KGS GROUP
CONSULTING ENGINEERS

Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada

DUNCAIRN DAM REHABILITATION OF THE DOWNSTREAM LOW LEVEL GATE SYSTEM TECHNICAL SPECIFICATIONS

FINAL - REV 2

KGS Group 16-0217-003
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Part 1 General

1.1 SCOPE OF WORK

.1 The Work to be done under the Contract shall consist of replacement of the cast-iron slide gate (control gate), replacement of the existing wall thimble with a custom designed thimble, and installation of gate operating system.

.2 The major components of the Work are as follows:

.1 Removal and replacement of the existing downstream control gate and gate operator with a new cast iron slide gate and gate hoist.

.2 Removal and replacement of the cast-iron thimble with a custom designed steel flow transition thimble.

1.2 DEFINITIONS

.1 When used in this Bid Opportunity:

.1 “Departmental Representative” means Agriculture and Agri-Food Canada or their designated representative.

.2 “Shop Drawings” means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data, including site erection drawings which are to be provided by the Contractor to illustrate details of a portion of the work.

.3 “Manufacturer” is the person, partnership, or corporation responsible for the manufacture and fabrication of equipment provided to the Contractor for the completion of the Work.

.4 “Manufacturer's Representative” is a trained serviceman empowered by the manufacturer to provide installation, testing, and commissioning assistance to the Contractor in his performance of these functions.

1.3 APPLICABLE SPECIFICATIONS AND DRAWINGS

.1 These Specifications shall apply to the Work.

.2 The following are applicable to the Work:

Drawing No.	Drawing Name/Title
16-0217-003_S01	DUNCAIRN DAM PROJECT RIPARIAN OUTLET WORKS REHABILITATION DOWNSTREAM SLIDE GATE REPLACEMENT – EXISTING GENERAL ARRANGEMENT
16-0217-003_S02	DUNCAIRN DAM PROJECT RIPARIAN OUTLET WORKS REHABILITATION DOWNSTREAM SLIDE GATE REPLACEMENT – EXISTING GEOMETRY
16-0217-003_S03	DUNCAIRN DAM PROJECT RIPARIAN OUTLET WORKS REHABILITATION DOWNSTREAM SLIDE GATE REPLACEMENT – GATE, FRAME AND THIMBLE REPLACEMENT

Drawing No.	Drawing Name/Title
16-0217-003_S04	DUNCAIRN DAM PROJECT RIPARIAN OUTLET WORKS REHABILITATION DOWNSTREAM SLIDE GATE REPLACEMENT – GATE, FRAME AND THIMBLE REPLACEMENT
16-0217-003_S05	DUNCAIRN DAM PROJECT RIPARIAN OUTLET WORKS REHABILITATION DOWNSTREAM SLIDE GATE REPLACEMENT – ISOMETRIC VIEW OF NEW STEEL TRANSITION

1.4 USE OF SITE AND FACILITIES

.1 Contractor may place a construction trailer on the Site and store materials in designated areas.

.2 Any blockage or impediment to traffic over the dam shall be arranged with the local RM. Blockages and/or impediments shall be signed and/or provided with barriers, in accordance with Saskatchewan Highways standards.

.3 Make arrangements to provide drinking water for workers as required. There is no potable water available at this site for human consumption or construction.

.4 Provide temporary ventilation and space heat as required during construction period.

.5 Contractor to provide their own power supply for construction purposes.

.6 Provide portable washroom facilities in accordance with legislative requirements.

1.5 REGULATIONS

.1 All Work shall be in full accordance with applicable Codes, Regulations, By-laws, and ordinances.

1.6 PERMITS, FEES AND INSPECTIONS

.1 Apply for all permits, supply all test certificates and pay all fees to authorities having jurisdiction regarding the installation and inspection of the systems installed under this Contract.

1.7 EXISTING CONDITIONS AND OTHER TRADES

.1 Visit the Site to determine existing conditions affecting the Work of this Division.

.2 Examine all drawings and become fully familiar with the Work of other trades in all divisions under this Contract.

.3 Cooperate with other trades. Pay particular attention to the proximity of the Work to electrical cables, control conduits, and utilities. Maintain maximum clear ceiling heights throughout.

1.8 METRIC CONVERSION

.1 All units in this division are expressed in SI units.

.2 Submit all Shop Drawings and maintenance manuals in SI units.

.3 On all submittals (Shop Drawings, etc.) use the same SI units as stated in the Specifications.

1.9 CUTTING AND PATCHING

.1 Provide holes and sleeves, cutting and fitting required for mechanical Work. Relocate improperly located holes and sleeves.

.2 Drill for epoxy anchors, hanger rods, brackets, and supports.

.3 Obtain written approval from the Departmental Representative before cutting or burning structural members.

.4 Patch structure where damaged from equipment installation, improperly located holes etc., using reviewed and approved methods and materials.

1.10 EQUIPMENT PROTECTION AND CLEAN-UP

.1 Protect equipment and materials in storage on-site during and after installation until final acceptance. Leave factory covers in place.

.2 Protect equipment with crates and polyethylene covers until component is required.

1.11 TEMPORARY HEATING AND VENTILATION

.1 Provide temporary heating required during construction period, including attendance, maintenance and fuel.

.2 Construction heaters used inside building must be vented to outside or be non-flameless type. Solid fuel salamanders are not permitted.

.3 Provide temporary heat and ventilation in enclosed areas as required to:

- .1 Facilitate progress of Work.
- .2 Protect Work and products against dampness and cold.
- .3 Prevent moisture condensation on surfaces.
- .4 Provide ambient temperatures and humidity levels for storage, installation and curing of materials.
- .5 Provide adequate ventilation to meet health regulations for safe working environment. A minimum of 6 ACH of continuous ventilation is required in below grade areas.

.4 Maintain temperatures of minimum 10 degrees C in areas where construction is in progress.

.5 Ventilating:

- .1 Prevent accumulations of dust, fumes, mists, vapours or gases in areas occupied during construction.
- .2 Provide local exhaust ventilation to prevent harmful accumulation of hazardous substances into atmosphere of occupied areas.
- .3 Dispose of exhaust materials in manner that will not result in harmful exposure to persons.
- .4 Ventilate storage spaces containing hazardous or volatile materials.
- .5 Continue operation of ventilation and exhaust system for time after cessation of work process to assure removal of harmful contaminants.

.6 Maintain strict supervision of operation of temporary heating and ventilating equipment to:

.1 Conform to applicable codes and standards.

.2 Enforce safe practices.

.3 Prevent abuse of services.

.4 Prevent damage to finishes.

.5 Vent direct-fired combustion units to outside.

.7 Be responsible for damage to Work due to failure in providing adequate heat and protection during construction.

.8 Make good any damage to electrical system caused by use under this Contract.

1.12 TEMPORARY POWER AND LIGHT

.1 Provide temporary power and light as required for temporary pumping, construction power, lighting, and other requirements.

1.13 TEMPORARY COMMUNICATION FACILITIES

.1 Provide and pay for temporary telephone, fax, data hook up, line and equipment necessary for own use.

1.14 FIRE PROTECTION

.1 Provide and maintain temporary fire protection equipment during performance of Work required by insurance companies having jurisdiction and governing codes, regulations and bylaws.

.2 Burning rubbish and construction waste materials is not permitted on site.

1.15 SITE PLAN

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Indicate use of supplemental or other staging area.

.3 Provide construction facilities in order to execute work expeditiously.

.4 Remove from site all such work after use.

1.16 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding and ladders.

1.17 TEMPORARY GUARD RAILS AND BARRICADES

.1 Provide secure, rigid guard rails and barricades around deep excavations, open shafts, open edges of floors and roofs, and any other fall hazards.

.2 Provide rigid guard rails in the existing gate chamber structure where existing guard rails are of insufficient height.

.3 Provide as required by governing authorities.

1.18 AVAILABILITY

.1 Immediately upon signing Contract, review product delivery requirements and anticipate foreseeable supply delays for items. If delays in supply of products are foreseeable, notify the Departmental Representative of such, in order that substitutions or other remedial action may be authorized in ample time to prevent delay in performance of Work.

.2 In event of failure to notify the Departmental Representative at commencement of Work and should it subsequently appear that Work may be delayed for such reason, the Departmental Representative reserves right to substitute more readily available products of similar character, at no increase in Contract Price or Contract Time.

1.19 PROJECT CLEANLINESS

.1 Maintain Work in tidy condition, free from accumulation of waste products and debris from the work.

.2 Remove waste materials from site at daily regularly scheduled times or dispose of as directed by the Departmental Representative. Do not burn waste materials on site.

.3 Remove tools and waste materials on completion of Work, and leave work area in clean and orderly condition.

.4 The Contractor will be responsible to clear snow and ice from access to construction site. Pile snow in designated and approved areas only.

.5 Make arrangements with and obtain permits from authorities having jurisdiction for disposal of waste and debris.

.6 Provide on-site containers if required for collection of waste materials and debris.

.7 Dispose of waste materials and debris off site.

.8 Store volatile waste in covered metal containers, and remove from premises at end of each Working Day.

.9 Provide adequate ventilation during use of volatile or noxious substances.

.10 Clean-up work area as Work progresses.

.11 Use only cleaning materials recommended by manufacturer of surface to be cleaned, and as recommended by cleaning material manufacturer.

.12 Schedule cleaning operations so that resulting dust, debris and other contaminants will not fall on wet, newly painted surfaces.

1.20 CONTRACTOR USE OF PREMISES

.1 Obtain and pay for use of appropriate additional storage or Work areas needed for operations under this Contract.

.2 Repair or replace portions of existing Work which have been altered during construction operations to match existing or adjoining work, as directed by Departmental Representative.

.3 Execute Work with least possible interference or disturbance to building operations, and normal use of premises. Arrange with Departmental Representative to facilitate execution of Work.

.4 Where public safety or gate operation security is reduced by Work, provide temporary means to maintain.

1.21 OFFICES

.1 Subcontractors to provide their own offices as necessary.

.2 Provide a heated, site trailer with electrical service for Contractor and Departmental Representative use. Trailer shall be approximately 300 ft^2 and suitable for hosting site meetings for up to six people. Provide suitable tables, and chairs as required.

1.22 SHOP DRAWINGS

.1 Description

.1 General Requirements

.1 The term ‘shop drawings’ means drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data, including site erection drawings which are to be provided by the Contractor to illustrate details of a portion of the work.

.2 The Contractor shall submit specified shop drawings to the Departmental Representative for review. All submissions must be in metric units. Where data is in imperial units, the correct metric equivalent shall also be on all submissions for Engineering review.

.2 Shop Drawings

.1 Original drawings are to be prepared by Contractor, Subcontractor, supplier, distributor, or manufacturer, which illustrate appropriate portion of work; showing fabrication, layout, setting or erection details as specified in appropriate sections.

.3 Contractor’s Responsibilities

.1 Review shop drawings, product data and samples prior to submission and stamp and sign drawings indicating conformance to the Contract requirements.

.2 Verify:

.1 Field Measurements

.2 Field Construction criteria

.3 Catalogue numbers and similar data

.3 Coordinate each submission with requirements of Work and Contract Documents. Individual shop drawings will not be reviewed until all related drawings are available.

.4 Notify Departmental Representative, in writing at time of submission, of deviations from requirements of Contract Documents.

.5 Responsibility for deviations in submission from requirements of Contract Documents is not relieved by Departmental Representative's review of submission, unless the Departmental Representative gives written acceptance of specified deviations.

.6 Responsibility for errors and omissions in submission is not relieved by the Departmental Representative's review of submittals.

.7 The Contractor shall make any corrections required by the Departmental Representative and shall resubmit the required number of corrected copies of Shop Drawings. The Contractor shall direct specific attention in writing or on resubmitted Shop Drawings to revisions other than the corrections requested by the Departmental Representative on the previous submission.

.8 After Departmental Representative's review and return of copies, distribute copies to sub-trades as required.

.9 Maintain one (1) complete set of reviewed shop drawings, filed by Specification Section Number, at the site of the work for use and reference of the Departmental Representative and Subcontractors.

.4 Submission Requirements

.1 Schedule submissions at least 7 Calendar days before dates reviewed submissions will be needed, and allow for a 7 Calendar day period for review by the Departmental Representative of each individual submission and re-submission, unless noted otherwise in the Contract Documents.

.2 Submit electronic (.pdf) copies of all shop drawings. The Departmental Representative will return an electronically reviewed copy to the Contractor.

.3 Accompany submissions with transmittal letter, containing:

.1 Date

.2 Project title

.3 Contractor's name and address

.4 Number of each shop drawing, product data and sample submitted

.5 Specification Section, Title, Number and Clause

.6 Drawing Number and Detail/ Section Number

.7 Other pertinent data

.4 Submission shall include:

.1 Date and revision dates.

.2 Project title

.3 Name of:

.1 Contractor

.2 Subcontractor

.3 Supplier

.4 Manufacturer

.5 Separate detailer when pertinent

.4 Identification of product of material.

.5 Relation to adjacent structure or materials.

.6 Field dimensions, clearly identified as such.

.7 Specification section name, number and clause number or drawing number and detail/section number.

.8 Applicable standards, such as CSA or CGSB numbers.

.9 Contractor’s stamp, initialled or signed, certifying review of submission, verification of field measurements and compliance with Contract Documents.

.5 Other Considerations

.1 Fabrication, erection, installation or commissioning may require modifications to equipment or systems to conform to the design intent. Revise pertinent shop drawings and resubmit.

.2 Incomplete shop drawing information will be considered as stipulated deductions or the purposes of progress payment certificates.

.3 No delay or cost claims will be allowed that arise because of delays in submission, re-submissions and review of shop drawings.

.2 Measurements and Payment

.1 Preparation and submittal of Shop Drawings shall be considered incidental to the Works of this Contract and no measurement or payment will be made for this item.

1.23 REVIEW

.1 In all instances in the Contract where there is a requirement for review, such reviews shall be conducted in accordance with the following. The Departmental Representative will review the Contractor's documents and return to the Contractor an electronic copy with one of the following notations:

.1 "Submittal Approved": Meaning that there are no comments to the technical and/or drafting aspects of the document and the applicable Work may proceed.

.2 "Submittal Approved as Noted ": Meaning that the applicable Work may proceed with the noted changes incorporated, and that the documents shall be resubmitted for the Departmental Representative’s review.

.3 "Amend and Resubmit": Meaning that the document is technically unacceptable and the applicable Work shall not begin, and that the document shall be resubmitted for the Departmental Representative’s review.

1.24 CLOSEOUT SUBMITTALS

.1 Project Record Documents

.1 Maintain at construction Site, two sets of white prints for record drawing purposes. Mark one set "FIELD DRAWINGS" and use to record initial data when field measurements are made. Mark other set "RECORD DRAWINGS".

.2 Store record drawings in field office apart from other documents used for construction. Maintain record drawings in clean, dry and legible condition. Do not use record drawings for construction purposes.

.3 Record "as-built" information in red ink, accurately and concurrently with construction progress. Do not conceal Work until required information is recorded.

.4 Legibly mark each item to record actual construction, including:

.1 Measured locations of internal utilities and appurtenances, referenced to visible and accessible features of construction.

.2 Changes made by Addendum, Change Order or Field Instruction.

.3 Details not on original Contract Drawings.

.4 References to related shop drawings and modifications.

.5 At completion of project and prior to final inspection, neatly transfer "as-built" notations to second set of white prints and submit to Departmental Representative along with field drawings.

.5 Provide an electronic copy (PDF) of all final shop drawing in an orderly fashion on one CD.

.2 Operation and Maintenance Manuals

.1 Operation and maintenance instructions and technical data to be sufficiently detailed with respect to design elements, construction features, component function, correct installation procedure and maintenance requirements, to permit effective start-up, operation, maintenance, repair, modification, extension and expansion of any portion or feature of installation. Technical data to be in form of approved shop drawings, product data, supplemented by bulletins, component illustrations, exploded views, technical descriptions of items, and parts lists.

.2 Combine operating and maintenance information of various components in binders with the project name identified on the cover. Divide the manual into appropriate sections for the components the information pertains to.

.3 Provide electronic (.Pdf) copies of operating and maintenance manuals to the Departmental Representative for review. Revise initial manual as required by the Departmental Representative prior to final submission.

.3 Warranties and Bonds

.1 Provide warranties and bonds as specified.

.2 Assemble warranties and bonds, executed by each of respective manufacturers, suppliers, and subcontractors.

.3 Provide Table of Contents neatly typed, in orderly sequence. Provide complete information for each item:

.1 Product or work item.

.2 List subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

.3 Date of beginning of warranty or bond.

.4 Duration of warranty or bond.

.5 Proper procedure in case of failure.

.6 Instances which might affect validity of warranty or bond.

.4 Except for items put into use with Departmental Representative's permission, leave date of beginning of time of warranty until Date of Total Performance is determined.

.5 Verify that documents are in proper form, contain full information, and are notarized.

.6 Co-execute submittals when required.

.7 Retain warranties and bonds until time specified for submittal.

.8 Submit with Contractor's Application for Certificate of Total Performance, warranties and bonds as required, executed in duplicate by subcontractors, suppliers, and manufacturers.

.9 For items of Work, where acceptance is delayed materially beyond Date of Total Performance, provide updated submittal within 10 Calendar Days after acceptance, listing date of acceptance as start of warranty period.

1.25 EQUIPMENT INSTALLATION

.1 Intent

.1 This Section describes general requirements for all equipment supplied under the Contract relating to the supervision of installation, testing, operation, and performance verification. The Contractor shall be responsible for the supply, installation, testing, operation, and performance verification of the specified equipment.

.2 Expertise and Responsibility

.1 The Departmental Representative recognizes the expertise of the manufacturer.

.2 Should the Departmental Representative issue a Field Order, Authorization for Contract Change, or Instruction to Change the Work, which would, in the opinion of the Contractor, compromise the success or safety of the Work, then it shall be incumbent on the Contractor to notify in writing the Departmental Representative to this effect within two (2) Calendar Days.

.3 Equipment Delivery

.1 Equipment shall be delivered to the construction Site to the Contractor who shall be responsible for taking delivery, off-loading, and placing into storage of the equipment. Any minor damage identified during inspection of delivered materials shall be repaired as per the manufacturer's recommendations by the Contractor. Any severe damage will be grounds for rejection of the equipment. Severely damaged equipment shall be replaced.

.2 Ten (10) Calendar Days before delivery, notice shall be given to the Departmental Representative so that arrangements for receipt and for inspection can be made. The shipping lists of materials will be carefully checked by the supplier in the presence of the Departmental Representative and the Contractor.

.3 The Contractor shall ensure that he is fully informed of precautions to be taken in the unloading of equipment and its subsequent storage.

.4 Installation Assistance

.1 If necessary, or if so directed by the Departmental Representative during the course of installation, contact the manufacturer to receive clarification of installation procedures, direction, or any other additional information necessary to continue or complete the installation in an appropriate manner.

.2 If it is found necessary, or if so directed by the Departmental Representative, arrange for the manufacturer's representative to visit the Site to provide assistance during installation.

.3 Prior to completing installation, inform the manufacturer and arrange for the attendance at the Site of the manufacturer's representative to verify successful installation.

.4 The manufacturer's representative shall conduct a detailed inspection of the installation including alignment, running clearances, workmanship, and all other items as required ensuring successful operation of the equipment.

.5 The manufacturer's representative shall identify any outstanding deficiencies in the installation.

.6 The deficiencies shall be rectified by the Contractor and the manufacturer's representative will be required to re-inspect the installation.

.5 Operation and Performance Verification

.1 Equipment will be subjected to a demonstration, running test, and performance tests after the installation has been verified and any identified deficiencies have been remedied.

.2 Inform the Departmental Representative at least fourteen (14) Calendar Days in advance of conducting the tests and arrange for the attendance of the manufacturer's representative. The tests may be concurrent with the inspection of satisfactory installation if mutually agreed by the Contractor and the Departmental Representative.

.3 The manufacturer's representative will conduct all necessary checks to equipment and if necessary, advise the Contractor of any further checking, flushing, cleaning, or other Work needed prior to confirming the equipment is ready to run.

.4 Notify the Departmental Representative of readiness to demonstrate the operation of the equipment. The Departmental Representative shall attend, as expeditiously as possible.

.5 With the assistance of the manufacturer's representative, demonstrate that the equipment is properly installed. Alignment, piping connections, etc., will be checked and if appropriate, code certifications provided.

.6 The equipment shall then be run in the dry and shall be satisfactorily verified by cycling the equipment through several start-stop operations. Following satisfactory dry testing, the gatewell shall be watered up and in the wet tests and commissioning of each gate and gate hoist component shall be performed, reviewed, and verified by the Departmental Representative. Operating parameters such as the hoist motor temperature, voltage, current draw, etc., will be checked to ensure that they are within the manufacturer's recommended limits. These shall be documented for future trending.

.7 On satisfactory completion of the dry test demonstration, the equipment will be stopped and critical parameters will be rechecked.

.8 In the wet performance tests shall be as specified for each item of equipment or as requested by the Departmental Representative to prove adherence to the requirements listed in the Specification. In the absence of any equipment specific performance testing provided by the manufacturer, the following wet performance testing procedure shall be implemented as a minimum requirement:

.1 If upstream water level in the reservoir is less than El. 805.72 m:

.1 Water up the gatewell and fully open the upstream closure valve. Perform four full gate operation cycles (fully closed to fully opened) with upstream conduit valve opened. Record operating parameters specified in Section 01 00 00 - 1.25.5.6.

.2 Close upstream conduit valve.

.3 Dewater gate well.

.4 The Departmental Representative and the Contractor shall jointly perform a visual inspection of the new downstream gate in closed position. An additional 4 full gate cycles shall be performed with the gate in the dry. (i.e., gatewell dewatered).

.5 If gate operation and installation is approved by the Departmental Representative, the Contractor may demobilize from site.

.6 Contractor shall return to site when water levels are at or above El. 805.72 m and perform four full gate operation cycles with the upstream conduit valve open.

.7 Dewater gate well.

.8 The Departmental Representative and the Contractor shall perform a visual inspection of the new downstream gate in closed position.

.9 If gate operation and installation is approved by the Department Representative, performance testing of the work is considered complete.

.2 If upstream water level is at or above El. 805.72 m:

.1 Water up the gatewell and fully open the upstream closure valve. Perform four full gate operation cycles (fully closed to fully opened) with upstream conduit valve opened. Record operating parameters specified in Section 01 00 00 - 1.25.5.6.

.2 Close upstream conduit valve.

.3 Dewater gate well.

.4 The Departmental Representative and the Contractor shall jointly perform a visual inspection of the new downstream gate in closed position. An additional 4 full gate cycles shall be performed with the gate in the dry. (i.e., gatewell dewatered).

.5 If gate operation and installation is approved by the Departmental Representative, performance testing of the work is considered complete.

.9 Submit the results of the dry and the in-the-wet performance tests to the Departmental Representative, documented in a format acceptable to the Departmental Representative. The Departmental Representative reserves the right to request additional testing. No equipment shall be accepted and handed over to the AAFC prior to the satisfactory completion of the performance tests and receipt of the test reports.

.10 All water, temporary power, heating, or any other ancillary services required to complete the initial demonstration, running test and performance tests are the responsibility of the Contractor.

.11 Should the initial demonstration, running test or performance tests reveal any defects, then those defects shall be promptly rectified and the demonstration, running tests, and/or performance tests shall be repeated to the satisfaction of the Departmental Representative. Additional costs incurred by the Contractor, the Departmental Representative, or AAFC, due to repeat demonstration, running tests, and/or performance tests shall be the responsibility of the Contractor. AAFC reserves the right to operate the equipment while waiting for any defects to be fixed.

1.26 SITE SAFETY AND DANGEROUS WORK CONDITIONS

.1 Contractor shall submit a Site Safety Plan prior to commencing the Work for review by the Departmental Representative which addresses all foreseeable construction risks and which demonstrates that the requirements of this specification and the Saskatchewan Occupational Health and Safety Regulations have been met, particularly requirements associated with Confined Space Entry Work as outline below.

.2 The Contractor shall be aware that the gate chamber is considered a confined space and is subject to the requirements of the “Guidelines for Confined Space Entry Work” as published by the Saskatchewan Occupational Health and Safety (OHS) Regulations, as well as “Z1006-16 – Management of Work in Confined Spaces” published by CSA Group. Where conflict exists between the Saskatchewan provincial regulations and the CSA standard, the more stringent shall apply.

.3 The Contractor shall be aware of the potential hazards that can be encountered in gate chambers, manholes and sewers such as explosive gases, toxic gases (CO_2, CO, H_2S) and oxygen deficiency.

.4 The air in a confined space must be tested before entry and continuously during the time that personnel are inside the space. Equipment for continuous monitoring of gases must be explosion-proof and equipped with an audible alarm. The principal tests are for oxygen deficiency, explosion range and toxic gases. Testing equipment must be calibrated in accordance with manufacturer’s specifications and shall be marked with a calibration sticker indicating the date of last calibration.

.5 The Contractor shall ventilate all confined spaces including underground chambers, tunnels, pipes and shafts as required and approved by the Saskatchewan Occupational Health and Safety Regulations. If no ventilation is supplied, a worker must wear a respirator or supplied air to enter the confined space.

.6 The Departmental Representative may issue a Stop Work Order to the Contractor if the Saskatchewan OHS Regulations and the CSA Management of Work in Confined Spaces standard are not being followed. The Contractor shall not resume his operations until the

Departmental Representative is satisfied the Contractor is following the appropriate procedures. The Contractor shall have no claim for extra time or costs due to the Stop Work Order for not following these safety regulations/standards.

1.27 COLD WEATHER REQUIREMENTS:

.1 Any concrete or cementious grout work required to be carried out when temperatures are below 5°C or anticipated to fall below 5°C within the curing period of 10 days (defined as Cold Weather) shall be subject to the requirements of CSA A23.1-14 Section 7.1.2 Cold Weather Concreting except as modified herein.

.2 Adherence to the requirements of this specification will not relieve the Contractor of the necessity for producing concrete which has not been weakened or injured by frost or freezing, or replacing such damaged Work at no additional cost to the Owner.

.3 All freshly placed concrete or grout shall be protected from the elements and from defacements due to construction operations.

.4 The following are minimum requirements for protecting concrete during and after placement during freezing weather, but mere adherence to these requirements will not relieve the Contractor of the necessity for producing concrete or grout which has not been weakened or injured by frost or freezing, or replacing such damaged Work at no additional cost to the Owner;

.1 Before concrete placement, all ice, snow, and frost shall be completely removed from all formwork, and other surfaces against which concrete or grout shall be placed.

.2 The temperatures of all surfaces which concrete or grout shall be placed against shall be raised above 7°C for a period of twenty-four (24) hours at minimum prior to concreting.

.3 Where concrete Work is to come in contact with the earth, the surface of the earth shall be completely free of frost when concrete is placed thereon.

.4 Concrete aggregates and water shall be heated to not over 80°C. Concrete or grout shall be not less than 20°C or more than 30°C in temperature when deposited.

.5 Concrete or grout that is placed during Cold Weather, or if Cold Weather is anticipated during the 10 day curing period, shall be fully enclosed and the temperature maintained at not less than 20°C for the first five (5) days, nor less than 10°C for an remaining five (5) days of the curing period. The Contractor shall monitor and maintain a record of the temperature within the heated enclosures to confirm these requirements have been maintained.

.6 Heating enclosures shall be strong and wind-proof, well ventilated with heating units so located as to prevent local overheating or drying of the concrete or damage from combustion gases. Only indirect fired heaters will be accepted. Units must be vented outside the enclosure. No direct fired units will be accepted.

.7 Prior to the removal of heated enclosures the concrete or grout shall be within 20°C of the ambient temperature to limit thermal cracking.

.8 The Contractor shall submit to the Departmental Representative the methods of enclosure and frost protection proposed for review.

.9 Should the concrete or grout be exposed to Cold Weather the Departmental Representative shall be notified and Cold Weather Requirementsn shall be reinstated.

.5 Cold weather requirements shall be considered incidental to the Works of this Contract and no measurement or payment will be made for this item.

1.28 ENVIRONMENTAL REQUIREMENTS

.1 The Contractor shall submit an Environmental Protection Plan prior to commencing the Work for review by the Departmental Representative which outlines how the Contractor shall meet or exceed the requirements included in Section 01 35 43 – Environmental Procedures. Work shall not commence until the Departmental Representative has accepted the Environmental Protection Plan.

1.29 SITE FLOW CONTROL

.1 AAFC will close the upstream conduit valve prior to the Contractor commencing work. The Contractor and AAFC will each perform a lock and tagout of the upstream gate.

.2 In order to maintain access to the gate chamber, flow control measures must be in place to maintain dry work conditions during construction. The gate chamber may receive flow of an undetermined amount from leakage in the gate chamber and/or the upstream gate valve as well as from any flows that arise in the conduit downstream of the gate well and gate work area.

.3 The contractor shall install and maintain a cofferdam downstream of the slide gate chamber as required to prevent water in the downstream conduit from flowing back into the gate chamber during construction. Cofferdams constructed downstream of the gate chamber shall not exceed one-half of the pipe diameter as to not restrict flows in case of emergency conditions. The Cofferdam shall maintain a 150 mm (6”) freeboard at all times. Downstream sandbag cofferdams should be constructed with polyethylene sheeting to ensure water-tightness.

.4 The Contractor shall maintain a submersible sump pump in the slide gate chambers to dewater the chambers of potential leakage from the upstream gate valve, gate chamber and downstream cofferdam. All pumping must be discharged downstream of the cofferdam.

.5 Any temporary closures used as part of the work to block air flow at the outfall pipe shall be designed to be easily disconnected from the pipe in case of emergency flow conditions.

.6 Measurement and Payment

.1 Costs for flow control will be considered incidental to Section 05 60 00 - Cast Iron Slide Gates.

1.30 DEMOLITION OF STRUCTURES

.1 Description of Work

.1 The Work required under this section shall include, but is not limited to, the following:

.1 Demolition of existing gate thimble and concrete to specified limits shown on the Drawings.

.2 Removal and disposal of construction debris.

.2 The Work required under this section shall include, but is not limited to, the following:

.1 Removal of existing concrete, performing abrasive saw or diamond wire cutting, demolition, existing equipment to be maintained, demolition and disposal of existing concrete, and clean-up of Work Site in anticipation of new Work for those demolition areas indicated on the drawings.

.3 The work to be done by the Contractor under this Section shall include the furnishing of all superintendence, overhead, labour, materials, equipment, tools, supplies, and all things necessary for and incidental to the satisfactory performance and completion of all Works as described hereinafter.

.2 References

.1 CSA S350-M1980, Code of Practice for Safety in Demolition of Structures.

.2 Saskatchewan Occupational Health and Safety Regulations, and all applicable National, Provincial, and Municipal regulations.

.3 Protection

.1 Prevent damage of existing gates and structure to remain. Provide bracing, shoring as required. Make good any damage caused by the demolition Work.

.2 Take precautions to support affected structures and, if safety of structure being demolished or adjacent structures appears to be endangered, cease operations and notify the Departmental Representative.

.4 Execution

.1 Inspection

.1 Inspect Site with Departmental Representative and verify extent of items for removal, disposal, salvage and items to remain.

.2 Notify and obtain approval of Departmental Representative before starting demolition.

.2 Demolition

.1 Demolish structures to permit construction of new work as indicated.

.2 Remove existing equipment, services, and obstacles where required for refinishing or making good of existing surfaces, and replace as Work progresses.

.3 At end of each day's Work, leave Work in safe condition so that no part is in danger of toppling or falling.

.4 Do not sell or burn materials on Site.

.5 Damage to concrete that is to remain shall be minimized. Concrete shall be demolished by sawcutting and subsequent jackhammering using hand-held breakers or jack hammers (maximum 10 kgs/20 lbs.). Other methods of performing concrete demolition may be submitted for review and approval to the Departmental Representative. The Contractor shall take measures to ensure that the concrete beyond the limits of demolition

is not fractured or shattered. The Contractor shall remove using acceptable methods and replace any concrete which is deemed to be fractured as a result of demolition methods employed by the Contractor. This repair Work shall be performed at no additional cost to the Owner.

.6 After demolition of existing concrete has been completed to the satisfaction of the Departmental Representative, the surfaces shall be pressure-washed with potable water in order to remove any loose debris. The water-debris runoff mix shall be collected and disposed of by the Contractor using approved methods. The water-debris runoff mix shall not be allowed to enter into the downstream body of water.

.3 Demolition Tolerances

.1 All demolition shall be done using equipment and procedure to prevent over-breakage of the existing structure.

.2 Final demolition surfaces must remain locally within (25 mm) of the demolition lines, alignments, or limits shown on the drawings. Demolition beyond the limits shown shall be reviewed by the Departmental Representative. The Contractor shall repair excess demolition to the satisfaction of the Departmental Representative, and at no cost to the Owner where required.

.3 All protrusions into the defined limits of demolition shall be removed if they interfere with the placement and alignment of embedded components or reinforcing steel.

.4 Abrasive Wire and Sawcutting

.1 Areas of demolition shall be delineated from existing concrete that is to remain using either abrasive disc sawcutting, or abrasive wire sawing.

.2 All sawcuts shall be performed straight and normal to the surface being cut, following the locations shown on the drawings, or as directed by the Departmental Representative.

.3 Overruns at the junctions of sawcuts, and mis-starts shall be cleaned and filled with dry patching mortar of matching colour, as directed by the Departmental Representative.

.4 Minimum depths of sawcuts shall be 50 mm (2”) unless otherwise shown on drawings.

.5 Disposal of Demolished Material

.1 The Contractor shall be responsible for removal of debris and waste from the Work area to the location to an appropriate solid waste disposal area approved by the Departmental Representative.

.2 Metal debris, which may include cast-iron slide gates assemblies, and reinforcing steel, shall be removed from Site and disposed of by the Contractor.

.5 Measurement and Payment

.1 Demolition of Structures

.1 Payment for all demolition and removal of existing materials will be measured and paid for at the Contract Lump Sum Price for “Demolition

of Structures", executed in accordance with this specification and accepted by the Departmental Representative.

.2 No payment shall be made for demolition beyond the limits specified, or those otherwise approved by the Departmental Representative. The separation, as necessary of embedded and structural steel shall be considered incidental to the Work. The installation of temporary supports, shoring or hangers shall also be considered incidental to the Work. Sawcutting of concrete and removal of construction debris shall be considered incidental to the Demolition work.

END OF SECTION

Part 1 General

1.1 REFERENCES

.1 Definitions:

.1 Environmental Pollution and Damage: presence of chemical, physical, biological elements or agents which adversely affect human health and welfare; unfavourably alter ecological balances of importance to human life; affect other species of importance to humans; or degrade environment aesthetically, culturally and/or historically.

.2 Environmental Protection: prevention/control of pollution and habitat or environment disruption during construction.

1.2 RELATED REQUIREMENTS

.1 Aquatic Habitat Protection Permit by Agriculture and Agri-Food Canada (attached in Appendix A).

1.3 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:

.1 Adherence to the Environmental Procedures described in this Section will be considered incidental to the Project. The total price for the Project shall be payment in full for all actions, submittals, and tasks described in Section 01 35 43 – Environmental Procedures.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Division 1.

.2 All work shall be in accordance with the Aquatic Habitat Protection Permit produced for this project by Agriculture and Agri-Food Canada.

.3 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for all grouts / resins and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Submit 2 copies of WHMIS MSDS for any hazardous materials.

.4 Before commencing construction activities or delivery of materials to site, submit Environmental Protection Plan for review and approval by Departmental Representative.

.5 Environmental Protection Plan must include comprehensive overview of known or potential environmental issues to be addressed during construction.

.6 Address topics at level of detail commensurate with environmental issue and required construction tasks.

.7 Include in Environmental Protection Plan:

.1 Name of person responsible for ensuring adherence to Environmental Protection Plan.

.2 Name and qualifications of person responsible for manifesting hazardous waste to be removed from site.

.3 Name and qualifications of person responsible for training site personnel.

.4 Descriptions of environmental protection personnel training program.

.5 Drawings indicating locations of proposed temporary cofferdams and water control measures including methods to control runoff and to contain materials on site.

.6 Work area plan showing proposed activity in each portion of area and identifying areas of limited use or non-use.

.1 Plan to include measures for marking limits of use areas and methods for protection of features to be preserved within authorized work areas.

.7 Spill Control Plan to include procedures, instructions, and reports to be used in event of unforeseen spill of regulated substance.

.8 Non-Hazardous solid waste disposal plan identifying methods and locations for solid waste disposal including clearing debris.

.9 Air pollution control plan detailing provisions to assure that dust, debris, materials, and trash, are contained on project site.

.10 Contaminant Prevention Plan identifying potentially hazardous substances to be used on job site; intended actions to prevent introduction of such materials into air, water, or ground; and detailing provisions for compliance with Federal, Provincial, and Municipal laws and regulations for storage and handling of these materials.

.11 Waste Water Management Plan identifying methods and procedures for management of discharge of waste waters which are directly derived from construction activities, such as cleaning demolished areas, concrete curing water, clean-up water, and water used in flushing of lines.

.12 Pesticide treatment plan to be included and updated, as required.

1.5 FIRES

.1 Fires and burning of rubbish on site is not permitted.

1.6 SUSPENDED SEDIMENT

.1 Do not allow water containing suspended materials into the watercourse, sewage, or drainage system.

.2 Control disposal or runoff of water containing suspended materials or other harmful substances in accordance with local authority requirements.

1.7 WORK ADJACENT TO WATERWAYS

.1 Construction equipment to be operated on land or floating barge only.

.2 Waterways to be kept free of waste construction material and debris.

.3 Clean equipment so as to prevent wash water from entering watercourse.

.4 Keep emergency spill kit and copy of spill response plan on site to respond quickly if spills occur.

.5 Maintain vehicles and equipment in good working condition to avoid leaks and spills of hazardous materials. Hydraulic equipment must utilize environmentally friendly hydraulic fluid.

1.8 POLLUTION CONTROL

.1 Maintain temporary pollution control features installed under this Contract.

.2 Control emissions from equipment and plant in accordance with local authorities' emission requirements.

1.9 DISPOSAL OF WASTES

.1 Do not bury rubbish and waste materials on site.

.2 Do not dispose of waste or volatile materials, such as mineral spirits, oil or paint thinner into waterways, storm or sanitary sewers.

1.10 NOTIFICATION

.1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations, permits, and other elements of Contractor's Environmental Protection plan.

.2 Contractor: after receipt of such notice, inform Departmental Representative of proposed corrective action and take such action for approval by Departmental Representative.

.1 Take action only after receipt of written approval by Departmental Representative.

.3 Departmental Representative will issue stop order of work until satisfactory corrective action has been taken.

.4 No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

Part 2 Execution

2.1 CLEANING

.1 Progress Cleaning: clean in accordance with Division 1.

END OF SECTION

Approved: 2006-06-30

Part 1 General

1.1 DESCRIPTION

.1 This specification shall cover the mobilization and demobilization of all construction facilities and associated tasks.

1.2 RELATED REQUIREMENTS

.1 Section 01 00 00 – General Provisions

.2 Section 01 35 43 – Environmental Procedures

1.3 REFERENCE STANDARDS

.1 Canadian Construction Documents Committee (CCDC)

.1 CCDC 2-1994, Stipulated Price Contract.

.2 Latest editions from Canadian Standards Association (CSA International)

.1 CSA-A23.1/A23.2-, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-0121, Douglas Fir Plywood.

.3 CAN/CSA-S269.2, Access Scaffolding for Construction Purposes.

.4 CAN/CSA-Z321, Signs and Symbols for the Occupational Environment.

.3 Public Works Government Services Canada (PSPC) Standard Acquisition Clauses and Conditions (SACC)-ID: R0202D, Title: General Conditions 'C', In Effect as of: May 14, 2004.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Division 1.

1.5 INSTALLATION AND REMOVAL

.1 Prepare site plan indicating proposed location and dimensions of area to be fenced and used by Contractor, number of trailers to be used, avenues of ingress/egress to fenced area and details of fence installation.

.2 Identify areas which have to be gravelled to prevent tracking of mud.

.3 Indicate use of supplemental or other staging area.

.4 Provide construction facilities in order to execute work expeditiously.

.5 Remove from site all such work after use.

1.6 SCAFFOLDING

.1 Scaffolding in accordance with CAN/CSA-S269.2.

.2 Provide and maintain scaffolding, ramps, swing staging, platforms, ladders, and temporary stairs as required.

1.7 HOISTING

.1 Provide, operate and maintain hoists and/or cranes required for moving of workers, materials and equipment. Make financial arrangements with Subcontractors for their use of hoists.

.2 Hoists and/or cranes to be operated by qualified operator.

1.8 SITE STORAGE/LOADING

.1 Refer to CCDC 2, GC 3.12.

.2 Confine work and operations of employees by Contract Documents. Do not unreasonably encumber premises with products.

.3 Do not load or permit to load any part of Work with weight or force that will endanger Work.

1.9 CONSTRUCTION PARKING

.1 Parking will be permitted on site provided it does not disrupt performance of Work.

.2 Provide and maintain adequate access to project site.

1.10 SECURITY

.1 Provide and pay for reasonable security measures to protect the work site and contents of site after working hours and during holidays.

1.11 OFFICES

.1 Provide office heated to 22 degrees C, 750 lx lighted and ventilated, of sufficient size to accommodate site meetings and furnished with drawing laydown table.

.2 Provide marked and fully stocked first-aid case in a readily available location.

.3 Subcontractors to provide their own offices as necessary. Direct location of these offices.

.4 Departmental Representative's Site office.

.1 Provide temporary office for Departmental Representative.

.2 Inside dimensions minimum 3.6 m long x 3 m wide x 2.4 m high, with floor 0.3 m above grade, complete with 4 50% opening windows and one lockable door.

.3 Insulate building and provide heating system to maintain 22 degrees C inside temperature at -20 degrees C outside temperature.

.4 Finish inside walls and ceiling with plywood, hardboard or wallboard and paint in selected colours. Finish floor with 19 mm thick plywood.

.5 Install electrical lighting system to provide min 750 lx using surface mounted, shielded commercial fixtures with 10% upward light component.

.6 Provide private washroom facilities adjacent to office complete with flush or chemical type toilet, lavatory and mirror and maintain supply of paper towels and toilet tissue.

.7 Equip office with 1 x 2 m table, 4 chairs, 2 m of shelving 300 mm wide, one plan rack and one coat rack and shelf.

.8 Maintain in clean condition.

1.12 EQUIPMENT, TOOL AND MATERIALS STORAGE

.1 Provide and maintain, in clean and orderly condition, lockable weatherproof sheds for storage of tools, equipment and materials.

.2 Locate materials not required to be stored in weatherproof sheds on site in manner to cause least interference with work activities.

1.13 SANITARY FACILITIES

.1 Provide sanitary facilities for work force in accordance with governing regulations and ordinances.

.2 Post notices and take precautions as required by local health authorities. Keep area and premises in sanitary condition.

1.14 CONSTRUCTION SIGNAGE

.1 Provide and erect project sign, within three weeks of signing Contract, in a location designated by Departmental Representative.

.2 Indicate on sign name of Owner and Contractor.

.3 No other signs or advertisements, other than warning signs, are permitted on site.

.4 Provide project identification site sign comprising foundation, framing, and 1200 x 2400 mm signboard as detailed and as described below.

.1 Foundations: 15 MPa concrete to CSA-A23.1 minimum 200 mm x 900 mm deep.

.2 Framework and battens: SPF, pressure treated minimum 89 x 89 mm.

.3 Signboard: 19 mm Medium Density Overlaid Douglas Fir Plywood to CSA O121.

.4 Paint: alkyd enamel to CAN/CGSB-1.59 over exterior alkyd primer to CAN/CGSB 1.189.

.5 Fasteners: hot-dip galvanized steel nails and carriage bolts.

.6 Vinyl sign face: printed project identification, self-adhesive, vinyl film overlay, supplied by Departmental Representative.

.5 Locate project identification sign as directed by Departmental Representative and construct as follows:

.1 Build concrete foundation, erect framework, and attach signboard to framing.

.2 Paint surfaces of signboard and framing with one coat primer and two coats enamel. Colour white on signboard face, black on other surfaces.

.3 Apply vinyl sign face overlay to painted signboard face in accordance with installation instruction supplied.

.6 Direct requests for approval to erect Consultant/Contractor signboard to Departmental Representative. For consideration general appearance of Contractor signboard must conform to project identification site sign. Wording in both official languages.

.7 Signs and notices for safety and instruction in both official languages. Graphic symbols to CAN/CSA-Z321.

.8 Maintain approved signs and notices in good condition for duration of project, and dispose of offsite on completion of project or earlier if directed by Departmental Representative.

1.15 PROTECTION AND MAINTENANCE OF TRAFFIC

.1 Provide access and temporary relocated roads as necessary to maintain traffic.

.2 Maintain and protect traffic on affected roads during construction period except as otherwise specifically directed by Departmental Representative.

.3 Provide measures for protection and diversion of traffic, including provision of watch-persons and flag-persons, erection of barricades, placing of lights around and in front of equipment and work, and erection and maintenance of adequate warning, danger, and direction signs

.4 Protect travelling public from damage to person and property.

.5 Contractor's traffic on roads selected for hauling material to and from site to interfere as little as possible with public traffic.

.6 Verify adequacy of existing roads and allowable load limit on these roads. Contractor: responsible for repair of damage to roads caused by construction operations.

.7 Provide necessary lighting, signs, barricades, and distinctive markings for safe movement of traffic.

.8 Dust control: adequate to ensure safe operation at all times.

.9 Lighting: to assure full and clear visibility for full width of haul road and work areas during night work operations.

.10 Provide snow removal during period of Work.

.11 Remove, upon completion of work, haul roads designated by Departmental Representative.

1.16 CLEAN-UP

.1 Remove construction debris, waste materials, packaging material from work site daily.

.2 Clean dirt or mud tracked onto paved or surfaced roadways.

.3 Store materials resulting from demolition activities that are salvageable.

.4 Stack stored new or salvaged material not in construction facilities.

Part 2 Execution

2.1 TEMPORARY EROSION AND SEDIMENTATION CONTROL

.1 Provide temporary erosion and sedimentation control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, in compliance with EPA 832/R-92-005 or requirements of authorities having jurisdiction, whichever is more stringent.

.2 Inspect, repair, and maintain erosion and sedimentation control measures during construction until permanent vegetation has been established.

.3 Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

2.2 Measurement and Payment

.1 Mobilization / Demobilization

.1 Payment for all works associated with mobilization and demobilization of the construction facilities will be measured and paid for at the Contract Lump Sum Price for “Mobilization / Demobilization”, executed in accordance with this specification and as accepted by the Departmental Representative.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 03 30 01 - Cast-In-Place Concrete and Grout Infill

1.2 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:

.1 Concrete forming and accessories will be considered incidental to the Contract Lump Sum Price for “Supply and Installation of Steel Transition”. Said price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the Work included in this specification.

1.3 REFERENCES

.1 Canadian Standards Association (CSA International)

.1 CSA-A23.1-04/A23.2-04, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA-O86S1-05, Supplement No. 1 to CAN/CSA-O86-01, Engineering Design in Wood.

.3 CSA O121-M1978(R2003), Douglas Fir Plywood.

.4 CSA O151-04, Canadian Softwood Plywood.

.5 CSA O153-M1980(R2003), Poplar Plywood.

.6 CAN/CSA-O325.0-92(R2003), Construction Sheathing.

.7 CSA O437 Series 93(R2006), Standards for OSB and Waferboard.

.8 CSA S269.1-1975(R2003), Falsework for Construction Purposes.

.9 CAN/CSA-S269.3-M92(R2003), Concrete Formwork, National Standard of Canada

.2 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submittals in accordance with Division 1.

.2 Submit shop drawings for formwork and falsework.

.3 Indicate method and schedule of construction, shoring, stripping and re-shoring procedures, materials, arrangement of joints, special architectural exposed finishes, ties, liners, and locations of temporary embedded parts. Comply with CSA S269.1, for falsework drawings. Comply with CAN/CSA-S269.3 for formwork drawings.

.4 Indicate formwork design data: permissible rate of concrete placement, and temperature of concrete, in forms.

Part 2 Products

2.1 MATERIALS

.1 Formwork materials:

.1 For concrete without special architectural features, use wood and wood product formwork materials to CSA-O121, CAN/CSA-O86, CSA O437 Series, and CSA-O153.

.2 Rigid insulation board: to CAN/ULC-S701.

.2 Form ties:

.1 Use snap ties complete with plastic cones and light grey concrete plugs.

.3 Form liner:

.1 Plywood: Canadian Softwood Plywood to CSA O151.

.4 Form release agent: non-toxic, biodegradable, low VOC.

.5 Form stripping agent: colourless mineral oil, non-toxic, biodegradable, low VOC, free of kerosene, with viscosity between 70 and 110s Saybolt Universal 15 to 24 mm^2/s at 40 degrees C, flashpoint minimum 150 degrees C, open cup.

.6 Falsework materials: to CSA-S269.1.

Part 3 Execution

3.1 FABRICATION AND ERECTION

.1 Verify lines, levels and centres before proceeding with formwork/falsework and ensure dimensions agree with drawings.

.2 Obtain Departmental Representative's approval for use of earth forms framing openings not indicated on drawings.

.3 Fabricate and erect falsework in accordance with CSA S269.1.

.4 Fabricate and erect formwork in accordance with CAN/CSA-S269.3 to produce finished concrete conforming to shape, dimensions, locations and levels indicated within tolerances required by CSA-A23.1/A23.2.

.5 Align form joints and make watertight.

.1 Keep form joints to minimum.

.6 Use 25 mm chamfer strips on external corners and/or 25 mm fillets at interior corners, joints, unless specified otherwise.

.7 Form chases, slots, openings, drips, recesses, expansion and control joints as indicated.

.8 Build in anchors, sleeves, and other inserts required to accommodate Work specified in other sections.

.1 Ensure that anchors and inserts will not protrude beyond surfaces designated to receive applied finishes, including painting.

.9 Clean formwork in accordance with CSA-A23.1/A23.2, before placing concrete.

3.2 REMOVAL AND RESHORING

.1 Leave formwork in place for a minimum of 7 days after placing concrete.

.2 Remove formwork when concrete has reached 70 % of its design strength or minimum period noted above, whichever comes later, and replace immediately with adequate reshoring.

.3 Provide necessary reshoring of members where early removal of forms may be required or where members may be subjected to additional loads during construction as required.

.4 Space reshoring in each principal direction at not more than 3000 mm apart.

.5 Re-use formwork and falsework subject to requirements of CSA-A23.1/A23.2.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This specification will cover construction of cast-in-place concrete and/or cementitious grout infill for the embedment of the new steel flow transition, including the installation of epoxy dowel anchors.

.2 Embedment of the new steel shall be by grouting with subsequent contact grouting to fill all voids between the existing concrete and new steel transition. Specifically, microfine cement grouting between the existing concrete and the new grout shall be performed through pre-placed Fuko injection hose at the obvert of the work area.

.3 Conventional cast in place concrete and reinforcing are not anticipated as required but have been specified in the event that over demolition and repairs are required.

1.2 RELATED REQUIREMENTS

.1 Section 03 10 00 – Concrete Forming and Accessories

.2 Section 05 50 00 – Metal Fabrications

1.3 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:

.1 Construction of cast-in-place concrete or grout infill will be considered incidental to the Contract Lump Sum Price for “Supply and Installation of Steel Transition”. Said price shall be payment in full for supplying all materials and performing all operations herein described and all other items incidental to the Work included in this specification.

1.4 REFERENCES

.1 Reference Standards:

.1 ASTM International

.1 ASTM C260/C260M-10a, Standard Specification for Air-Entraining Admixtures for Concrete.

.2 ASTM C494/C494M-10a, Standard Specification for Chemical Admixtures for Concrete.

.2 CSA International

.1 CSA A23.1/A23.2-09, Concrete Materials and Methods of Concrete Construction/Methods of Test and Standard Practices for Concrete.

.2 CSA A283-06, Qualification Code for Concrete Testing Laboratories.

.3 CSA A3000-08, Cementitious Materials Compendium (Consists of A3001, A3002, A3003, A3004 and A3005).

.3 Army Corps of Engineers

.1 CRD-C611 Test Method for Flow of Grout Mixtures

.2 CRD-C619 Specification for Grout Fluidifier

.3 CRD-C621 Specification for Non Shrink Grout

1.5 ADMINISTRATIVE REQUIREMENTS

.1 Pre-installation Meetings: Convene pre-installation meeting one week prior to beginning concrete or grout works.

.1 Ensure key personnel attend.

.1 Verify project requirements.

1.6 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Division 1.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Delivery and Acceptance Requirements:

.1 Concrete hauling time: deliver to site of Work and discharged within 120 minutes maximum after batching.

.1 Do not modify maximum time limit without receipt of prior written agreement from Departmental Representative and concrete producer as described in CSA A23.1/A23.2.

.2 Deviations to be submitted for review by Departmental Representative.

.2 Concrete delivery: ensure continuous concrete delivery from plant meets CSA A23.1/A23.2.

Part 2 Products

2.1 DESIGN CRITERIA

.1 Performance: to CSA A23.1/A23.2, and as described in MIXES of PART 2 - PRODUCTS.

2.2 PERFORMANCE CRITERIA

.1 Quality Control Plan: ensure concrete supplier meets performance criteria of concrete as established by the Departmental Representative.

2.3 MATERIALS

.1 Grout: Grout shall be Sika Grout 212 SR or approved equivalent.

.2 Microfine Cement Grout: Microcem 900 Microfine Portland Cement (20 kg bags) or SPINOR A12 Ultrafine Blast Furnace Slag Cement (20 kg bags) shall be supplied by the Contractor for grouting injectable tubing.

.3 Anchor Epoxy: Anchor Epoxy shall be Hilti HIT-RE 500 V3 or approved equivalent.

.4 Permeable Injectable Tubing: FUKO (Type 2) Injection System by Multiurethanes Limited shall be supplied by the Contractor for microfine cement grouting of the crown of the grout infill of the flow transition insert, and installed and applied in strict accordance with the manufacturer’s instructions.

.5 Water: to CSA A23.1, water used for mixing concrete or grout shall be potable.

.6 Aggregates: to CSA A23.1/A23.2.

.7 Admixtures:

.1 All admixtures shall be compatible with the grout or concrete.

.2 Air entraining admixture: to ASTM C260.

.3 Chemical admixture: to ASTM C494.

.8 Shrinkage compensating grout: premixed compound consisting of non-metallic aggregate, Portland cement, water reducing and plasticizing agents to CSA A23.1/A23.2.

.1 Compressive strength: 35 MPa at 28 days.

.2 Net shrinkage at 28 days: maximum 0 %.

.3 Acceptable product: Sika Grout 212 SR.

.9 Curing compound: to CSA A23.1/A23.2 white.

.10 Waterstops:

.1 Hydrophilic Waterstop shall be Hydrotite as supplied by Multiurethanes or approved equal. Profile and dimensions of waterstop are as shown on the Drawings.

.2 Hydrophilic Waterstop shall be stored per manufacturer's recommendation and protected from moisture until use. Once installed Hydrophilic Waterstop shall be protected from moisture, oil, dirt and other contaminants until grouting or concreting commences.

.3 Waterstop shall be affixed to the surrounding concrete with hydrophilic caulking. Hydrophilic caulking shall be Leakmaster as supplied by Multiurethanes, or approved equal.

.4 Installation of Hydrophilic Waterstop and Caulking shall be installed per manufactures instructions.

.11 Reinforcing steel accessories

.1 Reinforcing steel shall be in accordance with CSA G30.18 Grade 400W.

.2 Chairs, bolsters, bar supports, spacers and accessories shall be in accordance with CSA A23.1 and shall be approved by the Departmental Representative.

.3 Remove reinforcing steel the Departmental Representative has determined exhibits flaws in manufacture or fabrication. Rust, surface seams, or surface irregularities will not be cause for rejection provided minimum dimensions, cross-sectional area and tensile properties of a hand wire-brushed specimen are not less than requirements of CSA G30.18.

.12 Shop drawings:

.1 Provide shop drawings in accordance with Division 1 of this specification.

.2 Submit shop drawings for reinforcing steel a minimum of two (2) weeks prior to the fabrication of any reinforcing steel.

2.4 MIXES

.1 Performance Method: The Contractor shall be responsible for the design and performance of all concrete mixes supplied under this Specification. Concrete and/or cementitious grout shall be supplied in accordance with the requirements of CSA A23.1-09, with the minimum properties as provided below:

.1 Ensure concrete supplier meets performance criteria as established below and provide verification of compliance.

.2 Provide chamber construction concrete mix to meet following hard state requirements:

.1 Durability and class of exposure: S-2

.2 Cement type: Type HS or HSb

.3 Compressive strength at 7 days: 25 MPa minimum.

.4 Compressive strength at 28 days: 32 MPa minimum.

.5 Maximum Water/Cementing Materials Ratio: 0.45

.6 Entrained Air Content: 6.5% ± 1.5%

.7 Aggregate size: 19 mm maximum.

.8 Slump/Flow: 180 mm ± 20 mm.

.9 Intended application: Concrete encasement, foundation slab, walls, structural slab, and benching.

.3 Provide a “Mix Design Statement” for each type of concrete to be used certifying constituent materials and mixing proportions to the Departmental Representative at least 2 weeks prior to delivery of Concrete to the Site. Supply reasonable evidence to the Departmental Representative that the mix proportions selected will produce concrete meeting the specified strength, workability and yield.

.4 Concrete supplier's certification: both batch plant and materials meet CSA A23.1 requirements.

Part 3 Execution

3.1 PREPARATION

.1 Construction method submission:

.1 No Work shall commence on construction of cast-in-place concrete or grout infill until after the Departmental Representative’s review of the Contractor’s Construction Method submission.

.2 The Contractor shall prepare for the Departmental Representatives review a Construction Method submission detailing:

.1 Construction sequence to be followed including all methods to be employed.

.2 Specialized equipment to be used

.3 Any design revisions proposed to accommodate the Contractor’s proposed construction method.

.3 The Contractor shall respond to any concerns that may be raised by the Departmental Representative after review of Construction Method submission.

.2 Obtain Departmental Representative’s written approval before placing concrete or grout.

.1 Provide 48 hours minimum notice prior to placing of concrete or grout.

.3 During concreting operations:

.1 Development of cold joints not allowed.

.2 Ensure concrete delivery and handling facilitates placing with minimum of re-handling, and without damage to existing structure or Work.

.4 Pumping of concrete or grout is permitted only after approval of equipment and mix.

.5 Ensure reinforcement and inserts are not disturbed during concrete or grout placement.

.6 Protect previous Work from staining.

.7 Clean and remove stains prior to application of concrete or grout finishes.

.8 Do not place load upon new concrete or grout until authorized by Departmental Representative.

3.2 INSTALLATION/APPLICATION

.1 Cast-in-place Concrete Chamber Construction:

.1 Construct cast in place concrete in accordance with CSA A23.1 except as supplemented, revised or amended in this specification and as indicated in the construction notes on the Drawings.

.2 Drill and install the 10M epoxy dowel anchors as shown on the Drawings, as per manufacturer's instructions, as included on the anchor packaging.

.3 Arrange an anchor manufacturer's representative to provide onsite installation training for all of their anchoring products specified. Documented confirmation that all of the contractor's personnel who install anchors are trained prior to the commencement of installing anchors is to be submitted for review by Departmental Representative.

.4 Adjust the location of reinforcing steel adjacent to openings to frame those openings in accordance with good practice, and maintain the bar spacing intent.

.5 Do not use welded splices for reinforcing steel.

.6 Utilize the grouting nipples installed on the steel transition and in the formwork to perform pressure grouting of the void between the steel transition and existing demolished concrete. Inject grout through the grouting nipples and through the upstream/downstream formwork up to a pressure of 1 MPa.

.7 The annular space between the municipal flow and air vent pipe and the cored hole in the existing concrete shall be grouted simultaneously with the rest of the grouting works.

.2 Formwork:

.1 Formwork shall be provided upstream and downstream of the Thimble to facilitate injection Grouting.

.2 Formwork shall be designed per CSA A23.1 and sustain the loads imposed by injection grouting the perimeter of the Thimble.

.3 Formwork shall be provided with ports for grouting as well as air and grout return.

.4 Shop drawing shall be provided for the Formwork per Division 1 for review by the Departmental Representative.

.3 Finishing and curing:

.1 Finish concrete or grout to CSA A23.1/A23.2.

.1 Landing pads – Broom Finish

.2 Use procedures as reviewed by Departmental Representative or those noted in CSA A23.1/A23.2 to remove excess bleed water. Ensure surface is not damaged.

.3 Use curing compounds compatible with applied finish on concrete or grout surfaces. Provide written declaration that compounds used are compatible.

.4 Waterstops:

.1 Install waterstops to provide continuous water seal.

.2 Do not distort or pierce waterstop in way as to hamper performance.

.3 Do not displace reinforcement when installing waterstops.

.4 Use equipment to manufacturer's requirements to field splice waterstops.

.5 Tie waterstops rigidly in place to reinforcement.

.6 Use only straight heat sealed butt joints in field.

.7 Use factory welded corners and intersections unless otherwise approved by Departmental Representative.

.5 Cast-in-place concrete chamber:

.1 Construct cast-in-place concrete in accordance with CW 2160, except as supplemented, revised or amended in this specification and as indicated in the construction notes on the Drawings.

.2 Adjust the location of reinforcing steel adjacent to openings to frame those openings in accordance with good practice, and maintain the bar spacing intent.

.3 Do not use welded splices for reinforcing steel.

.4 Order all wall reinforcement steel in lengths to best suit the spacing of shoring whalers so that reinforcing bars will not be bent or misformed in order to remove the walers.

.6 Grout:

.1 Mix and apply grout in accordance with the manufacturer’s instructions. Consistency is to be suitable for the intended application.

.7 Fuko Hose Injection Grouting:

.1 Cut the injectable tubing into an appropriate number of lengths with the maximum length of each section not to exceed a 5 metre loop. An appropriate length of colored extension tubing shall be placed on each end of each section of cut tubing. For joint lengths exceeding 5 m, overlap additional sections.

.2 Provide a smooth surface for attaching the injectable tubing. Fasten the retaining clips along the length of injectable tubing at a maximum spacing of 300 mm while maintaining the tubing under tension. Use special care to avoid crimping or damaging the injectable tubing during installation. Cut the coloured extension tubing to an appropriate length and extend the extension tubes, as these must be visible and accessible to allow for future injection.

.3 Inject the injectable tubing with microfine cementitious grout a minimum of 3 weeks after concrete encasement of the steel transition. If additional grout injections are required, as directed by the Departmental Representative, the injectable tubing shall be cleared using water and vacuum pressure in accordance with the manufacturer’s recommendations.

.8 Cold weather requirements:

.1 Any concrete or cementious grout work required to be carried out when temperatures are below 5°C or anticipated to fall below 5°C within the curing period of 10 days (defined as Cold Weather) shall be subject to the requirements of CSA A23.1-14 Section 7.1.2 Cold Weather Concreting except as modified herein.

.2 Adherence to the requirements of this specification will not relieve the Contractor of the necessity for producing concrete which has not been weakened or injured by frost or freezing, or replacing such damaged Work at no additional cost to the Owner.

.3 All freshly placed concrete or grout shall be protected from the elements and from defacements due to construction operations.

.4 The following are minimum requirements for protecting concrete or grout during and after placement during freezing weather, but mere adherence to these requirements will not relieve the Contractor of the necessity for producing concrete or grout which has not been weakened or injured by frost or freezing, or replacing such damaged Work at no additional cost to the Owner;

.1 Before concrete or grout placement, all ice, snow, and frost shall be completely removed from all formwork, and other surfaces against which concrete shall be placed.

.2 The temperatures of all surfaces which concrete or grout shall be placed against shall be raised above 7°C for a period of twenty-four (24) hours at minimum prior to concreting.

.3 Where concrete or grout Work is to come in contact with the earth, the surface of the earth shall be completely free of frost when concrete or grout is placed thereon.

.4 Concrete aggregates and water shall be heated to not over 80°C. Concrete or grout shall be not less than 20°C or more than 30°C in temperature when deposited.

.5 Concrete or grout when placed during Cold Weather, or if Cold Weather is anticipated during the 10 day curing period, shall be fully enclosed and the temperature maintained at not less than 20°C for the first five (5) days, nor less than 5°C for an remaining five (5) days of the curing period. The Contractor shall monitor and maintain a record of the temperature within the heated enclosures to confirm these requirements have been maintained.

.6 Heating enclosures shall be strong and wind-proof, well ventilated with heating units so located as to prevent local overheating or drying of the concrete or grout or damage from combustion gases. Only indirect fired heaters will be accepted. Units must be vented outside the enclosure. No direct fired units will be accepted.

.7 Prior to the removal of heated enclosures the concrete or grout shall be within 20°C of the ambient temperature to limit thermal cracking.

.8 The Contractor shall submit to the Departmental Representative the methods of enclosure and frost protection proposed for review.

.9 Should the concrete or grout be exposed to Cold Weather the Departmental Representative shall be notified and Cold Weather Requirements shall be reinstated.

.5 Cold weather requirements shall be considered incidental to the Works of this Contract and no measurement or payment will be made for this item.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This Specification shall cover the supply, fabrication, transportation, handling, delivery and placement of metal fabrications.

.2 This specification shall cover the supply, delivery, installation and testing of the new fabricated steel flow transition.

1.2 RELATED REQUIREMENTS

.1 Section 03 30 01 – Cast-In-Place Concrete and Grout Infill

.2 Section 05 60 00 – Cast Iron Slide Gates

1.3 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:

.1 Supply, fabrication, transportation, handling, delivery and placement of the steel transition and its anchorage, shop and field welding, fasteners, and restoration of protective coating will be measured and paid for at the Contract Lump Sum Price for “Supply and Installation of Steel Transition”, executed in accordance with this specification and as accepted by the Departmental Representative.

.2 Supply, fabrication, transportation, handling, delivery and placement of any other metal fabrications will be incidental to the work and shall be included in the costs of the “Cast Iron Slide Gate Installation and Testing” pay item.

1.4 REFERENCES

.1 ASTM International

.1 ASTM A53/A53M-07, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 ASTM A269-08, Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

.3 ASTM A307-07b, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.4 ASTM A108, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.

.5 ASTM A276/A276M, Standard Specification for Stainless Steel Bars and Shapes.

.6 ASTM F2329 Standard Specification for Zinc Coating Hot-Dip Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.

.2 CSA International

.1 CSA G40.20/G40.21-04 (R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.

.2 CAN/CSA G164-M92 (R2003), Hot Dip Galvanizing of Irregularly Shaped Articles.

.3 CSA S16-09, Design of Steel Structures.

.4 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).

.5 CSA W59-M03 (R2008), Welded Steel Construction (Metal Arc Welding) Metric.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Division 1.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for sections, plates, pipe, and bolts and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings in accordance with Division 1 of this Specification.

.2 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

.3 Indicate field measurements on shop drawings.

.4 Submit air vent cleaning process for approval.

.4 Qualifications

.1 The Contractor shall submit the qualifications of the fabricator and welders to the Departmental Representative for acceptance.

.5 Provide the following information to the Departmental Representative prior to the delivery of slide gate and operator assemblies.

.1 A certified copy of the Chemical and Physical Analysis on all materials used in the manufacture of the metal fabrications, wall brackets plus any accessories or certification that the materials used are in strict accordance with this specification.

.6 Provide the following information to the Departmental Representative prior to installation of the new steel transition section:

.1 A detailed welding procedure for review and approval in order to minimize the potential for distortion of steel components during field welding.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer's written instructions.

.2 Delivery and Acceptance Requirements: deliver materials to site in original factory packaging, labelled with manufacturer's name and address.

.3 Storage and Handling Requirements:

.1 Store materials off ground in dry location, and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.

.2 Replace defective or damaged materials with new.

Part 2 Products

2.1 MATERIALS

.1 All material shall be of a type acceptable to the Departmental Representative, and shall be subject to inspection and testing by the Departmental Representative.

.2 Material intended for use in the various assemblies shall be new, straight, and clean with sharply defined profiles.

.3 Steel Sections and Plates: to CAN/CSA G40.20/G40.21, Grade 300 W, except W, HP AND HSS sections, which shall be Grade 350 W.

.4 Steel Pipe: to ASTM A53/A53M, seamless, as specified by item.

.5 Welding materials: to CSA W59.

.6 Stud Anchors: to ASTM A108, Grade 1020.

.7 Anchor bolts and fasteners: ASTM A276, Type 316 stainless steel, of ample section to safely withstand the forces created by operation of the equipment or the load to which they may be subjected.

.8 Paint: Amerlock 2 Epoxy or approved equivalent in accordance with B6; Colour: neutral grey.

.9 Delivery and Shipping:

.1 The Departmental Representative will examine all materials and accessories upon delivery and will reject any equipment that is found to be damaged to the extent that, in the Departmental Representative’s opinion, it cannot be put to the use for which it was intended. The Contractor shall arrange with the supplier to repair any superficially damaged equipment to the satisfaction of the Departmental Representative.

.2 It shall be the responsibility of the Contractor to negotiate any claims for damage with the carrier and to make arrangements to have any rejected equipment replaced as soon as possible at no extra expense to the Owner.

2.2 FABRICATION

.1 Fabricate Work square, true, straight and accurate to required size, with joints close fitted and properly secured. Assemble Work in such a way that no disfigurements show in the finished Work, or impair the strength.

.2 Fabricated bolt pattern on the upstream face of the steel transition shall be in accordance with the slide gate manufacturer’s requirements for anchoring the gate frame to the steel transition.

.3 Confirm measurements for all fabrications before fabricating.

.4 Pieces are to be of the sizes indicated on the Drawings and built using new materials with mill certificates supplied and not scrap pieces. Confirm sizes with field measurements,

.5 Where possible, fit Work and shop assemble, ready for erection.

.6 Remove and grind smooth burrs, filings, sharp protrusions, and projections from metal fabrications to prevent possible injury. Correct any dangerous or potential harmful installations as directed by the Departmental Representative.

.7 All steel welding is to conform to CSA Standard W.59. Fabricator is to be fully approved by the Canadian Welding Bureau, in conformance with CSA Standard W.47.1. Welding is to be done by currently licensed welders only.

.8 All shop welding is to be visually inspected and 10% of the shop welding is to undergo non-destructive testing using magnetic particle examination performed by a CWB and CSA licensed weld inspector and observed by the Departmental Representative. Additional magnetic particle testing may be required, at the discretion of the Departmental Representative.

.9 The Departmental Representative may request unsatisfactory welding to be ground off and have the welds re-applied and re-inspected.

.10 Ensure exposed welds are continuous for length of each joint. File or grind exposed welds smooth and flush.

.11 Seal exterior steel fabrications to provide corrosion protection in accordance with CAN3-S16.1.

.12 Use self-tapping shake-proof flat-headed screws on items requiring assembly by screws.

.13 Fabricated steel transition and square thimble shall be painted in accordance with Section 2.4

2.3 SHOP PAINTING

.1 Surface prepare steel fabrications requiring epoxy coating to manufacturers' recommendations.

.2 Apply two coats of Amerlock 2 Epoxy paint, 150 μm per coat dry film thickness. Colour: Neutral Grey.

.3 Recoating and curing times to be as per coating manufacturers recommendations.

.4 Clean surfaces to be field welded; do not paint.

Part 3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.

.1 Visually inspect substrate in presence of Departmental Representative.

.2 Inform Departmental Representative of unacceptable conditions immediately upon discovery.

.3 Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Departmental Representative.

3.2 ERECTION

.1 Conduct welding work in accordance with CSA W59.

.2 Erect metalwork square, plumb, straight, and true, accurately fitted, with tight joints and intersections.

.3 Make field connections with bolts to CAN/CSA-S16, or weld.

.4 Provide suitable means of anchorage acceptable to Departmental Representative such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles where not specifically indicated on the Drawings.

.5 Provide components for structure in accordance with shop drawings and schedule.

.6 Touch-up rivets, bolts and burnt or scratched surfaces that are to receive paint finish, with zinc primer after completion of erection.

.7 Install electrochemical isolation gaskets and sleeves to electrically isolate dissimilar metals.

.8 The steel transition is to be manufactured and delivered in one piece. After concrete demolition has been approved by the Departmental Representative, drill and embed the epoxy dowel anchors as per manufacturer's installation procedures and recommendations and as per Section 03 30 01 – Cast-In-Place Concrete and Grout Infill. Remove any dust and debris from the work site. Lower the steel transition pieces into place from the top deck of the gate well and provide temporary support blocking. Install steel backer rod beneath existing transition. Use temporary steel guides to align the new transition to the existing transition.

.9 Temporarily support new steel transition. Bolt the gate frame to the new flow transition. Tack weld bolt heads on the downstream side of the flange of the new steel transition. Ensure gate operation and then remove gate until Step 13.

.10 Align the steel transition and gate frame, and temporarily support the assembly. Weld the new transition to the existing transition, monitoring alignment during welding.

.11 All field welding is to be visually inspected and 10% of the field welding is to undergo non-destructive testing using magnetic particle examination performed by a CWB and CSA licensed weld inspector and observed by the Departmental Representative. Additional magnetic particle testing may be required, at the discretion of the Departmental Representative.

.12 The Departmental Representative may request unsatisfactory welding to be ground off and have the welds re-applied and re-inspected.

.13 Place and inject grout around the steel transition and annular space in the cored hole by injecting through the formwork around the steel works and grouting nipples on the steel transition, as per Section 03 30 01- Cast-In-Place Concrete and Grout Infill. After the grout has cured, grind off the nipples and alignment angles. Plug-weld all remaining

holes from the inserts. Grind flush and install corrosion protective paint, reconfirm gate frame alignment, and reinstall gate.

3.3 PROTECTION

.1 Protect installed products and components from damage during construction.

.2 Repair damage to adjacent materials caused by metal fabrications installation.

END OF SECTION

Part 1 General

1.1 DESCRIPTION

.1 This specification shall cover the supply, delivery, installation and testing of cast iron slide gates, mechanical lift operator, stems, wall brackets and mechanical accessories.

.2 This specification shall cover the supply, delivery, installation and testing of medium duty cast iron slide gate, mechanical lift operator, stems, wall brackets, and mechanical accessories.

1.2 RELATED REQUIREMENTS

.1 Section 05 50 00 – Metal Fabrications

1.3 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:

.1 Installation and testing of a cast iron slide gate, mechanical lift operator, stem, wall bracket(s), accessories, and installation of new anchor bolts will be measured and paid for at the Contract Lump Sum Price for "Cast Iron Slide Gate Installation and Testing", executed in accordance with this specification and accepted by the Departmental Representative.

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit shop drawings of cast iron slide gate, gate frame, mechanical lift operator, stem, wall brackets, and accessories in accordance with Division 1.

.2 Submit Operating and Maintenance Manuals in accordance with Division 1.

.3 Provide electronic (.Pdf) copies of all the manufacturer's brochures and technical literature detailing correct installation procedure and recommend operating and maintenance instructions. Manuals shall be bound with the project title and gate description identified on the front cover. One set of manuals shall be provided.

.4 Provide the following information to the Departmental Representative prior to the delivery of slide gate and operator assemblies in accordance with Division 1.

.1 A certified copy of the Chemical and Physical Analysis on all materials used in the manufacture of the slide gate, stems, operator and accessories or certification that the materials used are in strict accordance with this specification.

.2 Copies of the test reports for Performance and Leakage tests. Included on the report shall be the signature of the official who is responsible for the gate assembly and testing.

Part 2 Products

2.1 DESIGN - CAST IRON SLIDE GATE

.1 Specification Standard: AWWA C560 (Latest Edition)

.2 Gate Opening Sizes & Style

.1 Duncairn Dam: 1219 mm x 1219 mm (48" x 48")

.3 Mounting: Custom wall thimble (new), see Section 05 50 00 – Metal Fabrications

.4 Seating Head: Maximum design seating head for the gate will be from horizontal centerline of the gate to the top of the gate chamber roof unless noted otherwise in the drawings:

.1 Duncairn Dam: 18.7 m (61.4 ft)

.5 Unseating Head: Maximum design unseating head for the gate will be from horizontal centerline of the gate to the top of the gate chamber.

.1 Duncairn Dam: 0 m (0 ft)

.6 Operator and Lift:

.1 Gate Chamber: Enclosed rising stem gear lift with pedestal. Operator to be finished with a 50 millimetre x 50 millimetre square nut suitable for attachment of an electric portable drill for opening. Operator shall turn counterclockwise to open.

.2 Maximum pull load on operator hand wheel shall be 11.4 kg (25 lbs).

.7 Stem Cover: Gear lift to be complete with stem cover with acrylic window with gradations in 25 mm (1") increments for the entire range of gate operation.

.8 Stem: The stainless steel stem shall be designed so the slenderness ratio (kL/r) does not exceed 200.

.9 Stem Guides: Adjustable in both horizontal and vertical directions.

.10 Acceptable Leakage as per AWWA C560 (Latest Edition).

.11 Butyl rubber mastic shall be used to form a seal between the frame and thimble.

.12 Frame and gate shall be painted with two coats of Intergard FP, Amerlock 2 Epoxy Coating or approved equivalent in accordance with B6. Coatings shall be 150 μm per coat dry film thickness.

.13 The size, quantity and spacing of fasteners shall be as recommended by the gate manufacturer.

.14 The sluice gate shall be as manufactured by Waterman, Hydro Gate or approved equivalent.

.15 Field touch-up chips and scratches of the cast-iron gate coating shall be completed with Amerlock 2 epoxy coating.

2.2 MATERIALS - CAST IRON SLIDE GATE

.1 Frame, Slide, guides and yoke Ni-Resist Cast Iron ASTM A436 Type 2B.

.2 Seating Faces ASTM B21 Naval Bronze, Alloy 48200 or ASTM B98, Alloy 655.

.3 Wall Thimble to CAN/CSA G40.20/G40.21, Grade 300 W (see section A10).

.4 Wedges ASTM B584 Manganese Bronze, Alloy 865

.5 Wedge Blocks ASTM A48 Cast Iron (Class 30) or ASTM A126 Cast Iron (Class B)

.6 Fasteners & Anchors ASTM A276 Type 304 Stainless Steel

.7 Stem ASTM A276 Type 304 Stainless Steel

.8 Stem Couplings ASTM A276 Type 304 Stainless Steel

.9 Stem Guide ASTM A48 Cast Iron (Class 30) or ASTM A126 Cast Iron (Class B) with Bronze bushings

.10 Operator Pedestal ASTM A48 Cast Iron (Class 30) or ASTM A126 Cast Iron (Class B) or Steel

.11 Stem Cover Aluminum or Galvanized Steel.

.12 Shop Drawings:

.1 Submit shop drawings of cast iron slide gates, mechanical lift operators, stems, wall brackets and accessories in accordance with Division 1.

.13 Delivery and Shipping:

.1 The Departmental Representative will examine the slide gate assemblies, frames, stems, operators and accessories upon delivery and will reject any equipment that is found to be damaged to the extent that, in the Departmental Representative's opinion, it cannot be put to the use for which it was intended. The Contractor shall arrange with the gate supplier to repair any superficially damaged equipment to the satisfaction of the Departmental Representative.

.2 It shall be the responsibility of the Contractor to negotiate any claims for damage with the carrier and to make arrangements to have any rejected equipment replaced as soon as possible at no extra expense to the Owner.

.14 Shop Testing

.1 The fully assembled gate shall be shop inspected, adjusted and tested for operation and leakage at the design head before shipping.

.2 Provide the following information to the Departmental Representative prior to delivery of the slide gate and operator assemblies:

.3 A certified copy of the Chemical and Physical Analysis on all materials used or certification that the materials used are in strict accordance with this specification.

.4 Copies of the test reports for Performance and Leakage tests. Included on the report shall be the signature of the official who is responsible for the gate assembly and testing.

Part 3 Execution

3.1 CONSTRUCTION METHODS

.1 Installation of New Gate Frame Bolts

.1 The new anchor bolt pattern shall mate with the fabricated steel flow transition.

.2 Install gate frame bolts as per manufacturer's installation procedures and recommendations. Bolts shall be installed only upon confirmation of correct bolt hole layout and completion of drilling all anchor holes.

.2 Installation of Cast Iron Slide Gate:

.1 Install cast iron slide gate, mechanical lift operator, stem, wall brackets, frame and accessories as shown on the drawings and in accordance with the manufacturer's recommendations.

.2 Make arrangements to have a qualified field representative of the slide gate supplier/manufacturer inspect the installation during and after completion at the Contractor's expense and provide a Certificate of Satisfactory Installation to the Departmental Representative.

.3 Shop Testing:

.1 The fully assembled gate shall be shop inspected, adjusted and tested for operation and leakage at the design head before shipping.

.4 Field Testing:

.1 Perform leakage tests in the Departmental Representative's presence once slide gate has been installed to ensure compliance with the allowable leakage rate indicated in AWWA C560 (Latest Edition).

.2 Examine gate leakage in the Departmental Representative's presence once the cast iron slide gate has been installed to ensure a leakage rates are within the gate supplier's performance guarantees and this specification.

.3 Arrange for a qualified field representative of the slide gate supplier /manufacturer to be present during field testing.

.4 The leakage test for seating head can be performed by measuring the flow at the end of the discharge conduit with the new gate closed and the upstream gate valve opened.

.5 If the gate fails the field leakage test, the Contractor shall undertake adjustments, replacements or other modifications recommended by the slide gate supplier/manufacturer's field representative and repeat the test. The sequence shall be repeated until the gate passes the allowable leakage rate.

.6 All components and systems shall be operated as required in the presence of the Departmental Representative and Operation Staff to prove proper operation.

END OF SECTION

Part 1 General

1.1 SUMMARY

.1 Section Includes:

.1 Procedures and cleaning methods for cleaning and inspecting existing 102 mm air vent pipe.

.2 Related Requirements

.1 Section 05 50 00 – Metal Fabrications

.2 Section 05 60 00 – Cast Iron Slide Gates

1.2 PRICE AND PAYMENT PROCEDURES

.1 Measurement and Payment:

.1 Cleaning and inspecting the air vent pipe will be measured and paid for at the Contract Lump Sum Price for “Cleaning and Inspecting Air Vent Pipe”, executed in accordance with this specification and accepted by the Departmental Representative.

1.3 REFERENCES

.1 American Society for Testing and Materials International (ASTM):

.1 ASTM E202-[00], Standard Test Methods for Analysis of Ethylene Glycols and Propylene Glycols.

.2 American Society for Mechanical Engineers (ASME):

.1 ASME B31.3 – 2016, Process Piping Guide.

.3 Health Canada/Workplace Hazardous Materials Information System (WHMIS):

.1 Material Safety Data Sheets (MSDS).

1.4 ACTION AND INFORMATIONAL SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's printed product literature, specifications and datasheet for any cleaning materials used in accordance with Section 01 00 00 – General Provisions. Include product characteristics, performance criteria, and limitations.

.2 Quality assurance submittals: submit following in accordance with Section 01 00 00 – General Provisions.

.1 Proposed air vent pipe inspection equipment and procedures.

.2 Inspection audio and video.

1.5 QUALITY ASSURANCE

.1 Health and Safety:

.1 Handle cleaning solutions in accordance with WHMIS guidelines.

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Packing, shipping, handling and unloading:

.1 Deliver, store and handle in accordance with manufacturer's written instructions.

Part 2 Products

2.1 CLEANING SOLUTIONS

.1 Water: potable water with maximum chloride ion content 50 ppm.

.2 Cleaning chemicals: as selected by the Contractor in accordance with ASME B31.3 and as approved by the Departmental Representative.

2.2 INSPECTION EQUIPMENT

.1 In order to facilitate the inspection of the cleaned pipe, the following materials, at a minimum, must be provided and utilized:

.1 A pan, tilt, and zoom color camera capable of inspecting the full length of the air vent pipe.

.2 A microphone that can record digital audio data.

.3 A portable computer capable of storing the camera inspection audio and video data.

Part 3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written recommendations or specifications for any equipment and chemicals used, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 PRE-CLEANING CAMERA INSPECTION

.1 At the direction of the Departmental Representative, use the camera to inspect the air vent pipe.

.2 Conduct the inspection under the direction of the Departmental Representative and record the inspection audio.

.3 Record the audio and video data on a portable computer and submit to the Departmental Representative.

3.3 CLEANING AIR VENT PIPE

.1 Select an appropriate cleaning method below based on the pre-cleaning camera inspection.

.2 Water cleaning procedure:

.1 Apply pure water / service water / steam condensate industrial water with a maximum chloride ion content of 50 ppm.

.2 Use water meter to record volume of water in system to +/- 0.5%.

.3 Clean pipe with water by method of heated pressurized water and pulse water, and rapidly drain from filled pipe.

.4 After cleaning, dry pipe with compressed air or natural drying.

.5 Repeat steps 1 through 4 three times.

.3 Mechanical cleaning procedure

.1 Utilize a mechanical driven rotary cleaning tool or wire brush and push through the inside of the pipe.

.4 Chemical cleaning procedure

.1 Compose a detailed submission of the proposed chemical cleaning procedure, including proposed chemical, injection system, recovery of fluids, neutralization of chemicals, containment, environmental considerations, and safety considerations.

.2 After chemical cleaning procedure submission is approved by the Departmental Representative, implement procedure.

.5 Report on Completion of Cleaning:

.1 When cleaning is completed, submit report, complete with certificate of compliance with specifications of cleaning component supplier.

3.4 CLEANING

.1 Contain all water and cleaning products, remove from site, and dispose of offsite to an approved waste location.

.2 Upon completion of cleaning, remove surplus materials, excess materials, rubbish, tools and equipment.

.3 Ensure any and all chemicals disposed of at a reviewed and approved disposal facility.

3.5 POST CLEANING INSPECTION

.1 After the Departmental Representative has reviewed and approved the Report on Completion of Cleaning, the Contractor will inspect the air vent pipe at the direction of the Departmental Representative.

.2 The Departmental Representative will lead the inspection and will record their inspection audio.

.3 The audio and video data will be recorded on a portable computer and submitted to the Departmental Representative.

.4 The Departmental Representative may request additional pipe cleaning to be performed.

END OF SECTION