

**Part 1 General****1.1. LOCATION OF WORK**

- 1.1.1. Public Services and Procurement Canada (PSPC) owns and operates the Rideau Falls East Dam, a flow control structure on the Rideau River. The dam spans between Green Island and the right bank of the Rideau River where the latter empties into the Ottawa River.
- 1.1.2. The total length of the Rideau Falls East Dam is 68.31m from abutment face to abutment face. The deck is 7.31m wide deck and is divided into a 5.07m wide operating deck on the upstream side and a 2.24m wide pedestrian deck on the downstream side.
- 1.1.3. On the West dam, the steam header with the two outlets used for de-icing the dam runs parallel with the condensate return header (collecting high pressure drips) in an open trench downstream of the stop logs openings. The pipes and insulated headers are above the river with an open catwalk underneath for maintenance access. Contractor is to perform spot repairs are on the West dam as indicated on the drawing.
- 1.1.4. On the East dam, both the existing steam header (with 4 outlets) and condensate header run in parallel in a concrete trench and connect to each other at the East end under the East bridge abutment. Contractor is to remove both the steam and the condensate headers and install a new steam header as shown on the drawing. The new steam header will connect with the existing condensate header under the West bridge abutment, therefore a new condensate header is not necessary on the East dam deck.

**1.2. REFERENCE DIRECTIONS**

- 1.2.1. The terms “left” and “right” are taken when facing downstream.

**1.3. ACCESS TO WORK**

- 1.3.1. The dam is accessible from the east (right) bank, through a parking lot at the intersection of Sussex Drive and John Street. It is accessible from the west (left) bank through the park on Green Island. Contractor parking is available in the PWGSC parking spots just east of the 1 John Street building.
- 1.3.2. The roof of the water intake for the hydroelectric facility east of the right abutment is weak and therefore prevents crane access from the right abutment of the East Dam, except from far away with quite unfavourable boom angles.

**1.4. TAXES**

- 1.4.1. Pay all taxes properly levied by law (including Federal, Provincial, and Municipal.)

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**1.5. FEES, PERMITS, AND CERTIFICATES**

- 1.5.1. Pay all fees and obtain all permits. Provide authorities with plans and information for acceptance certificates. Provide inspection certificates as evidence that work conforms to requirements of Authority having jurisdiction.

**1.6. REGULATORY REQUIREMENTS**

- 1.6.1. **Materials.**—Materials shall be new and work shall conform to minimum applicable standards of “References” indicated in specification sections, the National Building Code of Canada 2015 (NBC) and all applicable Provincial and Municipal codes. In case of conflict or discrepancy most stringent requirement shall apply.
- 1.6.2. Hazardous Materials
- 1.6.2.1. Hazardous Materials: products, substances, or organisms used for the purpose for which they were originally intended, but that may cause adverse effect on environment or adversely affect health of persons, animals, or plants when released into environment.
- 1.6.2.2. Comply with requirements of Workplace Hazardous Materials Information System (WHMIS 2015) regarding use, handling, storage, and disposal of hazardous materials and regarding labelling and provision of Safety Data Sheets (SDS).
- 1.6.2.3. Hazardous materials discovery: Stop work immediately when material resembling a hazardous material is encountered during Work. Take preventative measure and promptly notify Departmental Representative. Do not proceed until written instructions have been received from Departmental Representative.

**1.7. FIRE SAFETY REQUIREMENTS**

- 1.7.1. Fires or rubbish burns on site are not permitted.
- 1.7.2. Comply with the National Building Code of Canada 2010 (NBC) as amended for fire safety in construction and the National Fire Code of Canada 2015(NFC) as amended for fire prevention, fire fighting and life safety.
- 1.7.3. Retain all fire safety documents and standards on site.

**1.8. SUBMITTAL PROCEDURES**

- 1.8.1. Submit to Departmental Representative submittals listed for review in other sections. Submit promptly and in orderly sequence to not cause delay in Work.
- 1.8.2. Do not proceed with work affected by submittals until review is complete.
- 1.8.3. Shop Drawings

1.8.3.1. "Shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of specific portion of work.

1.8.3.2. Review is for sole purpose of ascertaining conformance with general design concept, and does not mean approval of design details inherent in shop drawings, responsibility for which shall remain with Contractor. Such review shall not relieve Contractor of responsibility for errors or omissions in shop drawings or of his responsibility for meeting all requirements of Contract Documents.

#### 1.8.4. Product Data

1.8.4.1. Cross reference product data information to applicable portions on Contract Documents.

### 1.9. CONSTRUCTION PROGRESS SCHEDULE

1.9.1. On award of contract, submit construction schedule for work, indicating anticipated progress stages within time of completion. When Departmental Representative has reviewed schedule, take necessary measures to complete work within scheduled time. Do not change schedule without notifying Departmental Representative.

1.9.2. Give the Departmental Representative 48 hours notice for work to be carried out during "off hours" (defined as before 7 AM or after 7 PM).

### 1.10. DESIGNATED SUPERINTENDENT

1.10.1. Designate a Superintendent who is an employee of the Contractor to be present on site at all times when work is being performed at the dam, for duration of project.

### 1.11. QUALITY OF WORK

1.11.1. Contractor is responsible for Quality Control. Work shall conform to the minimum applicable standards of the "References" indicated in the specification sections, and all applicable Provincial and Municipal codes. In the case of conflict or discrepancy the most stringent requirement shall apply.

1.11.2. Carry out work using qualified licensed workers or apprentices in accordance with Provincial Act respecting manpower vocational training and qualification.

1.11.3. Permit employees registered in Provincial apprenticeship program to perform specific tasks only if under direct supervision of qualified licensed workers.

1.11.4. Determine permitted activities and tasks by apprentices, based on level of training attended and demonstration of ability to perform specific duties.

1.11.5. Subcontractors must hold valid licenses for work in Ontario.

1.11.6. Decisions as to standard or fitness of Quality of Work in cases of dispute rest solely with Departmental Representative.

- 1.11.7. Perform remedial work required to repair or replace parts or portions of Work identified as defective or unacceptable.
- 1.11.8. Departmental Representative's use of third-party inspection or testing agencies does not relax Contractor's responsibility to perform Work.

## 1.12. MEASUREMENTS

- 1.12.1. Measurements, sizes, exact count and dimension are responsibility of Contractor to verify.
- 1.12.2. Verify all drawings, measurements and detentions or omissions before commencing work.
- 1.12.3. Verify all conditions and dimensions prior to fabrication and construction.
- 1.12.4. Notify Departmental Representative of any discrepancies or divergences in drawings before proceeding.

## 1.13. TEMPORARY UTILITIES AND CONSTRUCTION FACILITIES

- 1.13.1. **Electrical**.—Existing services required for work may be used by the Contractor without charge. Maximum power supply of 120 V, single phase, 60 Hz is available from outlets in the utility trench. Ensure capacity is adequate prior to imposing additional loads. Provide electrical generators if additional capacity is required.
- 1.13.2. **Sanitary** — Contractor is allowed to use the toilet on the top floor of the 1 John building. Departmental Representative will provide Contractor with name of building manager, from whom the Contractor will need to sign out the keys on a daily basis
- 1.13.3. **Pedestrian Barriers** — Block-off pedestrian access to dam during hours of work on site. Provide signs with wording in both English and French re-directing pedestrians to use Sussex Drive as an alternative route. Re-open this access at the end of the day, leaving premises in clean, unencumbered and safe manner for normal public use after hours.

### 1.13.4. Scaffolding (if required)

- 1.13.4.1. To CSA Z797-09 *Code of Practice for Access Scaffold* and O. Reg. 213/91 *Construction Projects*, as amended
- 1.13.4.2. Provide design drawings, signed and sealed by qualified Professional Engineer licensed in Province of work, where prescribed.
- 1.13.4.3. Additions or modifications to scaffolding must be approved by Professional Engineer in writing.

### 1.13.5. Site Storage

- 1.13.5.1. Departmental Representative will assign storage space that shall be equipped and maintained by Contractor.
- 1.13.5.2. Do not unreasonably encumber site with materials or equipment.

- 1.13.5.3. Move stored products or equipment that interfere with operations of Departmental Representative.
- 1.13.5.4. Obtain and pay for use of additional storage or work areas needed for operations.
- 1.13.5.5. Do not load or permit to load any part of work with weight or force that will endanger Work.
- 1.13.6. **Public safety** — Where public safety may be reduced by work, provide temporary means to maintain public safety.

#### **1.13.7. Signage**

- 1.13.7.1.1. Provide common-use signs related to traffic control, information, instruction, use of equipment, public safety devices, etc., in both official languages or by use of commonly understood graphic symbols and to approval of Departmental Representative.
- 1.13.7.1.2. No advertising will be permitted on this project.
- 1.13.7.1.3. Maintain approved signs and notices in good condition for duration of project and dispose of off site, on completion of project or earlier, as directed by Departmental Representative.

#### **1.14. GUARANTEES AND WARRANTIES**

- 1.14.1. Before completion of work collect all manufacturer's guarantees or warranties and deposit with Departmental Representative.
- 1.14.2. Under Company Letter Head, submit 12 month guarantee.
- 1.14.3. Upon notice from Departmental Representative, correct all failures or defects in material or workmanship within 12 months of date of acceptance.
- 1.14.4. Conduct inspection of work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
- 1.14.5. Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection of work to identify obvious defects or deficiencies.
- 1.14.6. The Departmental Representative and Contractor will perform inspection of work to identify obvious defects and deficiencies. Contractor will correct work accordingly.
- 1.14.7. Submit written certificate that following has been performed:
  - 1.14.7.1.1. Work has been completed and inspected for compliance with contract documents
  - 1.14.7.1.2. Defects have been corrected and deficiencies have been completed.
  - 1.14.7.1.3. Equipment and system have been tested and are fully operational.
  - 1.14.7.1.4. Operation of system has been demonstrated to Departmental Representative.
  - 1.14.7.1.5. Work is complete and ready for final inspection.

- 1.14.8. Request final inspection of work by Departmental Representative when items noted above are completed. If work is deemed incomplete by Departmental Representative complete outstanding items and request reinspection.

## **1.15. PRECEDENCE**

- 1.15.1. Division 01 Sections take precedence over technical specification sections in other Divisions.

## **2. Products**

### **2.1. ACCEPTANCE OF MATERIALS**

- 2.1.1. Materials shall be new, not damaged or defective, and of best quality for purpose intended. If requested, furnish evidence as to type, source and quality of products provided.
- 2.1.2. Reference is made to CGSB, CSA, ASTM, ASME and other national and international standards. These standards when quoted form an integral part of and are to be considered as if reproduced within Specification. The latest edition is applicable unless a dated edition is specified.
- 2.1.3. Where materials are specified to CSA, CGSB, ASTM, ASME or similar standards, submit a written request to Departmental Representative for approval of selected relevant items. Include test data bearing a recent date of test, manufacturer's details and other documents to prove that proposed product meets the specified standard.
- 2.1.4. Do not use materials or products in Work until written approval has been received from Departmental Representative.
- 2.1.5. Pay cost of additional work and modifications to design due to use of alternatives.

### **2.2. COMMON PRODUCT REQUIREMENTS**

- 2.2.1. Handle and store products in manner to prevent damage, adulteration, deterioration, and soiling and in accordance with manufacturer's instructions.
- 2.2.2. Store packaged or bundled products in original and un-damaged condition with manufacturer's seal and labels intact. Do not remove packaging or bundling until required in work.
- 2.2.3. Keep sand, when used for grout or mortar materials, clean and dry. Store sand on wooden platforms and cover with waterproof tarpaulins during inclement weather.
- 2.2.4. Unless otherwise indicated in specifications, install or erect products in accordance with manufacturer's instructions. Do not rely on labels or enclosures provided with products, but obtain written instructions directly from manufacturers.

- 2.2.5. Deliver cementitious materials in clearly marked, sealed, bags and store in dry, heated, enclosure maintained between 2 and 40 degrees C.

### **3. Execution**

#### **3.1. PRELIMINARY EXAMINATION OF SITE**

- 3.1.1. Examine site and conditions likely to affect work and be familiar and conversant with existing conditions. Be aware of all difficulties involved and the logistics of delivering and operating plant and of delivering, handling, and storing materials on site. Pay particular attention to areas where vehicles are not permitted.
- 3.1.2. Submit photographs of surrounding properties, objects and structures liable to be damaged.
- 3.1.3. Before starting work, establish location and extent of services lines in area of work and notify Departmental Representative of findings.

#### **3.2. WORK LAY-OUT**

- 3.2.1. Undertake all layout and dimensional-control work. Check reference plan dimensions against field measurements. Notify Departmental Representative immediately of all discrepancies between field measurements and dimensions shown on plans or reference drawings.

#### **3.3. EXECUTION**

- 3.3.1. Execute work with least possible interference or disturbance to public's normal use of premises.
- 3.3.2. Cut existing surfaces as required to accommodate new work.
- 3.3.3. Remove all items shown or specified for removal and dispose out of site.
- 3.3.4. Patch and make good surfaces cut, damaged or disturbed, to Departmental Representative's approval. Match existing material, colour, finish and texture.
- 3.3.5. Snow Clearing
- 3.3.5.1. The Contractor will be responsible for clearing snow off deck and out of steam trench as required to effect work.
- 3.3.6. Dam Operation
- 3.3.6.1. PSPC may need to operate flow control equipment during time Work is taking place on site. The Contractor shall be prepared to remove tools and materials in the way of the stoplog lifter and close up generally such that Damkeepers can manipulate stoplogs. This is not likely to take more than a couple of hours. Contractor may resume work after water control operations are complete.

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### **3.4. EXPLOSIVES**

- 3.4.1. Do not use explosives.

### **3.5. CLEANING**

- 3.5.1. Clean up as work progresses as often as necessary to prevent a hazardous condition from arising and in any event, at least daily, and more often if ordered by Departmental Representative. Clean up involves removing debris from site, neatly stacking material for use, and cleaning up generally. Permit no undue amounts of debris, trash or garbage to accumulate.
- 3.5.2. Neither bury nor burn rubbish on site.
- 3.5.3. Separate and recycle all materials that can be recycled.
- 3.5.4. Place materials defined as hazardous or toxic waste in designated containers.
- 3.5.5. At completion of Work remove all scaffolding, temporary protection and surplus materials, tools, plant, rubbish and debris and dispose of them in an approved manner off Crown property.
- 3.5.6. Clean areas under contract to condition equal to what previously existed and to approval of Departmental Representative.

### **3.6. WASTE MANAGEMENT**

- 3.6.1. Comply with Environmental Protection Act, Ontario Regulations: O. Reg. 102/94 – Waste Audits and Waste Reduction Work Plans; and O. Reg. 103/94 – Industrial, Commercial and Institutional Source Separation Programs; for waste management on construction and demolition projects. Handle and dispose of hazardous or toxic materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.
- 3.6.2. Implement principles to reduce, reuse and recycle materials to extent that is possible.
- 3.6.3. Collect in orderly fashion following "materials designated for alternative disposal" and dispose of separately/ individually when possible.
- 3.6.4. Unless otherwise specified, materials for removal become Contractor's property and shall be taken from site.
- 3.6.5. Store all waste awaiting disposal minimum 10 metres from watercourse.
- 3.6.6. Do not bury waste or debris materials on site. Do not dispose of waste or volatile materials into watercourse, storm or sanitary sewers, catch basins or deck drains.
- 3.6.7. Do not wash foreign materials including garbage, sand, or debris, into watercourse or through deck drains.
- 3.6.8. Submit complete records of all removals from site for both hazardous and toxic waste including:
  - 3.6.8.1.1. Time and date of removal;



- 3.6.8.1.2. Description of material and quantities; and
- 3.6.8.1.3. Proof that materials have been received at approved Waste Processing Site or certified Waste Disposal Site as required.

### 3.7. PROTECTION AND RECTIFICATION

- 3.7.1. Protect finished work until take over.
- 3.7.2. Protect surroundings from damage during Work. Be responsible for all damage incurred to surroundings as a result of Work to the satisfaction of Departmental Representative.
- 3.7.3. Except as approved by Departmental Representative, repair restore, or replace to Departmental Representative's approval any and all utilities, structures, machinery, equipment, etc. damaged due to Work.
- 3.7.4. Repaired, replaced, or refinished items to be at least equal to those that existed immediately before damage occurred.
- 3.7.5. Protect public and keep site free from all hazards.
- 3.7.6. Contractor shall be liable to Her Majesty for any loss or damage to any property of Her Majesty arising out of performance of work whether or not such loss arises from causes beyond his control.

### 3.8. CLOSEOUT PROCEDURE AND SUBMITTALS

- 3.8.1. Acceptance of Work Procedures
  - 3.8.1.1. **Contractor's Inspection** — Conduct inspection of Work, identify deficiencies and defects, and repair as required to conform to Contract Documents.
    - 3.8.1.1.1. Notify Departmental Representative in writing of satisfactory completion of Contractor's inspection and submit verification that corrections have been made.
    - 3.8.1.1.2. Request Departmental Representative inspection.
  - 3.8.1.2. **Departmental Representative Inspection**
    - 3.8.1.2.1. Departmental Representative and Contractor to inspect Work and identify defects and deficiencies.
    - 3.8.1.2.2. Contractor to correct Work as directed.
  - 3.8.1.3. **Completion Tasks** — Submit written certificates in English or French that tasks have been performed as follows:
    - 3.8.1.3.1. Work: completed and inspected for compliance with Contract Documents.
    - 3.8.1.3.2. Defects: corrected and deficiencies completed.
    - 3.8.1.3.3. Equipment and systems: tested and fully operational.
    - 3.8.1.3.4. Certificates required by the TSSA: final approval.

3.8.1.3.5. Operation of systems: demonstrated to Departmental Representative.

3.8.1.3.6. Work: complete and ready for final inspection.

3.8.1.4. **Final Inspection**

3.8.1.4.1. When completion tasks are done, request final inspection of Work by Departmental Representative and Contractor.

3.8.1.4.2. When Work incomplete according to Departmental Representative, complete outstanding items and request re-inspection.

3.8.2. **As-Builts** — As work progresses, maintain accurate records to show deviations from contract drawings. Just prior to Departmental Representative's inspection for issuance of final certificate of completion, supply to the Departmental Representative one (1) set of white prints with all deviations neatly inked in. Departmental Representative will provide two sets of clean white prints for this purpose. Contractor to pay for all reproductions.

3.8.3. **Guarantees and Warranties** — Before completion of work, collect all manufacturer's warranties and deposit with Departmental Representative.

END OF SECTION

**Part 1 General****1.1 BACKGROUND**

- .1 An investigation into the presence of designated substances at the Rideau Falls East Dam was performed on May 23, 2013, in order to meet the requirements of Section 30 of the Ontario Occupational Health and Safety Act (OSHA), the revised statutes of Ontario, 1990, Chapter 0.1. The Canada Labour Code also stipulates under Part II Section 124, that every employer shall ensure that the health and safety of work of every person employed by the employer is protected.
- .2 By means of this Designated Substances Report ("DSR") for the Rideau Falls Dam, the Departmental Representative has informed the Contractor of designated substances that may be present and disturbed throughout the Work. The informed Contractor will then be able to impose appropriate health and safety precautions for all applicable personnel as required.
- .3 All bidders requesting tenders from potential subcontractors shall furnish this report to subcontractors.

**1.2 REGULATORY REQUIREMENTS**

- .1 As of July 1, 2010, the 11 designated substances in the Occupational Health and Safety Act and its corresponding regulations are the following:
  - .1 **Acrylonitrile:** O. Reg. 835 *Designated Substance – Acrylonitrile*, as amended by O. Reg. 490/09.
  - .2 **Arsenic:** O. Reg. 836 *Designated Substance – Arsenic*, as amended by O. Reg. 490/09.
  - .3 **Asbestos:**
    - .1 O. Reg. 278/05 as amended as amended by O. Reg. 490/09: *Designated Substance – Asbestos on Construction Projects and in Buildings and Repair Operations*.
    - .2 O. Reg. 347 *General – Waste Management*, as amended by O. Reg. 337/09.
    - .3 O. Reg. 490/09: *Designated Substance – Asbestos*.
    - .4 O. Reg. 837 *The Regulation Respecting Asbestos*, as amended by O. Reg. 490/09.
    - .5 Departmental Policy DP 057, Public Work Government Services Canada, *Asbestos Management*.
  - .4 **Benzene:** O. Reg. 839 *Designated Substance – Benzene*, as amended by O. Reg. 490/09.
  - .5 **Coke Oven Emissions:** O. Reg 840 *Designated Substance – Coke Oven Emissions*, as amended by O. Reg. 490/09.
  - .6 **Ethylene Oxide:** O. Reg. 841 *Designated Substance – Ethylene Oxide*, as amended by O. Reg. 490/09.
  - .7 **Isocyanates:** O. Reg 842 *Designated Substance – Isocyanates*, as amended by O. Reg 490/09.

.8 **Lead:**

- .1 O. Reg. 843 *Designated Substance – Lead*, as amended by O. Reg. 490/09.
- .2 O. Reg. 347 *General – Waste Management*, as amended by O. Reg. 337/09.
- .3 *Regulations Amending the Surface Coating Materials Regulations* SOR/2010-224

.9 **Mercury:**

- .1 O. Reg. 844 *Designated Substance – Mercury*, as amended by O. Reg. 490/09.
- .2 O. Reg. 347 *General – Waste Management*, as amended by O. Reg. 337/09.

.10 **Silica:** O. Reg. 845 *Designated Substance – Silica*, as amended by O. Reg. 490/09.

.11 **Vinyl Chloride:** O. Reg. 846 *Designated Substance – Vinyl Chloride*, as amended by O. Reg. 490/09.

### 1.3 VALIDITY

- .1 The proposed scope of work for this project consists of the following activities:
  - .1 Repairs and modification to steam and condensate pipes on West Dam
  - .2 Removal of condensate piping on East Dam
  - .3 Replacement of steam pipe on East Dam.
- .2 On May 23, 2013, a consultant conducted the on-site survey of the deck of the Rideau Falls East Dam.
  - .1 The scope of work for this Designated Substances Report involved a visual inspection of the materials of the dam for the presence of suspected designated substances. The visual inspection was limited to readily accessible areas on the dam deck.
  - .2 Materials suspected of containing the above listed designated substances were sampled and analysed, where appropriate.
  - .3 Due to the nature of dam construction, some inherent limitations exist as to the possible thoroughness of the designated substance survey. Further, no confined space was accessed for the purpose of this report. Hence, it is possible that the aforementioned designated substances are present in non-accessible areas and concealed spaces or confined spaces. No other areas outside the defined work boundaries have been assessed.

## Part 2 Designated Substances

### 2.1 GENERAL

- .1 There is a possibility that materials which could not be reasonably identified within the scope of this assessment or which were not apparent during previous site visits may exist. It is not expected that these would be disturbed during the work of this contract.

- .2 Should any designated substance be encountered in the course of the project, stop Work, take preventative measures, and notify the Departmental Representative immediately. Do not proceed until written instructions have been received.
- .3 Before starting work, confirm with the Departmental Representative that no additional designated substances have been brought to the project area since the time of the on-site survey.

## 2.2 DESIGNATED SUBSTANCES SURVEY RESULTS

- .1 **Acrylonitrile:** Not identified on dam deck.
- .2 **Arsenic:** Not identified on dam deck.
- .3 **Asbestos** — Potential friable asbestos-containing material was found in a type of plaster on the upstream walls of the utility chamber, just below the lid hinges. This plaster was analysed and was found to contain 1% chrysotile asbestos. This plaster is still extant. All other similar plaster encountered during work should be consider asbestos-containing until laboratory testing proves otherwise. Asbestos was found also on black caulking/tar applied to minor areas (less than one (1) square metre of the East dam concrete. No asbestos was found in the insulation of the steam and condensate piping systems on the East and West dam.
- .4 **Benzene:** Not identified on dam deck.
- .5 **Coke oven emissions:** Not identified on dam deck.
- .6 **Ethylene oxide:** Not identified on dam deck.
- .7 **Isocyanates:** Not identified on dam deck.
- .8 **Lead:** Not identified on dam deck.
- .9 **Mercury:** Not identified on dam deck.
- .10 **Silica:** The concrete of the dam is considered to contain free crystalline silica.
- .11 **Vinyl chloride monomer:** Not identified on dam deck.

## 2.3 ADDITIONAL MATERIALS

- .1 The following hazardous materials were also included in the on-site survey of May 23, 2013:
  - .1 **Ozone-depleting substances:** not identified on dam deck.
  - .2 **Polychlorinated biphenyls (PCBs):** not identified on dam deck.
  - .3 **Urea Formaldehyde Foam Insulation (UFFI):** The original pipe insulation present at the time of the survey was considered to be UFFI. It has since been removed and replaced with new insulation, thus there is no longer any UFFI present.
  - .4 **Mould and animal feces:** Should be considered present in the utility trench, as raccoons are often present there.
  - .5 **Microbial Contamination:** not identified on dam deck.

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**Part 3            Execution****3.1            CONTRACTOR'S DUTIES**

- .1      Review the designated substances report.
- .2      Take necessary precautions to protect health and safety of workers and the environment.
- .3      Exercise every reasonable precaution for the protection of workers and subcontractors.
- .4      Contact the Departmental Representative if you have any questions about the Designated Substances Report.

**3.2            RECOMMENDATIONS**

- .1      **Asbestos** — Do not disturb asbestos during Work.
- .2      **Silica** — Drilling of concrete may generate silica dust. Implement the measures and procedures outlined in the *Guideline Silica on Construction Projects* (Ontario Ministry of Labour, 2004), to control exposure to silica dust during drilling operations.
- .3      **Animal feces** — Provide appropriate protective equipment such as HEPA filter respirators and disposable coveralls.

**3.3            WASTE MANAGEMENT**

- .1      Do all generation, transportation and disposal of hazardous waste to the requirements of the Ontario General Waste Regulations O. Reg. 347/90.

**3.4            PROTECTION**

- .1      Any accidental release of designated substance into the environment would constitute a spill and as such, control, instruction and procedures as described in Section 01 35 43 *Environmental Procedures* must be followed.

**END OF SECTION**

**Part 1 General****1.1 REFERENCES**

- .1 Health Canada
  - .1 Safety Data Sheets (SDS) to Workplace Hazardous Materials Information System (WHMIS 2015).
- .2 Province of Ontario:
  - .1 Occupational Health and Safety Act, R.S.O. [1990 Updated 2005], as amended, O. Reg. 213/91 as amended by O. Reg. 631/94, O. Reg. 143/99, O. Reg. 571/99, O. Reg. 145/00, O. Reg. 527/00, R.R.O. 1990, Reg. 834, O. Reg. 838/90 (Asbestos - Construction) as amended by O. Reg. 510/92, O. Reg. 845/90 (Silica) as amended by O. Reg. 521/92 and O. Reg. 391/00.
  - .2 Workplace Safety and Insurance Act, 1997.
  - .3 Municipal statutes and authorities.
  - .4 Regulations for Construction Projects 213/91 as amended by Regulation 145/00.
  - .5 WHMIS 2015 Regulation – O. Reg. 860.
  - .6 Ontario Regulation 213/91, as amended.
- .3 Canadian Standards Association:
  - .1 CSA-S350-M1980 *Code of Practice for Safety in Demolition of Structures*
  - .2 CAN/CSA Z462-08 *Workplace Electrical Safety Standard*
  - .3 CAN/CSA Z460-05 (R2010) *Control of Hazardous Energy*
- .4 National Building Code of Canada 2015 as amended):
  - .1 Part 8 *Safety Measures at Construction and Demolition Sites*
- .5 *National Building Code of Canada 2015* (NBC) as amended for fire safety in construction
- .6 *National Fire Code of Canada 2010* (NFC) as amended for fire prevention, fire fighting and life safety in building in use.

**1.2 DEFINITIONS**

- .1 **Competent Person**
  - .1 Person with knowledge, training and expertise in organizing work and its performance.
  - .2 Person familiar with acts and regulations that apply to work.
  - .3 Person with knowledge of any potential or actual danger to Health and Safety in workplace.

**1.3 SUBMITTALS**

- .1 Submit the following within 72 hours of being awarded contract and before starting work:
  - .1 Proof of liability insurance paper with a valid clearance certificate from the Workplace Safety Insurance Board (WSIB).
  - .2 Copies of all workers' Certificate of Qualification or Apprentices Certificates for Trades.
  - .3 Employees and employer's Job Protection Cards and Registration (if applicable)

- .4 Registration of constructors and employers engaged in construction form completed and signed.
- .2 **Hazard Assessment Site-Specific Safety Plan (HASSSP)** — Submit HASSSP within 5 days after date of Notice to Proceed and before starting Work. Departmental Representative will review HASSSP and provide comments; revise as appropriate and resubmit plan within 24 hours after receipt of comments. Review of Contractor's final HASSSP should not be construed as approval and does not reduce the Contractor's overall responsibility for construction Health and Safety. HASSSP to include, but need not be limited to, the following:
  - .1 Results of site specific safety hazard assessment and of hazard analysis for site tasks required to complete Work, operations and procedures for managing identified hazards, and proof that personnel and sub-contractors have successfully completed safety-related training and have access to up-to-date personal protective equipment commensurate with identified hazards.
  - .2 Names of person and of alternates designated as Health and Safety Coordinator for the Work. Proof of training and qualifications of these persons.
  - .3 Safety Communication Plan including contact phone numbers.
  - .4 Company Health and Safety Policy containing Health and Safety Policy signed by highest level of management in the company.
  - .5 On-site Contingency and Emergency Response Plan addressing standard operating procedures to be implemented during emergency situations.
  - .6 Fire Safety Plan in accordance with NBC 2015 and NFC 2010.
  - .7 Company's standard procedures for use of Personal Protective Equipment.
  - .8 Proof of health and safety training for all individual workers on the project commensurate with identified hazards. Training includes but is not necessarily limited to: first aid, electrical hazards, fall protection, use of personal protective equipment.
- .3 Submit to Departmental Representative on a weekly basis the Health and Safety Coordinator's work site health and safety inspection reports and minutes of all safety talks.
- .4 Submit copies of reports or directions issued by Federal and Provincial health and safety inspectors. The Constructor shall immediately advise the Departmental Representative of any visit to the site by Federal and Provincial authorities, or health and safety inspectors, and submit to the Departmental Representative copies of reports or directions issued by such authorities within 24 hours after the visit.
- .5 Submit copies of incident and accident reports. The Constructor shall immediately advise the Departmental Representative of any incident, accident, injury, near-miss, fire, explosion or chemical spill occurring at the work site, and submit to the Departmental Representative copies of incident and accident reports within 24 hours after the event.
- .6 Submit WHMIS 2015 SDS (Safety Data Sheets) for all products used in Work.

#### 1.4 SAFETY ASSESSMENT

- .1 Perform site-specific safety hazard assessment related to project.

#### 1.5 EXPLOSIVES

- .1 Do not use explosives.



**1.6 FILLING OF NOTICE**

- .1 File Notice of Project with Ministry of Labour of Ontario.

**1.7 MEETINGS**

- .1 Schedule and administer Health and Safety meeting with Departmental Representative before starting Work.

**1.8 RESPONSIBILITY**

- .1 Be responsible for health and safety of persons on site, safety of property on site and for protection of persons adjacent to site and environment to extent that they may be affected by conduct of Work.
- .2 Assume the role of "Constructor" as described in Ontario Occupational Health & Safety Act and regulations for Construction Projects.
- .3 Comply with and enforce compliance by employees with safety requirements of Contract Documents, applicable federal, provincial and local statutes, regulations, and ordinances, and with site-specific Health and Safety Plan.
- .4 Comply with all applicable federal and provincial regulations.

**1.9 CURRENTLY KNOWN PROJECT AND SITE CONDITIONS**

- .1 Work at site will involve contact with:
  - .1 Working at heights.
  - .2 Working over water.
  - .3 Hand and power tools.
  - .4 Concrete drilling and concrete dust (including silicates).
  - .5 Fresh cementitious grout.
  - .6 Electrical hazards and welding.
  - .7 Pressure vessels (pipes, when undergoing pressure test).

**1.10 COMPLIANCE REQUIREMENTS**

- .1 Comply with all applicable Acts, Codes and Regulations of the province having jurisdiction, including but not necessarily limited to:
  - .1 *Occupational Health and Safety Act and Regulations for Construction Projects*, R.S.O. 1990, c. 0.1, as amended and O. Reg. 213/91, as amended.
  - .2 *CAN/CSA Z462-08 Workplace Electrical Safety Standard*.
  - .3 *CAN/CSA Z460-05 (R2010) Control of Hazardous Energy*.
  - .4 *National Building Code of Canada 2015* as amended.
  - .5 *National Fire Code of Canada 2010* as amended.

**1.11 POSTING OF DOCUMENTS**

- .1 Ensure applicable items, articles, notices and orders are posted in conspicuous location on site in accordance with Acts and Regulations of Ontario, and in consultation with Departmental Representative.

**1.12 HEALTH & SAFETY COORDINATOR**

- .1 Employ and assign to Work, one competent and authorized worker who, in addition to whatever other duties they have, acts as Health and Safety Co-ordinator.
- .2 Health and Safety Co-ordinator must:
  - .1 Have site related working experience specific to activities associated with Work.
  - .2 Have working knowledge of occupational safety and health regulations.
  - .3 Be responsible for completing Contractor's Health and Safety Training Sessions and ensuring that personnel not successfully completing required training are not permitted to enter site to perform Work.
  - .4 Be responsible for implementing, enforcing daily and monitoring site specific Contractor's Health and Safety Plan.
  - .5 Be on site during execution of Work.
- .3 Assign responsibility and obligation to other Competent Persons to stop or start work when, at Competent Persons' discretion, it is necessary or advisable for reasons of health and safety.

**1.13 UNFORSEEN HAZARDS**

- .1 When unforeseen or peculiar safety-related factor, hazard, or condition occur during performance of Work, follow procedures in place for Employee's Right to Refuse Work in accordance with Acts and Regulations of Province having jurisdiction and advise Departmental Representative verbally and in writing.

**1.14 CORRECTION OF NON-COMPLIANCE**

- .1 Immediately address health and safety non-compliance issues identified by authority having jurisdiction or by Departmental Representative.
- .2 Provide Departmental Representative with written report of action taken to correct non-compliance of health and safety issues identified.
- .3 Departmental Representative may stop Work if non-compliance of health and safety regulations is not corrected.

**1.15 PUBLIC SAFETY**

- .1 Take all precautions as stated in governing provincial regulations to ensure no person is exposed to undue risk.
- .2 Work site to be barred from public according to governing provincial regulations and to approval of Departmental Representative.

**1.16 WORK STOPPAGE**

- .1 Give precedence to safety and health of public and site personnel over cost and schedule considerations for Work.

**END OF SECTION**

**Part 1 General****1.1 REFERENCES**

- .1 Environmental Protection Act, Ontario Regulations O. Reg. 102/94 and O. Reg. 103/94. Regulations made under Ontario Environmental Protection Act, R.S.O. 1990, c. E.19.
  - .1 O. Reg. 347 Amended to O. Reg. 395/07 *General – Waste Management*
  - .2 O. Reg. 224/07 *Spill Prevention and Contingency Plans*
  - .3 R.R.O. 1990, Reg. 360 *Spills*
- .2 *Workplace Hazardous Materials Information System (WHMIS 2015).*
- .3 *Fisheries Act*, (R.S., 1985, c. F-14).
- .4 *Species at Risk Act* (S.C. 2002, c. 29)
- .5 *Canadian Environmental Protection Act*, 1999 (CEPA 1999).
- .6 *National Fire Code of Canada*, 2005.
- .7 *Transportation of Dangerous Goods Act (TDG Act)*, 1992 c. 34.
- .8 *Transportation of Dangerous Goods Regulations (TDG Regulations)*, T-19.01-SOR/2003-400.

**1.2 SUBMITTALS**

- .1 **Site-Specific Environmental Protection Plan (SSEPP)** —Submit SSEPP within 5 days of award of Contract and before starting Work. Discuss methods and procedures for the protection of environment during Work. Address topics at level of detail commensurate with Work. Divide SSEPP into the following sections:
  - .1 **Part 1 - Identification** —List all types and sources of contaminating or polluting materials that will be present on site during Work.
  - .2 **Part 2 - Environmental Protection Measures** —Methods for preventing these materials from entering or damaging surrounding environment.
  - .3 **Part 3 - Environmental Emergency Procedures** —Contact Manufacturers of products and equipment you will be using and ascertain hazards involved, precautions required, and measures used in spill cleanup or mitigating action. Design spill response and stock spill response materials that are compatible with type of material being handled.
  - .4 **Part 4 - Waste Disposal Methods** —Describe methods, equipment, frequency, of work involved in gathering, storing, and disposal of wastes from site.

**1.3 DEFINITIONS**

- .1 **Deleterious material** — Substances that, if added to a water body, could degrade water quality or adversely affect fish, fish habitat and aquatic wildlife. This includes, but is not limited to, oil, diesel, or gasoline.
- .2 **Drip line** — Location on ground surface directly beneath a theoretical line described by tips of outermost branches of trees.
- .3 **Barrier** — Fence consisting of approved material, supported by steel posts and being a minimum of 1.2 m high, without breaks or unsupported sections.

**1.4 FIRES**

- .1 Do not light fires or burning of waste and debris.

**1.5 EXPLOSIVES**

- .1 Do not use explosives.

**1.6 WORK ADJACENT TO WATERWAYS**

- .1 Do not release any Deleterious Material into watercourse. Do not dump waste material or debris into watercourse.
- .2 Ensure all equipment and temporary access structures such as scaffolding placed in water bodies is free of earth material, and excess, loose or leaking fuel, lubricants, coolant and other Deleterious Material that could enter water body.

**1.7 PLANT AND TREE PROTECTION**

- .1 Protect trees and plants on site and adjacent properties.
- .2 Minimize damage to areas with grass cover. Make good all damage to grass.
- .3 Provide Barrier around trees which would otherwise be affected by Work. Locate Barrier 1 metre beyond Drip line. Barrier to consist of a protective wood framework covered with plastic construction fence material, extending from grade level to a height of 2 metres. Maintain Barriers in good repair throughout duration Work. Remove Barriers upon completion of Work.
- .4 Repair of damage to trees as a result of Contractor's operations:
  - .1 Broken branches 25mm or greater in diameter: cut back cleanly at break, or to within 10mm of their base, if a substantial portion of branch is damaged. Departmental Representative will direct.
  - .2 Exposed roots 25mm or larger: cut back cleanly to soil surface within five calendar days of exposure.
  - .3 Damaged bark: neatly trim back to un-injured bark, without causing further injury, within five calendar days of damage.

**1.8 NOISE CONTROL**

- .1 Comply with municipal noise by-laws.

**1.9 DUST AND POLLUTION CONTROL**

- .1 Prevent dust, debris, and other extraneous materials from contaminating air beyond work area by providing the necessary control of dust and debris.

**1.10 OPERATION AND MAINTENANCE OF EQUIPMENT**

- .1 Provide drip trays to prevent discharge of oil, grease, antifreeze, or any other materials into ground or onto dam deck.
- .2 All equipment: to meet or exceed all applicable emission requirements.
- .3 Leave machinery running only while in actual use, except where extreme temperatures prohibit shutting machinery down. Prevent any and all hydrocarbons from entering watercourse. Do not refuel, perform oil changes, or any and all other maintenance on

equipment parked or placed within 5 metres of water; remove it to farther away from the watercourse before undertaking these operations.

#### **1.11 SPILLS**

- .1 Maintain vehicles and equipment in good working condition to avoid leaks and spills of hazardous materials. Vehicles and equipment to arrive on-site in clean condition and maintained free of fluid leaks. Wash, refuel and service vehicles and equipment and store fuel away from water to prevent harmful substances from entering watercourse.
- .2 Be prepared to immediately mitigate, intercept, clean up, and dispose of spills or releases that may occur whether on land or on water, to the procedures described in reviewed Site-Specific Environmental Protection Plan. Spill kit, which must be on-site at all times, may include, but is not necessarily limited to: containers, adsorbent floating boom/skimmer, shovels, and personal protective equipment. Be responsible for all costs of cleaning up any spills.
- .3 Reporting: Promptly report spills and releases potentially causing damage to environment to the following persons:
  - .1 Departmental Representative
  - .2 Ministry of Environment Spill Action Centre at 1-800-268-6060
  - .3 Authority having jurisdiction or interest in spill or release including conservation authority, water supply authorities, drainage authority, road authority, and fire department.
  - .4 Owner of pollutant, if known.
  - .5 Person having control over pollutant, if known.

#### **1.12 QUALITY ASSURANCE**

- .1 Departmental Representative will notify Contractor in writing of observed noncompliance with Federal, Provincial or Municipal environmental laws or regulations.
- .2 Contractor to inform Departmental Representative of proposed corrective action and proceed only when written approval of Departmental Representative is received.
- .3 Departmental Representative may issue stop work order until satisfactory corrective action has been taken. No time extensions granted or equitable adjustments allowed to Contractor for such suspensions.

**END OF SECTION**

PART 1 GENERAL1.1 RELATED SECTIONS

- .1 Section 01 00 10 – General Instruction
- .2 Section 01 35 29 06 Health & Safety
- .3 Section 01 74 11 Cleaning

1.2 SUBMITTALS

- .1 Provide submittals in accordance with Section 01 00 10 – General Instructions.

1.3 INSTALLATION AND REMOVAL

- .1 Provide temporary utilities controls in order to execute work expeditiously.
- .2 Remove from site all such work after use.

1.4 WATER SUPPLY

- .1 Provide continuous supply of potable water for construction use.
- .2 Arrange for connection with appropriate utility company and pay costs for installation, maintenance and removal.
- .3 Pay for utility charges at prevailing rates.

1.5 TEMPORARY POWER AND LIGHT

- .1 Existing services required for the work may not be used by Contractor without prior approval of Departmental Representative. Ensure capacity is adequate prior to imposing additional loads. Connect and disconnect at own expense and responsibility
- .2 Provide and maintain temporary power and lighting throughout project. Ensure level of illumination is not less than 162 lx.
- .3 Contractors to provide their own welding power source. NRC CHCP Plant welding receptacles are not for contractor's use.

1.6 TEMPORARY COMMUNICATION FACILITIES

- .1 Provide and pay for temporary telephone, fax, data hook up lines, as well as equipment necessary for own use.

1.7 FIRE PROTECTION

- .1 Provide and maintain temporary fire protection equipment during performance of Work required by governing codes, regulations and bylaws.
- .2 Burning rubbish and construction waste materials is not permitted on site.

1.8 NOTIFICATION

- .1 Notify the Departmental Representative and utility companies of intended interruption of services and obtain requisite permissions and approval from Departmental Representative.
- .2 Give the Departmental Representative 14-day notice related to each necessary interruption of any mechanical or electrical service throughout the course of the work. Keep duration of these interruptions to a minimum. Carry out all interruptions after normal working hours of the occupants, preferably on weekends.
- .3 Give the Departmental Representative 14-day notice related to building isolation of steam or chilled water.

PART 2 PRODUCTS2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION3.1 NOT USED

- .1 Not Used.

**END OF SECTION**

PART 1 GENERAL1.1 RELATED SECTIONS

- .1 Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.
- .2 Section 33 65 13 – Telethermics – Distribution Piping – Steel.

1.2 REFERENCES

- .1 Canadian Standards Association (CSA International).
  - .1 CSA B31.3, Installation code for Process Pressure Piping

1.3 DELIVERY, STORAGE AND HANDLING

- .1 Deliver, store and handle materials in accordance with Section 01 00 10 – General Instructions and with manufacturer's written instructions.
- .2 Delivery and Acceptance Requirements:
  - .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.
- .3 Packaging Waste Management: remove for reuse and return by manufacturer of pallets crates padding and packaging materials in accordance with good practices in the field of construction/demolition waste management and disposal.

PART 2 PRODUCTS2.1 NOT USED

- .1 Not Used.

PART 3 EXECUTION3.1 APPLICATION

- .1 Comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

3.2 CONNECTIONS TO EQUIPMENT

- .1 In accordance with manufacturer's instructions, drawing, and Section 33 65 13.
- .2 Use valves and either unions or flanges for isolation and ease of maintenance and assembly.
- .3 Provide fabrication drawings and seek acceptance from Departmental Representative before fabricating and installing any sections that will connect to new or existing equipment



### 3.3 CLEARANCES

- .1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer. Coordinate piping installation and spacing to allow installation of all components such as valves, joints, expansion specialties, and insulation
- .2 Provide space for disassembly, removal of equipment and components as recommended by manufacturer or as indicated without interrupting operation of other system, equipment, and components.

### 3.4 DRAINS

- .1 Install drain valve at low points as shown on drawing.

### 3.5 PIPEWORK INSTALLATION

- .1 Screwed fittings jointed with Teflon tape.
- .2 Protect openings against entry of foreign material.
- .3 Install to isolate equipment and to allow removal without interrupting operation of other equipment or systems.
- .4 Assemble piping using fittings manufactured to ANSI standards.
- .5 Saddle type branch fittings may be used on mains if branch line is no larger than half size of main.
  - .1 Hole saw (or drill) and ream main to maintain full inside diameter of branch line prior to welding saddle.
- .6 Install exposed piping and equipment parallel or perpendicular to trenches and bridge abutment lines.
- .7 Slope piping, except where indicated, in direction of flow for positive drainage and venting.
- .8 Install, except where indicated, to permit separate thermal insulation of each pipe.
- .9 Ream pipes, remove burrs, scale and other foreign material before assembly.
- .10 Use eccentric reducers at pipe size changes to ensure positive drainage and venting.
- .11 Provide for thermal expansion as indicated.
- .12 Valves:
  - .1 Install in accessible locations.
  - .2 Remove interior parts before soldering.
  - .3 Install with stems above horizontal position unless indicated.

- .4 Valves should be accessible for maintenance without removing adjacent piping.
- .5 Use gate, ball or butterfly valves at branch take-offs for isolating purposes except where specified.

### 3.6 FLUSHING OUT OF PIPING SYSTEMS

- .1 Flush system in accordance with Section 23 08 02 - Cleaning and Start-up of Mechanical Piping Systems.
- .2 Before start-up, clean interior of piping systems in accordance with requirements of Section 23 08 02 Flushing and Cleaning.
- .3 Preparatory to acceptance, clean and refurbish equipment and leave in operating condition, including replacement of strainers in piping systems.

### 3.7 PRESSURE TESTING OF EQUIPMENT AND PIPEWORK

- .1 Advise Departmental Representative 48 hours minimum before doing pressure tests.
- .2 Test pipework as specified in relevant section of Section 33 65 13 – Telethermics – Distribution Piping – Steel.
- .3 Prior to tests, isolate equipment and other parts which are not designed to withstand test pressure or media, e.g. pressure gauges, relief valves, etc.
- .4 Conduct tests in presence of Departmental Representative. Test may also have to be coordinated with the Authority having Jurisdiction, namely the TSSA in this case.
- .5 Insulate or conceal work only after approval and certification of tests by Departmental Representative.

### 3.8 EXISTING SYSTEMS

- .1 Connect into existing piping systems at times approved by Departmental Representative.
- .2 Request written approval by Departmental Representative 10 days' minimum, before starting work.
- .3 Be responsible for damage to existing plant by this work.

**END OF SECTION**

PART 1      GENERAL1.1          RELATED SECTIONS

- .1      33 65 13 Telethermics – Distribution Piping - steel

1.2          REFERENCES

- .1      American National Standards Institute/American Society of Mechanical Engineers (ANSI/ASME).
  - .1      ANSI/ASME B16.11-2009, Forged Fittings, Socket-Welding and Threaded
  - .2      ANSI/ASME B31.1-2010, Power Piping.
  - .3      ANSI/ASME B31.3-2008, Process Piping.
  - .4      ASME Boiler and Pressure Vessel Code (BPVC):
    - .1      BPVC 2007 Section I: Power Boilers.
    - .2      BPVC 2007 Section V: Nondestructive Examination.
    - .3      BPVC 2007 Section IX: Welding and Brazing Qualifications.
- .2      American National Standards Institute/American Water Works Association (ANSI/AWWA).
  - .1      ANSI/AWWA C206-03, Field Welding of Steel Water Pipe.
- .3      American Welding Society (AWS).
  - .1      AWS B3.0-1977, Welding Procedure and Performance Qualification (Historical).
  - .2      AWS C1.1M/C1.1-2000 (R2006), Recommended Practices for Resistance Welding.
  - .3      AWS Z49.1-2005, Safety in Welding, Cutting and Allied Process.
  - .4      AWS W1-2000, Welding Inspection Handbook.
- .4      Canadian Standards Association (CSA International).
  - .1      CSA W47.2-M1987 (R2008), Certification of Companies for Fusion Welding of Aluminum.
  - .2      CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding.
  - .3      CSA W48.1-M1991 (1998), Carbon Steel Covered Electrodes for Shielded Metal Arc Welding.
  - .4      CSA B51-09, Boiler, pressure vessel, and pressure piping code Includes Update No. 1 (2009).
  - .5      CSA-W117.2-06, Safety in Welding, Cutting and Allied Processes.
  - .6      CSA W178.1-08, Certification of Welding Inspection Organizations.
  - .7      CSA W178.2-08, Certification of Welding Inspectors.

### 1.3 SUBMITTALS

- .1 Coordinate with the Authority having Jurisdiction (the TSSA) for the welders' certifications and construction materials used for the fabrication of the pressure piping.

### 1.4 QUALITY ASSURANCE

- .1 Qualifications:
  - .1 Welders:
    - .1 Welding qualifications in accordance with CSA B51.
    - .2 Use qualified and licensed welders possessing certificate for each procedure performed from Authority Having Jurisdiction.
    - .3 Submit welder's qualifications to Departmental Representative.
    - .4 Each welder to possess identification symbol issued by the Authority Having Jurisdiction.
  - .2 Inspectors:
    - .1 Inspectors qualified to CSA W178.2.
  - .3 Certifications:
    - .1 Registration of welding procedures in accordance with CSA B51.
    - .2 Copy of welding procedures available for inspection.
    - .3 Safety in welding, cutting and allied processes in accordance with CSA-W117.2.

### 1.5 DELIVERY, STORAGE AND HANDLING

- .1 Deliver materials to site in original factory packaging, labelled with manufacturer's name, address.

## PART 2 PRODUCTS

### 2.1 ELECTRODES

- .1 Electrodes: in accordance with CSA W48 Series.
- .2 Store in dry, heated area free of moisture and dampness. Damaged rods or electrodes will be rejected
- .3 Use dry oven to ensure rod integrity is maintained.

## PART 3 EXECUTION

### 3.1 APPLICATION

- .1 Comply with manufacturer's written recommendations, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### 3.2 QUALITY OF WORK

- .1 Welding: in accordance with ANSI/ASME B31.1, B31.3, ANSI/ASME Boiler and Pressure Vessel Code, Sections I and IX and ANSI/AWWA C206, using procedures conforming to AWS B3.0, AWS C1.1, and special procedures specified elsewhere in Division 15 applicable requirements of provincial Authority Having Jurisdiction.

### 3.3 INSTALLATION REQUIREMENTS

- .1 Identify each weld with welder's identification symbol.
- .2 Backing rings:
  - .1 Where used, fit to minimize gaps between ring and pipe bore.
  - .2 Do not install at orifice flanges.
- .3 Fittings:
  - .1 NPS 50 and smaller: install welding type sockets.
  - .2 Branch connections: install welding tees or forged branch outlet fittings.
- .4 Welding:
  - .1 Prepare field bevels and shop bevels by mechanical means or flame cutting in conformance with recognized standards. Clean bevels of scale and oxidation just before welding.
  - .2 Provide full penetration welds. Use welding sockets for joints 50 mm or under, conforming to ANSI B16.11.
  - .3 Preheat to 10°C minimum in accordance with ANSI B31.1 if ambient temperature is lower.

### 3.4 INSPECTION AND TESTS - GENERAL REQUIREMENTS

- .1 Review weld quality requirements and defect limits of applicable codes and standards with Departmental Representative before work is started.
- .2 Formulate "Inspection and Test Plan" in co-operation with Departmental Representative.
- .3 Do not conceal welds until they have been inspected, tested and approved by inspector.
- .4 Provide for inspector to visually inspect welds during early stages of welding procedures in accordance with Welding Inspection Handbook. Repair or replace defects as required by codes and as specified.

### 3.5 SPECIALIST EXAMINATIONS AND TESTS

- .1 General:
  - .1 Perform examinations and tests by specialist qualified to CSA W178.1 and CSA W178.2 and approved by the Departmental Representative.
  - .2 Perform examinations and tests to ANSI/ASME Boiler and Pressure Vessels Code, Section V, CSA B51 and requirements of Authority Having Jurisdiction.
  - .3 Inspect and test 20% of field welds, as well as 100% of bench welds in accordance with "Inspection and Test Plan" by non-destructive visual

examination and full gamma ray radiographic (hereinafter referred to as "radiography") tests.

- .2 Hydrostatically test welds to ANSI/ASME B31.1. Comply with Section 33 65 13 – Telethermics – Distribution Piping – steel for the pressure test.
- .3 Visual examinations: include entire circumference of weld externally and wherever possible internally.
- .4 Failure of visual examinations:
  - .1 Upon failure of welds by visual examination, perform additional testing as directed by Departmental Representative of total of up to 10% of welds, selected at random by Departmental Representative by radiographic tests.
- .5 Full radiographic tests for all piping systems.
  - .1 Radiograph over full circumference up to 10% of welds for chilled water piping systems, selected at random by Departmental Representative from welds which would be most difficult to repair in event of failure after system is operational.
  - .2 Radiographic film:
    - .1 Identify each radiographic film with date, location, name of welder, and submit to Departmental Representative. Replace film if rejected because of poor quality.
  - .3 Interpretation of radiographic films:
    - .1 By qualified radiographer.
  - .4 Failure of radiographic tests:
    - .1 Extend tests to all welds by welder responsible when those welds fail tests.

### 3.6 DEFECTS CAUSING REJECTION

- .1 As described in ANSI/ASME B31.1 and ANSI/ASME Boiler and Pressure Vessels Code.
- .2 In addition, steam, condensate, and HP Drip:
  - .1 Undercutting greater than 0.8 mm adjacent to cover bead on outside of pipe.
  - .2 Undercutting greater than 0.8 mm adjacent to root bead on inside of pipe.
  - .3 Undercutting greater than 0.8 mm at combination of internal surface and external surface.
  - .4 Incomplete penetration and incomplete fusion greater than total length of 38 mm in 1500 mm length of weld depth of such defects being greater than 0.8 mm.
  - .5 Repair cracks and defects in excess of 0.8 mm in depth.
  - .6 Repair defects whose depth cannot be determined accurately on basis of visual examination or radiographic tests.
- .3 Failure to meet radiographic requirements.

- .4 Welding performed by unqualified personnel.
- .5 Welds not reasonably uniform in appearance.
- .6 Evidence of peening.
- .7 Cracks.
- .8 Oxidation of welds.
- .9 Lack of fusion.
- .10 Presence of porosity, slag inclusion, or overlaps.
- .11 Undercutting adjacent to completed welds or evidence of undercutting by grinding.
- .12 Burn-through.

### 3.7 REPAIR OF WELDS WHICH FAILED TESTS

- .1 Replace welds of poor or doubtful quality.
- .2 Re-inspect and re-test repaired or re-worked welds.

**END OF SECTION**

PART 1 GENERAL1.1 REFERENCES

- .1 Health Canada/Workplace Hazardous Materials Information System (WHMIS 2015)
  - .1 Safety Data Sheets (SDS).

1.2 SUBMITTALS

- .1 Product Data:
  - .1 Manufacturer's printed product literature, specifications and datasheet. Include product characteristics, performance criteria, and limitations.
- .2 Quality assurance submittals:
  - .1 Submit manufacturer's installation instructions.

PART 2 PRODUCTS2.1 CLEANING SOLUTIONS

- .1 Sodium carbonate: 0.40 kg per 100 L water in system.
- .2 Low-foaming detergent: 0.01 kg per 100 L water in system.
- .3 Provide all the necessary piping, valves, pumps, pot feeders to complete the flushing and cleaning of the piping.

PART 3 EXECUTION3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

3.2 CLEANING PIPING SYSTEMS

- .1 Provide all the necessary piping, valves, pump, pot feeders to complete the flushing and cleaning of the piping.
- .2 Timing: systems operational, hydrostatically tested and with safety devices functional, before cleaning is carried out.
- .3 Cleaning Agency:
  - .1 Retain qualified water treatment specialist to perform system cleaning.



- .4 Install instrumentation such as flow meters, orifice plates, pitot tubes, flow metering valves only after cleaning is certified as complete by water treatment specialist.
- .5 Cleaning procedures:
  - .1 Provide detailed report outlining proposed cleaning procedures at least 4 weeks prior to proposed starting date. Report to include:
    - .1 Cleaning procedures, flow rates, elapsed time.
    - .2 Chemicals and concentrations used.
    - .3 Inhibitors and concentrations.
    - .4 Specific requirements for completion of work.
    - .5 Special precautions for protecting piping system materials and components.
    - .6 Complete analysis of water used to ensure water will not damage systems or equipment.
- .6 Conditions at time of cleaning of systems:
  - .1 Systems: free from construction debris, dirt and other foreign material.
- .7 Report on Completion of Cleaning:
  - .1 When cleaning is completed, submit report, complete with certificate of compliance with specifications of cleaning component supplier.

**END OF SECTION**

## PART 1 - GENERAL

### 1.1 Related Sections

- .1 Section 33 65 13 - Telethermics - Distribution Piping - Steel.

### 1.2 References

- .1 American National Standards Institute (ANSI)
  - .1 ANSI/NFPA 255-2006, Surface Burning Characteristics of Building Materials.
- .2 American Society for Testing and Materials (ASTM)
  - .1 ASTM A 167-97, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
  - .2 ASTM C 411-2019, Test Method for Hot-Surface Performance of High-Temperature Thermal Insulation.
- .3 Canadian General Standards Board (CGSB)
  - .1 CAN/CGSB-51.2-95, Calcium Silicate Thermal Insulation for Piping, Machinery and Boilers.
  - .2 CAN/CGSB-51.9-95, Mineral Fiber Thermal Insulation, for Piping and Round Ducting.
  - .3 CAN/CGSB-51.12-95, Thermal Insulating and Finishing Cement.
  - .4 CGSB 51-GP-52Ma-89, Vapour Barrier, Jacket and Facing Material for Pipe, Duct and Equipment Thermal Insulation.
- .4 Underwriters Laboratories of Canada (ULC)
  - .1 CAN/ULC-S102-[M88], Surface Burning Characteristics of Building Materials and Assemblies.

### 1.3 Product Data and Shop Drawings

- .1 Submit product data and shop drawings.
- .2 Indicate:
  - .1 Manufacturers recommendations for application of insulation to valves, fittings, etc.
  - .2 Manufacturers installation instructions

### 1.4 Regulatory Requirements

- .1 Flame spread and smoke development: to ANSI/NFPA 255 and CAN/ULC-S102. ANSI/NFPA 255 et
  - .1 Flame spread - maximum 25.
  - .2 Smoke development - maximum 50.
- .2 Testing: to ASTM C 411.

## PART 2 - PRODUCTS

### 2.1 Formed Mineral Fibre (TP-1)

- .1 Application: all heated telethermics distribution piping systems (steam, condensate, HP drip) except directly buried systems and insulated plastic jacketed systems.
- .2 Materials:
  - .1 Rigid mineral fibre to CAN/CGSB-51.9, having thermal resistivity of 28 to 32 m.°C/W at ambient temperature of 15 to 32°C.

## .3 Thicknesses:

## .1 Single or multiple layers to total thickness as following table:

	Nominal Pipe Size				
Fluid Temp °C	Up to 25	32 to 50	65 to 100	150 to 200	250 and above
Steam	25	38	51	51	51
Condensate return					

2.2 Fastenings for Mineral Fibre Insulation

## .1 Materials:

## .1 Tape: self-adhesive.

## .2 Lap seal adhesive for joints and lap-sealing of vapour barriers: quick-setting

## .3 Straps: type 304 stainless steel, 13 x 0.5 mm, dead soft annealed.

2.3 Insulation Cement

## .1 To CAN/CGSB-51.12.

2.4 Insulation Protection Shields, Saddles

## .1 To Section 33 65 13 - Telethermics - Distribution Piping - Steel.

2.5 Jackets

## .1 Aluminum alloy:

## .1 Crimped or embossed, 0.4 mm thick, with longitudinal slip joints and 50 mm end laps, with factory attached protective liner on interior surface and with aluminum alloy butt straps with mechanical fasteners. Aluminum alloy jackets for fittings to have die-shaped components.

2.6 Forming Jacket for polyurethane foam

## .1 For piping that is part of underground system at tie-in points: Galvanized Carbon Steel sheet 12 gauge thickness to form around fiber insulation and jacket prior to injecting insulation foam for water proofing

2.7 Insulation foam to be injected between 12 ga. Galvanized Carbon Steel sheet and aluminium jacket

## .1 Polyurethane foam in accordance with ASTM C591. The polyurethane foam shall fill the annular space between the fiber insulation jacket and the forming jacket. The foam shall be :

1. Two component Urethane
2. Compressive strength 170 kPa parallel to rise (minimum at 50% compression)
3. Shrinkage: none at 1 to 21 °C
4. Free rise density: 32 kg/m<sup>3</sup>
5. K value of 0.02 W/m-°K at 24 °C

2.8 Sleeve around polyurethane foam

1. Use yellow shrink wrap for underground piping application

## PART 3 - EXECUTION

### 3.1 Application

- .1 Apply insulation after all tests have been completed and accepted by Departmental Representative.
- .2 Apply insulation to:
  - .1 New telethermics distribution piping.
  - .2 Existing telethermics distribution piping where the insulation has been removed, disturbed or damaged by work of this contract.
  - .3 Insulation and surfaces to be clean and dry during installation and during application of finishes.
  - .4 Apply insulation and finishes in accordance with manufacturer's recommendations and as specified herein.
  - .5 Install high density insulation under hanger shields.
  - .6 Maintain integrity of vapour barrier over full length of pipe without any interruptions whatsoever

### 3.2 Installation

- .1 Preformed:
  - .1 Up to NPS 100: sectional.
- .2 Install insulation tight to insulated work.
- .3 Place longitudinal joints on top of piping.
- .4 Multi-layered: staggered butt joint construction.
- .5 Vertical pipe over NPS 75: install insulation supports welded to pipe directly above lowest fitting. Thereafter, at 4.5 m intervals.
- .6 Expansion joints in insulation: terminate single layer and each layer of multiple layers in straight cut at intervals recommended by manufacturer. Leave 25 mm void between terminations. Pack void loosely with mineral fibre.
- .7 Piping expansion joints: provide for adequate movement without damage to insulation, vapour barrier or finishes.
- .8 At Orifice flanges, Expansion Joints, Valves: use split insulation lined aluminum boxes to permit easy disassembly and replacement.
- .9 Unions, other components requiring regular maintenance: install insulation and finishes to permit easy disassembly and replacement without damage to adjacent insulation, vapour barrier or finishes.
- .10 Fittings: insulate with mitred sections of pipe insulation, galvanized wire and insulating cement.
- .11 Weld beads: gouge out insulation where interferences prevent tight fit to pipe.
- .12 Guides, saddles, shields: full thickness of insulation.
- .13 Saddles, supports, hangers, clamps, guides: trim neatly and closely. Seal with insulating cement.

.14 Seal and finish exposed ends and other terminations of all insulation with insulating cement.

.15 Insulation, finishes, jackets to be undamaged by pipe movement.

### 3.3 Fastenings

.1 Secure pipe insulation at each end and in centre of each section, but not greater than 900 mm on centres.

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— END —

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PART 1      GENERAL1.1      RELATED SECTIONS

- .1      Section 23 05 05 - Installation of Pipework.
- .2      Section 23 05 17 - Welding.

1.2      REFERENCE

- .1      American Society for Testing and Materials International (ASTM)
  - .1      ASTM A 53/A 53M-12, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated Welded and Seamless.
  - .2      ASTM A 105/A 105M-14, Standard Specification for Carbon Steel Forgings, for Piping Application.
  - .3      ASTM A 106/A 106M-14, Standard Specification for Seamless Carbon Steel Pipe for High Temperature Service.
  - .4      ASTM A 108-13, Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
  - .5      ASTM A 181/A 181M-14, Standard Specification for Carbon Steel Forgings, for General-Purpose Piping.
  - .6      ASTM A 193/A 193M-14a, Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature or High Pressure Service and Other Special Purpose Applications.
  - .7      ASTM A 194/A 194M-14a, Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High Temperature Service, or Both.
  - .8      ASTM A 216/A 216M-14e1, Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding for High-Temperature Service.
  - .9      ASTM A 234/A 234M-14, Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
  - .10     ASTM A 278/A 278M-01(2011), Standard Specification for Gray Iron Castings for Pressure-Containing Parts for Temperature Up to 650 Degrees F (350 Degrees C).
  - .11     ASTM A 307-14, Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile.
- .2      American National Standards Institute (ANSI) / American Society of Mechanical Engineers (ASME)
  - .1      ANSI/ASME B1.20.1-2013, Pipe Threads, General Purpose (Inch).
  - .2      ANSI/ASME B31.1-2014, Power Piping.
- .3      Canadian General Standards Board (CGSB)
  - .1      CAN/CGSB-14.5-M88, Thermometers, Bimetallic, Self-Indicating, Commercial/Industrial Type.

- .4 Health Canada, Workplace Hazardous Materials Information System (WHMIS 2015)
  - .1 Safety Data Sheets (SDS).
- .5 Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS).
  - .1 MSS SP-58-2009, Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation.

### 1.3 SUBMITTALS

- .1 The steam and condensate piping falls in the category of Pressure Piping and shall therefore bear the necessary approvals by the Authority having Jurisdiction (Namely the Technical Standards and Safety Authority in Ontario.)
- .2 Product Data:
  - .1 Submit manufacturer's printed product literature, specifications and datasheet and include product characteristics, performance criteria, physical size, finish and limitations.
  - .2 Submit WHMIS SDS - Safety Data Sheets.
- .3 Shop Drawings:
  - .1 Include plans, elevations, sections and/or piping isometrics and/or construction details, including:
    - .1 Prefabricated sections with field connection points.
    - .2 Branch connections.
    - .3 Equipment connections
    - .4 Pipe supports.
    - .5 Expansion joints, anchors, and guides.
    - .6 Valves and Steam quick connect fittings.
    - .7 Steam Traps and check valves
    - .8 Pipeline identification data.
  - .2 Shop drawings for alternative systems for expansion loops (if proposed): include calculations based on temperature between minus 18 degrees C and system operating temperature plus 25%. Obtain Departmental Representative's acceptance before fabrication.
  - .3 Expansion joints: include relevant engineering data.
- .4 Quality assurance submittals: submit following:
  - .1 Test reports: submit certified test reports for specified materials from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.
  - .2 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.
  - .3 Manufacturer's Instructions: submit manufacturer's installation instructions and special handling criteria, installation sequence, and cleaning procedures.
- .5 Closeout submittals:
  - .1 Provide operation and maintenance data

- .2 Record Drawings: provide, and include the following information:
  - .1 Information relating to elevations, inverts and location of piping, branches, anchors, expansion joints.
  - .2 Valve data.
  - .3 Details of permanent instrumentation.
  - .4 Details of permanent provisions for temporary instrumentation.
  - .5 Access points.
  - .6 Details of pipe grades, vents, drip points.
  - .7 Drainage provisions at low points
  - .8 Ventilation of manholes, valve chambers.
  - .9 Existing services uncovered during installation.
  - .10 Existing services known to exist within 3m of installation.

#### 1.4 QUALITY ASSURANCE

- .1 Convene pre-installation meeting one (1) week prior to beginning work of this Section and on-site installation, with Contractor's Representative and Departmental Representative to:
  - .1 Verify project requirements.
  - .2 Review installation and substrate conditions.
  - .3 Co-ordination with other subtrades and Dam Operations.
  - .4 Review manufacturer's installation instructions and warranty requirements

#### 1.5 SYSTEM START-UP

- .1 Provide continuous supervision during start-up.
- .2 Upon start-up, bring mains up to temperature and pressure slowly over a 24 hour period.
- .3 After system is in operation and under maximum temperatures and pressures:
  - .1 Tighten bolts on flanges, using torque wrench; repeat several times during commissioning.
  - .2 Check operation of drain valves and vent valves.
- .4 Expansion joints: during cooling down, monitor carefully to ensure complete freedom of movement. If binding occurs, shut down system, re-align and repeat start-up procedures.
- .5 Anchors, guides, supports:
  - .1 Monitor at all times during start-up and commissioning to ensure operation as designed.
  - .2 Adjust pipe supports and guides to ensure free movement.
- .6 Full scale tests: upon completion, conduct full scale tests at maximum design flow rates, operating temperatures and pressures for continuous consecutive period of six (6) hours.



## 1.6 COMMISSIONING

- .1 Provide three (3) days written notice to Departmental Representative of intention to start up, test, and adjust.
- .2 Start up systems only after written approval of installation Departmental Representative coordinating with the NRC CHCP personnel.

## 1.7 MAINTENANCE

- .1 Furnish special tools for maintenance of systems and equipment.
- .2 Include following:
  - .1 Lubricant gun for expansion joints.

## PART 2 PRODUCTS

### 2.1 GENERAL

- .1 Provide complete piping systems including:
  - .1 Piping, fittings, valves.
  - .2 Expansion joints, guides, anchors.
  - .3 Pipe supports, hangers, hardware.
  - .4 Thermal insulation.
  - .5 Waterproofing and jackets.
- .2 Valves:
  - .1 Repackable under full line pressure while fully open.
- .4 Operators
  - .1 Wormgear operators: All butterfly valves larger than NPS 150. Enclosed gear operator and handwheel, field interchangeable while under full line pressure.

### 2.2 STEAM PIPING - 600 kPa OP. PRESSURE (SATURATION TEMPERATURE 165 °C), DESIGN PRESSURE = 690 kPa

- .1 Piping: to ASTM A 53/A 53M, Grade B or ASTM A106.
  - .1 NPS 15 to 50 mm: Sch. 80, seamless or ERW plain end.
  - .2 NPS 65 and above: Sch. 40 seamless or ERW bevel end.
- .2 Fittings:
  - .1 NPS 15 to 50: Class 3000, 20 MPa, forged steel, socket weld ends, to ASTM A105/A 105M.
  - .2 NPS 65 to 250 mm: Sch. 40, seamless, bevel ends, to ASTM A 234/A 234M, Grade WPB.
- .3 Couplings, caps, plugs:
  - .1 NPS 15 to 40 mm: Class 3000, 20 MPa, socket weld, to ASTM A 105/A 105M.
- .4 Nipples for drains, vents, pressure gauges:

- .1 NPS 15 to 20 mm: Sch. 160, plain ends to ASTM A 106/A 106M Grade A.
- .6 All other nipples:
  - .1 NPS 15 to 40 mm: Sch. 80, plain ends to ASTM A 106/A 106M Grade A.
- .7 Outlet for reducing branch connections:
  - .1 Socket welding TEE with reducing insert for NPS 40 and smaller Class 3000, ASTM A 105/A 105M.
  - .2 Reduce welding TEE NPS 50 and larger. Where proper size unavailable, use TEE with reducer. Schedule to match run and branch pipe.
  - .3 For tie-in on existing line use reducing weldolet to ASTM A 105/A 105M, Schedule to match run and branch pipe.
- .8 Flanges:
  - .1 Class 150, 1 MPa, raised faced, socket welded, bored to Sch. 80, to ASTM A 105/A 105M.
- .9 Studs, bolts and nuts:
  - .1 Stud bolts: With heavy hex heads, alloy steel to ASTM A 193/A 193M, Grade B7
  - .2 Nuts: Semi-finished heavy hex, to ASTM A 194/A 194M, Grade 2H.
- .10 Gaskets:
  - .1 304 SS and flexite super (non-asbestos) filler c/w 3.175 mm thick carbon steel integral centering ring, type spiral wound, Class 150.
- .11 Gate valves:
  - .1 NPS 15 to 50 mm: Class 800, 5.5 MPa socket weld ends, forged steel body, union bonnet, solid wedge disc, Rising stem.
  - .2 NPS 65 to 300 mm: Class 150, 1 MPa raised faced flanged ends, cast steel body, hardened stainless steel trim, OS&Y, wedge disc.
- .12 Globe valves:
  - .1 NPS 15 to 50 mm: Class 800, 5.5 MPa, socket weld ends, forged steel body, union bonnet, hardened stainless steel plug type disc and seat.
- .13 Drain valves:
  - .1 Gate valves, NPS 20 mm, as specified above.

## 2.3 CONDENSATE RETURN – ATMOSPHERIC, DESIGN UP TO 690 kPa

- .1 Piping: to ASTM A 53/A 53M, Grade B (or A106).
  - .1 NPS 15 to 50 mm: Sch. 80, seamless or ERW plain end.
  - .2 NPS 65 to 250 mm: Sch. 40 seamless or ERW bevel end.
- .2 Fittings:
  - .1 NPS 15 to 50 mm: Class 3000, 20 MPa, forged steel, socket weld ends, to ASTM A105/A 105M.

- .2 NPS 65 to 250 mm: Sch. 80, seamless, bevel ends, to ASTM A 234/A 234M, Grade WPB.
- .3 Couplings, caps, plugs:
  - .1 NPS 15 to 50 mm: Class 3000, 20 MPa, socket weld, to ASTM A 105/A 105M.
- .4 Nipples for drains, vents, pressure gauges:
  - .1 NPS 15 to 20 mm: Sch. 160, plain ends to ASTM A 106/A 106M Grade A.
- .5 All other nipples:
  - .1 NPS 15 to 40 mm: Sch. 80, plain ends to ASTM A 106/A 106M Grade A.
- .6 Outlet for reducing branch connections:
  - .1 Sockolet welding TEE with reducing insert for NPS 40 mm and smaller Class 3000, ASTM A 105/A 105M.
  - .2 For tie-in on existing line use reducing weldolet to ASTM A 105/A 105M, Schedule to match run and branch pipe.
- .7 Flanges:
  - .1 Class 150, 1 MPa, raised faced, socket welded, bored to Sch. 80, to ASTM A 105/A 105M.
- .9 Studs, bolts and nuts:
  - .1 Stud bolts: With heavy hex heads, alloy steel to ASTM A 193/A 193M, Grade B7
  - .2 Nuts: Semi-finished heavy hex, to ASTM A 194/A 194M, Grade 2H.
- .10 Gaskets:
  - .1 304 SS and flexite super (non-asbestos) filler c/w 3.2 mm thick carbon steel integral centering ring, type spiral wound, Class 150.
- .11 Gate valves:
  - .1 NPS 15 to 50 mm: Class 800, 5.5 MPa socket weld ends, forged steel body, union bonnet, solid wedge disc, Rising stem.
  - .2 NPS 65 to 300 mm and over: Class 150, 1 MPa, raised faced flanged ends, cast steel body, hardened stainless steel trim, OS&Y, wedge disc.
- .12 Globe valves:
  - .1 NPS 15 to 80 mm: Class 800, 5.5 MPa, socket weld ends, forged steel body, union bonnet, hardened stainless steel plug type disc and seat.
- .13 Drain valves:
  - .1 Gate valves, NPS 20 mm, as specified above.

## 2.4 ANCHORS, GUIDES, ROLLERS

- .1 Anchors:
  - .1 Provide as indicated.
  - .2 Anchor to be welded to pipe and either bolted or welded to pipe rack.
  - .3 Anchors to be painted or finished to resist corrosion from salt in winter.

- .4 Anchors to be designed to anchor against pipe expansion forces and movement.
- .2 Alignment guides:
  - .1 Provide pipe alignment guides as indicated.
  - .2 To accommodate specified thickness of insulation.
  - .3 Construction is carbon steel, all surfaces are hot dip galvanized with zinc plated bolts and nuts.
  - .4 with shoe/saddle to accommodate for insulation thickness
  - .5 Vapour barriers installed to keep insulation dry, jackets to remain uninterrupted to avoid water infiltration.
- .3 Pipe roller:
  - .1 Adjustable steel yoke pipe roll with Cast iron roll; carbon steel yoke, roll rod and hex nuts
  - .2 Hot dip galvanized Yoke with Zinc Plated Parts or Resilient Coated
  - .3 For support of pipe lines where longitudinal movement due to expansion and contraction may occur and where vertical and lateral adjustment during installation may be required.
  - .4 With shoe/saddle to accommodate for insulation thickness
  - .5 Selection to be a low profile style to minimize the height of the pipe roller assembly.
  - .6 All steam and condensate pipes shall be supported using pipe rollers unless supported by anchors.

## 2.5 EXPANSION JOINTS-BELLOWS TYPE

- .1 For axial movements, for 100 mm axial movement.
  - .1 Maximum operating pressure: 600 kPa, design pressure 690 kPa.
  - .2 Maximum operating temperature: 165 degrees C.
  - .3 Type: externally pressurized, designed to eliminate pressure thrust, factory tested to 1½ times maximum working pressure. Provide test certificates.
  - .4 Materials: Single, A240-304 bellows with A53/106 Gr. B shell (or A516-70) std. wall shell and A105 A516-70 Flanges. Body to be painted.
  - .5 Ends: Flanges to match pipe.

## 2.6 SUPPORTS, HANGERS, INSERTS

- .1 In accordance with Section 2.4 above – all bracketry to be hot dip galvanized.
- .2 Components and assemblies to be to ANSI/MSS SP-58.
- .3 Use standard components and assemblies by one manufacturer wherever possible.
- .4 Submit shop drawings for approval before fabrication.
- .5 Percussion type inserts not permitted.
- .6 Power driven fasteners not permitted.

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## PART 3 EXECUTION

### 3.1 MANUFACTURER'S INSTRUCTIONS

- .1 Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheets.

### 3.2 PREPARATION

- .1 Lay out work in accordance with lines and grades as indicated.
- .2 Verify floor profiles, grades, lines, levels, dimensions as indicated against established benchmarks. Report discrepancies to Departmental Representative and obtain written instruction.
- .3 When required by Departmental Representative, provide drawings showing relative locations of various services.

### 3.3 FABRICATION OF PIPING

- .1 Do work in accordance with ANSI/ASME B31.1.
- .2 Joints:
  - .1 Welded throughout, except at flanged components.
  - .2 Screwed joints: to ANSI/B1.20.1.
    - .1 Provide clean machine-cut threads.
    - .2 Use fluoropolymer resin tape or paste on male threads.
    - .3 Welding: in accordance with Section 23 05 17 - Pipe Welding.

### 3.4 INSTALLATION OF PIPING

- .1 In accordance with Section 23 05 05 - Installation of Pipework.
- .2 Maintain clearances between pipes as indicated.
- .3 Maintain clearance between pipes and structures for O&M as indicated, as directed and to manufacturer's recommendations.
- .4 Provide manual air vents, drains, drip legs, dirt pockets as specified and as indicated.
- .5 Provide for pipe movement as indicated and in accordance with expansion joint manufacturer's installation instructions.
- .6 Use eccentric reducers in horizontal piping to prevent accumulation of pockets of air or condensate.
- .7 Weld couplings for drains into piping in accordance with ANSI/ASME B31.1.
- .8 Branch take-offs:
  - .1 Use welding tees where indicated.
  - .2 Where reducing tees of proper size are unavailable, use available tees with reducers. Tees with increasers not acceptable.
  - .3 Weldolets may be used for tie-in on existing lines.
- .9 Cap open ends of piping during installation. Remove foreign material from inside piping.

- .10 Remove burrs from piping.
- .11 Grade nominally horizontal piping as indicated at 0.5% slope to low point for condensate drainage.
- .12 Flanges: tighten bolts evenly with torque wrench.
  - .1 Retighten bolts with torque wrench after system is in operation.
- .13 Revisions to location of piping require written approval of Departmental Representative.

### 3.5 EXPANSION JOINTS

- .1 Install to manufacturer's recommendations.
- .2 Install lubrication facilities on expansion joints where required.

### 3.6 ANCHORS AND GUIDES

- .1 Locate anchors and guides as indicated.
- .2 Align piping at expansion joints and guides so as to avoid damage by movement of piping against fixed structures.

### 3.7 PIPE SUPPORTS

- .1 Headers and condensate lines
  - .1 Refer to drawing for types and location.
  - .2 Install to manufacturer's recommendations.
  - .3 Adjust supports and hangers after system is in operation.
- .2 Expansion joints:
  - .1 Provide supports as indicated, to manufacturer's recommendations, as required to maintain venting and/or drainage.

### 3.8 VALVES

- .1 Install isolating valves at branch take-offs, at each piece of equipment and elsewhere as indicated.
- .2 Install in accordance with manufacturer's recommendations.
- .3 Install valves between weld neck flanges to ensure full compression of liner.
- .4 Install in accessible locations with stem horizontal or above.
- .5 Screwed and flanged valves to be accessible for maintenance without removing adjacent piping.

### 3.9 VALVED DRAINS

- .1 Locations:
  - .1 At low points in mains and branches where equipment is to be serviced.
  - .2 Elsewhere as indicated.
- .2 Discharge: provide hose adapter on drain valves where discharge piping cannot conveniently be carried to floor drains or drainage trench.

**3.10 PRESSURE TESTS**

- .1 Pressure test piping after having removed any part or equipment that has a rating less than test pressure
- .2 Test piping at 1035 kPa hydrostatic pressure and maintain pressure for 15 minutes for certification, then lower pressure to 600 kPa and hold for four (4) hours to monitor that there are no losses.

**3.11 INSULATION**

- .1 insulate pipe works only after having performed pressure test in accordance with the Specification 33 07 13 – Telethermics – piping insulation

**3.12 FIELD QUALITY CONTROL**

- .1 Inspections: leave joints in piping systems uncovered until tests are completed and system inspected and approved by Departmental Representative.
- .2 Re-coat hangers, supports, exposed steelwork where galvanized finish is damaged prior to commencement of insulation.

**3.13 DEMONSTRATION AND TRAINING**

- .1 Arrange for installer to demonstrate and train Departmental Representative's personnel in operation and maintenance of equipment.
- .2 Co-ordinate with PART 1 - System Start-Up and Commissioning.

**END OF SECTION**

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