

- 1.1 GENERAL CONDITIONS .1 All drawings and all divisions and sections of these specifications shall apply to and form an integral part of this division.
- .2 Refer to Division 1 for description of work areas, sequencing of work, security, and restrictions.
- 1.2 DESCRIPTION OF WORK.1 This specification outlines requirements for:
- .1 The demolition of the existing wet pipe system in CORCAN Operations, Building E.
- .2 The installation, testing, and certification of a new wet pipe sprinkler system.
- .3 Wiring new sprinkler devices to existing fire alarm using existing fire alarm points, testing, and verification.
- .4 Revisions to Zone 35.
- .5 Electrical connection of existing wiring to new excess pressure pump.
- .6 Cutting, patching, and painting.
- 1.3 RELATED SECTIONS .1 Division 1.
- 1.4 CONTRACT DRAWINGS .1 FP1-1: Sprinkler System Site Plan and Partial Plans.
- .2 FP1-2: Sprinkler System Ceiling Plan.
- 1.5 REGULATIONS .1 The installation of the wet pipe sprinkler system shall be in accordance with the drawings issued under this contract, these specifications, and;
- .1 The 2010 National Building Code of Canada.
- .2 The 2010 National Fire Code of Canada.
- .3 The 2010 National Plumbing Code of Canada, (NPC).
- .4 NFPA 13-2013, "*Standard for the*

Installation of Sprinkler Systems".

.5 NFPA 25-2014, "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems".

.6 CAN/ULC S524-14, "Standard for the Installation of Fire Alarm Systems".

.7 CAN/ULC S537-13, "Verification of Fire Alarm Systems".

.8 C22.1-12, "Canadian Electrical Code, Part I".

1.6 COMPONENTS

- .1 All system components are required to be "listed" as per NFPA shall have their listing through Underwriter's Laboratories of Canada (ULC).

1.7 AUTHORITY HAVING JURISDICTION

- .1 The system is to be reviewed by Technical Services Branch of Correctional Service Canada (CSC) for approval.

1.8 REVIEW AUTHORITY

- .1 The working (shop) drawings are to be submitted to the Departmental Representative for review. Any comments shall be directed to the Departmental Representative for review and action.
- .2 The working (shop) drawings, stamped reviewed by the Departmental Representative, will be forwarded to the Technical Services Branch of Correctional Service Canada for approval.

1.9 QUALITY ASSURANCE

- .1 Installers:
 - .1 Sprinkler - Company or person specializing in wet pipe sprinkler systems with documented experience.
 - .2 Fire Alarm - Company or person specializing in fire alarm systems with documented experience.
 - .3 Electrical - Company or person specializing in electrical wiring with documented experience.

1.10 SUBMISSIONS

- .1 Working (Shop) Drawings:
 - .1 Shall be submitted in strict accordance with NFPA 13, 2013.
 - .2 Floor plan drawings shall match the tender drawings scale and show required pipe routing for the new wet pipe system, valves, sprinklers, hangers, and other system components, etc., the maintained hose stations and associated pipe routing, and the pipe routing for the existing sprinklers that are maintained.
 - .3 Cross sections of building showing floors, mezzanines, ceilings, and sprinkler system components.
 - .4 Submit updated drawings at regularly scheduled job meetings or as requested by the Departmental Representative during construction.
 - .5 Working (shop) drawings shall be submitted to the Departmental Representative for review and acceptance. Work shall commence only when all submissions have been reviewed by the Departmental Representative. Allow ten (10) working days for the Departmental Representative to review each submission.
 - .6 Confirmation for full time foreman's name and provincial certification.
 - .7 The working drawings shall be submitted as one package.
 - .8 All drawings shall be submitted as described above and in AutoCAD 2010 (or newer) and PDF formats complete with electronic copy of each.
 - .9 Submit hydraulic calculations with node drawings for review.
 - .10 Complete catalogue information for devices/equipment specified.
 - .11 Six (6) copies of each to be submitted.
- .2 As-Built Drawings
 - .1 As-built drawings shall represent the installed system components for the wet pipe

system.

.2 The Trade Contractor shall use reviewed (stamped) white print shop drawings. During system installation the Trade Contractor shall note any substantial variances from the reviewed drawings and shall record these variances in red pencil on these drawings.

.3 Identify drawings as "*Project Record Copy*". Maintain in new condition and make available for inspection on site and at job meetings.

.4 The Trade Contractor shall submit up-to-date accurate as-built drawings for the complete system(s) to the Departmental Representative.

.5 The Trade Contractor shall provide folded white prints for each maintenance manual, PDF, and AutoCAD files on CD.

.3 Operation and Maintenance Data:

.1 The Trade Contractor shall provide two copies of operation and maintenance information in a three ring binder and drawings. Information in each binder is to include:

.1 Copy of reviewed (stamped) product data.

.2 Detailed periodic inspection and tests schedule per the requirements in the 2010 NFC and NFPA 25.

.3 Copy of as-built drawings (folded prints) and electronic files on CD.

.4 Copy of hydraulic calculations, complete with corresponding node drawings.

.5 Copy of Material and Test Certificate for each sprinkler zone.

.6 Letter identifying Trade Contactor's warranty obligations.

.7 Copy of hydraulic data nameplates.

.8 Settings for all switches.

.2 Binders are to include an index and dividing tabs for each section.

.4 Submit maintenance manuals two weeks prior

to substantial completion.

1.11 SPARE PARTS

- .1 The Trade Contractor shall provide spare sprinklers in accordance with NFPA 13, 2013 and sprinkler wrenches. A lockable metal cabinet sized to accommodate the spare sprinklers and wrenches shall be provided and mounted on the wall adjacent to the zone valve header.

1.12 MAINTENANCE

- .1 The Trade Contractor shall include in their price, one full year of maintenance as per the NFC and NFPA 25.
- .2 The Trade Contractor is to provide quarterly inspections throughout the first year. Proper forms as per NFPA 25, shall be issued to the Owner after each inspection.
- .3 The Trade Contractor shall test the sprinkler system and the associated fire alarm devices at the 12 month anniversary, prior to the expiration of warranty. Proper forms as per NFPA 25 for the sprinkler system shall be issued to the Departmental Representative following the testing.
- .4 Servicing, including replacement parts for the complete system shall be readily available locally within 24 h of placing a trouble call.

1.13 WARRANTY

- .1 The equipment, components, and installation shall be under full labour and material warranty for a period of one year from certification.

1.14 CERTIFICATION

- .1 The Trade Contractor shall complete a Material and Test Certificate for the zones that are part of this sprinkler upgrade in accordance with NFPA 13, 2013.

- .2 The Trade Contractor shall retain a fire alarm contractor to test and verify all sprinkler monitoring devices and shall provide a verification report for the upgraded sprinkler system, in accordance with CAN/ULC S537.
- .3 Certification date shall be as posted on certificate unless otherwise directed by Departmental Representative.

1.15 DESIGN APPROACH

- .1 The Trade Contractor shall prepare detailed working drawings following a detailed tender package review and site coordination.
- .2 The Trade Contractor shall prepare hydraulic calculations matching the installation (shop) drawings.
- .3 The Trade Contractor shall install the system using the reviewed shop drawings and is responsible for confirming all pipe routing and sprinkler head locations. Any changes shall be the responsibility of the Trade Contractor and must be approved by the Departmental Representative.
- .4 Any changes to piping or sprinkler head locations or type that, in the opinion of the Departmental Representative, alter the hydraulic design, will require confirming hydraulic calculations by this Trade Contractor.
- .5 Refer to drawings for hazard table.
- .6 The following criteria shall be met:
 - .1 Light Hazard areas (e.g. offices, washrooms 108A and 108B, Rooms F106, F116, concealed space above F122A, and Room F123).
4.1 L/min/m² over 83.6 m², 379 L/min hose demand.
 - .2 Ordinary Hazard, Group 1 areas (e.g.

F120 and F121). 6.1 L/min/m² over entire area, 946 L/min hose demand.

.3 Ordinary Hazard, Group 2 area (e.g. F122A loading dock). 8.1 L/min/m² over entire area (approximately 26 m²), 946 L/min hose demand. Based on the following from Paragraph 12.12.1.2.(4) of NFPA 13, 2013:

.1 Idle wood pallet pile(s) stored up to a maximum 1.8 m high.

.2 Maximum of four stacks per pile.

.3 Idle wood pallet piles separated from other idle wood pallet piles by at least 2.4 m.

.4 Group A plastics storage areas (e.g. mattress production and storage areas including mezzanine). 24.4 L/min/m² over 232 m², 1,900 L/min hose demand. Based on the following from Chapter 15 of NFPA 13, 2013:

.1 Figure 15.2.2., Group A, expanded, exposed, solid piled, unstable.

.2 Table 15.2.6.(b), Column C.

.3 Storage height not exceeding 3.6 m.

.4 Ceiling height of approximately 7 m.

1.16 SYSTEM DESCRIPTION.1

This contract includes work identified on the contract drawings and specifications.

.2 The following shall be included with the wet pipe sprinkler valve:

.1 Alarm valve complete with trim.

.2 Control valve complete with tamper switch.

.3 Low water pressure switch.

.4 Alarm switch.

.5 Listed pressure gauges.

.6 System header piping.

.7 Main drain valve and drain piping.

.8 Excess pressure pump and pressure switch.

.9 Installation and instruction manuals.

.3 Identification tags shall be fastened to

control valves and clearly indicate the appropriate system.

- .4 Hydraulic data nameplate for the wet pipe system.
- .5 The system shall be designed not to exceed 1,207 kPa working pressure.

1.17 DESIGN CRITERIA

- .1 Water supply for the sprinkler system shall be based on the available water supply at the point of connection of the existing 200 mm underground lateral main to the existing 250 mm underground loop main.
- .2 Water flow test results from 2015 indicate the following:
 - .1 Static pressure at 1,172 kPa
 - .2 5,931 L/min at 690 kPa
 - .3 7,982 L/min at 496 kPa
- .3 Hydraulic calculations are to include a minimum 68.9 kPa safety factor.

2.1 SPRINKLERS

- .1 All sprinklers shall be of one manufacturer.
- .2 Sprinklers to be ULC listed.
- .3 Sprinklers:
 - .1 Standard response upright sprinklers, Temperature: 141°C, K = 241.9. Brass finish.
 - .2 Standard response dry type pendent sprinklers, Temperature: 93°C, K = 115.2. Chrome finish.
 - .3 Standard response upright sprinklers, Temperature: 68°C and 93°C, K = 80.6. Brass finish.
 - .4 Standard response pendent sprinklers, Temperature: 68°C, K = 80.6. Chrome finish.
 - .5 Standard response institutional pendent sprinklers, Temperature: 68°C, K = 80.6. Chrome finish.
 - .6 Quick response pendent sprinklers,

Temperature: 68°C, K = 80.6. Chrome finish.
.7 Quick response upright sprinklers,
temperature 68°C, K = 80.6. Brass finish.

2.2 PIPING AND FITTINGS.1

- Piping shall satisfy the following criteria:
- .1 Steel pipe shall be of the type tested for sprinkler use as per Section 6.3 of NFPA 13, 2013 and be stamped accordingly. Pipe to be manufactured in Canada or the United States. All pipe must be stored inside prior to installation and have zero corrosion.
 - .2 Pipe shall have red and white decals indicating sprinkler system piping every 3 m along mains and risers.
 - .3 Schedule 10 black steel pipe for all pipe 65 mm and larger in diameter.
 - .4 Schedule 40 black steel pipe for all pipe 50 mm and smaller in diameter.
 - .5 One manufacturer to be used for all pipe.
- .2 Fittings shall satisfy the following criteria:
- .1 Piping 65 mm and greater to be grooved.
 - .2 Piping 50 mm and smaller to be threaded or grooved.
 - .3 Fittings are to withstand 1,207 kPa working pressure.
 - .4 Fittings shall be of the type tested for sprinkler use as per Section 6.4 of NFPA 13, 2013. Each individual fitting is to be complete with a ULC marking, be stored inside prior to installation, and have zero corrosion.
 - .5 One manufacturer to be used for each type (grooved and screwed) of fitting.
- .3 Flange bolts shall be square or hexhead bolts with heavy hex nuts to ASTM A307-82a.
- .4 Flange gaskets shall be 1.6 mm thick plain or cloth inserted red rubber to ASME/ANSI B16.20-2007 and ASME/ANSI B16.21-2011.
- .5 Tie rods shall be a minimum of 16 mm.

- .6 No welding of pipe is permitted.
- .7 Exposed hangers shall have collars/plates at ceilings.

2.3 CONTROL VALVES

- .1 Only one manufacturer's valves shall be used.
- .2 Valves to be ULC listed.
- .3 Valves shall bear:
 - .1 Manufacturer's name.
 - .2 Trademark.
 - .3 Valves controlling water supply to any part of the sprinkler system shall be:
 - .1 Greater than 100 mm: OS&Y gate valve type complete with tamper switch.
 - .2 65 mm to 100 mm: Butterfly type complete with tamper switch.
 - .3 50 mm and under: Ball type complete with tamper switch.

2.4 FLOW SWITCH

- .1 Vane type water flow switch listed for fire protection use, with retard and cover tamper switch/screw.

2.5 TAMPER SWITCH

- .1 Switches for gate, butterfly and ball valves.
- .2 Switches to be ULC listed.

2.6 PIPE HANGERS

- .1 Piping shall be supported by hangers in accordance with NFPA 13, 2013, the National Building Code of Canada 2010, and the additional requirements specified in this section for this project.
- .2 Shall be ULC listed.

2.7 INSPECTOR'S TEST CONNECTION AND DRAINS

- .1 Inspector's test connection shall be ULC listed complete with pressure relief.

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| <u>2.8 PRESSURE GAUGES</u> | .1 | Provide and install listed 100 mm pressure gauges on test connection assemblies and at valve header. |
| <u>2.9 SPRINKLER HEAD GUARDS</u> | .1 | To be listed for use with installed sprinkler heads. |
| <u>2.10 SPRINKLER HEAD CABINETS</u> | .1 | Metal box, painted finish. |
| | .2 | Twelve (12) sprinkler capacity. |
| <u>2.11 FIRE STOPPING</u> | .1 | All penetrations through all separations are to be fire stopped in accordance with the National Building Code of Canada. |
| <u>2.12 IDENTIFICATION TAGS/SIGNS</u> | .1 | Required for all control valves, drain valves, inspector's test connections, trim valves, and auxiliary drain valves. |
| | .2 | Caution signs worded in accordance with the requirements of NFPA 13, 2013 shall be attached to all valves controlling sprinklers. |
| | .3 | Identification tags/signs shall be red lamicoid with white letters. |
| <u>2.13 HYDRAULIC DATA NAMEPLATES</u> | .1 | Hydraulic nameplates signs. |
| | .2 | Metal sign or sticker permanently attached to zone riser at alarm valve. |
| <u>2.14 LOW WATER PRESSURE SWITCH</u> | .1 | Low water switch to be ULC listed. |
| <u>2.15 ALARM SWITCH</u> | .1 | Alarm switch to be ULC listed. |

- 2.16 EXCESS PRESSURE PUMP
- .1 115 Volt, 60 Hz, single phase, ½ HP.
 - .2 Provide and install pressure switch for excess pressure pump.
- 2.17 ALARM VALVE
- .1 Alarm valve, complete with trim.
 - .2 Alarm valve to be ULC listed.
- 3.1 APPROVALS
- .1 Working (shop) drawings and hydraulic calculations shall be reviewed by the Departmental Representative and AHJ prior to any fabrication, ordering of material, or site work.
- 3.2 SITE OBSERVATIONS
- .1 Do not recess, paint, or conceal piping, accessories, or work prior to site review and approval by the Departmental Representative.
 - .2 Site Visit Reports as issued by the Departmental Representative are to be signed off (by item) by the Site Foreman when the deficiency is rectified. Signed-off reports are to be issued to the Departmental Representative upon completion.
- 3.3 INSTALLATION
- .1 All system components are to be installed as per the reviewed shop drawings, the specifications, and manufacturer's recommendation.
 - .2 Install control valves, drain valves, and inspector's test sight glass in a manner that will allow for easy access and use.
 - .3 Trade Contractor shall allow for pipe routing to suit obstructions.
 - .4 Install drains with slopes to allow for proper draining. Where more than one sprinkler

system drain is located in an area, they shall be interconnected so that only one pipe exits the building.

- .5 Standard response sprinklers to be installed throughout, except where otherwise noted on the drawings.
- .6 Standard response pendent sprinklers protecting loading bay shall be dry barrel type.
- .7 Sprinkler heads protecting loading bay and under air handling unit platform and ducts shall have guards.
- .8 Locate spare sprinkler head cabinet and hydraulic data nameplate at the valve header.
- .9 Intermediate temperature classification sprinklers to be installed in mechanical/electrical rooms.
- .10 Provide and install sprinkler protection below obstructions in all areas, in accordance with NFPA 13, 2013.
- .11 Install high temperature classification sprinkler heads where located within a 2,135 mm radius of a unit heater and intermediate temperature classification sprinkler heads located within a radius greater than 2,135 mm up to 6,095 mm.
- .12 Install new hangers on all new sprinkler system piping. Reuse existing holes in walls and ceilings wherever possible. **The following pipe hanging provisions in addition to the requirements of NFPA 13 are required:**
 - .1 Hangers supporting pipe 150 mm and larger in diameter shall be spaced 3.5 m apart or less.**
 - .2 Where pipe hangers are attached to open-web steel joists, the hanger C-clamps shall be located within 75 mm from a joist**

node (connection point between a web member and chord member of a joist).

- .13 Provide sprinkler protection under all overhead doors in accordance with NFPA 13, 2013.
- .14 Pendent dry type sprinklers shall be installed on the outlet side of a tee per manufacturer's requirements.
- .15 Provide and install the following:
 - .1 Alarm valve complete with trim, excess pressure pump, and switches. Valve(s) to be monitored by the fire alarm system for "low water pressure" and "water flow".
 - .2 Air filled gauges at the valve header and remote test locations.

3.4 FIRE STOPPING

- .1 The Trade Contractor is responsible for fire stopping penetrations through all separations (with and without fire resistance rating) with listed fire stopping system in accordance with the National Building Code of Canada.

3.5 TESTING AND TRAINING

- .1 The building staff shall be trained prior to functional testing. Allow for two, 2 hour sessions.
- .2 The Trade Contractor shall subject all system components to operational, pneumatic, and hydrostatic tests as per NFPA 13, 2013. These are to be conducted for the new wet pipe system. Repair any leaks or defective piping that occurs during the tests.
- .3 The Trade Contractor shall provide hydraulic pump, temporary connections and labour required to perform tests.
- .4 The Trade Contractor shall conduct a full

system functional test in the presence of the Departmental Representative. Provide foreman for a minimum of six hours for the duration of this testing. The purpose of the test will be to verify the operation of the equipment and provide additional training to the building staff. 10 days' notice shall be given before any functional testing. This Trade Contractor shall retain the services of a Fire Alarm Trade Contractor to be present for operation of the fire alarm system during full system functional testing.

- .5 The Trade Contractor shall issue completed Material and Test Certificates for each sprinkler system zone that is part of this sprinkler upgrade.

3.6 CUTTING, CORE
DRILLING, PATCHING, AND
PAINTING

- .1 All cutting, core drilling, patching, and painting shall be the responsibility of this Trade Contractor.
- .2 All new exposed sprinkler piping and fittings in watch station (Zone 35) shall be primed and painted (anti-corrosion paint). Paint colour number will be provided by Departmental Representative.
- .3 All patching and painting required to gain access to areas and spaces for sprinkler system demolition/installation for this upgrade is the responsibility of this Trade Contractor.
- .4 Apply decals.
- .5 Building envelope sprinkler system penetrations are to be sealed weather tight.
- .6 Abandoned sprinkler system penetrations in building envelope are to be patched with construction and finishes as adjacent surfaces.

3.7 COORDINATION

- .1 Sprinkler head and piping locations are to be coordinated with all other services, building structure, and ceilings.
- .2 Any new drill holes in building's structural steel for sprinkler pipe hanging shall be reviewed by a Structural Engineer retained by the Trade Contractor prior to any holes being drilled.
- .3 Wiring and monitoring of sprinkler system devices and wiring of excess pressure pump is to be completed by fire alarm and electrical Trade Contractors retained by this Trade Contractor.

3.8 DEMOLITION

- .1 Trade Contractor is responsible for demolition and disposal of the existing sprinkler system.
- .2 Trade Contractor shall dispose demolished material off site in accordance with applicable regulations.