GENERAL

The following changes in the Tender Documents are effective IMMEDIATELY. This addendum will form part of the Contract Documents

APPROVED ALTERNATIVE MATERIALS

APPROVED AS EQUAL	SPECIFIED
Gas Fired Humidifiers	**Neptronic**
Expansion Tank	**Flexcon**
Air Separator	**Caleffi**

DRAWINGS

1. **Architectural**
    a. Refer to Drawing A2 – Second Floor Demolition Plans
        i. Reduce extent of demolition for the existing fire separation between Generator Room 2672 and Mechanical Room 2670 as indicated on the attached detail sheet RA-01.
        ii. Revise keynote C as indicated on the attached detail sheet RA-01.
    b. Refer to Drawing A3 – Second Floor New Construction Plans
        i. Delete interior wall type 2.
        ii. Revise fire separation between Generator Room 2672 and Mechanical Room 2670 to existing construction as indicated on the attached detail sheet RA-01.
2. **Electrical**
    a. Refer to drawings E2 R1, E4 R1A, E4 R1B and E4 R1C
        i. New mechanical room modifications and humidifier clarification.
3. **Mechanical**
    a. Refer to Drawing M7 R1 – Shop Area New Systems
        i. Relocated sprinkler heads in new mechanical room.

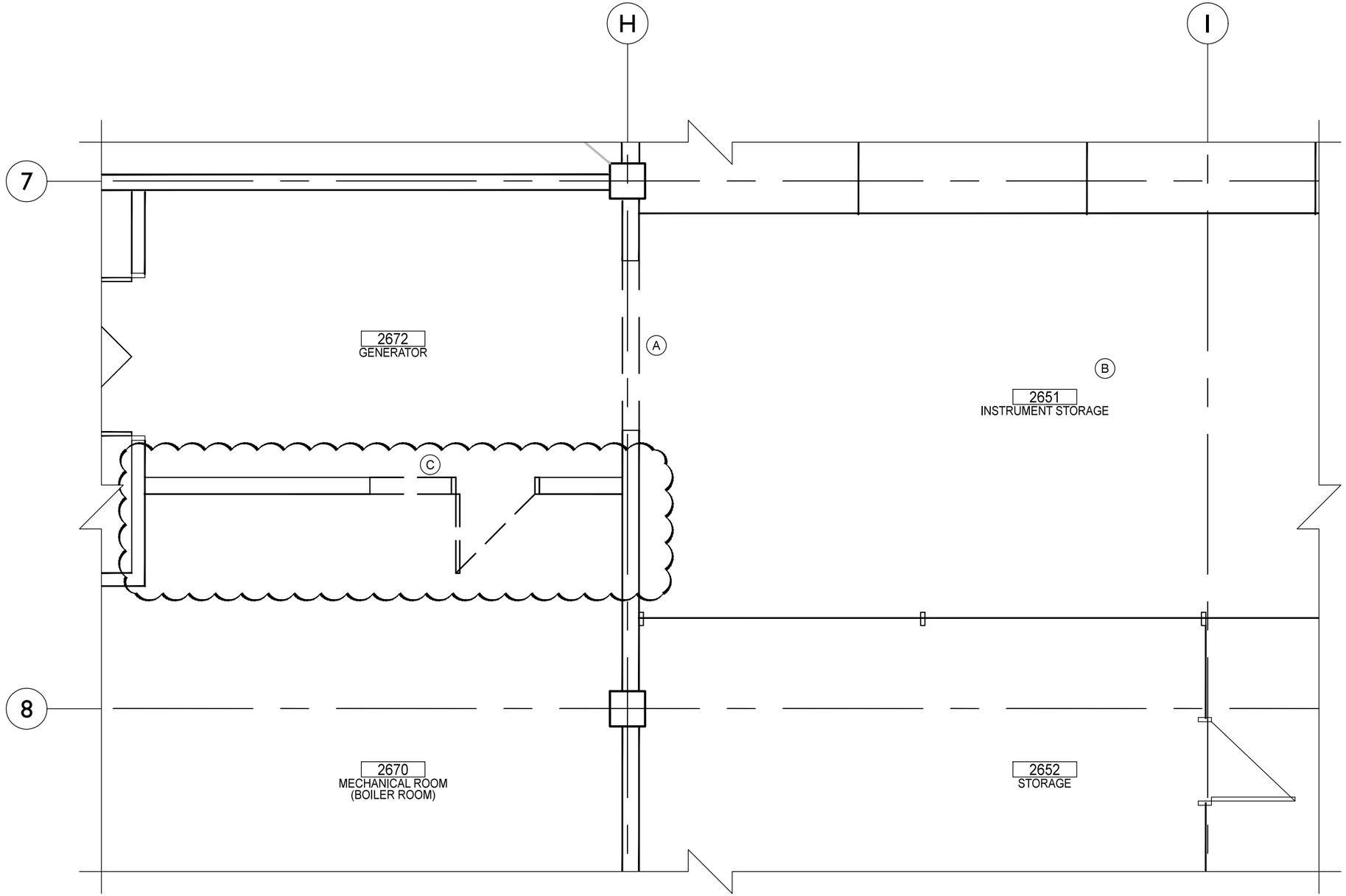
4. **Specifications**
    a. Refer to 000110 – Table of Contents
        i. Included Division 21 - Sections 21 05 05 Common Work Results for Fire Suppression and 21 13 13 Wet Pipe Sprinkler Systems.

CLARIFICATIONS

The following Dual Return Temperature Condensing Boilers are considered equal:

1. Cleaver Brooks Clearfire-LC (CFLC-4000); 4,000 MBH Input
2. Viessmann Vitocrossal 300 CT3 (CT3-89); 3,361 MBH Input
3. Bosch Buderus SB745WS (1050); 3,754 MBH Input

END OF ADDENDUM 4



1 / A2 LARGE SCALE DEMOLITION PLAN
SCALE: 1:50

DEMOLITION KEYNOTES

Ⓒ MODIFY OPENING WITHIN EXISTING FIRE SEPARATION FOR NEW DOUBLE LEAF DOOR; REMOVE EXISTING DOOR. REFER TO DOOR SCHEDULE FOR DOOR DIMENSIONS.

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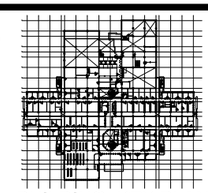

BUILDING KEY PLAN

01	ISSUED WITH ADDENDUM #4	14-SEP-17
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A detail no. no. du detail
B location drawing no. sur dessin no.
C drawing no. dessin no.

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NHRC MECHANICAL UPGRADES BOILERS REPLACEMENT

NATIONAL HYDROLOGY RESEARCH CENTRE
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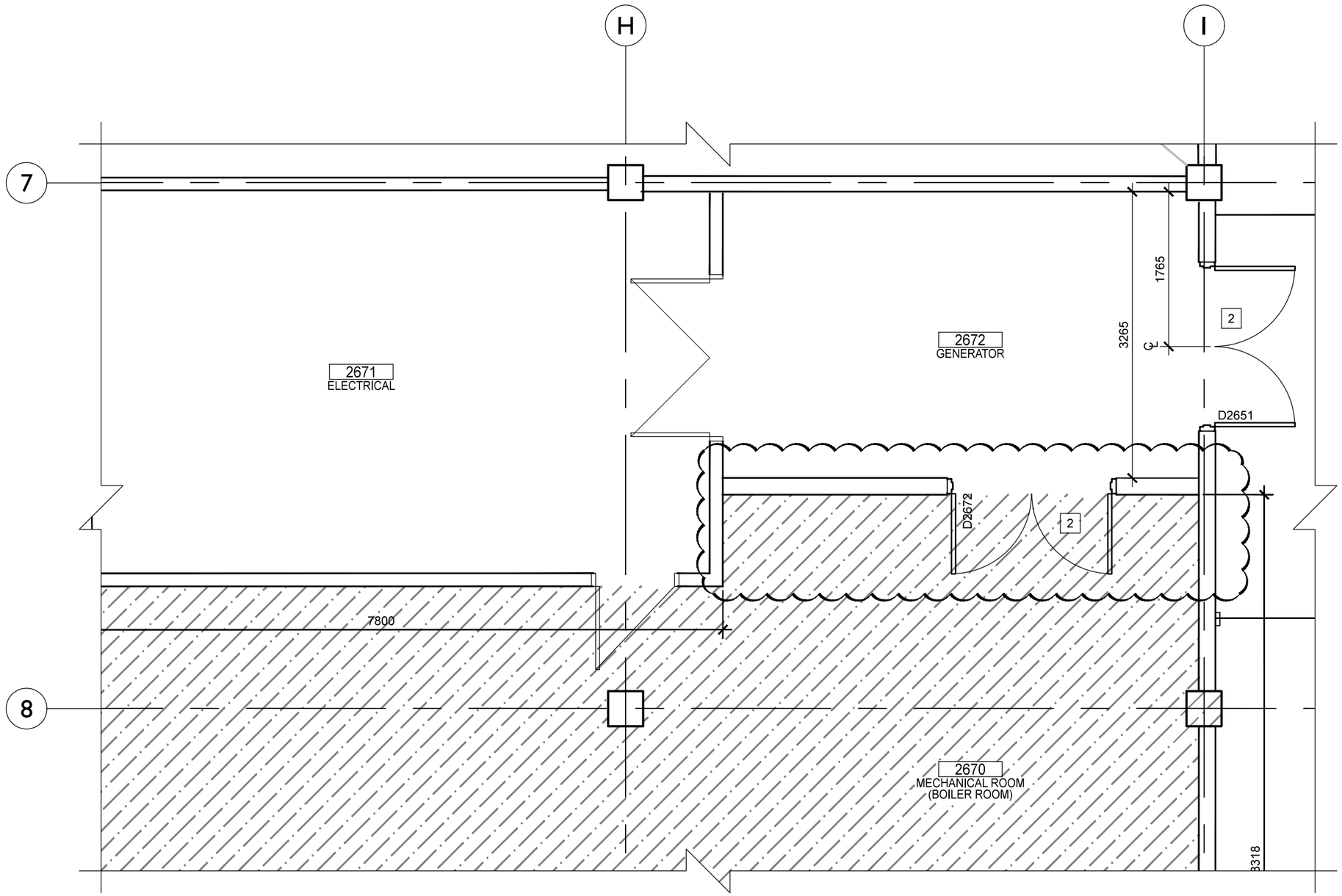
REVISION SHEET FOR ORIGINAL DRAWING A2

Designed By / Conçu par	DD
Date (yyyy/mm/dd)	2017/06/26
Drawn By / Dessiné par	DD
Date (yyyy/mm/dd)	2017/06/26
Reviewed By / Examiné par	JR
Date (yyyy/mm/dd)	2017/06/26
Approved By / Approuvé par	SS
Date (yyyy/mm/dd)	2017/06/27
Tender / Soumission	
Project Manager / Administrateur de projets	NIKOLAS FEHR

EC Proj no.	Consultant Proj no.
NHRC-010	197

Drawing no. / No. du dessin: RA-01



1 / A3 LARGE SCALE CONSTRUCTION PLAN

SCALE: 1:50

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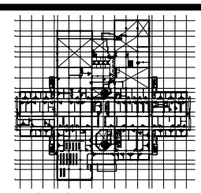

BUILDING KEY PLAN

revisions	description	date
01	ISSUED WITH ADDENDUM #4	14-SEP-17

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NHRC MECHANICAL UPGRADES BOILERS REPLACEMENT

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REVISION SHEET FOR ORIGINAL DRAWING A3

Designed By / Conçu par	DD	
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Date	2017/06/26	(yyyy/mm/dd)
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Date	2017/06/26	(yyyy/mm/dd)
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Date	2017/06/27	(yyyy/mm/dd)
Tender / Soumission		
Project Manager / Administrateur de projets	NIKOLAS FEHR	

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NHRC-010	197

Drawing no. / No. du dessin: RA-02

MECHANICAL EQUIPMENT SCHEDULE

EQUIPMENT			ELECTRICAL CHARACTERISTICS			PACKAGED UNIT	STARTERS					CONTROLS				DRIVE ISOLATION TRANSFORMER	CIRCUITRY INFORMATION				NOTES
ITEM	DESCRIPTION	LOCATION	HP/kW	AMPS	VOLTS/ø		TYPE	HOA	PILOT LIGHT	PUSH BUTTON	SUPPLIED BY	TYPE	SUPPLIED BY	INSTALLED BY	WIRED BY		PANEL-CCT #	O.C.P.	WIRE	CONDUIT	
B-1	GAS FIRED BOILER	MECHANICAL ROOM		8.0A	600V/3ø	X	PACKAGED					PACKAGED					EXISTING MCC-1A	15A-3P	3 #12 AWG RW90 Cu + GRD.	21mm	EMERGENCY POWER/PROVIDE NEW ELECTRICAL
B-2	GAS FIRED BOILER	MECHANICAL ROOM		8.0A	600V/3ø	X	PACKAGED					PACKAGED					EXISTING MCC-1A	15A-3P	3 #12 AWG RW90 Cu + GRD.	21mm	EMERGENCY POWER/PROVIDE NEW ELECTRICAL
B-3	GAS FIRED BOILER	MECHANICAL ROOM		8.0A	600V/3ø	X	PACKAGED					PACKAGED					EXISTING MCC-1A	15A-3P	3 #12 AWG RW90 Cu + GRD.	21mm	EMERGENCY POWER/PROVIDE NEW ELECTRICAL
H-1	HUMIDIFIER	FAN ROOM		7.0 A	120V/1ø	X	PACKAGED					PACKAGED					B-1	15A-1P	2 #12 AWG RW90 Cu + GRD.	21mm	
H-2	HUMIDIFIER	FAN ROOM		7.0 A	120V/1ø	X	PACKAGED					PACKAGED					B-2	15A-1P	2 #12 AWG RW90 Cu + GRD.	21mm	
H-3	HUMIDIFIER	FAN ROOM		7.0 A	120V/1ø	X	PACKAGED					PACKAGED					B-3	15A-1P	2 #12 AWG RW90 Cu + GRD.	21mm	
H-4	HUMIDIFIER	FAN ROOM		5.1 A	120V/1ø	X	PACKAGED					PACKAGED					B-4	15A-1P	2 #12 AWG RW90 Cu + GRD.	21mm	
H-5	HUMIDIFIER	FAN ROOM		5.1 A	120V/1ø	X	PACKAGED					PACKAGED					B-5	15A-1P	2 #12 AWG RW90 Cu + GRD.	21mm	
H-6	HUMIDIFIER	FAN ROOM		2.0 A	120V/1ø	X	PACKAGED					PACKAGED					B-6	15A-1P	2 #12 AWG RW90 Cu + GRD.	21mm	
H-7	HUMIDIFIER	ROOM 2648		2.0 A	120V/1ø	X	PACKAGED					PACKAGED					PANEL RPWA	15A-1P	2 #12 AWG RW90 Cu + GRD.	21mm	
P-1	BOILER RECIRCULATION PUMP	MECHANICAL ROOM	10 HP	11.0 A	600V/3ø		VFD									14KVA	EXISTING MCC-1A	20A-3P	3 #12 AWG RWRx VFD CABLE Cu + GRD.	21mm	PROVIDE NEW ELECTRICAL/LEAD/LAG/REFER TO NOTE #6
P-2	BOILER RECIRCULATION PUMP	MECHANICAL ROOM	10 HP	11.0 A	600V/3ø		VFD									14KVA	EXISTING MCC-1A	20A-3P	3 #12 AWG RWRx VFD CABLE Cu + GRD.	21mm	PROVIDE NEW ELECTRICAL/LEAD/LAG/REFER TO NOTE #6
P-23	BOILER RADIATION PUMP	MECHANICAL ROOM	3 HP	3.9 A	600V/3ø		VFD									7.5KVA	EXISTING MCC-1A	15A-3P	3 #12 AWG RWRx VFD CABLE Cu + GRD.	21mm	PROVIDE NEW ELECTRICAL/LEAD/LAG/REFER TO NOTE #6
P-24	BOILER RADIATION PUMP	MECHANICAL ROOM	3 HP	3.9 A	600V/3ø		VFD									7.5KVA	REFER TO NOTE #5	15A-3P	3 #12 AWG RWRx VFD CABLE Cu + GRD.	21mm	PROVIDE NEW ELECTRICAL/LEAD/LAG/REFER TO NOTE #5

NOTES:

1. DIVISION 26 TO CONFIRM FINAL LOCATION OF ALL EQUIPMENT WITH MECHANICAL DRAWINGS PRIOR TO ROUGHING IN OF CONDUIT. CONFIRM FINAL EQUIPMENT RATINGS WITH MECHANICAL PRIOR TO ROUGHING-IN OF CONDUIT, WIRING AND CIRCUIT BREAKERS. SIZE OVERLOADS ACCORDINGLY. CONFIRM FINAL RATINGS WITH EQUIPMENT NAMEPLATES. INFORM DEPARTMENTAL REPRESENTATIVE OF ANY DISCREPANCIES AND OR DEVIATIONS PRIOR TO ROUGHING IN OF EQUIPMENT.
2. ALL CONTROL WIRING TO BE BY DIVISION 23 UNLESS OTHERWISE NOTED. REFER TO MECHANICAL DRAWINGS AND SPECIFICATIONS. ALL CONDUIT REQUIRED FOR CONTROLS TO BE SUPPLIED AND INSTALLED BY DIVISION 26. COORDINATE ALL WORK WITH DIVISION 23.
3. PROVIDE DISCONNECTS FOR ALL EQUIPMENT AS REQUIRED.
4. PROVIDE CONTROL TRANSFORMERS FOR ALL VAV'S. CONFIRM LOCATIONS AND QUANTITIES WITH MECHANICAL. COORDINATE ALL WORK WITH MECHANICAL CONTRACTOR.
5. P-24 TO BE FED FROM EXISTING MCC-1A. REMOVE EXISTING B-4 CELL AND REPLACE WITH NEW CIRCUIT BREAKER CELL.
6. REPLACE EXISTING STARTER CELLS FOR P-1, P-2 AND P-23 WITH NEW CIRCUIT BREAKER CELLS.
7. REPLACE COMBINATION STARTERS FOR ALL PUMPS EQUIPPED WITH VFD'S.

EXISTING MCC-1A IN ELECTRICAL ROOM

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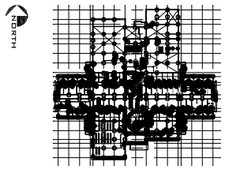

BUILDING KEY PLAN

1	ISSUED WITH ADDENDUM #4	14-SEPT-2017
revisions	description	date

A detail no. no. du detail
B location drawing no. sur dessin no.
C drawing no. dessin no.

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BOILERS REPLACEMENT

NATIONAL HYDROLOGY RESEARCH CENTRE
11 INNOVATION BOULEVARD
SASKATOON, SASKATCHEWAN

drawing / dessin

MECHANICAL
EQUIPMENT SCHEDULE

Designed By	PL	Conçu par
Date	2017/09/14	(yyyy/mm/dd)
Drawn By	RD	Dessiné par
Date	2017/09/14	(yyyy/mm/dd)
Reviewed By	HCC	Examiné par
Date	2017/09/14	(yyyy/mm/dd)
Approved By	HCC	Approuvé par
Date	2017/09/14	(yyyy/mm/dd)

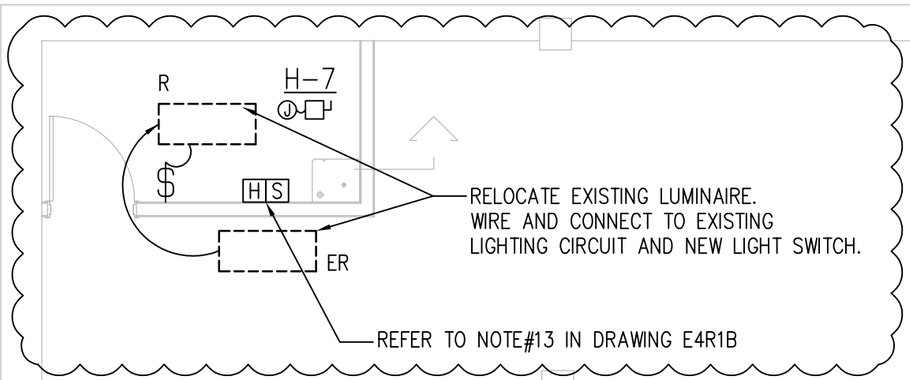
Tender / Soumission

NIKOLAS FEHR
Project Manager / Administrateur de projets

EC Proj no.	Consultant Proj no.
NHRC-010	16131

Drawing no. / No. du dessin

E2 R1



1 / E4R1A MECHANICAL ROOM 2670 & SHOP AREA - NEW ELECTRICAL LAYOUT

1:75

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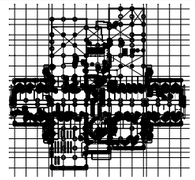

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MECHANICAL ROOM
2670 & SHOP AREA -
NEW ELECT. LAYOUT

Designed By / Conçu par	PL	
Date	2017/09/14	(yyyy/mm/dd)
Drawn By / Dessiné par	RD	
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Project Manager / Administrateur de projets

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Drawing no. / No. du dessin

E4 R1A

GENERAL NOTES:

1. MAINTAIN THE INTEGRITY OF ALL EXISTING SYSTEMS REQUIRED TO REMAIN OPERATIONAL. IDENTIFY ALL CIRCUIT BREAKERS, WIRING, JUNCTION BOXES AND DEVICES PRIOR TO PROCEEDING WITH WORK. CONTACT DEPARTMENTAL REPRESENTATIVE IF UNSURE BEFORE SHUTDOWNS, DEMOLITION OR RELOCATION OF ANY DEVICES.

2. ALL ITEMS SHOWN DASHED WITH AN "E" ARE EXISTING AND ARE TO REMAIN. ITEMS SHOWN DASHED WITH A "D" ARE TO BE DISCONNECTED AND REMOVED AND HAVE ALL ASSOCIATED WIRE AND CONDUIT REMOVED BACK TO SOURCE.

3. WIRE AND CONDUIT SERVING DEVICES REQUIRED TO REMAIN IN USE SHALL BE RE-ROUTED AND DIVERTED AS REQUIRED TO MAINTAIN OPERATION. EXTEND, RE-ROUTE, RE-WIRE AND RE-CONNECT AS REQUIRED. CONFIRM EXISTING ON SITE.

4. PROVIDE NEW BLANK STAINLESS STEEL COVERPLATES FOR ALL ABANDONED OUTLETS.

5. REPORT ANY DISCREPANCIES BETWEEN THE CONTRACT DOCUMENTS AND SITE OBSERVATIONS TO DEPARTMENTAL REPRESENTATIVE.

6. NOT ALL DEVICES AND ELECTRICAL EQUIPMENT IS BEING SHOWN ON ELECTRICAL DRAWINGS. REMOVE ALL EXISTING ELECTRICAL DEVICES SHOWN OR NOT LOCATED ON INDICATED WALLS OR PORTIONS OF THE BUILDING BEING DEMOLISHED OR MODIFIED. MAINTAIN INTEGRITY OF ALL EXISTING ELECTRICAL SYSTEMS IN AREAS NOT INCLUDED IN THIS PROJECT AND IN PARTS OF THE BUILDING WITHIN RENOVATION THAT ARE NOT SUBJECTED TO ANY DEMOLITION WORK.

7. REFER TO SYMBOL SCHEDULE FOR ELECTRICAL SYMBOLS AND LETTER DESIGNATIONS.

8. ALL EXISTING DEVICES ON WALLS, FLOORS OR CEILING NOT BEING AFFECTED BY RENOVATION ARE TO REMAIN.

9. SYSTEMS AND DEVICES IN AREAS OF LIMITED SCOPE OF WORK AREAS TO REMAIN OPERATIONAL. PROVIDE ALL MODIFICATIONS TO ACCOMODATE SCOPE OF WORK.

10. PROVIDE THREE (3) NEW ENCLOSED EMERGENCY STOP PUSHBUTTONS FOR NEW BOILERS. LABEL EACH PUSHBUTTON TO READ " EMERGENCY BOILER # SHUTDOWN". SWITCHES TO BE IN BOTH LOCATIONS AS INDICATED.

11. EXTEND, RE-ROUTE, RE-WIRE AND RECONNECT NEW DHWH'S TO EXISTING CIRCUITS. CONFIRM EXISTING ON SITE.

12. EXTEND, RE-ROUTE, RE-WIRE AND RECONNECT NEW HOT WATER RECIRCULATION PUMP TO EXISTING CIRCUIT. CONFIRM EXISTING ON SITE.

13. PROVIDE NEW FIRE ALARM HORN/STROBE TO MATCH EXISTING. WIRE AND CONNECT TO LOCAL INDICATING CIRCUIT BACK TO EXISTING NOTIFIER NFS23030 MAIN FIRE ALARM CONTROL PANEL. PROVIDE VERIFICATION FOR ALL DEVICES ON AFFECTED CIRCUIT.

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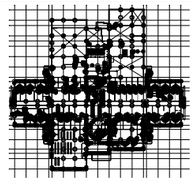

BUILDING KEY PLAN

revisions	description	date
1	ISSUED WITH ADDENDUM #4	09/14/17

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MECHANICAL ROOM 2670 & SHOP AREA - GENERAL NOTES

Designed By	PL	Conçu par
Date	2017/09/14	(yyyy/mm/dd)
Drawn By	RD	Dessiné par
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NIKOLAS FEHR
Project Manager / Administrateur de projets

EC Proj no.	Consultant Proj no.
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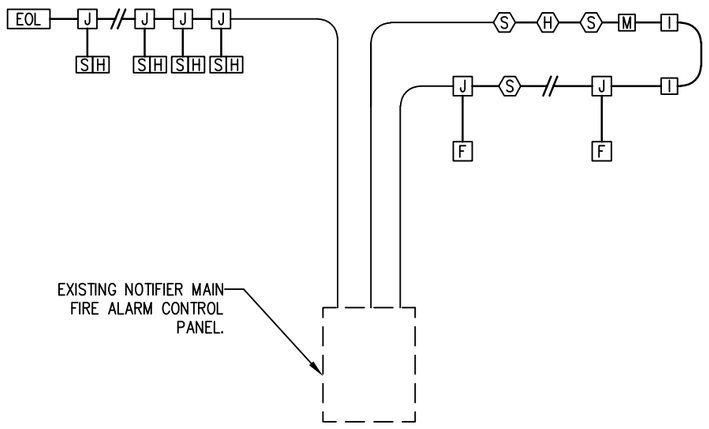
E4 R1B

FIRE ALARM RISER DIAGRAM

RISER DIAGRAM



NOTE:
RISER/SCHEMATIC DIAGRAM IS A GRAPHICAL REPRESENTATION OF THE FIRE ALARM SYSTEM AND DOES NOT INDICATE ALL DEVICES, CONDUIT, WIRING, ETC. REFER TO FIRE ALARM DRAWINGS FOR DEVICE LOCATIONS

GENERAL NOTES:

1. ALL NEW DEVICES TO BE WIRED TO THE EXISTING EDWARDS FIRE ALARM CONTROL PANEL. EXISTING NOTIFIER PANEL TO REMAIN.
2. ALL WIRING FOR NOTIFICATION DEVICES TO BE WIRED IN A CLASS 'A' CONFIGURATION (RETURN LOOP CIRCUIT) AND ALL WIRING FOR SIGNALING DEVICES TO BE WIRED IN A CLASS 'B' CONFIGURATION. PROVIDE SEPARATE CONDUIT SYSTEM FOR EACH LOOP.
3. ALL FIRE ALARM WIRING TO BE RUN IN MINIMUM 21mm EMT. ALL FIRE ALARM CONDUIT TO BE RED.
4. ELECTRICAL CONTRACTOR TO PROVIDE FAULT ISOLATION MODULES WHEN ENTERING AND LEAVING EACH FIRE ALARM ZONE PER NATIONAL BUILDING CODE OR A LESSER NUMBER WHERE RECOMMENDED BY THE MANUFACTURER. THIS DIAGRAM IS FOR SCHEMATIC PURPOSES ONLY. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ADDITIONAL MODULES AS REQUIRED WHETHER SHOWN OR NOT IN ORDER TO ACCOMMODATE THE ACTUAL NUMBER OF DEVICES AND ROUTING OF WIRING. EACH MODULES TO BE CLEARLY LABELED WITH A RIVETED LAMACOID AND READILY ACCESSIBLE FOR INSPECTION. MODULES ARE NOT BE INSTALLED ABOVE SUSPENDED CEILINGS. AS BUILT DRAWINGS TO REFLECT THE LOCATION OF EACH ISOLATION MODULE.
5. THE OPERATION OF ANY MANUAL PULL STATION OR DETECTION TYPE DEVICE TO TRIP THE FIRE ALARM CONTROL PANEL CAUSING IT TO GO INTO ALARM. ALL FIRE ALARM SIGNALING DEVICES TO SOUND CONTINUOUSLY UNTIL THE SYSTEM IS MANUALLY RESET AT THE CONTROL PANEL.
6. ELECTRICAL CONTACTOR TO INCLUDE ALL COSTS ASSOCIATED WITH SETTING–UP, TESTING AND THE VERIFICATION OF THE FIRE ALARM SYSTEM. THE MANUFACTURER WITH THE ASSISTANCE OF THE ELECTRICAL CONTRACTOR AND THE OWNER'S REPRESENTATIVE TO PERFORM A COMPLETE FIRE ALARM VERIFICATION AFTER THE INSTALLATION HAS BEEN COMPLETE. A CERTIFICATE OF VERIFICATION AND A COMPLETE REPORT SHALL BE SENT TO THE DEPARTMENTAL REPRESENTATIVE FOR REVIEW. THE ENTIRE INSTALLATION SHALL CARRY A ONE (1) YEAR WARRANTY FROM THE DATE OF SUBSTANTIAL COMPLETION.
7. THE ENTIRE INSTALLATION TO BE TO THE FULL SATISFACTION OF THE DEPARTMENTAL REPRESENTATIVE.

SYMBOL SCHEDULE

S	SMOKE DETECTOR
H	HEAT DETECTOR
S H	HORN/STROBE
M	MONITOR MODULE
F	MANUAL PULL STATION
I	ISOLATION MODULE
J	JUNCTION BOX
EOL	END OF LINE DEVICE

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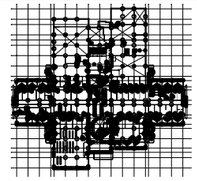

BUILDING KEY PLAN

revisions	description	date
1	ISSUED WITH ADDENDUM #4	09/14/17

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FIRE ALARM
RISER DIAGRAM

Designed By	PL	Conçu par
Date	2017/09/14	(yyyy/mm/dd)
Drawn By	RD	Dessiné par
Date	2017/09/14	(yyyy/mm/dd)
Reviewed By	HCC	Examiné par
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Project Manager / Administrateur de projets

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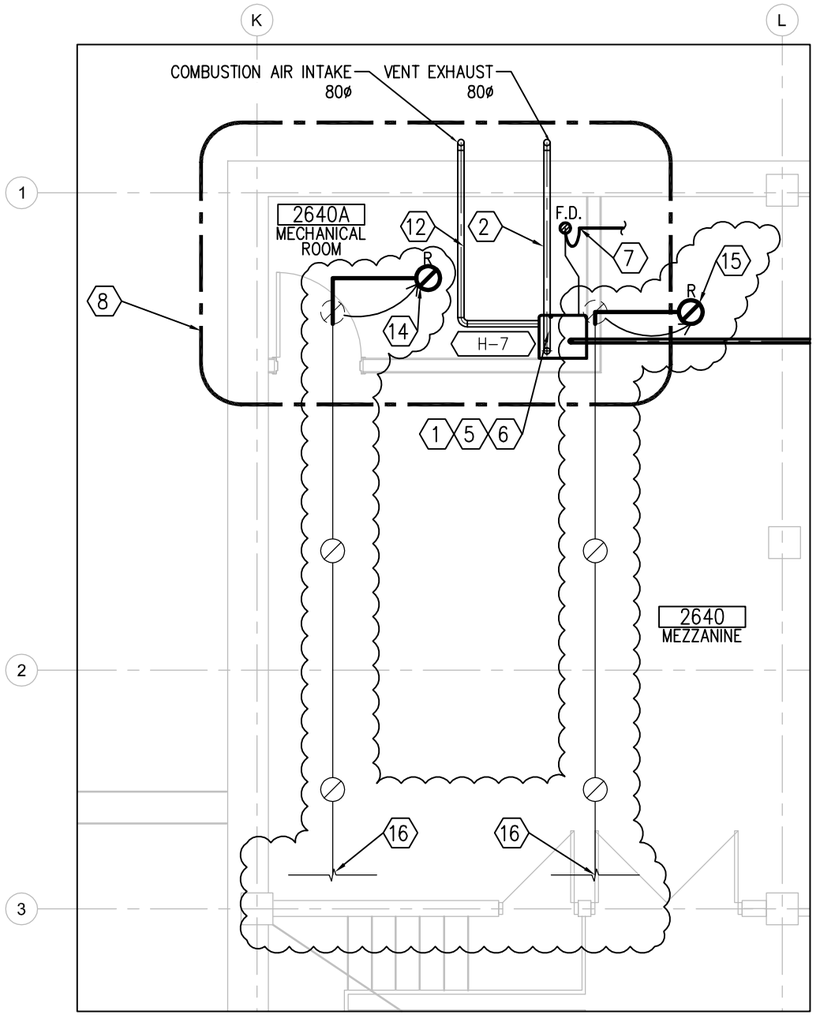
E4 R1C



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1 / M7 SHOP AREA - NEW SYSTEMS

1:75

NEW SYSTEMS KEYNOTES:

14 RELOCATE SPRINKLER HEAD TO THE CENTRE OF THE NEW MECHANICAL ROOM.

15 VERIFY INTERFERENCE BETWEEN SPRINKLER HEAD AND NEW WALL. RELOCATE SPRINKLER HEAD AS REQUIRED.

16 EXISTING SPRINKLER LINES TO REMAIN.

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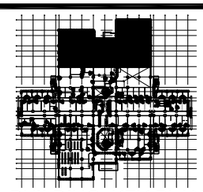

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SHOP AREA
NEW SYSTEMS

Designed By / Conçu par	MG
Date (yyyy/mm/dd)	2017/04/28
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Date (yyyy/mm/dd)	2017/04/28
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Tender / Soumission	
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Part 1 General

1.1 REFERENCES

.1 National Fire Protection Association (NFPA).

.2 Electrical Equipment Manufacturers' Advisory Council (EEMAC)

.3 American National Standards Institute/ American Society of Mechanical Engineers (ANSI/ASME)

.1 ANSI/ASME B31.1, Power Piping, (SI Edition).

.4 American Society for Testing and Materials (ASTM)

.1 ASTM A125, Specification for Steel Springs, Helical, Heat-Treated.

.2 ASTM A307, Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

.3 ASTM A563, Specification for Carbon and Alloy Steel Nuts.

.5 Manufacturer's Standardization Society of the Valves and Fittings Industry (MSS)

.1 MSS SP58, Pipe Hangers and Supports - Materials, Design and Manufacture.

.2 MSS SP69, Pipe Hangers and Supports - Selection and Application.

.3 MSS SP89, Pipe Hangers and Supports - Fabrication and Installation Practices.

.6 Underwriter's Laboratories of Canada (ULC)

1.2 REGULATORY REQUIREMENTS

.1 Refer to other parts of the specifications.

.2 Conform to the requirements and recommendations of all local municipal, provincial and federal codes, by-laws and ordinances.

.3 Where work indicated exceeds minimum requirements of applicable codes and standards, provide work as specified.

1.3 APPLICABLE CODES AND STANDARDS

.1 In general, and as applicable, the physical and chemical properties, the characteristics and the performance of items in this Division shall be as noted in the following:

.1 Canadian Standards Association.

.2 American National Standards Institute.

.3 Civic Building By-Laws.

.4 Civic Water Works By-Laws and Sewer By-Laws.

.5 Worker's Compensation Board Requirements.

.6 American Society for Testing and Materials.

.7 Canadian Government Specifications Board.

.8 National Fire Protection Association.

.9 Canadian Council of Ministers of the Environment Codes.

.10 Underwriters' Laboratories of Canada.

1.4 LATEST EDITIONS

.1 The latest edition of all codes and standards, of the date of tender submission, shall apply; except for specific editions referenced by overriding codes.

1.5 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section 01 33 00 - Submittal Procedures.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for specified equipment and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province where work is taking place.

.2 Drawings to show:

.1 Mounting arrangements.

.2 Operating and maintenance clearances.

.3 Drawings and product data accompanied by:

.1 Detailed drawings of bases, supports, and anchor bolts.

.2 Acoustical sound power data, where applicable.

.3 Points of operation on performance curves.

.4 Manufacturer to certify current model production.

.5 Certification of compliance to applicable codes.

.4 In addition to transmittal letter referred to in Section 01 33 00 - Submittal Procedures: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

.4 Certificates:

.1 Provide CSA certified equipment.

.2 Where CSA certified equipment is not available, submit such equipment to authority having jurisdiction for special approval before delivery to site.

.3 Submit test results of installed electrical systems and instrumentation.

.4 Permits and fees: in accordance with General Conditions of contract.

.5 Submit certificate of acceptance from authority having jurisdiction upon completion of Work to Departmental Representative.

1.6 QUALITY ASSURANCE

.1 Pre-Installation Meeting:

.1 Convene pre-installation meeting one week prior to beginning on-site installations

.1 Verify project requirements.

.2 Review installation and substrate conditions.

.3 Co-ordination with other building subtrades.

.4 Review manufacturer's installation instructions and warranty requirements.

.2 Health and Safety:

.1 Do construction occupational health and safety in accordance with Section 01 35 29.06 - Health and Safety Requirements.

1.7 AUTHORITIES HAVING JURISDICTION

.1 Comply with all requirements of Authorities Having Jurisdiction (AHJ), including authorized inspectors, without additional compensation.

1.8 PERMITS, FEES AND CERTIFICATES

.1 Obtain all permits, approvals, and the like, required to complete the work ready for occupancy. Include the cost of same in the Tender Price.

.2 Assist the Owner in obtaining both temporary and permanent occupancy permits.

.3 In addition to the requirements in Division 01, obtain all required Certificates of Inspection for the work and deliver same to the Departmental Representative before request for substantial performance. These include but are not limited to:

.1 Equipment start-up reports.

.2 Fire protection certificate.

1.9 EQUIPMENT LIST

.1 Compile a complete list of fire suppression equipment and materials to be used on this project and forming part of tender documents by adding manufacturer's name, model number and details of materials, and submit for approval.

.2 Submit for approval within 48h after award of contract.

1.10 SPECIFIED EQUIPMENT AVAILABILITY

.1 If specified equipment is not available (due to delays in delivery due to reasons within the Contractor’s control) at scheduled installation time an acceptable alternate shall be installed AT THE CONTRACTOR'S EXPENSE and replaced with the specified equipment when the specified equipment becomes available WITH NO ADDITIONAL COMPENSATION.

1.11 REGISTRATION / CERTIFICATION OF FIRE PROTECTION CONTRACTOR

.1 The contractor shall be registered and/or certified as a fire protection contractor, where required by the Authority Having Jurisdiction.

.2 All individual workers must hold a valid Certificate of Qualification, or be a Registered Apprentice, as required by the AHJ.

.3 Where required by the local professional engineering governing body, fire protection engineer shall carry authorization to practice as an engineering service company (such as a Certificate of Authorization, etc.).

1.12 DESIGN AND ENGINEERING OF FIRE PROTECTION SYSTEMS

.1 The fire protection contractor is responsible for the design and engineering of the systems in accordance with NFPA, other applicable standards, and the AHJ. This includes, but is not limited to layout, calculations, certification, and other work required by NFPA.

.2 Perform a complete system design confirming the requirements specified herein and detailing all aspects of the required fire protection systems and document with shop drawings as specified herein. Refer to other sections for additional requirements.

.3 Data used for designing fire protection systems shall be current, obtained within six (6) months of date indicated on the working drawings. Fire protection contractor shall verify that conditions have not changed in the vicinity of the project that would make the data questionable. Test as required for valid, current data.

.4 Equipment and piping indicated on the contract drawings shall be located as shown. Advise the Departmental Representative if code or other reasons do not permit equipment and piping to be located as shown. Locate other equipment and piping as required to suit the design, subject to timely coordination with other trades and approval of the Departmental Representative.

1.13 USE OF ELECTRONIC DRAWINGs

.1 Refer to Division 01 for availability with respect to obtaining drawings in electronic format (i.e. AutoCAD ".dwg" or ".dxf") directly from the Departmental Representative, for use in the production of fire protection design, shop drawings, and/or record drawings. Otherwise contact Departmental Representative.

1.14 PROTECTION OF OPENINGS

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

1.15 ELECTRICAL CHARACTERISTICS

.1 Check with the electrical trade and provide all mechanical items with correct electrical characteristics to suit the electrical work.

.2 If correct characteristics are not available from the specified equipment manufacturer, contact the Departmental Representative prior to the close of tenders.

.3 At time of ordering mechanical equipment, confirm electrical characteristics with the Electrical Contractor including voltage, current, horsepower and other relevant data, and ensure that they have been confirmed by the power authority.

.4 No additional compensation will be paid for problems arising from incorrect electrical characteristics.

1.16 CUTTING, PATCHING, REPAIRING, MAKING GOOD

.1 In addition to the requirements in Division 01, each trade requiring such work shall be responsible for necessary cutting. Patching shall be by appropriate trade. All work to be performed by experienced tradesmen.

.2 Neatly perform cutting and patching work to blend smoothly with surrounding surfaces.

.3 Patch and make good disturbed surfaces to match existing adjacent work. Leave finished, neat, to Departmental Representative's approval.

.4 Perform X-ray examination of wall and floors prior to making openings, where required to avoid damage to concealed elements such as structural reinforcements and electrical conduit.

1.17 TESTS

.1 In addition to the requirements in Division 01, carry out all tests hereinafter noted, as required by the regulatory agencies and as requested by the Departmental Representative and furnish all labour and equipment required for such tests without extra compensation.

.2 Before activating systems, review manufacturer’s instructions, recheck equipment, check all connections, set all controls for proper start-up, obtain necessary clearances from the electrical division, etc.

.3 Submit to the Departmental Representative, legible report for each test conducted, within one week of the test.

.4 Notify the Departmental Representative at least 2 regular working days ahead of all tests, so that the tests can be witnessed.

1.18 FUNCTIONAL TESTING

.1 Test all fire protection equipment and systems. Test as required by the AHJ and Departmental Representative, submitting comprehensive reports. Example forms are available from the Departmental Representative.

.2 Ensure all tests demonstrate compliance with the specified and manufacturers’ shop drawing and catalogued performance, as well as compliance with applicable standards.

1.19 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTIONS

.1 In addition to the requirements in Division 01, supply tools, equipment and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.2 Manufacturers or expert suppliers to provide demonstrations and instructions.

.3 Use operation and maintenance manual, record drawings, audio visual aids, etc. as part of instruction materials.

.4 Instruction duration time requirement are as specified in appropriate sections. Where time is not specified, training shall be of sufficient scope and duration as needed to convey required information to the trainee, as approved by the Departmental Representative.

.5 Where deemed necessary, Owner may record these demonstrations on videotape for future reference.

.6 Submit training schedule and scope description to the Departmental Representative for review and approval for each training topic. Training shall not commence until approval of training schedule and scope if given by the Departmental Representative.

1.20 CLOSEOUT SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Operation and Maintenance Data: submit operation and maintenance data for incorporation into manual.

.1 Operation and maintenance manual approved by, and final copies deposited with, Departmental Representative before final inspection.

.2 Operation data to include:

.1 Control schematics for systems including environmental controls.

.2 Description of systems and their controls.

.3 Description of operation of systems at various loads together with reset schedules and seasonal variances.

.4 Operation instruction for systems and component.

.5 Description of actions to be taken in event of equipment failure.

.6 Valves schedule and flow diagram.

.7 Colour coding chart.

.3 Maintenance data to include:

.1 Servicing, maintenance, operation and trouble-shooting instructions for each item of equipment.

.2 Data to include schedules of tasks, frequency, tools required and task time.

.4 Performance data to include:

.1 Equipment manufacturer's performance datasheets with point of operation as left after commissioning is complete.

.2 Equipment performance verification test results.

.3 Special performance data as specified.

.4 Testing, adjusting and balancing reports as specified in Section 23 05 93 - Testing, Adjusting and Balancing for HVAC.

.5 Approvals:

.1 Submit 2 copies of draft Operation and Maintenance Manual to Departmental Representative for approval. Submission of individual data will not be accepted unless directed by Departmental Representative.

.2 Make changes as required and re-submit as directed by Departmental Representative.

.6 Additional data:

.1 Prepare and insert into operation and maintenance manual additional data when need for it becomes apparent during specified demonstrations and instructions.

.7 Site records:

.1 Departmental Representative will provide 1 set of reproducible mechanical drawings. Provide sets of prints as required for each phase of work. Mark changes as work progresses and as changes occur. Include changes to existing mechanical systems, control systems and low voltage control wiring.

.2 Transfer information weekly to reproducibles, revising reproducibles to show work as actually installed.

.3 Use different colour waterproof ink for each service.

.4 Make available for reference purposes and inspection.

.8 As-Built drawings:

.1 Prior to start of Testing, Adjusting and Balancing, finalize production of as-built drawings.

.2 Identify each drawing in lower right hand corner in letters at least 12 mm high as follows: "AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (Date).

.3 Submit to Departmental Representative for approval and make corrections as directed.

.4 Perform testing, adjusting and balancing for HVAC using as-built drawings.

.5 Submit completed reproducible as-built drawings with Operating and Maintenance Manuals.

.9 Submit copies of as-built drawings for inclusion in final TAB report.

1.21 MAINTENANCE MATERIAL SUBMITTALS

.1 Submit in accordance with Section 01 78 00 - Closeout Submittals.

.2 Provide one set of special tools required to service equipment as recommended by manufacturers.

.3 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.22 DELIVERY, STORAGE AND HANDLING

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

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

.3 Storage and Handling Requirements:

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

.2 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse as specified in Construction Waste Management Plan and in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

1.23 SUBSTANTIAL COMPLETION

.1 Provide minimum notice of ten (10) working days to the Departmental Representative prior to request to declare project Substantially Complete. Failure to do so may result in site review being delayed. Show 2 weeks on construction schedule.

.2 A minimum of three (3) working days before substantial completion is to be declared, submit the following:

.1 All certificates and documentation recommended by NFPA standards and required by these specifications and AHJ that are applicable to the project.

.2 Operation and Maintenance Manuals, complete with revisions as directed.

.3 Confirm all fire protection equipment is operational, under control, indicating exceptions and temporary controls/arrangements, including 'tenant' areas.

.3 Confirm systems are ready for occupancy and use for intended purpose in every respect. Submit a letter signed by the manager or president of the prime contractor under Div 21 (i.e. the fire protection contractor) stating as such upon request of the Departmental Representative.

.4 Before certification date submit detailed written confirmation of completion of deficient life safety work noted in the documentation listed in previous paragraphs, including date completed. Provide schedule for any outstanding or deferred non-life safety work that is to be completed.

1.24 QUALITY OF MATERIALS

.1 Furnish new materials, apparatus or products required for the work, of first class quality, delivered, erected, connected up and finished in every detail.

.2 The use of any or all materials is subject to the approval of the Departmental Representative.

.3 Unless otherwise specified, all products shall be CSA approved.

.4 All fire protection materials, apparatus or products shall be ULC approved.

.5 If materials, apparatus or products are not CSA or ULC approved, obtain approval of the provincial regulatory authority. Pay all applicable charges levied and make all modifications required for approval.

.6 Confirm colours with the Architect before ordering.

1.25 SAFETY FEATURES

.1 Provide safety features on all equipment to ensure safe operation and maintenance including belt, coupling, and other guards, screened fan intakes and discharges where inadequate ductwork for protection, safety interlocks and labels.

Part 2 Products

2.1 GENERAL

.1 Installations shall include all devices, attachments, equipment, components and piping necessary to form complete working systems to code requirements.

2.2 FIRE SEPARATION REPAIR

.1 Cooperate fully with other trades to ensure maintenance of the rating of fire separations that are penetrated, in strict compliance with the manufacturer's recommendations and requirements of the AHJ.

2.3 ACCESSIBILITY

.1 Be responsible for supplying and locating all access panels in the ceiling, wall, partitions, etc., where openings are necessary for the inspection, servicing and/or removal of equipment, valves and other items that require periodic access. Panel type to suit the construction of the ceilings, walls, partitions, etc., in which they are located. Determine the location subject to the approval of the Departmental Representative. Access panels to be installed by trade experienced in work with surface in which the panel is to be installed.

.2 Mark mechanical access points in accessible ceilings with distinctive but inconspicuous tags properly attached to the ceiling grid. Obtain sample approval before purchase and installation. Indicate on record drawings.

.3 Accessibility shall be defined as:

.1 Ability to place both hands on equipment or device, with no duct, pipe or other equipment in the way.

.2 Must be accessible while standing on maximum 8'-0" step ladder.

.3 Must be in plain view.

2.4 SLEEVES AND PENETRATIONS

.1 Install sleeves for all piping passing through floors and walls.

.2 Sleeves as specifically noted, or through structural walls shall be Schedule 40 steel. All other sleeves are 6 mm galvanized sheet steel.

.3 Fit sleeves flush on either side of the wall through which they pass, extend sleeves through floors and terminate 50 mm above finished floor. Adjust as necessary to accommodate the requirements of through-penetration fire-stopping systems.

.4 Where passing through walls, make sleeves a minimum 6 mm clear of the piping, through floors make sleeves a minimum of 20 mm clear of the piping. Pack for full depth with fiberglass insulation & finish with a lagging compound. Penetrations through fire separations shall be repaired to maintain rating.

.5 Provide escutcheon plates with set screws to completely cover openings for all exposed pipes passing through walls, subject to the approval of the Departmental Representative. Provide chrome plated plates in finished areas unless otherwise approved.

.6 Be responsible for maintaining integrity of building envelope when making penetration to install equipment or devices. Enlist services of qualified trade to make openings in and/or repairs to building envelope.

.7 Sleeving through steel beams shall be permitted only where approved by the Departmental Representative in writing or where expressly indicated on the Contract Documents. Sleeves are NOT permitted in concrete beams.

.8 Seal all sleeves to make water tight.

Part 3 Execution

3.1 GENERAL

.1 All Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. Do not scale the Drawings. Consult the Architectural Drawings and details for exact locations of fixtures and equipment; obtain direction from the Departmental Representative where equipment locations are not clearly defined.

.2 Follow Drawings as closely as possible in laying out work and check Drawings of all other trades to verify spaces in which work will be installed. Maintain maximum headroom and space conditions at all points. When headroom or space conditions appear inadequate, notify the Departmental Representative before proceeding with the installation.

.3 Make modifications to the work to accommodate conditions on site without additional compensation, as required to prevent conflicts with work of other trades and to ensure proper operation and installation of systems. Allow for vertical offsets and relocation of piping up to 3m in any direction to accommodate site conflicts.

.4 Where variances occur between the Drawings and Specifications or within either document itself, include in the contract, the item or arrangement of better quality, greater quantity, and higher cost or clarify before tenders close. The final decision on the item and manner in which work is installed rests with the Departmental Representative.

.5 The mechanical contractor, with all trades involved shall provide marked-up drawings, when requested, of mechanical spaces indicating all dimensions for all installations prior to the work being done. Report any discrepancies to the Departmental Representative. ANY CONFLICTS ARISING THAT MAY HAVE BEEN RESOLVED BY LAYING THE WORK OUT IN THIS MANNER WILL BE RESOLVED WITHOUT ADDITIONAL COMPENSATION.

.6 Provide 48 hours minimum notice to Departmental Representative of all work before it is concealed. Expose concealed work for inspection, upon request, when proper notice was not provided and pay all costs therefore, including making good other trades' work.

3.2 SURVEYS AND MEASUREMENTS

.1 Base all measurements, both horizontal and vertical from established bench marks. All work shall agree with these established lines and levels. Verify all measurements shown on the Drawings at the site, and check the correctness of same as related to the work.

.2 Notify the Departmental Representative if any discrepancy is discovered between the actual measurements and those indicated which prevent following good practice or the intent of the Drawings & Specifications. Do not proceed with the work until receiving instructions from the Departmental Representative.

3.3 CO-ORDINATION

.1 Give full co-operation to those doing work under other Divisions and furnish in writing with copies to the Departmental Representative any information necessary to permit the work of all Divisions to be installed satisfactorily and with least possible

interference or delay. Work installed before full coordination is subject to removal and replacement without additional compensation.

.2 Discuss work with other Divisions prior to installation. Confirm proposed locations for equipment installed by this Division will not interfere with work installed by others.

.3 If work is installed before coordinating with other trades or so as to interfere with work of other trades, make necessary changes in the work to correct the conditions without extra compensation.

.4 When requested, provide marked up drawings indicating required clearances for installation of fire protection equipment. Provide section drawings including location of other equipment not installed by Division 21, such as ducts, cable trays, other piping, etc. Report any discrepancies to the Departmental Representative.

.5 Where work is installed in close proximity with work of other Divisions or where there is evidence that the work will interfere with work of other trades, assist in working out space conditions to make a satisfactory adjustment. Failure to co-ordinate shall require the mechanical trades to resolve the problem at their expenses. If so directed by the Departmental Representative, prepare composite working drawings and section at a suitable scale not less than 1:50 (¼" to 1'-0"), clearly showing how work is to be installed in relation to work of other trades.

3.4 ACCESSIBILITY

.1 Locate all equipment which must be serviced, operated or maintained in fully accessible positions, with minimum interference and maximum usable space. Provide access doors as required to ensure sufficient access for service and inspection. Make minor modifications to routing and locations of equipment indicated on drawings as required to improve access to equipment. Obtain direction from the Departmental Representative where major modifications are necessary to provide sufficient access.

3.5 SCAFFOLDING, RIGGING, HOISTING

.1 Unless otherwise specified, furnish all scaffolding, rigging, hoisting and services necessary for erection and delivery into the premises of any equipment apparatus furnished. Remove same from the premises when no longer required.

.2 Take precautions not to overload the structure in any manner nor provide inadequate scaffolding and rigging so as to endanger the safety of personnel on the site whether under this Division's employ or otherwise.

3.6 SUPPORTS

.1 Provide all necessary and recommended supports for all equipment furnished under this Division. Co-ordinate and facilitate all necessary and recommended foundations, pads, bases and piers provided under other Divisions for equipment furnished or installed under this Division.

3.7 PROTECTION

.1 Protect the work and material of all other sections from damage and make good all damage thus caused, to the satisfaction of the Departmental Representative.

3.8 EXAMINATION

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

.1 Visually inspect substrate.

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

.3 Proceed with installation only after unacceptable conditions have been remedied.

3.9 PAINTING REPAIRS AND RESTORATION

.1 Do painting in accordance with Section 09 91 23 - Interior Painting.

.2 Prime and touch up marred finished paintwork to match original.

.3 Restore to new condition, finishes which have been damaged.

3.10 SYSTEM CLEANING

.1 Clean interior and exterior of all systems including strainers. Vacuum interior of ductwork and air handling units.

3.11 FIELD QUALITY CONTROL

.1 Site Tests: conduct following tests in accordance with Section 01 45 00 - Quality Control and submit report.

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

3.12 DEMONSTRATION

.1 Departmental Representative will use equipment and systems for test purposes prior to acceptance. Supply labour, material, and instruments required for testing.

.2 Supply tools, equipment, and personnel to demonstrate and instruct operating and maintenance personnel in operating, controlling, adjusting, trouble-shooting and servicing of all systems and equipment during regular work hours, prior to acceptance.

.3 Use operation and maintenance manual, as-built drawings, and audio-visual aids as part of instruction materials.

.4 Instruction duration time requirements as specified in appropriate sections.

.5 Departmental Representative will record these demonstrations on video tape for future reference.

3.13 CLEANING

.1 Progress Cleaning: clean in accordance with Section 01 74 11 – Cleaning.

.1 Leave Work area clean at end of each day.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Section 01 74 11 - Cleaning.

.3 Waste Management: separate waste materials for reuse and recycling.

.1 Remove recycling containers and bins from site and dispose of materials at appropriate facility.

3.14 PROTECTION

.1 Protect equipment and systems openings from dirt, dust, and other foreign materials with materials appropriate to system.

3.15 EQUIPMENT START UP

.1 Mechanical contractor shall ensure that all electrical/mechanical components match and that it is safe to start up mechanical equipment. See also Functional Testing.

.2 All support such as electrical contractor, controls contractor, etc., shall be arranged by the mechanical and all trades directly involved in mechanical equipment being started shall be present for start up.

3.16 MANUFACTURERS' RECOMMENDATIONS

.1 Install, adjust, test, start-up, and maintain all equipment in strict accordance with the manufacturer's recommendations. If in conflict with the drawings and specifications, contact the Departmental Representative for clarification. Include edited data in O&M manuals.

.2 Ensure that the manufacturer recommends the product for its intended use. If in doubt, contact the Departmental Representative.

3.17 PERSONNEL PROTECTION

.1 In addition to the requirements in Division 01, provide visual warning signs and/or markers and mechanical protection devices for all mechanical items mounted below the minimum limits listed below and suspended more than 1500mm clear of the floor.

.1 Occupied spaces 2.3 m.

.2 Service spaces 2.1 m.

.2 Visual warning devices to be yellow tape with black stripes adhered to the entire perimeter of the item infringing on the occupied space. This will include but not be limited to:

.1 Length of pipes or equipment below specified height.

.3 Mechanical protection devices to be 7 mm wire mesh guard and/or 25 mm thick flexible foam type insulation. This will include but not be limited to:

.1 Pipe and equipment hangers.

.2 Valves.

END OF SECTION

Part 1 General

1.1 RELATED REQUIREMENTS

.1 Section 21 05 05 – Common Work Results for Fire Suppression.

1.2 REFERENCES

.1 National Fire Prevention Association (NFPA)

.1 NFPA 13, Standard for the Installation of Sprinkler Systems, latest edition.

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

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 00 10 05 - General Instruction.

.2 Product Data:

.1 Provide manufacturer's printed product literature and data sheets, and include product characteristics, performance criteria, physical size, finish and limitations.

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in the Province where work is taking place.

.2 Indicate:

.1 Materials.

.2 Finishes.

.3 Method of anchorage

.4 Number of anchors.

.5 Supports.

.6 Reinforcement.

.7 Assembly details.

.8 Accessories.

.4 Test reports:

.1 Submit certified test reports for wet pipe fire protection sprinkler systems from approved independent testing laboratories, indicating compliance with specifications for specified performance characteristics and physical properties.

.5 Certificates:

.1 Submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.6 Manufacturers' Instructions:

.1 Provide manufacturer's installation instructions.

.7 Field Quality Control Submittals:

.1 Manufacturer's Field Reports: manufacturer's field reports specified.

1.4 CLOSEOUT SUBMITTALS

.1 Provide operation, maintenance and engineering data for incorporation into manual specified in Section 01 78 00 - Closeout Submittals in accordance with ANSI/NFPA 20.

.2 Manufacturer's Catalog Data, including specific model, type, and size for: Pipe and fittings.

.1 Valves, including gate, check, and globe.
.2 Sprinkler heads.
.3 Pipe hangers and supports.
.4 Mechanical couplings.

.3 Drawings:

.1 Sprinkler heads and piping system layout.
.1 Prepare 279.4 mm by 431.8 mm detail working drawings of system layout in accordance with NFPA 13, "Working Drawings".
.2 Show data essential for proper installation of each system.
.3 Show details, plan view, elevations, and sections of systems supply and piping.
.4 Show piping schematic of systems supply, devices, valves, pipe, and fittings.

.4 Field Test Reports: Preliminary tests on piping system.

.5 Records:

.1 As-built drawings of each system.
.1 After completion, but before final acceptance, submit complete set of as-built drawings of each system for record purposes.
.2 Submit 279.4 mm by 431.8 mm drawings on reproducible Mylar film with title block similar to full size contract drawings.

.6 Operation and Maintenance Manuals:

.1 Provide Contractors Material and Test Certificate for aboveground piping and other documentation for incorporation into manual in accordance with NFPA 13.

1.5 QUALITY ASSURANCE

.1 Qualifications:

.1 Installer: company or person specializing in wet sprinkler systems with documented experience.

.2 Supply grooved joint couplings, fittings, valves, grooving tools and specialties from a single manufacturer. Use date stamped castings for coupling housings, fittings, valve bodies, for quality assurance and traceability.

1.6 MAINTENANCE MATERIAL SUBMITTALS

.1 Extra Materials:

.1 Provide maintenance materials in accordance with Section 01 78 00 – Closeout Submittals.

.2 Provide spare sprinklers and tools in accordance with NFPA 13.

1.7 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 - Common Product Requirements 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 Storage and Protection:

.1 Store materials indoors in dry location.

.2 Store and protect materials from exposure to harmful weather conditions and at temperature and humidity conditions recommended by manufacturer.

.4 Develop Construction Waste Management Plan related to Work of this Section.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

Part 2 Products

2.1 DESIGN REQUIREMENTS

.1 A professional Engineer licensed to practice in Manitoba is required to perform and seal the design.

.2 Design automatic wet pipe fire suppression sprinkler systems in accordance with required and advisory provisions of NFPA 13 latest edition, by pipe schedules for light hazard occupancy or hydraulic calculations for uniform distribution of water over design area.

.3 Include with each system materials, accessories, and equipment inside and outside building to provide each system complete and ready for use.

.4 Design and provide each system to give full consideration to blind spaces, piping, electrical equipment, ducts, and other construction and equipment in accordance with

detailed shop drawings. Locate sprinkler heads in consistent pattern with ceiling grid, lights, and air supply diffusers.

.5 Devices and equipment for fire protection service: ULC approved for use in wet pipe sprinkler systems.

.6 Location of Sprinkler Heads:

.1 Locate heads in relation to ceiling and spacing of sprinkler heads not to exceed that permitted by NFPA 13 for light hazard occupancy 20.9m² per head.

.2 Uniformly space sprinklers on branch.

.7 Water Distribution:

.1 Make distribution uniform throughout the area in which sprinkler heads will open.

.2 Discharge from individual heads in hydraulically most remote area to be 100 % of specified density.

.8 Density of Application of Water:

.1 Size pipe to provide specified density when system is discharging specified total maximum required flow.

.2 Application to horizontal surfaces below sprinklers shall be 0.38 lpm per m².

.9 Sprinkler Discharge Area:

.1 Area: hydraulically most remote 139m² to 279 m² area as defined in NFPA 13.

.10 Outside Hose Allowances:

.1 Include allowance in hydraulic calculations of 378 lpm for outside hose streams.

.11 Friction Losses:

.1 Calculate losses in piping in accordance with Hazen-Williams formula with 'C' value of 120 for steel piping, 150 for copper tubing, and 140 for cement-lined ductile-iron piping.

.12 Water Supply:

.1 Base hydraulic calculations on existing water supply reading on existing sprinkler system pressure gauges.

2.2 ABOVE GROUND PIPING SYSTEMS

.1 Provide fittings for changes in direction of piping and for connections.

.1 Make changes in piping sizes through tapered reducing pipe fittings, bushings will not be permitted.

.2 Perform welding in shop; field welding will not be permitted.

.3 Conceal piping in areas with suspended ceiling and paint piping in areas exposed. Coordinate paint color with Architects and Owner.

2.3 PIPE, FITTINGS AND VALVES

.1 Pipe:

.1 Ferrous: to NFPA 13.

.2 Copper tube: to NFPA 13.

.2 Fittings and joints to NFPA 13:

.1 Ferrous: screwed, welded, flanged or roll grooved.

.1 Grooved joints designed with two ductile iron housing segments, pressure responsive gasket, and zinc-electroplated steel bolts and nuts. Cast with offsetting angle-pattern bolt pads for rigidity and visual pad-to-pad offset contact.

.2 Copper tube: screwed, soldered, brazed, grooved.

.3 Provide welded, threaded, grooved-end type fittings into which sprinkler heads, sprinkler head riser nipples, or drop nipples are threaded.

.4 Plain-end fittings with mechanical couplings and fittings which use steel gripping devices to bite into pipe when pressure is applied will [not] be permitted.

.5 Rubber gasketed grooved-end pipe and fittings with mechanical couplings are permitted in pipe sizes 32 mm and larger.

.6 Fittings: ULC approved for use in wet pipe sprinkler systems.

.7 Ensure fittings, mechanical couplings, and rubber gaskets are supplied by same manufacturer.

.8 Side outlet tees using rubber gasketed fittings are not permitted.

.9 Sprinkler pipe and fittings: metal.

.3 Valves:

.1 ULC listed for fire protection service.

.2 Gate valves: open by counter-clockwise rotation.

.3 Check valves: flanged clear opening swing or spring actuated check type with flanged inspection and access cover plate for sizes 10 cm and larger.

.4 Provide gate valve in piping protecting elevator hoist ways, machine rooms, and machinery spaces.

.4 Pipe hangers:

.1 ULC listed for fire protection services in accordance with NFPA.

2.4 SPRINKLER HEADS

.1 General: to NFPA 13 and ULC listed for fire services.

.2 Sprinkler Head Type:

.1 Type A: upright bronze.

.2 Type B: pendent chrome link and lever type.

.3 Type C: pendent chrome glass bulb type.

.4 Type D: recessed pendent polished chrome glass bulb type with ring and cup.

.5 Type E: concealed polished chrome link and lever type.

.6 Type F: side wall polished chrome link and lever type.

.3 Provide nominal 1.2 cm orifice sprinkler heads.

.1 Release element of each head to be of intermediate temperature rating or higher as suitable for specific application.

.2 Provide polished stainless steel ceiling plates or chromium-plated finish on copper alloy ceiling plates, and chromium-plated pendent sprinklers below suspended ceilings.

.3 Provide corrosion-resistant sprinkler heads and sprinkler head guards in accordance with NFPA 13.

.4 Provide sprinkler heads as indicated.

.5 Deflector: not more than 75 mm below suspended ceilings.

.6 Ceiling plates: not more than 25 mm deep.

.7 Ceiling cups: not permitted.

2.5 PRESSURE GAUGES

.1 ULC listed and to Section 23 05 19.01 - Thermometers and Pressure Gauges - Piping Systems.

2.6 PIPE SLEEVES

.1 Provide pipe sleeves where piping passes through walls, floors.

.2 Secure sleeves in position and location during construction.

.3 Provide sleeves of sufficient length to pass through entire thickness of walls, floors.

.4 Provide 2.5 cm minimum clearance between exterior of piping and interior of sleeve or core-drilled hole.

.1 Firmly pack space with mineral wool insulation.

.2 Seal space at both ends of sleeve or core-drilled hole with plastic waterproof cement which will dry to firm but pliable mass, provide mechanically adjustable segmented elastomeric seal.

.3 In fire walls and fire floors, seal both ends of pipe sleeves or core-drilled holes with ULC listed fill, void, or cavity material.

.5 Sleeves in Masonry and Concrete Walls, Floors, and Roofs:

.1 Provide hot-dip galvanized steel, ductile-iron, cast-iron sleeves.

.2 Core drilling of masonry and concrete may be provided in lieu of pipe sleeves when cavities in core-drilled hole are completely grouted smooth.

.6 Sleeves in Other Than Masonry and Concrete Walls, Floors, and Roofs:

.1 Provide 0.61 mm thick galvanized steel sheet.

2.7 ESCUTCHEON PLATES

.1 Provide one piece type metal plates for piping passing through walls, floors, and ceilings in exposed spaces.

.2 Provide polished stainless steel plates, chromium-plated finish on copper alloy plates in finished spaces.

.3 Provide paint finish on metal plates in unfinished spaces.

2.8 INSPECTOR'S TEST CONNECTION

.1 Locate inspector's test connection at hydraulically most remote part of each system, provide test connections approximately 3 m above floor for each sprinkler system or portion of each sprinkler system equipped with alarm device.

.2 Provide test connection piping to location where discharge will be readily visible and where water may be discharged without property damage.

.3 Provide discharge orifice of same size as corresponding sprinkler orifice.

2.9 SIGNS

.1 Attach properly lettered and approved metal signs to each valve and alarm device to NFPA 13.

.2 Permanently fix hydraulic design data nameplates to riser of each system.

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 datasheet.

3.2 INSTALLATION

.1 Install, inspect and test to acceptance in accordance with NFPA 13 and NFPA 25.

3.3 PIPE INSTALLATION

.1 Install piping straight and true to bear evenly on hangers and supports. Do not hang piping from plaster ceilings.

.2 Keep interior and ends of new piping and existing piping thoroughly cleaned of water and foreign matter.

.3 Keep piping systems clean during installation by means of plugs or other approved methods. When work is not in progress, securely close open ends of piping to prevent entry of water and foreign matter.

.4 Inspect piping before placing into position.

3.4 DISINFECTION

.1 Disinfect new piping.

.2 Fill piping systems with solution containing minimum of 50 parts per million of chlorine and allow solution to stand for minimum of 24 hours.

.3 Flush solution from systems with clean water until maximum residual chlorine content is not greater than 0.2 part per million or residual chlorine content of domestic water supply.

.4 Obtain at least two consecutive satisfactory bacteriological samples from piping, analyzed by certified laboratory, and submit results prior to piping being placed into service.

3.5 FIELD PAINTING

.1 Clean, pre-treat, prime, and paint new systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories.

.2 Apply coatings to clean, dry surfaces, using clean brushes.

.3 Clean surfaces to remove dust, dirt, rust, and loose mill scale.

.4 Immediately after cleaning, provide metal surfaces with 1 coat of pre-treatment primer applied to minimum dry film thickness of 0.3 ml, and one coat of zinc chromate primer applied to minimum dry film thickness of 1.0 ml.

.5 Shield sprinkler heads with protective covering while painting is in progress.

.6 Upon completion of painting, remove protective covering from sprinkler heads.

.7 Remove sprinkler heads which have been painted and replace with new sprinkler heads.

.8 Provide primed surfaces with following:

.1 Piping in Finished Areas:

.1 Provide primed surfaces with 2 coats of paint to match adjacent surfaces.

.2 Provide valves and operating accessories with 1 coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil.

.3 Provide piping with 50 mm wide red enamel bands or self-adhering red plastic bands spaced at maximum of 6 m intervals throughout piping systems.

.2 Piping in Unfinished Areas:

.1 Provide primed surfaces with one coat of red alkyd gloss enamel applied to minimum dry film thickness of 1.0 mil in spaces above suspended ceilings, crawl spaces, pipe chases, mechanical

equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material.

.2 Provide piping with 50 mm wide red enamel bands or self-adhering red plastic bands] spaced at maximum of 6 m intervals.

3.6 FIELD QUALITY CONTROL

.1 Site Test, Inspection:

.1 Perform test to determine compliance with specified requirements in presence of Departmental Representative.

.2 Test, inspect, and approve piping before covering or concealing.

.3 Preliminary Tests:

.1 Hydrostatically test each system at 200 psig for a 2 hour period with no leakage or reduction in pressure.

.2 Flush piping with potable water in accordance with NFPA 13.

.3 Piping above suspended ceilings: tested, inspected, and approved before installation of ceilings.

.4 Test alarms and other devices.

.5 Test water flow alarms by flowing water through inspector's test connection. When tests have been completed and corrections made, submit signed and dated certificate in accordance with NFPA 13.

.4 Formal Tests and Inspections:

.1 Do not submit request for formal test and inspection until preliminary test and corrections are completed and approved.

.2 Submit written request for formal inspection at least 15 days prior to inspection date.

.3 Repeat required tests as directed.

.4 Correct defects and make additional tests until systems comply with contract requirements. Furnish equipment, instruments, connecting devices, and personnel for tests.

.5 Authority of Jurisdiction, will witness formal tests and approve systems before they are accepted.

.2 Manufacturer's Field Services:

.1 Obtain written report from manufacturer verifying compliance of Work, in handling, installing, applying, protecting and cleaning of product and submit Manufacturer's Field Reports as described in PART 1 - ACTION AND INFORMATIONAL SUBMITTALS.

.2 Provide manufacturer's field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with manufacturer's instructions.

.3 Schedule site visits, to review Work, as directed in PART 1 - QUALITY ASSURANCE.

.3 Site Tests:

.1 Testing to be witnessed by authority having jurisdiction.

.2 Develop, with Departmental Representative, detailed instructions for O & M of this installation.

3.7 CLEANING

.1 Clean in accordance with Section 01 74 11 - Cleaning.

.1 Remove surplus materials, excess materials, rubbish, tools and equipment.

.2 Waste Management: separate waste materials for reuse and recycling in accordance with Section 01 74 21 Construction/demolition Waste Management And Disposal.

END OF SECTION