profile Station 0+00 to Station 9+49.63
- D-1109 - Charleswood-Assiniboia Feedermain River Crossing  
Plan-Profile Station 3+50 to Station 9+49.63
- D-1110 - Charleswood-Assiniboia Feedermain River Crossing  
Detail of Meter Pit Station 2+04.10
- D-1111 - Charleswood-Assiniboia Feedermain River Crossing  
Thrust Blocks and Miscellaneous details
- C - 480- Standard Wiring Diagram for Magnetic Flow Meter Pits.

10.05 MATERIAL TO BE SUPPLIED BY THE CORPORATION

The Corporation under other contracts shall have arranged for the supply and delivery of the prestressed concrete main line pipe and fittings and for the valves 6" and larger shown on the drawings, together with bolts, nuts and gaskets for those valves, and all victaulic couplings as detailed on the drawings.



CONCRETE

Clause

Section 1212.01 GENERAL REQUIREMENTS

The Contractor shall furnish and install all concrete work complete, including reinforcing steel, as specified herein and as shown on the contract drawings. This section of the specifications is intended to cover all concrete work with the exception of the reinforced concrete pipe. All concrete shall be transit mixed; job mixing will only be permitted by special permission of the Engineer.

12.02 MATERIALS

All cement used shall be alkali-resisting and shall be Kalicrete as manufactured by Canada Cement Company or approved equal. Certified mill tests shall be furnished for all cement at least two days prior to commencement of the work.

All fine and coarse aggregate shall conform to the current A.S.T.M. "Standard Specifications for Concrete Aggregate", A.S.T.M. Designation C-33, except that slag aggregate shall not be used. The maximum size of the aggregate shall be as specified in the current A.C.I. "Building Code for Reinforced Concrete", but shall in no case exceed the limits hereinafter outlined under Section 12.04.

Water used in mixing concrete shall be clean, and free from injurious amounts of oil, acids, alkalis, organic materials or other deleterious substances.

Reinforcing bars shall conform to the requirements of the latest "Standard Specifications for Billet-Steel Bars for Concrete Reinforcement" A.S.T.M. Designation A-15 of Intermediate grade. Deformation on deformed bars shall conform to the latest "Standard Specification for Minimum Requirements for the Deformation on Deformed Bars for Concrete Reinforcement", A.S.T.M. Designation A-305. All bars shall be new, clean stock, free from loose rust, scale, paint or coating of any kind. No welded or secondhand bars shall be used. Air entraining admixtures used in concrete mixtures shall conform to the current A.S.T.M. Specification C-260.

12.03 STORAGE OF MATERIALS

Concrete, cement, aggregates and reinforcing steel shall be transported and/or stored in such a manner as to prevent deterioration or intrusion of foreign matter. Reinforcing bars shall be stored on racks and not on the ground. Any material which has deteriorated or which has been damaged shall not be used in concrete work.

12.04 CONCRETE QUALITY AND STRENGTH

All materials used shall be subject to laboratory inspection and testing and shall conform to the current A.S.T.M. Specifications in regard to their acceptance. The mixing and proportioning of water, cement and aggregates shall be in accordance with the practice and the current A.S.T.M. "Specifications for Ready Mixed Concrete", A.S.T.M. Designation C-94.

All concrete shall have the following requirements:

<u>Portion of Structure</u>	<u>Minimum Compressive Strength at 28 Days psi</u>	<u>Maximum Size of Aggregate Based on Sq. Openings in.</u>	<u>Minimum Sacks of Cement/ cu.yd.</u>	<u>Maximum Allowable Slump (ins)</u>
Monolithic Sewer	3,000	1-1/2"	6	5
Manhole Grout	5,000	3/8"	8	2
Structures	3,000	3/4"	6	3
Pipe cradles, skin coats, concrete backing around the pipe, buttresses, anchors	2,500	1-1/2"	5	4
All other concrete	3,000	3/4"	6	3

12.05 CONCRETE TESTING

During the progress of the work, compression test specimens shall be made and cured in accordance with the latest "Standard Method of Making and Curing Compression and Flexure Tests Specimens in the Field", A.S.T.M. Designation C-31. No less than two test cylinders shall be taken by the Engineer at any time. Specimens shall be cured under laboratory conditions except that, when, in the opinion of the Engineer, there is a possibility of the surrounding air temperature falling below 40°F, he may require additional specimens to be cured under job conditions.

Specimens shall be tested in accordance with the latest "Standard Method of Test for Compressive Strength of Molded Concrete Cylinders", A.S.T.M. Designation C-39. The cost of making tests of the samples will be borne by the Corporation, but the Contractor shall furnish paraffined cylinder forms closed at one end, and shall assist the Engineer in obtaining samples and moving the cylinders about the job site. The Contractor shall also furnish a curing box for the storage of concrete test cylinders. All samples shall be taken at the forms and shall be representative of the concrete being poured.

Sample cylinders shall be taken in pairs with one cylinder to be broken after seven days and the other after twenty-eight days.

If the average strength of the laboratory control cylinders for any portion of the works falls below the compressive strengths called for, the Engineer shall have the right to order a change in the proportions of the water content for the remaining portion of the structure.

If the average strength of the job cured cylinders falls below the required strength, the Corporation shall have the right to require conditions of temperature and moisture necessary to secure the required strength and may require tests in accordance with the latest "Standard Methods of Securing, Preparing and Testing Specimens of Hardened Concrete for Compressive and Flexural Strengths", A.S.T.M. Designation C-42, or, order load tests to be made on the portions of the structure so affected. If the concrete poured, after proper curing, still does not reach the required strength and/or the load tests are unsatisfactory, then the Contractor shall remove and rebuild that part of the structure affected at no extra cost to the Corporation.

#### 12.06 FORMING

Forms shall be built true to line and grade, mortar tight, sufficiently rigid to prevent displacement or sagging between supports and to properly withstand action of vibrators. They shall be constructed of wood, steel or other approved materials. All exposed concrete surfaces shall be formed with 3/4" Douglas fir plywood made with waterproof glue and especially manufactured for concrete form work. For unexposed surfaces and rough work, square-edge lumber may be used. By "unexposed" is meant any concrete surface that will not be exposed to view upon completion of the project. All edges shall be square, all sheets uniform in thickness and of such size as to provide as few joints as possible. Joints shall be tight and flush, backed solidly and rendered watertight. The surfaces of all forms shall be absolutely level and smooth.

All form work shall be provided with adequate cleanout openings to permit inspection and easy cleaning after all reinforcement has been placed. Interior and exterior corners shall have a 3/4" minimum fillet or Chamfer strip.

Forms shall be tight so as to prevent the leakage of mortar, or water. They shall be properly braced or tied together by means of tie rods or bolts. The type of tie to be used shall be subject to the approval of the Engineer. Any holes or recesses left in the concrete shall be filled or plugged in a manner satisfactory to the Engineer. No tie shall be used which leaves a hole entirely through the concrete wall. Use of tie wires will not be permitted.

Unless otherwise called for, or unless written instructions to the contrary are given by the Engineer, earth structures shall not be used to form concrete.

#### 12.07 CLEANING OF FORMS

Before placing concrete within the forms they shall be thoroughly cleaned of all shavings, sawdust and debris of every nature. Before re-using, all form surfaces shall be carefully cleaned.

The surface of forms for exposed concrete shall be coated with a non-staining mineral oil.

12.08 FORM OPENINGS

The Contractor shall provide special forms for openings in walls and floors for the installation of pipes, gates, flanges, etc., after the concrete has been poured. All such approved openings shall be provided with a waterstop and keyway in the face of the opening for anchorage of the filling concrete after the installation of pipes, in a water-tight manner. Cement used for the filling concrete shall be Ferrogrout or approved equal.

12.09 STRIPPING FORMS

Forms shall remain in place a sufficient time to allow the concrete to set properly and the Contractor shall assume all responsibility for removal of forms. In no case shall forms be removed until concrete has attained sufficient strength to carry its own weight and the loads upon it with safety. Forms for walls shall not be removed sooner than two days after concreting. The Engineer, however, may, when he deems it advisable, order the forms to remain for a longer time, but his acquiescence in permitting removal of forms shall not relieve the Contractor of his responsibility for same.

Special care shall be taken in stripping forms so as not to break concrete edges. Any portion of concrete damaged while stripping forms may be ordered torn down and recast at the discretion of the Engineer. Upon the removal of forms the Engineer shall be notified by the Contractor. The Engineer, after inspecting the surface newly stripped, will designate how the slightly damaged portions of concrete, if any, may be repaired, or replaced. No freshly stripped surfaces shall be pointed up or touched in any manner before having been inspected by the Engineer.

12.10 PLACING CONCRETE

Prior to the placing of any concrete, the Contractor shall submit for approval his proposed construction schedule, including location of all construction joints. No deviations from this approved schedule shall be permitted except as shall be given in writing by the Engineer.

Concrete shall be conveyed as rapidly as possible from the mixer or truck to the place of final deposit using methods which will prevent the separation or loss of the materials.

Before placing concrete in forms or excavated areas for foundations or footings, they shall be thoroughly cleaned of all loose and foreign material and the forms thoroughly wetted or otherwise treated to prevent adherence of concrete to forms. Chemicals shall not be used to remove ice or foreign materials from the forms.

All water shall be removed from the excavations before concrete is deposited and any flow of water shall be diverted through proper side drains or be removed by other approved methods so as to prevent washing of the freshly deposited concrete.

Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to re-handling or flowing. Concreting shall be carried on at such a rate that the concrete is at all times plastic and flows readily into the spaces between the bars. No concrete that has partially hardened or been contaminated by foreign material shall be deposited on the work, nor shall retempered concrete be used.

When concreting is once started, it shall be carried on as a continuous operation until the placing of the panel or section is completed. Top surfaces shall generally be level. When construction joints are necessary they shall be made in accordance with the section titled Construction Joints below.

#### 12.11 VIBRATING

Vibrating shall be used in the placement of all concrete. Vibration shall be sufficiently intense to cause the concrete to flow or settle readily into place. Form vibrators shall be used when sections are too small for the internal type of vibrator. A sufficient number of vibrators shall be employed so that at the required rate of placement, vibration throughout the entire volume of each layer of concrete and complete compaction are secured. At least one extra vibrator shall be kept on hand at all times for emergencies. Vibration shall not be continued at any one spot to the extent that pools of grout or water are formed. Care shall be taken to avoid any disturbance of concrete which has become too stiff to regain plasticity when vibrated. Vibration shall not be applied directly to steel which extends into partially hardened concrete.

Chuting of concrete will be allowed only as approved by the Engineer. No concrete shall have a free fall of over three (3) feet, and if this height is exceeded, it shall be conveyed in place by approved spouts or chutes.

Such surfaces which are to be finished shall be brought to proper grade, struck off, and finished in a workmanlike manner. No honey-combing, rough spots or protruding stones shall be left exposed. When a section of slab concrete is once placed, it shall be left entirely undisturbed until the concrete is thoroughly hardened.

#### 12.12 CONSTRUCTION JOINTS

Joints not indicated on the plan must be approved by the Engineer and shall be so made and located as to least impair the strength of the structure. For all construction joints including the joining of successive days pours, the Contractor shall provide an approved type of waterstop. Waterstops shall be five inches wide by 3/8 inches thick polyvinyl-chloride Arctic grade Duraseal, Koroseal or approved equal. Waterstops shall be set and spliced in accordance with the manufacturer's recommendations.

Before depositing new concrete on or against concrete that has set, the existing surfaces shall be thoroughly roughened by hammers, and cleaned of laitance, foreign matter and loose particles. The existing surfaces shall be thoroughly wet down, followed by one (1) inch of grout consisting of one part of cement to two parts of sand with sufficient water to produce a mortar consistency. New concrete shall be placed before this grout has obtained its initial set.

#### 12.13 FINISHING CONCRETE

On all surfaces the cavities produced by form ties and all other small pits or openings shall, after inspection by the Engineer, be cleaned of loose particles and thoroughly saturated with water, after which all such cavities, pits, or openings shall be neatly stopped with pointing mortar consisting of cement and fine aggregate mixed in the same proportions as used in the concrete. The mortar shall be mixed in small quantities and shall be used only while plastic.

The top surface of slabs shall be screeded to the proper profile and smoothed with a wood float. Care shall be taken to avoid an excess of water in the concrete and to drain or otherwise promptly remove any water that comes to the surface. Sprinkling or dusting the surface with a dry mixture of cement or sand shall not be permitted.

All surfaces after finishing shall be cured as specified herein.

#### 12.14 CURING OF CONCRETE

Before actual concrete placement begins, the Contractor shall have all equipment needed for adequate curing of the concrete on hand and ready to use.

All concrete shall be adequately protected from injurious action by the sun. Fresh concrete shall be protected from heavy rains, flowing water and mechanical injury. All reinforced concrete shall be kept wet for a period of not less than seven (7) days by covering with water or with an approved water-saturated covering or by means of a commercial membrane curing compound. Where wood forms are left in place for curing, they shall be kept wet at all times to prevent opening at the joints and drying out of the concrete. If a commercial membrane curing compound is to be used, it shall meet the requirements of the A.S.T.M. Specification C-309, shall be approved by the Engineer and applied in strict accordance with the manufacturer's recommendations. The membrane material shall be so applied that the concrete surface is completely coated and sealed at one application.

#### 12.15 COLD WEATHER REQUIREMENTS

The Corporation reserves the right to order all work stopped with the onset of winter weather. When placing concrete at or below a temperature of 40°F or whenever, in the opinion of the Engineer, the atmospheric temperatures will probably fall below this limit within the next

twenty-four (24) hours after placing concrete, all aggregate and water shall be pre-heated and all reinforcement, forms and ground with which the concrete is to come in contact shall be defrosted by means of live steam. No concrete shall be placed on frozen ground.

The Contractor shall have on the job, ready to install adequate equipment for heating the materials and the freshly placed concrete and for enclosing the work so as to maintain a temperature in the enclosure of at least 50°F or greater for a period of five (5) days after placing.

The entire structure shall be enclosed by means of tarpaulins supported on frameworks or by other means approved by the Engineer. Freshly placed concrete and the surrounding air shall be maintained at a temperature of at least 50°F for a period of five (5) days after placing. Within this enclosure, such means of artificial heat shall be provided as will maintain the temperature specified continuously and with a reasonable degree of uniformity in all parts of the enclosure. All exposed concrete surfaces within the heated area shall be wet down with a hose whenever instructions are received from the Engineer to do so.

Heating appliances shall not be placed in such a manner as to endanger form work or expose any area of the concrete to drying out or other injury due to excessive temperatures. The Contractor shall provide adequate fire protection accessible at all times at each location where heating is in progress and shall maintain watchmen or other attendants to keep the heating units in continuous operation.

#### 12.16 CONCRETE PLACING AGAINST EXISTING STRUCTURES

Where new concrete is to be placed against existing concrete, the existing surface shall be thoroughly cleaned to remove loose sand, gravel, dirt, grease and other foreign material. Immediately before pouring the concrete, the existing surfaces shall be thoroughly wetted and horizontal surfaces shall be treated as specified in the clause titled "Construction Joints" in this section, and vertical surfaces shall receive a brush coat of mortar.

Where existing reinforcing steel is to extend into new concrete, it shall be thoroughly cleaned and wire brushed to remove all oil, dirt, rust, scale and other foreign material immediately before new concrete is poured.

#### 12.17 CONTRACTOR'S SHOP DRAWINGS

The Contractor shall furnish for approval the drawings showing his proposed reinforcing details which shall be indicated on suitable erection diagrams. No reinforcing steel shall be manufactured until these detailed drawings have been approved by the Engineer.

12.18 AIR ENTRAINMENT

All concrete shall have a total entrained air content between 4 and 6 percent of the fresh concrete by volume when determined by direct measurement or in accordance with the standard method of test set forth in A.S.T.M. Specification C-138.

Before use, the Contractor shall submit acceptable documentary evidence on the air entraining admixture proposed for use, and which shall show that the material increases durability of the concrete when subjected to freezing and thawing and to corrosion, and further that the material has been used in similar work for not less than 5 years. Only admixtures, which, when added to the concrete mix, will permit reduction of the water-cement ratio, will be approved.

12.19 PLACING REINFORCEMENT

Reinforcing shall be placed at locations as shown on the drawings or as subsequently ordered by the Engineer.

Splices shall provide sufficient lap to transfer the stresses between bars by bond.

Reinforcing shall be adequately supported by means of concrete blocks, chairs, or spacers and secured against displacement during concrete placing. Brick, wood, gypsum, tile or similar materials shall not be used to support the reinforcement.



EXCAVATIONClauseSection 1313.01 GENERAL

The Contractor shall furnish all labor, materials, tools and equipment necessary and shall perform all clearing, grubbing and earthwork as required by the drawings for the completion of all work under the contract as specified herein.

All excavations shall be carried out in accordance with the best rules and methods of construction and provincial and municipal regulations and shall conform with the alignment and grades as shown on the drawings and specifications and as given by the Engineer.

13.02 CLEARING AND GRUBBING

Trees and brush shall be cleared as directed by the Engineer, on either side of the pipe centreline, piled and burned in accordance with Provincial regulations, as soon as possible, taking all necessary precautions to guard against damage by fire.

No clearing, other than that specifically ordered by the Engineer in writing shall be done on any easement. In any case, damage to existing trees and shrubbery shall be kept to an absolute minimum. Trees and shrubs which are removed without authority shall be replaced with comparable size trees and shrubs by the Contractor at his own expense.

All stumps and roots, whether left from clearing done by the Contractor or by others, shall be grubbed out for a distance of at least 5 ft. on either side of the pipe centreline, and piled and burned with due precautions.

13.03 PIPE TRENCH

The dimensions of trenches for the pipe and appurtenances shall be such as are required to install the various pipe, fittings, vaults, buttresses and anchorages as shown on the drawings and as specified herein.

The width of trench at the top of the pipe shall not be less than 12 inches nor more than 24 inches greater than the outside diameter of the pipe. Additional trench width may be ordered by the Engineer to permit proper tamping and placing of such sheathing and shoring as is required. The Engineer will insist that vertical trench walls be maintained for the entire depth of the trench in built up areas and wherever designated by the Engineer.

Depth of trench shall be such as to permit the pipe to be laid to the grades and elevations shown on the contract drawings. Generally there shall be not less than 7 ft. cover over the top of pipeline. Additional excavation shall be performed in the bottoms and sides of trenches where necessary to permit the necessary handling of pipe and making of joints.

13.04 SHORING

Adequate shoring shall be used on all trenches in accordance with the Manitoba Dept. of Labour regulations. Sufficient shoring shall be used to maintain vertical sides in the trench from one foot above the top of the pipe barrel to the bottom of the trench.

In built up areas sufficient shoring shall be used to maintain a vertical trench wall at all times. In open country, where specifically permitted by the Engineer, the walls of the trench may be sloped and maintained to slopes of 1.1 or less steep.

The Contractor shall be responsible for the sufficiency of sheeting and bracing which may be used for any damage to persons and property or to the work resulting from the improper placing, maintaining or removal of sheeting, shoring and bracing.

The neglect, failure or refusal of the Engineer to order sheeting and shoring placed in the trench, to order the use of greater quantity, or to order the use of additional struts or stringers, shall not in any way or to any extent relieve the Contractor of any or all of his obligations under this contract.

13.05 TRENCH BOTTOM

The attention of the Contractor is drawn to the fact that an unyielding bottom is essential for the reception of pipe, footings and other structures to be built in place upon the ground, and to the fact that the soil in its natural condition contains a high percentage of moisture which, if allowed to dry out after trimming for the reception of pipe, will cause the soil to crack and shrink, and, after the return of moisture to the soil, cause it to swell with the possibility of subsequent settlement and perhaps damage to pipe, footing or structure. In order to avoid this, the Contractor shall keep the final trimming of such surfaces only just ahead of the laying of pipe and shall keep all prepared surfaces damp, by sprinkling, in such manner as may be directed by the Engineer, until the pipe is in place against such surfaces.

Refer to further instructions under Pipe Bedding.

The bottom of the trench shall be hand cleaned to the desired grade. Any part of the trench excavated below grade line shall be corrected with sand fill, thoroughly compacted. There shall be no obstructions such as boulders etc., along the bottom of the trench and any that occur which would be within 6 inches of the bottom of the pipe shall be removed and replaced with sand.

13.06 DAMAGE TO TRENCH BOTTOM

If, during the progress of the work, and before pipe laying, the natural soil of the trench bottom shall be rendered soft or otherwise allowed to get into a condition not suitable, in the opinion of the Engineer, to receive or to carry the weight of the pipeline and its backfill, the material so injured or condemned shall be removed by the Contractor and replaced with suitable materials acceptable to the Engineer, all at the Contractor's expense.

The Contractor shall be responsible for all settlement of pipe, footings or structures which may be due, in the opinion of the Engineer, to the improper preparation and protection of the trench bottom. The Contractor shall bear all costs of removing, rebuilding and replacing work which may crack or become defective by reason of such neglect, or of failure to properly construct, place and backfill around and over the pipe.

13.07 EXCAVATION IN POOR SOIL

If soil is encountered, which in the opinion of the Engineer, is unsuitable or unsafe for placing the pipe directly thereon, the Contractor shall excavate, remove and dispose of such soil to the extent necessary to provide for the placing of other approved foundation materials such as gravel, or other materials approved by the Engineer. After such unsuitable soil has been removed, the Contractor shall furnish and place materials so as to provide a foundation satisfactory for placing the pipe bed or structure thereon.

Filling with suitable material shall be done in layers not to exceed six (6) inches in thickness and each layer shall be rolled, compacted or otherwise consolidated in such a manner as to provide a solid and compact fill without excessive voids and suitable for placing the pipe bed or structure thereon to the lines and grades shown or established.

Materials so excavated and replaced shall be paid for within the standard vertical lines established at the unit prices for excavation and refill agreed upon before the work commences. No compensation will be allowed for the first six (6) inches of excavation and refill below sub-grade.

However, if foundation materials are rendered unsuitable by the action of the Contractor, he shall provide a foundation satisfactory to the Engineer at his own expense.

The Contractor shall perform such additional excavation in the vicinity of the joints to permit the proper jointing, welding, testing or coating of joints at no additional expense to the Corporation.

13.08 UNAUTHORIZED EXCAVATION

If the bottom or sides of any excavation, against which pipe bedding material or granular backfill has to be placed, be taken out beyond the limits authorized or approved, the resulting space shall be refilled at the Contractor's expense with gravel or with other suitable material, as directed by the Engineer.

The Contractor shall be responsible for the condition of all excavations made by him. All slides and cave-ins shall be removed without extra compensation, at whatever time and under whatever circumstances they may occur.

13.09 REMOVAL OF WATER

The Contractor shall, at all times during the construction of the work and at its completion, for final inspection, provide and maintain ample means and equipment with which promptly to remove and properly dispose of all water entering the excavation or other parts of the work and shall keep such excavations dry until the structures to be built therein are so completed. No concrete shall be placed in water, nor shall water be allowed to rise over, drip on, or flow over freshly placed concrete until the concrete has hardened sufficiently to prevent injury. All water pumped or drained from the work shall be disposed of in a suitable manner without damage to the construction work or to other property, structures or persons. Such drains or outlets as are built as a part of this contract may be used for removal of water, under conditions approved by the Engineer, but such drains or outlets shall be left in a clean and satisfactory condition at the expiration of the contract.

Written permission shall be secured from the Municipal Authority before any water may be disposed of through municipal sewers.

13.10 DISPOSITION OF EXCAVATED MATERIAL

Excess material shall be disposed of as it is excavated by the Contractor. The excavated material shall not be placed so as to cause pressure against uncured concrete, nor as to endanger the safety of nor cause damage to adjacent structures, property, streets, alleys, sidewalks, dykes or railroads. No excavated material shall be hauled from the work over the streets or roads in trucks or other means which allow the material to be dropped or spilled. If any material is dropped or spilled on the streets, it shall be promptly cleaned by the Contractor to the satisfaction of the municipality concerned.

Excess material shall be hauled by the Contractor to a disposal site to be located by the Contractor and approved by the Engineer. The loading of all excavated material and its hauling from the point of loading to the disposal site is to be included in the cost of the work performed under this contract.

The Contractor shall, however, contact the Engineer of the Municipality in which the work is being done and give him the first opportunity of obtaining this fill material at no additional cost to the Corporation.

13.11 COLD WEATHER WORK

Excavation or pipe laying will not be permitted during winter weather except by written permission of the Engineer, and then only to such widths and depths as he may authorize. Every precaution must be taken to prevent frost from penetrating the ground to depths below the foundations during construction. Any pipe, footing or structure laid on frost, which in the opinion of the Engineer shall have been injured through neglect of this provision of the specifications, shall be removed and made good by the Contractor and at the Contractor's expense.

Further, the Corporation reserves the right to order all work stopped whenever, in the opinion of the Engineer, the onset of winter weather is imminent.

No trench shall be left open over winter and the ends of any pipe laid before winter shall be bulkheaded and covered with backfill to prevent the entry of frost.

13.12 CHANGE OF GRADE

Should the Engineer order the grade and/or alignment of the new main altered payment for extra excavation over a depth of 6 inches will be paid for at the unit prices shown on the Schedule of Unit Prices, and, similarly, reductions in the contract price will be made should less excavation result.

PIPE BEDDING & BACKFILLINGSection 14Clause14.01 GENERAL

The Contractor shall furnish all labor, material, tools and equipment necessary to supply, deliver and compact the bedding and backfill for the pipeline, 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 BEDDING

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 than is absolutely necessary.

The pipe bedding material shall be placed in the bottom of the trench and levelled throughout the full width of the trench to the exact grade specified, except at the point of couplings. In the case of asbestos cement pipe, bedding material shall be left clear of the joint for a distance of not more than four (4) coupling lengths until after the pipe has been connected.

In the case of concrete pipe, bedding material shall be left clear of the joint to permit the diaper band to be filled. In the case of steel pipe, bedding material shall be left free of the joint to such a distance as will permit the welding, bolting, inspection, coating and wrapping operations to be completed.

After the connection has been completed, this section shall be properly bedded by thoroughly tamping sand under the joint. Sand shall not be taken from completed portions of the trench for this purpose.

Care shall be taken to ensure that there is just sufficient sand in the trench to bring the pipe bed to the proper grade line. Pipe shall not be lowered into the trench until the pipe bed has been brought to grade. The use of wooden or other blocks or shims for bringing pipe to grade is prohibited.

14.03 BEDDING MATERIAL

A bed of free flowing, well graded sand with 100% passing the  $\frac{1}{2}$ " screen and a maximum of 85% passing the No. 4 Screen shall be carefully placed and thoroughly compacted to a depth of 6" for the full width of the excavated trench.

This material shall be thoroughly compacted and trimmed so as to provide a uniform firm support for the pipe. No concrete, timber or other blocks shall be used to support the pipe but the granular bedding shall be depended upon entirely to hold the pipe to true grade.

14.04 BACKFILL AT PIPE ZONE

As soon as possible after the pipe has been laid, selected granular backfill shall be deposited in the trench simultaneously on both sides of the pipe for the full width of the trench and to an elevation of one foot above the top of the pipe barrel. Selected backfill material shall be sand or pit run gravel containing stones no larger than 2 inches in maximum diameter and with no greater than 85% passing a No. 4 Screen.

This backfill material shall be placed in six (6) inch layers and thoroughly compacted in a manner approved by the Engineer so as to provide solid support for the pipe and the trench wall. Compaction effort and equipment must be compatible with the strength of the pipe and so as to avoid any possible damage to the pipe or to the pipe coating.

14.05 BACKFILL ABOVE PIPE ZONE

On all streets under the jurisdiction of the Metropolitan Corporation of Greater Winnipeg, By-Law No. 31 of the Corporation and the latest amendments thereto shall apply.

Backfill above pipe zone under paved roadways or sidewalks shall conform with the City of Winnipeg By-Law No. 16225 with regard to incompressible fill, or as directed by the authority having jurisdiction over the roadway.

Backfill above pipe zone under unpaved roadways shall comply with requirements of the authority having jurisdiction over the roadway.

Backfill above pipe zone where the pipe passes under unimproved streets or under the boulevard space shall comply with the requirements of the authority having jurisdiction over the roadway.

Backfill above pipe zone where the pipe passes under easements and private property shall comply with the requirements of By-Law No. 31 of the Corporation and the latest amendments thereto, or to the requirements of the owner.

Where mechanical means of consolidating the trench backfill has not been specified by the authority having jurisdiction, the Contractor shall thoroughly saturate the trench with a hose using the following method: Holes of sufficient size to accept the hose, at least two feet in depth, shall be made in the filled trench at twenty (20) foot intervals and through these holes the trench shall be flooded with water. This watering procedure shall be continued for at least two successive days or until the backfill is thoroughly consolidated.

The Contractor shall supply his own hose, and shall arrange with the City or Municipality for the supply of water for this purpose.

After wetting down, the trench shall be refilled to a level of one (1) foot above established street, boulevard or property grade. If, in the opinion of the Engineer, sufficient compaction is not obtained by this method, the Engineer may order a drop hammer or other method to be used to obtain proper consolidation.

14.06 REMOVAL OF CRIBBING

All shoring, bracing and cribbing shall be removed from the trench as backfilling proceeds unless ordered left in place by the Engineer.

If cribbing, shoring, etc., is ordered left in place by the Engineer, it shall be cut off in place at an elevation not less than three (3) feet below grade or as otherwise directed by the Engineer.

14.07 RESTORATION OF SURFACE AND MAINTENANCE PERIOD

Arrangements shall be made by the Contractor with the authority concerned regarding restoration of surfaces, where such surface restoration is not specifically detailed herein. The Contractor will bear the full expense involved in replacing surfaces to the satisfaction of the Engineer.

Furthermore, it shall be the Contractor's responsibility to maintain all surfaces over the pipe trench, including pavement, boulevards, sidewalks etc., until December 31st of the calendar year following so that the effect of a full cycle of seasons has been experienced. Where cut permits relieving the Contractor of this responsibility have not been taken out or have been taken out by the Waterworks & Waste Disposal Division, the Contractor's performance bond shall be held by the Corporation for the length of time specified above.

14.08 CLEANING UP

Upon completion of the work, all rubbish, refuse and unused materials and tools shall be removed promptly from the site. All excavated material, when deposited in its final position, shall be neatly trimmed to the lines and grades given from time to time and shown on the drawings. The entire length of the pipeline shall be left in a neat and orderly condition, free from debris, construction plant and equipment. It shall be the Contractor's responsibility to maintain the site until the expiration of the guarantee period specified herein.



## DETAILED SPECIFICATIONS

## LAYING CONCRETE PIPE

SECTION 15

## Clause

15.01 GENERAL

The Contractor shall furnish all labor, material, tools and equipment necessary to construct the pipeline, 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.

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 ensure 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.

All pipe shall be laid and jointed in accordance with the specifications and with the pipe manufacturer's supplementary directions and to his satisfaction.

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.

15.02 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.

Clause

15.03 HANDLING PIPE

The concrete 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, 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. Another groove shall be provided at the joint to facilitate placing the diaper for pouring the grout in the joint recess. Both these grooves shall be filled after placing of the diaper and removal of the sling using sand, thoroughly compacted.

15.04 JOINTING

Immediately prior to connecting two lengths of concrete pressure pipe, the spigot end of the pipe shall be thoroughly cleaned prior to insertion of the rubber gasket in the spigot groove. The gasket shall then be thoroughly cleaned and then lubricated with a vegetable soap approved by the pipe manufacturer, the consistency of which shall be approximately that of soft No. 2 cup grease. In stretching the gasket, care shall be exercised to maintain a uniform tension or volume of rubber around the whole circumference of the spigot. The bell of the pipe already in place shall be carefully cleaned and lubricated with vegetable soap. The spigot shall then be pushed into the bell and against steel inserts placed between the top of the spigot and the shoulder of the bell to provide a space for inserting the feeler gauge. The entire circumference of the joint shall be gauged to determine that the rubber gasket is in its proper position. If the gasket cannot be felt all around the pipe, the pipe shall be withdrawn and the gasket examined for cuts. If the gasket is undamaged it may be re-used, but only after the bell ring and gasket have been lubricated with soap again, as previously specified, before the pipe is relaid. When it has been determined that the gasket is in its proper position, the steel inserts shall be removed and the pipe pushed completely "home".

The outer joint of the concrete pipe shall be made using diaper bands approved by the pipe manufacturer and shall be made of burlap or other approved porous material. Diaper bands to hold grout in place shall be used as follows: The bands shall be cut or made in such lengths that they will extend completely around the pipe except for 18" to 24" at the top. The wires or band irons supporting the burlap shall be cut into such lengths that they will pass around the pipe with sufficient extra length for the ends to be fastened at the top of the pipe to hold the fabric securely in place, and shall be accurately centered around the lower portion of

the joint. Immediately before pouring cement grout the entire joint shall be thoroughly wetted if required by the Engineer. A cement grout of one part cement to two parts sand shall be poured between the burlap band and the pipe, to ensure a thorough sealing of the joint around the portion of the pipe covered by the band. Silt, slush, water or polluted mortar grout shall be carefully forced out by the pouring and removed. The upper portion of the joint shall then be filled with mortar and a bead made around the outside of the top half of the pipe joint with a sufficient amount of additional mortar. The completed joints shall immediately be protected from the air sun or cold with proper coverings and shall be kept protected for such period as necessary to secure satisfactory curing of the mortar. No backfilling around joints shall be done until the joints have been fully inspected and approved.

The inside joint recess of the concrete pipe sizes 24" and larger shall be completely filled with mortar made from one part cement and one part sand so as to provide a smooth continuous flush surface across the joint.

15.05 BULKHEADING

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

15.06 FREEZING CONDITIONS

If in the opinion of the Engineer the temperature is such that the mortar joints will freeze, the following precautions shall be taken:

The pipe shall be heated throughout with a low heat immediately prior to installation (warm to the touch).

All mortar for joints shall be heated, and heated sand shall be placed around the pipe for a minimum distance of two feet on either side of the joint; all to the satisfaction of the Engineer.

TESTING PIPELINEClauseSection 1717.01 GENERAL

The Contractor shall field test the new pipe installation before connecting to any existing structures. The Engineer shall determine the amount of main to be tested at any one time and reserves the right to separate the testing into several sections in the event of long extensions or for any other reason.

The Contractor shall provide all necessary labor, materials and equipment for the test, including a suitable pump and measuring device, pressure hoses and connection, plugs, caps, gauges and all other apparatus necessary for filling the pipeline, expelling air, pumping to the required test pressure and dewatering the line. Bulkheads to be used for testing shall be of adequate design and construction to withstand the required pressures without causing injury to, or excessive stresses in the pipe. Drawings showing the details of test bulkheads shall be submitted by the Contractor and approved by the Engineer before fabrication. Care shall be taken by the Contractor in bracing and strutting all bulkheads, bends, etc., to prevent movement when pressure is applied. The necessary water for testing and flushing will be supplied by the Corporation from the Chamber located at the beginning of this contract.

17.02 PROCEDURE

The test section of the pipeline shall be filled slowly, taking care to expell all air from the high points. If other means for venting of air are not provided, the Contractor shall, at his own expense, drill and tap small holes for this purpose at the high points. He shall also provide a suitable cock to vent air which can be shut when pressure is applied and after satisfactory completion of the test, he shall remove same and seal the hole by means of a tight fitting plug. Any damage caused to the pipe coating shall be subsequently repaired in an approved manner. The pipeline shall be allowed to stand under pressure for at least twenty-four (24) hours to allow the pipe to absorb moisture before the test period is begun.

After the completion of the preliminaries described above, the Contractor shall proceed to apply pressure to the pipeline using a suitable pump, connected to an approved calibrated water tank. Alternatively, the Contractor may supply a suitable calibrated water meter obtained from the City of Winnipeg Water Department for measuring the amount of leakage.

A test pressure of 150 p.s.i., measured at the lowest point in the pipeline or pipeline section shall be applied by means of a pump connected to the pipe in a satisfactory manner. This pressure shall be maintained for at least four (4) hours.

Careful examination shall be made for leakage. The Contractor, at his own expense, shall do all excavating necessary to locate and repair leaks or other defects which may develop under the test, and shall make all

repairs necessary to secure the required water tightness, after which the test shall be repeated until the pipe under test is found satisfactory to the Engineer. All expense incurred in locating, repairing and back-filling the leaking portions of the pipeline shall be borne by the Contractor.

17.03 PERMISSIBLE LEAKAGE

Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section of it necessary to maintain the specified leakage test pressure after the pipe has been filled with water and air expelled.

Suitable means shall be provided for determining the quantity of water lost by leakage under pressure. No pipe installation will be accepted until or unless this leakage (evaluated on a pressure basis of 150 p.s.i.) is less than 65 U.S. gallons per inch of diameter per mile of pipe, per twenty-four (24) hours. In calculating leakage, the Engineer will make allowances for added joints in the pipeline above those incidental to normal unit lengths of pipe. Steel pipe sections shall be bottle tight.

17.04 COMPLETION OF TEST

Regardless of the rate of leakage, all detectable leaks shall be stopped. After the necessary repairs for correcting any such detectable leak, whether in the pipe or in any of the appurtenances connected thereto, have been satisfactorily completed, the Contractor shall refill the pipeline with water and re-apply the designated test pressure and this process shall be repeated until no further leaks can be detected. After the pipe has successfully met all the test requirements, the entire pipeline shall be filled with water and so maintained until the completion of the contract.

The Contractor shall carefully restore any sections of the pipeline excavated for the purpose of locating leaks to their original condition or to the condition required under the terms of this contract.

17.05 STERILIZATION PROCEDURE

The Contractor shall sterilize the feedermain after the pipe has been laid. The sterilization procedure shall be carried out in accordance with Specification A.W.W.A. C-601-53T "Disinfecting Watermains".

SUPPLY AND DELIVERY OF STEEL PIPESection 18Clause18.01 GENERAL

The General Conditions, together with the following Special Provisions, shall govern the design, manufacture and delivery of the steel pipe required for the Charleswood-Assiniboia Feedermain River Crossing.

18.02 SITE OF WORK

The details of the site of work for the entire contract are outlined in Clause 10.02. The steel pipe section of the River Crossing shall begin on the south bank of the Assiniboine River and extend in a northerly direction across the Assiniboine and shall terminate at a flanged connection extending from a meter pit to be built under this contract.

18.03 SCOPE OF WORK

The work required under this section consists of the design, manufacture, supply and delivery of all the necessary steel pipe and fittings required for the river crossing complete in every respect.

The Contractor shall include in his lump sum price all costs, including Sales Tax, with all charges, governmental or otherwise, paid for the delivery of the pipe as specified herein, or as otherwise directed by the Engineer.

18.04 SCHEDULE OF QUANTITIES

The steel pipe shall be flanged Mill Pipe, 24" O.D, with minimum wall thickness of 3/8", lined and coated as specified, extending from the face of a flange at Station 2+08.10 to the face of a flange at Station 9+49.63.

The pipe shall be in 40 foot lengths except where shorter lengths are required to meet horizontal and vertical deflections.

The lump sum price shall be shown on the Supplementary Schedule of Unit Prices for the design, manufacture, supply and delivery of the pipe and fittings complete as specified in every respect, together with unit prices, which shall be used for additions to or deletions from these quantities.

18.05 DELIVERY

Date of delivery will be an important factor governing the award of this contract. Tenderers shall state in their tenders the earliest firm delivery date that they can promise.

Clause18.06 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, Steel Water Pipe of Sizes up to but not including 30"; C-203-57, Coal Tar Enamel Protective Coating for Steel Water Pipe.

18.07 TYPE OF PIPE

The pipe for the river crossing shall be steel mill pipe 24" O.D. Minimum wall thickness shall be 3/8", and nominal weight 94.62 lbs. per foot (uncoated), conforming to A.W.W.A. Specification C-202-49. Pipe shall be provided with flanges on both ends. The tenderer shall supply mill certificate and heat number for the pipe supplied.

18.08 FLANGES

Pipe shall be provided with flanges on both ends, conforming to A.W.W.A. Specification C-207-55, Class D. End flanges and fittings shall conform in dimensions and drilling to standard A.S.A. B16.1 for Cast Iron Flanges and Flange Fittings Class 125. Flanges shall be installed by or under the direct supervision of the pipe supplier.

18.09 BOLTS, NUTS AND GASKETS

The flanged steel pipe shall be supplied by the Contractor, complete with stainless steel Type 303 bolts and nuts, together with 1/16" thick cloth inserted rubber gasket for the number of flanges supplied, but not including the end flanges.

18.10 SHOP DRAWINGS

From the plan and profile of the proposed pipeline, the Contractor shall prepare a laying schedule for the installation of pipe and fittings, using the plan as a guide. Five copies of these detailed schedules shall be provided to the Engineer for approval prior to the manufacture of any pipe or fittings.

18.11 MARKING

Special marks shall be provided for identification, sufficient to show proper location of the pipe or special in the line by reference to layout drawings and schedules.

18.12 DRAWINGS AND DATA WITH BID

The bidder shall submit with his bid, detailed drawings, specifications and descriptive matter for all steel pipe and fittings.

Clause18.13 EXTERIOR COATING

The steel pipe section 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. Enamel shall be modified to withstand cold temperatures. 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.

18.14 INTERIOR COATING OF STEEL PIPE

The steel pipe section shall be given a tasteless and odorless inside coating of coal tar primer, followed by a hot coat of coal tar enamel in accordance with Specification A.W.W.A. C-203-57.

18.15 TRANSPORTING & HANDLING PIPE

All pipe, and especially 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 pipe or coating. Bare cables, chains, hooks, metal bars or narrow skids shall not be permitted to come in contact with the pipe or 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.

In truck shipments, the pipe shall be supported in wide cradles of suitable padded timbers, hollowed out on the supporting surface to fit the curvature of the pipe, and all chains, cables, and other equipment used in fastening the load must be carefully padded. Rolling the pipe on the coated surface will not be permitted.

Any pipe section that becomes 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.



Clause18.16 LEAKAGE TESTS

After the pipe has been installed, it shall be subjected to a hydrostatic test of 150 p.s.i. in place. The steel pipe section shall be bottletight. The testing of the pipeline shall follow the procedure as outlined in Section 17.

Any pipe which exhibits leakage and defects which, in the Engineer's opinion, is due to faulty manufacture of pipe, shall be replaced at the Contractor's expense and his decision shall be final and binding upon both parties.

18.17 PIPE MANUFACTURERS' EXPERIENCE

All pipe to be supplied under this contract shall be designed and manufactured by a firm having at least five years prior experience in manufacturing this type of pipe.

18.18 EXPERIENCE

All pipe coating shall be done by pipe coating contractor or sub-contractor having had at least five years experience in coating steel pipe of this type and diameter and in this climate.

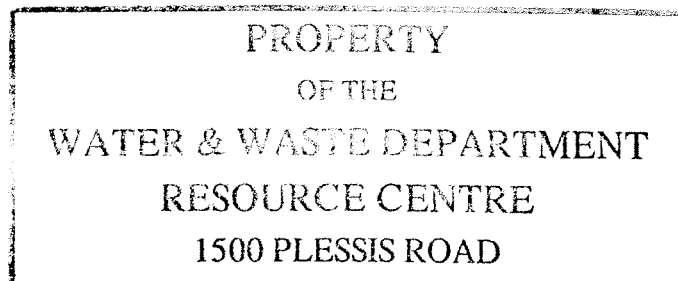
18.19 INSPECTION OF PIPE

The Corporation's Inspector shall carefully examine each length of pipe upon delivery. No pipe shall be accepted where the coating or wall shows cracks that may be harmful.

Any bruised spots on the coating of the steel pipe shall be repaired by hand brushing a thick layer of hot coal tar enamel over the area. Should any long abrasions be discovered on which the wrapping has been completely broken, it shall be necessary to scrape off any damaged coating and wrapping, re-prime the surfaces, then coat the damaged area of the pipe with a sufficient amount of hot enamel. The area should then be covered with bonded, fibrous glass mat and asbestos felt, applied as specified.

18.20 VARIANCE FROM SPECIFICATIONS

Each tenderer shall, in his tender, either state that his pipe fully complies with these specifications or list the variance of his pipe from these specifications. Tenderers shall complete and sign attached form.



Section 19

Clause

19.01 GENERAL

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

All foregoing sections of these specifications shall also apply to the Assiniboine River Crossing section of this contract. In addition to the requirements of these foregoing sections, the following sections shall also apply, specifically:

19.02 METHOD OF DOING THE WORK

Refer to Clause 11.22.

The Corporation requires that the Contractor furnish with his tender an outline of his proposal for installing the pipe in the river. Subsequent to the award of a contract, the Contractor will be required to furnish a more detailed account of his proposed construction method and approval of this proposed method by the Corporation must be secured before construction commences. Generally, the Contractor will be permitted to follow any reasonable method of construction, provided that it results in the pipe being safely installed in the river bed with a minimum of one (1) foot of cover over the pipe at all locations.

Any plan or method of work suggested by the Engineer, or any other representative of the Corporation, to the Contractor, if adopted or followed by the Contractor in whole or in part, shall be used at the risk and responsibility of the Contractor, and the Engineer will assume no responsibility therefor.

19.03 RIGHT-OF-WAY

No easements are required for the construction of this feedermain.

Clearing and grubbing on both sides of the river shall be done only after securing the written permission of the Engineer. The Contractor shall exercise caution in working around private property 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 or other structures on or near the site of the work.

19.04 SOUNDINGS

See Clause 2.10.

The plans show the elevation of ground and the bottom of the river as obtained from 1964 surveys. The Contractor's attention is drawn to the fact that the bottom of the river and the banks may not be stable at all points. Therefore, the Corporation cannot guarantee the accuracy of the profile shown.

Clause

The Contractor shall make such further soundings or borings or surveys at his own expense as he sees fit, to assure himself as to the conditions under which the work will be done.

19.05 BANK IMPROVEMENT

The Contractor shall grade both banks of the Assiniboine River within the minimum limits shown on the drawings. This work shall be done carefully so as to keep disturbances to adjoining ground and trees to a minimum.

The area of bank improvement shall be carefully trimmed, seeded and left in a neat and orderly condition.

19.06 MATERIAL TO BE SUPPLIED BY CORPORATION

Refer to Clause 10.05.

19.07 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 becomes 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.

19.08 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.

The Contractor shall make any additional bends required to fit the pipe to the river bed contour encountered in construction. The pipe shall be carefully cut and mitred so as to reduce the damage to the inside coating of the pipe to the minimum. Welding shall conform to the requirements of A.W.W.A. Specification C-206-57 "Field Welding of Steel Water Pipe Bends". Following re-welding, the inside coating of the pipe which has been damaged shall be repaired, using tasteless and odorless coal tar primer, followed by hot coal tar enamel.

Clause

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. After joints are welded, the pipe shall be primed with coal tar enamel and given a double wrap of fibrous glass mat and asbestos felt so as to comprise a coating as follows:

- (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 entire pipe length shall be tested with a "holiday" tester provided by the Contractor before lowering into the trench, and all defects found shall be satisfactorily repaired by and at the expense of the Contractor.

19.09 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. At no point shall the cover be less than one (1) foot. Bedding material shall consist of 3/4" crushed stone.

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 there will be at least one (1) foot of cover over the pipe at all points when backfilled.

19.10 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.

Anchor blocks shall be placed around the pipe as 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.

19.11 TESTING PIPE LAID UNDER WATER

Before backfilling the trench around the pipe, the Contractor shall test the entire length 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 150 p.s.i. and this pressure shall be maintained for a period of at least four hours. The line shall be bottletight. If the line is not tight, the Contractor shall take whatever steps are necessary to furnish a watertight crossing.

19.12 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.

19.13 TRENCHING ON LAND

See Clause 13.03.

The trenches shall be excavated to the alignment and depth required on land only so far in advance of pipe laying as the Engineer shall permit. The trench shall be so braced and drained that workmen may work therein safely and efficiently. The trench width shall be as narrow as practicable to permit the pipe to be laid properly and the backfill to be placed and compacted properly. Vertical sides are desired where the nature of the excavated material and depth trench will permit. The maximum clear width of trench shall not be more than two (2) feet greater than the internal pipe diameter.

The trench shall be excavated to a depth of six (6) inches below specified grade for the steel pipe. The bottom of the trench shall be hand cleaned to the desired grade line. Any part of the trench excavated to more than six (6) inches below grade shall be corrected with sand fill, thoroughly compacted. There shall be no obstructions such as boulders, etc. left along the bottom of the trench.

A bed of sand shall then be placed in the bottom of the trench and levelled throughout the full width of the trench to exact grade specified. The pipe shall then be lowered into the trench and backfilled with sand to a height of one (1) foot above the top of the pipe. Settlement of sand backfill in the trench shall be by means of flooding, puddling, tamping or jetting. Rodding with metal rods will not be permitted. Clay dams shall be provided in the sand backfill as directed by the Engineer. The remaining portion of the trench shall be backfilled with selected clay compacted as specified in Clause 17.05.

The Contractor shall be responsible for settlement of material in the trench until the completion and final acceptance of his contract, and as specified in Clause 17.07.

The Contractor shall dispose of all excavated material that cannot be replaced in the trench.

All surplus materials shall be so deposited that they will not interfere with free drainage.

MISCELLANEOUS CONSTRUCTION ITEMSSection 20Clause20.01 GENERAL

The Contractor shall furnish all material, labor, tools and equipment necessary and shall perform all miscellaneous construction as required by the drawings and for the completion of all work under the contract and as specified herein. Note Clause 10.05 for material to be furnished by others.

20.02 VALVES BY CORPORATION

The Corporation will have under other contracts arranged for the supply and delivery of all mainline and off-take valves 6" in size and larger. Valves 16" in size and larger shall be 125 psi rubber seated butterfly valves with geared operators and hand wheels. These shall be installed at the locations shown on the drawings with shaft horizontal operating stem vertical with hand wheel in place correctly aligned directly beneath a cast iron valve box to be supplied by the Contractor.

The Corporation shall also supply the required victaulic couplings, bolts, nuts and gaskets required to connect these valves to the adjoining pipe. The Contractor shall install these valves at the location shown on the drawings with stems vertical and correctly aligned below cast iron valve boxes to be supplied and installed by the Contractor.

All air release valves will be supplied by the Corporation and installed by the Contractor. All other valves, small fittings and jointing materials required to complete the work shall be supplied and installed by the Contractor in the manner indicated on the plans or as directed by the Engineer.

20.03 SMALL VALVES

The Contractor shall supply all valves required smaller than 6" diameter.

Where flanged valves are indicated, they shall be iron body, bronze trimmed, OSY rising stem gate valves, flanged faced and drilled to American 125# standard with hand wheel turn counter-clockwise to open, rated for 200 psi cold water non-shock Jenkins Fig. 404 or approved equal.

Where threaded valves are indicated, they shall be all bronze gate valves, double disc or solid wedge, rising stem, with hand wheel turn counter-clockwise to open, rated for 200 psi cold water non-shock Jenkins Fig. 470 or approved equal.

20.04 IRON CASTINGS

All iron castings shall be in accordance with the latest standard specification for "Gray Iron Castings" of the A.S.T.M., Designation A-48, Class 30. 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.

20.05 STEEL

Unless otherwise shown or specified, all steel products shall be rolled from new billet steel conforming to the latest specification for "Steel for Bridges and Buildings" A.S.T.M., Designation A-7.

Steel pipe for use in vaults and for vents shall comply with the latest issue of "Standard Specifications for Black and Hot Dipped Zinc Coats (Galvanized Welded and Seamless Steel Pipe for Ordinary Uses)", A.S.T.M. Designation A-120 for Schedule 40 Pipe. In addition to the galvanizing, steel vent pipe below grade shall be given one heavy brush-coat of hot coal tar enamel. Steel pipe flanges shall be in accordance with A.W.W.A. Specification C-207-55 suitable for 125 p.s.i. service.

20.06 CAST IRON PIPE

All cast iron pipe shall be Class 150 cast iron pipe, meeting E.I.C. Standard Specifications. Cast iron fittings shall conform to A.W.W.A. Specifications C-110-52, "American Standard for Short Body Cast Iron Fittings". All flanges shall be faced and drilled to American Standards for 125 lb. service.

20.07 BUTTRESSES AND ANCHORAGE

Buttresses or anchorage shall be placed behind all caps, horizontal and vertical bends and branches where the deflection angle is greater than four (4) degrees 30 minutes. Deflections of less than four (4) degrees 30 minutes shall normally require no anchorage in average soil. If either the deflection or the soil condition requires, in the opinion of the Engineer, additional anchorage shall be provided by the Contractor.

The Contractor's attention is particularly directed to the requirement that the entire face of the excavation against which the buttresses will bear shall be undisturbed earth and shall be flat and at the proper angle with the pipe. No horizontal struts or braces required for trench shoring shall remain in the concrete buttress. Before any concrete is placed the excavation for all buttresses shall be inspected and approved by the Engineer. Note that two types of thrust blocks are shown on the detail drawings.

The lump sum price tendered shall include and cover all thrust blocks as well as all excavation required. The Engineer reserves the right to increase or decrease the number and size of thrust blocks as provided for under the General Conditions.

## 20.08 OFF-TAKES

The Contractor shall install off-takes from the pipeline at the locations shown on the drawings. The Corporation reserves the right to change the locations of these off-takes at any time prior to actual installation of the fittings.

The Contractor shall install the off-take pipe through the wall of valve chambers and install a temporary plywood plug at this time so that the pipe may be extended readily in the future. The Corporation reserves the right to have the Contractor complete the connection to the new or to any existing municipal watermains.

Off-takes shall be backfilled with gravel, thoroughly compacted to an elevation of one (1) foot above the top of the pipe. Above this elevation the material used for backfill shall be placed in accordance with the procedure outlined for backfilling the pipeline itself.

## 20.09 BOLTS, NUTS AND GASKETS

The Contractor shall supply all bolts, nuts and gaskets not specifically mentioned herein as being supplied by the Corporation. All flanges which are to be installed in chambers shall be provided with carbon steel (A.S.T.M. A-307 Grade B) bolts and nuts, which have been cadmium plated or zinc coated (A.S.T.M. A-123), or rust proofed by some other process disclosed to and acceptable to the Corporation. Where flanges are to be installed underground not in a concrete chamber, flanges shall be connected with stainless steel Type 303 bolts and nuts. Gaskets shall be 1/8" thick cloth-inserted rubber. The bolts, nuts and gaskets will be supplied by the Corporation for material supplied by the Corporation.

## 20.10 VALVE BOXES

The Contractor shall supply and install cast iron valve boxes over each mainline and offtake valve. The boxes shall be firmly supported and maintained centered and plumb, over the wrench nut of the gate valve with the box cover flush with the surface of the finished concrete vault or at such other levels as may be directed by the Engineer. Valve box covers shall be standard Metro Waterworks covers.

## 20.11 SETTING VALVES

All valves shall be set and jointed in a workmanlike manner. Valve stems shall be set plumb unless otherwise shown.

The Contractor shall provide efficient and adequate concrete support for all valves. These shall be so placed that no strain will be placed on the valves and such that the valves may be conveniently disconnected and removed. Building paper should be placed between the valve and the concrete support.

## 20.12 PAINTING

All steel work not enclosed in concrete or specified as galvanized shall be painted. Metal surfaces shall be cleaned thoroughly by wire brushing



and given one coat of Rust-Oleum 769 primer, followed by one coat of Rust Oleum 960 primer, followed by Rust Oleum top coat #432, all coats shall be smoothly and neatly brushed on. Should thinning of paint become necessary, use only thinners recommended by the manufacturer.

#### 20.13 WATERPROOFING

The outside of all concrete chambers shall be given a heavy brush coat of an approved waterproofing material in accordance with the manufacturer's directions prior to backfilling. Backfilling shall be done carefully after the waterproofing material has set-up so as not to pierce the film. Waterproofing is not required where close sheeting is used as the outside form.

#### 20.14 PRECAST SLABS

Where valve chambers, meter pits, etc., are shown on the drawings with precast concrete roof slabs, an approved type of sealer shall be used to completely seal all joints in the roof to prevent the entry of water.

Where chambers are located under municipal streets, the grade at the top of the chamber shall be set below pavement grade. After the fittings are installed in the chamber and the chamber is completed, all joints in the precast panels shall be carefully sealed.

The Contractor shall mark the precast roof slabs in the order in which they can be removed. The markings shall be stencilled in 3" numbers on the flange and web of the steel roof beam and/or 3" typical house numbers fastened to the underside of the removable roof slabs.

#### 20.15 RELAYING WATERMAINS

All watermains requiring relocation or lowering will be relocated or lowered at the Corporation's expense. The cost of repairing, renewing or re-locating house connections, service lines, pit drains or catch basin connections shall be at the Contractor's expense as stated in Clause 5.13.

#### 20.16 GAS MAINS

The drawings show existing gas mains crossing of the pipeline and they are assumed to be of a nominal depth of 4 feet. Should the mains be found by sounding or on exposure, to be at such depths as to interfere with the laying of the feeder main at the grade shown, the Engineer may order the grade and/or alignment of the new main altered to clear the existing gas mains. Payment for extra excavation over a depth of 6 inches will be paid for at the unit prices shown on the Schedule of Unit Prices. Similarly reductions in the contract price will be made should less excavation result.

Alternatively, the Engineer may order the existing gas main relaid. In this case these mains will be relaid by the Gas Company prior to or at the same time as the installation of the new pipeline. The cost of relaying these gas mains, including disconnecting, removing, relaying and reconnecting the new pipe will not be borne by the Contractor. The cost of trenching, backfilling or unshrinkable fill within the limits of the pipe trench for the new feeder main shall be the Contractor's responsibility.

The Contractor shall co-operate with the Gas Company and the Corporation in every way possible in facilitating this work.

20.17 RESTORATION OF DITCHES

All ditches disturbed in any manner by the Contractor shall be graded and restored to their original condition, upon completion of the installation of the feedermain. Ditch grades shall be as determined by the Engineer or by the municipality or authority having jurisdiction over the roadway, and in general, will be as shown on the drawings.

20.18 FLANGE PROTECTION

The Contractor shall coat the metal of all flange assemblies, not in a concrete chamber, with asphalt and cover them with Kalicrete concrete reinforced with light wire mesh to a thickness of not less than 2 inches. For flanges under water, use asphalt coating only.

20.19 PRECAST MANHOLE RISERS

All precast concrete manhole risers shall be rubber gasketed. Rubber gaskets must fit a recessed seat or groove on the spigot. Under no circumstances will gaskets be glued or otherwise fastened to the spigot end of the precast manhole riser sections.

20.20 CUT PERMITS AND EXCAVATION FEES

The work to be carried out will be in the Rural Municipality of Charleswood and the Rural Municipality of Assiniboia.

Cut permits and excavation fees are not required for this Contract.

20.21 BACKFILL ABOVE PIPE ZONE

Mud backfill shall be used above pipe zone for that portion of the feedermain not installed under roadways. See Clause 19.12 for backfill requirements for feedermain installed under water. Compacted gravel backfill shall be used from toe to toe of shoulder slope for the sections of the feedermain installed under roadways.

20.22 SURFACE RESTORATION AND MAINTENANCE PERIOD

The surface restoration and maintenance period requirements for the entire contract are detailed in Clause 14.07 of these specifications. In addition, the following shall apply for the surface restoration in all boulevard areas not requiring sodding.

The entire area shall be uniformly graded with excess excavated material. This area shall then be seeded with the following mixture at the rate of 40 pounds per acre using an approved mechanical seeder:

- 50% Kentucky Blue Grass
- 20% Creeping Red Fescue
- 20% Red Top
- 10% Crested Wheat Grass

Clause

Seeding shall be done in:

- (a) Early Spring
- (b) Last week of August or early September
- (c) After third week in October at the discretion of the Engineer.

20.23 ELECTRICAL WIRING

Refer to Section 16 and Drawing No. C-480 for wiring specifications and Standard Wiring Diagram for Magnetic Flow Meter Pits. A dip service pole will be provided by the Corporation at the specified location.

20.24 POINT OF BEGIN AND DIRECTION OF LAYING

The Contractor shall commence laying pipe on the south bank of the Assiniboine River, as directed by the Engineer, and shall continue laying pipe in a northerly direction to the end of the pipeline.

20.25 PIPE DELIVERY

Prestressed concrete pipe delivery shall begin approximately September 15, 1964. The Contractor may indicate an alternate railway siding other than specified in Clause 10.05 for pipe delivery.

20.26 FEEDERMAIN TESTING

Note Clauses 19.16, 19.11 and Section 18.

The feedermain shall be tested in three separate sections as follows:

- (a) River Crossing Proper: As outlined in Section 19.11
- (b) The Steel Pipeline Section: Shall be tested from the meter pit on the north bank of the Assiniboine River to the face of the flange at the end of the contract on the south bank of the Assiniboine River. The blind flange required for testing shall be supplied by the Contractor.
- (c) Prestressed Concrete Section: Shall be tested from the meter pit to Station 0+00. A spigot bulkhead will be provided by the Corporation and the Contractor shall construct a temporary thrust block for testing purposes at Station 0+00. The temporary thrust block shall be removed by the Contractor upon the successful completion of the testing.

Written By: WSB

Checked By: LET

THE METROPOLITAN CORPORATION OF GREATER WINNIPEG

ADDENDUM NO. 1

Specification W 6-64

Contract No. 200

SUPPLY & INSTALLATION OF PIPE FOR  
CHARLESWOOD ASSINIBOIA RIVER CROSSING

NOTICE TO BIDDERS

This is exhibit " I " referred to  
in the agreement  
between Nelson River Construction  
Company and Metropolitan Corporation of  
Greater Winnipeg dated the 22<sup>nd</sup>  
day of August A. D. 1964

C. G. M.  
B. K.

Please note the following changes, corrections, additions, deletions, information and/or instructions in connection with the work to be done under this contract and submit prices and be governed accordingly. This Addendum shall be incorporated with the specifications and shall form part of the contract documents.

Prices are required from bidders on the following two (2) alternatives, which will be designated Alternate "B" and Alternate "C". The original contract, as modified below, will be known as Alternate "A".

1. Add the following clause to Alternate "A" and "B".

18.21 Elbows - Flanged elbows are required at all vertical and horizontal changes in direction. Straight lengths of pipe with bevelled ends shall not be used

2. The following changes and/or additions apply to Alternate "B"

18.07 Wall thickness revised to  $\frac{1}{4}$ " (.250")  
Nominal weight revised to 63.41 lbs. per foot

18.14 Delete and substitute

- interior coating shall be in accordance with A.W.W.A.  
C-205-62T

- Sec. 2.2

Certified mill tests shall be furnished for all cement prior to commencement of work.

- holdback of mortar from ends of pipe shall be of sufficient length to enable the flanges to be welded to the pipe. Reinforcing steel shall extend the total length of the pipe. Subsequent to the welding of the flanges to the pipe the mortar shall be placed and ground flush with the pipe ends.

- revise all clauses referring to lining under A.W.W.A. Specification C203-57 to read C-205-62T

3. Alternate "C"

- under this alternate, delete Section 18 entirely. The Corporation shall supply all pipe and fittings listed under Section 18. Such pipe will consist of Flanged Cage and Cylinder Concrete Pressure Pipe in accordance with A.W.W.A. C-300. The pipe shall be supplied in 32 ft. lengths were possible and will weigh approximately 356 lbs. per foot.
- installation instructions for this Pressure Pipe are detailed in Section 15 and applicable clauses in Section 19.

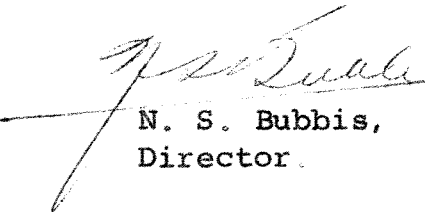
19.10 Delete all anchor blocks from this alternate

- in all clauses, substitute Cage & Cylinder Pressure Pipe where such clauses now read Steel Pipe or Steel Pipeline Section.

4. Form 40-A - indicate on Form 40-A progress schedules for Alternates A, B & C.
5. Delete Form 40-C-1 and substitute Form 40-C-1R
6. Form 40-C-2 delete page one, and substitute Form 40-C-2R.
7. Form 40-C-2 delete page two, and substitute Form 40-C-2R
8. Add a 4" Gas Main located 5.5" south of the north property line of Assiniboine Avenue on Drawing D-1108.

PLEASE STAPLE THIS ADDENDUM TO INSIDE FRONT COVER OF YOUR COPY OF THE SPECIFICATIONS AND DETACH AND RETURN THE ACKNOWLEDGEMENT BELOW.

August 12, 1964.

  
N. S. Bubbis,  
Director.