Specifications and drawings for

**Daniel J. MacDonald Modernization**

are amended as follows:

SPECIFICATIONS

1.1 **REVISED SPECIFICATIONS**

.1 The following revised specifications issued with this addendum supersede previously issued specifications of the same title and number

.1 Section No. 00 01 10_R5, Table of Contents

.2 Section No. 01 61 10_R2, List of Materials

.3 Section No. 06 40 00_R2, Architectural Woodwork

.4 Section No. 22 05 00_R1, Common Work Results for Plumbing

.5 Section No. 25 30 02_R1, EMCS: Field Control Devices

.6 Section No. 25 90 01_CS402_R2, Domestic Hot Water System – Control Points List

.7 Section No. 25 90 01_CS601_R2, Heat Recovery Chillers – Control Points List

.8 Section No. 25 90 01_CS621_R2, Heating Water Distribution System – Control Points List

.9 Section No. 25 90 01_CS701_R2, Make-Up Air Dedicated Outdoor Air System with Energy Recovery System – Control Points List

.10 Section No. 25 90 01_CS722_R1, Unit Heaters Hydronic – Control Points List

.11 Section No. 25 90 01_CS732_R2, Forced Flow Heaters Hydronic – Control Points List

.12 Section No. 25 90 01_CS737_R2, Fan Coil Units – Control Points List

.13 Section No. 25 90 01_CS801_R1, Washroom Exhaust – Control Points List

.14 Section No. 25 90 01_CS805_R1, Elevator Room Ventilation – Control Points List

.15 Section No. 25 90 01_CS809_R2, Parking Garage Ventilation – Control Points List

.16 Section No. 25 90 01_CS810_R2, Mechanical Room Ventilation – Control Points List

.17 Section No. 25 90 01_CS821_R1, Fan Powered VAV Dedicated Outdoor Air System

.18 Section No. 25 90 01_CS821_R2, Fan Powered VAV Dedicated Outdoor Air System – Control Points List

.19 Section No. 26 05 34_R1, Conduits, Conduit Fastenings and Conduit Fittings

.20 Section No. 26 32 13.01_R2, Power Generation Diesel

DRAWINGS

1.2 **REVISED DRAWINGS**

.1 The following Drawings are revised and re-issued with this addendum. Revisions are shown in bubbled areas on drawings. The following descriptions of revisions are for convenience only and do not define or limit the extent of actual revisions indicated on drawings:

.1 Drawing M02-01 - MECHANICAL SCHEDULES 1

.1 Clarify EA information in the Energy Ventilator Schedule.

.2 Drawing M02-03 - MECHANICAL SCHEDULES 3

.1 Deleted reference to tank type water closet from Plumbing Fixture Schedule.

.3 Drawing M50-01 - HVAC - MAIN FLOOR NEW WORK

.1 Deleted references to biofilter wall and revised notes.

.4 Drawing M50-03 - HVAC - THIRD FLOOR NEW WORK

.1 Added missing temperature, humidity, and CO2 sensors.

.5 Drawing M53-00 - HYDRONIC - PARKING LEVEL NEW WORK

.1 Clarified and revised pipe sizes.

.6 Drawing M53-01 - HYDRONIC - MAIN FLOOR NEW WORK

.1 Added missing control valve indication and associated piping.

.2 Revised key notes tags and general note.

.7 Drawing M53-02 - HYDRONIC - SECOND FLOOR NEW WORK

.1 Re-routed some heating water piping to hide drops in partition walls.

.2 Re-located various control valves.

.3 Revised key notes and key notes tags.

.4 Clarified missing pipe sizes.

.8 Drawing M53-03 - HYDRONIC - THIRD FLOOR NEW WORK

.1 Re-routed some heating water piping to hide drops in partition walls.

.2 Re-located various control valves.

.3 Revised key notes tags.

.4 Clarified radiators capacity measurement units.

.5 Added missing thermostat.

.6 Clarified missing pipe sizes.

.9 Drawing M53-04 - HYDRONIC - FOURTH FLOOR NEW WORK

.1 Re-routed some heating water piping.

.2 Added missing control valves.

.3 Revised key notes, key notes tags and general note.

.4 Clarified radiators capacity measurement units.

.5 Clarified missing pipe sizes.

.10 Drawing M53-05 - HYDRONIC - FIFTH FLOOR NEW WORK

.1 Relocated control valve indication.

.2 Added missing control valves.

.3 Clarified pipe penetration locations.

.4 Revised key notes tags.

.11 Drawing M60-01 - MECHANICAL RISER DETAILS PART PLANS

.1 Clarified and revised pipe sizes.

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| | 25 90 01_CS812 Destratification Fans System | M | 27 May 2022 | 1 |
| | 25 90 01_CS812 Destratification Fans System – Control Points List | M | 27 May 2022 | 1 |
| | 25 90 01_CS821_R1 Fan Powered VAV Dedicated Outdoor Air System | M | ~~27 May~~25 Jul 2022 | 2 |
| | 25 90 01_CS821_R~~1~~2 Fan Powered VAV Dedicated Outdoor Air System – Control Points List | M | ~~29 Jun~~25 Jul 2022 | 1 |
| | 25 90 01_CS824 Demand Control Ventilation VAV with Active Chilled Beams | M | 27 May 2022 | 2 |
| | 25 90 01_CS824_R1 Demand Control Ventilation VAV with Active Chilled Beams – Control Points List | M | 29 Jun 2022 | 1 |
| | 25 90 01_CS825 Demand Control Ventilation VAV with Fan Coil Units | M | 27 May 2022 | 2 |
| | 25 90 01_CS825_R1 Demand Control Ventilation VAV with Fan Coil Units– Control Points List | M | 29 Jun 2022 | 1 |
| | 25 90 01_CS831 Humidification System | M | 27 May 2022 | 1 |
| | 25 90 01_CS831_R1 Humidification System – Control Points List | M | 29 Jun 2022 | 1 |
| | 25 90 01_CS832 Glycol Make-up System | M | 27 May 2022 | 1 |
| | 25 90 01_CS832 Glycol Make-up System – Control Points List | M | 27 May 2022 | 1 |
| | 25 90 01_CS901 Geothermal Field Management System | M | 27 May 2022 | 2 |
| | 25 90 01_CS901 Geothermal Field Management System – Control Points List | M | 27 May 2022 | 1 |
| | 25 90 01_CS910 Miscellaneous Equipment | M | 08 Jul 2022 | 1 |
| | 25 90 01_CS910 Miscellaneous Equipment – Control Points List | M | 08 Jul 2022 | 1 |
| | 25 90 01_CS912 Lighting System | M | 08 Jul 2022 | 1 |

| DIVISION | SECTION | DOCUMENT RESPONSIBILITY | DATE | PAGES |
|---|---|---|---|---|
| | 25 90 01_CS912 Lighting System – Control Points List | M | 08 Jul 2022 | 1 |
| **DIVISION 26** | **ELECTRICAL** | | | |
| | 26 05 00 Common Work Results for Electrical | E | 27 May 2022 | 12 |
| | 26 05 04 Existing Building – Modifications | E | 27 May 2022 | 3 |
| | 26 05 05_R1 Selective Demolition for Electrical | E | 18 Jul 2022 | 5 |
| | 26 05 20 Wire and Box Connectors (0-1000 V) | E | 27 May 2022 | 2 |
| | 26 05 21 Wires and Cables (0-1000 V) | E | 27 May 2022 | 5 |
| | 26 05 22 Connectors and Terminations | E | 27 May 2022 | 2 |
| | 26 05 28 Grounding – Secondary | E | 27 May 2022 | 4 |
| | 26 05 29 Hangers and Supports for Electrical Systems | E | 27 May 2022 | 2 |
| | 26 05 31 Splitters, Junction, Pull Boxes and Cabinets | E | 27 May 2022 | 2 |
| | 26 05 32 Outlet Boxes, Conduit Boxes and Fittings | E | 27 May 2022 | 2 |
| | 26 05 34_**R1** Conduits, Conduit Fastenings and Conduit Fittings | E | ~~27 May~~**25 Jul** 2022 | 4 |
| | 26 05 36 Cable Trays for Electrical Systems | E | 27 May 2022 | 2 |
| | 26 05 37 Wireways and Auxiliary Gutters | E | 27 May 2022 | 2 |
| | 26 05 48 Vibration and Seismic Controls | E | 27 May 2022 | 6 |
| | 26 08 02 Field Testing and Commissioning – Low Voltage Installations | E | 27 May 2022 | 7 |
| | 26 09 13 Power Monitoring | E | 08 Jul 2022 | 7 |
| | 26 09 43 Network Lighting Controls | E | 27 May 2022 | 16 |
| | 26 12 16.01 Dry Type Transformers Up To 600 V Primary | E | 27 May 2022 | 3 |
| | 26 22 19 Control and Signal Transformers | E | 27 May 2022 | 2 |
| | 26 24 13 Switchboards | E | 27 May 2022 | 5 |
| | 26 24 16.01 Panelboards Breaker Type | E | 27 May 2022 | 3 |
| | 26 27 26 Wiring Devices | E | 27 May 2022 | 3 |

| DIVISION | SECTION | DOCUMENT RESPONSIBILITY | DATE | PAGES |
|---|---|---|---|---|
| | 26 28 13.01 Fuses – Low Voltage | E | 27 May 2022 | 2 |
| | 26 28 16.02 Moulded Case Circuit Breakers | E | 27 May 2022 | 2 |
| | 26 28 18 Ground Fault Equipment Protection | E | 27 May 2022 | 3 |
| | 26 28 20 Ground Fault Circuit Interrupters - Class A | E | 27 May 2022 | 2 |
| | 26 28 23 Disconnect Switches - Fused and Non-Fused | E | 27 May 2022 | 2 |
| | 26 29 01 Contactors | E | 27 May 2022 | 3 |
| | 26 29 03 Control Devices | E | 27 May 2022 | 4 |
| | 26 29 10 Motor Starters to 600 V | E | 27 May 2022 | 5 |
| | 26 32 13.01_R~~1~~2 Power Generation Diesel | E | ~~18~~ 25 Jul 2022 | 14 |
| | 26 36 23 Automatic Transfer Switches | E | 27 May 2022 | 7 |
| | 26 50 00 Lighting | E | 27 May 2022 | 3 |
| | 26 52 13.13 Emergency Lighting | E | 27 May 2022 | 3 |
| | 26 52 13.16 Exit Signs | E | 27 May 2022 | 2 |
| **DIVISION 27** | **COMMUNICATIONS** | | | |
| | 27 05 00 Common Work Results for Communications | E | 27 May 2022 | 9 |
| | 27 51 19 Sound Masking System | E | 27 May 2022 | 8 |
| **DIVISION 28** | **ELECTRONIC SAFETY AND SECURITY** | | | |
| | 28 10 00 Access Control, Intrusion Detection and Video Surveillance Systems | E | 27 May 2022 | 32 |
| | 28 31 00.02 Multiplex Fire Alarm and Voice Communication Systems | E | 27 May 2022 | 14 |
| **DIVISION 31** | **EARTHWORK** | | | |
| | 31 00 00 Earthwork | C | 27 May 2022 | 8 |
| **DIVISION 32** | **EXTERIOR IMPROVEMENTS** | | | |
| | 32 01 90.23 – Pruning | L | 27 May 2022 | 4 |

| DIVISION | SECTION | DOCUMENT RESPONSIBILITY | DATE | PAGES |
|---|---|---|---|---|
| | 32 01 90.33 - Tree and Shrub Preservation | L | 27 May 2022 | 4 |
| | 32 12 16 Asphalt Paving | C | 27 May 2022 | 4 |
| | **VOLUME 3 OF 3** | | | |
| **APPENDIX 1** | **DESIGNATED SUBSTANCES AND HAZARDOUS BUILDING MATERIALS** | | | |
| | Hazardous Materials Assessment Report, prepared by All-Tech Environmental Services Limited | Info | 04 Jan 2021 | 68 |
| | Data Gap Analysis & Intrusive Asbestos Survey, prepared by Englobe | Info | 28 Jun 2019 | 37 |
| | DRAFT - Identification, Quantification and Abatement Estimates for Asbestos-Containing Materials - Letter, prepared by Englobe | Info | 22 Mar 2019 | 4 |
| | Halocarbon Standard Operating Procedure, prepared by MCW Maricor | Info | Oct 2012 | 50 |
| **APPENDIX 2** | **BUILDING CONDITION REPORTS** | | | |
| | Building Condition Report 2017 | Info | 26 Apr 2017 | 103 |
| **APPENDIX 3** | **GEOTECHNICAL INVESTIGATION** | | | |
| | EastTech Geotechnical Report - Daniel J. MacDonald Building Charlottetown, PEI, prepared by EastTech Engineering Consultants Inc. | Info | 21 May 2020 | 18 |
| | Charlottetown - DJM Building Phase II Soil Investigation, prepared by Jacques, Whitford & Associated Ltd. | Info | 15 Aug 1980 | 25 |


**LEGEND TO DOCUMENTS RESPONSIBILITY**

.1 A - Denotes documents prepared by Architect.

.2 HS – Denotes documents prepared by Health & Safety Advisor, PSPC Human Resources Branch, Construction & Maintenance.

.3 SC - Denotes documents prepared by Sustainability Consultant.

.4 Cx – Denotes documents prepared by Commissioning Agent.

.5 Env - Denotes documents prepared by PSPC Environmental Group.

.6 S - Denotes documents prepared by Structural Engineer.

.7 H - Denotes documents prepared by Architectural Hardware Consultant.

.8 AV - Denotes documents prepared by Audio Visual Consultant

.9 M - Denotes documents prepared by Mechanical Engineer.

.10 E - Denotes documents prepared by Electrical Engineer.

.11 C – Denotes documents prepared by Civil Engineer

.12 L - Landscape documents prepared by PSPC

.13 Info - Denotes Information Documents prepared by various entities.

**END OF SECTION**

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|

Where a product is indicated with a particular colour, texture, or pattern, that product is the basis for matching the colour, texture, or pattern in the Work.

**DIVISION 03 - CONCRETE**

| | | | |
|---|---|---|---|
| **CSLR-1** | **Concrete Sealer** | Silane Sealer | Parking Garage |
| **C-TOP-1** | **Polished Concrete Topping** | Fast-setting, high strength, cementitious, non-shrink, polishable tinted architectural topping, fully bpnded.<br><br>Polish to Medium Gloss Finish<br>Colour to match Tile CT-1 | Atrium |

**DIVISION 04 - MASONRY**

| | | | |
|---|---|---|---|
| **BRK-1** | **Brick Cladding** | Salvaged brick from onsite exterior wall demolition.<br><br>Or<br><br>New Brick to Match Existing as required. Provide samples to Departmental Representative for Approval. New brick to be mixed with salvaged brick proportionally | Exterior;<br>Interior (lobby)<br> |

**DIVISION 05 – METALS**

| | | | |
|---|---|---|---|
| **MET-A1** | **Metal Finish - Prefinished Aluminum** | Shop Applied Anodized Coating for Aluminum<br><br>AAMA Class 1<br><br>Exterior Grade<br><br>Min Film Thickness +0.7mils<br><br>Colour: Light Bronze<br>RGB Colour Code: 110-95-64 | Curtain Wall Sections - CW-3, CW-4<br><br>Entrance Canopy<br> |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **MET-A2** | **Metal Finish - Prefinished Aluminum** | Shop Applied 3-coat Fluoropolymer Coating for Aluminum<br><br>Dry Film Thickness (nominal) ASTM D1400<br><br>0.20-0.30 mil primer coat<br>0.70-0.80 mil colour coat<br>0.30-0.40 mil clear topcoat<br><br>Colour: Light Bronze<br>RGB Colour Code: 110-95-64 | Cap flashing and aluminum cladding. Applied for colour matching building elements having panels **MTL-PNL1** |
| **MET-A3** | **Metal Finish - Prefinished Aluminum** | Shop Applied Anodized Coating for Aluminum<br><br>AAMA Class 1<br><br>Exterior Grade<br><br>Min Film Thickness +0.7mils<br><br>Colour: Dark Bronze<br>RGB Colour Code: 24-17-9 | Curtain wall CW-1, CW-2 sections. |
| **MET-A4** | **Metal Finish - Prefinished Aluminum** | Shop Applied 3-coat Fluoropolymer Coating for Aluminum<br><br>Dry Film Thickness (nominal) ASTM D1400<br><br>0.20-0.30 mil primer coat<br>0.70-0.80 mil colour coat<br>0.30-0.40 mil clear topcoat<br><br>Colour: Dark Bronze<br>RGB Colour Code: 24-17-9 | Cap flashing and aluminum cladding. Applied for colour matching building elements having panels **MTL-PNL3**. |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **MET-A5** | **Metal Finish - Prefinished Aluminum** | Shop Applied 3-coat Fluoropolymer Coating for Aluminum<br><br>Dry Film Thickness (nominal) ASTM D1400<br><br>0.20-0.30 mil primer coat<br>0.70-0.80 mil colour coat<br>0.30-0.40 mil clear topcoat<br><br>Colour: Black | Custom Atrium Acoustic Panel:<br> <br>Solids — UC40577<br>**Black - UC40577** |
| **MET-S1** | **Prefinished Steel** | Architecturally Exposed Structural Steel (AESS):<br>Category 3, Feature Elements<br><br>Paint: Coating System: Three (3) Coat System, Orzn /Epoxy /Pu<br>Refer to Section 05 12 48 Coatings for Architecturallt Exposed Structural Steel | Front Canopy;<br>Column as the Atrium;<br>Exposed Seismic Bracing |
| **MET-S2** | **Metal Finish - Prefinished Steel** | Shop Applied 4-coat Fluoropolymer Coating for Steel<br><br>Dry Film Thickness (nominal) ASTM D1400<br><br>0.20 mil primer coat<br>0.75 mil protection coat<br>0.75 mil color coat<br>0.50 mil clear topcoat<br><br>Colour: Light Bronze<br>RGB Colour Code: 110-95-64 | Atrium Stage:<br>Bench Seat/ Edge Banding/ Railings |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **MET-S4** | **Prefinished Steel** | Bluing of Acoustic Panel's Steel Frame<br><br>Shop Applied Transparent Black Acrylic Lacquer Coating<br><br>Dry Film Thickness .3-.5 mils<br><br>Color: Black Matte<br>RGB Colour Code: 39 39 45 | Custom Atrium Acoustic Panel:<br> |
| **MET-Z1** | **Flat Lock Zinc Panels** | Pre-patinated Titanium Zinc Panel<br><br>FlatLock Panels<br>Thickness - 0.65mm<br>on 16mm plywood substrate<br><br>Note: All corners to be continuous, no exterior corner flashing to be used<br>Width: 230mm with ~280mm elongation on sloped stair ceiling surfaces (to match 230mm width on vertical faces)<br>Height: Typically 575mm, as needed around edges and corners<br>Colour: Pre-patinated<br>Pigmented brown-grey to complement natural limestone STN-1.<br>Provide samples to consultant | Interior Atrium Stair E, guard post roof<br> <br> |
| **CRBT-1** | **Carborundum Tape** | Self Adhered Anti-Slip Tape<br><br>Peel Adhesion: MIL-D-17951E(SH): Adhesive strength 0.75 lbs. (minimum)<br><br>Width: 51mm<br>Colour: White | Atrium Stair E nosing<br> |

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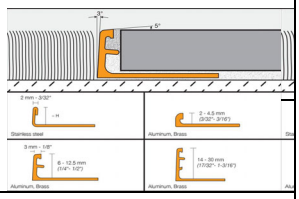
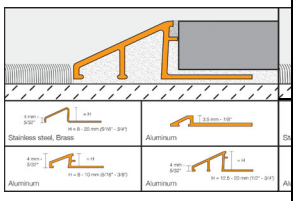
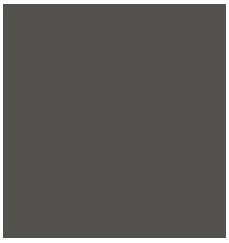
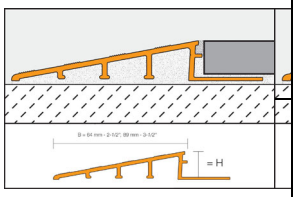
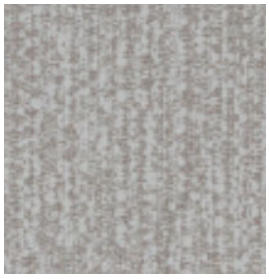
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **TS-1** | **Transition Strip**<br>**- Carpet, LVT to Tile** | SS Transition Strip<br>Material: Stainless steel Type 304<br>Height: Match tile thickness |  |
| **TS-2** | **Transition Strip**<br>**- Carpet, LVT, Tile to SDT** | Sloped SS Transition Strip<br>Material: Stainless Steel Type 304<br>Height: To Match both adjacent floor thickness |  |
| **TS-3** | **Transition Strip**<br>**- Carpet, LVT, SDT to Painted Epoxy/ Concrete** | Product: Rubber Transition Strips<br>Colour: Charcoal Grey<br>Material: Rubber<br>Gauge to be coordinated with flooring material thickness |  |
| **TS-4** | **Transition Strip**<br>**- Tile to Painted Epoxy/ Concrete** | Sloped SS Transition Strip<br>Material: Stainless Steel Type 304<br>Height: Tile thickness to Painted epoxy/ concrete flooring |  |

**DIVISION 06 – WOOD, PLASTICS AND COMPOSITES**

| | | | |
|---|---|---|---|
| **FAB-1** | **Fabric** | ~~RESERVED~~<br>**Face: 100% Polyurethane**<br>**Back: 100% Polyester Knit**<br>**Weight: 18 oz Per Linear Yard**<br>**Stain Repellent**<br>Fire Rating: NFPA 260, Class 1 | Bench seating<br>  |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **HDW-1** | **Decorative hardware** | Product: Silver Handle<br>Material: Metal<br>Colour: Nickel<br>Size: 160mm center to center<br>Width: 10mm<br>Projection: 35mm<br>Description: Square Edge D pull | Millwork: Security Console<br>Drawer and Cupboard Pulls<br> |
| **HDW-2** | **Decorative hardware** | Product: Black Metal Handle<br>Material: Metal<br>Colour: Black<br>Finish: Matte<br>Size: 160mm center to center<br>Width: 13mm<br>Projection: 33mm<br>Description: Hexagon Square Edges D Pull | Millwork: Kitchenette<br>Drawer and Cupboard Pulls<br> |
| **HDW-3** | **Decorative hardware** | Product: Dark Grey Handle<br>Material: Metal<br>Colour: Dark Grey<br>Size: 160mm center to center<br>Projection: 35mm<br>Description: Square Edge D pull | Millwork: Business Centers<br>Drawer and Cupboard Pulls<br> |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **PLAM-1** | **Plastic Laminate HPL** | Product: High Pressure Laminate<br>Colour: Medium Brown Wood Pattern<br>Material: High Pressure Laminate<br>Finish: Smooth Texture<br>Finish: Hi-Brite | Security Desk / Refer to Millwork details for location<br> |
| **PLAM-2** | **Plastic Laminate HPL** | Product: High Pressure Laminate<br>Colour/ Wood look: Walnut Wood look with amber, light browns, greys, and taupes.<br>Design Repeat: 1295mm L x 647mm W<br>Material: Scratch Resistant High Pressure Laminate<br>Finish: Soft Grain | Kitchenette/ Business Center/Vertical Surfaces<br> |
| **PLAM-3** | **Plastic Laminate HPL** | Product: High Pressure Laminate<br>Colour/Wood look: Wood laminate design with mix of Teak and Framire, and African Oak. Mid-toned brown with tints and shades.<br>Design Repeat: 1092mm L x 774mm W<br>Material: Scratch Resistant High Pressure Laminate<br>Finish: Soft Grain | Doors<br> |
| **PLAM-4** | **Plastic Laminate HPL** | Product: High Pressure Laminate<br>Colour/Wood look: Wood laminate design with mix of Teak and Framire, and African Oak. Mid-toned brown with tints and shades. | Window Sills and Trim |

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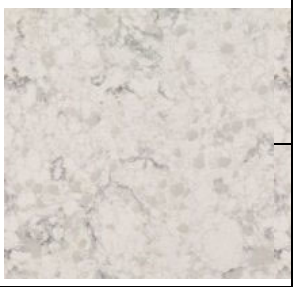
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | Design Repeat: 1092mm L x 774mm W<br>Material: Scratch Resistant High Pressure Laminate<br>Finish: Soft Grain | |
| **SSF-1** | **Solid Surfacing** | Product: Quartz Countertop<br>Material: Quartz<br>Colour: White ground with touches of gray and pale beige, feather look<br>Finish: Polished<br>Thickness:30 mm<br>Edge Profile: Mitered Edge | Security Desk/ Refer to millwork details for location<br>  |
| **SSF-2** | **Solid Surfacing** | Product: Quartz Countertop<br>Material: Quartz<br>Colour: Snow White with icy look<br>Finish: Polished<br>Thickness: 30 mm<br>Edge Profile: Mitered Edge | Countertop/ Washroom<br> |
| **SSF-3** | **Solid Surfacing** | Product: Solid Surface Countertop<br>Colour: White with veining<br>Material: 1/3 acrylic resin and 2.3 natural materials<br>Finish: Polished<br>Thickness: 12mm | Countertop/ Business Center |

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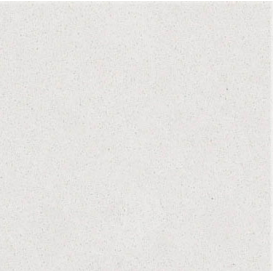
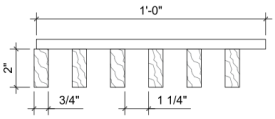
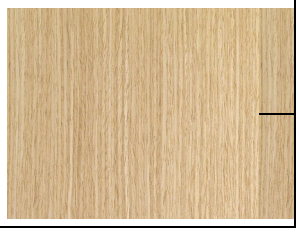
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | Edge Profile: Mitered Edge |  |
| **SSF-4** | **Solid Surface** | Product: Quartz Countertop<br>Colour: Organic Speckled White<br>Finish: Polished<br>Material: Quartz<br>Thickness:13mm<br>Edge Profile: Mitered Edge | Countertop/ Kitchenette<br>  |
| **WD-PNL-1** | **Solid Wood Grille Panel** | Linear Wood Blade Panel<br><br>Panel Size 460mm x 1220mm<br>Blade Size 50 x 19 mm<br>Number of Blades: 6<br>Blade Material: Solid Wood White Oak<br>Finish: Clear Stain – Matte Finish<br>Backer: Cross Wood Backer, fire-rated, painted Black @ 305 O.C.<br>Acoustic Backer: Black Acoustic Wovem Material, Exterior Rated<br>Fire Rating: Class A | Grafton Street Entrance - Exterior Canopy Soffit<br>  <br>  |

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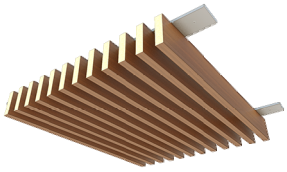
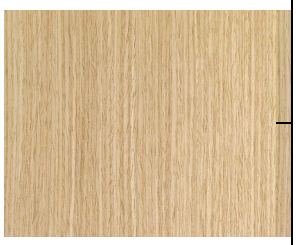
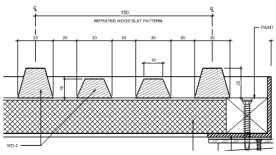
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **WD-PNL-2** | **Solid Wood Grille Panel – Acoustic Composite** | Custom Acoustic Panel<br>Solid Wood Slats in steel angle frame<br>Wood: White Oak; Rift Cut: Natural<br>Fire Rating: Class A<br><u>Associated Materials:</u><br>MET-S4 (on steel frame)<br>WD-2 (Fire Treated solid wood)<br>MET-A5 (Flashing and Closures)<br>AWP-3 (acoustic board) | Custom Atrium Acoustic Panel: |
| **WD-PNL-3** | **Solid Wood Grille Panel** | Custom Solid Wood Slats in steel frame at ceiling<br>Wood: White Oak; Rift Cut: Natural<br>Core Material: Solid Wood White Oak<br>Finish: White Oak; Rift Cut, Natural – Match WD-PNL1<br>Backer: Cross Wood Backer painted Black<br>Blade Size: 50mm x 152mm length varies depending on location<br>Fire Rating: Class A | Wellness Room Ceiling/ Kitchenette Level 2-5/ Elevator Lobbies Level 1-5<br>  |
| **WD-PNL-4** | **Wood Panel Solid** | Custom Wood Panel System<br>Wood: White Oak; Rift Cut: Natural<br>Slip Matched<br>Core Material: Solid Wood White Oak<br>Finish: White Oak; Rift Cut, Natural – Match WD-PNL1<br>Fire Rating: Class A<br>Size: Refer to architectural drawings for details<br>*Applied to wall and ceiling | Kitchenette 1-20, Locker end panels, Huddle Booths<br>  |

NOTE: The application / location for the materials indicated is not limited to the list below and is to be used in conjunction with and may be supplemented by the Specifications, Schedules, and Drawings. Refer to Specifications, Schedules, and Drawings for full extent of material application and additional material types.

| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **WD-1** | **Wood Throughout** | Wood Throughout<br>Wood: White Oak; Rift Cut: Natural<br>Slip Matched<br>Core Material: Solid Wood White Oak<br>Finish: White Oak; Rift Cut, Natural – Match WD-PNL1<br>Flame Spread Rating: Class A<br>Size: Refer to millwork shop drawings for sizing. | Wall/ Ceiling Panel Ground Floor Kitchenette/ Locker End Panels/ Huddle Booths. |
| **WD-2** | **Solid Wood** | Wood: White Oak; Rift Cut: Natural<br>Core Material: Solid Wood White Oak<br>Finish: Clear Stain – Matte Finish Match WD-PNL1<br><br>Fire Treatment:<br>Water-base intumescent fire retardant wood treatment<br><br>Wet Film Thickness: 1ml /coat, 3ml after 3 coats<br><br>Class A<br>Flame Spread: 20<br>Smoke Development: 95-105 | Custom Atrium Acoustic Panel:<br>  |

**DIVISION 07 – THERMAL AND MOISTURE PROTECTION**

| | | | |
|---|---|---|---|
| **MTL-PNL1** | **Aluminum Cladding Panel** | High Strength, Low Weight Aluminum Alloy Sheet<br>Sheet Thickness - 3mm<br>Panel Thickness – min 25mm<br>Finish & Colour: MET-A1<br>Framing System Attachment: | Grafton St Column Covers/ Grafton St Entrance Canopy/ Atrium and Grafton St Ground Level Bases at Curtain Walls |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | Vertical support fastened to thermally broken clip system off structural girts.<br>Rear Ventilated Rainscreen<br>Pressure-Equalized<br>Vertical Joints to be open and minimized to 3mm | |
| **MTL-PNL2** | **Aluminum Cladding Panel** | High Strength, Low Weight Aluminum Alloy Sheet<br>Sheet Thickness - 3mm<br>Panel Thickness – min 25mm<br>Finish and Colour: MET-A2<br>Framing System Attachment:<br>Vertical support fastened to thermally broken clip system off structural girts.<br>Rear Ventilated Rainscreen<br>Pressure-Equalized<br>Vertical Joints to be open and minimized to 3mm | Entrance Vestibules/ Atrium Fascia/ 4th Floor Metal Cladding at Atrium CW-3 Base |
| **MTL-PNL3** | **Aluminum Cladding Panel** | High Strength, Low Weight Aluminum Alloy Sheet<br>Sheet Thickness - 3mm<br>Panel Thickness – min 25mm<br>Finish and Colour: MET-A4<br>Framing System Attachment:<br>Vertical support fastened to thermally broken clip system off structural girts. | 2nd thorugh 5th Floor Metal Cladding at Ribbon Windows |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | Rear Ventilated Rainscreen<br>Pressure-Equalized<br>Vertical Joints to be open and minimized to 3mm | |
| **MTL-PNL4** | **Aluminum Cladding Panel** | High Strength, Low Weight Aluminum Alloy Sheet<br>Sheet Thickness - 3mm<br>Panel Thickness – min 25mm<br><br>Finish and Colour: MET-A4<br>Framing System Attachment:<br>Vertical support fastened to thermally broken clip system off structural girts.<br>Rear Ventilated Rainscreen<br>Pressure-Equalized<br>Vertical Joints to be open and minimized to 3mm | Ground and 2nd Floor Cladding at Ribbon Windows<br>[redacted] |
| **MTL-PNL5** | **Aluminum Cladding Panel** | High Strength, Low Weight Aluminum Alloy Sheet<br>Sheet Thickness - 3mm bonded to abuse resistant backer<br>Panel Thickness – min 25mmFinish and Colour: MET-A3 (Anodized Dark Bronze)<br>Framing System Attachment:<br>Vertical support fastened to thermally broken clip system off structural girts.<br>Rear Ventilated Rainscreen<br>Pressure-Equalized<br>Vertical Joints to be open and minimized to 3mm | Ground Floor Bases at CW-1 (Kent St)<br>[redacted] |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **INS-1** | **Insulation** | Closed Sell Spray Foam | |
| **INS-2** | **Insulation** | Extruded Polystyrene – Foam Board | |
| **INS-3** | **Insulation** | Mineral Wool Insulation | Exterior |
| **RT-1** | **Roofing Assembly** | Inverted roof<br><br>40 Ballast<br>Filter fabric<br>10 Drainage Board<br>2x76 INS-2<br>Leak detection system -Conductor Wire<br>2 Ply modified bitumen roof membrane<br>Leak detection system - Measurement grid<br>Sloped insulation<br>Self adhesive Vapour Retarder<br>16 Exterior Sheathing Board<br>Galv Metal deck<br><br>Colour: White | At New Atrium Roof |
| **RT-2** | **Roofing Assembly** | Canopy roof<br><br>2 Ply Modified Bitumen roof membrane<br>Sloped insulation as required to form roof slope<br>13 Exterior Sheathing Board<br>38 Galv. Metal deck<br><br>Colour: white | Grafton Street canopy / revolving door |

**DIVISION 08 – OPENINGS**

| | | | |
|---|---|---|---|
| **CW-1** | **Curtain Wall System** | Thermal Broken Curtain Wall System<br>Material: Aluminum Alloy – 6603<br><br>Mullion Size: 63.5mm x 133.4mm | Ground Floor Kent Street |

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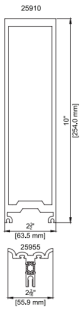
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | profile 63.5mm x 101.6mm profile at existing columns<br>25mm cap at end of field locations. Structural Silicone Glazing (SSG) at all vertical joints.<br>Finish: MET-A3 | |
| **CW-2** | **Window System** | Flush Front Glazed Fixed Window System<br>Material: Aluminum Alloy - 6003<br>Mullion Size: 19mm x 127mm + 19mm setting block<br>Finish: MET-A3 | Ground, 2nd, 3rd, 4th and 5th floors. |
| **CW-3** | **Curtain Wall System – High Span** | Thermal Broken Curtain Wall System<br>Material: Aluminum Alloy – 6603<br>Final dimensions of system per CW engineering requirements<br>Mullion Size: 63.5mm x 254mm profile everywhere except 63.5mm x 133.4mm profile at Atrium clerestory horizontal mullions at 5th floor level<br>25mm cap at end of field locations. 4-sided Structural Silicone Glazing (SSG).<br>Finish: MET-A1 Provide exterior knife blades as required to support CW-VS1 vertical sunshade at Atrium clerestory. | Atrium/ Grafton St Entrance<br>  |
| **CW-4** | **Curtain Wall System South Block 3rd floor** | Thermal Broken Curtain Wall System<br>Material: Aluminum Alloy – 6603<br>Mullion Size: 63.5mm x 254mm tapered profile at end of field locations , 63.5mm | South Block 3rd Floor<br>Special Surround Mullion Cap 25254 |

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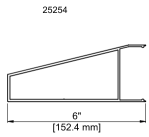
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | x 168.3mm rect. profile at middle vertical mullions. Structural Silicone Glazing (SSG) at all vertical joints..<br>Colour: MET-A1 |  |
| **CW-VS1** | **Curtain Wall System Vertical Sunshade** | Vertical Sunshade –<br>Material: Aluminum Alloy – 6603<br>Sunshade size: 63mm x 305mm<br>Fastened to the CW-3 curtain wall framing.<br>Colour: MET-A2 (light bronze) | |
| **FLM-1** | **Glazing Film** | Standard of Acceptance: 3M<br>Product: Dusted Crystal<br>Code: 7725SE-314 | Glass Fronts<br>*Refer to Signage Package |
| **FLM-2** | **Glazing Film** | Standard of Acceptance: 3M<br>Product: Dusted Crystal<br>Code: 7725SE-314 | Bike Storage Glass Front<br>*Refer to Signage Package |
| **GL-BL** | **Ballistic Glass** | Type: Laminated Ballistic<br>Thickness: 32mm = 3mm + 0.6 urethane interlayer +25mm + 0.6 urethane interlayer +3mm<br><br>Glass 1 (3mm): Mar-Resistant Polycarbonate<br>Interlayer: .0.60 Urethane<br>Glass 2 (25mm): Acrylic<br>Interlayer: 0.60Urethane<br>Glass 1 (3mm): Mar-Resistant Polycarbonate | At Security Desks |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | Mullion Size:<br>45mmx100mm Ballistic Aluminum Frame<br>Assembly Rated: ULC-752-3 | |
| **GL-FR1** | **Fire Rated Glass** | Clear laminated ceramic glazing material<br>Thickness: 8mm | |
| **GL-L1** | **Laminated Tempered Glass** | Type: Laminated Float Glass<br>Thickness: 13mm<br>Glass 1 (6mm): Clear Float Glass<br>Interlayer: 0.60 PVB interlayer<br>Glass 2 (6mm): Clear Float Glass | Building Entrances |
| **GL-L2** | **Laminated Tempered Glass** | Type: Laminated Safety<br>Thickness: 21 mm<br>Glass 1 (10mm): Clear Tempered Glass<br>Interlayer: 0.80 PVB interlayer<br>Glass 2 (10mm): Clear Tempered Glass<br>2mm chamfer on all glass edges | Bridge and Stair Guards |
| **GL-T1** | **Tempered Safety Glass** | Type: Tempered Glass, impact resistant<br>Thickness: 6 mm | Doors, as per Door/Hardware Schedule indicated on drawings |
| **GS-1** | **Glass Partition System**<br><br>**Single Glazed** | Aluminum Framed Full Height Glazed Partition System<br><br>Glass:<br>Glass 1 (4mm): Tempered Glass<br>Laminate 1: 0.8 PVB laminate<br>Glass 2 (4mm) Tempered Glass<br><br>Mullion Size:<br>45mmx95mm - Horizontal Mullions, End of Range Terminations and Door Frames | All interior Single Glazed Glass Fronts |

NOTE: The application / location for the materials indicated is not limited to the list below and is to be used in conjunction with and may be supplemented by the Specifications, Schedules, and Drawings. Refer to Specifications, Schedules, and Drawings for full extent of material application and additional material types.

| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | 90mmx95mm - Perpendicular Butt Joint Walls,<br>Extra Clear Silicone butt joints all remaining vertical locations<br>Frame Colour: Dark Grey / Graphite<br>RGB Colour Code: 60,61,6<br>Doors: Wood doors by Division 8. See Door/Hardware Schedule | |
| **GS-2** | **Glass Partition System**<br><br>**Double Glazed** | Aluminum Framed Full Height Glazed Partition System<br><br>Glass: 9.5mm + Airspace + 9.5mm<br><br>Glass 1 (4mm): Tempered Glass<br>Laminate 1: 0.8 PVB laminate<br>Glass 2 (4mm): Float Glass<br>Gap 1:<br>Glass 3 (4mm): Float Glass<br>Laminate 2: 0.8 PVB laminate<br>Glass 4 (4mm): Tempered Glass<br><br>Mullion Size:<br>45mmx95mm - Horizontal Mullions, End of Range Terminations and Door Frames<br>90mmx95mm - Perpendicular Butt Joint Walls,<br>Extra Clear Silicone butt joints all remaining vertical locations<br><br>Frame Colour: Dark Grey / Graphite<br>RGB Colour Code: 60,61,6<br>Doors: Wood doors by Division 8 | All interior Glass Fronts (STC 45) |

NOTE: The application / location for the materials indicated is not limited to the list below and is to be used in conjunction with and may be supplemented by the Specifications, Schedules, and Drawings. Refer to Specifications, Schedules, and Drawings for full extent of material application and additional material types.

| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **GS-3** | **Glass Partition System**<br><br>**Double Glazed** | Aluminum Framed Full Height Glazed Partition System<br><br>Glass: 12.5mm + Airspace + 12.5mm<br><br>Glass 1 (5mm): Tempered Glass<br>Laminate 1: 2.3 PVB laminate<br>Glass 2 (5mm): Float Glass<br>Gap 1:<br>Glass 3 (5mm): Float Glass<br>Laminate 2: 2.3 PVB laminate<br>Glass 4 (5mm): Tempered Glass<br><br>Mullion Size:<br>45mmx165mm - Horizontal Mullions, End of Range Terminations and Door Frames<br>90mmx165mm - Perpendicular Butt Joint Walls,<br>Extra Clear Silicone butt joints all remaining vertical locations<br><br>Colour: Dark Grey / Graphite<br>RGB Colour Code: 60,61,6<br>Doors: Wood doors by Division 8 | All interior Glass Fronts (STC 52) |
| **IGU-1V1** | **Insulated Glass Vision Glazing**<br><br>**Double Glazed**<br><br>**Bird Friendly to meet (CSA) A460:19** | VISIBLE LIGHT<br>Transmittance - 68 %<br>Reflectance outside - 11 %<br>Reflectance inside - 12 %<br>General Color Rendering Index (CRI) - 95.4<br>ULTRAVIOLET<br>Transmittance UV - 30 %<br>SOLAR ENERGY<br>Solar transmittance - 33 %<br>Reflectance outside - 33 %<br>Reflectance inside - 36 %<br>Solar absorptance - 34 %<br>SHGC - 0.37 | On CW-2 at Floors 3-5 |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | Shading Coefficient - 0.43<br>THERMAL PROPERTIES<br>Winter night U-Value - 0.245<br>Summer day U-value - 0.220<br>Light to Solar Gain - 1.82<br><br>25mm IGU = 6 mm + 13mm air space + 6 mm.<br>Glass 1 (6mm): Clear Float Glass w/ #1 Bird Friendly Acid Etch Pattern No. 17<br>Gap 1 (13mm): Required min 0.25U Argon filled, Warm Edge spacer, black<br>Glass 2 (6mm): Clear Float Glass w/ #2 Low-e Coating | |
| **IGU-1V2** | **Insulated Glass Vision Glazing**<br><br>**Double Glazed**<br><br>**Bird Friendly to meet (CSA) A460:19** | VISIBLE LIGHT<br>Transmittance - 68 %<br>Reflectance outside - 11 %<br>Reflectance inside - 12 %<br>General Color Rendering Index (CRI) - 95.4<br>ULTRAVIOLET<br>Transmittance UV - 30 %<br>SOLAR ENERGY<br>Solar transmittance - 33 %<br>Reflectance outside - 33 %<br>Reflectance inside - 36 %<br>Solar absorptance - 34 %<br>SHGC - 0.37<br>Shading Coefficient - 0.43<br>THERMAL PROPERTIES<br>Winter night U-Value - 0.245<br>Summer day U-value - 0.220<br>Light to Solar Gain - 1.82<br><br>25mm IGU = 6 mm + 9mm air space + 10 mm.<br>Glass 1 (6mm): Clear Float Glass w/ #1 | On CW-3 & CW-4 at Floors 3-5<br> |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | Bird Friendly Acid Etch Pattern No. 17<br>Gap 1 (9mm): Required min 0.25U Argon filled, Warm Edge spacer, black<br>Glass 2 (10mm): Clear Float Glass w/ #2 Low-e Coating | |
| IGU-2V1 | Insulated Glass Vision Glazing<br><br>Double Glazed<br><br>Bird Friendly to meet (CSA) A460:19<br><br>Security Interlayer to comply with ULC-S332 | VISIBLE LIGHT<br>Transmittance - 68 %<br>Reflectance outside - 11 %<br>Reflectance inside - 12 %<br>General Color Rendering Index (CRI) - 95.4<br>ULTRAVIOLET<br>Transmittance UV - 30 %<br>SOLAR ENERGY<br>Solar transmittance - 33 %<br>Reflectance outside - 33 %<br>Reflectance inside - 36 %<br>Solar absorptance - 34 %<br>SHGC - 0.37<br>Shading Coefficient - 0.43<br>THERMAL PROPERTIES<br>Winter night U-Value - 0.245<br>Summer day U-value - 0.220<br>Light to Solar Gain - 1.82<br><br>25mm IGU = 6 mm + 9mm air space + 5 mm + .060 PVB interlayer + 5 mm.<br><br>Glass 1 (6mm): Clear Float Glass w/ #1 Bird Friendly Acid Etch Pattern No. 17<br>Gap 1 (9mm): Required min 0.25U Argon filled, Warm Edge spacer, black<br>Glass 2 (5mm): Clear Float Glass w/ #2 Low-e Coating<br>Interlayer: 060 PVB interlayer<br>Glass 3 (5mm): Clear Float Glass | On CW-1 & CW-3 at Ground and 2nd Floor |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **IGU-2V2** | **Insulated Glass Vision Glazing**<br>**Double Glazed**<br><br>**Bird Friendly to meet (CSA) A460:19**<br><br>**Security Interlayer to comply with ULC-S332** | VISIBLE LIGHT<br>Transmittance - 68 %<br>Reflectance outside - 11 %<br>Reflectance inside - 12 %<br>General Color Rendering Index (CRI) - 95.4<br>ULTRAVIOLET<br>Transmittance UV - 30 %<br>SOLAR ENERGY<br>Solar transmittance - 33 %<br>Reflectance outside - 33 %<br>Reflectance inside - 36 %<br>Solar absorptance - 34 %<br>SHGC - 0.37<br>Shading Coefficient - 0.43<br>THERMAL PROPERTIES<br>Winter night U-Value - 0.245<br>Summer day U-value - 0.220<br>Light to Solar Gain - 1.82<br><br>25mm IGU = 4 mm + 12mm air space + 5 mm + .060 PVB interlayer + 4 mm.<br><br>Glass 1 (4mm): Clear Float Glass w/ #1 Bird Friendly Acid Etch Pattern No. 17<br>Gap 1 (12mm): Required min 0.25U Argon filled, Warm Edge spacer, black<br>Glass 2 (5mm): Clear Float Glass w/ #2 Low-e Coating<br>Interlayer: 060 PVB interlayer<br>Glass 3 (4mm): Clear Float Glass | On CW-2 at Ground and 2nd Floor.<br> |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **IGU-1S** | **Insulated Glass Shadow Box**<br>**Match IGU-1V glass**<br>**Double Glazed**<br><br>**Bird Friendly to meet (CSA) A460:19** | VISIBLE LIGHT<br>Transmittance - 68 %<br>Reflectance outside - 11 %<br>Reflectance inside - 12 %<br>General Color Rendering Index (CRI) - 95.4<br>ULTRAVIOLET<br>Transmittance UV - 30 %<br>SOLAR ENERGY<br>Solar transmittance - 33 %<br>Reflectance outside - 33 %<br>Reflectance inside - 36 %<br>Solar absorptance - 34 %<br>SHGC - 0.37<br>Shading Coefficient - 0.43<br>THERMAL PROPERTIES<br>Winter night U-Value - 0.245<br>Summer day U-value - 0.220<br>Light to Solar Gain - 1.82<br><br>25mm IGU = 6 mm + 13mm air space + 6 mm.<br><br>Glass 1 (6mm): Clear Float Glass w/ #1 Bird Friendly Acid Etch Pattern No. 17<br>Gap 1 (13mm): Required min 0.25U Argon filled, Warm Edge spacer, black<br>Glass 2 (6mm): Clear Float Glass w/ #2 Low-e Coating<br>Insulation: 102mm INS-3Gun Welded Stick Pins – 1 per 0.1m2<br>Linear Back Panel: Galvanized sheet metal | |

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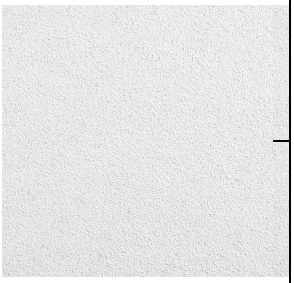
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **MIR-1** | **Fixed Position Mirror** | Product: Fixed-Position Mirror<br>Material: Mirror Frame should be 18-8, Type-430, heavy-gauge stainless steel. 13 x 13 mm angle with vertical-grain satin finish. Wall Frame should be 18-8, Type-430, heavy-gauge stainless steel with satin finish. Mirror should be No.1 quality, 6mm select float glass.<br>All mirror edges should be polished and protected by plastic filler strips. | |
| **MIR-2** | **Mirror - Washrooms** | Refer to Washroom Elevations for more information<br>Frame Finish: Satin Stainless Steel | **NO IMAGE** |
| **MIR-3** | **Mirror – Fitness Center** | Refer to Fitness Center for more information<br>Frame Finish: Satin Stainless Steel | **NO IMAGE** |

**DIVISION 09 - FINISHES**

| | | | |
|---|---|---|---|
| **ACT-1** | **Acoustic Ceiling Tile** | Product: Acoustic Ceiling Tile<br>Edge: Tegular<br>Colour: White<br>Size: 500x1500mm<br>NRC Rating: 0.75<br>CAC rating: 35<br>Fire Class: Class A (UL)<br>Grid: 9/16" Suprafine White | General<br>  |

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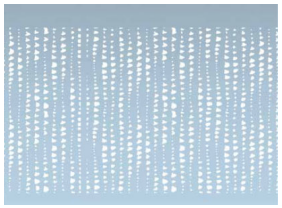
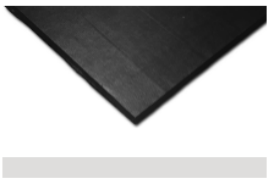
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **AWP-2** | **Acoustical Wall Panel - Suspended** | Product: Acoustical Wall Panel<br>Material: 100% polyester, approximately 50% should be recycled water/soda bottles<br>Colour: TBD<br>Pattern: Custom Cut to Match Selected Film Pattern<br>Size: Review floor plan locations for sizes<br>Thickness: 1/2" (12mm)<br>Hardware: Cable suspension at floor (carpet tile on slab) and ceiling (T-bar). No top and bottom rails.<br>*Refer to Signage Package for more information. | Various – Refer to Furniture and Equipment Plans for Locations<br>  |
| **AWP-3** | **Acoustic Board** | Semi-rigid glass fibre sound attenuation board insulation with a black glass fibre mat surface.<br>Thickness 25mm<br>NRC = 0.70<br>Compliance:<br>Type I ASTM C553<br>Type I ASTM C612<br>Fire Flame Spread <25; Smoke Developed <50 CAN/ULC-S102 | Custom Atrium Acoustic Panel:<br>  <br>Superior Acoustical Performance |

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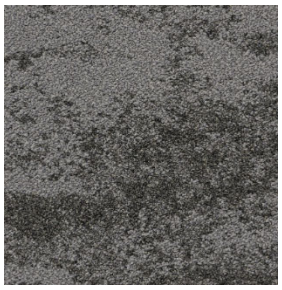
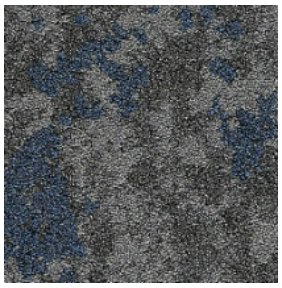
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **CPTT-1** | **Carpet Tile** | Product: Grey Carpet Tile<br>Material: 100% recycled nylon fiber<br>Dye Method: 100% solution dyed<br>Colour: Blend of gray tones to coordinate with CPTT-2<br>Size: 305 mm x 914 mm<br>Construction: Textured Pattern Multi-Colours Loop<br>Installation Method: Half Lap<br>*Water-based releasable adhesive | Corridors/ Locker Rooms<br>NO IMAGE |
| **CPTT-2** | **Carpet Tile** | Product: Grey Carpet Tile<br>Material: 100% recycled nylon fiber<br>Dye Method: 100% solution dyed<br>Colour: Grey tone blend<br>Size: 305 mm x 914 mm<br>Construction: Textured Patterned Multi-Coloured Loop<br>Pattern: Bark look<br>Installation Method: Half Lap<br>*Water-based releasable adhesive | General Open Workstation<br>  |
| **CPTT-3** | **Carpet Tile** | Product: Grey/Blue Carpet Tile<br>Material: 100% recycled nylon fiber<br>Dye Method: 100% solution dyed<br>Colour: Blend of two grey tones and a small amount of indigo blue<br>Size: 305 mm x 914 mm<br>Construction: Textured Patterned Multi-Coloured Loop<br>Pattern: Bark look<br>Installation Method: Half Lap | Accent Open Workstation Floor 1<br>  |

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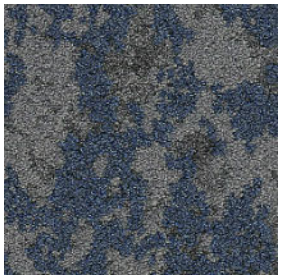
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | *Water-based releasable adhesive | |
| **CPTT-4** | **Carpet Tile** | Product: Grey/Blue Carpet Tile<br>Material: 100% recycled nylon fiber<br>Dye Method: 100% solution dyed<br>Colour: Blend of two grey tones and indigo blue<br>Pattern: Bark look varying with colour<br>Size: 305 mm x 9104 mm<br>Construction: Textured Patterned Multi-Coloured Loop<br>Installation Method: Half Lap<br>*Water-based releasable adhesive | Enclosed Rooms<br>Floor 1<br>  |
| **CPTT-5** | **Carpet Tile** | Product: Grey/ Terracotta Carpet Tile<br>Material: 100% recycled nylon fiber<br>Dye Method: 100% solution dyed<br>Colour: Blend of two grey tones and small amount of terracotta<br>Pattern: Bark lookSize: 305 mm x 914 mm<br>Construction: Textured Patterned Multi-Coloured Loop<br>Installation Method: Half Lap<br>*Water-based releasable adhesive | Accent Open Workstation Floor 2<br> |

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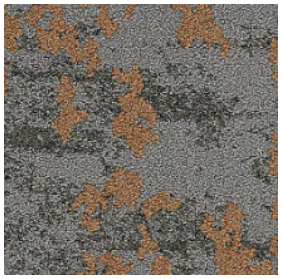
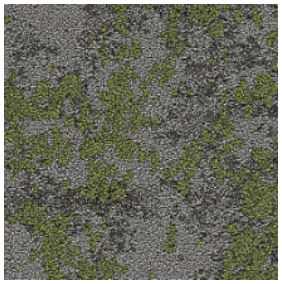
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **CPTT-6** | **Carpet Tile** | Product: Grey/ Terracotta Carpet Tile<br>Material: 100% recycled nylon fiber<br>Dye Method: 100% solution dyed<br>Colour: Blend of two grey tones and terracotta<br>Pattern: Bark look varying with colour<br>Size: 305 mm x 914 mm<br>Construction: Textured Patterned Multi-Coloured Loop<br>Installation Method: Half Lap<br>*Water-based releasable adhesive | Enclosed Rooms<br>Floor 2<br>  |
| **CPTT-7** | **Carpet Tile** | Product: Green and Grey Carpet Tile<br>Material: 100% recycled nylon fiber<br>Dye Method: 100% solution dyed<br>Colour: Blend of two grey tones with a small amount of green<br>Pattern: Bark lookSize: 305 mm x 914 mm<br>Construction: Textured Patterned Multi-Coloured Loop<br>Installation Method: Half Lap<br>*Water-based releasable adhesive | Accent Open Workstation Floor 3<br> |
| **CPTT-8** | **Carpet Tile** | Product: Green, and Grey Carpet Tile<br>Material: 100% recycled nylon fiber<br>Dye Method: 100% solution dyed<br>Colour: Blend of two grey tones with green<br>Pattern: Bark look varying with colour<br>Size: 305 mm x 914 mm<br>Construction: Textured Patterned Multi- | Enclosed Rooms<br>Floor 3<br>  |

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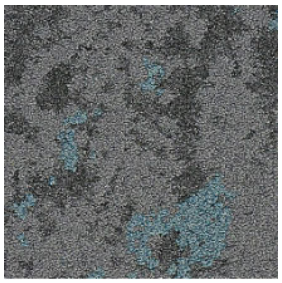
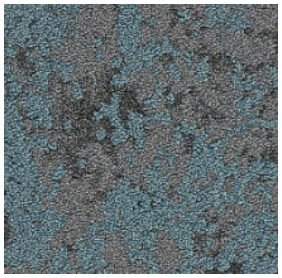
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | Coloured LoopInstallation Method : Half Lap<br>*Water-based releasable adhesive | |
| **CPTT-9** | **Carpet Tile** | Product: Light Blue and Grey Carpet Tile<br>Material: 100% recycled nylon fiber<br>Dye Method: 100% solution dyed<br>Colour: Blend of two grey tones with a small amount of light blue<br>Pattern: Bark look<br>Size: 305 mm x 914 mm<br>Construction: Textured Patterned Multi-Coloured Loop<br>Installation Method: Half Lap<br>*Water-based releasable adhesive | Accent Open Workstation Floor 4<br>  |
| **CPTT-10** | **Carpet Tile** | Product: Light Blue and Grey Carpet Tile<br>Material: 100% recycled nylon fiber<br>Dye Method: 100% solution dyed<br>Colour: Blend of two grey tones with light blue<br>Pattern: Bark look varying with colour<br>Size: 305 mm x 914 mm<br>Construction: Textured Patterned Multi-Coloured Loop<br>Installation Method: Half Lap<br>*Water-based releasable adhesive | Enclosed Rooms<br>Floor 4<br>  |

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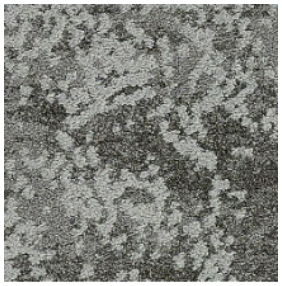
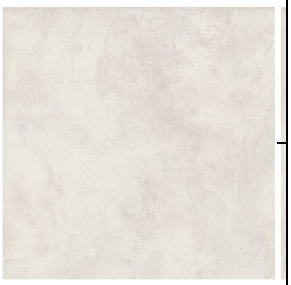
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **CPTT-11** | **Carpet Tile** | Product: Blue and Grey Carpet Tile<br>Material: 100% recycled nylon fiber<br>Dye Method: 100% solution dyed<br>Colour: Blend of two grey tones with a small amount of light grey<br>Pattern: Bark lookSize: 305 mm x 914 mm<br>Construction: Textured Patterned Multi-Coloured Loop<br>Installation Method: Half Lap<br>*Water-based releasable adhesive | Accent Open Workstation Floor 5<br> |
| **CPTT-12** | **Carpet Tile** | Product: Beige and Grey Carpet Tile<br>Material: 100% recycled nylon fiber<br>Dye Method: 100% solution dyed<br>Colour: Blend of three tones of grey<br>Pattern: Bark look varying with colour<br>Size: 305 mm x 914 mm<br>Construction: Textured Patterned Multi-Coloured Loop<br>Installation Method: Half Lap<br>*Water-based releasable adhesive | Enclosed Rooms<br>Floor 5<br>  |
| **CT-1** | **Porcelain Tile** | Product : Porcelain Tile, rectified<br>Colour : White<br>Finish : Matte RT<br>Size : 750x1500 mm<br>Thickness : 9mm<br>Grout Joint width : 2mm<br>Slip Resistance: >=0.42 | Floor Tile/Corridor & Atrium<br>  |

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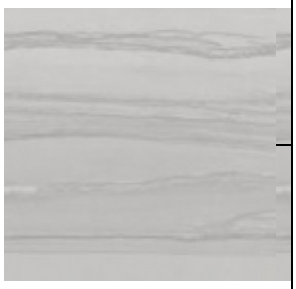
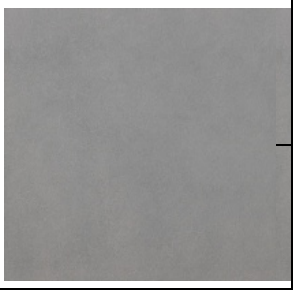
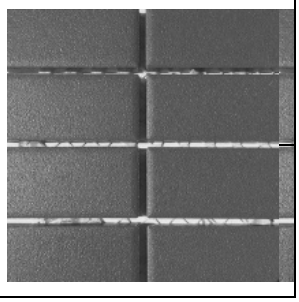
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **CT-2** | **Porcelain Tile** | Product : Porcelain Tile, rectified<br>Colour: Various gray shades with veining<br>Finish: Matte<br>Size: 300mm x 600mm<br>Thickness: 9.5mm<br>Grout Joint width: 2mm | Wall Tile/ Washroom<br>  |
| **CT-3** | **Porcelain Tile** | Product : Porcelain Tile, rectified<br>Colour: Grey<br>Finish: Matte<br>Size: 300mm x 600mm<br>Thickness: 10mm<br>Grout Joint width: 2mm<br>Slip Resistance: 0.62 | Wall & Floor Tile/ Washroom<br>  |
| **CT-3A** | **Porcelain Tile Mosaic** | Product : Porcelain Tile Mosaic, rectified<br>Colour: Gray to match CT-3 wall colour<br>Finish: Matte<br>Size: 23x48 mm/300x300 mm meshed<br>Thickness: 10mm<br>Grout Joint width: 2mm | Locker Room Showers<br>  |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **CT-4** | **Porcelain Tile** | Product : Porcelain Tile, rectified<br>Colour: White with gray variation<br>Finish: Matte<br>Size: 800 x 800 mm<br>Thickness: 10mm<br>Grout Joint width: 2mm<br>Slip Resistance: 0.71 | Floor Tile/ Kitchenette/Lounge<br> |
| **CT-5** | **Ceramic Tile** | Product : Ceramic Tile<br>Colour: White<br>Finish: Gloss<br>Size: 50mmx300mm<br>Installation : Stacked<br>Thickness: 8mm<br>Grout Joint width: 2mm | Wall Tile/ Kitchenette/Lounge<br> |
| **CT-6** | **Porcelain Tile** | Product : Porcelain Tile , rectified<br>Colour: Pearl<br>Finish: Matte RT<br>Size : 750x1500 mm<br>Thickness : 9mm<br>Grout Joint width: 2mm<br>Slip Resistance: >=0.42 | Floor Tile / Kitchenette Ground Floor & Elevator Lobbies<br> |
| **CTB-1** | **Wall Base** | Product : Porcelain stoneware wall base<br>Colour: White<br>Finish: Matte RT<br>Size: 100mm High | Wall Base/ Corridor & Atrium |

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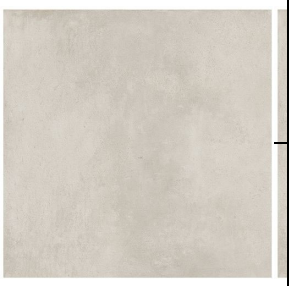
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | Thickness:9mm<br>Grout Joint width:2mm |  |
| **CTB-2** | **Wall Base** | Product : Porcelain stone wall base<br>Colour: White with gray variation<br>Finish: Matte<br>Size: 100mm High<br>Thickness: 9.5mm<br>Grout Joint width: 2mm | Wall Base/ Kitchenette/Lounge<br> |
| **CTB-3** | **Wall Base** | Product : Porcelain stoneware wall base<br>Colour: Pearl<br>Finish: Matte RT<br>Size: 100mm high<br>Thickness: 9mm<br>Grout Joint width: 2mm | Wall Base/ Kitchenette Ground Floor & Elevator Lobbies<br>  |
| **LVT-1** | **Luxury Vinyl Tile** | Product: Luxury Vinyl Tile<br>Tile Size: 250 mm x 1000 mm<br>Thickness: 4.5mm<br>Colour/ Finish: Light Oak colour with antiqued wood grain texture<br>Construction: High performance Luxury Vinyl Tile | Atrium Stage |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | Class: Class III Printed Vinyl Plank<br>Wear Layer Thickness: 22mil<br>Installation: Ashlar, in Full Adhesive | |
| **LVT-2** | **Luxury Vinyl Tile** | Product: Luxury Vinyl Tile<br>Tile Size: 500 mm x 500 mm<br>Thickness: 4.5mm<br>Colour/Finish: Blend of cool and warm grays/ Textured stone polished cement look<br>Construction: High performance Luxury Vinyl Tile<br>Class: Class III Printed Vinyl Tile<br>Wear Layer Thickness: 22mil<br>Installation Type: Non-Directional | Storage Rooms<br> |
| **PT-1** | **Paint** | Product: Off White Paint<br>RGB Code: (229,227,220)<br>Finish: Varies based on application | General/ Ceiling paint<br> |
| **PT-2** | **Accent Paint** | Product: Charcoal Grey<br>RGB Code: (101,101,98)<br>Finish: Dependant on application | Accent Walls – Kitchenettes, Business Centers, Meeting Rooms, Open Collab |

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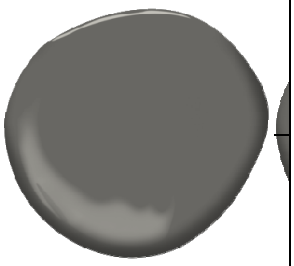
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | | Workpoints Painted Exposed Ceilings  |
| **PT-3** | **Paint** | Product: Light Grey Paint<br>RGB Code: (207,205,203) | Accent Walls –<br>Wellness Center, Focus Rooms, Phone Rooms, Reflection Rooms |
| **PT-4** | **Accent Paint** | Product: Medium Grey Paint<br>RGB Code: (183,181,179) | Accent Wall – Work Rooms, Project Rooms |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **PT-5** | **Accent Paint** | Product: Dusty Grey Paint<br>RGB Code: (159,160,158) | Accent Wall – SPS spaces<br> |
| **PT-6** | **Writeable Surface Paint** | Product: Dry Erase Top Coat<br>Finish: Clear Gloss Coating<br>Material: Waterbased Polyurethane<br>Allow only for standard dry erase marker writing to be removed using a dry cotton cloth or dry eraser. | ITIM & Admin Application Management – Innovation Lab<br>**NO IMAGE** |
| **PT-EP1** | **Epoxy Paint** | Product:<br>Two-component water based epoxy, VOC less than 50 g/l, gloss level 3<br>Application:<br>two (2) coats, 3.0 mils DFT per coat | Basement, Janitor Closets<br> |
| **PT-SPC** | **Spray-on Cementitious Wall Finish** | Water based acrylic coating with integral quartz aggregates providing lustrous metallic finish<br>COATING THICKNESS<br>2 coats combined - 1.5 mm<br>Colour: TBD to complement adjacent Titanium Zinc Stair panels. | Atrium Stair E Wall Surfaces |

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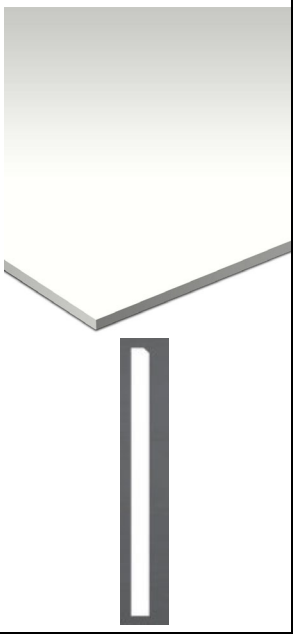
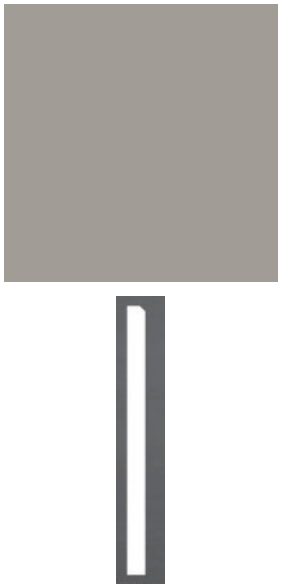
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **RB-1** | **Rubber Wall Base** | Product: Rubber Wall Base<br>Colour: White<br>Style: Millworkbase with eased edge<br>Size: 100mm high<br>Material: Rubber | Varies, refer to floor finish plan for location<br>  |
| **RB-2** | **Rubber Wall Base** | Product: Rubber Wall Base<br>Colour: Silver Grey<br>Style: Millworkbase with eased edge<br>Size: 100mm high<br>Material: Rubber | Varies, refer to floor finish plan for location<br>  |

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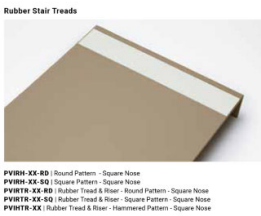
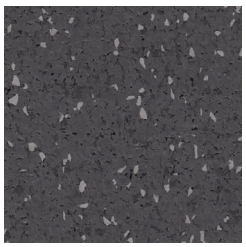
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **RB-3** | **Rubber Wall Base** | Product: Rubber Wall Base<br>Colour: Grey<br>Style: Millworkbase with eased edge<br>Size: 100mm high<br>Material: Rubber | Varies, refer to floor finish plan for location<br> <br> |
| **RST-1** | **Rubber stair tread** | Product: Rubber Stair Tread with integral 50mm colour contrast strip at the nosing to conform to CSA B651-18 Article 5.4.2<br>Material: Rubber<br>Colour: TBD | Stairs A, B C & D<br>  |
| **RSF-1** | **Rubber Sheet Flooring** | Product : Roll good Rubber Flooring<br>Colour : Dark grey with light grey specks<br>Thickness : 4mm<br>Material : Rubber | Floor Tile/ Wellness Center<br>  |

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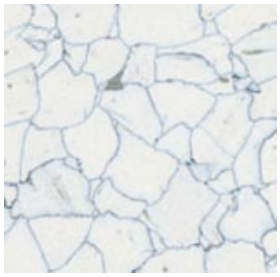
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **SDT-1** | **Static Dissipative Tile** | Product: Static Dissipative Vinyl Tile with Copper Grounding Straps<br>Material: Dissipative Vinyl, copper grounding strips.<br>Colour: Finish should be white and grey marble finish<br>Dimension of tile: 610mm x 610mm x 3mm THK<br>Dimensions of Copper Strip should be 25.4mm wide, 45.7mm long and 0.1mm thick. | Data, Electrical Room<br>  |
| **STN-1** | **Natural Limestone** | Native Canadian Limestone originating in Wiarton / Owen Sound, Ontario with a fleuri pattern.<br>Vertical Faces: Vein Cut<br>Horizontal Faces: Fleuri Cut<br>Finish: Honed<br>Thickness: 19mm<br>Grout Joint: 1/8", colour to match<br>Epoxy Quirk Mitre Corners, Pencile round edges. Shadow reveal cut at base<br>Size 100mm height (TBD)– Font, layout.<br>Stone joint spacing in coordination / alignment with floor tile | Atrium – Stage<br>Vertical Face (front sides):<br>Vein Cut<br> <br>Horizontal Face (Top):<br>Fleuri Cut<br> |
| **VWC-1** | **Vinyl Wallcovering** | Continuous Graphics throughout<br>* Refer to Signage Package for Specification. | Parking Garage |

NOTE: The application / location for the materials indicated is not limited to the list below and is to be used in conjunction with and may be supplemented by the Specifications, Schedules, and Drawings. Refer to Specifications, Schedules, and Drawings for full extent of material application and additional material types.

| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **VWC-2** | **Vinyl Wallcovering** | * Refer to Signage Package for Specification. | Wellness Center Interior |
| **VWC-3** | **Vinyl Wallcovering** | * Refer to Signage Package for Specification. | Wellness Center Exterior |
| **VWC-4** | **Vinyl Wallcovering** | Different Graphic Per Floor<br>* Refer to Signage Package for Specification. | Washroom Core |
| **VWC-5** | **Vinyl Wallcovering** | * Refer to Signage Package for Specification. | Corridor 120 |
| **VWC-6** | **Vinyl Wallcovering** | Different Graphic Per Floor<br>* Refer to Signage Package for Specification. | Adjacent to Elevator Lobbies |
| **VWC-7** | **Vinyl Wallcovering** | * Refer to Signage Package for Specification. | Museum |
| **VWC-8** | **Vinyl Wallcovering** | RESERVED | |
| **VWC-9** | **Vinyl Wallcovering** | RESERVED | |
| **VWC-10** | **Vinyl Wallcovering** | Different Graphic Per Floor<br>* Refer to Signage Package for Specification. | Locker Core |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **VWC-11** | **Vinyl Wallcovering** | Different Graphic Per Floor<br>* Refer to Signage Package for Specification. | Locker Core 2 |
| **VWC-12** | **Vinyl Wallcovering** | Different Graphic Per Floor<br>* Refer to Signage Package for Specification. | Washroom Cores – South Block |
| **VWC-13** | **Vinyl Wallcovering** | * Refer to Signage Package for Specification. | Meeting Room 2-86 Exterior |
| **VWC-14** | **Vinyl Wallcovering** | * Refer to Signage Package for Specification. | Locker 3-70 Exterior |
| **VWC-15** | **Vinyl Wallcovering** | * Refer to Signage Package for Specification. | Open Workspace 5-14 |
| **VWC-16** | **Vinyl Wallcovering** | Different Graphic Per Floor<br>* Refer to Signage Package for Specification. | Elevator Lobbies |

## DIVISION 10 – SPECIALTIES

| | | | |
|---|---|---|---|
| **BFL-1** | **Bottle Filler** | Supplied and installed under Division 22, Plumbing | |
| **BP-1** | **Fiberglass Ballistic Panel** | Product: Bullet-Resistant Fiberglass<br>Thickness: 12mm<br>Must have ballistic rating of UL 752, Level 3 and N.I.J 0108.01 Level IIIA<br>Panels must be rated ULC-752-3 | Security Office |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **CH-1** | **Coat Hook** | Product: Surface-Mounted Coat Hook<br><br>Materials: Flange and Support Arm are 18-8, Type-304, 22-gauge (0.8mm) stainless steel.<br>Concealed wall plate should be 18-8, Type-304, 16-gauge (1.6mm) stainless steel<br>Cap should be 18-8, Type-304, 10-gauge (3.6mm) stainless steel<br><br>Size: Flange is 50 x 50mm. Hook 13mm wide, projects 40mm from wall.<br>Finish: Satin stainless steel<br>Supplier/Installer: Contractor supplied/ Contractor Installed | |
| **CH-2** | **Coat Hook** | Supplied and installed by Toilet Compartment Manufacturer | **NO IMAGE** |
| **CG-1** | **Corner Guard** | Product: Stainless Steel Corner Guard<br>Material: Type 304 Stainless Steel<br>Finish: #4 Satin Finish<br>Size: 50mm x 1219mm x 50mm<br>(WxHxD)<br>Installation: Mastic Construction Adhesive | **NO IMAGE** |

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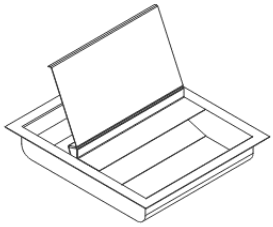
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **BCT-1** | **Baby Changing Table** | Product: Horizontal Stainless Steel Wall Mounted Baby Changing Table<br>Size:<br>Unit Dimensions: 892 mm x 508 mm<br>Depth (closed): 102 mm<br>Extension (open): 483 mm<br>Material: 18 gauge, Type-304 satin stainless steel exterior finish with blow molded high-density grey polyethylene<br>Finish: Stainless Steel<br>Minimum holding capacity: 22.68 kg<br>Supplier/Installer: Contractor supplied/ Contractor Installed | |
| **DT-1** | **Deal Tray** | Product: Recessed Flip Lid Currency Tray<br>Material: 18 ga Stainless Steel with welded connections<br>Should be bullet-proof.<br>Dimensions: 368mm x 419mm x 70mm<br><br>Standard of Acceptance: Total Security Solutions<br>Product: Recessed Flip Lid Deal Tray 368mm x 419mm x 70mm<br>Rated ULC-752-3 |  |
| **GRB-1** | **Grab Bar** | Product: 32mm Diameter Stainless Steel Grab Bars with Snap Flange<br>Clearance from wall : 38mm<br>Length : 610mm<br>Material : 18-1, Type-304, 18-Gauge (1.2mm) Stainless steel tubing with a | Barrier Free WR/Stalls & Universal Washrooms<br> |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | satin finish and slip resistant surface.<br><br>Mounting flanges to be 18-8, Type-304, 11-gauge (3.2mm) thick, Stainless steel plates.<br><br>Snap Flange Covers to be 18-8, Type-304, 22-gauge (0.8mm) drawn stainless steel with satin finish.<br><br>Strength : 408 kg<br><br>Supplier/Installer: Contractor supplied/ Contractor Installed | |
| **GRB-2** | **Grab Bar L-Shaped** | Product: 32mmDiameter Stainless Steel Grab Bars with Snap Flange<br><br>Clearance from wall : 38mm<br><br>Material : Grab bar to be 18-1, Type-304, 18-Gauge (1.2mm) Stainless steel tubing with a satin finish and slip resistant surface.<br><br>Mounting flanges to be 18-8, Type-304, 11-gauge (3.2mm) thick, Stainless steel plates.<br><br>Snap Flange Covers to be 18-8, Type-304, 22-gauge (0.8mm) drawn stainless steel with satin finish.<br><br>Strength : 408 kg<br><br>Dimension : 760mm x 760mm | Barrier Free WR/Stalls & Universal Washrooms<br> |
| **GRB-3** | **Grab Bar – L-Shaped Shower** | Product: 32mm Diameter Stainless Steel Grab Bars with Snap Flange<br><br>Clearance from wall : 38mm | Barrier Free Shower – Vertical Installation |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | Length : 750mm<br><br>Material : Grab bar to be 18-1, Type-304, 18-Gauge (1.2mm) Stainless steel tubing with a satin finish and slip resistant surface.<br><br>Mounting flanges to be 18-8, Type-304, 11-gauge (3.2mm) thick, Stainless steel plates.<br><br>Snap Flange Covers to be 18-8, Type-304, 22-gauge (0.8mm) drawn stainless steel with satin finish.<br><br>Strength : 408 kg<br><br>Supplier/Installer: Contractor supplied/ Contractor Installed | |
| **GRB-4** | **Grab Bar** | Product: 32mm Diameter Stainless Steel Grab Bars with Snap Flange<br><br>Clearance from wall : 38mm<br><br>Length : 1000mm<br><br>Material : Grab bar to be 18-1, Type-304, 18-Gauge (1.2mm) Stainless steel tubing with a satin finish and slip resistant surface.<br><br>Mounting flanges to be 18-8, Type-304, 11-gauge (3.2mm) thick, Stainless steel plates.<br><br>Snap Flange Covers to be 18-8, Type-304, 22-gauge (0.8mm) drawn stainless steel with satin finish.<br><br>Strength : 408 kg | Barrier Free Shower – Vertical and Horizontal Installation<br><br> |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | Supplier/Installer: Contractor supplied/ Contractor Installed | |
| **OP-1** | **Operable Partitions** | Product: Moveable Wall Partitions<br>STC: 47<br>Panel Type: Full height marker board<br>Size: Refer to Architectural Drawings for sizing – equal panel sizing as required to suite opening.<br>Thickness: 76mm<br>Frame: Roll Formed & Welded 16 Gage Steel<br>Seals: Top: Fixed Sweep Bottom: 2" Automatic, | Teaching Centre<br> |
| **PTDD-1** | **Paper Towel Dispenser and Disposal** | Surface Mounted Paper Towel/ Waste Receptacle<br>Supplied/Installed: Owner Supplied/ Contractor Installed | **NO IMAGE** |
| **PTN-1** | **Toilet Partition** | Product: Full Height Toilet Compartments<br>Solid colour partitions<br>Colour - metallic stainless steel<br>Material: HDPE<br>Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.<br>Partition thickness: 25mm.<br>Finish: #4 Brushed Stainless Steel<br>Supplier/Installer: Contractor | **NO IMAGE** |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | supplied/ Contractor Installed | |
| **SD-1** | **Soap Dispenser** | Automatic Wall-Mounted Foam Soap Dispenser<br>Supplier/Installer: Owner supplied/ Contractor Installed | **NO IMAGE** |
| **SD-2** | **Soap Dispenser** | Automatic Wall-Mounted Foam Soap Dispenser<br>Supplier/Installer: Owner supplied/ Contractor Installed | **NO IMAGE** |
| **SD-3** | Recessed Soap Shelf | RESERVED<br>Supplier/Installer: Contractor supplied/ Contractor Installed | Showers/ Locker Room |
| **SHCU-1** | **Shower Curtain** | Product: Vinyl Shower Curtain<br>Materials : Curtain should be an opaque, vinyl material that is 0.2mm thick.<br>Curtain should have HDPE grommets every 150mm.<br>Standard of Acceptance: Bobrick<br>Product: B-204-2<br>Size: To suite shower opening<br>Colour: TBD<br>*Provide B-204-01 shower curtain hooks<br>Supplier/Installer: Contractor supplied/ Contractor Installed | |
| **SHR-1** | **Shower Rod** | Product: Heavy Duty Shower Curtain Rod with Concealed Mounting and Stainless Steel Shower Curtain Hooks<br>Size: To suite shower opening<br>Material : Curtain Rod to be 18-8, | |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | Type-304, 20-gauge (1.0mm) stainless steel tubing with satin finish, 25mm outside diameter,<br><br>Flanges to be 35mm diameter, chrome-plated plastic. Bright polished finish.<br><br>Concealed mounting brackets to be Aluminum.<br><br>Size: To suite shower opening<br><br>Finish: Satin Finishes Stainless Steel<br><br>Supplier/Installer: Contractor supplied/ Contractor Installed | |
| **SHST-1** | **Shower Seat** | Product: Reversible Folding Shower Seat<br><br>Seat should be durable, water-resistant, ivory-coloured 13mm thick solid phenolic.<br><br>Frame and mounting brackets are type 304 stainless steel with satin finish, and should have self-locking mechanisms.<br><br>Must support up to 163kg.<br><br>Seat dimensions are 840mm wide and projects 565mm from the wall when in use.<br><br>Standard of Acceptance: Bobrick<br><br>Product: B-5181<br><br>Finish: Satin stainless steel and matter antique white phenolic<br><br>Supplier/Installer: Contractor supplied/ Contractor Installed | |
| **SND-1** | **Sanitary Napkin Disposal** | Surface-Mounted Sanitary Napkin Disposal<br><br>Supplier/Installer: Owner supplied/ | **NO IMAGE** |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | Contractor Installed | |
| **SND-2** | **Sanitary Napkin Dispenser** | Semi Recessed - Mounted Sanitary Napkin Dispenser Flat door design with 90° return.<br>Size: 330mm W x 711mm H.<br>Material: 18-8, Type-304, 18-gauge (1.2mm) stainless steel. All-welded construction<br>Finish: Satin Stainless steel<br>Projection: 100mm<br>Operation:<br>Push-Button Operation and two tumbler door locks keyed<br>Capacity: Holds 30 tampons, 20 napkins<br>Supplier/ Installer: Contractor supplied/ Contractor installed | |
| **TBR-1** | **Toilet Backrests** | Refer to Mechanical Schedules for Specification<br>Supplier/Installer: Contractor supplied/ Contractor Installed | **NO IMAGE** |
| **TPH-1** | **Toilet Paper Holder** | Surface-Mounted Multi-Roll Toilet Tissue Dispenser<br>Supplier/Installer: Owner supplied/ Contractor Installed | **NO IMAGE** |

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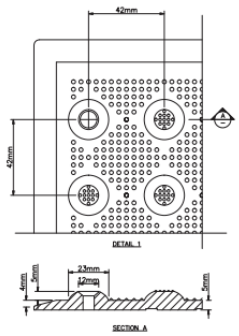
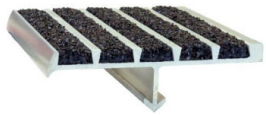
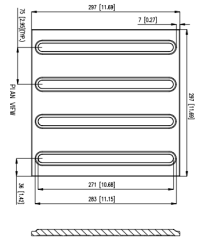
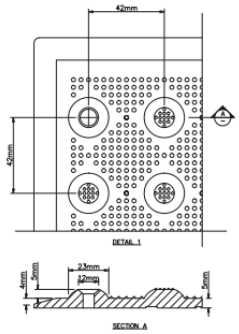
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **TWS-1** | **Tactile Attention Indicator** | 610mm x 610mm Tile<br>Colour Contrasting Surface formed of Truncated Domes of 4mm height arranged in a square grid to conform to CSA B651-18 Article 4.3.5.3.1 |  |
| **TWS-2** | **Stair Nosing** | 75 Deep x 12mm H Colour Contrast Carborundum Strips with integral mounting hooks |  |
| **TWS-3** | **Tactile Direction Indicator** | 305x305 Tile<br>Colour Contrasting Surface formed of Truncated Bars of 4mm height and 270mm length arranged in a square grid to conform to CSA B651-18 Article 4.3.5.4.1 |  |
| **TWS-4** | **Tactile Attention Indicator** | Surface Applied 610mm Deep x Stair Width<br>Colour Contrasting Surface formed of Truncated Dome of 4mm height arranged in a square grid to conform to CSA B651-18 Article 4.3.5.3.1 |  |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **LECT-1** | **Lectern** | Metal, height adjustable, accessible base with cable pass through<br>Finish: Ebony Black | |

**DIVISION 12 – FURNISHINGS**

| | | | |
|---|---|---|---|
| **FG-1** | **Entrance Floor Grille** | Aluminum Floor Grille<br>30 mm deep Aluminum Backpan<br>9.5 x 3 x 25mm Aluminum T-shaped Profile Bars Striated every 25mm with AntiSlip surface both directions<br>Concealed Aluminum Integral Mounting Tracks at 100mm O.C.<br>Bars Oriented perpendicular to travel direction<br>Material: Aluminum Alloy 6061-T6<br>Mill Finish | |
| **WTR-M-RS-1** | **Roller Shades - Manual** | Product: Manual shades with pull chains<br>Must have reverse roll fabric drop and concealed hembar<br>Pull chains should be located at exterior edges of shade only.<br>Fabric: White basket-weave design<br>manual shade in standard pocket; | South Block 3rd Floor New Windows |

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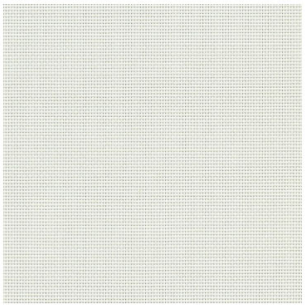
| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| | | reverse roll fabric drop;<br>concealed, fabric-wrapped hembar;<br>width to cover window opening in maximum 2 sections<br>chains to be at outside edges only, no chains in the middle<br>Fabric: TBD<br>Openness: 5%<br>Casing to match CW-4 mullion finish | <br>  |
| **WTR-A-RS-2** | **Roller Shades - Motorized** | Product: Concealed Motorized Roller Shade Scrim<br>Product: MagnaShade by Mecho;<br>Must include stiffened concealed hembar, channel tracks in jamb and sill, and base channel to receive and lock stiffened concealed hembar;<br>Casing to match CW-1 mullion finish<br>Fabric: White basket-weave design<br>Openness: 5% | Ground Floor Kent St Façade Privacy Screen<br> <br> |

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| CODE | ITEM | DESCRIPTION | APPLICATION / LOCATION |
|---|---|---|---|
| **WTR-M-RS-3** | **Roller Shades – Strip Windows** | Product: Manual shades with pull chains<br>Must have reverse roll fabric drop and concealed hembar<br>Fabric: White basket-weave design<br>Surface mounted manual shade;<br>reverse roll fabric drop;<br>concealed, fabric-wrapped hembar;<br>Openness: 5% | Strip Windows |

END OF SECTION

**Part 1 General**

**1.1 RELATED SECTIONS**

.1 Section 06 05 73 - Wood Treatment.

.2 Section 06 20 00 - Finish Carpentry.

.3 Section 06 61 16 – Solid Surfacing Fabrications.

.4 Section 07 92 00- Joint Sealants.

**1.2 REFERENCE STANDARDS**

.1 American National Standards Institute (ANSI)

.1 ANSI/BHMA A156.9-2010, Cabinet Hardware.

.2 ANSI/BHMA A156.11-2014, Cabinet Locks.

.3 ANSI/NPA A208.1-09, Particleboard.

.4 ANSI A208.2-2016, Medium Density Fiberboard (MDF) for Interior Applications.

.2 Architectural Woodwork Manufacturers Association of Canada (AWMAC)

.1 North American Architectural Woodwork Standards 4.0, 2021(NAAWS).

.3 ASTM International

.1 ASTM F1667-21 Standard Specification for Driven Fasteners: Nails, Spikes and Staples.

.4 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-71.20-M88, Adhesive, Contact, Brushable.

.5 CSA Group (CSA)

.1 CSA B111-1974 (R2003), Wire Nails, Spikes and Staples.

.2 CSA O121-17, Douglas Fir Plywood.

.3 CSA O151-17, Canadian Softwood Plywood.

.4 CSA O153-19, Poplar Plywood.

.6 Forest Stewardship Council (FSC)

.1 FSC-STD-01-001-V5-2 2018, FSC Principle and Criteria for Forest Stewardship.

.2 FSC Accredited Certified Bodies.

.7 GB Initiative Canada

.1 GREEN GLOBES Canada Design for New Construction and Major Retrofits v.2, http://www.greenglobes.com

.8 Hardwood Plywood & Veneer Association (HPVA)

.1 ANSI/HPVA HP-1-2016 Standards

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

.1 Safety Data Sheets (SDS).

.10 National Electrical Manufacturers Association (NEMA)

.1 ANSI/NEMA LD-3-05, High-Pressure Decorative Laminates (HPDL).

.11 National Lumber Grades Authority (NLGA)

.1 NLGA Standard Grading Rules for Canadian Lumber 2017.

.12 South Coast Air Quality Management District (SCAQMD), California State, Regulation XI. Source Specific Standards

.1 SCAQMD Rule 1168-A2005, Adhesives and Sealants Applications.

.13 Sustainable Forestry Initiative (SFI)

.1 SFI-2015-2019 Standard.

.14 Underwriters' Laboratories of Canada (ULC):

.1 CAN/ULC-S102-2019, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

## 1.3 DEFINITIONS

.1 Concealed Surfaces: Surfaces not visible after installation.

.2 Exposed Surfaces: Surfaces exposed to view. Surfaces visible when doors and drawers are closed, backs of hinged doors and edges of hinged doors exposed when opened.

.3 Semi-Exposed Surfaces: Surfaces that become visible when drawers and doors are opened.

## 1.4 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:

.1 Prepare and submit material list in accordance with NAAWS, cross-referenced to specifications.

.2 Include manufacturer's instructions, printed product literature, data sheets and catalogue pages for all materials and products to be incorporated into architectural wood casework and include product characteristics, performance criteria, dimensions and profiles, finish and limitations on use.

.3 Submit two copies of WHMIS SDS in accordance with Section 01 35 29.06 - Health and Safety Requirements.

.3 Hardware List:

.1 Submit hardware list.

.2 Include manufacturer’s specification sheets indicating name, model, material, function, finish, BHMA designations and other pertinent information.

.4 Shop Drawings:

.1 Prepare and submit shop drawings in accordance with NAAWS and as follows.

.2 Submit shop drawings for initial review. Revise as directed, submit shop drawings for final acceptance and distribution.

.3 Indicate details of construction, profiles, jointing, fastening and other related details.

.1 Scales: profiles full size, details half full size.

.4 Indicate materials, thicknesses, finishes and hardware.

.5 Indicate locations of service outlets in casework, typical and special installation conditions, and connections, attachments, anchorage and location of exposed fastenings.

.6 Show location on casework elevations of backing required in supporting structure for attachment of casework.

.7 Show locations and details of framing, blocking and furring and co-ordination for interface work at substrates: details and layout of cutouts for finish hardware, cabinet hardware, audio/visual, security, mechanical and electrical services and fixtures;

.8 On casework and countertop elevations show location of backing required for attachment within walls; or provide blocking schedule;

.9 For panelling produced from pre-manufactured sets, show finished panel sizes, set numbers, sequence numbers within sets, and method of cutting panels to produce indicated sizes;

.10 For panelling veneered in fabrication shop, show veneer with dimensions, grain direction, and exposed face.

.11 Indicate NAAWS quality grade where different from predominant grade specified.

.12 Include colour schedule of all casework items, including all countertop, exposed, and semi-exposed cabinet finishes, finish material manufacturer, pattern, and color.

.5 Samples: Prepare and submit samples as follows.

.1 Apply sample finishes to specified substrate or core material minimum 300 x 300 mm to match designer sample. For veneers with transparent finish submit three samples to illustrate range and colour of grain expected.

.2 Submit duplicate samples of laminated plastic for each specified colour selection.

.3 Submit duplicate samples of laminated plastic joints, edging, cutouts and post-formed profiles.

.4 Certifications: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.5 Submit statement of experience and qualifications of architectural wood casework fabricator.

.6 Test reports: Duplicate copies of flame spread classification test reports by independent testing agency to requirements of CAN/ULC-S102.

.7 Maintenance Data and Operating Instructions: Supply 3 copies of detailed instructions for maintaining, preserving and keeping work of this Section clean, including adequate warning of maintenance practices or materials detrimental to the finished work.

## 1.5 SUSTAINABLE DESIGN SUBMITTALS

.1 Provide sustainable design submittals in accordance with Section 01 47 15 Sustainable Requirements: Construction.

.2 Certified Wood:

.1 Submit listing of wood products and materials used, produced from wood obtained from forests certified by FSC Accredited Certification Body in accordance with FSC-STD-01-001.

.2 Submit vendor's FSC Chain-of-Custody Certificate number.

.3 Submit in accordance with Section 01 33 00 - Submittal Procedures and Section 01 47 15 Sustainable Requirements: Construction, to confirm that products and procedures conform to specified sustainability requirements.

.4 Submit evidence that work of this Section incorporates required percentage of regional materials and products, showing their cost, distance from project to furthest site of extraction or manufacture, and total cost of materials for project.

.5 All wood products are to be certified under CAN/CSA-Z809 or FSC or SFI certified wood.

.1 Submit manufacturer's Chain-of-Custody Certificate number.

.6 Provide the following documentation in accordance with Section 01 47 15 Sustainable Requirements: Construction:

.1 Environmental Product Declarations (EPDs): where available for products in this section provide compliant EPDs as per Section 01 47 15 Sustainable Requirements: Construction.

.1 Provide cost of materials excluding on-site labour and equipment.

.7 Low-Emitting Materials: Interior site -applied Adhesives and Sealants

.1 Submit product data/SDS sheets for VOC emitting materials that clearly identifies the VOC content for compliance with Green Globes.

.2 Submit listing of adhesives and sealants used in building, showing compliance with VOC and chemical component limits or restrictions requirements.

.3 Submit listing of composite wood products used in building, stating that they contain no added urea-formaldehyde resins, and laminate adhesives used in building, stating that they contain no urea-formaldehyde.

.8 Low-emitting materials: Interior site-applied Paints and Coatings

.1 Submit product data/SDS sheets for VOC emitting materials that clearly identifies the VOC content for compliance with Green Globes.

.9 Construction Waste Management:

.1 Submit project Waste Management Plan highlighting recycling and salvage requirements.

## 1.6 PRE-INSTALLATION MEETING

.1 Prior to enclosing framing, convene a meeting of contractor, casework fabricator, casework installer, framing subcontractor and Departmental Representative.

.1 Review locations of backing required for casework installation as shown on shop drawings and as necessary for installation.

.2 Review method of attachment for backing to wall system.

.3 Review coordination with other affected sections.

## 1.7 QUALITY ASSURANCE

.1 Work of this Section shall be done by manufacturer and tradesmen with experience in successful manufacture and installation of this type of work and of quality as indicated on Drawings and as specified.

.2 Single Source Manufacturing and Installation responsibility: Engage a qualified manufacturer to assume undivided responsibility for architectural woodwork items specified in this Section, including fabrication, finishing, and installation. The manufacturer shall maintain an organized quality control program and retain facilities with sufficient capacity and quality to produce the required architectural woodwork without causing delay to the project.

.3 Quality of work and materials:

.1 Comply with the requirements for Premium Grade in accordance with the NAAWS standards for all materials and fabrication.

.2 In case of conflict between Contract Documents and NAAWS grade requirements, Contract Documents govern.

.4 Site Quality Control: Provide full-time, fully qualified architectural woodwork supervisor to be present at Site at all times during execution of work specified in this Section.

.5 Mock-ups:

.1 Construct mock-ups in accordance with Section 01 45 00- Quality Control.

.2 Erect mock-up to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution, as well as details, jointing, assembly, colour, finishes, alignment, and relationship to other materials, components and equipment placed by other Sections.

.3 Shop prepare one base cabinet unit, complete with counter top and hardware, and install where directed by Departmental Representative.

.4 Allow 48 hours for inspection of mock-up Departmental Representative before proceeding with Work.

.5 Adjust mock-up at no extra cost to Owner as required to obtain approval.

.6 When accepted, mock-up will demonstrate minimum standard for Work.

.7 Do not proceed with work prior to receipt of written acceptance of mock-up by Departmental Representative.

.8 Accepted mock-up may remain as part of finished work.

.9 Make sure the mock-up production, review and approval is accommodated in the construction schedule.

.6 Lumber by grade stamp of an agency certified by Canadian Lumber Standards Accreditation Board.

.7 Plywood, particleboard, OSB and wood based composite panels to CSA and ANSI standards.

.8 Regulatory requirements: Provide finished wall assemblies flame spread rating of not more than 150 and finished ceiling assemblies flame spread of not more than 25, listed and labelled by an organization accredited by Standards Council of Canada in conformance with CAN/ULC-S102, Surface Burning Characteristics of Building Materials and Assemblies.

.9 Factory Finish: Apply finish in accordance with the NAAWS standards and to match Standard of Acceptance samples.

**1.8 DELIVERY, STORAGE AND HANDLING**

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

.2 Deliver wood casework only when area of work is enclosed, plaster and concrete work is dry, and area is broom clean and site environmental conditions are acceptable for installation.

.3 Protect millwork against dampness and damage during and after delivery.

.4 Store millwork in ventilated areas, protected from extreme changes of temperature and humidity, and within range recommended by NAAWS for location of project.

.5 Store materials indoors, in dry location, in clean, dry, well-ventilated area.

.6 Protect architectural woodwork and hardware from nicks, scratches, and blemishes.

.7 Replace defective or damaged materials with new.

.8 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in Construction Waste Management Plan in accordance with Section 01 74 19 - Waste Management and Disposal.

**1.9 FIELD CONDITIONS**

.1 Environmental Limitations: Do not deliver or install millwork items until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 16 and 32 deg. C and relative humidity between 25 and 55 percent during the remainder of the construction period.

.2 Field Measurements: Where items are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

.1 Locate concealed framing, blocking, and reinforcements that support items by field measurements before being enclosed, and indicate measurements on Shop Drawings.

.3 Established Dimensions: Where items are indicated to fit to other construction, establish dimensions for areas where items are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

**1.10 CO-ORDINATION**

.1 Verify all dimensions on job site prior to shop fabrication and work on site. Alert Departmental Representative immediately where discrepancies occur.

.2 Co-ordinate fabrication, delivery, and installation with other Sections whose work affect work of this Section, including finish hardware, audio/visual, security, mechanical and electrical services and fixtures.

.3 It shall be the responsibility of this Section to verify the dimensions and installation details for Departmental Representative's supplied equipment and furnishings requiring cut-outs, adaptations and interfacing with woodwork items.

**Part 2 Products**

**2.1 SUSTAINABILITY CHARACTERISTICS**

.1 Provide wood products, adhesives, and related materials as specified and in accordance with Section 01 47 15 Sustainable Requirements: Construction.

.2 Lumber: to be CAN/CSA-Z809 or FSC or SFI certified.

.3 Plywood, Particleboard, OSB: urea-formaldehyde free and certified to, CAN/CSA-Z809 or FSC or SFI.

.4 Adhesives used to fabricate laminated assemblies used in the building that contain composite wood and agrifibre products shall not contain added formaldehyde.

.5 Adhesives used must meet VOC requirements.

**2.2 MATERIALS**

.1 Softwood lumber: S4S, moisture content 6 – 8% or less in accordance with following standards:

.1 CSA O141.

.2 NLGA Standard Grading Rules for Canadian Lumber.

.3 AWMAC premium grade, kiln-dried to moisture content as specified.

.4 Machine stress-rated lumber is acceptable.

.2 Hardwood lumber: moisture content 6 – 8% or less in accordance:

.1 National Hardwood Lumber Association (NHLA).

.2 AWMAC premium grade, kiln-dried to moisture content as specified.

.3 Medium Density Fibreboard Core (MDF): to ANSI A208.2, Grade 155, manufactured from 100% recycled materials, without the use of added formaldehyde resins, minimum density of 760 kg/m3.

.1 Where indicated on drawings or required by authorities having jurisdiction, provide industrial grade MDF certified to meet Class A surface burning characteristics of CAN/ULC S102 and UL 723 (maximum flame spread ≤25, maximum smoke development ≤200).

.2 Use moisture resistant MR grade for countertops and splash-backs to receive plumbing fixtures.

.4 Veneer Core (Plywood): Provide exterior grade, veneer core (plywood) conforming to NAAWS.

.1 Softwood plywood (concealed locations): Canadian Softwood Plywood (CSP) to CSA O151, standard construction, grade as required, of thickness as indicated, as recommended by NAAWS.

.2 Hardwood plywood: In accordance with ANSI/HPVA HP-1, with a non telegraphing grain manufactured with exterior glue meeting requirements of NAAWS. Exposed faces of Slip Matched, selected veneers, and unexposed faces of Sound Grade, So, veneers.

.3 Douglas Fir plywood (DFP): CSA O121; Western Softwood Plywood: CSA O151. Exposed two sides shall be Grade S2S, and exposed one side shall be Grade S1S. Consider fitment doors exposed on both sides.

.4 Birch-faced hardwood plywood: CSA O115, Slip Matched, Select White or Select Red.

.5 Where indicated on drawings, provide fire-retardant treated plywood.

.5 Particleboard Core: 100% pre-consumer recycled wood fiber particleboard, no added formaldehyde, to ANSI/NPA A208.1, Grade R, minimum density of 720 kg/m$^3$, sanded both sides with thickness as recommended by NAAWS for specified applications.

.6 Solid wood, exposed and semi-exposed: refer to Section 06 20 00, Finish Carpentry.

## 2.3 LAMINATED PLASTIC MATERIALS

.1 Laminated plastic for flatwork: to NEMA LD3, Grade VGL, Type HD, 1.2 mm thick.

.2 Laminated plastic for postforming work: to NEMA LD3, Grade VGP, Type HD 1.2 mm thick.

.3 Laminated plastic backing sheet: Grade BKL, Type HD minimum of 0.5 mm thick, colour as face laminate.

.4 Laminated plastic liner sheet: Grade CLS, Type HD, 0.5 mm thick, colour white

.5 Thermofused Melamine: to NEMA LD3 Grade LPDL.

.1 High wear resistant thermofused melamine: equal or exceed 400 cycles (Minimum standard for HPL abrasion test).

.6 Plastic laminate colours, patterns, and finish: as specified in Section 01 61 10 – List of Materials.

.7 Edgeband

.1 For Plastic Laminate Casework: High Pressure Decorative Laminate (HPDL).

.8 Laminated plastic adhesive: contact adhesive to CAN/CGSB-71.20, resorcinol resin adhesive to CSA O112.7, polyvinyl adhesive to CSA O112.4, or two component epoxy thermosetting adhesive.

## 2.4 HARDWARE

.1 Meeting requirements of AWS for grade specified, unless otherwise specified.

.2 Finish for Semi exposed hardware: Manufacturer's standard finish.

.3 Hardware Pulls: as indicated in 01 61 10, List of Materials.

.4 Drawer Guides: full extension meeting requirements of AWS for type and size of drawer.

.5 Hinges: 170˚, concealed European style, self-closing.

.6 Flip-up Hinges: 90˚, flip-up hinge, nickel plated steel, self-closing.

.7 Shelf Supports: recessed metal shelf standard and compatible supports.

**2.5 MANUFACTURED UNITS**

.1 General: Materials and methods of construction to meet requirements of AWS for Premium grade.

.2 Plastic Laminate Casework:

.1 Grade: AWS Premium Grade.

.2 Construction Type: AWS construction type, Frameless.

.3 Cabinet and door interface: flush overlay.

.4 Exposed Exterior Surfaces High Pressure Decorative Laminate (HPDL).

.5 Exposed interior surfaces: LPDL (melamine), white.

.6 Semi-exposed surfaces: vertical grade laminate matching exposed surfaces.

.7 Edgeband: ~~HPDL~~**PVC**

.1 Edgeband at doors, drawer fronts, and false fronts: ~~6~~**3** mm thick minimum.

.3 Drawers:

.1 Sides: Particle board with melamine surfaces.

.2 Bottoms: MDF with melamine surfaces.

.3 Joinery: Meeting requirements of AWS for Premium Grade.

.1 Sides, front and back: Miter fold and glued

.2 Drawer bottoms grooved into front and sides and glued.

**2.6 CUSTOM MILLWORK**

.1 Fabricate to sizes and profiles shown, and as detailed on drawings.

**2.7 CASEWORK FABRICATION - GENERAL**

.1 Set nails and countersink screws apply plain wood filler to indentations, sand smooth and leave ready to receive finish.

.2 Shop install cabinet hardware for doors, shelves and drawers. Recess shelf standards unless noted otherwise.

.3 Shelving to cabinetwork to be adjustable unless otherwise noted.

.4 Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes and other fixtures.

.5 Shop assemble work for delivery to site in size easily handled and to ensure passage through building openings.

.6 Obtain governing dimensions before fabricating items which are to accommodate or abut appliances, equipment and other materials.

**2.8 LAMINATED PLASTIC CASEWORK FABRICATION - - GENERAL**

.1 Perform laminated plastic fabrication in compliance with NEMA LD3, Annex A and specified NAAWS quality grade.

.2 Ensure adjacent parts of continuous laminate work match in colour and pattern.

.3 Veneer laminated plastic to core material in accordance with adhesive manufacturer's instructions. Ensure core and laminate profiles coincide to provide continuous support and bond over entire surface. Use continuous lengths up to 2400 mm. Keep joints 600 mm from sink cutouts.

.4 Form shaped profiles and bends as indicated, using post-forming grade laminate to laminate manufacturer's instructions.

.5 Use straight self-edging laminate strip for flatwork to cover exposed edge of core material. Chamfer exposed edges uniformly at approximately 20 degrees. Do not mitre laminate edges.

.6 Apply laminate backing sheet to reverse side of core of plastic laminate work.

.7 Apply laminated plastic liner sheet to interior of cabinetry.

**2.9 CABINET LOCKS**

.1 Cabinet locks: to ANSI/BHMA A156.11. Provide locks at cabinet doors and drawers.

.2 Keying: Keyed as scheduled. Stamp keying code numbers on keys and cylinders.

**2.10 ACCESSORIES**

.1 Provide screws, bolts, expansion shields and other fastening devices required for satisfactory installation.

.2 Wood screws: stainless steel, type and size to suit application.

.3 Nails and staples: to CSA B111 and ASTM F1667.

.4 Splines: metal.

.5 Sealant: in accordance with Section 07 92 00- Joint Sealants.

**2.11 SOLID SURFACING**

.1 Refer to Section 06 61 16 – Solid Surfacing Fabrications.

**Part 3 Execution**

**3.1 EXAMINATION**

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

.1 Visually inspect substrate in presence of Departmental Representative.

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

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

and after receipt of written approval to proceed from Departmental Representative.

**3.2 INSTALLATION**

.1 Install architectural wood casework in accordance with NAAWS grade for respective items.

.2 In case of conflict between Contract Documents and NAAWS grade requirements, Contract Documents govern.

.3 Install prefinished millwork at locations shown on drawings.

.1 Position accurately, level, plumb straight.

.4 Fasten and anchor millwork securely.

.1 Supply and install heavy duty fixture attachments for wall mounted cabinets.

.5 Countersink mechanical fasteners at exposed and semi-exposed surfaces, excluding installation attachment screws and screws securing cabinets end to end.

.6 Use draw bolts in countertop joints.

.7 Scribe and cut as required to fit abutting walls and to fit properly into recesses and to accommodate piping, columns, fixtures, outlets or other projecting, intersecting or penetrating objects.

.8 At junction of plastic laminate counter back splash and adjacent wall finish, apply small bead of sealant in accordance with Section 07 92 00- Joint Sealants.

.9 Apply moisture barrier between wood framing members and masonry or cementitious construction.

.10 Fit hardware accurately and securely in accordance with manufacturer's written instructions.

.11 Make cutouts for inset equipment and fixtures using templates provided.

.12 Install accessories where indicated on drawings, in accordance with manufacturer’s written instructions.

**3.3 CLEANING**

.1 Progress Cleaning: clean in accordance with Section 01 74 00- 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 00 - Cleaning.

.1 Clean outside surfaces, cabinet work, inside cupboards and drawers.

.2 Remove excess glue, pencil and ink marks from surfaces.

**3.4 PROTECTION**

.1 Protect millwork items from damage until final inspection.

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

.3 Repair damage to adjacent materials caused by architectural woodwork installation.

**END OF SECTION**

## Part 1 General

### 1.1 RELATED REQUIREMENTS

.1 Section 09 91 23 - Interior Painting.

.2 Division 22 – sections included as per table of content

.3 Section 23 05 29 Hangers and Supports for HVAC Piping and Equipment

.4 Division 26 – Electrical Power Wiring

### 1.2 REFERENCE STANDARDS

.1 GB Initiative Canada

.1 GREEN GLOBES Canada Design for New Construction and major Retrofits v.2, http://www.greenglobes.com

.2 AWWA C651 - Disinfecting Water Mains

.3 NSF/ANSI 61 - Drinking Water System Components

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit in accordance with Section front-end specification documents.

.2 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for equipment in mechanical schedule 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 Prince Edward Island, Canada.

.2 Indicate on drawings:

.1 Mounting arrangements.

.2 Operating and maintenance clearances.

.3 Shop 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 front-end specification documents: use MCAC "Shop Drawing Submittal Title Sheet". Identify section and paragraph number.

.4 Sustainable Design Submittals:

.1 Adhere to the requirements of the Construction Waste Management plan as per Section 01 74 19 Construction Waste Management and Disposal.

.2 Provide the following documentation in accordance with Section 01 47 15 Sustainable Requirements: Construction:

.1 Environmental Product Declarations (EPDs): where available for products in this Division 21, provide compliant EPDs.

.1 Provide cost of materials excluding on-site labour and equipment.

.2 Low-emitting materials: Interior site -applied Adhesives and Sealants

.1 Submit product data/MSDS sheets for VOC emitting materials that clearly identifies the VOC content for compliance with Green Globes.

.3 Low-emitting materials: Interior site-applied Paints and Coatings

.1 Submit product data/MSDS sheets for VOC emitting materials that clearly identifies the VOC content for compliance with Green Globes.

## 1.4 CLOSEOUT SUBMITTALS

.1 Submit in accordance with front-end specification documents.

.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 white 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 for HVAC, 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 as required 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.

## 1.5 MAINTENANCE MATERIAL SUBMITTALS

.1 Submit in accordance with front-end specification documents.

.2 Furnish spare parts as follows:

.1 One set of packing for each size of pump.

.2 One casing joint gasket for each size of pump.

.3 One glass for each gauge glass size, not including the water level gauges.

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

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

**1.6 DELIVERY, STORAGE AND HANDLING**

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

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

.3 Storage and Handling Requirements:

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

.2 Store and protect from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

.4 Develop Construction Waste Management Plan Waste Reduction Workplan related to Work of this Section and in accordance with front-end specification documents.

.5 Packaging Waste Management: remove for reuse and return by manufacturer of pallets, crates, padding, and packaging materials as specified in front end documents.

**Part 2 Products**

**2.1 HANGERS AND SUPPORTS**

.1 In accordance with Section 23 05 29 Hangers and Supports for HVAC Piping and Equipment

**2.2 HEAT TRACING**

.1 In accordance with Section 23 05 33 Heat Tracing for HVAC Piping

.2 Insulation in accordance with Section 23 07 19 HVAC Piping Insulation.

**2.3 THERMAL INSULATION**

.1 In accordance with Section 23 07 19 HVAC Piping Insulation.

**2.4 IDENTIFICATION FOR EQUIPMENT, VALVES AND PIPING**

.1 In accordance with Section 23 05 53 Identification for HVAC Piping and Equipment.

**2.5 GAUGES**

.1 In accordance with Section 23 05 19.13 Thermometers and Pressure Gauges Piping Systems.

**2.6 ELECTRIC MOTORS**

.1 In accordance with Section 23 05 13 Common Motor Requirements for HVAC Equipment.

**2.7 EXPANSION COMPENSATION**

.1 In accordance with Section 23 05 16 Expansion Fittings and Loops for HVAC Piping.

**2.8 VIBRATION ISOLATION**

.1 In accordance with Section 23 05 48 Vibration and Seismic Controls for HVAC

**2.9 VARIABLE FREQUENCY DRIVES**

.1 In accordance with Section 23 05 14 Variable Frequency Drives

**2.10 ESCUTCHEONS**

.1 Escutcheons shall be satin-finish, corrosion-resisting steel, polished chromium-plated zinc alloy, or polished chromium-plated copper alloy. Obtain Interior Designer's approval for the required finish. Escutcheons shall be either one-piece or split-pattern, held in place by internal spring tension or setscrew.

**2.11 ACCESS DOORS AND PANELS**

.1 In accordance with Section 23 05 00 Common Work Results for HVAC.

**2.12 DRAIN VALVES**

.1 In accordance with Section 23 05 00 Common Work Results for HVAC.

**2.13 SLEEVES**

.1 In accordance with Section 23 05 00 Common Work Results for HVAC.

**2.14 FIRE STOPPING AND SMOKE SEALS**

.1 In accordance with Section 23 05 00 Common Work Results for HVAC.

**2.15 SMOKE AND ACOUSTICAL SEALANT**

.1 In accordance with Section 23 05 00 Common Work Results for HVAC.

**2.16 WALL AND FLOOR PLATES**

.1 In accordance with Section 23 05 00 Common Work Results for HVAC.

**2.17 LINK SEALS**

.1 In accordance with Section 23 05 00 Common Work Results for HVAC.

**2.18 DRIP PANS**

.1 In accordance with Section 23 05 00 Common Work Results for HVAC.

**2.19 METERS**

**.1 In accordance with Section 23 05 19 Meters and Gauges for HVAC Piping.**

**Part 3 Execution**

**3.1 GENERAL**

.1 Execute the Plumbing Work in accordance with requirements specified in the various Sections of Division 22 – Plumbing.

.2 Install complete plumbing, drainage and vent piping in accordance with the municipal, provincial and federal plumbing codes, standard trade practice and as specified in this Specification.

.3 Arrange piping within pipe spaces behind washroom fixtures to allow unimpeded access to piping for servicing.

.4 Locate mains, risers and runouts concealed behind partition walls or above ceilings, except in service rooms and access spaces where piping shall be exposed.

.5 Anchor, guide and support vertical and horizontal runs of piping to resist dead load and absorb thrust.

.6 Generally, small diameter pipe runs from drips and drains, water cooling, and other services are not shown but must be provided.

.7 Air handling equipment drains

.1 Provide drains for air handling equipment, and low points in ductwork and plenums in locations and in arrangements as indicated on the Drawings, or as required by the layout of the equipment and services.

.2 Drain piping shall be of material and type as specified in Section 22 13 16 - Sanitary Waste and Vent Piping, with deep seal trap.

.3 Install trap seal equivalent to not less than 1½ times the maximum static pressure in the air system at the drain point.

.8 Electrical interconnection of controls and instruments: is generally not shown but shall be provided. This includes interconnection of sensors, transmitters, transducers, control devices, control and instrumentation panels, alarms, instruments and computer workstations.

.9 Provide a premise isolation backflow prevention device in accordance with applicable municipal, provincial and federal regulations.

.10 Make arrangements with the water service department of the municipality for the delivery of a municipal water service meter. Pay for calibration and transportation charges in connection with the meter.

.11 Install water meter at the location shown on the Drawings.

.12 Install a conduit for future wiring from the meter to the remote reader.

.13 Verify all invert elevations before proceeding with any of this work.

## 3.2 TRENCHING, BEDDING AND BACKFILL

.1 Extent

.1 For buried services inside of the building.

.2 Trench depth

.1 To 150mm below the correct elevation and slope established for the bottom of the pipe.

.3 Bedding

.1 Refill the bottom elevation of the trench with hand-placed bedding materials.

.2 Thoroughly compact to the approval of the Departmental Representative.

.3 At pipe hubs or couplings, remove bedding in the bottom of the trench as necessary to provide for even and constant support for each length of pipe.

.4 Shoring

.1 Provide adequate shoring, bracing and sheeting in pipe trenches.

.2 Place barriers and temporary crossings as necessary to ensure support, safety and protection at all times.

.5 Unstable soil conditions

.1 When encountered, advise the Departmental Representative.

.2 Excavate pipe trenches to a depth as directed by the Departmental Representative and then backfill to the correct grade with bedding material.

.6 Backfill

.1 Where joints occur, do not backfill until joint testing has been approved by Departmental Representative.

.2 Hand place backfill to 300mm above the top of the pipe in 100mm layers taking particular care to place and compact the backfill simultaneously on both sides of the pipe.

.3 From 300mm above the top of the pipe backfill in 150mm layers and mechanically compact.

.4 Keep excavations dry at all times.

.7 Compaction

.1 Mechanically tamp and thoroughly compact each layer of new granular bedding and backfill material to 95 percent Modified Proctor Density.

.2 Remove and dispose of excess excavated material off-site.

## 3.3 PENETRATIONS THROUGH EXISTING STRUCTURE

.1 Do all cutting and core drilling. Obtain Departmental Representative's approval before proceeding.

.2 Provide sleeves and follow Departmental Representative's instructions where necessary to completely penetrate existing floors, walls, ceiling, roof or structural members.

**3.4 ESCUTCHEONS**

.1 Install escutcheons at finished surfaces where bare or insulated exposed piping passes through floors, walls, or ceilings in finished areas. Escutcheons shall be fastened securely to pipe or pipe covering. In wet or humid areas such as washrooms, housekeeping rooms, pool areas, seal pipe penetrations through unrated walls behind escutcheons using plumber's putty.

**3.5 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 in presence of Departmental Representative.

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

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

**3.6 PAINTING REPAIRS AND RESTORATION**

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

.1 Concealed from view: not painted.

.2 Exposed to view: bare, uninsulated cast iron pipe and associated hangers exposed to view in finished areas shall be painted with one coat approved rust inhibiting primer.

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

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

**3.7 TESTING**

.1 Execute plumbing systems and equipment tests in accordance with the requirements of municipal, provincial and federal plumbing codes. For testing procedures of specialty systems refer to the respective Sections of the Division 22 - Plumbing Specifications.

.2 Furnish pumps, gauges and other equipment required to complete test.

.3 Charge system with water only when there is no possibility of freeze-up.

.4 Perform tests after plumbing pumps have been tested.

.5 Prior to testing, ensure that shut-off valves, pressure reducing valves, balancing valves, backflow prevention and control devices are functioning.

.6 Adjust setting of pressure reducing stations to the required setpoints.

.7 Check horizontal pipe with an accurate level for any alterations in pitch. Inspect laterals, cross arms, and eliminate pockets. Correct any cases of water hammer.

.8 Execute tests in the presence of the Departmental Representative and Departmental Representative's authorized representative.

.9 Test all water lines hydrostatically at 1-1/2 times the working pressure but at not less than 1,380 kPa, for a period of not less than four (4) hours without any drop in pressure. Do testing before piping is buried or furred in and before pressure sensitive devices are installed in the pipework.

.10 Testing of sanitary drain, storm drain and vent piping:

.1 Securely close all openings on pipe ends throughout the systems by means of approved plugs and fill the entire piping system, including stacks, branches to fixtures and all horizontal runs with water, up to the highest opening. Let this water stand at this level for not less than two (2) hours. Perform another test after the fixtures are set, connected, and connections are made to all equipment. Test by running water into all pipes, fixtures, traps, and apparatus in order to detect any imperfect material or workmanship. Where it is impossible to test the whole system at one time, divide into parts. Perform a smoke or ball test or any other test required by authorities having jurisdiction.

.11 Promptly repair defects which develop during tests, and then re-test system to complete satisfaction of authorized inspectors. Repairs to piping shall be made with new materials. Caulking of screwed joints or holes is not acceptable.

.12 Connect fixtures and faucets with integral strainer only after the initial flushing out has been completed.

.13 Testing of backflow prevention assemblies:

.1 Backflow prevention assembly shall be tested using gauges specifically designed for the testing of backflow prevention assemblies. Backflow prevention assembly test gauges shall be tested annually for accuracy.

.2 Report form for each assembly shall include, as a minimum, the name of the testing company, the date on which the test was performed, the make, model and size of the assembly tested, test pressure readings.

.3 If the assembly fails to meet the specified requirements, the assembly shall be repaired and retested.

.14 Shower pans

.1 After installation of the pan and finished floor, plug the drain temporarily below the weep holes. Flood the floor area with water to a minimum depth of 25 mm for a period of 24 hours.

.2 If a noticeable drop in the water level during test, except for evaporation, is encountered, repair the floor and retest.

## 3.8 SYSTEM CLEANING

.1 Clean interior and exterior of all systems including strainers.

## 3.9 FLUSHING AND STERILIZATION

.1 Inspect the systems, and remove any heavy debris and excessive oil and dirt.

.2 Flush all completed systems with clear water at the highest obtainable pressure and velocity.

.3 During flushing and cleaning, maintain all isolating and control valves in the open position.

.4 Provide adequate personnel to monitor the flushing operation and to ensure that drain lines are unobstructed in order to prevent flooding of the building. The Division 22 – Plumbing Contractor shall be responsible for any flood damage resulting from flushing of the system.

.5 Sterilize water piping connected to municipal water supply in accordance with local municipal requirements.

.6 Flush each system after completion by allowing full flow of water through the system for a period of 15 minutes or longer when directed by the Departmental Representative.

.7 After the system flushing has been completed, drain down the system to remove the flushing water.

.8 Adjust the hot water system for uniform circulation. Adjust flushing devices and automatic control systems for proper operation according to manufacturer's instructions.

.9 After the flushing of the system has been completed, perform a 24-hour contact sterilization treatment by treating the water with an initial concentration of 50 mg/L of chlorine as per AWWA C651 requirements. At the end of the 24-hour period, arrange and pay for laboratory testing of the water samples taken from the newly disinfected pipe. If the residual chlorine level is below 25 mg/L, drain down the water and repeat the disinfection process for an additional 24 hours with lab testing until a residual chlorine level of minimum 25 mg/L is obtained.

.10 Notify the Departmental Representative at least two (2) days in advance of the date when the disinfecting operations are proposed, so that the Departmental Representative may witness the procedure.

.11 After the sterilization period has elapsed, flush system to reduce the chlorine content to an acceptable level, for not less than 30 minutes.

.12 Remove and clean strainer screens after flushing operation has been completed. Repeat two weeks after the initial start-up of the plumbing systems, and again within two weeks after Substantial Completion.

## 3.10 FIELD QUALITY CONTROL

.1 Site Tests: conduct following tests in accordance with front-end specification documents and submit report as described in PART 1 -ACTION AND INFORMATIONAL SUBMITTALS.

.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.

**3.11 CLEANING**

.1 Progress Cleaning: clean in accordance with front-end specification documents.

.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 front-end specification documents.

.3 Waste Management: separate waste materials for reuse and recycling in accordance with front end documents.

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

**3.12 PROTECTION**

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

**3.13 COMPLETION**

.1 Provide chemical and bacteriological test data to prove that sterilization has been carried out. Provide written certification to the Departmental Representative that the plumbing systems were installed, flushed and tested in accordance with appropriate codes, approved plans and calculations, and confirming the following:

.1 Water pressure test performed and plumbing systems are leak free.

.2 Plumbing inspections completed. Issue the necessary certificates.

**3.14 DEMONSTRATION**

.1 Prior to final acceptance of the Plumbing systems, the Division 22 - Plumbing Contractor shall provide operational training in all aspects of these systems to the Departmental Representative's key personnel. Training shall include emergency procedures, safety requirements, and demonstration of the systems, including all interfaces with the Control and Building Automation Systems.

**END OF SECTION**

**Part 1 General**

**1.1 SUMMARY**

.1 Section Includes:

**1.2 DEFINITIONS**

.1 Acronyms and Definitions: refer to Section 25 05 01 - EMCS: General Requirements.

**1.3 REFERENCE STANDARDS**

.1 American National Standards Institute (ANSI).

.1 ANSI C12.7-1993(R1999), Requirements for Watthour Meter Sockets.

.2 ANSI/IEEE C57.13-1993, Standard Requirements for Instrument Transformers.

.2 ASTM International (ASTM)

.1 ASTM B148-97(03), Standard Specification for Aluminum-Bronze Sand Castings.

.3 National Electrical Manufacturer's Association (NEMA).

.1 NEMA 250-03, Enclosures for Electrical Equipment (1000 Volts Maximum).

.4 Air Movement and Control Association Inc. (AMCA).

.1 AMCA Standard 500-D-98, Laboratory Method of Testing Dampers For Rating.

.5 CSA Group CSA Group

.1 CSA-C22.1-02, Canadian Electrical Code, Part 1 (19th Edition), Safety Standard for Electrical Installations.

**1.4 ACTION AND INFORMATIONAL SUBMITTALS**

.1 Submit shop drawings and manufacturer's installation instructions in accordance with Section 25 05 02 - EMCS: Submittals and Review Process.

.2 Pre-Installation Tests.

.1 Submit samples at random from equipment shipped, as requested by Departmental Representative, for testing before installation. Replace devices not meeting specified performance and accuracy.

.3 Manufacturer's Instructions:

.1 Submit manufacturer's installation instructions for specified equipment and devices.

**1.5 EXISTING CONDITIONS**

.1 Cutting and Patching: in accordance with Section 01 73 00 - Execution Requirements supplemented as specified herein.

.2 Repair surfaces damaged during execution of Work.

.3 Turn over to Departmental Representative existing materials removed from Work not identified for re-use.

**Part 2 Products**

**2.1 GENERAL**

.1 Control devices of each category to be of same type and manufacturer.

.2 External trim materials to be corrosion resistant. Internal parts to be assembled in watertight, shockproof, vibration-proof, heat resistant.

.3 Operating conditions: 0 - 32 degrees C with 10 - 90% RH (non-condensing) unless otherwise specified.

.4 Terminations: use standard conduit box with slot screwdriver compression connector block unless otherwise specified.

.5 Transmitters and sensors to be unaffected by external transmitters including walkie talkies.

.6 Account for hysteresis, relaxation time, maximum and minimum limits in applications of sensors and controls.

.7 Outdoor installations: use weatherproof construction in NEMA4 enclosures.

.8 Devices installed in user occupied space not exceed Noise Criteria (NC) of 35. Noise generated by any device must not be detectable above space ambient conditions.

.9 Range: including temperature, humidity, pressure, as indicated in I/O summary in Section 25 90 01 - EMCS: Site Requirements, Applications and System Sequences of Operation.

**2.2 TEMPERATURE SENSORS**

.1 General: except for room sensors to be resistance or thermocouple type to following requirements:

.1 Thermocouples: limit to temperature range of 200degrees C and over.

.2 RTD's: 100 or 1000 ohm at 0degrees C (plus or minus 0.2 ohms) platinum element with strain minimizing construction, 3integral anchored lead wires. Coefficient of resistivity: 0.00385 ohms/ohm degrees C.

.3 Sensing element: hermetically sealed.

.4 Stem and tip construction: copper or type 304 stainless steel.

.5 Time constant response: less than 3 seconds to temperature change of 10 degrees C.

.6 Immersion wells: NPS 3/4, stainless steel spring loaded construction, with heat transfer compound compatible with sensor. Insertion length 100 150 mm as indicated.

.2 Room temperature sensors and display wall modules.

.1 Temperature sensing and display wall module.

.1 LCD display to show space temperature ed and temperature setpoint.

.2 Buttons for occupant selection of temperature setpoint and occupied/unoccupied mode.

.3 Jack connection for plugging in laptop personal computer contractor supplied zone terminal unit, contractor supplied palm compatible handheld device for access to zone bus.

.4 Integral thermistor sensing element 10,000 ohm at 24 degrees.

.5 Accuracy 0.2 degrees C over range of 0 to 70 degrees C.

.6 Stability 0.02 degrees C drift per year.

.7 Separate mounting base for ease of installation.

.2 Room temperature sensors.

.1 Wall mounting, in slotted type covers having brushed aluminum finish, with guard as indicated.

.2 Element 10-50mm long RTD with ceramic tube or equivalent protection or thermistor, 10,000 ohm, accuracy of plus or minus 0.2 degrees C.

.3 Duct temperature sensors:

.1 General purpose duct type: suitable for insertion into ducts at various orientations, insertion length 460 mm or as indicated.

.2 Averaging duct type: incorporates numerous sensors inside assembly which are averaged to provide one reading. Minimum insertion length 6096 mm. Bend probe at field installation time to 100 mm radius at point along probe without degradation of performance.

.4 Outdoor air temperature sensors:

.1 Outside air type: complete with probe length 100 - 150 mm long, non-corroding shield to minimize solar and wind effects, threaded fitting for mating to 13 mm conduit, weatherproof construction in NEMA 4 enclosure

## 2.3 TEMPERATURE TRANSMITTERS

.1 Requirements:

.1 Input circuit: to accept 3-lead, 100 or 1000 ohm at 0 degrees C, platinum resistance detector type sensors.

.2 Power supply: 24 V DC into load of 575 ohms. Power supply effect less than 0.01 degrees C per volt change.

.3 Output signal: 4 - 20 mA into500 ohm maximum load.

.4 Input and output short circuit and open circuit protection.

.5 Output variation: less than 0.2 % of full scale for supply voltage variation of plus or minus 10 %.

.6 Combined non-linearity, repeatability, hysteresis effects: not to exceed plus or minus 0.5 % of full scale output.

.7 Maximum current to 100 or 1000 ohm RTD sensor: not to exceed 25 mA.

.8 Integral zero and span adjustments.

.9 Temperature effects: not to exceed plus or minus 1.0 % of full scale/ 50degrees C.

.10 Long term output drift: not to exceed 0.25 % of full scale/ 6 months.

.11 Transmitter ranges: select narrowest range to suit application from following:
- .1 Minus 50 degrees C to plus 50 degrees C, plus or minus 0.5 degrees C.
- .2 0 to 100 degrees C, plus or minus 0.5 degrees C.
- .3 0 to 50 degrees C, plus or minus 0.25 degrees C.
- .4 0 to 25 degrees C, plus or minus 0.1 degrees C.
- .5 10 to 35 degrees C, plus or minus 0.25 degrees C.

## 2.4 HUMIDITY SENSORS

.1 Room and Duct Requirements:
- .1 Range: 5 - 90 % RH minimum.
- .2 Operating temperature range: 0 - 60 degrees C.
- .3 Absolute accuracy:
  - .1 Duct sensors: plus or minus 3 %.
  - .2 Room sensors: plus or minus 2 %.
- .4 Sheath: stainless steel with integral shroud for specified operation in air streams of up to 10 m/s.
- .5 Maximum sensor non-linearity: plus or minus 2% RH with defined curves.
- .6 Room sensors: locate in air stream near RA grille wall mounted as indicated.
- .7 Duct mounted sensors: locate so that sensing element is in air flow in duct.

.2 Outdoor Humidity Requirements:
- .1 Range: 0 - 100 % RH minimum.
- .2 Operating temperature range: -40 - 50 degrees C.
- .3 Absolute accuracy: plus or minus 2%.
- .4 Temperature coefficient: plus or minus 0.03%RH/ degrees C over 0 to 50 degrees C.
- .5 Must be unaffected by condensation or 100% saturation.
- .6 No routine maintenance or calibration is required.

## 2.5 HUMIDITY TRANSMITTERS

.1 Requirements:
- .1 Input signal: from RH sensor.
- .2 Output signal: 4 - 20 mA onto 500 ohm maximum load.
- .3 Input and output short circuit and open circuit protection.
- .4 Output variations: not to exceed 0.2 % of full scale output for supply voltage variations of plus or minus 10 %.
- .5 Output linearity error: plus or minus 1.0% maximum of full scale output.
- .6 Integral zero and span adjustment.
- .7 Temperature effect: plus or minus 1.0 % full scale/ 6 months.
- .8 Long term output drift: not to exceed 0.25 % of full scale output/ 6 months.

**2.6 CARBON DIOXIDE SENSORS**

.1 Measurement Range: 0-2000 ppm CO2

.2 Accuracy: +/- 50 ppm

.3 Repeatability: +/- 20 ppm

.4 Drift: +/- 20 ppm per year

.5 Operating conditions: 0-50°C, 10-100% rH non-condensing

.6 Temperature Dependence: 2ppm/°C

.7 Pressure Dependence: 0.13% of reading per mm Hg

.8 Dual Beam, Self Calibrating NDIR Detection

**2.7 PRESSURE TRANSDUCERS**

.1 Requirements:

.1 Combined sensor and transmitter measuring pressure.

.1 Internal materials: suitable for continuous contact with industrial standard instrument air, compressed air, water, steam, as applicable.

.2 Output signal: 4 - 20 mA into 500 ohm maximum load.

.3 Output variations: less than 0.2 % full scale for supply voltage variations of plus or minus 10 %.

.4 Combined non-linearity, repeatability, and hysteresis effects: not to exceed plus or minus 0.5 % of full scale output over entire range.

.5 Temperature effects: not to exceed plus or minus 1.5 % full scale/ 50 degrees C.

.6 Over-pressure input protection to at least twice rated input pressure.

.7 Output short circuit and open circuit protection.

.8 Accuracy: plus or minus 1% of Full Scale.

**2.8 DIFFERENTIAL PRESSURE TRANSMITTERS**

.1 Requirements:

.1 Internal materials: suitable for continuous contact with industrial standard instrument air, compressed air, water, steam, as applicable.

.2 Output signal: 4 - 20 mA into 500 ohm maximum load.

.3 Output variations: less than 0.2 % full scale for supply voltage variations of plus or minus 10 %.

.4 Combined non-linearity, repeatability, and hysteresis effects: not to exceed plus or minus 0.5 % of full scale output over entire range.

.5 Integral zero and span adjustment.

.6 Temperature effects: not to exceed plus or minus 1.5 % full scale/ 50 degrees C.

.7 Over-pressure input protection to at least twice rated input pressure.

.8 Output short circuit and open circuit protection.

.9 Unit to have 12.5 mm N.P.T. conduit connection. Enclosure to be integral part of unit.

**2.9 STATIC PRESSURE SENSORS**

.1 Requirements:

.1 Multipoint element with self-averaging manifold.

.1 Maximum pressure loss: 160 Pa at 10 m/s. (Air stream manifold).

.2 Accuracy: plus or minus 1 % of actual duct static pressure.

**2.10 STATIC PRESSURE TRANSMITTERS**

.1 Requirements:

.1 Output signal: 4 - 20 mA linear into 500 ohm maximum load.

.2 Calibrated span: not to exceed 150 % of duct static pressure at maximum flow.

.3 Accuracy: 0.4 % of span.

.4 Repeatability: within 0.5 % of output.

.5 Linearity: within 1.5 % of span.

.6 Deadband or hysteresis: 0.1% of span.

.7 External exposed zero and span adjustment.

.8 Unit to have 12.5 mm N.P.T. conduit connection. Enclosure to be integral part of unit

**2.11 VELOCITY PRESSURE SENSORS**

.1 Requirements:

.1 Multipoint static and total pressure sensing element with self-averaging manifold with integral air equalizer and straightener section.

.2 Maximum pressure loss: 37Pa at 1000 m/s.

.3 Accuracy: plus or minus 1 % of actual duct velocity.

**2.12 VELOCITY PRESSURE TRANSMITTERS**

.1 Requirements:

.1 Output signal: 4 - 20 mA linear into 500 ohm maximum load.

.2 Calibrated span: not to exceed 125 % of duct velocity pressure at maximum flow.

.3 Accuracy: 0.4 % of span.

.4 Repeatability: within 0.1 % of output.

.5 Linearity: within 0.5 % of span.

.6 Deadband or hysteresis: 0.1% of span.

.7 External exposed zero and span adjustment.

.8 Unit to have 12.5 mm N.P.T. conduit connection. Enclosure to be integral part of unit.

**2.13 LIQUID FLOW METERS**

.1 Requirements:

.1 Pressure rating: as specified in I/O summaries.

.2 Temperature rating: as specified in I/O summaries.

.3 Repeatability: plus or minus 0.2 %.

.4 Accuracy and linearity: plus or minus 1.0 %.

.5 Flow rangeability: at least 10:1.

.6 Body material:

.7 Ends:

.1 NPS 2 and under: screwed.

.2 NPS 2.1/2 and over: flanged.

## 2.14 PRESSURE AND DIFFERENTIAL PRESSURE SWITCHES

.1 Requirements:

.1 Internal materials: suitable for continuous contact with compressed air, water, steam, etc., as applicable.

.2 Adjustable setpoint and differential.

.3 Switch: snap action type, rated at 120V, 15 amps AC or 24 V DC.

.4 Switch assembly: to operate automatically and reset automatically when conditions return to normal. Over-pressure input protection to at least twice rated input pressure.

.5 Accuracy: within 2% repetitive switching.

.6 Provide switches with isolation valve and snubber, where code allows, between sensor and pressure source.

.7 Switches on steam and high temperature hot water service: provide pigtail syphon.

## 2.15 TEMPERATURE SWITCHES

.1 Requirements:

.1 Operate automatically. Reset automatically, except as follows:

.1 Low temperature detection: manual reset.

.2 High temperature detection: manual reset.

.2 Adjustable setpoint and differential.

.3 Accuracy: plus or minus 1 degrees C.

.4 Snap action rating: 120V, 15 amps or 24V DC as required. Switch to be DPST for hardwire and EMCS connections.

.5 Type as follows:

.1 Room: for wall mounting on standard electrical box with without protective guard as indicated.

.2 Duct, general purpose: insertion length = 460 mm.

.3 Thermowell: stainless steel, with compression fitting for NPS 3/4 thermowell. Immersion length: 100 mm.

.4 Low temperature detection: continuous element with 6096 mm insertion length, duct mounting, to detect coldest temperature in any 30 mm length.

.5 Strap-on: with helical screw stainless steel clamp.

**2.16 SUMP LEVEL SWITCHES**

.1 Requirements:

.1 Liquid level activated switch sealed in waterproof and shockproof enclosure.

.2 Complete with float, flexible cord, weight. Instrument casing to be suitable for immersion in measured liquid.

.3 N.O./N.C. Contacts rated at 15 amps at 120V AC. CSA approval for up to 250 volt 10 amps AC

**2.17 ELECTROMECHANICAL RELAYS**

.1 Requirements:

.1 Double voltage, DPDT, plug-in type with termination base.

.2 Coils: rated for 120V AC, 24V DC. Other voltage: provide transformer.

.3 Contacts: rated at 5 amps at 120 V AC.

.4 Relay to have visual status indication

**2.18 SOLID STATE RELAYS**

.1 General:

.1 Relays to be socket or rail mounted.

.2 Relays to have LED Indicator

.3 Input and output Barrier Strips to accept 14 to 28 AWG wire.

.4 Operating temperature range to be -20 degrees C to 70 degrees C.

.5 Relays to be CSA Certified

.6 Input/output Isolation Voltage to be 4000 VAC at 25 degrees C for 1 second maximum duration.

.7 Operational frequency range, 45 to 65 HZ.

.2 Input:

.1 Control voltage, 3 to 32 VDC.

.2 Drop out voltage, 1.2 VDC.

.3 Maximum input current to match AO (Analog Output) board.

.3 Output.

.1 AC or DC Output Model to suit application.

**2.19 CURRENT TRANSDUCERS**

.1 Purpose: combined sensor/transducer, to measure line current and produce proportional signal in one of following ranges:

.1 4-20 mA DC.

.2 0-1 volt DC.

.3 0-10 volts DC.

.4 0-20 volts DC.

.2 Frequency insensitive from 10 - 80 hz.

.3 Accuracy to 0.5% full scale.

.4 Zero and span adjustments. Field adjustable range to suit motor applications.

.5 Adjustable mounting bracket to allow for secure/safe mounting inside MCC.

**2.20 CURRENT SENSING RELAYS**

.1 Requirements:

.1 Suitable to detect belt loss or motor failure.

.2 Trip point adjustment, output status LED.

.3 Split core for easy mounting.

.4 Induced sensor power.

.5 Relay contacts: capable of handling 0.5 amps at 30 VAC / DC. Output to be NO solid state.

.6 Suitable for single or 3 phase monitoring. For 3-Phase applications: provide for discrimination between phases.

.7 Adjustable latch level.

**2.21 CONTROL DAMPERS**

.1 Construction: blades, 152 mm wide, 1219 mm long, maximum. Modular maximum size, 1219 mm wide x 1219 mm high. Three or more sections to be operated by jack shafts.

.2 Materials:

.1 Frame: 2.03 mm minimum thickness extruded aluminum. For outdoor air and exhaust air applications, frames to be insulated.

.2 Blades: extruded aluminum. For outdoor air/exhaust air applications, blades to be internally insulated.

.3 Bearings: maintenance free, synthetic type of material.

.4 Linkage and shafts: aluminum

.5 Seals: synthetic type, mechanically locked into blade edges.

.1 Frame seals: synthetic type, mechanically locked into frame sides.

.3 Performance: minimum damper leakage meet or exceed AMCA Standard 500-D ratings.

.1 Size/Capacity: refer to damper schedule

.2 25 L/s/m$^2$ maximum allowable leakage against 1000 Pa static pressure for outdoor air and exhaust air applications.

.3 Temperature range: minus 40degrees C to plus 100 degrees C.

.4 Arrangements: dampers mixing warm and cold air to be parallel blade, mounted at right angles to each other, with blades opening to mix air stream.

.5 Jack shafts:

.1 25 mm diameter solid shaft, constructed of corrosion resistant metal complete with required number of pillow block bearings to support jack shaft and operate dampers throughout their range.

.2 Include corrosion resistant connecting hardware to accommodate connection to damper actuating device.

.3 Install using manufacturers installation guidelines.

.4 Use same manufacturer as damper sections.

## 2.22 ELECTRONIC CONTROL DAMPER ACTUATORS

.1 Requirements:

.1 Direct mount proportional type as indicated.

.2 Spring return for "fail-safe" in Normally Open or Normally Closed position as indicated.

.3 Operator: size to control dampers against maximum pressure and dynamic closing/opening pressure, whichever is greater.

.4 Power requirements: 5 VA maximum at 24 V AC.

.5 Operating range: 0 - 10 V DC or 4 - 20 mA DC.

.6 For VAV box applications floating control type actuators may be used.

.7 Damper actuator to drive damper from full open to full closed in less than 120 seconds.

## 2.23 CONTROL VALVES

.1 Body: globe style, characterized ball.

.1 Flow characteristic as indicated on control valve schedule: linear, equal percentage, quick opening.

.2 Flow factor (KV) as indicated on control valve schedule: CV in imperial units.

.3 As indicated.

.4 As indicated.

.5 Leakage rate ANSI class IV, 0.01% of full open valve capacity

.6 Packing easily replaceable.

.7 Stem, stainless steel.

.8 Plug and seat, stainless steel, brass, bronze.

.9 Disc, replaceable, material to suit application.

.10 NPS 2 and under:

.1 Screwed National Pipe Thread (NPT) tapered female connections.

.2 Valves to ANSI Class 250, valves to bear ANSI mark

.3 Rangeability 50:1minimum.

.11 NPS 2½ and larger:

.1 Flanged connections.

.2 Valves to ANSI Class 150 or 250 as indicated, valves to bear ANSI mark

.3 Rangeability 100:1minimum.

.2 Butterfly Valves NPS 2 and larger:

.1 Body: for chilled water ANSI Class 150 cast iron lugged body and wafer body installed in locations as indicated. For steam and heating water ANSI Class 150 carbon steel lugged body and wafer body.

.2 End connections to suit flanges that are ANSI Class 150.

.3 Extended stem neck to provide adequate clearance for flanges and insulation.

.4 Pressure limit: bubble tight sealing to 170 kilopascals.

.5 Disc/vane: 316 stainless steel, aluminum bronze to ASTM B148

.6 Seat: for service on chilled water PTFE (polytetrafluoroethylene), EPDM (ethylene propylene diene monomer). For service on steam and heating water PTFE, RTFE (reinforced PTFE).

.7 Stem: 316 stainless steel.

.8 Flow factor (KV) as indicated on control valve schedule: CV in imperial units.

.9 Flow characteristic linear.

.10 Maximum flow requirement as indicated on control valve schedule.

.11 Maximum pressure drop as indicated on control valve schedule: pressure drop not to exceed one half of inlet pressure.

.12 As indicated.

.13 Valves are to be provided complete with mounting plate for installation of actuators.

.3 Pressure independent control valves (PICV)

.1 Up to 50mm: forged brass body rated at 2758 kPa, chrome plated brass ball and stem, female NPT union ends, dual EPDM lubricated O-rings and a brass or TEFZEL characterizing disc.

.2 65mm to 150mm: GG25 cast iron body to ANSI Class 125, standard class B, stainless steel ball and blowout proof stem, flange to match ANSI 125 with a dual EPDM O-ring packing design, PTFE seats, and a stainless steel flow characterizing disc.

.3 Accuracy: The control valves shall accurately control the flow from 0 to 100% full rated flow with an operating pressure differential range of 34.5 kPa] to 345 kPa differential across the valve with a valve body accuracy of +/- 5% variance due to differential pressure fluctuation or +/- 10% total assembly error incorporating differential pressure fluctuation, manufacturing tolerances and valve hysteresis.

.4 Flow characteristics: equal percentage characteristics.

.5 All actuators shall be capable of being electronically programmed in the field by the use of external computer software or a dedicated handheld tool for the adjustment of flow. Programming using actuator mounted switches or multi-turn actuators are not acceptable. Actuators for 3-wire floating (tri-state) and for two-position 12mm to 25mm pressure independent control valves shall fail in place and have a mechanical device inserted between the valve and the actuator for the adjustment of flow.

.6 Coil optimization: for valves 65mm to 150mm shall be accomplished by utilizing a pressure independent control valve assembly; two temperature sensors providing feedback of coil inlet and coil outlet water temperatures; and a flow meter provides analog flow feedback. Software shall control the valve to avoid the coil differential temperature from falling below a programmed setpoint. Independent trend logs data shall be available by means of BACnet MS/TP trending data to include, but not be limited to, inlet and outlet coil water

temperatures, valve position, absolute flow, absolute valve position, absolute power and heating/cooling energy in kW.

.7 The valve manufacturer shall provide a published commissioning procedure following the guidelines of a registered balancing organization.

.8 The control valve shall require no maintenance and shall not include replaceable cartridges.

## 2.24 ELECTRONIC / ELECTRIC VALVE ACTUATORS

.1 Requirements:

.1 Construction: steel, cast iron, aluminum.

.2 Control signal: 0-10V DC or 4-20 mA DC.

.3 Positioning time: to suit application. 90 sec maximum.

.4 Fail to normal position as indicated.

.5 Scale or dial indication of actual control valve position.

.6 Size actuator to meet requirements and performance of control valve specifications.

.7 For interior and perimeter terminal heating and cooling applications floating control actuators are acceptable.

.8 Minimum shut-off pressure: close against a minimum differential pressure rating of 275 kPa.

## 2.25 CARBON MONOXIDE AND NITROGEN DIOXIDE SENSORS AND DETECTION SYSTEM

.1 Wall-mounted gas detector for monitoring carbon monoxide (CO) and nitrogen dioxide (NO2)

.1 Output signal: 4 - 20 mA

.2 Electrochemical cell

.3 Response time: T90 < 50 seconds

.4 Detection range:

.1 Carbon monoxide: 0-250ppm with 1ppm resolution

.2 Nitrogen dioxide: 0-50ppm with 0.1ppm resolution

.5 Accuracy: ± 3% of full scale @ 25ºC

.6 Operating temperature: -20 to 50ºC

.7 LCD Display

.8 Audible alarm: >85 dBA at 3 m

.9 2 DPDT output relays

.2 Wall-mounted controller for centralized gas detection monitoring with real-time gas reading

.1 BACnet/IP interface, BTL listed

.2 Four fully programmable alarm levels

.3 Operating temperature: -20 to 50ºC

**2.26 REFRIGERANT MONITORING SYSTEM**

.1 The refrigerant monitoring system shall be comprised of:

.1 One main control/ alarm panel

.2 Two remote alarm panels, mounted at each access door to the mechanical room.

.3 Two refrigerant sensors mounted close to the chillers and connected to the main control panel

.2 Alarm panels shall be equipped with:

.1 Visual flashing amber beacon

.2 Audible alarm: >85 dBA at 3 m

.3 Touch screen display

.3 The monitoring panel shall allow for two alarm settings:

.1 A low level alarm shall warn (flashing screen) that refrigerant gas has been detected but the room is still safe. The screen shall display the gas ppm concentration.

.2 A high level alarm shall automatically activate audio / visual alarms.

.4 The refrigerant sensors shall have the following features:

.1 Use non-dispersive infrared technology to selectively target the refrigerant gas.

.2 Output signal proportional to the refrigerant ppm concentration.

.3 Life expectancy of 10 years.

.4 Calibrated to detect refrigerant levels equal to or less than the TLV-TWA for the refrigerant used.

.5 Alarm system to be activated when the refrigerant concentration in the mechanical room equals the TLV-TWA for the refrigerant used (1000ppm for R410A).

**2.27 Airflow measuring stations**

**.1 Airflow measuring stations shall be designed and built to comply with, and provide results in accordance with accepted practice as defined for system testing in the ASHRAE Handbook of Fundamentals, as well as the Industrial Ventilation Handbook.**

**.2 Where required, incorporate air straightening to ensure an accurate flow profile.**

**.3 Utilize total pressure and static pressure probes and incorporate averaging manifolds, internal piping, and connections for an external differential pressure/flow transmitter. Hot wire anemometer technology is also acceptable**

**.4 Airflow stations incorporated into the flow channels of silencers must be a series of probes inserted and tubed together according to design criteria, to provide an acceptable airflow profile.**

**.5 Performance:**

**.1 Accuracy, measured velocity pressure converted to airflow L/s: ±2% of the full scale**

**.2 Velocity range: 3.5 to 20 m/s**

**.3 Maximum airflow resistance: 0.6 times the velocity head**

**.4 Maximum operating temperatures: 121°C**

**.6 Construction:**

**.1 Casing: heavy gauge galvanized steel construction**

**.2 Duct to duct mounting flanges**

**.3 Aluminum pitot traverse tubes**

**.4 Inlet honeycomb air straightening section minimum free area: 97%.**

**~~2.27~~2.28 PANELS**

.1 Wall mounted enamelled steel cabinets with hinged and key-locked front door.

.2 Multiple panels as required to handle requirements with additional space to accommodate 25% additional capacity as required by Departmental Representative without adding additional cabinets.

.3 Panels to be lockable with same key.

**~~2.28~~2.29 WIRING**

.1 In accordance with Section 26 27 26 - Wiring Devices.

.2 For wiring under 70 volts use FT6 rated wiring where wiring is not run in conduit. Other cases use FT4 wiring.

.3 Wiring must be continuous without joints.

.4 Sizes:

.1 Field wiring to digital device: #18AWG 20AWG stranded twisted pair.

.2 Analog input and output: shielded #18 minimum solid copper #20 minimum stranded twisted pair.

## Part 3 Execution

**3.1 INSTALLATION**

.1 Install equipment, components so that manufacturer's and CSA labels are visible and legible after commissioning is complete

.2 Install field control devices in accordance with manufacturers recommended methods, procedures and instructions.

.3 Temperature transmitters, humidity transmitters, , controllers, relays: install in NEMA I enclosure or as required for specific applications. Provide for electrolytic isolation in cases when dissimilar metals make contact.

.4 Support field-mounted panels, transmitters and sensors on pipe stands or channel brackets.

.5 Fire stopping: provide space for fire stopping in accordance with Section 07 84 00 - Fire stopping. Maintain the fire-resistance rating integrity of the fire separation.

.6 Electrical:

.1 Complete installation in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Modify existing starters to provide for EMCS as indicated in I/O Summaries and as indicated.

.3 Refer to electrical control schematics included as part of control design schematics in Section 25 90 01 - EMCS: Site Requirements Applications and Systems Sequences of Operation on drawings. Trace existing control wiring installation and provide updated wiring schematics including additions, deletions to control circuits for review by Departmental Representative before beginning Work.

.4 Terminate wires with screw terminal type connectors suitable for wire size, and number of terminations.

.5 Install communication wiring in conduit.

.1 Provide complete conduit system to link Building Controllers, field panels and OWS(s).

.2 Conduit sizes to suit wiring requirements and to allow for future expansion capabilities specified for systems.

.3 Maximum conduit fill not to exceed 40%.

.4 Design drawings do not show conduit layout.

.6 Do not run exposed conduits in normally occupied spaces unless otherwise indicated or unless impossible to do otherwise. Departmental Representative to review before starting Work. Wiring in mechanical rooms, wiring in service rooms and exposed wiring must be in conduit.

.7 VAV Terminal Units: supply, install and adjust as required.

.1 Air probe, actuator and associated vav controls.

.2 Tubing from air probe to dp sensor as well as installation and adjustment of air flow sensors and actuators.

.3 Co-ordinate air flow adjustments with balancing trade.

## 3.2 TEMPERATURE AND HUMIDITY SENSORS

.1 Stabilize to ensure minimum field adjustments or calibrations.

.2 Readily accessible and adaptable to each type of application to allow for quick easy replacement and servicing without special tools or skills.

.3 Outdoor installation:

.1 Protect from solar radiation and wind effects by non-corroding shields.

.2 Install in NEMA 4 enclosures

.4 Duct installations:

.1 Do not mount in dead air space.

.2 Locate within sensor vibration and velocity limits.

.3 Securely mount extended surface sensor used to sense average temperature.

.4 Thermally isolate elements from brackets and supports to respond to air temperature only.

.5 Support sensor element separately from coils, filter racks.

.5 Averaging duct type temperature sensors.

.1 Install averaging element horizontally across the ductwork starting 305 mm from top of ductwork. Each additional horizontal run to be no more than 305 mm from one above it. Continue until complete cross sectional area of ductwork is covered. Use multiple sensors where single sensor does not meet required coverage.

.2 Wire multiple sensors in series for low temperature protection applications.

.3 Wire multiple sensors separately for temperature measurement.

.4 Use software averaging algorithm to derive overall average for control purposes.

.6 Thermowells: install for piping installations.

.1 Locate well in elbow where pipe diameter is less than well insertion length.

.2 Thermowell to restrict flow by less than 30%.

.3 Use thermal conducting paste inside wells.

**3.3 PANELS**

.1 Arrange for conduit and tubing entry from top, bottom or either side.

.2 Wiring and tubing within panels: locate in trays or individually clipped to back of panel.

.3 Identify wiring and conduit clearly.

**3.4 MAGNEHELIC PRESSURE INDICATORS**

.1 Install adjacent to fan system static pressure sensor and duct system velocity pressure sensor as reviewed by Departmental Representative.

.2 Locations: as specified.

**3.5 PRESSURE AND DIFFERENTIAL PRESSURE SWITCHES AND SENSORS**

.1 Install isolation valve and snubber on sensors between sensor and pressure source where code allows.

.1 Protect sensing elements on steam and high temperature hot water service with pigtail syphon between valve and sensor.

**3.6 IDENTIFICATION**

.1 Identify field devices in accordance with Section 25 05 54 - EMCS: Identification.

**3.7 AIR FLOW MEASURING STATIONS**

**.1 Install airflow measuring stations per manufacturer's recommendations in an unobstructed straight length of duct except the stations specifically designed for installation in a fan inlet. For installations in fan inlets, provide on both inlets of double inlet fans and provide inlet cone adapter as recommended by the manufacturer.**

~~.1~~.2 Protect air flow measuring assembly until cleaning of ducts is completed.

**3.8 TESTING AND COMMISSIONING**

.1 Calibrate and test field devices for accuracy and performance in accordance with Section 25 01 11 - EMCS: Start-up, Verification and Commissioning.

**END OF SECTION**

| | | | | | |
|---|---|---|---|---|---|
| Project Number | R.056687.005 | Consultant | NORR Architects and Engineers | System Reference | Domestic Hot Water System |
| Identifier | DJM | MCU Number | By EMCS subcontractor | EMCS System Identifier | DHWP-1/2 |
| Descriptor | DJM Building | Location of MCU | B-20, MEP Room 2 | EMCS System Descriptor | Domestic Water Heatpumps |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | 8 | 9 | 10 | 11 | 12 | | | | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **POINT IDENTIFICATION** | | | | | **AUXILLIARY DEVICES** | | | | **TYPE** | **AI** | **AI/DI** | | **ALARMS** | | | | **AI** | **AO/DO** | | **DI/DO** | |
| Point Number | Point Identifier | Point descriptor | Type | Eng Units | Auxilliary device or sensing signal | Supplied | Installed | Wired | Sensor or Output Device Signal | Active Sensor Range | Primary Point | CR CA MA | Analog Limits | | | | Set Point | Contact | Action | Heavy Motor | Applicable programs or notes |
| | | | | | | Division | | | | | | | L2 | L1 | H1 | H2 | | NO NC | CR OR | Delay | |
| 1 | DHWP-1/2 S/S | Domestic Hot water heat pump command | DO | on/off | BACnet DWHP controller | 22 | 22 | 25 | X | X | N | X | X | X | X | X | X | X | X | N | P4 |
| 2 | DHWP-1/2 ST | Domestic Hot water heat pump status | DI | on/off | BACnet DWHP controller | 22 | 22 | 25 | X | X | N | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 3 | O_IN | GLS temperature to heat pump | AI | °C | BACnet DWHP controller | 22 | 22 | 25 | X | X | N | X | X | X | X | X | X | X | X | X | X |
| 4 | O_OUT | GLR temperature from heat pump | AI | °C | BACnet DWHP controller | 22 | 22 | 25 | X | X | N | X | X | X | X | X | X | X | X | X | X |
| 5 | I_IN | DHW temperature to heat pump | AI | °C | BACnet DWHP controller | 22 | 22 | 25 | X | X | N | X | X | X | X | X | X | X | X | X | X |
| 6 | I_OUT | DHW temperature from heat pump | AI | °C | BACnet DWHP controller | 22 | 22 | 25 | X | X | N | X | X | X | X | X | X | X | X | X | X |
| 7 | P-13 S/S | Pump Run Command | DO | on/off | relay contact | 22 | 22 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | N | P4 |
| 8 | P-13 ST | Pump Status | DI | on/off | relay contact | 22 | 22 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 9 | P-15A/B S/S | Pump Run Command | DO | on/off | relay contact | 22 | 22 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | N | P4 |
| 10 | P-15A/B ST | Pump Status | DI | on/off | relay contact | 22 | 22 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 11 | V 3/4~~-2~~ POS | Valve Command | AO | % | Valve actuator | 25 | 22 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | X |
| 12 | V 3/4 ST | Valve Status | AI | % | Valve actuator | 25 | 22 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | X |
| 13 | BT-03 T | Domestic hot water temp inside BT-03 | AI | °C | Temp sensor | 25 | 22 | 25 | Sensor | -40 to 100 | Y | CA | 50 | 55 | 80 | 85 | 71 | X | X | X | X |
| 14 | DHW T | Domestic hot water supply temp | AI | °C | Temp sensor | 25 | 22 | 25 | Sensor | -40 to 100 | Y | CA | 50 | 55 | 80 | 85 | 71 | X | X | X | X |
| 15 | DHW BT03 T | Domestic hot water temp from BT-03 | AI | °C | Temp sensor | 25 | 22 | 25 | Sensor | -40 to 100 | Y | CA | 50 | 55 | 80 | 85 | 71 | X | X | X | X |
| 16 | DHWR T | Domestic hot water recirc temp | AI | °C | Temp sensor | 25 | 22 | 25 | Sensor | -40 to 100 | Y | CA | 30 | 35 | X | X | 49 | X | X | X | X |
| 17 | DHW-1 S/S | Domestic water heater command | AI | °C | BACnet DWH-1 controller | 22 | 22 | 25 | X | X | N | X | X | X | X | X | X | X | X | X | P4 |
| 18 | DHW-1 ST | Domestic water heater status | AI | °C | BACnet DWH-1 controller | 22 | 22 | 25 | X | X | N | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 19 | DHW-1 T | Domestic water heater temp setpoint | AI | °C | BACnet DWH-1 controller | 22 | 22 | 25 | X | X | N | X | 50 | 55 | 80 | 85 | 71 | X | X | X | X |
| 20 | DHW-1 DT | Domestic water heater temp diferential | AI | °C | BACnet DWH-1 controller | 22 | 22 | 25 | X | X | N | X | X | X | X | X | 11 | X | X | X | X |
| 21 | DHW-1 TMV T | Domestic hot water supply temp from TMV | AI | °C | Temp sensor | 25 | 22 | 25 | Sensor | -40 to 100 | Y | CR/ MA | X | 48 | 52 | X | 50 | X | X | X | X |
| 22 | DHWP-1/2 FLOW | Domestic hot water heat pump flow | AI | L/s | Flow meter | 25 | 23 | 25 | Output Device | 0 to 6 | Y | CR/ MA | X | 0.9 | 1.2 | X | 1.07 | X | X | X | X |
| 23 | V 5 POS | Valve Command | AO | % | Valve actuator | 25 | ~~22~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | X | X |
| 24 | V 5 ST | Valve Status | AI | % | Valve actuator | 25 | ~~22~~ 23 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | X |

Remarks: Provide equipment failure alarm, if status doesn't match command, on all equipment status points.

| | | | | | |
|---|---|---|---|---|---|
| Project Number | R.056687.005 | Consultant | NORR Architects and Engineers | System Reference | Heat Recovery Chillers |
| Identifier | DJM | MCU Number | By EMCS subcontractor | EMCS System Identifier | HRCH-01,02 |
| Descriptor | DJM Building | Location of MCU | B-20, MEP Room 2 | EMCS System Descriptor | Heat Recovery Chillers # 01, 02 |

| POINT IDENTIFICATION | | | | | AUXILLIARY DEVICES | | | | TYPE | AI | AI/DI | | ALARMS | | | | AI | AO/DO | DI/DO | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Point Number | Point Identifier | Point descriptor | Type | Eng Units | Auxilliary device or sensing signal | Supplied | Installed | Wired | Sensor or Output Device Signal | Active Sensor Range | Primary Point | CR CA MA | Analog Limits | | | | Set Point | Contact | Action | Heavy Motor | Applicable programs or notes |
| | | | | | | Division | | | | | | | L2 | L1 | H1 | H2 | | NO NC | CR OR | Delay | |
| 1 | HRCH-01/02 ST | Heat recovery chiller status | DI | on/off | BACnet Chiller Plant controller | 25 | 25 | 25 | X | X | N | CR/ MA | X | X | X | X | X | X | X | X | |
| 2 | HRCH-01/02 CLG S/S | Heat recovery chiller cooling command | DO | on/off | BACnet Chiller Plant controller | 25 | 25 | 25 | X | X | N | X | X | X | X | X | X | NO | X | Y | P4 |
| 3 | HRCH-01/02 HTG S/S | Heat recovery chiller heating command | DO | on/off | BACnet Chiller Plant controller | 25 | 25 | 25 | X | X | N | X | X | X | X | X | X | NO | X | Y | P4 |
| 4 | P-01/04 ST | Chilled water pump status | DI | on/off | BACnet Chiller Plant controller | 25 | 25 | 25 | X | X | N | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 5 | P-02/05 ST | Condenser water pump status | DI | on/off | BACnet Chiller Plant controller | 25 | 25 | 25 | X | X | N | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 6 | P-03/06 ST | Geothermal pump status | DI | on/off | BACnet Chiller Plant controller | 25 | 25 | 25 | X | X | N | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 7 | P-03/06 SPD | Geothermal pump speed | AI | % | BACnet Chiller Plant controller | 25 | 25 | 25 | X | X | N | X | X | X | X | X | X | X | X | X | |
| 8 | P-14A/B/C S/S | Dry cooler pump start/stop | DO | on/off | Relay contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | X | |
| 9 | P-14A/B/C ST | Dry cooler pump status | DI | on/off | VFD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | P2 |
| 10 | P-14A/B/C MOD | Dry cooler pump VFD control | AO | % | VFD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | * | X | X | X | |
| 11 | P-14A/B/C SPD | Dry cooler pump VFD position | AI | % | VFD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 12 | DC-1 FAN S/S | Dry cooler fans start/stop | DO | on/off | Relay contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | Y | P4 |
| 13 | DC-1 FAN ST | Dry cooler fans status | DI | on/off | VFD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | P2 |
| 14 | DC-1 FAN MOD | Dry cooler fans VFD control | AO | % | VFD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 15 | DC-1 FAN SPD | Dry cooler fans VFD position | AI | % | VFD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 16 | P-12A/B/C S/S | Ground loop pump start/stop | DO | on/off | Relay contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | X | |
| 17 | P-12A/B/C ST | Ground loop pump status | DI | on/off | VFD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | P2 |
| 18 | P-12A/B/C MOD | Ground loop pump VFD set point | AO | % | VFD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | * | X | X | X | |
| 19 | P-12A/B/C SPD | Ground loop pump VFD position | AI | % | VFD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 20 | CHWS T1 | Plant chilled water supply temperature | AI | °C | Temperature sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | CR CA | 3 | 5 | 11 | X | 7 | X | X | X | |
| 21 | CHWR T1 | Plant chilled water return temperature | AI | °C | Temperature sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | CA | X | X | X | X | X | X | X | X | |
| 22 | CWS T1 | Plant hot water supply temperature | AI | °C | Temperature sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | CA | 48 | 50 | X | X | 53 | X | X | X | |
| 23 | CWR T1 | Plant hot water return temperature | AI | °C | Temperature sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | X | X | X | X | X | X | X | X | X | |
| 24 | HWS T1 | Heating water supply temperature | AI | °C | Temperature sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | CR CA | 48 | 50 | X | X | 53 | X | X | X | |
| 25 | HWR T1 | Heating water return temperature | AI | °C | Temperature sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | X | X | X | X | X | X | X | X | X | |
| 26 | GTS T | Geothermal supply temperature (summer/winter) | AI | °C | Temperature sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | CR CA | 15/-4 | 18/-2 | 35/X | 38/X | 30/1.1 | X | X | X | |
| 27 | GTR T | Geothermal return temperature (summer/ winter) | AI | °C | Temperature sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | X | X | X | X | 38 | X | X | X | X | |
| 28 | GTS HE T | Geothermal supply temperature from HE (summer/winter) | AI | °C | Temperature sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | CR CA | 15/-4 | 18/-2 | 35/X | 38/X | 30/1.1 | X | X | X | |
| 29 | GTS DC T | Geothermal supply temperature from dry cooler (summer) | AI | °C | Temperature sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | CR CA | 15 | 18 | 35 | 38 | 30 | X | X | X | |

Remarks: Provide equipment failure alarm, if status doesn't match command, on all equipment status points.
* Setpoint will be determined at startup and balancing

| | | | | | |
|---|---|---|---|---|---|
| Project Number | R.056687.005 | Consultant | NORR Architects and Engineers | System Reference | Heating Water Distribution System |
| Identifier | DJM | MCU Number | By EMCS subcontractor | EMCS System Identifier | P-07, P-08, P-09A, B, P-10 |
| Descriptor | DJM Building | Location of MCU | B-20, MEP Room 2 | EMCS System Descriptor | Heating Water Back-up and Distribution |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | 8 | 9 | 10 | 11 | 13 | | | | 14 | 15 | 17 | | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **POINT IDENTIFICATION** | | | **AUXILLIARY DEVICES** | | | | **TYPE** | **AI** | **AI/DI** | | **ALARMS** | | | | **AI** | **AO/DO** | **DI/DO** | | |
| Point Number | Point Identifier | Point descriptor | Type | Eng Units | Auxilliary device or sensing signal | Supplied | Installed | Wired | Sensor or Output Device Signal | Active Sensor Range | Primary Point | CR CA MA | Analog Limits | | | | Set Point | Contact | Action | Heavy Motor | Applicable programs or notes |
| | | | | | | Division | | | | | | | L2 | L1 | H1 | H2 | | NO NC | CR OR | Delay | |
| 1 | P-07/08 S/S | Electric boiler pump command | DO | on/off | Relay contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | X | |
| 2 | P-07/08 ST | Electric boiler pump status | DI | on/off | Relay contact | 23 | 25 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 3 | P-07/08 MOD | Electric boiler pump control | AO | % | VFD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | * | X | X | X | |
| 4 | P-07/08 SPD | Electric boiler pump speed | AI | % | VFD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 5 | P-09A/B/10 S/S | Heating water pump command | DO | on/off | Relay contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | X | |
| 6 | P-09A/B/10 ST | Heating water pump status | DI | on/off | Relay contact | 23 | 25 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 7 | P-09A/B/C MOD | Heating waterpump control | AO | % | VFD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | * | X | X | X | |
| 8 | P-09A/B/C SPD | Heating water pump speed | AI | % | VFD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 9 | EB-01/02 S/S | Electric boiler enable | DO | on/off | BACnet EB controller | 23 | 25 | 25 | Output Device | X | N | X | X | X | X | X | X | X | X | Y | P4 |
| 10 | EB-01/02 ST | Electric boiler status | DI | on/off | BACnet EB controller | 23 | 25 | 25 | Output Device | X | N | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 11 | ST | Electric boiler supply temperature | AI | °C | BACnet EB controller | 23 | 25 | 25 | Output Device | X | N | X | X | X | X | X | X | X | X | X | |
| 12 | RT | Electric boiler retun temperature | AI | °C | BACnet EB controller | 23 | 25 | 25 | Output Device | X | N | X | X | X | X | X | X | X | X | X | |
| 13 | V2 2-POS | V2 position command | DO | on/off | Relay contact | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 14 | V2 POS | V2 position status | DI | on/off | Relay contact | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | NC | X | X | |
| 15 | HW DP | Differential pressure heating loop | AI | kPa | Diff Press Sensor | 25 | ~~25~~ 23 | 25 | Sensor | 0-700 | Y | X | X | X | X | X | * | X | X | X | |
| 16 | HWS T2 | Heating water supply temperature to the loop | AI | °C | Temp Sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | CR/ CA | 48 | 50 | X | X | 53 | X | X | X | |
| 17 | HWR T2 | Heating water return temperature to the loop | AI | °C | Temp Sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | X | X | X | X | X | X | X | X | X | |

Remarks: Provide equipment failure alarm, if status doesn't match command, on all equipment status points.
* Setpoint will be determined at startup and balancing

| | | | | | |
|---|---|---|---|---|---|
| Project Number | R.056687.005 | Consultant | NORR Architects and Engineers | System Reference | Makeup Air Dedicated Outdoor Air System with Energy Recovery |
| Identifier | DJM | MCU Number | By EMCS subcontractor | EMCS System Identifier | MUA-1, MUA-2 and MUA-3 |
| Descriptor | DJM Building | Location of MCU | B-20, MEP Room 2 | EMCS System Descriptor | Make-up air units #1,2,3 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | 8 | 9 | 10 | 11 | 12 | | | | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| POINT IDENTIFICATION | | | | | AUXILLIARY DEVICES | | | | TYPE | AI | AI/DI | | ALARMS | | | | AI | AO/DO | | | DI/DO |
| Point Number | Point Identifier | Point descriptor | Type | Eng Units | Auxilliary device or sensing signal | Supplied | Installed | Wired | Sensor or Output Device Signal | Active Sensor Range | Primary Point | CR CA MA | Analog Limits | | | | Set Point | Contact | Action | Heavy Motor | Applicable programs or notes |
| | | | | | | Division | | | | | | | L2 | L1 | H1 | H2 | | NO NC | CR OR | Delay | |
| 1 | SA T1 | Cooling Coil Leaving Air Temp | AI | ºC | Averaging Sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | CR/ CA | X | X | 11 | 12 | 10 | X | X | X | |
| 2 | CCV | Cooling Coil Valve Control | AO | % | Valve Actuator | 25 | 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 3 | CCV- P | Cooling Coil Valve Position | AI | % | Valve Actuator | 25 | 23 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | NC | X | X | |
| 4 | EA/OA T1/T2 | Exhaust / Outdoor Air Temperature | AI | ºC | Averaging Sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | X | X | X | X | X | X | X | X | X | |
| 5 | RA FLOW | Exhaust Air Flow | AO | L/s | AFS DP | 25 | 23 | 25 | Output Device | 0-10000 | Y | CR | 1793 | 1888 | X | X | X | X | X | X | |
| 6 | EFVFD | Exhaust Fan VFD Control | AO | % | VFD output | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 7 | EFVFD-P | Exhaust Fan VFD Postion | AI | % | VFD output | 23 | 25 | 25 | Output Device | X | Y | CA | 35 | 38 | X | X | X | X | X | X | |
| 8 | ERV ST | ERV Status | DI | on/off | Relay | 25 | 25 | 25 | Output Device | X | Y | CR | X | X | X | X | X | NO | X | X | |
| 9 | ERV-SS | ERV Enable | DO | on/off | Relay | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | Y | P1, P2, P4 |
| 10 | ECON S/S | Free cooling mode enable | DO | on/off | Relay | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 11 | RECIRC S/S | Recirculation mode enable | DO | on/off | Relay | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | X | |
| 12 | L VAV | Low volume fan operation enable | DO | on/off | Relay | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | X | |
| 13 | M VAV | Medium volume fan operation enable | DO | on/off | Relay | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | X | |
| 14 | FPD | Final filter Pressure Drop | AI | Pa | Magnehelic DP | 25 | 23 | 25 | Output Device | 0-250 | Y | X | X | X | X | X | X | X | X | X | |
| 15 | FIRE | Firestat | ~~HW~~DO | ~~X~~on/off | ~~X~~Relay | 25 | 25 | 25 | X | X | Y | X | X | X | X | X | X | X | X | X | |
| 16 | FREEZ | Freezestat | ~~HW~~DO | ~~X~~on/off | ~~X~~Relay | 25 | ~~25~~ 23 | 25 | X | X | Y | X | X | X | X | X | X | X | X | X | |
| 17 | SA T2 | Heating Coil Leaving Air Temp | AI | ºC | Averaging Sensor | 25 | 25 | 25 | Sensor | X | Y | CR/ CA | 10 | 12 | 40 | X | 13 | X | X | X | |
| 18 | HCV | Heating Coil Valve Control | AO | % | Valve Actuator | 25 | 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 19 | HCV-P | Heating Coil Valve Position | AI | % | Valve Actuator | 25 | 23 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | NO | X | X | |
| 20 | OAD | Outside Air Damper Control | DO | % | Damper Actuator | 25 | 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 21 | OAD-P | Outside Air Damper Position | DI | % | Damper Actuator | 25 | 23 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | NC | X | X | |
| 22 | EAD | Exhaust Air Damper Control | DO | % | Damper Actuator | 25 | 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 23 | EAD-P | Exhaust Air Damper Position | DI | % | Damper Actuator | 25 | 23 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | NC | X | X | |
| 24 | RAH | Return Air Humidity | AI | % | Humidity Sensor | 25 | 25 | 25 | Sensor | 0-100 | Y | X | X | X | X | X | X | X | X | X | |
| 25 | RAT | Return Air Temperature | AI | ºC | Averaging Sensor | 25 | 25 | 25 | Sensor | -40 to 100 | Y | X | X | X | X | X | X | X | X | X | |
| 26 | SAH | Supply Air Humidity | AI | RH | Humidity Sensor | 25 | 25 | 25 | Sensor | 0-100 | Y | X | X | X | X | X | X | X | X | X | |
| 27 | SASP | Supply Air Static Pressure | AI | Pa | Magnehelic DP | 25 | 25 | 25 | Output Device | 0-1250 | Y | X | X | X | X | X | * | X | X | X | |
| 28 | T1/T2 | Energy CoreLeaving Air Temperature | AI | ºC | Averaging Sensor | 25 | 25 | 25 | Sensor | -40 to 100 | Y | X | X | X | X | X | X | X | X | X | |
| 29 | SA FLOW | Supply Air Flow | AI | L/s | AFS DP | 25 | 23 | 25 | Output Device | 10000 | Y | X | X | X | X | X | X | X | X | X | |
| 30 | SF-S | Supply Fan Status | DI | on/off | VFD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 31 | SFVFD | Supply Fan VFD Control | AO | % | VFD output | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 32 | SFVFD-P | Supply Fan VFD Position | AI | % | VFD output | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 33 | OA T | Outdoor Air Temperature | AI | ºC | Temperature Sensor | 25 | 25 | 25 | Sensor | -40 to 100 | Y | X | X | X | X | X | X | X | X | X | |
| 34 | OA RH | Outdoor HUmidity | AI | % | Humidity Sensor | 25 | 25 | 25 | Sensor | 0-100 | Y | X | X | X | X | X | X | X | X | X | |
| 35 | SMK AL | Smoke detected in the SA/ RA duct | Di | on/off | Relay contact | 26 | 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 36 | FAS AL | Alarm to FAS | DO | on/off | Relay contact | 26 | 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 37 | FAS | Fire Alarm System | DI | on/off | Relay contact | 25 | 25 | 25 | Output Device | X | Y | CR | X | X | X | X | X | NC | X | X | |
| 38 | BLDG SP1/2 | Building static pressure | AI | Pa | Diff. pressure sensor | 25 | 25 | 25 | Sensor | 0-50 | Y | CR | -5 | -10 | 10 | 15 | 3 | X | X | X | * |

Remarks: Provide equipment failure alarm, if status doesn't match command, on all equipment status points.
* Setpoint is 3Pa in the summer and 0Pa in the winter, refer to control schematic 1/M74-01..

| | | | | | |
|---|---|---|---|---|---|
| Project Number | R.056687.005 | Consultant | NORR Architects and Engineers | System Reference | Unit Heaters |
| Identifier | DJM | MCU Number | By EMCS subcontractor | EMCS System Identifier | UH-1 through 26 |
| Descriptor | DJM Building | Location of MCU | B-20, MEP Room 2 | EMCS System Descriptor | Unit Heaters # 1 through 26 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | 8 | 9 | 10 | 11 | 13 | | | | 14 | 15 | 17 | | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **POINT IDENTIFICATION** | | | **AUXILLIARY DEVICES** | | | | **TYPE** | **AI** | **AI/DI** | | **ALARMS** | | | | **AI** | **AO/DO** | **DI/DO** | | |
| Point Number | Point Identifier | Point descriptor | Type | Eng Units | Auxilliary device or sensing signal | Supplied | Installed | Wired | Sensor or Output Device Signal | Active Sensor Range | Primary Point | CR CA MA | Analog Limits | | | | Set Point | Contact | Action | Heavy Motor | Applicable programs or notes |
| | | | | | | Division | | | | | | | L2 | L1 | H1 | H2 | | NO NC | CR OR | Delay | |
| 1 | UH-xx S/S | Unit heater fan stop start | DO | on/off | relay | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | X | P1 |
| 2 | UH-xx ST | Unit heater fan status | DI | on/off | relay | 25 | 25 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 3 | UH-xx HCV | Unit heater valve open/close | DO | open/close | Valve actuator | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 4 | UH-xx HCV-P | Unit heater valve position | DI | open/close | Limit switch | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | NC | X | X | P1 |
| 5 | UH-xx T | Space temperature sensor | AI | °C | Temperature sensor | 25 | 25 | 25 | Sensor | -40 to 100 | Y | X | 3 | 7 | X | X | 10 | X | X | X | |

Remarks: Provide equipment failure alarm, if status doesn't match command, on all equipment status points.

| | | | | | |
|---|---|---|---|---|---|
| Project Number | R.056687.005 | Consultant | NORR Architects and Engineers | System Reference | Force Flow Heaters Hydronic |
| Identifier | DJM | MCU Number | By EMCS subcontractor | EMCS System Identifier | FFH-01 through 06 |
| Descriptor | DJM Building | Location of MCU | B-20, MEP Room 2 | EMCS System Descriptor | Forced fow heaters 01 through 06 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | 8 | 9 | 10 | 11 | 13 | | | | 14 | 15 | 17 | | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **POINT IDENTIFICATION** | | | **AUXILLIARY DEVICES** | | | | **TYPE** | **AI** | **AI/DI** | | **ALARMS** | | | | **AI** | **AO/DO** | **DI/DO** | | |
| Point Number | Point Identifier | Point descriptor | Type | Eng Units | Auxilliary device or sensing signal | Supplied | Installed | Wired | Sensor or Output Device Signal | Active Sensor Range | Primary Point | CR CA MA | Analog Limits | | | | Set Point | Contact | Action | Heavy Motor | Applicable programs or notes |
| | | | | | | Division | | | | | | | L2 | L1 | H1 | H2 | | NO NC | CR OR | Delay | |
| 1 | FFH-xx S/S | Force flow heater fan stop start | DI | on/off | Relay | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | N | P1 |
| 2 | FFH-xx ST | Force flow heater fan status | DI | on/off | Relay | 25 | 25 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 3 | FFH-xx HCV | Force flow heater valve open/close | AO | % | Valve actuator | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 4 | RM T | Space temperature sensor | AI | °C | Temperature sensor | 25 | 25 | 25 | Sensor | -40 to 100 | Y | CR/ CA | 3 | 7 | X | X | 10 | X | X | X | |

Remarks: Provide equipment failure alarm, if status doesn't match command, on all equipment status points.

| | | | | | |
|---|---|---|---|---|---|
| Project Number | R.056687.005 | Consultant | NORR Architects and Engineers | System Reference | Fan Coil Units |
| Identifier | DJM | MCU Number | By EMCS subcontractor | EMCS System Identifier | FCU-1 trhough 31 |
| Descriptor | DJM Building | Location of MCU | B-20, MEP Room 2 | EMCS System Descriptor | Fan coil unit # 1 through 31 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | 8 | 9 | 10 | 11 | 13 | | | | 14 | 15 | 17 | | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **POINT IDENTIFICATION** | | | | | **AUXILLIARY DEVICES** | | | | **TYPE** | **AI** | **AI/DI** | | **ALARMS** | | | | **AI** | **AO/DO** | **DI/DO** | | |
| Point Number | Point Identifier | Point descriptor | Type | Eng Units | Auxilliary device or sensing signal | Supplied | Installed | Wired | Sensor or Output Device Signal | Active Sensor Range | Primary Point | CR CA MA | Analog Limits | | | | Set Point | Contact | Action | Heavy Motor | Applicable programs or notes |
| | | | | | | Division | | | | | | | L2 | L1 | H1 | H2 | | NO NC | CR OR | Delay | |
| 1 | FCU-xx S/S | Fan Coil fan stop start | DI | on/off | Relay | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | N | P1 |
| 2 | FCU-xx ST | Fan coil fan status | DI | on/off | Relay | 25 | 25 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 3 | FCU-xx CCV | Fan Cooling Coil Valve Command | AO | % | Valve actuator | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 4 | FCU-xx HCV | Fan Heating Coil Valve Command | AO | % | Valve actuator | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 5 | RM T | Space temperature sensor | AI | ºC | Temperature sensor | 25 | 25 | 25 | Sensor | -40 to 100 | Y | CA | 16 | 18 | 26 | 28 | 24 | X | X | X | |
| 6 | OCC -OV | Occupancy over-ride | DI | on/off | Switch | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 7 | RM RH | Space humidity sensor | AI | % | Humidity Sensor | 25 | 25 | 25 | Sensor | 0-100 | Y | CA | X | X | 55 | 60 | 50 | X | X | X | |

Remarks: Provide equipment failure alarm, if status doesn't match command, on all equipment status points.

| | | | | | |
|---|---|---|---|---|---|
| Project Number | R.056687.005 | Consultant | NORR Architects and Engineers | System Reference | Washroom Exhaust |
| Identifier | DJM | MCU Number | By EMCS subcontractor | EMCS System Identifier | EF-03 |
| Descriptor | DJM Building | Location of MCU | B-20, MEP Room 2 | EMCS System Descriptor | Exhaust fan #3 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | 8 | 9 | 10 | 11 | 12 | | | | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **POINT IDENTIFICATION** | | | | | **AUXILLIARY DEVICES** | | | | **TYPE** | **AI** | **AI/DI** | | **ALARMS** | | | | **AI** | **AO/DO** | **DI/DO** | | |
| Point Number | Point Identifier | Point descriptor | Type | Eng Units | Auxilliary device or sensing signal | Supplied | Installed | Wired | Sensor or Output Device Signal | Active Sensor Range | Primary Point | CR CA MA | Analog Limits | | | | Set Point | Contact | Action | Heavy Motor | Applicable programs or notes |
| | | | | | | Division | | | | | | | L2 | L1 | H1 | H2 | | NO NC | CR OR | Delay | |
| 1 | EF-03 S/S | Fan stop start | DO | on/off | Relay contact | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | N | P1, P7 |
| 2 | EF-03 ST | Fan Status | DI | on/off | Relay contact | 25 | 25 | 25 | Output Device | X | Y | CR / MA | X | X | X | X | X | NC | X | X | P2 |
| 3 | EF-03 MD | Damper open/close | DO | open/close | Relay contact | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 4 | EF-03 MD-F | Damper position | DI | open/close | Limit switch | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | CR / MA | X | X | X | X | X | NC | X | X | |

Remarks: Provide equipment failure alarm, if status doesn't match command, on all equipment status points.

| | | | | | |
|---|---|---|---|---|---|
| Project Number | R.056687.005 | Consultant | NORR Architects and Engineers | System Reference | Elevator Room Ventilation |
| Identifier | DJM | MCU Number | By EMCS subcontractor | EMCS System Identifier | EF-4, EF-5 |
| Descriptor | DJM Building | Location of MCU | B-20, MEP Room 2 | EMCS System Descriptor | Exhaust Fans # 4, 5 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | 8 | 9 | 10 | 11 | 12 | | | | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **POINT IDENTIFICATION** | | | | | **AUXILLIARY DEVICES** | | | | **TYPE** | **AI** | **AI/DI** | | **ALARMS** | | | | **AI** | **AO/DO** | **DI/DO** | | |
| Point Number | Point Identifier | Point descriptor | Type | Eng Units | Auxilliary device or sensing signal | Supplied | Installed | Wired | Sensor or Output Device Signal | Active Sensor Range | Primary Point | CR CA MA | Analog Limits | | | | Set Point | Contact | Action | Heavy Motor | Applicable programs or notes |
| | | | | | | Division | | | | | | | L2 | L1 | H1 | H2 | | NO NC | CR OR | Delay | |
| 1 | OAD 2POS | Intake air damper command | DO | on/off | Relay contact | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 2 | OAD ES | Intake air damper position | DI | on/off | Limit switch | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 3 | EAD 2POS | Exhaust air damper command | DO | on/off | Relay contact | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 4 | EAD ES | Exhaust air damper position | DI | on/off | Limit switch | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 5 | IAD 2POS | Intake air damper command | DO | on/off | Relay contact | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 6 | IAD ES | Intake air damper position | DI | on/off | Limit switch | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 7 | TAD 2POS | Transfer air damper command | DO | on/off | Relay contact | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 8 | TAD ES | Transfer air damper position | DI | on/off | Limit switch | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 9 | EF-S/S | Exhaust Fan Start Stop | DI | on/off | ~~VSD~~Relay Contact | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | N | |
| 10 | EF-S | Exhaust Fan Status | DI | on/off | ~~VSD~~Relay Contact | 25 | 25 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 11 | RM T | Space temperature | AI | ºC | Temperature sensor | 25 | 25 | 25 | Sensor | -40 to 100 | Y | CA | X | X | 30 | 35 | 26 | X | X | X | |

Remarks: Provide equipment failure alarm, if status doesn't match command, on all equipment status points.

| | | | | | |
|---|---|---|---|---|---|
| Project Number | R.056687.005 | Consultant | NORR Architects and Engineers | System Reference | Parking Garage Ventilation |
| Identifier | DJM | MCU Number | By EMCS subcontractor | EMCS System Identifier | EF-2 |
| Descriptor | DJM Building | Location of MCU | B-20, MEP Room 2 | EMCS System Descriptor | Exhaust Fan #2 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | 8 | 9 | 10 | 11 | 12 | | | | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **POINT IDENTIFICATION** | | | | | **AUXILLIARY DEVICES** | | | | **TYPE** | **AI** | **AI/DI** | | **ALARMS** | | | | **AI** | **AO/DO** | **DI/DO** | | |
| Point Number | Point Identifier | Point descriptor | Type | Eng Units | Auxilliary device or sensing signal | Supplied | Installed | Wired | Sensor or Output Device Signal | Active Sensor Range | Primary Point | CR CA MA | Analog Limits | | | | Set Point | Contact | Action | Heavy Motor | Applicable programs or notes |
| | | | | | | Division | | | | | | | L2 | L1 | H1 | H2 | | NO NC | CR OR | Delay | |
| 1 | OAD 2POS | Outdoor air damper command | DO | on/off | Relay contact | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 2 | OAD ES | Outdoor air damper position | DI | on/off | Limit switch | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | NC | X | X | |
| 3 | EF-S/S | Exhaust Fan Start Stop | DI | on/off | VSD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | N | |
| 4 | EF-ST | Exhaust Fan Status | DI | on/off | VSD Contact | 23 | 25 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 5 | EFVSD | Exhaust Fan VSD Control | AO | % | VSD output | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 6 | EFVSD-P | Exhaust Fan VSD Position | AI | % | VSD output | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 7 | EAD 2POS | Exhaust air damper command | DO | on/off | Relay contact | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 8 | EAD ES | Exhaust air damper position | DI | on/off | Limit switch | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | |
| 9 | RM T | Space temperature | AI | °C | Temperature sensor | 25 | 25 | 25 | Sensor | -40 to 100 | Y | X | X | X | X | X | 26 | X | X | X | |
| 10 | CO ST | Carbon monoxide system status | DI | on/off | CO Controller | 25 | 25 | 25 | Output Device | x | | CR/ MA | X | X | X | X | X | NC | X | X | |
| 11 | EF-S/S | Exhaust Fan Start Stop | DI | on/off | CO Controller | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | N | |
| 12 | RF-1,2,3 S/S | Recirculation Fan Start Stop | DO | on/off | CO Controller | 25 | 25 | 25 | Output Device | X | X | X | X | X | X | X | X | NO | X | N | |
| 13 | RF-1,2,3 ST | Recirculation Fan Status | DI | on/off | Relay contact | 25 | 25 | 25 | Output Device | X | | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 14 | CO ALARM | Carbon monoxide system alarm | DI | on/off | CO Controller | 25 | 25 | 25 | Output Device | X | X | X | X | X | X | X | X | NC | X | X | |
| 15 | NO2 ALARM | Nitrogen dioxide system alarm | DI | on/off | CO Controller | 25 | 25 | 25 | Output Device | X | X | X | X | X | X | X | X | NC | X | X | |
| 16 | CO | Carbon monoxide sensor | AI | ppm | CO Controller | 25 | 25 | 25 | Sensor | 0-250 | X | CR | X | X | 25 | 100 | 25 | NC | X | X | |
| 17 | NO2 | Nitrogen dioxide sensor | AI | ppm | CO Controller | 25 | 25 | 25 | Sensor | 0-10 | X | CR | X | X | 0.7 | 2 | 0.7 | NC | X | X | |

Remarks: Provide equipment failure alarm, if status doesn't match command, on all equipment status points.

| | | | | | |
|---|---|---|---|---|---|
| Project Number | R.056687.005 | Consultant | NORR Architects and Engineers | System Reference | Mechanical Room Ventilation |
| Identifier | DJM | MCU Number | By EMCS subcontractor | EMCS System Identifier | EF-1, SF-1 |
| Descriptor | DJM Building | Location of MCU | B-20, MEP Room 2 | EMCS System Descriptor | Mechanical room supply and exhaust fans |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | 8 | 9 | 10 | 11 | 12 | | | | 13 | 14 | 5 | 6 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **POINT IDENTIFICATION** | | | | | **AUXILLIARY DEVICES** | | | | **TYPE** | **AI** | **AI/DI** | | **ALARMS** | | | | **AI** | **AO/DO** | **DI/DO** | | |
| Point Number | Point Identifier | Point descriptor | Type | Eng Units | Auxilliary device or sensing signal | Supplied | Installed | Wired | Sensor or Output Device Signal | Active Sensor Range | Primary Point | CR CA MA | Analog Limits | | | | Set Point | Contact | Action | Heavy Motor | Applicable programs or notes |
| | | | | | | Division | | | | | | | L2 | L1 | H1 | H2 | | NO NC | CR OR | Delay | |
| 1 | SF-S/S | Supply Fan Start Stop | DI | on/off | VSD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | N | |
| 2 | SF-S | Supply Fan Status | DI | on/off | VSD Contact | 23 | 25 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | |
| 3 | SFVSD | Supply Fan VSD Control | AO | % | VSD output | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 4 | SFVSD-P | Supply Fan VSD Position | AI | % | VSD output | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 5 | OAD 2POS | Outdoor air damper command | DO | on/off | Relay contact | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 6 | OAD ES | Outdoor air damper position | DI | on/off | Limit switch | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 7 | EAD 2POS | Exhaust air damper command | DO | on/off | Relay contact | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 8 | EAD ES | Exhaust air damper position | DI | on/off | Limit switch | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 9 | EF-S/S | Exhaust Fan Start Stop | DI | on/off | VSD Contact | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | N | |
| 10 | EF-S | Exhaust Fan Status | DI | on/off | VSD Contact | 23 | 25 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | |
| 11 | EFVSD | Exhaust Fan VSD Control | AO | % | VSD output | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 12 | EFVSD-P | Exhaust Fan VSD Position | AI | % | VSD output | 23 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 13 | RM T | Space temperature | AI | ºC | Temperature sensor | 25 | 25 | 25 | Sensor | -40 to 100 | Y | CA | X | X | 30 | 35 | 26 | X | X | X | |
| 14 | REF ST | Refrigerant concentration status | AI | ppm | Refrigerant detector | 25 | 25 | 25 | Sensor | 0 to 1000 | N | CA CR | X | X | 500 | 900 | X | NC | OR | X | |
| 15 | EFD 2POS | EF-1 intake damper command | DO | on/off | Relay contact | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 16 | EFD ES | EF-1 intake damper position | DI | on/off | Limit switch | 25 | ~~25~~ 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 17 | PB S | Push button START | DO | on/off | Relay contact | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 18 | PB ST | Push button STOP | DO | on/off | Relay contact | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 19 | OS | Occupancy Sensor | DI | on/off | Relay contact | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | X | |

Remarks: Interlock supply and exhaust fans and associated dampers.
Provide equipment failure alarm, if status doesn't match command, on all equipment status points.

| | | | | | |
|---|---|---|---|---|---|
| Project Number | R.056687.005 | Consultant | NORR Architects and Engineers | System Reference | Fan Powered DOAS VAV boxes |
| Identifier | DJM | MCU Number | By EMCS subcontractor | EMCS System Identifier | FPB-01 through 28 |
| Descriptor | DJM Building | Location of MCU | B-20, MEP Room 2 | EMCS System Descriptor | Fan powered DOAS VAV boxes #1 through 28 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | | | 8 | 9 | 10 | 11 | 12 | | | | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **POINT IDENTIFICATION** | | | | | **AUXILLIARY DEVICES** | | | | **TYPE** | **AI** | **AI/DI** | | **ALARMS** | | | | **AI** | **AO/DO** | **DI/DO** | | |
| Point Number | Point Identifier | Point descriptor | Type | Eng Units | Auxilliary device or sensing signal | Supplied | Installed | Wired | Sensor or Output Device Signal | Active Sensor Range | Primary Point | CR CA MA | Analog Limits | | | | Set Point | Contact | Action | Heavy Motor | Applicable programs or notes |
| | | | | | | Division | | | | | | | L2 | L1 | H1 | H2 | | NO NC | CR OR | Delay | |
| 1 | SF | Supply Fan Start Stop | DI | on/off | Relay contact | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | NO | X | N | P1 |
| 2 | SF-S | Supply Fan Status | DI | on/off | Relay contact | 25 | 25 | 25 | Output Device | X | Y | CR/ MA | X | X | X | X | X | X | X | X | P2 |
| 3 | FPB FLOW | Fresh Air Flow | AI | l/s | AFS DP | 25 | 23 | 25 | Output Device | 0-3000 | Y | X | X | X | X | X | X | X | X | X | |
| 4 | FPBAD-P | Fresh Air Damper Position | AI | % | Damper actuator | 25 | 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 5 | FPBAD | Fresh Air Damper Control | AO | % | Damper Actuator | 25 | 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 6 | HCV | Heating Coil Valve Control | AO | % | Valve actuator | 25 | 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 7 | LAT | Leaving Air Temp | AI | °C | Averaging Sensor | 25 | ~~25~~ 23 | 25 | Sensor | -40 to 100 | Y | CA | X | X | 40 | 50 | X | X | X | X | |
| 8 | CCV | Cooling Coil Valve Control | AO | % | Valve actuator | 25 | 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 9 | OCC -OV | Occupancy over-ride | DI | on/off | Switch | 25 | 25 | 25 | Output Device | X | Y | X | X | X | X | X | X | X | X | X | |
| 10 | SMK AL | Smoke Alarm | Di | on/off | Relay contact | 26 | 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 11 | FAS AL | Alarm to FAS | DO | on/off | Relay contact | 26 | 23 | 25 | Output Device | X | Y | X | X | X | X | X | X | NC | X | X | |
| 12 | ZCO2 | Zone $CO_2$ level | DI | ppm | Zone $CO_2$ sensor | 25 | 25 | 25 | Sensor | 0-3000 | Y | X | X | X | 1200 | 1500 | X | X | X | X | |
| 13 | RM T | Space Temperature | AI | °C | Temperature Sensor | 25 | 25 | 25 | Sensor | -40 to 100 | Y | CA | X | X | 26 | 28 | 24 | X | X | X | |

Remarks: Provide equipment failure alarm, if status doesn't match command, on all equipment status points.

**CS 821** **Fan Powered VAV Dedicated Outdoor Air System**

**Control Diagram** Detail: 3 Drawing: M74-01

**System Description** The system consists of a fan powered VAV box with a sensible cooling coil on the recirculated air and a reheat coil.

**System Start** Primary air damper is normally open (NO). When primary air supply is detected on start-up of associated air handling system, terminal unit control starts, and associated fan starts.

**Normal Operation**

*Temperature Control*

Terminal unit operates as variable volume primary air, constant volume supply air.

The chilled water and heating water control valves modulate in response to space temperature to maintain the temperature setpoint at 22°C in the winter and 24°C in the summer.

On decreasing load, when the space temperature drops below the setpoint (24°C) and the chilled water control valve is fully closed, the primary air damper closes to minimum position, then the reheat coil control modulates to maintain space temperature (22°C).

On increasing load, when the space temperature rises above the setpoint (22°C) reheat coil reduces to 0% output, then the cooling coil control valve opens to satisfy load demand and maintain the space temperature setpoint (24°C)

Occupant can adjust space temperature setpoint ±1°C using adjustment control on space temperature sensor. However, setpoint adjustment to affect both summer and winter setpoints and maintain the deadband of minimum 2°C.

*Pressure Independent Control*

Airflow sensor adjusts position of airflow damper to maintain current airflow value, independent of upstream system static pressure fluctuations.

*Indoor Air Quality (IAQ) Control*

The primary air damper modulates in response to CO2 levels in the space. IAQ Control has priority over Temperature Control.

*Unoccupied Minimum Heating Control*

Space temperature sensor cycles terminal unit fan ON and modulates reheat coil to maintain minimum winter space temperature at 18°C.

*After-hours Operation*

Occupant can activate auxiliary switch on space thermostat to start terminal unit fan, and control heating coil valve to maintain occupied space temperature. Associated air handling system does not need to be on.

| | |
|---|---|
| **CS 821** | **Fan Powered VAV Dedicated Outdoor Air System** |
| **System Stop** | When associated air handling unit shuts-down, loss of primary air turns the terminal unit fan OFF.<br>**On units that have smoke detectors in their associated ductwork (refer to plans), when smoke is detected, turn off the fan, close the primary air damper and send an alarm to the EMCS.** |
| **Schedule** | Always Enabled |
| **Fire Alarm** | N/A |
| **Emergency Power** | No. |
| **Control Points** | Refer to Control Points List appended at the end of this section. |

End of Section

## Part 1 General

### 1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 – Common Work Results for Electrical.

### 1.2 REFERENCE STANDARDS

.1 CSA Group

.1 CAN/CSA C22.2 No. 18.3-12 (R2017), Conduit, Tubing and Cable Fittings (Tri-National Standard, with ANCE NMX-J-017 and UL 514B).

.2 CSA C22.2 No. 45.1-07 (R2017), Electrical Rigid Metal Conduit, Steel (Tri-National Standard with UL6 and NMX-J-534-ANCE-2007)

.3 CSA C22.2 No. 56-17, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.

.4 CSA C22.2 No. 83-M1985(R2017), Electrical Metallic Tubing.

.5 CSA C22.2 No. 211.2-06, Rigid PVC (Unplasticized) Conduit.

.6 CAN/CSA C22.2 No. 227.3-21, Mechanical Protection Tubing (MPT) and fittings, (Trinational standard with UL 1696 and NMX-J-855-ANCE).

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Section 26 05 00 Common Work Results for Electrical.

.2 Product data: submit manufacturer's printed product literature, specifications and datasheets.

.1 Submit cable manufacturing data.

.3 Quality assurance submittals:

.1 Test reports: submit certified test reports.

.2 Certificates: submit certificates signed by manufacturer certifying that materials comply with specified performance characteristics and physical properties.

.3 Instructions: submit manufacturer's installation instructions.

### 1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 26 05 00 Common Work Results for Electrical and with manufacturer's written instructions.

## Part 2 Products

### 2.1 CONDUITS

.1 Rigid metal conduit: to CSA C22.2 No. 45, galvanized steel threaded.

.2 Electrical metallic tubing (EMT): to CSA C22.2 No. 83, with couplings.

.3 Rigid PVC conduit: to CSA C22.2 No. 211.2.

.4 Flexible metal conduit: to CSA C22.2 No. 56, liquid-tight flexible metal.

**2.2 CONDUIT FASTENINGS**

.1 One-hole malleable iron straps to secure surface conduits 50 mm and smaller.

.1 Two-hole steel straps for conduits larger than 50 mm.

.2 Beam clamps to secure conduits to exposed steel work.

.3 Channel type supports for two or more conduits at 2 m on centre.

.4 Threaded rods, 6 mm diameter, to support suspended channels.

**2.3 CONDUIT FITTINGS**

.1 Fittings: to CAN/CSA C22.2 No. 18, manufactured for use with conduit specified. Coating: same as conduit.

.2 Ensure factory "ells" where 90 degrees bends for 25 mm and larger conduits.

.3 Watertight connectors and couplings for EMT.

.1 Set-screws are not acceptable.

**2.4 EXPANSION FITTINGS FOR RIGID CONDUIT**

.1 Weatherproof expansion fittings with internal bonding assembly suitable for 200 mm linear expansion.

.2 Watertight expansion fittings with integral bonding jumper suitable for linear expansion and 19 mm deflection.

.3 Weatherproof expansion fittings for linear expansion at entry to panel.

**2.5 FISH CORD**

.1 Polypropylene.

**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 INSTALLATION**

.1 Install conduits to conserve headroom in exposed locations and cause minimum interference in spaces through which they pass.

.2 Conceal conduits except in mechanical and electrical service rooms and in unfinished areas.

.3 Use rigid galvanized steel threaded conduit ~~except where specified otherwise~~ **on exterior of buildings, where exposed to mechanical damage, within all concrete construction where conduits turn up out of a concrete slab**.

.4 Use electrical metallic tubing (EMT) concealed in walls.

.5 Use electrical metallic tubing (EMT) above 2.4 m not subject to mechanical injury.

.6 Use rigid PVC conduit underground.

.7 Use liquid tight flexible metal conduit for connection to motors, transformers and vibrating equipment.

.8 Minimum conduit size for lighting and power circuits: 21 mm.

.9 Bend conduit cold:

.1 Replace conduit if kinked or flattened more than 1/10th of its original diameter.

.10 Mechanically bend steel conduit over 19 mm diameter.

.11 Field threads on rigid conduit must be of sufficient length to draw conduits up tight.

.12 Install fish cord in empty conduits.

.13 Remove and replace blocked conduit sections.

.1 Do not use liquids to clean out conduits.

.14 Dry conduits out before installing wire.

**3.3 SURFACE CONDUITS**

.1 Run parallel or perpendicular to building lines.

.2 Locate conduits behind infrared or gas fired heaters with 1.5 m clearance.

.3 Run conduits in flanged portion of structural steel.

.4 Group conduits wherever possible on suspended surface channels.

.5 Do not pass conduits through structural members except as indicated.

.6 Do not locate conduits less than 75 mm parallel to steam or hot water lines with minimum of 25 mm at crossovers.

**3.4 CONCEALED CONDUITS**

.1 Run parallel or perpendicular to building lines.

.2 Do not install horizontal runs in masonry walls.

.3 Do not install conduits in terrazzo or concrete toppings.

**3.5 CONDUITS IN CAST-IN-PLACE CONCRETE**

.1 Locate to suit reinforcing steel.

.1 Install in centre one third of slab.

.2 Protect conduits from damage where they stub out of concrete.

.3 Install sleeves where conduits pass through slab or wall.

.4 Provide oversized sleeve for conduits passing through waterproof membrane, before membrane is installed.

.1 Use cold mastic between sleeve and conduit.

.5 Conduits in slabs: minimum slab thickness 4 times conduit diameter.

.6 Encase conduits completely in concrete with minimum 25 mm concrete cover.

.7 Organize conduits in slab to minimize cross-overs.

**3.6 CONDUITS IN CAST-IN-PLACE SLABS ON GRADE**

.1 Run conduits 25 mm and larger below slab and encase in 75 mm concrete envelope.

.1 Provide 50 mm of sand over concrete envelope below floor slab.

**3.7 CONDUITS UNDERGROUND**

.1 Slope conduits to provide drainage.

.2 Waterproof joints with heavy coat of bituminous paint.

**3.8 CLEANING**

.1 Progress Cleaning, Final Cleaning and Waste Management as per Section 26 05 00 Common Work Results for Electrical.

**END OF SECTION**

## Part 1 General

### 1.1 RELATED REQUIREMENTS

.1 Section 26 05 00 - Common Work Results for Electrical.

.2 Section 26 08 02 – Field Testing and Commissioning – Low Voltage Installations.

### 1.2 REFERENCE STANDARDS

.1 American Petroleum Institute (API)

.1 API Std. 650 13th Edition, Welded Steel Tanks for Oil Storage 11th Edition.

.2 Canadian General Standards Board (CGSB)

.1 CAN/CGSB-3.6-2010, Regular Sulphur Diesel Fuel.

.3 Canadian Environmental Protection Act (CEPA)

.1 CCME PN 1326-2008, Environmental Code of Practice for Aboveground and Underground Storage Tank Systems for Petroleum Products and Allied Petroleum Products.

.4 CSA Group (CSA)

.1 CSA C22.1-21, Canadian Electrical Code, Part 1 (25th Edition), Safety Standard for Electrical Installation.

.2 CSA C282:19, Emergency Power Supply for Buildings

.3 CSA C22.2 No. 5-16, Moulded Case Circuit Breakers

.4 CSA-B139 Series:19, Installation Code for Oil Burning Equipment.

.5 International Organization for Standardization (ISO)

.1 ISO 3046-1-2002, Reciprocating Internal Combustion Engines - Performance - Part 1: Declarations of Power, Fuel and Lubricating Oil Consumptions, and Test Methods - Additional requirements for engines for general use.

.6 National Electrical Manufacturers Association (NEMA)

.1 NEMA MG 1-2016, Motors and Generators.

.7 Underwriters' Laboratories of Canada (ULC)

.1 CAN/ULC-S601-14, Standard for Shop Fabricated Steel Aboveground Horizontal Tanks for Flammable and Combustible Liquids.

.8 The generator set must conform to applicable NFPA requirements.

.9 The generator set must meet federal emission guidelines for stationary emergency power generation.

### 1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Submit submittals in accordance with Section 26 05 00 Common Work Results for Electrical.

.2 Product Data:

.1 Provide manufacturer's printed product literature, specifications and data sheets for power generators and include product characteristics, performance criteria, physical size, finish and limitations, warranty statement.

.3 Shop Drawings:

.1 Submit drawings include:

.1 Engine: make and model, with performance curves.

.2 Alternator: make and model.

.3 Voltage regulator: make, model and type.

.4 Battery: make, type and capacity.

.5 Battery charger: make, type and model.

.6 Alternator control panel: make and type of meters and controls.

.7 Governor type and model.

.8 Control specification sheets.

.9 Wiring schematic.

.10 Sound data.

.11 Emission certification.

.12 British standard or DIN rating of engine.

.13 Dimensioned drawing showing complete generating set mounted on steel base, including vibration isolators, exhaust system, drip trays, and total weight.

.14 Continuous full load output of set at 0.8 PF lagging.

.15 Description of set operation.

## 1.4 CLOSEOUT SUBMITTALS

.1 Provide operation and maintenance data for diesel generator for incorporation into manual specified in Section 26 05 00 Common Work Results for Electrical.

.2 Include in Operation and Maintenance Manual instructions for particular unit supplied and not general description of units manufactured by supplier and:

.1 Operation and maintenance instructions for engine, alternator, control panel, battery charger, battery, fuel system, engine room ventilation system, exhaust system and accessories, to permit effective operation, maintenance and repair.

.2 Technical data:

.1 Illustrated parts lists with parts catalogue numbers.

.2 Schematic diagram of electrical controls.

.3 Certified copy of factory test results.

.4 Maintenance and overhaul instructions and schedules.

.5 Precise details for adjustment and setting of time delay relays or sensing controls which require on site adjustment.

**1.5 DELIVERY, STORAGE AND HANDLING**

.1 Deliver, store and handle materials in accordance with Section 26 05 00 Common Work Results for Electrical and 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 Packaging Waste Management: remove in accordance with Section 26 05 00 Common Work Results for Electrical.

**1.6 MAINTENANCE MATERIAL SUBMITTALS**

.1 Provide maintenance materials in accordance with Section 26 05 00 Common Work Results for Electrical.

.2 Include:

.1 2 fuel filter replacement elements.

.2 2 lube oil filter replacement elements.

.3 2 air cleaner filter elements.

.4 2 sets of fuses for control panel.

.5 Special tools for unit servicing.

**Part 2 Products**

**2.1 SYSTEM DESCRIPTION**

.1 Provide a 500 kW integrated, standby power system to supply electrical power at 600 Volts, 60 Hertz, 3 Phase.

.2 Generating system consists of:

.1 Liquid cooled diesel engine.

.2 Synchronous AC alternator.

.3 System controls with all necessary accessories for a complete operating system.

.4 Battery charger and battery.

.5 Fuel supply system.

.6 Exhaust system.

.7 Steel mounting base.

.8 Sub-base fuel tank.

.3 System designed to operate as emergency standby in remote location.

.4 Environment requirements:

.1 Altitude above sea level: 49 m

.2 Ambient temperature: -30 degree C to +40 degree C

.3 Humidity: 15 % to 100 %

.5 The genset is to meet site noise requirements of 75 dBa, at 7 meters.

**2.2 DIESEL ENGINE**

.1 Diesel engine: to ISO 3046-1.

.2 Liquid cooled, diesel fueled, turbo charged and after cooled engine of 4-cicle design, with adequate horsepower to achieve output with at a synchronous speed 1800 rpm.

.3 The generator system to support generator start-up and load transfer within 10 seconds.

.4 The engine to support a 100% load step.

.5 Cooling System:

.1 Liquid cooled: heavy duty industrial radiator mounted on generating set base with engine driven pusher type fan to direct air through radiator from engine side, with ethylene glycol anti-freeze non-sludging above -46 degrees C.

.2 To maintain manufacturer's recommended engine temperature range at no load to 100% continuous load in ambient temperature of 40 degrees C.

.3 Engine coolant heater: thermostatically controlled coolant heater connected to maintain engine at a suitable temperature for reliable starting at the site conditions.

.4 Engine coolant and oil drain extensions, equipped with pipe plugs and shut-off valves to the outside of the mounting base for cleaner and engine servicing.

.6 Fuel System:

.1 Fuel: to CAN/CGSB-3.6, Type A, Arctic Grade 2.

.2 Factory installed primary fuel filter, water separator, manual fuel priming pump, and engine flexible fuel lines.

.3 The engines suction line fitted with a check valve to secure prime for the engine injection pump.

.7 Governor:

.1 Electronic load sharing type, electric actuator, temperature compensated with steady state speed maintenance capability of plus or minus 0.25%.

.8 Lubrication system:

.1 Mineral based oil.

.2 Pressure lubricated by engine driven pump.

.3 Lube oil filter: replaceable, full flow type, removable without disconnecting piping.

.4 Lube oil cooler.

.5 Engine sump drain valve.

.6 Oil level dip-stick.

.9 Starting system:

.1 Positive shift, gear engaging starter 24 Vdc.

.2 Cranking limiter to provide trois (3) cranking periods of 10s duration, each separated by 5 s rest.

.3 Industrial type lead acid, 24V storage battery with sufficient capacity to crank engine for 1 min at 0 degrees C without using more than 25% of ampere hour capacity.

.4 Battery charger: constant voltage, solid state, two stage from trickle charge at standby to boost charge after use.

.1 Regulation: plus or minus 1% output for plus or minus 10% input variation.

.2 Automatic boost for 6 hours every 30 days.

.3 Equipped with dc voltmeter, dc ammeter and on-off switch, and power failure alarm.

.4 Minimum charger capacity: 10 A.

.10 Exhaust system:

.1 Heavy duty horizontally mounted exhaust silencer with condensate drain, plug and flanged couplings.

.2 Heavy duty flexible exhaust pipe with flanged couplings to connect the exhaust manifold of the engine to the muffler.

.3 Thermally wrapped exhaust piping from the turbo-charger discharge to the silencer.

.4 Fittings and accessories as required.

.5 Expansion joints: stainless steel, corrugated, of suitable length, to absorb both vertical and horizontal expansion.

.6 Engine mounted, replaceable, dry element filters on engine intake air.

.11 Vibration isolated engine instrument panel with:

.1 Lube oil pressure gauge.

.2 Lube oil temperature gauge.

.3 Lube oil level gauge.

.4 Coolant temperature gauge.

.5 Coolant level gauge.

.6 Running time meter: non-tamper type.

.12 Guards to protect personnel from hot and moving parts.

.1 Locate guards so that normal daily maintenance inspections can be undertaken without their removal.

.13 Drip tray.

**2.3 ALTERNATOR**

.1 Alternator: to NEMA MG1

.2 Rating: 3 phase, 347/600 V, 4 wire, 500 kW, 60 Hz, at 0.8 PF.

.3 Output at 40 degrees C ambient:

.1 100% full load continuously.

.4 Revolving field, brushless, single bearing.

.5 Drip proof.

.6 Amortisseur windings.

.7 Synchronous type.

.8 Dynamically balanced rotor permanently aligned to engine by flexible disc coupling.

.9 Exciter: permanent magnet.

.10 NEMA class H insulation on windings capable of withstanding 150 degrees C temperature rise.

.11 Voltage regulator: thyristor controlled rectifiers with phase controlled sensing circuit:

.1 Stability: plus or minus 0.25%; % maximum voltage variation at any constant load from no load to full load.

.2 Regulation: 1.5 % maximum voltage deviation between no-load steady state and full-load steady state.

.12 Alternator: capable of sustaining 300% rated current for period not less than 10 s permitting selective tripping of down line protective devices when short circuit occurs.

.13 The alternator protection against overloads and short circuit conditions: by advanced control panel of a time current algorithm protective functions.

**2.4 CONTROL PANEL**

.1 Totally enclosed, environmentally sealed, microprocessor-based module for engine control, monitoring, protection, metering, enabling remote diagnostics and easy building management integration of all generator functions, including fuel control, engine protection, alternator protection, speed governing, voltage regulation and all related generator operations.

.2 Controls to include predictive maintenance algorithm that alarms when maintenance is required. The controller shall have the capability to call out to the local servicing dealer when maintenance is required.

.3 Diagnostic capabilities:

.1 Time-stamped event and alarm logs.

.2 Ability to capture operational parameters during events.

.3 Simultaneous monitoring of all input or output parameters.

.4 Callout capabilities.

.5 Support for multi-channel digital strip chart functionality and .2 msec data logging capabilities.

.4 Communication:

.1 Pre-wired I/O: 4 relay outputs, communications support via RS232 and RS485 with optional additional I/O.

.2 Software configurable I/O providing full access to all alarm, event, data logging, and shutdown functionality.

.3 Custom ladder logic functionality in controller to provide application support flexibility with access to all the controller inputs and customer assignable outputs.

.5 Alternator protection: electronically implemented in the generator control panel a time current algorithm that protects the alternator against all overloads and short circuits.

.6 The control panel to include the following:

.1 Engine start button.

.2 Selector switch: Off-Auto-Manual.

.3 Engine emergency stop button and provision for remote emergency stop button.

.4 Automatic shutdown and lockout for following:

.1 Engine overcrank

.2 Engine overspeed

.3 Engine high coolant temperature

.4 Engine low lubricating oil pressure

.5 Short circuit

.6 AC overvoltage

.5 Alarm annunciation with lamp indication, local horn, silence pushbutton, acknowledge and rest pushbuttons, lamp test function and common alarm contacts for remote annunciation for the following:

.1 Engine overcrank shutdown

.2 Engine overspeed shutdown

.3 Engine high coolant temperature shutdown

.4 Engine low lubricating oil pressure shutdown

.5 Low or no battery voltage, continuously monitored even when engine not running

.6 Engine Gauges:

.1 Lube oil pressure

.2 Lube oil temperature

.3 Tachometer, scale in r/min

.4 Coolant temperature

.5 Coolant level

.6 Elapsed time meter

.7 Digital metering unit, controlled by a microprocessor, with digital readout for generator voltages, amps, frequency, kilowatts, and power factor.

.8 Remote annunciator.

## 2.5 ENGINE ALTERNATOR PACKAGING

.1 The engine/alternator to be isolated from the generator frame with rubber isolators.

.2 A mainline, factory installed electronic LSI circuit breaker, 100% carrying of the rated ampacity of the genset. The line side connections are to be made at the factory. Output lugs to be provided for load side connections.

.3 Factory installed electronic LSI load bank circuit breaker, 100% carrying of the rated ampacity of the genset. The line side connections are to be made at the factory. Output lugs to be provided for load side connections. The breaker is to include auxiliary contacts and shunt trip functionality.

.4 Factory mounted auxiliary power load center to serve the generator set and enclosure with factory wired equipment including but not limited GFCI receptacles, emergency lighting battery unit with lighting heads, AC lamps, lighting switches, heaters, battery charger. All devices provided with dedicated breaker withing the load center.

**2.6 STEEL MOUNTING BASE**

.1 Complete generating set mounted on structural steel base of sufficient strength and rigidity to protect assembly from stress or strain during transportation, installation and under operating conditions on suitable level surface.

.2 The base to be complete with steel flooring under generator to avoid sound dissipation and debris collection.

.3 Assembly fitted with vibration isolators and control console resiliently mounted.

.1 Spring type isolators with adjustable side snubbers and adjustable for levelling.

.4 Sound insulation pads for installation between isolators and concrete base.

**2.7 SUB-BASE FUEL TANK**

.1 Fuel storage tanks: to API Standard 650, ULC labelled, to ULC-S601.

.2 Integral sub-base double wall, pressure tested fuel tank system of 24 hours capacity at ~~100~~ **80**% load**, but not exceeding 2500L** to be supplied by the diesel generator set supplier and complete with following:

.1 Rupture basin alarm contact and high fuel level alarm contact

.2 Low level alarm contact

.3 Float switch

.4 Fuel gauge, dial type

.5 Connections for engine supply, engine return, vent with vent whistle, bottom drain, fuel gauge, lockable fill cap.

.6 Normally closed 1” fuel solenoid shut off valve for positive control of fuel supply.

.3 Fuel storage tank installation and associated equipment and devices to comply with the requirements of CSA B139.1.0-15 and CSA B139.1.1-15, NFCC, NBC and the authorities having jurisdiction.

.4 For tanks specified for a design static pressure exceeding 35 kPa at the bottom of the tank, submit a copy of the shop drawings and a copy a report of the factory pressure test at the specified design pressure.

**2.8 ENCLOSURE**

.1 Complete generator set packaged with a sound attenuating weather protective enclosure.

.2 The enclosure completely lined with sound deadening self extinguishing design material with a reflective surface for enhanced serviceability.

.3 Enclosure material: steel with a minimum thickness of 16 gauge.

.4 The enclosure equipped with:

.1 Hinged, removable doors to allow access to the engine, alternator and control panel. The hinges shall allow for door fit adjustment.

.2 Stainless steel hinges and all exposed fasteners stainless steel or Sermagard coated.

.3 Door equipped with lockable hardware with identical keys.

.4 Upward discharging radiator hood.

.5 Silencer mounted on the discharge hood of the enclosure.

.6 Silencers mounted inside the main generator compartment are acceptable only if the silencer is thermally wrapped to minimize heat stress on the surrounding components.

.7 Weather hood, exhaust cap, motorized damper.

.8 Thermostatically controlled space heater designed to maintain the enclosure at 40 degrees F.

.5 The enclosure finish:

.1 Electrostatic applied powder paint, baked and finished to manufacturer's specifications.

.2 Colour: manufacturer’s standard.

**2.9 EQUIPMENT IDENTIFICATION**

.1 Provide equipment identification in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Control panel:

.1 Size 5 nameplates for controls including alternator breakers and program selector switch.

.2 Size 3 nameplates for meters, alarms, indicating lights and minor controls.

**2.10 FABRICATION**

.1 Shop assemble generating unit including:

.1 Base.

.2 Engine and radiator.

.3 Alternator.

.4 Alternator output circuit breaker.

.5 Control panel.

.6 Remote annunciator.

.7 Battery and charger.

.8 Auxiliary power load center

.9 Sub-base fuel tank.

.10 Enclosure.

## 2.11 PERMANENT LOAD BANK

.1 Provide a fan cooled resistive load bank for permanent, outdoor installation for routing load testing of standby diesel generating system. The load bank designed to operate from a remote control panel.

.2 The load bank to be completely self contained, free standing unit, incorporated all resistive elements, load contactors for each load group, individual load group circuit breakers, load bank protective devices, main load busbar, auxiliary terminals, fan cooling systems, malfunction detection system, unit controller, remote control facility and IP55 type control enclosure.

.3 Load Bank rating – 500 kW, 600 Volt, 3 phase, Delta, 60 Hz, 1.0 power factor, 50 kW load as a minimum, 15° to 120° F ambient temperature, continuous duty cycle, 120 Volt control.

.4 The load enclosure to be constructed of heavy gauge aluminized steel with stainless steel exterior fasteners. Permanent base to be equipped with built-in forklift channels.

.5 The resistive elements manufactured from corrosion resistant chromium alloy wire. Resistor design and rating shall ensure a life span of ten years under normal operating conditions.

.6 The resistive elements to be air cooled by integrally mounted blower motor.

.7 Cooling airflow through the resistor chamber to be vertical discharge, with cold air intake at the bottom and hot air exhaust at the top.

.8 Resistor groups to have brunch circuit fusing on all steps and over temperature protection. Differential pressure air switches on blowers to be electrically interlocked to remove load if the airflow is not sufficient to provide proper cooling.

.9 The load bank controls to be incorporated into the generator control switchboard and include:

.1 Power ON-OFF switch,

.2 Power ON light,

.3 Blower ON-OFF pushbuttons with a Blower Failure light,

.4 Over temperature light,

.5 Master Load ON-OFF switch,

.6 Six (6) load step toggle switches.

.10 The control panel to be the means to control the load bank in the generator test and exercise mode. Manual operation only be possible when the automatic transfer switch is in the normal position. When the manual operation is in progress and emergency standby is called for, the control panel automatically disable the manual mode operation, dump loads and initiate a fan run-on for a period of five minutes.

## 2.12 FINISHES

.1 Apply finishes in accordance with Section 26 05 00 Common Work Results for Electrical.

.2 Alternator control cubicle: to manufacturer’s standards.

.3 Exhaust and inlet air hoods: to manufacturer’s standards.

.4 Other ducts and racks grey.

.5 Supply 0.25 L of grey touch-up enamel.

**2.13 SOURCE QUALITY CONTROL**

.1 Factory test generator set for 4 hours under rated load for performance and proper functioning of engine, alternator, control panels, control and interfacing circuits, and accessories. Tests to include:

.1 Verification of voltage and frequency stability.

.2 Verification of the transient voltage and frequency dip response.

.3 Load test the generator for 4 hours at rated power factor.

.2 Provide factory test reports for Department Representative review and acceptance.

.3 Test procedure:

.1 Prepare blank forms and check sheet with spaces to record data and at top of first sheet record:

.1 Date.

.2 Generator set serial no.

.3 Engine, make, model, serial no.

.4 Alternator, make, model, serial no.

.5 Voltage regulator, make and model.

.6 Rating of generator set, kW, kVA, V, A, r/min, Hz.

.2 Mark check sheet and record data on forms in duplicate as test proceeds.

.3 Tests:

.4 With 100% rated load, operate set for 4 hours, and record following:

.1 Time of reading.

.2 Running time.

.3 Ambient temp in degrees C.

.4 Lube oil pressure in kPa.

.5 Lube oil temp in degrees C.

.6 Engine coolant temp in degrees C.

.7 Exhaust stack temp in degrees C.

.8 Alternator voltage: phase 1, 2, 3.

.9 Alternator current: phase 1, 2, 3.

.10 Power in kW.

.11 Frequency in Hz.

.12 Power Factor.

.13 Battery charger current in A.

.14 Battery voltage.

.15 Alternator cooling air outlet temp.

.5 Next install continuous strip chart recorders to record frequency and voltage variations during load switching procedures. Each load change delayed until steady state conditions exist. Switching increments to include:

.1 No load to full load to no load.

.2 No load to 70% load to no load.

.3 No load to 20% load to no load.

.4 20% load to 40% load to no load.

.5 40% load to 60% load to no load.

.6 60% load to 80% load to no load.

.4 Record:

.1 Automatic starting of set and automatic transfer of load on failure of normal power time.

.2 Automatic shut down of engine on resumption of normal power.

.3 That battery charger reverts to high rate charge after cranking.

.4 Low oil pressure and high engine temperature shutdown devices operation without subjecting engine to these excesses.

## Part 3 Execution

### 3.1 INSTALLATION

.1 Install the complete electrical generating system including all external fuel connections in accordance with requirements of all applicable codes, standards, and the manufacturer's recommendations.

.2 Complete wiring and interconnections as indicated.

.3 Start generating set and test to ensure correct performance of components.

### 3.2 FIELD QUALITY CONTROL AND STARTUP

.1 Perform tests in accordance with Section 26 05 00 - Common Work Results for Electrical.

.2 Notify Departmental Representative 10 working days in advance of test date.

.3 Provide fuel for testing and leave full tanks on acceptance.

.4 The supplier of the generator set and associated items is to provide factory trained personnel to validate the completed installation and to perform an initial Life Safety start-up inspection in compliance with CSA C282, and to include:

.1 Ensuring the engine starts (both hot and cold) within the specified time.

.2 Verification of engine parameters within specification.

.3 Verify no load frequency and voltage, adjusting if required.

.4 Test all automatic shutdowns of the engine-generator.

.5 Ensuring full load frequency and voltage are within specification by using building load.

.6 Perform operational test for 1 hour using building load, after which normal power to be restored to the building and satisfactory transfer of the load and shutdown of the generator to be demonstrated. All required by CSA C282 data to be observed and recorded.

.7 Following the operational test, generator set to be tested for a 4-hour full load test based on the maximum site design load specified by the engine generator set label.

.5 Demonstrate:

.1 Unit start, transfer to load, retransfer to normal power, unit shut down, on "Automatic" control.

.2 Unit start and shut down on "Manual" control

.3 Unit start and transfer on "Test" control.

.4 Unit start on "Engine start" control.

.5 Operation of manual bypass switch.

.6 Operation of automatic alarms and shut down devices.

.6 At end of test run, check battery voltage to demonstrate battery charger has returned battery to fully charged state.

**3.3 TRAINING**

.1 Training is to be supplied by the start-up technician for the end-user during commissioning. The training should cover basic generator operation and common generator issues that can be managed by the end-user.

.2 Training is to include manual operation of system.

**3.4 SERVICE**

.1 Permanent service facilities to be available in this trade area.

.2 The facilities to comprise a permanent force of factory trained service personnel on 24 hour call, experienced in servicing this type of equipment, providing warranty and routine maintenance service to afford the owner maximum protection.

.3 Service and maintenance contracts to be available.

**3.5 WARRANTY**

.1 A five (5) years manufacturer’s warranty against defective materials and factory workmanship for all standby electric generating system components.

.2 The defective parts replacement or repair to be free of charge for parts, labor and travel.

.3 The warranty period is to commence when the standby power system is first placed into service.

## 3.6 CLEANING

.1 Progress Cleaning, Final Cleaning and Waste Management as per Section 26 05 00 Common Work Results for Electrical.

## 3.7 MAINTENANCE - CLEARANCES

.1 Provide clearance around systems, equipment and components for observation of operation, inspection, servicing, maintenance and as recommended by manufacturer and accordance with NBC and CSA-B139.

**END OF SECTION**

# ENERGY RECOVERY VENTILATOR SCHEDULE

| UNIT CODE | SERVICE | DESCRIPTION | DUTY | FANS | | | | WINTER ROOM AIR | SUMMER ROOM AIR | | COOLING | | | | | | HEATING | | | | | WINTER DESIGN | | | | SUMMER DESIGN | | | | ELECTRICAL | | | | | | | | | WEIGHT | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | SUPPLY FAN | | EXHAUST FAN | | | | | SENSIBLE | LATENT | FLOW RATE | EWT | LWT | P.D. | CAPACITY | FLOW RATE | EWT | LWT | P.D. | FRESH AIR | | EXHAUST AIR | ENERGY RECOVERY FACTOR | FRESH AIR | | EXHAUST AIR | ENERGY RECOVERY FACTOR | SUPPLY FAN | | | EXHAUST FAN | | | Total | | | | |
| | | | | FLOW | E.S.P. | FLOW | E.S.P. | DB | DB | WB | | | | | | | | | | | | O/A DB/WB | S/A DB/WB | R/A DB/WB | | O/A DB/WB | S/A DB/WB | R/A DB/WB | | HP | BHP | V/PH/HZ | HP | BHP | V/PH/HZ | FLA | MCA | MOP | | |
| | | | | L/s | Pa | L/s | Pa | °C | °C | °C | kW | kW | L/s | °C | °C | kPa | kW | L/s | °C | °C | kPa | °C | °C | °C | % | °C | °C | °C | % | | | | | | | | | | KG | |
| MUA-1 | EAST WING | PACKAGED INVERSE FLOW HEAT RECOVERY UNIT WITH HEAT / COOL UNIT WITH HEAT RECOVERY - VERTICAL SUPPLY / RETURN | TEMPERED OUTSIDE AIR AND VENTILATION | 5,191 | 872 | 5,191 | 673 | 22.2 | 23.9 | 17.0 | 93.5 | 79.1 | 7.40 | 7.22 | 12.78 | 41.49 | 88.1 | 1.82 | 54.44 | 43.33 | 25.71 | -22.2/-22.2 | 18.0/10.3 | 22.2/13.9 | 89.3 | 26.7/20.6 | 24.6/19.9 | 23.9/16.9 | 75.7 | 20 | 14.44 | 575/3/60 | 10 | 8.77 | 575/3/60 | 33 | 38 | 60 | 5200 | 1, 2, 3 |
| MUA-2 | WEST WING | PACKAGED INVERSE FLOW HEAT RECOVERY UNIT WITH HEAT / COOL UNIT WITH HEAT RECOVERY - VERTICAL SUPPLY / RETURN | TEMPERED OUTSIDE AIR AND VENTILATION | 5,191 | 872 | 5,191 | 673 | 22.2 | 23.9 | 17.0 | 93.5 | 79.1 | 7.40 | 7.22 | 12.78 | 41.49 | 88.1 | 1.82 | 54.44 | 43.33 | 25.71 | -22.2/-22.2 | 18.0/10.3 | 22.2/13.9 | 89.3 | 26.7/20.6 | 24.6/19.9 | 23.9/16.9 | 75.7 | 20 | 14.44 | 575/3/60 | 10 | 8.77 | 575/3/60 | 33 | 38 | 60 | 5200 | 1, 2, 3 |
| MUA-3 | ATRIUM | PACKAGED INVERSE FLOW HEAT RECOVERY UNIT WITH HEAT / COOL UNIT WITH HEAT RECOVERY - VERTICAL SUPPLY / RETURN | TEMPERED OUTSIDE AIR AND VENTILATION | 3,304 | 623 | 3,304 | 498 | 22.2 | 23.9 | 17.0 | 59.5 | 50.1 | 4.70 | 7.22 | 12.777 | 33.92 | 58.3 | 1.27 | 54.44 | 43.3 | 26.5 | -22.2/-22.2 | 17.8/10.2 | 22.2/13.9 | 90.0 | 26.7/20.6 | 24.6/19.9 | 23.9/16.9 | 77 | 10 | 7.59 | 575/3/60 | 7.5 | 4.72 | 575/3/60 | 17.8 | 21 | 30 | 3700 | 1, 2, 3 |

NOTES:
1. MERV 13 SUPPLY FILTER
2. REFER TO ENERGY RECOVERY VENTILATOR SCHEDULE 2 FOR CONTINUATION
3. C/W FACTORY INSTALLED SMOKE DETECTORS IN SUPPLY AND RETURN AIR PLENUMS

# ENERGY RECOVERY VENTILATOR SCHEDULE 2

| UNIT CODE | SERVICE | SOUND (dBA) SUPPLY FAN INLET Hz 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | SUPPLY FAN OUTLET Hz 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | EXHAUST FAN INLET Hz 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | EXHAUST FAN OUTLET Hz 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MAU-1 | EAST WING | 52 | 64 | 81 | 79 | 81 | 80 | 79 | 74 | 63 | 66 | 83 | 87 | 89 | 84 | 80 | 76 | 51 | 64 | 80 | 78 | 77 | 76 | 76 | 70 | 64 | 69 | 83 | 85 | 86 | 81 | 78 | 72 | 1 |
| MAU-2 | WEST WING | 52 | 64 | 81 | 79 | 81 | 80 | 79 | 74 | 63 | 66 | 83 | 87 | 89 | 84 | 80 | 76 | 51 | 64 | 80 | 78 | 77 | 76 | 76 | 70 | 64 | 69 | 83 | 85 | 86 | 81 | 78 | 72 | 1 |
| MAU-3 | ATRIUM | 53 | 63 | 81 | 82 | 80 | 80 | 76 | 71 | 64 | 67 | 84 | 86 | 89 | 87 | 82 | 77 | 50 | 61 | 79 | 78 | 78 | 78 | 73 | 66 | 61 | 67 | 81 | 84 | 87 | 84 | 81 | 72 | 1 |

NOTES:
1. SOUND DATA DOES NOT INCLUDE THE EFFECT OF DUCT END CORRECTION

# HYDRONIC HOT WATER UNIT HEATER SCHEDULE

| TAG | SERVICE | kW | WATER DATA L/s | PRESSURE DROP (kPa) | EWT (°C) | WATER TEMP DROP (°C) | AIR DATA MAXIMUM MOUNTING HT (m) | HEAT THROW OR SPREAD @ MAX. HT (m) | L/s | OUTLET VELOCITY (m/s) | EAT (°C) | LAT (°C) | MOTOR DATA HP | RPM | V-Ph-Hz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UH-1 TO 15 | PARKING | 11.3 | 0.24 | 4.5 | 53 | 6.7 | 2.44 | 8.53 | 311 | 2.08 | 10 | 45 | 1/25 | 1550 | 115-1-60 |
| UH-16 AND UH-17 | MECHANICAL ROOM | 11.3 | 0.24 | 4.5 | 53 | 6.7 | 2.44 | 8.53 | 311 | 2.08 | 10 | 45 | 1/25 | 1550 | 115-1-60 |
| UH-18 AND UH-19 | LOADING DOCK | 11.3 | 0.24 | 4.5 | 53 | 6.7 | 2.44 | 8.53 | 311 | 2.08 | 10 | 45 | 1/25 | 1550 | 115-1-60 |
| UH-20 TO UH-23 | PENTHOUSE | 12.4 | 0.32 | 7.0 | 60 | 6.7 | 2.44 | 8.53 | 311 | 2.08 | 10 | 45 | 1/25 | 1550 | 115-1-60 |

NOTES:
1. MAX. UNIT HEIGHT 470mm.
2. HORIZONTAL DISCHARGE.

# HEAT RECOVERY CHILLER SCHEDULE

| UNIT | DUTY | COOLING CAPACITY (kW/TONS) | EER | LOAD (kW) | AMPS | SOURCE EWT (°C) | LWT (°C) | FLOW (L/s) | P.D. (kPa) | SYSTEM EWT (°C) | LWT (°C) | FLOW (L/s) | P.D. (kPa) | HEATING CAPACITY (kW) | COP | LOAD (kW) | AMPS | SOURCE EWT (°C) | LWT (°C) | FLOW (L/s) | P.D. (kPa) | SYSTEM EWT (°C) | LWT (°C) | FLOW (L/s) | P.D. (kPa) | SIMULTANEOUS CLG CAPACITY (k/WTONS) | HTG CAPCITY (kW) | TER | LOAD (kW) | AMPS | COOLING EWT (°C) | LWT (°C) | FLOW (L/s) | P.D. (kPa) | HEATING EWT (°C) | LWT (°C) | FLOW (L/s) | P.D. (kPa) | MCA | MOP | SCCR (kA) | V/PH/HZ | WEIGHT (KG) | SOUND (dBA) Hz 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HRCH-1 | HEATING AND COOLING | 427.6/121.6 | 13.90 | 105.0 | 121 | 30.0 | 35.6 | 24.6 | 49.9 | 12.8 | 7.2 | 20.2 | 39.4 | 353.6 | 2.57 | 137.8 | 154 | 1.1 | -4.4 | 10.6 | 11.9 | 42.2 | 53.3 | 8.2 | 5.6 | 329.9/93.8 | 490.3 | 18.80 | 149.0 | 171 | 11.8 | 7.2 | 20.2 | 46.3 | 36.5 | 53.3 | 8.2 | 5.6 | 212 | 261 | 10 | 575/3/60 | 2552.2 | 48.2 | 72.27 | 78.77 | 84.06 | 81.29 | 76.04 | 58.85 |
| HRCH-2 | HEATING AND COOLING | 427.6/121.6 | 13.90 | 105.0 | 121 | 30.0 | 35.6 | 24.6 | 49.9 | 12.8 | 7.2 | 20.2 | 39.4 | 353.6 | 2.57 | 137.8 | 154 | 1.1 | -4.4 | 10.6 | 11.9 | 42.2 | 53.3 | 8.2 | 5.6 | 329.9/93.8 | 490.3 | 18.80 | 149.0 | 171 | 11.8 | 7.2 | 20.2 | 46.3 | 36.5 | 53.3 | 8.2 | 5.6 | 212 | 261 | 10 | 575/3/60 | 2552.2 | 48.2 | 72.27 | 78.77 | 84.06 | 81.29 | 76.04 | 58.85 |

NOTES:
1. C/W FACTORY MOUNTED DISCONNECT SWITCH.
2. C/W MULTI-CHILLER CONTROLLER, EXPANISION BOARDS, TEMPERATURES SENSORS AND ALL REQUIRED ACCESSORIES FOR COMPLETE INSTALLATION.

# DESTRATIFICATION FAN SCHEDULE

| TAG | DIAMETER (m) | WEIGHT (KG) | RPM | PRESSURE (kPa) | HP | FLA | V/PH/HZ |
|---|---|---|---|---|---|---|---|
| DF-1 | 6.1 | 118 | 64 | 80 | 2 | 8.8 | 208/3/60 |
| DF-2 | 6.1 | 118 | 64 | 80 | 2 | 8.8 | 208/3/60 |

# FAN POWERED BOX SCHEDULE

| TAG | LOCATION | SERVICE | INLET SIZE (mm) | FAN FLOW (L/s) | PRIMARY AIR FLOW (L/s) | MIN. PRIMARY AIR (OA) FLOW (L/s) | SUPPLY SIZE (mm x mm) | RETURN INLET SIZE (mm x mm) | COOLING COIL ROWs | CAPACITY (kW) | FLOW (L/s) | EWT (°C) | LWT (°C) | WPD (kPa) | EAT (°C) | LAT (°C) | HEATING COIL ROWs | HEATING CAP (kW) | FLOW (L/s) | EWT (°C) | LWT (°C) | WPD (kPa) | EAT (°C) | LAT (°C) | FAN MOTOR (HP) | FLA | V-Ph-Hz | DOWNSTREAM E.S.P (Pa) | MIN.PD (Pa) | DISCHARGE NC | RADIATED NC |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FPB-01 | MAIN FLOOR | CORRIDOR 1-26 | 100 | 212 | 47 | N/A | 314X175 | 914X222 | 2 | 2.05 | 0.25 | 14.5 | 16.3 | 30 | 24 | 16.0 | 1 | 2.93 | 0.32 | 53.3 | 53.2 | 29.9 | 22 | 33.5 | - | 7.5 | 120-1-60 | 175 | 50 | 26 | 34 |
| FPB-02 | MAIN FLOOR | CORRIDOR 1-26 | 100 | 330 | 47 | N/A | 314X175 | 914X222 | 2 | 2.05 | 0.25 | 14.5 | 16.3 | 30 | 24 | 18.9 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 7.5 | 120-1-60 | 175 | 50 | 26 | 34 |
| FPB-03 | MAIN FLOOR | CORRIDOR 1-87 | 100 | 236 | 47 | N/A | 314X175 | 914X222 | 2 | 1.17 | 0.06 | 14.5 | 18.9 | 15 | 24 | 19.9 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 7.5 | 120-1-60 | 175 | 15 | 26 | 26 |
| FPB-04 | MAIN FLOOR | CORRIDOR 1-81 | 150 | 283 | 94 | N/A | 314X175 | 914X222 | 2 | 1.17 | 0.06 | 14.5 | 18.9 | 15 | 24 | 20.6 | 1 | 1.71 | 0.13 | 53.3 | 53.0 | 10.0 | 22 | 27.0 | - | 7.5 | 120-1-60 | 175 | 50 | 26 | 26 |
| FPB-05 | MAIN FLOOR | VARIOUS SPACES, REFER TO PLAN | 150 | 378 | 94 | N/A | 314X175 | 914X222 | 2 | 1.17 | 0.05 | 14.5 | 19.7 | 15 | 24 | 21.4 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 7.5 | 120-1-60 | 175 | 50 | 26 | 34 |
| FPB-07 | MAIN FLOOR | KITCHENETTE/LOUNGE 1-06 | 200 | 378 | 94 | 17 | 406X381 | 914X381 | 4 | 3.81 | 0.63 | 14.5 | 15.9 | 29.9 | 24 | 15.6 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 6.5 | 120-1-60 | 175 | 2 | 21 | 34 |
| FPB-08 | MAIN FLOOR | ATRIUM 1-96 | 200 | 850 | 425 | 66 | 610X381 | 914X381 | 4 | 6.7 | 0.57 | 14.5 | 17.1 | 29.9 | 24 | 17.5 | 1 | 6.11 | 0.63 | 53.3 | 53.2 | 29.9 | 22 | 28.0 | - | 9.5 | 120-1-60 | 175 | 30 | 29 | 43 |
| FPB-09 | MAIN FLOOR | ATRIUM 1-96 | 200 | 850 | 330 | 66 | 610X381 | 914X381 | 4 | 6.7 | 0.57 | 14.5 | 17.1 | 29.9 | 24 | 17.5 | 1 | 6.11 | 0.63 | 53.3 | 53.2 | 29.9 | 22 | 28.0 | - | 9.5 | 120-1-60 | 175 | 30 | 29 | 43 |
| FPB-10 | MAIN FLOOR | ATRIUM 1-96 | 200 | 850 | 330 | 66 | 610X381 | 914X381 | 4 | 6.7 | 0.57 | 14.5 | 17.1 | 29.9 | 24 | 17.5 | 1 | 6.11 | 0.63 | 53.3 | 53.2 | 29.9 | 22 | 28.0 | - | 9.5 | 120-1-60 | 175 | 30 | 29 | 43 |
| FPB-11 | MAIN FLOOR | KITCHENETTE/LOUNGE 1-88 | 200 | 614 | 142 | 12 | 610X381 | 914X381 | 4 | 4.98 | 0.38 | 14.5 | 17.4 | 17.9 | 24 | 17.3 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 6.5 | 120-1-60 | 138 | 22 | 33 | 44 |
| FPB-12 | MAIN FLOOR | KITCHENETTE/LOUNGE 1-20 | 200 | 566 | 118 | 11 | 314X175 | 914X222 | 6 | 5.57 | 0.38 | 14.5 | 17.8 | 25 | 24 | 15.8 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 6.5 | 120-1-60 | 175 | 5 | 28 | 41 |
| FPB-13 | PARKING LEVEL | BGIS STORAGE B-21 | 200 | 519 | 330 | N/A | 406X381 | 914X381 | 2 | 2.9 | 0.25 | 14.5 | 17.1 | 25 | 24 | 19.4 | 1 | 2.06 | 0.03 | 53.3 | 53.1 | 0.3 | 22 | 25.3 | - | 6.5 | 120-1-60 | 175 | 5 | 28 | 38 |
| FPB-14 | SECOND FLOOR | CORRIDOR 2-53, LOCKERS 2-48 | 200 | 378 | 142 | 48 | 314X175 | 914X222 | 2 | 1.76 | 0.05 | 14.5 | 22.4 | 4.5 | 24 | 20.1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 7.5 | 120-1-60 | 175 | 50 | 26 | 34 |
| FPB-15 | SECOND FLOOR | KITCHENETTE/LOUNGE 2-07 | 200 | 566 | 118 | 28 | 314X175 | 914X222 | 6 | 5.57 | 0.5 | 14.5 | 17.0 | 29.9 | 24 | 15.8 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 6.5 | 120-1-60 | 175 | 5 | 28 | 41 |
| FPB-16 | SECOND FLOOR | CORRIDOR 2-53 | 150 | 188 | 71 | N/A | 314X175 | 914X222 | 4 | 1.76 | 0.13 | 14.5 | 17.5 | 3 | 24 | 16.2 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 7.5 | 120-1-60 | 175 | 25 | 28 | 26 |
| FPB-17 | SECOND FLOOR | KITCHENETTE/LOUNGE 2-70 | 150 | 378 | 94 | 8 | 314X175 | 914X222 | 4 | 3.81 | 0.63 | 14.5 | 15.9 | 29.9 | 24 | 15.6 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 6.5 | 120-1-60 | 175 | 2 | 23 | 35 |
| FPB-18 | THIRD FLOOR | CORRIDOR 3-63 | 200 | 188 | 142 | N/A | 314X175 | 914X222 | 4 | 1.76 | 0.13 | 14.5 | 17.5 | 3 | 24 | 16.2 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 7.5 | 120-1-60 | 175 | 25 | 26 | 26 |
| FPB-19 | THIRD FLOOR | KITCHENETTE/LOUNGE 3-77 | 150 | 378 | 94 | 9 | 314X175 | 914X222 | 6 | 3.81 | 0.25 | 14.5 | 17.9 | 11.9 | 24 | 15.6 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 6.5 | 120-1-60 | 175 | 2 | 23 | 35 |
| FPB-20 | THIRD FLOOR | CORRIDOR 3-43, LOCKERS 3-22 | 200 | 330 | 142 | N/A | 314X175 | 914X222 | 2 | 1.76 | 0.13 | 14.5 | 17.5 | 4.5 | 24 | 19.6 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 7.5 | 120-1-60 | 175 | 50 | 26 | 34 |
| FPB-21 | THIRD FLOOR | KITCHENETTE/LOUNGE 3-07 | 200 | 566 | 118 | 28 | 314X175 | 914X222 | 6 | 5.57 | 0.5 | 14.5 | 17.0 | 29.9 | 24 | 15.8 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 6.5 | 120-1-60 | 175 | 5 | 41 | 41 |
| FPB-22 | FOURTH FLOOR | CORRIDOR 4-34 | 200 | 378 | 142 | N/A | 314X175 | 914X222 | 4 | 3.2 | 0.25 | 14.5 | 17.4 | 11.9 | 24 | 17.0 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 7.5 | 120-1-60 | 175 | 50 | 26 | 34 |
| FPB-23 | FOURTH FLOOR | KITCHENETTE/LOUNGE 4-07 | 200 | 566 | 118 | 28 | 314X175 | 914X222 | 6 | 5.57 | 0.38 | 14.5 | 17.8 | 25 | 24 | 15.8 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 6.5 | 120-1-60 | 175 | 5 | 28 | 41 |
| FPB-24 | FIFTH FLOOR | CORRIDOR 5-22 | 200 | 566 | 142 | N/A | 314X175 | 914X222 | 4 | 1.76 | 0.06 | 14.5 | 21.1 | 0.8 | 24 | 21.4 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 7.5 | 120-1-60 | 175 | 50 | 26 | 34 |
| FPB-25 | FIFTH FLOOR | KITCHENETTE/LOUNGE 5-09 | 200 | 566 | 118 | 28 | 314X175 | 914X222 | 6 | 5.57 | 0.38 | 14.5 | 17.8 | 25 | 24 | 15.8 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | - | 6.5 | 120-1-60 | 175 | 5 | 28 | 41 |

NOTES:
1. COOLING CAPACITY IS ONLY THE SENSIBLE COOLING LOAD.
2. SELECT FPB HANDING TO MATCH INSTALLATION LOCATION AND TO ENSURE SUFFICIENT CLEARANCE FOR MAINTENANCE AND COIL REMOVAL.
3. ALL FPB TO BE C/W MERV 8 FILTERS.
2. ALL FPB TO BE C/W RETURN AIR ATTENUATOR AND 900mm DISCHARGE ATTENUATOR.
3. PROVIDE MINIMUM OF THREE DUCT DIAMETERS OF STRAIGHT DUCT BEFORE INLET OF FPB.

# GRILLES, REGISTERS & DIFFUSERS

| TAG | SERVICE | TYPE & MATERIAL | FACE SIZE (mm) | NECK SIZE (mm) | VOLUME DAMPER | NOTES |
|---|---|---|---|---|---|---|
| A | SUPPLY | SQUARE PLAQUE DIFFUSER STEEL CONSTRUCTION | 500x500 | (REFER TO DRAWING) | YES | 1 |
| B | SUPPLY | LOUVERED STEEL SUPPLY DOUBLE DEFLECTION 20mm BLADE SPACING GRILLE | (REFER TO DRAWING) | N/A | YES | 1 |
| C | RETURN EXHAUST | EGG CRATE ALUMNUM CONSTRUCTION | (REFER TO DRAWING) | N/A | EXH ONLY | 1 |
| D | SUPPLY | MOTORIZED SQUARE PLAQUE VAV DIFFUSER STEEL CONTRSUCTION | 500x500 | (REFER TO DRAWING) | NO | 1, 3 |
| G | SUPPLY | 2-SLOT LINEAR DIFFUSER, 40mm WIDTH,1500mm LENGTH | (REFER TO DRAWING) | 250ø | YES | 2 |
| H | SUPPLY | 2-SLOT LINEAR DIFFUSER, 40mm WIDTH,1200mm LENGTH | (REFER TO DRAWING) | 200ø | YES | 2 |

NOTES:
1. FINISH TO BE OFF-WHITE FOR CEILING APPLICATIONS AND PRIME PAINTED FOR EXPOSED APPLICATIONS. REFER TO ARCHITECTURAL DRAWINGS.
2. ALUMINUM FINISH
3. C/W CONTROLLER AND BACnet INTERFACE.

# DCV BOX SCHEDULE

| TAG | AIRFLOW RANGE (L/s) MIN. | MAX. | INLET SIZE (mm) | INLET STATIC PRESSURE (Pa) | MAX PRESSURE DROP (Pa) | ΔP ACROSS UNIT (125 Pa) DISCHARGE NC C/W 900 mm ATTENUATOR | RADIATED NC BASIC UNIT |
|---|---|---|---|---|---|---|---|
| DCV-4 | 21 | 71 | 100 | 250 | 125 | 29 | - |
| DCV-5 | 28 | 142 | 125 | 250 | 125 | 25 | 20 |
| DCV-6 | 30 | 189 | 150 | 250 | 125 | 26 | 20 |
| DCV-7 | 44 | 283 | 175 | 250 | 125 | 26 | - |
| DCV-8 | 59 | 378 | 200 | 250 | 125 | 25 | 20 |
| DCV-9 | 75 | 472 | 225 | 250 | 125 | 21 | - |
| DCV-10 | 99 | 661 | 250 | 250 | 125 | 22 | 20 |
| DCV-12 | 141 | 850 | 300 | 250 | 125 | 25 | 28 |

NOTES:
1. ALL MINIMUM FLOWS ARE BASED ON THE MINIMUM AIR VOLUME REQUIRED TO MAINTAIN REASONABLE CONTROL ACCURACY. ALL CONTROLLERS PROVIDED WITH DCV UNITS SHALL PROVDIE CONTROL TO THE MINIMUM FLOWS INDICATED.
2. ALL UNITS COMPLETE WITH DIGITAL PRESUSSRE INDEPENDENT CONTROLLER.
3. ALL UNITS C/W MIN 900mm ATTENUATORS AND TO INCLUDE MIN. 25mm ACOUSTICAL LINING.

# FAN COIL UNIT SCHEDULE

| TAG | LOCATION | SERVICE | SYSTEM TYPE | COIL ROWs COOLING/ HEATING | MIN. PRIMARY AIR (OA)FOR THE DCV SERVING THE ZONE (L/s) | AIR FLOW (L/s) | E.S.P (Pa) | COOLING COIL T. CAP (kW) | SEN. CAP (kW) | EAT DB (°C) | EAT WB (°C) | LAT DB (°C) | LAT WB (°C) | WATER FLOW (L/s) | EWT (°C) | LWT (°C) | WATER (P.D) KPa | HEATING COIL T. CAP (kW) | EAT DB (°C) | LAT DB (°C) | WATER FLOW (L/s) | EWT (°C) | LWT (°C) | WATER (P.D) KPa | FAN MOTOR FLA | MCA (A) | MFS | SCCR | V-Ph-Hz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FCU-01 | PARKING | ELECTRICAL ROOM B-28 | 2-PIPE COOLING | 6/- | N/A | 281 | 99.5 | 2.75 | 2.75 | 26.7 | 19.4 | 18.4 | 16.7 | 0.12 | 14.4 | 20 | 2.69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.5 | N/A | N/A | 2KA | 115/1/60 |
| FCU-02 | MAIN FLOOR | DATA ROOM 1-01 | 2-PIPE COOLING | 6/- | N/A | 281 | 99.5 | 2.75 | 2.75 | 26.7 | 19.4 | 18.4 | 16.7 | 0.12 | 14.4 | 20 | 2.69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.5 | N/A | N/A | 2KA | 115/1/60 |
| FCU-03 | MAIN FLOOR | ELECTRICAL ROOM 1-02 | 2-PIPE COOLING | 6/- | N/A | 281 | 99.5 | 2.75 | 2.75 | 26.7 | 19.4 | 18.4 | 16.7 | 0.12 | 14.4 | 20 | 2.69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.5 | N/A | N/A | 2KA | 115/1/60 |
| FCU-04 | MAIN FLOOR | SECURITY SERVER RM 1-04 | 2-PIPE COOLING | 6/- | N/A | 514 | 154.3 | 3.66 | 3.66 | 23.9 | 15.6 | 18.1 | 13.3 | 0.16 | 14.4 | 20 | 2.69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 12 | 13.5 | 15 | 2KA | 115/1/60 |
| FCU-05 | PARKING | ELEC. CLOSET B-27 | 2-PIPE COOLING | 6/- | N/A | 281 | 99.5 | 2.75 | 2.75 | 26.7 | 19.4 | 18.4 | 16.7 | 0.12 | 14.4 | 20 | 2.69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.5 | N/A | N/A | 2KA | 115/1/60 |
| FCU-06 | MAIN FLOOR | DATA ROOM 1-78 | 2-PIPE COOLING | 6/- | N/A | 281 | 99.5 | 2.75 | 2.75 | 26.7 | 19.4 | 18.4 | 16.7 | 0.12 | 14.4 | 20 | 2.69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.5 | N/A | N/A | 2KA | 115/1/60 |
| FCU-07 | MAIN FLOOR | ELECTRICAL ROOM 1-79 | 2-PIPE COOLING | 6/- | N/A | 233 | 99.5 | 2.06 | 2.06 | 26.7 | 19.4 | 19.2 | 16.9 | 0.09 | 14.4 | 20 | 1.49 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.1 | N/A | N/A | 2KA | 115/1/60 |
| FCU-08 | SECOND FLOOR | DATA ROOM 2-04 | 2-PIPE COOLING | 6/- | N/A | 281 | 99.5 | 2.75 | 2.75 | 26.7 | 19.4 | 18.4 | 16.7 | 0.12 | 14.4 | 20 | 2.69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.5 | N/A | N/A | 2KA | 115/1/60 |
| FCU-09 | SECOND FLOOR | ELECTRICAL ROOM 2-06 | 2-PIPE COOLING | 6/- | N/A | 233 | 99.5 | 2.06 | 2.06 | 26.7 | 19.4 | 19.2 | 16.9 | 0.09 | 14.4 | 20 | 1.49 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.1 | N/A | N/A | 2KA | 115/1/60 |
| FCU-10 | SECOND FLOOR | DATA ROOM 2-67 | 2-PIPE COOLING | 6/- | N/A | 281 | 99.5 | 2.75 | 2.75 | 26.7 | 19.4 | 18.4 | 16.7 | 0.12 | 14.4 | 20 | 2.69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.5 | N/A | N/A | 2KA | 115/1/60 |
| FCU-11 | SECOND FLOOR | ELECTRICAL ROOM 2-68 | 2-PIPE COOLING | 6/- | N/A | 281 | 99.5 | 2.75 | 2.75 | 26.7 | 19.4 | 18.4 | 16.7 | 0.12 | 14.4 | 20 | 2.69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.5 | N/A | N/A | 2KA | 115/1/60 |
| FCU-12 | THIRD FLOOR | DATA ROOM 3-04 | 2-PIPE COOLING | 6/- | N/A | 281 | 99.5 | 2.75 | 2.75 | 26.7 | 19.4 | 18.4 | 16.7 | 0.12 | 14.4 | 20 | 2.69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.5 | N/A | N/A | 2KA | 115/1/60 |
| FCU-13 | THIRD FLOOR | ELECTRICAL ROOM 3-06 | 2-PIPE COOLING | 6/- | N/A | 233 | 99.5 | 2.06 | 2.06 | 26.7 | 19.4 | 19.2 | 16.9 | 0.09 | 14.4 | 20 | 1.49 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.1 | N/A | N/A | 2KA | 115/1/60 |
| FCU-14 | THIRD FLOOR | ELECTRICAL ROOM 3-61 | 2-PIPE COOLING | 6/- | N/A | 233 | 99.5 | 2.06 | 2.06 | 26.7 | 19.4 | 19.2 | 16.9 | 0.09 | 14.4 | 20 | 1.49 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.1 | N/A | N/A | 2KA | 115/1/60 |
| FCU-15 | THIRD FLOOR | DATA ROOM 3-62 | 2-PIPE COOLING | 6/- | N/A | 281 | 99.5 | 2.75 | 2.75 | 26.7 | 19.4 | 18.4 | 16.7 | 0.12 | 14.4 | 20 | 2.69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.5 | N/A | N/A | 2KA | 115/1/60 |
| FCU-16 | FOURTH FLOOR | DATA ROOM 4-04 | 2-PIPE COOLING | 6/- | N/A | 281 | 99.5 | 2.75 | 2.75 | 26.7 | 19.4 | 18.4 | 16.7 | 0.12 | 14.4 | 20 | 2.69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.5 | N/A | N/A | 2KA | 115/1/60 |
| FCU-17 | FOURTH FLOOR | ELECTRICAL 4-06 | 2-PIPE COOLING | 6/- | N/A | 281 | 99.5 | 2.75 | 2.75 | 26.7 | 19.4 | 18.4 | 16.7 | 0.12 | 14.4 | 20 | 2.69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.5 | N/A | N/A | 2KA | 115/1/60 |
| FCU-18 | FIFTH FLOOR | DATA ROOM 5-02 | 2-PIPE COOLING | 6/- | N/A | 281 | 99.5 | 2.75 | 2.75 | 26.7 | 19.4 | 18.4 | 16.7 | 0.12 | 14.4 | 20 | 2.69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.5 | N/A | N/A | 2KA | 115/1/60 |
| FCU-19 | FIFTH FLOOR | ELECTRICAL 5-03 | 2-PIPE COOLING | 6/- | N/A | 233 | 99.5 | 2.06 | 2.06 | 26.7 | 19.4 | 19.2 | 16.9 | 0.09 | 14.4 | 20 | 1.49 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.1 | N/A | N/A | 2KA | 115/1/60 |
| FCU-20 | MAIN FLOOR | ATRIUM 1-96 | 4-PIPE COOLING/HEATING | 6/1 | N/A | 1410 | 199 | 19.51 | 13.3 | 26.7 | 19.4 | 11.9 | 11.6 | 0.83 | 7.2 | 12.8 | 37.66 | 8.58 | 21.1 | 30.8 | 0.18 | 53.3 | 42.2 | 48.72 | 13.6 | 15.3 | 20 | 2KA | 115/1/60 |
| FCU-21 | MAIN FLOOR | ATRIUM 1-96 | 4-PIPE COOLING/HEATING | 6/1 | N/A | 1410 | 199 | 19.51 | 13.3 | 26.7 | 19.4 | 11.9 | 11.6 | 0.83 | 7.2 | 12.8 | 37.66 | 8.58 | 21.1 | 30.8 | 0.18 | 53.3 | 42.2 | 48.72 | 13.6 | 15.3 | 20 | 2KA | 115/1/60 |
| FCU-22 | MAIN FLOOR | ATRIUM 1-96 | 4-PIPE COOLING/HEATING | 6/1 | N/A | 1410 | 199 | 19.51 | 13.3 | 26.7 | 19.4 | 11.9 | 11.6 | 0.83 | 7.2 | 12.8 | 37.66 | 8.58 | 21.1 | 30.8 | 0.18 | 53.3 | 42.2 | 48.72 | 13.6 | 15.3 | 20 | 2KA | 115/1/60 |
| FCU-23 | MAIN FLOOR | MAIL DIGITIZATION ROOM 1-103 | 2-PIPE COOLING | 6/- | 4 | 201 | 99.5 | 3.79 | 3.2 | 23.9 | 16.9 | 11.8 | 11.4 | 0.16 | 7.2 | 12.8 | 3.89 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.1 | N/A | N/A | 2KA | 115/1/60 |
| FCU-24 | MAIN FLOOR | MUSEUM STORAGE 1-69 | 4-PIPE COOLING/HEATING | 6/1 | N/A | 201 | 99.5 | 3.79 | 3.20 | 23.9 | 16.9 | 11.8 | 11.4 | 0.16 | 7.2 | 12.8 | 3.89 | 2.18 | 22.2 | 30.6 | 0.06 | 53.3 | 42.2 | 2.69 | 3.1 | N/A | N/A | 2KA | 115/1/60 |
| FCU-25 | MAIN FLOOR | STORE/SHIPPING & RECEIVING 1-63 | 2-PIPE COOLING | 6/- | 11 | 201 | 99.5 | 3.79 | 3.2 | 23.9 | 16.9 | 11.8 | 11.4 | 0.16 | 7.2 | 12.8 | 3.89 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.1 | N/A | N/A | 2KA | 115/1/60 |
| FCU-26 | PARKING | WELLNESS CENTRE B-02 | 4-PIPE COOLING/HEATING | 6/1 | 31 | 587 | 124.4 | 11.94 | 9.42 | 23.9 | 16.9 | 10.8 | 10.5 | 0.51 | 7.2 | 12.8 | 17.34 | 7.15 | 22.2 | 32.3 | 0.16 | 53.3 | 42.2 | 36.76 | 12 | 13.5 | 15 | 2KA | 115/1/60 |
| FCU-27 | MAIN FLOOR | LOCKERS 1-20A & CORRIDOR 1-26 | 4-PIPE COOLING/HEATING | 6/1 | 42 | 277 | 124.4 | 5.46 | 4.38 | 23.9 | 16.9 | 11.0 | 10.7 | 0.23 | 7.2 | 12.8 | 8.97 | 5.36 | 22.2 | 38.2 | 0.11 | 53.3 | 42.2 | 4.78 | 6 | N/A | N/A | 2KA | 115/1/60 |
| FCU-28 | MAIN FLOOR | STORES ROOM 1-61 & LOADING DOCK 1-62 | 4-PIPE COOLING/HEATING | 6/1 | 36 | 333 | 99.5 | 6.42 | 5.18 | 23.9 | 16.9 | 11.2 | 10.9 | 0.28 | 7.2 | 12.8 | 11.66 | 3.65 | 22.2 | 31.3 | 0.08 | 53.3 | 42.2 | 8.07 | 6 | N/A | N/A | 2KA | 115/1/60 |
| FCU-29 | MAIN FLOOR | MUSEUM 1-77 | 4-PIPE COOLING/HEATING | 6/1 | 24 | 672 | 99.5 | 13.43 | 10.67 | 23.9 | 16.9 | 10.9 | 10.6 | 0.57 | 7.2 | 12.8 | 20.92 | 7.78 | 22.2 | 31.8 | 0.17 | 53.3 | 42.2 | 41.85 | 12 | 13.5 | 15 | 2KA | 115/1/60 |
| FCU-30 | SECOND FLOOR | MUSEUM 1-77 | 4-PIPE COOLING/HEATING | 6/1 | 36 | 426 | 99.5 | 8.37 | 6.7 | 23.9 | 16.9 | 11.0 | 10.8 | 0.36 | 7.2 | 12.8 | 20.03 | 4.67 | 22.2 | 31.3 | 0.10 | 53.3 | 42.2 | 13.15 | 6.2 | 7 | 15 | 2KA | 115/1/60 |
| FCU-31 | MAIN FLOOR | CLEANING STAFF LOUNGE 1-76 | 2-PIPE COOLING | 6/- | 5 | 215 | 99.5 | 2.64 | 2.2 | 23.9 | 16.9 | 12.2 | 11.8 | 0.11 | 7.2 | 12.8 | 6.87 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 3.1 | N/A | N/A | 2KA | 115/1/60 |

NOTES:
1. SELECT FCU HANDING TO MATCH INSTALLATION LOCATION AND TO ENSURE SUFFICIENT CLEARANCE FOR MAINTENANCE AND COIL REMOVAL.
2. ALL FCU TO BE C/W MERV 8 FILTERS.
3. ALL FCU TO BE THE HORIZONTAL TYPE.
4. PROVIDE CONDENSATE PUMPS FOR FCU-25 AND FCU-28.
5. ON ALL FCU EQUIPED WITH, HEATING COILS TO BE LOCATED IN RE-HEAT POSITION.

# DRY COOLER SCHEDULE

| TAG | DUTY | FLUID | DESIGN CONDITIONS EWT (°C) | LWT (°C) | FLOW (L/s) | WATER P.D. (kPa) | OA DB (°C) | OA WB (°C) | FAN POWER (HP) | HEAT REJECTION kW | TONS | ELECTRICAL MCA | MOCP | FLA | SCCR (kA) | V/PH/HZ | OPERATING WEIGHT (KG) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| DC-1 | DRY COOLER | GLYCOL 35% | 35.6 | 30.0 | 39.9 | 96.5 | 26.7 | 25.6 | 60 | 868.8 | 197.6 | 84.1 | 90 | 70.1 | 10 | 575/3/60 | 10918 |

NOTES:
1. C/W FACTORY MOUNTED DISCONNECT SWITCH.

# HEAT EXCHANGER SCHEDULE

| OPERATING SEASON | TAG | LOAD (kW) | SYSTEM SIDE (GTS/R LOOP) EWT (°C) | LWT (°C) | SYSTEM FLUID | FLOW (L/s) | MAX. PRESSURE DROP (kPa) | CONNECTION SIZE (mm) | SOURCE SIDE (GLS/R LOOP) EWT (°C) | LWT (°C) | SYSTEM FLUID | FLOW (L/s) | MAX. PRESSURE DROP (kPa) | CONNECTION SIZE (mm) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SUMMER OPERATION | HE-1 | 175.7 | 35.6 | 30.0 | 35% PROPYLENE GLYCOL | 8.23 | 20.7 | 100 | 26.1 | 30.1 | 25% PROPYLENE GLYCOL | 11.04 | 20.7 | 100 |
| | HE-2 | 175.7 | 35.6 | 30.0 | 35% PROPYLENE GLYCOL | 8.23 | 20.7 | 100 | 26.1 | 30.1 | 25% PROPYLENE GLYCOL | 11.04 | 20.7 | 100 |
| WINTER OPERATION | HE-1 | 131.8 | -4.4 | 1.1 | 35% PROPYLENE GLYCOL | 6.25 | 20.7 | 100 | 3.9 | 0.9 | 25% PROPYLENE GLYCOL | 11.04 | 20.7 | 100 |
| | HE-2 | 131.8 | -4.4 | 1.1 | 35% PROPYLENE GLYCOL | 6.25 | 20.7 | 100 | 3.9 | 0.9 | 25% PROPYLENE GLYCOL | 11.04 | 20.7 | 100 |

# AIR SEPARATOR SCHEDULE

| TAG | SERVICE | MAX WORKING PRESSURE (kPa) | FLOW (L/s) | PRESSURE DROP (kPa) | INLET /OUTLET CONNECTION (mm) | MAX. DIAMETER (mm) | MAX. HEIGHT (mm) | MAX. WIDTH (BETWEEN FLANGES) (mm) | WEIGHT (kg) |
|---|---|---|---|---|---|---|---|---|---|
| AS-1 | CHILLED WATER | 861.8 | 40.4 | 4.5 | 152 | 305 | 1200 | 800 | 145.9 |
| AS-2 | HEATING WATER | 861.8 | 17.7 | 5.4 | 102 | 305 | 800 | 600 | 73.2 |

NOTES:
1. 50 mm NPT VALVED CONNECTIONS FOR AIR VENT AND BLOW DOWN ASSEMBLY
2. C/W WITH MAGNETIC FILTER

# ELECTRIC BOILER SCHEDULE

| TAG | DUTY | OUTPUT (kW) | ELECTRICAL FLA | V/PH/HZ | WEIGHT (KG) |
|---|---|---|---|---|---|
| EB-1 | HYDRONIC ELECTRIC HEATERS | 259.77 | 251 | 600/3/60 | 1383.2 |
| EB-2 | HYDRONIC ELECTRIC HEATERS | 259.77 | 251 | 600/3/60 | 1383.2 |


Public Works and Government Services Canada / Travaux Publics et Services gouvernementaux Canada

NORR
NORR Architects & Engineers Limited
An Ingenium Group Company
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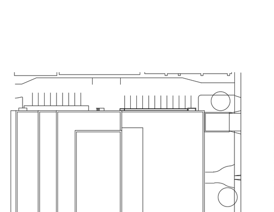
key plan



project and true North

project legend

| | | |
|---|---|---|
| 1 | ADDENDUM # 5 | 2022-07-25 |
| 0 | ISSUED FOR TENDER | 2022-05-27 |
| revisions | | date |

project / projet
DANIEL J MACDONALD MODERNIZATION
161 GRAFTON STREET
CHARLOTTETOWN, PEI, C1A 1L1

drawing / dessin
MECHANICAL SCHEDULES 1

designed NORR conçu
date 2020-8-31
drawn NORR dessiné
date 2020-8-31
approved NORR approuvé
date 2022-07-25
Tender Soumission
PWGSC Project Manager Administrateur de projets TPSGC
project number / no. du projet
R.056687.005
drawing no. / no. du dessin
M02-01

# CHILLED BEAM SCHEDULE

| ROOM OR ZONE | ROOM OR ZONE AREA | OCCUPANCY | SENSIBLE LOAD | LATENT LOAD | OA REQUIRED FOR VENTILATION | MIN. OA REQUIRED FOR VENTILATION | MIN. PRIMARY AIR FLOW PER ZONE | MAX. PRIMARY AIR FLOW PER ZONE | PRIMARY AIR FLOW PER ZONE | SENSIBLE COOLING PER ZONE | LATENT COOLING PER ZONE | BEAM QTY | COIL LENGTH | BLANK LENGTH | PRIMARY AIR FLOW PER BEAM | PRIMARY AIR PRESSURE DROP | MIN. PRIMARY AIR FLOW PER BEAM | AIR INLET SIZE | SOUND LEVEL | CHILLED WATER | COOLING WATER PRESSURE DROP | TOTAL SENSIBLE COOLING CAPACITY | PRIMARY AIR LATENT COOLING PER BEAM | PRIMARY AIR SENSIBLE COOLING PER BEAM | WATER COIL COOLING CAPCITY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ROOM OR ZONE DATA | | | | | | | ZONE PERFORMANCE | | | | | BEAM PERFORMANCE | | | | | | | | | | | | | |
| | SQ. m | PPL. | W | W | L/s | L/s | L/s | L/s | L/s | W | W | | m | m | L/s | Pa | L/s | mm | NC | L/s | kPa | W | W | W | W |
| 2-49-6 OPEN WORKSPACE | 46 | 8 | 2928 | 363 | 34 | 14 | 44 | 88 | 78 | 2936 | 383 | 3 | 2.1 | 0.9 | 26 | 154 | 15 | 125 | 18 | 0.14 | 8.36 | 979 | 128 | 177 | 802 |
| 2-49-7 OPEN WORKSPACE | 46 | 5 | 2284 | 227 | 27 | 14 | 25 | 50 | 47 | 2298 | 232 | 2 | 2.7 | 0.3 | 24 | 159 | 12 | 125 | 17 | 0.16 | 10.75 | 1149 | 116 | 161 | 988 |
| 2-49-8 OPEN WORKSPACE | 54 | 8 | 4480 | 363 | 31 | 16 | 109 | 218 | 200 | 4494 | 985 | 2 | 3.0 | N/A | 100 | 184 | 55 | 200E | 33 | 0.16 | 13.46 | 2247 | 493 | 682 | 1565 |
| 2-49-9 OPEN WORKSPACE | 54 | 10 | 4275 | 454 | 41 | 16 | 109 | 218 | 187 | 4286 | 820 | 2 | 3.0 | N/A | 93 | 162 | 54 | 200E | 32 | 0.16 | 13.46 | 2143 | 460 | 637 | 1506 |
| 2-49-10 OPEN WORKSPACE | 85 | 9 | 3133 | 408 | 48 | 26 | 44 | 88 | 85 | 3141 | 418 | 3 | 2.1 | 0.9 | 28 | 167 | 15 | 125 | 21 | 0.15 | 9.21 | 1047 | 139 | 193 | 854 |
| 2-49-11 OPEN WORKSPACE | 130 | 17 | 6003 | 772 | 82 | 39 | 87 | 174 | 164 | 6012 | 809 | 4 | 3.0 | N/A | 41 | 157 | 22 | 125 | 23 | 0.16 | 13.46 | 1503 | 202 | 280 | 1223 |
| 2-50 REFLECTION ROOM | 5 | 1 | 88 | 45 | 4 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 2-51 PHONE BOOTH | 5 | 1 | 59 | 45 | 4 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 2-52 FOCUS ROOM | 7 | 1 | 468 | 45 | 4 | 2 | 5 | 10 | 9 | 469 | 47 | 1 | 1.2 | N/A | 9 | 184 | 5 | 125 | <15 | 0.11 | 14.95 | 469 | 47 | 64 | 405 |
| 2-52B FOCUS ROOM | 7 | 1 | 176 | 45 | 4 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 2-54 LARGE MEETING ROOM | 53 | 22 | 2577 | 998 | 68 | 16 | 111 | 221 | 208 | 3214 | 1022 | 4 | 1.2 | N/A | 52 | 174 | 28 | 150E | 30 | 0.03 | 1.50 | 803 | 256 | 354 | 449 |
| 2-55 LARGE MEETING ROOM | 47 | 22 | 2225 | 998 | 66 | 14 | 111 | 221 | 208 | 3214 | 1022 | 4 | 1.2 | N/A | 52 | 174 | 28 | 150E | 30 | 0.03 | 1.50 | 803 | 256 | 354 | 449 |
| 2-56 WORK ROOM | 15 | 4 | 410 | 182 | 14 | 4 | 27 | 55 | 38 | 566 | 186 | 1 | 0.9 | N/A | 38 | 95 | 27 | 125 | 24 | 0.03 | 1.20 | 566 | 186 | 257 | 308 |
| 2-57 FOCUS ROOM | 8 | 1 | 176 | 45 | 5 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 2-58 PHONE BOOTH | 4 | 1 | 59 | 45 | 4 | 1 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 2-63A FOCUS ROOM | 6 | 4 | 322 | 182 | 11 | 2 | 27 | 55 | 38 | 566 | 186 | 1 | 0.9 | N/A | 38 | 95 | 27 | 125 | 24 | 0.03 | 1.20 | 566 | 186 | 257 | 308 |
| 2-63B FOCUS ROOM | 6 | 4 | 322 | 182 | 11 | 2 | 27 | 55 | 38 | 566 | 186 | 1 | 0.9 | N/A | 38 | 95 | 27 | 125 | 24 | 0.03 | 1.20 | 566 | 186 | 257 | 308 |
| 2-63C REFLECTION ROOM | 5 | 1 | 59 | 45 | 4 | 1 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 2-65 PHONE BOOTH | 5 | 1 | 88 | 45 | 4 | 1 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 2-71 WORK ROOM | 13 | 6 | 410 | 272 | 18 | 4 | 39 | 78 | 57 | 816 | 279 | 1 | 1.2 | N/A | 57 | 105 | 39 | 125 | 31 | 0.03 | 1.50 | 816 | 279 | 386 | 430 |
| 2-72 OPEN COLLAB | 54 | 10 | 2284 | 454 | 40 | 16 | 62 | 123 | 94 | 2294 | 464 | 2 | 1.8 | N/A | 47 | 117 | 31 | 125 | 27 | 0.14 | 7.77 | 1147 | 232 | 322 | 825 |
| 2-73 PROJECT ROOM | 17 | 7 | 908 | 318 | 22 | 5 | 39 | 77 | 66 | 918 | 325 | 1 | 1.2 | N/A | 66 | 144 | 39 | 150E | 32 | 0.03 | 1.50 | 918 | 325 | 450 | 467 |
| 2-74 PHONE BOOTH | 7 | 1 | 88 | 45 | 4 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 2-76 FOCUS ROOM | 8 | 5 | 322 | 227 | 14 | 2 | 27 | 54 | 47 | 672 | 232 | 1 | 0.9 | N/A | 47 | 152 | 27 | 125 | 30 | 0.03 | 1.20 | 672 | 232 | 322 | 350 |
| 2-76(A) FOCUS ROOM | 9 | 5 | 322 | 227 | 14 | 3 | 27 | 54 | 47 | 672 | 232 | 1 | 0.9 | N/A | 47 | 152 | 27 | 125 | 30 | 0.03 | 1.20 | 672 | 232 | 322 | 350 |
| 2-77-1 OPEN WORKSPACE | 57 | 8 | 4392 | 363 | 37 | 17 | 109 | 218 | 200 | 4406 | 957 | 2 | 3.0 | N/A | 100 | 159 | 54 | 200E | 33 | 0.16 | 13.43 | 2203 | 479 | 663 | 1540 |
| 2-77-2 OPEN WORKSPACE | 50 | 7 | 3367 | 318 | 33 | 15 | 37 | 74 | 72 | 3376 | 348 | 3 | 2.7 | 0.3 | 24 | 184 | 12 | 125 | 17 | 0.13 | 8.36 | 1125 | 116 | 161 | 965 |
| 2-77-3 OPEN WORKSPACE | 64 | 10 | 4334 | 454 | 44 | 19 | 49 | 94 | 94 | 4343 | 465 | 4 | 2.7 | 0.3 | 26 | 184 | 12 | 125 | 17 | 0.10 | 23.82 | 1086 | 116 | 161 | 925 |
| 2-77-4 OPEN WORKSPACE | 56 | 8 | 2987 | 363 | 37 | 17 | 44 | 88 | 79 | 2981 | 390 | 3 | 2.1 | 0.9 | 26 | 162 | 15 | 125 | 19 | 0.15 | 9.21 | 997 | 130 | 180 | 817 |
| 2-77-5 OPEN WORKSPACE | 52 | 4 | 1640 | 182 | 26 | 16 | 23 | 46 | 42 | 1648 | 209 | 3 | 1.2 | 0.3 | 14 | 167 | 8 | 125 | 15 | 0.15 | 25.22 | 519 | 70 | 97 | 453 |
| 2-78 FOCUS ROOM | 8 | 4 | 322 | 182 | 12 | 2 | 27 | 55 | 38 | 566 | 186 | 1 | 0.9 | N/A | 38 | 95 | 27 | 125 | 24 | 0.03 | 1.20 | 566 | 186 | 257 | 308 |
| 2-79 PHONE BOOTH | 5 | 1 | 59 | 45 | 4 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 2-81-1 FG #5 BPA WORK | 67 | 9 | 3397 | 408 | 43 | 20 | 85 | 170 | 145 | 3406 | 716 | 2 | 2.4 | 0.6 | 73 | 174 | 42 | 125 | 35 | 0.16 | 12.00 | 1703 | 358 | 495 | 1208 |
| 2-81-2 FG #5 BPA WORK | 87 | 6 | 2430 | 272 | 41 | 26 | 43 | 87 | 74 | 2436 | 362 | 4 | 1.2 | 1.8 | 18 | 187 | 11 | 125 | 17 | 0.15 | 25.00 | 609 | 90 | 125 | 483 |
| 2-81-3 FG #5 BPA WORK | 72 | 23 | 2723 | 1044 | 79 | 22 | 154 | 308 | 212 | 3143 | 1046 | 2 | 3.0 | N/A | 106 | 114 | 77 | 200E | 31 | 0.03 | 3.00 | 1572 | 523 | 724 | 848 |
| 2-82 MEDIUM MEETING ROOM | 29 | 10 | 1054 | 454 | 33 | 9 | 54 | 108 | 94 | 1345 | 464 | 2 | 0.9 | N/A | 47 | 152 | 27 | 125 | 30 | 0.03 | 1.20 | 672 | 232 | 322 | 350 |
| 2-83 PHONE BOOTH | 7 | 1 | 88 | 45 | 4 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 2-84 PHONE BOOTH | 7 | 1 | 88 | 45 | 4 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 2-85 FOCUS ROOM | 7 | 4 | 322 | 182 | 12 | 2 | 27 | 55 | 38 | 566 | 186 | 1 | 0.9 | N/A | 38 | 95 | 27 | 125 | 24 | 0.03 | 1.20 | 566 | 186 | 257 | 308 |
| 2-86 MEDIUM MEETING ROOM | 31 | 10 | 1610 | 454 | 33 | 10 | 54 | 108 | 95 | 1614 | 469 | 2 | 0.9 | N/A | 48 | 154 | 27 | 125 | 30 | 0.15 | 19.73 | 807 | 235 | 325 | 482 |
| 2-87A FOCUS ROOM | 8 | 5 | 322 | 227 | 14 | 2 | 27 | 54 | 47 | 672 | 232 | 1 | 0.9 | N/A | 47 | 152 | 27 | 125 | 30 | 0.03 | 1.20 | 672 | 232 | 322 | 350 |
| 2-87B FOCUS ROOM | 8 | 5 | 322 | 227 | 14 | 2 | 27 | 54 | 47 | 672 | 232 | 1 | 0.9 | N/A | 47 | 152 | 27 | 125 | 30 | 0.03 | 1.20 | 672 | 232 | 322 | 350 |
| 2-87C FOCUS ROOM | 8 | 5 | 322 | 227 | 14 | 2 | 27 | 54 | 47 | 672 | 232 | 1 | 0.9 | N/A | 47 | 152 | 27 | 125 | 30 | 0.03 | 1.20 | 672 | 232 | 322 | 350 |
| 2-87D FOCUS ROOM | 8 | 5 | 322 | 227 | 14 | 2 | 27 | 54 | 47 | 672 | 232 | 1 | 0.9 | N/A | 47 | 152 | 27 | 125 | 30 | 0.03 | 1.20 | 672 | 232 | 322 | 350 |
| 2-90 HUDDLE ROOM | 13 | 3 | 264 | 136 | 11 | 4 | 19 | 38 | 28 | 485 | 139 | 1 | 0.9 | N/A | 28 | 107 | 19 | 125 | 21 | 0.03 | 1.20 | 485 | 139 | 193 | 293 |
| 3-02 FOCUS ROOM | 8 | 1 | 176 | 45 | 5 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 3-08 MEDIUM MEETING ROOM | 27 | 10 | 966 | 454 | 32 | 8 | 54 | 108 | 94 | 1345 | 464 | 2 | 0.9 | N/A | 47 | 152 | 27 | 125 | 30 | 0.03 | 1.20 | 672 | 232 | 322 | 350 |
| 3-09 MEDIUM MEETING ROOM | 30 | 10 | 1083 | 454 | 33 | 9 | 54 | 108 | 94 | 1345 | 464 | 2 | 0.9 | N/A | 47 | 152 | 27 | 125 | 30 | 0.03 | 1.20 | 672 | 232 | 322 | 350 |
| 3-10 WORK ROOM | 15 | 7 | 527 | 318 | 21 | 5 | 36 | 72 | 66 | 1000 | 325 | 1 | 1.5 | N/A | 66 | 169 | 36 | 150E | 32 | 0.03 | 1.79 | 1000 | 325 | 450 | 550 |
| 3-12 TEAMING AREA | 29 | 14 | 820 | 635 | 42 | 9 | 72 | 144 | 132 | 2000 | 651 | 2 | 1.5 | N/A | 66 | 169 | 36 | 150E | 32 | 0.03 | 1.79 | 1000 | 325 | 450 | 550 |
| 3-13-1 OPEN WORKSPACE | 42 | 3 | 3631 | 136 | 20 | 13 | 76 | 151 | 142 | 3633 | 697 | 2 | 3.0 | N/A | 71 | 174 | 38 | 125 | <15 | 0.16 | 13.46 | 1816 | 349 | 483 | 1334 |
| 3-13-2 OPEN WORKSPACE | 20 | 2 | 1347 | 91 | 11 | 6 | 22 | 43 | 35 | 1347 | 174 | 1 | 3.0 | N/A | 35 | 135 | 22 | 125 | 19 | 0.15 | 12.46 | 1347 | 174 | 241 | 1106 |
| 3-13-3 OPEN WORKSPACE | 19 | 1 | 439 | 45 | 8 | 6 | 14 | 27 | 21 | 448 | 105 | 1 | 0.9 | 2.1 | 21 | 123 | 14 | 125 | 20 | 0.04 | 1.61 | 448 | 105 | 145 | 303 |
| 3-14 WORK ROOM | 15 | 6 | 498 | 272 | 19 | 4 | 39 | 78 | 57 | 816 | 279 | 1 | 1.2 | N/A | 57 | 105 | 39 | 125 | 31 | 0.03 | 1.50 | 816 | 279 | 386 | 430 |
| 3-15 FOCUS ROOM | 8 | 1 | 176 | 45 | 5 | 3 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 3-19 FOCUS ROOM | 8 | 2 | 234 | 91 | 7 | 3 | 11 | 22 | 19 | 320 | 93 | 1 | 0.6 | N/A | 19 | 144 | 11 | 125 | 20 | 0.03 | 0.90 | 320 | 93 | 129 | 191 |
| 3-20 FOCUS ROOM | 8 | 2 | 234 | 91 | 7 | 3 | 11 | 22 | 19 | 320 | 93 | 1 | 0.6 | N/A | 19 | 144 | 11 | 125 | 20 | 0.03 | 0.90 | 320 | 93 | 129 | 191 |
| 3-21 PHONE BOOTH | 7 | 1 | 88 | 45 | 4 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 3-22A FOCUS ROOM | 7 | 2 | 176 | 91 | 7 | 2 | 11 | 22 | 19 | 320 | 93 | 1 | 0.6 | N/A | 19 | 144 | 11 | 125 | 20 | 0.03 | 0.90 | 320 | 93 | 129 | 191 |
| 3-22B PHONE BOOTH | 5 | 1 | 59 | 45 | 4 | 2 | 8 | 15 | 12 | 248 | 58 | 1 | 0.6 | N/A | 12 | 117 | 8 | 125 | <15 | 0.03 | 0.90 | 248 | 58 | 81 | 167 |
| 3-30 PROJECT ROOM | 18 | 6 | 878 | 272 | 20 | 6 | 39 | 78 | 57 | 888 | 279 | 1 | 1.2 | N/A | 57 | 105 | 39 | 125 | 31 | 0.05 | 3.59 | 888 | 279 | 386 | 502 |
| 3-31 PROJECT ROOM | 20 | 5 | 878 | 227 | 18 | 6 | 28 | 55 | 47 | 880 | 232 | 1 | 1.2 | N/A | 47 | 144 | 28 | 125 | 29 | 0.08 | 8.37 | 880 | 232 | 322 | 559 |
| 3-32 REFLECTION ROOM | 5 | 1 | 59 | 45 | 4 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 3-33 REFLECTION ROOM | 5 | 1 | 59 | 45 | 4 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 3-34-1 OPEN WORKSPACE | 66 | 10 | 6764 | 454 | 20 | 45 | 164 | 327 | 303 | 6785 | 1492 | 3 | 3.0 | N/A | 101 | 170 | 55 | 200E | 34 | 0.16 | 13.46 | 2262 | 497 | 688 | 1573 |
| 3-34-2 OPEN WORKSPACE | 56 | 10 | 4656 | 454 | 17 | 42 | 109 | 219 | 211 | 4669 | 1041 | 2 | 3.0 | N/A | 106 | 186 | 55 | 200E | 35 | 0.16 | 13.46 | 2334 | 520 | 721 | 1614 |
| 3-34-3 OPEN WORKSPACE | 38 | 9 | 2899 | 408 | 11 | 34 | 61 | 122 | 89 | 2900 | 437 | 2 | 3.0 | N/A | 44 | 105 | 31 | 125 | 22 | 0.15 | 12.46 | 1450 | 218 | 302 | 1148 |
| 3-34-4 OPEN WORKSPACE | 54 | 11 | 3602 | 499 | 16 | 44 | 58 | 116 | 106 | 3607 | 523 | 3 | 2.7 | 0.3 | 35 | 166 | 19 | 125 | 21 | 0.09 | 18.70 | 1202 | 174 | 241 | 961 |
| 3-34-5 OPEN WORKSPACE | 93 | 16 | 3631 | 726 | 28 | 68 | 107 | 215 | 151 | 3655 | 743 | 2 | 3.0 | N/A | 76 | 98 | 54 | 150E | 31 | 0.15 | 11.49 | 1827 | 372 | 515 | 1313 |
| 3-34-6 OPEN WORKSPACE | 92 | 12 | 3426 | 545 | 28 | 58 | 62 | 124 | 113 | 3446 | 558 | 2 | 3.0 | N/A | 57 | 167 | 31 | 125 | 28 | 0.15 | 12.46 | 1723 | 279 | 386 | 1337 |
| 3-34-7 OPEN WORKSPACE | 110 | 13 | 2694 | 590 | 33 | 66 | 77 | 155 | 123 | 2699 | 604 | 4 | 1.2 | 1.8 | 31 | 126 | 19 | 125 | 23 | 0.06 | 4.27 | 675 | 151 | 209 | 466 |
| 3-34-8 OPEN WORKSPACE | 54 | 9 | 3309 | 408 | 16 | 39 | 62 | 123 | 107 | 3324 | 525 | 2 | 3.0 | N/A | 53 | 149 | 31 | 125 | 27 | 0.16 | 13.46 | 1662 | 263 | 364 | 1298 |
| 3-34-9 OPEN WORKSPACE | 41 | 7 | 2840 | 318 | 12 | 30 | 43 | 87 | 76 | 2843 | 376 | 2 | 3.0 | N/A | 38 | 155 | 22 | 125 | 21 | 0.15 | 12.46 | 1421 | 188 | 261 | 1161 |
| 3-34-10 OPEN WORKSPACE | 58 | 8 | 4012 | 363 | 17 | 37 | 108 | 216 | 170 | 4014 | 836 | 2 | 3.0 | N/A | 85 | 122 | 54 | 150E | 34 | 0.16 | 13.46 | 2007 | 418 | 579 | 1428 |
| 3-34-11 OPEN WORKSPACE | 61 | 10 | 4656 | 454 | 18 | 43 | 109 | 219 | 211 | 4669 | 1041 | 2 | 3.0 | N/A | 106 | 188 | 55 | 200E | 35 | 0.16 | 13.46 | 2334 | 520 | 721 | 1614 |
| 3-34-12 OPEN WORKSPACE | 74 | 11 | 3602 | 499 | 22 | 50 | 58 | 116 | 106 | 3607 | 523 | 3 | 2.7 | 0.3 | 35 | 166 | 19 | 125 | 21 | 0.09 | 18.70 | 1202 | 174 | 241 | 961 |
| 3-34-13 OPEN WORKSPACE | 162 | 24 | 6266 | 1089 | 49 | 109 | 163 | 325 | 270 | 6272 | 1331 | 3 | 3.0 | N/A | 90 | 138 | 54 | 200E | 31 | 0.16 | 13.46 | 2091 | 444 | 614 | 1476 |
| 3-36 FOCUS ROOM | 7 | 1 | 176 | 45 | 4 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 3-37 FOCUS ROOM | 8 | 2 | 234 | 45 | 7 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 3-41 FOCUS ROOM | 7 | 1 | 468 | 45 | 4 | 2 | 5 | 10 | 9 | 469 | 47 | 1 | 1.2 | N/A | 9 | 184 | 5 | 125 | <15 | 0.11 | 14.95 | 469 | 47 | 64 | 405 |
| 3-42 PHONE BOOTH | 5 | 1 | 59 | 45 | 4 | 2 | 6 | 11 | 9 | 221 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 3-44 LARGE MEETING | 53 | 22 | 2606 | 998 | 68 | 16 | 111 | 221 | 208 | 3214 | 1022 | 4 | 1.2 | N/A | 52 | 174 | 28 | 150E | 30 | 0.03 | 1.50 | 803 | 256 | 354 | 449 |
| 3-45 ITIM - ADMIN APPLIC | 68 | 12 | 3221 | 408 | 49 | 21 | 62 | 123 | 103 | 3240 | 507 | 2 | 3.0 | N/A | 51 | 139 | 31 | 125 | 26 | 0.16 | 13.46 | 1620 | 253 | 351 | 1269 |
| 3-47 MEDIUM MTG ROOM | 30 | 10 | 2167 | 454 | 33 | 9 | 51 | 101 | 94 | 2170 | 464 | 2 | 1.5 | N/A | 47 | 172 | 25 | 125 | 30 | 0.13 | 23.92 | 1085 | 232 | 322 | 763 |
| 3-48 FOCUS ROOM | 8 | 4 | 351 | 182 | 12 | 3 | 27 | 55 | 38 | 566 | 186 | 1 | 0.9 | N/A | 38 | 95 | 27 | 125 | 24 | 0.03 | 1.20 | 566 | 186 | 257 | 308 |
| 3-49 FOCUS ROOM | 8 | 4 | 322 | 182 | 12 | 3 | 27 | 55 | 38 | 566 | 186 | 1 | 0.9 | N/A | 38 | 95 | 27 | 125 | 24 | 0.03 | 1.20 | 566 | 186 | 257 | 308 |
| 3-50 FOCUS ROOM | 7 | 2 | 234 | 45 | 7 | 2 | 6 | 11 | 9 | 238 | 47 | 1 | 0.6 | N/A | 9 | 139 | 6 | 125 | <15 | 0.03 | 0.90 | 221 | 47 | 64 | 157 |
| 3-51-1 OPEN WORKSPACE | 91 | 13 | 4597 | 590 | 60 | 27 | 92 | 184 | 143 | 4605 | 704 | 3 | 3.0 | N/A | 48 | 120 | 31 | 125 | 24 | 0.16 | 13.46 | 1535 | 235 | 325 | 1210 |
| 3-51-2 OPEN WORKSPACE | 87 | 5 | 4421 | 227 | 39 | 26 | 92 | 184 | 136 | 4442 | 669 | 3 | 3.0 | N/A | 45 | 109 | 31 | 125 | 23 | 0.16 | 13.46 | 1481 | 223 | 309 | 1172 |
| 3-51-3 OPEN WORKSPACE | 45 | 4 | 2313 | 182 | 24 | 14 | 77 | 154 | 142 | 2315 | 697 | 2 | 1.2 | 1.8 | 71 | 167 | 39 | 150E | 34 | 0.13 | 18.13 | 1157 | 349 | 483 | 675 |
| 3-51-4 OPEN WORKSPACE | 29 | 10 | 1464 | 454 | 34 | 9 | 101 | 202 | 151 | 2107 | 743 | 2 | 1.5 | 1.5 | 76 | 111 | 51 | 150E | 33 | 0.03 | 1.78 | 1054 | 372 | 515 | 539 |
| 3-51-5 OPEN WORKSPACE | 119 | 21 | 6032 | 953 | 88 | 36 | 123 | 246 | 198 | 6047 | 976 | 4 | 3.0 | N/A | 50 | 129 | 31 | 125 | 25 | 0.12 | 8.01 | 1512 | 244 | 338 | 1174 |
| 3-51-6 OPEN WORKSPACE | 60 | 7 | 4129 | 318 | 35 | 18 | 108 | 217 | 177 | 4136 | 874 | 2 | 3.0 | N/A | 89 | 133 | 54 | 150E | 35 | 0.16 | 13.46 | 2068 | 437 | 605 | 1463 |

NOTES:
1. DATA IN THE SCHEDULE IN RELATION TO PRIMARY AIR CONDITION OF 18.3°C, 58% RH, 10°C DEW POINT.
2. NC LEVEL SHOWN AT DESIGN PRIMARY AIRFLOW RATE.
3. ALL BEAMS ARE 2-WAY DISCHARGE 300mm WIDE COMPLETE WITH COANDA WINGS WITH A TOTAL WIDTH OF 500mm. LENGTHS AS INDICATED IN THE...
4. PROVIDE BLANK SECTIONS AS REQUIRED TO MATCH BEAM LENGTHS AS SHOWN ON PLANS.
5. BEAMS TO HAVE ROOM EXPOSED SURFACES FINISHED IN STANDARD B12 WHITE.
6. AIR PLENUMS TO BE STANDARD GALVANIZED STEEL.
7. AIR PLENUMS TO BE EXTERNALLY INSULATED.
8. 'E' SUFFIX ON AIR INLET SIZE DENOTES OVAL CONNECTION.
9. THE PRIMARY AIRFLOW PER ZONE IS THE PRIMARY AIR SUPPLIED TO THE ZONE AT DESIGN CONDITIONS.
10. THE OA REQUIRED IS THE VENTILATION RATE AS PER ASHRAE 62.1 REQUIREMENTS.
11. THE PRESSURE DROP AT DESIGN AIRFLOW IS NOT THE MAXIMUM PRESSURE DROP.
12. MAX. AIR PRESSURE DROP IS 187 PA AND MAX. PRIMARY AIRFLOW CORRESPONDS TO THIS MAX PRESSURE DROP.
13. MINIMUM PRIMARY AIR PER ZONE IS THE SUM OF THE MINIMUM PRIMARY AIR FOR EACH BEAM, WHICH IS THE MINIMUM RATE NEEDED FOR THE BEAM TO OPERATE.
14. ALL VALUES NOTED IN THE SCHEDULE ARE DESIGN VALUES, UNLESS OTHERWISE NOTED (E.G. MIN OR MAX VALUES).

# SUPPLY AND EXHAUST FAN SCHEDULE

| TAG | SERVICE | TYPE | FAN DRIVE | FLOW (L/s) | ESP (Pa) | WEIGHT (KG) | MOTOR V | Ph | Hz | FLA | HP | BHP | RPM | VFD | INLET SOUND NC/dBA @ 1.52m | INTERLOCK WITH | NOTES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SF-1 | MECH. ROOM | INLINE FAN | DIRECT | 2265 | 248.84 | 54 | 575 | 3 | 60 | 2.7 | 2 | 1.42 | 1750 | YES | 69 | EF-1 | 1,4 |
| EF-1 | MECH. ROOM | INLINE FAN | DIRECT | 2265 | 248.84 | 54 | 575 | 3 | 60 | 2.7 | 2 | 1.42 | 1750 | YES | 69 | SF-1 | 1,4 |
| EF-2 | PARKING | AXIAL SIDEWALL FAN | DIRECT | 3540 | 75 | 52.1 | 575 | 3 | 60 | 3.9 | 3 | 1.26 | 1484 | YES | 76 | RCF 1,2,3 | 1,4 |
| EF-3 | W/R EXHAUST | INLINE FAN | DIRECT | 3917 | 373 | 121.5 | 575 | 3 | 60 | 6.1 | 5 | 3.4 | 1274 | YES | 72 | MUA-1,2 | 3,4 |
| EF-4 | ELEV. MACHINE ROOM | INLINE FAN | DIRECT | 755 | 107 | 30.3 | 115 | 1 | 60 | 9.8 | 1/2 | 0.43 | 1725 | NO | 66 | - | 1,4 |
| EF-5 | ELEV. MACHINE ROOM | INLINE FAN | DIRECT | 236 | 75 | 22.2 | 115 | 1 | 60 | 1.5 | 1/10 | 0.06 | 1517 | NO | 54 | - | 1,4 |
| EF-6 | ELEV. MACHINE ROOM | INLINE FAN | DIRECT | 378 | 75 | 36.2 | 115 | 1 | 60 | 5.8 | 1/4 | 0.24 | 1561 | NO | 64 | - | 4 |
| EF-7 | ELEC. CLOSET 1-13 | INLINE FAN | DIRECT | 283 | 62.21 | 14.5 | 115 | 1 | 60 | 3.5 | 1/2 | 0.24 | 1367 | NO | 57 | - | 2,4 |
| EF-8 | ELEC. CLOSET 1-08 | INLINE FAN | DIRECT | 236 | 62.21 | 14.5 | 115 | 1 | 60 | 3.5 | 1/2 | 0.15 | 1187 | NO | 54 | - | 2,4 |
| EF-9 | ELEC. CLOSET 2-36 | INLINE FAN | DIRECT | 283 | 62.21 | 14.5 | 115 | 1 | 60 | 3.5 | 1/2 | 0.24 | 1367 | NO | 57 | - | 2,4 |
| EF-10 | ELEC. CLOSET 2-31 | INLINE FAN | DIRECT | 236 | 62.21 | 14.5 | 115 | 1 | 60 | 3.5 | 1/2 | 0.15 | 1187 | NO | 54 | - | 2,4 |
| EF-11 | ELEC. CLOSET 3-28 | INLINE FAN | DIRECT | 283 | 62.21 | 14.5 | 115 | 1 | 60 | 3.5 | 1/2 | 0.24 | 1367 | NO | 57 | - | 2,4 |
| EF-12 | ELEC. CLOSET 3-23 | INLINE FAN | DIRECT | 236 | 62.21 | 14.5 | 115 | 1 | 60 | 3.5 | 1/2 | 0.15 | 1187 | NO | 54 | - | 2,4 |
| EF-13 | ELEC. CLOSET 4-28 | INLINE FAN | DIRECT | 283 | 62.21 | 14.5 | 115 | 1 | 60 | 3.5 | 1/2 | 0.24 | 1367 | NO | 57 | - | 2,4 |
| EF-14 | ELEC. CLOSET 4-23 | INLINE FAN | DIRECT | 236 | 62.21 | 14.5 | 115 | 1 | 60 | 3.5 | 1/2 | 0.15 | 1187 | NO | 54 | - | 2,4 |
| EF-15 | ELEC. CLOSET 5-32 | INLINE FAN | DIRECT | 283 | 62.21 | 14.5 | 115 | 1 | 60 | 3.5 | 1/2 | 0.24 | 1367 | NO | 57 | - | 2,4 |
| EF-16 | ELEC. CLOSET 5-11 | INLINE FAN | DIRECT | 236 | 62.21 | 14.5 | 115 | 1 | 60 | 3.5 | 1/2 | 0.15 | 1187 | NO | 54 | - | 2,4 |
| RCF-1,2,3 | PARKING | AXIAL TRANSFER FAN | DIRECT | 1062 | N/A | 65 | 575 | 3 | 60 | - | 0.75 | 0.74 | 3500 | NO | 71 | EF-2 | 1,4 |

NOTES:
1. INTERLOCK FAN WITH ASSOCIATED MOTORIZED DAMPERS, REFER TO PLAN.
2. C/W SPEED CONTROL.
3. INTERLOCK FAN WITH ASSOCIATED EQUIPMENT AS NOTED.
4. C/W LOCAL DISCONNECT SWITCH.

# BUFFER TANK SCHEDULE

| TAG | TANK VOLUME (L) | TANK DIAMETER (mm) | TANK HEIGHT (mm) | OPERATING WEIGHT (kg) | CONNECTION SIZE (mm) | NUMBER OF CONNECTIONS PER TANK | CONNECTION LOCATION |
|---|---|---|---|---|---|---|---|
| BT-1A, BT-2A | 1703 | 1219.2 | 2155.8 | 2292.7 | 150 | 4 | LOW/HIGH |
| BT-1B, BT-1C, BT-1D, BT-1E, BT-1F | 1703 | 1219.2 | 2047.9 | 2192.9 | 150 | 2 | HIGH |
| BT-2B, BT-2C, BT-2D, BT-2E, BT-2F | 1703 | 1219.2 | 2047.9 | 2192.9 | 150 | 2 | HIGH |
| BT-3 | 946 | 910 | 2440 | 1372.4 | 50 | 4 | LOW/HIGH |

NOTES:
1. TANK DIMENSIONS ARE MAXIMUM DIMENSIONS. TANK DIMENSIONS ARE RESTRICTED DUE TO LIMITED INSTALLATION SPACE.

# ELECTRIC DOMESTIC WATER HEATER

| TAG | TANK CAPACITY (L) | INPUT (kW) | POWER (V) | ELEMENT WATTAGE | HEIGHT (mm) | DIAMETER (mm) | WATER CONNECTION (mm) | FLA | OPERATING WEIGHT (kg) |
|---|---|---|---|---|---|---|---|---|---|
| DWH-1 | 946 | 45 | 600 | 3 @ 15kW | 2340 | 860 | 40 | 44 | 1474 |

NOTES:
1. DOMESTIC WATER HEATER TO BE ABLE TO OPERATE AT 75°C WATER TEMPERATURE.

# GLYCOL FILL TANK SCHEDULE

| TAG | TANK VOLUME (L) | TANK DIAMETER (mm) | TANK HEIGHT (mm) | VOLTS / PH / Hz | WEIGHT (kg) |
|---|---|---|---|---|---|
| GLFT-1, 2 | 208 | 610 | 1245 | 115/1/60 | 224 |

# FIRE PUMP SCHEDULE

| UNIT | TYPE | PUMP: RATED FLOW (L/s) | RATED HEAD (kPa) | IMP. DIA (mm) | POWER REQUIRED @ DUTY (HP) | RATED EFFICIENCY | FLUID | TEMPERATURE (°C) | SP. GRAVITY (kg/L) | NFPA LIMITS: 140% HEAD OF RATED HEAD (kPa) | 65% HEAD @ 150% FLOW (kPa) | FLOW @ 150% (L/s) | HEAD @ 150% (kPa) | POWER REQ. @ 150% (HP) | EFFICIENCY @ 150% | MAX BHP | CLOSED VALVE HEAD (kPa) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FP-1 | HORIZONTAL SPLIT CASE | 63.1 | 792.9 | 422.0 | 98.6 | 67.9% | WATER | 29.4 | 1.0 | 1110 | 516 | 94.6 | 703 | 116 | 76.9 | 125.0 | 841.2 |
| JP-1 | VERTICAL MULTI-STAGE | 0.6 | 861.4 | N/A | 1.6 | 50.9% | WATER | 4.0 | 1.0 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

REMARKS:
1. PROVIDE ELECTRIC FIRE PUMP CONTROLLER, AUTOMATIC POWER TRANSFER SWITCH, SOFT START AND JOCKEY PUMP CONTROLLER AS PART OF FIRE PUMP PACKAGE.
2. PUMPS TO BE ULC LISTED.
3. THE ABOVE ARE MINIMUM REQUIREMENTS FOR THE FIRE PUMP THAT NEED TO BE MET. THE CONTRACTOR IS FULLY RESPONSIBLE TO DELIVER A SYSTEM COMPLIANT WITH ALL APPLICABLE REGULATIONS AND TO SUBMIT THE RELEVANT HYDRAULIC CALCULATIONS.

# PLUMBING FIXTURES SCHEDULE

| DESCRIPTION | WASTER PIPE (mm) | VENT PIPE (mm) | CW PIPE SUPPLY (mm) | HW PIPE SUPPLY (mm) |
|---|---|---|---|---|
| WATER CLOSET, FLUSH VALVE | 75 | 50 | 25 | - |
| | | | | |
| URINAL, WASHOUT | 50 | 40 | 20 | - |
| LAVATORY | 40 | 40 | 10 | 10 |
| SERVICE SINK | 75 | 40 | 15 | 15 |
| SHOWER, PUBLIC | 50 | 40 | 15 | 15 |
| NON-FREEZE WALL HYDRANT | - | - | 20 | - |
| HOSE BIBB | - | - | 15 | - |

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# HYDROPNEUMATIC TANK SCHEDULE

| TAG | TANK VOLUME (L) | MAX ACCEPT. VOLUME (L) | TANK HEIGHT (mm) | TANK DIAMETER (mm) | SYSTEM CONNECTION (mm) | OPERATING PRESSURE RANGE (kPa) | WEIGHT (kg) |
|---|---|---|---|---|---|---|---|
| HPN-01 | 1000 | 1000 | 2184 | 914 | 98 | 485 - 590 | 307 |

# SILENCER SCHEDULE

| TAG | SERVICE | PERFORMANCE DATA: FLOW (L/s) | PRESSURE DROP (Pa) | VELOCITY (m/s) | SIZE: WIDTH (mm) | HEIGHT (mm) | LENGTH (mm) | LOUVER NOICE REDUCTION (dB): 63 | 125 | 250 | 500 | 1K | 2K | 4K | 8K |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SL-1 | MUA-1 SUPPLY | 5191 | 52 | 6 | 1250 | 700 | 1500 | 2 | 7 | 17 | 34 | 49 | 47 | 27 | 13 |
| SL-2 | MUA-1 RETURN | 5191 | 100 | -6 | 1000 | 1000 | 1500 | 6 | 10 | 21 | 29 | 27 | 17 | 11 | 7 |
| SL-3 | MUA-3 SUPPLY | 3304 | 15 | 6 | 900 | 600 | 1500 | 7 | 9 | 13 | 23 | 15 | 13 | 11 | 8 |
| SL-4 | MUA-3 RETURN | 3304 | 40 | -6 | 900 | 600 | 2100 | 6 | 12 | 24 | 40 | 49 | 29 | 17 | 12 |
| SL-5 | MUA-2 SUPPLY | 5191 | 35 | 6 | 1250 | 750 | 1500 | 4 | 9 | 19 | 28 | 28 | 18 | 10 | 7 |
| SL-6 | MUA-2 RETURN | 5191 | 35 | -6 | 1250 | 750 | 1500 | 5 | 10 | 20 | 29 | 28 | 17 | 11 | 7 |

NOTES:
1. ALL SILENCERS ARE STRAIGHT SILENCERS EXCEPT FOR SL-2, WHICH IS AN ELBOW SILENCER.


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key plan

KENT STREET

GRAFTON STREET

project and true North

project legend

| revisions | | date |
|---|---|---|
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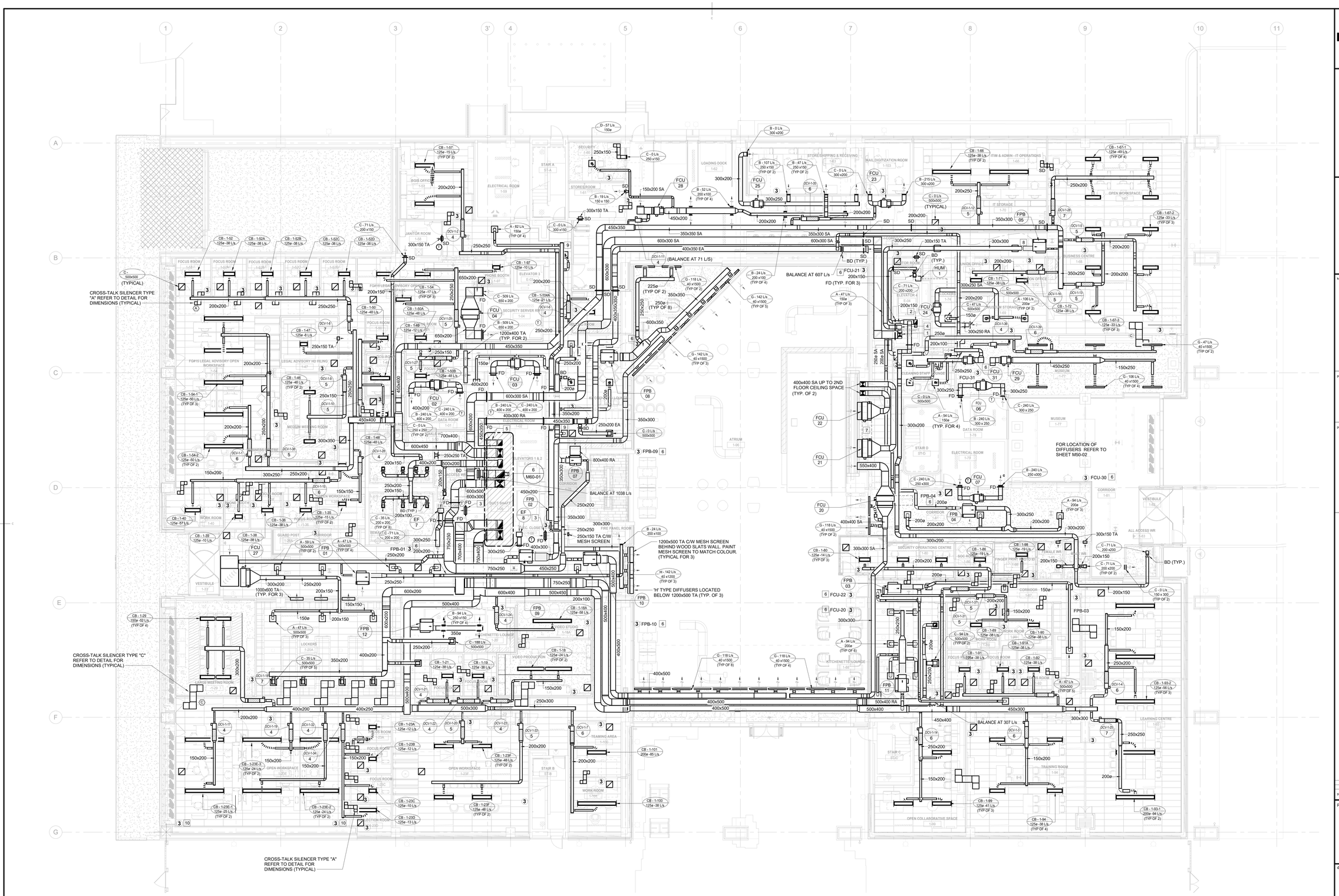
| 0 | ISSUED FOR TENDER | 2022-05-27 |

project / projet
DANIEL J MACDONALD MODERNIZATION
161 GRAFTON STREET
CHARLOTTETOWN, PEI, C1A 1L1

drawing / dessin
MECHANICAL SCHEDULES 3

designed Designer conçu
date 2021-11-8
drawn Author dessiné
date 2021-11-8
approved Checker approuvé
date 2022-07-25
Tender Soumission
PWGSC Project Manager Administrateur de projets TPSGC
project number / no. du projet
R.056687.005
drawing no. / no. du dessin
M02-03




2 M50-01 HVAC MAIN FLOOR

SCALE : 1:100

0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m

DRAWING NOTES:

1. 600x300 SUPPLY AIR DUCT UP, TRANSITION TO 300x300, OFFSET IN RISER TO SOUTH SIDE OF SHAFT.
2. 350x250 EXHAUST AIR DUCT UP.
3. 600x200 TRANSFER AIR DUCT C/W WIRE MESH SCREEN.
4. 300x250 SUPPLY AIR DUCT DOWN TO PARKING LEVEL.
5. ALL DUCTS PENETRATING RISER SHAFT WALL TO BE C/W FIRE DAMPERS AND FOR THE DUCT SIZES PENETRATING WALL REFER TO DRAWING M60-01.
6. PROVIDE PROTECTIVE GUARD.
7. PROVIDE CLEAR SPACE FOR COIL REMOVAL AND MAINTENANCE ACCESS.
8. SMOKE DETECTOR INSTALLED IN FPB-05 SA DUCT. SHUT-OFF FPB-05 UPON SMOKE DETECTION.
9. PROVIDE AIR BAFFLE TO BLOCK DISCHARGE SIDE OF THE DIFFUSER ADJACENT TO WALL.
10. PROVIDE INSULATION ON THE BACK OF THE THERMOSTAT TO AVOID FALSE READINGS DUE TO WALL INFLUENCE.

1

GENERAL NOTES:

1. DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL FLOOR PLANS AND SPECIFICATIONS.
2. ALL EXISTING SERVICES SHOWN ARE APPROXIMATE AND BASED ON EXISTING DRAWINGS. CONTRACTOR SHALL VERIFY ALL LOCATIONS ON SITE.
3. CONTRACTOR TO COORDINATE INSTALLATION WITH ALL OTHER TRADES INVOLVED ON SITE.
4. ENSURE NOT TO DISTURB SERVICES COVERING AREAS NOT INCLUDED IN THE SCOPE. ALL WORK MUST BE COORDINATED WITH DEPARTMENTAL REPRESENTATIVE.
5. CONTRACTOR SHALL VISIT SITE TO EXAMINE EXISTING CONDITIONS.
6. CONTRACTOR TO PROPOSE SOLUTIONS FOR REVIEW TO THE CONSULTANT IF ANY INTERFERENCES OCCUR DUE TO SITE CONDITIONS.
7. ALL MATERIAL USED IN THE CEILING SPACE (RETURN AIR PLENUM) SHALL MEET AND EXCEED THE N.B.C REQUIREMENTS FLAME AND SMOKE SPREAD/DEVELOPMENT RATINGS.
8. CONTRACTOR TO PROVIDE CONNECTION TO RELOCATED EXISTING EQUIPMENT AND ADDED EQUIPMENT DIRECTLY TO BUILDING HVAC SYSTEM AND UPDATE THE BMS ARCHITECTURE AS REQUIRED.
9. CONTRACTOR TO REMOVE ALL MECHANICAL EQUIPMENT AND INSTALL NEW ONES; SALVAGE AND REINSTALL ONLY WHEN SPECIFICALLY INDICATED.
10. CHILLED BEAMS DUCT CONNECTION SIZES ARE NOTED ON THE DRAWING. REFER TO CHILLED BEAMS SCHEDULE FOR THE CORRECT TYPE OF DUCTWORK - ROUND OR OVAL - FOR EACH CHILLED BEAM.
11. PROVIDE 26mm THICK ACOUSTIC LINER ON FIRST 3000mm LENGTH OF SUPPLY AIR DUCT FROM ALL DCV AND FPB IF DISCHARGE ATTENUATOR CANNOT BE INSTALLED DUE TO SPACE RESTRICTIONS.
12. MECHANICAL CONTRACTOR TO COORDINATE FCU-20, 21, 22 START-UP, TESTING AND COMISSIONING CONFIRM SCHEDULING WITH DEPARTMENTAL REPRESENTATIVE.
13. PROVIDE BALANCING DAMPERS AS REQUIRED FOR COMPLETE BALANCING OF THE SYSTEM. REFER TO DETAILS AND SPECIFICATIONS. NOT ALL THE REQUIRED BALANCING DAMPERS ARE SHOWN ON PLANS.
14. ALL THERMOSTATS IN PUBLIC AREAS TO BE EITHER BLANK PLATE-TYPE SENSORS OR PROVIDED WITH PROTECTIVE GUARDS.

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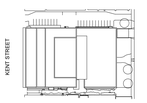
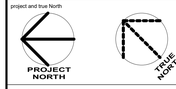
key plan




project and true North




project legend

| revisions | | date |
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project / projet

# DANIEL J MACDONALD MODERNIZATION

161 GRAFTON STREET
CHARLOTTETOWN, PEI, C1A 1L1

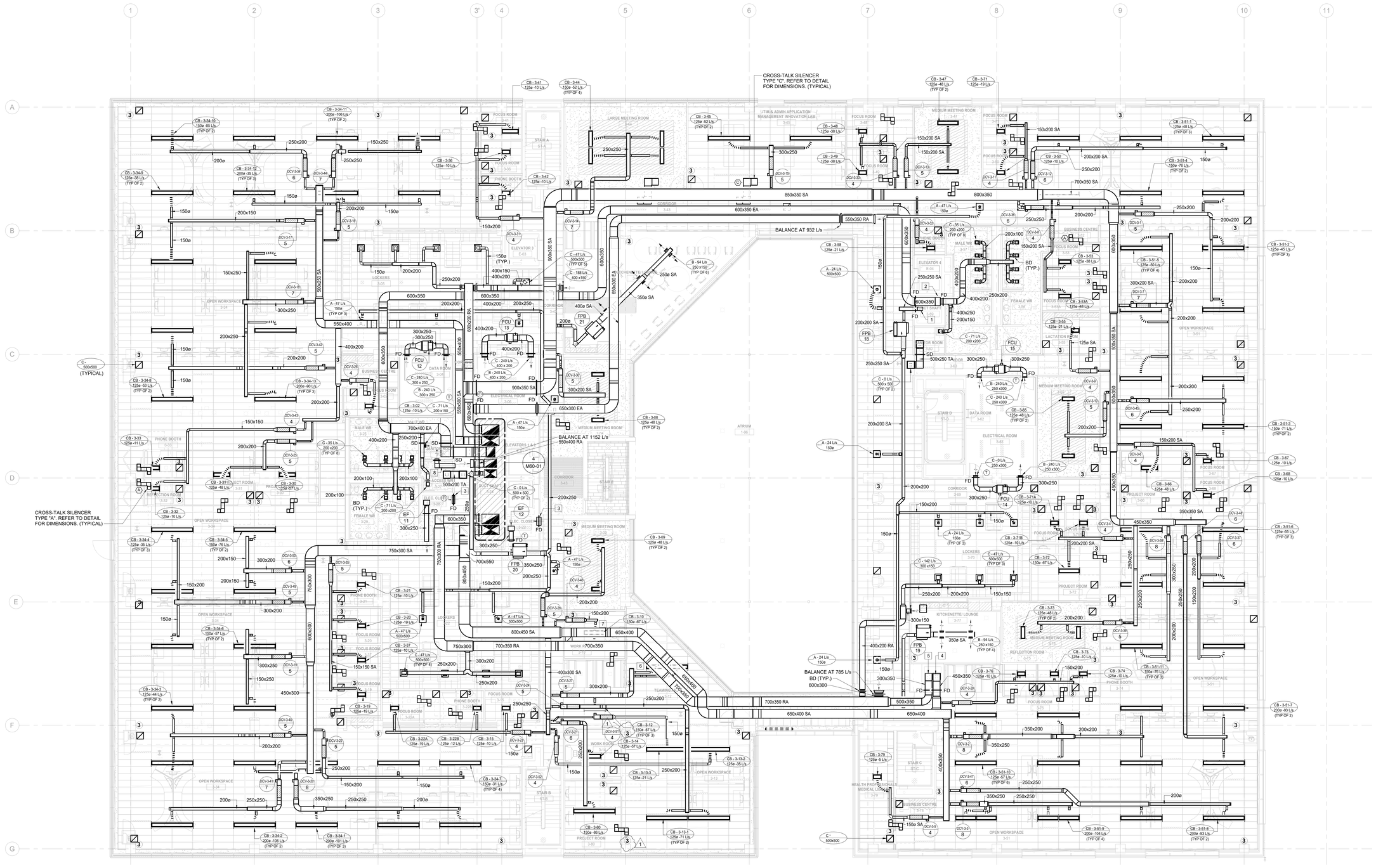
drawing / dessin

## HVAC - MAIN FLOOR NEW WORK

| | | |
|---|---|---|
| designed / conçu | NORR | |
| date | 2020-8-31 | |
| drawn / dessiné | NORR | |
| date | 2020-8-31 | |
| approved / approuvé | NORR | |
| date | 2022-07-25 | |
| Tender | | Soumission |
| PWGSC Project Manager | Administrateur de projets TPSGC | |
| project number / no. du projet | R.056687.005 | |
| drawing no. / no. du dessin | M50-01 | |

PWGSC AS (2004)

E-DRM/GDD-E: 553185 v1




1 M50-03 HVAC THIRD FLOOR

SCALE : 1:100

0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m

DRAWING NOTES:

1. 250x250 SUPPLY AIR DUCT FROM BELOW.
2. 600x350 EXHAUST AIR DUCT FROM BELOW.
3. 600x200 TRANSFER AIR DUCT C/W WIRE MESH SCREEN.
4. 500x350 SUPPLY AIR DUCT DOWN.
5. 500x350 RETURN AIR DUCT FROM BELOW.
6. SA / RA DUCT TRANSFERS ABOVE CHILLED BEAMS AND DOWN BELOW CONCRETE BEAM.
7. SA / RA DUCT OFFSETS ABOVE CHILLED BEAM AND RELATED DUCTWORK.
8. 300x150 TA C/W MESH SCREEN.

GENERAL NOTES:

1. DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL FLOOR PLANS AND SPECIFICATIONS.
2. ALL EXISTING SERVICES SHOWN ARE APPROXIMATE AND BASED ON EXISTING DRAWINGS. CONTRACTOR SHALL VERIFY ALL LOCATIONS ON SITE.
3. CONTRACTOR TO COORDINATE INSTALLATION WITH ALL OTHER TRADES INVOLVED ON SITE.
4. ENSURE NOT TO DISTURB SERVICES COVERING AREAS NOT INCLUDED IN THE SCOPE. ALL WORK MUST BE COORDINATED WITH DEPARTMENTAL REPRESENTATIVE.
5. CONTRACTOR SHALL VISIT SITE TO EXAMINE EXISTING CONDITIONS.
6. CONTRACTOR TO PROPOSE SOLUTIONS FOR REVIEW TO THE CONSULTANT IF ANY INTERFERENCES OCCUR DUE TO SITE CONDITIONS.
7. ALL MATERIAL USED IN THE CEILING SPACE (RETURN AIR PLENUM) SHALL MEET AND EXCEED THE N.B.C REQUIREMENTS FLAME AND SMOKE SPREAD/DEVELOPMENT RATINGS.
8. CONTRACTOR TO PROVIDE CONNECTION TO RELOCATED EXISTING EQUIPMENT AND ADDED EQUIPMENT DIRECTLY TO BUILDING HVAC SYSTEM AND UPDATE THE BMS ARCHITECTURE AS REQUIRED.
9. CONTRACTOR TO REMOVE ALL MECHANICAL EQUIPMENT AND INSTALL NEW ONES, SALVAGE AND REINSTALL ONLY WHEN SPECIFICALLY INDICATED.
10. CHILLED BEAMS DUCT CONNECTION SIZES ARE NOTED ON THE DRAWING. REFER TO CHILLED BEAMS SCHEDULE FOR THE CORRECT TYPE OF DUCTWORK - ROUND OR OVAL - FOR EACH CHILLED BEAM.
11. PROVIDE 25mm THICK ACOUSTIC LINER ON FIRST 3000mm LENGTH OF SUPPLY AIR DUCT FROM ALL DCV AND FPB IF DISCHARGE ATTENUATOR CANNOT BE INSTALLED DUE TO SPACE RESTRICTIONS.
12. PROVIDE BALANCING DAMPERS AS REQUIRED FOR COMPLETE BALANCING OF THE SYSTEM. REFER TO DETAILS AND SPECIFICATIONS. NOT ALL THE REQUIRED BALANCING DAMPERS ARE SHOWN ON PLANS.
13. ALL THERMOSTATS IN PUBLIC AREAS TO BE EITHER BLANK PLATE-TYPE SENSORS OR PROVIDED WITH PROTECTIVE GUARDS.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key plan

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project legend

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| 0 | ISSUED FOR TENDER | 2022-05-27 |

project / projet

DANIEL J MACDONALD MODERNIZATION

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drawing / dessin

HVAC - THIRD FLOOR NEW WORK

designed / conçu: NORR
date: 2020-8-31
drawn / dessiné: NORR
date: 2020-8-31
approved / approuvé: NORR
date: 2022-07-25
Tender / Soumission
PWGSC Project Manager / Administrateur de projets TPSGC
project number / no. du projet: R.056687.005
drawing no. / no. du dessin: M50-03

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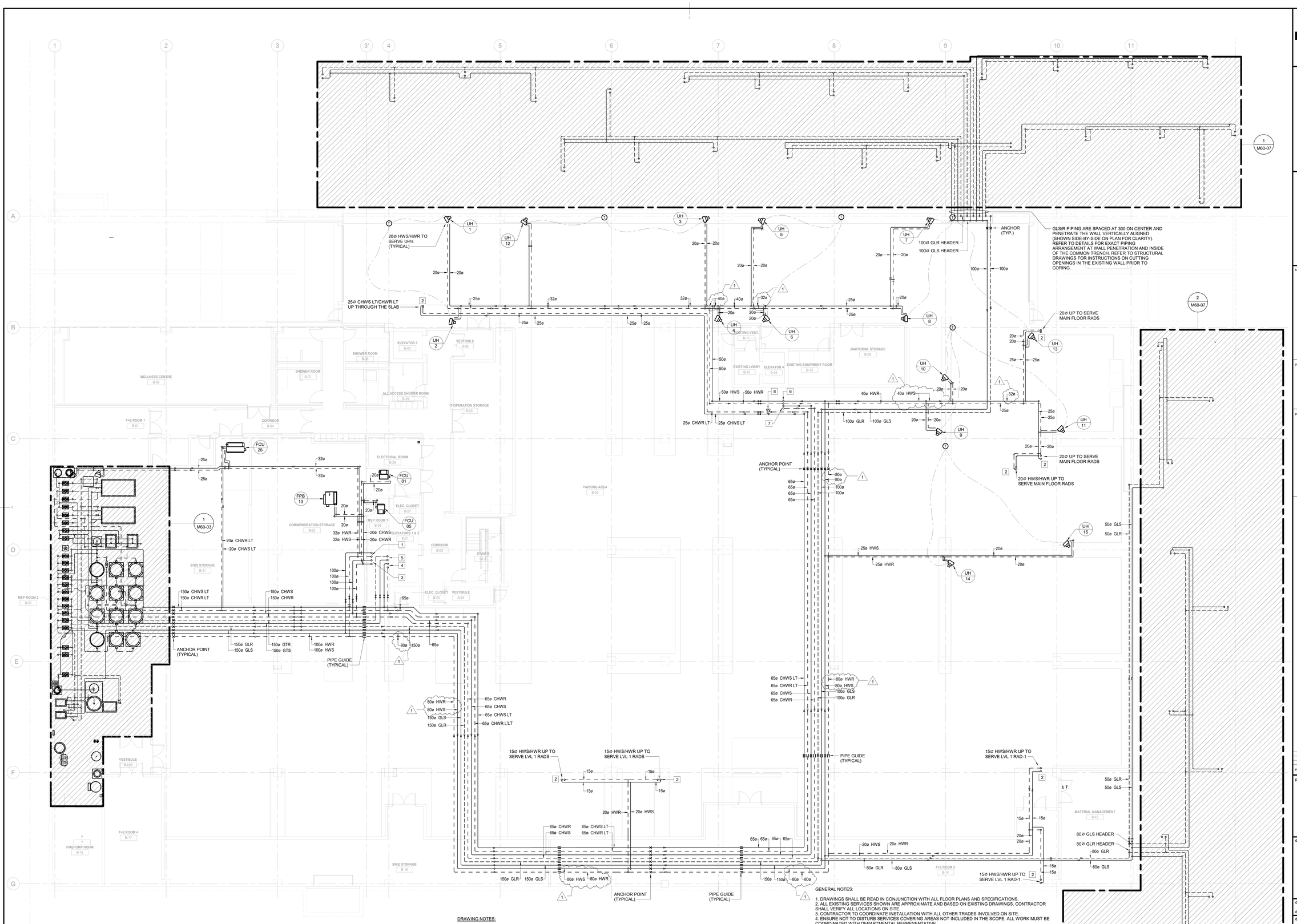


1 M53-00 HVAC PIPING PARKING LEVEL

SCALE : 1:100

0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m

DRAWING NOTES:

1. 100ø HWS/HWR UP TO FLOORS AND PENTHOUSE.
2. PROVIDE NEW FLOOR OPENINGS. SCAN FLOOR PRIOR TO CORING AND COORDINATE WITH STRUCTURAL.
3. 100ø CHWS/CHWR UP TO FLOORS TO SERVE COOLING REQUIREMENTS.
4. 100ø CHWS LT/CHWR LT UP TO PENTHOUSE.
5. 150ø GTS/GTR UP TO PENTHOUSE.
6. 65ø HWS/HWR UP TO FLOORS TO SERVE HEATING REQUIREMENTS.
7. 65ø CHWS/CHWR UP TO FLOORS TO SERVE COOLING REQUIREMENTS.
8. 65ø CHWS LT/CHWR LT UP TO SERVE FCU-20, 21, AND 22 ON MAIN FLOOR.
9. RESERVED

GENERAL NOTES:

1. DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL FLOOR PLANS AND SPECIFICATIONS.
2. ALL EXISTING SERVICES SHOWN ARE APPROXIMATE AND BASED ON EXISTING DRAWINGS. CONTRACTOR SHALL VERIFY ALL LOCATIONS ON SITE.
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8. CONTRACTOR TO PROVIDE CONNECTION TO RELOCATED EXISTING EQUIPMENT AND ADDED EQUIPMENT DIRECTLY TO BUILDING HVAC SYSTEM AND UPDATE THE BMS ARCHITECTURE AS REQUIRED.
9. CONTRACTOR TO REMOVE ALL MECHANICAL EQUIPMENT AND INSTALL NEW ONES; SALVAGE AND REINSTALL ONLY WHEN SPECIFICALLY INDICATED.
10. HEADROOM CLEARANCE VARIES THROUGHOUT THE PARKING GARAGE. INSTALL UNIT HEATERS AT MINIMUM 2000 A.F.F. INSTALL PIPING AS HIGH AS POSSIBLE AND MAINTAIN ABOVE 2000 A.F.F. AT ALL TIMES.
11. SUPPLY AND INSTALL ALL NECESSARY EXPANSION COMPENSATORS, ANCHORS AND ALIGN GUIDES ON ALL HYDRONIC PIPING TO SUIT INSTALLATION. EXPANSION CONTROL SHOWN ON THE DRAWING ONLY SUGGESTS THE DESIGN INTENT.
12. ALL THERMOSTSTS IN PUBLIC AREAS TO BE EITHER BLANK PLATE-TYPE SENSORS OR PROVIDED WITH PROTECTIVE GUARDS.

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key plan

project and true North

project legend

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| 0 | ISSUED FOR TENDER | 2022-05-27 |

project / projet

DANIEL J MACDONALD MODERNIZATION

161 GRAFTON STREET
CHARLOTTETOWN, PEI, C1A 1L1

drawing / dessin

HYDRONIC - PARKING LEVEL NEW WORK

designed NORR / conçu
date 2020-8-31
drawn NORR / dessiné
date 2020-8-31
approved NORR / approuvé
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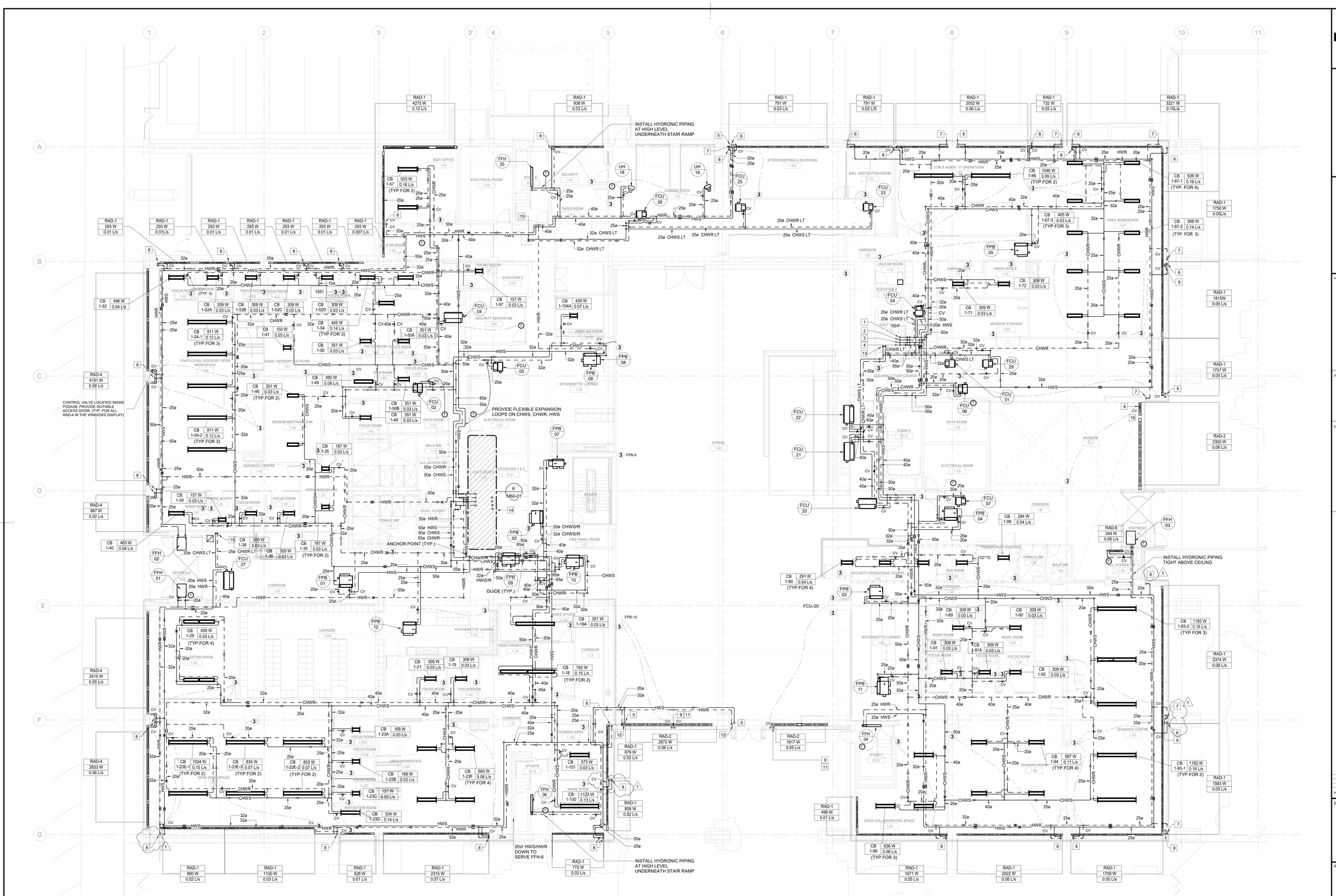
E-DRM/GDD-E: 553185 v1

PWGSC A0 (2004)




1 M53-01 HVAC PIPING MAIN FLOOR

SCALE : 1:100

0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m

DRAWING NOTES:

1. 65ø HWS FROM BELOW AND UP.
2. 65ø HWR FROM ABOVE AND DOWN.
3. 65ø CHWS FROM BELOW AND UP.
4. 65ø CHWR FROM ABOVE AND DOWN.
5. PROVIDE NEW FLOOR OPENINGS. SCAN FLOOR PRIOR TO CORING AND COORDINATE WITH STRUCTURAL.
6. 20ø HWS UP THROUGH FLOOR TO SERVICE RADIATORS AT LEVEL ABOVE. RE-USE EXISTING FLOOR OPENINGS.
7. 20ø HWR DOWN THROUGH FLOOR FROM RADIATORS AT LEVEL ABOVE. RE-USE EXISTING FLOOR OPENINGS.
8. 20ø HWS/HWR DOWN TO SERVE RADS.
9. 15ø HWS/HWR FROM PARKING GARAGE. PROVIDE NEW FLOOR OPENING. SCAN FLOOR PRIOR TO CORING AND COORDINATE WITH STRUCTURAL.
10. RESERVED
11. 15ø HWS/HWR FROM BELOW TO SERVE RAD-2.
12. 20ø HWS/HWR UP THROUGH FLOOR TO SERVE RADIATOR AT LEVEL ABOVE. PROVIDE NEW FLOOR OPENING. SCAN FLOOR PRIOR TO CORING AND COORDINATE OPENING WITH RADIATOR LOCATION. PIPING PENETRATES THROUGH FLOOR INTO THE RADIATOR TROUGH
13. 65ø CHWS/CHWR FROM BELOW. 25ø CHWS/R TO LEVEL ABOVE.
14. FOR HVAC PIPING, PLUMBING PIPING AND HVAC DUCTING WITHIN RISER SHAFT, REFER TO PART PLAN 5 ON DRAWING M60-01.
15. 32ø CHWS/CHWR FROM BELOW.
16. RUN PIPE THROUGH INSIDE OF THE WALL TO RADIATORS SECTION BEYOND THE COLUMN

NOTES:

1. PROVIDE RADIATORS TO MEET THE CAPACITY REQUIREMENTS NOTED ON THE DRAWING AND TO COMPLY WITH DIMENSIONS AND TYPE ACCORDING TO THE SCHEDULE.
2. RADIATORS TO BE C/W ALL ACCESSORIES AND TRIMS NECESSARY TO MAINTAIN CONTINUOUS APPEARANCE ALONG EXTERIOR WALLS.
3. INSTAL HWS/HWR PIPING THROUGH EXISTING FLOOR OPENINGS TO SERVICE RADIATORS ON LEVEL ABOVE AS NOTED. PATCH UNUSED FLOOR OPENINGS. PROVIDE SAME END OR OPPOSITE END CONNECTIONS AS NECESSARY TO SUIT INSTALLATION AS SHOWN ON THE DRAWING.
4. PROVIDE CONTROL VALVES FOR RADIATORS IN EACH ZONE. REFER TO RADIATOR PIPING DETAILS FOR CONTROL VALVES LOCATION AND PIPING ARRANGEMENTS.
5. SUPPLY AND INSTALL ALL NECESSARY EXPANSION COMPENSATORS, ANCHORS AND ALIGN GUIDES ON ALL HYDRONIC PIPING TO SUIT INSTALLATION. EXPANSION CONTROL SHOWN ON THE DRAWING ONLY SUGGESTS THE DESIGN INTENT.

GENERAL NOTES:

1. DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL FLOOR PLANS AND SPECIFICATIONS.
2. ALL EXISTING SERVICES SHOWN ARE APPROXIMATE AND BASED ON EXISTING DRAWINGS. CONTRACTOR SHALL VERIFY ALL LOCATIONS ON SITE.
3. CONTRACTOR TO COORDINATE INSTALLATION WITH ALL OTHER TRADES INVOLVED ON SITE.
4. ENSURE NOT TO DISTURB SERVICES COVERING AREAS NOT INCLUDED IN THE SCOPE. ALL WORK MUST BE COORDINATED WITH DEPARTMENTAL REPRESENTATIVE.
5. CONTRACTOR SHALL VISIT SITE TO EXAMINE EXISTING CONDITIONS.
6. CONTRACTOR TO PROPOSE SOLUTIONS FOR REVIEW TO THE CONSULTANT IF ANY INTERFERENCES OCCUR DUE TO SITE CONDITIONS.
7. ALL MATERIAL USED IN THE CEILING SPACE (RETURN AIR PLENUM) SHALL MEET AND EXCEED THE N.B.C REQUIREMENTS FLAME AND SMOKE SPREAD/DEVELOPMENT RATINGS.
8. CONTRACTOR TO PROVIDE CONNECTION TO RELOCATED EXISTING EQUIPMENT AND ADDED EQUIPMENT DIRECTLY TO BUILDING HVAC SYSTEM AND UPDATE THE BMS ARCHITECTURE AS REQUIRED.
9. CONTRACTOR TO REMOVE ALL MECHANICAL EQUIPMENT AND INSTALL NEW ONES; SALVAGE AND REINSTALL ONLY WHEN SPECIFICALLY INDICATED.
10. MECHANICAL CONTRACTOR TO X-RAY SCAN SLAB PRIOR TO CORING.
11. ALL THERMOSTATS IN PUBLIC AREAS TO BE EITHER BLANK PLATE-TYPE SENSORS OR PROVIDED WITH PROTECTIVE GUARDS.

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key plan

project and true North

project legend

| revisions | | date |
|---|---|---|
| 1 | ADDENDUM # 5 | 2022-07-25 |
| 0 | ISSUED FOR TENDER | 2022-06-27 |

project / projet

DANIEL J MACDONALD MODERNIZATION

161 GRAFTON STREET
CHARLOTTETOWN, PEI, C1A 1L1

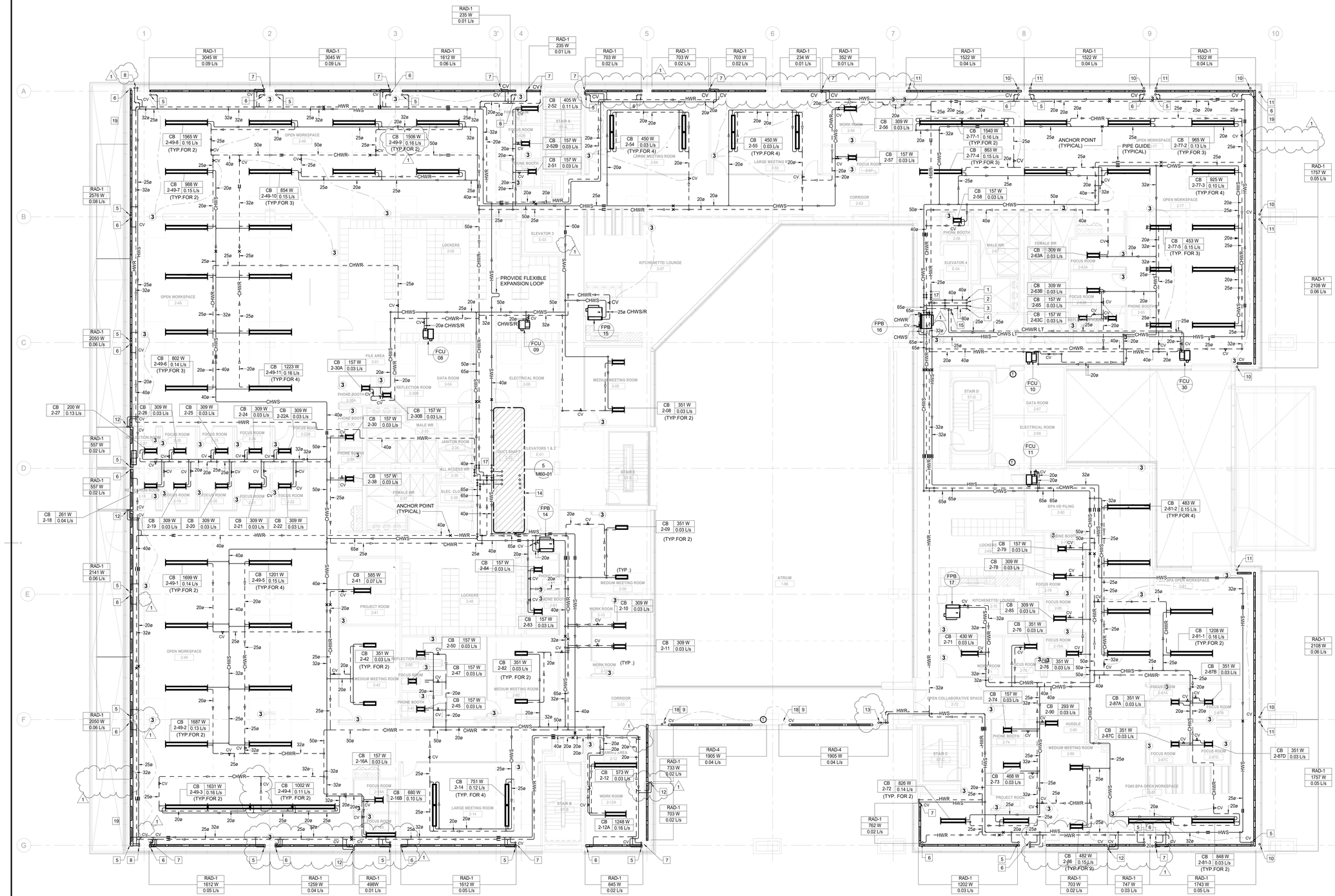
drawing / dessin

HYDRONIC - MAIN FLOOR NEW WORK

| | | |
|---|---|---|
| designed | NORR | congu |
| date | 2020-8-31 | |
| drawn | NORR | dessiné |
| date | 2020-8-31 | |
| approved | NORR | approuvé |
| date | 2022-07-25 | |
| Tender | | Soumission |
| PWGSC Project Manager | Administrateur de projets TPSGC | |
| project number | | no. du projet |
| R.056687.005 | | |
| drawing no. | | no. du dessin |
| M53-01 | | |

E-DRM/GDD-E: 553185 v1

PWGSC A0 (2004)




1 M53-02 HVAC PIPING SECOND FLOOR

SCALE : 1:100

0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m

DRAWING NOTES:

1. 65ø HWS FROM BELOW, 40ø UP.
2. 40ø HWR FROM ABOVE, 65ø DOWN.
3. 65ø CHWS FROM BELOW, 40ø UP.
4. 40ø CHWR FROM ABOVE, 65ø DOWN.
5. 20ø HWS UP THROUGH FLOOR TO SERVICE RADIATORS AT LEVEL ABOVE. RE-USE EXISTING FLOOR OPENINGS.
6. 20ø HWR DOWN THROUGH FLOOR FROM RADIATORS AT LEVEL ABOVE. RE-USE EXISTING FLOOR OPENINGS.
7. 20ø HWS/HWR DOWN TO SERVE RADS.
8. 20ø HWS/HWS TIGHT TO COLUMN, DOWN TO SERVICE RADS ON THE NORTH SIDE. PROVIDE TRIM TO SUIT, RUN PIPING INSIDE TRIM.
9. 20ø HWS/HWR FROM BELOW. REFER TO IN-FLOOR RADIATOR DETAIL.
10. 20ø HWR DOWN. RE-USE EXISTING FLOOR OPENING.
11. 20ø HWS FROM BELOW. RE-USE EXISTING FLOOR OPENING.
12. 20ø HWS/HWR INSIDE PARTITION WALL, DOWN TO SERVICE RADS.
13. 20ø HWS/HWR UP THROUGH FLOOR TO SERVE RADIATOR AT LEVEL ABOVE. PROVIDE NEW FLOOR OPENING. SCAN FLOOR PRIOR TO CORING AND COORDINATE OPENING WITH RADIATOR LOCATION. PIPING PENETRATES THROUGH FLOOR INTO THE RADIATOR TROUGH
14. FOR HVAC PIPING, PLUMBING PIPING AND HVAC DUCTING WITHIN RISER SHAFT, REFER TO PART PLAN 4 ON DRAWING M60-01.
15. 25ø CHWS/CHWR FROM BELOW.
16. RESERVED 1
17. PROVIDE CBV ON ALL HWR AND CHWR BRANCHES UPSTREAM OF SHUT-OFF VALVE.
18. CV LOCATED IN CEILING SPACE AT LEVEL BELOW.
19. LEAVE THIS SECTION BLANK, PROVIDE TRIM ONLY TO COVER THE PIPING.

NOTES:

1. PROVIDE RADIATORS TO MEET THE CAPACITY REQUIREMENTS NOTED ON THE DRAWING AND TO COMPLY WITH DIMENSIONS AND TYPE ACCORDING TO THE SCHEDULE.
2. RADIATORS TO BE C/W ALL ACCESSORIES AND TRIMS NECESSARY TO MAINTAIN CONTINUOUS APPEARANCE ALONG EXTERIOR WALLS.
3. INSTAL HWS/HWR PIPING THROUGH EXISTING FLOOR OPENINGS TO SERVICE RADIATORS ON LEVEL ABOVE AS NOTED. PATCH UNUSED FLOOR OPENINGS. PROVIDE SAME END-OR OPPOSITE END CONNECTIONS AS NECESSARY TO SUIT INSTALLATION AS SHOWN ON THE DRAWING. 1
4. PROVIDE CONTROL VALVES FOR RADIATORS IN EACH ZONE. REFER TO RADIATOR PIPING DETAILS FOR CONTROL VALVES LOCATION AND PIPING ARRANGEMENTS.

GENERAL NOTES:

1. DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL FLOOR PLANS AND SPECIFICATIONS.
2. ALL EXISTING SERVICES SHOWN ARE APPROXIMATE AND BASED ON EXISTING DRAWINGS. CONTRACTOR SHALL VERIFY ALL LOCATIONS ON SITE.
3. CONTRACTOR TO COORDINATE INSTALLATION WITH ALL OTHER TRADES INVOLVED ON SITE.
4. ENSURE NOT TO DISTURB SERVICES COVERING AREAS NOT INCLUDED IN THE SCOPE. ALL WORK MUST BE COORDINATED WITH DEPARTMENTAL REPRESENTATIVE.
5. CONTRACTOR SHALL VISIT SITE TO EXAMINE EXISTING CONDITIONS.
6. CONTRACTOR TO PROPOSE SOLUTIONS FOR REVIEW TO THE CONSULTANT IF ANY INTERFERENCES OCCUR DUE TO SITE CONDITIONS.
7. ALL MATERIAL USED IN THE CEILING SPACE (RETURN AIR PLENUM) SHALL MEET AND EXCEED THE N.B.C REQUIREMENTS FLAME AND SMOKE SPREAD/DEVELOPMENT RATINGS.
8. CONTRACTOR TO PROVIDE CONNECTION TO RELOCATED EXISTING EQUIPMENT AND ADDED EQUIPMENT DIRECTLY TO BUILDING HVAC SYSTEM AND UPDATE THE BMS ARCHITECTURE AS REQUIRED.
9. CONTRACTOR TO REMOVE ALL MECHANICAL EQUIPMENT AND INSTALL NEW ONES; SALVAGE AND REINSTALL ONLY WHEN SPECIFICALLY INDICATED.
10. MECHANICAL CONTRACTOR TO X-RAY SCAN SLAB PRIOR TO CORING.
11. SUPPLY AND INSTALL ALL NECESSARY EXPANSION COMPENSATORS, ANCHORS AND ALIGN GUIDES ON ALL HYDRONIC PIPING.
12. ALL THERMOSTATS IN PUBLIC AREAS TO BE EITHER BLANK PLATE-TYPE SENSORS OR PROVIDED WITH PROTECTIVE GUARDS.

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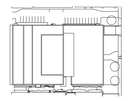
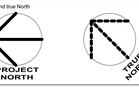
key plan




project and true North




project legend

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|---|---|---|
| 1 | ADDENDUM # 5 | 2022-07-25 |
| 0 | ISSUED FOR TENDER | 2022-05-27 |

project / projet

DANIEL J MACDONALD MODERNIZATION

161 GRAFTON STREET
CHARLOTTETOWN, PEI, C1A 1L1

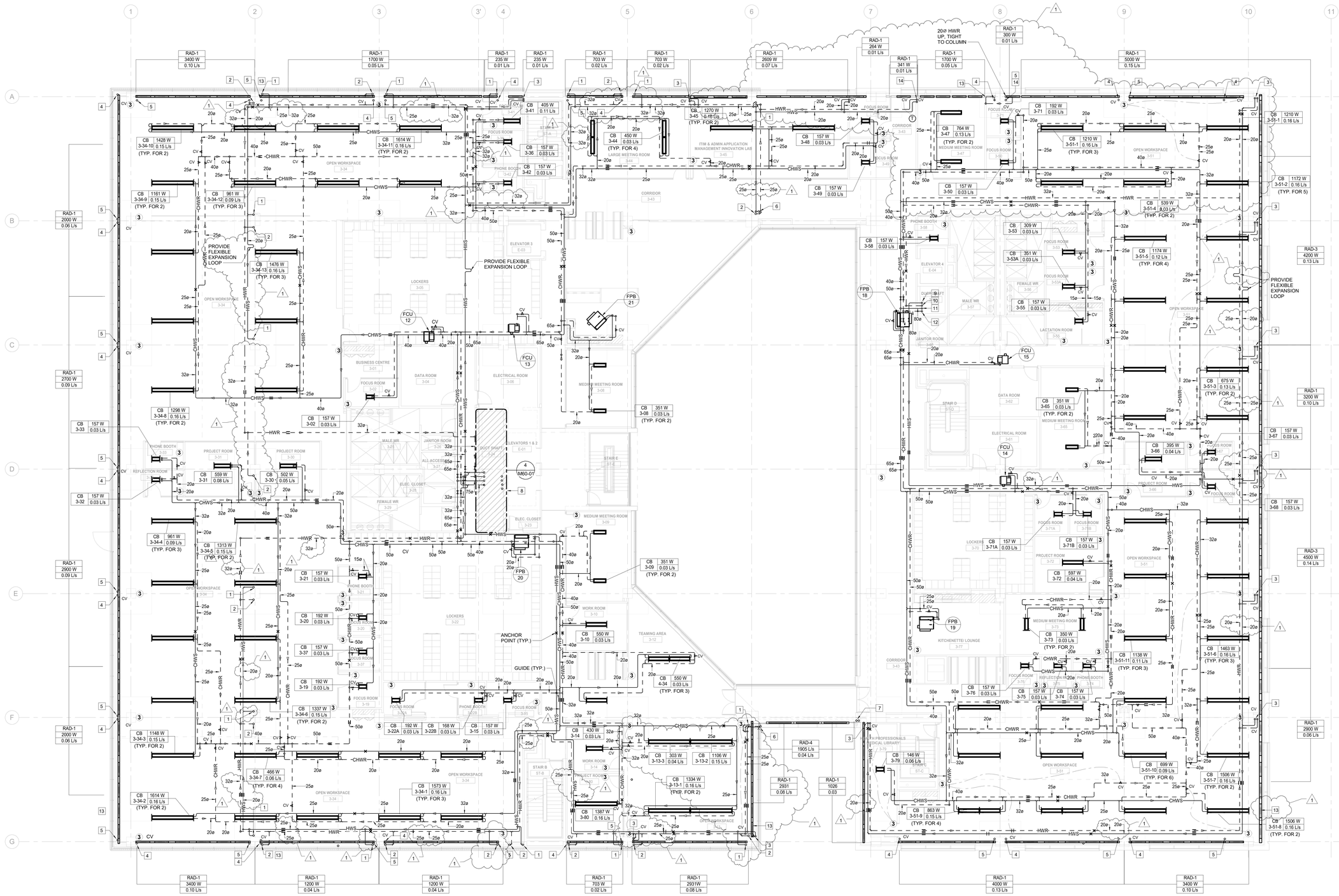
drawing / dessin

HYDRONIC - SECOND FLOOR NEW WORK

designed / conçu: NORR
date: 2020-8-31
drawn / dessiné: NORR
date: 2020-8-31
approved / approuvé: NORR
date: 2022-07-25
Tender / Soumission
PWGSC Project Manager / Administrateur de projets TPSGC
project number / no. du projet: R.056687.005
drawing no. / no. du dessin: M53-02

E-DRM/GDD-E: 553185 v1

PWGSC A0 (2004)




1 / M53-03 HVAC PIPING THIRD FLOOR

SCALE : 1:100

0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m

DRAWING NOTES:

1. 20ø HWS UP THROUGH FLOOR TO SERVICE RADIATORS AT LEVEL ABOVE. RE-USE EXISTING FLOOR OPENINGS.
2. 20ø HWR DOWN THROUGH FLOOR FROM RADIATORS AT LEVEL ABOVE. RE-USE EXISTING FLOOR OPENINGS.
3. 20ø HWS/HWR DOWN TO SERVE RADS.
4. 20ø HWR DOWN. RE-USE EXISTING FLOOR OPENING.
5. 20ø HWS FROM BELOW. RE-USE EXISTING FLOOR OPENING.
6. 20ø HWS/HWR UP TO SERVE THE SERVICE SPACE RADS. C/W ISOLATION VALVES LOCATED INSIDE THE 'T-BAR' CEILING SPACE.PROVIDE NEW FLOOR OPENINGS. SCAN FLOOR PRIOR TO CORING AND COORDINATE WITH STRUCTURAL.
7. 20ø HWS/HWR FROM BELOW. PROVIDE NEW FLOOR OPENINGS, SCAN FLOOR PRIOR TO CORING AND COORDINATE WITH STRUCTURAL. REFER TO IN-FLOOR RADIATOR PIPING DETAIL.
8. FOR HVAC PIPING, PLUMBING PIPING AND HVAC DUCTING WITHIN RISER SHAFT, REFER TO PART PLAN 4 ON DRAWING M60-01.

DRAWING NOTES:

9. 32ø HWS FROM BELOW.
10. 32ø HWR DOWN.
11. 100ø CHWS FROM BELOW.
12. 100ø CHWR DOWN.
13. LEAVE THIS SECTION BLANK, PROVIDE TRIM ONLY TO COVER THE PIPING.
14. RUN PIPE THROUGH WALL TO SERVICE RADIATOR IN ADJACENT ROOM.

NOTES:

1. PROVIDE RADIATORS TO MEET THE CAPACITY REQUIREMENTS NOTED ON THE DRAWING AND TO COMPLY WITH DIMENSIONS AND TYPE ACCORDING TO THE SCHEDULE.
2. RADIATORS TO BE C/W ALL ACCESSORIES AND TRIMS NECESSARY TO MAINTAIN CONTINUOUS APPEARANCE ALONG EXTERIOR WALLS.
3. INSTAL HWS/HWR PIPING THROUGH EXISTING FLOOR OPENINGS TO SERVICE RADIATORS ON LEVEL ABOVE AS NOTED. PATCH UNUSED FLOOR OPENINGS. PROVIDE SAME END OR OPPOSITE END CONNECTIONS AS NECESSARY TO SUIT INSTALLATION AS SHOWN ON THE DRAWING.
4. PROVIDE CONTROL VALVES FOR RADIATORS IN EACH ZONE. REFER TO RADIATOR PIPING DETAILS FOR CONTROL VALVES LOCATION AND PIPING ARRANGEMENTS.

GENERAL NOTES:

1. DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL FLOOR PLANS AND SPECIFICATIONS.
2. ALL EXISTING SERVICES SHOWN ARE APPROXIMATE AND BASED ON EXISTING DRAWINGS. CONTRACTOR SHALL VERIFY ALL LOCATIONS ON SITE.
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5. CONTRACTOR SHALL VISIT SITE TO EXAMINE EXISTING CONDITIONS.
6. CONTRACTOR TO PROPOSE SOLUTIONS FOR REVIEW TO THE CONSULTANT IF ANY INTERFERENCES OCCUR DUE TO SITE CONDITIONS.
7. ALL MATERIAL USED IN THE CEILING SPACE (RETURN AIR PLENUM) SHALL MEET AND EXCEED THE N.B.C REQUIREMENTS FLAME AND SMOKE SPREAD/DEVELOPMENT RATINGS.
8. CONTRACTOR TO PROVIDE CONNECTION TO RELOCATED EXISTING EQUIPMENT AND ADDED EQUIPMENT DIRECTLY TO BUILDING HVAC SYSTEM AND UPDATE THE BMS ARCHITECTURE AS REQUIRED.
9. CONTRACTOR TO REMOVE ALL MECHANICAL EQUIPMENT AND INSTALL NEW ONES; SALVAGE AND REINSTALL ONLY WHEN SPECIFICALLY INDICATED.
10. MECHANICAL CONTRACTOR TO X-RAY SCAN SLAB PRIOR TO CORING.
11. SUPPLY AND INSTALL ALL NECESSARY EXPANSION COMPENSATORS, ANCHORS AND ALIGN GUIDES ON ALL HYDRONIC PIPING TO SUIT INSTALLATION. EXPANSION CONTROL SHOWN ON THE DRAWING ONLY SUGGESTS THE DESIGN INTENT.
12. ALL THERMOSTATS IN PUBLIC AREAS TO BE EITHER BLANK PLATE-TYPE SENSORS OR PROVIDED WITH PROTECTIVE GUARDS.


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key plan

project and true North

project legend

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project / projet

DANIEL J MACDONALD MODERNIZATION

161 GRAFTON STREET
CHARLOTTETOWN, PEI, C1A 1L1

drawing / dessin

HYDRONIC - THIRD FLOOR NEW WORK

designed NORR / conçu
date 2020-8-31
drawn NORR / dessiné
date 2020-8-31
approved NORR / approuvé
date 2022-07-25
Tender / Soumission
PWGSC Project Manager / Administrateur de projets TPSGC
project number / no. du projet R.056687.005
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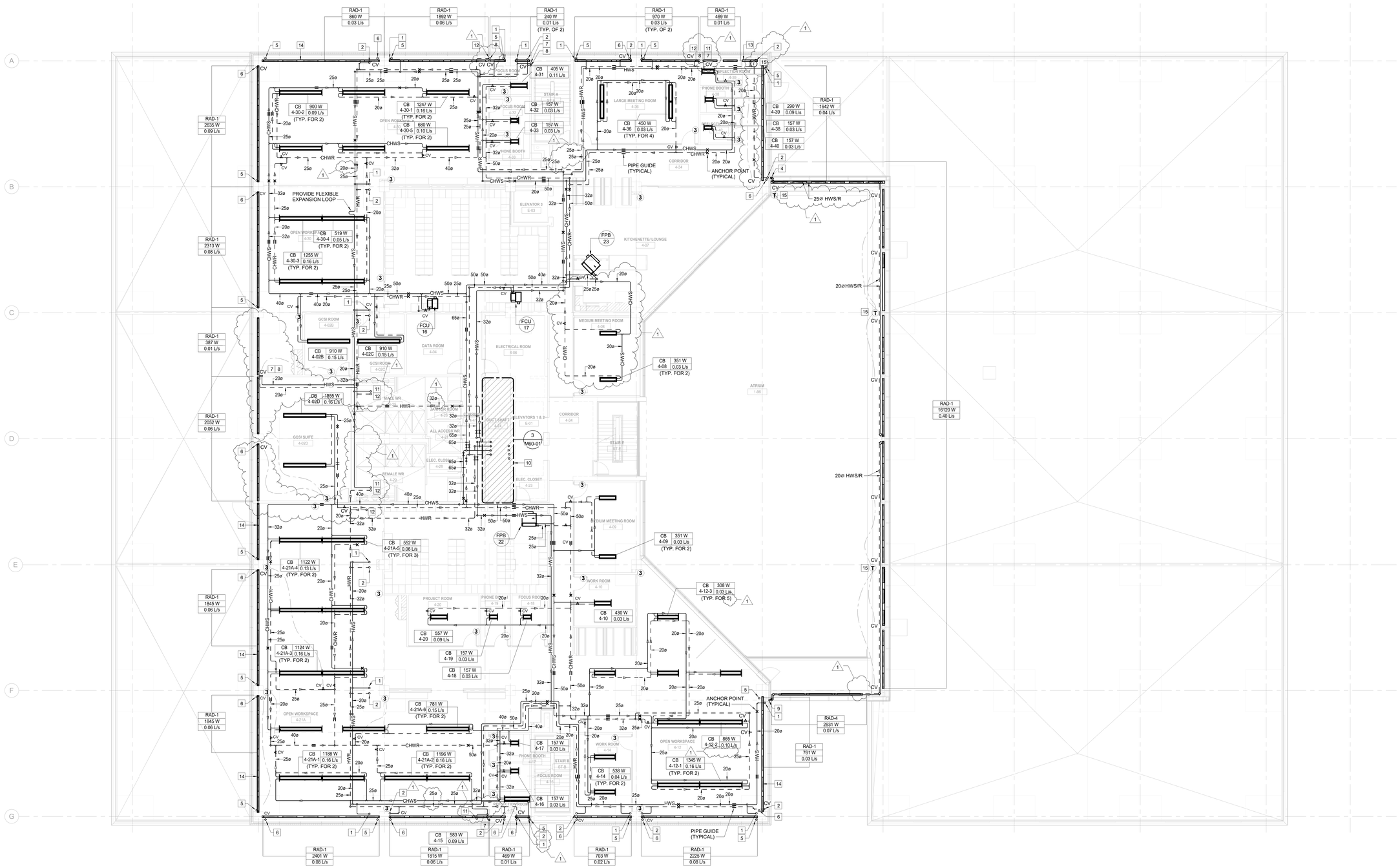
PWGSC A0 (2004)




1 M53-04 HVAC PIPING FOURTH FLOOR

SCALE : 1:100

0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m

DRAWING NOTE

1. 20ø HWS UP THROUGH FLOOR TO SERVICE RADIATORS AT LEVEL ABOVE. RE-USE EXISTING FLOOR OPENINGS.
2. 20ø HWR DOWN THROUGH FLOOR FROM RADIATORS AT LEVEL ABOVE. RE-USE EXISTING FLOOR OPENINGS.
3. 20ø HWS/HWR DOWN TO SERVE RADS.
4. 20ø HWS/HWR FROM BELOW TO SERVE THE SERVICE SPACE RADS. PROVIDE NEW FLOOR OPENINGS, SCAN FLOOR PRIOR TO CORING AND COORDINATE WITH STRUCTURAL.
5. 20ø HWS FROM BELOW. RE-USE EXISTING FLOOR OPENING.
6. 20ø HWR DOWN. RE-USE EXISTING FLOOR OPENING.
7. 20ø HWS DOWN TO SERVE RAD.
8. 20ø HWR FROM RAD.
9. 20ø HWS/HWR FROM BELOW TO SERVE RAD-4. PROVIDE NEW FLOOR OPENINGS, SCAN FLOOR PRIOR TO CORING AND COORDINATE WITH STRUCTURAL.
10. FOR HVAC PIPING, PLUMBING PIPING AND HVAC DUCTING WITHIN RISER SHAFT, REFER TO PART PLAN 3 ON DRAWING M60-01.

DRAWING NOTE

11. 20ø HWS UP THROUGH FLOOR TO SERVICE RARIATORS AT LEVEL ABOVE. PROVIDE NEW FLOOR OPENINGS. SCAN FLOOR PRIOR TO CORING AND COORDINATE WITH STRUCTURAL.
12. 20ø HWR THROUGH FLOOR FROM RADIATORS AT LEVEL ABOVE. PROVIDE NEW FLOOR OPENINGS, SCAN FLOOR PRIOR TO CORING AND COORDINATE WITH STRUCTURAL.
13. PROVIDE TRIM ONLY.
14. NO RADIATOR IN THIS SECTION. PROVIDE TRIM TO COVER PIPING.
15. PROVIDE WALL PLATE SENSOR (NOT ADJUSTABLE)

NOTES:

1. PROVIDE RADIATORS TO MEET THE CAPACITY REQUIREMENTS NOTED ON THE DRAWING AND TO COMPLY WITH DIMENSIONS AND TYPE ACCORDING TO THE SCHEDULE.
2. RADIATORS TO BE C/W ALL ACCESSORIES AND TRIMS NECESSARY TO MAINTAIN CONTINUOUS APPEARANCE ALONG EXTERIOR WALLS.
3. INSTAL HWS/HWR PIPING THROUGH EXISTING FLOOR OPENINGS TO SERVICE RADIATORS ON LEVEL ABOVE AS NOTED. PATCH UNUSED FLOOR OPENINGS. PROVIDE SAME END OR OPPOSITE END CONNECTIONS AS NECESSARY TO SUIT INSTALLATION AS SHOWN ON THE DRAWING.
4. PROVIDE CONTROL VALVES FOR RADIATORS IN EACH ZONE. REFER TO RADIATOR PIPING DETAILS FOR CONTROL VALVES LOCATION AND PIPING ARRANGEMENTS.

GENERAL NOTES:

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7. ALL MATERIAL USED IN THE CEILING SPACE (RETURN AIR PLENUM) SHALL MEET AND EXCEED THE N.B.C REQUIREMENTS FLAME AND SMOKE SPREAD/DEVELOPMENT RATINGS.
8. CONTRACTOR TO PROVIDE CONNECTION TO RELOCATED EXISTING EQUIPMENT AND ADDED EQUIPMENT DIRECTLY TO BUILDING HVAC SYSTEM AND UPDATE THE BMS ARCHITECTURE AS REQUIRED.
9. CONTRACTOR TO REMOVE ALL MECHANICAL EQUIPMENT AND INSTALL NEW ONES; SALVAGE AND REINSTALL ONLY WHEN SPECIFICALLY INDICATED.
10. MECHANICAL CONTRACTOR TO X-RAY SCAN SLAB PRIOR TO CORING.
11. SUPPLY AND INSTALL ALL NECESSARY EXPANSION COMPENSATORS, ANCHORS AND ALIGN GUIDES ON ALL HYDRONIC PIPING TO SUIT INSTALLATION. EXPANSION CONTROL SHOWN ON THE DRAWING ONLY SUGGESTS THE DESIGN INTENT.
12. ALL THERMOSTATS IN PUBLIC AREAS TO BE EITHER BLANK PLATE-TYPE SENSORS OR PROVIDED WITH PROTECTIVE GUARDS.

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key plan

project and true North

project legend

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| 1 | ADDENDUM # 5 | 2022-07-25 |
| 0 | ISSUED FOR TENDER | 2022-05-27 |

project / projet

DANIEL J MACDONALD MODERNIZATION

161 GRAFTON STREET
CHARLOTTETOWN, PEI, C1A 1L1

drawing / dessin

HYDRONIC - FOURTH FLOOR NEW WORK

| | | |
|---|---|---|
| designed | NORR | conçu |
| date | 2020-8-31 | |
| drawn | NORR | dessiné |
| date | 2020-8-31 | |
| approved | NORR | approuvé |
| date | 2022-07-25 | |
| Tender | | Soumission |
| PWGSC Project Manager | | Administrateur de projets TPSGC |
| project number | | no. du projet |

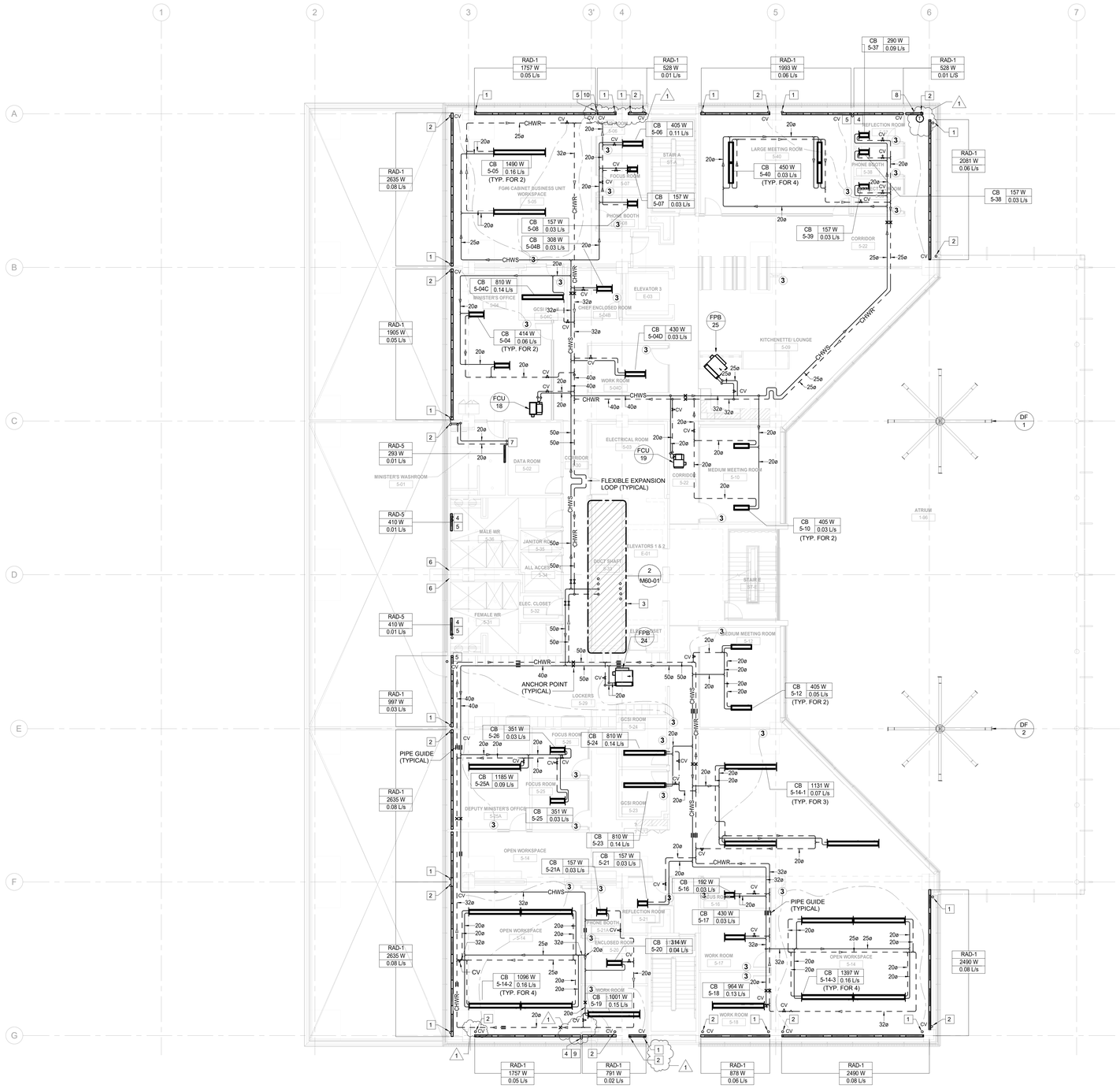
R.056687.005

drawing no. / no. du dessin

M53-04

E-DRM/GDD-E:

PWGSC AD (2004)




1 M53-05 HVAC PIPING FIFTH FLOOR

SCALE : 1:100

0m 1m 2m 3m 4m 5m 6m 7m 8m 9m 10m

DRAWING NOTE

1. 20ø HWS FROM BELOW. RE-USE EXISTING FLOOR OPENING.
2. 20ø HWR DOWN. RE-USE EXISTING FLOOR OPENING.
3. FOR HVAC AND DOMESTIC WATER PIPING SIZES REFER TO DRAWING M60-01.
4. 20ø HWS FROM LEVEL BELOW. PROVIDE NEW FLOOR OPENING, SCAN FLOOR PRIOR TO CORING AND COORDINATE OPENING WITH THE RADIATOR LOCATION.
5. 20ø HWR TO LEVEL BELOW. PROVIDE NEW FLOOR OPENING, SCAN FLOOR PRIOR TO CORING AND COORDINATE OPENING WITH THE RADIATOR LOCATION.
6. PATCH UNUSED FLOOR OPENINGS.

DRAWING NOTE

7. 20ø HWS/R DOWN WITHIN WALL TO SERVICE RADIATOR.
8. 20ø HWR INSIDE THE WALL TO EXISTING FLOOR OPENING. PROVIDE TRIM TO COVER PIPE AND OPENING AS REQUIRED.
9. 20ø HWS INSIDE THE WALL TO RADIATOR IN ADJACENT ROOM.
10. 20ø HWR INSIDE THE WALL FROM RADIATOR IN ADJACENT ROOM.

NOTES:

1. PROVIDE RADIATORS TO MEET THE CAPACITY REQUIREMENTS NOTED ON THE DRAWING AND TO COMPLY WITH DIMENSIONS AND TYPE ACCORDING TO THE SCHEDULE.
2. RADIATORS TO BE C/W ALL ACCESSORIES AND TRIMS NECESSARY TO MAINTAIN CONTINUOUS APPEARANCE ALONG EXTERIOR WALLS.
3. INSTAL HWS/HWR PIPING THROUGH EXISTING FLOOR OPENINGS TO SERVICE RADIATORS ON LEVEL ABOVE AS NOTED. PATCH UNUSED FLOOR OPENINGS. PROVIDE SAME END OR OPPOSITE END CONNECTIONS AS NECESSARY TO SUIT INSTALLATION AS SHOWN ON THE DRAWING.
4. PROVIDE CONTROL VALVES FOR RADIATORS IN EACH ZONE. REFER TO RADIATOR PIPING DETAILS FOR CONTROL VALVES LOCATION AND PIPING ARRANGEMENTS.

GENERAL NOTES:

1. DRAWINGS SHALL BE READ IN CONJUNCTION WITH ALL FLOOR PLANS AND SPECIFICATIONS.
2. ALL EXISTING SERVICES SHOWN ARE APPROXIMATE AND BASED ON EXISTING DRAWINGS. CONTRACTOR SHALL VERIFY ALL LOCATIONS ON SITE.
3. CONTRACTOR TO COORDINATE INSTALLATION WITH ALL OTHER TRADES INVOLVED ON SITE.
4. ENSURE NOT TO DISTURB SERVICES COVERING AREAS NOT INCLUDED IN THE SCOPE. ALL WORK MUST BE COORDINATED WITH DEPARTMENTAL REPRESENTATIVE.
5. CONTRACTOR SHALL VISIT SITE TO EXAMINE EXISTING CONDITIONS.
6. CONTRACTOR TO PROPOSE SOLUTIONS FOR REVIEW TO THE CONSULTANT IF ANY INTERFERENCES OCCUR DUE TO SITE CONDITIONS.
7. ALL MATERIAL USED IN THE CEILING SPACE (RETURN AIR PLENUM) SHALL MEET AND EXCEED THE N.B.C REQUIREMENTS FLAME AND SMOKE SPREAD/DEVELOPMENT RATINGS.
8. CONTRACTOR TO PROVIDE CONNECTION TO RELOCATED EXISTING EQUIPMENT AND ADDED EQUIPMENT DIRECTLY TO BUILDING HVAC SYSTEM AND UPDATE THE BMS ARCHITECTURE AS REQUIRED.
9. CONTRACTOR TO REMOVE ALL MECHANICAL EQUIPMENT AND INSTALL NEW ONES; SALVAGE AND REINSTALL ONLY WHEN SPECIFICALLY INDICATED.
10. MECHANICAL CONTRACTOR TO X-RAY SCAN SLAB PRIOR TO CORING.
11. SUPPLY AND INSTALL ALL NECESSARY EXPANSION COMPENSATORS, ANCHORS AND ALIGN GUIDES ON ALL HYDRONIC PIPING TO SUIT INSTALLATION. EXPANSION CONTROL SHOWN ON THE DRAWING ONLY SUGGESTS THE DESIGN INTENT.
12. ALL THERMOSTATS IN PUBLIC AREAS TO BE EITHER BLANK PLATE-TYPE SENSORS OR PROVIDED WITH PROTECTIVE GUARDS.

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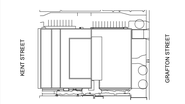
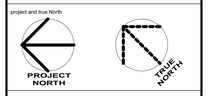
key plan




project and true North




project legend

| revisions | | date |
|---|---|---|
| 1 | ADDENDUM # 5 | 2022-07-25 |
| 0 | ISSUED FOR TENDER | 2022-05-27 |

project / projet

DANIEL J MACDONALD MODERNIZATION

161 GRAFTON STREET
CHARLOTTETOWN, PEI, C1A 1L1

drawing / dessin

HYDRONIC - FIFTH FLOOR NEW WORK

designed NORR / conçu
date 2020-8-31
drawn NORR / dessiné
date 2020-8-31
approved NORR / approuvé
date 2022-07-25
Tender / Soumission
PWGSC Project Manager / Administrateur de projets TPSGC
project number / no. du projet: R.056687.005
drawing no. / no. du dessin: M53-05

PWGSC A0 (2004)

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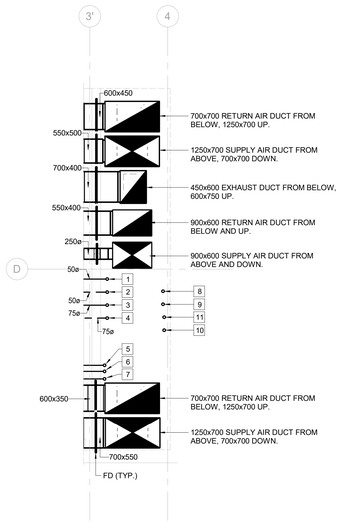
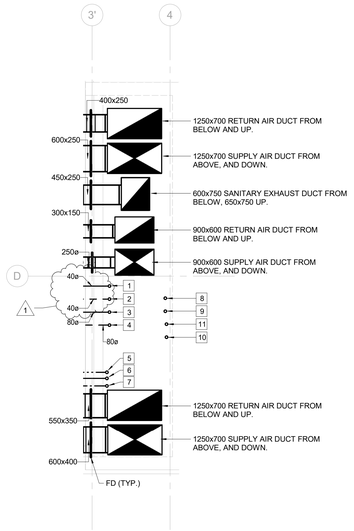



DRAWING NOTES:

1. 100ø HWS FROM BELOW AND UP.
2. 100ø HWR FROM ABOVE AND DOWN.
3. 100ø CHWS FROM BELOW AND UP.
4. 100ø CHWR FROM ABOVE AND DOWN.
5. 15ø DHWR FROM ABOVE AND DOWN.
6. 40ø DHW FROM BELOW, 32ø UP.
7. 50ø DCW FROM BELOW AND UP.
8. 150ø GTR FROM BELOW AND UP.
9. 150ø GTS FROM ABOVE AND DOWN.
10. 100ø CHWR LT FROM ABOVE AND DOWN.
11. 100ø CHWS LT FROM BELOW AND UP.

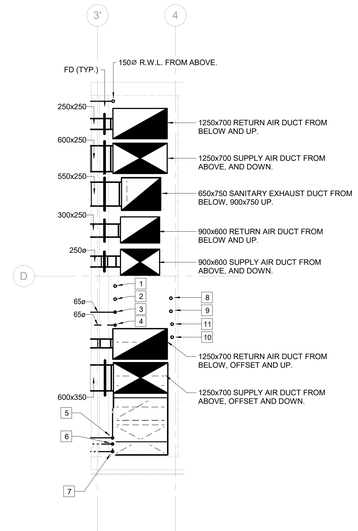
4 M60-01 THIRD FLOOR MECHANICAL RISER DETAILS
SCALE: 1:50




DRAWING NOTES:

1. 100ø HWS FROM BELOW AND 80ø UP.
2. 80ø HWR FROM ABOVE AND 100ø DOWN.
3. 100ø CHWS FROM BELOW, 65ø UP.
4. 65ø CHWR FROM ABOVE, 100ø DOWN.
5. 15ø DHWR FROM ABOVE AND DOWN.
6. 32ø DHW FROM BELOW, 25ø UP.
7. 50ø DCW FROM BELOW AND UP.
8. 150ø GTR FROM BELOW AND UP.
9. 150ø GTS FROM ABOVE AND DOWN.
10. 100ø CHWR LT FROM ABOVE AND DOWN.
11. 100ø CHWS LT FROM BELOW AND UP.

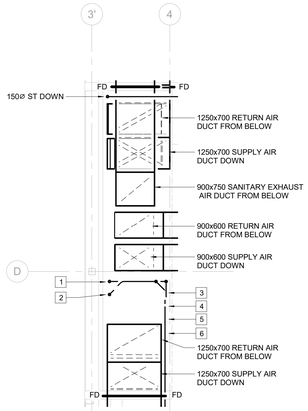
3 M60-01 FOURTH FLOOR MECHANICAL RISER DETAILS
SCALE: 1:50




DRAWING NOTES:

1. 80ø HWS FROM BELOW, 80ø UP.
2. 80ø HWR FROM ABOVE, 80ø DOWN.
3. 65ø CHWS FROM BELOW.
4. 65ø CHWR DOWN.
5. 15ø DHWR DOWN.
6. 25ø DHW FROM BELOW.
7. 50ø DCW FROM BELOW.
8. 150ø GTR FROM BELOW AND UP.
9. 150ø GTS FROM ABOVE AND DOWN.
10. 100ø CHWR LT FROM ABOVE AND DOWN.
11. 100ø CHWS LT FROM BELOW AND UP.

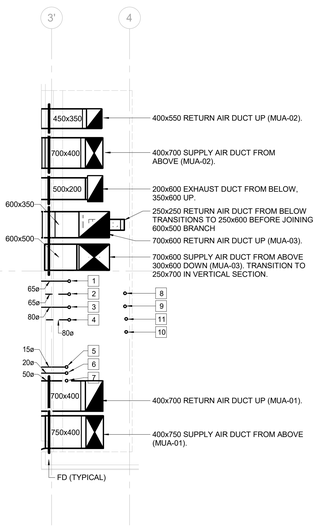
2 M60-01 FIFTH FLOOR MECHANICAL RISER DETAILS
SCALE: 1:50




DRAWING NOTES:

1. 80ø HWS FROM BELOW.
2. 80ø HWR DOWN.
3. 150ø GTR FROM BELOW.
4. 150ø GTS DOWN.
5. 15ø DHWR DOWN.
6. 100ø CHWS LT FROM BELOW.
7. 100ø CHWR LT DOWN..

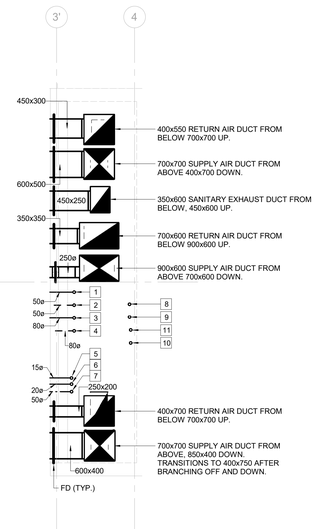
1 M60-01 PENTHOUSE FLOOR MECHANICAL RISER DETAILS
SCALE: 1 : 50 SCALE: 1:50




DRAWING NOTES:

1. 100ø HWS FROM BELOW AND UP.
2. 100ø HWR FROM ABOVE AND DOWN.
3. 100ø CHWS FROM BELOW AND UP.
4. 100ø CHWR FROM ABOVE AND DOWN.
5. 15ø DHWR FROM ABOVE AND DOWN.
6. 50ø DHW FROM BELOW AND UP.
7. 75ø DCW FROM BELOW AND UP.
8. 150ø GTR FROM BELOW AND UP.
9. 150ø GTS FROM ABOVE AND DOWN.
10. 100ø CHWR LT FROM ABOVE AND DOWN.
11. 100ø CHWS LT FROM BELOW AND UP.

6 M60-01 MAIN FLOOR MECHANICAL RISER DETAILS
SCALE: 1:50




DRAWING NOTES:

1. 100ø HWS FROM BELOW AND UP.
2. 100ø HWR FROM ABOVE AND DOWN.
3. 100ø CHWS FROM BELOW AND UP.
4. 100ø CHWR FROM ABOVE AND DOWN.
5. 15ø DHWR FROM ABOVE AND DOWN.
6. 50ø DHW FROM BELOW, 40ø UP.
7. 75ø DCW FROM BELOW AND UP.
8. 150ø GTR FROM BELOW AND UP.
9. 150ø GTS FROM ABOVE AND DOWN.
10. 100ø CHWR LT FROM ABOVE AND DOWN.
11. 100ø CHWS LT FROM BELOW AND UP.

5 M60-01 SECOND FLOOR MECHANICAL RISER DETAILS
SCALE: 1:50

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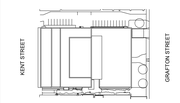
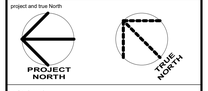
key plan




project and true North

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MECHANICAL RISER DETAILS PART PLANS

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