CITY SUPPLIED EQUIPMENT

1. GENERAL

.1 The City has entered into supply contracts based on the Bid Opportunities described in D23. Installation of City Supplied Equipment is the responsibility of this Contractor.

.2 The City Supplied Equipment will be delivered to and stored at the enclosed and heated City owned warehouse located at 1500 Plessis Road, Winnipeg, Manitoba. The cost for pick-up and delivery of equipment from the City owned warehouse to the jobsite shall be borne by the Contractor.

.3 The form referred to in this section (Form 100) will be initiated by the Supply Contractor to be completed by the Contractor as detailed below.

.4 Prior to accepting any of the equipment to be supplied by a Supply Contractor, the Contractor shall inspect the equipment. A representative from each of the following groups will be in attendance at the time of transfer; the Supply Contractor, Contractor, and Contract Administrator. A duly executed Form 100 – Certification of Equipment Delivery shall be completed. Any minor damage identified during the inspection shall be repaired as per the Supply Contractor's instructions at the Supply Contractor's cost. Any severe damage will be grounds for rejection of the equipment. The severely damaged equipment will be replaced at the Supply Contractor's cost. The Contractor shall accept the equipment and assume risk and responsibility for the equipment and fill out Form 100 – Certificate of Equipment Delivery.

.5 If the Contractor's inspection reveals any deficiencies in the equipment, then these shall be noted in writing prior to the Contractor accepting the equipment. Only deficiencies noted and documented in the foregoing manner will be deemed not the responsibility of the Contractor.

.6 The Contractor shall be responsible for the installation of City Supplied Equipment in addition to all equipment supplied under this Contract. City Supplied Equipment shall be installed in accordance with the Supply Contractor's installation instructions.

.7 For the purposes of Form 100, the Supply Contractor will be the Manufacturer.

.8 Once the Contractor has accepted the equipment, the Contractor shall be responsible for the equipment at the City owned warehouse or any alternative storage location. The Contractor shall ensure that he is fully informed of precautions to be taken in the loading and unloading of equipment and its subsequent storage.

2. INSTALLATION

.1 If necessary, or if so directed by the Contract Administrator during the course of installation, the Contractor shall contact the Manufacturer's representative to receive clarification of installation procedures, direction, or any other additional information necessary to continue or complete the installation in a proper manner.

.2 If it is found necessary, or if so directed by the Contract Administrator, the Contractor shall arrange for the Manufacturer's Representative to visit the site to provide assistance during installation, all at the Contractor's cost.

CERTIFICATE OF EQUIPMENT DELIVERY
FORM 100

We certify that the equipment listed below has been received and delivered into the care of the Contractor. The equipment has been found to be in satisfactory condition. No defects in the equipment were found.

PROJECT: _____

ITEM OF EQUIPMENT: _____

_____

TAG NO: _____

REFERENCE SPECIFICATION: _____

_____ _____
(Authorized Signing Representative of the Contractor) Date

_____ _____
(Authorized Signing Representative of the Manufacturer) Date

_____ _____
(Authorized Signing Representative of the Contract Administrator) Date

END OF SECTION

SUBMITTALS

1. SHOP DRAWINGS

1.1 General

.1 Arrange for the preparation of clearly identified Shop Drawings as specified or as the Contract Administrator may reasonably request. Shop Drawings are to clearly indicate materials, methods of construction, and attachment or anchorage, erection diagrams, connections, explanatory notes, and other information necessary for completion of the Work. Where articles or equipment attach or connect to other articles or equipment, clearly indicate that all such attachments and connections have been properly coordinated, regardless of the trade under which the adjacent articles or equipment will be supplied and installed. Shop Drawings are to indicate their relationship to design Drawings and Specifications. Notify the Contract Administrator of any deviations in Shop Drawings from the requirements of the Contract Documents to allow the Contract Administrator to assess the deviations.

.2 Where all or part of the Shop Drawings are to be prepared under the stamp and seal of a Professional Engineer registered in the Province of Manitoba, the Contract Administrator will limit that review to an assessment of the completeness of the part of the submission so stamped and sealed.

1.2 Submission Requirements

.1 Coordinate each submission with requirements of the Work and Contract Documents. Individual submissions will not be reviewed until all related information is available.

.2 Accompany all submissions with a transmittal letter, in duplicate, containing:

.1 Date

.2 Project title and Bid Opportunity number

.3 Contractor’s name and address

.4 Specification Section number for each submittal

.5 Submittal number and revision number in the following format:

.1 Contract # - Spec Section # - Submittal # - Revision #

.2 The first submittal is numbered 1 with sequential numbering after that for revisions

.6 Identification and quantity of each Shop Drawing product

.7 Other pertinent data

.3 Submissions shall include:

.1 Date and revision dates

.2 Project title and number

.3 Name, email address, and address of:

.1 Contractor

.2 Manufacturer

.4 Contractor's stamp, signed by Contractor's authorized representative, certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

.5 As required in the specifications, the seal and signature of a Professional Engineer registered in the Province of Manitoba.

.4 Details of appropriate portions of work as applicable:

.1 Fabrication

.2 Layout showing dimensions including identified field dimensions and clearances

.3 Setting or erection details

.4 Capacities

.5 Performance characteristics

.6 Standards

.7 Operating weight

1.3 Drawings

.1 Original Drawings or modified standard Drawings provided by the Contractor to illustrate details of portions of Work which are specific to project requirements.

.2 Maximum sheet size: 850 x 1050 mm.

.3 Submit twelve (12) prints and one (1) reproducible copy of Shop Drawings. The Contract Administrator will return the reproducible copy with comments transcribed.

.4 Cross-reference Shop Drawing information to applicable portions of the Contract Documents.

1.4 Product Data

.1 Product Data: Manufacturer’s catalogue sheets, brochures, literature, performance charts, and diagrams used to illustrate standard manufactured products.

.2 Submit twelve (12) copies of product data.

.3 Sheet size: 215 x 280 mm.

1.5 Procedure and Routing

.1 The Contractor shall provide to the Contract Administrator thirteen (13) printed copies of the Shop Drawings and corresponding submittal transmittal form(s) complete with the information specified in 1.3 Submission Requirements.

.2 The Contractor shall simultaneously email the .pdf version of these same Shop Drawings and submittal transmittal forms to the Contract Administrator. The Contractor shall ensure the .pdf version of the Shop Drawings and corresponding submittal transmittal form(s) are identical to the printed copies being distributed for review. When the total size of the email is greater than 5 MB, the Contractor shall post the .pdf version of the Shop Drawings and submittal transmittal form(s) to an accessible place on the internet (provided by the Contract Administrator) and an e-mail notification is to be sent to all parties listed above when posting is complete.

.3 The routing and the names of individuals responsible for receiving submittals will be identified by the Contract Administrator at the pre-construction meeting held pursuant to D3.2.

.4 Upon review of the Shop Drawings, the Contract Administrator will e-mail the .pdf version of the annotated Shop Drawings and corresponding transmittal form(s) to the Contractor. When the total size of the email is greater than 5 MB, the Contract Administrator will post the .pdf version of the Shop Drawings and corresponding transmittal form(s) to the same accessible place on the internet and an e-mail notification will be sent to the Contractor. Two (2) printed copies of the reviewed Shop Drawings will be sent back to the Contractor.

1.6 Shop Drawing Review

.1 Shop Drawing review by the Contract Administrator is solely to ascertain conformance with the general design concept. Responsibility for the approval of detail design inherent in Shop Drawings rests with the Contractor and review by the Contract Administrator shall not imply such approval.

.2 Review by the Contract Administrator shall not relieve the Contractor of his responsibility for errors or omissions in Shop Drawings or for proper completion of the Work in accordance with the Contract Documents.

.3 Shop Drawings will be returned to the Contractor with one of the following notations:

.1 When stamped “REVIEWED”, distribute additional copies as required for execution of the Work.

.2 When stamped “REVIEWED AS MODIFIED”, ensure that all copies for use are modified and distributed, same as specified for “REVIEWED”.

.3 When stamped “REVISE AND RE-SUBMIT”, make the necessary revisions, as indicated, consistent with the Contract Documents and submit again for review.

.4 When stamped "NOT REVIEWED", submit other drawings, brochures, etc., for review consistent with the Contract Documents.

.5 Only Shop Drawings bearing "REVIEWED" or "REVIEWED AS MODIFIED" shall be used on the Work unless otherwise authorized by the Contract Administrator.

.4 After submittals are stamped “REVIEWED” or “REVIEWED AS MODIFIED”, no further revisions are permitted unless re-submitted to the Contract Administrator for further review.

.5 Any adjustments made on Shop Drawings by the Contract Administrator are not intended to change the Contract Price. If it is deemed that such adjustments affect the Contract Price, clearly state as such in writing prior to proceeding with fabrication and installation of Work.

.6 Make changes in Shop Drawings which the Contract Administrator may require consistent with Contract Documents. When re-submitting, notify the Contract Administrator in writing of any revisions other than those requested by the Contract Administrator.

.7 Shop Drawings indicating design requirements not included in the Contract Documents require the seal of a Professional Engineer registered in the Province of Manitoba. If requested, submit engineering calculations for review, sealed by a Professional Engineer.

END OF SECTION

QUALITY CONTROL

1. GENERAL

1.1 Section Includes

.1 Quality assurance requirements

.2 Inspection and testing, administrative and enforcement requirements

.3 Tests and mix designs

.4 Mock-ups

.5 Mill tests

1.2 Precedence

.1 Refer to C:2.

1.3 Related Sections (Not Used)

1.4 References

.1 Unless the edition number and/or date are specified, any reference to the Manufacturer's and published codes, standards and specifications shall mean the latest edition published by the issuing authority, and in effect three (3) Business Days before the Submission Deadline.

.2 Referenced standards and specifications define minimum requirements. Work in quality exceeding these minimum requirements conforms to the Contract.

.3 Any reference to a Manufacturer's direction, instruction, or specification shall be deemed to include full information on storing, handling, preparing, mixing, installing, erecting, applying, or other matters concerning the products pertinent to their use and their relationship to the products with which they are incorporated.

.4 Any reference to regulatory authorities includes all authorities having jurisdiction.

.5 Any reference to a Specification section includes all Drawings and Schedules related to the work of that section.

1.5 Inspection

.1 Refer to C:11.

1.6 Independent Inspection Agencies

.1 Except where inspecting, testing and similar quality control services are specifically indicated to be the Contractor's responsibility, the City will engage Independent Inspection/Testing Agencies for the purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the City.

.2 Where inspecting, testing and similar quality control services are specifically indicated in the Specification Sections as the Contractor's responsibility, the Contractor shall engage appropriate Independent Inspection/Testing Agencies. Cost of such services will be borne by the Contractor.

.3 Where the City has engaged an Inspection/Testing Agency for testing and inspection of a part of the Work and the Contractor is also required to engage an Inspection/Testing Agency for the same or related part of the Work; the Contractor shall not employ the same agency engaged by the City without the prior written approval of the Contract Administrator.

.4 Employment of Inspection/Testing Agencies does not relax responsibility to perform Work in accordance with Contract Documents.

.5 If defects are revealed during inspection and/or testing, appointed agency may require additional inspection and/or testing to ascertain full degree of defect. Regardless of original responsibility, pay costs for additional inspection and testing, retesting, re-inspection.

1.7 Procedures

.1 Refer to C:11.

.2 Submit for the Contract Administrator's approval a written Quality Assurance Plan prior to start of any on site activities. The plan shall include as a minimum:

.1 Contractor's approach and philosophy to QA/QC during construction.

.2 Contractor's method for identification and tracking of all control documents.

.3 Organization chart showing proposed personnel and key contact for QA/QC.

.4 QC Representative and any subordinate experts. Submit resumes for the Contract Administrator's approval.

.5 QC Representative on Site presence and participation in pre-installation, and Subcontractor meetings.

.6 Contractor's bi-weekly QC report, including results of contractor certifications, test results, corrective action and follow-up on any deficiencies in the Project's quality control.

.7 A list of proposed Inspection/Testing Agencies and their qualifications.

.3 The QC Representative shall be:

.1 Independent of the Contractor's Supervisor.

.2 Qualified by experience and training to monitor construction quality.

.3 Responsible for the overall quality assurance of the Contractor's work and compliance with Contract.

.4 Responsible to observe and certify the performance of contractor tests and pre-inspections identified, and to attend meetings on site. The QC Representative may elect to use an alternate expert to observe/certify performance.

.5 Authorized to stop work at any time that quality problems necessitate. This authority shall be delineated in a letter of appointment from a Contractor, and shall be included in the QA Plan.

.4 Notify appropriate agency and the Contract Administrator not less than forty eight (48) hours in advance of requirement for tests, in order that attendance arrangements can be made.

.5 Submit samples and/or materials required for testing, as specified in Specification section. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in Work.

.6 Provide labour and facilities to obtain and handle samples and materials on the Site.

.7 Provide suitable facilities for the storage of specimens or samples at correct temperature, free from vibration or damage in accordance with the instruction of the Inspection/Testing Agency and the governing standard.

1.8 Rejected Work

.1 Refer to C:11.

.2 Make good other Contractor's work damaged by such removals or replacements promptly.

1.9 Reports

.1 For inspecting, testing, and similar quality control services which are the Contractor's responsibility, submit four (4) copies of inspection and test reports to the Contract Administrator, unless specified otherwise.

.2 Each report shall include:

.1 Date of issue

.2 Contract name and number

.3 Name, address and telephone number of Inspection/Testing Agency

.4 Name and signature of inspector and tester

.5 Date of inspection or test

.6 Identification of the product and Specification section covering inspected or tested Work

.7 Location of the inspection or the location from which the tested product was derived

.8 Type of inspection or test

.9 Complete inspection or test data

.10 Test results and an interpretation of test results

.11 Ambient conditions at the time of sample taking and testing

.12 The remarks and observations on compliance with the Contract Documents

.13 Recommendations on retesting or other corrective action where necessary

.14 Signature of a qualified and authorized representative of the Agency

.3 Submit reports within forty eight (48) hours, and notify the Contract Administrator forthwith if the report indicates improper conditions or procedures.

.4 Refer to Specification section for definitive requirements.

1.10 Tests and Mix Designs

.1 Furnish test results and mix designs as specified or reasonably required by the Contract Administrator.

.2 Refer to Specification section for definitive requirements.

1.11 Mock-ups

.1 Prepare mock-ups as identified in Specification sections. Include for Work of all Sections required to provide mock-ups.

.2 Construct in locations as identified in Specification sections or as otherwise approved by the Contract Administrator.

.3 Prepare mock-ups for the Contract Administrator's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in Work.

.4 Failure to prepare mock-ups in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

.5 Specification section identifies whether mock-up may remain as part of Work or if it is to be removed and when.

1.12 Mill Tests

.1 Submit mill test certificates as specified or reasonably required by the Contract Administrator.

.2 Refer to Specification section for definitive requirements.

1.13 Equipment and Systems

.1 Submit adjustment and balancing reports for mechanical, electrical, and other equipment systems.

.2 Refer to Specification section for definitive requirements.

END OF SECTION

MATERIAL AND EQUIPMENT

1. PRODUCTS

1.1 Manufacturer's Directions

.1 Unless otherwise specified, install or erect all products in accordance with Manufacturers' recommendations. Do not rely on labels or enclosures provided with products. Obtain instructions directly from manufacturers.

.2 Notify the Contract Administrator, in writing, of any conflicts between the Specifications and Manufacturers' instructions so that the Contract Administrator may establish the course of action.

.3 Improper installation or erection of products due to failure in complying with these requirements authorizes the Contract Administrator to require any removal and re-installation that may be considered necessary, at no increase in Contract Price.

2. WORKMANSHIP

2.1 Cutting and Remedial Work

.1 Perform all cutting and remedial work that may be required to make the several parts of the Work come together properly. Coordinate and schedule the Work to ensure that cutting and remedial work are kept to a minimum.

.2 Employ specialists familiar with the materials affected in performing cutting and remedial work. Perform in a manner to neither damage nor endanger any portion of the Work.

.3 Do not cut, drill or sleeve any load-bearing members without written acceptance of the Contract Administrator.

.4 The Contractor is to perform work so as to minimize dust.

2.2 Fastenings

.1 Provide metal fastenings and accessories in same texture, colour and finish as adjacent material unless otherwise specified.

.2 Prevent electrolytic action between dissimilar metals and materials.

.3 Use non-corrosive, non-staining fasteners and anchors for securing exterior Work unless otherwise specified.

.4 Space anchors within their load limit or shear capacity and ensure that they provide positive permanent anchorage. Wood plugs are not acceptable.

.5 Keep exposed fastenings to a minimum, space evenly and lay out neatly.

.6 Fastenings which cause spalling or cracking of material to which anchorage is made are not acceptable.

3. MEASUREMENT

3.1 Metric Project

.1 Unless otherwise noted, this Project has been designated and is to be constructed in the SI nominal metric system of measurements.

END OF SECTION

EXCAVATING, TRENCHING AND BACKFILLING

1. GENERAL

1.1 Description

.1 This Section provides the requirements associated with the excavation, trenching and backfilling for utilities.

1.2 References

.1 The following Specifications of the City of Winnipeg Standard Construction Specifications latest edition are applicable to the Work:

.1 CW 2030 Excavation, Bedding and Backfill

.2 Division 3 Standard Details – Underground Works:

.1 SD-001 Standard Pipe Bedding Classes

.2 SD-002 Standard Trench and Excavation Backfill Classes

.3 SD-003 Jetting Nozzle Insertion Locations

.3 Division 3 Approved Products for Underground Works

1.3 Measurement and Payment

.1 Except as specified herein, measurement and payment for excavation, trenching and backfilling will be as specified in CW 2030.

.2 Cement-Stabilized Fill:

.1 Cement-stabilized fill will be measured on a volume basis and paid for at the Contract Unit Price for "Cement-Stabilized Fill". Volume to be paid for will be the total number of cubic metres of cement stabilized fill supplied and placed, including the excavation and disposal of *in-situ* material in accordance with this specification, accepted and measured by the Contract Administrator.

.2 Measurement for cement stabilized fill will be made by calculating the volume of the excavation constructed to receive cement stabilized fill using the method of Average End Areas.

2. PRODUCTS

2.1 Materials

.1 Products shall be as specified in CW 2030.

3. EXECUTION

3.1 General

.1 Protection:

.1 Before starting Work, locate all utilities serving the Site. Notify all agencies or companies having jurisdiction over the specific utilities and protect, relocate, remove, or discontinue service according to their requirements. Any damages shall be repaired at the Contractor's expense.

.2 Protect and restore pavements, boulevards, grassed areas, etc., that may be opened or damaged in the performance of the Work.

.3 During construction, as well as at the completion of the Contract, all roads used to haul materials shall be cleaned of materials dropped on them.

Refer to E10 for work restrictions in the vicinity of water transmission mains or Aqueduct.

.2 Do excavation, trenching and backfill to CW 2030.

.3 Where indicated on the construction drawings, or as directed by the Contract Administrator over excavate the trench sub-grade and replace with cement stabilized fill. Do not lay pipe on cement-stabilized fill until sufficient strength has been attained.

.4 Except as specifically noted on the construction drawings, backfill requirements are as follows:

.1 Class 4 Backfill.

.2 Where trenchless installation is specified, backfill shafts with the class of backfill noted on the construction Drawings.

.3 Stockpile material to be used for backfilling on Site as directed by the Contract Administrator. Excess material is to be disposed of on Site as directed by the Contract Administrator.

.4 All excavated or disturbed areas are to be restored to a condition better than or equal to original.

END OF SECTION

LARGE WATERMAINS

1. GENERAL

1.1 Work Included

.1 The Work included in this Section generally includes, but is not limited to the following items:

.1 Construction of 762 mm diameter supernatant forcemain by open trench methods, from the valve chamber to the 2,134 mm diameter WTP overflow.

1.2 References

.1 Section 02315 – Excavation, Trenching and Backfilling

.2 The following specifications of the City of Winnipeg Standard Construction Specifications latest edition are applicable to the Work:

.1 Division 3 Approved Products for Underground Works

.2 Division 3 Standard Details – Underground Works:

.1 SD-001 Standard Pipe Bedding

.2 SD-002 Standard Trench and Excavation Backfill

.3 SD-003 Jetting Nozzle Insertion Locations

1.3 Standards

.1 Work and materials to be in accordance with the following standards:

.1 NSF

.2 ANSI/AWWA

.1 AWWA M9 Manual, Concrete Pressure Pipe – Manual of Water Supply Practices.

.2 AWWA C301-99, Prestressed Concrete Pressure Pipe, Steel-Cylinder type.

.3 AWWA C304-99, Design of Prestressed Concrete Cylinder Pipe

.4 AWWA C200-97, Steel Water Pipe - 6 in (150 mm) and Larger

.5 AWWA M11, Steel Pipe - A Guide for Design and Installation.

1.4 Measurement and Payment

.1 Supernatant Forcemain:

.1 Supernatant Forcemain installation will be measured on a lump sum basis and paid for at the Contract Unit Price for "Supernatant Forcemain". The lump sum price shall include the installation of the City Supplied prestressed concrete pressure pipe, supply and installation of couplings, excavation, backfill, removal of existing temporary plug and connection to existing stub outside valve chamber.

2. PRODUCTS

2.1 Materials

.1 Prestressed Concrete Pressure Pipe:

.1 Prestressed Concrete Pressure Pipe will be City Supplied through a separate supply contract.

.2 Couplings:

.1 Design pressure 1.0 MPa.

.2 AWWA C219 Bolted Sleeve-Type Couplings:

.1 Minimum sleeve length: 250 mm buried applications; 175 mm within structures.

.2 Capable of accommodating up to 3 degrees deflection with out leakage at up to the design pressure.

.3 Bolts and nuts: 316 Stainless Steel.

.4 Coating and Lining: fusion bonded epoxy coated to AWWA C213, and meeting the requirements of ANSI/NSF 61 "Standard for Drinking Water System Components – Health Effects"

.5 Provide insulating boot where connecting to metal pipe.

.3 Victaulic Dependo-Lok Type ExE Type 2, gasket EPDM for potable water service. 316 Stainless steel or ASTM A36 carbon steel lined and coated to AWWA C213. Capable of accommodating up to 3 degrees deflection with out leakage at up to the design pressure.

.3 Field applied petrolatum tape, coatings including profiling mastic and paste, to AWWA C217. Acceptable products: Polyken, Tec-Wrap or Denso.

.4 Paint:

.1 Paint for exposed metal surfaces shall be in accordance to AWWA C210.

.2 Linings and coatings shall comply with ANSI/NSF 61 "Drinking Water System Components – Heath Effects".

.3 Linings and coatings shall be two (2) or more layers (0.127 mm minimum each coat) polyamide epoxy. Acceptable products: Amerlock 400, Tnemec Series 140F Pota-Pox Plus, Devoe Bar-Rust 233-H or approved equal.

.5 Pipe Bedding and Initial Backfill:

.1 Pipe bedding and initial backfill shall be sand bedding material as specified in Table CW 2030.1.

.6 Backfill Material:

.1 Granular backfill to Table CW 2030.1 Type 1 material.

.2 Cement Stabilized Fill to Table CW 2160.1

3. EXECUTION

3.1 Excavation, Bedding and Backfill

.1 Do excavation, bedding and backfill to CW 2030, except as noted herein.

.2 Pipe bedding and initial backfill shall be sand as specified in Table CW 2030.1.

.3 Backfill remainder of excavation using Class 2 backfill.

.4 Backfill over-excavations adjacent to structures with cement stabilized fill to provide stable foundation for bedding material.

3.2 Installation

.1 Prestressed Concrete Pressure Pipe:

.1 Lay pipes in accordance with AWWA Manual M9 Concrete Pressure Pipe.

.2 Bedding: Type R4 as specified in AWWA M9; minimum thickness 150 mm.

.3 Install pipe by open trench methods.

.4 Lay pipe and fit together so that when complete, the pipe will have a smooth and uniform invert.

.5 Protect exposed end of the pipe with an approved stopper to prevent foreign matter from entering the pipe. The interior of the pipe shall be kept free of all dirt, concrete or superfluous material as the Work proceeds.

.2 Frost Conditions:

.1 No pipe shall be laid upon a foundation into which frost has penetrated, nor at any time when the Contract Administrator shall deem that there is danger of the formation of ice or the penetration of frost at the bottom of the excavation. Every precaution must be taken to prevent frost from penetrating the ground to depths below the foundations during construction. Any pipe which, in the opinion of the Contract Administrator, shall have been injured through neglect of this provision of the specifications, shall be removed and replaced by the Contractor and at the Contractor's expense.

.2 Heating of the pipe, sand, mortar and gaskets shall commence when the ambient temperature falls below -5°C. The pipe shall be heated throughout with a low heat immediately prior to installation (warm to the touch).

.3 All mortar for joints shall be heated, and heated sand shall be placed around the pipe for the full height of the specified bedding and initial backfill and to at least 600 mm on either side of the joint.

.3 Closures:

.1 Buried pipe closures shall be accurately measured, cut and installed.

.2 All flange and closure assemblies not in valve chambers shall be coated in accordance to AWWA C213 on all exposed metal surfaces. Touch-up trimmed field closures with liquid epoxy in accordance with AWWA C210.

.3 Following the completion of buried flanged or coupled joints prime joint with petrolatum primer. Pack coupler irregularities, around all bolts, sleeves and flanges with profiling mastic in accordance to manufacturer's recommendations. Wrap coupler or flange and all exposed steel pipe completely with tape in accordance to AWWA C217.

END OF SECTION

GRAVITY SEWERS

1. GENERAL

1.1 Work Included

.1 The Work included in this Section generally includes, but is not limited to the following items:

.1 Construction of 2,134 mm diameter WTP overflow and land drainage trunk sewer by open trench and trenchless methods, from the main WTP building to the existing 1,524 mm diameter Deacon drain.

1.2 References

.1 CW 2130 Gravity Sewers

.2 CW 2160 Concrete Underground Structures and Works

.3 Division 3 Standard Details – Underground Works:

.1 SD-001 Standard Pipe Bedding

.2 SD-002 Standard Trench and Excavation Backfill

.3 Division 3 Approved Products for Underground Works

.4 ASTM:

.1 ASTM C14M, Standard Specification for Concrete Sewer, Storm Drain and Culvert Pipe (Metric).

.2 ASTM C76M, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe (Metric).

.3 ASTM C443M, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric).

.4 ASTM D1785, Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120.

.5 ASTM D2467, Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.

.6 ASTM D2564, Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.

.7 ASTM D2855, Standard Specification for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.

.5 CSA International:

.1 CAN/CSA-A257 Series, Standards for Concrete Pipe.

.2 CSA B1800, Plastic Non-pressure Pipe Compendium - B1800 Series (Consists of B181.1, B181.2, B181.3, B181.5, B182.1, B182.2, B182.4, B182.6, B182.7, B182.8 and B182.11).

.1 CSA B182.2, PVC Sewer Pipe and Fittings (PSM Type).

.2 CSA B182.4, Profile PVC Sewer Pipe and Fittings.

.3 CSA B182.11-, Recommended Practice for the Installation of Thermoplastic Drain, Storm, and Sewer Pipe and Fittings.

.3 CSA B137 Series, Thermoplastic Pressure Piping Compendium.

.1 CSA B137.3 Rigid Polyvinyl Chloride (PVC) Pipe for Pressure Applications.

1.3 Submittals

.1 Submit shop drawings in accordance with Section 01300 - Submittals.

.2 Submit proposed method of installation and sequencing for under-crossings.

.3 Submit Shop Drawings for excavation shoring in accordance with CW 2030. Shoring shall be designed and stamped by a Professional Engineer experienced in shoring design and licensed to practice in Province of Manitoba.

.4 Submit Shop Drawings for reinforced concrete pipe layout. Shop drawings shall include laying schedule, indicating standard and non-standard pipe lengths and special fittings required to conform to geometry shown on the Drawings.

.5 Submit Shop Drawings (stamped with the seal of a Professional Engineer) for direct design of reinforced concrete pipe in accordance with Section 01300 – Submittals summarizing all structural analysis and pipe wall design for each unique design section, at least two (2) weeks prior to beginning Work.

.6 Submit reinforcing steel shop drawings and concrete mix design in accordance to CW 2160.

.7 Submit samples in accordance with Section 01300 - Submittals.

.8 Submit manufacturer's test data and certification at least two (2) weeks prior to beginning Work.

.9 Submit to Contract Administrator copy of manufacturer's installation instructions.

.10 Submit shoring and excavation plans of the 2,134 WTP Overflow pipe crossing of the electrical duct bank at station 1+179.82, in accordance to Section 01300.

.11 Cast-in-place bends consisting of bevelled pipe and a concrete collar or a formed concrete bend will be permitted in lieu of pre-cast bends. Design of cast-in-place bends shall be the responsibility of the Contractor, and shall be designed to be equivalent in strength to the pipeline. Submit details of proposed bends in accordance with Section 01300.

2. PRODUCTS

2.1 Materials

.1 Concrete pipe:

.1 Use only those products listed as Approved Products for Underground Use in the City of Winnipeg found on the City of Winnipeg, Materials Management web site at: http://www.winnipeg.ca/matmgt/spec/ except as noted herein.

.2 Reinforced circular concrete pipe and fittings: to CAN/CSA-A257 and ASTM C76M, strength classification as indicated on the Drawings.

.3 Reinforced concrete pipe shall be designed by direct design methods in accordance with the ASCE Standard Practice fro Concrete Pipe Design (SIDD). The following minimum design requirements shall apply:

.1 Arching coefficients and earth pressure distribution shall be based on a Type 2 Standard installation with positive projection embankment.

.2 Minimum soil density shall be 1920 kg/m^3.

.3 Ground elevation used for design shall be as follows:

.1 238.0 from station 0+999.8 to station 1+070.10.

.2 238.5 from station 1+070.10 to station 1+209.51.

.4 Wall thickness shall conform to ASTM C76 for either a Wall B or Wall C.

.5 Concrete strength and reinforcing steel requirements shall be determined for each section based on the greatest height of cover in that section. The design shall not further be broken down between the sections listed below:

.1 From connection to existing sewer to the first joint immediately downstream of the vertical bend for the Cell 3 Outlet siphon.

.2 Cell 3 Outlet siphon.

.3 From the first joint immediately upstream of the vertical bend for the Cell 3 Outlet siphon to the connection with the WTP overflow.

.6 Minimum live loading requirements shall be based on the equivalent live load due to an AASHTO HS20 design vehicle.

.7 All pipe and fittings shall be designed and constructed to withstand maximum design surface water geodetic elevation of 236.0 m.

.8 Under no circumstances shall the design cross section be less than required to facilitate installation by jacking methods.

.4 Pipe 900 mm in diameter and larger installed by jacking shall be supplied complete with a steel banding plate around the bell end of the pipe. The banding plate shall be manufactured with 14 gauge steel and shall have a width 1.5 times the length of the bell end groove or approved equal.

.2 Formwork, Reinforcing Steel and Concrete:

.1 As per City of Winnipeg CW 2160

.3 Concrete Mix Design:

.1 Concrete Mix Design as per Table CW 2160, Type A mix.

.4 Plastic Pipe:

.1 Use only those products listed as Approved Products for Underground Use in the City of Winnipeg found on the City of Winnipeg, Materials Management web site at: http://www.winnipeg.ca/matmgt/spec/ except as noted herein.

.2 Type PSM PVC: to ASTM D3034 and CSA-B182.2:

.1 Standard Dimensional Ratio (SDR): 35

.3 Schedule 80 PVC distribution piping: to ASTM D1785 and CSA-B137.3

.4 Schedule 80 PVC fittings: to ASTM D2467 and CSA-B137.3

.5 Welding glue: to ASTM D2564: solvent based.

.5 Pipe Bedding and Initial Backfill:

.1 Pipe bedding and initial backfill shall be sand bedding material as specified in Table CW 2030.1.

.6 Backfill Material:

.1 Granular backfill to Table CW 2030.1 Type 2 material

.2 Cement Stabilized Fill to Table CW 2160.1

.7 Joint Mortar:

.1 Portland cement: to CAN/CSA-A3000, Type HS.

.2 Mortar: one part Portland cement to two parts clean sharp sand mixed with minimum amount of water to obtain optimum consistency for use intended. Do not use additives.

3. EXECUTION

3.1 Excavation, Bedding and Backfill

.1 Do excavation, bedding and backfill to CW 2030.

.2 Supply and install excavation shoring adjacent to the Cell 3 outlet pipe.

.3 Supply and install foundation material in shafts for trenchless installations in accordance with CW 2030 Clause 3.7.

.4 All WTP overflow piping installed in a trench, excepting crossing under electrical duct bank, shall be Class IV backfill to CW 2030.

.5 Advise Contract Administrator if unsuitable foundation or trench wall conditions are encountered. Replace unsuitable material with Type 2 granular material compacted to Class II standards.

.6 Supply and install excavation shoring adjacent the electrical duct bank. Shoring shall be installed underneath the duct bank such that the maximum span of unsupported duct bank is 6.0 m at all times during the shoring installation process. Shoring shall be installed tight to the bottom of the duct bank. Once the shoring is in place underneath the duct bank, any void underneath the duct bank and behind the shoring shall be backfilled with sand. The shoring shall extend a sufficient distance from the edge of the duct bank to ensure trench excavation will not undermine the duct bank. The Contractor shall utilize trench shoring, trench excavation shields or other methods to prevent disturbance of the duct bank where pipe installations parallel the duct bank.

.7 The Contractor is advised that the ground along the WTP Overflow route has been previously excavated to an elevation of approximately 230.8 m under the centreline of the pipe, approximately from station 1+130 to 1+170, and tapering up to the pipe invert at approximate stations 1+105 and 1+180. Backfill in this area has been completed by others to an approximate elevation of 234.0 m in the Fall of 2006, and to 236.7 m in 2007. All backfill in this area is stockpiled excavated material from the site, generally classed as silty clay, placed and compacted in lifts generally to 95% SPMDD.

.8 All backfill under the electrical duct bank above the pipe springline shall be Type 2 backfill compacted to Class 2 Standards.

.9 Where final backfill cover over the pipe is less than the typical safe minimum backfill cover over the pipe required before crossing with heavy equipment (typically 1 m or as recommended by the pipe manufacturer), the Contractor shall limit the size of the compaction equipment and construction methods to preclude damage to the pipe during compaction of backfill.

3.2 Trenchless Installation

.1 Trenchless installations under existing pipes shall be installed by jacking methods.

.2 Pipe jacking shall be completed in a manner that minimizes ground movement.

.3 Monitor crossing utilities constantly during construction. Report movement in excess of 3 mm to the Contract Administrator.

.4 Excavation face shall not proceed more than 300 mm in advance of pipe face.

.5 Annulus around pipeline shall not exceed 25 mm.

.6 Dewatering and recharging the Cell 3 outlet pipe shall be completed by City forces prior to and following installation of the siphon piping and will be coordinated by the Contract Administrator.

3.3 Installation in a Trench

.1 Installation to CW 2130.

.2 Piping shall not be installed by jacking methods under the electrical duct bank.

3.4 Field Closures and Cast-in-Place Sewer Fittings

.1 Confirm dimensions and configuration of existing bell and spigot joints prior to construction.

.2 At field closures, accurately cut pipe to required length and geometry as shown on the Drawings. Where assembling adjoining pipes, cut pipe to required length minus bell depth plus 25 mm to permit assembly.

.3 Assemble pipes to line and grade.

.4 Install formwork, reinforcing and concrete collars in accordance with CW 2160.

.5 Grout interior joints smooth.

3.5 Field Testing

.1 Inspection:

.1 The Contractor shall afford the Contract Administrator every facility to access and inspect all Plant to be provided, work to be performed, Materials to be supplied and equipment or machinery to be installed.

.2 Line and Grade:

.1 The pipe shall be installed to the line and grade shown on the Drawings and as set in the field by the Contract Administrator. Vertical variance from grade shall not exceed 25 mm and horizontal variance from line shall not exceed 100 mm. Tees and bends shall be installed to the grades and at the locations shown on the Drawings or where required to connect to existing pipelines.

.3 Joint Testing:

.1 Acceptance testing to confirm the hydrostatic integrity of the joints of the installed pipe shall be carried out by testing each individual joint with an approved testing device in accordance with ASTM C1103, except the test duration shall be 20 seconds. The joint

tester shall be an Air-Loc Cherne Joint Tester or approved equal. Acceptance testing shall be to confirm acceptable joint behaviour at 90 kPa (13 psi) of applied internal pressure and shall be completed once the pipe has been backfilled to the final grade.

.4 Video Inspection:

.1 In accordance to CW 2130 Clause 3.25 and CW 2145.

3.6 Three Edge Bearing Test

.1 The Contract Administrator will randomly select one pipe from the pipe supplied for the sewer installation for a three-edge bearing test in accordance with ASTM C497. Deliver selected pipe to supplier and perform testing to ultimate failure in presence of Contract Administrator. The test is not intended to be a proof of design test.

3.7 Temporary Relocation of Chlorine Solution Line

.1 The chlorine solution line carries a concentrated chlorine solution (approximately 2000 ppm or 0.2% chlorine dissolved in water). Prior to relocation, the solution line shall be thoroughly flushed with non-chlorinated water until all chlorine solution is expelled from the pipeline. Dewatering and flushing of the chlorine solution line shall be completed by City forces and will be coordinated by the Contract Administrator.

.2 The Contractor shall temporarily relocate the chlorine solution line to the east to allow construction of the siphon under the Cell 3 outlet piping. Upon completion of the siphon the chlorine solution line shall be relocated along its original alignment.

.3 Prepare trenches to piping Manufacturer's recommendations and approval of the Contract Administrator. Bedding is to be smooth and level and provide continuous and uniform support.

.4 Install piping in accordance with PVC manufacturer's recommendations. Joints shall be solvent weld throughout. Threaded joints will not be permitted. Make joints in accordance with ASTM D2855, and to manufacturer's recommendations, using both primer and solvent welding cement.

.5 Following each relocation, the chlorine solution line shall be pressure tested with water using existing pumping equipment with the DBPS. The joints shall be left uncovered until pressure tests are completed and system inspected and approved by the Contract Administrator.

4. METHOD OF MEASUREMENT AND BASIS OF PAYMENT

4.1 Supply and Installation of 2134 Sewer in a Trench

.1 Supply and installation of 2134 sewer in a trench shall be in accordance with CW 2130. Cost for relocation of existing catch basins and catch basin leads, removal of existing 1524 sewer piping, coring and connection of 100 drain from Branch II surge tower, relocation of existing 50 drain from VC-6, provision of 250 junctions, provision of temporary access road,

restoration of existing gravel roadway and provision of temporary support for crossing utilities and installation and removal of shoring adjacent to the electrical duct bank shall be included in the price for supply and installation of 2134 sewer.

4.2 Supply and Installation of 2134 Sewer by Trenchless Methods

.1 Supply and installation of 2134 sewer by trenchless methods from station 1+046.67 to station 1+070.10 shall be in accordance with CW 2130. Cost for excavating tunnelling shaft, installation of shoring, and temporary support of crossing utilities shall be included in the price for supply and installation of 2134 sewer.

4.3 Supply and Installation of Sewer Fittings

.1 Supply and installation of pre-cast sewer fittings shall be included in the price for supply and installation of 2134 sewer.

.2 Supply and installation of cast-in-place fittings shall be on a measured for payment on a unit basis and shall be paid for at the Contract Unit Price for "Supply and Installation of Cast-in-Place Sewer Fittings." The price shall be payment for supply and installation of each type in accordance with this Specification, accepted and measured by the Contract Administrator. Payment will be in addition to the payment measured and paid for "Land Drainage Sewers."

.3 Supply and installation of field closures shall be included in the price for supply and installation of 2134 sewer.

4.4 Supply and Installation of Granular Backfill

.1 Supply and installation of granular backfill shall be measured for payment on a volume basis and shall be paid for at the Contract Unit Price for "Supply and Installation of Granular Backfill." The price shall be payment for removal of unsuitable site material and supply and installation of granular backfill.

4.5 Temporary relocation of the Chlorine Solution Line

.1 Relocation of the chlorine solution line shall be measured for payment on a lump sum basis and shall be paid for at the Contract Unit Price for "Temporary Relocation of Chlorine Solution Line." The price shall be payment for the relocation of the chlorine solution line to accommodate construction of the siphon under the Cell 3 outlet and for relocation of the solution line along its original alignment following construction of the siphon. Fifty percent (50%) payment upon relocation of the chlorine solution line to accommodate construction of the siphon under the Cell 3 outlet, including completion of successful pressure test, and one hundred percent (100%) payment upon relocation of the solution line along its original alignment following construction of the siphon including completion of successful pressure test.

END OF SECTION