Halifax Regional Centre For Education

Purchasing Division

RFT #4018

Culinary Kitchen-Sir John A. Macdonald High

Addendum #4

June 28th, 2019
12:30 P.M.

To: Bidders

From: Nancy Rideout, Manager, Accounting and Purchasing

Pages: 2 including cover

Phone: 464-2000(ext. 2222)

The bid documents shall be amended and new drawings and clauses added, and shall become part of the contract documents as follows:

The closing date and time of RFT #4018 has been extended to 3rd July, 2019 – 2:00:00 p.m. (ADT)

To the Specifications Sir John A Macdonald Culinary Kitchen:

N/A

To the Drawings – Sir John A Macdonald Culinary Kitchen:

N/A

Attachments to Addendum #4

In response to Bidder queries, PDFs of the following As-Built Drawings are provided for reference purposes:

a) Bound-F-106-FIRE PROTECTION LEVEL 2 - EAST SIDE F-106
b) E-107-LIGHTING LEVEL 2 - EAST SIDE E-107
c) E-113-POWER LEVEL 2 - EAST SIDE E-113
d) E-119-COMMUNICATIONS LEVEL 2 - EAST SIDE E-119
e) MH-106-HEATING LEVEL 2 - EAST SIDE MH-106

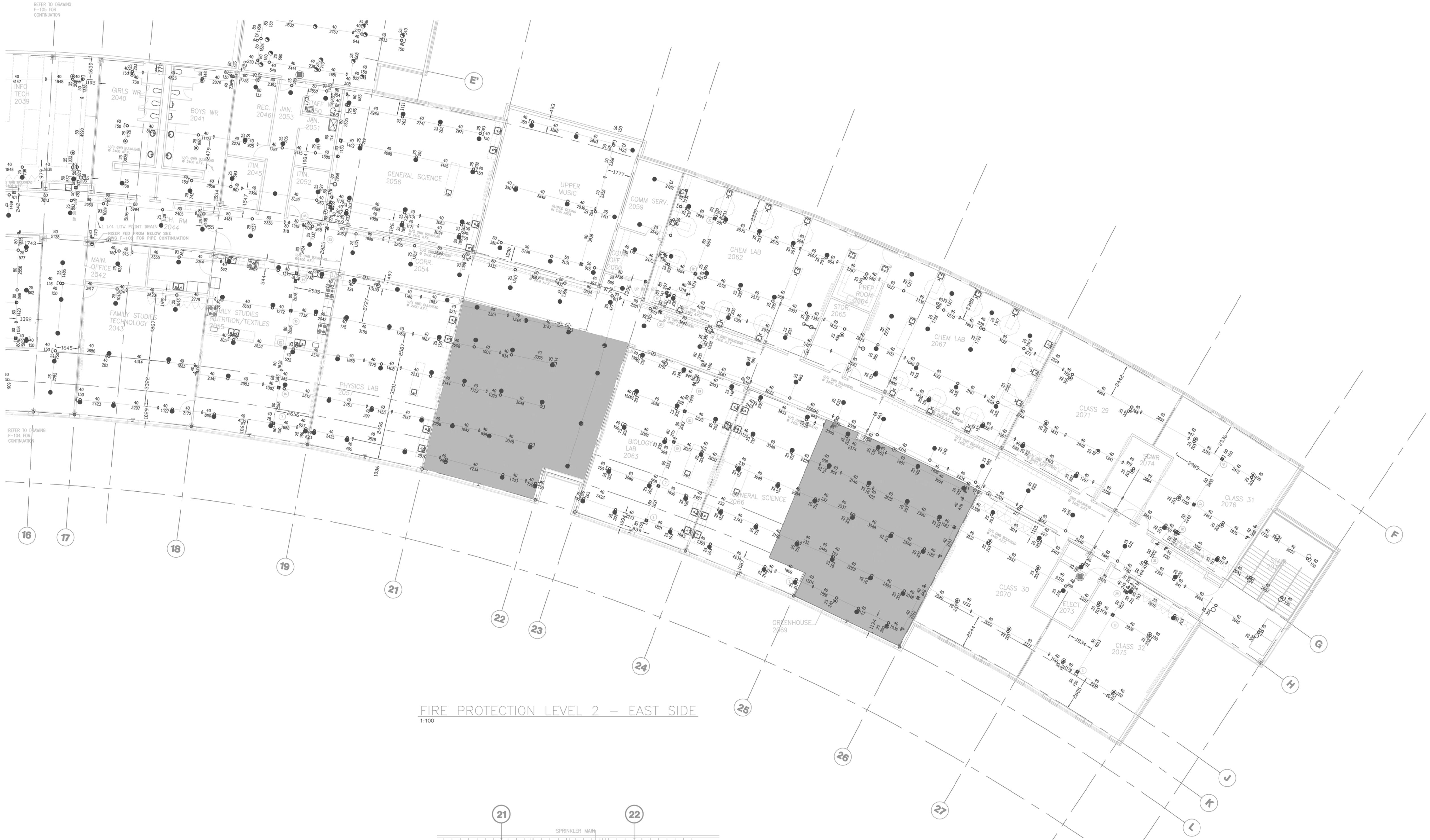
f) MV-106-VENTILATION LEVEL 2 - EAST SIDE MV-106
g) P-106-SANITARY & STORM LEVEL 2 - EAST SIDE P-106
h) P-112-DOMESTIC WATER LEVEL 2 - EAST SIDE P-112

End of Addendum #4

PLEASE SIGN BELOW AND RETURN WITH BID DOCUMENTS:

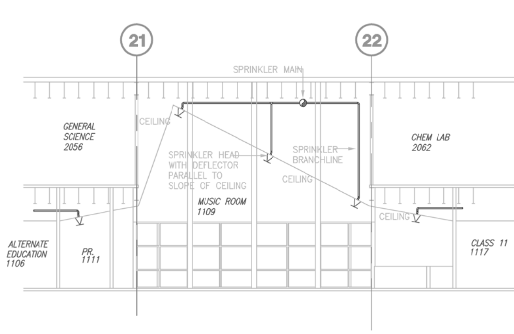
_____ _____

Signature Company Name



FIRE PROTECTION LEVEL 2 – EAST SIDE

1:100



1 SECTION THRU MUSIC ROOM

F-106 1:100

RECORD DRAWING NOTE:

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NOVA SCOTIA
Transportation and Public Works

F.C. O'NEILL SCRIVEN & ASSOC. LTD.
Consulting Engineers
5450 CORNWALLIS STREET
HALIFAX, N.S.
B3K 1A9

DATE	MARK	ISSUE
07 MAR/07	2	RECORD DRAWINGS
27 APR/05	1	ISSUED FOR TENDER

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27-09-2006

SCALE	1:100
DRAWN BY:	MJM
CHECKED BY:	MJM
REVIEWED BY:	JPS
APPROVED BY:	JPS
AS-BUILT CHECK	
DATE:	21 JUNE, 2006

PROJECT
WESTERN HRM
HIGH SCHOOL

TANTALLON, NOVA SCOTIA

PROJECT NO.: F14-04-01-01

SHEET TITLE
FIRE PROTECTION
LEVEL 2 – EAST SIDE

INTERNAL NO.: 2004-057

F-106

SHEET 6 OF 6

TPW A0 REV APO8 2003

LIGHTING LEVEL 2 – EAST SIDE
1:100

NOVA SCOTIA
Transportation and Public Works
Public Works - Building Design Group

KEY PLAN

LOGO

FOWLER BAUDL & MITCHELL
architecture
Fowler Baudl & Mitchell Ltd.
PO Box 314, Suite 102
1660 Hollis Street
Halifax, Nova Scotia B3J 2R7
Tel: 902 429 4100
Fax: 902 423 3063
architects@fbm.ns.ca
www.fbm.ns.ca

BMR Structural Engineering
5413 Duke Street
Halifax, Nova Scotia B3J 1N9
ph. (902) 429-3321 fax (902) 422-3650

F.C.O'NEILL SCRIVEN & ASSOC.LTD.
Consulting Engineers
5450 CORNWALLIS STREET
HALIFAX, N.S.
B3K 1A9

Gordon Ratcliffe Landscape Architects
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Halifax, Nova Scotia
Tel (902) 867-1500

Servant, Dunbrack, McKenzie & MacDonald Ltd.
36 GLADE CRESCENT
BAYERS LAKE BUSINESS PARK
HALIFAX, NOVA SCOTIA
OFFICE: (902) 450-1537
FAX: (902) 450-1579
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SCALE 0 2 4 10m

DATE	MARK	ISSUE
20 SEPT/06	2	RECORD DRAWING
27 APR/05	1	ISSUED FOR TENDER

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DRAWN BY:	P.M.
CHECKED BY:	P.M.
REVIEWED BY:	A.A.M.
APPROVED BY:	A.A.M.
AS-BUILT CHECK:	M.K.M.
DATE:	21 JUNE, 2006

PROJECT
WESTERN HRM HIGH SCHOOL

TANTALLON, NOVA SCOTIA

PROJECT NO.: F14-04-01-01

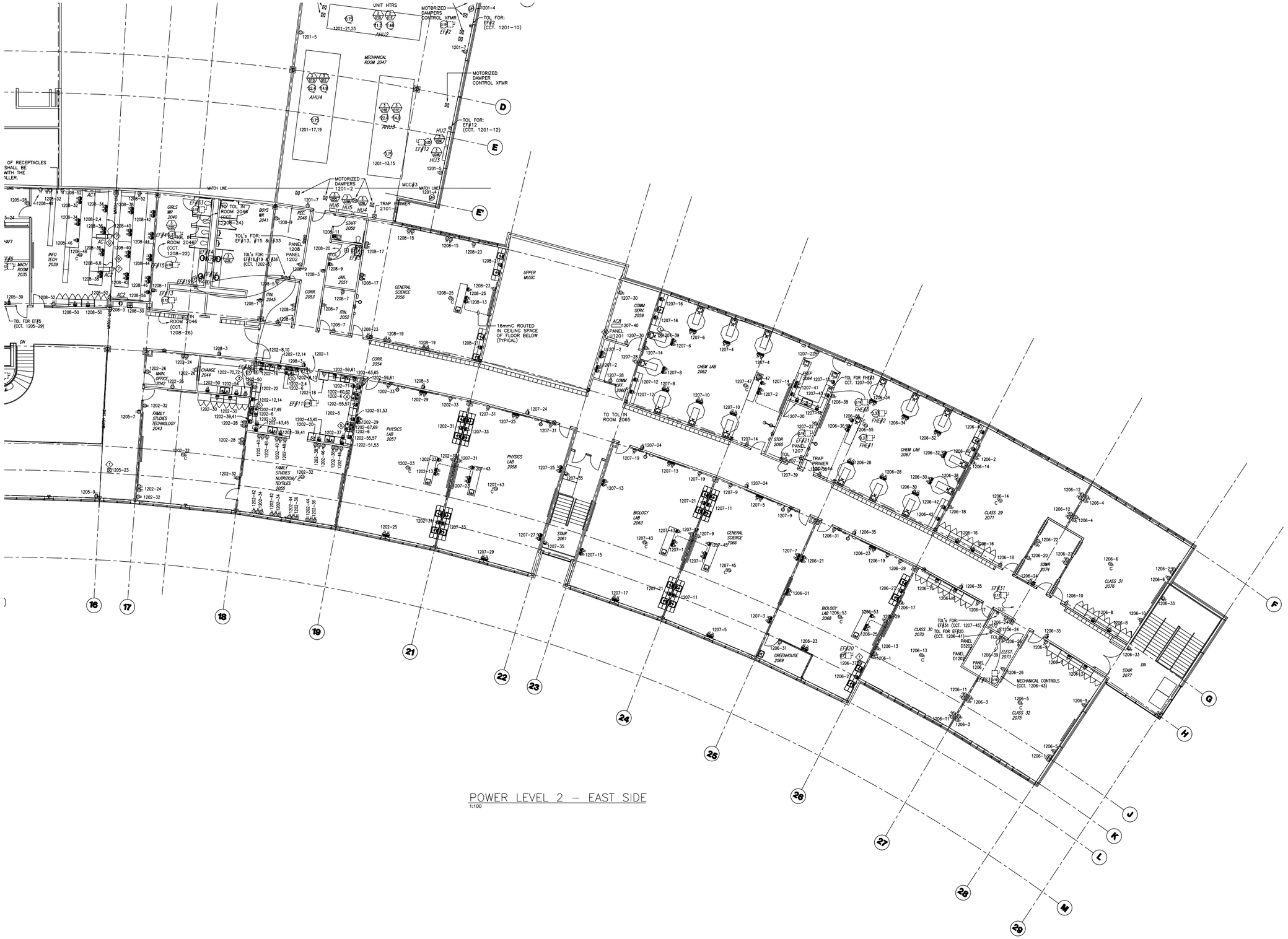
SHEET TITLE
LIGHTING LEVEL 2 EAST SIDE

INTERNAL NO.: 2004-057

E-107

SHEET 9 OF 39

TPW AS REV APR 2003



POWER LEVEL 2 – EAST SIDE
1:100

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PO Box 514, Suite 102
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Halifax, Nova Scotia B3J 2R7
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BMR Structural Engineering
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Halifax, Nova Scotia B3J 1N9
ph. (902) 429-3321 fax (902) 422-3650

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Consulting Engineers
5450 CORNWALLIS STREET
HALIFAX, N.S.
B3K 1A9

Gordon Ratcliffe Landscape Architects
997 Burnside Street
Halifax, Nova Scotia
Tel (902) 867-1600

SDMM
Servant, Dunbrack, McKenzie & MacDonald Ltd
36 ELAND CRESCENT
BAYSIDE INDUSTRIAL PARK
HALIFAX, NOVA SCOTIA
OFFICE (902) 455-1537
FAX (902) 455-9479
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KEY PLAN

LOGO

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DRAWN BY:	P.M.
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REVIEWED BY:	A.A.M.
APPROVED BY:	A.A.M.
AS-BUILT CHECK:	M.K.M.
DATE:	21 JUNE, 2006

PROJECT
WESTERN HRM
HIGH SCHOOL

TANTALLON, NOVA SCOTIA

PROJECT NO.: F14-04-01-01

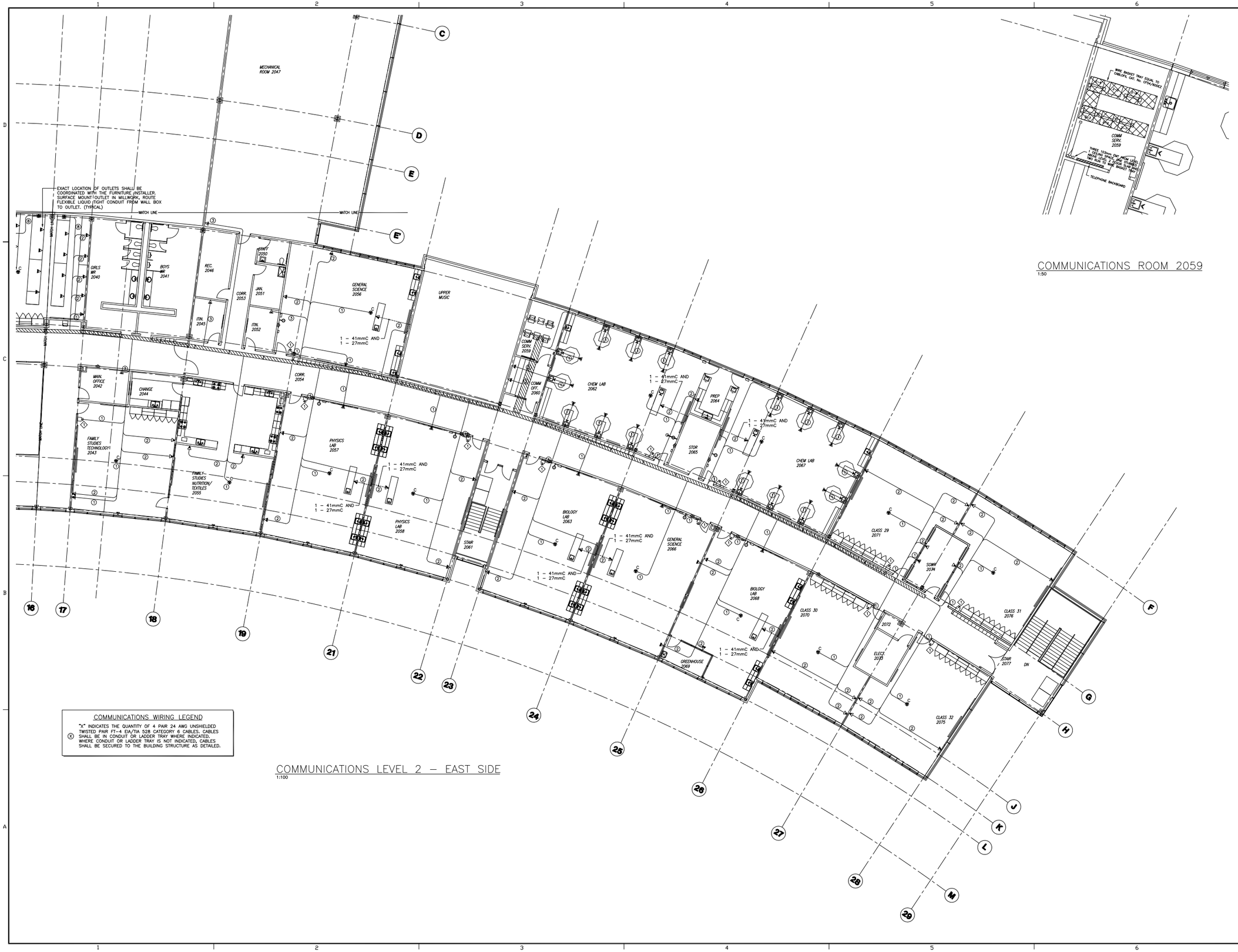
SHEET TITLE
POWER
LEVEL 2
EAST SIDE

INTERNAL NO.: 2004-057

E-113

SHEET 15 OF 39

TPW 80 REV APR 2003



COMMUNICATIONS ROOM 2059
1:50

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KEY PLAN

LOGO

FOWLER BAUDL & MITCHELL
architecture

Fowler Baudl & Mitchell Ltd.
PO Box 514, Suite 102
1660 Hollis Street
Halifax, Nova Scotia B3J 2R7
Tel: 902 429 4100
Fax: 902 423 3063
architects@fbm.ns.ca
www.fbm.ns.ca

BMR Structural Engineering
5413 Duke Street
Halifax, Nova Scotia B3J 1N9
ph. (902) 429-3321 fax (902) 422-3650

F.C.O'NEILL SCRIVEN & ASSOC.LTD.
Consulting Engineers
5450 CORNWALLIS STREET
HALIFAX, N.S.
B3K 1A9

Gordon Ratcliffe Landscape Architects
917 Barrack Street
Halifax, Nova Scotia
Tel (902) 867-1500

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36 OLAND CRESCENT
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REVIEWED BY:	A.A.M.
APPROVED BY:	A.A.M.
AS-BUILT CHECK:	M.K.M.
DATE:	21 JUNE, 2006

PROJECT
WESTERN HRM HIGH SCHOOL

TANTALLON, NOVA SCOTIA

PROJECT NO.: F14-04-01-01

SHEET TITLE
COMMUNICATIONS LEVEL 2 EAST SIDE

INTERNAL NO.: 2004-057

E-119

SHEET 21 OF 39

TPW AS REV APR 2003

REFER TO DRAWING MH-104 FOR CONTINUATION

CONTRACTOR IS TO CO-ORDINATE ALL PIPING, EQUIPMENT, ETC. WITH DUCTWORK AND AHU'S TO ENSURE ALL EQUIPMENT IS ACCESIBLE

UNIT HEATER 9,400 WATTS

MATCH LINE

GIRLS WR 2040 — BOYS WR 2041 — STAFF 2050 — REC. 2046 — CORR. 2053 — JAN. 2051 — ITN. 2045 — ITN. 2052 — GENERAL SCIENCE 2056 — PHYSICS LAB 2057 — PHYSICS LAB 2058 — BIOLOGY LAB 2063 — GENERAL SCIENCE 2066 — BIOLOGY LAB 2068 — GREENHOUSE 2069 — CLASS 30 2070 — EXCT. 2073 — CLASS 32 2075 — STAIR 2077

MAIN OFFICE 2042 — CHANGE 2044 — FAMILY STUDIES TECHNOLOGY 2043 — FAMILY STUDIES NUTRITION / TEXTILES 2045 — CORR. 2054 — UPPER MUSIC — COMM SERV 2059 — CHEM STOR 2060 — CHEM LAB 2062 — STOR 2065 — CHEM LAB 2067 — SCWR 2074 — CLASS 31 2076 — 2072

AC1 — AC2 — AC3 — AC4 — AC5 — AC6

REMOTE CONTROL

19ø SUC. & 9.5ø LIQ. REFRIGERANT LINES DN. THRU ROOF TO WALL MOUNTED AC UNIT IN INFO TECH 2039

13ø SUC. & 6ø LIQ. REFRIGERANT LINES DN. THRU ROOF TO WALL MOUNTED AC UNIT IN INFO TECH 2059

TO SENSOR LOCATED ON FIRST FLOOR LEVEL OF MUSIC ROOM 1109

PANELS IN MUSIC ROOM TO RUN PARALLEL TO SLOPE OF CEILING. REFER TO ARCHITECTURAL FOR DETAILS

RADIANT PANEL LENGTHS SHOWN ON DRAWINGS ARE ACTIVE LENGTHS. PANELS ARE TO RUN WALL TO WALL AND WILL HAVE TO BE ADJUSTED ON SITE TO ACCOMMODATE ANGLES.

NOTE: CO-ORDINATE RADIANT PANELS IN SLOPE AREA WITH ARCHITECTURAL BULKHEADS

RH20 — RH21 — RH22 — RH23 — RH24 — RH25 — RH26 — RH27

REFER TO DRAWING MH-104 FOR CONTINUATION

HEATING LEVEL 2 – EAST SIDE
1:100

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SCALE 0 2 4 10m

29 JUN/06	1	RECORD DRAWINGS
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DATE	MARK	ISSUE

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SCALE	1:100
DRAWN BY:	MJM
CHECKED BY:	MJM
REVIEWED BY:	RWM
APPROVED BY:	RWM
AS-BUILT CHECK	
DATE:	21 JUNE, 2006

PROJECT
WESTERN HRM HIGH SCHOOL

TANTALLON, NOVA SCOTIA

PROJECT NO.: F14-04-01-01

SHEET TITLE
HEATING LEVEL 2 – EAST SIDE

INTERNAL NO.: 2004-057

MH-106

SHEET 6 OF 6

NOVA SCOTIA
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FOWLER BAUDLD & MITCHELL architecture
Fowler Baudld & Mitchell Ltd.
PO Box 514, Suite 102
1660 Hollis Street
Halifax, Nova Scotia B3J 2R7
Tel: 902 429 4100
Fax: 902 423 3063
architects@fbm.ns.ca
www.fbm.ns.ca

BMR Structural Engineering
5413 Duke Street
Halifax, Nova Scotia B3J 1N9
ph. (902) 429-3321 fax (902) 422-3454

F.C.O'NEILL SCRIVEN & ASSOC.LTD.
Consulting Engineers
5450 CORNWALLIS STREET
HALIFAX, N.S.
B3K 1A9

Gordon Ratcliffe Landscape Architects
907 Barrack Street
Halifax, Nova Scotia
Tel (902) 807-1002

Servant, Dunbrack, McKenzie & MacDonald Ltd.
36 GLADD CRESCENT
BAYERS LAKE BUSINESS PARK
HALIFAX, NOVA SCOTIA
OFFICE (902) 455-1537
FAX (902) 455-8479
www.sdmm.ns.ca

TPW AD REV APR 2003

Drawing: MH-105-HEATING LEVEL 2 - EAST SIDE.dwg,PWC was plotted 06/29/07 at time 1:05:05 pm

VENTILATION LEVEL 2 – EAST SIDE
1:100

Drawing Bound–MV–106–VENTILATION LEVEL 2 – EAST SIDE.dwg.DWG was plotted 06/08/10, at time 3:45:21 pm

NOVASCOTIA
Transportation and Public Works
Public Works - Building Design Group

KEY PLAN

LOGO

FOWLER BAULD & MITCHELL architecture
Fowler Bauld & Mitchell Ltd.
PO Box 514, Suite 102
1660 Hollis Street
Halifax, Nova Scotia B3J 2R7
Tel: 902 429 4100
Fax: 902 423 3063
architects@fbm.ns.ca
www.fbm.ns.ca

BMR Structural Engineering
5413 Doyle Street
Halifax, Nova Scotia B3J 1H9
ph. (902) 429-3321 fax (902) 422-8650

F.C.O'NEILL SCRIVEN & ASSOC.LTD.
Consulting Engineers
5450 CORNWALLIS STREET
HALIFAX, N.S.
B3K 1A9

Gordon Ratcliffe Landscape Architects
1697 Brunswick Street
Halifax, Nova Scotia
Tel (902) 857-1500

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Servant, Dunbrack, McKenzie & MacDonald Ltd.
36 OLAND CRESCENT
BAYERS LAKE BUSINESS PARK
HALIFAX, NOVA SCOTIA
OFFICE: (902) 455-1537
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SCALE 0 2 4 10m

DATE	MARK	ISSUE
09 AUG/06	2	RECORD DRAWINGS
27 APR/05	1	ISSUED FOR TENDER

STAMP

SCALE	1:100
DRAWN BY:	TNN
CHECKED BY:	
REVIEWED BY:	RWM
APPROVED BY:	
AS-BUILT CHECK	
DATE:	21 JUNE, 2006

PROJECT
WESTERN HRM HIGH SCHOOL

TANTALLON, NOVA SCOTIA

PROJECT NO.: F14-04-01-01

SHEET TITLE
VENTILATION
LEVEL 2 – EAST SIDE

INTERNAL NO.: 2004-057

MV-106

SHEET 6 OF 6

TPW A0 REV APO8 2003

SANITARY & STORM LEVEL 2 – EAST SIDE
1:100

Drawing Source: P-106 SANITARY & STORM LEVEL 2 - EAST SIDE.dwg DWG was plotted 06/09/10, at time 3:46:17 pm

NOVA SCOTIA
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KEY PLAN

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architecture

Fowler Baudd & Mitchell Ltd.
PO Box 314, Suite 102
1660 Hollis Street
Halifax, Nova Scotia B3J 2R7
Tel: 902 429 4100
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ph. (902) 429-3321 fax (902) 422-3455

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B3K 1A9

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Halifax, Nova Scotia
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SCALE	1:100
DRAWN BY:	TDM
CHECKED BY:	TDM
REVIEWED BY:	RWM
APPROVED BY:	RWM
AS-BUILT CHECK	
DATE:	21 JUNE, 2006

PROJECT
WESTERN HRM HIGH SCHOOL

TANTALLON, NOVA SCOTIA

PROJECT NO.: F14-04-01-01

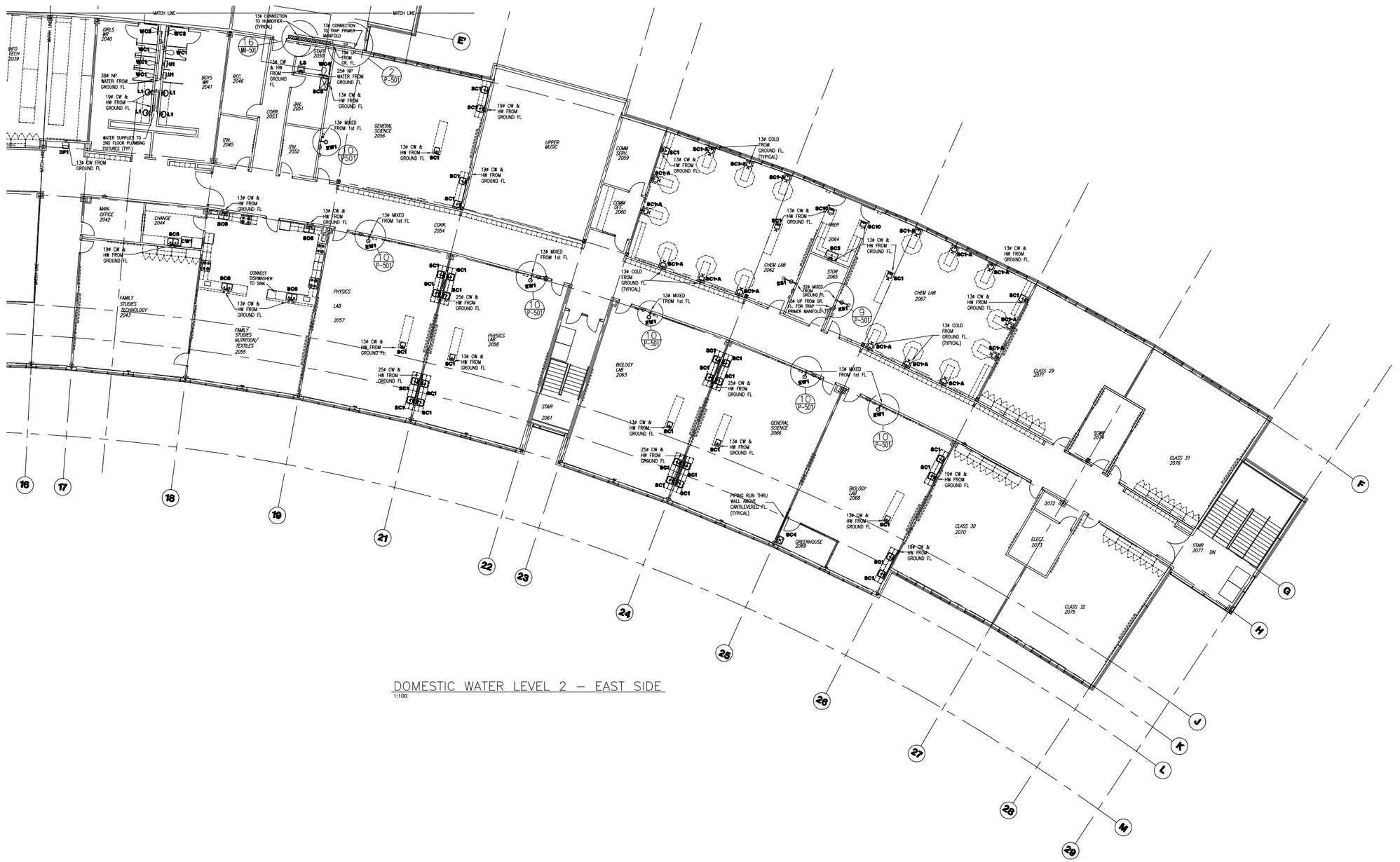
SHEET TITLE
SANITARY & STORM LEVEL 2 – EAST SIDE

INTERNAL NO.: 2004-057

P-106

SHEET 6 OF 12

TPW 80 REV APR 2003



DOMESTIC WATER LEVEL 2 – EAST SIDE

1:100

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KEY PLAN

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STAMP

SCALE	1:100
DRAWN BY:	CR
CHECKED BY:	CR
REVIEWED BY:	RWM
APPROVED BY:	RWM
AS-BUILT CHECK DATE:	21 JUNE, 2006

PROJECT
WESTERN HRM HIGH SCHOOL

TANTALLON, NOVA SCOTIA

PROJECT NO.: F14-04-01-01

SHEET TITLE
DOMESTIC WATER LEVEL 2 – EAST SIDE

INTERNAL NO.: 2004-057

P-112

SHEET 12 OF 12

TPW AD REV APR 2003

Drawing Board: P-112-DOMESTIC WATER LEVEL 2 - EAST SIDE.dwg/DWG was plotted 06/09/10, at time 3:46:53 pm

Halifax Regional Centre For Education

Purchasing Division

RFT #4018

Culinary Kitchen-Sir John A. Macdonald High

Addendum #3

June 27th, 2019
2:45 P.M.

To: Bidders

From: Nancy Rideout, Manager, Accounting and Purchasing

Pages: 2 including cover

Phone: 464-2000(ext. 2222)

The bid documents shall be amended and new drawings and clauses added, and shall become part of the contract documents as follows:

To the Specifications Sir John A Macdonald Culinary Kitchen

1) **Reference Section 24 81 34 Ductless Split System Units**

a) To Part 2.6 ACCEPTABLE MANUFACTURERS FOR FAN COIL UNITS, add ".2 Daiken to the requirements listed above."

To the Drawings – Sir John A Macdonald Culinary Kitchen:

1) **Reference Drawing MV-001 – Mechanical Legend**

a) Add the note, "GENERAL NOTE: Trades to allow for removals and reinstatements of existing services as required to facilitate structural reinforcements as detailed on drawing 2001. Typical services in the area of work include: Sprinkler piping, heating hot water piping, domestic water piping, radiant ceiling panels, ductwork, and controls wiring/conduits."

2) **Reference Drawing SP-101 – LEVEL 2 FLOOR PLAN – SPRINKLER**

a) Add the note, " Sprinkler contractor to allow for removal and reinstallation of sprinkler heads and pipe drops in Rooms 2042 & 2044 as required to facilitate removal of ceilings to accommodate structural work."

Attachments to Addendum #3

N/A

Responses to Bidder Questions

1) Question 1

   Are the sprinkler heads in Rooms 2042 and 2044 to be removed and reinstalled to replace the ceilings or is the intention to just remove the head plates/escutcheons in order to remove the ceiling tiles?

   Response

   Please see Item 2 a) above.

End of Addendum #3

PLEASE SIGN BELOW AND RETURN WITH BID DOCUMENTS:

_____ _____

Signature Company Name

Halifax Regional Centre For Education

Purchasing Division

RFT #4018

Culinary Kitchen-Sir John A. Macdonald High

Addendum #2

June 27th, 2019
9:30 A.M.

To: Bidders

From: Nancy Rideout, Manager, Accounting and Purchasing

Pages: 1 including cover

Phone: 464-2000(ext. 2222)

The bid documents shall be amended and new drawings and clauses added, and shall become part of the contract documents as follows:

To the Specifications Sir John A Macdonald Culinary Kitchen

1) **Reference Section 05 50 00 Metal Fabrications**

a) To Part 2.4 SCHEDULE OF ITEMS, add ".5 Steel components for bollards and propane tank enclosure with gates."

To the Drawings – Sir John A Macdonald Culinary Kitchen:

1) **Reference Drawing MV101 – Mechanical Partial Level 2 and Roof Plan – Air Distribution**
   a) On drawing 1/M-101 Delete the note reading "EXISTING RADIANT PANELS TO REMAIN".
   b) On Drawing 1/M-101 Add note reading "EXISTING RADIANT PANELS TO BE REMOVED, PROTECTED AND REINSTALLED TO ACCOMMODATE STRUCTURAL WORK ABOVE CEILING."

Attachments to Addendum #2

N/A

Responses to Bidder Questions

1) Question 1

On detail 1/3350 it shows an L- Angle and tells us to reference the structural drawings for size, however the framing plan on drawing 2001 does not show any supports for this new exhaust fan. Please provide details on what is required.?

Response

Framing for 1/3350 and all other roof openings are covered by Structural detail "TYPICAL FRAMING AROUND ROOF OPENINGS" on Drawing 2001.

The L50x50x4.8 shown at the New Exhaust Fan opening on Structural Part Roof Framing Plan is lateral bracing for the new beams which just happens to be adjacent to the Exhaust Fan opening.

2) Question 2

For pricing purposes please advise the extent of repair required at the block wall shown on 1/3002

Response

The extent of repair anticipated is related to removing the old door frame at door 2043.1, and installation of the new frame at door 2043A.1.

3) Question 3

Please indicate the areas where existing fireproofing on structural elements exists that may need to be repaired as per note 4 on 3001. If any, please provide specifications on the existing fireproofing.

Response

Note 4 on 3001 is a general note.

As far as we are aware, there is no specialized fireproofing (ie intumescent paint) on structural elements within the area of the Work.

Should any fireproofed structural elements be uncovered during the course of the Work, the Consultant should be advised. Any structural elements forming part of a rated assembly (ie boxed in columns) will need to remain boxed in.

4) Question 4

The note on 1/3350 indicates GC is responsible to line up new beams with no duct interference. Looking on MV101 there is an existing duct branch that looks like it is in the path of the new W- Beams are to go. Based on the information on MV101 its difficult to asses how much room we have to work with when installing the new beams. Please clarify if the intention is to temporarily remove and reinstate any of the existing ductwork.

Response

Because as-built drawings from the existing school may not accurately reflect the on-site duct locations, it is difficult to tell how much of the existing duct work will interfere with installation of the new beams. This may depend on the Contractor's means and methods as well.

The exact location of the structural beams can vary as long as they remain within the middle third of the wedge shaped span between existing joists. (Joists and grids 17 & 18 are radial – not parallel.)

As noted on the Architectural Reflected Ceiling Plan – Level 2 Demo, all existing ceiling tiles, grids, mechanical and electrical equipment are to be removed and either reinstalled, or disposed of depending on the locations as noted.

The note on 1/3350 is pointing out that, in addition, the new beam and new hood exhaust duct will need to be carefully coordinated

5) Question 5

Is the wall at the sanitary trench load bearing? If so who is required to provide the temporary shoring for this?

Response

The wall at the sanitary trench is not load bearing.

6) Question 6

It has come to our attention that the lead time for the rooftop unit could be 14 to 16 weeks which will push us beyond your required substantial completion. In order to keep the project on schedule, will it be acceptable for us to provide weather protection at the roof until the unit arrives? Please advise.

Response

In the event that the lead time for the MUA unit will extend beyond the required substantial completion date, providing adequate weather protection at the roof until the MUA unit arrives will be acceptable.

End of Addendum #2

PLEASE SIGN BELOW AND RETURN WITH BID DOCUMENTS:

_____ _____

Signature Company Name

Halifax Regional Centre For Education

Purchasing Division

RFT #4018

Culinary Kitchen-Sir John A. Macdonald High

Addendum #1

June 26th, 2019
3:30 P.M.

To: Bidders

From: Nancy Rideout, Manager, Accounting and Purchasing

Pages: 1 including cover

Phone: 464-2000(ext. 2222)

The bid documents shall be amended and new drawings and clauses added, and shall become part of the contract documents as follows:

The closing date and time of RFT #4018 has been extended to 2nd July, 2019 – 2:00:00 p.m. (ADT)

To the Specifications Sir John A Macdonald Culinary Kitchen

1) Reference Section 05 50 00 Metal Fabrications

a) To Part 1.3 ACTION AND INFORMATIONAL SUBMITTALS, add: " .4 Submit drawings stamped and signed by professional engineer registered or licensed in Province of Nova Scotia, Canada."

b) To Part 2.3 FINISHES, add: ".3 Galvanizing: hot dipped galvanizing with zinc coating 600 g/m² to CAN/CSA-G164. Field touch ups to use zinc rich coating with 90-95% zinc in dry film, minimum 3 coats."

2) Reference Section 09 91 23 Painting

a) Add "Part 2.5 EXTERIOR PAINTING SYSTEMS:

.1 Paint XP-2: For exterior hot-dipped galvanized steel components., apply:

.1 One coat Rapid Coat epoxy primer (PPG Code 95-245 Series) @ 5 to 7 mils DFT. Two coats of Pitthane Ultra Acrylic Urethane (PPG Code 95-812 Series) @ 2 to 3 mils DFT per coat.

.2 One coat mastic epoxy primer (BM M45/M46) @ 5 to 7 mils DFT. Two coats aliphatic acrylic urethane (BM M74/M75) @ 2 to 3 mils DFT per coat.

.3 One coat Devoe epoxy primer (ICI 205) @ 5 to 7 mils DFT. Two coats acrylic urethane (ICI 379) @ 2 to 3 mils DFT per coat.

3) Reference Section: 11 10 00 Food Service Catalogue and Custom Equipment

To Part 2.3 EQUIPMENT :

a) .23 Item #23: Replace "GE model GFWN1100DWW washer, front console and GFMN110EDWW dryer, front console," with :" Samsung WF45M5100AW front load washer and DV42H5000EW dryer."

b) Add ".48 Item #48: Mobile Work Table With Mirror (1)
Table mounted demo mirror added to work table.
Work Table: Stainless Steel Work Table, 60" x 30" x 36"high solid undershelf, stainless steel tubular legs and 5" non-marking HD casters, one 20" x 20" x 5" utility drawers cutting board slides mounted under drawer housing to hold two cutting board supply four cutting boards 18" x 26"
Mirror: aluminium frame adjustable demo mirror with glass, safety backing 16ga stainless steel round tube –5-5/8" mounted to s/s lower bracing aluminium mirror frame, overall height no greater then79" must be Capable of moving from kitchen to dining room.

c) To Items #46, 47 and 48, add: "Manufactured by Doucet Watts and Davis 902-422-0963"

To the Drawings – Sir John A Macdonald Culinary Kitchen:

1) **Reference Drawing 3001 – Architectural – Floor Plan – Leve 2 Demo**
   a) This drawing is re-issued with this Addendum.
   b) Existing tack/white boards in Rooms 2043, 2042 and 2055 are to be protected and turned over to HRCE.
   c) Existing millwork on North wall of RM 2043 previously noted as being 'removed' is to be relocated to the west wall of Room 2055 as shown on Drawing 3001, reissued with this Addendum.

2) **Reference Drawing 3002 - Architectural– Floor Plan – Level 2:**
   a) In the Equipment Schedule, Manufacturer column, change Item 23 to read: "Samsung". In the Model # column, change Item 23 to read: "WF45M5100AW front load washer and DV42H5000EW dryer"
   b) As shown on ASK-001, attached, add the following note:"NEW PROPANE GAS LINE TO BE BURIED IN WALL FROM CEILING TO SHUT OFF (+/- 1530'AFF), THEN UP TO 2440, ABOVE DOORWAY HEADER, AND DOWN INSIDE WALL TO BACK OF STOVE WHERE IT WILL RUN SURFACE MOUNTED TO SERVICE KITCHEN EQUIPMENT."

Attachments to Addendum #1

Sir John A Macdonald Culinary Kitchen

1. Architectural Drawing 3001 Re-issued with this Addendum, dated June 26, 2019
2. Architectural Sketch ASK-001 – Propane Line Clarification, dated June 26, 2019
3. Architectural Sketch ASK-002 –Propane Tank Enclosure, Plan and Elevation, dated June 26, 2019

Responses to Bidder Questions

1) Question 1

Is the Contractor required to order the Kitchen Equipment?

Response

Yes. As identified in Spec Section 11 10 00 Food Services Catalogue and Custom Equipment, supply and installation of all equipment listed in that section and shown on Architectural Drawing 3002 is to be included in the Contractor's bid.

2) Question 2

The clothes washer specified (Item 23) appears to be discontinued. What should be priced?

Response

A new washer/dryer set has been selected. See item 1 in this Addendum.

3) Question 3

There is a conflict between the RCP and the Mechanical Sprinkler layout. Which is correct?

Response

The Contractor should follow the Mechanical Sprinkler layout.

4) Question 4

a) In the plumbing fixture section there is a “L-1” sink. Are these to be supplied by the mechanical? (They show also in the Food Service Catalogued & Custom Equipment section.) ,

b) In the plumbing fixture section there is a MS-1 Mop Sink, I don’t see one that is being replaced on the drawings, is there a new one required?

Response

a) The Contractor will decide which subtrade will provide the L-1 sinks.

b) There is no MS-1 Mop Sink required nor replaced in the project. Delete reference to MS-1 Mop Sink in Mechanical Specification Section 22 42 03.

5) Question 5

On drawing MP101 there are breaklines in the domestic water piping coming from the tie points towards the new work area. What is the missing distance there

Response

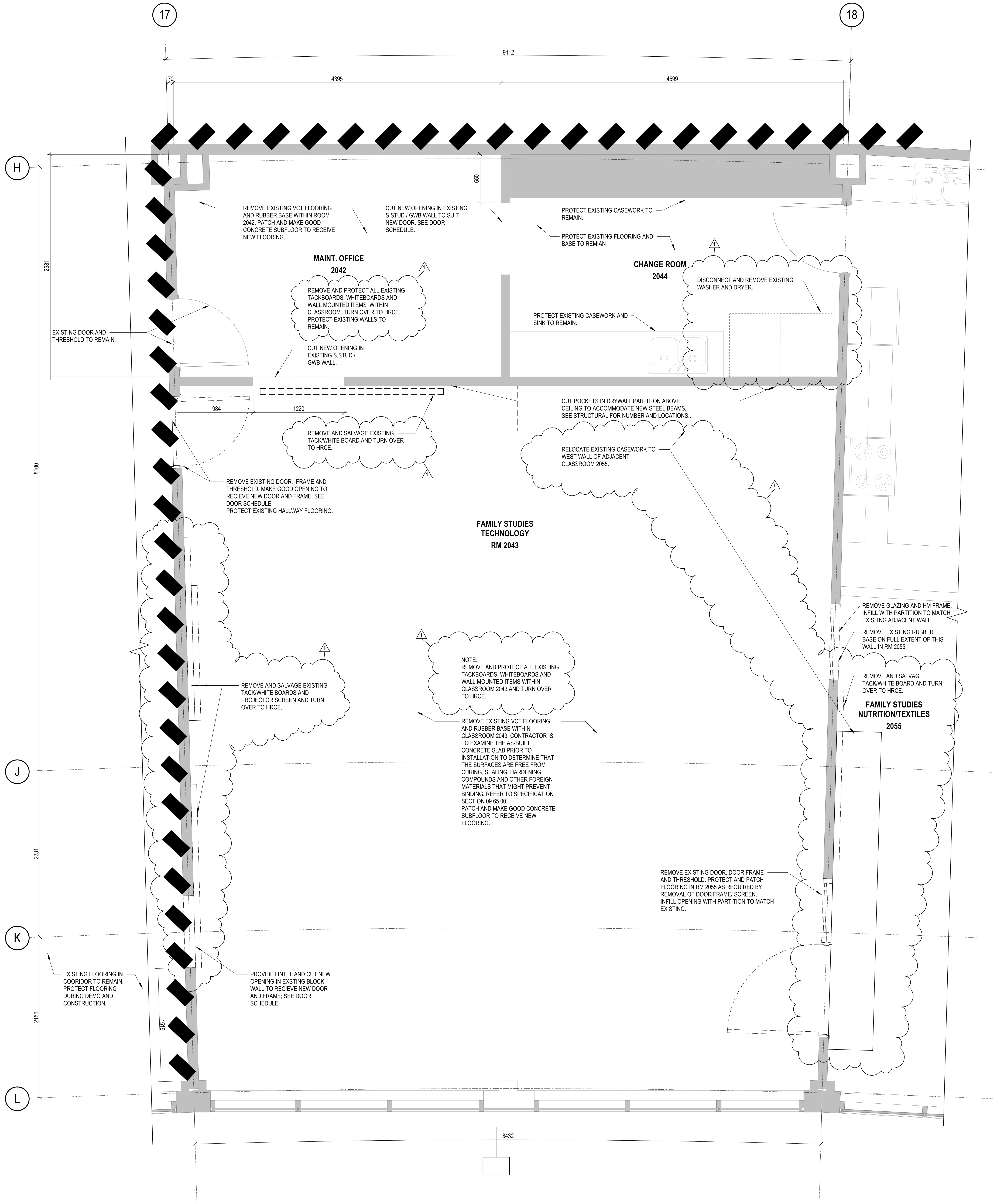
Architectural Drawing 1/3701 Level 1 Existing Reflected Ceiling Plan shows the approximate extent of work required in the Level 1 ceiling due to the plumbing work above. On that drawing, Recycle Room 1077 is the room shown on Mechanical Drawing MP101 with a sink where the approximate location of domestic water tie ins will be.

End of Addendum #1

PLEASE SIGN BELOW AND RETURN WITH BID DOCUMENTS:

_____ _____

Signature Company Name



1 LEVEL 2 - EXISTING AND DEMOLITION FLOOR PLAN

SCALE: 1 : 25

GENERAL NOTES:

1. REPORT ANY HAZARDOUS MATERIALS FOUND ON SITE TO CONSTRUCTION MANAGER.

2. CEASE OPERATIONS AND NOTIFY CONSTRUCTION MANAGER IF SAFETY OR ANY ADJACENT WORK APPEAR TO BE ENDANGERED.

3. CONTRACTOR TO PROTECT AND MAINTAIN THE INTEGRITY OF EXISTING FINISHES IN ALL AREAS NOT SCHEDULED FOR DEMOLITION WORK. ANY DAMAGE DUE TO DEMOLITION AND / OR NEW CONSTRUCTION TO BE REPAIRED AND MADE GOOD.

4. CONTRACTOR TO REPAIR ANY FIREPROOFING ON STRUCTURAL ELEMENTS AND FIRE-RATED ASSEMBLIES DAMAGED DURING DEMOLITION AND CONSTRUCTION.

5. CONTRACTOR TO REMOVE AND LAWFULLY DISPOSE OFF SITE ALL EQUIPMENT, RUBBISH, AND DEBRIS RESULTING FROM CONSTRUCTION. KEEP PROJECT AREA BROOMCLEAN. WHENEVER APPLICABLE, ALL DEMOLITION DEBRIS TO BE SORTED AND TAKEN TO APPROPRIATE FACILITIES FOR RECYCLING.

6. REMOVE EXISTING TEL. / ELECT. OUTLETS, THERMOSTATS, SWITCHES, CABLING, ETC. FROM WALLS TO BE DEMOLISHED. ALL SERVICES TO BE REMOVED ARE TO BE PULLED BACK TO SOURCE. REFER TO MECHANICAL AND ELECTRICAL DRAWINGS.

7. FOR DEMOLITION WORK DONE WHILE BUILDING IS OCCUPIED, ALLOW FOR PROPER VENTILATION OF THE PREMISES DURING AND AFTER COMPLETION OF DEMOLITION. VENTILATION SYSTEM TO BE PROTECTED FROM DUST AND DEBRIS.

8. REFER TO MECHANICAL, FIRE PROTECTION, AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION NOTES APPLICABLE TO THOSE DISCIPLINES.

9. CONTRACTOR IS RESPONSIBLE FOR THE DESIGN, COORDINATION AND EXECUTION OF CONSTRUCTION METHODS, PROCEDURES AND SCHEDULES. THE OPERATIONAL PROCEDURES AND METHODS ARE THE RESPONSIBILITY OF THE CONTRACTOR INSOFAR AS THEY DO NOT PRESENT HAZARDS TO PERSONNEL OR PROPERTY OR INFRINGE ON WORK SCHEDULES FOR NORMAL SITE ACTIVITY.

LEGEND

ITEMS TO DEMOLISH

EXISTING WALL TO REMAIN

UNRATED FIRE SEPARATION

FBM
ARCHITECTURE • INTERIOR DESIGN
HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429.4100 architects@fbm.ca fbm.ca

No	REVISION	BY	DATE
1	ADDENDUM 1		26 JUN 19
0	ISSUED FOR TENDER	GF	22 MAY 19

STAMP

LICENSED ARCHITECT GREGORY FRY NOVA SCOTIA ASSOCIATION OF ARCHITECTS

SCALE	As indicated
DRAWN	MGD/CS/CK
CHECKED	GPF
DATE	22 MAY 2019

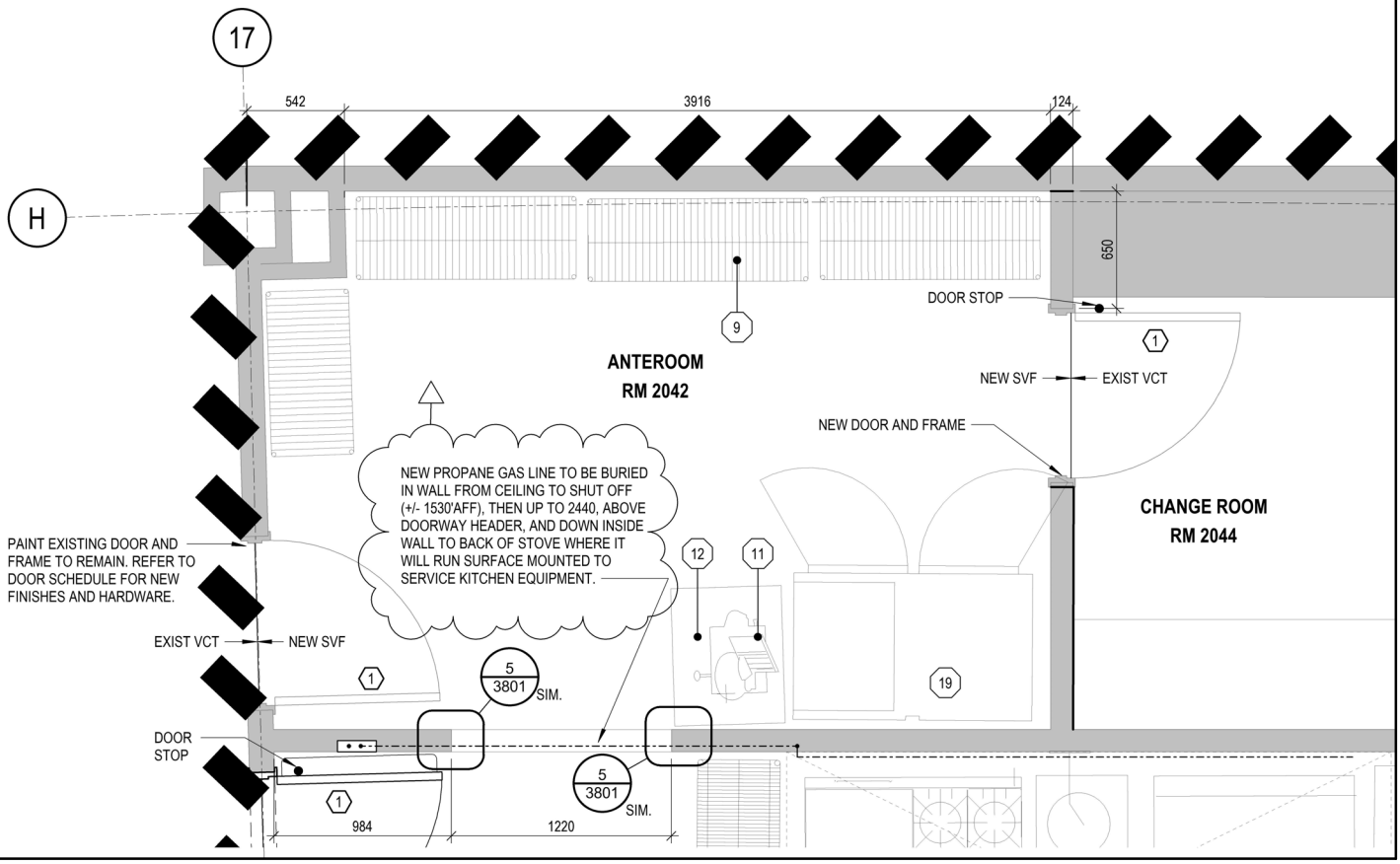
PROJECT
SIR. JOHN A. MACDONALD CULINARY KITCHEN
31 Scholars Rd, Upper Tantallon NS B3Z 0C3

CLIENT
Halifax Regional Centre for Education

PROJECT No. 2018-132

SHEET TITLE
FLOOR PLAN - LEVEL 2 DEMO

3001



FBM
ARCHITECTURE • INTERIOR DESIGN

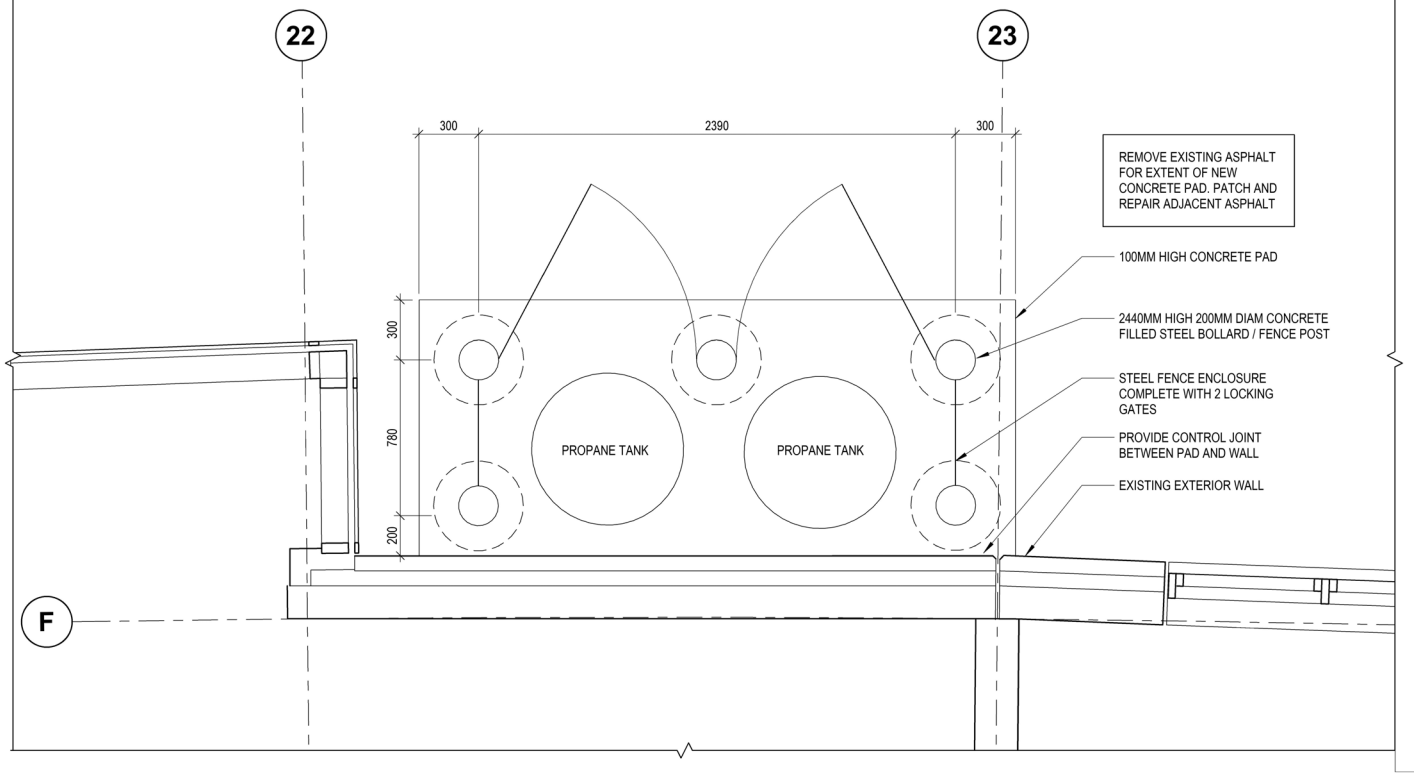
HS1-1660 Hollis Street
Halifax, Nova Scotia, B3J 1V7
Canada

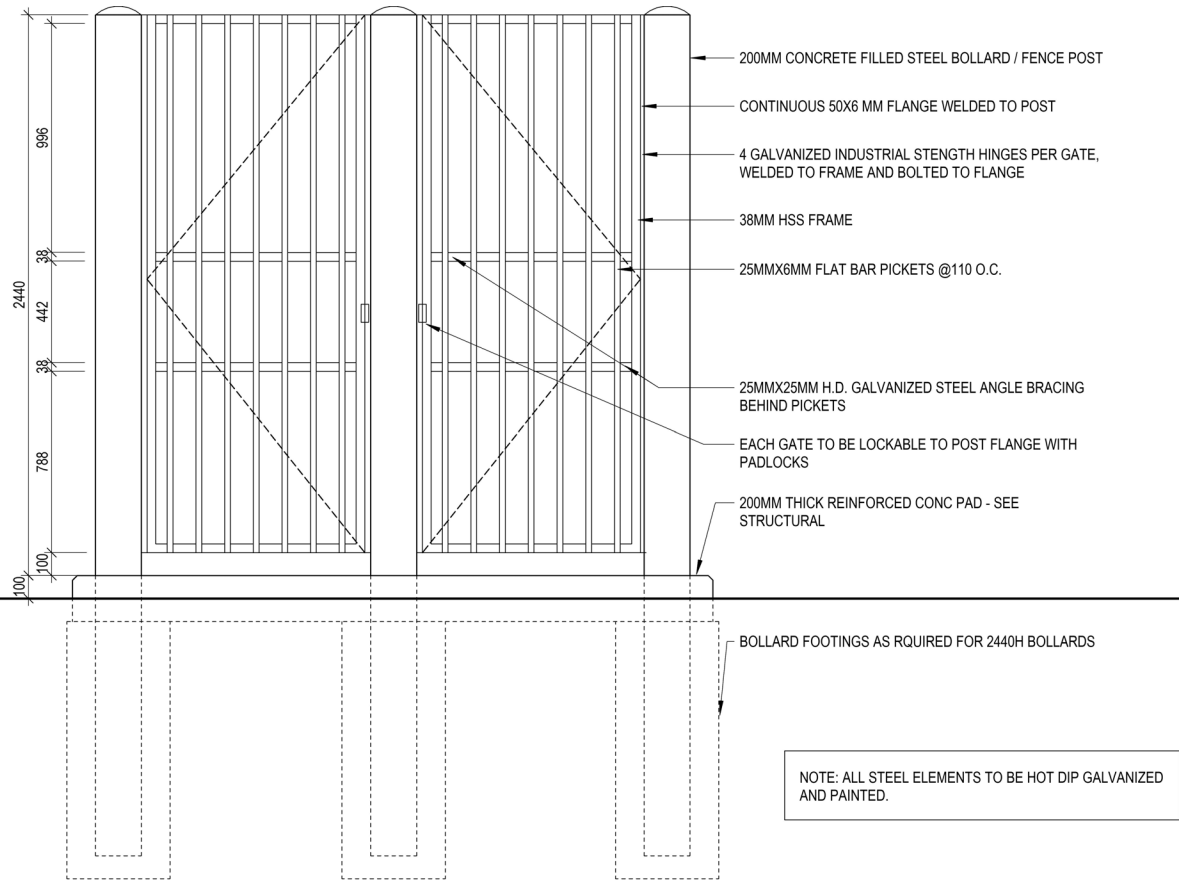
T: (902) 429.4100
architects@fbm.ca
fbm.ca

DATE: 26 JUN 2019
SCALE: NTS
FBM PROJECT NO.: 2018-132
DEPT. PROJ. NO.: 000-00-00-00-00
DRAWN BY: CK

PROJECT: SIR. JOHN A. MACDONALD CULINARY KITCHEN
SUBJECT: PROPANE LINE CLARIFICATION

ASK-001





NOTE: ALL STEEL ELEMENTS TO BE HOT DIP GALVANIZED AND PAINTED.

FBM
ARCHITECTURE • INTERIOR DESIGN

HS1-1660 Hollis Street
Halifax, Nova Scotia, B3J 1V7
Canada

T: (902) 429.4100
architects@fbm.ca
fbm.ca

DATE: 26 JUN 2019
SCALE: NTS
FBM PROJECT NO.: 2018-132
DEPT. PROJ. NO.: 000-00-00-00-00
DRAWN BY: CK

PROJECT: SIR. JOHN A. MACDONALD CULINARY KITCHEN
SUBJECT: PROPANE TANK ENCLOSURE, PLAN AND ELEVATION

ASK-002

HALIFAX REGIONAL CENTRE FOR EDUCATION

TENDER #4018

Culinary Kitchen
Sir John A. Macdonald High

Closing Date: **THURSDAY, JUNE 27TH, 2019**
Closing/Opening Time: **2:00 P.M. (Atlantic Daylight Time)**

Closing Location:
Halifax Regional Centre for Education
33 Spectacle Lake Drive
Dartmouth, N.S. B3B 1X7

Substantial Completion Date:
September 15th, 2019

HRCE Contact:
Don Walpola, Buyer
Tel: (902) 464-2000 #2223
Fax: (902) 464-0161
Email: dwalpola@hrce.ca

School Location:
Sir John A. Macdonald High
31 Scholars Road
Upper Tantallon
B3Z 0C3

Operations Contact:
Earl McMullin, Manager Special Projects
Tel: (902) 464-2000 #5116
Email: emcmullin@hrce.ca

A mandatory tenderers' site meeting is scheduled for *MONDAY JUNE 24th 2019 at 10:00 a.m., SIR JOHN A. MACDONALD HIGH – Please meet at the front entrance of the school.*

To obtain documents:
Download tender documents in .pdf format from the HRCE's Website:
http://www.hrce.ca/about-hrce/financial-services/purchasing/tenders/tender-listing

SECTION 00 00 01 - TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS **# of Pages**

DIVISION 22 PLUMBING

DIVISION 23 HYDRONIC

DIVISION 24 AIR DISTRIBUTION

SECTION 00 00 15 - DESCRIPTION OF WORK & LIST OF DRAWINGS

1. General

1.1 The work of this contract includes the provision of all materials, labour and equipment necessary to complete the **Culinary Kitchen** at **Sir John A. Macdonald High**, as noted on the drawings & specifications prepared by **Fowler Bauld & Mitchell Limited**.

1.2 It is the HRCE's intent to have all work completed, to point of Substantial Performance, prior to **September 15th, 2019**. It is expected that an early award of this contract will enable the Contractor to facilitate shop drawing review and ordering of materials to allow commencement of work immediately following award of tender.

1.3 The whole of the work shall agree in all particulars with the levels, measurements and details contained in the drawings accompanying this specification and with such other drawings or information as may from time to time be supplied by the HRCE, or may be supplied by the Contractor and reviewed by the HRCE.

2. List Of Drawings

Drawing NO.	Drawing Title
2001	**Part Roof Framing Plan and Details**
3001	**Floor Plan – Level 2 Demo**
3002	**Floor Plan – Level 2**
3003	**Floor Plan – Roof**
3301	**Partial Building Sections**
3350	**Section Details**
3601	**Interior Elevations**
3701	**Level 1 – Reflected Ceiling Plan and Partial Floor Plan**
3702	**Reflected Ceiling Plan – Level 2 Demo**
3703	**Reflected Ceiling Plan – Level 2**

3801	**Screens, Frames and Doors**
M-001	**Mechanical Legend**
MC601	**Controls**
MP101	**Partial FL Plans Levels 1 & 2 - Plumbing**
MP501	**Mechanical Schedules and Details**
MV101	**Partial Level 2 and Roof Plan – Air Distribution**
MV501	**Details – Air Distribution**
MV601	**Schedules – Air Distribution**
PG101	**Partial LF. Plans and Roof Plan – Propane Gas**
SP101	**Level 2 Floor Plan - Sprinkler**
E-001	**Electrical Legend and Details**
E-101	**Level 1 and 2 Electrical Key Plans**
EL101	**Level 2 Floor Plan - Lighting**
EM101	**Level 2 Floor Plan – Mechanical Equipment Connections**
EP101	**Level 2 Floor Plan – Power & Systems**
EP501	**Level 2 Floor Plan – Kitchen Equipment Connections**
EP601	**Electrical Riser Details**

END OF SECTION 00 00 15

SECTION 00 05 00 - LIST OF CONSULTANTS

Owner: **HALIFAX REGIONAL CENTRE FOR EDUCATION**
33 SPECTACLE LAKE DRIVE, DARTMOUTH NS

Architect:

Greg Fry
Fowler Bauld & Mitchell Limited
Phone: (902) 429-4100
Email: fry@fbm.ca

END OF SECTION 00 05 00

SECTION 00 21 13 – INFORMATION FOR TENDERERS

Invitation:

1. Bid Call

1.1. The HALIFAX REGIONAL CENTRE FOR EDUCATION (HRCE) will receive offers in the form of a bid from Contractors which is signed and received on or before the date and time specified on the cover sheet of this document. The HRCE deems the correct time to be the time indicated on the phone clock on the Receptionist's desk at at 33 Spectacle Lake Drive.

1.2. Offers submitted after the closing time/date shall be returned to the tenderer unopened.

1.3. Submit completed tender documents for above project in sealed envelope marked as follows: ***TENDER #4018, Culinary Kitchen –Sir John A. Macdonald High.***

1.4. Bids will be opened at the time indicated on the cover sheet of this document. As of April 1, 2014 Public tender openings are no longer held for any tenders relating to goods, services or construction for HRCE. A list of tenderers and bid amounts will be posted on the Procurement Services website (http://novascotia.ca/tenders/tenders/ns-tenders.aspx) shortly following the closing of the tender. All bid submissions are subject to evaluation after opening and before award of contract. The winning tenderer and award amount will be posted on the Procurement Services website (http://novascotia.ca/tenders/tenders/ns-tenders.aspx) after award.

1.5. In the event that the HALIFAX REGIONAL CENTRE FOR EDUCATION office is closed due to inclement weather or any other reason on the date and at the time of closing, the Closing Date and Time will be extended one (1) business day. Proponents should note that closure of Schools does not necessarily mean closure of the HRCE's Regional Office.

1.6. Amendments to the submitted offer will be permitted if received in writing prior to bid closing and if endorsed by the same party or parties who signed and executed the offer.

1.7. Emailed/Faxed Bid Submissions **will not** be accepted.

2. Intent

2.1. The intent of this bid call is to obtain an offer to perform all work associated with ***TENDER #4018, Culinary Kitchen,*** at ***Sir John A. Macdonald High*** for a Stipulated Price Contract in accordance with the Contract Documents.

3. Scope of work

3.1. Refer to Section 00 00 15 – Description of Work and List of Drawings.

4. Availability

4.1. Bid Documents can be obtained as per the directions on the cover sheet of this document.

4.2. Bid Documents are made available only for the purpose of obtaining offers for this project. Their use does not confer a license or grant for other purposes.

4.3. The HALIFAX REGIONAL CENTRE FOR EDUCATION is not responsible for accuracy of documents and project postings obtained from any other source.

5. Examination

5.1. Bid Documents are on display at the offices of the Nova Scotia Construction Association (CANS), Halifax, NS.

5.2. Upon receipt of Bid Documents verify that documents are complete; notify the HRCE's Buyer by email to dwalpola@hrce.ca, should the documents be incomplete, or upon finding discrepancies or omissions in the Bid Documents.

5.3. Tenderers shall become fully aware of the content of all tender documents for the preparation of the Tenderer's offer.

5.4. Tenderers will be deemed to have familiarized themselves with the existing site and working conditions and all other conditions which may affect the performance of the work. No plea of ignorance of such conditions as a result of failure to make all necessary examinations will be accepted as a basis for any claims for extra compensation or an extension of time.

6. Clarification and Addenda

6.1. Notify Don Walpola, Buyer, by email to dwalpola@hrce.ca no less than **five (5)** working days before Tender Closing regarding any questions, omissions, errors or ambiguities found in Contract Documents. If HRCE considers that correction, explanation or interpretation is necessary, a reply will be in the form of an addendum, a copy of which will be posted on the novascotia.ca/tenders and/or HRCE website as applicable, and it is the responsibility of the Tenderer to ensure all addenda are received and acknowledged.

6.2. Addenda will be issued no less than three (3) business days before tender closing date and time, and will form part of the Contract Documents.

6.3. Verbal answers to queries are not binding. Information must be confirmed by written addenda. The HRCE and its representatives shall not be bound by or be liable for any representation or information provided verbally. Information obtained by any other source is not official and will not bind the HALIFAX REGIONAL CENTRE FOR EDUCATION.

6.4. Complete tender form (section 00 41 13) acknowledging that addenda have been received.

7. Product/System Options

7.1. Alternatives to specified products and systems will only be considered during the bidding period in the manner prescribed below.

7.1.1. Where the Bid Documents stipulate a particular product, alternatives may be considered by the Consultant up to five (5) working days before tender closing date and time. Tenderers must forward their written requests by email to: dwalpola@hrce.ca. The Buyer will relay the requests to the appropriate person(s) for review.

7.2. The submission must provide sufficient information to enable the Consultant to determine acceptability of such products. Request for an alternate must be accompanied with:

7.2.1. information about how the request affects other work in order to accommodate each alternate;

7.2.2. the dollar amount of additions to or reductions from the Bid Price, including revisions to other Work.

A later claim by the tenderer for an addition to the contract price because of changes in work necessitated by use of alternates shall not be considered.

7.3. When a request to substitute a product is made and pursuant to consultation with the Consultant, HRCE may approve or disapprove the substitution. The tenderer making the request will be notified of the HRCE's decision and if the alternate is approved, the HRCE will issue an Addendum.

7.4. Alternates must be submitted in above manner; otherwise, they will not be accepted.

8. Mandatory Tenderers' Site Meeting (Site Assessment)

8.1. Tenderers will be deemed to have familiarized themselves with existing project site and working conditions and all other conditions, which may affect performance of the Contract. No plea of ignorance of such conditions as a result of failure to make all necessary examinations will be accepted as a basis for any claims for extra compensation or an extension of time.

8.1.1. A Mandatory Tenderers' Site Meeting has been scheduled as per the information on the cover sheet of this document. All Tenderers are required to attend. Representatives of HRCE and the Consultant will be in attendance;

9. Tenderers Registration

9.1. The successful Contractor and Sub-contractors must comply with the Nova Scotia Corporations Registration Act or Partnerships and Business Name Registration Act, or equivalent, before a contract is awarded.

10. Qualifications

10.1. Sub-Contractors

10.1.1. HRCE reserves the right to reject a proposed sub-contractor for a reasonable cause.

10.1.2. Refer to Article GC 3.7.3 of CCDC-2 2008.

11. Bid Submission

11.1. Submissions

11.1.1. Tenderers shall be solely responsible for the delivery of their bids in the manner and time prescribed.

11.1.2. Bids must be submitted on the **Bid Form** provided by the HRCE (Section 00 41 13 – Bid Form). These forms are to be completely filled out in ink, with the signature in longhand, and corporate sealed as applicable, and the completed form shall be without interlineations, alterations or erasures. Electronic bid submissions sent by facsimile transmission or email will not be accepted.

11.1.3. Fully complete the Tender Bid Form and enter the contract price in both written words and numerals. Where this bid is requested in both words and numbers, and if the two (2) do not represent the identical amount, words shall prevail.

11.1.4. Submit the executed offer on the Bid Forms together with the required bid security in a closed opaque envelope, clearly identified with tenderer's name, project name and tender number on the outside.

11.1.5. Improperly completed information, irregularities in the bid security, may be cause to declare the bid informal.

12. Accuracy of Referencing

12.1. Indexing and cross-referencing are for convenience only.

13. Conditions of Tendering

13.1. Take full cognizance of content of all Contract Documents in preparation of Tender. Refer to Section 00 41 13 – Tender Form, Subsection 5.0 for a complete list of Contract Documents.

14. Preparation of Tender

14.1. Complete Tender Bid Form (section 00 41 13) provided with Contract Documents in ink. Tender all items and fill in all blanks. Have corrections initialed by person signing Tender. Tenderers' are required to provide all information as detailed.

15. Amendment or Withdrawal of Tender

15.1. Bids may be amended or withdrawn by post, hand or facsimile prior to date and time of closing.

15.2. A Tender Price Amendment Form is provided immediately following the Bid Form (section 00 41 73).

15.2.1.1. The Tender Price Amendment Form provided is the standard Master form for submission of all tender price amendments for this project.

15.2.1.2. Copy and complete form, as directed, for all tender price amendments submitted.

15.3. Amendments shall not disclose either original or revised total price.

15.4. Sign, execute and submit to the HRCE Office or by facsimile to (902) 464-0161 prior to time of Tender Closing.

16. Bid Ineligibility (reason for rejection)

16.1. HRCE may reject a bid which has been received prior to the closing time where:

16.1.1. The bid is not submitted on the required bid form (Section 00 41 13) included herein.

16.1.2. The bid is submitted by electronic transmission.

16.1.3. There are omissions of information that HRCE in its sole discretion deems to be significant.

16.1.4. The bid is not signed as required.

16.1.5. The bid has conditions attached which are not authorized by the invitation to bid.

16.1.6. The bid fails to meet one or more standards specified in the invitation to bid.

16.1.7. All addenda have not been acknowledged.

16.1.8. Any other defect which, in the opinion of the HRCE brings the meaning of the bid into question.

16.1.9. A major irregularity is a deviation from the bid request which affects the price, quality, quantity, or delivery of the project and is material to the award, and is a reason for rejection.

16.1.10. A minor irregularity is a deviation from the bid request which affects form, rather than substance. The effect on price, quality, quantity or delivery is not material to the award, and may be waived by the HRCE.

16.1.11. The required bid security in the required form is not provided.

16.1.12. Tenderer failed to attend Tenderers' Mandatory Site Meeting.

17. Communications Affecting Bids

17.1. Electronic Transmissions, including, but not limited to facsimile transmission:

17.1.1. Bid forms submitted by facsimile and/or e-mail etc. transmission are not acceptable and will be rejected.

17.1.2. Electronic transmissions (facsimile only) modifying tenderer supplied information are acceptable when signed by an authorized signatory of the original bid. Submission and receipt of such electronic transmissions is at the risk of the tenderer. HRCE assumes no liability for the receipt of the electronic transmission or for their proper inclusion with original bid. There is no requirement for HRCE to follow up upon receipt of an electronic transmission. Electronic submissions will be considered binding on both parties. Electronic submissions must be submitted and received prior to closing time and date specified in the bid documents. HRCE Procurement Department Date and Time stamps will prevail. **HRCE Procurement facsimile number is 902-464-0161.**

18. Right to Accept or Reject any Tender

18.1. The HRCE reserves the right to reject any bid in its sole and absolute discretion for any reason whatsoever.

18.2. The HRCE specifically reserves the right to reject all bids if none is considered to be satisfactory in the HRCE's sole and absolute discretion and, in that event, at its option, to call for additional bids.

18.3. Without limiting the generality of any other provision herein, the HRCE reserves the right to accept or reject any bid in accordance with bullet #16 above. (Bid Ineligibility)

18.4. Notwithstanding the above, the HRCE shall be entitled, in its sole and absolute discretion, to waive any irregularity, informality or non-conformance with these instructions in any proposal received by the HRCE. HRCE reserves the right to reject any or all tenders, or to accept any tender, or portion thereof, deemed in its best interest.

18.5. In the event that a number of Tenderers submit bids in substantially the same amount, the HRCE may, at its discretion, call upon those Tenderers to submit further bids or take into consideration any value added services being provide in determination of award.

18.6. No term or condition shall be implied, based upon any industry or trade practice or custom or in a practice or policy of the HRCE or otherwise, which is inconsistent or conflicts with the provisions contained in these Instructions.

19. Construction Contract Guidelines

19.1. The printed policies of the Nova Scotia Construction Guidelines, dated May 18, 2006 (or latest revisions) are applicable to these bid documents.

20. Bid and Security Forms – Signatures

20.1. All bid forms, bid security forms and performance assurance forms **must** bear the Tenderer's original signature and name HRCE as insured.

21. Bid Security

21.1. Submit with Bid one of the following: Bid security in the form of a Certified Cheque, Irrevocable Letter of Credit, or Bid Bond on CCDC Form 220, in the amount of ten percent (10%) of the Bid Price made payable to, or naming HRCE (as obligee), must accompany the tender.

21.2. Where bid bond is provided as bid security:

21.2.1. Provide bond on the standard CCDC Bid Bond Form, latest version, in the amount of not less than ten percent (10%) of the Bid Price.

21.2.2. Bid Bonds, submitted by the general contractor tenderer, signed and sealed by the principal (Contractor) and Surety and shall be with an established Surety Company satisfactory to and approved by HRCE.

21.2.3. Where Bid Bond is used as Bid Security, include the cost of providing the Bid Bond in the Bid Price.

21.3. Where certified cheque or bank draft is provided as bid security:

21.3.1. Provide a certified cheque or bank draft, endorsed in the name of HRCE, for a sum not less than ten percent (10%) of the amount of the Bid Price.

21.3.2. Where certified cheque or bank draft is used as Bid Security, include the cost in the Bid Price.

21.4. Where the Irrevocable Standby Letter of Credit is used as bid security:

21.4.1. Provide an Irrevocable Standby Letter, endorsed in the name of HRCE, for a sum not less than ten percent (10%) of the Bid Price

21.4.2. The Irrevocable Standby Letter of Credit shall be issued by a certified financial institution subject to the Uniform Custom and Practices for Documentary Credit (1993 revision or latest revision) International Chamber of Commerce (Publication No. 500).

21.4.3. Where Irrevocable Standby Letter of Credit is used as bid security, include the cost in the Bid Price.

21.5. Return of Bid Security:

21.5.1. The bid security of the unsuccessful tenderers will be returned to them after the contract has been signed, or previous to such time, at the discretion of HRCE.

21.5.2. The above shall apply provided a contract is awarded within ninety (90) days from the closing date of the bid.

21.5.3. If no contract is awarded, all bid security will be returned.

22. Contract Security (Performance Assurance)

22.1. All bid forms, bid security forms and performance assurance forms must bear the tenderer's original signature and name HRCE as insured.

22.2. Tenderer shall maintain performance assurance in force for a period of not less than twelve (12) months after the issue of the substantial performance certificate certified by HRCE and until completion of the contract.

22.3. Endorse Performance Assurance as specified for bid security.

22.4. Should it become apparent that the final cost of the project will exceed the total amount payable by more than 20%, the tenderer shall arrange to have their bonds reissued based on the projected final cost.

22.5. Refer to Section 00 72 13 – General Conditions GC11.2 and Section 00 73 00 – Supplementary General Conditions for form of Contract Security. Refer to project documents for amount of Contract Security and alternate type of Contract Security if applicable.

22.6. Submit as Performance Assurance one of the following:

22.6.1. Where a Bid Bond was used as bid security:

22.6.1.1. Within ten (10) days after notification of award of the Contract, provide a Performance Bond and a Labour & Material Payment Bond, each in an amount equal to fifty percent (50%) of the amount of the Contract, naming HRCE.

22.6.1.2. Performance Bond and Labour and Material Payment Bonds, submitted by the tenderers, shall be provided at the expense of the tenderer and shall be with an established Surety Company satisfactory to and approved by HRCE.

22.6.1.3. Include the cost of providing the Performance Bond and Labour and Material bond in the Contract price.

22.6.2. Where a Certified Cheque or Bank Draft is used as Contract Security:

22.6.2.1. The Certified Cheque or Bank Draft submitted during the bid period will be cashed and the amount retained by HRCE shall serve as Performance Assurance**,** including the payment of all obligations arising under the Contract.

22.6.2.2. The Certified Cheque or Bank Draft will be held in lieu of the Performance Bond and Labour and Material Bonds, providing that, at Contract award, the successful Tenderer shall supplement their Certified Cheque or Bank Draft to maintain an amount of ten (10%) of

the total amount payable (Contract Price plus HST) under the contract.

22.6.2.3. The amount remaining will be returned without interest after a period of not less than twelve (12) months after the issue of the substantial performance certificate certified by HRCE and shall serve as performance assurance and not until completion of the contract.

22.6.2.4. Where certified cheque or bank draft is used as Performance Assurance, include the cost of providing the certified cheque in the Contract price.

22.6.3. Where an Irrevocable Standby Letter or Credit is used as Contract Security:

22.6.3.1. The Irrevocable Standby Letter of Credit submitted during the bid period will be retained by HRCE and shall serve as performance assurance, including the payment of all obligations arising under the contract. The irrevocable standby letter of credit shall be issued by a certified financial intuition subject to the Uniform Customs and Practices for Documentary Credit (1993 revision) International Chamber of Commerce (Publication No. 500).

22.6.3.2. Where irrevocable standby letter of credit is used as Performance Assurance, include the cost of providing and Irrevocable Standby Letter of Credit in the Contract Price. The contractor shall provide to HRCE documentation throughout the duration of the contract that the irrevocable standby letter of credit remains in full effect at all times as specified,

22.6.3.3. Upon expiry of the Irrevocable Standby Letter of Credit, a separate Irrevocable Standby Letter of Credit shall be provided for work requiring extended warranties for such amounts as are required by the contract.

22.6.3.4. The Irrevocable Standby Letter of Credit is to be in effect for a period of not less than twelve (12) months after the issue of the substantial performance certificate certified by HRCE and shall serve as performance assurance and not until completion of the contract.

23. Insurance

23.1. Refer to Section 00 72 13 -General Conditions of Contract, GC 11.1 – Insurance and Section 00 73 00 – Supplementary General Conditions for form of Insurance. Refer to project documents for amount of insurance, duration of coverage and alternate type of Insurance if applicable.

23.2. General Contractor shall secure and maintain at its expense during the term of the Insurance:

23.2.1. Workers' Compensation to meet Statuary requirements and/or Employers Liability.

23.2.2. Wrap Up liability Insurance must insure the general contractor(s) and all sub-contractors on this project:

23.2.2.1. including but not limited to, products liability and completed operations, contractual liability, owners and contractors liability, attached machinery extension endorsement, independent contractor, for a combined single limit of no less than $5,000,000.00 per occurrence.

23.2.3. Commercial Auto Liability insurance covering all owned, non-owned and hired vehicles for a minimum combined single coverage of $2,000,000.00 per occurrence.

23.2.4. Builders Risk – all risks – in the amount of the project contract stipulated bid price.

23.2.5. Deliver a certificate of insurance evidencing the above prior to work being performed. It is also agreed that the above insurance coverage is primary and must be kept in force during the term of this agreement. Furthermore, HRCE must receive, in writing, at least thirty (30) days' notice of cancellation or modification of the above insurances. All insurance policies or certification documents shall specify coverage being applicable to this contract. The Contractor shall not do or omit to do or suffer anything to be done or omitted to be done which will in any way impair or invalidate such policy or policies of insurance.

23.3. Primary Insurance- Supplier agrees that the insurance as required above shall be primary and non-contributory.

23.4. No limitation- Supplier is responsible for determining whether the above minimum insurance coverage's are adequate to protect its interests. The above minimum coverage's do not constitute limitations upon Supplier's Liability.

23.5. Endorsements – For the policies in para 23 above, there shall contain an endorsement naming HRCE and its Affiliates as an Additional Insureds, and eliminating and removing any exclusion of liability for:

23.5.1. injury, including bodily injury and death to an employee of the insured or of HRCE, or

23.5.2. any obligation of the insured to indemnify, hold harmless, defend, or otherwise make contribution to the HRCE because of damage arising out of injury, including bodily injury and death, to an employee of HRCE.

24. Proof of Competency of Tenderer

24.1. Any tenderer may be required to furnish evidence satisfactory to the owner that he and his proposed sub-contractors have sufficient means and experience in the types of work called for to assure completion of the contract in a satisfactory manner.

24.1.1. The successful tenderer **must** be a member in good standing with CRCA, RCANS; and

24.1.2. Nova Scotia Construction Safety Association or approved recognized association or program.

25. Bid Form Requirements

25.1. Bid Submission

25.1.1.1. Tenderers shall be solely responsible for the delivery of their bids in the manner and time prescribed.

25.1.1.2. Bids must be submitted on forms provided by the HRCE. These forms are to be completely filled out in ink or by typewriter, with the signature in longhand, and the completed form shall be without interlineations, alterations or erasures.

25.1.1.3. Submit the executed bid on the bid forms provided, signed and corporate sealed as applicable together with the required security in a closed opaque envelope, clearly identified with Tenderers name, project name on the outside.

25.1.1.4. Improperly completed information, irregularities, in required enclosures may be cause to declare the bid informal.

25.2. Bid Signing

25.2.1. The bid form **Must** be signed and under seal (as applicable) by a duly authorized signing officer(s) in their normal signatures.

25.3. Contract Time

25.3.1. The tenderer, in submitting an offer, agrees to achieve Substantial performance of the work by the date indicated in the contract documents. The Substantial Performance date in the agreement shall be as indicated on the cover sheet.

26. Offer Acceptance / Rejection

26.1. Duration of offer

26.1.1. Bids shall remain open to acceptance and shall be irrevocable for a period of ninety (90) days after the bid closing date.

26.2. Award/Selection/Acceptance of Offer

26.2.1. In the evaluation of a bid, HRCE will consider, but not be limited to, the following criteria:

26.2.1.1. Compliance with Bid requirements.

26.2.1.2. Bid price submitted.

26.2.1.3. The qualifications and experience of the tenderer with similar projects in size and scope.

26.2.1.4. References.

26.2.1.5. Gantt chart (schedule of proposed scope of work for various disciplines).

26.2.1.6. Completion date.

26.2.2. The Owner's evaluation of any and all bid submission(s) will be final.

26.3. HRCE reserves the right to accept or reject any or all offers or to accept any offer deemed most satisfactory, HRCE reserves the right to waive any informality in any or all bids.

26.4. After acceptance HRCE will issue to the successful tenderer, a written bid acceptance.

26.5. After acceptance by HRCE, the successful tenderer shall be notified in writing of acceptance of the bid and will be issued an official purchase order.

27. Agreement

27.1. After acceptance by HRCE and the successful tenderer will enter into a CCDC-2 –2008, standard form of contract for the execution of the work.

28. Post Bid Submissions

28.1. Provide after closing of bid period, but before award of Contract, when requested by HRCE, a copy of the following documents:

28.1.1. Current Certificate of Recognition or Letter of Good Standing:

28.1.1.1. Certificate of Recognition issued jointly by the Nova Scotia Department of Labour and an occupational health and safety organization approved by Nova Scotia Department of Labour, or a valid letter of Good Standing from an occupational health and safety organization approved by HRCE indicating the Contractor is in the process of qualifying for the Certificate

of Recognition. Contractor shall remain in good standing for the duration of the contract. In the event that any such certification during the term of the contract expires, the obligation remains with the contractor to provide the updated required certificates.

28.1.1.2. Worker's Compensation Coverage

28.1.1.2.1. Evidence of an account with the Workers' Compensation Board, coverage under the Workers Compensation Act, R.S.N.S. and a clearance certificate indicating the tenderer is in good standing and shall remain so for the duration of the contract. In the event that any such certification during the term of the contract expires, the obligation remains with the contractor to provide the updated required certificates.

28.1.1.3. Certificates of good standing with CRCA (Canadian Roofing Contractors Association) and RCANS (Roofing Contractors Association of Nova Scotia),

28.1.2. Submit Post-Bid Submissions requested by HRCE within forty-eight (48) hours of request in order to be eligible to receive award of contract.

28.1.3. Submit the following post award documents within ten (10) working days of notice of award:

28.1.3.1. Provide all required contract security and insurance documentation,

28.1.3.2. Schedule of Values,

28.1.3.3. Copy of safety plan,

28.1.3.4. Copy of Hot Work Permit system and procedures,

28.1.3.5. Shop drawings, as applicable, and

28.1.3.6. Applicable documentation as required by the Tender Documents.

28.1.4. All post bid submissions must be received by HRCE in the manner prescribed above, or prior to commencement of work and delivery of materials on-site, whichever occurs first.

29. Taxes

29.1. The General Conditions of the Contract state that the Contractor as of April 1, 1997 and thereafter, the Contractor is to pay all Harmonized Sales Tax.

29.2. HRCE is not exempt for Harmonized Sales Tax (HST) purposes. As a result, the aggregate amount of the bid for contracts is subject to HST, however, **prices submitted shall not include HST.**

29.3. The HST payable by the HRCE will be added as a separate item during the processing of progress payments and therefore **HST will not appear as a cost in the aggregate amount of the tender.**

29.4. Tenderers are advised that they may be eligible to claim an Input Tax Credit (ITC) for a portion of the HST paid in relation to the Contract requirement of the Government of Canada.

29.5. Tenderers are to note that prices indicated on the Bid Form and the appendices to the Bid Form shall not include Provincial Sales Taxes, the Federal Goods and Services Tax or the Harmonized Sales Tax.

29.6. Exclude Harmonized Sales Tax in Tender Contract Price, unless requested to do otherwise.

29.7. Refer to CCDC-2 - 2008 (Section 00 72 13) and Supplementary General Conditions (Section 00 73 00).

END OF SECTION 00 21 13

SECTION 00 41 13 - TENDER FORM

1. Salutation:

To: **HALIFAX REGIONAL CENTRE FOR EDUCATION**
33 SPECTACLE LAKE DRIVE, DARTMOUTH NS
Attn: DON WALPOLA, BUYER

For: ***#4018 Culinary Kitchen – Sir John A. Macdonald High***
From: _____
Address: _____
_____
E-Mail: _____
Phone: **Fax**: _____
Person Signing for Firm: _____
Position: _____

2. Tenderer Declares:

2.1. That this tender was made without collusion or fraud.
2.2. That the proposed work was carefully examined.
2.3. That the Tenderer was familiar with local conditions.
2.4. That Contract Documents and Addenda were carefully examined.
2.5. That all the above were taken into consideration in preparation of this Tender.

3. Tenderer Agrees:

3.1. To provide all necessary equipment, tools, labour, incidentals and other means of construction to do all the Work and furnish all the materials of the specified requirements which are necessary to complete the Work in accordance with the Contract and agrees to accept, therefore, as payment in full the Lump Sum Price stated in Subsection 6 hereunder.
3.2. Carefully examined the site of the work described herein; become familiar with local conditions and the character and the extent of the work; carefully examined every part of the proposed Contract and thoroughly understands its stipulations, requirements and provisions.
3.3. Determined the quality and quantity of materials required; investigated the location and determined the source of supply of the materials required; investigated labour conditions; and has arranged for the continuous prosecution of the work herein described

3.4. To be bound by the award of the contract and if awarded the contract on this bid to execute the required contract within ten (10) days after notice of award.

3.5. Noted that the Harmonized Sales Tax is excluded from his "Contract Price".

3.6. School/Work site access control: Contractor's employees shall always report to the main office of a school, indicate who they are and state their purpose on site prior to starting any work in the school. Contractor is not permitted to work on the school site without the HRCE's assigned representative on site unless authorized by the HRCE Operations representative. Typical hours of work are daylight hours. Working in occupied schools will be determined by the Operations representative. No work shall be conducted on weekends or holidays without specific approval of the Operations Representative. Work in an occupied school will be limited to work that is not disruptive to the school. IE: No mechanical removals, no drilling, screwing or torch work during occupied hours without approval from HRCE.

3.7. Hours of work – All work shall be carried out after school hours unless otherwise indicated below or in writing by the Manager of Operations or designate. Last Day of school is 30th of June and Reopens on the 5th of September, 19. During this period work needs to be carried out during Regular business hours. Hours of work shall comply with local ordinances and bylaws for each site.

4. Owner Agrees

4.1. To examine this bid and in consideration, therefore, the tenderer hereby agrees not to revoke this bid:

4.1.1. until some other tenderer has entered into the contract with The HRCE for the performance of the work and the supply of the materials specified in the notice inviting bids; or in the Information to Tenderers, or

4.1.2. until ninety (90) days after the time fixed in the Information to Tenderers for receiving bids has expired,

4.1.3. Whichever first occurs; provided, however, that the tenderer may revoke this bid at any time before the time fixed in the Information to Tenderers for receiving bids has expired upon receipt by the HRCE from the tenderer of written notice of such revocation before said time has expired.

4.1.4. The Tenderer declares that he has obtained from the Subcontractors all Bid Security required to be provided by Subcontractors pursuant to the "Instructions to Tenderers".

5. Contract Documents include:

5.1.1. Cover Page
5.1.2. Table of Contents – Section 00 00 01
5.1.3. Description of Work & List of Drawings – Section 00 00 15
5.1.4. List of Consultants – Section 00 05 00
5.1.5. Information for Tenderers – Section 00 21 13
5.1.6. Tender Form – Section 00 41 13
5.1.7. Tender Price Amendment Form (if applicable) – Section 00 41 73
5.1.8. Agreement Between Owner and Contractor (CCDC 2 – 2008) – Section 00 52 00
5.1.9. Definitions (CCDC 2 – 2008) – Section 00 52 13
5.1.10. General Conditions of the Stipulated Contract Price (CCDC 2 -2008) – Section 00 72 13
5.1.11. Supplementary General Conditions – Section 00 73 00
5.1.12. HRCE General Terms & Conditions – Section 00 73 10
5.1.13. Specifications of Work (all applicable sections)
5.1.14. Drawing(s) – as applicable
5.1.15. Addendum/Addenda issued by HRCE.
5.1.16. Contract Sets (2)

6. Fee Submission - Contract Price:

6.1. The undersigned Tenderer, having carefully read and examined the aforementioned Contract Documents prepared by the Consultant, for the Halifax Regional Centre for Education, hereby accepts the same as part and parcel of the Contract herein referred to, and having carefully examined the locality and Site of Works and having full knowledge of the work required and of the materials to be furnished and used, does hereby Tender and offer to enter into a contract to perform and complete, the whole of the said works and provide all necessary labour, plant, tools, materials and equipment and pay all applicable taxes, as set forth and in strict accordance with the Specifications, Drawings and other Contract Documents and to do all therein called for on the terms and conditions and under the provisions therein set forth for the following:

6.2 LUMP SUM BID PRICE

_____ /100 Dollars ($_____) (HST Excluded)

Contract Price to be completed in written form on the lines provided above, with cents expressed as numerical fraction of a dollar. Contract price to be completed in numerical form on the line bounded by parenthesis above, with cents expressed as a decimal of a dollar. WHERE THERE IS A CONFLICT, WRITTEN WORD WILL GOVERN.

6.3 Breakout Prices: Breakout prices requested in the Tender Document, as detailed below, **SHALL BE INCLUDED IN THE LUMP SUM TENDER PRICE** above (6.1 - Contract Price) and deleted only on the instruction at the sole discretion of the Owner, for which a credit will be offered by the Contractor, equal to the breakout pricing detailed below (price excludes HST):

Item No.	Description	Unit of Measurement	Credit Amount
1.	_____N/A_____	_____	$_____
2.	_____	_____	$_____
3.	_____	_____	$_____
4.	_____	_____	$_____
5.	_____	_____	$_____

Total Credit Amount for ALL Breakout Items:

_____ /100 Dollars ($_____) (HST Excluded)

6.4 Separate Prices: Separate prices requested in the Tender Document, as detailed below **SHALL NOT BE INCLUDED IN THE LUMP SUM TENDER PRICE** above (6.1 - Contract Price) and added only on the instruction and at the sole discretion of the Owner, for which the contract will be adjusted, equal to the separate pricing detailed below (price excludes HST):

Listing of Separate Price Details Requested by HRCE:

Item No.	Description	Unit of Measurement	Unit Price
6.	_____N/A_____	_____	$_____
7.	_____	_____	$_____
8.	_____	_____	$_____

9. _____ _____ $_____
10. _____ _____ $_____

7. Completion Time:

7.1. Tenderer agrees to be substantially complete as follows:

7.1.1.1. ***September 15th, 2019***

7.1.1.2. The undersigned Tenderer agrees if awarded the Contract on this Bid to achieve the Substantial Completion Date providing the contract is awarded within ten (10) business days of tender closing time.

7.2. Detailed breakdown of overall project specific phases (schedule of proposed scope of work for various disciplines) written and/or Gantt Chart to be provided with bid documents or within five (5) business days of tender award.

8. Addenda Acknowledgement

I/We have received and noted the following addenda ***for Tender #4018 Culinary Kitchen – Sir John A. Macdonald High***

Addendum #	Dated	# of Pages
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

9. Supporting Information

9.1. References: (Minimum of three)

Tenderer to furnish particulars of at least three (3) similar contracts successfully completed or currently being carried to completion. The projects quoted should preferably be approximate in nature to the work now tendered for and be of comparable or greater size. References are to be submitted with the bid prior to closing date and time.

Contact Name & Phone #	Date	Contract Value
_____	From _____ to _____	$ _____
_____	From _____ to _____	$ _____
_____	From _____ to _____	$ _____
_____	From _____ to _____	$ _____

9.2. Bid submission to include a minimum of two letters of endorsement from clients commenting upon the contractor's ability to deliver quality projects, similar in scope and size, which met schedule and budget.

10. Proof Of Competency Of Tenderer

10.1. Any tenderer may be required to furnish evidence satisfactory to the Owner that he and his proposed sub-contractors have sufficient means and experience in the types of work called for to assure completion of the Contract in a satisfactory manner.

10.1.1. The Tenderer acknowledges, as part of their bid submission, their responsibility and contract obligations to ensure that the proposed sub-contractors will fully perform the project requirements and meet the timings as detailed in this tender call.

10.2. Sub-Contractors: The Tenderer to provide the name and address of each major sub-contractor used in making up this tender. This list of sub-contractors is to be submitted with the bid prior to closing date and time. Only one sub-contractor shall be named for each part of the work to be sublet.

Subcontractor/Suppliers/Manufacturers	Service/Material
Site Works	
Electrical	
Mechanical	

Roof	

10.2.1. Project Personnel: The Tenderer to include below, the names, qualifications and previous experience of those people who will be directly involved with the project. The names shall, for example, include foremen, superintendent, project engineer and/or project manager, labourers and trade staff. This list of personnel is to be submitted with the bid prior to closing date and time.

Name	**Position**	**Qualifications/Experience**

Signature * The undersigned Tenderer declares that this bid is made without connection with any other person(s) submitting bids for the same work and is in all respects fair and without collusion or fraud.

SIGNATURE:

SIGNED AND DELIVERED
in the presence of:

_____
Witness

CONTRACTOR

_____
Company name

_____
Signature of Signing Officer

_____
Name and Title (printed)

_____
Date

HRCE is directly responsible for the safety of its students and staff. Should contractors be required to work in or on school property while children are present, it is a MANDATORY HRCE REQUIREMENT that contractors assign the work to employees and/or sub-contractors who DO NOT have a CRIMINAL RECORD and who ARE NOT LISTED ON THE CHILD ABUSE REGISTRY. Failure to comply with this requirement may result in immediate contract termination.

By checking the "Agreed" box you are confirming that you understand and will abide by this mandatory HRCE requirement.

Agreed □

Note: *Bids submitted **Must** be signed by a duly authorized officer or agent.*

END OF SECTION 00 41 13

SECTION 00 41 73 - TENDER AMENDMENT FORM

#4018 Culinary Kitchen - Sir John A. Macdonald High

Note: to be completed and forwarded for each Bid Price adjustment prior to bid closing time and date as detailed on the Cover Sheet of the tender document and related Addendum.

Lump Sum Price Adjustment – Section 00 41 13 Tender form, Article 6.1.1 Contract Price

Increase Bid by		**Decrease Bid By**	
Amount (excluding HST)	**$**	**Amount** (excluding HST)	**$**
HST	**$**	**HST**	**$**
Total Amount (including HST)	**$**	**Total Amount** (including HST)	**$**

It is the Tenderer's responsibility to ensure the table above is legible

Attachments included: **no** ☐ **yes** ☐ (✓ one)

If yes above, check ✓ and complete information regarding attachments

☐ **Revised Bid Form**: Dated _____ # of pages _____

☐ **Other, Specify** _____

Dated _____ # of pages _____

Total number of pages (including this form) _____

Submitted by:

_____

Company Name (please print as it appears on original tender envelope)

_____

Authorized Tenderer's Name (please print as it appears on Bid Form)

_____

Authorized Tenderer's Signature

END OF SECTION 00 41 73

SECTION 00 52 00 - AGREEMENT BETWEEN OWNER AND CONTRACTOR

CCDC 2 – 2008

(a copy of Section 00 52 00, Standard Construction Contract CCDC 2 – 2008 (5 pages) is available upon request, otherwise, will form part of the contract sets to the successful tenderer)

END OF SECTION 00 52 00

SECTION 00 52 13 - DEFINITIONS

CCDC 2 - 2008

(A copy of section 00 52 13, Standard Construction Contract CCDC 2 – 2008 (2 pages) is available upon request, otherwise, will form part of the contract sets to the successful tenderer)

END OF SECTION 00 52 13

SECTION 00 72 13 - GENERAL CONDITIONS
OF THE STIPULATED PRICE CONTRACT
CCDC 2 - 2008

(A copy of section 00 72 13, Standard Construction Contract CCDC 2 – 2008 (23 pages) is available upon request, otherwise, will form part of the contract sets to the successful tenderer)

END OF SECTION 00 72 13

SECTION 00 73 00 - SUPPLEMENTARY GENERAL CONDITIONS CCDC2 – 2008

The Canadian Standard Construction Document for Stipulated Price Contract (CCDC 2, 2008 version), Definitions and General Conditions governing same, shall be used by the project. The following Supplementary General Conditions are intended to supplement or amend the General Conditions, and where conflicts occur, the Supplementary Conditions shall take precedence.

Where a General Condition or paragraph of the General Conditions of the Stipulated Price Contract is deleted by these Supplementary Conditions, the numbering of the remaining General Conditions or paragraphs shall remain unchanged, and the numbering of the deleted item will be retained, unused.

ARTICLE A-5 PAYMENT

Delete paragraph 5.1 in its entirety and insert:

5.1 "Subject to applicable legislation and the provisions of the Contract Documents, and in accordance with legislation and statutory regulations respecting holdback percentages and, where such legislation or regulations do not exist or apply, subject to a holdback of ten percent (10%) including the HST (Harmonized Sales Tax), the Owner shall:"

.1 Make progress payments to the Contractor on account of the Contract Price (work performed) when due in the amount certified by the Consultant together with Value Added Taxes as may be applicable to such payments, and
.2 Upon Substantial Performance of the Work as certified by the Consultant, pay to the Contractor the unpaid balance of monies then due, excepting that amounts as certified by the Consultant to rectify deficiency items, or incomplete portions of individual work items may be retained by the Owner pending Total Performance of the work or other authorization for the release by the Consultant, and
.3 Upon Total performance of the Work as certified by the Consultant pay to the contractor the unpaid balance of monies due together with such Value Added Taxes as may be applicable to such payment.

Change 5.3.1 (1) to read: "1% per annum above the prime rate."

Delete 5.3.2 (2) in its entirety.

DEFINITIONS

Add subparagraph 19a to definitions:

19a. Submittals

Submittals are documents or items required by the Contract Documents to be provided by the Contractor, such as:

1 Shop Drawings, samples, models, mock-ups to include details or characteristics, before the portion of the Work that they represent can be incorporated into the Work; and
2 As-built drawings and manuals to provide instructions to the operation and maintenance of the Work.

GC 1.1 CONTRACT DOCUMENTS

Add to the end of subparagraph 1.1.2.2:

1.1.2.2 Except where the Consultant shall be indemnified as a third party beneficiary as provided in subparagraphs 9.2.7.4, 9.5.3.4 and in 12.1.3.

Add subparagraph 1.1.7.5:

1.1.7.5 Should conflicts occur between Contract Documents and any work is done without consulting the Consultant for his decision, the Contractor shall assume full responsibility.

Add subparagraph to 1.1.7.6:

1.1.7.6 In case of discrepancies, noted materials and annotations shall take precedence over graphic indications in the Contract Documents.

Delete paragraph 1.18 in its entirety and insert:

1.18 "The Contractor will be provided with up to a maximum of ten (10) copies, without charge, of the Contract Documents or parts thereof for the performance of the work. Extra copies may be obtained for cost of printing and mailing."

GC 2.4 DEFECTIVE WORK

Add new subparagraphs 2.4.1.1 and 2.4.1.2:

2.4.1.1 The Contractor shall rectify, in a manner acceptable to the Owner and the Consultant, all defective work and deficiencies throughout the Work, whether or not they are specifically identified by the Consultant.

2.4.1.2 The Contractor shall prioritize the correction of any defective work which, in the sole discretion of the Owner, adversely affects the day to day operation of the Owner.

GC 3.1 CONTROL OF THE WORK

Add new paragraph 3.1.3:

3.1.3 Prior to commencing individual procurement, fabrication, and construction activities, the Contractor shall verify, at the Place of work, all relevant measurements and levels necessary for proper and complete fabrication, assembly and installation of the Work and shall further carefully compare such field measurements and conditions with the requirements of the Contract Documents. Where dimensions are not included or contradictions exist, or exact locations are not apparent, the Contractor shall immediately notify the Consultant before proceeding with any part of the affected work.

GC 3.4 DOCUMENT REVIEW

Delete paragraph 3.4.1 in its entirety and substitute new paragraph:

3.4.1 The Contractor shall review the Contract Documents and shall report promptly to the Consultant and error, inconsistency or omission the Contractor may discover. Except for its obligation to make such review and report the result, the Contractor does not assume any responsibility to the Owner or to the Consultant for the accuracy of the Contract Documents. The Contractor shall not be liable for damage or costs resulting from such errors, inconsistencies, or omissions in the Contract Documents, which the Contractor could not have reasonably have discovered. If the Contractor does discover any error, inconsistency, or omission in the Contract Documents the Contractor shall not proceed with the work affected until the Contractor has received corrected or missing information from the Consultant.

GC 3.7 SUBCONTRACTORS AND SUPPLIERS

Add the following paragraph 3.7.7:

3.7.7 A copy of the agreement between Contractor and any subcontractor(s) shall be provided to the Consultant if so requested.

GC 3.8 LABOUR AND PRODUCTS

Add the following paragraph 3.8.4:

3.8.4 The Contractor is responsible for the safe on-site storage of Products and their protection (including Products supplied by the Owner and other contractors to be installed under the Contract) in such ways as to avoid dangerous conditions or contamination to the Products or other persons or property and in locations at the Place of the Work to the satisfaction of the Owner and the Consultant. The Owner shall provide all relevant information on the Products to be supplied by the Owner.

GC 3.10 SHOP DRAWINGS

Add the words "AND OTHER SUBMITTALS" to the Title after SHOP DRAWINGS in GC 3.10.

Add "and submittals" after the words "Shop Drawings" in paragraphs 3.10.1, 3.10.2, 3.10.4, 3.10.7, 3.10.8, 3.10.8.2, 3.10.9, 3.10.10, 3.10.11 and 3.10.12.

Delete 3.10.3 in its entirety and substitute new paragraph:

3.10.3 Prior to the first application for payment, the Contractor and the Consultant shall jointly prepare a schedule of the dates for submission and return of Shop Drawings and any Submittals.

Add the following subparagraph 3.10.6.1:

3.10.6.1 The following paragraph shall apply to each shop drawing and submittals reviewed in connection with the project. This review shall not mean that the Consultant approved the detailed design inherent in the shop drawings, responsibility for which shall remain with the Contractor submitting same. The Contractor is responsible for information that pertains solely to fabricated processes or to techniques of construction and installation, and for coordination of the work of all sub trades.

Delete and insert the words in paragraph 3.10.12

3.10.12 "with reasonable promptness so as to cause no delay in the performance of the Work" and replace with "within ten (10) working days or such longer period as may be reasonably required"

PART 3 EXECUTION OF THE WORK

Add new GC 3.14 as follows:

GC 3.14 CONTRACTOR RESPONSIBILITY FOR WATER TIGHTNESS

GC 3.14.1 The drawings and specifications are not intended to depict each and every condition or detail of construction. As the knowledgeable party in the field, the contractor is in the best position to verify that all construction is completed in a manner which will provide a watertight structure. The contractor has the sole responsibility for ensuring the watertight integrity of the structure.

Add new GC 3.15 as follows:

GC 3.15 PERFORMANCE BY CONTRACTOR

GC 3.15.1 In performing its services and obligations under the Contract, the Contractor shall exercise a standard of care, skill and diligence that would normally be provided by an experienced and prudent contractor supplying similar services for similar projects. The Contractor acknowledges and agrees that throughout the Contract, the Contractor's obligations, duties and responsibilities shall be interpreted in accordance with this standard. The Contractor shall exercise the same standard of due care and diligence in respect of any products, personnel, or procedures which it may recommend to the Owner.

The Contractor further represents, covenants and warrants to the Owner that:

1. The personnel it assigns to the Project are appropriately experienced;
2. It has sufficient staff of qualified and competent personnel to replace its designated supervisor and project manager, subject to the Owner's approval, in the event of death, incapacity, removal or resignation.

GC 4.1 CASH ALLOWANCES

Delete paragraph 4.1.4 in its entirety and substitute:

4.1.4 Where cost under a cash allowance exceed the amount of the allowances, unexpended amounts from other cash allowances shall be reallocated at the *Consultant's* direction to cover the shortfall.

Delete paragraph 4.1.5 in its entirety and substitute:

4.1.5 The net amount of any unexpended cash allowances, after providing for any reallocations as contemplated in paragraph 4.1.4, shall be deducted from the Contract Price by Change Order.

Delete paragraph 4.1.7 in its entirety and substitute:

4.1.7 At the commencement of the work, the Contractor shall prepare for the review and acceptance of the Owner and the Consultant, a schedule indicating the times, within the construction schedule referred to in GC 3.5, that items call for under cash allowances and items that are specified to be Owner purchased and Contractor installed or hooked up are required at the site to avoid delaying the progress of the Work.

Add new paragraph 4.1.8:

4.1.8 The *Owner* reserves the right to call, or to have the Contractor call, for competitive bids for portions of the Work, to be paid for from cash allowances.

GC 5.1 FINANCING INFORMATION REQUIRED OF THE OWNER

Delete section GC 5.1 in its entirety.

GC 5.2 APPLICATION FOR PROGRESS PAYMENT

Add the following at the end of paragraph 5.2.2:

5.2.2 Such applications shall be accompanied by one or more of the following documents: a Statutory Declaration Waiver of Lien or receipt stating that the holdback monies claimed have been paid to the particular party or parties so named or referred to in the Declaration. Form of Statutory Declaration shall meet the approval of the Consultant.

Add the following paragraph 5.2.8:

5.2.8 The reference to payment for products delivered to the place of work in Article 5.2.7 shall not be construed as covering day-to-day financing of the project. Products delivered to the place of work shall be construed to mean major items of equipment or quantities of items that are essential for the expedient conduct of the work.

GC 5.3 PROGRESS PAYMENT

Supplement paragraph 5.3.1 by adding the following:

5.3.1 A holdback percentage of ten (10) percent (%) shall apply to progress payments. The sworn statement by the Contractor for release of holdback monies shall be in the form of a Statutory Declaration meeting the approval of the Consultant. Amounts as certified by the Consultant to rectify deficiency items, or incomplete portions of individual work items, may be retained by the Owner after Substantial Performance has been obtained, pending Total Performance of the work or other authorization for release by the Consultant.

Amend subparagraph 5.3.1.3 as follows:

5.3.1.3 Delete "20" and replace with "30."

GC 5.4 SUBSTANTIAL PERFORMANCE OF THE WORK

Add the following paragraph 5.4.4:

5.4.4 Before the Contractor submits his application for Substantial Performance of the Work, all Operations and Maintenance Manual materials shall be submitted in accordance with the Contract Documents. The Certificate of Substantial Performance will not be issued until this requirement is met.

GC 5.5 PAYMENT OF HOLDBACK UPON SUBSTANTIAL PERFORMANCE OF WORK

Add the following subparagraphs 5.5.1.3 and 5.5.1.4:

5.5.1.3 Submit a certificate from barrister stating that there are no Builders' Liens filed relating to the Contract Works.
5.5.1.4 Submit a clearance letter from the Workers' Compensation Board.

GC 5.7 FINAL PAYMENT

Add the following subparagraphs 5.7.1.1, 5.7.1.2, 5.7.1.3, 5.7.1.4 and 5.7.1.5:

5.7.1.1 Contractor's application for final payment is considered to be valid when the following have been performed:

1. Work has been completed and inspected for compliance with Contract Documents, and the Consultant is satisfied that all the requirements of the Contract have been fulfilled by the Contractor.
2. Defects have been corrected and deficiencies have been completed.
3. Equipment and systems have been tested, adjusted and balanced and are fully operational, and written reports as outlined in the Contract Documents have been provided to the Consultant.
4. Certificates required by Utility companies, manufacturer's representative and inspectors have been submitted.
5. Spare parts, maintenance materials, warranties and bonds have been provided.

5.7.1.2 If Work is deemed incomplete by Consultant, complete outstanding items and request re-inspection.

5.7.1.3 If in opinion of the Consultant, it is not expedient to correct defective work or Work is not performed in accordance with the requirements of the Contract, the Owner may deduct from Contract Price difference in value between work performed and that called for by Contract Documents, amount of which shall be determined by the Consultant.

5.7.1.4 If, within sixty (60) days after the issue by the Consultant of the Certificate of the Substantial Performance, the Contractor has not corrected all the deficiencies, the Owner will retain sufficient money to cover the cost of completing said deficiencies, as determined by the Consultant, in addition to holding monies retained in accordance with the Contract and subject to the provisions of the Builders' lien legislation of Nova Scotia.

5.7.1.5 Neither the final certificate nor the payment thereunder, nor any provision in the Contract Documents shall relieve the Contractor from responsibility for faulty material or workmanship which shall appear within a period of one (1) year from the date of Substantial Performance of the Work and he shall remedy any defects due thereto and pay for any damage to other Work resulting therefrom which shall appear within such period of one year. The Owner shall give notice of observed defects promptly. This article shall not be deemed to restrict any liability of the Contractor arising out of any law in force in the Province of Nova Scotia.

GC 6.2 CHANGE ORDER

Add the following paragraphs 6.2.3, 6.2.4, 6.2.5, 6.2.5, 6.2.6 and 6.2.7:

6.2.3 All contemplated changes in the work shall be issued by the Consultant on a "Contemplated Change Order" form.

6.2.4 For lump sum pricing, the Contractor shall, upon receipt of the Contemplated Change Order, submit to the Consultant for approval within seven (7) days, a quotation for changes in the work.

6.2.5 Quotation for changes shall be priced in sufficient detail (GC6.6 applies).

6.2.6 Consultant shall, within five (5) working days, notify the Contractor whether estimates are accepted by Owner or further information required. Acceptance of Owner shall be indicated by writing, and a signed copy of form (Change Order) returned to Contractor.

6.2.7 Contractor shall take reasonable measures to stop work or minimize the work in areas affected by or related to the contemplated changes.

GC 6.4 CONCEALED OR UNKNOWN CONDITIONS

Add new paragraph 6.4.5:

6.4.5 The *Contractor* confirms that, prior to bidding the *Project,* it carefully investigated the Place of the Work and applied to that investigation the degree of care and skill described in paragraph 3.15.1, given the amount of time provided between the issue of the bid documents and the actual closing of bids, the degree of access provided to the Contractor prior to submission of bid, and the sufficiency and completeness of the information provided by the Owner. The Contractor is not entitled to compensation or to an extension of the Contract Time for which could reasonably have been ascertained by the Contractor by such careful investigation undertaken prior to the submission of the bid.

GC 6.5 DELAYS

Delete the period at the end of paragraph 6.5.1 and substitute the following words:

6.5.1 ", but excluding any consequential, indirect or special damages."

Add new paragraph 6.5.6:

6.5.6 If the Contractor is delayed in the performance of the Work by any act or omission of the Contractor or anyone employed or engaged by the Contractor directly or indirectly, or by any cause within the Contractor's control, then the Contract Time shall be extended for such reasonable time as the Consultant may decide in consultation with the Contractor. The Owner shall be reimbursed by the Contractor for all reasonable costs incurred by the Owner as the result of such delay, including all services required by the Owner from the Consultant as a result of such delay by the Contractor and, in particular, the cost of the Consultant's services during the period between the date of Substantial Performance of the Work stated in Article A-1 herein as the same may be extended through the provisions of these General Conditions and any later, actual date of Substantial Performance of the Work achieved by the Contractor.

Add new paragraph 6.5.7:

6.5.7 If the Contractor is delayed in the completion of the Work by any act or neglect of: The HRCE, any employee or either any other Contractor employed by The HRCE, changes ordered in the Work, strikes, lockouts, fire, unusual delay by common carriers, unavoidable casualties, any other cause of any kind whatsoever beyond the Contractor's control or by any cause within the Contractor's control which the Consultant shall decide as justifying the delay, then the time of completion shall be extended for such reasonable time as the Consultant may decide.

Add new paragraph 6.5.8:

6.5.8 No such extension shall be made for delay occurring more than seven (7) days before claim therefore is made in writing to the Consultant, provided however that in the case of a continuing cause of delay, only one (1) claim shall be necessary.

Add new paragraph 6.5.9:

6.5.9 If no schedule is made, no claim for delay shall be allowed on account of failure to furnish such schedule until two (2) weeks after demand for such schedule and not then unless such claim be reasonable.

Add new paragraph 6.5.10:

6.5.10 The Consultant shall not, except by written notice to the Contractor, stop or delay any part of the main Contract Work pending decisions or proposed changes.

GC6.6 CLAIMS FOR A CHANGE IN CONTRACT PRICE

Amend paragraph 6.6.5 as follows:

6.6.5 Add the words "as noted in paragraph 6.6.3" after the words "of the claim" and add the words "and the consultant", at the end.

GC 6.7 VALUATION OF CHANGES

Add the following Header and paragraphs 6.7.1, 6.7.2, 6.7.3 and 6.7.4 in their entirety:

GC 6.7 VALUATION OF CHANGES

6.7.1 The value of any change shall be determined in one or more of the following way as determined by the Consultant:

(a) By estimate and acceptance in a lump sum, submitted with sub-contractors' and suppliers' signed quotations and breakdown estimates including itemized material and labour lists.
For changes where the individual trade cost is anticipated to be less than $1000, the requirement for the detailed cost breakdown may be waived, but individual trade quotation must be supplied.

(b) By unit prices agreed upon or as listed in the contract.

(c) Cost of work and percentage or by cost and fixed fee.

6.7.2 In cases of additional work to be paid for under method "c", the Contractor shall keep and present in such form as the Consultant may direct, a correct account of the net cost of labour and materials, together with vouchers. In any case, the Consultant shall certify to the amount due to the Contractor including the profit and overhead. Pending final determination of value, payments on account of changes shall be made on the Consultant's certificate.

6.7.3 In determination of method ".1(a) or ".1(c) above, the labour costs to be calculated by the actual estimated hours at an hourly rate determined as follows:

The hourly labour rate to be total payroll costs including hourly wage, statutory contributions to UIC, WCB, CPP, Training Funds, Health Benefits and other applicable labour burdens paid directly by the employer such as vacation pay, holiday pay, pension plan etc.

The HRCE reserves the right to verify the payroll cost by independent audit.

To the total payroll cost the following percentage factors will be recognized.

- small tools/expenditures 5% (on payroll costs)
- site supervision 5% (on payroll costs)

(d) In determination of methods ".1(a)" and ".1(c)" above, the material costs to be calculated as follows:

Contractors net costs, including contractor discounts from suppliers, FOB the project site plus applicable taxes.

(e) In determination of methods ".1(a)" and ".1(c)" above, equipment rental costs for major pieces of equipment required will be at local industry rates.

(f) In determination of methods ".1(a)" and ".1(c)" above, overhead and fees shall be calculated as follows:

The cost of any authorized change shall be determined by the net total of labour and material or equipment as outlined in ".3(a)", ".3(b)" and ".3(c)" above on which the percentage markup shall be determined as follows:

<u>For Extras Up to $5,000:</u>	
Sub- Contractors Own Work	- Overhead & Fee – 15% total
General Contractors Own Work	- Overhead & Fee – 15% total
General Contractors on Sub Contractors work	- 10% total
(no percentage markup shall be applied to deductions)	
<u>For Extras Above $5,000:</u>	
Sub-Contractors Own Work	- Overhead & Fee – 10% total
General Contractors Own Work	- Overhead & Fee – 10% total
General Contractors on sub contractor's work	– 8% total
(no percentage markup shall be applied to deductions)	

6.7.4 Submit to the Consultant and The HRCE's representative detailed breakdown of the hourly labour rate as defined in paragraph ".3(a)".

GC 8.2 NEGOTIATION, MEDIATION, AND ARBITRATION

<u>Add</u> the following paragraphs 8.2.9, 8.2.10, 8.2.11, 8.2.12, 8.2.13, 8.2.14, and 8.3:

8.2.9 Within five days of receipt of the notice of arbitration by the responding party under paragraph 8.2.6, the Owner and the Contractor shall give the Consultant a written notice containing:

a) a copy of the notice of arbitration;

b) a copy of supplementary conditions 8.2.9 to 8.2.14 of this contract, and;

c) any claims or issues which the Contractor or the Owner, as the case may be, wishes to raise in relation to the Consultant arising out of the issues in dispute in the arbitration.

8.2.10 The Owner and the Contractor agree that the Consultant may elect, within ten days of receipt of the notice under paragraph 8.2.9, to become a full party to the arbitration under paragraph 8.2.6 if the Consultant:

a) has a vested or contingent financial interest in the outcome of the arbitration;

b) gives the notice of election to the Owner and the Contractor before the arbitrator is appointed;

c) agrees to be a party to the arbitration within the meaning of the rules referred to in paragraph 8.2.6, and;

d) agrees to be bound by the arbitral award made in the arbitration.

8.2.11 If an election is made under paragraph 8.2.10, the Consultant may participate in the appointment of the arbitrator and, notwithstanding the rules referred to in paragraph 8.2.6, the time period for reaching agreement on the appointment of the arbitrator shall begin to run from the date the respondent receives a copy of the notice of arbitration.

8.2.12 The arbitrator in the arbitration in which the Consultant has elected under paragraph 8.2.10 to become a full party may:

a) on application of the Owner or the Contractor, determine whether the Consultant has satisfied the requirements of paragraph 8.2.10, and;

b) make any procedural order considered necessary to facilitate the addition of the Consultant as a party to the arbitration.

8.2.13 The provisions of paragraph 8.2.9 shall apply mutatis mutandis to written notice to be given by the Consultant to any sub-consultant.

8.2.14 In the event of notice of arbitration given by the Consultant to a sub-consultant, the sub-consultant is not entitled to any election with respect to the proceeding as outlined in 8.2.10, and is deemed to be bound by the arbitration proceeding.

8.3 An application for arbitration shall be accompanied by security in the amount of $1000 to apply to the cost of arbitration. Any claims of excess costs must be submitted in writing to the Consultant within two weeks of completion or alleged completion of the work. No claims shall be accepted after this date and, also, no claims shall be accepted for disputed work unless the Consultant has been notified as specified.

GC 9.1 PROTECTION OF WORK AND PROPERTY

Delete subparagraph 9.1.1.1 in its entirety and substitute the following new paragraph 9.1.1.1:

9.1.1.1 errors in the Contract Documents which the Contractor could not have discovered applying the standard of care described in paragraph 3.15.1.

Delete paragraph 9.1.2 in its entirety and substitute the following new paragraph 9.1.2:

9.12 Before commencing any Work, the Contractor shall determine the locations of all underground utilities and structures indicated in the Contract Documents, or that are discoverable by applying to an Inspection of the Place of Work exercising the degree of care and skill described in paragraph 3.15.1.

GC 9.2 TOXIC AND HAXARDOUS SUBSTANCES

Add in paragraph 9.2.6 after the word “responsible”, the following new words:

9.2.6 Or whether any toxic or hazardous substances or materials already at the Place of Work (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the Contractor or anyone for whom the Contractor is responsible in a manner which does not comply with legal and regulatory requirements, or which threatens human health and safety or the environment, or material damage to the property of the Owner and others,

Add in subparagraph 9.2.7.4:

9.2.7.4 “and the Consultant” after “Contractor”:

Add in paragraph 9.2.8 after the word “responsible”, the following new words:

9.2.8 or that any toxic or hazardous substances or materials already at the Place of the Work (and which were then harmless or stored, contained or otherwise dealt with in accordance with legal and regulatory requirements) were dealt with by the Contractor or anyone for whom the Contractor is responsible in a manner which does not comply with legal and regulatory requirement, or which threatens, humane health and safety or the environment, or material damage to the property of the Owner or others.

GC 9.5 MOULD

Add in subparagraph 9.5.3.4:

9.5.3.4 "and the Consultant" after "Contractor"

GC 10.1 TAXES AND DUTIES

Add the following paragraph 10.1.3:

10.1.3 The Contractor shall indicate on each application for payment as a separate amount, the appropriate Harmonized Sales Tax the Owner is legally obliged to pay. This amount will be paid to the Contractor in addition to the amount certified for payment under the Contract.

GC 10.2 LAWS, NOTICES, PERMITS AND FEES

Delete from the first line of paragraph 10.2.5 the word, "The" and substitute the words:

10.2.5 "Subject to paragraph 3.15.1, the"

GC 10.4 WORKERS' COMPENSATION

Add the following paragraphs 10.4.3, 10.4.4, and 10.4.5:

10.4.3 The contractor is referred to regulations, as applicable, under the Worker's Compensation Act of Nova Scotia.

10.4.4 Registration with Worker's Compensation Board shall be continuous during the contract. Should registrations be scheduled to expire during the contract period, the Contractor shall submit a copy of registration renewal one month prior to the expiration of the current certificate.

10.4.5 The Contractor shall furnish evidence of coverage under the Worker's Compensation Act, R.S.N.S. and a clearance Certificate providing proof of registration with Worker's Compensation Board prior to commencement of work. (A photocopy of the Contractors registration certificate is acceptable proof). On-going proof of good standing with the Worker's Compensation Board during the term of the contract is required.

GC 11.1 INSURANCE

Delete sentences and replace with the following in subparagraph 11.1.1.1:

11.1.1.1 "General liability insurance shall be maintained from the commencement of the work until one year from the date of Substantial Performance of the Work. Liability coverage shall be provided for completed operations hazards from the date of Substantial Performance of the Work, as set out in the certificate of Substantial Performance of the Work, on an ongoing basis for a period of 6 years following the Substantial Performance of the Work**" and replace with:** " General Liability Insurance or Wrap- Up Liability Insurance, (as detailed in the Information to Tenders section under "Insurance Requirements"), shall be maintained from the commencement of the work until final completion and acceptance of the work including the making good of faulty work or materials, except that coverage of completed operations liability shall in any event be maintained for twelve (12) months from date of Substantial Performance of the work as certified from the Consultant, and approved by the Owner".

Add the following subparagraphs 11.1.1.1.1, 11.1.1.1.2, and 11.1.1.2.1:

11.1.1.1.1 The general liability insurance to be maintained by the Contractor shall include Commercial General Liability Insurance covering Premises and Operations Liability, elevators, board form property damage, board from automobile, owners and contractors protective, blanket contractual, personal injury, completed operations liability contingent employers liability, cross liability clause, non-owned automobile liability, and a 30 day notice of cancellation clause.

11.1.1.1.2 All liability insurance policies shall be written in such terms as will fully protect the Contractor and
The Halifax Regional Centre for Education as an additional named insured.

11.1.1.2.1 Liability coverage of not less than two million dollars ($2,000,000) is required with regard to operations of owned automobiles.

Delete subparagraph 11.1.1.4 in its entirety and insert the following subparagraphs:

11.1.1.4 Broad Form (All Risks) Builders Risk Coverage - Prior to the commencement of any Work the Contractor shall maintain and pay for Broad Form (All Risks) Builders Risk Coverage in the joint names of The HRCE and the Contractor totaling not less than one hundred percent (100%) of the total value of the Work done and materials delivered on the site (contract value), so that any loss under such policies of insurance will be payable to The HRCE and the Contractor as their respective interests appear. The Builders Risk Insurance shall include all materials related to the work while in transit or at other locations.

11.1.1.4.1 Should a loss be sustained under the Builders Risk Coverage, the Contractor shall act on behalf of The HRCE and Contractor for the purpose of adjusting the amount of such loss with the insurance companies. As soon as such adjustment has been satisfactorily completed, the Contractor shall proceed to repair the damage and complete the Work and shall be entitled to receive from The HRCE in addition to any sum due under the Contract, the amount at which The HRCE interest has been appraised in the adjustment made with the insurance companies as referred to above, said amount to be paid to the Contractor as the Work of restoration proceeds. Any loss or damage which may occur shall not affect the rights and obligations of either party under the Contract except as aforesaid and except that the Contractor shall be entitled to a reasonable extension of time for the performance of the Work, as The HRCE may decide.

11.1.1.4.2 Upon approval by The HRCE of the Substantial Performance certificate issued by the Consultant, the Contractor's obligation to maintain Builder Risk Insurance shall cease and The HRCE shall assume full responsibility for insuring the whole of the Work against loss or damage.

11.1.1.4.3 "Broad form" property insurance in the joint names of the *Contractor,* the *Owner* and the *Consultant.* The policy shall include as insureds all *Subcontractors* The Broad form" property insurance shall be provided from the date of commencement of the *Work* until the earliest of:

11.1.4.3.1 Ten (10) Calendar days after the date of *Substantial Performance of the Work;*

11.1.4.3.2 on the commencement of use or occupancy of any part or section of the *Work* unless such use or occupancy is for construction purposes, habitational, office, banking, convenience store under 465 square meter in area, or parking purposes, or for the installation, testing and commissioning or equipment forming part of the *Work*; and

11.1.4.3.3 when left unattended for more than thirty (30) consecutive calendar days or when construction activity has ceased for more than thirty (30) consecutive calendar days.

Paragraph 11.1.2 is clarified as follows:

11.1.2 Submit certified true copies of each insurance policy to the Owner's Contract Authority within seven (7) working days after notification of award or in any event prior to payment of the first progress claim. Such copies shall be exclusive of information pertaining to premium or premium bases used by the insurer to determine the cost of the insurance. Prior to the commencement of

any work, the Contractor shall file with the Owner a certified copy of each insurance policy and certificate required.

Delete 11.1.5 in its entirety and replace with the following:

11.1.5 Insurance contracts shall be procured from and the premiums paid to a resident agent of an insurance Company licensed to underwrite insurance in the Province of Nova Scotia.

Add the following paragraph 11.1.9:

11.1.9 All of the insurance policies shall contain a clause stating that no change in terms and conditions or cancellation may at any time be made without the full knowledge and consent of the owner.

GC 11.2 CONTRACT SECURITY

Add the following subparagraph 11.2.2.1:

11.2.2.1 "Bonds shall be procured from a Nova Scotia resident agent of an insurance company licensed to do business in Nova Scotia and shall be maintained in good standing and held by the Owner until one (1) year after Substantial Performance of the Work.

Add the following paragraph 11.2.3:

11.2.3 If a Certified Cheque is held as contract security it shall be in an amount equal to ten (10) percent (%) of the Contract Price. Supplement the Certified Cheque as necessary to maintain the amount equal to ten (10) percent (%) of the total amount payable (Contract Price plus HST).

.1 The Certified Cheque will be deposited at the chartered bank holding The HRCE deposits.
.2 The HRCE will return the cheque amount to the Contractor upon satisfactory completion of the contract and duration as specified in the Tender documents.
.3 Should Contractor default, total amount payable under the Certified Cheque will be the face value of the cheque plus all accrued interest.
.4 Payment for completion of work, due to failure of performance of the Contractor, shall include all reasonable obligations under the Contract, including architectural and engineering costs arising because of the default of the Contractor.
.5 Payment for labour and materials shall be limited to those who have a direct contract with the Contractor for the provision of labour and/or material (which includes equipment rental).

GC 12.3 INDEMNIFICATION

Add the following paragraph 12.1.1.3:

12.1.1.3 The Contractor shall indemnify and hold harmless the Consultant, its agents and employees from and against claims, demands, losses, costs, damages, actions, suits, or proceeding by third parties that arise out of, or are attributable to, the Contractor's performance of the Contract, provided such claims are attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property, and caused by negligent acts or omissions of the Contractor or anyone for whose acts the Contractor may be liable, and made in writing within a period of six (6) years from the date of Substantial Performance of the Work, or within such shorter such period as may be prescribed by any limitation statute or the province or territory of the Place of Work.

GC 12.3 WARRANTY

Delete from the first line the word, "The" and substitute the words in paragraph 12.3.2:

12.3.2 "Subject to paragraph 3.15.1, the…"

Add the following paragraph 12.3.7:

12.3.7 Warranty repairs or replacements which arise during warranty period which affect the operation of the system shall be attended to immediately upon notification from the Consultant.

END OF SECTION 00 73 00

SECTION 00 73 10 - HRCE GENERAL TERMS & CONDITIONS

1. General

1.1. These Terms and Conditions, shall apply only to those documents (Quotations, Request for Proposals and Tenders, herein referred to as Public RFX or RFX) that reference them specifically. In the event of any conflict or disagreement between these Terms and Conditions and the RFX documents, the RFX documents have precedence and will be assumed to be correct.

1.2. These Terms and Conditions are intended to cover a wide range of procurements, including goods and services. As such, not all clauses will be applicable in all situations. If Suppliers have questions regarding any of these Terms and Conditions, they should contact the Halifax Regional Centre for Education (HRCE) Procurement Division. To satisfy special requirements, supplementary Terms and Conditions may also apply to some acquisitions. If this is the case, the RFX documents will reference any such documents, in addition to these Terms and Conditions.

1.3. For the purpose of these Terms and Conditions HRCE intends to only contract with responsible Suppliers who are in the business of providing the goods and/or services submitted upon, and can provide proof that they can furnish satisfactory performance based on past work experience with HRCE, other companies, or government agencies and have the financial managerial, and resource capabilities for the size of project bid upon. Satisfactory performance includes meeting all of the requirements of the various federal and provincial regulations and agencies for the completion of work and making payment to sub-contractors in a timely basis.

1.4. All of the terms, conditions and/or specifications stated or referenced in the Solicitation are assumed to be accepted by the Tenderer and incorporated in the Bid.

2. RFX Documents

2.1. RFX Documents should be obtained as indicated on the Cover Sheet of the tender document.

2.2. While HRCE has tried to ensure accuracy in the RFX documents, it is not guaranteed or warranted by HRCE to be accurate, nor is it necessarily comprehensive or exhaustive.

2.3. HRCE cannot ensure the accuracy of RFX documents obtained from any other source. (i.e. Construction Association of Nova Scotia (CANS), Nova Scotia Electronic Tendering Bulletin Board, Project Consultants, etc.).

2.4. All inquiries to this RFX are to be directed, in writing, to HRCE Procurement Division representative indicated in the RFX documents. Information obtained from any other source is not official and will not bind HRCE.

2.5. HRCE will assume that all Suppliers have resolved any questions they might have about the RFX and have informed themselves as to existing conditions and limitations, site restrictions, etc. before providing a RFX submission.

2.6. Nothing in the RFX is intended to relieve Suppliers from forming their own opinions and conclusions with respect to the matters addressed in the RFX or its associated documents.

2.7. In the event that HRCE Regional Office (33 Spectacle Lake Drive, Dartmouth) is closed (this includes partial day closures) due to inclement weather on the date and time of the RFX closing, the closing date and time will be extended one (1) business day. Tenderers should note that closure of Schools does not necessarily mean the closure of the HRCE's Regional Office. Closures are detailed on HRCE website.

3. Verbal instructions: Any changes to RFX call, specifications, terms and conditions shall be stated in writing. Verbal statements made by employees or representatives of HRCE, whether or not they appear to have the proper authority, shall not be binding on HRCE.

4. Addenda: HRCE reserves the right to modify the terms of the RFX documents prior to closing, at its sole discretion by addenda.

4.1. HRCE Procurement Division will make every effort to ensure the information provided on hrsb.ca is complete and accurate, please report any omissions or discrepancies to the Procurement Division immediately. **Any questions or requests for clarification arising from omissions, discrepancies, or ambiguities, must be made in**

writing no later than five(5) working days prior to the closing date, not including the closing date. Replies to requests for clarification, if required, will be made in the form of written addenda, copies of which will be posted on www.hrsb.ca/tender no later than three (3) working days prior to the date of closing, not including the closing date.

4.2. By downloading files from the www.hrsb.ca, you will automatically become registered for the applicable RFX. HRCE Procurement Division will make reasonable efforts, strictly as a courtesy, to directly inform registered Suppliers of any addenda, **however it is the sole responsibility of each registered Supplier to ensure that they have all the documents associated with any RFX and, to this end, every registered Supplier should review HRCE Tender Web Site daily**. These documents must be downloaded from the www.hrsb.ca/tender or obtained from HRCE Procurement Division, as applicable. Suppliers must acknowledge receipt of all addenda(s) with their RFX Submission.

5. Suppliers Responsibility: Suppliers are solely responsible for their own expenses in preparing, delivering or presenting a RFX and for subsequent negotiations, if any, with HRCE. It will be the responsibility of the Supplier to acquire at the Suppliers cost, any RFX documents as indicated on the Cover Sheet of the tender document.

6. Existing Conditions: Suppliers will be deemed to have familiarized themselves with the existing conditions which may affect the performance of required goods, services and construction. No plea of ignorance of such conditions as a result of failure to make all necessary examinations will be accepted as a basis for any claims for extra compensation or an extension of time. Suppliers are to ensure that they understand the expected use for the requested goods, service and construction and submit their RFX submission accordingly.

7. RFX Submissions

7.1. RFX will close at the time, date and location specified in the RFX documents (Atlantic Time Zone).

7.2. All RFX submissions must be received in their entirety on or before the closing time specified. Suppliers are responsible for ensuring that their RFX submission, however submitted, is received on time and at the location specified.

7.3. RFX Submissions must be submitted on the forms provided or in such format as directed in the RFX documents. These forms must be legible, complete, filled out in ink, or by typewriter, with the signature in longhand and the completed form shall be without interlineations, alterations or erasures.

7.4. If an electronic transmission (i.e. Facsimile, e-mail or hrsb.ca upload) can be accepted, as detailed in the applicable RFX documents, it is the responsibility of the Supplier:

7.4.1. to ensure that the submissions are delivered on or before the closing time and date shown on the RFX documents;

7.4.2. that the correspondence is legible and properly transmitted; and

7.4.3. that the name and number of the RFX is clearly displayed.

7.5. Electronic transmission of a RFX submission cannot be used where original documents are required, e.g. bid bonds, certified cheques, samples, etc., or as may be otherwise stated in the RFX documents.

7.6. **Sealed RFX submissions** must be delivered to HRCE Receptionist, 1st floor, 33 Spectacle Lake Drive, Dartmouth, Nova Scotia, on or before the closing time and date shown on the RFX documents. The RFX Submission is to be submitted on the provided forms, signed (together with the required RFX security as applicable) in a sealed opaque envelope, clearly identified with Suppliers name, RFX identification number and name, and closing date on the outside of the envelope. RFX Submissions are date and time stamped upon receipt at the Procurement Division (not at any other location) by the Procurement date time stamp. Any submission received after the closing date and time shown on the RFX documents will not be accepted and will be returned to the Supplier unopened and deemed non-compliant.

7.7. **Facsimile submissions** received are date and time stamped by the Procurement Division Facsimile, no other time stamp will be considered. A facsimile submission received after the closing date and time shown on the RFX documents will not be accepted and shall be deemed non-compliant. **The facsimile number for the**

Procurement Department of HRCE is (902) 464-0161. Do not send RFX correspondence to any other fax number.

7.7.1. Where specified, facsimile submissions are accepted for the convenience of the Supplier; HRCE cannot ensure the confidentiality or error-free receipt of facsimile submissions.

7.8. Amendments/Withdrawn Submissions

7.8.1. Submissions may be withdrawn or amended by written request (on company letterhead or equivalent), prior to RFX closing date and time, but cannot be altered or changed in any way after the RFX closing.

7.8.2. Facsimile transmissions modifying supplier provided information are acceptable when signed by a duly authorized officer or agent. Submission of such electronic transmissions is at the risk of the Supplier. HRCE assumes no liability for the receipt of the electronic transmissions or their proper inclusion with original RFX submission. An electronic submission must be submitted prior to closing time and date specified in the RFX documents.

7.8.3. An amendment to a RFX submission replaces any other RFX submission amendment previously submitted by the supplier; only the last of any RFX submission amendment received will be accepted.

7.9. All RFX submissions must be signed by an authorized representative of the entity.

7.10. HRCE's time clocks will be assumed to be correct in the event of dispute.

7.11. HRCE reserves the right in its sole discretion to clarify any RFX submission after closing by seeking further information from that Supplier, without becoming obligated to clarify or seek further information from any or all other Supplier. However, Suppliers are cautioned that any clarifications sought will not be an opportunity either to correct errors or change their Bids in any substantive manner.

8. Brand Name: Some terminology may be used that would imply or denote a particular supplier. Brand names may be utilized to designate the type and quality of the product requested. Such usage shall not to be construed as restrictive in any way. Suppliers must be prepared to provide samples if required.

9. Substitute

9.1. If the Supplier is offering an equivalent (similar) substitute product to those specified, unless a specific product is requested, the supplier must clearly identify this substitution and supply the manufacturer's name, product number and provide any technical information required so that HRCE can determine the acceptability of the substitute.

9.2. HRCE reserves the right to inspect or test any product bid to determine equivalency, and may require demonstrator or sample items in order to be able to evaluate the items proposed.

9.3. HRCE shall be the sole judge of the acceptability of any substitute or proposed equivalent.

9.4. Specifications may, for technical or logistical reasons, require that the items specified be supplied without substitution.

10. Warranty

10.1. The supplier must describe the duration, type (e.g. on-site, depot, ship-in or carry-in) and terms of the manufacturer's warranty on all goods. If the supplier provides any additional/supplementary warranty coverage, describe this as well.

10.2. If warranties can be upgraded or extended, identify the upgrade costs separately. Do not include warranty upgrade or extension costs in the price unless the RFX documents specifically states that the upgrade is a mandatory requirement.

11. Pricing

11.1. All prices must be extended and totaled, where practical to do so. RFX Submission may be rejected as incomplete if total figures are not provided. In the case of an error in the extension of prices, the unit prices shall prevail.

11.2. Prices must be in Canadian funds, and shall include all shipping, handling, freight, offloading, duty, insurance and any other charges, which are applicable at time RFX is awarded (FOB – Destination). HRCE will not assume responsibility for any goods or services until they have been delivered to the destination(s) specified in the Solicitation. It is the responsibility of the Supplier to find out from the appropriate authorities what rates and charges are applicable to this RFX. No extra charges will be paid by HRCE.

11.3. In the event that a number of Suppliers provide submission in substantially the same amount, HRCE may, at its discretion, call upon those Suppliers to submit further bids.

12. Permits and Taxes: It is the responsibility of the Supplier to ensure that quotations include all taxes, permits, and other charges required to supply the goods, services and construction. The successful Supplier is to comply with all codes, regulations, and by-laws and all government and applicable standards pertaining to the work and job-site including, and not limited to, the Nova Scotia Occupational Health and Safety Act and Regulations. HRCE is required to pay a Harmonized Sales Tax (HST) at a rate specified by the Province of Nova Scotia. This tax is to be shown as a separate line item.

13. Standards

13.1. All goods, services and construction supplied to HRCE shall, when standards are available, be certified in accordance with the applicable code(s), but not limited to:

13.1.1. Canadian Standards Association;
13.1.2. Canadian Government Standards Board;
13.1.3. Underwriters Laboratories of Canada; and
13.1.4. And all applicable Federal, Provincial and Municipal regulations and acts.

13.2. HRCE reserves the right to discontinue the purchase of any product/service that does not continue to meet the applicable standard(s).

14. Inspection: HRCE reserves the right to inspect any goods, services or construction supplied either during or after manufacture and delivery, and shall be the sole judge as to the acceptability of goods, services and construction to meet the needs of HRCE and fulfills the requirements as specified.

15. Rejection of RFX Submissions/Compliance:

15.1. Failure to comply with any of the mandatory terms or conditions contained or referenced in the RFX documents shall result in the rejection of the RFX submission.

15.2. HRCE specifically reserves the right to accept or reject any or all RFX submission and implies no obligation on HRCE to accept any RFX submission, a portion of any RFX submission or any RFX submission. HRCE reserves the right to cancel any RFX in its entirety and shall not be responsible, in any manner, for expenses incurred by the Supplier for preparing a RFX submission. HRCE may award all or a portion of the work to one or more Suppliers. Without limiting the generality or any other provision hereof, HRCE reserves the right to reject or accept any RFX submission:

15.2.1. that contains any irregularity or informality;
15.2.2. that is not accompanied by the security documents required;
15.2.3. that contains an alteration in the quoted price that is not initialed by the or on behalf of the Supplier;
15.2.4. that is incomplete or ambiguous;
15.2.5. contains clauses additional to the RFX that are "qualified" or "conditional"; and/or
15.2.6. that does not strictly comply with the requirements contained in these instructions.

15.3. HRCE reserves the right to waive minor non-compliance where such non- compliance is not of a material nature in its sole and absolute discretion, or to accept or reject in whole or in part any or all RFX submissions, with or without giving notice. Such minor non-compliance will be deemed substantial compliance and capable of acceptance. HRCE will be the sole judge of whether a RFX submission is accepted or rejected.

15.4. HRCE reserves the right to accept or reject any or all RFX submission, not necessarily accept the lowest priced RFX submission, or to accept any RFX submission which it may consider to be in its best interest.

16. Evaluation criteria: If applicable, award of the RFX will be based on "Best Value" (which includes, but not limited to; price, discounts, product specifications, warranty, delivery, reference checks, etc.

17. Cancellation/no award

17.1. Issuing a RFX implies no obligation on HRCE to accept any submission, or a portion of any submission. The lowest or any RFX submission will not necessarily be accepted.

17.2. RFX's may be cancelled in whole or in part by HRCE in its sole discretion when:

17.2.1. the RFX submission price exceeds the funds allocated for the purchase;

17.2.2. there has been a substantial change in the requirements after the RFX has been issued;

17.2.3. information has been received by the RFX after the RFX has been issued that the RFX believes has substantially altered the procurement;

17.2.4. there was insufficient competition in order to provide the level of service, quality of goods or pricing required.

17.3. If no compliant RFX submission is received in response to a RFX, the HRCE reserves the right to enter into negotiations with one or more suppliers in order to complete the procurement.

17.4. HRCE will be the sole judge of whether there is sufficient justification to cancel any RFX.

17.5. No action or liability will lie or reside against HRCE in its exercise of its rights under this section.

18. Eligibility and Conflict of Interest

18.1. A RFX Submission may not be eligible for acceptance if current or past corporate or other interests of the Tenderer may, in HRCE's opinion, give rise to a conflict of interest in connection with a project.

18.2. Suppliers are cautioned that acceptance of their RFX submission may preclude them from submitting a response on subsequent phases where a conflict of interest may arise. Suppliers should study the project implementation strategy to determine whether or not they plan to submit response on subsequent phases.

18.3. If the RFX submission covers the first phase of what may prove to be a multi-phased project, the successful Supplier on the initial phase may be permitted to respond on subsequent phases as long as, in HRCE's opinion, no conflict of interest would be created in performance of the work by that Supplier.

18.4. Sub-contracting to any firm or individual whose current or past corporate or other interests may, in HRCE's opinion, give rise to a conflict of interest in connection with this bid will not be permitted. This includes, but is not limited to, any firm or individual involved in the preparation of the RFX documents.

19. Disputes: In case of dispute as to whether or not an item or service quoted or delivered meets RFX requirements, the decision of HRCE, or its authorized representative, shall be final and binding on all parties.

20. Exceptions: A RFX submission shall be considered an agreement to all terms and conditions provided herein and in various RFX documents, unless specifically noted otherwise in the RFX documents.

21. Irrevocable Offer: A RFX submission represents an irrevocable offer, unless otherwise stated in the RFX documents and shall be valid for a period of ninety (90) days following the closing date for RFX submissions.

22. Patent right and royalties: The successful Supplier shall pay all royalties and patent license fees required for the performance of the work. The successful Supplier shall hold HRCE harmless from and against claims, demands, losses,

costs, damages, action suits or proceedings arising out of the successful Supplier's performance of the Contract which are attributable to an infringement or an alleged infringement of a patent of invention by the successful Supplier or anyone for whose acts the successful Supplier may be liable.

23. Assignment: The successful Supplier shall not assign the Contract (or portion thereof) nor sub-contract without the prior written consent of HRCE, consent shall not be unreasonably withheld.

24. Purchase Order: Work by the Supplier will begin only with the issuance of HRCE's official purchase order and/or any Contract Documents as applicable. The purchase order number must appear on any/all invoices covering same. No work is authorized until the successful Supplier has received an official HRCE purchase order and/or required Contract Documents. HRCE accepts no responsibility for any work performed prior to the issuance of a purchase order and/or required Contract Documents.

25. Delivery

25.1. Where the RFX Document includes a mandatory delivery schedule, HRCE will assume that the Supplier can meet the requested schedule and is satisfied that the goods or services required will be available for delivery on the requested date(s).

25.2. If Suppliers wish to specify a delivery schedule different from that requested in the RFX document, they must provide specific delivery dates or a schedule in calendar days from the date a Purchase Order is issued. RFX Submission that do not meet the delivery schedule as requested in the RFX documents may be rejected.

25.3. Time is of the essence, and supplier's delivery schedule is legally binding. HRCE reserves the right to assess penalties or cancel awards to Suppliers who fail to meet their stated delivery or completion dates.

26. Invoices

26.1. All invoices are to be submitted quoting the Purchase Order number (as applicable). The H.S.T. number must be shown on each invoice. Invoices must include a description of the goods, services and construction provided with HRCE Work Order Numbers (where applicable). Invoices must also clearly indicate list price, discounts offered and net price, if applicable. All invoices are to be forwarded to:

Halifax Regional Centre for Education
33 Spectacle Lake Drive
Dartmouth, NS, B3B 1X7
Attn: Accounts Payable

26.2. All Suppliers are required to maintain their tax status in good standing. In this regard, Suppliers are advised that verification of good standing with the Nova Scotia Minister of Finance and Revenue Canada (GST/HST) may be carried out prior to the award of a contract to a successful Supplier.

26.3. In order to maximize efficiencies, as well as to be more environmentally friendly, vendor payments are now being paid via EFT (Electronic Funds Transfer) direct deposit to vendor bank accounts. A vendor direct deposit form must be filled out with banking information for EFT payments.

27. Payment:

27.1. HRCE's normal payment terms are thirty (30) days from acceptance that the goods, services and construction meet the specifications. Alternative payment schedules may be proposed and are to be shown as an option and list any additional discounts to HRCE. Early payment discount terms (minimum period ten (10) days) may be considered in the evaluation of the RFX response. Payment of term discount invoices will be calculated from the date of the invoice or goods have been received, whichever is later. Discount terms must appear on the invoice.

27.2. The Supplier shall make application for payment at least monthly with the application based on progress or services provided during that month. HRCE will hold back ten percent (10%) of any payment until the lien periods have expired and the Supplier has provided HRCE with a complete release of any lien registered as a result of any work carried out by the Supplier, or any sub-contractor or supplier to the Supplier.

28. Right to offset: The successful Supplier agrees that HRCE may apply payments for goods, services and construction to any amount owing to HRCE by the Supplier or supplier including any related administration fees.

29. Confidentiality: The Supplier shall keep private, treat as being confidential, and not make public or divulge during, as well as after, the term on this Agreement, any information or material to which the Supplier or staff becomes privy as a result of acting under this Agreement without having first obtained HRCE's consent in writing.

30. Freedom of Information and Protection of Privacy (FOIPOP) Act and Personal Information International Disclosure Protection Act (PIIDPA)

30.1. As a public body, HRCE is subject to provincial legislation, Freedom of Information and Protection of Privacy (FOIPOP) Act. RFX submissions and associated documents are subject to disclosure and protection under this legislation. In the event an application for disclosure of information is made under FOIPOP, HRCE is subject to the disclosure and protection of information in accordance with that legislation. Suppliers are recommended to visit the following websites for more information on the Act: http://www.gov.ns.ca/just/IAP/default.asp and http://www.foipop.ns.ca/

30.2. The Province of Nova Scotia is required to comply with the Personal Information International Disclosure Protection Act (PIIDPA) (S.N.S 2006, c.3). The act creates obligations for the Province of Nova Scotia and its service providers when personal information is collected, used or disclosed. Requirements include limiting storage, access and disclosure of personal information to Canada, except as necessary or otherwise required by law. Suppliers are recommended to visit the following PIIDPA websites for more information on the Act: http://nslegislature.ca/legc/bills/60th_1st/3rd_read/b019.htm and http://www.gov.ns.ca/just/IAP/PIIDPAquest.asp#p01

30.3. The Supplier acknowledges and confirms that it is a "service provider" as defined in the Personal Information International Disclosure Protection Act, SNS 2006 c. 3 ("PIIDPA"), that the Supplier has read and understands its obligations as a service provider thereunder and that as a service provider It is legally bound by the obligations imposed on it by PIIDPA. It is a condition precedent to HRCE entering into the Agreement with the Supplier that the Supplier irrevocably undertakes covenants and agrees to be bound by and comply with the obligations imposed on it as a service provider under PIIDPA.

30.4. The Supplier further covenants, warranty and represents to HRCE that it will not at any time provide or allow the release of personal information to which it has access in its capacity as a service provider to HRCE in response to any "foreign demand for disclosure" or permit or allow the "unauthorized disclosure of personal information" as each of those terms are defined in PIIDPA.

30.5. The Supplier shall implement and strictly enforce security arrangements that will ensure that all personal information that it collects or uses on behalf of HRCE is protected at all times from unauthorized access or disclosure and shall confirm in writhing to HRCE, upon request, the details of such security arrangement. The Supplier also agrees to implement and enforce any additional security procedures as may be required by HRCE from time to time to protect the personal information that the Supplier collects on behalf of HRCE. HRCE shall be authorized, upon giving prior written notice to the Supplier, to enter the premises of the Supplier during normal business hours for the purpose of conducting an audit of the security arrangement referenced herein.

30.6. All personal information that the Supplier obtains or becomes aware of while providing services to HRCE is not and shall not be or be deemed to be the property of the Supplier. The Supplier acknowledges and agrees that it will not, either directly or indirectly, acquire any rights to use or own any such information other than the right to use it for the sole purpose of fulfilling its obligations to HRCE under the Agreement.

30.7. All RFX submissions become the property of HRCE. By providing a RFX submission, the supplier hereby grants HRCE a license to distribute, copy, print or translate the RFX submission for the purposes of the RFX. Any attempt to limit HRCE's right in this area may result in rejection of the RFX submission.

30.8. Suppliers RFX submission may be subject to disclosure under the Province's "freedom of information" legislation. By submitting a RFX submission, the Supplier agrees to the appropriate disclosure of the information

supplied, subject to the provisions of the governing law. HRCE cannot guarantee the confidentiality of the complete content of any RFX submissions after the procurement has been awarded to the successful supplier.

30.9. During the delivery and installation of goods and/or services, the supplier or supplier's staff may have access to confidential information belonging to HRCE. Should this occur, the supplier must ensure that such information is not released to any third parties or unauthorized individuals; failure to comply may result in legal action being taken and/or the supplier's disqualification from any further RFX's issued by HRCE.

31. Indemnification: The Supplier shall indemnify and hold harmless HRCE, their agents, representatives and employees from and against all claims, demands, losses, costs, damages, actions, suits or proceedings arising out of, or resulting from the performance of this work, provided that any such claim is caused in whole or in part by the negligent act or omission of the Supplier, and sub-contractor, supplier, licensee, anyone directly or indirectly employed by any one of them or anyone for whose act any of them is liable, regardless of whether or not it is cause in part by a party indemnified hereunder.

32. Insurance: Unless otherwise stated, Commercial General Liability Insurance with policy limits of not less than five (5) million dollars ($5,000,000.00) must be filed with the Procurement Department of HRCE; such insurance shall be in the name of the Supplier and HRCE. The insurance must include non-owned automobile liability with policy limits of not less than two (2) million dollars ($2,000,000.00). All insurances are to be maintained in good standing for the duration of the Contract.

33. Termination for convenience: HRCE may terminate a contract, in whole or part, whenever HRCE determined that such termination is in the best interest of HRCE, without just cause giving sixty (60) days written notice to the proponent. However, in no event shall the proponent be paid an amount that exceeds the submitted price for the work performed.

34. Termination for default: When the proponent has not performed or has unsatisfactorily performed the contract, HRCE may terminate the contract for default. Upon termination for default, outstanding payment will be withheld at the discretion of HRCE. Failure on the part of the proponent to fulfill the contract obligations shall be considered just cause for termination of the contract. The proponent will be paid for work satisfactorily performed prior to termination, less any excess costs incurred by HRCE in re-procuring and completing the work.

35. Workers Compensation: Prior to commencing the work, the Supplier shall provide a current clearance letter from the Workmen's Compensation Board (WCB) and must maintain this coverage during the whole term of the Contract.

36. WHMIS: All controlled products supplies to HRCE must have approved Workplace Hazardous Materials Information System (WHMIS) supplier labels; Material Safety Data Sheets must also be supplied. Failure to comply with this requirement may result in rejection of any shipment, and may result in cancellation of the order and the return of goods to the supplier at the supplier's expense.

37. Health and Safety Act: The Supplier shall take every precaution to ensure that every employee, self-employed person and employer performing work in respect of the project complies with the latest revisions of the Nova Scotia Occupational Health and Safety Act and the Regulations, HRCE Occupational Health and Safety Policy BP 303.1, and all other safety measures as required by authorities having jurisdiction.

38. Site Safety Plan: Before being permitted access to the site to commence construction the Supplier may be requested provide HRCE with a written Project Specific Site Safety Plan. The Site Safety Plan provided shall be a written course of action that, through a pre-job evaluation, identifies and sets out specific actions to be taken to eliminate or control hazards associated with the work to be performed and to also deal with concerns or hazards that may develop during the course of the project. This Plan shall include, but not be limited to, identification of safety hazards anticipated during the project, solutions to those hazards, safety procedures, identification of designated safety officers and provision for safe access to the site for HRCE staff and or Consultants. Receipt and acceptance of the safety plan shall be mandatory prior to

commencement of work.

39. Extension to the Broader Public Sector

39.1. HRCE may choose to allow the Broader Public Sector to purchase goods or services from some RFX's. The Broader Public Sector are generally permitted to purchase from "Standing Offers", which are contracts resulting from a RFX. Other RFXs may also be available to the Broader Public Sector; if so, the Solicitation documents will state this.

39.2. By submitting a response to a RFX, the Supplier agrees to extend the same pricing to other eligible Broader Public Sector institutions as per the terms and specifications in the Solicitation

40. Governing Laws and Trade Agreements

40.1. Unless the RFX documents specifically state otherwise, the RFX, all submissions, and any subsequent contracts will be construed and interpreted in accordance with the laws of the Province in which the Solicitation was issued.

40.2. RFX's subject to the Atlantic Procurement Agreement, the Agreement on Internal Trade, any other inter-provincial trade agreements, or any international trade agreements, will be specifically identified as such in the public notice and/or the Solicitation documents.

40.3. Information of any applicable trade or procurement agreements and/or legislation can be obtained by contacting HRCE Procurement Department.

40.4. Suppliers agree to comply with all applicable laws, regulations and standards, including all labour, occupational health & safety, and worker compensation requirements of the Province.

40.5. HRCE may consider and evaluate any RFX submission from other jurisdictions on the same basis that the purchasing authorities in those jurisdictions would treat a similar RFX submission from a supplier located in this Province. HRCE will be the sole judge of whether these conditions will be used and the extent to which they will be applied.

40.6. Suppliers registered to do business in any Atlantic Province can bid on RFX issued by any other Atlantic Province without having to satisfy any local registration or residency requirements.

40.7. Under Canadian law (and international agreements), your RFX submission must be arrived at separately and independently, without conspiracy, collusion or fraud; see: http://www.competitionbureau.gc.ca/internet/index.cfm?itemid=1243&lg=e for further information.

41. Other General Conditions

41.1. No RFX submissions shall be accepted from any person or corporation who, or which, has a claim or has instituted a legal proceeding against HRCE or against whom HRCE has a claim or has instituted a legal proceeding with respect to a previous contract, without prior approval of HRCE.

41.2. The Supplier shall perform the obligations of this Contract in a good and workmanlike manner in compliance with all applicable legislation in effect in Nova Scotia, and in accordance with industry standards and practice.

41.3. The Supplier shall be solely responsible for all means, methods, techniques and procedures necessary for performing the work required under this Contract.

41.4. All Suppliers must comply with the Nova Scotia Corporations Registration Act (CRA) or the Partnerships and Business Names Registration Act (PBNRA) as one of the conditions of doing business with the Province of Nova Scotia. In this regard, Suppliers are advised that verification of registration and good standing may be carried out prior to the final award of a contract to a successful Supplier. Suppliers residing outside Nova Scotia (which are not otherwise carrying on business in Nova Scotia) are expected to be registered in an equivalent manner in their respective jurisdictions.

41.5. Unless otherwise specified, all materials installed by the Supplier as part of this Contract shall be new and shall comply with the specifications and any applicable building codes. The Supplier is, at all times, responsible for

correcting any defective work or materials at the Supplier's cost, and payment by HRCE to the Supplier does not relieve the Supplier of that responsibility.

41.6. Where applicable, the end user must be provided with complete operation manuals, warranty registration forms, user licenses/ authentications and/or other associated documentation normally provided by the manufacturer, reseller, installer and/or consultant.

41.7. The Supplier shall, at all times, keep HRCE premises free from accumulations of waste and rubbish. Disposal of all waste and rubbish shall be at approved waste disposal sites.

41.8. If the Supplier files for bankruptcy, becomes insolvent or fails to perform the Supplier's obligations under this Contract in a timely and workmanlike manner, HRCE may, by written notice, immediately terminate the employment of the Supplier and the Supplier shall be entitled only to the value of work performed and materials supplied up to the date of the termination.

41.9. The Supplier shall not permit smoking by any of its employees or sub-contractors on HRCE property and will act in accordance to the HRCE policy BP101.3 Tobacco-Free Schools and Workplaces.

41.10. The Supplier warrants its work and materials for a minimum of twelve (12) months after the date of substantial completion.

41.11. The Supplier, if performing work on HRCE property may be required to provide a safety program certified with the Nova Scotia Construction Safety Association or with an approved alternate safety association and/or program.

41.12. HRCE reserves the right to split an award amongst Suppliers as deemed in the best interests of HRCE.

END OF SECTION 00 73 10

SECTION 01 11 00 - HRCE SUMMARY OF WORK

1. Project Location & General Scope

1.1. ***Sir John A. Macdonald High,***
31 Scholars Road, Upper Tantallon B3Z 0C3

1.2. Scope: Refer to Section 00 00 15 for scope and schedule information.

2. Contract Documents

2.1. Work will be performed under CCDC-2, 2008 contract.

3. General Conditions

3.1. Halifax Regional Centre for Education and CCDC-2, 2008, form an integral part of this Project Manual, a copy of which is bound herein.

4. Project Manual

4.1. Sections of the Project Manual are numbered in conformance with the Master List of Section Titles and Numbers, CSC Document 004E, published jointly by Construction Specifications Canada and The Construction Specifications Institute (USA). Sections are arranged in their standard format.

4.2. Sections are written as units of the Work which have been assigned numbers in conformance with the CSC/CSI system. They are arranged in sequence for this Manual. Gaps in the order of numerical sequence do not indicate that a section has been inadvertently omitted from this Manual, but, rather that a Section is not required for completion of the Work.

4.3. Wherever the project location building name occurs in the Contract Documents it shall be taken to mean all work included in the Contract.

4.4. Wherever in the Contract Documents the words "approval", "approved", "direction", "directed", "selection", "selected", "request", "requested", "report", and similar words are used, such approvals, directions, selections, requests and reports shall be given by the HRCE unless specifically stated otherwise.

4.5. Wherever in the Contract Documents the word "provide" is used in any form, it shall mean that the Work concerned shall include both supply and installation of the products required for completion of that part of the Work.

4.6. Wherever in this Project Manual it is specified that Work is to proceed or to meet approval, direction, selection or request of jurisdictional authorities or others, such approval, direction,

selection or request shall be in writing.

5. Errors & Omissions

5.1. If errors or omissions are observed in the Contract Documents, immediately notify the HRCE Procurement in writing of all such errors or omissions. In the event no such notice is given, the Contractor will be held responsible for the results of any such error or omission and the cost of rectifying the same.

6. Division 1

6.1. The provisions of all Sections of **Division 1** shall apply to each Section of this Specification**.**

7. Wage Rates

7.1. Pay all employees engaged on the Work a wage not less than the minimum wage per hour as set out by the Province of Nova Scotia. For overtime work beyond 48 hours in any one week, pay no employee at a rate of less than one and one-half times the minimum wage per hour noted above. Provide for these wage rates in tendered contract amount.

8. Work Performed Under Separate Contracts

8.1. Work not to be included in the Contract, as noted "NIC" on the Drawings, shall be governed by Article 37, Separate Contracts, of General Conditions of Contract.

8.2. Furniture installation will be carried out by others.

8.3. Computer installation will be carried out by others.

9. Project Schedule

9.1. Refer to Section 00 00 15 Description of Work.

9.2. Existing services (mechanical & electrical) will need to be maintained through the renovations.

9.3. During construction, all life safety systems as well as mechanical and electrical systems must be in active, usable condition to permit the school to operate or alternate methods used to ensure the safe operation of the school as directed by HRCE project representative.

9.4. As construction progresses revise the schedule to compensate for any delays or unforeseen activities so as to maintain the contract completion date. Each schedule submission is to be complete with a statement indicating the changes made, the reason they were changed and confirmation that the project completion date will not change. The above schedule information is to be submitted monthly or more often if necessary.

10. Site Progress Records

10.1. Maintain at site a permanent written record of progress of Work. Make the record available at all times with copies provided when requested. Include in record each day:

10.1.1. Commencement and completion dates of the Work of each trade in each area of Project.

10.1.2. Attendance of Contractor's and Subcontractor's Work forces at Project and a record of the work they perform.

10.1.3. Visits to site by representatives of the Owner, Engineer, jurisdictional authorities, Contractor, Subcontractors, and suppliers.

10.2. Maintain a progress chart in approved format. Show on chart proposed Work schedule and progress of Work by Contractor and Subcontractor.

11. Examination

11.1. Site:

11.1.1. Examine site, and ensure that site conditions have been examined, that all are fully informed on all particulars which affect Work thereon and at the place of construction, and in order that construction proceeds competently and expeditiously.

11.1.2. Ensure by examination that all physical features, and working restrictions and limitations which exist are known.

11.2. Previously Completed Work:

11.2.1. Verify dimensions of existing Work in place before construction of Work to be incorporated with it.

11.2.2. Verify that previously executed Work and surfaces are satisfactory for construction, and that performance of subsequent Work will not be adversely affected.

11.2.3. Commencement of Work will constitute acceptance of site conditions and previously executed Work as satisfactory.

11.2.4. Report to Engineer defects in prior Work which will affect quality of subsequent Work, or construction schedule.

11.3. Construction Measurements:

11.3.1. Before commencing installation of Work, verify that its layout is accurate in accordance with intent of Drawings, and that locations, elevations, and clearances to adjacent infrastructure are maintained.

11.3.2. If Work is installed in wrong location, rectify it before other Work concerned proceeds.

12. PROTECTION OF WORK, PROPERTY & PERSONS

12.1. Include in Work necessary methods, materials, and construction to ensure that no damage or harm to Work, materials, property and persons results from the Work of this Contract. Temporary facilities relating to protection are specified in Section 01 52 00.

12.2. Protect, and if damaged make good, adjacent private and public property.

12.3. Keep surfaces, on which finish materials will be applied, free from grease, oil, and other contamination which would be detrimental in any way to the application of finish materials.

12.4. Protect finished surfaces of completed Work from damage by restriction of access or by use of physical means suitable to the material and surface location. Establish with each Subcontractor the suitability of such protection in each case.

12.5. Protect existing underground infrastructure, mechanical, electrical, telephone and similar services from damage. If necessary, relocate active services to ensure that they function continuously in safety and without risk of damage.

12.6. Cap off and remove unused utility services encountered during Work after approval is given by the utilities concerned or jurisdictional authorities, whichever may apply. Relocation, removal, protection and capping of existing utility services shall be performed only by the applicable utility and of other services by licensed mechanics.

12.7. To prevent soiling or damage to finish flooring where pedestrian traffic occurs after the flooring has been installed, install and maintain 6 mil. polyethylene membrane or reinforced kraft paper temporary protection, secured in place and with joints sealed by reinforced pressure sensitive tape.

12.8. Install plywood panels of minimum ¼" thickness over completed finish flooring materials, on which further construction Work is performed by other trades or delivery of products is made, or both. Seal joints between panels with reinforced pressure sensitive tape.

12.9. Prevent spread of dust beyond the construction zone by wetting, or by other approved means, as it accumulates.

12.10. The outside work area shall be appropriately demarked and/or surrounded by rigid chain link panels or fencing to prevent unauthorized entry to the work area. Any area of roof having work completed is to be covered below with this fencing approximately 10' from the edge of the building. It is to be maintained at all times throughout the project. All waste disposal bins are to be fenced in using the same type of fencing as indicated above during working hours. After working hours, all waste disposal bins shall be located a minimum of 25 feet from any structure. Any windows where the debris chute is located are to be covered. All entrances below the roof area are to have covered scaffolding erected to ensure a safe travel path to a distance of ten feet from edge of building. All workers shall contain their activity to the work site area. Access to the school shall only be allowed as planned in coordination with HRCE Operations and the

school administration.

12.11. The contractor is responsible for security of all project materials and access to the project site and/or the school through the project site at all times until completion of work and acceptance of the finished project by HRCE. Such additional security costs for security personnel or other means of security as deemed necessary by the contractor will be the sole responsibility of the contractor. The HRCE will provide security personnel up to and including the Substantial Completion date as noted on the bid submission documents.

12.12. The contractor shall keep the work site free from accumulated debris caused by the employees or work and shall remove all debris at the end of each work shift. Debris shall not be deposited in HRCE controlled garbage and/or recycling containers.

12.13. All waste materials and debris created during demolition and/or construction shall be disposed of in a dumpster provided by the contractor, to be removed at the end of the construction project, using a methodology that is in compliance with the applicable HRM solid waste by laws. Otherwise, the material must be removed and disposed of off site at the end of each working day. The waste materials may not be stored on site unless they are held in an approved project dumpster no closer than twenty five (25) feet from any structure.

12.14. All temporary structures such as portable washroom facilities, materials storage trailer, work trailer, debris dumpster, vehicles, etc., shall be located a minimum of (25) twenty-five feet from the school building.

12.15. Where applicable, a hot work permit will be required to be completed prior to commencement of work and all conditions of the permit must be maintained until completion of hot work. A copy of the hot work permit signed by the contractor representative shall be provided to HRCE upon completion of each hot work session. Contractor must assign a designated fire watch as noted on the permit document who shall remain on site for three hours after completion of each hot work session.

12.16. A school washroom will be designated for use where appropriate. However, protection of the surfaces as indicated above must be maintained. It should also be noted that access to the building during summer months will be limited for security reasons. Contractor is responsible to provide temporary portable washroom facilities for general use of contractor staff.

12.17. Access to Interior of School - All interior access is to be scheduled with the PM. This will allow for notice to the school admin., custodial and possible scheduling of a security guard for after hour access.

12.18. Adhesives / Torch Work - All adhesive use and torch work must be completed after school hours.

13. Cleaning

13.1. Ensure that during and after construction the public streets and existing asphalt parking lot are cleaned as required.

14. Salvage

14.1. Unless otherwise specified, salvaged material resulting from construction, and surplus materials and construction debris shall become property of Contractor, who must dispose of it away from Site.

15. Site Limitations

15.1. Since the existing building will be occupied during the Work (in accordance with the Phasing Schedule) the Architect will designate the precise areas on the site which may be utilized for work and storage, and where personnel will be permitted to be present. Refer also to Drawings. Allow for hoarding to secure construction areas from occupied portions of the Building and Site.

15.2. All access to the construction site is to be coordinated with the Project Manager for HRCE and communicated at the pre-construction meeting.

15.3. Any Work carried out in the building is to be carried out during hours approved by the School Administration.

15.4. Any disruption to services within the building must occur during hours approved by School Administration.

15.5. Any Work which may have an adverse affect on the occupancy functions, must have prior approval of the School Administration and **may** require scheduling during off-hours.

16. Security Regulations

16.1. Perform Work in conformance to the security regulations of the building as directed by the Project Manager for HRCE.

17. Project Identification

17.1. No project sign is required on this Project.

18. Owner's Occupancy

18.1. The Owner reserves the right to occupy and use portions of the Project, whether partially or entirely completed, or whether completed on schedule or not, provided such occupancy does not interfere with the Contractor's continuing Work.

18.2. Partial occupancy or installation by the Owner of his equipment shall not imply acceptance of the Project in whole, or in part, nor shall it imply acknowledgement that terms of the Agreement are fulfilled.

END OF SECTION 01 11 00

SECTION 01 11 25 - PRICES

1. General

1.1. Prices included in the Contract shall be complete for the applicable Work, and shall include for each price:

1.1.1. Expenditures for wages and for salaries of workmen, engineers, superintendents, draftsmen, foremen, timekeepers, accountants, expeditors, clerks, watchmen and such other personnel as may be approved, employed directly under the Contractor and while engaged on the applicable Work at the site and expenditures for travelling and HRCE allowances of such employees when required by location of the applicable Work or when covered by trade agreements and when approved; provided, however, that nothing shall be included for wages or salary of the Contractor if an individual, or of any member of the Contractor's firm if the Contractor is a firm or the salary of any officer of the Corporation if the Contractor is a corporation, unless otherwise agreed to in writing.

1.1.2. Expenditures for material used in or required in connection with the construction of the applicable Work including material tests and required by the laws or ordinances of any authority having jurisdiction and not included under Subparagraph .9.

1.1.3. Expenditures for preparation, inspection, delivery, installation and removal of materials, equipment, tools and supplies.

1.1.4. Temporary facilities as required for the applicable Work.

1.1.5. Travelling expenses properly incurred by the Contractor in connection with the inspection and supervision of the applicable Work or in connection with the inspection of materials prepared or in course of preparation for the applicable Work and in expediting their delivery.

1.1.6. Rentals of all equipment whether rented from the Contractor or others, in accordance with approved rental agreements including any approved applicable insurance premiums thereon and expenditures for transportation to and from the site of such equipment, costs of loading and unloading, cost of installation, dismantling and removal thereof and repairs or replacements during its use on the applicable Work, exclusive of any repairs which may be necessary because of defects in the equipment when brought to the Work or appearing within thirty (30) days thereafter.

1.1.7. The cost of all expendable materials, supplies, light, power, heat, water and tools (other than tools customarily provided by tradesmen) less the salvage value thereof at the completion of the applicable Work.

1.1.8. Assessments under the Workmen's Compensation Act, the Unemployment Insurance Act, Canada Pension Act, statutes providing for government hospitalization, vacations with pay or any similar statutes; or payments on account of usual vacations made by the Contractor to his employees engaged on the applicable Work at the site, to the extent to which such assessments or payments for vacations with pay relate to the Work covered by the specified price; and all sales taxes or other taxes where applicable.

1.1.9. The amounts of all Subcontracts related to the specified price.

1.1.10. Premiums on all insurance policies and bonds called for under this Contract as related to the specified price.

1.1.11. Royalties for the use of any patented invention on the applicable Work.

1.1.12. Fees for licenses and permits in connection with the applicable Work. No Building Permit is required for the project.

1.1.13. Duties and taxes imposed on the applicable Work.

1.1.14. Such other expenditures in connection with the applicable Work as may be approved.

1.1.15. Provided always that except with the consent of the Owner, the above items of cost shall be at rates comparable with those prevailing in the locality of the Work.

END OF SECTION 01 11 25

SECTION 01 11 41 - PROJECT COORDINATION

1. Requirements Included

1.1. Each Trade Contractor's responsibilities include the coordination of Work within his own Contract and with the Work of other Contracts.

2. Related Requirements

2.1. Project Meetings: Section 01 31 19

2.2. Submittals: Section 01 33 00

3. Description

3.1. Coordinate Work on which subsequent Work depends to facilitate mutual progress, and to prevent conflict between parts of the work.

3.2. Ensure that each Section makes known for the information of the Construction Manager and other Sections, the environmental and surface conditions required for the execution of its Work, and the sequence of others Work required installation of its Work.

3.3. Ensure that each Section, commencing Work, and that each Section is assisted in the execution of its preparatory Work by Sections depending upon its preparation.

3.4. Deliver materials supplied by one Section to be installed by another well before the installation begins.

3.5. Sections giving installation information in error, or too late to incorporate in the Work, shall be responsible for having Work done which was thereby additionally made necessary.

3.6. Coordinate warranty conditions of interconnected Work to ensure that full coverage is obtained.

3.7. Remove work installed in error which is unsatisfactory for subsequent Work.

4. Cutting And Patching

4.1. Include under Work of this Section all cutting and patching of asphalt required by the Work.

4.2. Finish new surfaces flush with existing surfaces.

4.3. Cut and patch as required making work fit.

4.4. Make cuts with clean, true, smooth edges.

4.5. Patching of existing or new asphalt shall be performed only by workmen with expertise in that particular trade and who normally perform that Trade.

4.6. Replace, and otherwise make good, damaged or defective Work. If required by the Construction Manager.

4.7. Do not endanger Work or property by cutting, digging, or similar activities. No Section shall cut or alter the Work of another Section unless approved by the Section which has installed it.

4.8. Cut and drill with true smooth edges and to minimum suitable tolerances.

4.9. If required, before cutting, drilling, or sleeving structural load bearing elements, obtain approval of location and methods.

4.10. Cutting, drilling and sleeving of Work shall be done only by the Section which has installed it. The Section requiring drilling and sleeving shall inform the Section performing the Work of the location and other requirements for drilling and sleeving. The Contractor shall directly supervise performance of cutting and patching.

4.11. Cutting and Patching for Holes Required by Mechanical & Electrical Work:

4.11.1. Include under Work of Mechanical Divisions cutting or provision of holes up to 8" in diameter and related patching.

4.11.2. Include under Work of this Section holes and other openings required by the work of Mechanical Divisions which are larger than 8" in diameter or least dimension, and chases, bulkheads, furring and required patching. This Section shall be responsible for determination of Work required for holes in excess of 8" diameter or least dimension.

4.11.3. Include under the Work of Electrical Divisions all cutting or provision of holes and related patching for the Work of that Division.

4.12. Include under Work of this Section all other cutting and patching required by the Work except as described in Clause .11 above.

4.13. Patching or replacement of damaged Work shall be done by the Subcontractor under whose Work it was originally executed, and at the expense of the Subcontractor who caused the damage.

4.14. Make patches invisible in final assembly.

5. Quality Assurance

5.1. Requirements of Regulatory Agencies:

5.1.1. Make known and coordinate the requirements of jurisdictional authorities, as made explicit by the Contract Documents, and by representatives of such authorities

5.2. Source Quality Control:

5.2.1. Ensure that Work meets specified requirements

5.2.2. Schedule, supervise and administer inspection and testing as specified in Section 01 45 00.

5.3. Job Records:

5.3.1. Maintain job records and ensure that such records are maintained by subcontractors.

Submittals

5.4. Prepare a Project schedule in accordance with Section 01 33 00, and ensure that all subcontractors and suppliers are aware of the details of this schedule, and progressively of their general compliance with the schedule.

5.5. Become aware of the required submittals specified in each Section, and expedite submission of such submittals so as not to hinder the Project Schedule.

5.6. Review submittals and make comments as specified in Section 01 33 00.

6. Job Conditions

6.1. Ensure that Work proceeds under conditions meeting specified environment and job safety requirements

6.2. Ensure that protection of adjacent property and the Work is adequately provided and maintained to meet specified requirements.

7. Product Delivery, Storage And Handling

7.1. Site has limited spaces for storage, only delivery of materials agreed upon by the Construction Manager will be allowed. Comply with Construction Manager's allocations. Any requirement for modifications to the building in order to allow delivery and storage of the materials to complete this work is the responsibility of the contractor.

7.2. Schedule delivery of products & removal of material with Construction Manager.

7.3. Make available areas for storage of products and construction equipment to meet specified requirements, and to ensure a minimum of interference with progress of the Work and relocations.

7.4. Trade Contractor to provide flag persons, traffic signals, barricades and Flares/lights/lanterns as required to perform the Work and to protect the public.

7.5. Material and Waste - Deliveries and Removals - Must be coordinated to be completed 30 minutes after school dismissal where applicable.

END OF SECTION 01 11 41

SECTION 01 31 19 – PROJECT MEETINGS

1. Pre-Award Meeting

1.1. A Pre-award meeting will be held at which time the following will be addressed:

1.1.1. Owner and HRCE's functions.
1.1.2. The Consultant and the Consultant's functions.
1.1.3. The General Contractor and the General Contractor's functions.
1.1.4. Documentation requirements from the General Contractor.
1.1.5. Obligee for Performance and Payment Bonds from Sub-contractors.
1.1.6. Progress Claims.
1.1.7. CO's & CCO's.
1.1.8. Construction Schedule.
1.1.9. Project Start-up.
1.1.10. Job Meetings.
1.1.11. Superintendent – General Contractor's Representative.
1.1.12. Design / Administration authority.
1.1.13. Owner's Representative.
1.1.14. Special Consultants.
1.1.15. Quality of Workmanship.
1.1.16. Accountability.
1.1.17. Harmonized Sales Tax.
1.1.18. Contract Close-out Documentation.

2. Preconstruction Meeting

2.1. Within fifteen (15) days after award of Contract, arrange a meeting between the, Consultant, Subcontractors, Project Superintendents, Inspection and Testing Company Representatives, and representatives of others whose coordination is required during construction.

2.2. Discuss at the meeting the means by which full cooperation and coordination of the participants during construction can be achieved.

2.3. Document the responsibilities and necessary activities of the participants during construction as discussed, and distribute to each participant.

2.4. Establish procedures for maintenance and completion of Project record drawings specified in Section 01 77 00.

2.5. Review and establish methods of maintaining life safety and egress for the school occupants. Communicate these methods thoroughly with the School Principal.

3. Progress Meeting

3.1. Invite representatives of HRCE, to attend twice monthly site meetings called by the Contractor during the progress of the Work.

3.2. Inform HRCE of each meeting and of proposed agenda a minimum of five (5) days before meeting.
3.3. Submit proposed schedule of site meetings to Engineer and Owner.
3.4. Record, prepare and distribute minutes of each meeting to HRCE and to each other participant within 72 hours of meeting.
3.5. Ensure that all representatives who attend meetings have the authority to conduct business on behalf of firms they represent.
3.6. Details of Progress Meetings to be discussed at the project start-up meeting.

4. Suggested Agendum (Preconstruction Meeting)

4.1. Distribution and discussion of:
4.1.1. List of major subcontractors and suppliers.
4.1.2. Projected Construction Schedules.
4.2. Critical work sequencing.
4.3. Major equipment deliveries and priorities.
4.4. Project Coordination:
4.4.1. Designation of responsible personnel.
4.5. Procedures and Processing of:
4.5.1. Field decisions
4.5.2. Proposal requests
4.5.3. Submittals
4.5.4. Change orders
4.5.5. Applications for Payment.
4.6. Adequacy of distribution of Contract Documents.
4.7. Procedures for maintaining Record Documents.
4.8. Use of premises:
4.8.1. Office, work and storage areas.
4.8.2. Owner's requirements.
4.9. Construction facilities, controls and construction aids.
4.10. Safety/Tool Box Meetings.
4.11. Security procedures.
4.12. Housekeeping procedures.
4.13. Egress/life safety procedures

5. Suggested Agendum (Progress Meetings)

5.1. Review and approval of minutes of previous meeting.
5.2. Safety meeting minutes.
5.3. Review of work progress since previous meeting.
5.4. Field observations, problems, conflicts.
5.5. Problems which impede Construction Schedule.

5.6. Review of off-site fabrication, delivery Schedules.
5.7. Corrective measures and procedures to regain projected schedules.
5.8. Revisions to Construction Schedules.
5.9. Maintenance of quality standards.
5.10. Pending changes and substitutions and effect on Construction Schedule.
5.11. Other Business.

6. Attend, with representatives of HRCE weekly meetings with the School Administration to review construction activities and concerns of Building Occupants.
7. Quarterly meetings with Contractor and the HRCE / User during Warranty Period including major sub-trade contractors.
8. Dates for meetings will be set at time of completion.

END OF SECTION 01 31 19

SECTION 01 33 00 – SUBMITTAL PROCEDURES

1. General Requirements

1.1. Make submittals specified in this Section to Consultant unless otherwise specified, with additional submissions made, in manner he directs, to other parties involved with construction of the Project as their interests are concerned. These parties are, but shall not be restricted to, consultants, jurisdictional authorities, and Subcontractors whose Work must be coordinated with Work related to Submittals.

1.2. Ensure that submissions are made to allow sufficient time for review without the construction schedule being delayed.

2. Document Submissions Required

2.1. At Commencement of Contract:

2.1.1. Performance and Payment Bonds.

2.1.2. Public Liability and Property Damage Insurance Certificates.

2.1.3. List of Subcontractors by firm name.

2.1.4. Construction Schedule and other required schedules and estimates.

2.1.5. Site Specific Safety Plan/Safety Policy.

2.1.6. Workers' Compensation Board status.

2.2. During Construction:

2.2.1. Weekly progress reports.

2.2.2. Job meeting reports and minutes.

2.2.3. Updated construction schedules.

2.2.4. Shop drawings as required.

2.2.5. Inspection and test reports.

2.2.6. Daily communication of Hot Work Permits as needed.

2.3. Submissions at completion of Work are specified in Section 01 77 00, Contract Closeout.

3. Administrative

3.1. Submit to Consultant submittals listed for review. Submit promptly and in orderly sequence to not cause delay in Work. Failure to submit in ample time is not considered sufficient reason for extension of Contract Time no claim for extension by reason of such default will be allowed.

3.2. Do not proceed with Work affected by submittal until review is complete.

3.3. Present shop drawings, product data, samples and in Imperial units.

3.4. Review submittals prior to submission to Consultant. This review represents that necessary requirements have been determined and verified, or will be, and that each submittal has

been checked and coordinated with requirements of Work and Contract Documents. Submittals not stamped, signed, dated and identified as to specific project will be returned without being examined and considered rejected.

3.5. Notify Consultant in writing at time of submission, identifying deviations from requirements of Contract Documents stating reasons for deviations.

3.6. Verify field measurements and affirm that affected adjacent work is coordinated.

3.7. Contractor's responsibility for errors and omissions in submission is not relieved by Consultant's review of submittals.

3.8. Contractor's responsibility for deviations in submission from requirements of Contract Documents is not relieved by Consultant's review.

3.9. Keep one review copy of each submission on site.

4. Construction Schedules

4.1. Submit proposed construction schedule at beginning of Project, as specified in Project Documents.

4.2. As construction progresses, submit up-dated construction schedules as specified in Project documents.

5. Shop Drawings And Product Data

5.1. The term "shop drawings" means drawings, diagrams, illustrations, schedules, performance charts, brochures and other data which are to be provided by Contractor to illustrate details of a portion of Work.

5.2. Submit drawings stamped and signed by professional consultant registered or licensed in Province of Nova Scotia of Canada.

5.3. Indicate materials, methods of construction and attachment or anchorage, erection diagrams, connections, explanatory notes and other information necessary for completion of Work. Where articles or equipment attach or connect to other articles or equipment, indicate that such items have been coordinated, regardless of Section under which adjacent items will be supplied and installed. Indicate cross references to design drawings and specifications.

5.4. Allow seven (7) days for Consultant's review of each submission. Do not proceed with work involving relevant products until completion of shop drawing review.

5.5. Adjustments made on shop drawings by Consultant are not intended to change Contract Price. If adjustments affect value of work, state such in writing to Consultant prior to proceeding with work.

5.6. Make changes in shop drawings as Consultant may require, consistent with Contract Documents. When resubmitting, notify Consultant in writing of revisions other than those requested.

Accompany submission with transmittal letter, in duplicate, containing:

5.6.1. Date

5.6.2. Project title and number

5.6.3. Contractor's name and address

5.6.4. Identification and quantity of each shop drawing, product data and sample.

5.6.5. Other pertinent data.

5.7. Submission to include:

5.7.1. Date and revision dates.

5.7.2. Project title and number.

5.7.3. Name and address of:

5.7.3.1. Subcontractor.

5.7.3.2. Supplier.

5.7.3.3. Manufacturer.

5.7.4. Contractor's stamp, signed by Contractor's authorized representative certifying approval of submissions, verification of field measurements and compliance with Contract Documents.

5.7.5. Details of appropriate portions of Work as applicable:

5.7.5.1. Fabrication.

5.7.5.2. Layout, showing dimensions, including identified field dimensions, and clearances.

5.7.5.3. Setting or erection details.

5.7.5.4. Capacities.

5.7.5.5. Performance characteristics.

5.7.5.6. Standards.

5.7.5.7. Relationship to adjacent work.

5.8. After Consultant's review, distribute copies.

5.9. Submit for review one electronic copy in PDF file format of shop drawings for each requirement requested in specification Sections and as Consultant may reasonably request.

5.10. Submit electronic copies of product data sheets for brochures for requirements requested in specification Sections and as requested by Consultant where shop drawings will not be prepared due to standardized manufacture of product.

5.11. Submit electronic copies of test reports for requirements requested in specification Sections and as requested by Consultant.

5.11.1. Report signed by authorized official of testing laboratory that material, product or system identical to material, product or system to be provided has been tested in accord with specified requirements.

5.11.2. Testing must have been within three (3) years of date of contract award for project.

5.12. Documentation of testing and verification actions taken by manufacturer's representative to confirm compliance with manufacturer's standards or instructions.

5.13. Delete information not applicable to project.

5.14. Supplement standard information to provide details applicable to project.

5.14.1. If upon review by Consultant, no errors or omissions are discovered or if only minor corrections are made, copies will be returned and fabrication and installation of work may proceed. If shop drawings are rejected, noted copy will be returned and resubmission of corrected shop drawings, through same procedure indicated above, must be performed before fabrication and installation of work may proceed.

5.14.2. Without restricting generality of foregoing, Contractor is responsible for dimensions to be confirmed and correlated at job site, for information that pertains solely to fabrication processes or to techniques of construction and installation and for coordination of work of sub-trades.

5.15. Shop Drawings are specified for submission under the following:

Section 03 20 00 Concrete Reinforcement
Section 05 12 23 Structural Steel
Section 05 31 00 Steel Deck
Section 05 50 00 Metal Fabrications
Section 06 10 11 Rough Carpentry
Section 06 40 00 Architectural Woodwork
Section 07 41 43 Aluminum Composite Panels
Section 07 46 13 Preformed Metal Siding
Section 07 55 00 Modified Bitumen Roofing System & Flashing
Section 07 84 00 Fire Stopping and Smoke Seals
Section 08 11 14 Steel Doors & Frames
Section 08 11 16 Aluminum Doors & Frames
Section 08 14 10 Wood Doors
Section 08 50 50 Aluminum Windows
Section 08 62 11 Vinyl Windows
Section 08 71 10 Door Hardware
Section 09 22 16 Non-Load Bearing Wall Framing
Section 09 30 13 Ceramic Tile
Section 10 11 13 Communication Boards
Section 10 11 23 Tackboards

Section 10 14 53 Traffic Signs
Section 10 28 10 Toilet & Bath Accessories
Section 10 50 00 Miscellaneous Specialties
Section 11 40 11 Food Services Catalogued & Custom Equipment
Section 12 21 13 Horizontal Blinds
Section 12 21 16 Roller Shades
Section 14 42 13 Wheelchair Platform Lift

All pre-manufactured Mechanical & Electrical items as noted in Mechanical & Electrical Divisions.

6. SAMPLES

6.1. Submit for review samples in duplicate as requested in respective specification Sections, as requested by the Consultant. Label samples with origin and intended use.

6.2. Deliver samples prepaid to Consultant's business address.

6.3. Notify Consultant in writing, at time of submission of deviations in samples from requirements of Contract Documents.

6.4. Adjustments made on samples by Consultant are not intended to change.

6.5. Make changes in samples which Consultant may require, consistent with Contract Documents.

6.6. Reviewed and accepted samples will become standard of workmanship and material against which installed work will be verified.

6.7. Samples are specified for submission under the following Sections:

Section 07 41 43 Aluminum Composite Panels
Section 07 46 13 Preformed Metal Siding
Section 08 14 10 Wood Doors
Section 08 50 50 Aluminum Windows
Section 09 30 13 Ceramic Tile
Section 09 51 13 Acoustical Ceiling Units
Section 09 65 19 Resilient Tile Flooring
Section 12 21 13 Horizontal Blinds
Section 12 21 16 Roller Shades

Refer to Mechanical & Electrical Divisions for sample requirements in those Trades.

7. Record Drawings

7.1. Record, as the Work progresses, changes and deviations in the location of Work concealed by the finished Work, and such other approved changes that occur during progress of Work, to ensure that an accurate record is provided for future maintenance and alterations.

7.2. White prints will be provided by the HRCE for use in preparing record drawings. Record changes in the Work on these prints in red ink.

7.3. Dimension location of concealed Work in reference to building walls, and elevation in reference to floor elevation. Indicate at which point dimension is taken to conceal Work. Dimension all terminations and offsets of runs of concealed work.

7.4. Record work constructed differently than shown on Contract Documents, changes in the work caused by site conditions, by Owner, Consultant, Contractor and Subcontractor originated changes, and by site instructions, supplementary instructions, field orders, change orders, addenda, correspondence and directions of jurisdictional authorities.

7.5. Record location of mechanical and electrical services, piping, valves, conduits, pull boxes, junction boxes and similar work not clearly in view, and position of which is required for maintenance, alteration work and future additions. Do not conceal critical work until its location has been recorded.

7.6. Identify record drawings as a "Project Record Copy". Maintain in good condition, do not use for construction purposes and make available to Consultant at all times.

7.7. Submit record drawings at completion of Work. Final acceptance of the Work will be predicated on receipt and approval of record drawings.

8. Extra Stock

8.1. Supply extra stock at completion of Project as specified in other Sections of the Project Manual.

8.2. Deliver extra stock as directed by the Architect to location he designates.

8.3. Extra stock is specified to be supplied in the following Sections:

Section 09 30 13 Ceramic Tile
Section 09 51 13 Acoustical Ceiling Units
Section 09 65 19 Resilient Tile Flooring
Section 09 91 23 Painting
Refer to Mechanical & Electrical Divisions for Extra Stock requirements in those Trades.

9. Maintenance Manual & Operating Instructions

9.1. Submit three (3) copies of Maintenance Manual with application for completion certificate.

9.2. Include in Maintenance Manual one (1) copy of each final approved shop drawing issued for Project on which have been recorded changes made during fabrication and installation caused by unforeseen conditions.

9.3. Submit extended guarantees together in one (1) report binder.

9.4. The Manuals shall:

9.4.1. Consist of a hard-cover, black, vinyl-covered, loose-leaf, letter-size binder.

9.4.2. Have a title sheet, or sheets preceding data on which shall be recorded Project name, Project number, date, list of contents, and Contractor's and Subcontractors' names.

9.4.3. Be organized into applicable Sections of Work with each Section separated by hard paper dividers with plastic covered tabs marked by Section.

9.4.4. Contain only typed or printed information and notes, and neatly drafted drawings.

9.4.5. Contain maintenance and operating instructions on all building, and mechanical and electrical equipment.

9.4.6. Contain maintenance instructions as specified in various Sections.

9.4.7. Contain brochures and parts lists on all equipment.

9.4.8. Contain sources of supply for all proprietary products used in the Work.

9.4.9. Contain lists of supply sources for maintenance of all equipment in Project of which more detailed information is not included above.

9.4.10. Contain finished hardware schedule.

9.4.11. Contain charts, diagrams and reports specified in Mechanical & Electrical Divisions.

10. Extended Warranties

10.1. Submit the extended warranties listed in this Article and as specified in each applicable Section of this Project Manual.

10.2. Extended warranties shall commence on termination of the standard one-year warranty granted in this Contract.

10.3. Submit each extended warranty on a standard Form of Warranty, a sample of which is included in this Section.

10.4. Secure each extended Warranty by a Maintenance Bond in an amount indicated.

10.5. Submit extended warranties for:

Section 06 40 00 Architectural Woodwork – extended 4 years
Section 07 41 43 Aluminum Composite Panels – extended 10 years (panel finish)
Section 07 55 00 Modified Bitumen Roofing System & Flashing:

- 2 year CRCA materials and workmanship against leaks and blow off
- 10 year material warranty the membrane will perform as a roofing material
- 1 year CRCA warranty against defects of materials and workmanship for the sheet metal work.

Section 07 92 10 Joint Sealants – extended 5 years
Section 08 11 16 Aluminum Doors & Frames – extended 4 years
Section 08 14 10 Wood Doors – extended 4 years
Section 08 50 50 Aluminum Windows – extended 4 years
Section 08 62 11 Vinyl Windows – extended 5 years
Section 08 71 10 Door Hardware – various, refer to that Section

Section 09 30 13 Ceramic Tile – extended 4 years
Section 09 51 13 Acoustical Ceiling Units – extended 4 years
Section 09 65 19 Resilient Tile Flooring – extended 4 years
Section 10 11 13 Communication Boards – extended 24 years
Section 10 11 23 Tackboards – extended 9 years
Section 12 21 13 Horizontal Blinds – extended 5 years
Section 12 21 16 Rollers Shades – extended 5 years
Section 14 42 13 Platform Lift – extended 5 years
Refer to Mechanical & Electrical Divisions for extended Warranty requirements in those trades.

11. Inspection Laboratory Reports

11.1. Submit copies of inspection and test reports obtained by the Contractor and Subcontractors for their Work or for Jurisdictional Authorities, if requested by Consultant.

11.2. Submit reports in accordance with requirements specified in Section 01 41 00.

12. Documentation On Suppliers & Manufacturers

12.1. Provide information under headings identifying the following: Associated Technical Section, Manufacturer, Supplier, Contact Name, and Phone Numbers.

SAMPLE FORM OF WARRANTY FOLLOWS THIS PAGE

Sample Form for Warranty

Date .....

Client .....

Project .....

.....

Warranty .....
(title of work)

We hereby undertake to warrant all materials supplied and installed under our Contracts and include the providing of necessary materials and labour to cover the result of faulty materials or workmanship. Upon written notification from Client or the Architect that the above work is defective any repair or replacement work required shall be to the Architect's satisfaction at no cost to the Client. This Warranty shall not apply to defects caused by the work of others, maltreatment of materials, negligence or Acts of God. This Warranty shall remain in effect for the total period from the acceptance of the Work to (....date....), irrespective of the date of completion or the beneficial use by the Owner.

Signature .....

Authorized Signing Officer .....

Name of Firm .....

Address .....

END OF SECTION 01 33 00

SECTION 01 35 13 – APPENDIX A - SPECIAL PROJECT PROCEDURES

1. Introduction

1.1. School construction, renovation and maintenance projects are scheduled every year as a normal and necessary course of business by operations departments in each Nova Scotia Centre for Education. Building modifications, repairs and additions/demolitions to buildings may impact the school environment without appropriate controls. With increased controls based primarily on the CSA standards implementation, proper scheduling and clear communication on adequate controls can be put into place to eliminate/minimize the impact to all occupants.

1.2. Projects of this nature may generate varying levels of dusts, noises and odors. It is possible, unknown/unforeseeable environmental contaminants, such as spills, mould, fumes, lead or asbestos exposure maybe identified.

1.3. To successfully complete work within the school environment, it is necessary to plan and implement appropriate containment and control strategies. This document is developed to provide a minimum standard for contaminant controls for various types of projects in schools. These standards are in addition to and should complement all legislated protocols for working with regulated materials such as asbestos, lead paints, PCB's etc.

1.4. Executing a successful project will depend primarily on clear, concise communication. This may involve a number of parties (Project Manager, Operations staff, School Administration and Health & Safety staff and Joint Occupational Health & Safety Committee).

2. Communication Plan

2.1. The most critical element of any project management plan is effective communication between all stakeholders. Communication between the Operations project manager/supervisor, the contractor and school administrators before the start of a project is very important. This meeting is meant to explain the scope, schedule and risk assessment for the project. The meeting will also help establish clear expectations when managing planned and unplanned exposure risks associated with contaminant controls.

2.2. The communication plan shall include:

2.2.1. A description of potential contaminants, which may include but is not limited to:

2.2.1.1. Particulates (dirt, concrete/silica, steel, fiberglass, wood dust, ash, cellulose, etc.)

2.2.1.2. Moisture: external water infiltration, internal system leaks (domestic water, sanitary, storm, sprinkler)

2.2.1.3. Noise from equipment/tool operation,

2.2.1.4. Fumes/odors from equipment exhaust, boiler exhaust, septic waste, chemical/adhesives, etc.

2.2.1.5. Hazardous materials including, asbestos, PCB, mercury, lead, fuel oil, fungi/mould, etc.

2.2.1.6. Excessive heat/cold

2.2.2. A description of the control measure which may include but not be limited to:

2.2.2.1. Isolation within an enclosure (water, noise, hazardous materials)

2.2.2.2. Ventilation and filtration

2.2.2.3. Dehumidifiers/blowers (moisture)

2.2.2.4. Personal protective equipment

2.2.2.5. Schedule outside or inside school hours

2.2.2.6. Sound dampeners

2.2.2.7. Monitoring

2.2.2.8. Security

2.2.3. Other Hazards created by the work, including but not limited to fire safety and the need to alter fire safety plans.

2.3. For small routine work orders the communication plan may only involve one tradesperson and the school principal or designate. This communication is equally as important for management of contaminant controls.

3. Contaminant Control Management

3.1. Regardless of the contaminant or control measure used, the following procedures shall apply for every project:

3.1.1. Every project, including all routine work requests, shall be assessed, as per this document, by appropriate personnel for potential contaminant risk.

3.1.2. Clear lines of communication must be established between project personnel, site supervisor or project manager and the school administration.

3.1.3. Control strategies as per this document, shall be, communicated to workers as well as the site JOHSC and implemented prior to starting the work.

3.1.4. Where isolation is used as a control, all entry points must be clearly posted to describe the purpose of the enclosure and limitations of access.

3.1.5. During the execution of the project, the control measures must be regularly inspected and maintained before the start of each work shift, and throughout the shift as required.

3.1.6. A process for stop work and remediation orders must be established to ensure the project manager; site supervisor and school administrator have a means to cease project operations when a contaminant control breach may impact the school environment. Breached control measures must be reported immediately to HRCE project manager upon discovery. He/she will be responsible to communicate to the school principal or designate. Work shall be stopped immediately until the control measures are re-established.

3.1.7. Access to the controlled work site is only permitted by authorized personnel. The project supervisor or designate shall determine appropriate personal protective equipment (PPE) and necessary worker orientation.

4. Particulate Control

4.1. Exposure to minimal levels of dust is a normal condition in most outdoor and indoor environments and is typically controlled inside a building through building ventilation, filtration and routine housekeeping measures. However, as noted, construction projects generally create elevated dust levels in work areas, whether inside or outside of a building.

4.2. Operational Services Managers must ensure maintenance staff and contracted service providers implement dust control measures appropriate for the type and scope of work being performed. This will include assessing the type and amount of dust being created as well as the location of the work being conducted.

4.2.1. Interior Construction Projects:

4.2.2. Construction projects may be described as projects that may include Culinary Kitchen, wall creation/demolition, etc.

4.3. As a minimum for these types of construction projects, all interior entry points into a construction zone must be effectively sealed. The barrier must prevent contaminants from the work area to be distributed to other areas of the school. Appropriate signage must be posted to indicate only authorized persons are permitted access.

4.4. Entrance design could range from a two flap plastic tarp door to a fully constructed sealed entry door with negative hepa-filtered ventilation on the construction side of the barrier.

4.5. Exterior Construction Projects:

4.5.1. Exterior work shall be performed so as not to affect the safety of building occupants. It will also provide controls to avoid impact to adjacent properties. Depending up on the results identified in the risk assessment, at a minimum consideration must be given to prevent dust from entering into the school environment. This may be controlled through isolation, dampening application, closing building AHU and window/door openings.

5. Noise Control

5.1. Hearing plays an essential role in communication, speech and language development and learning within a school environment. During construction the contractor is responsible for ensuring acceptable noise levels will be adhered to for the HRCE staff and students within the building. Noise related to a project may prove to be very distracting for staff and students. To minimize distractions and interruptions in student learning the following are important to consider:

5.1.1. Contractors are responsible to ensure appropriate noise control measures are taken

5.1.2. "No work" periods may need to be incorporated into construction schedules

5.1.3. Work causing a noise disruption may need to take place during unoccupied times and/or during pre-determined acceptable times of the day (i.e. before and after class times)

5.1.4. It may be necessary for the School Administrator to make a request to the HRCE Project Manager or the Contractor to exclude undertaking certain noisy activities during particular periods and/or activities.

6. Moisture Control

6.1. Moisture levels are to be controlled during construction and maintenance activities. Moisture levels above normal may impact the air in the room and/or building and may also penetrate building materials giving the potential to lead to mould growth.

6.2. Certain activities (i.e. tape and mud of drywall, painting, pressure washing, concrete cutting with water or other water based dust-suppression) introduce high amounts of moisture into the room environment and ventilation and or drying is required to control local moisture.

6.3. An enclosure properly set-up to contain other contaminants will similarly contain/control high levels of airborne moisture. A wet-vac should be available on-site for activities which have a risk of water spillage of more than 5 gallons at any instance.

6.4. Standing and or stagnate water must be avoided on construction sites, for a number of reasons, including, but not limited to; insects breed in these bodies of water, the water may give off odours, it is a nuisance to walk through, and it may be an ice hazard in cold weather.

6.5. It is important that all water leaks and flooding are reported immediately to the HRCE's project manager and building supervisor. Where works to existing "plumbing" is to occur the water lines (potable, heating, fire suppression) must be isolated and drained (de-energized/de-pressurized) following Lock Out - Tag Out procedure. Adequate supplies such as buckets and absorbents should be present when drains are not available to drain a line.

6.6. When an interruption to the water supply, potable or service, is to occur then the "owner's representative" and building supervisor should be notified 24 hours in advance. Bottled water provision may be required.

6.7. Materials used in the construction and or maintenance activities are to be stored in dry areas. The introduction of materials to the activities with moisture levels above the acceptable (XXX%)CNBC states for wood, on dry weight basis, a max of 19%, I can't find info on drywall but assume it is much lower range is prohibited as these materials are highly susceptible to colonization by mould spores.

7. Fumes

7.1. Fumes may be produced on a project site for a variety of reasons such as use of motorized equipment, off gassing of sealants, adhesives and finish products, cutting/torching processes, exposure of sanitary systems, process ignition gases such as propane and acetylene, proximity of project temporary washrooms, radon, etc.

7.2. The impact of fumes on occupants may range from discomfort to health risk, to life safety risk.

7.3. The project manager or supervisor must ensure that all potential fume sources are identified and remedial or control measures included in the scope of work by the contractor.

7.4. Monitoring equipment may be required to determine for example radon exposure or safety of confined space access.

8. Activity Assessment

8.1. Activities that may produce contaminants which require control may be considered as low, medium and high impact.

8.2. Low impact activities include routine maintenance and repairs that may create localized dust or odors or brief periods of noise which are not considered harmful to occupants but may be a nuisance which requires minimal control. These may include activities such as opening ceiling tiles or gyproc walls, replacing a plumbing fixture, paint touch ups, drilling through a wall, etc.

8.3. Medium impact activities include larger repair jobs or longer duration projects that will create more wide spread levels of contaminant which must be controlled to prevent exposure to building occupants. Boiler cleaning, ceiling replacement, long periods of hammer drilling, etc.

8.4. High impact activities include large demolition and construction projects, or jobs with exposure to contaminants that are a risk to health or life safety such as asbestos remediation, mould abatement, lead paint clean up, etc.

9. Hazard Assessment

9.1. A hazardous assessment is required to be completed for each job to ensure hazards are identified and corresponding controls are implemented. Depending upon the circumstances at the site it may be necessary to upgrade and/or add other precautions.

9.2. Determine the most appropriate hazard classification and apply the corresponding protocols. The attached hazard assessment identifies the minimum controls that must be in place during the corresponding activities. Depending on the specific circumstances at a site further controls may be required. When the hazards are deemed to be in the C or F category the form including specific controls must be submitted to the HRCE for review, prior to commencing work. The contractor may still be required to complete their own hazard assessment of the job/work.

10. Contaminant Controls Procedure for initiating work for all Contaminant Controls:

10.1. Contaminant Control I

10.1.1. The tradesperson or project manager for the HRCE will discuss the details, including the scope and any impacts of the job/project with the principal.

10.1.2. Ensure fire exiting requirements and life safety systems are addressed or adequate mitigating plans are implemented for the building, construction staff and building occupants.

10.1.3. Presence of lead paint or ACM's (Asbestos Containing Materials) must be determined prior to the start of any job. Specific protocols or Codes of Practice may apply.

10.1.4. Consideration will be given for work that is anticipated to generate significant noise, odours or VOC's (Volatile Organic Compounds) and this will be scheduled outside of school hours or during times when the noise will not disrupt occupant activities. This will require coordination with the Principal.

10.1.5. The work area shall be isolated where possible. This may be achieved at varying levels, by closing doors and opening outside windows for ventilation or by installing appropriate hoarding and negative pressure units to ensure contaminants are not circulated throughout the school causing further health and safety concerns.

10.1.6. Dust shall be minimized during the activity. When drilling, sanding or cutting is taking place, wetting the area may be necessary to reduce dust.

10.1.7. Good housekeeping practices shall be maintained at all times on the work site. Bag and remove dust and debris from the building as soon as possible.

10.1.8. Possible environmental impacts shall be managed and minimized. If work uncovers environmental contaminants or suspected contaminants such as oil spills (current or historic) or potentially friable asbestos materials (check the school asbestos audit) that may be disturbed, this information shall be brought to the attention of the HRCE's employee responsible for the project so that appropriate actions can be taken.

10.1.9. When the activity is completed the work area shall be inspected and cleaned. Dust and debris shall be removed from the area and all efforts will be made to return items to their pre-maintenance activity location.

10.1.10. The Principal shall be notified that the work is completed.

10.2. Contaminant Control II - All Contaminant Control I measures shall apply, as well as;

10.2.1. Cover furniture, bookshelves and teaching materials with plastic sheets.

10.2.2. Water misting while performing dust generating activities may be required.

10.2.3. Seal un-used doors. Seal wall penetrations, electrical outlets, or any other source of air leaks in the construction area.

10.2.4. Seal exhaust air vents in construction area and open the windows. If possible shut down air handling system in the area for duration of project.

10.2.5. A walk out mat at exterior of exit door to trap dust may be required.

10.3. Contaminant Control III - All Contaminant Control I and II measures shall apply, as well as;

10.3.1. Install an impermeable dust barrier from the true ceiling to the floor consisting of two layers of 6 mil fire retardant polyethylene or solid wall and sealed door. The wall shall remain in place until the job is finished and the clean-up is completed.

10.3.2. Seal all wall penetrations

10.3.3. Seal off all return and supply air handling ducts and close all windows.

10.3.4. Turn off the air handling system in the area of construction.

10.3.5. Maintain negative air pressure in the construction area using HEPA filter equipped exhaust ventilation. The pressure differential between the project area of contamination and the building's occupied areas shall be demonstrable by a means approved by the HRCE employee responsible for the project.

10.3.6. Ensure that the air is exhausted directly outside and away from intake vents.

10.3.7. Vacuum all horizontal surfaces including drop cloths with a hepa vacuum.

10.3.8. Remove drop clothes

10.3.9. Vacuum again all horizontal surfaces with HEPA Vacuum.

10.3.10. Restore ventilation.

10.3.11. Remove enclosure and equipment.

10.4. Control IV: (External Work)

10.4.1. External work may impact building interior or occupants.

10.4.2. To reduce the impact to building interior or occupants, it may be necessary to contain the work area from impacting building interior. This may include closing or opening windows, tarping ceilings to capture debris or water, temporary relocation of occupants or ventilation controls.

10.4.3. The job supervisor shall consider weather conditions and forecast to reduce the effect of any weather impacts to the building materials or building occupants.

10.4.4. It may be necessary to use protective tarps and ground cover sheets below equipment and work areas to contain building debris such as paint chips, materials, dust or oil from equipment.

10.4.5. When the job is completed and the tarps have been lifted, inspect the ground around the job for debris and clean as necessary.

Fire Protection

10.5. Type V: General Fire Protection

10.5.1. Ensure fire exiting requirements and life safety systems are addressed or adequate mitigating plans are implemented for the building, construction staff and building occupants. Staff must be aware of temporary modifications to fire safety plans.

10.5.2. MSDSs for all materials to be used must be reviewed and available on site.

10.5.3. Construction materials stored outside must be a minimum distance of ten feet from the building and be in a secured area.

10.5.4. Flammable or Combustible liquids must be stored as per Fire Code requirements. All flammable and combustible liquids or materials must be kept in a secure area at all times.

10.6. Control VI: Fire Protection (minor hot work) - All Contaminant Control V shall apply as well as;

10.6.1. Notify the Principal that a risk of fire has increased and the area in which the hot work will occur.

10.6.2. Refer and implement the HRCE's hot work permit process. At a minimum the following should be considered;

10.6.2.1. Sweep the work area and remove all unnecessary materials in the vicinity; particularly all combustible and flammable materials and liquids shall be removed from the area (35 feet).

10.6.2.2. Have an appropriate size fire extinguisher available.

10.6.2.3. Inspect the work location for areas (such as a hole in the wall) where hot material or sparks could fall and smolder and close them off so that any hot debris can only fall within your field of view.

10.6.2.4. If it is possible that the flame will go past the object being welded or soldered and excessively heat a flammable or combustible material then either protect that material with a non-flammable material or wet the material and keep it wetted during the use of heat or grinding.

10.6.2.5. Remain in the area while the joint and/or heated materials cool to room temperature (ambient) while checking for the smell or appearance of smoke in the area.

10.6.2.6. Stay in the area for at least Y2 hour and then re-inspect for any smell or appearance of smoke.

10.6.2.7. Ask another staff person to inspect the area for the smell or appearance of smoke. Record who you asked to do the final inspection.

10.6.3. Type VII: Fire Protection (hot work w fire watch) - All Contaminant Control V and VI shall apply as well as;

10.6.4. Notify the Principal that a risk of fire has increased and the area in which the hot work will occur. If any life safety system components (sprinkler, detectors, fire alarms) are not function, hot work should not proceed until these systems are functioning unless fire watch procedures for life systems are followed. See Activation of Fire Watch for Life Safety Systems checklist. Appendix…XX

10.6.5. Refer and implement the HRCE's hot work permit process. At a minimum the following should be considered;

10.6.5.1. Cover all floor openings with fire stop material. Seal duct work openings with metal covers or blankets and close all doors.

10.6.5.2. Ensure that there are no potentially explosive atmospheres in the area.

10.6.5.3. Hot work on vessels, pressure tanks or boilers, use only contractors who are qualified by nationally or internationally recognized boiler and pressure vessel code.

10.6.5.4. Notify the local fire department of the type of work and the work schedule.

10.6.5.5. Before hot work is started, designate one employee responsible to complete the fire watch: while work is in progress, during lunch breaks and other breaks and for one hour after all flames are extinguished for the day and monitor the area for an additional two hours. After three hours after the last flame has been extinguished, have a second employee do a final survey of the area for smells or evidence of smoldering or fire and record the inspection.

APPENDIX
Fire Watch Activation Checklist

1. Documentation (identify locations to be checked on an hourly basis, provide contact information for relevant HRCE staff and outside agencies} HRCE provided template to be used for documentation.
2. Procedure reviewed with Custodian or individual responsible for fire watch. Any high risk areas shall be identified to be highlighted on the documentation page and checked during the rounds.
3. Staff working in the building have been notified of the Fire Watch and that they are responsible to monitor areas for signs of fire or smoke and have been reminded of required actions to take according to the school fire safety plan.
4. Staff responsible for fire watch have been trained in how to use a fire extinguisher. (PASS)
5. Staff responsible for the fire watch have a means of communication (cell phone or walkie-talkies)
6. Staff responsible for the fire watch are aware of the procedure for initiating fire alarm and what systems are functioning. i.e. systems (sprinklers, alarm panel or if school has monitoring company or if calling 911 is required)
7. The School Insurance Program (SIP) Emergency Information Line has been notified 1-902-448-2840
8. All relevant information has been documented in the school's fire books. Including date, time and reason for fire watch.

Fire Watch De-Activation Checklist

1. Document the date, time and actions taken to remedy the deficiency requiring the fire watch.
2. School Insurance Program (SIP) has been notified
3. Copy of the Fire Watch documentation is kept in the fire book and the original is sent to the HRCE Project Representative.

END OF SECTION 01 35 13

SECTION 01 35 29 - OCCUPATIONAL HEALTH & SAFETY REQUIREMENTS

1. References

1.1. CSA S269.1-1975 Falsework for Construction Purposes.

2. CONSTRUCTION SAFETY MEASURES

2.1. Observe construction safety measures of:

- **2.1.1.** National Building Code 2010, Part 8
- **2.1.2.** National Fire Code of Canada
- **2.1.3.** Provincial Government, including but not limited to the:
  - **2.1.3.1.** Occupational Health & Safety Act revised Statutes of Nova Scotia 1996, Chapter 7 and regulations.
  - **2.1.3.2.** Workers' Compensation Act
  - **2.1.3.3.** Fire Protection Act
  - **2.1.3.4.** Dangerous Goods Transportation Act

2.2. In case of conflict or discrepancy the more stringent requirement shall apply.

2.3. Ensure that employees working on this specific project have met training requirements as legislated by the Nova Scotia Occupational Health & Safety Act and its regulations.

2.4. Where reference is made to jurisdictional authorities, it shall mean all authorities who have within their constituted powers the right to enforce the laws of the place of the building.

3. Equipment & Tools

3.1. Each user of equipment or tools shall be responsible to examine for sufficiency before use. Make equipment and tools safe if necessary.

4. WHMIS

4.1. Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets.

4.2. Have a copy of WHMIS data sheets available at the workplace on delivery of materials.

5. Hazardous Material

5.1. Should material resembling hazardous materials other than those identified with the Contract Documents, including but not limited to spray or trowel applied asbestos, be encountered in course of work; stop work immediately. Do not proceed until written instructions have been received from Consultant.

5.2. Where work entails use, storage, or disposal of toxic or hazardous materials, chemicals and or explosives, or otherwise creates a hazard to life, safety, health, or the environment; work shall be in accordance with the Jurisdictional Authority.

6. Site Cleaning

6.1. Except where special permission is obtained, maintain clear access on public sidewalks and roads.

6.2. Maintain walks and roads clear of construction materials and debris, including excavated material. Clean walks and roads as frequently as required to ensure that they are cleared of materials, debris and excavated material.

7. Fire Safety Requirements

7.1. Enforce fire protection methods, good housekeeping and adherence to local and Underwriter's fire regulations including, but not limited to, Fire Protection Act and the Provincial Building Code Act. Provide UL approved fire extinguishers, and other fire- fighting services and equipment, except where more explicit requirements are specified as the responsibility of individual Sections.

7.2. Smoking is not permitted on school property.

7.3. Advise Fire Chief in the area of Work of any work that would impede fire apparatus response, including but not limited to violation of minimum overhead clearance prescribed by the fire chief, erecting of barricades and digging of trenches and in areas where work is being done.

7.4. Ensure nothing subverts the integrity of fire protection provided for the building structure.

8. Reporting Fires

8.1. Know the location of the nearest fire alarm box and telephone, including the emergency phone number.

8.2. Report immediately all fire incidents to the fire department as follows:

8.2.1. Activate nearest fire alarm box, or

8.2.2. Telephone local fire department

8.2.3. Where fire alarm box is exterior to building, the person activating the fire alarm box shall remain at the box to direct Fire Department to scene of the fire.

8.2.4. When reporting a fire by telephone, give location of fire, name or number of building and be prepared to verify the location.

9. Safety Document Submission

9.1. Ensure Safety Document Submission applies to Work of this specific project and site.

9.2. Submit two (2) copies of Project Safety Document at the Pre-Construction Meeting. Do not commence Work nor deliver material on-site prior to submission.

9.3. Include in Safety Document submission specific information detailing the methods and procedures to be implemented ensuring adherence to the acts, regulations, codes and policies specified in this section and to:

9.3.1. Ensure the Health & Safety of persons at or near the Work; including, but not limited to, the Public.

9.3.2. Ensure the measures and procedures of the regulatory agencies specified are carried out.

9.3.3. Ensure every employee, self-employed person and employer performing Work under this contract complies with the regulatory agencies specified.

9.3.4. Where changes to the methods and procedures in the execution of work change submitted safety methods and procedures, modify submitted Safety Documentation and submit modifications, in writing to the Consultant and Owner prior to implementation.

10. Safety Document Organization

10.1. Organize information in the form of an instructional manual as follows:

10.1.1. Place in binders of commercial quality, accommodating 8½" x 11" paper size.

10.1.2. Cover: Identify binder with typed or printed title ‘Project Safety Document’ and list the title of project.

10.1.3. Provide tabbed fly leaf for each separate heading, with typed heading on tab.

10.1.4. Where drawings are within the safety document, provide with reinforced punched binder tab. Bind in with text; fold in larger drawings to size of text pages.

10.1.5. Arrange content under Safety Document headings specified herein.

11. Safety Document Headings

11.1. Employee Safety Training

11.1.1. Place, under this heading, a statement indicating employees working on this specific project have met specified training requirements, if required.

11.2. Company Safety Policy

11.2.1. Place, under this heading, information pertaining to the company's policy and commitment to Occupational Health & Safety, including the responsibilities of management, supervisors and workers.

11.3. Company Safety Rules in General Terms

11.3.1. Place, under this heading, information of a general, global nature, applying to every work environment where the company has staff and pertaining to rules directing compliance to policy. For example state company safety rules with respect to use of hard hats, safety glasses, safety foot ware, CSA approval on such items, and use of alcohol or non-prescription drugs.

11.4. Hazard Assessment

11.4.1. Place, under this heading, information identifying possible hazards specific to this project and identify safe methods and procedures for the execution of work to ensure safety in the work place.

11.4.2. Arrange contents of this heading by technical section number of the project manual.

11.5. Emergency Action Plan

11.5.1. Place, under this heading, information detailing action to be taken in the event of various emergencies.

11.5.2. Arrange content under the following sub-headings:

11.5.2.1. First Aid

11.5.2.1.1. Include information concerning establishment of a First Aid Station, related supplies, staff awareness of location and staff training in First Aid Care of Casualties.

11.5.2.2. Contact of Emergency Support Groups:

11.5.2.2.1. Include relative information including phone location for emergency use, the emergency telephone numbers and their location for the various organizations which must be contacted in case of an emergency, and staff training in procedures.

Cessation of Work:

11.5.2.2.2. Include relative information how work cessation during emergencies is handled and communicated to persons present on site.

11.6. Joint Occupational Health & Safety Committee/Representative:

11.6.1. Place under this heading information detailing membership and terms of reference.

OCCUPATIONAL HEALTH & SAFETY SUMMARY FOLLOWS THIS PAGE

Occupational Health & Safety Summary (to be submitted with each monthly Progress estimate)

The following information summarizes Occupational Health & Safety activities on the project conducted by the Contractor during the month and includes activities of Subcontractors. Activities include all matters prescribed by the Occupational Health & Safety Act and Regulations and the submitted Occupational Health & Safety Document for the Project.

Indicate the applicable # number below:

#_____new contractors on site,
#_____orientations
#_____toolbox talks
#_____safety meetings
#_____Joint Occupational Health and Safety Committee meetings
#_____hazard assessments
#_____formal written inspections
#_____warnings issued to employees or subcontractors
#_____other, explain_____

List new Contractors on Site below:

_____
_____
_____
_____
_____
_____

The Contractor certifies that the above noted activity list is accurate and that during the month:

Check

☐ All activities on the Project were found to be in compliance with the Occupational Health & Safety Act and Regulations

☐ Some activities on the Project were not found to be in compliance with the Occupational Health & Safety Act and Regulations but were adequately corrected in an appropriate time frame. Explain _____
_____

Prepared by

_____
(Contractor Project Manager)

Certified by

_____
(Contractor Senior Management)

END OF SECTION 01 35 29

SECTION 01 37 00 - SCHEDULE OF VALUES

1. Related Documents

1.1. General Conditions of Contract.

2. General

2.1. Submit to the Architect, and Owner, Schedule of Values, within twenty (20) days after signing Agreement.

2.2. Use Schedule of Values as basis for Contractor's Progress Claim.

3. Form Of Submittal

3.1. Form included at end of this Section.

3.2. **The form included below is a suggested guide but might not be appropriate for all projects. Contractors may submit their own template to the Owner for review/approval.**

4. Preparing Schedule Of Values

4.1. Itemize separate line item cost for work required.

4.2. Round off figures to nearest ten (10) dollars.

4.3. The sum of all values listed in the schedule shall equal the total contract sum.

5. Review And Submittal

5.1. After review by Architect and Owner, revise and resubmit Schedule as directed.

5.2. The form shall be completed and supported by such evidence as to its correctness as the Architect may reasonably direct.

Schedule of Values

Project Name ***#4018-Culinary Kitchen – Sir John A. Macdonald High***

Contract Number .....

Architect .....

Contractor .....

Date .....

Item	Description	Item Amount

1. **General Requirements**
   - **1.1.** Mobilization & Initial Expenses
   - **1.2.** Site Overhead & Fee
   - **1.3.** Bonds
   - **1.4.** Certificates
   - **1.5.** Testing
   - **1.6.** Construction Facilities & Temporary Controls
   - **1.7.** Other (Specify)

Total (Items 1.1 to 1.7) _____

2. **Excavation, Backfill, Sitework**

Total (Item 2.) _____

3. **Concrete**

Total (Item 3.) _____

4. **Masonry**

Total (Item 4.) _____

5. **Metals**

Total (Item 5.) _____

6. **Wood & Plastics**
   - **6.1.** Rough Carpentry
   - **6.2.** Finish Carpentry
   - **6.3.** Architectural Woodwork

Total (Items 6.1 to 6.3) _____

7. **Thermal & Moisture Protection**
   - **7.1.** Insulation
   - **7.2.** Air Vapour Barrier
   - **7.3.** Aluminum Composite Panels
   - **7.4.** Preformed Metal Siding
   - **7.5.** Fire Stopping
   - **7.6.** Roofing

Total (Item 7.1 to 7.6) _____

8. Doors And Windows

8.1. Metal Doors & Frames
8.2. Wood Doors
8.3. Hardware
8.4. Windows

Total (Items 8.1 to 8.4) _____

9. Finishes

9.1. Acoustic Ceiling Systems
9.2. Gypsum Board and Support Systems
9.3. Hard Tile
9.4. Resilient Tile
9.5. Painting

Total (Items 9.1 to 9.5) _____

10. Specialties

10.1. Tackboards, Communication Boards
10.2. Toilet & Bath Accessories
10.3. Manufactured Specialties
10.4. Food Service Equipment

Total (Items 10.1 to 10.4) _____

11. Mechanical

11.1. As per Sections — Total (Item 11.) _____

12. Electrical

12.1. As per Sections — Total (Item 12.) _____

TOTAL (Items 1 - 12) _____

END OF SECTION 01 37 00

SECTION 01 41 00 - REGULATORY AGENCIES

1. Jurisdictional Authorities

1.1. Where reference is made to jurisdictional authorities, it shall mean all authorities who have within their constituted powers the right to enforce the laws of the place of building.

2. Definitions

2.1. The "Constructor" named in the Construction Safety Act, Chapter 52, Revised Statutes of Nova Scotia, as amended by 1972, Chapter 25; and Construction Safety Regulations, pursuant to Chapter 52 R.S.N.S., including any amendments, shall mean the "Contractor" for the Work performed under this Specification.

3. Fire Prevention, Safety & Protection

3.1. General Construction Safety Measures:

3.1.1. Observe safety measures of the

3.1.1.1. National Building Code 2010, Part 8.

3.1.1.2. National Fire Code of Canada.

3.1.1.3. Provincial Government, including but not limited to the Occupational Health & Safety Act Revised Statutes of Nova Scotia 1996, Chapter 320, and the Construction Safety & Industrial Safety Regulations made pursuant to the Occupational Health and Safety Act, 1996.

3.1.1.4. Workers'/Workmen's Compensation Board.

3.1.2. In case of conflict or discrepancy the more stringent requirement shall apply.

3.1.3. Maintain clear emergency exit paths for personnel.

3.2. Except where special permission is obtained, maintain clear access on public sidewalks and roads.

3.3. Maintain walks and roads clear of construction materials and debris, including excavated materials. Clean walks and roads as frequently as required to ensure that they are cleared of materials, debris and excavated materials.

3.4. WHMIS:

3.4.1. Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labelling and provision of material safety data sheets acceptable to Labour Canada and Health & Welfare Canada.

3.4.2. Have a copy of WHMIS data sheets available at the workplace on delivery of materials.

Blockage of Roadways

3.5. Advise Fire Chief of any work that would impede fire apparatus response. This includes violation of minimum overhead clearance, as prescribed by fire chief, erecting of barricades and the digging of trenches.

4. Smoking Precautions

4.1. Observe, at all times, smoking regulations.

5. Rubbish And Waste Materials

5.1. Rubbish and waste materials are to be kept to a minimum.

5.2. The burning of rubbish is prohibited.

6. Flammable And Combustible Liquids

6.1. The handling, storage and use of flammable and combustible liquids are to be governed by the current National Fire Code of Canada.

6.2. Flammable and combustible liquids such as gasoline, kerosene and naphtha will be kept for ready use in quantities not exceeding 45 litres provided they are stored in approved safety cans bearing the Underwriter's Laboratory of Canada or Factory Mutual seal of approval. Storage of quantities of flammable and combustible liquids exceeding 45 litres for work purposes, requires the permission of the Fire Chief.

6.3. Transfer of flammable and combustible liquids is prohibited within buildings or jetties.

6.4. Transfer of flammable and combustible liquids will not be carried out in the vicinity of open flames or any type of heat-producing devices.

6.5. Flammable liquids having a flash point below 38°C such as naphtha or gasoline will not be used as solvents or cleaning agents.

6.6. Flammable and combustible waste liquids, for disposal, will be stored in approved containers located in a safe ventilated area. Quantities are to be kept to a minimum and the Fire Department is to be notified when disposal is required.

7. Hazardous Substances

7.1. Work entailing the use of toxic or hazardous materials, chemicals and/or explosives, otherwise creates a hazard to life, safety or health, will be in accordance with the National Fire Code of Canada.

7.2. Where flammable liquids, such as lacquers or urethanes are to be used, proper ventilation will be assured and all sources of ignition are to be eliminated. The Fire Chief is to be informed prior to and at the cessation of such work.

8. Questions and/or Clarification

8.1. Direct any questions or clarification on Fire Safety in addition to above requirements to Fire Chief.

9. Fire Inspection

9.1. Site inspections by Fire Chief will be coordinated through HRCE Project Manager.

9.2. Allow Fire Chief unrestricted access to the work site.

9.3. Co-operate with the Fire Chief during routine fire safety inspection of the Work site.

9.4. Immediately remedy all unsafe fire situations observed by the Fire Chief.

10. Reference Standards

10.1. Where edition date is not specified, consider that references to manufacturer's and, published codes, standards and specifications are made to the latest edition, (revision) approved by the issuing organization, current at the date of this Specification.

10.2. Reference standards and specifications are quoted in this Specification to establish minimum standards. Work which in quality exceeds these minimum standards shall be considered to conform.

10.3. Should the Contract Documents conflict with specified reference standards or specifications the General Conditions of the Contract shall govern.

10.4. Where reference is made to manufacturer's directions, instructions or specifications they shall include full information on storing, handling, preparing, mixing, installing, erecting, applying, or other matters concerning the materials pertinent to their use and their relationship to materials with which they are incorporated.

10.5. Have a copy of each code, standard and specification, and manufacturer's directions, instructions and specifications, to which reference is made in this Specification, always available at construction site.

10.6. Standards, specifications, associations, and regulatory bodies are generally referred to throughout the specifications by their abbreviated designations:

AA	The Aluminum Association
AISI	American Iron and Steel Institute
ANSI	American National Standards Institute
ARI	Air Conditioning & Refrigeration Institute
ASTM	American Society for Testing & Materials
CCA	Canadian Construction Association
CGSB	Canadian General Standards Board
CSA	Canadian Standards Association
NSDTIR	Department of Transportation & Infrastructure Renewal, Province of Nova Scotia
IAO	Insurers Advisory Organization
NBC	National Building Code
NFPA	National Fire Protection Association
CANS	Construction Association of Nova Scotia
ULC	Underwriters Laboratories of Canada
WHMIS	Workplace Hazardous Materials Information System

END OF SECTION 01 41 00

SECTION 01 45 00 - QUALITY CONTROL

1. Section Includes

1.1. Inspection and testing, administrative and enforcement requirements

1.2. Tests and mix designs.

1.3. Mock-ups.

1.4. Mill tests.

1.5. Equipment and system adjust and balance.

1.6. Verification by affidavits and certificates that specified products meet requirements of reference standards: In applicable Sections of the Specification.

1.7. Testing, balancing and adjusting of equipment: In applicable Mechanical and Electrical Sections of the Specification.

1.8. Cutting & Patching: Section 01 11 41.

2. Related Sections

2.1. Section 01 33 00 Submittal Procedures: Submission of samples to confirm product quality.

2.2. Section 01 61 00 Material & Equipment: Material and workmanship quality – reference standards.

2.3. Section 01 77 00 Contract Closeout.

3. REVIEW OF WORK

3.1. The Owner shall have access to the Work. If part of the Work is in preparation at locations other than the Place of the Work, access shall be given to such work whenever it is in progress.

3.2. Give timely notice to the Owner's Representative, requesting review of the Work as indicated in the Contract Documents.

3.3. If the Contractor covers or permits to be covered Work that has been designated for review by the Owner before such is made, uncover such Work, have the review satisfactorily completed and make good such Work at no extra cost to Owner.

4. Inspection, Special Tests, Approvals

4.1. Engage the services of appropriate inspection testing agencies ensuring the Work meets codes, acts and regulations, and lows in force at the place of Work. Include such costs in the Contract Price.

4.2. Give timely notice requesting inspection to those required to provide inspections, special tests, or approvals, where Work is designated, by the Owner's instructions or the law of the place of Work, for special tests.

4.3. If the Contractor covers or permits to be covered Work that has been designated for special tests, inspections or approvals before such is made, uncover such Work, have the inspections or tests satisfactorily completed and make good such Work at no extra cost to the Owner.

4.4. The Owner may order any part of the Work to be examined if the Work is suspected to be not in accordance with the Contract Documents. If, upon examination such Work is found not in accordance with the Contract Documents, correct such Work and pay the cost of examination and correction. If such Work is found in accordance with the Contractor Documents, the Owner shall pay the cost of examination and replacement.

5. Independent Inspection Agencies

5.1. Independent Inspection/Testing Agencies may be engaged by the Owner for the purpose of inspecting and/or testing portions of Work. Cost of such services will be borne by the Owner.

5.2. Provide access to the Work, and equipment required for executing inspection and testing by the appointed agencies.

5.3. Employment of inspection/testing agencies does not relax the Contractor's responsibility to perform Work, or carry out his own inspections and testing in accordance with the Contract Documents.

5.4. If defects are revealed during inspection and/or testing, the appointed agency will request additional inspection and/or testing to ascertain full degree of defect. Correct defect and irregularities as advised by Owner at no cost to the Owner. Pay costs for retesting and reinspection.

6. Access To Work

6.1. Allow inspection/testing agencies access to the Work, off site manufacturing and fabrication plants.

6.2. Co-operate to provide reasonable facilities for such access.

7. Procedures

7.1. Notify the appropriate agency and Owner in advance of the requirement for tests, in order that attendance arrangements can be made.

7.2. Submit samples and/or materials required for testing, at specifically requested in specifications. Submit with reasonable promptness and in an orderly sequence so as not to cause delay in the Work.

7.3. Provide labour and facilities to obtain and handle samples and materials on site. Provide sufficient space to store and cure test samples.

8. Rejected Work

8.1. Remove defective Work, whether the result of poor workmanship, use of defective products or damage and whether incorporated in the Work or not, which has been rejected, including (but not limited to) defective Work rejected by the Owner as failing to conform to the Contract Documents. Replace or re-execute in accordance with the Contract Documents.

8.2. Make good other Contractor's work damaged by such removals or replacements promptly.

8.3. If in the opinion of the Owner, it is not expedient to correct defective Work or Work not performed in accordance with the Contract Documents, the Owner may deduct from the Contract Price the difference in value between the Work performed and that called for by the Contract Documents, the amount of which shall be determined by the Owner.

9. Reports

9.1. Submit four (4) copies of inspection and test reports to the Owner.

9.2. Provide copies to Contractor's Consultant and Subcontractor of Work being inspected or tested.

10. Tests and Mix Designs

10.1. Furnish test results and mix designs as may be requested.

10.2. The cost of tests and mix designs beyond those called for in the Contract Documents or beyond those required by law of the Place of Work shall be appraised by the Owner and may be authorized as recoverable.

11. Mock-Up

11.1. Prepare mock-up for Work for each finish in the Work and other work specifically requested in the specifications. Include for Work of all Sections required to provide mock-ups.

11.2. Construct in all locations as specified in specific Section.

11.3. Prepare mock-up for Owner's review with reasonable promptness and in an orderly sequence, so as not to cause any delay in the Work.

11.4. Failure to prepare mock-up in ample time is not considered sufficient reason for an extension of Contract Time and no claim for extension by reason of such default will be allowed.

11.5. If requested the Owner will assist in preparing a schedule fixing the dates for preparation.

11.6. Mock-ups may remain as part of the Work, unless specified otherwise in the Contract Documents.

12. Mill Tests

12.1. Submit mill test certificates as may be requested.

13. Equipment And Systems

13.1. Submit adjustment and balancing reports for mechanical, electrical and building equipment systems.

13.2. Refer to Contract Documents for definitive requirements.

END OF SECTION 01 45 00

SECTION 01 52 00 – CONSTRUCTION & TEMPORARY FACILITIES

1. General

1.1. Include in the Work construction and temporary facilities required as construction aids or by jurisdictional authorities or as otherwise specified. Install to meet needs of construction as Work progresses. Maintain construction and temporary facilities during use, relocate them as required by the Work, remove them at completion of need and make good adjacent Work and property affected by their installation.

1.2. Include in the Work construction and temporary facilities to provide for construction safety such as: fences, barricades, bracing, supports, storage, sanitation and first aid facilities, fire protection, stand pipes, electrical supply, construction equipment with its supports and guards, stairs, ramps, platforms, runways, ladders, scaffolds, guardrails, temporary flooring, rubbish chutes, and walkway, morality and guard lights, and as otherwise required of the Constructor by the Construction Safety Act, of the Province of Nova Scotia, as well as all other applicable regulations or jurisdictional authorities.

1.3. Construct temporary Work of new materials unless use of second-hand materials is approved.

1.4. Ensure that structural, mechanical, and electrical characteristics of temporary facilities are suitable and adequate for use intended. Be responsible that no harm is caused to persons and property by failure of temporary facilities because of placing, location, stability, protection, structural sufficiency, removal, or any other cause.

1.5. Locate temporary facilities as directed and coordinated with School Administration and HRCE.

1.6. Relocate construction and temporary facilities as required by the Progress of the Work, and remove at completion of Work.

1.7. Do not permit construction personnel to use new washroom and toilet facilities.

1.8. Interior work zones to be complete with temporary negative air ventilation units to be functioning at all times to control dust migration to occupied areas.

1.9. Refer also to HRCE Policies & Guidelines contained in Appendix A of Section 01 35 13.

2. Services

2.1. Temporary Electric Power:

2.1.1. The Contractor will provide a source of electric power for all construction purposes.

2.1.2. Coordinate with the Building Operator locations of power sources and arrange to connect under his direction.

2.1.3. Install electric service distribution conductors and necessary components. Determine anticipated demand which will be placed on service during normal peak

periods and obtain approval on this basis before making installation. Supply power of characteristics required by the Work. Install a power centre for miscellaneous tools and equipment for each major building floor area with distribution box, a minimum of four 20 amp grounded outlets, and circuit breaker protection for each outlet. Make connections available to any part of the Work within distance of a 100'-0" extension.

2.2. Temporary Lighting:

2.2.1. Install lighting for

2.2.1.1. emergency evacuation, safety and security throughout the Project at intensity levels required by jurisdictional authorities.

2.2.1.2. performance of Work throughout Work areas as required, evenly distributed, and at intensities to ensure that proper installations and applications are achieved.

2.2.1.3. performance of finishing Work in areas as required, evenly distributed and of an intensity of at least 15 foot candles.

2.2.2. Permanent fluorescent lighting may be used during construction, provided that fixtures, lamps and lenses are completely cleaned. Incandescent sources may be used during construction to the extent of 20% of the total. Electrical Division Contractor to provide 20% spare lamps to the Owner for replacement purposes.

2.3. Temporary Sanitary Facilities:

2.3.1. Provide sanitary facilities for persons on the Work site. Facilities in areas of the building are only to be used under extraordinary circumstances and with prior approval.

2.4. Maintain fire protection as required by jurisdictional authorities. The Contractor is responsible for de-activating and re-activating Fire Alarm zones as required by the Work of the Contract and to maintain protection in the existing building.

3. Construction Aids

3.1. Hoists & Cranes:

3.1.1. Select, operate and maintain hoisting equipment and cranes as may be required. Operate such equipment only by qualified hoist or crane operators. Make hoist available for Work of each Section.

3.2. Building Enclosure:

3.2.1. Include in Work temporary enclosure for building as required to protect it, in its entirety or in its parts, against the elements, to maintain environmental conditions required for Work. Design enclosures to withstand wind pressures required for the building by jurisdictional authorities. Erect enclosures to allow complete accessibility for installation of materials during the time enclosures remain in place.

3.3. Scaffolding:

3.3.1. Each user of scaffolding shall be responsible for its examination and testing for sufficiency before using it. He shall make it secure if necessary, or shall notify the Contractor in writing that he will not commence work until it is made secure; otherwise he will be held responsible for accidents due to its insufficiency.

4. Barriers

4.1. Install barricades for traffic control, and to prevent damaging traffic over exterior and interior finished areas, as well as safety barricades and otherwise, as may be required.

4.2. Construct hoardings and walkways as required by HRCE or jurisdictional authorities.

5. Protection

5.1. Protect roofs and podiums by substantial temporary construction to ensure that no damage occurs. Provide protection by materials of sufficient thickness to prevent all damage to structure and finish, and to waterproofing qualities of membranes, whenever each of these individual components are exposed. Damage shall include harm resulting from all construction work, such as falling objects, wheel and foot traffic, failure to remove debris, operation of machinery and equipment, and scaffolding and hoisting operations. Positively secure protection to prevent displacement from any cause.

5.2. Box with wood or otherwise protect from damage, by continuing construction, finished sills, jambs, corners, and the like.

END OF SECTION 01 52 00

SECTION 01 61 00 - MATERIAL & EQUIPMENT

1. General

1.1. Products refer to materials, manufactured components and assemblies, fixtures and equipment incorporated in the Work.

1.2. Use only products of Canadian manufacture unless such products are not manufactured in Canada, are specified otherwise, or are not competitive.

1.3. Products for use in the Project and on which the Tender was based shall be in production at that time, with a precise model and shop drawings available for viewing.

1.4. Where equivalent products are specified, or where alternatives are proposed under "substitution of products", these products claimed by the Contractor as equivalent shall be comparable in construction, type, function, quality, performance, and, where applicable, in appearance, as approved. Where specified equivalents are used in the tendered bulk sum price for the Work, they shall be subject to final approval.

1.5. Incorporate products in the Work in strict accordance with manufacturers' directions unless specified otherwise.

1.6. Products delivered to the Project site for incorporation in the Work shall be considered the property of the Owner. Maintain protection and security of products stored on the site after payment has been made for them.

1.7. Do not install permanently incorporated labels, trademarks and nameplates, in visible locations unless required for operating instructions or by jurisdictional authorities.

2. Specified Products

2.1. Products specified by manufacturer's name, brand name or catalogue reference shall be the basis of the bid and shall be supplied for the Work without exception in any detail, subject to allowable substitutions as specified.

2.2. Where several proprietary products are specified, any one of the several will be acceptable.

2.3. For products specified by reference standards, the onus shall be on the supplier to establish that such products meet reference standard requirements. The Architect may require affidavits from the supplier, as specified in Section 01 33 00, or inspection and testing at the expense of the supplier, or both, to prove compliance. Products exceeding minimum requirements established by reference standards will be accepted for the Work if such products are compatible with and harmless to Work with which they are incorporated.

3. Substitution Of Products During Progress Of Work

3.1. Products substituted for those specified or approved, or both, shall be permitted only if the listed product cannot be delivered to maintain construction schedule and if the delay is caused by conditions beyond the Contractor's control.

3.2. Obtain approval for substitutions. Application for approval of substitutions shall be made only by Contractor. Process proposals for substituted Work in accordance with procedures established for changes in the Work.

3.3. Submit, with request for substitution, documentary evidence that substituted products are equal to, or superior to, approved products, and a comparison of price and delivery factors for both specified or approved products, and proposed substitute.

3.4. Ensure that substituted products can be both physically and dimensionally incorporated in the Work with no loss of intended function, performance, space or construction time, and that spare parts and service are readily available. The Contractor shall be responsible for additional installation costs, including architectural and engineering fees, required by incorporation of substituted products, and for adaptations made otherwise necessary to ensure that above requirements are satisfied.

4. Product Handling

4.1. Manufacture, pack, ship, deliver and store products so that no damage occurs to structural qualities and finish appearance, nor in any other way detrimental to their function or appearance, or both.

4.2. Ensure that products, while transported, stored or installed, are not exposed to an environment which would increase their moisture content beyond the maximum specified.

4.3. Schedule early delivery of products to enable Work to be executed without delay. Before delivery, arrange for receiving at site.

4.4. Deliver package products, and store until use, in original unopened wrapping or containers, with manufacturer's seals and labels intact.

4.5. Label packaged products to describe contents, quantity and other information as specified.

4.6. Product handling requirements may be repeated and additional requirements specified, in other Sections.

5. Storage & Protection

5.1. Coordinate material delivery to ensure that areas within or on building are available to receive them.

5.2. Store manufactured products in accordance with manufacturer's instructions, when such instructions are attached to products or submitted by him.

5.3. Store finished products and woodwork under cover at all times.

5.4. Store and handle flammable liquids and other hazardous materials in approved safety containers and as otherwise prescribed by safety authorities. Store no flammable liquids or other hazardous materials in bulk within the Project.

5.5. Storage and special protection requirements may be repeated, and additional requirements specified, in other Sections.

6. Defective Products & Work

6.1. Products and Work found defective; not in accordance with the Specifications; or defaced or injured through negligence of the Contractor, his employees or subcontractors, or by fire, weather or any other cause will be rejected for incorporation in the Work.

6.2. Remove rejected products and Work from the premises immediately.

6.3. Replace rejected products and Work with no delay after rejection. Provide replacement products and execute replacement Work precisely as required by the Specification for the defective Work replaced. Previous inspection and payment shall not relieve the Contractor from the obligation of providing sound and satisfactory Work in compliance with this Project Manual.

7. Workers, Suppliers & Subcontractors

7.1. Assign Work only to workers, suppliers, and Subcontractors who have complete knowledge, not only of the conditions of this Project Manual, but of jurisdictional requirements, and reference standards and specifications.

7.2. Give preference to use of local workers, suppliers, and Subcontractors wherever possible.

8. Workmanship

8.1. Unless otherwise specified in a more detailed manner, workmanship shall be of the highest quality recognized by trade executing the Work in accordance with standard practices, by the best methods recommended by the manufacturer of the Product, and as approved by the Architect.

END OF SECTION 01 61 00

SECTION 01 77 00 – CONTRACT CLOSEOUT

1. Section Includes

1.1. Final cleaning.

1.2. Spare parts and maintenance materials.

1.3. Take over procedures.

2. Related Sections

2.1. Individual Specifications Sections: Specific requirements for operation and maintenance data.

3. Final Cleaning

3.1. Refer to the General Conditions of Contract.

3.2. Before final inspection, replace glass and mirrors broken, damaged and etched during construction, or which are otherwise defective.

3.3. In addition to requirements for cleaning-up specified in General Conditions of the Contract, include in Work final cleaning by skilled cleaning specialists on completion of construction.

3.4. Remove temporary protections and make good defects before commencement of final cleaning.

3.5. Remove waste products and debris other than that caused by the Owner, other contractors or their employees, and leave the Work clean and suitable for occupancy by Owner.

3.6. Remove surplus products, tools, construction machinery and equipment. Remove waste products and debris other than that caused by the Owner or other Contractors.

3.7. Clean and polish glass, mirrors, hardware, wall tile, stainless steel, chrome, porcelain enamel, baked enamel, plastic laminate, mechanical and electrical fixtures. Replace broken, scratched or disfigured glass.

3.8. Remove stains, spots, marks and dirt from decorative work, electrical and mechanical fixtures, furniture fitments, walls, and floors and ceilings.

3.9. Vacuum clean and dust building interiors, behind grilles, louvres and screens as affected by Work.

3.10. Wax, seal, shampoo, buff or prepare floor finishes, as recommended by the manufacturer. Use products compatible with products used by building maintenance staff.

3.11. Broom clean and wash all horizontal and vertical surfaces as affected by Work.

3.12. Clean up and make good exterior grades, lawns, planting and surfaces after removal of temporary access and facilities.

3.13. Removing of visible labels left on materials, components, and equipment.

3.14. Maintain cleaning until Owner has taken possession of building or portions thereof.

4. Spare Parts And Maintenance Materials

4.1. Spare parts and maintenance materials provided shall be new, not damaged or defective, and of the same quality and manufacture as Products provided in the Work. If requested, furnish evidence as to type, source and quality of Products provided.

4.2. Defective Products will be rejected, regardless of previous inspections. Replace products at own expense.

4.3. Store spare parts and maintenance materials in a manner to prevent damage, or deterioration.

4.4. Provide spare parts, special tools, maintenance and extra materials in quantities specified in individual specification Sections.

4.5. Provide items of same manufacture and quality as items in the Work.

5. Demonstration Of Systems & Equipment

5.1. Give a complete demonstration of all systems and equipment in the presence of the Consultant at the following times:

5.2. When each is 100% completed at the request of the Contractor.

5.3. At time of inspection to validate final completion.

5.4. At final completion for the benefit of the maintenance staff for the Project.

5.5. Responsible personnel representing the Subcontractor responsible for the Work being demonstrated shall be present at each demonstration.

6. Submittals

6.1. Submit with application for substantial performance certificate.

6.1.1. Certificate of substantial completion inspection report from electrical utility or inspection.

6.1.2. Certificate of verification of fire alarm system.

6.1.3. Certificate from the Fire Marshal's Office and I.A.O. of final inspection of sprinkler system.

6.1.4. Air balance reports.

6.1.5. Other reports required or specified.

6.1.6. Maintenance Manuals and Operating Instructions.

6.2. Submit with application for release of final payment:

6.2.1. Final project record drawings.

6.2.2. Extra stock.

6.2.3. Performance bonds which shall remain in effect for one (1) year after take-over date.

6.2.4. Completed Liability Insurance Policy extended for one (1) year from take-over date.

6.2.5. Written guarantee covering all workmanship and materials used in the Work.
6.2.6. Maintenance bonds as specified.
6.2.7. Extended Warranties as specified
6.2.8. Certificate from Workers' Compensation Board.
6.2.9. Certificate from Health Services Tax Division.

7. Final Inspection Procedures

7.1. Schedule, make arrangements for and administer final inspections and close out in the following stages.

7.2. Contractor's Inspection:

7.2.1. Determination that Project meets requirements for substantial performance and inspection is the responsibility of the Contractor.

7.2.2. The Contractor and all Subcontractors shall conduct an inspection of the work, identify deficiencies and defects; repair as required. Notify the Consultant in writing of satisfactory completion of the contractor's Inspection and that corrections have been made. Request a Consultant's Substantial Performance Inspection.

7.3. Consultant's Inspection: Consultants and the Contractor will perform an inspection of the Work to identify obvious defects or deficiencies. The contractor shall correct Work accordingly.

7.4. Substantial Performance Inspection:

7.4.1. When the items noted above are complete, request a substantial performance inspection of the Work by the Consultant, and the Contractor. If Work is deemed incomplete by the Consultant, complete the outstanding items and request a re-inspection.

7.4.2. Substantial performance inspections shall be scheduled to begin within eight working days of the Contractor's request.

7.4.3. Present at the substantial performance inspection will be:

7.4.3.1. The Consultant and his Sub-consultants that he requires and notifies.
7.4.3.2. The Owner's representatives, upon notification by the Consultant.
7.4.3.3. The Contractor and such Subcontractors that he considers are required.
7.4.3.4. The Contractor will compile a substantial performance deficiency list at this inspection and issue it to the Consultant and Owner.
7.4.3.5. The Contractor shall correct substantial performance deficiencies before a date agreed upon by the Contractor and Consultant.
7.4.3.6. Upon the Consultant's approval of substantial performance, the Contractor shall submit an application for a substantial performance certificate.
7.4.3.7. When the Contractor has satisfied himself that these corrections have been completed in a satisfactory manner by his inspection he shall schedule a

final Contractor's inspection by the Consultant, and the Owner's representatives if required, within five working days of the Contractor's request.

7.4.3.8. Upon the Consultant's approval of completion, the Contractor shall submit an application for a completion certificate.

8. Substantial Performance

8.1. The Consultant will issue a Certificate of Substantial Performance when satisfied outstanding deficiencies noted during inspections prior to the substantial completion inspection have been corrected, the Work is substantially complete and is so certified by the Owner.

8.2. A list of remaining deficiencies to be rectified before final acceptance will be attached to the Certificate of Substantial Performance.

8.3. Make submissions specified in Subparagraph 1.06 of this Section.

9. Certificate For Release Of Amount Due At Substantial performance

9.1. The Consultant will issue to the Owner a certificate for release of money in an amount equal to the amount due the Contractor under the Agreement providing he is satisfied the Work has been substantially completed.

9.2. The certificate shall indicate the date of substantial performance.

9.3. Payment shall be due upon date of substantial performance.

10. Completion Certificate

10.1. The Consultant will issue a Certificate of Completion (DSS Document DC670-92) when he is satisfied that outstanding deficiencies noted during inspections have been corrected and the Work is completed and is so certified by the Owner.

10.2. The date of the completion certificate will commence the required sixty (60) day period before release of final payment.

11. Certificate For Release Of Final Payment

11.1. The Consultant will issue to the Owner a certificate for release of final payment sixty (60) days after date of completion certificate providing he is satisfied the Work has been completed.

11.2. The certificate will be in an amount equal to the remaining money due the Contractor under the Contract, and shall indicate the date of final completion.

11.3. Payment shall be due upon date of final completion.

12. Warranties

12.1. Establishment of Warranties:

12.1.1. Warranties shall commence on date of substantial performance certificate.

12.2. Warranty Period:

12.2.1. The Owner will advise the Consultant of defects observed during warranty periods.

12.2.2. The Consultant will notify the Contractor of defects observed during warranty period and request him to remedy the defects in accordance with the Contractor documents.

12.2.3. Thirty (30) days before expiration of warranties the Owner's representatives, the Consultant and the Contractor will inspect the Work as arranged by the Contractor noting defects of products and workmanship.

12.2.4. The Contractor shall immediately remedy such noted defects.

END OF SECTION 01 77 00

CONTRACTOR'S CHECKLIST

Enclose the following documents with your bid:

□ ***Bid Security as required in section 21.1 (Information for Tenderers)*** **-** in the amount of 10% of the Contract Price (before HST).

□ ***Contract Security for bids over $100,000 as required in section 22.6.1.1 (Information for Tenderers)*** – required upon award.

□ ***Certificate of Insurance*** indicating a minimum of **$5,000,000** ***Commercial General Liability Insurance*** per occurrence and ***Commercial Auto Liability Insurance*** covering all owned, non-owned and hired vehicles for a minimum combined single limit of **$2,000,000** per occurrence and ***Builder's Risk Insurance*** in the amount of the contract price. ***Please comply with the insurance requirements as indicated in the sample insurance form (attached)***

□ ***Tentative Work Schedule (Timelines)*** – Subsequently, within five (5) business days of tender award the successful tenderer shall provide a schedule clearly indicating timelines for completion of all aspects of the project.

□ ***Workers' Compensation Board Letter*** of Good Standing

□ ***Certificates of good standing with CRCA*** **(**Canadian Roofing Contractors Association**)** ***and RCANS*** **(**Roofing Contractors Association of Nova Scotia**).**

□ ***Certificate of Recognition from one of the seven safety audit companies that jointly sign with the WCB***:

- East Coast Mobile Medical Inc.
- HSE Integrated
- Nova Scotia Construction Safety Association
- Nova Scotia Trucking Safety Association
- Occupational Health & Educational Services (2002) Inc.
- Safety Services Nova Scotia
- Stantec Inc.

This list can be found on WCB's website: www.wcb.ns.ca.

□ ***Completed HRCE Safety Plan***

□ ***Applicable Warranty Information***

CSIO

CERTIFICATE OF LIABILITY INSURANCE

This certificate is issued as a matter of information only and confers no rights upon the certificate holder and imposes no liability on the insurer. This certificate does not amend, extend or alter the coverage afforded by the policies below.

1. CERTIFICATE HOLDER - NAME AND MAILING ADDRESS		2. INSURED'S FULL NAME AND MAILING ADDRESS	
Halifax Regional Centre for Education		Contractors Name and Address	
33 Spectacle Lake Drive			
Dartmouth, NS	POSTAL CODE B3B 1X7		POSTAL CODE

3. DESCRIPTION OF OPERATIONS/LOCATIONS/AUTOMOBILES/SPECIAL ITEMS TO WHICH THIS CERTIFICATE APPLIES (but only with respect to the operations of the Named Insured)

Insured project details and address: (List specific Project details)

Policy Includes: Contractual Liability, Primary and Non-Contributory, Waiver of Subrogation, Broad Form Property Damage

4. COVERAGES

This is to certify that the policies of insurance listed below have been issued to the insured named above for the policy period indicated notwithstanding any requirements, terms or conditions of any contract or other document with respect to which this certificate may be issued or may pertain. The insurance afforded by the policies described herein is subject to all terms, exclusions and conditions of such policies.

LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS

TYPE OF INSURANCE	INSURANCE COMPANY AND POLICY NUMBER	EFFECTIVE DATE YYYY/MM/DD	EXPIRY DATE YYYY/MM/DD	LIMITS OF LIABILITY (Canadian dollars unless indicated otherwise)		
				COVERAGE	DED.	AMOUNT OF INSURANCE
COMMERCIAL GENERAL LIABILITY ☐ CLAIMS MADE OR ☑ OCCURRENCE ☑ PRODUCTS AND / OR COMPLETED OPERATIONS ☑ EMPLOYER'S LIABILITY ☑ CROSS LIABILITY ☑ TENANTS LEGAL LIABILITY ☑ POLLUTION LIABILITY EXTENSION	XX Insuance 123Binder (Wrap - Up Liability)	2017/11/20	2018/11/20	COMMERCIAL GENERAL LIABILITY BODILY INJURY AND PROPERTY DAMAGE LIABILITY - GENERAL AGGREGATE		$5,000,000
				- EACH OCCURRENCE		$5,000,000
				PRODUCTS AND COMPLETED OPERATIONS AGGREGATE		$5,000,000
				☐ PERSONAL INJURY LIABILITY OR ☑ PERSONAL AND ADVERTISING INJURY LIABILITY		$1,000,000
				MEDICAL PAYMENTS		$25,000
				TENANTS LEGAL LIABILITY		$1,000,000
				POLLUTION LIABILITY EXTENSION		$2,000,000
☑ NON-OWNED AUTOMOBILES ☐ HIRED AUTOMOBILES	XX Insurance 123 Binder	2017/11/20	2018/11/20	NON OWNED AUTOMOBILE		$2,000,000
AUTOMOBILE LIABILITY ☑ DESCRIBED AUTOMOBILES ☐ ALL OWNED AUTOMOBILES ☐ LEASED AUTOMOBILES ** ** ALL AUTOMOBILES LEASED IN EXCESS OF 30 DAYS WHERE THE INSURED IS REQUIRED TO PROVIDE INSURANCE	XX Insurance 123 Binder	2017/11/20	2018/11/20	BODILY INJURY AND PROPERTY DAMAGE COMBINED		$2,000,000
				BODILY INJURY (PER PERSON)		
				BODILY INJURY (PER ACCIDENT)		
				PROPERTY DAMAGE		
EXCESS LIABILITY ☐ UMBRELLA FORM ☐				EACH OCCURRENCE		
				AGGREGATE		
OTHER LIABILITY (SPECIFY) ☑ Builders Risk - All Risk	XX Insurance 123 Binder	2017/11/20	2018/11/20	Limit - (Project Limit)		
☐				Extra Expense		$1,000,000
☑ Professional Liability	XX Insurance 123 Binder	2017/11/20	2018/11/20	Limit of Liability - Per Claim		$5,000,000

5. CANCELLATION

Should any of the above described policies be cancelled before the expiration date thereof, the issuing company will endeavor to mail 30 days written notice to the certificate holder named above, but failure to mail such notice shall impose no obligation or liability of any kind upon the company, its agents or representatives.

6. BROKERAGE/AGENCY FULL NAME AND MAILING ADDRESS		7. ADDITIONAL INSURED NAME AND MAILING ADDRESS (but only with respect to the operations of the Named Insured)	
		Halifax Regional Centre for Education	
		33 Spectacle Lake Drive	
	POSTAL CODE		
BROKER CLIENT ID:		Dartmouth, NS	POSTAL CODE B3B 1X7

8. CERTIFICATE AUTHORIZATION

ISSUER	CONTACT NUMBER(S)			
	TYPE	NO.	TYPE	NO.
AUTHORIZED REPRESENTATIVE	TYPE	NO.	TYPE	NO.
SIGNATURE OF AUTHORIZED REPRESENTATIVE	DATE 2017/11/20		EMAIL ADDRESS	

HALIFAX REGIONAL CENTRE FOR EDUCATION

Project Safety Plan Outline

During the planning of each project, environmental and occupational health and safety issues will be assessed like any other key project component.

Prior to beginning a new project, tendering contractors shall examine the work area to identify potentially hazardous site specific situations.

Once identified, these hazards should be prioritized on this Hazard Assessments/Project Safety Plan Outline and corrective *actions* noted to eliminate or control each hazard. The dates of when and names of the persons who are responsible for completing the *action* should also be assigned.

Copies of the completed Safety Plan Outline shall be submitted as part of the tender document submittal, sent to the HRCE Operations Services Regional Manager, made available on the job site and communicated to the workers.

Project Name: _____

Project Location: _____

Project Start date: _____

Project End date: _____

Company Name: _____

Completed by: _____
(Contractor's project manager)

Date: _____

Copy to: _____

PLANNING:

Does the Contractor's Occupational Health and Safety Program deal with the work activities associated with this project? ☐ Yes ☐ No

Describe tasks to be undertaken:_____

_____

_____

_____

HAZARDS ASSESSMENT:

Identify the hazards that could present themselves on this project (e.g. live electrical wires, over water, confined space, etc) and describe what steps will be taken to prevent an incident (e.g. cover up, de-energize, safe work practices, netting, etc). Prioritize from #1 as needing immediate action.

#	Hazard	Required Action	Completed by	Date
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

ENVIRONMENTAL ASSESSMENT:

Identify the environmental issues that could present themselves on this project (e.g. oil spills, asbestos, etc.) and describe the action that will betaken to eliminate or reduce the risk of occurrence (e.g. mop kits, air sampling, etc.)

#	Hazard	Required Action	Completed by	Date
1				
2				
3				
4				
5				

EMERGENCY RESPONSE:

In the event of an incident, pre-plan the response and write up the procedures. Minimally, the following list should be completed and posted on site:

Contact	Phone #	Contact	Phone #
Fire	911	Poison Control	428-8161
Ambulance	911	Dangerous Goods	1-800-565-1633
Doctor	911	Waste Disposal	
Police	911	Insurance	
HRCE Office	493-5110	Min/Dept of Labour	1-800-952-2687
Min./Dept.of Transport.		Min/Dept of Environment	1-800-565-1633

- Identify and arrange source of first aid, ambulance and rescue.
- Accidents will be reported to: _____
- Accidents will be investigated by: _____
- Back-up call to: _____
- HRCE # emergency/after hours: day 493-5110 after 4:00 pm 442-2476

SAFETY MEETINGS:

On this project, given the nature of the work and the anticipated size of the work force, the following frequency will apply:

Site meetings _____

Site Audits _____

Follow up with HRCE Manager: _____

SITE IMPLEMENTATION:

- Health and Safety Rep & Safety Committee:
  Establish liaison between HRCE, contractor, site administration
  First Aid, PPE, other safety items as required.

- Documentation:
  Applicable MSDS
  Safety program
  Applicable work procedures
  Permits
  First Aid Certification

TRAINING:

The following training/testing will be mandatory on site:

1) _____

_____

2) _____

_____

3) _____

_____

TENTATIVE SCHEDULE OF WORK:

1) Date Project Will Commence: _____

2) Number of Weeks to Complete Project: _____ weeks

NOTE:

Within one week of tender award the successful bidder shall provide a schedule clearly indicating timelines for completion of all aspects of the project.

1 General

1.1 RELATED REQUIREMENTS

.1 All relevant Division 1 Sections

1.2 REFERENCES

.1 ASTM International
- .1 ASTM A53/A53M-10, Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.

.2 CSA International
- .1 CSA G40.20/G40.21-04(R2009), General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA W48-06, Filler Metals and Allied Materials for Metal Arc Welding (Developed in co-operation with the Canadian Welding Bureau).
- .3 CSA W59-M03(R2008), Welded Steel Construction (Metal Arc Welding) Metric.

.3 Canadian Institute of Steel Construction (CISC)/Canadian Paint Manufacturer's Association (CPMA).
- .1 CISC/CPMA 1-73b, Quick-Drying, One-Coat Paint for Use on Structural Steel.
- .2 CISC/CPMA 2-75, Quick-Drying, Primer for Use on Structural Steel.

.4 Environmental Choice Program
- .1 CCD-047-98(R2005), Architectural Surface Coatings.
- .2 CCD-048-98(R2006), Surface Coatings - Recycled Water-borne.

.5 Green Seal Environmental Standards (GS)
- .1 GS-11-2008, 2nd Edition, Paints and Coatings.

.6 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.7 The Master Painters Institute (MPI)
- .1 Architectural Painting Specification Manual - current edition.

.8 The Society for Protective Coatings (SSPC)
- .1 SSPC SP-7, Brush-off Blast Cleaning.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

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

.2 Product Data:
- .1 Submit manufacturer's instructions, printed product literature and data sheets and include product characteristics, performance criteria, physical size, finish and limitations.
- .2 Submit two copies of WHMIS MSDS in accordance with Section 01 35 29 – Occupational Health and Safety Requirements.
  - .1 For finishes, coatings, primers, and paints applied on site: indicate VOC concentration in g/L.

.3 Shop Drawings:
.1 Indicate materials, core thicknesses, finishes, connections, joints, method of anchorage, number of anchors, supports, reinforcement, details, and accessories.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Materials & Equipment.

.2 Storage and Handling Requirements:
.1 Store materials off ground in dry location and in accordance with manufacturer's recommendations in clean, dry, well-ventilated area.
.2 Replace defective or damaged materials with new.

2 Products

2.1 MATERIALS

.1 Steel angle and channel sections to CSA G40.20/G40.21, Grade 300W.

.2 Steel plates: to CSA G40.20/G40.21, Grade 350W.

.3 Welding materials: to CSA W59.

.4 Welding electrodes: to CSA W48 Series.

.5 Bolts and anchor bolts: to ASTM A307 and A325.

.6 Stainless Steel – Type 304 Brushed finish, 16 ga.

2.2 FABRICATION

.1 Fabricate work square, true, straight and accurate to required size, with joints closely fitted and properly secured.

.2 Where possible, fit and shop assemble work, ready for erection.

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

.4 Do not paint when temperature is lower than 7 degrees C.

2.3 FINISHES

.1 Shop coat primer:
.1 Prime paint or shop coat all steel work.
.2 To CISC/CPMA 2-75.
.3 Clean all members of loose mill scale, rust, oil, dirt and other foreign matter. Prepare to SSPC-SP7, Brush-Off Blast Cleaning.
.4 Apply one coat of primer in shop to all steel surfaces. Acceptable material to meet 2-75.

.2 Field touch-up primer: water borne metal primer, compatible with shop primer as specified above.

2.4 SCHEDULE OF ITEMS - Miscellaneous metal items includes, but is not limited to, the following:

.1 Steel support brackets, channels and angles as indicated.

.2 Lintels and structural angles as indicated.

.3 Steel components for roof opening and support.

.4 Stainless Steel Corner guards. 16ga. Sizes indicated on drawings. Brushed finish type 304. 90 degree rounded corner.

3 Execution

3.1 EXAMINATION

.1 Verification of Conditions: verify conditions of substrates previously installed under other Sections or Contracts are acceptable for metal fabrications installation in accordance with manufacturer's written instructions.
- .1 Visually inspect substrate in presence of Consultant.
- .2 Inform Consultant 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 Consultant.

3.2 ERECTION

.1 Do welding work in accordance with CSA W59 unless specified otherwise.

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

.3 Provide suitable means of anchorage acceptable to Consultant such as dowels, anchor clips, bar anchors, expansion bolts and shields, and toggles.

.4 Exposed fastening devices to match finish and be compatible with material through which they pass.

.5 Supply components for work by other trades in accordance with shop drawings and schedule.

3.3 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01.
- .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 Division 01.

END OF SECTION

1 General

1.1 SECTION INCLUDES

.1 Fiberglass reinforced plastic (FRP), general-purpose, interior wall panels.

1.2 RELATED SECTIONS

.1 All Relevant Division 1 Sections.

1.3 REFERENCES

.1 ASTM C 367 - Standard Test Methods for Strength Properties of Prefabricated Architectural Acoustical Tile or Lay-In Ceiling Panels.

.2 ASTM D 256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.

.3 ASTM D 570 - Standard Test Method for Water Absorption of Plastics.

.4 ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.

.5 ASTM D 696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 Degrees C and 30 Degrees C With a Vitreous Silica Dilatometer.

.6 ASTM D 790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.

.7 ASTM D 792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.

.8 ASTM D 1929 - Standard Test Method for Determining Ignition Temperature of Plastics.

.9 ASTM D 2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.

.10 ASTM D 3841 - Standard Specification for Glass-Fiber-Reinforced Polyester Plastic Panels.

.11 ASTM E 84/ ULC-S102 - Surface Burning Characteristics of Building Materials.

.12 ICC Evaluation Service ES Report ESR-2364.

1.4 SUBMITTALS

.1 Comply with Section 01 33 00 - Submittal Procedures.

.2 Product Data: Submit manufacturer's product data, including installation instructions.

.3 Samples: Submit manufacturer's samples.
- .1 Color Samples: Standard and special colors.
- .2 Liner Panels: Minimum 4 inches by 4 inches.
- .3 Moldings: Each type specified.
- .4 Fasteners: Each type specified.

.4 Manufacturer's Certification:
.1 Submit manufacturer's certification that materials comply with specified requirements and are suitable for intended application.

.5 Submit drawings indicating location, dimensions and details as part of all submitted.

1.5 QUALITY ASSURANCE

.1 Manufacturer’s Qualifications:
.1 Panels and moldings originate from the same manufacturer

1.6 DELIVERY, STORAGE, AND HANDLING

.1 Storage:
.1 Store liner panels in clean, cool, dry, well-ventilated area indoors in accordance with manufacturer's instructions.
.2 Store liner panels flat.
.3 Stack panels on skids a maximum of 5 skids high.
.4 Do not allow moisture to collect on or in-between panels.

.2 Handling: Protect materials and finish from damage during handling and installation in accordance with manufacturer's instructions.

1.7 WARRANTY

.1 Liner Panel Warranty Period: Ten years from date of Final Completion.

2 Products

2.1 MANUFACTURER

.1 Graham/Stabilit Canada, Inc.

.2 Marlite

2.2 FRP WALL LINER PANELS

.1 Liner Panels: FRP wall liner panels.
.1 Conformance: ASTM D 3841.
.2 Approval:
.1 ICC ES Report ESR-2364.
.2 ASTM E 84 &/or ULC-S102 tested.
.3 Wall Liner Panel Type: General-purpose, Class C panels.
.4 Nominal Thickness:
.1 Wall Liner Panels: 0.090 inch.
.5 Dimensions:
.1 Wall Liner Panels: 1220mm wide x height required.
.6 Finish: Traditional pebbled, textured one side (TOS).
.7 Color:
.1 Wall Liner Panels: Bright White

.2 Physical Properties, Series 1200, Stabilit Glasliner (or equivalent) FRP Class C General-Purpose Wall Liner Panels:
.1 Flexural Strength, ASTM D 790: 17,000 psi.
.2 Flexural Modulus, ASTM D 790: 6.0 x 105 psi.

.3 Tensile Strength, ASTM D 638: 8,000 psi.
.4 Tensile Modulus, ASTM D 638: 9.43 x 105 psi.
.5 Elongation, ASTM D 638: 1.20 percent.
.6 Water Absorption, ASTM D 570, 21 Degrees C at 72 Hours: 0.17 percent.
.7 Izod Impact Strength, ASTM D 256: 7.0 foot-pounds/inch.
.8 Coefficient of Linear Thermal Expansion, ASTM D 696: 2.22 x 10-5 inches/inch/degree F.
.9 Barcol Hardness, ASTM D 2583: 30 average.
.10 Specific Gravity, ASTM D 792: 1.6138.
.11 Abrasion Resistance, Tabor Weight Loss: 0.293 percent weight loss.
.12 Flash Ignition Temperature, ASTM D 1929: 430 degrees C.
.13 Self Ignition Temperature, ASTM D 1929: 450 degrees C.
.14 Surface Burning Characteristics, ASTM E 84 or CAN4ULC-S102-M88:
.1 Flame Spread Index: 150.
.2 Smoke Developed Index: Less than 450.

2.3 ACCESSORIES

.1 Moldings: PVC, same manufacturer and color as liner panels.
1. Dividers.
2. Outside corners.
3. Inside corners.
4. End caps.
5. Angles
6. Division Trim Pieces

.2 Manufacturer’s Silicone Sealant.

.3 Adhesive: Water-based or solvent-based adhesive, compatible with FRP liner panels.

3 Execution

3.1 EXAMINATION

.1 Examine areas to receive liner panels. Notify Technical Authority of conditions that would adversely affect installation or subsequent use. Do not proceed with installation until unsatisfactory conditions are corrected.

3.2 PREPARATION

.1 Ensure solid wall surfaces to receive liner panels are plumb, clean, flat, smooth, and dry.

.2 Precondition liner panels before installation in accordance with manufacturer's instructions.

3.3 INSTALLATION

.1 Install liner panels in accordance with manufacturer's instructions.

.2 Install liner panels over plumb, clean, flat, smooth, dry, solid wall surfaces.

.3 Install liner panels plumb, level, square, and in proper alignment.

.4 Lay out liner panels to minimize joints. Use full panels where possible.

.5 Cut liner panels in accordance with manufacturer's instructions for proper installation.

.6 Expansion and Contraction:
- .1 Install liner panels with gap at ceiling, floor, and between panels in accordance with manufacturer's instructions to allow for expansion and contraction of panels due to changes in temperature.
- .2 Allow for expansion and contraction of liner panels when pre-drilling holes for fasteners and when installing around penetrations, including pipes, conduits, and electrical outlets.

.7 Moldings and Sealants:
- .1 Install moldings and silicone sealant with liner panels in accordance with manufacturer's instructions to achieve moisture-resistant installation.
- .2 Remove excess silicone sealant during installation or trim after silicone has cured.

.8 Adhesive: Apply adhesive in accordance with manufacturer's instructions along with fasteners when installing liner panels. Install with manufacturer’s FRP adhesive. Apply adhesive to panel using 100% coverage with a notched trowel.

.9 Neatly cut liner panel for penetrations. Ensure cover plates and escutcheon plates conceal cut edges of liner panel.

3.4 CLEANING

.1 Clean liner panels promptly after installation in accordance with manufacturer's instructions.

.2 Do not use harsh or abrasive cleaning materials or methods that would damage liner panels or finish.

3.5 PROTECTION

.1 Protect installed liner panels and finish from damage during construction.

END OF SECTION

1 GENERAL

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 09 21 16 - Gypsum Board Assemblies.

.3 Section 09 22 16 - Non-Structural Metal Framing.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C423-09a Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
- .2 ASTM C665-01e1, Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- .3 ASTM C1320-05, Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
- .4 ASTM E136 Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees F (unfaced).
- .5 ASTM C553 Mineral Fiber Blanket Thermal Insulation, Type III- Type 701,711
- .6 ASTM C612, Mineral Block & Board Thermal Insulation, Types IA, IB-Types 702,703,704,705,707
- .7 CAN/CGSB-51.10-Type I , Class I- Types 703,704

.2 Underwriters Laboratories of Canada (ULC)
- .1 CAN/ULC-S702-1997, Standard for Mineral Fibre Insulation.
- .2 CAN/ULC-S102-M

1.3 SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.

.2 Manufacturer's Instructions:
- .1 Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

.3 Health and Safety Requirements: do construction occupational health and safety in accordance with Section 01 35 29 – Occupational Health and Safety Requirements.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Division 01.

.2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.

2 PRODUCTS

2.1 ACOUSTIC BLANKET INSULATION

.1 Blanket Glass Fibre: to CAN/ULC S102:
- .1 Type I: unfaced glass fiber insulation complying with ASTM C 665 and ASTM E136.
- .2 Surface burning characteristics:
  - .1 Unfaced insulation.
  - .2 Maximum flame spread: 10
  - .3 Maximum smoke developed: 10.
- .3 Combustion characteristics: unfaced insulation to pass ASTM E136 test.
- .4 Dimensional stability: linear stability less than 0.1%. 3 EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSTALLATION: BATT INSULATION

.1 Install insulation in gypsum board partitions and in locations indicated, to meet acoustic requirements of building elements and spaces.

.2 Fit insulation firmly between studs and closely around electrical boxes, pipes, ducts, frames and other objects in or passing through insulation.

.3 Do not compress insulation to fit into spaces.

.4 Keep insulation minimum 75 mm (3") from heat emitting devices such as recessed light fixtures.

.5 Do not enclose insulation until it has been inspected and approved by HRM Project Manager.

3.3 INSTALLATION: ACOUSTIC BLANKET INSULATION

.1 Coordinate installation with other trades including painting, mechanical and electrical.

.2 Fit blankets over conduit, cutting around hangers, junction boxes, devices, valves, etc., as required, leaving them exposed for access.

3.5 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

Part 1 General

1.1 RELATED WORK

.1 Section 01 33 00 - Submittal Procedures.

.3 Section 01 35 29 - Occupational Health & Safety (OSHA) Requirements.

.4 Section 01 45 00 - Quality Control.

.5 Section 01 70 00 - Contract Closeout.

.6 Section 01 74 19 - Construction/Demolition Waste Management and Disposal.

.7 Division 22, 23, and 24 for roof mounted mechanical equipment and services.

1.2 REFERENCES

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM D-6878, Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing.
- .2 ASTM C 1396/C 1396M-13, Standard Specification for Gypsum Board.

.2 Underwriters= Laboratories of Canada (ULC)=CAN/ULC-S701-05, Standard for Thermal Insulation, Polystyrene, Boards and Pipe Covering.

.3 Factory Mutual (FM Global)
- .1 FM Approvals Roofing Products.

.4 Canadian Roofing Contractors' Association (CRCA)
- .1 CRCA Roofing Specification Manual.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

1.3 SUBMITTALS

.1 Manufacturer=s Instructions: Provide to indicate special handling criteria, installation sequence, cleaning procedures.

1.4 PRODUCT DATA

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

.2 Submit WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures.

1.5 DELIVERY, STORAGE AND HANDLING

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

.2 Provide and maintain dry, off-ground weatherproof storage.

.3 Store rolls of TPO flat on cross supports.

.4 Remove only in quantities required for same day use.

.5 Store insulation protected from sunlight and weather and deleterious materials.

1.6 PROJECT/SITE ENVIRONMENTAL REQUIREMENTS

.1 Temperature, relative humidity, moisture content.
- .1 Apply TPO membrane only when surfaces and ambient temperatures are within manufacturers' prescribed limits.
- .2 Do not install TPO membrane when temperature remains below 5EC, or when wind chill gives equivalent cooling effect.
- .3 Install TPO membrane on dry substrate, free of snow and ice. Use only dry materials and apply only during weather that will not introduce moisture into system.
- .4 When liquid adhesives and sealants are exposed to lower temperatures restore to a minimum of 15EC.

.2 Safety: Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of asphalt, sealing compounds, primers and caulking materials.

1.7 WARRANTY

.1 Contractor hereby warrants that TPO roofing and membrane flashings as follows:
- .1 1 year CRCA materials and workmanship against defects of materials and workmanship against leaks.

1.8 SOURCE QUALITY CONTROL

.1 Submit laboratory test reports in accordance with Section 01 33 00 - Submittal Procedures and Section 01 45 00 - Quality Control.

1.9 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Division 01.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.

.4 Separate for reuse and recycling all steel, metal and plastic waste in accordance with Waste Management Plan.

.5 Place materials defined as hazardous or toxic in designated containers.

.6 Handle and dispose of hazardous materials in accordance with Regional and Municipal regulations.

.7 Clearly label location of salvaged material's storage areas and provide barriers and security devices.

.8 Ensure emptied containers are sealed and stored safely.

Part 2 Products

2.1 ACCEPTABLE MANUFACTURERS

.1 Carlisle Syntec Systems and Firestone Building Products.

.2 All products are to be from the same manufacturer.

2.2 COMPATIBILITY

.1 Compatibility between components of system and adjacent materials is essential. Provide a written declaration to Consultant stating that materials and components, as assembled in system, meet this requirement.

2.3 DECK SHEATHING

.1 Canadian softwood plywood (CSP): to CSA O151, standard construction exterior grade, CANPLY/COFI certified.
- .1 Urea-formaldehyde free.
- .2 FSC certified.
- .3 13m thickness.
- .4 Wood preservative: not to be used.

.2 For use below wood framing at curbs and condenser piping box.

2.4 DECK PRIMER

.1 As recommended by manufacturer to suit existing vapour barrier, new plywood, and new vapour barrier.

2.5 VAPOUR RETARDER

.1 Self-adhesive vapour barrier membrane comprised of SBS modified bitumen factory laminated to a high density polyethylene top surface, with a release liner protection of the adhesive undersurface.

- .1 Acceptable materials:
  - .1 725TR Air Vapour Barrier, By Carlisle.
  - .2 V-Force, by Firestone.
- .2 For use at existing vapour barrier tie-ins.

2.6 INSULATION

.1 Moulded (expanded) polystyrene (EPS): to CAN/ULC-S701, Type 2, square edges, thicknesses to match existing.
- .1 Acceptable material:
  - .1 Trueroof, by Truefoam.
  - .2 Approved alternate.

2.7 COVER BOARD

.1 Glass Mat Gypsum board sheathing: to ASTM C 1396/C 1396M 12.7 mm thick.
- .1 Acceptable material:
  - .1 Densdeck Prime by Georgia Pacific.
  - .2 Securock Roof Board by CGC Inc.
  - .3 Greenglass Roof Board by Temple-Inland Inc.
  - .4 GlasRoc Roof Board by CertainTeed

2.8 MEMBRANE

.1 Thermoplastic Polyolefin (TPO) sheet membrane, to ASTM D-6878.
- .1 Reinforced at curbs and non-reinforced at receptacle support, 0.060" thick.
  - .1 Acceptable material:
    - .1 Sure-Weld TPO, by Carlisle.
    - .2 UltraPly TPO, by Firestone.
  - .2 Colour: To match existing.

2.9 ADHESIVE AND SOLVENTS

.1 Synthetic rubber, high strength solvent based, quick drying bonding adhesive, as recommended by membrane manufacturer.

2.10 WALKWAYS

.1 TPO walkway with textured top surface and smooth undersurface, 750mm wide, colour to match existing.
- .1 Acceptable material:
  - .1 Sure-Weld TPO Walkway Rolls, by Carlisle.
  - .2 UltraPly TPO Walkway Pad, by Firestone.

2.11 FASTENERS

.1 Plywood to steel deck: #12 roofing screws and plates meeting FM 4470 Standard.

.2 Bolts: 12.5 mm diameter, complete with nuts and washers; for use at bottom plate of wood framed curbs, secured to structural steel deck and framing.

.3 Insulation to substrate: fasteners and plates must meet Factory Mutual 4470 Standard for wind uplift and corrosion resistance as supplied by the membrane manufacturer.

2.12 ACCESSORIES

.1 Membrane cut edge sealant, prefabricated TPO outside corners and t-joint covers, water cut off mastic, primer, splicing cement and other materials as recommended by the manufacturer.

Part 3 Execution

3.1 REMOVALS

.1 Remove existing roofing materials down to existing vapour barrier at new equipment and curb location where indicated. Remove existing vapour barrier and gypsum deck board where indicated to allow for installation of plywood. Dispose materials in accordance with Section 01 74 19.

.2 Remove ceiling finishes as required to install bolt and nut assemblies for curb and receptacle supports. Reinstate finishes to as found condition.

3.2 PROTECTION

.1 Cover walls and adjacent work where materials are hoisted or used.

.2 Use warning signs and barriers. Maintain in good order until completion of work.

.3 Protect from traffic and damage. Comply with precautions deemed necessary by Consultant.

.4 Place plywood runways over work to enable movement of material and other traffic.

.5 At end of each day's work or when stoppage occurs due to inclement weather, provide protection for completed work and materials out of storage.

3.3 SUBSTRATE EXAMINATION

.1 Examine and immediately inform Consultant in writing of defects.

.2 Prior to commencement of work ensure:
- .1 Substrates are firm, straight, smooth, dry, free of snow, ice or frost, and swept clean of dust and debris.
- .2 Curbs have been built.

3.4 DECK SHEATHING

.1 Fasten plywood to existing steel deck’s upper rib at 152mm on center, each way.

3.5 PRIMING DECK

.1 Apply primer on deck sheathing and existing vapour barrier membrane at the rate recommended by manufacturer.

3.6 VAPOUR BARRIER

.1 Install self-adhesive vapour barrier over primed surfaces, in accordance with manufacturer’s instructions. Lap 102mm minimum onto existing vapour barrier. Run membrane up curb 152mm.

3.7 INSULATION AND COVER BOARD

.1 Cut insulation and cover board to suit removed portions. Loose lay insulation and cover board, tightly fit. Mechanically fasten through to steel deck’s upper rib surface. Fasten at 305mm on center, each way. Screw lengths to be such that they penetrate roof deck by a minimum of 25 mm but not extend beyond the level of the bottom flute.

3.8 MEMBRANE APPLICATION

.1 Membrane: Install fully adhered membrane and flashings using bonding adhesive in accordance with manufacturer's written instructions and as indicated. Heat weld all seams and laps.

.2 Flashings.
- .1 Install unreinforced TPO membrane flashings in accordance with manufacturer's written instructions.
- .2 Use pipe clamp and water cut-off mastic at top edge of flashing membrane at receptacle support post.

3.9 WALKWAYS

.1 Install TPO walkway rolls where indicated, heat welded to existing membrane, in accordance with manufacturer's instructions.

3.10 FIELD QUALITY CONTROL

.1 Periodic site review by Consultant.

3.11 CLEANING

.1 Clean to Consultant's approval, soiled surfaces, spatters, and damage caused by work of this Section.

.2 Check drains to ensure cleanliness and proper function, and remove debris, equipment and excess material from site.

END OF SECTION

Part 1 General

1.1 SECTION INCLUDES

.1 This Section specifies caulking and sealants not specified in other Sections.

.2 Refer to other sections for other caulking and sealants.

1.2 RELATED REQUIREMENTS

.1 Division 8 - Openings

.2 Division 9 - Finishes

.3 Division 23 - Heating, Ventilation and Air Conditioning / HVAC

.4 Division 26 - Electrical

1.3 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM C919-12, Standard Practice for Use of Sealants in Acoustical Applications.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB 19.13-M87, Sealing Compound, One-component, Elastomeric, Chemical Curing.
- .2 CAN/CGSB 19.17-M90, One-Component Acrylic Emulsion Base Sealing Compound.
- .3 CAN/CGSB 19.24-M90, Multi-component, Chemical Curing Sealing Compound.

.3 Department of Justice Canada (Jus)
- .1 Canadian Environmental Protection Act, 1999 (CEPA).

.4 General Services Administration (GSA) - Federal Specifications (FS)
- .1 FS-SS-S-200-E(2)1993, Sealants, Joint, Two-Component, Jet-Blast-Resistant, Cold Applied, for Portland Cement Concrete Pavement.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.6 Transport Canada (TC)
- .1 Transportation of Dangerous Goods Act, 1992 (TDGA).

1.4 ACTION AND INFORMATIONAL SUBMITTALS.

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

.2 Manufacturer's product to describe.
- .1 Caulking compound.
- .2 Primers.
- .3 Sealing compound, each type, including compatibility when different sealants are in contact with each other.

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

.4 Submit duplicate samples of each type of material and colour.

.5 Cured samples of exposed sealants for each color where required to match adjacent material.

.6 Submit manufacturer's instructions in accordance with Section 01 33 00 - Submittal Procedures.
.1 Instructions to include installation instructions for each product used.

1.5 QUALITY ASSURANCE

.1 Retain purchase orders, invoices and other documents to prove that all materials utilized in this contract meet requirements of the specifications. Produce documents when requested by Consultant.

.2 Manufacturer's obligations:
.1 The manufacturer shall play an active role in the application of their product during the period of this contract.
.2 The manufacturer shall be represented at all relevant meetings by a qualified technical representative, with a minimum of 5 years' experience.
.3 The technical representative, shall be approved by the Consultant.
.4 The project shall be subdivided into "Sectors of Work".
.5 A minimum of three inspections per sector from the Manufacturer's representative must be made prior to and during application of this work to ensure proper application.
.6 After each visit provide a written report to the General Contractor and Consultant within 5 working days.

1.6 STORAGE, AND HANDLING

.1 Deliver, handle, store and protect materials.

.2 Deliver and store materials in original wrappings and containers with manufacturer's seals and labels, intact. Protect from freezing, moisture, water and contact with ground or floor.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.2 Place materials defined as hazardous or toxic in designated containers.

.3 Handle and dispose of hazardous materials in accordance with the CEPA, TDGA, Regional and Municipal regulations.

.4 Unused material must not be disposed of into sewer system, into streams, lakes, onto ground or in other location where it will pose health or environmental hazard.

.5 Divert unused joint sealing material from landfill to official hazardous material collections site approved by Consultant.

.6 Empty plastic joint sealer containers are not recyclable. Do not dispose of empty containers with plastic materials destined for recycling.

.7 Fold up metal banding, flatten, and place in designated area for recycling.

1.8 PROJECT CONDITIONS

.1 Environmental Limitations:
  .1 Do not proceed with installation of joint sealants under following conditions:
    .1 When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 degrees C.
    .2 When joint substrates are wet.

.2 Joint-Width Conditions:
  .1 Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.

.3 Joint-Substrate Conditions:
  .1 Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.9 ENVIRONMENTAL REQUIREMENTS

.1 Comply with requirements of Workplace Hazardous Materials Information System (WHMIS) regarding use, handling, storage, and disposal of hazardous materials; and regarding labeling and provision of material safety data sheets acceptable to Labour Canada.

.2 Conform to manufacturer's recommended temperatures, relative humidity, and substrate moisture content for application and curing of sealants including special conditions governing use.

.3 Ventilate area of work by use of approved portable supply and exhaust fans.

1.10 EXTENDED WARRANTIES

.1 For respective trade sections where sealants are used, provide a warranty of five years, for material and workmanship beyond date of Substantial Performance.

Part 2 Products

2.1 SEALANT MATERIALS

.1 Do not use caulking that emits strong odours, contains toxic chemicals or is not certified as mould resistant in air handling units.

.2 When low toxicity caulks are not possible, confine usage to areas which off-gas to exterior, are contained behind air barriers, or are applied several months before occupancy to maximize off-gas time.

.3 Where sealants are qualified with primers use only these primers.

2.2 LOW EMITTING MATERIALS

.1 Although this project is not seeking LEED certification, all site-applied interior paints, coatings, adhesives, sealants, sealant primers, carpets, etc., must conform to VOC content requirements of LEED Canada-NC - 2009.

.2 Submit Material Safety Data Sheets (MSDS) for all products and materials of these types incorporated into the construction of the project as per Section 01 33 00.

2.3 SEALANT MATERIAL DESIGNATIONS

.1 Type 1 - Urethanes One Part. Perimeter of drywall partition at exposed windows
- .1 Non-Sag to CAN/CGSB-19.13, Type 2, MCG-2-25 colour to be selected.
- .2 Acceptable material:
  - .1 Tremco Dymonic.
  - .2 Sika Sikaflex 1a.
  - .3 Sonneborn NP 1.
  - .4 Pecora DynaTrol I-XL.

.2 Type 4 - Acrylic Latex One Part.Perimeter of Interior glazing frames
- .1 To CAN/CGSB-19.17.
- .2 Acceptable material:
  - .1 Tremco 100 latex.
  - .2 Sonneborn Sonolac.
  - .3 Pecora AC-20 + Silicone.

.3 Type 2 - Acoustical Sealant. Perimiter of drywall partitions in non-exposed conditions
- .1 To CAN/CGSB-19.21.
- .2 Acceptable material:
  - .1 Tremco Acoustical Sealant.

.4 Preformed Compressible and Non-Compressible back-up materials.
- .1 Neoprene or Butyl Rubber.
  - .1 Round solid rod, Shore A hardness 70.
- .2 High density foam:
  - .1 Extruded closed cell polyvinyl chloride (PVC), extruded polyethylene, closed cell, Shore A hardness 20, tensile strength 140 to 200 kPa, extruded polyolefin foam, 32 kg/m3 density, or neoprene foam backer, size as recommended by manufacturer.
- .3 Bond breaker tape:
  - .1 Polyethylene bond breaker tape which will not bond to sealant.

2.1 JOINT CLEANER

.1 Non-corrosive and non-staining type, compatible with joint forming materials and sealant recommended by sealant manufacturer.

.2 Primer: as recommended by manufacturer.

Part 3 Execution

3.1 PROTECTION

.1 Protect installed work of other trades from staining or contamination.

3.2 PREPARATION OF JOINT SURFACES

.1 Examine joint sizes and conditions to establish correct depth to width relationship for installation of backup materials and sealants.

.2 Clean bonding joint surfaces of harmful matter substances including dust, rust, oil grease, and other matter which may impair work.

.3 Do not apply sealants to joint surfaces treated with sealer, curing compound, water repellent, or other coatings unless tests have been performed to ensure compatibility of materials. Remove coatings as required.

.4 Ensure joint surfaces are dry and frost free.

.5 Prepare surfaces in accordance with manufacturer's directions.

3.3 PRIMING

.1 Where necessary to prevent staining, mask adjacent surfaces prior to priming and caulking.

.2 Prime sides of joints in accordance with sealant manufacturer's instructions immediately prior to caulking.

3.4 BACKUP MATERIAL

.1 Apply bond breaker tape where required to manufacturer's instructions.

.2 Install joint filler to achieve correct joint depth and shape, with approximately 30% compression.

3.5 MIXING

.1 Mix materials in strict accordance with sealant manufacturer's instructions.

3.6 APPLICATION

.1 Sealant:
- .1 Apply sealant in accordance with manufacturer's written instructions.
- .2 Mask edges of joint where irregular surface or sensitive joint border exists to provide neat joint.
- .3 Apply sealant in continuous beads.
- .4 Apply sealant using gun with proper size nozzle.
- .5 Use sufficient pressure to fill voids and joints solid.
- .6 Form surface of sealant with full bead, smooth, free from ridges, wrinkles, sags, air pockets, embedded impurities.
- .7 Tool exposed surfaces before skinning begins to give slightly concave shape.
- .8 Remove excess compound promptly as work progresses and upon completion.

.2 Curing:
- .1 Cure sealants in accordance with sealant manufacturer's instructions.
- .2 Do not cover up sealants until proper curing has taken place.

.3 Cleanup:
- .1 Clean adjacent surfaces immediately and leave work neat and clean.
- .2 Remove excess and droppings, using recommended cleaners as work progresses.
- .3 Remove masking tape after initial set of sealant.

.4 Defective work:
- .1 Shall include, but not be restricted to, joint leakage, cracking, crumbling, melting, runny, loss of adhesion, loss of cohesion, or staining of adjoining or adjacent work or surfaces. Contractor to make good any defective sealant work.

END OF SECTION

LEGEND

Door Materials
SC Solid Wood Core

Glazing
TG Tempered Glass

Door Types
D1, D2, etc. Solid Wood Doors, see dwg 3801

Jamb Details
J1, J2, etc. Jamb installation types

Frame Materials
PS Pressed Steel
PSE Pressed Steel Existing

Finishes
P Painted

Frame Types
F1 Welded Frame

General Notes:
1. Door sizes in HM frames are rebate dimension.
2. Contractor to determine frame throat sizes.
3. Door sizes in existing openings to match existing door sizes. Contractor to dimension existing door sizes.

Fire Ratings
NR Fire Separation without a rating

No.	Size	DOOR			FRAME					Fire Rating	Glass	Hardware Set #	Remarks
		Type	Mat=l	Finish	Type	Mat=l	Finish	Throat	Jamb Detail				
LEVEL 2													
2042.1	915 X 2134		SC	P		PSE	P			NR			Existing door and frame
2043A.1	915 X 2134	D4	SC	P	F1	PS	P	149	J3	NR	TG		Coordinate throat depth with lintel
2043.1	915 x 2134	D3	SC	P	F1	PS	P	143	J2	NR			Dutch Door with new frame in exist opening.
2043.2	915 x 2134	D2	SC	P	F1	PS	P	124	J1		TG		This door opens into 2043A Cafe
2043.3	915 x 2134	D2	SC	P	F1	PS	P	124	J1		TG		
2044.1	915 x 2134	D1	SC	P	F1	PS	P	124	J1				Confirm existing wall depth
2044.2													Existing Door

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 All relevant Division 1 Sections.

.2 Section 07 92 00 - Joint Sealing.

.3 Section 09 91 23 - Painting.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM A653/A653M-06a, Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-1.181-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 Canadian Standards Association (CSA International)
- .1 CSA-G40.20-04/G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.
- .2 CSA W59-03, Welded Steel Construction (Metal Arc Welding).

.4 Canadian Steel Door Manufacturers' Association (CSDMA)
- .1 CSDMA, Recommended Specifications for Commercial Steel Doors and Frames, 2000.
- .2 CSDMA, Selection and Usage Guide for Commercial Steel Doors, 1990.

1.3 SUBMITTALS

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

.2 Provide product data: in accordance with Section 01 33 00 - Submittal Procedures.

.3 Provide shop drawings: in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Indicate each type frame material, core thickness, reinforcements, glazing stops, location of anchors and exposed fastenings, reinforcing, fire rating and finishes.
- .2 Submit test and engineering data, and installation instructions.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with manufacturer’s written recommendations.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Division 01.

2 Products

2.1 MATERIALS

.1 Hot dipped galvanized steel sheet: to ASTM A653M, minimum base steel thickness in accordance with CSDMA Table 1 - Thickness for Component Parts. all interior frames to have coating designation to ZF75 (wipe coat).

2.2 PRIMER

.1 Touch-up prime CAN/CGSB-1.181.
.1 Maximum VOC limit 50 g/L.

2.3 PAINT

.1 Field painting of steel frames by Section 09 91 10 - Painting.

2.4 ACCESSORIES

.1 Metallic paste filler: to manufacturer's standard.

.2 Sealant: as per Section 07 92 00.

2.5 FRAMES FABRICATION GENERAL

.1 Fabricate frames in accordance with CSDMA specifications.

.2 Fabricate frames to profiles and maximum face sizes as indicated.

.3 Interior frames: 1.6 mm welded type construction.

.4 Manufacturer's nameplates on frames and screens are not permitted.

.5 Conceal fastenings except where exposed fastenings are indicated.

.6 Provide factory-applied touch up primer at areas where zinc coating has been removed during fabrication.

.7 Provide fire rated door frames, with label, where shown on drawings.

2.6 FRAME ANCHORAGE

.1 Provide appropriate anchorage to floor and wall construction.

.2 Provide 2 anchors for rebate opening heights up to 1520 mm and 1 additional anchor for each additional 760 mm of height or fraction thereof.

.3 Locate anchors for frames in existing openings not more than 150 mm from top and bottom of each jambs and intermediate at 660 mm on centre maximum.

2.7 FRAMES: WELDED TYPE

.1 Welding in accordance with CSA W59.

.2 Accurately mitre or mechanically joint frame product and securely weld on inside of profile.

.3 Cope accurately and securely weld butt joints of mullions, transom bars, centre rails and sills.

.4 Grind welded joints and corners to a flat plane, fill with metallic paste and sand to uniform smooth finish.

.5 Weld in 2 temporary jamb spreaders per frame to maintain proper alignment during shipment.

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 GENERAL

.1 Install frames to CSDMA Installation Guide.

3.3 FRAME INSTALLATION

.1 Set frames plumb, square, level and at correct elevation.

.2 Secure anchorages and connections to adjacent construction.

.3 Brace frames rigidly in position while building-in. Install temporary horizontal wood spreader at third points of door opening to maintain frame width. Remove temporary spreaders after frames are built-in.

.4 Make allowances for deflection of structure to ensure structural loads are not transmitted to frames.

.5 Caulk perimeter of frames between frame and adjacent material.

3.4 FINISH REPAIRS

.1 Touch up with primer finishes damaged during installation.

.2 Fill exposed frame anchors and surfaces with imperfections with metallic paste filler and sand to a uniform smooth finish.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 74 21 - Construction/Demolition Waste Management And Disposal.

.3 Section 08 00 00 – Door Schedule

.4 Section 08 11 00 - Metal Frames.

.5 Section 08 71 00 - Door Hardware.

.6 Section 08 80 00 - Glazing.

.7 Section 09 91 23 - Painting.

1.2 REFERENCES

.1 Architectural Woodwork Manufacturers Association of Canada (AWMAC).
  .1 Architectural Woodwork Standards (AWS) - 2009.

.2 Window & Door Manufacturer's Association (WDMA):
  .1 ANSI/WDMA IS-1A-04, Architectural Wood Flush Doors.

1.3 SUBMITTALS

.1 Product Data:
  .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
  .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:
  .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.
  .2 Indicate door types and cutouts for lights and louvres, sizes, core construction, and cutouts.

1.4 SAMPLES

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

.2 Submit one 200 x 300 mm (8" x 12") corner sample of each type wood door.

.3 Show door construction, core, glazing detail and faces.

.4 Manufacturer's Instructions:
  .1 Submit manufacturer's installation instructions.

1.5 DELIVERY, STORAGE, AND HANDLING

.1 Storage and Protection:
  .1 Protect doors from dampness. Arrange for delivery after work causing abnormal humidity has been completed.

.2 Store doors in well ventilated room, off floor, in accordance with manufacturer's recommendations.
.3 Protect doors from scratches, handling marks and other damage. Wrap doors.
.4 Store doors away from direct sunlight.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Division 01.

.2 Collect and separate for disposal corrugated cardboard, polystyrene, and plastic packaging material in accordance with Waste Management Plan.

1.7 WARRANTY

.1 For all interior wood flush doors, provide manufacturer’s warranty for full life of original installation, including hanging and finishing if doors do not comply with warranty tolerance standards.

.2 Include coverage for delamination, warping, bow, cup and telegraphing of core construction beyond warranty tolerances.

2 Products

2.1 COMPONENTS: FLUSH WOOD DOORS

.1 Doors shall meet the requirements of ANSI/WDMA I.S. 1A-11 Heavy Duty performance level.

.2 Faces at doors for opaque finish shall be MDO, Medium Density Overlay.

.3 Core for non-rated doors shall be UF Free Particleboard.

.4 Stiles for non-rated doors shall be 25mm (1") structural composite lumber laminated to 11mm (7/16") hardwood, before trim.

.5 Top and bottom rails for non-rated doors shall be 36mm (1-7/16") structural composite lumber.

.6 Stiles and rails for fire-rated wood doors shall be the standard of the door manufacturer and shall conform to the requirements of the manufacturer's labelling agency.

.7 Crossband shall be UF Free composite crossband. Wood crossband is not permitted.

.8 Adhesives shall be Type I adhesives.

.9 Laminating adhesives, on-site and shop-applied must not contain added urea-formaldehyde resins.

2.2 GLAZING

.1 Glazing Stops:
.1 Non-rated glazing stops: Wood species compatible with door face.

.2 Glass and glazing in wood doors.
.1 Glass and glazing for doors to be provided by and installed as per Section 08 80 00 - Glazing.

2.3 FABRICATION

.1 Flush wood doors shall be Custom Grade construction in accordance with the Grade requirements specified in the Architectural Woodwork Standards 1st Edition 2009, or as herein otherwise specified.

.2 Doors shall be 5 ply construction.

.3 Stiles and rails shall be fully bonded to core and assembled unit shall be abrasive planed prior to lamination of faces.

.4 Doors shall be assembled using Type 1 adhesive that does not contain added urea formaldehyde.

.5 Edges for doors with opaque finishes shall be Type A with a standard hardwood edge.

.6 Provide blocking as required for surface mounted hardware to prevent the need for through-bolting.

.7 Factory pre-machine doors to receive all finish hardware including all mounting holes and pilot holes.

.8 Bevel lock and hinge stile to Architectural Woodwork Standard 1st Edition 2009, 3 degree bevel.

.9 Doors to be factory primed.

.10 Fire rated doors as indicated on schedule with fire rated mineral core and fire rated stiles and rails.

2.4 FINISHES

.1 Factory finishing:
- .1 Doors to be factory primed.
- .2 Factory seal top and bottom of doors.

3 Execution

3.1 MANUFACTURER'S INSTRUCTIONS

.1 Compliance: comply with manufacturer's written data, including product technical bulletins, product catalogue installation instructions, product carton installation instructions, and data sheets.

3.2 INSTALLATION

.1 Unwrap, protect and install doors in accordance with the Architectural Woodwork Standards, latest edition. Installation shall conform to the AWS Grade of the item being installed.

.2 Install hardware in accordance with manufacturer's printed instructions.

.3 Adjust hardware for correct function.

.4 Install glazing in accordance with Section 08 80 00 - Glazing.

3.3 ADJUSTMENT

.1 Re-adjust doors and hardware just prior to completion of building to function freely and properly.

3.4 CLEANING

.1 Perform cleaning as soon as possible after installation to remove construction and accumulated environmental dirt.

.2 Remove traces of primer, caulking; clean doors and frames.

.3 Clean glass and glazing materials with approved non-abrasive cleaner.

.4 On completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

1 General

1.1 RELATED WORK

.1 Section 08 11 00 **-** Metal Doors & Frames

.2 Section 08 14 14 - Flush Wood Doors

.3 Division 26 - Electrical Wiring for and hook-up of all electrical hardware specified in this section

1.2 REFERENCE STANDARDS

.1 Standard hardware location dimensions in accordance with the Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers Association.

.2 ANSI/BHMA A156.1-2016, Butts and Hinges.

.3 ANSI/BHMA A156.2-2017, Bored & Preassembled Locks and Latches.

.4 ANSI/BHMA A156.3-2014, Exit Devices.

.5 ANSI/BHMA A156.4-2013, Door Controls - Closers.

.6 ANSI/BHMA A156.5-2014, Cylinders and Input Devices for Locks.

.7 ANSI/BHMA A156.6-2010, Architectural Door Trim.

.8 ANSI/BHMA A156.7-2014, Template Hinge Dimensions.

.9 ANSI/BHMA A156.8-2010, Door Controls – Overhead Stops & Holders.

.10 ANSI/BHMA A156.13-2017, Mortise Locks and Latches.

.11 ANSI/BHMA A156.15-2011, Release Devices – Closer Holder, Electromagnetic.

.12 ANSI/BHMA A156.16-2013, Auxiliary Hardware.

.13 ANSI/BHMA A156.18-2016, Materials and Finishes.

.14 ANSI/BHMA A156.19-2013, Power Assist & Low Energy Power Operated Doors.

.15 ANSI/BHMA A156.26-2017, Continuous Hinges.

.16 ANSI/BHMA A156.21-2014, Thresholds.

.17 ANSI/BHMA A156.22-2017, Door Gasketing and Edge Seal Systems

.18 ANSI/BHMA A156.25-2013, Electrified Locking Devices.

.19 ANSI/BHMA A156.24-2012, Delayed Egress Locks.

.20 ANSI/BHMA A156.29-2013, Exit Locks, Exit Alarms, Alarms for Exit Devices.

1.3 REQUIREMENTS REGULATORY AGENCIES

.1 Hardware for doors in fire separations and exit doors to be certified by ULI / ULC, a Canadian Certification Organization accredited by Standards Council of Canada.

1.4 SAMPLES

.1 When requested, submit samples of hardware items in accordance with Section 01 33 00 Submittal Procedures.

.2 Identify each sample by label indicating applicable specification paragraph number, brand name and number, finish and hardware package number.

.3 After approval, samples will be returned for incorporation in the Work.

1.5 HARDWARE SCHEDULE

.1 Submit contract hardware schedule using the standard DHI format for finish hardware schedules in accordance with Section 01 33 00 Submittal Procedures.

.2 Clearly indicate specified hardware, including make, model, material, function, size, finish and other pertinent information.

1.6 MAINTENANCE DATA

.1 Provide operation and maintenance data for door closers, locksets, door holders and fire exit devices for incorporation into manual specified in Section 01 77 00 Contract Closeout.

.2 Brief maintenance staff regarding proper care, cleaning and general maintenance of door hardware items.

1.7 MAINTENANCE MATERIALS

.1 Provide maintenance materials in accordance with Section 01 77 00 Contract Closeout.

.2 Supply two sets of wrenches for door closers, locksets and fire exit hardware.

1.8 DELIVERY AND STORAGE

.1 Store finishing hardware in locked, clean and dry area.

.2 Package each item of hardware including fastenings, separately or in like groups of hardware, label each package as to item definition and location.

2 Products

2.1 HARDWARE ITEMS

.1 Use one manufacturer’s products only for all similar product groups.

.2 All products supplied must meet design criteria standards of HRSB.

.3 The product numbers listed in the finish hardware schedule are to be used as the standard of acceptance for all items and are from the following group of manufacturers:

.1	Butts, Continuous Hinges	Ives
.2	Locksets, Latchsets	Schlage
.3	Rim and Mortise Cylinders	Schlage
.4	Door Closers	LCN
.5	Door Pulls, Push & Kick Plates	Ives
.6	Flush Bolts, Door Stops	Ives

.7	O/H Door Stops	Glynn-Johnson
.8	Door Seal	DraftSeal

2.2 DOOR HARDWARE

.1 Butts and hinges:
- .1 Butts and continuous hinges: designated by letter and numeral identifiers, followed by size and finish, as listed in Hardware Schedule.
- .2 Self-closing hinges and pivots: designated by letter and numeral identifiers as listed in Hardware Schedule.
- .3 Butt hinges on exterior doors and locked doors opening out shall have non removable pins (NRP) and doors equipped with door closers or in high traffic areas shall have ball bearing (BB) hinges.
- .4 Continuous hinges: designated by letter and numeral identifiers, followed by size and finish, as listed in Hardware Schedule.
- .5 Continuous hinges shall be heavy duty full mortise aluminum geared type, providing full height door support with minimum of 32 bearings for quiet, smooth and self-lubricating operation. Hinge material to be 6063-T6 aluminum, and each hinge shall be able to hold a door up to 450 lbs, and to door width of 4'0". Finish to be as listed in hardware schedule.
- .6 Specified product:
  - .1 Butt hinges: Ives
  - .2 Continuous hinges: Ives

.2 Locks and latches:
- .1 Locksets and latchsets are to be heavy duty cylindrical, lever type, and meet ANSI Grade 1, A156.2-2011, A117.1 Accessibility, and ULC requirements.
- .2 Lever handle trim must have concealed through bolt mounting, and the levers are to be solid cast with a return to the door face. All locks are to have heavy duty cast mounting plates, threaded hub and locking nut, and stainless steel interlocking spindle. Lever design to be Schlage ND-SPA.
- .3 Provide ¾" latch throw for pairs of labeled doors.
- .4 Roses or Escutcheons: Round design 3 7/16" O.D., as listed in schedule.
- .5 Locksets are to have "Vandlgard" free-wheeling vandal-resistant lever handles on exterior doors.
- .6 Normal strikes: box type, lip projection not to exceed ¼" beyond jam.
- .7 Cylinders: Standard Core, key to Existing Master Key system.
- .8 Finish to be Satin Chrome Plated - 626.
- .9 Specified products: Locksets - Schlage Lock

.3 Locks and latches:
- .1 Mortise locks and latches: to ANSI/BHMA A156.13-1994, Series 1000 mortise lock, Grade 1 operational and Grade 1 security, ULC Listed for A label doors, with all functions available in one size case;
- .2 Mortise locks shall have a full ¾" throw two-piece mechanical anti-friction latchbolt, a one-piece stainless steel 1" throw deadbolt, and handing of locks shall be reversible without disassembly of the lockcase.
- .3 Lever Handles: Schlage # 17 Design, Solid curved face type design, Forged, complete with return to door.
- .4 Roses or Escutcheons: Round design "A" as listed in schedule.
- .5 Normal strikes: ASA type, lip standard projection except where noted.
- .6 Cylinders: Schlage Standard Core, key to Existing Master Key system.
- .7 Finish to be Satin Chromium Plated 626.
- .8 Specified products: Locksets - Schlage Lock

.4 Exit Devices:
- .1 to be heavy duty, grade 1, modern design with push bar, narrow stile, concealed vertical rod, or rim mounted, to meet ANSI, ULC, NFPA and ADA certification, to have thru-bolted trim, heavy-duty steel I-beam bar, and heavy gauge latch head with reinforced bracket. All lever trims to be free-wheeling, vandal-resistant, and all devices are to have deadlocking latchbolts.
- .2 Finish to be Satin Chrome 626, as listed in Hardware Schedule. Functions and trims (17) to be as listed in Hardware Schedule.
- .3 Specified product: Von Duprin – No Substitution

.5 Door Closers and Accessories:
- .1 Door controls (closers): to meet or exceed ANSI A156.4 Grade 1 requirements; to be heavy duty cast aluminum bodies with adjustable spring power and have separate valves for latching, closing and backcheck control. All closer arms to be forged steel with power adjustment arm bracket.
- .2 All closers are to be non-sized to suit door and opening, and to have full covers with finish 689. Brackets, shoes, and plates are to be included for proper mounting of closers. All closers shall have minimum 25 - year warranty.
- .3 Specified product: LCN

.6 Overhead stops/holders:
- .1 Door controls (overhead stops/holders): to meet or exceed ANSI A156.8 Grade 1 requirements; to be heavy duty slide track type with heavy duty shock absorber spring and non-metal slide block and shock block, non-handed.
- .2 to be Type 304 stainless steel material in stainless steel 630 finish.
- .3 Specified product: Glynn-Johnson

.7 Door Operators:
- .1 Power-operated pedestrian doors: to meet ANSI A156.19 Grade 1, ADA , UBC 7.2, and UL10C requirements; to be heavy duty electromechanical powered system, adjustable spring size, multi-function, with valve adjustable sweep and latch closing speeds, and back check cushioning.
- .2 operator features to include digital control box, dual independent program memories, on-board diagnostics, on-board power supply, plug & play sensors, “No Destruct” drive system, electronic circuit protection, visual function indicators, and programming mode.
- .3 to have adjustable delay time, opening time/opening force, opening angle and door width selector, and be finished in 689.
- .4 Specified product: LCN

.8 Auxiliary locks:
- .1 to meet or exceed ANSI A156.16 Grade 1 requirements, to be heavy-duty and finished in 626.
- .2 Cylinders: Schlage Standard rim or mortise type, with keyway to match existing Master Key system, finished to 626, for installation in exit devices on aluminum doors as listed in Hardware Schedule.
- .3 Specified product: Schlage

.9 Architectural door trim:
- .1 To meet ANSI A156.6 Grade 1 requirements, type 304 stainless steel, finished 630.
- .2 Door protection plates: kick plate type 304 stainless steel, 1.27 mm thick stainless steel, finished to 630.
- .3 Push plates: type 304 stainless steel, 1.27 mm thick stainless steel, finished to 630.
- .4 Push/Pull units: type 304 stainless steel, 1” thick stainless steel, finished to 630.

.3 Specified product: Ives Hardware

.10 Auxiliary hardware; door stops:
.1 To meet CAN/CGSB-69.32-(M90)/ANSI/BMHA A156.16-1989, designated by letter and numeral identifiers, as listed in Hardware Schedule, finished to 626.
.1 Floor stops, dome type, cast brass, finished 626.
.2 Wall stops, convex or concave, cast brass, finished 626.
.3 Flush Bolts, metal door type, cast brass, finished 626.
.2 Specified products: Ives Hardware

.11 Weatherstripping:
.1 Head and jamb seal:
.1 Extruded aluminum frame and solid closed cell neoprene insert, clear anodized finish.
.2 Adhesive backed santoprene material.
.2 Door Sweep:
.1 Extruded aluminum frame and closed cell neoprene or nylon brush, clear anodized finish.
.3 Specified product: DraftSeal

2.3 FASTENINGS

.1 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.2 Exposed fastening devices to match finish of hardware.

.3 Use fasteners compatible with material through which they pass.

2.4 KEYING

.1 All lockset and deadlock cylinders are to have Schlage standard rim or mortise cylinders to suit, with keyway to match existing MK system. Cylinders to be keyed differently, keyed alike, keyed alike in groups, master keyed or grandmaster keyed as directed. Prepare detailed keying schedule in conjunction with owner's representative.

3 Execution

3.1 INSTALLATION INSTRUCTIONS

.1 Furnish metal door and frame manufacturer's with complete instructions and templates for preparation of their work to receive hardware.

.2 Furnish manufacturer's instructions for proper installation of all hardware components.

.3 Install hardware to standard hardware location dimensions in accordance with Canadian Imperial Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturers' Association.

.4 Where door stop contacts door pulls, mount stop to strike bottom of pull.

3.2 SCHEDULE

.1 Hardware Set # H-1 - Single Door 2043A.1; Each to have:

.1 3 Hinges 5BB1 4 ½" x 4" - 652

.2 1 Lockset Schlage ND70PD - RHO x GMK'D - 626
.3 1 Floor Stop Ives FS439 - 626
.4 1 Set Door Seal DraftSeal DS11D x 5183mm - BN
.5 1 Door Sweep DraftSeal DS149CNB x 915mm - AN

.2 Hardware Set # H-2 - Single Door 2043.1; Each to have:

.1 4 Hinges 5BB1 4 ½" x 4" - 652
.2 1 Lockset Schlage ND70PD - RHO x GMK'D - 626
.3 1 Floor Stop Ives FS439 - 626
.4 1 O/H Door Stop/Holder Glynn-Johnson 454H - 630
.5 1 Set Door Seal DraftSeal DS11D x 5183mm – BN
.6 1 Door Sweep DraftSeal DS149CNB x 915mm - AN
.7 1 Dutch Door Bolt Ives 054 - 626

.3 Hardware Set # H-3 - Single Doors # 2043.2, 2043.3; Each to have:

.1 3 Hinges Ives 5BB1 4 ½" x 4" - 630
.2 1 Push Plate Ives 8200- 6 x 16 - 630
.3 1 Pull Plate Ives 8302-0 x 10"- 4 x 16 - T/B - 630
.4 1 Door Closer LCN 1450 EDA FC x TB/SN - 689
.5 1 Kickplate Ives 8400B4E- 10" x 34" - 630
.6 1 Floor Stop Ives FS439 - 630

.4 Hardware Set # H-4 - Single Door 2044.1; Each to have:

.1 3 Hinges 5BB1 4 ½" x 4" - 652
.2 1 Lockset Schlage ND53PD - RHO x GMK'D - 626
.3 1 Floor Stop Ives FS439 - 626

.5 Hardware Set # H-5 - Single Door 2044.2; Each to have:

.1 1 Lockset Schlage ND53PD - RHO x GMK'D - 626

END OF SECTION 08 71 10

1 General

1.1 RELATED SECTIONS

.1 Section 01 33 00 - Submittal Procedures.

.2 Section 01 35 29 - Health and Safety Requirements.

.3 Section 01 45 00 - Quality Control.

.4 Section 01 77 00 - Closeout Procedures.

.5 Section 01 78 00 - Closeout Submittals.

.6 Section 01 74 21 - Construction/Demolition Waste Management and Disposal.

.7 Section 08 00 00 – Door Schedule

.8 Section 08 14 16 - Flush Wood Doors.

1.2 REFERENCES

.1 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-12.1-M90 Tempered or Laminated Safety Glass.
- .2 CAN/CGSB-12.3-M91 Flat, Clear Float Glass.
- .3 CAN/CGSB-12.5-M86, Mirrors, Silvered.

.2 Flat Glass Manufacturers Association (FGMA):
- .1 FGMA Glazing Manual - 1997.

1.3 SUBMITTALS

.1 Product Data:
- .1 Submit manufacturer's printed product literature, specifications and data sheet in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit two copies of WHMIS MSDS - Material Safety Data Sheets in accordance with Section 01 33 00 - Submittal Procedures.

.2 Shop Drawings:
- .1 Submit shop drawings in accordance with Section 01 33 00 - Submittal Procedures.

.3 Samples:
- .1 Submit samples in accordance with Section 01 33 00 - Submittal Procedures.
- .2 Submit duplicate 300x300mm (12" x 12") size samples of each type of glazing and sealant material.

.4 Manufacturer's Instructions:
- .1 Submit manufacturer's installation instructions.

1.4 CLOSEOUT SUBMITTALS

.1 Provide maintenance data including cleaning instructions for incorporation into specified manual.

1.5 ENVIRONMENTAL REQUIREMENTS

.1 Install glazing when ambient temperature is 10°C minimum. Maintain ventilated environment for 24 hours after application.

.2 Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Collect, separate and recycle all site generated waste materials in accordance with Division 01.

2 Products

2.1 MATERIALS: FLAT GLASS

.1 Float glass: to CAN/CGSB-12.3, Glazing quality, 6mm thick.

.2 Safety glass: to CAN/CGSB-12.1, transparent, 6mm thick and as indicated on drawings. Where exposed, edges are to be polished
- .1 Type 2 - tempered.
- .2 Class B - float.

.3 Silvered mirror glass: to CAN/CGSB-12.5, 5mm thick.
- .1 Type 1B-Float glass for high humidity use. Where exposed, edges are to be polished.

2.2 ACCESSORIES

.1 Setting blocks: Neoprene 80 - 90 Shore A durometer hardness to ASTM D2240, to suit glazing method, glass light weight and area.

.2 Spacer shims: Neoprene 50 - 60 Shore A durometer hardness to ASTM D2240, 75 mm long x one half height of glazing stop x thickness to suit application. Self adhesive on one face.

.3 Glazing tape: Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume 2%, designed for compression of 25%, to effect an air and vapour seal.

.4 Mirror attachment accessories:
- .1 Mirror adhesive, chemically compatible with mirror coating and substrate.

3 Execution

3.1 EXAMINATION

.1 Verify that openings for glazing are correctly sized and within tolerance.

.2 Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.2 PREPARATION

.1 Clean contact surfaces with solvent and wipe dry.

.2 Seal porous glazing channels or recesses with substrate compatible primer or sealer.

.3 Prime surfaces scheduled to receive sealant.

3.3 INSTALLATION: INTERIOR WET/DRY METHOD (TAPE AND SEALANT)

.1 Cut glazing tape to length and install against permanent stops, projecting 1.6 mm above sight line.

.2 Place setting blocks at 1/3 points, with edge block maximum 150 mm from corners.

.3 Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of light or unit.

.4 Install removable stops, with spacer shims inserted between glazing and applied stops at 600 mm intervals, 6 mm below sight line.

.5 Fill gaps between light and applied stop with sealant to depth equal to bite on glazing, to uniform and level line.

.6 Trim protruding tape edge.

3.4 INSTALLATION: MIRROR

.1 Set mirrors with adhesive, applied in accordance with adhesive manufacturer’s instructions. Temporarily hold in place with clips. Remove when adhesive has set.

.2 Place plumb and level.

3.5 CLEANING

.1 Remove glazing materials from finish surfaces.

.2 Remove labels after work is complete.

.3 Clean glass and mirrors.

3.6 PROTECTION OF FINISHED WORK

.1 After installation, mark light with an "X" by using removable plastic tape or paste.

3.7 SCHEDULE

.1 Install glazing as indicated.

END OF SECTION

LEGEND

Ceiling Materials and Finish ACT Acoustic Ceiling Tile (Type ACT1, ACT2 etc., refer to Spec.)	**Wall Finish** PT Paint (Types PT1, PT2, etc.) Paint for Gyp. Refer to Spec Section 09 91 23 for complete listing of paint types FRP Fibreglass Reinforced Plastic
Floor Materials and Finish LVT Vinyl Tile SVF Sheet Vinyl Flooring	**Wall Materials** GWB Gypsum Wall Board CB Concrete Block
Base RB Rubber Base	**Schedule Notes**. 1. See ceiling plans for heights of ceilings

Room #	ROOM NAME	FLOOR FINISH		WALL FINISH		CEILING FINISH			SCHEDULE NOTES
		FIN	BASE	MAT.	FIN.	MAT.	FIN.	HT.	
Sir John A. Macdonald H.S. Level 2									
2042	ANTEROOM	SVF	RB	GWB/ CB	PT	EXIST ACT	-	See Drawings	
2043	CULINARY TRADES	SVF	RB	GWB/ CB	PT/ FRP	ACT1/ ACT2	-	See Drawings	* Concrete block wall to be painted; see elevations for extent of FRP & paint.
2043A	CAFE	LVT	RB	GWB/ CB	PT	ACT1	-	See Drawings	*Floor: LVT Tiles to run lengthwise parallel to Grid K
2044	CHANGE ROOM	EXIST	EXIST	GWB/ CB	PT	EXIST ACT	-	EXIST	*Paint all walls
2055	FAMILY STUDIES NUTRITION/ TEXTILES	EXIST	RB	GWB	PT	ACT	-	EXIST	* New RB full length of infilled wall *Paint infilled wall only

End of Section

1 General

1.1 RELATED SECTIONS

.1 All relevant Division 1 Sections.

.6 Section 05 50 00 - Metal Fabrications.

.7 Section 07 21 16 - Blanket Insulation.

.8 Section 07 92 00 - Joint Sealing.

.9 Section 09 22 16 - Non-Structural Metal Framing.

.10 Division 23 - Heating, Ventilating and Air Conditioning.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM)
- .1 ASTM C475-02(2007), Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
- .2 ASTM C840-11, Specification for Application and Finishing of Gypsum Board.
- .3 ASTM C954-11, Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
- .4 ASTM C1002-07, Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
- .5 ASTM C1047-10a, Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
- .6 ASTM C1178-11, Specification for Glass Mat Water-Resistant Gypsum Backing Board.
- .7 ASTM C1396-11, Standard Specification for Gypsum Board.
- .8 ASTM C1658-06 Standard Specification for Glass Mat Gypsum Panels.
- .9 ASTM D3273-00(2005) Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

.2 Underwriters' Laboratories of Canada (ULC)
- .1 CAN/ULC-S102-10, Surface Burning Characteristics of Building Materials and Assemblies.

1.3 DELIVERY, STORAGE & HANDLING

.1 Deliver materials in original packages, containers or bundles bearing manufacturers brand name and identification.

.2 Store materials inside, level, under cover. Keep dry. Protect from weather, other elements and damage from construction operations and other causes.

.3 Handle gypsum boards to prevent damage to edges, ends or surfaces. Protect metal accessories and trim from being bent or damaged.

1.4 SITE ENVIRONMENTAL REQUIREMENTS

.1 Maintain temperature minimum 10 degrees C, maximum 21 degrees C for 48 hours prior to and during application of gypsum boards and joint treatment, and for at least 48 hours after completion of joint treatment.

.2 Apply board and joint treatment to dry, frost free surfaces.

.3 All materials must be kept dry before, during and after execution and application.

.4 Ventilation: ventilate building spaces as required to remove excess moisture that would prevent drying of joint treatment material immediately after its application.

1.5 SUBMITTALS

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

.2 Submit duplicate 300 x 300 mm (12" x 12") size samples of each type of gypsum board material and 300 mm (12") long samples of corner and casing beads, vinyl mouldings expansion joint material, and insulating strip.

1.6 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Division 01.

.2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.

.3 Divert unused gypsum from landfill to gypsum recycling facility for disposal approved by Consultant.

.4 Divert unused paint and caulking material from landfill to official hazardous material collections site approved by Consultant.

.5 Do not dispose of unused paint and caulking materials into sewer systems, into lakes, streams, onto ground or in other locations where it will pose health or environmental hazard.

Part 2 Products

2.1 MATERIALS

.1 Gypsum sheathing board (GWB): to ASTM C1396, 16mm (5/8") thick, 1220mm (48") wide x maximum practical length, ends square cut, edges beveled. Use this board for ceiling and bulkheads, and for general walls where indicated. Refer to drawings, legends and schedules for locations.

.2 Tile backer board: Glass mat water-resistant gypsum backing board, to ASTM C1178, 16mm thick, 1220mm wide x maximum practical length: For use under ceramic tile full height.

1. Acceptable material:
   - .1 DensShield Tile Backer by Georgia Pacific.
   - .2 GlasRoc Tile Backer by Certainteed.
   - .3 GreenGlass Tile Backer by Temple-Inland.

.3 Metal furring runners, hangers, tie wires, inserts, anchors: to CSA A82.30, galvanized.

.4 Drywall furring channels: 0.5 mm core thickness galvanized steel channels for screw attachment of gypsum board.

.5 Steel drill screws: to ASTM C 1002.

.6 Laminating compound: as recommended by manufacturer, asbestos-free.

.7 Casing beads, corner beads, control joints and edge trim: to ASTM C1047, Z275 zinc finish, 0.5 mm base thickness, perforated flanges, fillable types only, one piece length per location.

.8 Sealants: As per Section 07 92 00, installed by 09 21 16.

.9 Insulating strip: rubberized, moisture resistant, 3mm thick closed cell neoprene strip, 12mm wide, with self sticking permanent adhesive on one face, lengths as required.

.10 Joint compound: to ASTM C475, asbestos-free, moisture and mould resistant.

.11 Acoustic batt insulation: as per Section 07 21 16, installed by 09 21 16.

.12 Joint tape: mould resistant, fibreglass mesh.

.13 Shaft wall:
- .1 Erect rated shaft wall assembly in strict accordance with manufacturer`s written instructions to achieve fire resistance rating indicated and in accordance with UL/ULC Classification.
- .2 Install gypsum liner panels between C-H studs with liner securely engaged in assembly.
- .3 Apply face layer of gypsum board to studs and secure with fasteners.

Part 3 Execution

3.1 ERECTION

.1 Do application and finishing of gypsum board in accordance with ASTM C840 except where specified otherwise.

.2 Erect hangers and runner channels for suspended gypsum board ceilings in accordance with ASTM C840 except where specified otherwise.

.3 Support light fixtures by providing additional ceiling suspension hangers within 6" (150mm) of each corner and at maximum 24" (600mm) around perimeter of fixture.

.4 Install work level to tolerance of 1:1200.

.5 Frame with furring channels, perimeter of openings for access panels, light fixtures, diffusers and grilles.

.6 Furr for gypsum board faced vertical bulkheads within and at termination of ceilings.

.7 Install wall furring for gypsum board wall finishes in accordance with ASTM C840, except where specified otherwise.

.8 Furr openings and around built-in equipment, cabinets, access panels, on four sides. Extend furring into reveals. Check clearances with equipment suppliers.

.9 Furr duct shafts, beams, columns, pipes and exposed services where indicated and/or exposed to view.

3.2 APPLICATION

.1 Do not apply gypsum board until all bucks, anchors, blocking, electrical and mechanical work are installed and approved. Ensure existing wood stud framing has been shimmed and furred to accept new board materials.

.2 Apply single layer of gypsum board to metal furring or framing using screw fasteners. Maximum spacing of screws 300 mm (12") on centre.
- .1 Single-Layer Application:
  - .1 Apply gypsum board on ceilings prior to application of walls in accordance with ASTM C840.
  - .2 Apply gypsum board vertically or horizontally, providing sheet lengths that will minimize end joints.

.3 Apply tile backer gypsum board behind all wall tile.

.4 Install ceiling boards in direction that will minimize number of end-butt joints. Stagger end joints at least 250 mm.

.5 Apply gypsum board with face side out.

.6 Do not install damaged or damp boards.

.7 Apply gypsum board from 13 mm (½") above floor to underside of structure above, unless otherwise indicated.

.8 Locate edge or end joints over supports. Stagger vertical joints over different studs on opposite sides of wall.

3.3 INSTALLATION

.1 Erect accessories straight, plumb or level, rigid and at proper plane. Use full length pieces where practical. Make joints tight, accurately aligned and rigidly secured. Mitre and fit corners accurately, free from rough edges. Secure at 150 mm (6") o.c. using screws.

.2 Install casing beads around perimeter of suspended ceilings.

.3 Install casing beads where gypsum board butts against surfaces having no trim concealing junction and where indicated.

.4 Install construction control joints of preformed units set in gypsum board facing and supported independently on both sides of joint.

.5 Install access doors to electrical and mechanical fixtures specified in respective Sections.
- .1 Rigidly secure frames to furring or framing systems.

.6 Finish face panel joints and internal angles with joint system consisting of joint compound, joint tape and taping compound installed according to manufacturer's directions and feathered out onto panel faces.

.7 Gypsum Board Finish: finish gypsum board walls and ceilings to following levels in accordance with Association of the Wall and Ceiling Industries (AWCI) International Recommended Specification on Levels of Gypsum Board Finish (GA-214-10):

.1 Level 4 - Embed tape for joints and interior angles in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads and accessories; surfaces smooth and free of tool marks and ridges.

.1 All areas exposed to view except where indicated to have ceramic tile finish.

.8 Fill screw head depressions with joint and taping compounds to bring flush with adjacent surface of gypsum board to be invisible after surface finish is completed.

.9 Sand lightly to remove burred edges and other imperfections. Avoid sanding adjacent surface of board.

.10 Completed installation to be smooth, level or plumb, free from waves and other defects and ready for surface finish.

.11 Install acoustic blanket insulation to underside of floor above as per Section 07 21 16. Coordinate with installation of electrical/mechanical systems.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 All relevant Division 1 Sections.

.6 Section 05 50 00 - Metal Fabrications.

.7 Section 07 92 00 - Joint Sealing.

.8 Section 08 11 00 - Metal Frames.

.9 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

.1 American Society for Testing and Materials International, (ASTM).
- .1 ASTM C645-11, Standard Specification for Nonstructural Steel Framing Members.
- .2 ASTM C754-11, Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

1.3 QUALITY ASSURANCE

.1 Test Reports: certified test reports showing compliance with specified performance characteristics and physical properties.

.2 Certificates: product certificates signed by manufacturer certifying materials comply with specified performance characteristics and criteria and physical requirements.

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials in accordance with Division 01.

.2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with Waste Management Plan.

Part 2 Products

2.1 MATERIALS

.1 Non-loadbearing channel stud framing: to ASTM C645, stud sizes, as required or otherwise noted on drawings, roll formed from 20 ga (1.02mm) thickness for interior work, hot dipped galvanized steel sheet, for screw attachment of gypsum board. Knock-out service holes at 450mm (18") centres.

.2 Floor and ceiling tracks: to ASTM C645, in widths to suit stud sizes, 1-3/8" flange height at floor, 2" at top.

.3 Metal channel stiffener bridging: 3/4" x 1-1/2" size, 1.4 mm thick cold rolled steel, coated with rust inhibitive coating.

.4 Tie wire: 18 ga.

.5 Insulating strip: rubberized, moisture resistant 3mm thick foam strip, 12mm (½") wide, with self sticking adhesive on one face, lengths as required; at junction with exterior window frames.

.6 Wood blocking:
.1 Use 3/4" thick plywood wall backing, for use in steel stud wall assemblies and existing wood stud framing, for attachment of railings, shelves, millwork, wall panels and various specialties. Provide backing for hand soap and paper towel dispensers to be supplied and marked by the owner where shown on drawings.

Part 3 Execution

3.1 ERECTION

.1 Align partition tracks at floor and top and secure at 600mm (24") o.c. maximum.

.2 Place studs vertically at 406mm (16") o.c., or as noted on drawings, not more than 50mm (2") from abutting walls and at each side of openings and corners. Position studs in tracks at floor and ceiling.

.3 Install continuous bridging channels at 1/3 points of the height of the wall for all walls. Bridging to be lapped through 2 studs with legs facing and nested tightly together. All bridging laps to be secured with two separate wraps of 18 ga. tie wire. Where bridging butts to ends of walls, turn bridging channel 6" up wall and secure with 2 fasteners.

.4 Erect metal studding to tolerance of 1:1000.

.5 Attach studs to bottom track using screws.

.6 Co-ordinate simultaneous erection of studs with installation of service lines. When erecting studs ensure web openings are aligned.

.7 Co-ordinate erection of studs with installation of frames and special supports or anchorage for work specified in other Sections.

.8 Provide two studs extending from floor to structure above at each side of openings wider than stud centres specified. Secure studs together, with legs facing, using column clips or other approved means of fastening placed alongside frame anchor clips.

.9 Install double jamb studs at all door and screen openings. Secure double studs together as per 3.1.8. Stud clips to be located close to hinge locations on the latch side at the same spacing as used on the hinge side; 3 per side. Frame anchors are to be installed and secured to the double stud close to hinge locations and stud clips.

.10 Erect track at head of door/window openings and sills of sidelight/window openings to accommodate intermediate studs. Secure track to studs at each end. Install intermediate studs above and below openings in same manner and spacing as wall studs. Hollow metal (HM) door frames in drywall partitions are to be installed by Section 09 21 16.

.11 Frame openings and around built-in equipment, cabinets, duct penetrations, access panels, on four sides. Extend framing into reveals. Check clearances with equipment suppliers.

.12 Install all wood blocking between studs as required or as indicated for structural securement of wall mounted shelves, equipment, accessories, benches, etc. Screw

blocking to flanges of steel studs with minimum of 2 screws. Screw to existing wood stud framing where being retained as part of the renovations.

.13 Install steel studs or furring channel between studs for attaching electrical and other boxes.

.14 Extend partitions to u/s floor or roof structures except where noted otherwise on drawings.

.15 Maintain clearance under beams and structural decks to avoid transmission of structural loads to studs. Provide a single 20 ga. track with 2" legs. Studs to be cut 1" short and not fastened to track.

.16 Install continuous insulating strips to isolate studs from uninsulated surfaces.

.17 Shim and furr existing studs being retained and reused as part of the renovation with wood strips or shingles to permit plumb and level installation of new board materials by Section 09 21 16. Add new 20ga studs in existing stud tracks as required for new wall assemblies.

3.2 CLEANING

.1 Upon completion of installation, remove surplus materials, rubbish, tools and equipment barriers.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 All relevant Division 1 Sections

.2 Section 09 21 16 - Gypsum Board Assemblies.

.3 Section 09 53 00 - Acoustical Suspension.

.4 Division 23 - HVAC.

.5 Division 26 - Lighting Equipment.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C423-09a, Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
- .2 ASTM E1264-08e1, Standard Classification for Acoustical Ceiling Products.
- .3 ASTM E1477-98a (2008), Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.

.3 Canadian Standards Association (CSA International)
- .1 CSA B111-1974(R2003), Wire Nails, Spikes and Staples.

.4 Department of Justice Canada (Jus)
- .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33.
- .2 Transportation of Dangerous Goods Act (TDGA), 1992, c. 34.

.5 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.6 Underwriter's Laboratories of Canada (ULC)
- .1 CAN/ULC-S102-2010, Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies.

1.3 SUBMITTALS

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

.2 Submit duplicate full size samples of each type acoustical units.

1.4 DELIVERY, STORAGE AND HANDLING

.1 Protect on site stored or installed absorptive material from moisture damage.

.2 Store extra materials required for maintenance, where directed by Consultant.

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for reuse and recycling in accordance with Division 01.

.2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with Waste Management Plan (WMP).

1.6 ENVIRONMENTAL REQUIREMENTS

.1 Permit wet work to dry before beginning to install.

.2 Maintain uniform minimum temperature of 15 degrees C and humidity of 20-40 % before and during installation.

.3 Store materials in work area 48 hours prior to installation.

1.7 EXTRA MATERIALS

.1 Provide extra materials of acoustic units.

.2 Provide acoustical units amounting to 2% of gross ceiling area for each pattern and type required for project.

.3 Ensure extra materials are from same production run as installed materials.

.4 Clearly identify each type of acoustic unit, including colour and texture.

.5 Deliver to Owner upon completion of the work of this section.

2 Products

2.1 MATERIALS

.1 Type AT-1:
- .1 Class A.
- .2 Ceramic bonded mineral fibre with minimum 30-50% recycled content, designed to withstand high humidity environment.
- .3 Pattern: non-directional visual, fine fissured, perforated.
- .4 Texture: medium.
- .5 Flame spread rating of 25 or less in accordance with CAN/ULC-S102.
- .6 Noise Reduction Coefficient (NRC) designation of .50 minimum.
- .7 Light Reflectance (LR) range of .82 to ASTM E1477.
- .8 Edge type: square, lay-in.
- .9 Colour: white.
- .10 Size 610 x 610 x 16 mm (24" x 24" x 5/8") thick.
- .11 Acceptable materials:
  - .1 CGC Radar Ceramic ClimaPlus, #56644.
  - .2 Armstrong Ceramaguard Fine Fissured #607.
  - .3 CertainTeed VinylShield A-White perforated CRF, #1102-CRFP-1.

.2 Type AT-2
- .1 To match AT-1 except size to be 610x1220

3 Execution

3.1 EXAMINATION

.1 Do not install acoustical panels and tiles until work above ceiling has been inspected by Consultant.

3.2 INSTALLATION

.1 Install acoustical panels and tiles in ceiling suspension system.

3.3 APPLICATION

.1 Install acoustical units with directional pattern running in same direction. Refer to reflected ceiling plan.

.2 Scribe acoustic units to fit adjacent work. Butt joints tight, terminate edges with moulding.

.3 Cut, scribe and finish edges of tegular units in matching colour where partial tile sizes are required at perimeters.

3.4 INTERFACE WITH OTHER WORK

.1 Coordinate with Section 09 53 00 - Acoustical Suspension.

.2 Coordinate ceiling work to accommodate components of other sections, such as light fixtures, diffusers, speakers, sprinkler heads, to be built into acoustical ceiling components.

3.5 SCHEDULE

.1 Refer to Reflected Ceiling Plans for locations.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 All relevant Division 1 Sections

.2 Section 09 21 16 - Gypsum Board Assemblies.

.3 Section 09 51 13 - Acoustical Panel Ceilings.

.4 Division 23 - HVAC.

.5 Division 26 - Lighting Equipment.

1.2 REFERENCES

.1 American Society for Testing and Materials International (ASTM)
- .1 ASTM C635/C635M-07, Standard Specifications for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings.
- .2 ASTM C636/C636M-08, Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.

.2 Health Canada/Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

1.3 DESIGN REQUIREMENTS

.1 Maximum deflection: 1/360th of span to ASTM C635 deflection test.

1.4 SUBMITTALS

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

.2 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.
- .1 Submit one representative model of each type ceiling suspension system.
- .2 Ceiling system to show basic construction and assembly, treatment at walls, recessed fixtures, splicing, interlocking, finishes, acoustical unit installation.

1.5 DELIVERY, STORAGE AND HANDLING

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

1.6 WASTE MANAGEMENT AND DISPOSAL:

.1 Separate waste materials for reuse and recycling in accordance with Division 01.

2 Products

2.1 MATERIALS

.1 Heavy duty system to ASTM C635.

.2 Basic materials for suspension system: commercial quality cold rolled steel zinc coated.

.3 Suspension system: non fire rated, made up as follows:
.1 Two directional exposed tee bar grid.

.4 Exposed tee bar grid components:
.1 Components die cut. Main tee with double web, rectangular bulb and rolled cap on exposed face. Cross tee with rectangular bulb; web extended to form positive interlock with main tee webs; lower flange extended and offset to provide flush intersection.
.2 25 mm (15/16") Grid Face.

.5 Finish: shop painted satin sheen: white satin.

.6 Hanger wire: galvanized soft annealed steel wire:
.1 3.6 mm diameter for access tile ceilings.

.7 Hanger inserts: purpose made.
.1 Acceptable material:
.1 Hilti HCA Ceiling anchor.
.2 ITW Ramset RA 5170.
.3 VCANTIE Wire wedge anchor.

.8 Accessories: splices, clips, wire ties, retainers and wall mouldings to complement suspension system components, as recommended by system manufacturer.

.9 Exposed edge moulding:
.1 Cold rolled steel channel moulding, hemmed, prefinished to match tee bar grid.

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 data sheets.

3.2 INSTALLATION

.1 Installation: in accordance with ASTM C636 except where specified otherwise.

.2 Install suspension system to manufacturer's instructions.

.3 Do not erect ceiling suspension system until work above ceiling has been inspected by Consultant.

.4 Secure hangers to overhead structure using attachment methods as indicated.

.5 Install hangers spaced at maximum 1200 mm (48") centres and within 150 mm (6") from ends of main tees.

.6 Lay out system according to reflected ceiling plan.

.7 Ensure suspension system is co-ordinated with location of related components.

.8 Install wall moulding to provide correct ceiling height.

.9 Completed suspension system to support super-imposed loads, such as lighting fixtures diffusers grilles and speakers.

.10 Support at light fixtures and diffusers with additional ceiling suspension hangers within 150 mm (6") of each corner and at maximum 600 mm (24") around perimeter of fixture.

.11 Interlock cross member to main runner to provide rigid assembly.

.12 Frame at openings for light fixtures, air diffusers, speakers and at changes in ceiling heights.

.13 Finished ceiling system to be square with adjoining walls and level within 1:1000.

3.3 CLEANING

.1 Proceed in accordance with Division 01.

.2 Touch up scratches, abrasions, voids and other defects in painted surfaces.

END OF SECTION

1 General

1.1 RELATED REQUIREMENTS

.1 All related Division 1 Sections.

.2 Section 07 92 00 – Sealants

.3 Section 09 00 00 – Finish Schedule

1.2 REFERENCES

.1 ASTM International (ASTM)

.1 ASTM F710-11, Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.

.2 ASTM F1066-04(2010)e1, Standard Specification for Vinyl Composition Floor Tile.

.3 ASTM F1303 04(2014), Standard Specification for Sheet Vinyl Floor Covering with Backing.

.4 ASTM F1516 13, Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended).

.5 ASTM F1700-13a, Standard Specification for Solid Vinyl Floor Tile.

.6 ASTM F1913-04(2010), Standard Specification for Vinyl Sheet Floor Covering Without Backing.

.7 ASTM F2034-08(2013), Standard Specification for Sheet Linoleum Floor Covering.

.2 Underwriters Laboratories of Canada (ULC):

.1 CAN/ULC S102.2 10, Method of Test for Surface Burning Characteristics of Flooring, Floor Covering and Miscellaneous Materials and Assemblies.

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide product data in accordance with Section 01 33 00 - Submittal Procedures.

.1 Submit one copy of product data for each type of product specified.

.2 Provide samples in accordance with Section 01 33 00 - Submittal Procedures.

.1 Submit duplicate 300 x 300 mm sample pieces of sheet material, 300 mm long base, feature strips, edge strips.

.3 Closeout Submittals:

.1 Provide manufacturer's printed recommendations for general maintenance, including cleaning instructions and guidelines for use of waxes and other protective coatings and appearance enhancers in accordance with Section 01 70 00 – Contract Closeout.

.2 Submit warranties.

1.4 EXTRA MATERIALS

.1 Provide extra materials of resilient sheet flooring and adhesives in accordance with Section 01 70 00 – Contract Closeout.

.2 Provide 5 m^2 of each colour, pattern and type flooring material required for project for maintenance use.

.3 Extra materials one piece and from same production run as installed materials.

.4 Clearly identify each roll of sheet flooring and each container of adhesive.

.5 Deliver to Owner upon completion of the work of this section.

.6 Store where directed by Owner.

1.5 QUALITY ASSURANCE

.1 Regulatory Requirements: Provide products that meet requirements of ULC S102.2 as applicable for required flame spread ratings; labelled and listed by Underwriters Laboratories of Canada (ULC), or another testing and inspecting agency acceptable to authorities having jurisdiction.

.2 Qualifications: Provide proof of qualifications when requested by Consultant:

.1 Installer shall be Trade Qualified for their specific flooring products by the National Floor Covering Association.

.2 Resilient Flooring Installer: Use an installer who is competent in heat welding and have a minimum of three (3) years documented experience in the installation of resilient sheet flooring and seams in accordance with manufacturer's training or certification program:

.3 Source Limitations: Obtain each type, colour, and pattern of flooring or accessories specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Deliver, store and handle materials in accordance with Section 01 61 00 – Material & Equipment.

.2 Deliver materials in good conditions to the jobsite in the manufacturer's original unopened containers that bear the name and brand of the manufacturer, project identification, and shipping and handling instructions.

.3 Store materials in a clean, dry, enclosed space off the ground, and protect from the weather and from extremes of heat and cold. Protect adhesive from freezing. Store flooring, adhesives and accessories in the spaces where they will be installed for at least 48 hours before beginning installation.

.4 Install flooring and accessories after the other finishing operations, including painting, have been completed. Close spaces to traffic during the installation of the flooring. Do not install flooring over concrete slabs until they are sufficiently dry to achieve a bond with the adhesive, in accordance with the manufacturer's recommended bond and moisture tests.

1.7 AMBIENT CONDITIONS

.1 Maintain air temperature and structural base temperature at flooring installation area above 20 degrees for 48 hours before, during and 48 hours after installation.

1.8 WARRANTIES

.1 Provide Manufacturer's Warranty for product to be free from manufacturer's defects for a period of 5 years from date of substantial performance.

.2 Contractor agrees to correct any deficiencies of labour or material found in the work performed for a period of 2 years from date of Substantial Performance.

2 Products

2.1 MATERIALS

.1 Provide vinyl composite tile (VCT), treads (with non-slip safety nosing with contrasting colour), and rubber base, in accordance with Drawings; FloorScore certified.

- .1 Sheet vinyl without backing: to ASTM F1913.
- .2 Vinyl composite tile: to ASTM F1066.
- .3 Solid vinyl tile: to ASTM F1700.
- .4 Rubber tile: to ASTM F1344.
- .5 Rubber sheet: to ASTM F1860.
- .6 Rubber base: to ASTM F1861.

2.2 COLOURS – GENERAL

.1 Colour(s): Colours for the products specified in this Section 09 65 00 shall be selected by the Consultant from the manufacturer's full range in each instance, but shall not exceed four different colours overall for the project.

2.3 VINYL SHEET FLOORING

.1 Sheet vinyl (RS) without backing: to ASTM F1913, Type II, Grade 1 Commercial.

- .1 Minimum width: 2.0 meters.
- .2 Total Thickness: nominal 2 mm
- .3 Texture: embossed.
- .4 Pattern: as selected by Consultant.
- .5 Colour: as selected by Consultant.
- .6 Acceptable Manufacturers:
  - .1 Forbo
- .7 Product Name: Eternal
- .8 Colour and Pattern: Smoke 174032 (SVF)

2.4 RESILIENT VINYL TILE FLOORING

.1 Vinyl composition tile (VT/VCT): 3 mm thick x 305 x 305 mm size, in standard colours selected by Consultant; FloorScore certified.

.2 Acceptable Materials:

- .1 Forbo

.3 Product Name: Allure

.4 Colour and Pattern: White wash elegant dark W60064 (LVT)

2.5 ACCESSORIES

.1 External corner protectors: extruded aluminum, smooth, mill finish, type recommended by flooring manufacturer.

.2 Sub-floor filler and leveler 2-part latex-type filler requiring no water, as recommended by flooring manufacturer for use with their product.

.3 Primers and adhesives: waterproof, of types recommended by resilient flooring manufacturer for specific material on applicable substrate, above, on or below grade.

.4 Welding rod: designed to weld seams of sheet flooring, as recommended by flooring manufacturer, colour as directed by Consultant.

.5 Sealer and wax: type recommended by resilient flooring material manufacturer for material type and location.

2.6 FLOOR PROTECTION

.1 Protection Mat: breathable mat to allow for heavy traffic on flooring.

.1 Acceptable Materials: EZcover, by McTech Group.

3 Execution

3.1 INSPECTION

.1 Contractor is to examine the as-built concrete slab prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds and other foreign materials that might prevent adhesive bond. This trade is to allow for the grinding and/or filling that will be required over area to receive resilient flooring. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with specified filler. Floor levelness to be plus or minus 3mm in 3000mm or better, as required by resilient floor manufacturer.

.2 Inspect subfloors prior to installation to determine that surfaces are free from curing, sealing, parting and hardening compounds and other foreign materials that might prevent adhesive bond. Visually inspect for evidence of moisture, alkaline salts, carbonation, dusting, mold or mildew.

.3 Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed with the installation until unsatisfactory conditions have been corrected.

.4 Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance and approval of the subfloor. Installation indicates acceptance of substrates with regard to conditions existing at the time of installation.

3.2 SUB-FLOOR TREATMENT

.1 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler is cured and dry.

.2 Prime concrete to floor manufacturer's printed instructions.

3.3 MANUFACTURER'S INSTRUCTIONS

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

3.4 SITE VERIFICATION OF CONDITIONS

.1 Ensure concrete floors have maximum 2.5% moisture content, exhibit normal alkalinity and no carbonization or dusting.

.2 Ensure concrete floors are clean, smooth, and flat to flooring manufacturer’s requirements and technical datasheets.

3.5 PREPARATION

.1 Remove existing resilient flooring.

.2 Remove or treat old adhesives to prevent residual, old flooring adhesives from bleeding through to new flooring and/or interfering with the bonding of new adhesives.

.3 Clean floor and apply filler; trowel and float to leave smooth, flat hard surface. Prohibit traffic until filler cured and dry.

.4 Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.

.5 Prime floor substrate to resilient flooring manufacturer's printed instructions.

3.6 INSTALLATION: GENERAL

.1 Provide high ventilation rate, with maximum outside air, during installation, and for 48 to 72 hours after installation. If possible, vent directly to outside. Do not let contaminated air recirculate through district or whole building air distribution system. Maintain extra ventilation for at least one month following building occupation.

.2 Apply adhesive uniformly using recommended trowel in accordance with flooring manufacturer's instructions. Do not spread more adhesive than can be covered by flooring before initial set takes place.

.3 Cut flooring around fixed objects.

.4 Install feature strips and floor markings where indicated. Fit joints tightly.

.5 Install flooring in pan type floor access covers. Maintain floor pattern.

.6 Continue flooring over areas which will be under built-in furniture.

.7 Continue flooring through areas to receive movable type partitions and lockers without interrupting floor pattern.

.8 Terminate flooring at centreline of door in openings where adjacent floor finish or colour is dissimilar.

.9 Install metal edge strips at unprotected or exposed edges where flooring terminates.

3.7 INSTALLATION: ACCESSORIES

.1 Install metal edge strips at unprotected and exposed edges where flooring terminates.

.2 Install cove support strips continuously where sheet flooring is to be coved to vertical surfaces.

.3 Install cap strips continuously to cover top edge of coved sheet flooring. Mitre corners. Top of cap strip shall be straight and level to variation of plus or minus 3 mm over 3 m straight edge.

3.8 FIELD QUALITY CONTROL

.1 Manufacturer's Field Services:

.1 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.

3.9 CLEANING

.1 Progress Cleaning: clean in accordance with Division 01. Leave Work area clean at end of each day.

.1 Remove excess adhesive from floor, base and wall surfaces without damage.

.2 Clean, seal and wax floor and base surface to flooring manufacturer's printed instructions.

.2 Final Cleaning: upon completion remove surplus materials, rubbish, tools and equipment in accordance with Division 01. Perform cleaning after installation to remove construction and accumulated environmental dirt.

.3 Manage and dispose of demolition and construction waste materials in accordance with Division 01.

3.10 PROTECTION

.1 Protect new floors from time of final set of adhesives until final inspection.

.2 Prohibit traffic on floor for 48 hours after installation.

.3 Protect floors until Substantial Performance by covering with breathable protection mat.

END OF SECTION

1 General

1.1 RELATED SECTIONS

.1 All relevant Division 1 Sections

.2 Section 07 92 00 - Joint Sealing.

.3 Section 08 11 00 – Metal Frames

.4 Section 08 14 16 – Flush Wood Doors

.5 Section 09 21 16 - Gypsum Board Assemblies.

1.2 REFERENCES

.1 Department of Justice Canada (Jus)
- .1 Canadian Environmental Protection Act (CEPA), 1999, c. 33

.2 Environmental Protection Agency (EPA)
- .1 EPA Test Method for Measuring Total Volatile Organic Compound Content of Consumer Products, Method 24 - 1995, (for Surface Coatings).

.3 Health Canada / Workplace Hazardous Materials Information System (WHMIS)
- .1 Material Safety Data Sheets (MSDS).

.4 Master Painters Institute (MPI)
- .1 MPI Architectural Painting Specifications Manual, 2004.

.5 National Fire Code of Canada (NFC) - 2010.

.6 Society for Protective Coatings (SSPC).
- .1 SSPC Painting Manual, Volume Two, 8th Edition, Systems and Specifications Manual.

1.3 QUALITY ASSURANCE

.1 Qualifications:
- .1 Contractor: minimum of five years proven satisfactory experience. Provide list of last three comparable jobs including, job name and location, specifying authority, and project manager.
- .2 Journeymen: qualified journeymen who have "Tradesman Qualification Certificate of Proficiency" engaged in painting work.
- .3 Apprentices: working under direct supervision of qualified trades person in accordance with trade regulations.

.2 Retain purchase orders, invoices and other documents to prove that all materials utilized in this contract meet requirements of the specifications. Produce documents when requested by Consultant.

.3 Health and Safety:
- .1 Do construction occupational health and safety in accordance with Section 01 35 29 – Occupational Health and Safety Requirements.

1.4 SUBMITTALS

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

.2 Product Data:
- .1 Submit product data and instructions for each paint and coating product to be used.
- .2 Submit full records of all products used. List each product in relation to finish formula and include the following:
  - .1 Finish formula designation (PT-1, PT-2, etc.).
  - .2 Product type and use.
  - .3 Manufacturer's product number.
  - .4 Colour numbers.
  - .5 Manufacturer's Material Safety Data Sheets (MSDS).
  - .6 Maximum VOC classification.
- .3 Submit manufacturer's installation and application instructions for each product specified.
- .4 At completion of the project submit 4 copies of a Maintenance Manual. Each one is to include:
  - .1 Cleaning instructions.
  - .2 Product list.
  - .3 Colour schedule.
  - .4 Product technical data.
  - .5 Material Safety Data Sheets.
  - .6 Colour samples.

.3 Samples:
- .1 Submit full range colour sample chips to indicate where colour availability is restricted.

.4 Closeout Submittals: submit maintenance data for incorporation into specified manual. Include following:
- .1 Product name, type and use.
- .2 Manufacturer's product number.
- .3 Colour numbers.
- .4 MPI Environmentally Friendly classification system rating.

1.5 MAINTENANCE

.1 Extra Materials:
- .1 Deliver extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels.
- .2 Quantity: provide one - four litre can of each type and colour of finish coating. Identify colour and paint type in relation to established colour schedule and finish system.
- .3 Delivery, storage and protection: comply with University’s Project Manager requirements for delivery and storage of extra materials.

1.6 DELIVERY, STORAGE AND HANDLING

.1 Packing, Shipping, Handling and Unloading:
- .1 Pack, ship, handle and unload materials in accordance with manufacturer's written instructions.

.2 Acceptance at Site:
- .1 Identify products and materials with labels indicating:

.1 Manufacturer's name and address.
.2 Type of paint or coating.
.3 Compliance with applicable standard.
.4 Colour number in accordance with established colour schedule.

.3 Remove damaged, opened and rejected materials from site.

.4 Storage and Protection:
.1 Provide and maintain dry, temperature controlled, secure storage.
.2 Store materials and supplies away from heat generating devices.
.3 Store materials and equipment in well ventilated area with temperature range 7 degrees C to 30 degrees C.

.5 Store temperature sensitive products above minimum temperature as recommended by manufacturer.

.6 Keep areas used for storage, cleaning and preparation clean and orderly. After completion of operations, return areas to clean condition.

.7 Remove paint materials from storage only in quantities required for same day use.

.8 Fire Safety Requirements:
.1 Provide one 9 kg Type ABC dry chemical fire extinguisher adjacent to storage area.
.2 Store oily rags, waste products, empty containers and materials subject to spontaneous combustion in ULC approved, sealed containers and remove from site on a daily basis.
.3 Handle, store, use and dispose of flammable and combustible materials in accordance with National Fire Code of Canada requirements.

1.7 WASTE MANAGEMENT AND DISPOSAL

.1 Separate waste materials for recycling in accordance with Division 01.

.2 Collect and separate for disposal paper, plastic, polystyrene and corrugated cardboard packaging material for recycling in accordance with Waste Management Plan (WMP).

.3 Separate for reuse and recycling steel, metal and plastic waste in accordance with Waste Management Plan (WMP).

.4 Place materials defined as hazardous or toxic in designated containers.

.5 Handle and dispose of hazardous materials in accordance with Regional and Municipal, regulations.

.6 Ensure emptied containers are sealed and stored safely.

.7 Unused paint materials must be disposed of at official hazardous material collections site as approved by Consultant.

.8 Paint, stain and wood preservative finishes and related materials (thinners, and solvents) are regarded as hazardous products and are subject to regulations for disposal. Information on these controls can be obtained from Provincial Ministries of Environment and Regional levels of Government.

.9 Material which cannot be reused must be treated as hazardous waste and disposed of in an appropriate manner.

.10 Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in containers or areas designated for hazardous waste.

.11 To reduce the amount of contaminants entering waterways, sanitary/storm drain systems or into ground follow these procedures:
- .1 Retain cleaning water for water-based materials to allow sediments to be filtered out.
- .2 Retain cleaners, thinners, solvents and excess paint and place in designated containers and ensure proper disposal.
- .3 Return solvent and oil soaked rags used during painting operations for contaminant recovery, proper disposal, or appropriate cleaning and laundering.
- .4 Dispose of contaminants in approved legal manner in accordance with hazardous waste regulations.
- .5 Empty paint cans are to be dry prior to disposal or recycling (where available).

.12 Where paint recycling is available, collect waste paint by type and provide for delivery to recycling or collection facility.

.13 Set aside and protect surplus and uncontaminated finish materials. Deliver to organizations for verifiable re-use or re-manufacturing.

1.8 SITE CONDITIONS

.1 Heating, Ventilation and Lighting:
- .1 Ventilate enclosed spaces.
- .2 Provide heating facilities to maintain ambient air and substrate temperatures above 10 degrees C for 24 hours before, during and after paint application until paint has cured sufficiently.
- .3 Provide continuous ventilation for seven days after completion of application of paint.
- .4 Provide temporary ventilating and heating equipment where permanent facilities are not available or supplemental ventilating and heating equipment if ventilation and heating from existing system is inadequate to meet minimum requirements.
- .5 Provide minimum lighting level of 270 Lux on surfaces to be painted.

.2 Temperature, Humidity and Substrate Moisture Content Levels:
- .1 Unless pre-approved written approval by Consultant and product manufacturer, perform no painting when:
  - .1 Ambient air and substrate temperatures are below 10 degrees C.
  - .2 Substrate temperature is above 32 degrees C unless paint is specifically formulated for application at high temperatures.
  - .3 Substrate and ambient air temperatures are not expected to fall within MPI or paint manufacturer's prescribed limits.
  - .4 The relative humidity is under 85% or when the dew point is more than 3 degrees C variance between the air/surface temperature. Paint should not be applied if the dew point is less than 3 degrees C below the ambient or surface temperature. Use sling psychrometer to establish the relative humidity before beginning paint work.
  - .5 Rain or snow are forecast to occur before paint has thoroughly cured or when it is foggy, misty, raining or snowing at site.
  - .6 Ensure that conditions are within specified limits during drying or curing process, until newly applied coating can itself withstand 'normal' adverse environmental factors.

.2 Perform painting work when maximum moisture content of the substrate is below:
.1 12% for concrete and masonry. Allow new concrete and masonry to cure minimum of 28 days.
.2 15% for wood.
.3 12% for plaster and gypsum board.
.3 Test for moisture using calibrated electronic Moisture Meter. Test concrete floors for moisture using "cover patch test".
.4 Test concrete, masonry and plaster surfaces for alkalinity as required.

.3 Surface and Environmental Conditions:
.1 Apply paint finish in areas where dust is no longer being generated by related construction operations or when wind or ventilation conditions are such that airborne particles will not affect quality of finished surface.
.2 Apply paint to adequately prepared surfaces and to surfaces within moisture limits.
.3 Apply paint when previous coat of paint is dry or adequately cured.

.4 Additional interior application requirements:
.1 Apply paint finishes when temperature at location of installation can be satisfactorily maintained within manufacturer's recommendations.

2 Products

2.1 MATERIALS

.1 Provide paint materials for paint systems from single manufacturer.

.2 Conform to latest MPI requirements for interior painting work including preparation and priming.

2.2 COLOURS

.1 Consultant will provide Colour Schedule after Contract award.

.2 Colour Schedule will be based upon selection of no more than five (5) colours for entire project.

.3 Selection of colours from manufacturer’s full range of colours.

.4 Where specific products are available in restricted range of colours, selection based on limited range.

.5 Second coat in three coat system to be tinted slightly lighter colour than top coat to show visible difference between coats.

2.3 MIXING AND TINTING

.1 Perform colour tinting operations prior to delivery of paint to site.

.2 Mix paste, powder or catalyzed paint mixes in accordance with manufacturer's written instructions.

.3 Use and add thinner in accordance with paint manufacturer's recommendations. Do not use kerosene or similar organic solvents to thin water-based paints.

.4 Thin paint for spraying in accordance with paint manufacturer's instructions.

.5 Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and colour and gloss uniformity.

2.4 INTERIOR PAINTING SYSTEMS

Paint formula types are based on the following manufacturers' products:
.1 PPG: Pittsburgh Paints.

.1 Paint PT-1: for gypsum board walls, ceilings and bulkheads, apply:
  .1 One coat Pure Performance latex primer (PPG code 9-900; 0 g/L VOC). Two coats Pitt-Tech Plus Acrylic Satin (PPG Code 90-1110 Series; 85 g/L VOC) @ 2.0 to 3.0 mils DFT per coat.

.2 Paint PT-2: for primed steel frames, miscellaneous steel items and existing windows and radiators, apply:
  .1 Two coats of Pitt-Tech Plus 100% acrylic Semi-Gloss (PPG Code 90-1210 Series; 90 g/L VOC) @ 2.0 to 3.0 mils DFT per coat.

.3 Paint PT-3: for all wood at mirror apply:
  .1 One coat of Seal Grip Interior/Exterior Acrylic Primer/Sealer (PPG Code 17-921C; 81 g/L VOC) @ 1.5 to 2.0 DFT. Two coats of finish paint as noted above. (PT-1 at mirror light valences.)

.4 Paint PT-4: for all wood doors, apply:
  .1 One coat of Dulux gripper #60000 at a spread rate of 3mils dry.
  .2 Two coats of Dulux Lifemaster semi-gloss spread rate of 3mils per dry coat.

.5 Paint PT-5: for all painted concrete blocks, apply:

.6 For paint required to blend and match existing finishes, select PPG product similar to above that suits existing.

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 data sheet.

3.2 GENERAL

.1 Perform preparation and operations for interior painting in accordance with MPI Architectural Painting Specifications Manual except where specified otherwise.

.2 Apply paint materials in accordance with paint manufacturer's written application instructions.

3.3 EXAMINATION

.1 Investigate existing substrates for problems related to proper and complete preparation of surfaces to be painted. Report to Consultant damages, defects, unsatisfactory or unfavourable conditions before proceeding with work.

.2 Conduct moisture testing of surfaces to be painted using properly calibrated electronic moisture meter, except test concrete floors for moisture using simple "cover patch test". Do not proceed with work until conditions fall within acceptable range as recommended by manufacturer.

.3 Maximum moisture content as follows:
- .1 Stucco, plaster and gypsum board: 12 %.
- .2 Concrete: 12%.
- .3 Clay and Concrete Block/Brick: 12%.
- .4 Wood: 15%.

3.4 PREPARATION

.1 Protection:
- .1 Protect existing building surfaces and adjacent structures from paint spatters, markings and other damage by suitable non-staining covers or masking. If damaged, clean and restore surfaces as directed by Consultant.
- .2 Protect items that are permanently attached such as Fire Labels on doors and frames.
- .3 Protect factory finished products and equipment.
- .4 Protect all persons in and about the building.

.2 Surface Preparation:
- .1 Remove electrical cover plates, light fixtures, surface hardware on doors, bath accessories and other surface mounted equipment, fittings and fastenings prior to undertaking painting operations. Identify and store items in secure location and re-installed after painting is completed.
- .2 Move and cover furniture and portable equipment as necessary to carry out painting operations. Replace as painting operations progress.
- .3 Place "WET PAINT" signs as painting operations progress.

.3 Clean and prepare surfaces in accordance with MPI Architectural Painting Specification Manual requirements. Refer to MPI Manual in regard to specific requirements and as follows:
- .1 Remove dust, dirt, and other surface debris by vacuuming, wiping with dry, clean cloths or compressed air.
- .2 Wash surfaces with a biodegradable detergent and bleach where applicable and clean warm water using a stiff bristle brush to remove dirt, oil and other surface contaminants.
- .3 Rinse scrubbed surfaces with clean water until foreign matter is flushed from surface.
- .4 Allow surfaces to drain completely and allow to dry thoroughly.
- .5 Prepare surfaces for water-based painting, water-based cleaners should be used in place of organic solvents.
- .6 Use trigger operated spray nozzles for water hoses.
- .7 Many water-based paints cannot be removed with water once dried. Minimize use of mineral spirits or organic solvents to clean up water-based paints.

.4 Prevent contamination of cleaned surfaces by salts, acids, alkalis, other corrosive chemicals, grease, oil and solvents before prime coat is applied and between applications of remaining coats. Apply primer, paint, or pretreatment as soon as possible after cleaning and before deterioration occurs.

.5 Where possible, prime non-exposed surfaces of new wood surfaces before installation. Use same primers as specified for exposed surfaces.
- .1 Apply vinyl sealer to MPI #36 over knots, pitch, sap and resinous areas.

.2 Apply wood filler to nail holes and cracks.

.6 Sand and dust between coats as required to provide adequate adhesion for next coat and to remove defects visible from a distance up to 900mm (36").

.7 Clean any existing metal surfaces to be painted by removing rust, loose mill scale, welding slag, dirt, oil, grease and other foreign substances in accordance with MPI requirements. Remove traces of blast products from surfaces, pockets and corners to be painted by brushing with clean brushes, blowing with clean dry compressed air or vacuum cleaning.

.8 Caulk perimeter of all door frames prior to any painting.

.9 Do not apply paint until prepared surfaces have been accepted by Consultant.

3.5 APPLICATION

.1 Method of application to be as approved by paint manufacturer and Consultant. Apply paint by brush, roller, or sprayer. Conform to manufacturer's application instructions unless specified otherwise.

.2 Brush and Roller Application:
- .1 Apply paint in uniform layer using brush and/or roller type suitable for application.
- .2 Work paint into cracks, crevices and corners.
- .3 Paint surfaces and corners not accessible to brush using spray, daubers and/or sheepskins. Paint surfaces and corners not accessible to roller using brush, daubers or sheepskins.
- .4 Brush and/or roll out runs and sags, and over-lap marks. Rolled surfaces free of roller tracking and heavy stipple.
- .5 Remove runs, sags and brush marks from finished work and repaint.

.3 Spray application:
- .1 Provide and maintain equipment that is suitable for intended purpose, capable of atomizing paint to be applied, and equipped with suitable pressure regulators and gauges.
- .2 Keep paint ingredients properly mixed in containers during paint application either by continuous mechanical agitation or by intermittent agitation as frequently as necessary.
- .3 Apply paint in uniform layer, with overlapping at edges of spray pattern. Back roll first coat application.
- .4 Brush out immediately all runs and sags.
- .5 Use brushes and rollers to work paint into cracks, crevices and places which are not adequately painted by spray.

.4 Use dipping, sheepskins or daubers only when no other method is practical in places of difficult access.

.5 Apply coats of paint continuous film of uniform thickness. Repaint thin spots or bare areas before next coat of paint is applied.

.6 Allow surfaces to dry and properly cure after cleaning and between subsequent coats for minimum time period as recommended by manufacturer.

.7 Sand and dust between coats to remove visible defects.

.8 Finish surfaces both above and below sight lines as specified for surrounding surfaces, including such surfaces as tops of interior cupboards and cabinets and projecting ledges.

.9 Paint all wood at suspended mirrors in kitchen.

.10 Finish top, bottom, edges and cutouts of doors after fitting as specified for door surfaces.

3.6 MECHANICAL/ELECTRICAL EQUIPMENT

.1 Finished areas: paint exposed heating radiators, piping, and other mechanical and electrical equipment unless directed otherwise.

.2 In unfinished areas and above ceilings (T-bar, GWB, etc.): leave exposed conduits, piping, hangers, ductwork and other mechanical and electrical equipment in original finish and touch up scratches and marks.

.3 Touch up scratches and marks on factory painted finishes and equipment with paint as supplied by manufacturer of equipment.

.4 Do not paint over mechanical or electrical identification labelling, colour codes or nameplates.

.5 Keep sprinkler heads free of paint.

.6 Paint fire protection piping and fire extinguisher cabinets to match adjacent ceiling or wall colours as selected by Consultant.

.7 Paint disconnect switches for fire alarm system and exit light systems in red enamel.

3.7 SITE TOLERANCES

.1 Walls: no defects visible from a distance of 900 mm (36") at 90 degrees to surface.

.2 Ceilings: no defects visible from floor at 45 degrees to surface when viewed using final lighting source.

.3 Final coat to exhibit uniformity of colour and uniformity of sheen across full surface area.

3.8 RESTORATION

.1 Clean and re-install hardware items removed before undertaken painting operations.

.2 Remove protective coverings and warning signs as soon as practical after operations cease.

.3 Remove paint splashings on exposed surfaces that were not painted. Remove smears and spatter immediately as operations progress, using compatible solvent.

.4 Protect freshly completed surfaces from paint droppings and dust to approval of Consultant. Avoid scuffing newly applied paint.

.5 Restore areas used for storage, cleaning, mixing and handling of paint to clean condition as approved by Consultant.

END OF SECTION

The Executed Agreement (DTIR Standard Form of Agreement between Minister and Contractor) including General Conditions and Supplementary Conditions, Division 01, applicable Drawings and amendments are part of and are to be read in conjunction with this Section.

1. General

1.1 RELATED WORK

.1	Plumbing connections	Mechanical Sections
.2	Electrical connections	Electrical Sections
.3	Exhaust hood	Mechanical Sections

1.2 SHOP DRAWINGS & PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Section 01 33 00 Submittal Procedures.

.2 All equipment as listed are to be quoted and supplied, requests for approval of equal or superior equipment must be requested two weeks prior to tender closing, submitting equipment information and cut sheet for each item requested,

PART 2 Products

2.1 MATERIALS & COMPONENTS

.1 Stainless steel: to CSA ASTM A167-82, Type 304 with No. 4 finish unless otherwise indicated.

.2 Stainless Steel Tubing: to ASTM A269-83, Type 302, commercial grade, seamless welded with No. 4 finish.

.3 Fastenings: for securing corrosion resistant or plated metal parts to be as corrosion resistant as, and colour matched to materials being fastened. Fastenings used for securing unplated ferrous metal or wood parts are to have a minimum protective coating of cadmium or zinc. Where possibility of food or food acid contact, plating to be chromium; cadmium, zinc or other toxic coatings not accepted.

.4 Chrome and Nickel Plating: to ASTM B456-79 Service Condition Number SC 3, polished finish.

.5 Sealant: aluminum coloured sealing compound such as Dow Corning Silastic 732 RTV silicone adhesive sealant, to meet requirements of the National Sanitation Foundation (NSF) for direct contact with food, and stay flexible during long term exposure to temperature ranging from 73.3°C to 232.0°C. Seal all backsplashes to walls.

2.2 FABRICATION

.1 Fabricate work square, true, straight, to fit conditions and as indicated. Design is to afford maximum sanitary conditions and is not to have any areas where disease causing bacteria may accumulate.

.2 Fabricate equipment from Stainless Steel, except as otherwise indicated.

.3 Fit and shop-assemble equipment ready for erection where possible.

.4 Carefully deburr and smooth new edges. Sharp or rough edges will not be acceptable.

.5 Straight Lengths: Counter tops, table tops, drain boards, tray rails, shelving and the like to be one continuous piece if 300 mm or less in length. If over 300 mm, Stainless Steel sections to be welded, including field joints, unless otherwise indicated.

.6 Welding: to be sound, non-porous and free from imperfections. Weld metal to be colour matched to, and be as corrosion resistant as the parent metal. Spot welds, if any, to be minimum 3.18 mm diameter and have full penetration. All exposed welds to be ground smooth and polished to match parent metal. All other welds to be ground smooth. The welding or finishing is not to impair the corrosion resistance of the finished article. All welds, except spot welds, are to be 6+continuous unless otherwise indicated.

,7 Remove all creating materials, packaging, etc from site, clean all equipment ready for inspection and start-up and demo,

2.3 EQUIPMENT

.1 Item #1 –Soiled Dish Tabling 30' x 132"
Stainless steel to configuration indicated, stainless steel tubular legs, cross bracing and adjustable feet, backsplash rolled up and splayed, edges rolled. Integral pre-rinse/pot sinks, 20' x 20" x 14"deep, all curved corners, removable s/s perf basket c/w slat cover. s/s panel on wall at pre-rinse spray, t & s spray assembly model B-0133B c/w add on faucet with 254mm spout
Services: 13mm H&C water pre-rinse spray assembly c/w add-on faucet by this section, 38mm drain to solids interceptor by **Mechanical Divisions**.

.2 Item #2 – Table mounted sloped dish rack shelf
Stainless steel wall shelf angled 20" wide & 28"ong

.3 Item #3 – Pre Rinse Sink – Part of item-1

.4 Item #4 – Dishwasher
Hobart Model AM-15VLT Ventless tall dishwasher complete with all standard features and single point connection, two peg racks, two combination racks, one pan rack.
Services: ½'hot & cold water, 1½" direct drain, 208V, 3 phase, 45.4 amps direct connection,

.5 Item #5 –Clean Dish Tabling 30' x 36"
Stainless steel to configuration indicated, stainless steel tubular legs, cross bracing and adjustable feet, backsplash rolled up and splayed, edges rolled.

.6 Item #6 – Wall mounted shelf
Stainless steel wall shelf flat s/s 12"wide to length 30" long

.7 Item #7 – Hand Sink (2)
Tarrison model 7HSF c/w 20 faucet, soap and towel dispenser
Services: ½" hot & cold water, 1 ½ " direct drain

.8 Item # 8- Three Shelf Cart
Metro MW404 three shelf cart, 1 solid s/s shelf and two wire shelves, castors and brakes

.9 Item #9 - Storage Shelving (4)

Tarrison. Coated 5 tier high, 72" posts, 5" casters. two with brakes per shelf unit
3 units 48" x 18", & 1 unit 36" x 18".

.10 Item #10 – Mobile Work Tables (2)
Stainless Steel Work Table, 60" x 30" x 36"high solid undershelf, stainless steel tubular legs and 5" non-marking HD casters, one 20" x 20" x 5" utility drawers cutting board slides mounted under drawer housing to hold two cutting board supply four cutting boards 18" x 26"

.11 Item #11 – Slicer
Hobart # Edge 12 slicer, manual single speed 12" blade.
Services: 120V, 1 phase, C&P, 1/2 hp, 4 amps.

.12 Item #12 – Slicer Stand
16 gauge stainless steel top, undershelf and legs and 5" non-marking HD casters.
24" x 30" x 36"high

.13 Item #13 – Mobile Bins (3)
Rubbermaid Model 3600, cw slidig cover and scoop

.14 Item #14 – Induction burners
Cooktec model ACD1800G
Services: 120V, 1 phase, C&P.

.15 Item #15 – Bakers Table
Wood top 30" x 78" open base (maple), 2" thick top with 4" hardwood risers with s/s overshelf c/w spice bins supported on 1 ½ " OD, one section of drawer (3), stainless steel legs complete with cross bracing at sides and rear.
Services 120V, 1P outlet mounted under table top

.16 Item #16 –Mixer
Hobart N50 counter style mixer or approved equal.
c/w s/s bowl, beater, hook and whisk.
Services: 120V, 1 phase, C&P, 6 hp, 2.9.amps

.17 Item #17- Bun pan carts
Cown Model FAZNBR20, 3" spacing, for 18" x 26" pans

.18 Item #18 – Refrigerator
Traulsen #G20010 digital thermometer. one extra shelf
Services: 120V, 1 phase, C&P, 1/3 hp.

.19 Item #19 - Freezer
Traulsen #G22010 digital thermometer.
Services: 120V, 1 phase, C&P, 1/2 hp, NEMA-5-15R.

.20 Item #20 - Utility cart
Metro model BC2030-34MB three shelf cart blue. Standard unit.

.21 Item #21 - Storage shelf units (2)
Metromax mobile shelf cart, 36"x 18"x80" 5 tier, casters, brakes. open grid, removable shelf mats

.22 Item #22 – Pot & Utensil Rack
S/S table mounted pot rack as shown on plan, 48" long, 10ea double S hooks.

.23 Item # 23 - Domestic Washer & Dryer Machine .

GE model GFWN1100DWW washer, front console and

GFMN110EDWW dryer, front console,

Services: ½" hot and cold water, 1" indirect drain,
120V, 1 phase, C&P & 208, 1 phase C&P

.24 Item #24 – Exhaust hood/fan/fire protection system – existing by mechanical

.25 Item #25 - Recycle Bins - 3 required
Rubbermaid Model #9569-06.

.26 Item #26 – Range/oven
Garland model GFE48-4G24LL Range c/w 4 burners, 24" grill and oven, extra oven rack, casters
Services: 232,000 btu, ¾" conn.

.27 Item #27 – Stock Pot Range
Garland model G20-SP SINGLE burner. standard finish
Services: 60,000 btu. ¾" conn.

.28 Item #28 – Pot Filler Faucet
T&S model B-0610
Services: ½" hot and cold water.

.29 Item #29 Combi Oven - GAS
Alto-Shaam Canada Model No. **CTP7-20G** or approved equal
Combitherm® CT PROformance™ Combi Oven/Steamer, electric, gas boiler-free, countertop, capacity (8) 18" x 26" full size sheet or (16) 12" x 20" full Size hotel pan (1/1 GN), PROtouch control with steam/convection/combi/retherm modes, removable single-point temperature probe, (3) power levels, (4) cooking modes, programmable cool-down,SafeVent™ steam venting, CombiClean PLUS™ with (5) cleaning levels, (2) side rails with 8 non-tilt support CoolTouch3™ glass window, door hinged right, high efficiency LED lighting, stainless steel construction, adjustable steel 98,000btu legs, EcoSmart®, cULus, UL EPH ANSI/NSF 4, CE, IP X5, ENERGY STAR, EAC
Kleensteam II twin system #9797-22
3ea CE36354 combiclean cleaning tabs, 1ea CE-27889 deliming product, 2ea -23000 chicken racks, 4 ea SH-26731 grilling racks, 4ea BS-26730 fry baskets, 5016085 combitherm mobile stand.
OptiPure SX2-22B dual 20" drop in/chiorine taste & odour and scale inhibition
12 month extended warranty to begin at the end of std.warranty & continue for 12 additional months (net)
Services: 3/4" cold water, 1 1/2" indirect drain,
120V, 6.8 amps, 98,000btu.

.30 Item #39 – Reach in Cooler
True GDM41LD Black finish
Services: 120V, 1 phase, C&P, 1/3hp. 6.2 amps

.31 Item #31 – VEG PROCESSOR
Robot Coup R2N
Services: 120V, 1 phase, C&P, 1/2hp. 8 amps

.32 Item #32 - Hot Food Unit
Custom HFT3248D Free-Standing hot food unit, stainless steel construction, complete with drains and individual controls. c/w pans and cover all 4" deep, 1 full size, 2 half size and three one third size, cutting board.
Services: 38 mm indirect drain, 208V, 3P, direct connection, 3 kw.

.33 Item #33 – Double Overshelf
Stainless steel double overshelf to run full length of item 32, 34 & 37
12" wide to length 28" OA height.

.34 Item #34 - Work Table with Sink
Stainless Steel Work Table, 30" D x 48" L solid undershelf, stainless steel tubular legs and adj. feet, , 20" x 16"x 10" deep integral utility sink. c/w t & s deck mounted faucet B-0221
Services: 13mm hot & cold water, 38mm direct drain,

.35 Item #35 - Toaster
Hatco TPT208 or approved equal.
Services: 208V, 1 phase, C&P, 2.6 kw.

.36 Item #36 - Microwave Oven
Panasonic Model # NE1064C, 1000W, 6 power levels, enamelled steel cavity and wrap. Mounted on Custom s/s wall shelf suited to support this item see item 16
Services: 120V, 1 phase, C&P, fused 20 amp.

.37 Item #37 - Sandwich Unit
Traulsen # UPT276 c/w casters, pans
Services: 120V, 1 phase, C&P, ¼ hp.

.38 Item #38 – Pipe Chase
stainless steel pipe chase 4" x 18" from floor to ceiling c/w
removable sections for access on 18" side

.39 Item #39 – Pick up shelf and storage unit
Stainless Steel Work Table, 14" D x 138"L x 34" H solid undershelf, adjustable middle shelf stainless steel tubular legs and adj. feet.

.40 Item #40 – Spare number

.41 Item #41 –Spare number

.42 Item #42 – Coffee/dessert Station-24"x32"x36"
Custom s/s counter 4" back splash at rear and RH end
three drawers on LH side, open RH side to suite item 44

.43 Item #43 – Coffee maker
Bunn model VPR17
Services: 120 V, C&P 13.9 amps.

.43a Item #43 – Coffee maker
Bunn model CWTF35
Services: 120/208 V, DIR. 3.8 kw 17.9 amps. 1/4"cws

.44 Item #44 – Ice Maker
Ice O Matic model ICEUO70A ice maker, standard unit
c/w with water filler suited for this machine
Services: 120 V, C&P, 9.7 amps, ½" cold water, 1" indirect drain.

.45 Item #45 – Computer Table
Ikea model 102.447.43, black finish, cabinet door & drawer
on left side and main storage drawer

.46 Item #46 – Dining Room Tables (3)
DWD-D3636 veneer top solid wood, anti-microbial wood finish
hardwood legs and apron.

.47 Item #47 –Small Tables (2)
DWD-D2630 veneer top solid wood, anti-microbial wood finish
cast iron base in black, wrinkle finish

.48 Item #48 – Dining Room Chairs (16)
DWD-D1721, Gold metal frame, red pattern fabric

PART 3 Execution

3.1 INSTALLATION

.1 Install equipment in accordance with manufacturer's printed instructions.

.2 Coordinate connection of mechanical and electrical services.

.3 Adjust equipment for smooth and proper operation.
provide special instruction on combi oven control panel
contact consultant for date and time.

.4 Provide demonstration and training of all equipment

.5 Provide three copies of operation and maintenances manuals

END OF SECTION 11 40 00

1 General

1.1 GENERAL

.1 The General Conditions of the contract as well as provisions of Division 01 are part of and to be read in conjunction with this Section.

.2 This section covers items common to all sections of Division 20, 21, 22, 23, 24 and 25.

1.2 RELATED SECTIONS THAT ARE PART OF DIVISION 20 TO 25 WORK

.1 Section 25 01 11 BAS: Start-Up and Verification

.2 Section 25 05 01 BAS: General Requirements

.3 Section 25 05 02 BAS: Submittals

.4 Section 25 30 02 BAS: Field Control Devices

.5 Section 25 30 03 BAS Field Installation

1.3 INTENT

.1 It is the intent of these specifications to outline the method, materials, and quality of equipment to be furnished and installed hereinafter specified and/or shown on the drawings.

.2 The Mechanical Contractor shall be responsible for the installation of all equipment, materials, and accessories, and the labour required for the completion of this contract to the full satisfaction and acceptance of the Consultant. Misinterpretation of either the drawings or the specifications will not relieve the Contractor of responsibility.

1.4 DEFINITIONS

.1 "CONCEALED" - mechanical services and equipment in hung ceiling spaces and non-accessible chases and furred spaces.

.2 "EXPOSED" - will mean "not concealed" as defined herein.

.3 "Domestic Water" includes domestic cold water, domestic hot water, tempered hot water and domestic hot water recirculation.

.4 “Provide” will mean “Supply and install”.

1.5 REFERENCE STANDARDS

.1 The most stringent requirements of local municipal by-laws, provincial codes and following codes and standards shall be followed.

.2 In no instance shall the Standard established by the contract documents be reduced by the application of any other codes.

.3 General
- .1 Nova Scotia Building Code Regulations Effective April 1, 2017.
- .2 National Building Code of Canada - 2015.
- .3 National Fire Code of Canada - 2015.
- .4 National Plumbing Code of Canada - 2015.
- .5 National Energy Code of Canada for Buildings 2015.
- .6 ANSI/ASHRAE Standard 135, BACnet®.
- .7 The following standards/codes are referenced in the above codes:
  - .1 ARI 410 Forced Circulation Air Cooling and Air Heating Coils.
  - .2 ANSI/AHRI 430 Central Station Air Handling Units.
  - .3 ASTM A653/A653M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
  - .4 ASTM A795/A795M Standard Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use
  - .5 CAN/CSA B149.1 Natural Gas and Propane Installation Code.
  - .6 CAN/CSA B365Installation Code for Solid-Fuel-Burning Appliances and Equipment.
  - .7 CSA B139 Installation Code for Oil Burning Equipment.
  - .8 CSA B140.7 Oil-Fired Steam and Hot Water Boilers for Commercial and Industrial Use.
  - .9 CSA B51 Boiler, Pressure Vessel, and Pressure Piping Code.
  - .10 CSA B52 Mechanical Refrigeration Code.
  - .11 CSA C22.1 Canadian Electrical Code, Part 1 Safety Standard for Electrical Installations.
  - .12 CSA C22.2 No. 155 Electric Duct Heaters.
  - .13 CAN/CSA C390- Test methods, marking requirements, and energy efficiency levels for three-phase induction motors
  - .14 NFPA 13 Installation of Sprinkler Systems.
  - .15 NFPA 14 Installation of Standpipe and Hose Systems.
  - .16 NFPA 17A Wet Chemical Extinguishing System.
  - .17 NFPA 20 Installation of Centrifugal Fire Pumps.
  - .18 NFPA 96 Ventilation Control and Fire Protection of Commercial Cooking Operations.
  - .19 Provincial Petroleum Storage Regulations.
  - .20 SMACNA HVAC Air Duct Leakage Test Manual.
  - .21 SMACNA Round Industrial Duct Construction Standards
  - .22 SMACNA HVAC Duct Construction Standards - Metal and Flexible.
  - .23 ULC-S505, Fusible Links for Fire Protection Service.
  - .24 CAN/ULC-S102 Test for Surface Burning Characteristics of Building Materials and Assemblies
  - .25 CAN/ULC S110 Test for Air Ducts.
  - .26 TIAC Mechanical Insulation Best Practice Guide

1.6 EQUIPMENT INSTALLATION

.1 Unions or flanges: provide for ease of maintenance and disassembly.

.2 Space for servicing, disassembly and removal of equipment and components: provide as recommended by manufacturer or as indicated.

.3 Equipment drains: pipe to floor drains.

.4 Install equipment, rectangular cleanouts and similar items parallel to or perpendicular to building lines.

1.7 ANCHOR BOLTS AND TEMPLATES

.1 Supply anchor bolts and templates for installation by other divisions.

1.8 COORDINATION

.1 Closely coordinate the design and installation of Sprinkler System piping and placement of Sprinkler System equipment with other Trade Contractors, including but not limited to, Structural steel Contractor, Ceiling Contractor, Plumbing Contractor, Air Distribution Contractor, Controls Contractor and Electrical Contractor.

.2 Closely coordinate the installation of Plumbing System piping and placement of Plumbing System equipment with other Trade Contractors, including but not limited to, Structural steel Contractor, Ceiling Contractor, Sprinkler Contractor, Air Distribution Contractor, Controls Contractor and Electrical Contractor

.3 Closely coordinate the installation of Heating System piping and placement of Heating System equipment with other Trade Contractors, including but not limited to, Structural steel Contractor, Ceiling Contractor, Sprinkler Contractor, Plumbing Contractor, Air Distribution Contractor, Controls Contractor and Electrical Contractor

.4 Closely coordinate the installation of Air Distribution System piping and placement of Air Distribution System equipment with other Trade Contractors, including but not limited to, Structural steel Contractor, Ceiling Contractor, Sprinkler Contractor, Plumbing Contractor, Controls Contractor and Electrical Contractor

.5 Closely coordinate the installation of Controls System and placement of Controls System equipment with other Trade Contractors, including but not limited to, Structural steel Contractor, Ceiling Contractor, Sprinkler Contractor, Plumbing Contractor, Air Distribution Contractor and Electrical Contractor.

1.9 ELECTRICAL

.1 Electrical work to conform to Electrical Contract including the following:
- .1 Supplier and installer responsibility is indicated in Motor, Control and Equipment Schedule on electrical drawings and related mechanical responsibility is indicated on Mechanical Equipment Schedule on mechanical drawings.
- .2 Control wiring and conduit is specified in Electrical Contract except for conduit, wiring and connections which are related to mechanical control systems specified in Mechanical Contractor. Refer to Electrical Contract for quality of materials and workmanship.

.2 Coordinate with Electrical Contractor to ensure that all controlled equipment is correctly connected for operation in accordance with plans and specifications, including supplying all necessary electrical interconnection information and location to Electrical Contractor.

1.10 EXISTING SYSTEMS

.1 Connections into existing systems to be made at time approved by Owner. Request written approval of time when connections can be made.

.2 Be responsible for damage to existing plant by this work.

.3 Ensure that all plumbing, heating, ventilation and other mechanical systems and services remain operational during the course of the renovation of the existing building and, if necessary, this Contractor shall be responsible for providing such temporary services by cutting off, altering, adapting, relocating and connecting existing services and disconnecting and removing such temporary or existing services upon providing new permanent services as detailed on all drawings. The site shall be examined to determine the extent of the temporary services and all co-ordination shall be made with the Owner's Representative. All costs shall be included in the Tender Price.

.4 Existing equipment, piping, ducting, etc. not being re-used under new schemes, shall be removed whether shown on drawings or not. The General Contractor shall repair all openings resulting from the removal of existing mechanical equipment and services. All costs shall be included in the Tender Price.

1.11 CUTTING AND PATCHING

.1 Refer to Division 01.

1.12 DRAWINGS

.1 The drawings accompanying this specification are to be considered as diagrammatic only and do not show all the structural and construction details. Any information involving measurements of the building shall be taken from the architectural and structural drawings, and at the building site. Make without additional charge any necessary changes or additions to the runs to accommodate structural conditions.

.2 The Mechanical drawings are not to be scaled.

.3 The drawings and the specifications shall be considered an integral part of the contract documents. Neither the drawings nor the specifications shall be used alone. Misinterpretation of any requirements of either plans or specifications shall not change the requirements of the specifications for proper completion of the work to the full approval of the Consultant.

.4 Except where dimensioned, indicate general Mechanical layouts only. Because of the small scale of Mechanical drawings, it is not possible to show all offsets, fittings and accessories which may be required. Investigate structural and finish conditions affecting this work and arrange work accordingly, providing such fittings, valves and accessories which are required to meet the conditions.

.5 The drawings indicate the general location and route to be followed by the pipes, ducts, conduits, etc., which are installed under this contract. Where the required conduit work, piping, ductwork, etc., is not shown on the plans or only shown diagrammatically, these shall be installed as tight as possible to structural members, concrete, ceilings, and walls to interfere as little as possible with the free use of the space through which they pass.

.6 The drawings and specifications are intended to supplement each other so that any details shown on the drawings are not mentioned in the specifications, or vice versa, shall be executed in the same manner as if contained in the specifications and shown on the drawings.

.7 Should any discrepancy appear between these specifications and the drawings to cause doubt as to the true meaning and intent of the drawings ad specifications, a ruling shall be obtained from the Consultant before submitting the tender. If this is not done it will be assumed that the more expensive alternative has been included in the contract.

.8 Layouts on the Mechanical drawings are based on the specified equipment, including mechanical and electrical connections and physical dimensions. Alternate equipment and systems proposed by the Contractor for use on this project, which necessitates changes in service connections to perform the specified functions may be considered by the Consultant, however, any required modifications or additions shall be done at no additional cost to the Owner. Furthermore, if it is found that the provisions made regarding space conditions and code required clearances are not met, the right is reserved by the Consultant to require installation of the equipment specified.

1.13 CONTRACT DOCUMENTS

.1 Before submitting tender for his work, each Contractor shall examine the contract documents (entire specifications, electrical drawings, structural drawings and architectural drawings) to ascertain that the work can be carried out as shown on these drawings and herein specified. No extra will subsequently be allowed to cover any omission and/or oversight for not having made a thorough inspection of the contract documents.

1.14 EXAMINE THE SITE AND CONDITIONS

.1 Each Contractor shall visit and examine the site and the local conditions affecting this work. No allowance will be made later for any expenses occurred through failure to make these examinations.

1.15 LOW VOC MATERIALS

.1 All site applied coatings, adhesives & sealants must conform to low VOC content requirements.

.2 Provide Material Safety Data Sheets for all products and materials of these types incorporated into the work.

1.16 OWNER SUPPLIED EQUIPMENT OR PRE-TENDERED EQUIPMENT

.1 Preform all work as if equipment purchased by this contractor

.2 Handle and store products in manner to prevent damage, deterioration and soiling and in accordance with manufacturer's instructions when applicable.

.3 Obtain written installation instructions directly from manufacturers.

.4 Upon completion of installation, engage manufacturer's representative as required for start-up and verification.

.5 Provide copies of start-up and verification reports

.6 During warranty period, preform all work as if equipment purchased by this contractor.

2 Products

2.1 MATERIAL

.1 For the purpose of uniformity similar materials shall be by one manufacturer.

.2 Standard of Acceptance and/or Acceptable Material:
.1 Means that item named and specified by manufacturer and/or catalogue number forms part of specification and sets standard regarding performance, quality of material and workmanship and when used in conjunction with a referenced standard, shall be deemed to supplement the standard.

.3 Acceptable Manufacturer:
.1 Means that item manufactured by named and specified manufacturer, meeting the specification and referenced standard regarding performance, space constraints, electrical requirements, quality of material and workmanship shall be deemed acceptable.

.4 Refer to "Instruction to Bidders" for method of applying for Alternatives Products/Systems prior to close of tender.

2.2 ELECTRICAL DEVICES AND PANELS.

.1 All electrical equipment and devices to be CSA certified and manufactured to standard quoted.

.2 The assembly of combinations of electrical components, such as, relays, current transformers, BAS devices, transformers, fuse blocks, transducers or other certified components in an enclosure to form an overall electrical assembly shall be CSA certified.

.3 Where field modifications are made to certified electrical equipment, arrange and pay for field certification by CSA.

2.3 MOTORS

.1 Provide motors for mechanical equipment as specified.

.2 If delivery of specified motor will delay delivery or installation of any equipment, install motor approved by Consultant for temporary use. Final acceptance of equipment will not occur until specified motor is installed.

.3 3 phase motors, 745 Watts (1.0 HP) and larger: Minimum (NEMA Premium) nominal efficiency in accordance with CAN/CSA C390 "*Test Methods, Marking Requirements and Energy Efficiency Levels for Three-Phase Induction Motors*"

.4 Definite Purpose Inverter-Ready Motors and meet NEMA MG 1 Part 31.4.4.2.
- .1 Suitable for current and/or future variable frequency drives (VFD's).
- .2 Exceptions: Sump pumps, wet rotor pumps, multi speed pumps, ECM pumps, oil and gas burners, unit heaters, cabinet heaters, cabinet fans and where noted.

.5 Motors under 370 Watts (1/2 HP): speed as indicated, continuous duty, built-in overload protection, resilient mount, single phase, 120 V, 60 Hertz, unless otherwise specified or indicated.

.6 Motors 370 Watts (1/2 HP) and larger: EEMAC Class B, squirrel cage induction, speed as indicated, continuous duty, drip proof, ball bearing, 3 phase, 208 V, 60 Hertz, maximum temperature rise 40° C, unless otherwise specified or indicated.

.7 Service factor 1.15.

.8 Totally enclosed fan cooled (TEFC) where specified.

2.4 BELT DRIVES

.1 Fit reinforced belts in sheaves matched to drive. Multiple belts to be matched sets.

.2 Use cast iron or steel sheaves secured to shafts with removable keys unless otherwise specified.

.3 For motors under 7.5kW (10 HP): standard adjustable pitch drive sheaves, having plus or minus 10% range. Use mid-position of range for specified r/min.

.4 For motors 7.5kW (10 HP) and over: sheaves with split tapered bushing and keyway having fixed pitch unless specifically required for item concerned. Provide sheaves of correct size to suit balancing.

.5 Minimum drive rating: 1.5 times nameplate rating on motor. Keep overhung loads within manufacturer's design requirements on prime mover shafts.

.6 Tension belts to manufacturer's recommendations before start-up and after first (100) hours of operation using calibrated belt tensioning gauge. Submit report showing the recommended and actual tension on all units.

2.5 GUARDS

.1 Provide guards for unprotected drives.

.2 Provide means to permit lubrication and use of test instruments with guards in place.

.3 Guards for belt drives:
- .1 Expanded metal screen welded to steel frame.
- .2 Minimum 1.3 mm (18 Ga.) thick sheet metal tops and bottoms.
- .3 38 mm (1 1/2") diameter holes on both shaft centers for insertion of tachometer.
- .4 Removable for servicing.

.4 Install belt guards to allow movement of motors for adjusting belt tension.

.5 Guard for flexible coupling:
- .1 "U" shaped, minimum 1.6 mm (16 Ga.) thick galvanized mild steel.
- .2 Securely fasten in place.
- .3 Removable for servicing.

.6 Unprotected fan inlets or outlets:
- .1 Wire or expanded metal screen, galvanized, 20 mm (3/4") mesh.
- .2 Net free area of guard: not less than 80% of fan openings.
- .3 Securely fasten in place.
- .4 Removable for servicing.

2.6 EQUIPMENT SUPPORTS

.1 Equipment supports supplied by equipment manufacturer: specified elsewhere in Mechanical Contractor.

.2 Equipment supports not supplied by equipment manufacturer: fabricate from structural grade steel.

.3 Exterior supports to be hot dipped galvanized. Touch up field welds and bolt holes with cold galvanized paint

.4 Mount interior base mounted equipment on chamfered edge housekeeping pads, supplied by General Contractor.
- .1 Nominal 100 mm (4") high and minimum 100 mm (4") larger all around than equipment.
- .2 Slabs to be pinned to floor by General Contractor.
- .3 Provide detailed drawing to Others showing location of pads.
- .4 Ensure bases are level prior to placement of equipment.

.5 Mount exterior base mounted equipment on chamfered edge reinforced housekeeping pads, supplied by General Contractor.
- .1 Minimum 300 mm (12") high and minimum 100 mm (4") larger all around than equipment.
- .2 Provide detailed drawing to Others showing location of pads.
- .3 Ensure bases are level prior to placement of equipment.

2.7 PAINT

.1 Apply at least one coat of primer paint to ferrous supports, pipe hangers and site fabricated work.

.2 Primer to be The Master Painters Institute MPI #23 with VOC < 351 grains/L

2.8 PIPE PENETRATION THROUGH WALLS AND FLOOR

.1 Do not grout or bond sprinkler piping, drainage waste and vent piping, domestic water and hydronic pipes solid to walls or floors.

.2 Provide cast in place temporary collar, core drill slab or sleeve all sprinkler piping, drainage waste piping, plumbing vent piping, domestic water and hydronic pipes penetration through floors.

.3 Provide cylindrical Sleeve all sprinkler piping, drainage waste and vent piping, domestic water, hydronic pipes and control conduits through all mechanical room slabs above grade.

.4 For all sprinkler piping, drainage waste piping, plumbing vent piping, domestic water, hydronic pipes and control conduits through all masonry walls, provide cylindrical sleeves. Maintain a minimum uniform 1/4" (6 mm) clearance all around or as required for smoke seal, acoustic seal and/or fire stopping.

.5 For all sprinkler piping, drainage waste piping, plumbing vent piping, domestic water, hydronic pipes and control conduits through all drywall walls, coordinate with other trades to ensure there is minimum uniform 6 mm clearance all around or as required for smoke seal, acoustic seal and/or fire stopping.

.6 Insulation on domestic cold water piping and hydronic piping to be continuous through Walls and Floor.

.7 Ensure no contact between copper tube / pipe and ferrous sleeve or concrete.

.8 Coat exposed exterior surface of ferrous sleeves with heavy application of zinc rich paint to CAN/CGSB-1.181-92 coating, zinc-rich organic, ready mixed.

2.9 PIPE SLEEVES

.1 For floors into Mechanical Rooms, provide schedule 40 sleeves with annular fin continuously welded to sleeve. Extend 50 mm above finish floor.
.1 Install sleeves prior to concrete installation.

.2 For floors other rooms, provide 1.6 mm (16 Ga.) galvanized round sleeves with tack welded longitudinal joints, retaining tabs, terminating flush with floor.

.3 For walls, provide 1.6 mm (16 Ga.) galvanized round sleeves with tack welded longitudinal joints.

.4 Center sleeves on centerline of pipe.

2.10 DUCT SLEEVES

.1 Refer to Section 24 33 16 Dampers-Fire and details on drawings for sleeves at fire dampers.
.1 Clearance between wall and sleeve shall not exceed requirements.

2.11 SMOKE SEAL AND/OR ACOUSTIC SEAL

.1 Firestop all pipe penetration through fire rated walls and fire rated floor.
.1 Refer to Section 20 05 04 Firestopping for Mechanical

.2 Where non rated walls extend from floor to floor or floor to roof deck and non-rated floors.
.1 Smoke seal and/or acoustic seal all pipes, both sides of wall/floor.
.2 Smoke seal and/or acoustic seal between duct and wall, both sides of wall/floor.

2.12 FIRESTOPPING

.1 Firestopping material and installation within annular space between pipes, ducts, insulation and adjacent fire separation
- .1 Refer to Section 20 05 02 Mechanical Submittals for firestopping submittals.
- .2 Refer to Section 20 05 04 Firestopping for Mechanical.

2.13 ESCUTCHEONS

.1 On pipes passing through walls, partitions, floors and ceilings in finished areas.

.2 Chrome or nickel plated brass or Type 302 stainless steel, split piece type.
- .1 Standard of Acceptance:
  - .1 Grinnell Fig 2 and 13.

.3 Outside diameter to cover opening or sleeve.

.4 Inside diameter to fit around finished pipe.

2.14 ACCESS DOORS

.1 Supply access doors to concealed mechanical equipment for operating, inspecting, adjusting and servicing.

.2 Size:
- .1 Sized to access concealed services
- .2 Minimum 600 x 600 mm (24" x 24") for body entry
- .3 Minimum 300 x 300 mm (12" x 12") for hand entry
- .4 Minimum 150 mm (6”) larger than access door in ductwork.
- .5 Unless otherwise noted.

.3 Door flush with frame.

.4 For unrated construction
- .1 Allen Key lock(es)
- .2 Flat door type
  - .1 Rounded safety corners
  - .2 One piece outer flange welded to mounting frame
  - .3 One piece concealed hinge
- .3 Formed door type

.5 For fire rated construction
- .1 Pull ring or raised knurled knob operated latch bolt
- .2 Interior latch release
- .3 Automatic closer
- .4 Hinged door
- .5 Flanged frame
- .6 For walls:
  - .1 1- 1/2 hour 'B' label
- .7 For ceiling membrane:
  - .1 1 hour label

.6 Material:
.1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Consultant.
.2 Remaining areas: use prime coated steel.

.7 Installation:
.1 Locate so that concealed items are accessible.
.2 Locate so that hand or body entry (as applicable) is achieved.
.3 Install in accordance with manufacturer's recommendation

.8 Acceptable material:

	Unrated Walls	**Fire Rated Walls**	**Fire Rated Ceilings**
Acudor	EB-2002 or UF-5000	FB-5050	FW-5050
Cendrex	AHD	PFI	
Mifab	UA	MPFR	MPFR

2.15 DIELECTRIC COUPLINGS

.1 Lead Free

.2 Compatible with and to suit pressure rating of piping system.

.3 Where pipes of dissimilar metals are jointed.

.4 Pipes NPS 2 and under: isolating unions.
.1 Acceptable material:
.1 Watts LF3000 Series

.5 Pipes NPS 2-1/2 and over: isolating flanges.

2.16 DRAINS VALVES

.1 In accordance with Section 23 05 23 Valves.

2.17 HANGERS AND SUPPORTS

.1 As per Section 23 05 29 Hangers and Supports.

2.18 IDENTIFICATION

.1 As per Section 23 05 53 Mechanical Identification.

2.19 INSULATION

.1 As per Section 23 07 00 Mechanical Thermal Insulation.

3 Execution

3.1 INSTALLATION

.1 Install all work in accordance with authorities having jurisdiction and manufacturer’s requirements. In case of conflicting requirements, the more stringent shall apply.

3.2 PROTECTION OF OPENINGS

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

.2 No fans to be started until the project has been cleaned to the satisfaction of the Consultant.

3.3 TESTS

.1 Give 4 working days written notice of date for tests.

.2 Insulate or conceal work only after testing by contractor and review by Consultant.

.3 Conduct tests in presence of Consultant or representative authorized by the Consultant.

.4 Bear costs including retesting and making good.

.5 Test drainage, waste and vent piping for leakage in accordance with National Plumbing Code of Canada and authorities having jurisdiction. Maintain test pressure without loss for a minimum of 1 hour for water test and 2 hours for air test otherwise specified.

.6 In addition to leakage test, test main storm and sanitary drainage piping for grade by ball test in accordance with National Plumbing Code of Canada and authorities having jurisdiction or provide copy of video of underground piping..

.7 Test domestic hot, recirculation and cold water piping at 1 1/2 times system operating pressure or minimum 860 kPa (125 psig), whichever is greater. Maintain test pressure without loss for a minimum of 2 hours otherwise specified.

.8 Refer to Section 22 11 16 Domestic Water Piping for Potable water testing

.9 Test sprinkler system to NFPA 13 and authorities having jurisdiction.

.10 Test gas piping to CAN/CGA B149.1 Natural Gas and Propane Installation Code.

.11 Equipment: test as specified in relevant sections.

.12 Prior to tests, isolate all equipment or other parts which are not designed to withstand test pressures of test medium.

.13 Provide signed copies of all tests within 2 weeks of completion of each test.

3.4 PAINTING

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

.2 Restore to new condition, finishes which have been damaged too extensively to be merely primed and touched up.

.3 Paint the balancing damper handles where concealed.

3.5 BACnet

.1 When equipment is specified to be supplied with a communication card and is to be connected to the BAS network and "communicate to the BAS" using the BACnet standard, the equipment includes:
- .1 BACnet communication media
  - .1 For unitary equipment, BACnet communication over RS485 2- wire network and a 76,800 baud rate is acceptable.
  - .2 For major mechanical equipment BACnet communication over an Ethernet is acceptable.
- .2 Equipment shop drawings are to include:
  - .1 Job specific wiring diagrams with details on interface wiring including, wire type and detailed wire termination drawings.
  - .2 Details on site specific addressing requirements and confirmation there will be no conflicts with the existing system architecture.
  - .3 Details as to what type of information can be read from the device and also what type of information can be written or defined from the BAS.
  - .4 Specified or intended sequence of the equipment and how the equipment will operate to meet your sequence a building requirements.
- .3 Complete with all configuration and programming software. Including any specific cables and proprietary software required to connect to and program the equipment. The owner will have full access to the equipment sequence at turnover of project. Equipment sequence is to be fully programmable by the Factory Trained Authorized Manufacturer Service Technician on site.
- .4 Field start-up to be performed by Factory Trained Authorized Manufacturer Service Technician.
- .5 Factory Trained Authorized Manufacturer Service Technician to be on site for start-up, commissioning and be available for technical support when required during the installation, setup and customer training.

.2 BAS ready equipment.
- .1 Complete with a terminal strip and receive direct hardwired control commands from the BAS.
- .2 BAS will directly control the equipment using analog and digital signals. This will allow the BACnet BAS to have direct control of the equipment and sequence. The only internal controls are the high/low safety limits that are “hardwired” inside the equipment.

3.6 MAINTENANCE SERVICE CONTRACT

.1 For Building Warranty Period.

.2 Refer to Section 25 05 01 BAS: General Requirements for Control Maintenance Contract.

.3 Provide all labor and materials for maintenance of all mechanical equipment supplied by this division except Section 25 05 01 BAS: General Requirements.

.4 Notify Owner 24 hours in advance of each visit.

.5 Provide written report to Owner and Consultant.

.6 During each major service visit, change all supply air pre-filters at air handling units and exhaust air filters at air handling units.

.7 Lubricate all fans, pumps and mechanical equipment in accordance with manufacturer's recommendations.

.8 Check, setup and calibrate all unit mounted controls.

.9 Check all belt drives and adjust and/or replace belts as required.

.10 Provide itemized maintenance check list to allow Owners verification of work done and time on site.

.11 Provide all labor and materials for maintenance of all mechanical equipment supplied by this Division except Section 25 05 01 BAS: General Requirements including but not limited to the following:

.1 Lubricate all fans, and mechanical equipment in accordance with manufacturer's recommendations.
.2 Check all belt drives and adjust and/or replace belts as required.
.3 Include a minimum four major service visits. During each major service visit, lubrication, service belts, change all supply air filters at all air handling units,
.4 Include a minimum four minor service visits between major service visits for filter changes. During minor service each visit, lubricate as required, check belts as required, change all supply air filters at air handling units.

.12 Provide itemized maintenance check list for Owner’s verification of work done and time on site. Written report to the Owner and Consultant to summarize work done, list material used and time on site. Report to be issued following each service with invoice.

.13 Spare parts

.1 At end of Maintenance Service, restock belts and filters to level specified in Section 20 05 02 Mechanical Submittals.

3.7 ALTERNATIVES

.1 Refer to Division 1

3.8 SEPARATE PRICES

.1 Refer to Division 1

.2 Provide separate prices for the following:

.1 Control maintenance contract for 12 month immediately after building warranty.
.2 Mechanical maintenance service contract for 12 month immediately after building warranty.

3.9 CEILING MOUNTED EQUIPMENT.

.1 Locate ceiling space mounted equipment (e.g. exhaust fans, motorized dampers) within 900 mm (36") of the finished ceiling for safe access.

.2 Locate ceiling space mounted equipment (e.g. exhaust fans, motorized dampers) with minimum 600 mm (24") access on service side.

.3 Locate valves mounted in ceiling space valves, within 450 mm (18") of the finished ceiling for safe access.

END OF SECTION

1 General

1.1 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 In accordance with Division 01

.2 Shop Drawings to be Project Specific

.3 All Shop Drawings to be Metric.

.4 Where specified in Division 01, submit electronic copies of shop drawings. In addition to the electronic shop drawing, The Mechanical or General Contractor must submit one hard copy of each mechanical shop drawing to the office of the mechanical consultant.

.5 Shop drawings that consist of technical data sheets (letter size) and larger detail drawing, such as, sprinkler, controls, etc., to be submitted in separate packages. Data sheets separated from detail drawings.

.6 Prior to submitting shop drawings, the Mechanical Contractor to review the shop drawing to ensure that they meet the requirements of the contract documents in all respects, that they are clear and **legible**, all options are being provided are clearly indicated and that the dimensions, weights, power requirements, quantities and capacity are consistent with the requirements of the contract documents.

.7 Assembled in groups by individual **Specification Section** and bound in sets.

.8 Where possible, submit all items specified in one section as one shop drawing package.

.9 On cover/front page indicate total number of pages in submission.

.10 Consecutively number each page.

.11 Shop Drawings to list components that are shipped loose.

.12 Shop Drawings to include **Project Specific** wiring diagrams.

.13 Shop Drawings for items with BACnet® control to include **Project Specific** list of BACnet® read/write variables. Also refer to Section 20 05 01 Mechanical General Requirements and Section 25 05 02 BAS: Submittals

.14 Fill in and attach "Shop Drawing Submittal Form" from Division 1. When "Shop Drawing Submittal Form" not part of Division 1 attach a Mechanical Contractor's Shop Drawing Review Confirmation to each shop drawing confirming the following:

- .1 The mechanical shop drawings have been reviewed by the Mechanical Contractor and all items are in conformance with the contract documents __ Yes __ No
- .2 Project specific model numbers and/or options are indicated __ Yes __ No
- .3 Mechanical Contractor: _____

.4 Mechanical Contractor Project Representative: _____
.5 Mechanical Contractor Signature: _____
.6 Item: _____
.7 Specification Section and item number: _____
.8 Drawing reference: _____

.15 Installation and Operation Manuals to be submitted to the contractor independent of shop drawing submission.

.16 Section 20 05 04 Through – Penetration Firestopping for Mechanical Systems
.1 Submit Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of ULC or cUL firestop systems to be used and manufacturer's installation instructions to comply with Division 1.
.2 Submit material safety data sheets provided with product delivered to job-site.

.17 Section 21 13 13 Sprinklers
.1 Working plans and design requirements in accordance with NFPA 13.
.2 Working plans stamped and signed by Professional Engineer registered in Province of the Nova Scotia.
.3 Hydraulic calculations.
.4 Components.

.18 Section 21 23 00 Pre-Engineered Wet Chemical Fire Protection System.
.1 System and Components.
.2 Wiring Diagram.

.19 Section 22 11 16 Domestic Water Piping
.1 PEX piping
.1 PEX system components
.1 Pipe
.2 Fittings
.3 Connection method.
.2 Letter from manufacturer stating that PEX system components meet manufacturer requirements.
.2 Roll groove coupling and fittings.

.20 Section 22 42 01 Plumbing Specialties and Accessories.
.1 Floor Drains.
.2 Cleanouts.
.3 Water Hammer Arrestors.
.4 Grease Interceptors.
.5 Trap Seal Primers.

.21 Section 22 42 03 Plumbing Fixtures.
.1 Label each sheet as to fixture type.
.2 Plumbing fixture and trim: Maximum 2 pages per component.
.3 Indicate roughing-in dimensions incorporating dimensions indicated on drawings.

.22 Section 23 05 23 Valves
.1 Circuit Balancing Valves.
.1 Provide schedule showing size, flow and pressure drop.

.23 Section 23 05 29 Hangers and Supports
- .1 Upper attachments for ducts.
- .2 Upper attachments for pipes.
- .3 Pipe hangers
- .4 Description of where each type of upper attachment and hanger will be utilized

.24 Section 23 07 00 Mechanical Thermal Insulation
- .1 Each type of insulation
- .2 Canvas

.25 Section 23 11 23 Facility Gas Piping
- .1 Copy of information being submitted for gas permit in accordance with fuel safety act including but not limited to the following:
  - .1 Business name, building name and civic address.
  - .2 Propane tank/cylinder size, clearances to buildings, building openings and property lines where applicable. Engineered drawing for bases of horizontal tanks.
  - .3 Use of areas adjacent to propane supply containers (lawn, parking, etc.).
  - .4 Vehicle impact protection barrier type and clearances.
  - .5 Regulator and line pressure relief locations and pressure settings.
  - .6 Where piping or tubing is located below grade, indicate size, material used, type of fittings, length of run, depth below grade and protection method.
  - .7 Arrangement of building piping/tubing, material used, size, type of fittings, length of runs, supports and identification method.
  - .8 Location of all shut-off valves and the make and model number of valve to be used.
  - .9 Flexible connectors make and model number.
  - .10 Appliance arrangement along with the individual make, model and BTU/hr input of each appliance.
  - .11 Venting arrangement of vented appliances including material used, size and length of vent, method of insulating and vent termination.
  - .12 Combustion air method.

.26 Section 24 31 13 Metal Ducts - Low Pressure to 500 Pa
- .1 Duct construction table showing metal gauges, type of joints and type of support.

.27 Section 24 33 15 Dampers - Operating

.28 Section 24 33 16 Dampers - Fire.
- .1 Integral Sleeve Fire Dampers.
- .2 Fire damper installation instruction.

.29 Section 24 34 25 Package Exhausters.
- .1 Fan curves and sound rating data showing point of operation.
- .2 For roof mounted fans provide the following:
  - .1 Manufacturer's suggested Roof Opening
  - .2 Manufacturer's suggested outside dimension of top of curb.
  - .3 Manufacturer's suggested inside dimension of curb.

.30 Section 24 38 13 Commercial Kitchen Exhaust Hoods and Fans

.31 Section 24 44 00 HVAC Air Filtration.

.32 Section 24 73 11 Packaged Air Handling Units.
- .1 Fan curves and sound rating data showing point of operation.
- .2 Motor type.
- .3 Coils and Coil Performance data.
- .4 Provide comparison sheet showing the following for the specified unit versus unit being supplied: Unit #, fan size, ESP, filter SP, internal SP, TSP, RPM, BHP/HP, discharge sound data, heat wheel performance.

.33 Section 24 81 34 Split System AC Units
- .1 Mounting arrangements.
- .2 Operating and maintenance clearances, e.g. access door swing spaces.
- .3 Points of operation on performance curves.
- .4 Electrical requirements
- .5 Performance data
- .6 Dimensional data

.34 Section 25 05 01 BAS: General Requirements.
- .1 Refer to Section 25 05 02 BAS: Submittals
- .2 Copy of Control Wiring Electrical Wiring Permit

.35 Shop drawings and product data shall show:
- .1 Mounting arrangements.
- .2 Operating and maintenance clearances, e.g. access door swing spaces.

.36 Shop drawings and product data shall be 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 as to current model production.
- .5 Certification of compliance to applicable codes.
- .6 Wiring diagrams and electrical characteristics specified for unit supplied.

1.3 MATERIAL ON SITE

.1 Refer to General Conditions of Contract.

.2 All claims for material on site must be supported by supplier's invoices showing supplier's unit prices including taxes.

.3 Material on site shall not be claimed under the "work complete" portion of the claim.

.4 Material eligible to be claimed as "material on site" must be project specific equipment, such as plumbing fixtures, DHW tanks, pumps, radiation products, air handling equipment, exhaust fans, control panels, control valves, etc.

.5 General material which is not considered project specific such as piping, fittings, control conduit, control wire, ductwork, small tools, etc., are not eligible to be claimed as "material on site."

.6 Project specific equipment may be claimed as "material on site" subject to the following:
.1 Claim to show previous material on site and deduct the amount of previously claimed material that was incorporated into the work during the current month.
.2 Claim to show material brought on site this month supported by a copy of the supplier's invoices showing supplier's unit prices including taxes.

.7 Invoices submitted for a "material on site" claim will not be considered by the engineer unless they are examined and initialed by both the mechanical contractor and the General Contractor.

1.4 START UP REPORT MANUAL

.1 Custom designed and contain material pertinent to this project only and to provide full and complete coverage of subjects referred to in this section.

.2 Operating and maintenance manual to be approved by and final copies deposited with Consultant before final inspection.

.3 Organize by specification section.

.4 Conform to requirements of Division 01, supplemented and modified by requirements specified in this section.

.5 Start Up and Performance data to include:
.1 Equipment manufacturer's performance data sheets with point of operation as left after commissioning is complete.
.2 Start up and verification reports
.3 Testing, adjusting and balancing reports as specified in Section 24 05 93, Testing, Adjusting and Balancing (TAB) of Mechanical Systems.

.6 Submittals:
.1 Submit a copy of the complete Start Up Report Manual to Consultant for Review.
.2 Start Up Report Manual Part 1
.1 Start up and verification reports as required with application for substantial performance certificate as per Section 20 05 03, Common Work Results for Mechanical Contract Closeout.
.3 Start Up Report Manual Part 2
.1 Start up and verification reports as required with application for release of final payment as per Section 20 05 03, Common Work Results for Mechanical Contract Closeout.
.4 Submission of individual data will not be accepted unless so directed by Consultant.
.5 Make changes as required and re-submit as directed by Consultant.
.6 Refer to Division 01 for quantity of Manuals (minimum 2).
.7 Hard-back, 25 mm (1") 3 ring, D-ring binders.
.8 Binders to be 2/3 maximum full.
.9 Provide index to full volume in each binder.
.10 Identify contents of each manual on cover and spine.
.11 Include names, addresses, telephone numbers of each sub-contractor having installed equipment, local representative for each item of equipment, each system.
.12 Provide full Table of Contents in each manual. Assemble each manual to conform to Table of Contents with tab sheets placed before instructions covering subject.

1.5 OPERATING AND MAINTENANCE (O&M) MANUAL

.1 Operating and maintenance manual to be reviewed by the Consultant and final copies deposited with Consultant before application for substantial performance certificate

.2 Organize by specification section.

.3 O&M Manuals to be custom designed and contain material pertinent to this project only and to provide full and complete coverage of subjects referred to in this section.

.4 Customize O&M data from manufacturer's to suit this project.
- .1 Provide site specific manual or
- .2 Neatly cross out non applicable generic information in the manual.
- .3 In Manufacturer's literature, highlight model supplied for this project.

.5 Provide Maintenance Program Schedule in table format (See Below) for each mechanical system and each piece of mechanical equipment including all items for which shop drawings have been submitted. Reference specification sections. List piece of equipment, items to be checked and frequency, tab in manual and page within section.

EQUIPMENT	ITEMS TO BE CHECKED	FREQUENCY	TAB & PAGE
Section 22 42 01 Plumbing Specialties	Clean and confirm flow from trap primer.	Monthly or as required.	22 42 01

.6 Conform to requirements of Division 01, supplemented and modified by requirements specified in this section.

.7 Project records and O&M manuals specified in this section are to be completely separate entity from those specified in Division 01.

.8 Operation data to include:
- .1 Control schematics for each system including environmental controls.
- .2 Description of each system and its controls.
- .3 Description of operation of each system at various loads together with reset schedules and seasonal variances.
- .4 Operation instruction for each system and each component.
- .5 Description of actions to be taken in event of equipment failure.
- .6 Valves schedule.
- .7 Color coding chart.

.9 Maintenance data shall 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.

.10 Submittals:
- .1 Include a copy of all reviewed mechanical shop drawings.
- .2 Submit a copy of the complete O&M Manual to Consultant for Review.
- .3 Submission of individual data will not be accepted unless so directed by Consultant.

.4 Make changes as required and re-submit as directed by Consultant.
.5 Refer to Division 01 for quantity of Manuals (minimum 2).
.6 Hard-back, 50 mm (2") 3 ring, D-ring binders.
.7 Binders to be 2/3 maximum full.
.8 Provide index to full volume in each binder.
.9 Identify contents of each manual on cover and spine.
.10 Include names, addresses, telephone numbers of each sub-contractor having installed equipment, local representative for each item of equipment, each system.
.11 Provide full Table of Contents in each manual. Assemble each manual to conform to Table of Contents with tab sheets placed before instructions covering subject.

.11 Provide maintenance data for the following:
.1 Section 21 23 00 Pre-Engineered Wet Chemical Fire Protection System.
.2 Section 24 73 11 Packaged Air Handling Units
.3 Section 24 38 13 Kitchen Exhaust Systems
.4 Section 24 34 00 HVAC Fans

.12 Prepare and insert into operation and maintenance manual, additional data when need for same becomes apparent during demonstrations and instructions specified above.

1.6 SPARE PARTS AND MAINTENANCE MATERIAL

.1 Section 21 13 13 Fire Suppression Sprinklers
.1 Minimum 1% of each type of sprinkler to a maximum of 6 of each type of head.
.2 Install in sprinkler cabinet.
.3 Sprinkler wrench.

.2 Section 23 05 19 Thermometers and Pressure Gauges.
.1 Two Thermometers. for each type and range
.2 Two Pressure Gauges for each type and range.

.3 Section 22 42 03 Plumbing Fixtures.
.1 Key for vandal resistant outlets.

.4 Section 24 73 11 Packaged Air Handling Units
.1 One matched set of belts for each fan.

.5 Section 24 38 13 Kitchen Exhaust Systems
.1 One matched set of belts for each fan.

.6 Section 24 34 25 Packaged Exhausters.
.1 One matched set of belts for each fan.

.7 Section 24 4400 HVAC Air Filtration
.1 One set filter media for each filter bank in addition to final operating set.

1.7 SPECIAL TOOLS

.1 Provide one set of special tools required to service equipment as recommended by manufacturers and in accordance with Section 01700.
  .1 Furnish one commercial quality grease gun, grease and adapters to suit different types of grease and grease fittings.

1.8 AS BUILT DRAWINGS

.1 In accordance with Division 01.

.2 Site Records:
  .1 Make available for reference purposes and inspection at all times. Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include change orders, site instructions, and changes to existing mechanical systems, control systems and low voltage control wiring.
  .2 Obtain AutoCAD drawing files from the consultant. The Contractor to update at his own expense the AutoCAD files to show the as-built conditions.
  .3 On a regular basis, transfer information to the AutoCAD files, revising drawings to show all work as actually installed. These AutoCAD files will at their completion, become the as-built drawings for this project.
  .4 Ensure that the modifications follow the same standard as the original file, that is, layer control, line weights, line types, etc.
  .5 Make available for reference purposes and inspection at all times.

.3 As Built Drawings:
  .1 Prior to start of Testing, Adjusting and Balancing (TAB), finalize production of As Built Drawings.
  .2 Identify each drawing in lower right hand corner in letters at least 13 mm (1/2") high as follows: -"AS BUILT DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW MECHANICAL SYSTEMS AS INSTALLED" (Signature of Contractor) (date).
  .3 Include on the As Built Drawings the identification number off all terminal units and as installed location.
  .4 Include on the As Built Drawings as installed location of all temperature sensors and/or thermostats
  .5 Submit to Consultant for approval and make corrections as directed.
  .6 TAB to be performed using as-built drawings.
  .7 Submit completed hard copy of as-built drawings with Operating and Maintenance Manuals.
  .8 Submit computer disk with the AutoCAD files to the consultant at the time specified in Division 01.
  .9 Include all sections shown on interference drawings.

.4 Where products are specified by manufacturer and/or model, update AutoCAD file to show installed manufacturer and model.

2 Products N/A

3 Execution N/A

END OF SECTION

1 General

1.1 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Common Work Results for Mechanical.

1.2 SUBMITTALS

.1 Start-up Report.
- .1 Provide start-up reports as listed below.
- .2 Reports to show model number, serial number, voltage and rated amperes.
- .3 If during start up there is an operation concern, repeat start-up after operation concern has been corrected.

.2 Section 20 05 02 Mechanical Submittals.
- .1 Maintenance Materials and Spare Parts.
- .2 Special Tools.
- .3 Operation and Maintenance Manuals.
- .4 As Built drawings.

.3 Section 20 05 03 Common Work Results for Mechanical Contract Closeout.
- .1 Confirmation of Demonstration and Operating and Maintenance Instruction.

.4 Section 20 91 13 Mechanical Systems Testing and Verification
- .1 Form V-22 42 01 – Cleanouts
- .2 Form V-22 42 01 - Floor Drains
- .3 Form V-22 42 01 – Interceptors
- .4 Form V-22 42 01 - Trap Primers
- .5 Form V-22 42 03 – Lavatory
- .6 Form V-22 42 03 - Mop Sink
- .7 Form V-22 42 03 – Sinks
- .8 Form V-24 34 25 - Fans
- .9 Form V-24 73 11 - Air Handling Unit
- .10 Form V-24 73 11 - Magnetic Coupled Drives

.5 Section 21 13 13 Sprinkler Systems:
- .1 Inspection Report from Office of the Fire Marshal.

.6 Section 23 05 53 Mechanical Identification.
- .1 Valve Chart.

.7 Section 22 11 16 Domestic Water Piping.
- .1 Confirmation of disinfection of Water System.

.8 Section 22 42 03 Plumbing Fixtures.
- .1 Thermostatic control mixing valve test report.

.9 Section 23 11 23 Gas Piping
- .1 Gas system test report

.10 Section 24 73 11 Packaged Air Handling Units.
- .1 Drain pan Report

.11 Section 24 05 93 Balancing (TAB) of Mechanical Systems.
- .1 TAB Report.

.12 Section 25 05 01 BAS: General Requirements.
- .1 BAS Point by Point verification report
- .2 BAS start-up report including all field programmable software settings including demand expand setpoint and schedules.
- .3 Final Inspection certificate from Inspection Authority for Control Wiring Electrical Wiring Permit

.13 With application for substantial performance certificate
- .1 Section 20 05 02 Mechanical Submittals.
  - .1 Start Up Report Manual Part 1
  - .2 Operation and Maintenance Manuals.
- .2 Section 20 05 02 Mechanical Contract Closeout.
  - .1 Confirmation of Demonstration and Operating and Maintenance Instruction.
  - .2 Letter confirming testing and commissioning to satisfaction of Owner.
- .3 Section 20 91 13 Mechanical Systems Testing and Verification
  - .1 Form V-22 42 03 – Lavatory
  - .2 Form V-22 42 03 - Mop Sink
  - .3 Form V-22 42 03 – Sinks
  - .4 Form V-24 34 25 – Fans
  - .5 Form V-24 73 11 - Air Handling Unit
  - .6 Form V-24 73 11- Magnetic Coupled Dives
- .4 Section 21 13 13 Sprinkler Systems:
  - .1 Inspection Report from Office of the Fire Marshal.
- .5 Section 22 11 16 Domestic Water Piping.
  - .1 Confirmation of disinfection of Water System.
  - .2 Laboratory test report for potable water
- .6 Section 24 05 93 Balancing (TAB) for Mechanical Systems.
  - .1 TAB Report.
- .7 Section 25 05 01 BAS: General Requirements.
  - .1 BAS Point by Point verification report
  - .2 BAS start-up report including all field programmable software settings including demand expand setpoint and schedules.
  - .3 Final Inspection certificate from Inspection Authority for Control Wiring Electrical Wiring Permit

.14 With application for release of final payment
- .1 Section 20 05 02 Common Work Results for Mechanical - Submittals.
  - .1 Start Up Report Manual Part 2
  - .2 Maintenance Materials and Spare Parts.
  - .3 Special Tools.
  - .4 AS Built drawings.
- .2 Section 20 91 13 Mechanical Systems Testing and Verification Forms not previously submitted.
- .3 Section 23 05 53 Mechanical Identification.
  - .1 Valve Chart.

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.15 During Warranty Period
- .1 20 05 01 Common Work Results for Mechanical - General.
  - .1 Maintenance Service Reports
- .2 Section 25 05 01 BAS: General Requirements
  - .1 Quarterly Control Maintenance report.

2 Products N/A

3 Execution

3.1 CLEANING

.1 Clean mechanical (building) systems in accordance with Division 01.

.2 Clean all pipe systems strainers.

.3 Vacuum interior air handling units.

.4 Wipe down exterior of air handling units.

.5 Wash interior of air handling units.

.6 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition including replacement of all filters in all air and piping systems.

3.2 VERIFICATION

.1 In context of this paragraph "verify" to include "demonstrate" to consultant.

.2 Timing: commission only after start-up deficiencies rectified.

.3 Access doors: verify size and location relative to items to be services.

.4 Adjust to suit site conditions, including, but not necessarily limited to, following:
- .1 Floor drains:
  - .1 Verify proper operation of trap primer.
  - .2 Verify security and removability of strainers.
- .2 Cleanouts:
  - .1 Verify covers are gastight, secure and easily removable.
  - .2 Verify that cleanout rods can properly reach as far as next cleanout.
- .3 Pressure regulators:
  - .1 Adjust settings to suit installed locations, required flow rates.
- .4 Trap seal primers:
  - .1 Verify operation.
  - .2 Adjust flow rate to suit site conditions.
- .5 Grease interceptors:
  - .1 Activate, using manufacturer's recommended activation procedures and materials.
- .6 Air handling units
  - .1 Verify installation in accordance with manufacturer's recommendation.
  - .2 Verify accessibility.
- .7 Magnetic coupled drives
  - .1 Verify installation in accordance with manufacturer's recommendation.
  - .2 Verify accessibility.

.5 Controls: Refer to Section 25 05 01 BAS: General Requirements.

.6 Verification reports:
- .1 Record all results on approved report forms.
- .2 Include signature of tester and supervisor.

.7 Verification:
- .1 Notify Consultant 24 hour before commencing tests.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE SECTIONS

.1 Section 07 84 00 Firestopping

1.3 SUBMITTALS

.1 In accordance with the following Sections:
- .1 Section 07 84 00 Firestopping
- .2 Section 20 05 02 Mechanical Submittals

2 Products

.1 Provide by Section 07 84 00 Firestopping

3 Execution

3.1 INSTALLATION

.1 Provide by Section 07 84 00 Firestopping

3.2 FIRESTOPPING

.1 Firestopping material and installation within annular space between pipes, ducts, insulation and adjacent fire separation

.2 Uninsulated unheated pipes not subject to movement: no special preparation.

.3 Uninsulated heated pipes subject to movement: wrap with non-combustible smooth material to permit pipe to move without damaging firestopping material.

.4 Insulated pipes and ducts: ensure integrity of insulation and vapor barrier at fire separation.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

1.3 RELATED WORK

.1 General requirements: Division 1.

.2 Section 24 05 93 Testing, Adjusting and Balancing (TAB) of Mechanical Systems

1.4 GENERAL

.1 The verification of all Mechanical systems installed on this project is the responsibility of the Mechanical Contractor. Manufactured systems or components shall be commissioned by factory trained technicians representing the manufacturer, in the presence of the Owner's designated representatives, and under the direction of the Mechanical contractor.

.2 The Mechanical contractor will provide assistance to the Owner's representatives and ensure that the manufacturer's representative is on site during functional performance testing.

.3 Tests shall be performed by qualified plumber, heating technicians, sheet metal technician, electricians or other technicians as required by the nature and complexity of the test.

1.5 QUALITY ASSURANCE

.1 Be responsible for quality assurance and whenever necessary, to ensure compliance with operating requirements, CSA, these contract documents, the Authority having Jurisdiction and other requirements and codes as applicable.

.2 Perform services under direction of supervisor qualified under certification requirements of sponsoring association.

1.6 SCOPE

.1 Testing are called for throughout the individual specifications, however, this does not relieve this Division from providing all testing necessary to ensure that systems and equipment operate as required and that they interface other systems and equipment as required.

.2 Testing of manufactured systems or components shall be performed by factory trained technicians representing the manufacturer.

.3 Perform test by qualified technicians as required by the nature and complexity of the test.

1.7 SYSTEM PERFORMANCE VERIFICATION

.1 When systems are ready for performance verification, arrange a time with the Consultant.

.2 Tested systems prior to this demonstration and be confident that all systems will operate as required.

.3 Systems shall be ready for performance verification at the time prior to final inspection.

1.8 CLEANING

.1 Clean mechanical (building) systems in accordance with Division 1.

.2 Clean all pipe systems strainers.

.3 Wipe down exterior of air handling units.

.4 Wash interior of air handling units.

.5 In preparation for final acceptance, clean and refurbish all equipment and leave in operating condition including replacement of all filters in all air and piping systems.

1.9 CONTRACTOR'S RESPONSIBILITIES

.1 Prepare each system for testing and verification.

.2 Co-ordinate the efforts of testing and verification.

.3 Provide personnel to operate systems at designated times, and under conditions required for proper testing and adjusting.

.4 Provide all necessary test and calibration equipment, temporary facilities, meters, sensors, etc. necessary to simulate and verify correct operating conditions.

.5 Co-ordinate and pay for all costs associated with testing and verification, including but not limited to costs for travel, labour, equipment, testing agencies, manufacturers, testing and any other costs incurred to test and verify equipment and systems.

.6 Make test instruments available to Consultant to facilitate spot checks during testing.

.7 Retain possession of test instruments and remove at completion of services.

.8 Verify system installation is complete and in continuous operation.

.9 Where systems or equipment do not operate as required, make the necessary corrections or modifications, re-test and re-commission.

1.10 FUNCTIONAL PERFORMANCE TESTING (FPT)

.1 Prior to Functional Performance Testing (FPT), submit the following documentation:
  .1 Record drawings.

.2 Operations and maintenance manuals.
.3 Copies of the test results listed in Section 20 05 03 Common Work Results for Mechanical – Contract Closeout.
.4 Written verification from the end user that demonstrations have been performed in accordance with Section 20 05 03 Common Work Results for Mechanical - Contract Closeout

.2 Prior to acceptance of The Substantial Performance application, the Owner will commence a Functional Performance Testing Program independent of other processes specified, upon receipt of written verification from the General Contractor that:
.1 All systems are complete and operational in all respects.
.2 All specified reports and documents have been submitted and approved.
.3 All tests, commissioning and start-up processes described elsewhere in the specification are complete.
.4 All demonstrations have been completed and documented.

1.11 FINAL REPORT

.1 Assemble all testing data and verification reports and submit them to the Consultant.

.2 Each form shall bear signature of recorder, date of test, and all relevant information in clear and legible form.

.3 Identify each instrument used, and latest date of calibration of each.

.4 Include written confirmation by Owner's representatives that all verification, testing, instruction and demonstrations have been completed to the Owner's satisfaction.

2 Products N/A

3 Execution

3.1 SYSTEM PERFORMANCE VERIFICATION

.1 When systems are ready for performance verification, arrange a time with the Consultant.

.2 Tested systems prior to this demonstration and be confident that all systems will operate as required.

.3 Systems shall be ready for performance verification at the time prior to final inspection.

3.2 VERIFICATION

.1 In context of this paragraph "verify" to include "demonstrate" to consultant.

.2 Timing: verification only after start-up deficiencies rectified.

.3 Access doors: verify size and location relative to items to be services.

.4 Verification reports:
- .1 Record all results on approved report forms.
- .2 Include signature of tester and supervisor.

.5 Verification:
- .1 Notify Consultant 24 hr before commencing tests.

Form V-22 42 01 - Floor Drains

EQUIPMENT DETAILS: (Identification)
Floor Drains
Manufacturer: _____

PRE-REQUISITES: Water available. Drainage pipe pressure tested. Trap Primer operational. Final sewer connection completed.

PROCEDURES: (Place checkmark in space provided)	*Room #*	*Room #*	*Room #*
	_____	_____	_____
.1 Verify security and removability of strainer.	_____	_____	_____
.2 Confirm floor drains are clear.	_____	_____	_____
.3 Served by Trap Primer #	_____	_____	_____
.4 Operate Trap Primer and Confirm flow at individual traps.	_____	_____	_____

PROCEDURES: (Place checkmark in space provided)	*Room #*	*Room #*	*Room #*
	_____	_____	_____
.1 Verify security and removability of strainer.	_____	_____	_____
.5 Confirm floor drains are clear.	_____	_____	_____
.6 Served by Trap Primer #	_____	_____	_____
.7 Operate Trap Primer and Confirm flow at individual traps.	_____	_____	_____

COMMENTS/EVALUATIONS:

_____

_____

_____

SIGN OFF:
Mechanical
Contractor: _____ Signature: _____ Date: _____

Form V-22 42 01 - Cleanouts

EQUIPMENT DETAILS: (Identification)
Cleanouts
Manufacturer: _____

PRE-REQUISITES: Drainage pipe pressure tested. Final sewer connection completed. Cleanouts for under slab drainage brought to floor level. Access doors installed for stack cleanouts. Access available for cleanouts in ceiling spaces.

PROCEDURES: (Place checkmark in space provided) Floor Cleanouts	*Left Wing*	*Center Wing*	*Right Wing*
.1 Verify cleanout is accessible.	_____	_____	_____
.8 Verified covers can easily be removed.	_____	_____	_____
.9 Verify cover is gas tight.	_____	_____	_____
.10 Verify that cleanout rod can properly reach as far as next cleanout.	_____	_____	_____

PROCEDURES: (Place checkmark in space provided) Above grade Cleanouts.	*Left Wing*	*Center Wing*	*Right Wing*
.1 Verify cleanout is accessible.	_____	_____	_____
.11 Verified covers can easily be removed.	_____	_____	_____
.12 Verify cover is gas tight.	_____	_____	_____

COMMENTS/EVALUATIONS:

_____

_____

_____

_____

SIGN OFF:
Mechanical
Contractor: _____ **Signature:** _____ **Date:** _____

Form V-22 42 01 - Trap Primers

EQUIPMENT DETAILS: (Identification)
Trap Primer
Manufacturer: _____ Model: _____

PRE-REQUISITES: Water system operation. Drainage pipe pressure tested.
Final sewer connection completed. Power connected to trap primer.

PROCEDURES: (Place checkmark in space provided)	*TP#*	*TP#*	*TP#*
.1 Number Trap Primer on record Drawings	_____	_____	_____
.2 Verify time setting.	_____	_____	_____
.13 Verify solenoid valve opens by visual inspection.	_____	_____	_____
.14 Operate Trap Primer	_____	_____	_____
.15 Verify that solenoid valve closes completely.	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

PROCEDURES: (Place checkmark in space provided)	*TP#*	*TP#*	*TP#*
.1 Number Trap Primer on record Drawings	_____	_____	_____
.2 Verify time setting.	_____	_____	_____
.16 Verify solenoid valve opens by visual inspection.	_____	_____	_____
.17 Operate Trap Primer	_____	_____	_____
.18 Verify that solenoid valve closes completely.	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____
	_____	_____	_____

COMMENTS/EVALUATIONS:

_____

_____

_____

SIGN OFF:
Mechanical
Contractor: _____ Signature: _____ Date: _____

Form V-22 42 01 - Interceptors

EQUIPMENT DETAILS: (Identification)
Interceptors
Manufacturer: _____ Model: _____

PRE-REQUISITES: Drainage pipe pressure tested. Final sewer connection completed.

PROCEDURES: (Place checkmark in space provided)	*Room*	*Room*	*Room*
	_____	_____	_____
.1 *Verify cover air tight.*	_____	_____	_____
.2 *Verify that cover can be easily removed.*	_____	_____	_____
	_____	_____	_____
.19 *Verify removability of basket where applicable.*			

PROCEDURES: (Place checkmark in space provided)	*Room*	*Room*	*Room*
	_____	_____	_____
.1 *Verify cover air tight.*	_____	_____	_____
.2 *Verify that cover can be easily removed.*	_____	_____	_____
	_____	_____	_____
.20 *Verify removability of basket where applicable.*			

COMMENTS/EVALUATIONS:

_____

_____

_____

SIGN OFF:
Mechanical Contractor: _____ **Signature:** _____ **Date:** _____

Form V-22 42 03 - Lavatory

EQUIPMENT DETAILS: (Identification)
Lavatory
Manufacturer: _____ Model: _____
Faucet
Manufacturer: _____ Model: _____

PRE-REQUISITES: Domestic Hot and Cold Water system operational.
Drainage pipe pressure tested. Final sewer connection completed. .

PROCEDURES: (Place checkmark in space provided)	*Room*	*Room*	*Room*
	_____	_____	_____
.1 Verify faucet handle on left controls hot water and handle on right controls cold water.	_____	_____	_____
.2 Verify faucet handles properly labeled.	_____	_____	_____
.3 Verify supplies shut off water flow.	_____	_____	_____
.4 Verify drain functions.	_____	_____	_____
.5 Verify overflow works by filling sink with water.	_____	_____	_____
.6 Check water outlet for debris.	_____	_____	_____
.7 Record DHW temperature at faucet.	_____	_____	_____

COMMENTS/EVALUATIONS:

_____

_____

_____

_____

SIGN OFF:
Mechanical
Contractor: _____ Signature: _____ Date: _____

Form V-22 42 03 - Sinks

EQUIPMENT DETAILS: (Identification)
Sinks
Manufacturer: _____ Model: _____
Faucet
Manufacturer: _____ Model: _____

PRE-REQUISITES: Domestic Hot and Cold Water system operational.
Drainage pipe pressure tested. Final sewer connection completed.

PROCEDURES: (Place checkmark in space provided)	*Room*	*Room*	*Room*
	_____	_____	_____
.1 Verify faucet handle on left controls hot water and handle on right controls cold water.	_____	_____	_____
.2 Verify faucet handles properly labeled.	_____	_____	_____
.3 Verify supplies shut off water flow.	_____	_____	_____
.4 Verify drain functions.	_____	_____	_____
.5 Check water outlet for debris.	_____	_____	_____
.6 Record DHW temperature at faucet.	_____	_____	_____

COMMENTS/EVALUATIONS:

_____

_____

_____

_____

SIGN OFF:
Mechanical
Contractor: _____ **Signature:** _____ **Date:** _____

Form V-22 42 03 - Mop Sink

EQUIPMENT DETAILS: (Identification)
Mop Sink
Manufacturer: _____ Model: _____
Faucet
Manufacturer: _____ Model: _____

PRE-REQUISITES: Domestic Hot and Cold Water system operational.
Drainage pipe pressure tested. Final sewer connection completed

PROCEDURES: (Place checkmark in space provided)	*Room*	*Room*	*Room*
.1 Verify faucet handle on left controls hot water and handle on right controls cold water.	_____	_____	_____
.21 Verify faucet handles properly labeled.	_____	_____	_____
.22 Verify supplies shut off water flow.	_____	_____	_____
.23 Verify drain functions.	_____	_____	_____
.24 Check water outlet for debris.	_____	_____	_____
.25 Record DHW temperature at faucet.	_____	_____	_____
.26 Verify vacuum breaker operation.			

COMMENTS/EVALUATIONS:

_____

_____

_____

_____

SIGN OFF:
Mechanical
Contractor: _____ **Signature:** _____ **Date:** _____

Form V-24 73 11 - Air Handling Unit

EQUIPMENT DETAILS: (Identification)
Air Handling Unit
Supply Fan #_____
Manufacturer: _____ Model: _____ Serial #: _____
Return or Exhaust Fan #_____
Manufacturer: _____ Model: _____ Serial #: _____

PRE-REQUISITES: Power, BAS, ductwork and glycol system complete. Balancing Report complete. BAS Control report complete.

PROCEDURES: (Place checkmark in space provided)		*SF #*	*RF or EF*
.1	*Verify installation in accordance with manufacturer's recommendation.*	_____	_____
.2	*Use balancing report to verify air flow with design.*	_____	_____
.3	*Verify fan isolation unimpeded.*	_____	_____
.4	*Verify there is no unusual vibration (i.e.: belt guard is secure).*	_____	_____
.5	*Check belt tension (if applicable.)*	_____	_____
.6	*Verify power is correct.*	_____	_____
.7	*Verify rotation by "bumping" fan.*	_____	_____
.8	*Verify lamecoid identification mechanically fastened.*	_____	_____
.9	*Verify accessibility.*	_____	_____
.10	*Verify coil shut-off valve works by closing, then opening it.*	_____	_____
.11	*Verify that no air bypasses around filters.*	_____	_____
.27	*Verify filters can be removed.*	_____	_____
.28	*Verify outside air damper and exhaust air damper operation.*	_____	_____
.29	*Verify outside air damper and exhaust air damper close tightly (no daylight visible).*	_____	_____

.12 *Pre-filter Model, size and quantity* _____
.13 *Pre-filter recommended change pressure* _____
.14 *Final filter Model, size and quantity* _____
.15 *Final filter recommended change pressure* _____
.16 *Exhaust-filter Model, size and quantity* _____
.17 *Exhaust filter recommended change pressure* _____

COMMENTS/EVALUATIONS:

_____
_____
_____

SIGN OFF:
Mechanical Contractor: _____ **Signature:** _____ **Date:** _____

Form V-24 34 25 - Fans

EQUIPMENT DETAILS: (Identification)
Fan # _____ Replacement Belt # _____
Manufacturer: _____ Model: _____ Serial #: _____
Fan # _____ Replacement Belt # _____
Manufacturer: _____ Model: _____ Serial #: _____
Fan # _____ Replacement Belt # _____
Manufacturer: _____ Model: _____ Serial #: _____

PRE-REQUISITES: Power and ductwork complete.
Balancing Report complete.
BAS Control report complete.

PROCEDURES: (Place checkmark in space provided)	*Fan #* _____	*Fan #* _____	*Fan #* _____
1. Use balancing report to verify air flow with design.			
2. Verify there is no unusual vibration (i.e.: belt guard is secure).	_____	_____	_____
3. Check belt tension (if applicable.)	_____	_____	_____
4. Verify power is correct.			
5. Verify rotation by "bumping" fan.	_____	_____	_____
6. Verify lamecoid identification mechanically fastened.	_____	_____	_____
	_____	_____	_____

COMMENTS/EVALUATIONS:

_____

_____

_____

_____

_____

SIGN OFF:
Mechanical
Contractor: _____ Signature: _____ Date: _____

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

1.3 SUBMITTAALS

.1 In accordance with Section 20 05 02 Mechanical Submittals.

1.4 PRODUCTS/SYSTEMS

.1 Products/Systems: as per listed and described below.

.2 Refer to "Instruction to Bidders" for method of applying for Alternatives Products/Systems prior to close of tender.

1.5 ENGINEERING DESIGN CRITERIA

.1 Design drawings to suit existing conditions and be complete as per NFPA 13.

.2 No alterations to layout shown without written instruction except for minor co-ordination items.

2 Products

2.1 PIPE AND FITTINGS

.1 All pipe to be stamped as per NFPA 13 and listed for Fire Service.

.2 Steel Pipe to ASTM A-53/A-135/A-795 as per NFPA 13.
- .1 Application:
  - .1 Mains
  - .2 Branch lines
  - .3 Branch pipe to heads.
- .2 NPS 2 and Smaller Pipe Joints:
  - .1 Schedule 40: Screwed or Roll Grooved Couplings.
  - .2 Schedule 10: Roll Grooved Couplings.
- .3 NPS 2½ up to NPS 8 Pipe Joints:
  - .1 Schedule 40: Welded, Flanged, Roll Grooved Couplings.
  - .2 Schedule 10: Roll Grooved Couplings.

.3 Pipe fittings, screwed, flanged or welded:
- .1 Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 to ASME B16.1
- .2 Malleable Iron Threaded Fittings: Classes 150 and 300 to ASME B16.3.

.3 Gray Iron Threaded Fittings: Classes 125 and 250 to ASME B16.4
.4 Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard to ASME B16.5
.5 Factory-Made Wrought Buttwelding Fittings to ASME B16.9
.6 Forged Fittings, Socket-Welding and Threaded to ASME B16.1
.7 Buttwelding Ends to ASME B16.25

.4 Braided Flexible Hose Assembly Fittings are not acceptable.

.5 Threadable thinwall not acceptable

2.2 ROLL GROOVED COUPLINGS AND FITTINGS

.1 Where rolled grooved couplings and fittings are used, they shall be of the same manufacturer.

.2 Ductile iron to ASTM A-536 or malleable iron to ASTM A-47 coupling housings painted with alkyd enamel.

.3 Gaskets.
.1 Grade "E" EPDM Type A.
.2 -34° C to +110° C temperature range.
.3 ULC listed for sprinkler systems.

.4 Ductile iron to ASTM A-536 or malleable iron to ASTM A-47 fittings painted with alkyd enamel.

.5 Coupling Bolts/Nuts:
.1 Heat treated carbon steel, track head to ASTM A-183 minimum tensile 110,000 psi.

.6 Standard of Acceptance:
.1 Victaulic Co. of Canada couplings and grooved-end fittings with Grade "EHP" EPDM gaskets

.7 Acceptable Manufacturers:
.1 Anvil Gruvlok

2.3 VALVES

.1 ULC listed for fire protection service.

.2 Up to NPS 2: Bronze, screw ends, OS&Y gate.

.3 NPS 2 1/2 and over: cast iron, flanged or roll grooved ends, indicating butterfly valve.

.4 Swing check valves with ball drip.

2.4 SPRINKLER HEADS

.1 In accordance with NFPA 13 and ULC listed for fire service.

.2 Chrome in finished areas.

.3 Bronze in service areas and concealed areas.

2.5 SUPERVISORY SWITCHES

.1 In accordance with NFPA 13 and ULC listed for fire service.

.2 Valves: Mechanically attached to valve body, with N.O. and N.C. contacts and supervisory capability.

.3 Flow Switch Type: With N.O. and N.C. contacts and supervisory capability.

2.6 PRESSURE GAUGES

.1 ULC listed for Fire Protection.

2.7 HANGERS AND SUPPORTS

.1 ULC listed for Fire Protection.

.2 As per Section 23 05 29 Hangers and Supports and NFPA 13, whichever is more stringent.

2.8 IDENTIFICATION

.1 As per Section 23 05 53 Mechanical Identification.

.2 In accordance with NFPA 13.

2.9 SIGNS

.1 Signs for control drain and test valves: to NFPA 13.

3 Execution

3.1 INSTALLATION

.1 Install in accordance with NFPA 13, contract documents and local authority having jurisdiction, whichever is more stringent

.2 Install pipes close to building structure to minimize furring, conserve headroom and space.

.3 Run piping parallel to building lines. Elevation offsets using industry standard screwed or grooved fittings. Building angle offsets using swing joints (with auxiliary drains where required)

.4 Test to acceptance in accordance with NFPA 13.

3.2 COORDINATION

.1 Closely coordinate design and installation of Sprinkler System piping and equipment with Mechanical Contractor and Electrical contractor.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

2 Products

2.1 GENERAL

.1 ULC listed pre-engineered system.

.2 Design to NFPA 17A and NFPA 96.

2.2 STORAGE CONTAINERS

.1 Main bank of extinguishing agent and expellant gas containers.

.2 Pressure gauge on each container.

.3 Approved container mounting and retaining system.

2.3 TUBING AND FITTINGS

.1 In accordance with ULC listing.

.2 Type 304 Stainless Steel.

2.4 DISCHARGE NOZZLES

.1 Stainless steel in accordance with NFPA 17A and ULC listed.
- .1 Appliance/Duct/Plenum (ADP) Nozzle
- .2 Fryer (F) nozzle
- .3 Duct/Mesquite (DM) nozzle
- .4 Range (R) nozzle
- .5 Gas Radiant/Wok (GRW) nozzle

2.5 DETECTION OF FIRES

.1 ULC listed automatic detection system to NFPA 17A.

2.6 GAS SHUTOFF VALVES

.1 ULC listed

.2 Cable operated

.3 Standard of Acceptance: ASCO HV216-585

2.7 OPERATING DEVICES

.1 ULC listed operating system to NFPA 17A.

.2 Provide one manual control ULC listed operating station to NFPA 17A,

.3 Located manual control at barrier free mounting height adjacent to room exit.

.4 Shut down all devices in accordance with instructions of listed system, including electrical power supply to cooking equipment under kitchen exhaust hood.

2.8 BUILDING FIRE ALARM CONNECTIONS

.1 Provide trouble and discharge terminal points for tying into building fire alarm system as specified in Electrical Contractor.

3 Execution

3.1 INSTALLATION

.1 Install and test to acceptance in accordance with ULC listing.

.2 Testing to be witnessed by authorities having jurisdiction.

.3 Where there is not a particular nozzle for the appliance such as convection ovens, steam kettles, etc., provide Appliance/Duct/Plenum (ADP) Nozzle(s).

3.2 RECHARGING

.1 After completion of all tests, ensure each cylinder contains correct chemical and weight of extinguishers agent and expelling gas.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

1.3 LEAD FREE

.1 In accordance with NSF/ANSI 372 Drinking water system components – Lead Content or California Health and Safety Code (Section 116875; commonly known as AB1953) or Vermont Bill S.152

2 Products

2.1 PIPING

.1 Domestic hot, tempered, cold and recirculation tubing, within building.
- .1 Above ground: copper tube, hard drawn, type L to ASTM B88.
- .2 Individual branch NPS ½ water lines, from main in ceiling to individual fixture:
  - .1 PEX Pressure Tubing to CAN/CSA-B137.5 with cold flare connections or Press flare connections as noted below
  - .2 All PEX Pressure Tubing and fittings to be by one Manufacturer.
  - .3 Bend supports, drop ear bend support with connection free stub out, etc.
  - .4 Acceptable Material:
    - .1 Uponor with ProPEX Connections.
    - .2 Rehau with Everloc Connections.
    - .3 ViegaPEX Ultra with PEX Press Connections.

.2 Trap Primer lines
- .1 Where exposed and concealed above grade: Copper tubing as above.

2.2 FITTINGS FOR COPPER

.1 ASME/ANSI B16 Series

.2 Brass or bronze flanges and flanged fittings.

.3 Cast brass or bronze threaded fittings, Class 125 & 250.

.4 Cast bronze or wrought copper and bronze.
- .1 NPS 2 and under: Lead free solder to ASTM B32.
- .2 NPS 2 1/2 and over: Roll Grooved or Silfos.

.5 Press Fitting:
- .1 Copper and copper alloy press fittings conforming to material requirements of ASME B16.18 or ASME B16.22 and performance criteria of IAPMO PS 117.
- .2 EPDM sealing elements for press fittings.
- .3 Factory installed sealing elements.

.4 Press ends with leakage path feature that assures leakage of liquids from inside the system past the sealing element of an unpressed connection. The function of this feature is to provide the installer quick and easy identification of connections which have not been pressed prior to putting the system into operation.

.5 Acceptable Material: Viega Copper ProPress fittings.

2.3 FITTINGS FOR PEX

.1 At mains, provide tee fittings to serve multiple drops.

.2 For NPS ½ and NPS 3/4, provide bend supports where pipe direction changes in lieu of elbows.

.3 Bend supports, drop ear bend support with connection free stub out, etc.

.4 Provide copper to fixture supplies.

.5 To manufacturer's requirements.

.6 Refer to Mechanical Insulation specification for continuous insulation.

2.4 JOINTS FOR COPPER

.1 Solder/brazing: lead free to ASTM B32.

.2 Press connections: Copper and copper alloy press connections in accordance with the manufacturer's installation instructions.

2.5 JOINTS FOR PEX

.1 To manufacturer's requirements using tools recommended by PEX manufacturer.

2.6 HANGERS AND SUPPORTS

.1 Support as per manufacturer's requirements and National Plumbing Code of Canada.

.2 Copper

.1 As per Section 23 05 29 Hangers and Supports.

.3 PEX

.1 Utilize Uponor PEX-a Pipe Support for all NPS 1 and larger mains supported with hangers as per Section 23 05 29 Hangers and Supports.

2.7 ROLL GROOVED COUPLINGS AND FITTINGS

.1 Where rolled grooved couplings and fittings are used, they shall be of the same manufacturer.

.2 Sized to copper-tube dimensions.

.3 Ductile iron coupling housings to ASTM A-536 with a copper alkyd enamel paint.

.4 Rigid Grooved type Couplings: Housings cast with offsetting angle-pattern bolt pads to provide rigidity and system support.

.5 Flush Seal Gaskets:
- .1 Molded EPDM Compound to ASTM D-2000 -34° C to 110° C temperature range.
- .2 Suitable for domestic cold water, domestic hot water, domestic hot water recirculation.
- .3 Classified in accordance with ANSI/NSF-61 for potable water service

.6 Fittings: NPS 2 to 4 Copper per ASTM B-75. NPS 6 Bronze Sand Casting per ASTM B-584.

.7 Coupling Bolts/Nuts: Heat treated carbon steel, track head to ASTM A-183 minimum tensile 110,000 psi.

.8 Fittings: NPS 2 and larger: roll grooved to CSA B242. Cast bronze to ANSI/ASME B16.18 or wrought copper ANSI/ASME B16.22.

.9 Standard of Acceptance:
- .1 Victaulic Co. of Canada Style 606 Rigid Couplings with Grade E Flush Seal Gasket, Style 641 Flange Adapters and Copper Connection Fittings.
- .2 Victaulic Co. of Canada Style 607 Quick-Vic Rigid Couplings with EHP gasket for direct stab installation without field disassembly.

.10 Acceptable Material: Anvil Gruvlok

2.8 MECHANICALLY FORMED TEE CONNECTIONS

.1 Mechanically extracted collars formed in a continuous operation, consisting of drilling a pilot hole and drawing out the tube surface to form a collar having a height of not less than three times the thickness of the tube wall.

.2 Mechanically Formed Tee Connections can be used on NPS 1 and larger pipe. Use only where branch is a minimum of one size smaller than run pipe.

.3 Branch notched to conform with the inner curve of the run tube, dimpled to insure penetration of the branch tube into the collar is of sufficient depth for brazing and that the branch tube does not obstruct the flow in the main line tube.

.4 Brazed joints.

2.9 VALVES

.1 As per Section 23 05 23 Valves.

2.10 INSULATION

.1 As per Section 23 07 00 Mechanical Thermal Insulation

3 Execution

3.1 INSTALLATION

.1 Connect to fixtures and equipment in accordance with manufacturer's instructions unless otherwise indicated.

.2 Install pipes close to building structure to minimize furring, conserve headroom and space. Run piping parallel to walls. Group piping wherever possible.

.3 Install groups of piping parallel to each other, spaced to permit application of insulation, identification, and service access, on individual hangers or trapeze hangers.

.4 Cut square, ream and clean tubing and tube ends, clean recesses of fittings and assemble without binding.

.5 Wipe all pipes of soldering flux as the joint is completed.

.6 Assemble all piping using fittings manufactured to ANSI standards.

.7 Install DCW piping below and away from DHW and DHWR and all other hot piping so as to maintain temperature of cold water as low as possible.

.8 Where pipe sizes differ from connection sizes of equipment, install reducing couplings close to equipment. Reducing bushings are not permitted.

.9 Lay copper tubing so that it is not in contact with dissimilar metal and will not be kinked or collapsed.

.10 Use non-corrosive lubricant or Teflon tape applied to male thread.

.11 Provide di-electric couplings wherever piping of dissimilar metals are joined.

.12 Install swing or swivel joints to connect risers to mains.

3.2 ROLL GROOVED CONNECTIONS

.1 In accordance with manufacturer's recommendations.

.2 Cut ends of roll grooved pipe square, with seating surface clean and free from indent and score marks.

3.3 PEX INSTALLATION

.1 In accordance with manufacturer's instructions unless otherwise indicated.

.2 Have a copy of manufacturer's instructions on site.

.3 Parallel to building lines.

3.4 PRESS CONNECTION INSTALLATION

.1 In accordance with the manufacturer's installation instructions.

.2 Fully inserted tubing into the fitting and the tubing marked at the shoulder of the fitting.

.3 Check the fitting alignment against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting.

.4 Pressed the joints using the tool(s) approved by the manufacturer.

3.5 MECHANICALLY FORMED TEE CONNECTIONS

.1 Mechanically Formed Tee Connections can be used on NPS 1 and larger pipe. Use only where branch is a minimum of one size smaller than run pipe.

3.6 DISINFECTION & TESTING

.1 Potable Water
- .1 Flush out, disinfect and rinse potable water piping to requirements of authority having jurisdiction.
- .2 Upon completion, provide bacteria and full chemical analysis laboratory test reports on water quality confirming that the potable water meets Guidelines for Canadian Drinking Water Quality
- .3 Test potable water system to requirements of authority having jurisdiction and in accordance with Division 1.

.2 Provide full chemical analysis laboratory test results for the following:
- .1 In the kitchen

.3 Provide bacteria test results in the following locations:
- .1 At end of longest run,
- .2 In the kitchen

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

2 Products

2.1 PIPING, FITTINGS AND JOINTS

.1 NPS 1 ¼ and larger: Type DWV Copper to ASTM B306.
- .1 Fittings:
  - .1 Cast brass: to CSA B158.1.
  - .2 Wrought copper: to ANSI B16.29.
- .2 Solder/brazing: Lead free to ASTM B32.

.2 Cast Iron Pipe: to CAN/CSA-B70 Cast Iron Soil Pipe, Fittings and Means of Joining.
- .1 Above Ground Sanitary Storm and Vent to CSA B-70, Product to be manufactured in ISO 9000 and ISO 14001 Facility
- .2 Acceptable material for pipe.
  - .1 Bibby Ste-Croix: All sizes.
  - .2 Tyler: up to and including NPS 4
- .3 Hub & Spigot Joint.
  - .1 Self-locking positive compression EPDM gasket
  - .2 Acceptable material.
    - .1 Bibby Ste-Croix Bi-Seal.
    - .2 Tyler Ty-Seal.
- .4 Cast Iron Pipe Mechanical Joints: to and listed to CAN/ULC S-102.2-10 and CAN/CSA-B602 Mechanical couplings for drain, waste, and vent pipe and sewer pipe
- .5 Acceptable material.
  - .1 Bibby Ste-Croix
    - .1 Series 2000.
    - .2 Husky SD4000 Heavy Duty
  - .2 Tyler MJ (No hub) coupling.

.3 PVC to CAN/CSA-B181.2, CAN/CSA-B182.1 and CAN/CSA-B182.2
- .1 PVC DWV 25-50: with solvent weld joints with flame spread not more than 25 and smoke developed classification not more than 50.
  - .1 Pipe and fittings by one manufacturer.
  - .2 Acceptable material:
    - .1 IPEX System XFR™ 15-50
- .2 PVC DWV: with solvent weld joints
- .3 SDR $\leq$ 35 PVC DWV up to and including NPS 6: solvent weld joints
- .4 SDR $\leq$ 35 PVC DWV 8 and over: locked in gasket and integral bell joint.

	Copper	Cast Iron	PVC DWV	PVC DWV 25 -50	SDR ≤ 35 PVC DWV
Above Grade Sanitary& Vent	Y	Y	N	N	N

2.2 SANITARY SERVING KITCHEN

.1 Above Grade: as described above.

2.3 RELIEF VALVE PIPING AND DRAINS

.1 All sizes: copper tube, hard drawn, type L to ASTM B88
  .1 Applications: relief valve piping, etc.

.2 NPS 1 ¼ and larger: Copper DWV or PVC DWV 25-50 as described above
  .1 Applications: air handling drains, plenums, A/C drains, etc.

2.4 HANGERS SUPPORTS

.1 As per Section 23 05 29 Hangers and Supports.

2.5 INSULATION

.1 As per Section 23 07 00 Mechanical Thermal Insulation

3 Execution

3.1 INSTALLATION

.1 Install piping parallel to building lines and close to walls and ceilings to conserve headroom and space and to grade indicated.

.2 For NPS 4 or less pipe, use double 45^{o} fittings to make 90^{0} change in direction

.3 Cast Iron
  .1 In accordance with manufacturer requirements.
  .2 Torque coupling connections to manufacturer requirements.

3.2 CLEANOUTS

.1 For stack cleanouts with access door, locate centerline of cleanout a minimum of 300mm (12") AFF.

3.3 RELIEF VALVE PIPING AND DRAINS

.1 Turn down at floor drain.

.2 Cut end of discharge pipe at 45°.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

1.3 LEAD FREE

.1 In accordance with NSF/ANSI 372 Drinking water system components – Lead Content or California Health and Safety Code (Section 116875; commonly known as AB1953) or Vermont Bill S.152

2 Products

2.1 CAST IRON BODY FLOOR DRAINS

.1 FD-F: Coated cast iron body with integral seepage pan, membrane clamping collar, nickel bronze adjustable head, integral oval funnel and round strainer (open at funnel).

.2 Acceptable material:

	Jay R. Smith	Mifab	Watts Drainage	Zurn
FD-F	2005-3591 OT-NB	F1100-C-EG-1	FD-100-C-EG-1	ZN-415-BF

2.2 CLEANOUTS

.1 CO: For Floors: Cast iron body, round adjustable secured nickel bronze full 13 mm (1/2") thick top with neoprene gasket, cast iron membrane clamp collar, cast iron extension and gas tight ABS expansion plug.

.1 Acceptable Material:

.1 Jay R. Smith 4100S-F-C

.2 Mifab C1100-XR-1-34

.3 Watts CO-100-C-RX-1-34G

.4 Zurn Z-415-U-ZXN-1612-SP ZXN-415-CO-SP-Devcon 4NH

.2 For stacks, concealed in block wall: install a Malcolm style in a TY with face of cleanout within 50mm (2") of wall face. Provide access door.

.3 For stacks, concealed in drywall: Barrett style with access door.

.4 For exposed stacks: Barrett style.

.5 For nominally horizontal piping in ceiling space: Malcolm style (with access door where above non-accessible ceiling).

2.3 WATER HAMMER ARRESTORS

.1 WHA: Stainless steel construction, bellows type: to Plumbing and Drainage Institute Standard PDI-WH 201-77.

.2 Acceptable Material:
- .1 Jay R. Smith 5000
- .2 Watts Drainage SG-SS
- .3 Zurn Z-1700

2.4 TRAP SEAL PRIMERS

.1 Electronic solenoid valve with brass body, atmospheric vacuum breaker, inlet isolation valve, 24 hour timer, manual override switch, adjustable timer and manifold with NPS 5/8 compression for NPS ½ copper tube connections, galvanized steel wall box, prime coated access door with Allen key lock. 120 volt single point power connection. All internal piping to be copper. Valve and manifold inside enclosure.
- .1 Acceptable Material:
  - .1 Precision Plumbing Products PT-FM series-TMR-1-ADJ-120V

.2 Provide water hammer arrestor for each trap primer.

.3 Each trap seal primer connection to run independent to each floor drain.

.4 For floor drains above grade, NPS 1/2 tubing between primer and floor drain. Pipe to be in ceiling space.

.5 Provide trap seal primer connection to all floor drains except where floor drains connect to a primed running trap.

2.5 TRAPS

.1 Deep seal traps.

2.6 PRESSURE REGULATOR

.1 Up to NPS 1 1/4:
- .1 Lead Free
- .2 For Dishwashers
- .3 Bronze body construction.
- .4 Stainless steel integral strainer.
- .5 Renewable stainless steel seat.
- .6 High temperature resistant diaphragm.
- .7 Union on inlet.
- .8 Built in thermal expansion bypass
- .9 Capacity:
  - .1 Inlet pressure 400 kPa (60 psi)
  - .2 Outlet pressure 200 KPa (30 psi)
  - .3 Capacity 0.6 l/s (10 USgpm)
- .10 Acceptable Material:
  - .1 Watts LFU5BLP-Z3NPS 3/4.
  - .2 Wilkins 600LPVXL

2.7 INTERCEPTORS

.1 Grease Interceptors
- .1 Tested and rated in accordance with epoxy coated fabricated steel body, baffles and removable internal flow control.
- .2 Non-slip scoriated heavy duty reinforced cover with gasket.
- .3 Mounted flush with finish floor.
- .4 Extension to suit construction.
- .5 Anchoring flange.
- .6 Capacity: 3.2 l/s (50 USgpm).

.2 Acceptable material:

	Jay R. Smith	Mifab	Watts Drainage	Zurn
Grease	8200	MI-G	GI-100-X-EHDCIP	Z-1170-E-EPHD

2.8 VACUUM RELIEF VALVE

.1 Lead Free

.2 Tested and rated under ANSI Z21.22.

.3 Acceptable Material:
- .1 Watts LF N36 NPS 3/4.
- .2 Wilkins 34XL-VR10

3 Execution

3.1 CLEANOUTS

.1 In addition to those required by code, an easily accessible cleanout shall be provided at each 135 degree change in direction in soil or waste pipe and at the base of each stack.

.2 Bring cleanouts to wall or finished floor unless serviceable from below floor.

.3 Running trap cleanouts to extend to finish floor.

.4 For stacks with access door, locate centerline of cleanout a minimum of 300mm (12") AFF.

.5 Building drain cleanout and stack base cleanouts: line size to maximum NPS 4.

3.2 FLOOR DRAINS

.1 Refer to Architectural drawings for floor slope.

.2 Service fixtures as follows:

Fixture	Waste Minimum NPS	Vent NPS
Floor Drain	3	1 1/2

3.3 GREASE INTERCEPTORS

.1 Allow sufficient space for ease of maintenance.

.2 Provide means to support from structure on underside of 2nd floor

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

1.3 FIXTURES AND TRIM

.1 All plumbing fixtures of same type to be by one Manufacturer.

.2 All vitreous china plumbing fixtures in any one washroom or location to be the product of one manufacturer.

.3 Trim of same type to be product of one manufacturer.

.4 Exposed plumbing brass to be chrome plated.

1.4 LEAD FREE

.1 In accordance with NSF/ANSI 372 Drinking water system components – Lead Content or California Health and Safety Code (Section 116875; commonly known as AB1953) or Vermont Bill S.152

2 Products

2.1 LAVATORY & SINK TRIM

.1 T-2 Lead Free Trim: chrome plated brass, 100 mm centerset supply fitting, mixing spout, vandal resistant laminar flow 5.7 L/min outlet, 62 mm lever handles with vandal resistant screws, NPS 1/2 IPS male inlets and coupling nuts.

- .1 Acceptable Material:
  - .1 Delta Commercial 21C123.
  - .2 Chicago Faucet AB1802A-369VP-E36VP.
  - .3 Kohler K-15240-4-CP and outlet as noted above.
  - .4 Zurn Z81103XL-18M.

2.2 P- TRAP

.1 PT-3 P-Trap: NPS 1 ½ chrome plated cast brass P-trap with cleanout and deep flange. Where concealed PT-4 P-Trap can be used.

- .1 Acceptable Material:
  - .1 Cambridge Brass 33T360 trap.
  - .2 McGuire 8912C trap.
  - .3 Oakville Stamping & Bending 96 trap.
  - .4 Watts Brass & Tubular Products 504 1735 trap.
  - .5 Zurn Z8702BD-PC

.2 GT-1: NPS 3 Cast brass trap with cleanout and removable trap dip draining to a grease interceptor as per Section 22 42 01 Plumbing Specialties and Accessories. Traps and associated pipe painted with aluminum paint.

2.3 FIXTURE SUPPLIES

.1 Lead Free chrome plated ¼ turn fixture supplies with chrome plated flexible copper riser wheel handle stops, screwed inlet with chrome plated brass nipple and escutcheons on each service to each fixture.
- .1 SUP-1 Acceptable Materials for Lavatories:
  - .1 Brasscraft KTR400A C-w/NIP Lead Free.
  - .2 Zurn Z8802Q-XL-LR-PC Lead Free

2.4 LAVATORIES

.1 SSL-2: wall hung, stainless steel, integral back splash up, supply openings on 100 mm centers, extra supply opening for sink mount eye/face wash, (see emergency equipment below), NPS 1 ½ waste assembly with brass tailpiece.
- .1 Mounted on wall bracket.
- .2 Acceptable Material:
  - .1 Franke Commercial WHB1819-3.
  - .2 AMI Novanni 8100.

.2 Lavatory Schedule:

Symbol	Lavatory	Trim	Drain	Trap	Supplies
L-1	SSL-2	T-2	-	PT-3	SUP-1

2.5 SERVICE SINKS

.1 MS-1: Floor mounted Stainless steel Mop Service sink with 450 mm (18”) integral splashguard on side (left or right as per plans) and back, 16 gauge, type 316 stainless steel. Polished satin finish, 250 mm (10") deep, radius coved bowl corners factory installed drain body with NPS 2 stainless steel dome strainer.
- .1 Nominal Size: 900 x 600 x 250 mm (36" x 24" x 10").
- .2 Acceptable Material:
  - .1 Franke Commercial FSSR or FSSL223410-18/316-1
  - .2 AMI Novanni 9501/316 with 450 mm (18”) integral splashguard
- .3 Trim: By Division 11

2.6 FIXTURE TRAPS

.1 P-traps complete with cleanouts on all fixtures which do not have built-in traps.

.2 Separate cleanout in stack is required where two or more sinks or lavatories connect to common stack using double sanitary tee.

.3 Running traps where indicated on drawing.

2.7 ROUGHING-IN OF FIXTURES

.1 For equipment supplied by others, provide rough-in complete with valved supplies, wastes and vents, capped.

2.8 EMERGENCY DEVICES

.1 EW-1: Eye-Wash
- .1 Sink mounted swing-down eye/face wash.
- .2 Water flows when eye/face wash swings down and stays open until manually swung up.
- .3 Metal parts of bracket for spray head/valve assembly are stainless steel.
- .4 Perforated spray head is ABS plastic and features soft flow spray head for flooding large areas as well as eyes only.
- .5 Protective spray head cover.
- .6 The integral flow control assures safe, steady flow under varying water supply conditions.
- .7 Emergency sign.
- .8 Tempered water blending system
  - .1 Thermostatic mixing valve liquid filled thermal motor built-in limit stops.
  - .2 Shuts off all incoming hot water if cold water supply fails.
  - .3 Check valve.
  - .4 Outlet temperature gauge.
  - .5 Provide union and isolation valve on inlets and outlet.
- .9 Acceptable Material for Eye Wash:
  - .1 Haws 7610 with TWBS.EWE lead-free TMV
  - .2 Bradley
  - .3 Acorn
  - .4 Guardian

3 Execution

3.1 FIXTURE INSTALLATION

.1 Connect fixtures complete with supplies and drains, trapped, supported level and square.

.2 Hot water faucets shall be on left.

.3 Fixtures on outside walls to have supplies from floor; other fixtures to be served from wall.

.4 For other fixtures refer to drawings for mounting heights.

.5 Ensure floor mounted fixtures are on a level base continuous around perimeter.

.6 In accordance with National Building Code and National Plumbing Code of Canada.

.7 Caulk wall hung lavatories to wall.

.8 Caulk floor mounted mop sinks to floor and wall. Caulk stainless steel wall trim to sink and wall.

.9 Service fixtures as follows:

Fixture	Waste NPS	Vent NPS	Cold Water NPS	Hot Water NPS
Lavatory	1 1/4	1 1/4	1/2	1/2
Sinks	1 1/2	1 1/4	1/2	1/2
Jan/ Mop Sink	2	1 1/2	1/2	1/2
Floor Drain	3	1 1/2	-	-

3.2 KITCHEN EQUIPMENT

.1 Make final plumbing connections to equipment.

.2 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

3.3 ADJUSTING

.1 Conform to water conservation requirements specified this section.

.2 Adjustments.
- .1 Adjust water flow rate to design flow rates.
- .2 Adjust pressure to fixtures to ensure no splashing at maximum pressures.
- .3 Adjust flush valves to suit actual site conditions.
- .4 Adjust urinal flush timing mechanisms.
- .5 Adjust water cooler, flow stream to ensure no spillage.

.3 Checks.
- .1 Outlets: operation, cleanliness.
- .2 Vacuum breakers, backflow preventers: operation under all conditions.

.4 Thermostatic controls.
- .1 Verify temperature settings, operation of control, limit and safety controls.

3.4 LAVATORY AND SINK TRIM

.1 Provide key for vandal resistant outlets.

.2 Clean outlet screens.

3.5 THERMOSTATIC CONTROL VALVES

.1 Verify temperature settings, operation of control, limit and safety controls.

.2 Install in accordance to manufacturer's recommendations.

.3 Master mixing valve Manufacturer’s service technician to visit the site and adjust Master mixing valve at full demand and no DHW demand.

.4 Test and adjust each thermostatic control mixing valve. Set limit stops as follows:

	TEMPERATURE ^{o}F	**TEMPERATURE ^{o}C**
Emergency Devices Mixing Valves	95	35

3.6 BRASS TRAPS, SUPPLIES AND ASSOCIATED PIPE

.1 Where exposed to view, paint with aluminum paint.

END OF SECTION

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

1.3 MANUFACTURED ITEMS

.1 All valves of one type to be by one manufacturer.

1.4 LEAD FREE

.1 In accordance with NSF/ANSI 372 Drinking water system components – Lead Content or California Health and Safety Code (Section 116875; commonly known as AB1953) or Vermont Bill S.152

2 Products

2.1 GAS VALVES NPS 2 AND UNDER

.1 Ball Valves NPS 2 and under, screwed.
- .1 Application.
  - .1 Section 23 11 23 Facility Gas Piping
- .2 ULC or CGA approved for Natural Gas and Propane.
- .3 Quarter-turn: bronze.

.2 Acceptable material:

NPS 2 and under	**Ball Gas**
Crane Canada Inc.	9302 CGA
Jenkins Valves 92 Inc.	901CJ
Kitz	58
Red-White/Toyo	5044A CGA
Newman Hattersley	1969F
Nibco	T-FP-600

2.2 VALVES NPS 2 AND UNDER

.1 Lead Free Ball Valves NPS 2 and under soldered and screwed:
- .1 Application
  - .1 Section 22 11 16 Domestic Water Piping
- .2 Quarter-turn: 4130 kPa (600 psi) W.O.G., bronze, large port.

.2 Lead Free Swing Check Valves NPS 2 and under, soldered and screwed:
- .1 Application
  - .1 Section 22 11 16 Domestic Water Piping
- .2 1380 kPa (200 psi) W.O.G., bronze body, bronze swing disc, screw in cap, regrindable seat.

.3 Acceptable material:

NPS 2 and under	Lead Free Ball	Lead Free Check
Apollo	77CLF-100/77CLF-200	161S-LF/161T-LF
Crane	LF9201/LF9202	LF37/LF1340
Milwaukee	UPBA150/ UPBA100	UP1509/UP509
Nibco	S-685-80-LF /T -685-80-LF	S-413-Y-LF / T-413-Y-LF
Kitz	868/869	822T/823T
Watts	LFB6080/ LFB6081	LFCV/LFCVS

2.3 DRAIN VALVES AND GAUGE COCKS

.1 Lead Free Drain Valves
- .1 Locate at low points of mains, branches and risers.
- .2 At domestic water branch isolation valves, provide drain unless branch can be drained through a fixture.
- .3 Equipment drain valves line size.
- .4 Minimum NPS 1/2 unless otherwise specified.
- .5 Ball valve with hose end male thread and cap with chain.

.2 Lead Free Gauge Cocks
- .1 NPS 1/4 screwed.
  - .1 Application
    - .1 Pressure Gauge
    - .2 Air vents
    - .3 Where indicated
- .2 Quarter-turn: 1725 kPa (250 psi) W.O.G., bronze.

.3 Acceptable material:

	Drain valves	Gauge Cocks
Apollo	77CLF-100-HC/77CLF-200-HC	77CLF-100/77CLF-200
Kitz	868/869 w/cap and chain.	868/869
Nibco	S-685-80-LF-HC /T -685-80-LF-HC	S-685-80-LF /T -685-80-LF
Watts	LFB6080/ LFB6081 w/cap and chain	LFB6080/ LFB6081
Milwaukee	UPBA150/ UPBA100 w/cap and chain	UP1509/UP509

3 Execution

3.1 GENERAL

.1 Install valves with stems upright or horizontal unless approved otherwise.

.2 Line size.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

2 Products

2.1 GENERAL

.1 Support from structural members. Where structural bearing does not exist or inserts are not in suitable locations, provide supplementary structural steel members.

2.2 UPPER ATTACHMENTS

.1 Preformed metal supports with 3 fasteners per side
- .1 Steel Deck
- .2 Galvanized.
- .3 Min 45 kg Static Load
- .4 Application:
  - .1 NPS ½ or ¾ domestic water piping or heating piping.
  - .2 Up to NPS 2 Plumbing vent.
  - .3 Maximum size duct: 400 mm (16").
- .5 Acceptable material: Brak-It

.2 Welded eye rod:
- .1 Wood.
- .2 Zinc plated.
- .3 Application: Piping and ductwork

.3 Coach screw with flatten end with hole for threaded rod:
- .1 For side attachment to Wood.
- .2 Application: Piping and ductwork

.4 Coach screw and machine thread rod:
- .1 Wood.
- .2 Zinc plated.
- .3 Application: Piping and ductwork

.5 Caddy clip for 6 mm (¼") rod Min 90 kg Static Load.
- .1 Steel beam, channel, joist or angle.
- .2 Application: Ductwork.

.6 Steel washer plate with double locking nuts.
- .1 Steel Joist.
- .2 Application: Cold and hot, plumbing and hydronic piping, any size and ductwork.

.7 Universal C-Clamp.
- .1 Top of steel beam, top of channel, top of joist or angle.
- .2 Application: Cold and hot, plumbing and hydronic piping, NPS 6 and under and ductwork.

.8 Acceptable material:

	CCTF/Hunt	**E. Myatt & Co**	**Taylor Pipe Supports**	**Anvil**	**Carpenter and Paterson Pipe Hangers Ltd.**
Welded eye rod	95	440		278	
Coach screw with Flattened end		#3 size 2			
Coach screw	58N	461	61	142	
Steel washer plate	560	545	80	60	260
Universal C-Clamp	56/56N/56NW		406/407	92/93/94	
C-Clamp	57	586	301	86	238

.9 Universal C-Clamp to NFPA 13 Requirements.
- .1 Top of steel beam, top of channel, top of joist or angle.
- .2 Application: Sprinkler.
- .3 Acceptable Material:
  - .1 CCTF/Hunt — Fig. 56N/56NW.
  - .2 Anvil — Fig. 92/93.
  - .3 Tolco — Fig. 65/66.

.10 For pipes and ducts parallel to steel structure:
- .1 Steel member from structural member to structural member.
- .2 Double locking nuts.

2.3 MIDDLE ATTACHMENT (ROD)

.1 Cadmium plated steel threaded rod:
- .1 Acceptable Material:
  - .1 Carpenter & Paterson Pipe Hangers Ltd. — Fig. 94.
  - .2 CCTF/Hunt — Fig. 99P.
  - .3 Anvil — Fig. 146.

2.4 PIPE ATTACHMENT

.1 Protecting Shield:
- .1 Minimum 1.3 x 300 mm (18 Ga. x 12”) long for NPS 6 and under.
- .2 Minimum 1.6 x 450 mm (16 Ga. x 18") long for over NPS 6.
- .3 Shop fabricated or as per table below

.2 Adjustable clevis hanger: to MSS-SP69, type 1, ULC listed.

.3 Long adjustable clevis hanger: to MSS-SP69, Type 1 ULC listed.

.4 Copper plated or epoxy coated adjustable clevis hanger:

.5 Adjustable steel yoke pipe roll: to MSS-SP69, Type 43.

.6 Adjustable clevis hanger for cast iron pipe:
.1 Application: Insulated and uninsulated cast iron pipe. All sizes.

.7 Black carbon steel riser clamp to MSS-SP69, Type 8, ULC listed.
.1 Application: Steel pipes and Cast iron pipe.

.8 Copper plated carbon steel to MSS-SP69, Type 8, ULC listed:
.1 Application: Copper pipes.

.9 Acceptable material:

	CCTF/ Hunt	**E. Myatt & Co**	**Taylor Pipe Supports**	**Anvil**	**Carpenter and Paterson Pipe Hangers Ltd.**
Protecting Shield	102		69H	167	
Protection Saddle	71	210 to 240	70 to 75	160 to 166	351 to 356
Adjustable clevis hanger	32N	124	24Z	260	100
Long adjustable clevis hanger	32U	124L	24L	300	286
Copper plated or epoxy coated clevis hanger	30C/E	151CT or 56	52	CT65	100CT
Adjustable steel yoke pipe roll	3436	258	93	181	140
Clevis hanger for cast iron pipe	33AC	126	27AC	590	
Black carbon steel riser clamp	40	183	82	261	126
Copper plated riser clamp	42C	150CT	85	CT121	126CT

.10 Double hook with double locking nut.
.1 Application: Insulated and uninsulated cast iron pipe: NPS 6 and under.
.2 Acceptable Material:
.1 Bibby Ste. Croix 6602 to 6606

.11 Cast iron support hanger saddle.
.1 Application: Insulated and uninsulated cast iron pipe: NPS 8 and 10.
.2 Acceptable Material.
.1 Bibby St. Croix 6606 to 6610

.12 Adjustable swivel ring hanger: to MSS-SP69, Type 10, ULC listed, tapped per NFPA 13 Standard.
.1 Application: Sprinkler piping.
.2 Acceptable Material:
.1 CCTF/Hunt Fig. 20.
.2 Anvil Fig. 69.
.3 Tolco Fig. 2.

3 Execution

3.1 PIPE SUPPORT SPACING

.1 Plumbing and Hydronic: Spacing and middle attachment (rod) diameter as specified in paragraphs below or as in table below, whichever is more stringent
.1 Plumbing piping: to National Plumbing Code of Canada.

.2 Authority having jurisdiction.
.3 Flexible joint roll groove pipe: in accordance with table below, but not less than one hanger at joints and not less than one hanger per pipe length over 1200 mm (4'0").
.4 Within 300 mm (12") of each elbow.
.5 Risers at each floor.
.6 Minimum hanger rod size as per full size manufacturer's recommendation and table below, whichever is greater.

Pipe Size: NPS	Rod Diameter	Maximum Spacing Steel	Maximum Spacing Copper
up to ¾	10 mm (3/8")	2100 mm (7'0")	1500 mm (5'0")
1 to 1-1/4	10 mm (3/8")	2100 mm (7'0")	1800 mm (6'0")
1-1/2	10 mm (3/8")	2750 mm (9'0")	2400 mm (8'0")
2	10 mm (3/8")	3000 mm (10'0")	2750 mm (9'0")
2-1/2	10 mm (3/8")	3350 mm (11'0")	3000 mm (9'10")
3	13 mm (1/2")	3650 mm (12'0")	3000 mm (9'10")
4	13 mm (1/2")	4250 mm (14'0")	3000 mm (9'10")
6	20 mm (3/4")	4570 mm (15'0")	3000 mm (9'10")
Over 8	22 mm (7/8")	4570 mm (15'0")	3000 mm (9'10")

Pipe Size: NPS	Rod Diameter	Maximum Spacing Cast Iron	Maximum Spacing PVC
Up to 4	10 mm (3/8")	3000 mm (9'10")	1200 mm (4'0")
Over 4	13 mm (1/2")	3000 mm (9'10")	1200 mm (4'0")

.7 PEX: Support horizontal pipe at National Plumbing Code of Canada and manufacturer's requirements.

.2 Sprinkler Piping: Spacing and middle attachment (rod) diameter as specified in paragraphs below or as in table below, whichever is more stringent
.1 To NFPA 13.
.2 Authority having jurisdiction.
.3 Within 300 mm (12") of each elbow.
.4 Risers at each floor.
.5 Where roll grooved pipe is used, any piece 1200 mm (48") or longer shall have a minimum of one support.
.6 Minimum hanger rod size as per full size manufacturer's recommendation, NFPA 13 and table below, whichever is greater.

Pipe Size: NPS	Rod Diameter	Maximum Spacing Steel
up to 1-1/4	10 mm (3/8")	2100 mm (7'0")
1-1/2	10 mm (3/8")	2750 mm (9'0")
2	10 mm (3/8")	3000 mm (10'0")
2-1/2	10 mm (3/8")	3350 mm (11'0")
3	13 mm (1/2")	3650 mm (12'0")
4	13 mm (1/2")	4250 mm (14'0")
6	20 mm (3/4")	4570 mm (15'0")
Over 8	22 mm (7/8")	4570 mm (15'0")

.3 Gas piping:
.1 To CAN/CGA B149.1.

.2 Minimum hanger rod size as per full size manufacturer's recommendation and table below, whichever is greater.

Pipe Size: NPS	Rod Diameter	Maximum Spacing Steel	Maximum Spacing Copper
1/2	10 mm (3/8")	1800 mm (6'0")	1800 mm (6'0")
3/4 and 1	10 mm (3/8")	2400 mm (8'0")	1800 mm (6'0")
1 1/4 to 2 1/2	10 mm (3/8")	3000 mm (10'0")	1800 mm (6'0")
3 and 4	13 mm (1/2")	4570 mm (15'0")	3000 mm (10'0")

.3 Rooftop: Less than NPS 1 support at 1200 mm (4'0")

.4 At Steel Joists
- .1 Locate hangers at panel points of OWSJ for piping perpendicular to OWSJ.
- .2 Locate steel support members at panel points of OWSJ for piping parallel to OWSJ.
- .3 For parallel runs of piping NPS 2 ½ and over.
  - .1 Where perpendicular to OWSJ support on alternating OWSJ.

3.2 PLUMBING AND HYDRONIC PIPE ATTACHEMENT APPLICATIONS

.1 Upper Attachment as noted above.

.2 Middle attachment as noted above.

.3 Pipe Attachment Application
- .1 Uninsulated steel pipe: All sizes.
  - .1 Adjustable clevis hanger.
- .2 Hot insulated steel pipe: NPS 4 and under.
  - .1 Long adjustable clevis hanger.
- .3 Hot insulated steel pipe: over NPS 4.
  - .1 Adjustable clevis hanger with protection saddle: Over NPS 4 with less than 25 mm (1") horizontal movement and with more than 300 mm (12") middle attachment (rod) length.
  - .2 Adjustable steel yoke pipe roll with protection saddle: Over NPS 4 with horizontal movement in excess of 25 mm (1") and with middle attachment rod 300 mm (12") or less.
  - .3 Insulate between saddle and pipe.
- .4 Cold insulated steel pipe: NPS 1 ¼ and under.
  - .1 Long adjustable clevis hanger.
- .5 Cold insulated steel pipe: NPS 1 ½ and over.
  - .1 Adjustable clevis hanger with protection shield and P-5 insulation (Section 23 07 00) between shield and pipe.
- .6 Uninsulated copper pipe: All sizes.
  - .1 Copper plated or epoxy coated adjustable clevis hanger.
- .7 Hot Insulated plumbing copper pipe: All sizes
  - .1 Copper plated or epoxy coated adjustable clevis hanger.
- .8 Cold Insulated plumbing copper pipe: NPS 1 ¼ and under.
  - .1 Copper plated or epoxy coated adjustable clevis hanger.
- .9 Cold insulated plumbing copper pipe: NPS 1 ½ and over.
  - .1 Adjustable clevis hanger with protection shield and P-5 insulation (Section 23 07 00) between shield and pipe.
- .10 PVC: All sizes.
  - .1 Adjustable clevis hanger.

.11 PEX: All sizes.
.1 Epoxy coated Adjustable clevis hanger.

3.3 SPRINKLER PIPE ATTACHMENT APPLICATION

.1 Upper Attachment as noted above.

.2 Middle attachment as noted above.

.3 Pipe Attachment Application, All sizes.
.1 Adjustable swivel ring hanger.

3.4 DUCT HANGERS

.1 In accordance with Section 24 31 13 Metal Ducts - Low Pressure to 500 Pa

3.5 MIDDLE ATTACHMENT (ROD)

.1 Trim excess threaded rod off within 13 mm (1/2") of attachment nut.

3.6 HANGER INSTALLATION

.1 Offset hanger so that rod is vertical in operating position.

.2 Adjust hangers to equalize load.

.3 Provide double nuts at middle attachment (rod) top and bottom.

.4 Where building structural members or inserts are not suitably located provide supplementary steel channels or angles, support these channels and angles only from the top of structural members. Drill holes in the channels and angles for insertion of hanger rods. If the holes are cut out with a torch, provide a back-up steel plates with drilled holes for inserting hanger rods. Secure each hanger rod to the channels and angles using a steel back-up plate where applicable and steel washers and a lock-nut system. All channels, angles and hanger rod upper supports shall have a load capacity of five (5) times the load to be supported from them.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

2 Products

2.1 MANUFACTURERS NAMEPLATES

.1 Provide metal nameplate on each piece of equipment, mechanically fastened complete with raised or recessed letters. Locate nameplates so that they are easily read. Do not insulate or paint over nameplates.

.2 Include registration plates (e.g. Pressure vessel, Underwriters' Laboratories and CSA Approval). Indicate size, equipment model, manufacturer's name, serial number, voltage, cycle, phase and power of motors.

2.2 SYSTEM NAMEPLATES

.1 Color:
- .1 Hazardous: white letters, red background
- .2 Elsewhere: black letters, white background (except where required otherwise by applicable codes).

.2 Construction:
- .1 2.4 mm (3/32") thick, laminated plastic or white anodized aluminum, matte finish, square corners, letters accurately aligned and machine engraved into core.

.3 Minimum Sizes:
- .1 Conform to following table:

Size 1	10 mm x 50 mm (3/8" x 2")	1 line	5 mm (0.2") high letters
Size 2	13 mm x 75 mm (1/2" x 3")	1 line	6 mm (0.25") high letters
Size 3	16 mm x 75 mm (3/4" x 3")	2 line	5 mm (0.2") high letters
Size 4	19 mm x 90 mm (3/4" x 3.5")	1 line	10 mm (3/8") high letters
Size 5	38 mm x 90 mm (1.5" x 3.5")	2 line	13 mm (1/2") high letters
Size 6	25 mm x 100 mm (1" x 4")	1 line	13 mm (1/2") high letters
Size 7	25 mm x 100 mm (1" x 4")	2 line	6 mm (1/4") high letters
Size 8	50 mm x 150 mm (2" x 6")	2 line	13 mm (1/2") high letters
Size 9	75 mm x 150 mm (3" x 6")	3 line	13 mm (1/2") high letters

- .2 Equipment type, number and service or area or zone of building it serves to be identified.
- .3 Use average of 25 letters/numbers (maximum) per nameplate.
- .4 Use Size 1.
  - .1 Control Components.

.5 Use Size 3.
- .1 Packaged fans.
- .2 Trap Primers
- .3 Fire dampers
- .4 Packaged fans less than 560 watts (3/4 HP)
- .5 Motorized Dampers
- .6 Mixing valves

.6 Use Size 7.
- .1 Exhaust fans more than 750 watts (1 HP)
- .2 Control panels.
- .3 Junction boxes.
- .4 Relay panels.

.7 Use Size 8.
- .1 Air handling units.

.4 Mechanically fasten nameplates.

.5 Sequential number all Fire Dampers (FD-1, FD-2, etc.). Record sequential number on Fire Damper Chart.

2.3 EQUIPMENT CONCEALED IN CEILING

.1 At valves, balancing dampers, air vents, drains and electrical components located above T-bar ceiling or access doors, provide self-adhering color disc as near as possible to where item is located.

.2 Where valves, balancing dampers, air vents, drains or electrical component has primary and secondary color, provide a 20 mm (3/4") primary color disc with a 10mm (3/8") secondary color disc centered on the primary disc.

.3 Where primary color only, provide a 20 mm (3/4") primary color disc.

.4 In addition to the System Nameplates noted above provide a second size 2 identical plate on the underside of the ceiling grid or access door frame as close as possible to the location of the following:
- .1 Fire dampers
- .2 Packaged fans less than 560 watts (3/4 HP)
- .3 Motorized Dampers
- .4 Mixing valves

.5 Mechanically fasten nameplates to equipment.

.6 Fasten nameplates to ceiling grid or access door frame with contact cement.

2.4 PIPE IDENTIFICATION

.1 General: Identify medium by lettered legend, classification by primary and secondary colors, direction of flow by arrows.

.2 Primary color bands: 50 mm (2") wide.

.3 Secondary color bands: 50 mm (2") wide, 75 mm (3") in from one end of primary color band.

.4 Legend: block capitals to following table:

Outside Diameter of Pipe or Insulation	Size of Letters
Up to 1 1/4"	1/2"
1 1/2" to 2"	3/4"
2 1/2" to 6"	1 1/2"
Over 6"	2"

Outside Diameter of Pipe or Insulation	Size of Letters
Up to 30 mm	13 mm
38 mm to 50mm	20 mm
63 mm to 150 mm	38 mm
Over 150 mm	50 mm

.5 Arrows:
- .1 Outside diameter of pipe/insulation 75 mm (3") and greater: 150 mm long x 50 mm high. (6" long x 2" high.)
- .2 Outside diameter of pipe/insulation less than 75 mm (3"): 100 mm long x 50 high (4" long x 2" high.)
  - .1 Use double headed arrows where flow is reversible.

.6 Material:
- .1 Paint for Stencil: Low VOC and environmentally friendly
- .2 Color bands:
  - .1 Plastic coated cloth material with protective overcoating and waterproof contact adhesive undercoating, suitable for 100% RH and continuous operating temperature of 150° C and intermittent temperature of 200° C. Apply to prepared surfaces. Wrap tape around pipe or pipe covering with ends overlapping one (1) pipe diameter. Cut band to length, don't tear off.
  - .2 Acceptable Manufacturer:
    - .1 WH Brady Inc.
    - .2 Seton Name Plate Corp.

.7 Colors:
- .1 Where not covered by table below, submit legend, primary and secondary classification colors to Consultant for approval.

.8 Table: Pipe and valve identification.

Pipe Marker Legend	Valve Legend	Tag Primary Color	Secondary Color
Dom. Cold Water	DCW	Green	None
Dom. Hot Water	DHW	Green	None
Dom. Hot Water Tempered	DHWT	Green	None
Dom. Hot Water Recirculation	DHWR	Orange	None
Storm Sewer	-	Green	None
Sanitary Sewer	-	Green	None
Vent (plumbing)	-	Green	None
Sprinkler	SW	Red	White
Trap Seal Primer	TSP	Green	None

.9 Legend and arrows:
.1 Black or white to contrast with primary color.

.10 Sprinkler:
.1 Mains.
.2 Cross mains.

.11 Natural Gas and Propane Piping
.1 To CAN/CGA B149.1-00, Natural Gas and Propane Installation Code.
.2 Paint entire piping or tubing system yellow.
.3 In addition, on interior piping provide yellow labels marked “Gas” at 6 meter (20') intervals. Secure label with color band tape wrapped around pipe with ends overlapping one (1) pipe diameter. Cut band to length, don’t tear off.

2.5 DUCTWORK

.1 50 mm (2") high black stenciled letters and directional flow arrows 150 mm long x 50 mm high (6" long x 2" high).

.2 Indicate “Supply”, “Exhaust”, “Kitchen Exhaust”, with directional arrow and “Fan System No.”

2.6 VALVE TAGS

.1 38 mm (1 1/2") square laminated plastic with corner hole.

.2 Horizontal 13 mm (1/2") letters accurately aligned and machine engraved into core.

.3 Face color to match primary color of piping identification.

.4 Core color to match secondary color of piping identification.

2.7 CEILING COLOR DISCS

.1 At valves, balancing dampers, air vents, drains and electrical components located above T-bar ceiling or access doors, provide self-adhering color disc as near as possible to where item is located.

.2 Where valves, balancing dampers, air vents, drains or electrical component has primary and secondary color, provide a 20 mm (3/4") primary color disc with a 10mm (3/8") secondary color disc centered on the primary disc.

.3 Where primary color only, provide a 20 mm (3/4") primary color disc.

2.8 BALANCING DAMPER

.1 Paint the balancing damper handles where concealed.

2.9 ELECTRICAL COMPONENTS SUPPLIED BY DIVISION 20 TO 25

.1 Identify electrically fed equipment supplied by Division 25 as per Section 25 05 03 BAS Identification.

2.10 WARNING SIGNS

.1 Equipment (e.g. motors, starters) under remote automatic control: provide orange colored signs warning of automatic starting under control of BAS.

.2 Sign to read: "Caution: This equipment is under automatic remote control of BAS" or equivalent to Consultant's approval.

3 Execution

3.1 GENERAL

.1 Provide ULC and CSA registration plates as required by Respective agency.

3.2 MANUFACTURERS NAMEPLATES

.1 Locate nameplates so that they are easily read.

.2 Do not insulate or paint over plates.

3.3 SYSTEM NAMEPLATES

.1 In conspicuous location to facilitate easy reading from operating floor to properly identify equipment and/or system.

.2 Provide stand-offs for nameplates on hot surfaces and insulated surfaces.

3.4 LOCATION OF PIPING AND DUCTWORK IDENTIFICATION

.1 On long straight runs in open areas in boiler rooms and equipment rooms, so that at least one is clearly visible from any one viewpoint in operating areas or walking isles and not at more than 50' intervals.

.2 Adjacent to all changes in direction.

.3 At least once in each small room through which piping passes.

.4 Both sides of visual obstruction or where run is difficult to follow.

.5 On both sides of any separation such as walls, floors and partitions.

.6 Where piping or ductwork is concealed in service chase, or other confined space, at entry and leaving points and adjacent to each access opening and not more than 15 meter (50') intervals.

.7 At beginning and end points of each run and at each piece of equipment in run.

.8 At point immediately upstream of major manually operated or automatically controlled valves or damper. Where this is not possible, place identification as close to valve or damper as possible, preferably on upstream side.

.9 Legend to be easily and accurately readable from usual operating areas and all readily accessible points.

.10 Plane of legend to be approximately at right angles to most convenient line of sight with consideration of operating positions, lighting conditions, reduced visibility of color or legends caused by dust and dirt and risk of physical damage.

.11 Stencil over final finish only.

.12 Beside each access door.

3.5 FIRE DAMPERS

.1 Provide one copy of fire damper schedule mounted in frame with non-glare glass where directed by Consultant. Fire damper chart to include the following:
- .1 Fire damper number (FD-#)
- .2 Air System #
- .3 Location room #

.2 Provide one copy in each operating and maintenance instruction manual.

3.6 VALVE TAGS

.1 Secure tags to valve handle with non-ferrous chains or closed "S" hooks for valves except at plumbing fixtures and radiation.

.2 Provide one copy of valve schedule mounted in frame with non-glare glass where directed by Consultant. Provide one copy in each operating and maintenance instruction manual.

.3 Consecutively number valves in system.

3.7 DUCTWORK & PIPING

.1 In finished public areas where piping and ductwork are exposed (such as, Gym) ductwork and piping does not require identification.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

1.3 DEFINITIONS

.1 Refer to Section 20 05 01 Mechanical General Requirements.

.2 Legend
- .1 ASJ: All Service Jacket
- .2 SSL: Self-Sealing Lap
- .3 FSK: Foil-Scrim-Kraft; jacketing
- .4 PSK: Poly-Scrim-Kraft; jacketing
- .5 PVC: Polyvinyl Chloride

1.4 ENVIRONMENTAL REQUIREMENTS

.1 Maintain ambient conditions required by manufacturers of tapes, adhesives, mastics, cements and insulation materials.

.2 Follow manufacturer’s recommended handling practices.

2 Products

2.1 GENERAL

.1 Components of insulation system to have maximum flame spread rating of 25 and maximum smoke developed rating of 50 in accordance with CAN/ULC-S102.

.2 Materials to be tested in accordance with ASTM C411.

2.2 PIPE INSULATION

.1 P-2 Formed Mineral Fiber with ASJ Vapour Barrier to 454° C
- .1 Application for piping, valves and fittings on:
  - .1 Domestic water piping
  - .2 Where indicated.
- .2 Material:
  - .1 CAN/CGSB 51.9 Mineral Fiber Thermal Insulation for Piping
  - .2 CGSB 51-GP-52 Vapour Barrier Jacket and Facing Material.
  - .3 Self-seal lap closure including ASJ butt strips.
- .3 Thermal Conductivity "k" shall not exceed 0.034 W/m° C at 24° C mean temperature when tested in accordance with ASTM C335.

.4 Thickness:
- .1 Domestic Cold Water
  - .1 13 mm (1/2") on NPS 1/2 pipe.
  - .2 25 mm (1") on NPS 3/4 and over.
- .2 Domestic Hot Water, and Domestic Hot Water Recirculation.
  - .1 13 mm (1/2") on NPS 1/2 pipe on branch vertical drops concealed in walls (25 mm (1") on horizontal to the branch vertical drops concealed in walls.)
  - .2 25 mm (1") on NPS 1/2 to NPS 2.
  - .3 38 mm (1 1/2") on NPS 2 1/2 and over.
- .3 Rainwater Piping: 25 mm (1").

.5 All pipe insulation shall be by one manufacturer.

.6 Copper tube size for copper pipe.

.2 P-5 Insulation Support System
- .1 Application at:
  - .1 Pipe Hangers.
- .2 Thickness: As per adjacent insulation.
- .3 Material for steel pipe NPS 6 and smaller:
  - .1 CAN/CGSB-51.2 Calcium Silicate Insulation.
  - .2 Buckaroo Insulation with ASJ Support System.
- .4 Material for Steel Pipe NPS 8 and larger: Buckaroo Insulation Support System with ASJ.
- .5 Material for Copper Pipe: Buckaroo Insulation Support System with ASJ.

.3 Acceptable Material:

	Owens-Corning	**Manson Insulation Inc.**	**Knauf Fiber Glass**	**Johns Manville Insulations**
P-2	Fiberglas SSL-II	Alley K-APT	ASJ-SSL	Micro Lok AP-T
P-3	All service duct wrap	Alley Wrap FSK	Duct Wrap.	Microlite Fiber Glass Wrap Insulation
P-5	Calcium Silicate	Calmax	Temperlite 1200	Thermo-12/Blue

.4 P-A Formed Mineral Fiber with Vapour Barrier Flexible elastomeric thermal insulation, manufactured without the use of CFC's, HFC's or HCFC's formaldehyde free, low VOCs, fiber free, dust free and resists mold and mildew to 100° C
- .1 Application for piping, valves and fittings on:
  - .1 Domestic water piping
- .2 Material:
  - .1 CAN/CGSB 51.9 Mineral Fiber Thermal Insulation for Piping
  - .2 CGSB 51-GP-52 Vapour Barrier Jacket and Facing Material.
  - .3 Self-seal lap closure including ASJ butt strips.
- .3 Thermal Conductivity "k": shall not exceed 0.25 BTU-in/hr.ft^2 °F
- .4 Water Vapor Transmission: 0.05 perm-inch
- .5 Flame-spread index of less than 25 and a smoke-developed index of less than 50 as tested by ASTM E 84 and CAN/ULC S-102.
- .6 Adhesive: Armaflex 520 BLV Adhesive low V.O.C. adhesive
- .7 Thickness:
  - .1 Domestic Cold Water
    - .1 13 mm (1/2") on NPS 1/2 pipe.
    - .2 25 mm (1") on NPS 3/4 and over.

.2 Domestic Hot Water and Hot Water Recirculation.
.1 25 mm (1") on NPS 1/2 to NPS 2.
.2 13 mm (1/2") on NPS 1/2 pipe on branch vertical drops concealed in walls (25 mm (1") on horizontal to the branch vertical drops concealed in walls.)
.3 25 mm (1") on NPS 1/2 to NPS 2.

.8 Insulation Support System
.1 Application at: Pipe Supports.
.2 Thickness: As per adjacent insulation.
.3 Acceptable Material: Armaflex IPH pipe hanger by Armacell

.9 Acceptable Material:
.1 AP Armaflex Pipe Insulation

2.3 DUCT INSULATION

.1 D-2 Mineral Fiber Blanket with ASJ Vapour Barrier 4° to 120° C
.1 Application: on concealed cold or dual temperature ducting.
.1 Roof Top AH Unit supply and ducting for 3 meters (measured on centerline of duct) from steel roof deck.
.2 All relief air ducting and exhaust ducting (except kitchen range hood exhaust duct) to the motorized damper or for minimum of 3 meters (measured on centerline of duct), whichever is greater, from steel roof deck, from underside of wood trusses or exterior wall.
.3 All air conditioned supply ducts
.4 Where indicated.

.2 Material
.1 CAN/CGSB 51.11 Mineral Fiber Blanket.
.2 CGSB 51-GP-52 Vapour Barrier Jacket and Facing Material.

.3 Thickness:
.1 One layer for air conditioned supply ducts.
.2 One layer of duct insulation for exhaust air ducting

.2 D-4 Mineral Fiber Rigid with ASJ Vapour Barrier to 4° to 120° C
.1 Application: on exposed cold or dual temperature ducting.
.1 Roof Top AH Unit supply ducting for 3 meters (measured on centerline of duct) from steel roof deck.
.2 All relief air ducting and exhaust ducting (except kitchen range hood exhaust duct) to the motorized damper or for minimum of 3 meters (measured on centerline of duct), whichever is greater, from steel roof deck, or exterior wall.
.3 All air conditioned supply ducts
.4 Where indicated.

.2 Material:
.1 CAN/CGSB 51.11 Rigid Mineral Fiberboard.
.2 CGSB 51-GP-52 Vapour Barrier, Jacket and Facing Material.

.3 Thickness:
.1 One 25 mm (1") layer for air conditioned supply ducts.

.3 Acceptable Material:

	Owens-Corning	**Manson Insulation Inc.**	**Knauf Fiber Glass**	**Johns Manville Insulations**
D-2	All Service Faced Duct Wrap	Alley Wrap FSK	Duct Wrap - FSK	Microlite Fiber Glass Duct Wrap Insulation.
D-4	Vapor Seal Duct Insulation AF-530	AK Board FSK	Insulation Board FSK	814 Spin Glass

2.4 D-6 FIRE RATED DUCTWORK

.1 Application:
- .1 Commercial Kitchen NFPA Exhaust duct 2 hour rated enclosure and zero clearance to combustibles.
  - .1 All exhaust air from kitchen range hood.
- .2 Ventilation & pressurized duct enclosure system where noted

.2 Commercial Kitchen NFPA Exhaust duct
- .1 Two layers applied to the ductwork for 2 hour fire-rated systems.
- .2 All seams on both layers shall be overlapped a minimum of 3 inches and foil taped.
- .3 Band the outer layer on 265 mm (10.5") centre's, all as outlined in the manufacturer's instructions.

.3 Fire-Rated Ventilation & Pressurization Ductwork:
- .1 One layer applied to the ductwork for 2 hour fire-rated systems.
- .2 All seams shall be overlapped a minimum of 3 inches, foil tapped and be banded on 265 mm (10.5") centre's, all as outlined in the manufacturer's instructions.
- .3 In compliance with the National Building Code of Canada which references NFPA-96 whereby the fire-rated duct wrap shall be listed in accordance with ASTM E 2336 and installed in accordance with the manufacturer's instructions and listing requirements.
- .4 ULC Listing and FRD number, as per Guide No. 40 U21, 'Fire Resistant Ducts' and be tested to ISO Standard 6944 and ULC Guide No. 440E9, per 0 mm clearance to combustibles.
- .5 Material: 38 mm (1 ½") thick non-combustible, flexible fireproof blanket, fully encapsulated in a foil scrim and supplied in roll form.
- .6 Acceptable Material:
  - .1 Pyroscat Double Layer Duct wrap Flexible Fire Barrier
    - .1 Two layers with overlapped joints for Commercial Kitchen NFPA Exhaust duct
    - .2 One layer with overlapped joints for Ventilation & pressurized duct enclosure
  - .2 Royal Quickwrap
    - .1 Two layers with overlapped joints for Commercial Kitchen NFPA Exhaust duct
    - .2 One layer with overlapped joints for Ventilation & pressurized duct enclosure
  - .3 3M™ Fire Barrier Duct Wraps
    - .1 Two layers with overlapped joints for Commercial Kitchen NFPA Exhaust duct

.2 One layer with overlapped joints for Ventilation & pressurized duct enclosure

.4 Thermal Ceramics FireMaster FastWrap XL Duct Wrap

.1 Two layers with overlapped joints for Commercial Kitchen NFPA Exhaust duct

.2 One layer with overlapped joints for Ventilation & pressurized duct enclosure

.4 An air space clearance is not required between the duct and adjacent combustible or non-combustible materials, as the system has a 'zero clearance' rating and complies with the requirements of the NFPA-96 Standard.

.5 All hangers, support rods, upper attachments and firestopping of duct penetrations through fire separations shall be in accordance with the ULC Listing and the manufacturers' instructions.

2.5 FASTENINGS

.1 Tape: self-adhesive, 100 mm (4") wide. ULC labeled for less than 25 flame spread and less than 50 smoke developed.

.1 Standard of Acceptance:

.1 S. Fattal Insultape.

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

.1 Standard of Acceptance:

.1 Monsey Bakor Inc. 230-39.

.3 Fire resistive lagging adhesive: for cementing canvas lagging cloths to pipe insulation.

.1 Standard of Acceptance:

.1 Monsey Bakor Inc. 120-09.

.4 For insulation system underside of roof drain body.

.1 Contact adhesive: quick-setting for seams and joints.

.2 Tape: self-adhesive PVC.

.5 Fire restrictive contact adhesive: quick setting.

.1 Standard of Acceptance:

.1 Monsey Bakor 230-38.

.6 Pins:

.1 Weld pins 4 mm (5/32") diameter, with 32 mm (1 1/4") diameter head for installation through the insulation. Length to suit thickness of insulation.

.2 Standard of Acceptance:

.1 Duro Dyne, Clip-Pin

.3 Weld pins 4 mm (5/32") diameter, for installation prior to applying insulation. Length to suit thickness of insulation. Nylon retain clips 32 mm (1 1/4") round.

.4 Standard of Acceptance:

.1 Duro Dyne Spotter Pins with Spotter-Clips.

2.6 JACKETS

.1 Canvas.
- .1 Plain weave, cotton fabric at 6.5 oz/yd² (220 g/m²).
- .2 ULC label every 600 mm (2 ft.)
- .3 Standard of Acceptance:
  - .1 S. Fattal Thermocanvas
- .2 Application:
  - .1 Exposed insulated piping
  - .2 Exposed insulated ductwork

.2 PVC.
- .1 CGSB 51-GP-53M PVC sheets.
- .2 0.4 mm (0.015") thick minimum.
- .3 Fitting covers, one piece, premoulded to match.
- .4 Application on exposed insulated piping where noted below:
  - .1 Section 22 11 16 Domestic Water Piping for elbows and mechanical couplings only
- .5 Standard of Acceptance:
  - .1 Proto.
  - .2 The Sure-Fit System.
  - .3 Zeston 2000 PVC.

.3 Weather Barrier Membrane
- .1 Application:
  - .1 Exterior ductwork
  - .2 Where indicated
- .2 SBS modified bitumen, self-adhering sheet membrane complete with a reflective foil surface, and having the following physical properties:
  - .1 Thickness: 1.5 mm (60 mils).
  - .2 Vapour permeance: 2.8 ng/Pa.m².s (0.05 perms) to ASTM E96;
  - .3 Low temperature flexibility: -30°C to CGSB 37-GP-56M;
  - .4 Elongation: 40% to ASTM D412-modifed;
- .3 Acceptable material: Foilskin™ as manufactured by Bakor.

3 Execution

3.1 APPLICATION

.1 Apply insulation after required tests have been completed and approved by Consultant.

.2 Verify that all piping, equipment, and ductwork are tested and approved prior to insulation installation.

.3 Verify that all surfaces are clean, dry and without foreign material before applying insulation materials.

.4 Surfaces shall be clean and dry when installed and during application of insulation and finishes.

.5 Apply insulation materials, accessories and finishes in accordance with manufacturer's recommendations and as specified herein.

.6 All surface finishes shall be extended in such a manner as to protect all raw edges, ends and surfaces of insulation.

.7 On piping with insulation and vapour barrier, maintain integrity of vapour barrier over full length of pipe without interruption at sleeves, fittings and supports.

.8 On ductwork with insulation and vapour barrier, maintain integrity of vapour barrier over full length of duct or surface, without penetration for hangers, standing duct seams and without interruption at sleeves. Do not break continuity of insulation vapour barrier with hangers or rods. Insulate strap hangers 100 mm (4") beyond insulated duct.

.9 On equipment with insulation and vapour barrier, maintain integrity of vapour barrier over full length without interruption at sleeves, fittings and supports.

3.2 WEATHER BARRIER MEMBRANE

.1 Verify that surfaces and conditions are ready to accept the Work of this section. Notify consultant in writing of any discrepancies. Commencement of the work or any parts thereof shall mean acceptance of the prepared substrate.

.2 Preparation
- .1 All surfaces must be sound, dry, clean and free of oil, grease, dirt, or other contaminants.
- .2 Seal all joints in ductwork to prevent air leakage.
- .3 Install FSK or foil faced insulation over ducts or piping and mechanically fasten using weld pins and washers or cup head pins welded to ductwork.
- .4 Cover washer or cup head pin with a 100 mm (4") strip of membrane.
- .5 Ensure positive slope to prevent the occurrence of ponding water.
- .6 Install FSK (foil-scrim-kraft) facer over surfaces to receive membrane, if not already present on insulation. Mechanically fasten as for insulation above.

.3 Insulated Air Handling exterior ductwork
- .1 Position membrane for alignment, and begin application of membrane on bottom of insulated ductwork, returning up sides a minimum of 100mm (4").
- .2 Install sections of membrane on sides of ductwork and return on to the top a minimum of 100 mm(4").
- .3 Finally install top section, lapping down the sides 100 mm (4").
- .4 Membrane applied to the underside of the substrate wider than 600 mm (2') requires mechanical fastening.
- .5 Fasten immediately after installation of membrane and seal with a 100x100 mm (4" x 4") patch of membrane.
- .6 When membrane is entirely in place, roll membrane including seams with a counter top roller or apply pressure using a plastic tape applicator to ensure full contact.

.4 Insulated Pipes
- .1 Begin installation on side of insulated pipe, wrapping downward and around the circumference and terminate to provide 100 mm (4") lap. Ensure that lap sheds water.

.5 Remove the release film in small increments, pressing firmly in place as work progresses.

.6 When membrane is entirely in place, roll membrane including seams with a counter top roller or apply pressure using a plastic tape applicator to ensure full contact.

3.3 PIPE INSULATION INSTALLATION

.1 Performed: sectional up to NPS 12, sectional or curved segmented above NPS 12.

.2 Multi-layered: staggered butt joint construction.

.3 Vertical pipe over NPS 3: insulation supports welded or bolted to pipe directly above lowest pipe fitting. Thereafter, locate on 15' centers.

.4 Expansion joints in insulation: terminate single layer and each layer of multiple layers in straight cut at intervals recommended by manufacturer. Leave void of 25 mm (1”) between terminations. Pack void tightly with P-3 flexible mineral insulation.

.5 Seal and finish exposed ends and other terminations with insulating cement.

.6 Provide P-5 insulation at pipe shields. Refer to Section 23 05 29 Hangers and Supports.

.7 Expansion joints in piping: provide for adequate movement of expansion joint without damage to insulator or finishes.

.8 Insulation is not required for:
- .1 Chrome plated piping, valves and fittings.

.9 Insulation on heating pipes to up fed radiation to terminate below floor.

.10 Fastenings
- .1 Secure pipe insulation by tape at each end and center of each section, but not greater than 900 mm (36") on centers.

.11 On exterior piping, provide weather barrier membrane.

3.4 DUCT INSULATION INSTALLATION

.1 General:
- .1 Adhere and seal vapour barrier using vapour seal adhesives.
- .2 Stagger longitudinal and horizontal joints, on multilayered insulation.

.2 Board Insulation fastenings:
- .1 On rectangular ducts, use 50% coverage of insulating cement and weld pins at 1 pin per square foot, but not less than 2 rows per side and bottom.
- .2 Secured with speed washers.
- .3 All joints, breaks and punctures sealed with appropriate pressure-sensitive foil tape or glass fabric and vapor barrier mastic.
- .4 Apply 20 gauge galvanized sheet metal corners to all duct work in mechanical rooms.
- .5 Seal duct insulation vapor barrier to air handling unit.
- .6 At exterior wall, Seal duct insulation vapor barrier to building envelope air barrier.

.3 Flexible Blanket Insulation fastenings:
- .1 Firmly butt all joints.
- .2 The longitudinal seam of the vapor barrier must be overlapped a minimum of 50 mm (2”).
- .3 All penetrations and damage to the facing shall be repaired using pressure-sensitive foil tape, or mastic prior to system startup.
- .4 Pressure-sensitive foil tapes shall be a minimum 75 mm (3”) wide and shall be applied with moving pressure using a squeegee or other appropriate sealing tool.
- .5 Secured to the bottom of rectangular ductwork over 600 mm (24”) wide using mechanical fasteners on 450 mm (36”) centers. Care should be exercised to avoid over-compression of the insulation during installation.

.4 On exterior ductwork, provide weather barrier membrane.

3.5 EQUIPMENT INSULATION INSTALLATION

.1 Insulation supports where welding or bolting is permitted:
- .1 Angle anchors: weld or bolt to equipment at lowest point of insulation. Thereafter, locate every 4500 mm (15') vertically.
- .2 Welded steel clips: at 200 mm (8") maximum on centers, but not less than 2 rows per side.

.2 Multi-layered: staggered butt joints and expansion joints in insulation, secured with wire or bands at 400 mm (16") on center intervals.

.3 Expansion joints in insulation: leave 25 mm (1”) space in each layer at 6000 mm (20') intervals. Pack space tightly with mineral fiber.

.4 Insulation at bolts, studs, nuts, instrumentation: bevel to permit removal without damage to insulation or finish.

.5 Fastenings: secure insulation with stainless steel wire at 900 mm (36") on center before application of finishing cement.

.6 Vapour barriers: adhere and seal with vapour seal adhesive.

.7 Finishes:
- .1 Cement: apply over insulation in two 6 mm (1/4") thick layers, reinforced by 25 mm (1”) mesh stainless steel wire netting.
- .2 Canvas: sewn and pasted on to all insulation and over cement finishes. Seams inconspicuously placed.
- .3 Metal Jacket:
  - .1 Apply over insulation in lieu of cement finish where specified.
  - .2 Apply over insulation in lieu of canvas finish where specified.

.8 Final surface: to be clean, smooth, ready for painting.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

1.3 PERMIT

.1 Mechanical Contractor to arrange and pay for the required permits and approvals by the Office of the Provincial Fire Marshal.

.2 Mechanical Contractor to make all necessary arrangements with the propane supplier for the supply and installation of storage tank(s), vaporizer, etc.

.3 Mechanical Contractor to obtain from the propane supplier the tank information required for the gas permit.

.4 Mechanical Contractor to engage a licensed gas installer for gas pipe work including but not limited to the following:

- .1 Above grade piping at the tank systems including but not limited to piping and fittings connecting the propane tanks and vaporizer to the 5 psig piping including pressure regulators, heavy ends trap, piping and fittings, etc. as required for a complete system.
- .2 Above grade piping at and in building

.5 Mechanical Contractor to apply for the gas permit in accordance with fuel safety act and including but not limited to the following:

- .1 Business name, building name and civic address.
- .2 Propane tank/cylinder size, clearances to buildings, building openings and property lines where applicable. Engineered drawing for bases of tanks.
- .3 Use of areas adjacent to propane supply containers (lawn, parking, etc.).
- .4 Vehicle impact protection barrier type and clearances.
- .5 Regulator and line pressure relief locations and pressure settings.
- .6 Arrangement of building piping/tubing, material used, size, type of fittings, length of runs, supports and identification method.
- .7 Location of all shut-off valves and the make and model number of valve to be used.
- .8 Flexible connectors make and model number.
- .9 Appliance arrangement along with the individual make, model and BTU/hr. input of each appliance.
- .10 Venting arrangement of vented appliances including material used, size and length of vent, method of insulating and vent termination.
- .11 Combustion air method.

2 Products

2.1 PIPE

.1 Minimum NPS ¾

.2 Steel pipe: to ASTM A53, Grade B Schedule 40 as follows:
- .1 NPS 3/4 to 2, socket welded joints
- .2 NPS 3/4 to 2, screwed.
- .3 NPS 2 1/2 and over, plan end.
- .4 Exterior: Galvanized piping with joints coated with cold galvanized paint.

.3 Copper Tube: to ASTM B75M.

2.2 FITTINGS AT TANK(S)

.1 Propane vaporizer
- .1 Propane fired
- .2 Building Owners' propane supplier.
- .3 Installation is by this mechanical contractor.

.2 Heavy ends trap provided by the mechanical contractor.
- .1 Acceptable Manufacturer: Algas SDI – Filtaire F Series.

2.3 FITTINGS

.1 Steel pipe fittings, screwed, flanged or welded:
- .1 Malleable iron: screwed, banded, Class 150.
- .2 Steel pipe flanges and flanged fittings: to ANSI/ASME B16.5.
- .3 Welding: butt-welding fittings.
- .4 Unions: malleable iron, brass to iron, ground seat, to ASTM A47M.
- .5 Bolts and nuts: to ANSI B18.2.1.
- .6 Nipples: schedule 40, to ASTM A53.

.2 Copper pipe fittings, screwed, flanged or soldered:
- .1 Cast copper fittings: to ANSI B16.18.
- .2 Wrought copper fittings: to ANSI/ASME B16.22.

2.4 JOINTING MATERIAL

.1 Steel pipe:
- .1 Welded fittings: to CSA W47.1
- .2 Flange gaskets: to nonmetallic flat.
- .3 Screwed fittings: pulverized lead paste.

.2 Copper Tube:
- .1 Soldered: to ASTM B32, (tin antimony 515).

2.5 VALVES

.1 Refer to Section 23 05 23 Valves.

2.6 VALVE BOX

.1 Fully recessed stainless steel front with hinged Plexiglas door.

2.7 IDENTIFICATION

.1 As per Section 23 05 53 Mechanical Identification.

3 Execution

3.1 PIPING

.1 Install in accordance with applicable Provincial/Codes by licensed installer.

.2 Assemble piping using fittings manufactured to ANSI standards.

.3 Slope piping down in direction of flow to low points.

.4 Install drip points:
- .1 At low points in piping system.
- .2 At each connection to equipment.

.5 Use eccentric reducers at pipe size change installed to provide positive drainage.

.6 Provide clearance for access and for maintenance.

.7 Ream pipes, clean scale and dirt, inside and out.

.8 Install piping to minimize pipe dismantling for equipment removal.

3.2 IDENTIFICATION

.1 Refer to Section 23 05 53 Mechanical Identification.

.2 Paint entire pipe system yellow.

3.3 KITCHEN EQUIPMENT

.1 Make final gas connections to equipment.

.2 Connect to equipment in accordance with manufacturer's instruction unless otherwise indicated.

3.4 PURGING

.1 Purge after pressure test.

3.5 VALVES

.1 Install valve with stems upright or horizontal unless approved otherwise.

.2 Install valves at all branch take-offs to isolate each piece of equipment, and as indicated.

.3 Install shut-off valves in recessed valve box approved for propane gas by Office of the Fire Marshal. Affix to each such recessed valve box a sign with an inscription identifying the shut-off valve in compliance with the Office of the Fire Marshal.

3.6 TESTING

.1 Test gas system in accordance with CAN/CGA B149.1, Natural Gas and Propane Installation Code and the Office of the Provincial Fire Marshal.

.1 At minimum, test to the requirements of a system operation over 14kPA (2 psig), but not more than 230kPa (33 psig) with greater than 60 M (200 feet) of piping.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

2 Product

2.1 TUBING

.1 For halongenetic refrigerants.

.2 Deoxidized, dehydrated and sealed.

.3 Annealed copper tube: to ASTM B280, with minimum wall thickness as per CSA B52 and ANSI/ASME B31.5.

.4 Size: as per manufacturer's recommendations.

2.2 FITTINGS

.1 Service: design pressure 2000 kPa (300 psi) and temperature 121° C.

.2 flared fittings may be used for soft annealed copper tubing.

.3 Brazed: wrought copper to ANSI/ASME B16.22.

.4 Flexible connections: 10 mm (3/8") nominal or less shall be made using coiled soft copper tubing. For larger sizes, use seamless flexible bronze hose with bronze wire braid covering. Use factory sealed neoprene jacket unit where freezing may occur.

2.3 JOINTS

.1 Brazing: silver solder, 45% AG-15% Cu or copper-phosphorous, 95% Cu-5%P.

.2 Gaskets: to ANSI/AWWA C111/A21.11, non-metallic.

.3 Brazing materials shall conform to ANSI/AWS A5.8 and be SIL-FOS-15 phosphor-copper-silver alloy for copper piping jointed by copper fittings; silver solder for brass fittings; 95-5 solder for connections to equipment or accessories.

2.4 INSULATION

.1 Components of insulation system to have maximum flame spread rating of 25 and maximum smoke developed rating of 50 in accordance with CAN/ULC-S102.

.2 Flexible elastomeric pipe insulation
- .1 Application: All refrigeration discharge, hot gas and liquid lines.
- .2 Thickness: 1/2".
- .3 Acceptable Material:
  - .1 AP Armaflex by Armacell

.3 Insulation Support System
- .1 Application at: Pipe Supports.
- .2 Thickness: As per adjacent insulation.
- .3 Acceptable Material:
  - .1 Armafix IPH pipe hanger by Armacell

.4 Joint Sealer
- .1 Acceptable Material:
  - .1 Armstrong 520

.5 Insulation Tape
- .1 Acceptable Material:
  - .1 Armstrong AP Tape by Armacell

.6 Exterior finish
- .1 Aluminum alloy: Apply in accordance with ASTM B209M.
- .2 Application: Exterior refrigerant piping.
- .3 Crimped or embossed jacketing 0.4 mm (0.016") thick with longitudinal slip joints and 50 mm (2") end laps with factory attached protective liner or interior surface. Aluminum alloy butt straps with mechanical fasteners.
- .4 On fittings: 0.4 mm (0.016") thick, die shaped components with factory attached protective liner on interior surface.

2.5 INSULATION JACKETS AND FINISHING

.1 Exterior finish Aluminum Alloy
- .1 Aluminum alloy: Apply in accordance with ASTM B209M.
- .2 Application: Exterior refrigerant piping.
- .3 Crimped or embossed jacketing 0.4 mm (0.016") thick with longitudinal slip joints and 50 mm (2") end laps with factory attached protective liner or interior surface. Aluminum alloy butt straps with mechanical fasteners.
- .4 On fittings: 0.4 mm (0.016") thick, die shaped components with factory attached protective liner on interior surface.

2.6 REPRIGERANT PIPE SUPPORTS

.1 Securing Channels
- .1 Free Standing Pipe Supports
  - .1 Acceptable Material: Unistrut P-1000 Channels
- .2 Wall Supports
  - .1 Acceptable Material: Unistrut P-3300 Channels
- .3 Suspended Supports
  - .1 Acceptable Material: Unistrut P-1001 Channels

.2 Angle Fittings
- .1 Acceptable Material: Unistrut P-2626

.3 Pipe Clamps
.1 At wall and suspended Pipe Supports
.1 Acceptable Material: Unistrut Pipe Clamp

3 Execution

3.1 INSTALLATION AND TESTING

.1 Piping/tubing runs are to be individually insulated

.2 Piping/tubing runs are to be individually supported. Grouping multiple runs of piping/tubing in a single hanger will not be permitted.

.3 Install and test in accordance with CSA B52 and ANSI/ASME B31.5.

.4 Support and protect exposed refrigerant piping on roof to Consultant's satisfaction.

.5 Locate vibration and noise isolation as indicated. Where units are supplied with sound attenuator, conform to manufacturer's instructions. Ensure adequate base or foundation.

.6 Run piping/tubing parallel to building lines.

.7 Where soft cooper tubing is used, use tube bender to radius tube.

.8 Support each pipe/tube independently.

.9 Refer to Section23 05 29 Hangers and Supports for spacing of supports.

.10 Meet with consultant prior to commencing installation

3.2 INSTRUCTIONS

.1 Post instructions in frame with glass cover in accordance Division 01 and CSA B52.

3.3 ACCESSIBILITY

.1 Provide clearance around all equipment and components for observation of operation, inspection, service and maintenance without removal of any equipment, components or piping.

3.4 PIPING

.1 Purge refrigerant lines and fittings.

.2 Install straight, parallel and close to walls and ceilings, with specified pitch.

.3 Keep elbows and fittings to minimum.

.4 Correlate equipment provided with Consultant and propose changes to line sizing required, before proceeding with installation.

.5 Grade horizontal pipe carrying gases 1:240 down in direction of flow.

.6 Install piping to prevent condensate or oil from flowing back into compressor or evaporator.

.7 Connect branch suction lines from top of suction main using wye-fitting. Install ancillaries and accessories such as back pressure compensating regulators and back pressure regulators horizontal.

.8 To avoid interference with services to compressor, do not obstruct view of oil level bulls-eye or run piping.

.9 Enclose tubing exposed to mechanical injury in rigid or flexible conduit.

.10 Keep piping joints sealed except when fabricating.

.11 Limit breakable joints to equipment connections not normally brazed. Limit flared joints to 10 mm (3/8") nominal OD for field assembly and 16 mm (5/8") nominal OD for factory assembly.

.12 Bleed dry nitrogen into piping when sweating connections.

.13 Braze flexible pipe vibration isolators and stub connectors on sealed hermetic compressors using alloys which melt at 620° C, 600° C or below.

.14 Directly connect vibration isolators to compressor and firmly anchor other end.

3.5 PIPE INSULATION

.1 Seal all joints. Orient seams to face down

.2 Provide insulation support system at each pipe support. Seal insulation to insulation support system.

3.6 FIELD QUALITY CONTROL

.1 Perform leak test before evacuating system. Meet requirements of CSA B52, but not less than a gauge pressure of 300 psi high side and 150 psi low side.

.2 Use refrigerant gas as tracer with dry nitrogen to develop pressure.

.3 Compressors with refrigerant holding charge shall remain isolated from system. Protect accessories when performing test.

.4 Build 35 kPa initial refrigerant pressure in high and low side and add dry nitrogen to field test pressure.

.5 Test for leaks with electronic or halide detector.

.6 Repair leaks and retest.

3.7 CLEANING

.1 Pressurize system with 5 psi of refrigerant approved by Consultant and hold charge for 2 h.

.2 Reclaim refrigerant by pumping down through filtration system.

3.8 CHARGING

.1 Give initial charge through side charging valve with pressure gauge and new filter-drier installed in connection to charging valve.

.2 Charge only amount of refrigerant necessary for proper operation of refrigeration system. When amount has been charged, close liquid charging valve. With system in operation, observe sight glass near receiver outlet to recheck.

.3 When refrigerant container must be changed during charging process, re-purge charging line.

.4 Low side charging shall be permitted only for charging small amounts in gaseous state.

.5 Provide 2 days' notice of leak testing, dehydration and charging.

.6 Prime oil separation with operating charge of compressor oil.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

1.3 GENERAL

.1 TAB means to test, adjust and balance to perform in accordance with requirements of Contract Documents and to do all other work as specified in this section.

.2 Standard: TAB to be to most stringent of this section or TAB standards of AABC NEBB, SMACNA and ASHRAE.

.3 TAB of all systems, equipment, components and controls specified Mechanical Contractor.

1.4 PURPOSE OF TAB

.1 Test to verify proper and safe operation, determine actual point of performance, evaluate qualitative and quantitative performance of equipment, systems and controls at design, average and low loads using actual or simulated loads

.2 Adjust and regulate equipment and systems so as to meet specified performance requirements and to achieve specified interaction with all other related systems under all normal and emergency loads and operating conditions.

.3 Balance systems and equipment to regulate flow rates to match load requirements over full operating ranges.

1.5 EXCEPTIONS

.1 TAB of systems and equipment regulated by codes, standards to be to satisfaction of authority having jurisdiction.

1.6 CO-ORDINATION

.1 Schedule time required for TAB (including repairs, re-testing) into project construction and completion schedule so as to ensure completion before acceptance of project.

.2 Do TAB of each system independently and subsequently, where interlocked with other systems, in unison with those systems.

1.7 PRE-TAB REVIEW

.1 Review contract documents before project construction is started and confirm in writing to Consultant adequacy of provisions for TAB and all other aspects of design and installation pertinent to success of TAB.

.2 Review specified standards and report to Consultant in writing all proposed procedures which vary from standard.

.3 During construction, coordinate location and installation of all TAB devices, equipment, accessories, measurement ports and fittings.

1.8 START-UP

.1 Follow start-up procedures as recommended by equipment manufacturer unless specified otherwise.

.2 Follow special start-up procedures specified elsewhere in Mechanical Contractor.

1.9 OPERATION OF SYSTEMS DURING TAB

.1 Operate systems for length of time required for TAB and as required by Consultant for verification of TAB reports.

1.10 START OF TAB

.1 Notify Consultant 7 days prior to start of TAB.

.2 Start TAB only when building is essentially completed, including:
- .1 Installation of ceilings, doors, windows, other construction affecting TAB.
- .2 Application of weather-stripping, sealing, caulking.
- .3 All pressure, leakage, other tests specified elsewhere Mechanical Contractor.
- .4 All provisions for TAB installed and operational.
- .5 Start-up, verification for proper, normal and safe operation of all mechanical and associated electrical and control systems affecting TAB including but not limited to:
  - .1 Proper thermal overload protection in place for electrical equipment.
  - .2 Air systems:
    - .1 Filters in place, clean.
    - .2 Duct systems clean.
    - .3 Ducts, air shafts, ceiling plenums are airtight to within specified tolerances.
    - .4 Correct fan rotation.
    - .5 Fire and volume control dampers installed and open.
    - .6 Access doors, installed, closed.
    - .7 All outlets installed, volume control dampers open.

1.11 APPLICATION TOLERANCES

.1 Do TAB to following tolerances of design values:
- .1 HVAC systems: plus 10%, minus 5%.

1.12 ACCURACY TOLERANCES

.1 Measured values to be accurate to within plus or minus 2% of actual values.

1.13 INSTRUMENTS

.1 Prior to TAB, submit to Consultant list of instruments to be used together with serial numbers.

.2 Calibrate in accordance with requirements of most stringent of referenced standard for either applicable system or HVAC system.

.3 Calibrate within 3 months of TAB. Provide certificate of calibration to Consultant.

1.14 TAB REPORT

.1 Format to be in accordance with reference standard.

.2 TAB report to show all results in units specified on drawings and to include:
.1 System schematics.

.3 Submit 3 copies of TAB Report to Consultant for verification and approval, in D-ring binders, complete with index tabs.

1.15 VERIFICATION

.1 All reported results subject to verification by Consultant.

.2 Provide manpower and instrumentation to verify up to 30% of all reported results.

.3 Number and location of verified results to be at discretion of Consultant.

.4 Bear costs to repeat TAB as required to satisfaction of Consultant.

1.16 SETTINGS

.1 After TAB is completed to satisfaction of Consultant, replace drive guards, close all access doors, lock all devices in set positions, ensure sensors are at required settings.

.2 Permanently mark all settings to allow restoration at any time during life of facility. Markings not to be eradicated or covered in any way.

1.17 COMPLETION OF TAB

.1 TAB to be considered complete only when final TAB Report received and approved by Consultant.

1.18 AIR SYSTEMS

.1 TAB all systems, equipment, components, controls specified Mechanical Contractor.

.2 Measurements: to include, but not limited to, following as appropriate for systems, equipment, components, controls:
- .1 Air velocity.
- .2 Static pressure.
- .3 Velocity pressure.
- .4 Air flow rate.
- .5 Cross sectional area
- .6 RPM: Fan and Motor
- .7 Electrical power:
  - .1 Voltage
  - .2 Current draw

.3 Locations of equipment measurements: To include, but not be limited to, following as appropriate:
- .1 Inlet and Outlet of each:
  - .1 Fan
  - .2 Filter
  - .3 Damper
  - .4 Other auxiliary equipment

.4 Locations of systems measurements to include, but not be limited to, following as appropriate:
- .1 Main ducts
- .2 Main branch ducts
- .3 Sub-branch ducts
- .4 Each supply, exhaust and return air inlet and outlet
- .5 Other auxiliary equipment
- .6 All areas served by system

.5 Re-measure Air Handling Unit fan static and airflow after final filters are installed.

2 Products (N/A)

3 Execution

3.1 TAB AGENCIES:

.1 Acceptable Agencies
- .1 Atlantic Indoor Air Audit Co.
- .2 Barrington Air Balance Service
- .3 Griffin Air Balance Limited
- .4 Scotia Air Balance 1996 Limited
- .5 System Balance Limited

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

2 Products

2.1 SEAL CLASSIFICATION

.1 Ductwork classification as follows:

Maximum Pressure	SMACNA Seal Class
500 Pa	C
500 Pa (Exterior ducts)	B

.2 Class C: transverse joints and connections made air tight with gaskets, sealant and tape or combination thereof. Longitudinal seams unsealed.

.3 Class B: Longitudinal seams, transverse joints and connections made air tight with gaskets, sealant and tape or combination thereof.

2.2 GALVANIZED STEEL

.1 Lock forming quality: to ASTM A653, Z90 zinc coating.

.2 Thickness, fabrication and reinforcement: to ASHRAE and SMACNA or as indicated.

.3 Minimum 26 gauge

.4 Satin coat for all exposed ductwork outside mechanical rooms.

.5 Use oil free material and take all necessary measures to prevent contamination

.6 Joints: to ASHRAE and SMACNA and/or proprietary manufactured duct joint.
- .1 Acceptable Material: for proprietary joints:
  - .1 Ductmate Canada Ltd.
  - .2 Exanno Nexus

2.3 RECTANGULAR DUCTWORK

.1 Cross break ducts 450 mm (18") and larger for stiffening.

.2 Same gauge on all sides and based on the greater cross sectional dimension.

.3 Reinforce flat slip joints of ducts over 450 mm (18").

2.4 ROUND DUCTWORK

.1 Factory fabricated conduit consisting helically wound galvanized steel straps with spiral lock seams.

.2 For concealed branch ductwork up to 350 mm (14") diameter, longitudinal seams.

.3 Gasket Duct System
- .1 Gasket Duct System consisting of fittings that are factory fitted with a sealing gasket and spiral pipe which when installed according to manufacturer's instruction, will seal without use of external duct sealer.
- .2 Spiral pipe: Lock forming grade with mechanical seam indentation, incorporate multiple corrugations between spiral seams for diameters greater than 175 mm (7") and manufactured to SMACNA's duct construction standards
- .3 300 mm (12") and less: Single-lip "T" profile gasket. Gasket bonded to fitting in a groove at the end of the fitting.
- .4 Larger than 300 mm (12"):
  - .1 Triple lipped gasket. Gasket bonded to fitting in a groove at the end of the fitting.
  - .2 Fitting ends rolled over edges for added strength and rigidity.
  - .3 Fittings ends for 660 mm and larger extended and tapered slip dimension to facilitate assembly sealed.
  - .4 Standing seam gore lock elbows internally sealed.
- .5 All fitting ends calibrated to manufacturer's published dimensional tolerance standard and associated spiral duct.
- .6 EPDM sealing gasket to conform to ASTM E84 and NFPA 90A flame spread and smoke developed ratings of 25/50.
- .7 Acceptable Material: for gasket system
  - .1 300 mm (12") and less Quick Kit system by EHG Duct, Inc.
  - .2 Larger than 300 mm (12") EHG G-3 system by EHG Duct, Inc.

.4 Rectangular ductwork may be convert to equivalent size round provided that the project space limitations are properly addressed.

.5 Use conical "T"s for 90^0 Branch takeoff

.6 Use long radius elbows where space permits.

.7 Galvanized steel of the following minimum gauges:

Duct Diameter	Straight Lengths of Spiral Duct Gauge	Round Duct fittings	Plain Duct Gauge
8" and smaller	26	24	24
9"-14"	26	24	24
15"-26"	24	20	N/A
27"-36"	22	20	N/A
37"-50"	20	20	N/A
200 mm& smaller	26	24	24
225-350	26	24	24
375-650	24	20	N/A
685-915	22	20	N/A
940-1270	20	20	N/A

2.5 FITTINGS

.1 Fabrication: to SMACNA.

.2 Radiused elbows:
- .1 Rectangular: Standard radius (Centerline radius 1.5 times width of duct) or short radius with single thickness turning vanes.
- .2 Round: Smooth radius or 5 piece. Centerline radius is 1.5 times diameter.

.3 Mitered elbows, rectangular:
- .1 To and including 400 mm: Single thickness turning vanes.
- .2 Over 400 mm: Double thickness turning vanes.

.4 Branch Ducts
- .1 Rectangular: Refer to Details on drawings.
- .2 Round: Conical T as per SMACNA

.5 Main supply duct branches without splitter damper. Provide branch and main duct balancing dampers.

.6 Sub branch duct with 45° entry and balancing damper on branch.

.7 Transitions:
- .1 Diverging: 20° maximum included angle.
- .2 Converging: 30° maximum included angle.

.8 Offsets: square elbows and/or full radiused elbows as indicated.

.9 Obstruction deflectors: maintain full cross-sectional area. Maximum included angles as for transitions.

2.6 FIRESTOPPING

.1 Retaining angles all around duct, on both sides of fire separation.

.2 Firestopping material and installation must not distort duct.

2.7 SEALANT

.1 Sealant: non-flammable, water base duct sealant.

.2 Temperature range of -30° C to +93° C.

.3 Flame spread rating of not more than 25.

.4 Smoke developed classification of not more than 50.

.5 Standard of Acceptance:
- .1 Duro Dyne DSW

2.8 TAPE

.1 Poly-vinyl treated, open weave fiberglass tape.

.2 50 mm (2") wide.

.3 Standard of Acceptance.
- .1 Duro Dyne FT-2.

2.9 ALUMINUM

.1 To ASHRAE and SMACNA: Aluminum type: 3003-H-14

.2 Thickness, fabrication and reinforcement: to ASHRAE and SMACNA or as indicated.

.3 Joints: to ASHRAE and SMACNA and/or proprietary manufactured duct joint.
- .1 Acceptable Material: for proprietary joints:
  - .1 Ductmate Canada Ltd.
  - .2 Exanno Nexus

2.10 KITCHEN RANGE HOOD EXHAUST SYSTEMS

.1 Construct in accordance with NFPA 96.

.2 Stainless Steel.
- .1 To ASTM A480/A480M-85, Type 304.
- .2 Joints: continuous inert gas welded.
- .3 Minimum 16 Ga.

.3 Black Steel
- .1 To ASTM/A621M-82.
- .2 Thickness: 16 Ga.
- .3 Joints: continuous weld.

2.11 HANGERS AND SUPPORTS

.1 Strap hangers: of same material as duct but next sheet metal thickness heavier than duct.

.2 Maximum size rectangular and round duct supported by strap hanger: 500 mm (20").

.3 Rectangular Hangers: angle iron with steel rods to ASHRAE and SMACNA following table:

Duct Size	Angle Size	Rod Size	Spacing
up to 30"	1" x 1" x 1/8"	1/4"	8'
31 to 36"	1 1/2" x 1 1/2" x 1/8"	1/4"	8'
37 to 60"	1 1/2" x 1 1/2" x 1/8"	3/8"	8'
61 to 84"	2" x 2" x 1/8"	3/8"	5'
85 to 96"	2" x 2" x 1/4"	3/8"	5'

Duct Size	Angle Size	Rod Size	Spacing
up to 750 mm	25 x 25 x 3mm	6 mm	2400 mm
751 to 900 mm	38 x 38 x 3 mm	6 mm	2400 mm
901 to 1500 mm	38 x 38 x 3 mm	10 mm	2400 mm
1501 to 2100 mm	50 x 50 x 3 mm	10 mm	1500 mm
2101 and over	50 x 50 x 6 mm	10 mm	1500 mm

.4 Round Hangers: strap/band with steel rods to ASHRAE and SMACNA following table:

Duct Size	Strap Size	Rod Size	Spacing
up to 610 mm	25 x 0.85 mm	6 mm	2400 mm
611 to 900 mm	25 x 1 mm	10 mm	2400 mm

Duct Size	Band Size	Rod Size	Spacing
901 to 1270 mm	25 x1.3 mm	2 @ 10 mm	2400 mm
1271 to 2130 mm	25 x 1.6 mm	2 @ 10 mm	2400 mm

.5 Upper attachment:
.1 As per Section 23 05 29 Hangers and Supports

.6 Middle attachment (Rod):
.1 As per Section 23 05 29 Hangers and Supports

3 Execution

3.1 GENERAL

.1 Install ducts in accordance with ASHRAE and SMACNA.

.2 Support risers in accordance with ASHRAE and SMACNA.

.3 Install breakaway joints in ductwork on each side of fire separation.

.4 Where ducts are shown passing through rated fire separations provide fire dampers (in accordance with Section 24 33 16, Dampers Fire) and associated angle frames as per fire damper manufacturer's recommendations

3.2 HANGERS

.1 Strap hangers: install in accordance with SMACNA.
.1 Minimum 25 mm (1") wide extending down 2 sides and 50 mm (2") under duct.
.2 Fasten to sides and bottom of duct.

.2 Angle hangers: complete with locking nuts and washers.
.1 Rod attached to angle within 50 mm (2") of the duct sides.

3.3 SEALING & TAPING

.1 Apply sealant to outside of joint to manufacturer's recommendations.

.2 Bed Tape in sealant and recoat with minimum of 1 coat of seal and to manufacturer's recommendation.

3.4 KITCHEN RANGE HOOD EXHAUST SYSTEMS

.1 Install to NFPA 96.

.2 Where exposed:
- .1 Stainless steel ductwork.

.3 Where concealed:
- .1 Stainless steel ductwork or
- .2 Black steel.

.4 Provide gasketted access doors at changes in direction and to access full length of duct.

.5 Minimum clearances:
- .1 450 mm (18") to combustibles.
- .2 75 mm (3") to limited and non-combustibles.

3.5 WATERTIGHT DUCT

.1 Provide water tight duct for:
- .1 Plenums at roof exhaust fans.
- .2 As indicated.

.2 Form bottom of horizontal duct without longitudinal seams. Weld joints of bottom and 150 mm (6") up side sheets. Seal all other joints with duct sealer and tape.

.3 Slope bottom of duct/plenum to drain.

.4 Duct connections to plenum to be minimum 50 mm (2") above bottom of plenum.

.5 Provide NPS 1 1/4 drain with deep seal trap from outside air intake plenums and louvered exhaust air plenums to floor drain. Provide 150 mm deep trap for drains.

3.6 LEAKAGE TESTS

.1 In accordance with SMACNA HVAC Duct Leakage Test Manual, latest edition.

.2 Make trial leakage tests as instructed to demonstrate workmanship.

.3 Install no additional ductwork until trial test has been passed.

.4 Test section minimum of 30 meter (100 ft.) long with not less than 3 branch takeoffs and 2 - 90° elbows. Test section shall be designated by Consultant.

.5 Complete test before insulation or concealment.

.6 Ductwork shall be free of audible noise in quiet ambient. Leakage shall not exceed 5% of design CFM proportioned to length.

.7 Leak testing of trial section shall be carried out by an independent test agency retained by this section.

.8 Should the initial test be unsuccessful bear costs of making duct improvements and additional testing at no extra cost or delay to the Owner.

.9 As a minimum, test one section for each system on each floor.

3.7 PROTECTION AND CLEANING

.1 Seal and protect open ends of ductwork continuously during construction.

.2 Wash down inside of intake duct and plenum from louver to unit prior to starting units.

3.8 CONTROL DAMPERS

.1 Install control dampers supplied by Section 24 33 15 Dampers - Operating and supplied with fans.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

2 Products

2.1 ACCESS DOORS IN DUCTS

.1 Non-insulated ducts:
- .1 Sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 26 Ga. thick complete with sheet metal angle frame.
  - .1 Gasketted, Frameless or Framed.

.2 Insulated ducts:
- .1 Sandwich construction of same material as duct, one sheet metal thickness heavier, minimum 26 Ga. thick complete with sheet metal angle frame and insulation thickness as per adjacent duct.

.3 Hardware for framed:
- .1 Up to 300 x 300 mm (12" x 12") 2 sash locks
- .2 325 mm to 450 mm (13" to 18") 4 sash locks
- .3 Safety chain except for hinged.
- .4 Lift out handle for access doors 450 x 450 mm (18" x 18") and over.
- .5 Access doors into intake and exhaust plenums.
  - .1 Gasketted
  - .2 Hinged
  - .3 Flanged mounted.
  - .4 Insulation stop

.4 For round ducts up to 16”, provide sheet metal rolled to duct size with gasket, hinge and latches (file of sharp edges of duct opening). For round ducts over 16”, provide square duct adapter and access doors.

2.2 FLEXIBLE CONNECTIONS

.1 Frame: galvanized sheet metal frame 1.6 mm (16 Ga.) thick with fabric clenched by means of double locked seams.

.2 Material: Fire resistant, self extinguishing, neoprene coated glass fabric, temperature rated at -40° to +90° C, density of 1.3 kg/m 2.

2.3 TURNING VANES

.1 Factory or shop fabricated single thickness without trailing edge, to recommendation of SMACNA.

2.4 BALANCING DAMPERS

.1 Standoffs for insulated ducts.

.2 Splitter Dampers
- .1 Single thickness construction of same material as duct but one sheet metal thickness heavier.
- .2 Control rod with locking device.
- .3 Bend end of rod to prevent end from entering duct.
- .4 Pivot: piano hinge.

.3 Single Blade Dampers
- .1 Of same material as duct, but one sheet metal thickness heavier. V-groove stiffened.
- .2 Size and configuration to SMACNA, except maximum height 250 mm (10").
- .3 Locking quadrant.
- .4 Inside and outside end bearings.

.4 Multi-Bladed Dampers
- .1 Factory manufactured of material compatible with duct.
- .2 Opposed blade: configuration to SMACNA.
- .3 Maximum blade height: 100 mm (4").
- .4 Bearings: pin in bronze bushings.
- .5 Linkage: shaft extension with locking quadrant.
- .6 Channel frame of same material as adjacent duct, complete with angle stop.

2.5 NON-METALLIC ACOUSTIC INSULATED FLEXIBLE DUCTWORK

.1 Pressure drop coefficients listed below are based on relative sheet metal duct pressure drop coefficient of 1.00.

.2 Flame spread rating not to exceed 25. Smoke developed rating not to exceed 50.

.3 Factory Fabricated, non-collapsible, coated mineral base perforated fabric type helically supported by steel wire with factory applied flexible glass fiber acoustic insulation with vapour barrier.

.4 Performance: Working pressure: -125 Pa to 1500 Pa (-1/2" to + 6" WG.), R = 4.2

.5 Acceptable material:
- .1 Thermaflex M-KE.
- .2 Dundas Jafine SPC

2.6 BOND CONECTIONS

.1 6 mm x 40 mm long grounding bolts

.2 Hex nuts and star washers.

.3 #12 AWG bonding conductor with Green jacket or round tinned Copper Braid with crimped lugs of equivalent AWG.

3 Execution

3.1 INSTALLATION

.1 Install in accordance with recommendations of SMACNA

.2 Flexible connections.
- .1 Length of connection: 150 mm (6").
- .2 Minimum distance between metal parts when system in operation: 75 mm (3").

.3 Bond connections
- .1 Bond across each flexible duct connection.
- .2 Bonding bolts: drill hole, install bolt with star washers both sides and secure with nut.
- .3 Length of bond connection determined by contractor.
- .4 Locate bond connection so they are visible from the floor level.

.4 Access doors:
- .1 Size:
  - .1 600 x 600 mm (24" x 24") for person size entry and plenums.
  - .2 300 x 300 mm (12" x 12") for service entry.
- .2 Location:
  - .1 At control dampers, person size for view the operation of the damper blades and access to linkage.
  - .2 At devices requiring maintenance.
  - .3 At locations required by code.

.5 Access panels
- .1 Size: Minimum 450 x 450 mm (18" x 18")
- .2 Location:
  - .1 At 9000 mm (30 ft.) centers in horizontal duct mains, at each change in direction, both sides of turning vanes and both sides of duct silencers.
  - .2 Access doors as per above or an access panel constructed of 500 x 500 mm (20” x 20”) 18 gauge sheet metal with gasket and fastened at 75 mm (3”) centers around perimeter.

3.2 FLEXIBLE DUCT INSTALLATION

.1 Install in accordance with SMACNA.

.2 Maximum 15° change in direction in flexible ductwork. For changes in direction of more than 15°, use rigid ductwork for the change.

.3 Fasten flexible duct to rigid duct with sheet metal screws adjacent to the flexible duct wire and tape flexible duct ends.

3.3 BALANCING DAMPERS

.1 Install balancing dampers for all branch supply, return and exhaust ducts.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

2 Products

2.1 OPERATING DAMPERS

.1 Sizes:
- .1 Blades maximum 150 mm (6") wide and 1200 mm (48") long.
- .2 Modular maximum 1525 mm (60") wide and 1525 mm (60") high.
- .3 Multiple sections with stiffening mullions and separate actuators.

.2 Materials:
- .1 Frame: extruded aluminum.
- .2 Blades: extruded aluminum.
- .3 Bearings: Nylon.
- .4 Provide additional thrust bearings for vertical blades.
- .5 Linkage: zinc plated steel.
- .6 Seals: PVC and/or SS spring on side, top and bottom of frame and along all blade edges and blade ends.

.3 Performance characteristics:
- .1 2% maximum allowable leakage against 2.5 kPa (10" w.g.) differential.
- .2 Temperature range minus 40° C to 90° C.

.4 Flanged to duct connection

.5 Insulated Dampers:
- .1 For outside air damper and exhaust air damper at all air handling units.
- .2 For outside air dampers.
- .3 R6 insulation.

.6 Low Leakage Dampers:
- .1 For individual exhaust fans except where noted above.

.7 Standard of Acceptance:
- .1 Low Leakage: T. A. Morrison Series 1000.
- .2 Insulated: T. A. Morrison Series 9000.

.8 Acceptable Manufacturer
- .1 Alumavent
- .2 Nailor Industries
- .3 Ruskin with T-Flange Frame
- .4 Trolec
- .5 Ventex

3 Execution

3.1 INSTALLATION

.1 Install in accordance with recommendations of SMACNA

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

2 Products

2.1 FANS GENERAL

.1 Capacity: airflow, static pressure, rpm, bhp, motor, model, size, sound power data and as indicated on schedule.

.2 Fans: statically and dynamically balanced, constructed in conformity with AMCA 99.

.3 Sound ratings: comply with AMCA (Air Moving and Conditioning Association) 301, tested to AMCA 300.

.4 Performance ratings: based on tests performed in accordance with ANSI/AMCA 210, and ANSI/ASHRAE 51.

.5 Motors: In accordance with Section 20 05 01 Common Work Results for Mechanical General.

.1 Include bearing protection in the form of a device to divert shafts currents to ground for all motors driven by variable frequency drives (VFDs). Maintenance free device constructed of highly conductive bronze with an integral sleeve.

.6 Accessories and hardware: matched sets of V-belt drives, adjustable slide rail motor bases, belt guards, coupling guards, fan safety screens, and as indicated.

.7 Factory primed before assembly in colour standard to manufacturer.

.8 Scroll casing drains: as indicated.

.9 Bearing lubrication systems plus extension lubrication tubes where bearings are not easily accessible.

.10 Vibration isolation: to Section 23 05 48 - Vibration Controls.

.11 Flexible duct connections: to Section 24 33 00 – Air Duct Accessories.

2.2 CENTRIFUGAL FANS

.1 Fan wheels:

.1 Welded steel construction.

.2 Maximum operating speed of centrifugal fans not more than 50% of first critical speed.

.3 Air foil, forward curved, backward inclined blades, as indicated.

.2 Bearings: split pillow-block grease lubricated ball or roller self-aligning type with oil retaining, dust excluding seals and a certified minimum rated life of 200,000 h in accordance with (Anti-Friction Bearing Manufacturers Association) AFBMA L-10 life standard. Bearings to be rated and selected in accordance with AFBMA 9 and AFBMA 11.

.3 Housings:

.1 Volute with inlet cones: fabricated steel for wheels 300 mm or greater, steel for smaller wheels, braced, and with welded supports.

2.3 IN-LINE CENTRIFUGAL FANS

.1 Characteristics and construction: as for centrifugal fan wheels, with axial flow construction and belt drive.

.2 Provide AMCA arrangements 1 or 9 as indicated with stiffened flanges, smooth rounded inlets, and stationary guide vanes.

2.4 FAN SELECTIONS

.1 Based on Manufacturer named as Standard of Acceptance. The approval of equipment of other manufacturers named in the acceptable materials list shall be subject to meeting the performance and sound power levels. The fan manufacturer shall also be responsible for all electrical changes caused by the change in motor size.

3 Execution

3.1 FAN INSTALLATION

.1 Install fans as indicated, complete with resilient mountings specified in Section 23 05 48 - Vibration Controls, flexible duct connections in accordance with Section 24 33 00 – Air Duct Accessories.

.2 Provide sheaves and belts required for final air balance.

.3 Access doors and access panels to be easily accessible.

.4 Provide fan restraining snubbers for suspended in line fans over 2.2 kW (3 HP).

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

2 Products

2.1 FANS GENERAL

.1 In accordance with Section 24 34 00 HVAC Fans.

.2 Motors:
- .1 In accordance with Section 20 05 01 Mechanical General Requirements and as per this section.
- .2 In accordance with Section 24 34 00 HVAC Fans and as per this section.

.3 Capacity: airflow/static pressure rpm, motor, model and size and sound ratings as per schedule on drawings.

.4 Statically and dynamically balanced.

.5 Bear AMCA Certified Air Performance Rating Seal.

.6 Bearings: sealed lifetime bearings or of self-aligning type with oil retaining, duct excluding seals and a certified minimum rated life of 80,000 h in accordance with AFBMA L10 life standard. Bearings to be rated and selected in accordance with AFBMA9 and AFBMA 11.

2.2 ROOF EXHAUST FAN

.1 Centrifugal V belt driven.

.2 Spun aluminum housing complete with resilient mounted motor and fan.

.3 Aluminum backward inclined wheel.

.4 Aluminum pre-punched base with continuously welded curb cap corners.

.5 Adjustable motor sheave.

.6 Mesh 13 mm (1/2") diameter aluminum birdscreen.

.7 Disconnect within fan housing.

.8 Cadmium plated securing bolts and screws.

.9 Standard of Acceptance:
.1 Loren Cook Co. as per schedule on drawings.

.10 Acceptable Manufacturer:
.1 Acme with curb cap as specified above.
.2 PennBarry
.3 Greenheck with curb cap as specified above.
.4 Jenco Fan Inc.
.5 Carnes with curb cap as specified above.

2.3 ROOF CURB

.1 1.3 mm (18 gauge) aluminum

.2 38 mm, 3 lb. density thermal and acoustical insulation.

.3 Continuously welded corners.

.4 CCA pressure treated wood nailer.

.5 Suitable for sloped roof construction.

.6 Height indicated on the drawings is on the upper side of the roof slope.

.7 Standard of Acceptance:
.1 Loren Cook Co. RCA Sloped

.8 Acceptable Manufacturer:
.1 Acme
.2 PennBarry
.3 Greenheck.
.4 Jenco Fan Inc.
.5 Carnes

3 Execution

3.1 INSTALLATION

.1 Coordinate of top of curb dimensions and roof openings with general Contractor.

.2 Provide fan sheaves required for final air balance.

.3 Coordinate roof and wall openings with other trades.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

1.3 MANUFACTURED ITEMS

.1 Product of one manufacturer for generic type, i.e. grilles and registers by one, diffusers by one, or same.

2 Products

2.1 GENERAL

.1 Capacity: As per schedule on drawing.

.2 Provide standard product to meet capacity, throw, noise level, throat and outlet velocity.

.3 Frames:
- .1 Steel: standard with exposed welded joints and mitered corners.
- .2 Aluminum: extruded with mechanical fasteners and mitered corners.

.4 Finish: Off white baked enamel.

.5 Diffusers, (Non Laminar)
- .1 Square type.
- .2 Fixed pattern.
- .3 Adjustable pattern where noted.
- .4 Plaster frame where installed in drywall ceilings.

.6 Standard of Acceptance:
- .1 E. H. Price as per schedule.

.7 Acceptable Manufacturer:
- .1 Krueger
- .2 Titus
- .3 Nailor Industries

.8 Laminar Flow Diffusers
- .1 Halton KCD

3 Execution

3.1 INSTALLATION

.1 Install with flat head cadmium plated screws in countersunk holes where fastenings are visible.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

2 Products

2.1 GENERAL

.1 Capacity: As per schedule on drawing.

.2 Motor In accordance with Section 20 05 01 Common Work Results for Mechanical – General.

2.2 KITCHEN ROOF EXHAUST FAN

.1 ULC listed for kitchen exhaust system.

.2 Discharge a minimum of 1000 mm (40") above roof.

.3 Prefab curb, height as specified and to provide 300 mm (12”) from top of roof surface to top of curb with a minimum height of 600 mm (24”).

.4 ULC listed insulated double skin duct collar.

.5 Disconnect switch.

.6 Fan housing, cowl and discharge constructed of minimum 16 gauge steel, continuously welded and liquid tight NFPA 96 requirements.

.7 Belt drive.

.8 Motors:
- .1 Totally enclosed fan cooled.
- .2 Motors in accordance with NEMA MG1. Rev 3 Part 31.

.9 Electrical conduit extended down to bottom of duct collar.

.10 Welded steel single inlet backward inclined fan wheel of the non-overloading type, statically and dynamically balanced.

.11 ULC approved back draft damper at fan discharge with wind deflector.

.12 Acceptable Material:
.1 Halton as per schedule.

2.3 GREASE FILTER TYPE KITCHEN HOOD

.1 NSF and cETLus listed.

.2 Base the exhaust airflow on the convective heat generated by the appliances underneath each hood system. Include convective heat calculations with shop drawing submittal based on the input power of the appliance served.

.3 General
.1 Outer casing / main body, inner liner, exhaust duct, pressure measurement T.A.B. ports.
.2 Outer casing panels constructed of stainless steel with a brushed satin finish.
.3 Double sided wall construction canopy ends.
.4 Integral 75 mm (3") air space (Double wall construction) on the rear of the hood.
.5 Exhaust collar.

.4 Construction
.1 All 18 gauge stainless steel construction.
.2 Welded duct collar with connection flange.
.3 All joints and seams welded and liquid tight.
.4 Welds ground and polished to the original finish of metal.

.5 Grease filters
.1 Multicyclone stainless steel grease extractors.
.2 Grease extraction efficiency of 93% on particles with a diameter of 5 microns and 98% on particles with a diameter of 15 microns or larger as tested by an independent testing laboratory.
.3 Pressure loss over the extractor less than 0.50” of water at flow rates approved by UL for heavy load cooking.
.4 Sound levels less than a NC rating of 55.

.6 Capture Jet™ technology
.1 Introduced through a special discharge panel and less than 10% of the calculated exhaust airflow.
.2 Discharge velocity a minimum of 1500 feet per minute.
.3 Internally mounted fan with a speed control

.7 T.A.B. (Testing and Balancing) ports
.1 Integral T.A.B. (Testing and Balancing) ports mounted in the hood for measurement of airflow through the extractors and the air chamber.
.2 Determined by the pressure vs. airflow curves supplied by manufacturer.

.8 LED lights.

.9 Acceptable Material:
.1 Halton Model KVC/E with KSA filters and Capture Jet™ as per drawings.

3 Execution

3.1 INSTALLATION

.1 Provide 100 mm (4") deep full size trap on drain from fan.

.2 Provide fan sheaves required for final air balance.

.3 Coordinate roof openings with other trades.

.4 Mount hoods 1980 mm (6’6”) AFF unless otherwise noted.

END OF SECTION

1 eneral

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

2 Products

2.1 GENERAL

.1 Filters: suitable for air at 100% RH and air temperatures between -40° and +50° C.

2.2 MERV 8 EXTENDED SURFACE PLEATED PANEL FILTER

.1 Disposable pleated non-woven reinforced cotton and synthetic filter media.

.2 Welded wire support grid bonded to air leaving side of the filter media.

.3 High-wet strength, moisture resistant beverage board frame with diagonal media support members.

.4 Pleated media pack bonded to the inside of the frame on all four edges.

.5 ULC Class-2 listed and labeled.

.6 Nominal thickness: 50 mm (2").

.7 MERV 8.

.8 Acceptable Material:
- .1 AAF Am-Air.
- .2 Flanders MERV 8 Pleated

2.3 MAGNEHELIC AIR FILTER GAUGES

.1 Range 0 to 750 Pa (0-3").

.2 Permanent markers for initial pressure drop and manufacturers' recommended final pressure drop.

3 Execution

3.1 INSTALLATION

.1 Install with adequate access for removal.

.2 Filters to be removed from the units and properly stored.

3.2 REPLACEMENT MEDIA

.1 Install final cartridge filters at upon acceptance of project.

3.3 SPARE FILTER MEDIA

.1 In accordance with Section 20 05 02 Common Work Results for Mechanical – Submittals.

3.4 FILTER GAUGES

.1 Across each bank of cartridge and extended surface pleated type filters.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

2 Products

2.1 MAKE UP AIR HANDLING UNITS GENERAL:

.1 Capacity: As per schedule on drawing.

.2 Factory assembled system components, to form unit supplying air at designed conditions, as indicated.

.3 Horizontal type unit having air tight modular components consisting of filter sections, coil sections, access sections, fan sections and blank sections supplied by Air Handling Manufacturer.

.4 Unit(s) may be shipped in sections, single package or vertical split.

.5 Units to be shipped inside an enclosed trailer or completely wrapped.

.6 All units by same manufacturer.

.7 Standard of Acceptance:
- .1 Engineered Air Custom as per drawings.

.8 Acceptable Manufacturers:
- .1 Daikin Vision.
- .2 York Solution

.9 Casing
- .1 Double wall acoustical - thermal construction. Liner continuously fasten to outside casing at end of each section.
- .2 Minimum 20 gauge solid galvanized steel liner.
- .3 50 mm (2") thick 1 1/2 pound density insulation or foam insulation.
- .4 Minimum 18 gauge galvanized steel exterior.
- .5 Paint steel parts where not galvanized with corrosion resistant paint to CGSB 1-GP-181M-78.
- .6 All panels completely gasketted
- .7 Closed-cell foam gasketing where modules are joined.
- .8 Minimum 200 high galvanized steel (minimum 10 gauge) base rail.

.10 Drain Pan
- .1 Insulated double wall

.2 Stainless Steel.
.3 Drain pan gauge to be sufficient to support a worker.
.4 All drain pans to be IAQ, that is, sloped in two planes, cross break pan and pitch towards recessed drain connection to ensure **complete drainage**.
.5 Extend downstream to provide sufficient amount of space to contain moisture carry-over.
.6 Coat with anti-microbial agent.
.7 The elevation between the invert of the drain connection on the unit and floor to be a minimum of 150 mm based on a 90 mm housekeeping pad.
.8 Drain connections in all drain pans to be recessed (no lip).
.9 Each drain pan connection to terminate at exterior of unit.
.10 Drain piping to be copper, brass or stainless steel on access side of unit..

.11 Diffuser Section
.1 Diffuser plate designed to distribute air evenly across face of the unit.
.2 Section complete with IAQ drain pan.

.12 Access Doors
.1 Provide access for maintenance of internal parts.
.2 Full perimeter bulb type neoprene gasket attached to doorframe.
.3 Construction to match casing: 50 mm (2") double wall access.
.4 Minimum two Ventlock latch operable from both sides.
.1 Linked handles so door opens when one handle operated.
.5 Access door both sides of fan section except for plenum fan sections with side discharge.
.6 Access door both sides of filter sections
.7 Hinged.
.8 For filter sections and diffuser sections under positive pressure, outward swing doors to have secondary safety latch. For other sections under positive pressure, access doors to swing inward swing doors.
.9 In fan and filter modules and where indicated.
.10 Min. door height equal unit height less 150 mm (6").
.11 Minimum width 400 mm (16").
.12 0.05 m² (72 in²) double glazed wired glass viewing window in fan sections, inlet to heat recovery sections (supply and exhaust) and where noted.
.13 Stacked units:
.1 Provide linked handles on access doors serving upper components.
.2 Operation of bottom handle shall release upper handles.

.13 Fan Section
.1 In accordance with Section 24 34 00 HVAC Fans.
.2 Double width, double inlet, single wheel or plenum as noted.
.3 Mount fan and motor assembly on isolation base, internally isolated with spring isolation. Attach fan scroll to the casing with flexible duct connection.
.4 Provide fan snubbers between fan scroll and casing.
.5 Section complete with IAQ drain pan.
.6 Motors:
.1 Totally enclosed fan cooled.
.2 In accordance with Section 20 05 01 Mechanical General Requirements - General and as per this section.

.14 In accordance with Section 24 34 00 HVAC Fans and as per this section.
Filter Section
.1 Filters to Section 24 44 00 HVAC Air Filtration.
.2 Gasket between filters.
.3 Provide blank off plates to ensure zero bypass around filters.
.4 Gasket between filter and door.
.5 Side access through adequately sized access door.
.6 Access doors both sides for units over 1,850 mm internal width.
.7 Pre-filters
.1 Prefabricated slide out channel rack.
.2 Angle.
.8 Final Filters
.1 Track: aluminum extrusions with replaceable gaskets.
.9 Section complete with IAQ drain pan.
.10 For future filter Sections, complete with tracks and doors as per as per final filters.

.15 Dampers
.1 Outside air dampers are duct mounted insulated dampers as per Section 24 33 15 Dampers Operating.
.2 Return air dampers may be duct mounted Low Leakage as per Section 24 33 15 Dampers Operating or factory supplied low leakage dampers in return air collar as described below.
.1 Assembly to include frame, divider, operating linkage and drive shaft.
.2 Sizes: Blades maximum 150 mm (6") wide and 1200 (48") long. Modular maximum 1200 mm (48") wide and 1200 mm (48") high.
.3 Multiple sections with stiffening mullions and jack shafts.
.4 Frame: 12 Ga. thick galvanized sheet steel.
.5 Blades: two sheets 22 Ga. thick or 16 Ga. thick galvanized sheet steel.
.6 Bearings: oil impregnated sintered bronze. Provide additional thrust bearings for vertical blades.
.7 Linkage: zinc plated steel.
.8 Seals: replaceable neoprene seals or stainless steel spring on side, top and bottom of frame and along all blade edges and blade ends.
.9 2% maximum allowable leakage against 2500 Pa (10" WG) differential.
.10 Temperature range -40º C to + 90° C.

.16 Modulating Electric Heat Section
.1 Factory supplied field installed
.2 Bear CSA label.
.3 Galvanized steel frame.
.4 Open coil elements made of nickel-chromium designed for minimum airflow.
.5 Ceramic coil support.
.6 SCR time – proportioning type controller.
.7 Modulating output based in input signal.
.8 Control transformer with fused secondary.
.9 Built-in, prewired pressure differential switch.
.10 Power and control terminals.
.11 Primary thermal cutout (Hi Limit).
.12 Disconnect switch.
.13 Suitable for airflow indicated.

.17 Variable frequency drives (VFD's)
- .1 Provide line and load reactors and DV/DT filters for each VFD.
- .2 A minimum of five digital inputs programmable for function as well as normally open or normally closed operation.
- .3 A minimum of two digital outputs programmable for run, frequency arrival or over torque, as well as normally open or normally closed operation.
- .4 Manual bypass contactor arrangement to allow fan operation at full design cfm, even if the drive has been removed for service.
- .5 Standard TYPE 12 and TYPE 3R enclosure to house drive and bypass.
- .6 User-friendly start-up wizard designed for HVAC applications: duct static, building static, pressure control, temperature control
- .7 Compact 24 VDC contactors allow extended power loss ride-through Run-permissive damper control in drive or bypass mode
- .8 User-selectable S-shaped acceleration/ deceleration curve
- .9 Programmable digital inputs can be defined for normally open or normally closed operation
- .10 Solid state motor overload
- .11 Top and bottom conduit access
- .12 Hand-Off-Auto and Drive-Off-Bypass selection buttons on keypad
- .13 Two or three contactor bypass
- .14 Standard input circuit breaker disconnect
- .15 Accept 0-5V DC, 0-10V DC and 4-20 mA analog speed reference inputs.
- .16 Current or voltage speed reference inputs shall be selectable by a digital input.
- .17 0-10V DC analog output programmable for frequency or current.
- .18 Include a set of normally open/normally closed alarm contacts.
- .19 A minimum of seven programmable pre-set speeds.
- .20 A minimum of three critical frequency reject points with programmable band width
- .21 Provide DC injection braking capable of automatic initiation prior to all start commands to brake a wind-milling fan.
- .22 Acceleration and deceleration programmable from 1 to 999 seconds.
- .23 Acceleration and deceleration programmable for linear, S-curve, U-curve, or reverse U-curve options.
- .24 The carrier frequency programmable to a maximum of 16 kHz.
- .25 Provide an automatic energy saving feature which will optimize the output voltage to minimize the power consumption.
- .26 Capable of an instantaneous power failure ride through of 15 milliseconds.
- .27 Programmable for constant or variable torque V/F curves to optimize energy consumption.
- .28 Programmable to offer thermal overload protection for a single motor.
- .29 Adjustable minimum speed setting from 0-100% and adjustable maximum speed setting from 0-100%.
- .30 Record on a fault log total number of faults and display details of the last three faults, including reason for fault, output frequency and current at time of fault, and DC bus voltage at time of fault.
- .31 Fuzzy logic control of acceleration and deceleration time without trip.
- .32 Keypad with the ability to enable or disable reverse and stop buttons.
- .33 PID programmable feature.
- .34 Lockable Software settings by both software and digital input.
- .35 Provide a non-volatile memory so that programming and fault log memory will not be lost in the event of a power failure.

.36 Equipped with an integral disconnect.
.37 Protective Devices Feature and Digital Display as a minimum:
- .1 Instantaneous over-current protection.
- .2 Electronic thermal overload protection.
- .3 Over-voltage protection.
- .4 Under-voltage protection.
- .5 Ground fault protection.
- .6 Phase loss protection.
- .7 Current transformer fault.
- .8 Instantaneous power failure protection.
- .9 Unattended start protection.
- .10 External trip input and display.
- .11 CPU error.
- .12 EEPROM error.
- .13 Option board error.

.38 Protective devices as a minimum:
- .1 3% impedance harmonically compensated line reactors rated to carry 150% total RMS current continuously.
- .2 Output filters consisting of 5% impedance, harmonically compensated, IGBT rated load, reactor connected on the VFD output with a three phase delta connected capacitor module connected in parallel to the reactor output. Output filters tuned to approximately 1 to 2 kHz and the VFD carrier frequency must be set to 5 kHz or higher.

.39 Operate within the following environmental ratings without derating:
- .1 Ambient temperature of -10 to 40^0 C.
- .2 Humidity of 20 to 90% non-condensing.
- .3 Vibration of 0.5G or less.

.40 Ensure that the VFD, load side wiring and motor combination are completely compatible.
.41 Output waveform tests shall be performed on all VFD's. Submit test results to the Consultant for review.
.42 Provide circuitry to limit the total harmonic distortion (THD) on the line side of the VFD.
.43 Ensure that the VFD is rated for constant torque or variable torque loads as applicable.
.44 Fusible disconnects used for all installations that do not offer other means of short circuit protection for the VFD. Non-fusible disconnects may be used for installations that do provide other means of short circuit protection.
.45 Provide fusible disconnect with fuses, for all VFD installations. Fusible disconnect shall be integrally mounted and wired with VFD in a NEMA 1 enclosure.
.46 Provide for a four line digital keypad that employs words and numbers for each operator interface. Keypad shall be capable of monitoring, programming and operating the VFD.
.47 Provide a separately mounted overload relay for each motor in a multi-motor application.
.48 Motors used with Variable Frequency Drive: Definite Purpose Inverter Fed Motors in accordance with NEMA MG1.1993 Rev 3 Part 31.
.49 Provide rated VFD Cable wire from the VFD to the motor.
.50 BACnet Communication capability
.51 Two-contactor type bypass switch.

.52 Ensure all VFD's are properly ventilated. Provide unistrut support structure, frame and racking system.
.53 VFD enclosures fitted with sprinkler hoods and comply with the intent of C.E.C. Section 26-008 and Appendix B-26-008.
.54 VFD and Bypass located in an enclosure accessible from outside of the unit.

.18 Acceptable Manufacturers:
.1 ABB
.2 Danfoss

2.2 REMOTE READING DIAL THERMOMETERS

.1 As per Section 23 05 19 Thermometers and Pressure Gauges.

.2 Remote reading dial thermometers may be field mounted or factory mounted

3 Execution

3.1 INSTALLATION

.1 Install units flat and level.

3.2 SHIPPING OF UNITS

.1 Units to be shipped inside an enclosed trailer or completely wrapped.

3.3 EQUIPMENT ON SITE

.1 Air handling equipment to be stored inside the building or in a construction trailer. Don't store outside.

.2 Filters to be removed from the unit and properly stored.

.3 Duct connections inside the units and inlets to the fans to be covered during construction.

.4 Maintain units isolated from the duct system until building is cleaned to satisfaction of consultant.

3.4 FANS

.1 Provide fan sheaves required for final air balance.

.2 Ensure metal bands of flexible connection are not touching when fan is running and when fan is stopped. Ensure flexible connection is not in tension when fan is running.

3.5 DRAIN PANS

.1 Provide NPS 1 trapped drain for each drain connections. Do not connect all drains to a common trap.

.2 Provide 150 mm deep trap for drains.

.3 Test each drain pan to ensure no water lays in drain pan. Test in presence of Consultant.

3.6 ADJUSTABLE FREQUENCY A/C MOTOR DRIVE START-UP

.1 Mount Adjustable Frequency A/C Motor Drive on an independent stand. Don't mount on the air handling unit.

.2 Utilize factory trained technician.

.3 In the presence of and in cooperation with the Controls Contractor, utilize the control signal to conform 50% speed and 100% speed.

.4 Submit written start-up report for each unit including the following:
- .1 Measured voltage per phase.
- .2 Speed at 50%, 100% control signal.
- .3 Signature of those present.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

1.3 WARRANTY

.1 For refrigeration compressors, the 12 months warranty period prescribed Division 0 and 1 is extended to 5 years.

2 Products

2.1 GENERAL

.1 DX refrigeration.

.2 Bear CSA label.

.3 Rated in accordance with ARI Standard 210 and bear the ARI label.

.4 A full charge of R-410-A for 7500 mm (25 feet) of refrigerant tubing shall be provided in the condensing unit.

.5 A dry air holding charge shall be provided in the evaporator.

.6 System efficiency shall meet or exceed 10.0 SEER.

2.2 PERFORMANCE

.1 Based on 26.6° C DB, 19.4° C WB for the indoor unit and 35° C DB, 23.8° C WB for the outdoor unit.

2.3 INDOOR UNIT

.1 General:
- .1 Factory assembled, wired and run tested. Contained within the unit all factory wiring, piping, control circuit board and fan motor.
- .2 Have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function and a test run switch. Indoor unit and refrigerant pipes will be charged with dry air instead of R22 before shipment from the factory.
- .3 White finish casing.

.2 Coil:
- .1 Nonferrous construction with smooth plate fins on copper tubing.
- .2 The tubing inner grooves for high efficiency heat exchange.
- .3 All tube joints brazed with phoscopper or silver alloy.
- .4 Pressure tested at the factory.
- .5 A condensate pan and drain provided under the coil.
- .6 Condensate pump able to raise drain water 825 mm (33") above the condensate pan.

.3 Electrical:
- .1 208 volts, 1 phase, 60 hertz.

.4 Ducted Fan Coil Units
- .1 Galvanized steel plate insulated with closed cell expanded polyurethane foam.
- .2 Air discharged out of the front of the unit to allow for field supply ductwork and diffusers to distribute the air into the room.
- .3 Return air will brought in through the rear of the unit to allow for the return air to be either ducted from the room or taken from the ceiling void.
- .4 Removable and washable factory supplied filters
- .5 Drain pan condensate pump.
- .6 Indoor unit fan an assembly with one or two Sirocco fan(s) direct driven by a single motor.
- .7 Statically and dynamically balanced and run on a motor with permanently lubricated bearings.
- .8 Three (3) speeds, High, Medium and Low.
- .9 Ducted air outlet system and ducted return air system

.5 Wired Control for Fan Coil Unit
- .1 Wired controller to perform input functions necessary to operate the system.
- .2 Controller consist of an On-Off switch, Cool/Dry-Fan selector, Thermostat setting, Timer Mode, High-Medium-Low fan speed, Test Run switching and Check Mode switching.
- .3 Temperature changes by 1° C increments with a range of 18 – 30° C.
- .4 Consist of two (2) microprocessors interconnected by a single non-polar two wire cable.
- .5 Wiring run direct from the indoor unit to the controller with no splices.
- .6 The microprocessor located in the indoor unit shall have the capability of sensing return air temperature and indoor coil temperature, receiving and processing commands from the wired controller, providing emergency operation and controlling the outdoor unit.
- .7 Normal operation of the remote controller provides individual system control in which one remote controller and one indoor unit are installed in the same room.
- .8 12 volts, DC control voltage from the controller to the indoor unit.
- .9 12 volts, DC control voltage between the indoor unit and the outdoor unit
- .10 Capable of automatic restart when power is restored after power interruption.
- .11 Include self-diagnostics including total hours of compressor run time.
- .12 The microprocessor within the wall mounted remote controller shall provide automatic cooling, display set point and room temperature, 24 hour on/off timer so that automatic operation function display, check mode for memory of most recent problem.
- .13 Provide on/off and system/mode function switching.
- .14 Capability to provide sequential starting with up to fifty seconds delay.

2.4 OUTDOOR UNIT

.1 General: Designed specifically for use with the indoor units.

.2 Completely factory assembled, piped and wired.

.3 Each unit run tested at the factory.

.4 Unit Cabinet: fabricated of galvanized steel, bonderized and finished with a powder coated baked enamel.

.5 Fan:
- .1 Either one or two direct drive propeller type fans.
- .2 The motor inherent protection, be permanently lubricated bearings.
- .3 The fan motor mounted for quiet operation.
- .4 The fan provided with a raised guard to prevent contact with moving parts.
- .5 Horizontal discharge airflow.

.6 Coil:
- .1 Nonferrous construction with lanced or corrugated plate fins on copper tubing.
- .2 Protected with an integral metal guard.
- .3 Refrigerant flow from the condenser controlled by means of a metering orifice.

.7 Compressor:
- .1 Multiple as required for capacity or multi-evaporators
- .2 High performance rotary.
- .3 Crankcase heater factory mounted on the outside of the compressor.
- .4 Accumulator.
- .5 Internal thermal overload.
- .6 High pressure safety switch.
- .7 Mounted to avoid the transmission of vibration.
- .8 Capable of operating at -18° C ambient temperature without additional low ambient controls. Wind baffle if required.

.8 Electrical:
- .1 208 volts, 1 phase, 60 hertz.
- .2 Controlled by the microprocessor located in the indoor unit.
- .3 The control voltage between the indoor unit and the outdoor unit shall be 12 volts, DC.

2.5 STANDARD OF ACCEPTANCE

.1 Mitsubishi as per schedule on drawing

2.6 ACCEPTABLE MANUFACTURERS FOR FAN COIL UNITS

.1 Mitsubishi to the requirements listed above.

2.7 CONTROLS

.1 Equipment supplier shall include BacNET adaptor to enable unit activation, and fan coil speed adjustment through building automation system

2.8 REFRIGERATION PIPING

.1 Between compressor, outdoor coil and indoor coil, complete with all refrigerant metering devices and valves.
.2 In accordance with Section 23 23 00 Refrigerant Piping.

2.9 REFRIGERATION PIPE INSULATION

.1 Material in accordance with Section 23 23 00 Refrigerant Piping.

.2 Thickness in accordance with Section 23 23 00 Refrigerant Piping.

3 Execution

3.1 INSTALLATION

.1 Install unit flat and level.

.2 Secure with hold-down bolts.

.3 Make all piping connections.

.4 Nothing to obstruct ready access to all components or to prevent removal of components for servicing.

.5 Provide refrigerant piping between Indoor and Outdoor Section.

3.2 INSTALLATION AND TESTING

.1 Install and test in accordance with CSA B52 and ANSI/ASME B31.5.

.2 Support and protect exposed refrigerant piping on roof to Consultant's satisfaction.

3.3 START-UP

.1 Startup of unit to be performed by factory authorized and trained mechanics.

.2 In the presence of and in cooperation with the HVAC unit manufacturer's representative and Electrical Contractor, start-up the unit and ensure that the unit is capable of performing all steps in the sequence of operation.

.3 Submit start-up report including the following information:
.1 Complete unit description.
.2 Voltage each phase.
.3 Current draw by each piece of equipment.
.4 All equipment setpoints which are field adjustable.
.5 Refrigeration circuits operating conditions.
.6 All information on manufacturer's startup report.

3.4 DRIP PANS

.1 Provide NPS 1 trapped drain for each drain connection.

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

1.3 RELATED SECTIONS

.1 Section 25 30 02 BAS: Field Control Devices.

.2 Section 25 30 03 BAS Field Installation

.3 Refer to Division 26 Electrical and Division 27 Communications for acceptable wiring materials and wiring methods.

1.4 BAS IDENTIFICATION

.1 Conform to requirements of Section 23 05 53 Mechanical Identification and Section 26 05 03 Electrical Identification supplemented and modified by requirements specified in this section.

1.5 WORK INCLUDED

.1 Except as otherwise indicated the system supplier shall secure and pay for all permits, inspections and certifications required for his work and arrange for necessary approvals by the governing authorities.

.2 Work covered by sections referred to above consists of, including, but not limited to, following:

- .1 Expansion of existing BACnet® based Memco Controls Building Automation System.
- .2 Design and provide all new networking equipment, local controllers, field control devices, cabling and any other accessories or devices required to make new controls function as designed.
- .3 Modify existing BAS programming and graphics to suit new sensors and controlled devices. New graphics to the standard of the existing BAS Graphic User Interface.
- .4 Provide all necessary power required for BAS from local 120V/208V branch circuit panelboards including low voltage transformers.
- .5 Related work performed by other Sections.
  - .1 This section to mount control damper actuators on the control dampers supplied by Section 24 33 15 Dampers Operating
  - .2 This section to wire control damper actuators supplied by this section.

1.6 COORDINATION

.1 Coordinate location of exposed control sensors with plans and room details before installation.

.2 Coordinate controlled/monitored equipment from other divisions to achieve compatibility with BAS.

1.7 WARRANTY

.1 Control system failures during warranty period shall be adjusted, repaired, or replaced at no additional cost or reduction in service to Owner. Respond during normal business hours within 24 hours of Owner's warranty service request 24 hours Monday through Friday and 48 hours on Saturday and Sunday.

.2 Provide updates to operator workstation or web server software, project-specific software, graphic software, database software, and firmware that resolve Contractor-identified software deficiencies at no charge during warranty period. Coordinate updates or upgrades with Owner's representative.

.3 Provide for 16 hours of customized programming after verification by the original programmer

1.8 OWNERSHIP OF PROPRIETARY MATERIAL

.1 Project-specific software and documentation shall become Owner's property. This includes, but is not limited to:
- .1 Graphics
- .2 As Built drawings
- .3 Database
- .4 Application programming code
- .5 Documentation

1.9 PERMITS, FEES AND INSPECTIONS

.1 Line and low voltage Control Wiring permit.
- .1 Wiring shall be installed by an Electrician
- .2 Submit to Electrical Inspection Department and Supply Authority necessary quantity of Control Drawings and Control Specifications for examination and approval prior to commencement of work
- .3 Pay associated fees.
- .4 Furnish Certificates of Acceptance from Inspection Department and authorities having jurisdiction on completion of work.

1.10 MAINTENANCE CONTRACT DURING WARRANTY PERIOD

.1 Provide services, materials and equipment to maintain BAS for the building warranty period.

.2 Records and logs: maintain records and logs of each maintenance task

.3 System modifications: provide in writing. No system modification, including operating parameters and control settings, to be made without prior written approval of Consultant.

.4 Rectify deficiencies revealed by maintenance inspections and environmental checks.

1.11 SUBMITTALS

.1 In accordance with Section 20 05 02 Mechanical Submittals.
- .1 Submit control diagrams
  - .1 Sequences of operation for each system,
  - .2 All input/output object listings and an alarm point summary listing.
  - .3 Complete bill of materials
  - .4 Provide BACnet® Conformance
  - .5 Provide complete description and documentation of any proprietary (non-BACnet®) services and/or objects used in the system.
  - .6 Specification sheets for each item to include manufacturer's descriptive literature, specification, drawings, diagrams, performance and characteristic curves, catalogue cuts, manufacturer's name, trade name, catalogue or model number, nameplate data, size, layout, dimensions, capacity, other data to establish compliance.
  - .7 Sketch of site-specific system architecture.
  - .8 Specification sheets for each item including memory provided, programming language, speed, type of data transmission.
  - .9 Controller locations.
  - .10 Sensing element type and location.

.2 As Built Drawings
- .1 Conform to requirements of Division 1 and Section 20 05 01 Common Work Results for Mechanical - General, supplemented and modified by requirements specified in this section.
- .2 Final Control Diagrams
- .3 Changes to contract documents as well as addenda and contract extras.
- .4 Changes to interface wiring.
- .5 Major routing of conduit and control air lines.
- .6 Signal levels, setpoints, reset curves, schedules.

2 Products

2.1 GENERAL

.1 Control system installed to be "fail-safe".

.2 Provide all required adapters between "metric" and "Imperial" components.

2.2 PRODUCT

.1 Use new products the manufacturer is currently manufacturing and selling for use in new installations. Do not use this installation as a product test site unless explicitly approved in writing by Owner. Spare parts shall be available for at least seven years after completion of this contract.

.2 Each major component of equipment shall have the manufacturer's name and address and the model and serial number on a nameplate.

.3 Maintainability: Maintenance of any satellite panel or any peripheral device shall not affect the remainder of the system.

2.3 LOCKABLE CONTROL ENCLOSURES

.1 Enclosures to bear the appropriate CSA designation i.e. CSA Enclosure 1 - General Purpose, CSA Enclosure 3 - Weatherproof.

.2 To have hinged doors equipped with standard keyed-alike cabinet locks, keyed to same key.

.3 Either free-standing or wall mounted enameled steel cabinets with hinged and key-locked front door.

.4 Modular multiple panels as required to handle requirements with additional space to accommodate future capacity without adding additional cabinets.

.5 Cabinets: 12 gauge furniture steel (12 gauge) with baked enamel finish on exterior and rust inhibitive paint on interior, for surface mounting, with hinged door, latch lock, 2 keys, complete with perforated metal mounting backboard.

.6 Factory installed bonding and neutral termination strips.

.7 Provide for conduit entrance from top, bottom or sides of panel.

.8 Cabinets to provide protection from water dripping from above, while allowing sufficient airflow to prevent internal overheating.

2.4 ACCEPTABLE MATERIAL AND INSTALLER

.1 Controllers (B-BC) to be currently listed by BACnet® Testing Laboratories (BTL)

.2 Acceptable Installer and Material:
.1 Memco Controls, Ltd. BTLwith Listed BACnet® Building Controllers (B-BC)

3 Execution

3.1 ELECTRICAL ENCLOSURES

.1 House all electrical equipment associated with the control system in separate dedicated enclosures provided by this section.

.2 House all controllers associated with the control system in lockable enclosures provided by this section.

.3 Top of lockable enclosure to be 1980 mm AFF.

3.2 BAS OBJECT TYPE SUMMARY

.1 Displays: System displays shall show all analog and binary object types within the system. They shall be logically laid out for easy use by the owner. Provide outside air temperature indication on all system displays associated

.2 Run Time Totalization: At a minimum, run time totalization shall be incorporated for each monitored piece of equipment (i.e. Fans, Pumps, Boilers but not including valves, dampers etc.). Warning limits for each point shall be entered for alarm and or maintenance purposes.

.3 Trend log: All binary and analog object types (including zones) shall have the capability to be automatically trended.

.4 Alarm: All analog inputs (High/Low Limits) and selected binary input alarm points shall be routed (locally or remotely) with alarm message per owner's requirements.

.5 Database Save: Provide back-up database for all stand-alone application controllers on disk.

3.3 BAS POINT DESCRIPTORS & NOMENCLATURE

.1 Conform to existing naming conventions for buildings, zones, controllers and devices in use at building.

.2 Typical control device identification tag:

Point: XYZ _AH1_SAT Address: 1000300.AI2 Description: Supply Air Temperature Part No. XXX – XXXX	Point: XYZ _HX1_VLV Address: 1000100.AO9 Description: Heating Water Exchanger: Steam Valve Part No. XXX – XXXX
Point: XYZ _AH2_FSS Address: 1000500.BO1 Description: Fan Start/Stop Relay Part No. XXX – XXXX	Point: XYZ _ DHWR_PST Address: 1000200.BI4 Description: Domestic Hot Water Return: Pump Current Sensor Part No XXX – XXXX

END OF SECTION

1 General

1.1 GENERAL

The General Conditions of the contract as well as provisions of Division 1 and Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

2 Products

2.1 GENERAL

.1 External trim materials to be corrosion resistant. Internal parts to be assembled in vibration-proof, assembly.

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

.3 Transmitters to be unaffected by external transmitters (e.g. walkie talkies).

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

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

2.2 TEMPERATURE SENSORS

.1 General: except for Terminal unit box control to be resistance or thermocouple type to following requirements:
- .1 Thermocouples: to be limited to temperature range of 200° C and over. RTD's: 100 ohm at 0° C (plus or minus 0.2 ohms) platinum element with strain minimizing construction, 3 integral anchored leadwires. Coefficient of resistivity: 0.00385 ohms/ohm ° C.
- .2 Sensing element: hermetically sealed.
- .3 Stem and tip construction: copper or type 304 stainless steel. Time constant response: less than 3 seconds to temperature change of 10° C.

.2 Thermistor:
- .1 Monitoring Range.
  - .1 -40° C to 55° C where exposed to outside air.
  - .2 -5° C to 55° C elsewhere.
- .2 Factory Calibration Point 25° C with accuracy of Calibration Point +/- 0.3° C.
- .3 Stainless steel probe.

.3 Resistance Temperature Detectors (RTD's):
.1 Monitoring Range.
.1 -1° C to 49° C for ducts.
.2 21° C to 104° C for hot water and glycol systems.
.2 Factory Calibration Point 21° C.
.3 Accuracy Calibration Point.
.1 For -7° C to 49° C type +/- 0.7° C.
.2 For 21° C to 104° C type +/- 1.1° C.
.3 Platinum or Nickel Wire Sensor.

.4 Duct Mounted: Suitable for insertion at any angle, minimum sensor probe length 18" or as indicated.

.5 Averaging duct type: continuous filament (Numerous sensors encapsulated along length of probe not acceptable) with immersion length of 1800 mm (72") minimum. Probe to be bent, at field installation time, to a minimum radius of 100 mm (4") at any point along the probe length without degradation in performance.

.6 Room Temperature Sensors-Type TRM
.1 Room type: wall mounting Intelligent room sensor with a LCD display and 4 push buttons for user control.
.1 Built-in 10k½ thermistor
.2 Programmable 3-value, 96 segment, LCD display
.3 4 stylized momentary push buttons
.4 Service port
.5 8-bit processor with internal A/D, Flash, and RAM
.6 Device Address Set via DIP switches
.2 Standard of Acceptance:
.1 Delta DNS-24

2.3 ELECTRICAL RELAYS

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

.2 Coils: rated for 120 VAC or 12 V DC. Other voltage: provide transformer

.3 Contacts: rated at 6 amps at 120 VAC

.4 Relay to have visual status indication

.5 Acceptable material: Eaton Model # XRR2D12 and plug-in base.

2.4 ANALOG CURRENT SENSORS

.1 Purpose: measure line current and produce proportional signal in one of following ranges:
.1 4-20 mA DC
.2 0-5 volt DC
.3 2-10 volts DC

.2 Solid core AC current sensors.

.3 Frequency insensitive from 10 - 80 Hz.

.4 Accuracy to 0.5% full scale

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

.6 Adjustable mounting bracket.

.7 Acceptable material: Greystone Model CS-450-1.

2.5 AIRFLOW PRESSURE SWITCHES

.1 Pressure sensing elements Bourbon tube, bellows or diaphragm type.

.2 Adjustable setpoint and differential.

.3 SPDT contacts.

.4 Operate automatically and reset automatically when condition returns to normal.

.5 Setpoint: 17 to 250 Pa (0.07" to 1" w.g.)

.6 Differential: 10 to 25 Pa (0.04" to 0.1" w.g.)

.7 CSA approved.

.8 Mount with diaphragms in a vertical plane.

2.6 ELECTRONIC CONTROL DAMPER OPERATORS

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

.2 Refer to Section 24 33 15 Dampers - Operating for damper size limits. Provide separate actuators per section for multiple section dampers.

.3 Operator: size so as to control dampers against maximum pressure or dynamic closing pressure (whichever is greater).

.4 Power requirements: 5 VA maximum at 24 VAC.

.5 Operating range: 0 - 20 VDC

.6 Provide adjustable external stops to limit stroke in either direction.

.7 For electric damper operators, use only 75% of the manufacturer's rated motor torque in calculating damper operator requirements.

.8 Provide multiple operators wired to operate in unison where required.

2.7 DAMPER END SWITCHES

.1 Activated by damper blade movement and mounted securely on damper frame.

.2 Rotary action steel slotted lever with plastic roller.

.3 Two electrically isolated SPST changeover micro switches. One circuit to fan interlock and other circuit to BAS system.

.4 Contact rating of 10 amperes at 120 V AC.

.5 CSA approved and bear a ULC label.

2.8 ELECTRONIC/ELECTRIC VALVE ACTUATORS

.1 Construction: steel, cast iron, aluminum.
- .1 Control voltage: 0-20V DC or 24V AC.
- .2 Positioning time: to suit application. 90 sec maximum
- .3 Spring return to normal position as indicated

.2 Size operators to ensure tight shut off when subjected to maximum system differential pressure

.3 Minimum close off rating shall be 200 kPa (30 psi).

3 Execution

3.1 GENERAL

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

.2 Support field-mounted transmitters, sensors on pipe stands or channel brackets.

.3 Duct and AH unit mounted devices: Seal duct and AH unit to prevent air leakage.

.4 Wall mounted devices: Install on plywood panel properly attached to wall.

.5 Duct mounted devices: On insulated ducts, mount devices and associated wiring on standoffs.

3.2 FAN AND PUMP STATUS

.1 Fan status: determined via AI points connected to current-operated sensors.

.2 Auxiliary contacts on motor starters will not be acceptable for this function.

3.3 BAS CONTROL COMPONENTS AND MOTOR STARTERS

.1 AC Current sensors

.1 For motor control centers and for individual magnetic starters, AC Current sensors are supplied and installed by Electrical Contractor. Refer to Section 26 29 10 Motor Starters to 600 V and Section 26 24 19 Motor Control Devices. Provide necessary adapters to utilize these devices.

.2 For thermal overload switches, AC Current sensors are supplied and installed by Section 25 30 02 BAS Field Control Devices.

.2 Relays and Relay Bases

.1 For motor control centers and for individual magnetic starters, relays and relay bases are supplied and installed by Electrical Contractor. Refer to Section 26 29 10 Motor Starters to 600 V and Section 26 24 19 Motor Control Devices. Provide necessary adapters to utilize these devices.

.2 For thermal overload switches, relays and relay bases are supplied and installed by Section 25 30 02 BAS Field Control Devices.

.3 The AC Current sensors, Relays and Relay Bases that are provided by Electrical Contractor are for use by the BAS. Provide necessary hardware, adapters and devices as required for the BAS to utilize this equipment. Should modifications be required to the supplied devices to facilitate interfacing with the BAS, all necessary modifications, equipment, programming, etc. shall be carried out by the BAS contractor, at no additional cost to the Owner. Further, if the BAS Contractor modifies the control components located in the starter enclosures, the services of CSA will be required to visit the site and perform a field certification of each modified starter. Include all costs for the field certification in the BAS Contract.

3.4 TEMPERATURE SENSORS

.1 Mount room temperature sensors on electrical box as per detail on the drawings.

.2 Stabilized to such a level as to permit on-the-job installations that will require minimum field adjustments or calibration.

.3 Assemblies readily accessible and adaptable to each type of application in such a manner as to allow for quick, easy replacement and servicing without special tools or skills.

.4 Locate duct sensors locations to sense the correct temperature of the air only, and not be located in dead air spaces. The location shall be within the vibration and velocity limits of the sensor. Where an extended surface element is required to properly sense the average temperature it shall be securely mounted within the duct to measure the best average temperatures. Elements shall be thermally isolated from brackets and supports to respond to air temperature only. Sensor element to be supported separately and not connected to coils or filter racks.

.5 Install wells in the piping at elbows where piping is smaller than the length of the well to affect proper flow across the entire area of the well. Well shall not restrict flow area to less than 70 percent of line-size-pipe normal flow area.

3.5 TEMPERATURE SENSORS

.1 Stabilize to ensure minimum field adjustments or calibrations

.2 To be readily accessible and adaptable to each type of application so as to allow for quick easy replacement and servicing without special tools or skills.

.3 Duct installations:
- .1 Do not mount in dead air space
- .2 Location to be 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 so as to respond to air temperature only
- .5 Support sensor element separately from coils, filter racks

.4 Averaging duct type temperature sensors:
- .1 Sensor length to be not less than 1000 mm per square meter of duct cross-sectional area
- .2 Use multiple sensors where single sensor does not meet minimum length ratio. Wire multiple sensors in series for freeze protection applications
- .3 Wire multiple sensors separately for temperature measurement
- .4 Use either software averaging algorithm to derive overall average for control purposes or separate inputs, based on site requirements

END OF SECTION

1 General

1.1 GENERAL

.1 NOTE: Section 20 05 01 Mechanical General Requirements, Section 20 05 02 Mechanical Submittals and Section 20 05 03 Mechanical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE STANDARDS

.1 In accordance with Section 20 05 01 Mechanical General Requirements.

1.3 RELATED DIVISIONS

.1 Divisions 26 Electrical

.2 Divisions 27 Communications

1.4 WIRING

.1 If departures from the contract drawings are deemed necessary, details of such departures, including changes in related portions of the project and the reasons therefore, shall be submitted to the Consultant with drawings for approval.

.2 Incorporate surge transient protection in the design of the system to protect all electrical components in all control equipment.

1.5 SYSTEM DESCRIPTION

.1 Electrical: Hard wiring between field control devices and BAS field panels.

2 Products

2.1 CONTROL SYSTEM WIRE AND CABLE

.1 Cable jacket:
- .1 FT6 jacket rated and bear the following labels: CSA 300 volts and FT6.
- .2 FT4 jacket rated and bear the following labels: CSA 600 volts and FT4.
- .3 Labeled with the following information, as a minimum:
  - .1 Cable type.
  - .2 FT rating.
  - .3 Temperature rating.
  - .4 CSA number.
  - .5 Rated voltage.
  - .6 Gauge and number of conductors.
- .4 Application:
  - .1 Control wiring to 600 volt starters to be FT4 in conduit.
  - .2 All control wiring in conduit may be FT4.
  - .3 All other control wiring to be FT6.
  - .4 Colored as follows:

System Description	Jacket Colour
BAS	Yellow

.2 Below 50V control wiring:
- .1 Minimum No. 14 stranded.
- .2 Minimum two conductor No. 18 AWG solid copper or No. 20 AWG, stranded twisted pair for field wiring of each digital device.
- .3 Minimum No. 22 AWG solid copper for multi-conductor wiring having four or more conductors.
- .4 Minimum two conductor No. 18 AWG, solid copper, or No. 20 AWG, stranded twisted pair, shielded for field wiring of each analog input.

2.2 BAS CONTROL WIRING MATERIALS AND INSTALLATION METHODS

.1 In accordance with the following Sections:
- .1 Section 26 05 20 Wire and Box Connectors - 0 - 1000 V
- .2 Section 26 05 28 Grounding- Secondary
- .3 Section 26 05 31 Splitter, Junction, Pull Boxes and Cabinets
- .4 Section 26 05 32 Outlet Boxes, Conduit Boxes and Fittings
- .5 Section 26 05 34 Conduits, Conduit Fastenings and Conduit Fittings
- .6 Section 27 10 05 Structured Cabling for Communications Systems

.2 Exception, where wiring is permitted to be run in free air, it shall be run as high as possible.
- .1 Refer to Section 27 05 28 Pathways for Communication System Wiring.

3 Execution

3.1 GENERAL

.1 Install all work in accordance with authorities having jurisdiction and manufacturer's requirements. In case of conflicting requirements, the more stringent shall apply.

.2 In accordance with Section 27 05 28 Pathways for Communication System Wiring

.3 Install in a neat and ordered manner.

.4 Colour Coding: Refer to 25 05 03 BAS Identification and Section 26 05 03 Electrical Identification.

.2 Fully enclose or properly guard electrical wiring, terminal blocks, high voltage above 70 V contacts and mark to prevent accidental injury.

.3 Check factory connections and joints. Tighten where necessary to ensure continuity.

.4 Holes through exterior wall and roofs: flash and make weatherproof.

.5 Where equipment, ducts or pipes are insulated, install control wiring on stand-offs.

.6 Do not cover with mechanical insulation.

.7 Secure approval for damper motor locations and supports.

.8 Run parallel or perpendicular to building lines. When installed in a wall cavity, conduit is to be installed vertically from outlet box to ceiling space, not run in an angled manner through the studs.

.9 Run conduits in flanged portion of structural steel, where possible.

.10 Group conduits wherever possible.

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

.12 Do not locate conduits closer than 75 mm (3 inch) parallel to hot water lines with a minimum of 25 mm (1 inch) at crossovers.

.13 Support electrical systems raceway independent of any type of suspended ceiling support rods, wires, etc. Toggle bolts shall not be used in Gypsum board construction.

.14 Do not install horizontal conduits runs in masonry walls.

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

END OF SECTION

1 General

1.1 GENERAL

.1 The General Conditions of the contract as well as provisions of Division 1 are part of and to be read in conjunction with this Section.

.2 This section covers items common to all sections of Divisions 26, 27 and 28.

1.2 FUNCTIONAL PERFORMANCE TESTING (FPT)

.1 Refer to Section 26 91 13 Electrical Systems Testing and Verification for Functional Performance Testing (FPT).

.2 The correction of all electrical deficiencies identified throughout the project associated with the Work shall be a condition of Substantial Performance and shall be corrected prior to achieving Substantial Performance.

.3 A condition of Substantial Performance shall be an Owner performed Functional Performance Testing (FPT) Program independent of other processes specified, upon receipt of written verification from the General Contractor that:
- .1 All systems are complete and operational in all respects.
- .2 All specified reports and documents have been submitted and approved.
- .3 All tests, commissioning and start-up processes described elsewhere in the specification are complete.
- .4 All demonstrations have been completed and documented.
- .5 All defects and deficiencies identified during the commissioning of all electrical systems have been corrected.

.4 Prior to Functional Performance Testing (FTP), submit the following documentation:
- .1 Record drawings.
- .2 Operations and maintenance manuals.
- .3 Documentations listed in Section 26 05 02 - Electrical Contract Closeout.
- .4 Written confirmation of System Demonstration and Operating and Maintenance Instructions have been performed in accordance with Section 26 05 02– Electrical Contract Closeout.

.5 Deficiencies or discrepancies discovered during the FPT process are to be immediately rectified by the Electrical Contractor. A condition of Substantial Performance shall be the correction of all electrical deficiencies identified throughout the project associated with this work.

.6 The contractor shall return copies of the deficiency lists to owner via the Engineer with all corrected items signed off.

1.3 INTENT

.1 It is the intent of these specifications to outline the method, materials, and quality of equipment to be furnished and installed hereinafter specified and/or shown on the drawings.

1.4 DEFINITIONS

.1 "CONCEALED" - electrical services and equipment in hung ceiling spaces and non-accessible chases and furred spaces.

.2 "EXPOSED" - will mean "not concealed" as defined herein.

.3 “PROVIDE”- means supply and install. Wherever in the Contract Documents the word "provide" is used in any form, it shall mean that the Work concerned shall include both supply and installation of the products required for completion of that part of the Work.

2 CODES AND STANDARDS

.1 Do complete installation in accordance with CSA C22.1-18 except where specified otherwise.

.2 Ensure that all electrical equipment is field marked to warn persons of the potential electric shock and arc flash hazards, as per CSA C22.1-18, Rule 2-306.

.3 CSA Z462-15 Workplace Electrical Safety Standard.

.4 Comply with CSA Certification Standards and Electrical Bulletins in force at time of tender submission.

.5 Abbreviations for electrical terms: to CSA Z85-1983.

3 CARE, OPERATION AND START-UP

.1 Instruct operating personnel in the operation, care and maintenance of equipment.

.2 Arrange and pay for the services of manufacturer's factory service engineer to supervise start-up of installation, check, adjust, balance and calibrate components.

.3 Provide these services for such period, and for as many visits as necessary to put equipment in operation, and ensure that operating personnel are conversant with aspects of its care and operation.

4 VOLTAGE RATINGS

.1 Operating voltages: to CAN3-C235-83.

.2 Motors, electric heating, control and distribution devices and equipment to operate satisfactorily at 60 Hz within normal operating limits established by above standard Equipment to operate in extreme operating conditions established in above standard without damage to equipment.

5 PERMITS, FEES, CONTRIBUTION TO CONSTRUCTION FEES AND UTILITY INSPECTION SERVICES

.1 Electrical Permits
- .1 Submit to Electrical Inspection Department and Supply Authority necessary number of drawings and specifications for examination and approval prior to commencement of work.
- .2 Pay associated fees.
- .3 Provide the Engineer with a copy of the permit (s).
- .4 Furnish Certificates of Acceptance from Inspection Department and authorities having jurisdiction on completion of work.

6 MATERIALS AND EQUIPMENT

.1 Provide materials and equipment in accordance Division 1.

.2 Equipment and material to be CSA certified, and manufactured to standard quoted.

.3 Factory assembled control panels and component assemblies.

.4 Arrange and pay for field certification by CSA, as may be required.

7 ELECTRIC MOTORS EQUIPMENT AND CONTROLS

.1 Supplier and installer responsibility is indicated on Motor Starter and Control List.

.2 Control wiring and conduit is the responsibility of the electrical contractor, except for conduit, wiring and connections which are related to control systems specified in the mechanical contract documents and shown on mechanical drawings.

8 FINISHES

.1 Shop finish metal enclosure surfaces by removal of rust and scale, cleaning, application of rust resistant primer inside and outside, and at least two coats of finish enamel.
- .1 Paint indoor switchgear and distribution enclosures light grey to EEMAC 2Y-1-1958.

.2 Clean and touch up surfaces of shop-painted equipment scratched or marred during shipment or installation, to match original paint.

.3 Clean, prime, and paint exposed hangers, racks, fastenings to prevent rusting.

9 WIRING TERMINATIONS

.1 Lugs, terminals, screws used for termination of wiring to be suitable for either copper or aluminum conductors.

.2 Panel boards are to be equipped in the factory with proper sized lugs to suit the conductor size.

.3 All stranded conductors (including phase, neutrals, grounds and bonds) prior to terminating under device bolts; i.e. light switches, receptacles etc., are to be twisted together so as to form a single conductor.

.4 Ensure all bonding conductors entering electrical enclosures, such as panel tubs, splitters, junction and pull boxes 150 mm x 150 mm (6 in. x 6 in.) and larger, etc. are terminated on terminal strips which are electrically continuous and fastened to the metal non-current carrying portion of the enclosure with a minimum of two bolts, c/w lock washers.

10 MANUFACTURER'S AND CSA LABELS

.1 Visible and legible after equipment is installed.

11 WARNING SIGNS

.1 Provide warning signs, as specified and/or to meet requirements of Inspection Department.

12 SINGLE LINE ELECTRICAL DIAGRAM

.1 Provide a framed single line electrical Power distribution system riser drawing under Plexiglas. This drawing is to reflect the riser following this project. Locate in main electrical room.

.2 Provide a legend of the colour coding used to identify the system as detailed in 26 05 03. Locate in main electrical room.

.3 Drawing 600 mm x 600 (24 in. x 24 in.) mm minimum size.

13 OUTLETS

.1 Locate outlets in accordance with Division 1.

.2 Do not install outlets back-to-back in wall; allow minimum 150 mm (6 in.) horizontal clearance between boxes.

.3 All outlets shall have brushed stainless steel coverplates regardless of the system involved, including light switches, receptacles, communication outlets, etc.

.4 Change location of outlets at no extra cost or credit, providing distance does not exceed 3 metres (10 feet), and information is given before installation.

.5 Locate light switches on latch side of doors. Locate disconnect devices in mechanical rooms on latch side of door.

14 MOUNTING HEIGHTS

.1 Mounting height of equipment is from finished floor to centreline of equipment unless specified or indicated otherwise.

.2 Verify mounting height of equipment before proceeding with installation.

.3 Confirm with Architectural elevations prior to mounting exterior electrical devices, lights, public address, etc.

.4 Install electrical equipment at the following heights unless indicated otherwise. Refer to device mounting height details on drawings.
- .1 Local switches: As indicated.
- .2 Wall receptacles:
  - .1 General: As Indicated.
  - .2 Above top of continuous baseboard heater: 178 mm (7 in.).
  - .3 Above top of counters or splash back: 178 mm (7 in.).
- .3 Panelboards: 1980 mm (78 in) AFF to top of 42 circuit panels.
- .4 Emergency Lights – 2286 mm AFF (90 in.) .
- .5 Emergency Remote Heads – 2286 mm AFF (90 in.) .

15 PROTECTION

.1 Protect exposed live equipment during construction for personnel safety.

.2 Shield and mark live parts "LIVE 120 VOLTS", or with appropriate voltage.

.3 Arrange for installation of temporary doors for rooms containing electrical distribution equipment. Keep these doors locked except when under direct supervision of electrician.

16 LOAD BALANCE

.1 Measure phase current to panelboards with normal loads and lighting operating at time of acceptance. Adjust branch circuit connections as required to obtain best balance of current between phases and record changes.

.2 Measure phase voltages at loads and adjust transformer taps to within 2% of rated voltage of equipment.

.3 Test and record phase and neutral currents on panelboards, operating under normal load. State hour and date on which each load was measured, and voltage at time of test.

17 CONDUIT AND CABLE INSTALLATION

.1 Install cables, conduits, and fittings to be embedded or plastered over, neatly and close to building structure so furring can be kept to minimum.

.2 All wiring is to be concealed unless noted otherwise. Where this is not possible due to existing construction, metal surface mounted raceways are to be used.

.3 Where conduits cross building expansion joints, provide conduit expansion joints with telescoping sleeve and insulated bushings.

.4 Any conduit which is installed under the ground floor slab and penetrates the ground floor slab must be sealed. Use appropriate bedding material for conduits.

18 SLEEVES AND FIRESTOPPING

.1 Where conduits and cables pass through assemblies, provide firestopping. Refer to Architectural Drawings for location of assemblies.

.2 Terminate sleeves flush with floor except in mechanical rooms, where sleeves will terminate 50 mm (2 in.) above finished floor.

19 FIELD QUALITY CONTROL

.1 All electrical work to be carried out by qualified, licensed electricians or apprentices as per the conditions of the Provincial Act respecting manpower vocational training and qualification. Employees registered in a provincial apprentices program shall be permitted, under the direct supervision of a qualified licensed electrician, to perform specific tasks - the activities permitted shall be determined based on the level of training attained and the demonstration of ability to perform specific duties.

.2 Conduct and pay for tests of the following:
- .1 Power distribution system including phasing, voltage, grounding and load balancing.
- .2 Circuits originating from branch distribution panels.
- .3 Lighting and its control.
- .4 Motors, heaters and associated control equipment including sequenced operation of system where applicable.
- .5 Polarity check on all receptacles.
- .6 Fire Alarm System.
- .7 Structured wiring system.
- .8 Public Address System.
- .9 Emergency lighting system.

.3 Furnish Manufacturer's, certificate or letter confirming that entire installation as it pertains to each system has been installed to manufacturer's instructions.

.4 Provide instruments, meters, equipment and personnel required to conduct tests during and at conclusion of project.

.5 Submit test results for Engineer's review.

20 DISTRIBUTION SYSTEM EQUIPMENT STARTUP CHECKS

.1 Panelboards.
- .1 Review the installation of all panel boards. Include the cost of measuring phase currents and voltages. Clean all panel board tubs. Re-torque all connections within panel boards. Provide written report.

21 MOTOR OVERLOAD OVERCURRENT PROTECTION

.1 Set and record all motor overload devices in accordance with nameplate information, manufacturer's recommendations and the 2018 edition of the CEC. Ensure proper

overcurrent devices are installed. Include these records in the Project Maintenance Manual.

22 SUPPLY CONDUCTOR INSULATION

.1 Ensure that the insulation rating on branch circuits feeding all electrical loads comply with the 2018 edition of the CEC, and the manufacturer's recommendations.

23 DRAWINGS

.1 Electrical drawings are not intended to show structural details or architectural features.

.2 The electrical drawings are not to be scaled.

.3 Electrical drawings, except where dimensioned, indicate general layouts only. Investigate structural and finish conditions and the work of all other trades affecting this work and arrange work accordingly.

.4 Coordinate the elevation of all outlet boxes with architectural drawings and report any conflicts to Engineer prior to installation.

.5 All electrical junction boxes must be accessible at the completion of the project. Coordinate the location of each junction box with the proposed location of mechanical services prior to installation.

.6 Layouts on the electrical drawings are based on the specified equipment (Standard of Acceptance), including electrical power connections, number of conductors and conduit sizes, and physical dimensions. Alternate equipment and systems proposed by the Contractor for use on this project (Acceptable Manufacturers) which necessitate changes in service connections, numbers of conductors and conduit sizes to perform the specified functions may be considered by the Engineer, however, any required modifications or additions to the electrical contract or the work of other trade contractors shall be done at no additional cost to the Owner. Furthermore, if it is found that the provisions made regarding space conditions and code required clearances are not met, the right is reserved by the Consultant to require installation of the equipment specified (Standard of Acceptance).

24 CONTRACT DOCUMENTS

.1 Before submitting tender for his work, each Contractor shall examine the contract documents (mechanical drawings, structural drawings, and architectural drawings and specifications) to ascertain that the work can be carried out as shown on these drawings and herein specified. No extra will subsequently be allowed to cover any omission and/or oversight for not having made a thorough inspection of the contract documents.

25 ACCESS DOORS

.1 The electrical contractor is to provide access doors to concealed electrical junction boxes, pull boxes and miscellaneous equipment for operating, inspecting, adjusting and servicing. Access doors are to be supplied which meet or exceed the fire resistance rating of the partition or ceiling in which they are being installed.

.2 Flush mounted 600 mm x 600 mm (24 in. x 24 in.) for body entry and 300 mm x 300 mm (12 in. x 12 in.) for hand entry unless otherwise noted. Doors to open 180 degrees, have

rounded safety corners, concealed hinges, screwdriver latches and anchor straps.

.3 Material:
- .1 Special areas such as tiled or marble surfaces: use stainless steel with brushed satin or polished finish as directed by Consultant.
- .2 Remaining areas: use prime coated steel.
- .3 Fire rated where installed in fire rated construction.
- .4 Provide panels in glazed tile walls of 2.5mm (12 gauge) 304 stainless steel #4 finish, with recessed frames secured with counter-sunk flush-head screws.
- .5 Provide panels in plaster surfaces with recessed doors with welded metal lath ready to accept plaster and with a plaster grommet for door key access.
- .6 Provide other access doors of 2.5mm (12 gauge), flush with concealed hinges, anchor strap and lock, all factory prime coated.
- .7 Supply details of doors prior to installation.

.4 Installation:
- .1 Locate so that concealed items are accessible.
- .2 Locate so that hand or body entry (as applicable) is achieved.
- .3 Installation is specified in applicable sections.

.5 Acceptable Manufacturers:
- .1 Acudor
- .2 LeHage
- .3 SMS
- .4 Zurn

26 CONNECTION OF EQUIPMENT

.1 Provide all connections required by the equipment supplied by this Division.

.2 Provide all connections required by equipment supplied by the Owner or by other Divisions. Examine all Drawings and Specifications and identify all requirements.

.3 Provide all necessary accessories to make connections, including flexible connectors, etc.

27 SPRINKLER PROOF HOODS

.1 All distribution equipment within ventilated enclosures (panelboards, transformers, etc.) located in the building shall be protected from the direct spray from sprinkler heads to the satisfaction of the Inspection Authority by the use of non-combustible hoods.

.2 Distribution conduits exiting or entering equipment enclosures equipped with sprinkler hoods shall be installed with rain-tight EMT connectors equipped with a rubber “O” Ring gasket.

28 CO-ORDINATION

.1 Co-ordinate the Work of this Division with all other Divisions for locations of openings, spaces, services, sleeves, ducts, pipes, supports, connections, etc. Where conflicts occur, reroute conduits, cable troughs, outlets, lighting, equipment, etc. as required. Advise

Engineer of proposed changes, and obtain written authorization, prior to proceeding.

.2 Contractor is to review Architectural millwork drawings and advise the Engineer of any conflicts with lighting and/or electrical outlets. This review is to take place prior to electrical rough-in in all affected areas.

.3 The layout of electrical equipment within mechanical rooms is approximate only.

.4 Ensure that the location of all mechanical equipment within mechanical rooms is coordinated with the location of all electrical equipment which resides within these rooms.

.5 Provide pertinent information to Mechanical contractor to assist him in the installation of mechanical services. This would include routing of all major electrical conduits, etc. Make adjustments as required to coordinate the installation of electrical services and equipment with those of other trades.

.6 Coordinate with Mechanical Contractor to ensure that all mechanical equipment is correctly supplied with electrical connections in accordance with plans and specifications.

29 INSTALLATION REQUIREMENTS

.1 Install all products and services to follow building planes. Installation shall permit free use of space and maximum headroom to the satisfaction of the Consultant.

.2 Confirm the exact location of fixtures, outlets and connections. Confirm location of connection points for equipment supplied under other Divisions.

.3 Install all equipment and appurtenances to allow free access for adjustment, maintenance and/or replacement.

.4 Provide all hangers, supports and fasteners such that no undue stresses are imposed on the structure and systems. Ensure that the load onto structures does not exceed the maximum loading per square metre as shown on structural drawings. Equipment supports not supplied by equipment manufacturer are to be fabricated using structural grade steel.

.5 Exterior supports are to be galvanized, unless noted otherwise.

.6 Install all products and services in accordance with the respective manufacturer's recommendations.

.7 High velocity explosive activated tools shall not be used. Only low velocity system types are permitted.

.8 Provide caps and seal all open ends of installed conduits to prevent the entrance of foreign substances.

.9 Install all services capped for future possible use such that easy access is provided for future connections.

30 FIELD REVIEW

.1 The Consultant and Owner shall have access to the site at all times for review of the work.

.2 Correct any deficiencies as they are reported during the performance of the Work.

31 UNIFORMITY

.1 All equipment and materials which serve a similar function shall be from one manufacturer and one product line (i.e.: panelboards, starters, major systems, etc.).

32 CUTTING AND PATCHING

.1 It is the responsibility of the Electrical Contractor to provide all required cutting and patching associated with the installation of electrical systems, devices, conduit, wire, etc., unless noted otherwise. Refer to Division 1 for more information.

.2 Restore all surfaces to a finish acceptable to the Owner.

33 MATERIAL

.1 Standard of Acceptance:
  .1 Means that item named and specified by manufacturer and/or catalogue number forms part of specification and sets standard regarding performance, quality of material and workmanship and when used in conjunction with a referenced standard, shall be deemed to supplement the standard.

.2 Acceptable Manufacturer:
  .1 Means that item, manufactured by named and specified manufacturer, shall be deemed acceptable provided it meets the specification and referenced standard regarding performance and quality of material and workmanship, as outlined under Standard of Acceptance (above).

.3 Refer to Instructions to Bidders for requirements of additional Acceptable Manufacturers or Acceptable Material.

34 TORQUES FOR WIRE TERMINATIONS

.1 For proper termination of conductors, it is very important that field connections be made properly tight.

.2 Where possible, obtain and comply with Manufacturer's instructions on the equipment.

.3 In the absence of Manufacturer's instructions, make terminations in conformance with the values given in Tables D6 and D7 of the 2018 CEC.

35 CABLE TIES AND TYE WRAPS

.1 Cable ties and tye wraps are only permitted to be used to provide limited support for bundling purposes only. These devices are not intended to provide the primary support for

conduits or cables.

.2 Cable Ties are not to be used for the support of cable or conductor runs between boxes and fittings.

36 WORKING SPACE ABOUT ELECTRICAL EQUIPMENT

.1 Arrange installation as required to maintain minimum working space around electrical equipment in conformance with CSA C22.1-18.

37 LOW V. O. C. MATERIALS

.1 All site applied coatings, adhesives & sealants must be low VOC content.

.2 Provide Material Safety Data Sheets for all products & materials of these types incorporated into the work.

38 PLYWOOD BACKBOARDS

.1 Electrical Contractor will provide all plywood backboards required for mounting electrical equipment.

.2 Paint all surfaces of plywood backboards with fire retardant paint prior to installation.

39 DUST CONTROL AND PROTECTION OF LIGHT FIXTURES

.1 Electrical Contractor will supply and install temporary protective sheeting for each light fixture to ensure that dust cannot enter the enclosure during the construction period.

.2 Electrical Contractor will remove and dispose of the protective sheeting at the end of construction related activities when the building is considered to be clean.

40 EXISTING SERVICES

.1 The Electrical Contractor shall ensure that all light, power, heat, fire alarm, telephone public address system and other electrical systems and services remain operational during the course of the work in the existing building, and if necessary, this Contractor shall be responsible for providing such temporary services by cutting off, altering, adapting, relocating and connecting existing services and disconnecting and removing such temporary or existing services upon providing new permanent services as detailed on all drawings. The site shall be examined to determine the extent of the temporary services and all co-ordination shall be made with the Owner's Representative. All costs shall be included in the Tender Price.

.2 Existing redundant equipment, wiring etc. not being re-used under new schemes, shall be removed whether shown on drawings or not. This contractor shall repair all openings resulting from the removal of existing electrical equipment and services. All unused outlet boxes (where it is not practical to remove same) shall be blanked with stainless steel cover plates. All costs shall be included in the Tender.

41 PROJECT PHASING AND HOURS OF WORK

.1 Refer to Instructions to Bidders for information pertaining to project phasing and hours of work. Work within occupied areas and work causing a disruption to school operations will be performed outside regular business hours as determined by the Owner.

******END OF SECTION******

1 General

1.1 GENERAL

.1 The General Conditions of the contract as well as provisions of Division 1 are part of and to be read in conjunction with this Section.

1.2 ELECTRICAL PERMITS AND RCDD CERTIFICATES

.1 Prior to submitting the first progress claim, provide the following permits and certificates:
  .1 As per Section 26 05 00 provide copies of the following electrical permit:
    .1 Electrical Wiring Permit.

1.3 HOURLY LABOUR RATE

.1 Submit the proposed hourly labour rate for review in a timely manner after contract award.

.2 Refer to General Conditions of Contract.

.3 The hourly labour rate will be based on the following components:

Base Rate	$
Holiday and Vacation Pay	$
Sub-Total	$
EI	$
WCB	$
Group Insurance	$
CPP	$
Group Pension	$
Other Payroll Burdens	$
IIF & Con Fund	$
Training and Education	$
ISO Program	$
Safety Program	$
Sub-Total	$
Total Payroll Hourly Cost	$
Small Tools	$
Site Supervision	$
Total Hourly Labour Cost	$

1.4 EQUIPMENT IDENTIFICATION

.1 As per 26 05 03 submit proposed nomenclature for all lamicoid plates for engineer's approval.

1.5 SHOP DRAWINGS

.1 In accordance with Division 1.

.2 All Shop Drawings to be Metric.

.3 Assembled in groups and bound in sets.

.4 On cover/front page indicate total number of pages in submission.

.5 Consecutively number each page.

.6 Where specified in Division 1, submit electronic copies of shop drawings. In addition to the electronic shop drawing, submit one hard copy to the office of the electrical consultant.

.7 Provide shop drawings for the following:
- .1 Through-Penetration Firestopping for Electrical Systems.
- .2 Wiring Devices.
- .3 Motor Starters to 600 V.
- .4 Molded Case Circuit Breakers.
- .5 Disconnect Switches Fused and Non-Fused.
- .6 Contactors.
- .7 Panelboards Breaker Type.
- .8 Fuses - Low Voltage.
- .9 Lighting Equipment.
- .10 Unit Equipment for Emergency Lighting.
- .11 Structured Cabling for Communications Systems.
- .12 Public Address System.
- .13 Multiplex Fire Alarm System.

1.6 PROGRESS CLAIMS

.1 Progress claims are to be submitted with the following breakdown:
- .1 Mobilization.
- .2 Conduit Rough-in.
- .3 Wire and Cable.
- .4 Wiring Devices.
- .5 Electrical Distribution.
- .6 Lighting Equipment and control systems.
- .7 Emergency Lighting systems.
- .8 Electrical Systems Testing and Verification.
- .9 Structured Wiring System.
- .10 Public Address System.
- .11 Fire Alarm System.
- .12 Commissioning.
- .13 Contract Closeout Documentation.

.2 Ensure that each item in the Progress Claim breakdown includes all components required to provide a fully working system, including hardware, components and all associated conduit and wire.

.3 The first electrical progress claim may be withheld until such time as the required breakdown is submitted.

.4 Material on Site.
- .1 Refer to General Conditions of Contract.
- .2 All claims for material on site must be supported by supplier's invoices showing supplier's unit prices including taxes.
- .3 Material on site shall not be claimed under the "work complete" portion of the claim.
- .4 Material eligible to be claimed as "material on site" must be large, project specific equipment.
- .5 General material which is not considered project specific such as conduit, connectors, fittings, wire, small tools, etc., are not eligible to be claimed as "material on site."
- .6 Project specific equipment may be claimed as "material on site" subject to the following:
  - .1 Claim to show previous material on site and deduct the amount of previously claimed material that was incorporated into the work during the current month.
  - .2 Claim to show material brought on site this month supported by a copy of the supplier's invoices showing supplier's unit prices including taxes.
- .7 Invoices submitted for a "material on site" claim will not be considered by the engineer unless they are examined and initialed by both the Electrical Contractor and the General Contractor.

1.7 OPERATING AND MAINTENANCE MANUAL

.1 Operation and maintenance manual to be approved by, and final copies deposited with Consultant before final inspection.

.2 Operation data to include:
- .1 Schematics for each system.
- .2 Description of each system and its controls.
- .3 Description of operation of each system.
- .4 Operation instruction for each system and each component.
- .5 Description of actions to be taken in event of equipment failure.
- .6 Colour coding chart.

.3 Maintenance data shall 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 data sheets with point of operation as left after system verification is complete.
- .2 Equipment performance verification test results.
- .3 Insulation resistance testing and panelboard phase current measurement records.
- .4 Special performance data as specified elsewhere.

.5 Approvals:
- .1 Submit 2 copies of draft Operation and Maintenance Manual to Consultant for approval. Submission of individual data will not be accepted unless so directed by Consultant.

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

.6 Provide maintenance data for the following:
- .1 Wiring Devices.
- .2 Motor Starters to 600 V.
- .3 Molded Case Circuit Breakers.
- .4 Disconnect Switches Fused and Non-Fused.
- .5 Contactors.
- .6 Panelboards Breaker Type.
- .7 Fuses - Low Voltage.
- .8 Lighting Equipment.
- .9 Unit Equipment for Emergency Lighting.
- .10 Structured Cabling for Communications Systems.
- .11 Public Address System.
- .12 Multiplex Fire Alarm System.

.7 Provide one copy of all approved shop drawings for each maintenance manual.

1.8 START UP REPORT MANUAL

.1 Custom designed and containing material pertinent to this project only and to provide full and complete coverage of subjects referred to in this section.

.2 Operating and maintenance manual to be approved by and final copies deposited with Consultant before final inspection.

.3 Organize by specification section.

.4 Conform to requirements of Division 1, supplemented and modified by requirements specified in this section.

.5 Start Up and Performance data to include:
- .1 Equipment manufacturer's performance data sheets after commissioning is complete.
- .2 Start up and verification reports as per Section 26 05 02, Electrical Contract Closeout.
- .3 Final inspection report from NSPI.

.6 Submittals:
- .1 Submit a copy of the complete Start Up Report Manual to Consultant for Review.
- .2 Refer to Division 1 for quantity of Manuals (minimum 3).
- .3 Hard-back, 25 mm (1") 3 ring, D-ring binders.
- .4 Binders to be 2/3 maximum full.
- .5 Provide index to full volume in each binder.
- .6 Identify contents of each manual on cover and spine.
- .7 Include names, addresses, telephone numbers of each sub-contractor having installed equipment, local representative for each item of equipment, each system.
- .8 Provide full Table of Contents in each manual. Assemble each manual to conform to Table of Contents with tab sheets placed before instructions covering subject.

1.9 SPARE PARTS AND MAINTENANCE MATERIALS

.1 Provide the following spare parts to the Owner or his designated representative. Retain a signed copy of transmittal and insert in operation and maintenance manuals.
- .1 Section 26 29 10 - Motor Control:
  - .1 Provide the following spare parts for each type and size of starter.
    - .1 Two (2) sets of auxiliary contacts.
    - .2 One (1) control transformer.
    - .3 Five (5) control fuses.
    - .4 Four (4) indicating LEDs.
- .2 Section 26 52 00 - Unit Equipment for Emergency Lighting:
  - .1 One (1) surface mount unit, 36 watt unit, c/w two heads.
  - .2 Two (2) remote units, c/w two heads.

1.10 RECORD DRAWINGS

.1 Site records:
- .1 Provide sets of white prints as required for each phase of the work. Mark thereon all changes as work progresses and as changes occur. This shall include change orders, site instructions and changes to electrical systems.
- .2 Make available for reference purposes and inspection at all times.
- .3 Produce record drawings in accordance with Division 1.

.2 Where products are specified by manufacturer and/or model, update AutoCAD file to show installed manufacturer and model.

.3 Record Drawings:
- .1 Prior to start of Testing and System verification finalize production of as-built drawings.
- .2 Identify each drawing in lower right hand corner in letters at least 1/2" (13 mm) high as follows: -"RECORD DRAWINGS: THIS DRAWING HAS BEEN REVISED TO SHOW ELECTRICAL SYSTEMS AS INSTALLED" (DATE).
- .3 Submit to Consultant for approval and make corrections as directed.
- .4 Submit computer disk with the AutoCAD files and a 4 mil. Reproducible film hard copy to the consultant at the time specified in Division 1.

******END OF SECTION ******

1 General

1.1 GENERAL

.1 The General Conditions of the contract as well as provisions of Division 1 are part of and to be read in conjunction with this Section.

1.2 FUNCTIONAL PERFORMANCE TESTING (FPT)

.1 Refer to Section 26 91 13 Electrical Systems Testing and Verification for Functional Performance Testing (FPT).

.2 The correction of all electrical deficiencies identified throughout the project associated with the Work shall be a condition of Substantial Performance and shall be corrected prior to achieving Substantial Performance.

.3 Deficiencies discovered during the FPT process are to be immediately rectified by the Electrical Contractor. A condition of Substantial Performance shall be the correction of all electrical deficiencies identified throughout the project associated with this work.

.4 The contractor shall return copies of the deficiency lists to Owner via the Engineer with all corrected items signed off.

.5 The FPT Deficiency list will form part of the Substantial Performance Inspection list specified in Division 1.

1.3 CLOSEOUT DOCUMENTATION

.1 Section 26 05 00: Common Work Results for Electrical
- .1 Copy of electrical permits from Utility.
- .2 Single line electrical diagram.
- .3 Final Inspection certificate(s) from Inspection Authority.

.2 Section 26 05 01 - Electrical Submittals:
- .1 Shop drawing and product data.
- .2 Operating and Maintenance Manual.
- .3 Spare parts.
- .4 Record drawings.

.3 Section 26 05 03: Identification.
- .1 Submission of proposed equipment identification lamicoid plates for approval.

.4 Section 26 27 26: Wiring Devices.
- .1 Written confirmation of receptacle polarity check.

.5 Section 26 29 10 & 26 24 19: Motor Starters & Motor Controls.
- .1 Complete list of all motors, starters, motor hp, motor FLA and installed solid state overload.
- .2 Field report.

.6 Section 26 52 00: Unit Equipment for Emergency Lighting.
- .1 Written Guarantee.

.7 Section 26 91 13: Electrical Systems Testing and Verification.
.1 Verification and Test Forms.

.8 Section 27 10 05: Structured Cabling for Communications Systems.
.1 Testing and Verification Report & Certificate.

.9 Section 27 51 16 - Public Address System.
.1 Testing and Verification Report & Certificate.

.10 Section 28 31 00.01: Multiplex Fire Alarm System.
.1 Fire Alarm Verification Report and Certificate.

1.4 EXTENDED WARRANTIES

.1 Section 27 10 05, Structured Cabling for Communications Systems
.1 The minimum warranty requirement will be 25 years for the network passive components. Upon completion of the project, a certificate stating the warranty of the system must be supplied to the end user.

1.5 DEMONSTRATION AND OPERATING AND MAINTENANCE INSTRUCTIONS

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

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

.3 Following the completion of each training and demonstration session, the contractor is to obtain an attendance sheet signed off by those personnel who have received training.

2 Products N/A

3 Execution N/A

********END OF SECTION ********

1 General

1.1 GENERAL

.1 The General Conditions of the contract as well as provisions of Division 1 are part of and to be read in conjunction with this Section.

1.2 IDENTIFICATION REQUIREMENTS

.1 All electrical equipment shall be identified by the use of Lamicoid plates. This includes all distribution equipment (Branch Circuit Wiring Panels, etc.).

.2 All equipment and enclosures receiving connections to the building power distribution system shall have their panel and circuit number identified by the use of Lamicoid plates. This includes equipment supplied by the electrical contractor, the mechanical contractor and all other divisions.

.3 All equipment located on the roof which receives an electrical connection provided by the electrical contractor requires a lamicoid identification plate affixed to the equipment in a conspicuous location. This includes equipment supplied by the electrical contractor, the mechanical contractor and all other divisions.

.4 All electrical junction, pull boxes and splitters installed in areas with drop ceilings shall be colour coded inside and out with appropriate coloured paint. **All paint is to be applied prior to installation and not with-in the confines of the building.**

.5 All electrical junction, pull boxes and splitters installed in areas without drop ceilings (exposed) shall be colour coded on the inside only with appropriate coloured paint. **All paint is to be applied prior to installation and not with-in the confines of the building.** Install an appropriately coloured dot on the exterior of the cover plate to indicate box function.

.6 Where conduits are installed in a room where no conduit couplings are visible, appropriate colour bands are required to identify the conduit function.

.7 All junction boxes installed in areas with drop ceilings shall have the panel and circuit numbers contained with-in, identified on the exterior of the cover plate.

.8 All junction boxes installed in areas without drop ceilings (exposed structure) shall have the panel and circuit numbers contained with-in, identified on the interior of the cover plate.

.9 All wiring installed under this contract shall be identified through the use of self-laminating labels.

.10 All receptacles installed under this contract shall be identified through the use of Lamicoid plates.

.11 All voice, data outlets installed under this contract shall be identified through the use of Lamicoid plates.

.12 Permanently identify voice and data horizontal cabling at each end. The identification must be mechanically generated, not hand written. Indicate the originating Telecommunications Room (TR) and the consecutively numbered jack for voice and data. This labeling is to be identical on the originating end and in the outlet box. This same information is to appear on the patch panel and outlet jack location.

.13 All control panels and time clocks shall be identified through the use of Lamicoid plates.

.14 All emergency lighting battery packs shall be identified through the use of Lamicoid plates.

.15 All disconnect switches shall be identified through the use of Lamicoid plates.

.16 All addressable fire alarm system devices shall be identified through the use of Lamicoid plates.

.17 All electrical devices (receptacles, communication outlets, multi-media outlets, relay panels and electrical equipment in concealed ceiling spaces shall be identified with two (2) Lamicoid plates, one on the device, junction box and equipment and one on the ceiling below.

2 Products

2.1 IDENTIFICATION NAMEPLATES

.1 Lamicoid identification plates.

.1 Lamicoid 1.5 mm thick plastic engraving sheet for all electrical systems, complete with rounded upper corners. Lamicoid characteristics are to be as follows, unless noted otherwise:

- .1 Fire alarm systems to have red face with white core Lamicoid plates.
- .2 Electrical equipment enclosures to have black face with white core Lamicoid plates.
- .3 Receptacles to have white face with black core Lamicoid plates.
- .4 Information outlets to have white face with black core Lamicoid plates.
- .5 All ceiling mounted plates to have white face with black core.

.2 Nameplate Sizes

Size 1	10 mm x 50 mm (3/8” x 2”)	1 line	5 mm (0.2”) high letters
Size 2	13 mm x 75 mm (1/2” x 3”)	1 line	6 mm (0.25”) high letters
Size 3	16 mm x 75 mm (3/4” x 3”)	2 line	5 mm (0.2”) high letters
Size 4	19 mm x 90 mm (3/4” x 3.5”)	1 line	10 mm (3/8”) high letters
Size 5	38 mm x 90 mm (1.5” x 3.5”)	2 line	13 mm (1/2”) high letters
Size 6	25 mm x 100 mm (1” x 4”)	1 line	13 mm (1/2”) high letters
Size 7	25 mm x 100 mm (1” x 4”)	2 line	6 mm (1/4”) high letters
Size 8	50 mm x 150 mm (2” x 6”)	2 line	13 mm (1/2”) high letters
Size 9	75 mm x 150 mm (3” x 6”)	3 line	13 mm (1/2”) high letters

.3 Identification to be in English.

2.2 COLOUR CODING OF ELECTRICAL BOXES

.1 The colour coding of splitters, junction boxes, pull boxes and outlet boxes will follow the schedule as listed:

System	Primary Colour	Secondary Colour
0volts to 50volts	VIOLET	-
51 volts to 240 volts	YELLOW	-
Above 240 volts	ORANGE	-
Fire Alarm	RED	-
Telephone	BLACK	-
P/A and Intercom	BLUE	
Ground or Bond	GREEN	
DC	YELLOW	BLACK
Energy Management	RED	WHITE
Data	BLUE	WHITE

.2 All various systems junction and/or pull boxes etc., where located above grid system, shall have location identified on underside or room side of t-bar spline, with (19 mm) or (6 mm on 19 mm) self adhering colour coded circular shaped discs, affixed directly to spline in close proximity to where concealed box is located. The same type of discs to be installed on ceiling or wall access cover plates.

.1 6 mm (1/4") discs are all white in colour.

.2 19 mm (3/4") discs are coloured as indicated.

.3 6 mm (1/4") to be affixed to center or middle of 19 mm (3/4") discs as system colours dictates.

.3 All junction boxes and/or pull boxes, conduit fittings (and respective covers), complete with their respective cover plates as per the following:

.1 Inside and out where one colour is required, with cover plate painted completely.

.2 Inside where two colours are required, with cover plate painted diagonally with both colours.

.4 All junction boxes and/or pull boxes, where not concealed, are to have discs fastened to the outside of the box when architectural painting is complete.

2.3 WIRING IDENTIFICATION

.1 Wiring Labels:

.1 Write on self-laminating labels.

.2 Panduit No's PLD-1, PLD-2.

3 Execution

3.1 EQUIPMENT IDENTIFICATION

.1 Submit description of proposed equipment identification plates for engineer's approval.

.2 Do not manufacture Lamicoid plates prior to receiving written approval from the engineer.

.3 Lamicoid nameplates shall be applied to all electrical equipment including but not limited to the following:

.1 All electrical equipment enclosures for starters, disconnect switches, relay panels, panelboards, splitter troughs, thermal overload switches, etc.

.2 Where electrical equipment that could have identical types of removable covers are grouped together, their lamicoid nameplates are to be installed on the wall adjacent to these devices, rather than directly to their covers (this is to avoid the possibility of cover mix-up occurring), for example: magnetic starters, magnetic contactors, manual T.O.L. switches, and relays.

.4 Lamicoid nameplate fastening method shall be as follows:

.1 Concrete or concrete block:

.1 Contact type cement (Note: Peel off type not acceptable). Contact type cement is to be applied (buttered) to complete rear side of plate, as opposed to several points or locations on same.

.2 Plasterboard.

.1 Contact type cement (Note: Peel off type not acceptable). Contact type cement is to be applied (buttered) to complete rear side of plate, as opposed to several points or locations on same.

.3 Equipment enclosures.

.1 Pop rivets. (Note: Screws not acceptable).

.4 Ceiling and T-Bar spline.

.1 Contact type cement (Note: Peel off type not acceptable). Contact type cement is to be applied (buttered) to complete rear side of plate, as opposed to several points or locations on same.

.5 Identify equipment as follows:

.1 Lamicoid nameplates installed on distribution panelboards, motor control centres, splitter troughs, shall indicate the following:

.1 Designated name of equipment.

.2 Amperage of overcurrent protection device.

.3 Voltages, number of phases and wires.

.4 Designation of power source.

.5 Size 9.

EXAMPLE:

PANEL 1101 - 400 AMPS
120/208V - 3PH - 4W
FED FROM DISTRIBUTION PANEL DP1150

.6 Lamicoid nameplates installed on combination starters, magnetic starters, manual starter and all various systems controls, control panels, disconnect switches, shall contain the following information:

.1 Designated name of equipment.

.2 Designated name of power source.

.3 Branch circuit breaker number(s) where possible.

.4 Voltage(s).

.5 Size 8

Example:
EXHAUST FAN NO. 5
PANEL 1101 - CCT. NO. 17
120V - 1 PH

.7 Lamicoid nameplates installed on fusible type disconnect switches are to also indicate maximum fuse size.

.8 Lamicoid nameplates are to be installed adjacent to each overcurrent device located in switchboards, CDP panels, etc. They need only indicate designated name and/or number of equipment they feed. Each unused or spare overcurrent device is to be identified with a Lamicoid plate indicating it as being a spare. Size #5.

3.2 RECEPTACLE IDENTIFICATION

.1 Submit description of proposed equipment identification plates for engineer's approval.

.2 Do not manufacture Lamicoid plates prior to receiving written approval from the engineer.

.3 Lamicoid nameplates are to be installed above all types of receptacles and abutted directly to tops of their respective device plates. Plates are to be the same width as the finish device plate.

.4 Identification is to indicate respective panel source c/w associated circuit breaker number(s) as per the following:

EXAMPLE: ***1101 - 20***

.5 Lamicoid nameplates installed above 120 volt receptacles protected by GFCI circuit breakers, or GFCI type receptacles (where their use is permitted) are to be identified as per the following:

EXAMPLE: **GFCI PROTECTED**
1101 - 22

3.3 TELLECOMMUNICATIONS IDENTIFICATION

.1 All telecommunications spaces within a building shall be uniquely identified as part of a complete administration system. The TR, ER or MTR shall be identified by the room designation assigned by the architectural design. The assigned number shall be used within the administration system identifier and shall be a “lamicoid” type plate minimum (50mm H) X (300mm L) as shown below and secured to the exterior of the door frame entering that space.

EXAMPLE: **TR-234**

.2 All telecommunications equipment racks within the telecommunications space require a unique component identifier as part of the administration system by a “lamicoid” nameplate, minimum (50mm H) X (600mm L) as shown below and secured to the upper horizontal rail of the equipment rack.

EXAMPLE: **TR-234 RACK 1**

.3 All ITS termination hardware within the telecommunications space requires a unique component identifier as part of the administration system. Identifiers must be self-adhesive thermal transfer type and placed appropriately to indicate all ports.

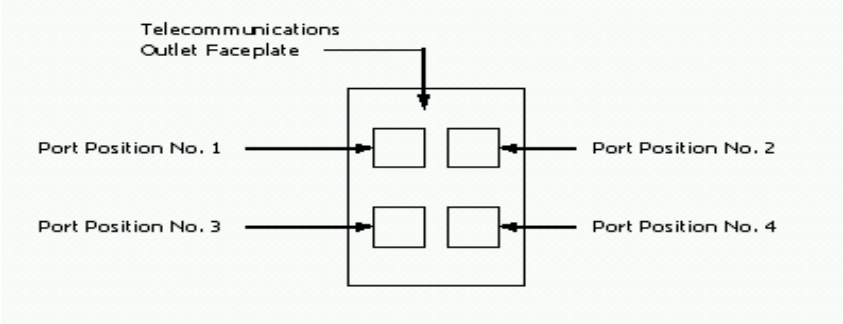
.3 All horizontal cabling shall be uniquely identified with a wrap type self-laminating adhesive label with mechanically generated (not hand written) identifier.

.4 Horizontal cable identifiers shall denote basic information transport system application and originating telecommunications space termination equipment port as shown;

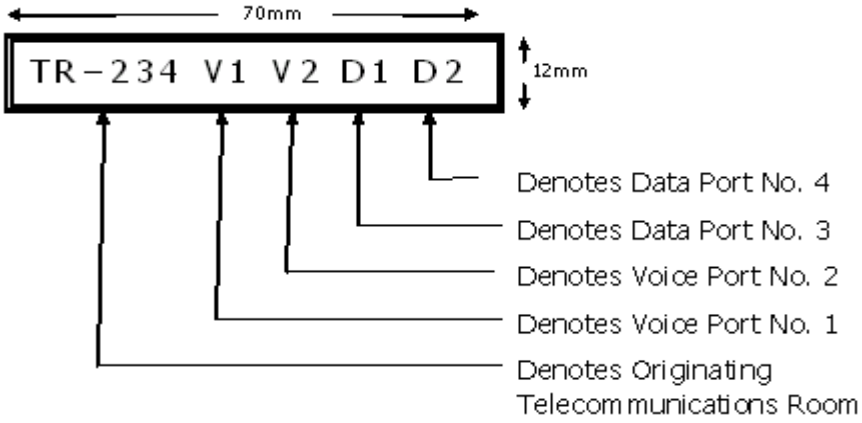
EXAMPLE: **D-024**

D = DATA
V = VOICE
DB = DATA BACKBONE

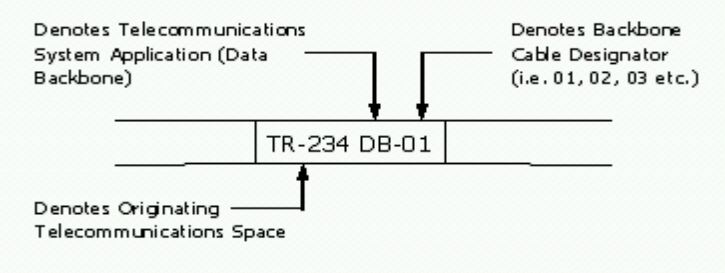
.5 All telecommunications outlet faceplates shall be standard four port configuration with port assignments as shown:



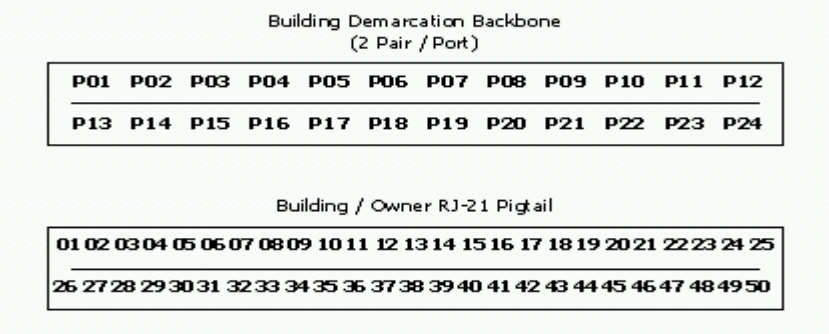
.6 All telecommunications outlet locations require a unique component identifier as part of the administration system by a "lamicoid" nameplate, minimum 120mm H X 70mm L and secured to the wall-space centered and above (min. 12mm) the telecommunications outlet faceplate. Telecommunications work area outlet identifiers must denote basic information transport system application, originating telecommunications space and termination equipment port as shown:



.7 All backbone system cabling shall be uniquely identified with a wrap type self-laminating adhesive label with mechanically generated (not hand written) identifier. Backbone cable identifiers shall denote basic information transport system application and originating telecommunications space as shown:



.8 All Building cross-connect hardware within the telecommunications space requires a unique component identifier as part of the administration system. Identifiers must be self-adhesive thermal transfer type and placed appropriately to indicate applicable pair assignments as shown:



.9 All information transport system demarcation backbone cabling shall be uniquely identified with a wrap type self-laminating adhesive label with mechanically generated (not hand written) identifier. All information transport system demarcation backbone cable identifiers shall denote basic telecommunications system application and originating telecommunications spaces.

3.4 EMERGENCY LIGHTING BATTERY PACK IDENTIFICATION

.1 Submit description of proposed equipment identification plates for engineer's approval.

.2 Do not manufacture Lamicoid plates prior to receiving written approval from the engineer.

.3 Lamicoid nameplate for each emergency lighting battery pack and Exit sign shall be installed adjacent each unit. Identification is to indicate panel number and circuit number, as per the following:

EXAMPLE: ***1101 – 20***

3.5 FIRE ALARM SYSTEM IDENTIFICATION

.1 Submit description of proposed equipment identification plates for engineer's approval.

.2 Do not manufacture Lamicoid plates prior to receiving written approval from the engineer.

.3 Lamicoid nameplate for Fire Alarm system addressable devices shall be installed above and abutted directly to top of their respective device. Identification is to indicate panel number, addressable loop number and device address.

EXAMPLE: ***01-02-125***

3.6 MECHANICAL EQUIPMENT CONNECTED TO THE ELECTRICAL DISTRIBUTION SYSTEM

.1 Lamicoid nameplate for each item of mechanical equipment (speed drives, humidifiers, trap primers, fans, pumps, etc.) fed from the electrical distribution system, shall contain the following information:
- .1 Designated name of equipment.
- .2 Designated name of power source.
- .3 Branch circuit breaker number(s) where possible.
- .4 Voltage(s).
- .5 Size 8

Example:
TRAP PRIMER
PANEL 1101 - CCT. NO. 17
120V - 1 PH

3.7 IDENTIFICATION OF JUNCTION BOXES, PULL BOXES, SPLITTER TROUGHS AND OUTLET BOXES

.1 Colour Coding
- .1 Identification of electrical junction boxes, pull boxes, splitter troughs.
  - .1 Colour code as per 2.2.
  - .2 Apply colour coding prior to pulling conductors into boxes.
  - .3 Where primary colour only is indicated:
    - .1 Colour inside and outside of box.
    - .2 Colour all cover plates.
  - .4 Where primary and secondary colours are indicated:
    - .1 Paint inside and outside of box with the primary colour.
    - .2 Diagonally apply to each half of the cover plate the primary and secondary colours.
    - .3 Provide a legend of colour coding used under Plexiglas. Locate in main electrical room.

.2 Voltage and Originating Source Identification
- .1 Identification of electrical junction boxes, pull boxes, splitter troughs: smaller than 150 mm x 150 mm.
  - .1 Identify on the coverplate, using permanent indelible black marker the panel and circuit numbers contained with.
- .2 Identification of electrical junction boxes, pull boxes, splitter troughs: 150 mm x 150 mm and larger.
  - .1 Provide Lamicoid plate fastened to coverplate, indicating:
    - .1 Voltage and phase.
    - .2 Originating panel.
    - .3 Size 6.
    - .4 Example: “120/208 v, 3Ø, 4w, panel ‘A’.”
  - .2 Using permanent indelible black marker, identify the circuits contained within.

3.8 IDENTIFICATION OF SYSTEM CONTROL PANELS

.1 Provide Lamicoid plate fastened to equipment enclosure indicating:
- .1 System name.
- .2 Size 6.
- .3 Example: "Fire Alarm Control Panel".

3.9 IDENTIFICATION OF WIRING

.1 Identification of wiring:
- .1 Identify wiring with permanent indelible identifying markings, either numbered or coloured plastic tapes, on both ends of phase conductors of feeders and branch circuit wiring.
- .2 Label each neutral conductor to indicate its associated phase conductors in each panelboard, distribution panel, pullbox and junction box it appears in. These labels are to be installed in a 'flagged' manner.
- .3 All circuit conductors are to be individually tie wrapped to their corresponding labeled neutral conductor in all panelboards, pull boxes and junction boxes. Each neutral conductor is to be identified to indicate its corresponding phase conductors.
- .4 Labeling of all branch circuit wiring including phase conductors, neutral, ground and/or bonding conductors to be done on both ends of all circuit wires plus in any junction and/or pull boxes located in between using approved product (refer to 2.3). These labels are to be installed in a 'flagged' manner around individual conductors.
- .5 Indicate panel and circuit number i.e.: Panel '1101', cct. #10.

END OF SECTION

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCE SECTIONS

.1 Section 07 84 00 Firestopping

1.3 SUBMITTALS

.1 In accordance with the following Sections:
- .1 Section 07 84 00 Firestopping
- .2 Section 26 05 01Electrical Submittals.

2 Products

2.1 MATERIALS

.1 In accordance with the following Section 07 84 00 Firestopping

3 Execution

3.1 INSTALLATION

.1 In accordance with the following Section 07 84 00 Firestopping.

3.2 FIRESTOPPING

.1 Firestopping material and installation within annular space around conduits and adjacent fire separation.

.2 Firestopping material and installation for cable tray assembly and adjacent fire separation.

.3 Firestopping material and installation inside conduit sleeves which penetrate an assembly with a fire resistance rating

********END OF SECTION ********

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCES

.1 C22.2 No.65-13 Wire Connectors.

2 Products

2.1 MATERIALS

.1 Spring type pressure type connectors for all branch circuit wiring sized #8 AWG and smaller. Current carrying parts are to be made of copper or copper alloy and be complete with an appropriate size insulating cap. Cap is to completely fit, or cover all enclosed conductors as required, with current carrying parts of sized to fit conductors as required.

.2 Branch circuit wiring sized #6 AWG and larger will be connected together using split bolt type with heat shrink insulation.

3 Execution

3.1 INSTALLATION

.1 Remove insulation carefully from ends of conductors.

.2 All wire connectors are to be “plier-tightened’. Finger tight is not acceptable.

.3 Installation shall meet secureness tests in accordance with CSA C22.2 No.65.

********END OF SECTION ********

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 PRODUCT DATA

.1 Submit product data in accordance with Division 1.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility.

2 Products

2.1 BUILDING WIRES

.1 Unless indicated conductors (phase, neutral, bond, isolated ground) installed on this project shall be stranded, soft drawn copper, with RW90 XLPE insulation rated for a minimum of 600 VAC. The minimum wire size will be #12 AWG.

.2 Grounding and bonding conductors to have green coloured RW90 X-link insulation.

.3 Unless noted otherwise, phase colour coding as per C.E.C. rule 4-036, will apply.

.4 All phase conductors sized from #12 AWG up to and including #2 AWG to have appropriate coloured insulation (red, black & blue).

.5 All neutral, grounds and/or bond conductors sized #12 AWG up to and including #3/0 AWG to have appropriate coloured insulation (white or green).

.6 Isolated ground conductors to have green coloured insulation c/w yellow stripe.

.7 Where three and four way switches are indicated, the associated travelers are to have yellow coloured insulation.

.8 Coloured tape may only be utilized when phase conductors sized larger than noted in item 4 are used.

.9 Coloured tape may only be utilized when neutral, grounds or bond conductors sized larger than noted in item 5 are used.

.10 Multi-conductor AC-90 cables containing a single white coloured conductor are not to be used where more than one neutral conductor is required.

.11 The maximum current that a conductor can carry shall be based on the 75 degree C tables in the Canadian Electrical Code.

2.2 ARMORED CABLE

.1 Conductor: copper, size as indicated.

.2 Type AC-90.

.3 Bonding conductor sized to CEC Table 16.

.4 AC-90 cable connectors shall be as follows:
.1 Two-screw, steel-type similar to T & B #3301, 3312.

2.3 TECK CABLE

.1 Conductor: copper, size as indicated.

.2 Insulation Type: RW90-XLPE

.3 Ground conductor sized to CEC Table 16.

.4 Interlocking aluminum tape armour

.5 Outer jacket: PVC flame retardant to FT-4 requirements.

.6 Connectors to be Star Teck or equal.

3 Execution

3.1 INSTALLATION OF BUILDING WIRES

.1 Install wiring as follows:
.1 In conduit systems in accordance with Section 26 05 34.
.2 The minimum size of any branch circuit conductor used shall be based on the allowable ampacity in the 75 degree C Column of Table 1, 2, 3, or 4, with all relevant correction factors being applied as required by Rule 4-004. Cable transitions in gauge between the equipment's lower termination temperature rating and a higher insulation temperature rating used in the circuit shall not be permitted in the balance of the branch circuit wiring.
.3 All stranded conductors, (neutrals, bonds and phase conductors) prior to terminating under device bolts i.e., circuit breakers, light switches, receptacles etc., to be twisted together so as to form a single conductor.

.4 All branch circuit phase conductors feeding light fixtures via junction and/or outlet boxes are to be complete with "pigtail" type leads to ensure minimal disruption of lighting circuits if fixtures are removed for future maintenance.

.5 Each line voltage switch is to be wired with the neutral conductor extended to the device box.

.6 All branch circuit phase conductors feeding receptacles via junction and/or outlet boxes are to be complete with "pigtail" type leads to ensure minimal disruption of receptacle circuits if receptacles are removed for future maintenance.

.7 All branch circuit wiring feeding light fixtures will be installed complete with a separate neutral conductor for each circuit.

.8 Where the application of coloured tape has been approved, apply as follows:

.1 Both ends of the conductor must be taped for all installed segments.

.2 Each location where the conductor is visible, i.e.; all junction and pull boxes.

.3 A minimum of 305 mm (12”) of the conductor is to have tape applied for all phase conductors.

.4 All neutral, grounds and/or bond conductors must be taped for their entire visible length in all enclosures.

.2 Install Teck cable where indicated. Teck cables shall be secured to the building structure at not less than 1.5 M (5 foot) intervals or as otherwise indicated.

.3 Use of AC-90 Cable.

.1 The use of AC-90 cable is acceptable for this project as a general wiring method with several exceptions. Refer to Section 26 05 34 where conduit requirements are defined.

.2 AC-90 cable is to be installed as per the following guidelines:

.1 All types of armoured cables are to be installed concealed, parallel and perpendicular to building lines and shall be adequately secured to the building structure at not less than 1.5M (5 foot) intervals or as otherwise indicated, in such manner as to ensure they are protected from potential mechanical damage. Install independent supports for cabling in ceiling spaces, and do not use those of other trades. Do not secure cables to mechanical systems piping or ducts, suspended ceiling support wires. The laying of cables directly atop ceiling grid system is strictly prohibited.

.2 Where possible, always install and secure cables directly to underside of metal decking and/or ceiling slabs where located in concealed ceiling spaces. Install supports to firmly secure AC90 to metal decking midway between OWSJ and when any change in direction occurs.

.3 The grouping together of AC-90 cables to form a “bundle” for securing purposes is acceptable providing the following procedures are adhered:

.1 In addition to securing type AC-90 cables at 1.5 M(5 foot) intervals to structure, multiple or bundled groups of armoured cables shall be tye-wrapped together at mid-point between each structure support and are to be secured together (between each structure support).

.2 Grouping of AC-90 cables shall be limited to a maximum of eight (8) current carrying conductors, including associated oversized neutral conductors where phase sharing occurs.

.4 The following examples incorporate uses of both, common and dedicated (separate) branch circuit neutral conductors:
- .1 Maximum of two runs of #12/4 conductor cables, including common (oversized) branch circuit neutral in each.
- .2 Maximum of two runs of #12/3 conductor cables, including (oversized) branch circuit neutrals (if not 3 phase, 3 wire), plus one run of #12/2 cable.
- .3 Maximum of four runs of #12/2 conductor cables, each including a separate, dedicated branch circuit neutral conductor.

.5 Where dedicated or separate branch circuit neutral conductors are non phase sharing, they need not be sized larger than phase conductors they accompany unless specifically indicated otherwise.

.6 All AC-90 fixture feeds shall originate from the sides of outlet boxes and not from the box cover. Where 3 and/or 4 fixture drops extend from any one outlet box, the box shall not be sized smaller than 120 mm (4-11/16") square.

.7 Fixture drop is defined as that portion of AC-90 cable or flexible conduit being used to make final connection between accessible type junction or outlet box located in ceiling space (above T-Bar ceiling only) and its respective light fixture.
- .1 Fixture drops are not to exceed 4.5 M (15 feet) in total length unless specifically indicated otherwise.
- .2 There shall be not more than 4 drops permitted to be fed from any one box regardless of its size. All AC-90 cables used for fixture drops are to be secured within 300 mm (12 in.) of the junction box and the light fixture connection point. Each light fixture is to be complete with its own separate fixture drop originating from a junction box located within the ceiling of the same room as the fixture.
- .3 With the exception of where “modular” type wiring has been approved for a particular application, within a T-Bar ceiling space, each light fixture shall be wired with a separate whip emanating from an overhead junction box.

.8 Separate pig-tail type leads shall be provided in each light fixture junction/outlet box for final connections to fixture drops. These pig-tail leads are to be only connected to light fixture returns and associated neutral conductors.

.3 <u>The use of AC-90 cable for branch circuit home runs is not acceptable</u>.
- .1 A home run is defined as that portion of the branch circuit wiring that runs between the applicable panelboard and the room or area in which it terminates, and/or makes its final splice, for drop off, to the applicable branch circuit device. The home run conduit shall be continued until the final room destination splice or drop off is reached.
- .2 Where the branch circuit has multiple splices and/or drop offs to multiple rooms, the use of AC90 for the drop off is permitted, however, the home run conduit shall be continued until the final room destination or drop off is reached.
- .3 The use of AC-90 cable between rooms is not permitted.
- .4 AC90 cables are not permitted to enter panelboards under any circumstances.

.4 Conductor Tie-wrapping:

.1 All circuit conductors are to be individually tie wrapped to their corresponding labeled neutral conductor in all panelboards, pullboxes and junction boxes. Suitable slack conductor length should be left to enable the ability to clamp the ground detector around the individually tie-wrapped circuit conductor and its corresponding labeled neutral. This wiring method is to be neat and of good workmanship quality.

.2 The tie-wrapping of the neutral with its respective phase conductors is to be made at the closest point of entry into panelboards, pullboxes and junction boxes.

.3 The main switchboard, CDP's, panelboards, MCC's etc. are to have their respective feeder phase and neutral conductors tye-wrapped together and enough slack conductor length to enable the ability to clamp the ground detector around each set of feeders. This wiring method is to be neat and of good workmanship quality.

.5 Final connection to receptacles and light fixtures:

.1 Separate pig-tail type leads shall be provided in each receptacle outlet box for final connections to receptacles and in each light fixture outlet box for final connection to the light fixture. These pig-tail leads are to be only connected to the phase and associated neutral conductors.

.6 Final connection to motors:

.1 The conductor phase colour coding as per C.E.C. rule 4-036 will carry through from the incoming service point to the motor starter and to the final connection to each motor. In the instance that a three phase motor requires transposition of phase conductors to achieve proper rotation, the change is to take place at the motor terminal box. Changing the motor feeder phase conductors at any other point in the distribution system (for example at the MCC or starter) will not be acceptable.

.7 When a circuit enters a junction box, the bonding conductor on the line side shall terminate on the box bonding screw, or terminal strip as applicable, prior to connecting other bonding conductors present in the junction box.

.8 Testing:

.1 Perform testing in conformance with NSP Electrical Inspection Bulletin B-2-132 and CEC Rule 2-136. Contractors are to verify by testing that all interior wiring is; free from shorts, broken, open, or incorrect connections, proper polarity, and that neutrals are free from connections to ground beyond the supply side of the consumer’s service box except as permitted in section 10 of the Canadian Electrical Code Part 1. (CEC).

.2 Prior to testing, ensure that all feeders or branch circuits which do not have neutral conductors are to have their respective phase conductors tye-wrapped together in accordance to the methods described previously.

.3 Prior to testing, ensure that voltage-sensitive devices such as ground fault circuit interrupters, arc-fault circuit interrupters, electronic ballasts, Surge Protective Devices (SPD) and other electronic equipment are not subjected to voltages that will damage the device.

.4 Megger testing is to be performed on all branch circuit wiring on the load side of a consumer's main overcurrent device, including main feeders and sub-feeders. Contractors shall record their results for all testing performed and shall have the testing results available for viewing by the inspection department upon request at

the time of inspection. Ensure that the Megger reports are submitted to the Engineer for review and are incorporated into the O & M manuals.

3.2 VOLTAGE DROP

.1 It is the intent of this specification that each branch circuit will be strategically planned and installed to ensure that when tested, the CEC requirement that the voltage drop will not exceed 3% in a feeder or branch circuit; and 5% from the supply side of the Consumer's service to the point of utilization. The contractor will account for distance and routing for each branch circuit and that appropriate wire sizes will be employed to allow an acceptable voltage drop test to be carried out during commissioning. When testing for voltage drop, each branch circuit fed from a 15 amp circuit breaker will be subjected to a 12 ampere load, and branch circuit fed from a 20 amp circuit breaker will be subjected to a 16 ampere load.

.2 The following table is to include both vertical and horizontal lengths of conductor runs. Minimum size of branch circuit neutral where phase sharing occurs shall not be smaller than #10 AWG. Minimum size of branch circuit neutral where dedicated to its own branch circuit phase conductor shall be not be less than #12 AWG. Note that minimum size #10 AWG bond conductors to accompany #8 branch circuit conductors.

.3 AS A MINIMUM, THE FOLLOWING TABLE SHALL BE ADHERED TO:

Branch Circuit Length of Run Mm (feet)	Phase Wire Size	Dedicated Neutral	Shared Neutral	Bond Wire Size
Up to 24,384 (80)	#12	#12	#10	#12
Up to 38,100 (125)	#10	#10	#8	#12
Up to 56,390 (185)	#8	#8	#6	#10

.4 Oversized #10 AWG branch circuit wiring conductors to be extended to outlet box of device they feed (including switch legs). Oversized #8 AWG branch circuit wiring conductors to be extended from panelboard to junction box located on wall or ceiling directly above wall light switches and/or receptacles. #8 AWG wire to be reduced to #10 AWG for vertical portion of drop only.

END OF SECTION

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCES

.1 CSA 22.2 No. 41.

2 Products

2.1 EQUIPMENT

.1 Insulated grounding conductors: green, insulation to Section 26 05 21 Wires and Cables 0-1000 V.

.2 Non-corroding accessories necessary for grounding system, type, size, material as indicated, including but not necessarily limited to:
- .1 Grounding and bonding bushings.
- .2 Protective type clamps.
- .3 Bolted type conductor connectors.
- .4 Thermit welded type conductor connectors.
- .5 Bonding jumpers, straps.
- .6 Pressure wire connectors.

2.2 CONDUCTOR IDENTIFICATION

.1 Provide identification for each conductor in accordance with 26 05 03.

3 Execution

3.1 INSTALLATION GENERAL

.1 Where EMT is used, install bonding conductor in each and every conduit.

.2 Install connectors in accordance with manufacturer's instructions.

.3 Protect exposed grounding conductors from mechanical injury.

.4 Make connections to ground rods and water main using permanent mechanical connectors or inspectable wrought copper compression connectors to ANSI/IEEE 837.

.5 Use mechanical connectors for grounding connections to equipment provided with lugs.

.6 Soldered joints not permitted.

.7 All metal raceways shall be bonded to ground including communications conduits.

.8 Install bonding wire for flexible conduit, connected at both ends to grounding bushing, solderless lug, clamp or cup washer and screw.

.9 Make bonding connections in radial configuration only. Avoid loop connections.

.10 Every metal conduit used to house a system ground conductor must be bonded to ground at each end.

3.2 EQUIPMENT BONDING

.1 Bond all non-current-carrying conductive parts of all electrical equipment regardless of supply voltage or its class.

.2 Install bonding connections to typical equipment included in, but not necessarily limited to following list. Duct systems, frames of motors, motor control centres, starters, control panels,

.3 Bond all metallic back boxes and metal enclosures to ground that are installed in ceiling spaces or in partitions in conformance with CEC Rule 10-404, including, but not limited to :

.1 Public address speaker back boxes.
.2 Occupancy sensor back boxes.
.3 Communications systems device back boxes and conduit sleeves.

END OF SECTION

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility.

2 Product

2.1 SUPPORT CHANNELS

.1 U shape, size 45 mm X 45 mm, 3 mm thick, surface mounted as required.

2.2 BEAM CLAMPS

.1 Beam clamp for 10 mm threaded rod.

.2 cUL listed.

.3 Malleable iron, complete with hardened steel cup point set screw.

.4 Rated for a minimum of 227 Kg (400 pounds).

.5 Taylor Pipe Support, Wide Mouth Top Beam Clamp #407, or equal.

.6 Push-on type conduit clips are not to be used on this project.

2.3 ARMOURED CABLE STRAPS

.1 Aluminum alloy.

.2 cUL listed.

.3 Rated for armoured cable.

.4 Iberville C10/C15

.5 Push-on type cable clips are not to be used on this project.

3 Execution

3.1 INSTALLATION

.1 Secure equipment to hollow and solid masonry, tile and plaster surfaces with lead anchors.

.2 Secure equipment to poured concrete with expandable inserts.

.3 Support equipment, conduit or cables using clips, spring-loaded bolts, cable clamps designed as accessories to basic channel members.

.4 Fasten exposed conduit or cables to building construction or support system using straps.
- .1 One-hole steel straps to secure surface conduits and cables 35 mm (1-1/4 inch) and smaller.
- .2 Two-hole steel straps for conduits and cables 41 mm (1-1/2 inch) and larger.
- .3 Beam clamps to secure conduit to exposed steelwork.

.5 Suspended supports systems.
- .1 Support single or multiple cables or conduits on a common steel support channel system supported by 10 mm (3/8") diameter threaded rod hangers, washers and nuts where direct fastening to building construction is impractical. Channel is to be sandwiched between nuts and washers located on both upper and underside portions of channels.
- .2 Do not support a single conduit using a threaded rod and a beam clamp. This is not an acceptable means of installation as no lateral support is provided.

.6 For surface mounting of single and multiple conduits use channels. Channels are to be securely attached to hangers with the maximum spacing not greater than:
- .1 Conduits of one size only:
  - .1 16 mm to 21 mm (1/2" to ¾") conduit 1524 mm (60")
  - .2 27 mm & 35 mm (1" to 1 ¼") conduit 1980 mm (78")
  - .3 41 mm (1 ½") & larger conduit 3050 mm (120")
- .2 Conduits of mixed size:
  - .1 Arrange supports so that maximum spacing of supports conforms to above, based on smallest conduit diameter.

.7 All suspended types of junction and pull boxes are to be supported using a minimum of 10 mm (3/8") threaded rod c/w nuts and flat washers. Secure threaded rods to boxes using one flat washer and nut installed on both sides of box. Provide as follows:
- .1 One rod required for all types of boxes sized 150 X 150 mm (6 X 6 inches) or smaller.
- .2 Two rods required for all types of boxes larger than 150 X 150 mm (6 X 6 inches) up to and including 304 X 304 mm (12 X 12 inches).
- .3 Minimum of four rods required for all types of boxes sized larger than 304 X 304 mm (12 X 12 inches).

.8 All excess threaded rod is to be cut-off within 13 mm (1/2") of channel bottom.

.9 Provide metal brackets, frames, hangers, clamps and related types of support structures where indicated or as required to support conduit and cable runs.

.10 Ensure adequate support for raceways and cables dropped vertically to equipment where there is no wall support.

.11 Do not use wire lashing or perforated strap to support or secure raceways or cables.

.12 Do not use supports or equipment installed by other trade contractors for conduit or cable support except with permission of other trade and approval of Engineer.

.13 Do not attach electrical conduit and cable to supports installed as part of a suspended ceiling installation (gypsum board or T-Bar for example).

.14 Install fastenings and supports as required for each type of equipment cables and conduits, and in accordance with manufacturer's installation recommendations.

********END OF SECTION********

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data for cabinets in accordance with Division 1.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility.

2 Products

2.1 SPLITTERS

.1 Sheet metal enclosure, minimum 14 gauge with continuously welded corner seams, and formed hinged cover suitable for locking in closed position. Suitable for exterior and/or interior use. Heat fused powder paint applied to enclosure.

.2 Splitter opening to have curled lip around all sides with poured in place gasket.

.3 Concealed hinges with captive pins. Quarter turn mechanisms to ensure positive closing.

.4 Bus bars for power distribution, neutral and ground. Tin plated copper material, drilled and tapped at 150 mm intervals, mounted on slanted insulators mounted on an interior panel.

.5 Main and branch lugs to match required size and number of incoming and outgoing conductors as indicated.

.6 Complete with a bonding terminal strip for individual bonding conductor connections for each feeder.

2.2 JUNCTION AND PULL BOXES

.1 Welded steel construction with screw-on flat covers for surface mounting.

.2 Covers with 25 mm (1 inch) minimum extension all around, for flush-mounted pull and junction boxes.

.3 Junction boxes larger than 120 mm (4 11/16) to have a bonding terminal strip installed.

2.3 CABINETS

.1 Type D: 1.6 mm steel cabinet, built for surface or flush mounting. Flush cover lip 25 mm all around. Finish - ASA-61 grey enamel. Complete with screw on cover. Complete with bonding terminal strip.

.2 Type E: 1.6 mm steel cabinet, surface mount. Formed steel hinge with pull ring catch. Finish ASA-61 grey enamel. Complete with bonding terminal strip.

.3 Type T: 1.6 mm steel cabinet, 1.9 mm cover, latch lock, 2 keys. Finish - ASA - 61 grey enamel. Complete with bonding terminal strip.

3 Execution

3.1 JUNCTION, PULL BOXES AND CABINETS INSTALLATION

.1 Install all raceways in conformance with CEC, Section 12.

.2 Boxes shall be of sufficient size to provide usable space for all insulated conductors contained in the box, as per CEC Rule 12-3034. The use of box extensions to provide sufficient space is not acceptable.

.3 Install pull boxes in inconspicuous but accessible locations. Box cover to be hinged on the side. **Do not install boxes with hinge on top.**

.4 Install pull boxes so as not to exceed 27 m (90 feet) of conduit run between pull boxes. Each run of raceway shall not have more than the equivalent of four 90 degree bends installed, including the bends located at an outlet or fitting. Pull boxes are to be sized in accordance with CEC Rule 12-3036.

.5 Terminate all bonding conductors on bonding terminal strip installed inside junction box.

.6 Where junction and or pull boxes are required to be 150 mm X 150 mm (6 inch X 6 inch) or larger Type E cabinets (hinged cover) shall be used.

.7 Do not use splitter troughs in lieu of pull boxes.

.8 Type T cabinets shall be used when equipment is required to be housed in a lockable enclosure.

.9 Where construction consists of metal Q deck and steel joists (Roof deck only), conduit boxes are to be installed in such a manner that the nearest outside surface of the electrical box is not less than 38 mm (1.5 inch) from the nearest surface of the metal roof deck.

.10 Location of junctions and/or pull boxes in suspended ceiling spaces, i.e., gyp-rock, T-bar, etc., are not to be greater than 760 mm (30 inch) above finish ceiling.

.11 All suspended types of junction and pull boxes are to be supported using a minimum of 10 mm (3/8 inch) threaded rod c/w nuts and flat washers. Secure threaded rods to boxes using one flat washer and nut installed on both sides of box. Provide as follows:

.1 One rod required for all types of boxes sized 150 X 150 mm (6 X 6 inches) or smaller.

.2 Two rods required for all types of boxes larger than 150 X 150 mm (6 X 6 inches) up to and including 304 X 304 mm (12 X 12 inches).

.3 Minimum of four rods required for all types of boxes sized larger than 304 X 304 mm (12 X 12 inches).

.12 Where junction boxes and pull boxes are secured to building structural components, they shall be mounted and secured in such a manner so as not to be "cantilevered" (ie, only supported on one side of the box). In rare instances where site constraints dictate the installation of a "cantilevered" box, threaded rods shall be installed to provide additional support on the opposite end.

.13 Colour Coding: Refer to 26 05 31. All electrical junction, pull boxes splitters and cabinets shall be colour coded inside and out with appropriate coloured paint. **All paint is to be applied prior to installation and not with-in the confines of the building.**

********END OF SECTION ********

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 RELATED WORK:

.1 Section 26 05 34 – Conduits, Conduit Fastenings and Conduit Fittings.

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility.

2 Products

2.1 OUTLET AND CONDUIT BOXES GENERAL

.1 Size boxes in accordance with CSA C22.1-18.

.2 100-mm (4 inch) square or larger outlet boxes as required for special devices.

.3 Multi-Gang boxes where wiring devices are grouped.

.4 Blank cover plates for boxes without wiring devices.

.5 Combination boxes with barriers where outlets for more than one system or voltage are grouped.

.6 Where tile rings are installed on this project, they must be the welded type with square corners (Rounded corners will not be acceptable). For single device installations use Iberville BC52-C-49XX. For two device installations use Iberville # 52-C-52-XX. Select appropriate depth of tile ring to suit application.

.7 Adjustable type tile rings such as Iberville # 52C-ADJ are not permitted on this project.

2.2 SHEET STEEL OUTLET BOXES

.1 One or Two Device, Flush Installation, Suitable for Conduit and Armoured Cable Entry:

.1 Electro-galvanized steel single, flush device boxes for use in dry flush installation, shall be pressed steel, minimum size 100 mm (4 inch) square x 54 mm (2.125 inch)

deep, minimum volume of 490 cubic centimetres (30 cu.in.), (similar to Iberville # 52171-K). Provide single device square cornered tile cover (similar to Iberville # BC52-C-49XX) or two device square cornered tile covers (similar to Iberville # 52-C-52-XX).

.2 Provide an outlet box for all communications outlets, c/w single gang raised tile ring and stainless steel cover plate, unless noted otherwise. Minimum dimensions as follows: 100mm (4 inch) x 100mm (4 inch) x 53mm (2.125 inch) deep, minimum volume of 490 cubic centimetres (30 cu.in.), (similar to Iberville # 52171-K).

.3 100-mm square or octagonal outlet boxes for lighting fixture outlets.

2.3 MASONRY BOXES

.1 Electro-galvanized steel masonry single and multi gang boxes for devices flush mounted in exposed block walls, minimum volume of 343 cubic centimetres (21 cu.in), 89 mm (3.5 in.) deep, (similar to Iberville # MBD).

2.4 SURFACE MOUNT CONDUIT BOXES

.1 Cast FS aluminum boxes with factory-threaded hubs and mounting feet for surface wiring of switches and receptacles.

.2 Metal type "FS" device plates to be used on all type "FS" boxes unless noted otherwise.

2.5 MOUNTING BRACKETS

.1 Provide box mounting brackets for the installation of multiple boxes for drywall partitions, c/w tile rings.

.2 Acceptable material: Caddy RBS Type (16 or 24 as required), or equal.

2.6 FITTINGS - GENERAL

.1 Knock-out fillers to prevent entry of foreign materials.

.2 Double locknuts and insulated bushings on sheet metal boxes.

2.7 COLOUR CODING

.1 Colour coding of system as per 26 05 03.

3 Execution

3.1 INSTALLATION

.1 Support boxes independently of connecting conduits.

.2 Fill boxes with paper, sponges or foam or similar approved material to prevent entry of construction material.

.3 Install multiple box mounting brackets and mount boxes.

.4 Where outlet boxes are installed in stud walls and not installed in multiple box mounting brackets, secure the box to a stud, and provide additional support on the opposite side of the box via a bracket or some other acceptable means so the box is firmly secured. Where stud walls are deeper than 100 mm, this may require additional brackets to provide the required support.

.5 For flush installations mount outlets flush with finished wall using tile rings to permit wall finish to come within 6 mm (1/4") of opening.

.6 The front edges of boxes, cabinets and fittings installed in noncombustible walls or ceilings shall not be set in more than 6 mm (1/4").

.7 The front edges of boxes, cabinets and fittings installed in combustible walls (ie, millwork) shall be flush with surface. Application of non-conductive box extenders, similar to Arlington BE Series can be employed where no other practical solution exists.

.8 Provide correct size of openings in boxes for conduit, mineral insulated and armored cable connections. Reducing washers not to be used.

.9 Install multi-gang boxes where more than one device is required. Sectional (gangable) boxes are not to be used on this project.

.10 Install range and dryer receptacles in mud boxes. Ensure U-Ground for range outlet is oriented to the side as per 26-744.

********END OF SECTION 26 05 32********

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 LOCATION OF CONDUIT

.1 Drawings do not show all conduits. Those shown are in diagrammatic form only.

1.3 REFERENCES

.1 Canadian Standards Association
- .1 CAN/CSA C22.2 No. 18-98 (R2003), Outlet Boxes, Conduit Boxes, Fittings and Associated Hardware, A National Standard of Canada.
- .2 CSA C22.2 No. 45-M1981 (R2003), Rigid Metal Conduit.
- .3 CSA C22.2 No. 56-04, Flexible Metal Conduit and Liquid-Tight Flexible Metal Conduit.
- .4 CSA C22.2 No. 83-M1985 (R2003), Electrical Metallic Tubing.
- .5 CSA C22.2 No. 211.2-M1984 (R2003), Rigid PVC (Unplasticized) Conduit.
- .6 CAN/CSA C22.2 No. 227.3-05, Nonmetallic Mechanical Protection Tubing (NMPT), A National Standard of Canada (February 2006).

1.4 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility.

2 Products

2.1 CONDUITS

.1 Rigid galvanized steel threaded conduit: size as indicated.

.2 Electrical metallic tubing (EMT): with couplings, size as indicated.

.3 Rigid PVC conduit: size as indicated.

.4 Liquid-tight flexible metal conduit: size as indicated.

.5 Metal flexible conduit: size as indicated.

.6 ENT conduit is not permitted for use on this project.

2.2 CONDUIT FASTENINGS

.1 Fasten conduit to building construction or support system using straps, as follows:
- .1 One-hole steel straps to secure surface conduits and cables 35 mm (1-1/4 inch) and smaller.
- .2 Two hole steel straps for conduits and cables 41 mm (1-1/2 inch) and larger.

.2 Beam clamps to secure conduits to exposed steelwork.

.3 Channel type supports for one or more conduits.

.4 10-mm (3/8 inch) diameter threaded rods to support suspended channels.

2.3 CONDUIT FITTINGS

.1 Fittings: manufactured for use with conduit specified. Coating same as conduit.

.2 Couplings for thinwall type EMT conduits shall be concrete tight, set screw, steel type, similar to Iberville Series CI-5500, unless noted otherwise.

.3 Conduits exiting equipment enclosures equipped with sprinkler hoods shall be installed with rain tight EMT connectors. These connectors will be equipped with a rubber "O" Ring gasket. In addition, any conduit couplings in the vertical portion of the conduit run over equipment enclosures equipped with sprinkler hoods shall be rain tight.

.4 Connectors for thinwall type EMT conduits shall be concrete tight, set screw, steel, c/w case hardened steel locknuts, similar to Iberville Series CI-5400-IT. Insulated throats are to be provided on connectors up to and including 27 mm (1 inch). Metal thread on bushings to be installed on all EMT connectors sized 35 mm (11/4 inch) or larger.

.5 Armoured cable connectors shall be two-screw, steel type similar to T & B #3301, 3312. The use of "snap-in" type connectors is not permitted. Provide insulating bushings (anti-shorts) for armoured cable connectors.

.6 Flexible metal conduit connectors shall be nylon insulated, steel or malleable iron type similar to T & B Tite-Bite #3115 thru 3124. Provide insulating bushings (anti-shorts) for flexible metal conduit connectors. Plastic thread on bushings to be installed on all flexible metal conduit connectors sized 35 mm (11/4 inch) or larger.

.7 Liquid-tight flexible metal conduit fittings:
- .1 Specifically listed for liquid tight flexible metal conduit.
- .2 Steel type, to match conduit size.
- .3 Fittings must incorporate a threaded grounding cone, a steel or plastic compression ring, and a gland for tightening.
- .4 Safe edge ground type.
- .5 Connectors shall have insulated throats.
- .6 T & B #5300 series or equal.

2.4 EXPANSION FITTINGS FOR RIGID PVC CONDUIT

.1 Provide expansion joints to the requirements of CEC Rule 12-1118 and the requirements of the manufacturer.

.2 Calculate the expansion of the conduit based on the maximum probable change in temperature during and after installation.

2.5 FISH CORD

.1 Polypropylene.

3 Execution

3.1 INSTALLATION

.1 Unless noted otherwise, conduits are to be installed as high as possible to conserve headroom, to reduce interference with other trades and cause minimum interference in spaces through which they pass.

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

.3 Conduits are to be installed as follows as high as possible in the space to conserve headroom.

.4 Use rigid galvanized steel threaded conduit where subject to injury.

.5 Use electrical metallic tubing (EMT) for the following:

- .1 Communication outlets between device box and accessible ceiling space in all walls and partitions. (Refer to 27 05 28 for definition of Communication System Wiring).
- .2 Sleeves for communication wiring (Refer to 27 05 28 for definition of Communication System Wiring).
- .3 All Fire alarm system wiring.
- .4 All wiring within electrical rooms and mechanical rooms.
- .5 All panel feeders.
- .6 All exposed wiring.
- .7 Home runs to panelboards for all branch circuit wiring. A home run is defined as that portion of the branch circuit wiring that runs between the applicable panelboard, and the room or area in which it terminates, and/or makes its first splice, for drop off, to the applicable branch circuit device. AC90 will not be acceptable for this application. Where the branch circuit has multiple splices and/or drop offs to multiple rooms, the use of AC90 for the drop off is permitted, however, the home run conduit shall be continued until the final room destination or drop off is reached.
- .8 Where noted elsewhere in the contract documents.

.6 EMT shall be installed as a complete system and shall be securely fastened in place within 1 metre (39 inches) of each outlet box, junction box, cabinet, couplings, fittings and changes in direction and the spacing between supports as follows:

.1 Not greater than 1500 mm (five feet) for 16 mm (1/2 inch) and 21 mm (3/4 inch) EMT
.2 Not greater than 1800 mm (six feet) for 27 mm (1 inch) and 35 mm (1-1/4 inch) EMT
.3 Not greater than 3050 mm (ten feet) for 41 mm (1-1/2 inch) EMT or larger.

.7 Install supports to firmly secure conduits to metal decking when any change in direction occurs.

.8 All conduit runs shall be a maximum of 30 meters (100 feet) in length with a maximum of four (4) 90 degree bends between pull points. A pull box shall be placed in conduit runs where the sum of the bends exceeds 360 degrees, where the overall run exceeds 30 meters (100 feet) or there is a reverse bend in the run.

.9 Pull boxes shall be placed in straight sections of conduit run and shall not be used in lieu of a bend. Conduit fittings shall not be used in place of pull boxes or bends. The use of C, LB, LL, LR and T type fittings are prohibited on this project unless written permission is provided by the Engineer.

.10 Pull boxes are to be sized in conformance with CEC Rule 12-3036, unless noted otherwise.

.11 The use of corner pulling ELLs or corner pulling elbows is not permitted.

.12 Conduits shall be installed in a neat and ordered manner. When installed in a group, conduits shall be parallel and evenly spaced apart.

.13 Unless noted otherwise all conduit systems installed below grade or under concrete slabs to be rigid type PVC conduit. All PVC rigid conduits prior to exiting concrete slabs where exposed, to be adapted from PVC conduit to rigid galvanized conduit elbow, with transition to take place below grade.

.14 Where PVC expansion joints are required, install as follows:
.1 Mount expansion joints so that the piston can travel in a straight line.
.2 Firmly attach the expansion joint so that it remains stationary. Ensure that the conduit is loosely mounted in supports to allow for lineal movement as it expands and contracts due to temperature changes.
.3 Spacing of conduit supports must be in accordance with Section 12-1114 of the CEC.
.4 Where more than one expansion joint is required in a run of conduit, consult manufacture's recommendations for proper installation procedures.

.15 Liquid tight metal flexible conduit is not to be used as a general purpose raceway. Use liquid tight flexible metal conduit (maximum length permitted to be 1.5 M) and liquid tight conduit fittings for:
.1 Final connection to all mechanical equipment (fans, pumps, terminal units, etc.) and all vibrating equipment.
.2 Final connection to **all** sprinkler system equipment (flow switches, supervised valves, alarm pressure switches, etc).

.16 Metal flexible conduit may be used for short runs for final connections (For example to fire alarm and security device boxes in suspended ceilings), unless noted otherwise. It must be securely fastened in place within 300 mm (12 inch) of each junction box, cabinet and device. Install specified connectors and bushings. Where supports are required, do not derive support from ceiling support wires on supports of other trades. Do not use liquid tight metal flexible conduit in lieu of metal flexible conduit unless specifically approved by the Engineer for that application.

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

.18 Mechanically bend steel conduit over 19-mm (3/4 inch) diameter.

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

.20 Install fish cord in empty conduits.

.21 Run 2 – 27 mm (1 inch) spare conduits up to nearest accessible ceiling space from each flush panel. Terminate these conduits in one 150-mm X 150 mm X 100 mm (6 inch X 6 inch X 4 inch) junction box in nearest accessible ceiling space or in case of an exposed concrete slab, terminate conduits in a flush concrete type box.

.22 Where conduits become blocked, remove and replace blocked section.

.23 Dry conduits out before installing wire.

.24 The installation of conduits above the structure, directly below roof insulation is strictly prohibited.

.25 All conduits to be complete with minimum #12 green insulated bond conductor.

.26 Ensure all metal raceways are bonded to ground, including those used for communication systems, fire alarm systems. Where a separate bonding conductor is run to a bonding bushing on an open end of a metal raceway, a #6 green RW90 shall be used.

3.2 SURFACE AND CONCEALED CONDUITS

.1 Run parallel or perpendicular to building lines. When installed in a wall cavity, conduit is to be installed vertically from outlet box to ceiling space, not run in an angled manner through the studs.

.2 Run conduits in flanged portion of structural steel.

.3 Group conduits wherever possible.

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

.5 Do not locate conduits closer than 75-mm (3 inch) parallel to hot water lines with a minimum of 25 mm (1 inch) at crossovers.

.6 Support of electrical systems raceway shall be independent of any type of suspended ceiling support rods, wires, etc. Toggle bolts shall not be used in Gypsum board construction.

3.3 CONCEALED CONDUITS

.1 Do not install horizontal runs in masonry walls.

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

********END OF SECTION ********

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 RELATED WORK:

.1 Electrical Contractor will provide all plywood backboards required for mounting electrical equipment.

1.3 RELATED SECTIONS:

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

.2 Section 26 05 03 - Electrical Identification.

.3 Section 26 28 16.02- Molded Case Circuit Breakers.

1.4 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Division 1.

.2 Drawings to include electrical detail of panel, branch breaker type, quantity, ampacity and enclosure dimension.

2 Products

2.1 LIGHTING & BRANCH CIRCUIT PANELBOARDS

.1 Panelboards: as indicated on drawings.

.2 Short Circuit Current Ratings:
- .1 All panelboard bus structures must be designed to withstand the magnetic forces generated by fault current passing through them at the installed location in the distribution system.

.3 Sequence phase bussing with odd numbered breakers on left and even on right, with each breaker identified by permanent number identification as to circuit number and phase.

.4 Panelboards: mains, number of circuits, and number and size of branch circuit breakers as indicated.

.5 Two keys for each panelboard and key panelboards alike.

.6 Bus Bars:
- .1 Lugs to be rated for CU/AL.
- .2 Tin-plated copper.
- .3 Neutral to have same ampacity rating as main bus, unless noted otherwise.

.7 Mains: To accommodate bolt-on type Circuit breakers only.

.8 All feeder conductors (phase, neutral and bonds) are to be terminated in factory provided multi-barrel lugs (Each conductor is to be provided with an individual, suitably sized connection point) with a single connection point to the bus bar. Multiple conductor type connection lugs under one screw are not acceptable (For example CMC-LA- 750 (2) style).

.9 Provide trim and doors on all panelboards.

.10 Provide drip hoods on all surface mounted panelboards.

.11 Trim and door finish: grey enamel.

.12 All panelboards to have factory installed bonding terminal strip.

.13 Panel tubs to be a minimum of 508 mm (20 in.) wide, 146 mm (6 in.) deep for ampacity up to 225 amperes, unless noted otherwise.

2.2 BREAKERS

.1 Breakers: to Section 26 28 16.02.

.2 Breakers with thermal magnetic tripping in panelboards, unless noted otherwise.

2.3 EQUIPMENT IDENTIFICATION AND PANEL DIRECTORY

.1 Provide lamicoid identification plates for all Panelboards in accordance with Section 26 05 03.

.2 Provide a complete circuit directory with typewritten legend indicating location and load of each circuit. All branch circuits such as lighting, receptacle, etc. to be identified by the room they terminate in. Panel directory is to be formatted so that odd numbered circuits appear on left of card; even numbered circuits appear on right. Identify all spare breakers. Panel directory is to include the number of breaker positions available in that particular panel, 72 circuit panel will require a single directory with a total of 72 spaces.

.3 Provide lamicoid identification plates for each breaker in each Distribution Panelboard.

2.4 STANDARD OF ACCEPTANCE

.1 Lighting and branch circuit panelboards:
- .1 Cutler- Hammer
  - .1 POW-R-LINE 1 & 2
  - .2 POW- R-LINE 3a

2.5 ACCEPTABLE MANUFACTURERS TO THE REQUIREMENTS ABOVE:

.1 Siemens.

.2 Square D.

3 Execution

3.1 INSTALLATION

.1 Locate panelboards as indicated and mount securely, plumb true and square, to adjoining surfaces. The Electrical Contractor will provide fire retardant plywood backboards for mounting electrical equipment, unless noted otherwise.

.2 Mount panelboards to height specified in Section 26 05 00 or as indicated. Ensure that the operating handle of the top mounted device is with-in two metres of the finished floor.

.3 Raceways entering into wall mounted panelboards shall be mechanically secured to the tub, and shall be mechanically continuous throughout the run.

.5 Connect feeder conductors to panel lugs. For proper termination of conductors, it is very important that field connections be properly tightened. Obtain manufacturer's recommended torque for the type of connection and wire type and gauge. Using a properly set up torque wrench, torque each termination to manufacturer's setting. In the absence of Manufacturer's instructions, make terminations in conformance with the values given in Tables D6 and D7 of the 2018 CEC. Using a RED felt tip marker, mark each terminal with a diagonal line to indicate a complete termination. The torque wrench being used for terminations must have been calibrated by a recognized company within the last year, indicated by a sticker on the torque wrench showing the date the calibration was done.

.6 Connect neutral conductors to common neutral bus.

.7 Connect bonding conductors to common bonding bar.

.8 Connect loads to circuits as indicated.

.9 Provide separate neutral conductors for all circuits feeding lighting equipment from panelboards.

.10 Provide a wire nut on each unused GFCI circuit breaker neutral conductor. Where neutral conductor cannot reach the neutral bar splice an appropriate length of white insulated conductor using a butt splice.

.11 AC-90 cables are not permitted to enter panelboards under any circumstances.

.14 Provide a CSA Z462-15 Workplace Electrical Safety compliant warning label on each panelboard.

3.2 PANELBOARD START-UP, VERIFICATION AND PERFORMANCE TESTING

.1 Start-Up
- .1 Perform start-up checks paying particular attention to:
  - .1 Name plate complete.
  - .2 Proper grounding.
  - .3 Drip hood in place.
  - .4 Clean equipment.

.5 Condition of insulation and insulators.
.6 Evidence of moisture damage.
.7 Cable lugs torqued to manufacturer's recommendation.
.8 Bus bolts torqued to manufacturer's recommendation.
.9 Doors and covers in place.
.10 Code required clearances around equipment.
.11 Exterior and paint finish.
.12 Insulation Megger tests.

.2 Verification
.1 Perform verification checks paying particular attention to:
.1 Manufacturer
.2 Voltage
.3 Main Bus Rating
.4 Copper Busing
.5 Copper Ground Bus
.6 Phase Rotation Test
.7 Feeder Breakers

.3 Performance
.1 Carry out performance checks:
.1 Test Feeder Breakers and Trip Units.

3.3 COMMISSIONING

.1 Commission the system in accordance with 26 91 13.

********END OF SECTION ********

1 General

1.1 GENERAL

1. The General Conditions of the contract as well as provisions of Division 1 are part of and to be read in conjunction with this Section.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Submittal Procedures.

1.3 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Division 1.

.2 Indicate:
- .1 Configuration of identified compartments.

.3 Project Specific Wiring Diagrams:
- .1 Refer to the MC drawings for individual motor starter control wiring diagrams and sequences of operation.
- .2 Submit with each starter a project specific wiring diagram indicating all interconnections. Ensure drawing includes terminals for each connection to the Building Automation System (BAS).
- .3 Each starter shop drawing will indicate the equipment being controlled (For example- Exhaust Fan EF-11).

1.4 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for motor control centre for incorporation into manual specified in Division 1.

.2 Include data for each type and style of starter.

2 Products

2.1 MATERIALS

.1 The MCC is existing, manufactured by Siemens (MCC #3).

2.2 SUPPLY CHARACTERISTICS

.1 347/600 VAC, 3 Phase, 4 Wire.

2.3 MOTOR STARTERS AND DEVICES

.1 Full Voltage Non Reversing Units
- .1 Combination magnetic starters of size, type, rating and enclosure type as indicated with components as follows:
  - .1 Contactor solenoid operated, rapid action type.

.2 Motor solid state, electronic, overload protective device (EOL) in each phase ambient compensated, manually reset from outside enclosure, c/w
  .1 One current sensor in each phase.
  .2 Dial selectable overload protection.
  .3 Selectable (on/off) phase imbalance.
  .4 Selectable (on/off) ground fault.
.3 Power and control terminals.
.4 Project specific wiring and schematic diagram inside starter enclosure in visible location.
.5 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.

.2 Combination type starters to include magnetic only circuit breaker (MCP), where indicated with operating lever on outside of enclosure to control circuit breaker, and provision for:
  .1 Locking in "OFF" position with up to 3 padlocks.
  .2 Locking in "ON" position.
  .3 Independent locking of enclosure door.
  .4 Provision for adjustable trip settings of 700 - 1300 % of motor FLA.

.3 Accessories:
  .1 Selector switches: labeled as indicated.
  .2 Indicating lights: LED type and colour as indicated.
  .3 1-N/O and 1-N/C spare auxiliary contacts unless otherwise indicated.
  .4 Manual overload reset button on enclosure exterior.
  .5 Control transformer, **347/120 VAC**, minimum 100 VA.

.4 Short Circuit Interrupting Rating:
  .1 To match existing.

.5 Each starter will be equipped with a project specific wiring diagram located inside the cover in a plastic sleeve.

2.4 STARTER UNIT COMPARTMENTS

.1 Plug-in type with self-disconnect. Guide rail supports for units to ensure that stabs make positive contact with vertical bus. Provision for units to be installed or removed, off load, while buses energized.

.2 Unit mounting:
  .1 Engaged position - unit stabbed into vertical bus.
  .2 Withdrawn position - unit isolated from vertical bus but supported by structure.
  .3 Provision for positive latching in either engaged or withdrawn position and padlocking in withdrawn position.
  .4 Stab-on connectors free floating silver-plated clips, self-aligning, backed up with steel springs.

.3 External operating handle of circuit switch interlocked with door to prevent door opening with switch in "on" position. Provision for 3 padlocks to lock operating handle in "off" position and lock door closed.

.4 Hinge unit doors on same side.

.5 Overload relays manually reset from front with door closed.

.6 Pushbuttons and indicating lights mounted on door front.

.7 Terminal strips to allow for connection of building control system components and devices.

.8 Devices and components by one manufacturer to facilitate maintenance.

2.5 BUILDING AUTOMATION SYSTEM CONTROL COMPONENTS

.1 Provide factory installed solid core current sensors to monitor line current and mechanical relay and relay base to switch the controlled load in the starter enclosure. Wire all connections to a factory installed terminal strip. Label each conductor and terminal accordingly.

.2 Confirm manufacturer and part number for the current sensor and control relay required by the Building Automation System (BAS) contractor for this project, prior to submitting shop drawings. For example:

.1 Typical Automated Logic Controls:

.1	Current Sensor:	Greystone Model CS-650 R1.
.2	Control Relay:	Veris Industries DPDT #VMD2B Relay with a 24 V coil and 120 VAC, 10 Amp contacts to switch motor control circuit and plug-in base.

.3 All components and entire assembly to be CSA approved.

.4 All items (current sensors, etc.) affecting starter CSA certification (or equivalent) are to be factory installed. Field certification is to be avoided.

2.6 BUILDING CONTROL SYSTEM COMPONENT CONNECTIONS

.1 Obtain the mechanical control system drawings and review the wiring diagram and sequence of operation associated with each motor. Provide internal starter wiring as required. Wire all connections to a factory installed terminal strip to allow for field termination by the mechanical contractor.

.2 All components and entire assembly to be CSA approved.

2.7 WIRING IDENTIFICATION

.1 Provide wiring identification in accordance with Section 26 05 03.

2.8 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 03.

2.9 COORDINATION

.1 Coordinate with mechanical contractor.

2.10 STANDARD OF ACCEPTANCE

.1 Siemens, to match existing

3 Execution

3.1 INSTALLATION

.1 Install starter as indicated in existing MCC#3.

.2 Make field power and control connections as indicated. Refer to Motor Starter and Control drawings for division of responsibility.

.3 Final connection to motors to the building power distribution system:

.1 The conductor phase colour coding as per C.E.C. rule 4-038 will carry through from the incoming service point to the motor starter and to the final connection to each motor. In the instance that a three phase motor requires transposition of phase conductors to achieve proper rotation, the change is to take place at the motor terminal box. Changing the motor feeder phase conductors at any other point in the distribution system (for example at the MCC or starter) will not be acceptable.

.4 Before energizing the Motor Control Center (MCC), conduct a thorough inspection to make certain that all foreign materials such as tools, scraps of wire and other debris are removed from all units and the structure. Remove any accumulation of dust and dirt with a vacuum cleaner.

.5 All circuit connections are tightened at time of assembly by power-driven tools with controlled torque. However, the vibrations experienced in transit may loosen some of these connections. Check all of the total connections for a tight connection. The connections to be checked include bus hardware, circuit breaker and switch terminals, contactor and relay terminals and terminal blocks. Check the incoming line connections. Tighten to the torque values shown in Manufacturer's literature.

.6 Compare all circuits for agreement with the wiring diagrams which accompany the MCC. Be sure that each motor is connected to its intended starter.

.7 Make certain that field wiring is clear of live busses and physically secured to withstand the effects of fault current.

.8 Check to determine that all grounding connections are made properly.

.9 Check all devices for damage. Make all necessary repairs or replacements, prior to energizing.

.10 Manually exercise all switches, circuit breakers and other operating mechanisms to make certain that they are properly aligned and operate freely.

.11 Ensure that Motor Circuit Protectors (MCPs) adjustable current trip mechanisms match the full-load current shown on the nameplate of each motor and the manufacturer's setpoint table.

.12 Ensure that solid-state overload relays are installed and adjusted to match the full-load current shown on the nameplate of each motor and comply with CEC, Rule 28-306 and set to trip at no more than the following:
- .1 125% of the FLA rating of a motor having a service factor of 1.15 or greater.
- .2 115% of the FLA rating of a motor having a service factor that is unmarked or less than1.15.

.13 Conduct an electrical insulation resistance test and make sure that the MCC and field wiring are free from short circuits and grounds. Do this test phase-to-phase, phase-to-ground, and phase-to-neutral with the switches or circuit breakers opened.

.14 Install covers, close doors, and make certain that no wires are pinched and that all enclosure parts are properly aligned and tightened.

.18 Provide Arc Flash warning label to suit NSPI.

3.2 START-UP, VERIFICATION AND PERFORMANCE TESTING

.1 Start-Up
- .1 Perform start-up checks paying particular attention to:
  - .1 Name plate complete.
  - .2 Proper grounding.
  - .3 Drip hood in place.
  - .4 Clean equipment.
  - .5 Condition of insulation and insulators.
  - .6 Evidence of moisture damage.
  - .7 Cable lugs torqued to manufacturer's recommendation.
  - .8 Bus bolts torqued to manufacturer's recommendation.
  - .9 Doors and covers in place.
  - .10 Wiring diagram is inside each wrapper.
  - .11 Code required clearances around equipment.
  - .12 Exterior and paint finish.
  - .13 Insulation Megger tests.

.2 Verification
- .1 Perform verification checks paying particular attention to:
  - .1 Manufacturer
  - .2 Voltage
  - .3 Main Bus Rating
  - .4 Bus Bracing
  - .5 Copper Busing
  - .6 Copper Ground Bus
  - .7 Phase Rotation Test
  - .8 Breakers (MCP and Thermal/magnetic type).

.3 Performance
- .1 Carry out performance checks:
  - .1 Test overecurrent devices.
  - .2 Test overload Trip Units.

3.3 TESTS

.1 Ensure moving and working parts are lubricated where required.

.2 Operate starters in sequence to prove satisfactory performance of motor control centre during 8h period.

.3 Check that starters operate as indicated and to requirements of the mechanical contractor.

3.4 RECORDS

.1 Obtain the following information for each motor and record.
- .1 Motor horsepower.
- .2 Motor voltage.
- .3 Motor full load amps - (both nameplate and site measured values).
- .4 Installed overload units.
- .5 Installed over current protection. (Trip Unit)
- .6 MCP adjustments. (In Amperes).

.2 Submit chart to Engineer for approval and make changes where instructed.

.3 Incorporate in maintenance manuals.

3.5 COMMISSIONING

.1 Commission the system in accordance with 26 91 13.

********END OF SECTION ********

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Submittal Procedures.

1.3 RELATED SECTIONS:

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

.2 Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

.3 Section 26 28 20 - Ground Fault Circuit Interrupters Class A

1.4 REFERENCES:

.1 Canadian Standards Association (CSA International)
- .1 CSA-C22.2 No.42-99 (R2002), General Use Receptacles, Attachment Plugs and Similar Devices.
- .2 CSA-C22.2 No.42.1-00, Cover Plates for Flush-Mounted Wiring Devices (Bi-national standard, with UL 514D).
- .3 CSA-C22.2 No.55-M1986 (July 2001), Special Use Switches.
- .4 CSA-C22.2 No.111-00, General-Use Snap Switches (Bi-national standard, with UL 20, twelfth edition).

1.5 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility.

2 Products

2.1 SWITCHES

.1 20 A, 120 V single pole, three-way, four-way switches as indicated.

.2 Manually-operated general purpose AC switches, extra heavy duty, industrial series, toggle type, as indicated and with the following features:
- .1 Terminal holes approved for No. 10 AWG wire.

.2 Silver alloy contacts.
.3 Urea or melamine molding for parts subject to carbon tracking.
.4 Suitable for back and side wiring.
.5 White toggle.

.3 Maximum continuous current: 20 Amps.

.4 Switches of one manufacturer throughout project.

.5 Standard of Acceptance: Hubbell No. HBL1221WCN.

.6 Acceptable manufacturers: Cooper Wiring Devices, Leviton, Pass & Seymour.

2.2 RECEPTACLES

.1 Unless specified otherwise, duplex receptacles, CSA type 5-15 R, 125V, 15 A, U ground, specification grade, with the following features:
.1 Reinforced thermoplastic base and deep nylon body.
.2 Impact resistant nylon face, complete with finder grooves.
.3 One piece brass mounting strap with integral ground contacts.
.4 Suitable for No. 10 AWG for back and side wiring.
.5 Break-off links for use as split receptacles.
.6 Eight back wired entrances, four side wiring screws.
.7 Double wipe contacts.
.8 White in color.
.9 Standard of Acceptance: Hubbell No. HBL5252WCN
.10 Acceptable Manufacturers:
.1 Leviton #5262.
.2 Pass and Seymour #PS5262
.3 Cooper Wiring Device #AH5262W.

.2 Duplex receptacles where indicated: CSA 5-20R, 125V, 20A U ground as above, except Hubbell No. HBL5352 WCN.

.3 Duplex receptacles, ground fault where indicated: CSA 5-15R, 125V, 15A U ground as above, except Hubbell No. GF5262 WCN.

.4 Standard USB Charger Duplex receptacles, tamper resistant: Two (2) USB Type 2.0, 3.0 amps, 5 VDC and two (2) CSA 5-15R, 125 V, 15A U ground receptacles as above, Hubbell # USB15X2W.

.5 Two pole, three wire grounding receptacle where indicated: CSA 5-30R, 30 amp, single phase, 125 VAC, heavy duty, specification grade, Hubbell # HBL9308.

.6 Three pole, thirty amp, four wire grounding receptacle where indicated: CSA 14-30R, 30 amp, single phase, 125/250 VAC, heavy duty, specification grade, Hubbell # HBL9430A.

.7 Three pole, fifty amp, four wire grounding receptacle where indicated: CSA 14-50R, 50 amp, single phase, 125/250 VAC, heavy duty, specification grade, Hubbell # HBL9450A.

.8 Three pole, sixty amp, four wire grounding receptacle where indicated: CSA 15-60R, 60 amp, three phase, 250 VAC, heavy duty, specification grade, Hubbell # HBL8460A.

.9 Two pole, three wire, Surge Protective receptacle with light and alarm, blue colour: CSA 5-20R, 125V, 20A U ground, Hubbell No. HBL5362SA, 240 joules/20KA per mode.

.10 Receptacles of one manufacturer throughout project.

.11 Acceptable manufacturers: Leviton, Pass & Seymour.

2.3 COVER PLATES

.1 Cover plates are required for all wiring devices.

.2 Cover plates from one manufacturer throughout project.

.3 Sheet steel utility box cover for wiring devices installed in surface-mounted utility boxes.

.4 Stainless steel, vertically brushed, 1 mm thick cover plates for wiring devices mounted in flush-mounted outlet box.

.5 Sheet metal cover plates for wiring devices mounted in surface-mounted FS or FD type conduit boxes, complete with four screws.

.6 For four inch square boxes in above ceiling applications, 3/8 inch (9.5 mm) raised surface covers as follows:
- .1 One duplex receptacle: Iberville Cat# BC-8365.
- .2 One toggle switch: Iberville Cat# BC-8361.

.7 Exterior receptacles shall be equipped with cover plates which are marked “Extra Duty” in compliance with CEC Rule 26-702 (2).

3 Execution

3.1 INSTALLATION

.1 Switches:
- .1 Install single throw switches with handle in "UP" position when switch closed.
- .2 Install switches in gang type outlet box when more than one switch is required in one location.
- .3 Mount toggle switches at height specified in Section 26 05 00 or as indicated.
- **.4 Each line voltage switch is to be wired with the neutral conductor extended to the device box.**

.2 Interior Receptacles:
- .1 Install receptacles in gang type outlet box when more than one receptacle is required in one location.
- .2 Mount receptacles at height specified in Section 26 05 00 or as indicated.
- .3 All receptacles to be polarity tested.
- .4 Install with U-ground up.

.5 Receptacles shall project a minimum of 3 mm (.125 in) from metal face plates.
.6 All receptacles to be mounted level and plumb.
.7 For above ceiling applications, outlet box is to be 100 mm (4 inch) square, c/w with raised surface covers.

.3 Exterior Receptacles:
.1 Mount back box, recessed in wall at height specified in Section 26 05 00 or as indicated, to permit the receptacle to be installed flush with wall.
.2 Wire and connect device and install with U-ground up.
.3 Apply caulking compound to back of cover to provide waterproof seal.
.4 All receptacles to be polarity tested.

.4 Cover plates:
.1 Protect stainless steel cover plate finish with paper or plastic film until painting and other work is finished.
.2 Install suitable common cover plates where wiring devices are grouped.
.3 Do not use cover plates meant for flush outlet boxes on surface-mounted boxes.
.4 Use "FS" coverplates for all "FS" boxes.
.5 For weatherproof installations, use cast aluminum,“While-in-use” cover marked for extra duty.

.5 Identification:
.1 Identify all receptacles as per 26 05 03.

3.2 COMMISSIONING

.1 Carry out the commissioning in conformance with Section 26 91 13.

********END OF SECTION ********

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Division 1.

1.3 DELIVERY AND STORAGE

.1 Ship fuses in original containers.

.2 Store fuses in original containers.

2 Products

2.1 FUSES GENERAL

.1 Low voltage, current limiting, HRC fuses, types as specified below and shall be CSA certified.

.2 Fuses shall meet the following parameters:
- .1 Fast Acting
  - .1 Rating: 1 – 600 amps.
    - .1 CSA certified to Standard C22.2 No. 248.8.
    - .2 200 KAIR.
    - .3 Class J.
    - .4 Ferraz Shawmut A4J.
- .2 Time Delay
  - .1 Rating: 1 – 600 amps.
    - .1 CSA certified to Standard C22.2 No. 248.8.
    - .2 200 KAIR.
    - .3 Class J.
    - .4 Ferraz Shawmut AJT.

.3 Fuses shall be so selected as to provide a fully coordinated system for both overload and short circuit fault conditions.

2.2 STANDARD OF ACCEPTANCE.

.1 FerrazShawmut

2.3 ACCEPTABLE MANUFACTURERS.

.1 Bussmann.

.2 English Electric.

3 Execution

3.1 INSTALLATION

.1 Install fast acting or time delay fuses, as indicated.

.2 Install fuses in mounting devices immediately before energizing circuit.

.3 All fusible equipment rated 600 amps or less shall be supplied with fuse clips to accept Class J fuses.

.4 Ensure correct fuses are fitted to physically matched mounting devices.

.5 Ensure correct fuses fitted to assigned electrical circuit.

******END OF SECTION******

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 RELATED SECTIONS

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

.2 Section 26 24 16.01 - Panelboards Breaker Type

1.3 WASTE MANAGEMENT AND DISPOSAL

.1 Separate and recycle waste materials.

.2 Remove from site and dispose of packaging materials at appropriate recycling facilities.

.3 Collect and separate for disposal packaging material for recycling in accordance with Waste Management Plan.

.4 Divert unused metal and wiring materials from landfill to metal recycling facility.

1.4 REFERENCES

.1 Canadian Standards Association (CSA International).

.1 CSA-C22.2 No. 5-02, Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures (Tri-national standard with UL 489, tenth edition, and the second edition of NMX-J-266-ANCE).

1.5 SUBMITTALS

.1 Submit product data in accordance with Division 1 - Submittal Procedures.

.2 Include time-current characteristic curves for breakers.

2 Products

2.1 BREAKER GENERAL

.1 Bolt-on, molded case circuit breaker, quick make, quick-break type, for manual and automatic operation with temperature compensation for 40 degrees Celsius ambient.

.2 Plug-in molded case circuit breakers, not accepted.

.3 Common-trip breakers with single handle for multipole applications.

.4 Magnetic instantaneous trip elements in circuit breakers, to operate only when the value of current reaches setting.

.5 Short Circuit Interrupting Ratings:
- .1 All circuit breakers must be fully rated to withstand the voltage and available fault current at their terminals at the installed location in the distribution system.
- .2 Series rated combinations (Integrated Equipment Rating) of circuit breakers, as per CEC, Rule 14-014 is not acceptable and cannot be applied to this project.
- .3 Unless otherwise noted, all circuit breakers are to be fully rated for a minimum symmetrical short circuit fault current of not less than 10 KA @ 240 volts.

.6 All circuit breakers sized 225 amps and above are to be supplied with extension handles.

2.2 THERMAL MAGNETIC BREAKERS

.1 Molded case circuit breaker to operate automatically by means of thermal and magnetic tripping devices to provide inverse time current tripping. Under overload conditions and instantaneous tripping for short circuit protection.

.2 All circuit breakers rated 150 amps and above are to be supplied with adjustable magnetic trip units, unless noted otherwise.

2.3 MAGNETIC BREAKERS

.1 Molded case circuit breakers to operate automatically by means of adjustable magnetic devices for motor circuit protection.

2.4 BREAKER TYPE GROUND FAULT CIRCUIT INTERRUPTER

.1 Single pole, Class A, ground fault circuit interrupter for 15 or 20 amp, as indicated, 120 VAC, single phase circuit, C/W test and reset facilities.

.2 Interrupt the circuit to the load when ground fault current is 6 milliamps (mA) or more.

.3 Must be marked “GFCI CL A”.

2.5 STANDARD OF ACCEPTANCE

.1 Eaton.

2.6 ACCEPTABLE MANUFACTURERS

.1 Siemens.

.2 Square D.

3 Execution

3.1 INSTALLATION

.1 Install circuit breakers as indicated.

3.2 COMMISSIONING

.1 Carry out the commissioning in conformance with Section 26 91 13.

********END OF SECTION ********

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 PRODUCT DATA

.1 Submit product data in accordance with Division 1.

2 Products

2.1 DISCONNECT SWITCHES

.1 Heavy Duty, non-fusible and fusible disconnect switch, number of poles as indicated, housed in CSA Enclosure as indicated.

.2 Provision for padlocking in on-off switch position.

.3 Mechanically interlocked door to prevent opening when handle in ON position.

.4 Quick-make, quick-break action.

.5 ON-OFF switch position indication on switch enclosure cover.

.6 Fuse clips to accommodate Class J only.

.7 Supply HRC-I-J fuses for all fused disconnect switches, unless indicated otherwise.

.8 Exterior disconnect switches to be Type 316 grade stainless steel, Type 3R, c/w viewing window to see blade position (Option W).

2.2 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 03.

2.3 MANUFACTURERS

.1 Standard of Acceptance:
- .1 Cutler-Hammer.

.2 Acceptable Manufacturer:
- .1 Square D.
- .2 Siemens.

3 Execution

3.1 INSTALLATION

.1 Install disconnect switches as indicated.

.2 Install fuses in disconnect switches.

*****END OF SECTION******

1 General

1.1 GENERAL

.1 The General Conditions of the contract as well as provisions of Division 1 are part of and to be read in conjunction with this Section.

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit shop drawings and product data in accordance with Division 1.

.2 Indicate:
- .1 Mounting method and dimensions.
- .2 Starter size and type.
- .3 Layout of identified internal and front panel components.
- .4 Enclosure types.
- .5 Wiring diagram for each type of starter.
- .6 Interconnection diagrams.
- .7 Equipment being controlled, making reference to the Motor Starter and Control list.

.3 Project Specific Wiring Diagrams:
- .1 Refer to the control drawings for individual motor starter control wiring diagrams and sequences of operation.
- .2 Submit with each starter a project specific wiring diagram indicating all interconnections.
- .3 Each starter shop drawing will indicate the equipment being controlled (For example- Supply fan #1).

1.3 OPERATION AND MAINTENANCE DATA

.1 Provide data for incorporation into maintenance manual specified in Division 1.

.2 Include operation and maintenance data for each type and style of starter.

1.4 SPARE PARTS

.1 Provide spare parts as indicated in 26 05 01.

2 Products

2.1 MATERIALS

.1 All individual starters and motor control centre starters are to be of one manufacturer.

.2 Starters: EEMAC E14-1.
- .1 Half size starters not acceptable.

2.2 MANUAL MOTOR STARTERS

.1 Single phase manual motor starters of size, type, rating, and enclosure type as indicated, with components as follows:
- .1 Switching mechanism, quick make and break.
- .2 One overload heater, manual reset, trip indicating handle.

.2 Accessories:
- .1 Toggle switch: standard labeled as indicated.
- .2 Indicating light: LED type and colour as indicated.
- .3 Locking tab to permit padlocking in "ON" or "OFF" position.

2.3 FULL VOLTAGE MAGNETIC STARTERS

.1 Combination magnetic starters of size, type, rating and enclosure type as indicated with components as follows:
- .1 Contactor solenoid operated, rapid action type.
- .2 Motor solid state overload protective device in each phase ambient compensated, manually reset from outside enclosure, c/w
  - .1 One current sensor in each phase.
  - .2 Dial selectable overload protection.
  - .3 Phase loss protection.
- .3 Power and control terminals.
- .4 Project specific wiring and schematic diagram inside starter enclosure in visible location.
- .5 Identify each wire and terminal for external connections, within starter, with permanent number marking identical to diagram.

.2 Combination type starters to include magnetic only circuit breaker, where indicated with operating lever on outside of enclosure to control circuit breaker, and provision for:
- .1 Locking in "OFF" position with up to 3 padlocks.
- .2 Locking in "ON" position.
- .3 Independent locking of enclosure door.
- .4 Provision for adjustable trip settings of 700 - 1300 % of motor FLA.

.3 Accessories:
- .1 Selector switches: labeled as indicated.
- .2 Indicating lights: LED type and colour as indicated.
- .3 1-N/O and 1-N/C spare auxiliary contacts unless otherwise indicated.
- .4 Manual overload reset button on enclosure exterior.
- .5 Control transformer, voltage as indicated, minimum 150 VA.

.4 Wiring Diagrams:
- .1 Each starter will be supplied with a project specific wiring diagram located inside the cover in a plastic sleeve.

2.4 CONTROL COMPONENTS

.1 Provide factory installed solid core current sensors to monitor line current and mechanical relay and relay base to switch the controlled load in each and every starter enclosure. Wire all connections to a factory installed terminal strip. Label each conductor and terminal accordingly.

.2 Confirm manufacturer and part number for the current sensor and control relay required by the Building Automation System (BAS) contractor for this project, prior to submitting shop drawings. For example:

.1 Typical Automated Logic Controls:

.1 Current Sensor: Greystone Model CS-650 R1.

.2 Control Relay: Veris Industries DPDT #VMD2B Relay with a 24 V coil and 120 VAC, 10 Amp contacts to switch motor control circuit and plug-in base.

.3 All components and entire assembly to be CSA approved.

.4 All items (current sensors, etc.) affecting starter CSA certification (or equivalent) are to be factory installed. Field certification is to be avoided.

2.5 ENCLOSURE

.1 Provide EEMAC 1 enclosures for all starters unless indicated otherwise.

2.6 COORDINATION

.1 Coordinate with mechanical contractor.

2.7 STANDARD OF ACCEPTANCE

.1 Cutler-Hammer MS Series manual motor starters.

.2 Cutler-Hammer – Freedom NEMA c/w CEP7 solid state overload relay.

2.8 ACCEPTABLE MANUFACTURERS

.1 Acceptable manufacturer: Furnas, Square D, Allen Bradley, Siemens.

3 Execution

3.1 INSTALLATION OF STARTERS

.1 Install starters, connect power and control as indicated.

.2 All manual motor starters are to be installed in a recessed backbox unless the starter is installed in a mechanical or an electrical room.

.3 Make field power and control connections as indicated. Refer to Motor Starter and Control drawings for division of responsibility.

.4 Final connection to motors:

.1 The conductor phase colour coding as per C.E.C. rule 4-038 will carry through from the incoming service point to the motor starter and to the final connection to each motor. In the instance that a three phase motor requires transposition of phase conductors to achieve proper rotation, the change is to take place at the motor terminal box. Changing the motor feeder phase conductors at any other point in the distribution system (for example at the starter) will not be acceptable.

.5 Before energizing the starter, conduct a thorough inspection to make certain that all foreign materials, scraps of wire and other debris are removed from the enclosure. Remove any accumulation of dust and dirt with a vacuum cleaner.

.6 Check all devices for damage. Make all necessary repairs or replacements, prior to energizing.

.7 Ensure that Motor Circuit Protectors (MCPs) adjustable current trip mechanisms match the full-load current shown on the nameplate of each motor and the manufacturer's setpoint table.

.8 Ensure that solid-state overload relays are installed and adjusted to match the full-load current shown on the nameplate of each motor and comply with CEC, Rule 28-306 and set to trip at no more than the following:
- .1 125% of the FLA rating of a motor having a service factor of 1.15 or greater.
- .2 115% of the FLA rating of a motor having a service factor that is unmarked or less than1.15.

.9 Provide NSPI compliant ARC FLASH warning labels.

3.2 MOTOR STARTER START-UP, VERIFICATION AND PERFORMANCE TESTING

.1 Start-Up
- .1 Perform start-up checks paying particular attention to:
  - .1 Name plate complete.
  - .2 Proper grounding.
  - .3 Clean equipment.
  - .4 Evidence of moisture damage.
  - .5 Cable lugs torqued to manufacturer's recommendation.
  - .6 Doors and covers in place.
  - .7 Code required clearances around equipment.
  - .8 Exterior and paint finish.

.2 Verification
- .1 Perform verification checks paying particular attention to:
  - .1 Manufacturer
  - .2 Voltage
  - .3 Phase Rotation Test
  - .4 Breakers (MCP and Thermal/magnetic type)

.3 Performance
- .1 Carry out performance checks:
  - .1 Test overecurrent devices.
  - .2 Test overload Trip Units.

3.3 TESTS

.1 Operate switches to verify correct functioning.

.2 Perform starting and stopping.

.3 Check that starters operate as indicated and to requirements of the mechanical contractor.

3.4 RECORDS

.1 Obtain and record the following information for each motor.
- .1 Motor horsepower.
- .2 Motor voltage.
- .3 Motor full load amps (both nameplate and site measured valves).
- .4 Installed solid state overload unit's setpoint.
- .5 Installed over current protection.
- .6 Motor circuit protector setpoint, where applicable.

.2 Submit chart to Engineer for approval and make changes where instructed.

.3 Incorporate in maintenance manuals.

3.5 COMMISSIONING

.1 Carry out the commissioning in conformance with Section 26 91 13.

********END OF SECTION ********

The Executed Agreement including General Conditions and Supplementary Conditions, Division 01, applicable drawings and amendments are part of and are to be read in conjunction with this Section.

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 REFERENCES

.1 Canadian Standards Association (CSA International)

.2 Underwriters' Laboratories of Canada (ULC).

1.3 ACTION AND INFORMATIONAL SUBMITTALS

.1 Provide submittals in accordance with Division 1 - Submittal Procedures.

.2 Product Data:

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

.2 Provide complete photometric data prepared by independent testing laboratory for luminaires where specified.

1.4 DELIVERY, STORAGE AND HANDLING

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

.2 Packaging Waste Management: remove for reuse.

.3 Divert unused metal materials from landfill to metal recycling facility.

.4 Disposal and recycling of fluorescent lamps as per local regulations.

1.5 SHOP DRAWINGS AND PRODUCT DATA

.1 Submit complete photometric data prepared by independent testing laboratory for luminaires specified, for review by Consultant. Include disc containing IES formatted photometric data.

1.6 LED DRIVER AND FIXTURE LIMITED WARRANTY

.1 All fixtures (LEDs, drivers, modules, circuit boards, components, etc.) are required to be supplied with a minimum of a five (5) year warranty, as follows:

.1 If the fixture, or any component fails within this time frame, the manufacturer shall supply replacement parts at no charge.

1.7 SPARE PARTS

.1 Provide spare parts as per 26 05 01.

2 Products

2.1 FINISHES

.1 Polyester powder finish:
- .1 Conditioning of metal before painting:
  - .1 For corrosion resistance conversion coating to CGSB 31-GP-103Ma.
  - .2 For paint base, conversion coating to CGSB 31-GP-105 Ma, CGSB 31-GP-106M.
- .2 Metal surfaces of luminaire housing and reflectors finished with baked white polyester powder enamel to give smooth, uniform appearance, free from pinholes or defects.
- .3 Surfaces finished as follows:
  - .1 White, minimum reflection factor 90%.
  - .2 Colour fastness: yellowness factor not above 0.02 and after 250 h exposure in Atlas fade-ometer not to exceed 0.05.
  - .3 Film thickness, not less than 0.03 mm average and in no areas less than 0.025 mm.
  - .4 Gloss not less than 80 units as measured with Gardner 60° gloss meter.
  - .5 Flexibility: withstand bending over 12 mm mandrel without showing signs of cracking or flaking under 10 times magnification.
  - .6 Adhesion: 24 mm square lattice made of 3 mm squares cut through film to metal with sharp razor blade. Adhesive cellulose tape applied over lattice and pulled. Adhesion satisfactory if no coating removed.

.2 Alzak finish:
- .1 Aluminum sheet fabricated from special aluminum alloys and chemically brightened, subsequently anodically treated to specifications established by Alcoa, to produce:
  - .1 Finish for mild commercial service, minimum density of coating 7.8 g/m2, minimum reflectivity 83% for specular, 80.5% for semi-specular and 75% for diffuse.
  - .2 Finish for regular industrial service, minimum density of coating 14.8 g/m2, minimum reflectivity 82% for specular and 73% for diffuse.
  - .3 Finish for heavy duty service, minimum density of coating 21.8 g/m2, minimum reflectivity 85% for specular, 65% for diffuse.

2.2 LED DRIVER

.1 LED Driver shall be installed inside an electrical enclosure.

.2 Wiring inside electrical enclosure shall comply with 600V/105°C rating or higher.

.3 LED Driver has a rated lifetime of 50,000 hours @ TC <=80C.

.4 LED Driver tolerates sustained open circuit and short circuit output conditions without damage.

.5 LED Driver maximum THD : less than 20%.

2.3 LIGHT CONTROL DEVICES

.1 Lens thickness: Minimum lens thickness of 3.17 mm (0.125 inch) at thinnest part of lens.

.2 Material: injection molded clear prismatic virgin acrylic.

2.4 LUMINAIRES

.1 Refer to light fixture schedule.

3 Execution

3.1 INSTALLATION

.1 Locate and install luminaires as indicated.

3.2 WIRING

.1 Connect luminaries to lighting circuits.

.2 Install separate #12 RW90 bonding conductor in fixture raceways when fixtures are continuously mounted in rows.

.3 Provide a separate neutral conductor for all lighting circuits.

3.3 LUMINAIRE SUPPORT

.1 For suspended ceiling installations support luminaires from ceiling grid. Additional ceiling suspension hangers are to be supplied and installed by Division 9. Hangers are to be installed within 150 mm of each corner of the fixture.

.2 For fixtures suspended using pendant or aircraft cable, supports are to be provided which are independent of any suspended ceiling components. Install to manufactures requirements.

.3 For recessed down lights (ie; pot lights) provide the following:
- .1 Non Accessible Type Ceilings:
  - .1 Fixtures are to be securely fastened to the T-Bar grid on all four corners. Provide a separate, individual fixture drop, extended to a junction box located in an accessible ceiling space.
- .2 Accessible Type Ceilings:
  - .1 Fixtures are to be securely fastened to the grid on all four corners, in a manner acceptable to the Engineer. No part of the fixture is to derive support from the ceiling tile.

.4 Luminaires weighing more than 11.4 kg shall be supported independently of the outlet box.

3.4 LUMINAIRE ALIGNMENT

.1 Align luminaires mounted in continuous rows to form straight uninterrupted line.

.2 Align luminaires mounted individually parallel or perpendicular to building grid lines.

3.5 COMMISSIONING

.1 Commission the system in accordance with 26 91 13.

********END OF SECTION ********

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 PRODUCT DATA

.1 Submit product data in accordance with Division 1.

.2 Data to indicate system components, mounting method, source of power and special attachments.

.3 Units shall comply with CSA C22.2 No. 141.

1.3 WARRANTY

.1 For batteries, the 12 months warranty period is extended to 10 years.

1.4 SPARE PARTS

.1 Provide spare parts as per 26 05 01.

2 Products

2.1 EQUIPMENT

.1 Supply voltage: 120 or 347 VAC, as indicated.

.2 Output voltage: 12 VDC.

.3 Operating time as indicated, but in no case less than 30 min.

.4 Battery: sealed, lead acid, maintenance free.

.5 Charger: solid state, multi-rate, voltage/current regulated, inverse temperature compensated, short circuit protected with regulated output of plus or minus 0.01 V for plus or minus 10% input variations.

.6 Solid state transfer circuit.

.7 Low voltage disconnect: solid state, modular, operates at 80% battery output voltage.

.8 Signal lights: solid state, for 'AC Power ON'.

.9 Lamp Type: 5 Watt LED.

.10 Heavy duty steel housing, c/w corrosion resistant undercoating.

.11 Battery units to be direct connect (not cord and cap) unless specifically noted otherwise.

.12 Automatic self-diagnostic circuitry and test feature, c/w the following features:
- .1 Microprocessor based.
- .2 Monitors lamps, battery and circuitry.
- .3 Internally simulated weekly functionality test.
- .4 Multicolour LED visual display (Red, Yellow & Green).
- .5 Non -audible.

.13 Auxiliary equipment:
- .1 Test switch.

.14 Remote heads to be 12 volt, 5 Watt LED, unless indicated otherwise.

2.2 WIRING OF REMOTE HEADS

.1 Conductors: RW90 type to Section 26 05 21 - Wires and Cables 0-1000 V.

.2 Conduit: type EMT, to Section 26 05 34 - Conduits, Conduit Fastenings and Conduit Fittings.

2.3 EQUIPMENT IDENTIFICATION

.1 Provide equipment identification in accordance with Section 26 05 03

2.4 STANDARD OF ACCEPTANCE

.1 Lumacell Q-BIC-ATN Series for surface mount units, RGS-TB-ATN Series for T-Bar mount, c/w 5 Watt LED lamps and wire guards where indicated.

.2 Lumacell RG12S ATN Series for surface mount units in areas where no heads are required.

.3 Lumacell MQM2NX-2LED-12V-5W NEMA 4X C/W two 5 Watt LED Lamps for remote heads.

2.5 ACCEPTABLE MANUFACTURERS TO THE REQUIREMENTS ABOVE

.1 Emergilite

.2 Stanpro

.3 Beghelli

3 Execution

3.1 INSTALLATION

.1 Ceiling mount units where indicated.

.2 Provide individual fixture chain supports on both ends of each ceiling mounted battery unit. The weight of each battery unit is not to be supported by the ceiling grid.

.3 Install remote heads in suspended ceilings using bar hangers, similar to B-Line BA50F RediMount. Install Kwik-Wire cable kit and attach to deck. Secure bracket to T-bar using self-tapping screws. Install wiring between battery packs and remote heads in a conduit system.

.4 Install unit equipment and remote mounted fixtures.

.5 Install battery units where indicated and connect to remote heads. Wiring between battery units and remote heads to be installed in a conduit system.

.6 Connect each emergency battery unit in such a manner that it will automatically be actuated upon failure of the power supply to the normal lighting in the area covered by that equipment.

.7 Direct heads.

.8 Where multiple DC feeds originate from a battery pack, install one feed from the battery pack to a suitably sized junction box. Feed multiple feeds from the junction box.

.9 Provide and post instructions for the operation and care of the emergency battery units and testing interval, in conformance with CEC Rule 46-102.

.10 Provide identification as per 26 05 03.

3.2 COMMISSIONING

.1 Commission the system in accordance with 26 91 13.

********END OF SECTION ********

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 RELATED WORK

.1 General requirements: Division 1.

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

1.3 PERFORMANCE TESTING AND COMMISSIONING

.1 The electrical and communications systems installed within this facility will require inspection, performance testing and commissioning.

.2 The electrical contractor will be responsible for inspection, performance testing and commissioning of the installed electrical and communications systems as part of this process.

.3 Manufactured systems or components shall be commissioned by factory trained technicians representing the manufacturer, in the presence of the Owner's designated representatives, and under the direction of the electrical contractor.

.4 The electrical contractor will provide assistance to the Owner's representatives and ensure that the manufacturer's representative is on site during functional performance testing (FPT).

.5 Tests shall be performed by qualified electricians or technicians as required by the nature and complexity of the test.

1.4 SCOPE

.1 Systems verification are called for throughout the individual specifications, however, this does not relieve this section from providing all testing and verification necessary to ensure that systems and equipment operate as required and that they interface with other systems and equipment as required.

1.5 QUALITY ASSURANCE

.1 The Electrical Contractor is responsible for quality assurance and whenever necessary, to ensure compliance with operating requirements, CSA, these contract documents, the Authority having Jurisdiction and other requirements and codes as applicable.

1.6 CONTRACTOR'S RESPONSIBILITIES

.1 Prepare each system for testing and verification.

.2 Co-ordinate the efforts of testing and verification.

.3 Provide personnel, operate systems at designated times, and under conditions required for proper testing and adjusting.

.4 Provide all necessary test and calibration equipment, temporary facilities, meters, sensors, load banks, etc. necessary to simulate and verify correct operating conditions.

.5 Co-ordinate and pay for all costs associated with testing and verification, including but not limited to costs for: travel, labour, equipment, testing agencies, manufacturers, testing and any other costs incurred to test and verify equipment and systems.

.7 Make test instruments available to Engineer to facilitate spot checks during testing.

.8 Retain possession of test instruments and remove at completion of services.

.9 Verify system installation is complete and in continuous operation.

.10 Where systems or equipment do not operate as required, make the necessary corrections or modifications, re-test and re-commission.

1.7 SUBMITTALS

.1 The Contractor shall submit the following documentation prior to FPT:
- .1 Record drawings.
- .2 Operations and maintenance manuals.
- .3 A letter of acceptance from the local inspection authority. A copy is to be included in the operations and maintenance manuals.
- .4 A letter of guarantee. A copy is to be included in the operations and maintenance manuals.
- .5 Copies of the following test results (A copy is to be included in the operations and maintenance manuals):
  - .1 Insulation/megger tests.
  - .2 Load balance tests on all distribution panels.
  - .3 Load tests on all electric motors.
  - .4 Structured cabling system link tests.
  - .5 Fire alarm system.
  - .6 P/A system.
  - .7 Receptacle polarity and voltage drop documentation.

.2 A Commissioning and/or Certification Report from the manufacturer for the following systems (A copy is to be included in the operations and maintenance manuals):
- .1 Structured cabling system link tests.
- .2 Fire alarm system.
- .3 P/A System.

.3 Written verification from the end user that demonstrations have been performed for the following (A copy is to be included in the operations and maintenance manuals):
- .1 Fire alarm system.

.4 Completed verification forms included with this section. When there are multiples of referenced equipment, devices or systems, electrical contractor is responsible for obtaining a suitable number of forms to complete the verification process for the entire project.

1.8 INSTRUCTION OF OWNER'S STAFF

.1 Provide the following:
- .1 Necessary instruction of equipment and systems operation to Owner's staff.
  - .1 At least 72 hours advance notifications in writing.
  - .2 Provision of factory trained technicians where necessary.
  - .3 Provision of presentation with the use of as-built drawings and data books required in other sections of these specifications.

.2 Conduct presentation on project premises.

.3 Training for all systems shall take place in four separate training sessions.

1.9 FUNCTIONAL PERFORMANCE TESTING (FTP)

.1 The Owner may commence a Functional Performance Testing Program independent of other processes specified, upon receipt of written verification from the electrical contractor that:
- .1 All systems are complete and operational in all respects.
- .2 All specified reports and documents have been submitted and approved.
- .3 All tests and start-up processes described elsewhere in the specification are complete.
- .4 All demonstrations have been completed and documented.

.2 During this program, for a period of not more than 12 working days, an FPT team will verify the operation of all systems. The FPT process may involve real or simulated conditions to determine the systems full operational capabilities. Copies of all specified reports and documents are to be made available to the site during the period.

.3 During the FPT process, the Electrical Contractor will provide within 48 hours notice, the following:
- .1 An onsite representative familiar with all aspects of the work to assist with coordination of trades during FPT as needed.
- .2 A full time onsite senior electrical or technical representative for each building system to assist with the FPT of systems and equipment.
- .3 Equipment manufacturer’s technical representatives shall be available for onsite and telephone consultation from time to time as required throughout the FPT.
- .4 All tools and test equipment required to operate the systems in real or simulated mode.

.4 FPT shall be performed on all electrical systems referenced in the contract documents which may include, but not be limited to, the following:
- .1 Life Safety Systems:
  - .1 Emergency Lighting.
  - .2 Exit Signs.
  - .3 Fire Alarm System.

.2 Lighting System
.3 Power Distribution System.
.4 Structured Cabling System.
.5 P/A System.

.5 Deficiencies or discrepancies discovered during the FPT process are to be immediately rectified by the Electrical Contractor. The Electrical Contractor shall also provide arrangements for labor and materials required to correct deficiencies which prevent the satisfactory completion of the FPT process.

1.10 FINAL REPORT

.1 Assemble all testing data and verification reports and submit them to the Engineer.

.2 Each form shall bear signature of recorder, date of test, and all relevant information in clear and legible form.

.3 Identify each instrument used, and latest date of calibration of each.

.4 Include written confirmation by Owner's representatives that all verification, testing, instruction and demonstrations have been completed to the Owner's satisfaction.

2 Products N/A

3 Execution

3.1 INSULATION RESISTANCE TESTING

.1 Megger circuits, feeders and equipment up to 350 V with a 500 V instrument.

.2 Check resistance to ground before terminating cables and wires.

3.2 PANELBOARD PHASE CURRENT MEASUREMENT

.1 Energize all possible loads.

.2 Measure each phase and record voltage and current.

3.3 MOTOR INFORMATION FORM

.1 Record all pertinent motor information for each motor installed.

.2 Measure each motor full load amps, after the Balancing Technician has completed his final adjustments.

.3 Set and record the installed overload and overcurrent data.

3.4 OTHER TESTS

.1 Perform other tests, not mentioned in this section, but specified in individual specification sections, to the approval of the Engineer.

3.5 VERIFICATION TESTS AND FORMS.

.1 Perform tests as required to properly complete the verification forms included in this section.

.2 Deficiencies or discrepancies discovered during this process are to be immediately rectified by the Electrical Contractor. The Electrical Contractor shall provide exceptional arrangements for labor and materials as may be required to correct these deficiencies.

Form 26 52 00-Unit Equipment for Emergency Lighting

EQUIPMENT DETAILS: (Identification)

Manufacturer: _____ Model: _____ Serial #: _____

Room #: _____ Designation: _____ Capacity: _____

Item	Yes	No	Comments
Nameplate label ……..	☐	☐	
Battery fully charged ….....	☐	☐	
Lamicoid identification plate…..	☐	☐	
Connected to normal lighting system for area served...	☐	☐	
Remote heads functional …….	☐	☐	
Written guarantee provided …….	☐	☐	
Auto test feature installed ……	☐	☐	
	☐	☐	

FIELD MEASUREMENTS:	
AC supply voltage _____ DC output voltage prior to test _____ DC voltage at farthest remote unit _____ Battery operating time (not less than 30 min)___	

SIGN OFF:
Electrical Contractor: _____ **Signature:** _____ **Date:** _____

Form 26 29 10-Motor Starters

EQUIPMENT DETAILS: (Identification)

Manufacturer: _____ Model: _____ Serial #: _____

Room #: _____ Designation: _____ Bus Rating: _____

Item	Yes	No	Comments
Nameplate label ……..	☐	☐	
Cable phase identified correctly.	☐	☐	
Clearance from adjacent surfaces	☐	☐	
Properly grounded……..	☐	☐	
Cleaned……..	☐	☐	
Cable lugs torqued……..	☐	☐	
Lamicoid identification plate…..	☐	☐	
Auxiliary contacts …….	☐	☐	
BAS components installed …….	☐	☐	
MCP field adjustments ……	☐	☐	
Overloads field adjusted	☐	☐	
Control wiring diagrams……	☐	☐	
Ground installed…….	☐	☐	
Control transformer….	☐	☐	

FIELD MEASUREMENTS:

<u>High Voltage</u>
H1-H2 _____
H2-H3 _____
H3-H1 _____
<u>Current</u>
H1 _____
H2 _____
H3 _____

SIGN OFF:
Electrical Contractor: _____ Signature: _____ Date: _____

Form 26 27 26-Wiring Devices

EQUIPMENT DETAILS: (Identification)

Manufacturer: _____ Part Number_____ Amp Rating _____

Room #: _____

Item	Yes	No	Comments
Receptacle Polarity tested.	☐	☐	
Receptacle properly grounded	☐	☐	
Lamicoid identification plate…..	☐	☐	
Cover plate installed	☐	☐	
GFCI tested	☐	☐	
Voltage drop tested within tolerance	☐	☐	
Installed plumb and level	☐	☐	
Protrudes min of 0.4 mm through plate	☐	☐	
	☐	☐	
	☐	☐	
	☐	☐	

FIELD MEASUREMENTS:	
Voltage L1-N _____	

SIGN OFF:
Electrical Contractor: _____ **Signature:** _____ **Date:** _____

Form 26 24 16.01-Panelboards

EQUIPMENT DETAILS: (Identification)

Manufacturer: _____ Model: _____ Serial #: _____

Room #: _____ Designation: _____ Bus Rating: _____

Item	Yes	No	Comments
Nameplate label ……..	☐	☐	
Filler pieces in place …..	☐	☐	
Cable phase identified correctly……..	☐	☐	
Cable lugs bolted to MRT……	☐	☐	
Bus bolts torqued to MRT……..	☐	☐	
Properly grounded……..	☐	☐	
Interior and exterior Cleaned……	☐	☐	
Insulation resistance measured……	☐	☐	
Spare breakers installed……..	☐	☐	
Lamicoid identification plate……	☐	☐	
Panel directory typed and complete…….	☐	☐	
Hinged door and front cover installed…..	☐	☐	
Branch circuit breaker operation checked.	☐	☐	
Breaker lock on devices installed……..	☐	☐	
Breaker bolts torqued to MRT……	☐	☐	
All tools removed, doors covers replaced…	☐	☐	

FIELD MEASUREMENTS:	**Current**
Voltage	L1 _____
L1-L2 _____	L2 _____
	N _____

SIGN OFF:
Electrical
Contractor: _____ Signature: _____ Date: _____

******END OF SECTION******

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 SYSTEM DESCRIPTION

.1 Communication systems consist of, but may not be limited to, structured wiring system (voice and data), low voltage wiring associated with the lighting system, building automation system (BAS) and Public Address system.

.2 Communications system wiring refers to all wiring associated with the systems indicated above.

.3 Related Work:
- .1 Splitter, Junction, Pull Boxes and Cabinets.
- .2 Outlet Boxes, Conduit Boxes and Fittings.
- .3 Conduits, Conduit Fastenings and Conduit Fittings.
- .4 Lighting Control Devices.
- .5 Structured Cabling for Communications Systems.
- .6 Public Address System.
- .7 Building Automation System

2 Products

2.1 COMMUNICATION SYSTEMS WIRE AND CABLE.

.1 Low Voltage Cable:
- .1 Cable jacket:
  - .1 Labeled with the following information, as a minimum:
    - .1 Cable type.
    - .2 FT rating.
    - .3 Temperature rating.
    - .4 CSA number.
    - .5 Rated voltage.
    - .6 Gauge and number of conductors.
  - .2 Cable not identified as above will not be permitted to be installed on this project.
  - .3 Coloured as follows:

System Description	Jacket Colour
Voice	White
Data	Blue
Fire Alarm	Red
BAS	Yellow
Public Address	Grey

3 Execution

3.1 WIRING METHODS.

.1 EMT type conduit wall-stub c/w flush installed device box are required in all partitions, regardless of construction material. Stubs shall be turned out into accessible ceiling space within the same room as the outlet box, c/w nylon insulated throat, Arlington bushing or threaded type bushing. Minimum size to be 27 mm (1 inch).

.2 Ensure that both the device box and accompanying conduit sleeve are bonded to ground, as follows:

- .1 Outlet box installed in partition utilizing metal studs, adjacent to receptacle box:
  - .1 Provide a #12 green insulated RW90 bonding conductor between receptacle device box and communication outlet device box. Provide a push-on non-metallic insulated bushing on the end of the conduit stub, similar to Arlington Series EMT*** (T&B Insuliner sleeves not acceptable).
- .2 Outlet box not otherwise bonded to ground:
  - .1 Where bonding connection is available from an overhead source (junction box, cable tray, etc), provide a #12 green insulated RW90 bonding conductor from the bonding connection, through the conduit sleeve to the device box. Terminate bond wire at the device box. Provide a push-on non-metallic insulated bushing on the end of the conduit stub similar to Arlington Series EMT*** (T&B Insuliner sleeves not acceptable).

.3 When cables not are required to pass through a partition separating a corridor from a room, or between rooms, EMT type conduit sleeves are required, sized in accordance with the information contained in this section. Sleeves shall be installed into accessible ceiling space, c/w nylon insulated throats or threaded type bushings and shall be secured to building structure. Provide a bonding bushing for all conduit sleeves. Seal the ends of all conduits after installation of cables. Firestop where required to maintain a fire resistance rating. Smoke seal where required.

.4 The electrical contractor is to supply and install a suitably sized electrical junction box for all wiring supplied by the electrical contractor, regardless of system voltage. This electrical box will contain all electrical connections associated with wiring for all electrical systems.

.5 Where grouping of various systems outlets or multiple type outlets in drywall type construction is required, the use of box mounting brackets as manufactured by Caddy #RBS16 or #RBS24 or approved equal, are to be installed between, and secured to both metal studs. Secure brackets to metal studs using low profile sheet metal screws. Install suitable sized 102 mm (4”) square and/or 119 mm (4 11/16”) boxes c/w single gang raised tile rings.

.6 All surface wiring installed in rooms and/or other areas not having any hung, or drop type ceilings, or where otherwise installed on, or to wall surfaces etc., are to always be contained or sleeved in EMT type conduits.

.7 All non-concealed, surface type wiring installed on either ceilings and/or walls, is to also be

sleeved in EMT type conduit.

.8 All concealed wiring routed through rooms with drywall or other inaccessible ceiling types are to be installed in a conduit system. The installation of access doors or recessed light fixtures in these areas does not change these types of ceilings from inaccessible to accessible.

.9 Provide suitably sized EMT conduit sleeves for communications system cables which pass through common walls between classrooms, workrooms, etc. Bond all sleeves to ground. Conduit sleeves are to be rigidly fastened in place.

.10 Pull boxes are to be sized in conformance with CEC Rule 12-3036, unless noted otherwise. In addition, pull boxes installed on conduits used for the installation of communication systems for straight pulls, shall conform to the following minimum requirements:

.1 Minimum size of pull box: 150 X 150 X 100 (6 x 6 x 4 inch)
.2 35 mm (1-1/4 in): 150 wide X 510 long X 100 deep (6 x 20 x 4 inch).
.3 41 mm (1-1/2 in): 200 wide X 686 long X 100 deep (8 x 27 x 4 inch).
.4 50 mm (2 in): 200 wide X 914 long X 150 deep (8 x 36 x 4 inch).
.5 75 mm (3 in): 300 wide X 1220 long X 100 deep (12 x 48 x 6 inch).
.6 100 mm (4 in): 375 wide X 1525 long X 200 deep (15 x 60 x 8 inch).

.11 All communications systems wiring installed within millwork is to be installed in a conduit system. Flexible metal conduit is permitted between outlet box and pull box. Where liquid tight metal flexible conduit is used for this purpose, matching liquid tight connectors are required. Increase one trade size.

.12 All communications system wiring (with the exception of BAS and lighting control cables) installed within accessible type ceiling spaces and not otherwise contained in conduits, are to be secured directly to the structure via the use of wide base, beveled edge supports approved, equal to, or better than those as manufactured by Caddy, CableCat cable type supports, Catalog # CAT16HP for up to 7 cables, Catalog # CAT32HP for up to 25 cables, Catalog # CAT48HP for up to 60 cables. Support of low voltage cables to the structure is not to be greater than 1200 mm (48 inch) intervals. In addition, cables are to be bundled together at midpoint between each support via the use of Velcro Softcinch wire management. Do not use nylon tye wraps for this purpose.

.13 BAS control cables installed within accessible ceiling spaces and not installed in a conduit system are to be secured directly to the steel deck, above the support structure. Provide supports at 1200 mm (48") intervals.

.14 All cable supports used for communications system wiring with the exception of BAS and lighting control cables are to be installed no more than 760 mm (30 inches) above a finished ceiling, to permit ready access for future additions.

.15 In addition to the above requirements, BAS control circuit wiring **50 volts and less** is to be installed as follows:

.1 EMT conduits are to be extended to within 760 mm (30 inches) of all various control devices associated with the operation of any given piece of mechanical equipment or device they might feed.
.2 Unless specifically indicated otherwise, liquid tight metal type conduit c/w matching liquid tight type connectors are to be used for final connection between

end of EMT conduit and applicable control device.

.3 Bonding conductors are not required in flexible metal conduits where the conduit terminates in a non-metallic electrical box.

.16 Maximum Conduit Fill for Voice and Data Wiring. Note that the minimum acceptable conduit size for communications pathways shall be 27 mm (1 inch), unless noted otherwise:

.1	27 (1)	Up to 3 Cat 6 cables
.2	35 (1 1/4)	4 to 8 Cat 6 cables
.3	41 (1 1/2)	9 to 10 Cat 6 cables
.4	53 (2)	11 to 17 Cat 6 cables
.5	63 (2 ½)	18 to 24 Cat 6 cables
.6	78 (3)	25 to 37 Cat 6 cables
.7	103 (4)	38 to 64 Cat 6 cables

********END OF SECTION ********

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 RELATED SECTIONS

.1 Common Work Results for Electrical

.2 Electrical Identification

.3 Electrical Systems Testing and Verification

.4 Pathways for Communications Systems

.5 Structured Cabling for Communications Systems

.6 Conduits, Conduit Fastenings and Conduit Fittings

1.3 REFERENCE STANDARDS

.1 CAN/CSA Standards
- .1 CAN/CSA T527-94 (Reaffirmed 1999) Grounding & Bonding for Telecommunications in Commercial Buildings.
- .2 CAN/CSA T528-93 (Reaffirmed 1997) Design Guidelines for Administration of Telecommunications Infrastructure in Commercial Buildings.
- .3 CAN/CSA T529-95 (Reaffirmed 2000) Telecommunications Cabling Systems in Commercial Buildings.
  - .1 CAN/CSA T530-99. Commercial Building Standard for Telecommunications Pathways and Spaces.
- .4 Nova Scotia Government Structured Cabling Standards.
- .5 C22-1-18 Canadian Electrical Code

.2 ANSI/TIA/EIA Standards
- .1 ANSI/TIA/EIA-568-C.2 – Commercial Building Telecommunications Cabling, Part 2.
- .2 ANSI/TIA/EIA-568-B.2.1 – Transmission Performance Specifications for 4-Pair 100 Ohm Category 6A Cabling.
- .3 ANSI/TIA/EIA-569-A – Commercial Building Standard for Telecommunications Pathways and Spaces.
- .4 ANSI/TIA/EIA-606 – The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
- .5 J-STD-607A Commercial Building Grounding and Bonding Requirements for Telecommunications.
- .6 ANSI/TIA/EIA TSB-67 – Transmission Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems.
  Open Offices.

.3 BICSI Standards
  .1 BICSI/TDMM – Telecommunications Distribution Methods Manual. (13th. Edition)
  .2 Information Transport Systems Installation Methods Manual (6th. Edition).

1.4 SCOPE OF WORK

.1 Provide a complete structured cabling system to carry voice and data, as indicated on the drawings. System components include but may not be limited to the following:
  .1 Category 6 Modular Patch Panels.
  .2 Category 6 Patch cords.
  .3 Category 6 UTP wiring.
  .4 Horizontal and vertical cable management.
  .5 Information outlets and faceplates.
  .6 IDC connectors and mounts.
  .7 Conduit system.
  .8 Grounding and bonding system.
  .9 Identification of all network components, terminations, information outlets, etc.
  .10 Complete project documentation and as built drawings.

1.5 STRUCTURED WIRING SYSTEM CONTRACTOR QUALIFICATIONS.

.1 The Structured Wiring System installation contractor must be an authorized installation agent for that particular manufacturer's solution and provide that manufacturer's system warranty upon project completion.

.2 The Structured Wiring System installation contractor shall be a current member of BICSI "Building Industry Consulting Services International" and must provide an RCDD "Registered Communications Distribution Designer" as Communications System Project Manager for the duration of the project.

2 Products

2.1 GENERAL

.1 All products installed in this system must be part of a complete end to end solution by a single manufacturer. Approved cable partners for that particular solution will be acceptable provided appropriate documentation is submitted at the time of shop drawing submittal and a warranty level is provided in conformance with this specification.

2.2 HORIZONTAL CABLING SYSTEM

.1 Cable
  .1 24 AWG 4 pair Category 6 cable.
  .2 CMP (FT-6 Rated).
  .3 Blue Outer Jacket for voice, White Outer Jacket for data.
  .4 CSA T529-95 Category 6 Compliant.
  .5 Belden IBDN GigaFlex 2400 series.

.2 Patch Panels
- .1 48 port (2U) 8 position modular patch panels.
- .2 E1A-310-D 482 mm (19") Mount Compliant.
- .3 Wiring Configuration T568A (ISDN).
- .4 Connectors shall be coloured as follows:
  - .1 Grey for data.
  - .2 Blue for voice.
  - .3 Yellow for special applications (CCTV, multi-media).
- .5 Belden IBDN 10GX series.
- .6 Complete with modular connectors colour coded to match active ports in all unused ports of each patch panel. (Fully populated).
- .4 Belden IBDN QPBIX PS6+ series.
- .5 Category 6 Compliant.

.3 Information Outlet:
- .1 Typical Recessed Installation:
  - .1 Outlet Boxes
    - .1 Provide an outlet box for all communications outlets, c/w single gang raised tile ring, unless noted otherwise. Minimum dimensions as follows: 100mm (4 inch) x 100mm (4 inch) x 53mm (2.125 inch) deep, minimum volume of 490 cubic centimetres (30 cu.in.), (similar to Iberville # 52171-K).
  - .1 Outlet boxes in common walls shall not be installed back to back and must provide a minimum 103mm (4 inch) lateral clearance.
  - .2 Grounding and bonding provided as per Section 27 05 28.
  - .3 Faceplate
    - .1 Single Gang faceplate.
    - .2 Brushed stainless steel, punched to accept flush mount keystone style insert in all non-resident areas.
    - .3 Four ports per plate.
    - .4 Blank to be supplied for unused ports.
    - .5 Belden/CDT #AX102011.
- .2 Typical Surface Installation
  - .1 Outlet Boxes
    - .1 Provide an outlet box for all communications outlets. Minimum dimensions as follows: 100mm (4 inch) x 100mm (4 inch) x 53mm (2.125 inch) deep, minimum volume of 490 cubic centimetres (30 cu.in.), (similar to Iberville # 52171-K).
    - .2 Grounding and bonding provided as per Section 27 05 28.
  - .2 Faceplate
    - .1 Single Gang faceplate.
    - .2 Steel, raised 3/8 inch raised, for two duplex receptacles, Iberville #BC8365
    - .3 Blank to be supplied for unused ports.
    - .4 Belden 106 adaptor, #AX104121.
- .3 Inserts
  - .1 8 position UTP category 6 module.
  - .2 IDC-type connection.
  - .3 Category 6 Compliant.
  - .4 Blue in colour for voice.

.5 Grey in colour for data.
.6 Wiring Configuration T568A (ISDN).
.7 Nordex GigaFlex PS6+ Module, Keystone.

2.3 PATCH CORDS

Patch cords must be the same manufacturer type as the warranty solution being provided.

.1 Telecommunications Rooms
  .1 Copper Patch Cords for Structured Wiring Racks
    .1 4 pair, 24 AWG Stranded Wire, 8MOD-8MOD
    .2 Category 6 Compliant.
    .3 Wiring Configuration T568A (ISDN).
    .4 Blue in Colour.
    .5 1m (3 foot) , 2m (6 foot), 3m (10 foot) in length for green field to blue field. (Provide 1/3 quantity of each).
    .6 1m (3 foot) , 2m (6 foot), 3m (10 foot) in length for silver field to hubs. (Provide 1/3 quantity of each).
    .7 Provide quantity of patch cords to meet immediate requirement plus 20%.
    .8 Belden IBDN PS6 Modular Patch Cords.

.2 Work Area
  .1 Copper Patch Cords
    .1 4 pair, 24 AWG Stranded Wire, 8MOD-8MOD
    .2 Category 6 Compliant.
    .3 Wiring Configuration T568A (ISDN).
    .4 White in colour.
    .5 3m (10 foot) in length.
    .6 Provide quantity of patch cords to meet immediate requirement plus 20%.
    .7 Belden IBDN PS6 Modular Patch Cords.

2.4 STANDARD OF ACCEPTANCE

.1 Belden IBDN with a **25 year warranty on parts and labour.**

2.5 ACCEPTABLE MANUFACTURES, TO THE REQUIREMENTS ABOVE:

.1 Commscope with a **25 year warranty on parts and labour.**

.2 Panduit Pan-Net with a **25 year warranty on parts and labour.**

.3 Hubbell Premise Wiring with a **25 year warranty on parts and labour.**

.4 Leviton with a **25 year warranty on parts and labour.**

2.6 COVER PLATES

.1 Stainless steel, vertically brushed, 1 mm (0.04 in.) thick cover plates for devices, unless noted otherwise.

3 Execution

3.1 INSTALLATION

.1 The structured wiring system contractor must retain the services of at least one Registered Communication Distribution Designer (RCDD) for the duration of the project. The RCDD must be identified prior to the submittal of structured wiring system shop drawings. Provide a copy of the RCDD certificate and proof of membership in BICSI upon award of contract.

.2 The minimum warranty requirement will be 25 years for the network passive components. Upon completion of the project, a certification certificate stating the warranty of the system must be supplied to the end user.

.3 Provide a complete structured cabling system for voice, data services, including all components and wiring as indicated.

.4 Install horizontal cabling in conformance with 27 05 28 Pathways for Communications Systems.

.5 Provide identification as per 26 05 03 Electrical Identification.

.6 Provide a slack loop of three (3) meters for all installed cables. The purpose of this service loop is to allow any future re-configuration and / or upgrade.

.7 Permanently identify voice and data horizontal cabling at each end. The identification must be mechanically generated, not hand written. Indicate the originating Telecommunications Room (TR) and the consecutively numbered jack for voice and data. This labeling is to be identical on the originating end and in the outlet box. This same information is to appear on the patch panel and outlet jack location.

.8 Install patch panels in racks. Fully populate all unused ports in each patch panel with modular connectors, colour coded to match the active ports.

.9 Provide a record drawing of each floor plan detailing all structured wiring cables and jacks.

.10 Perform a Permanent Link test of each installed cable. Submit test results for review. All cords tested must meet or exceed the minimum transmission requirements as per Category 6 requirements.

.11 Provide complete system documentation at completion of the work, c/w a hard copy of the following:

- .1 Cable test reports.
- .2 Record floor plan drawings in AutoCad format, indicating all communications racks, information outlet location and numerical identification.
- .3 Record drawings of the front elevation of each communication rack, detailing the location, size and description of all equipment.

.12 The AutoCad floor plan drawings indicating all communications racks, information outlet location and numerical identification are to be laminated and wall mounted in each telecommunications room.

3.2 COMMISSIONING

.1 Commission the system in accordance with 26 91 13.

1 General

1.1 GENERAL

.1 NOTE: Section 26 05 00 Common Work Results for Electrical, Section 26 05 01 Electrical Submittals and Section 26 05 02 Electrical Contract Closeout are part of and to be read in conjunction with this Section.

1.2 RELATED WORK

.1 26 05 21 Wires and Cables 0-1000V.

.2 26 05 34 Conduits, Conduit Fastenings and Conduit Fittings.

.3 26 91 13 Electrical Systems Testing and Verification.

1.3 REFERENCES

.1 CAN/ULC-S524-M01, Installation of Fire Alarm Systems.

.2 ULC-S525-1978, Audible Signal Appliances for Fire Alarm.

.3 ULC-S526, Visual Signal Appliance for Fire Alarm Systems.

.4 CAN/ULC-S527-M99, Control Units, Fire Alarm.

.5 CAN/ULC-S528-M91, Manual Pull Stations.

.6 CAN/ULC-S529-M87, Smoke Detectors, Fire Alarm.

.7 CAN/ULC-S530-M91, Heat Actuated Fire Detectors, Fire Alarm.

.8 CAN/ULC-S536-M97, Inspection and Testing of Fire Alarm Systems.

.9 CAN/ULC-S537-M97, Verification of Fire Alarm Systems.

.10 National Building Code of Canada, 2010.

.11 Nova Scotia Building Code, latest edition.

.12 Canadian Electrical Code C22.1-18, Section 32.

1.4 SYSTEM DESCRIPTION

.1 System includes:
- .1 Connection to existing, single stage, fire alarm control panel to carry out fire alarm and protection functions including receiving alarm signals, initiating general alarm, supervision system continuously, actuating zone annunciators, and initiating trouble signals.
- .2 Manual alarm stations.

.3 Automatic alarm initiating devices.
.4 Audible signal devices.
.5 End-of-line devices.
.6 Ancillary devices.

.2 Operation of any alarm initiating device to:
.1 Cause signal devices to operate throughout building.
.2 Transmit signal to fire department via automatic dialer.
.3 Cause origin of alarm to be indicated on control panel and remote annunciators.
.4 Cause fire doors to release.
.5 Cause shunt trip breakers to operate where indicated.
.6 Cause air handling systems to shut down, where indicated.

1.5 REQUIREMENTS OF REGULATORY AGENCIES

.1 System components: listed by ULC and comply with applicable provisions of National Building Code, Provincial Building Code, and meet requirements of local authority having jurisdiction.

1.6 SHOP DRAWINGS

.1 Submit shop drawings in accordance with Division 1.

.2 Include:
.1 Detail assembly and internal wiring diagrams for control unit.
.2 Overall system riser wiring diagram identifying control equipment initiating zones signaling circuits; identifying terminations, terminal numbers, conductors and raceways.
.3 Details for devices.
.4 Details and performance specifications for control, annunciation and peripherals with item by item cross reference to specification for compliance.

1.7 OPERATION AND MAINTENANCE DATA

.1 Provide operation and maintenance data for fire alarm system for incorporation into manual specified in Division 1.

.2 Include:
.1 Instructions for complete fire alarm system to permit effective operation and maintenance.
.2 Technical data - illustrated parts lists with parts catalogue numbers.
.3 Copy of approved shop drawings with corrections completed and marks removed except review stamps.

1.8 MAINTENANCE

.1 Provide one year's maintenance with two inspections by manufacturer during warranty period. Carry out first test six months after Substantial Performance. Carry out second test twelve months after Substantial Performance Inspection tests to conform to CAN/ULC-S536-97, Standard for The Inspection and Testing of Fire Alarm Systems.

Each Inspection shall conform to the test procedures as stipulated under Section 6, Periodic Inspections and Tests-Yearly. Contractor is to complete forms as contained in Appendix E3 on each inspection. Submit inspection report to Engineer. Include all associated costs in this tender.

1.9 TRAINING

.1 Provide on-site lectures and demonstration by fire alarm equipment manufacturer to train operational personnel in use and maintenance of fire alarm system.

2 Product

2.1 MATERIALS

.1 Equipment and devices: ULC listed and labeled and supplied by single manufacturer.

2.2 SYSTEM OPERATION: SINGLE STAGE - SIGNALS ONLY

.1 Actuation of any alarm initiating device to:
- .1 Cause electronic latch to lock-in alarm state at central control unit.
- .2 Indicate zone of alarm at central control unit and at Remote Annunciator.
- .3 Cause audible signaling devices to sound continuously throughout building and at central control unit.
- .4 Cause strobe lights to flash.
- .5 Transmit signal to fire department or ULC approved monitoring agency.
- .6 Cause closer/holders to release causing fire doors to close automatically.
- .7 Cause electrified hardware to release where indicated.
- .8 Cause automatic shutdown of any air handling systems, where indicated.
- .9 Cause shunt trip breakers to operate where indicated.

.2 Acknowledging alarm: indicated at central control unit.

.3 Possible to silence signals by "alarm silence" switch at control unit, after 60 s period of operation.

.4 Subsequent alarm, received after previous alarm has been silenced, to re-activate signals.

.5 Actuation of supervisory devices to:
- .1 Cause electronic latch to lock-in supervisory state at central control unit.
- .2 Indicate respective supervisory zone at central control unit.
- .3 Cause audible signal at central control unit to sound.
- .4 Activate common supervisory sequence.
- .5 Transmit signal to fire department or ULC approved monitoring agency.

.6 Alarm and supervisory device not to return system indications/functions back to normal until control unit has been reset.

.7 Trouble on system to:
- .1 Indicate circuit in trouble at central control unit.

.2 Activate "system trouble" indication, buzzer and common trouble sequence. Acknowledging trouble condition to silence audible indication; whereas visual indication to remain until trouble is cleared and system is back to normal.

.3 Transmit signal to fire department or ULC approved monitoring agency.

.8 Trouble on system: suppressed during course of alarm.

.9 Trouble condition on any circuit in system not to initiate alarm conditions.

2.3 CONTROL PANEL

.1 Control Panel is existing (Edwards Quick Start).

2.4 WIRING

.1 Twisted copper conductors: rated at not less than 300V (per CEC).

.2 To initiating circuits: 18 AWG minimum, “Red” coloured jacket and in accordance with manufacturer's requirements.

.3 To signal circuits: 14 AWG minimum, solid conductor and in accordance with manufacturer's requirements. Conductor insulation colour to “Red (Pos); “Black” (Neg). Clearly identify conductors as incoming and outgoing in device box.

.4 To control circuits: 14 AWG minimum, and in accordance with manufacturer's requirements.

.5 All conduits used for the installation of the fire alarm system are to contain a #12 RW90 green bonding conductor. The use of the shield component of a system cable is not an acceptable bonding method.

.6 Install all fire alarm wiring in a conduit system.

2.5 AUTOMATIC ALARM INITIATING DEVICES

.1 Addressable Multi-sensor Detectors.

.1 Photoelectric and Thermal sensors.

.2 Electronics to communicate detector's status to addressable module/transponder.

.3 Detector address to be set on detector in field.

.4 Sensitivity settings: settings determined and operated by control panel. No shifting in detector sensitivity due to atmospheric conditions (dust, dirt) within certain parameters.

.5 Ability to annunciate minimum of 4 levels of detector contamination automatically with trouble condition at control panel.

.6 Duct mounted where indicated.

.2 Addressable Interface Modules.

.1 Provide addressable interface modules (AIM) as required for each digital normally open contact that may require an address (or zone) interfaced to addressable loop controller.

.2 Addressable interface module address to be set in the field.

.3 Addressable Relay:
- .1 Addressable relays to perform control of magnetic door holders, solenoid valves, fan shutdown, elevator recall and other control functions as indicated.
- .2 Ability to be programmed as required by system sequence of operation with "and" and "and/or" functions as required.
- .3 Electronics to provide ability to communicate status and control commands over 2 wire addressable loop.
- .4 Address to be set in the field.

2.6 NOTIFICATION APPLIANCES

.1 Combination Bell/Strobe signals.
- .1 Flush mounted in electrical backbox.
- .2 Bell/Strobe mounting plate, red in colour.
- .3 Strobe (75 cd)
- .4 Self-Synchronizing strobe.
- .5 Six inch vibrating bell.
- .6 Complete with wire guard.

2.7 END-OF-LINE DEVICES

.1 End-of-line devices to control supervisory current in signaling circuits, sized to ensure correct supervisory current for each circuit. Open short or ground fault in any circuit will alter supervisory current in that circuit, producing audible and visible alarm at main control panel.

2.8 STANDARD OF ACCEPTANCE

.1 Edwards, to match existing.

3 Execution

3.1 INSTALLATION

.1 Fire Alarm Control Panel is existing (Edwards Quick Start). Modify existing FACP as required to allow for expansion as indicated.

.2 All fire alarm system wiring is to be in a conduit system. Flexible metal conduit may be used for the final connection of devices located in suspended ceilings, provided a junction box is installed within 1.5 meters (5 feet) of the device and a single flexible conduit is extended to the device box. Do not T-tap for initiating device wiring. Wire the addressable loop to the device input terminals and continue the addressable loop from the device output terminals.

.3 Maintain a minimum of 600 mm (24 inches) clearance between every addressable device and electronic ballasts.

.4 Install signal appliance and connect to signal circuits.

.5 Install addressable relay and connect to MUA unit control panel to shut air handler down when fire alarm panel is in alarm condition.

.6 Install addressable interface module and connect to fire suppression micro switch to activate fire alarm system when micro switch contacts change state.

.7 Install end-of-line devices at end of signal circuits.

.8 Install remote relay units to provide control function.

.9 Splices are not permitted for fire alarm system wiring.

.10 Provide necessary raceways, cable and wiring to make interconnections to terminal boxes, Annunciator equipment and CCU, as required by equipment manufacturer.

.11 Ensure that wiring is free of opens, shorts or grounds, before system testing and handing over.

.12 Identify circuits and other related wiring at central control unit, annunciators, and terminal boxes.

.13 Modify existing active graphic at front door to reflect additional devices.

.14 Modify existing active graphic at front door to reflect the recently added Skilled Trades building and all associated devices.

.15 Provide lamicoid identification plates for all addressable devices.

3.2 FIELD QUALITY CONTROL

.1 Perform tests in accordance with Section 26 05 00 – Common Work Results for Electrical and CAN/ULC-S537.

.2 Fire alarm system:

- .1 Test system and each new device and alarm circuit to ensure manual stations, smoke detectors, transmit alarm to control panel and actuate general alarm.
- .2 Check Annunciator panels to ensure zones are shown correctly.
- .3 Simulate grounds and breaks on alarm and signaling circuits to ensure proper operation of systems.
- .4 Addressable circuits system style DCLB:
  - .1 Test each conductor on all DCLB addressable links for capability of providing 3 or more subsequent alarm signals on line side of single open-circuit fault condition imposed near electrically most remote device on each link. Operate Acknowledge/Silence switch after reception of each of the 3 signals. Correct imposed fault after completion of each series of tests.

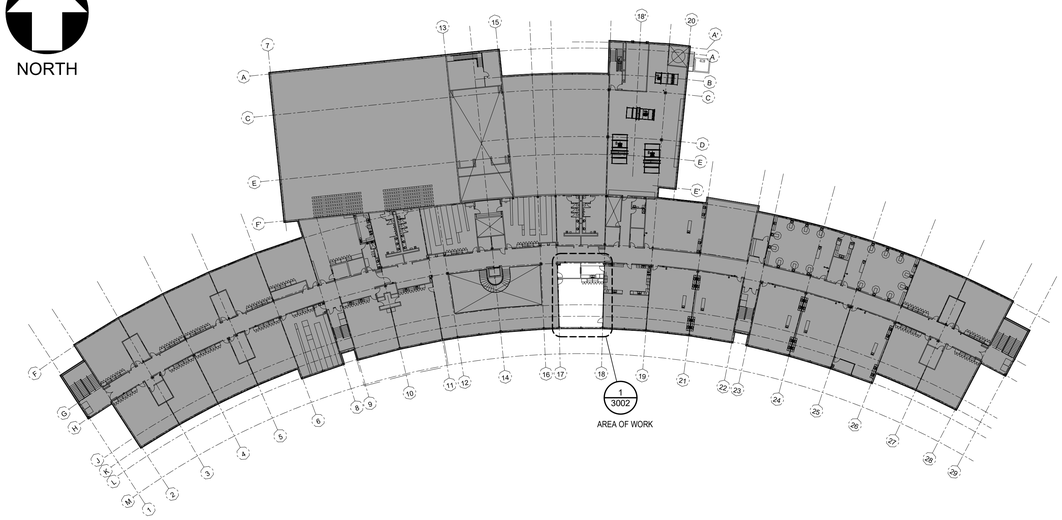
.2 Test each conductor on all DCLB addressable links for capability of providing 3 or more subsequent alarm signals during ground-fault condition imposed near electrically most remote device on each link. Operate Acknowledge/Silence switch after reception of each of the 3 signals. Correct imposed fault after completion of each series of tests.

.3 Provide final PROM program re-burn for system incorporating program changes made during construction.

.4 Provide written fire alarm system verification report and certificate following testing of system.

***** END OF SECTION *****

NORTH



1
0001 KEY PLAN - LEVEL 2

SCALE: 1 : 500

DRAWING LIST

STRUCTURAL

2001 PART ROOF FRAMING PLAN AND DETAILS

ARCHITECTURAL

3001 FLOOR PLAN - LEVEL 2 DEMO
3002 FLOOR PLAN - LEVEL 2
3003 FLOOR PLAN - ROOF
3301 PARTIAL BUILDING SECTIONS
3350 SECTION DETAILS
3601 INTERIOR ELEVATIONS
3701 LEVEL 1 - REFLECTED CEILING PLAN AND PARTIAL FLOOR PLAN
3702 REFLECTED CEILING PLAN - LEVEL 2 DEMO
3703 REFLECTED CEILING PLAN - LEVEL 2
3801 SCREENS, FRAMES AND DOORS

MECHANICAL

M-001 MECHANICAL LEGEND
MC601 CONTROLS
MP101 PARTIAL FL. PLANS LEVELS 1 & 2 - PLUMBING
MP501 MECHANICAL SCHEDULES AND DETAILS
MV101 PARTIAL LEVEL 2 AND ROOF PLAN - AIR DISTRIBUTION
MV501 DETAILS - AIR DISTRIBUTION
MV601 SCHEDULES - AIR DISTRIBUTION
PG101 PARTIAL LF. PLANS AND ROOF PLAN - PROPANE GAS
SP101 LEVEL 2 FLOOR PLAN - SPRINKLER

ELECTRICAL

E-001 ELECTRICAL LEGEND AND DETAILS
E-101 LEVEL 1 AND 2 ELECTRICAL KEY PLANS
EL101 LEVEL 2 FLOOR PLAN - LIGHTING
EM101 LEVEL 2 FLOOR PLAN - MECHANICAL EQUIPMENT CONNECTIONS
EP101 LEVEL 2 FLOOR PLAN - POWER & SYSTEMS
EP501 LEVEL 2 FLOOR PLAN - KITCHEN EQUIPMENT CONNECTIONS
EP601 ELECTRICAL RISER DETAILS

FBM
ARCHITECTURE • INTERIOR DESIGN

HS1-1660 Hollis Street
Halifax, Nova Scotia, B3J 1V7
Canada

T: (902) 429.4100
architects@fbm.ca
fbm.ca

PROJECT NAME:

SIR. JOHN A. MACDONALD CULINARY KITCHEN

31 Scholars Rd, Upper Tantallon NS B3Z 0C3

ISSUED FOR TENDER 22 MAY 2019

CLIENT:

Halifax Regional
Centre for Education

FBM PROJECT NO.: 2018-132 | DATE: 22 MAY 2019

STRUCTURAL STEEL NOTES

1. ALL STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN ACCORDANCE WITH CSA S16. CONTRACTOR SHALL MAINTAIN ERECTION BRACING UNTIL COMPLETION OF ENTIRE STRUCTURE, INCLUDING FLOOR/ROOF DECKS AND OTHER ELEMENTS WHICH ARE PART OF THE LATERAL LOAD RESISTING SYSTEM.
2. ALL STRUCTURAL STEEL SHALL BE NEW STOCK AND CONFORM TO THE FOLLOWING GRADES AND STANDARDS:
   2.1. CSA-G40.21 TYPE 350W UNLESS NOTED.
   2.2. HOLLOW STRUCTURAL SECTIONS: ASTM A500 GRADE C.
   2.3. COLD FORMED SECTIONS: CSA S136, 350 MPa MIN. YIELD STRENGTH.
   2.4. CHANNELS, ANGLES, PLATE & ROD MATERIAL TYPE 300W.
3. ALL WELDING SHALL BE CARRIED OUT IN ACCORDANCE WITH CSA W59 AND W55.3 BY A FABRICATOR FULLY APPROVED UNDER CSA W47.1 DIVISION No.1 OR No.2.
4. ALL BOLTS, NUTS AND WASHERS FOR STRUCTURAL STEEL CONNECTIONS SHALL CONFORM TO ASTM F3125.
5. INSPECTION AND TESTING OF STRUCTURAL STEEL FRAME WORK (SUCH AS BOLT TORQUE, SHEAR STUDS, ALIGNMENT, ETC.) SHALL BE IN ACCORDANCE WITH CSA S16 BY A QUALIFIED INSPECTION COMPANY ENGAGED BY THE OWNER. COST OF RETESTING DEFECTIVE WELDS SHALL BE BORNE BY THE STRUCTURAL STEEL FABRICATOR.
6. SPLICES IN STEEL MEMBERS, OTHER THAN THOSE SHOWN ON THE DRAWINGS, SHALL BE DESIGNED TO DEVELOP THE FULL CAPACITY OF THE MEMBER AT THE POINT OF THE SPLICE. MEMBERS SHALL NOT BE SPLICED AT POINTS OF MAXIMUM STRESS AND SHALL NOT BE PERMITTED WITHOUT THE WRITTEN PERMISSION OF BMR STRUCTURAL ENGINEERING.
7. NO STRUCTURAL STEEL SHALL BE CUT IN THE FIELD UNLESS REVIEWED AND APPROVED BY BMR STRUCTURAL ENGINEERING.
8. STEEL COATINGS – UNLESS NOTED OTHERWISE ALL STRUCTURAL STEEL SHALL BE CLEANED AND PREPARED:
   8.1. ALL INTERIOR STEEL THAT IS TO BE PROTECTED BY A SPRAY APPLIED CEMENTIOUS FIRE PROOFING SHALL BE CLEANED TO CISC/CPMA 2-75 AND REMAIN UNCOATED STEEL.
   8.2. ALL INTERIOR STRUCTURAL STEEL NOT TO RECEIVE FINISH PAINTING ON SITE SHALL BE SHOP PRIME PAINTED AS PER CSA/CAN-S-16. SHOP PRIMER SHALL CONFORM TO CISC/CPMA 1-73A.
   8.3. ALL INTERIOR STRUCTURAL STEEL TO RECEIVE FINISH PAINTING ON SITE SHALL BE SHOP PRIME PAINTED AS PER CSA/CAN-S-16. SHOP PRIMER SHALL CONFORM TO CISC/CPMA 2-75.
   8.4. ALL STEEL EXPOSED TO WEATHER IS TO BE HOT DIP GALVANIZED IN ACCORDANCE TO CSA G164. TOUCH UP OF WELDS, CUTS OR SCRATCHES TO GALVANIZING SHALL BE DONE WITH A MINIMUM OF 3 COATS OF ZINC RICH PAINT.
   8.5. HOT DIPPED GALVANIZED STEEL REQUIRING AN ADDITIONAL FINISH PAINT COAT SHALL BE PREPARED TO ASTM D6386 STANDARDS.
9. REFER TO ARCHITECTURAL DRAWINGS FOR LOCATIONS TO BE PAINTED OR UNPAINTED.
10. STEEL FABRICATOR SHALL SUBMIT SHOP DRAWINGS STAMPED BY A PROFESSIONAL ENGINEER REGISTERED IN THE PROVINCE OF CONSTRUCTION PRIOR TO COMMENCEMENT OF FABRICATION.
11. DESIGN ALL BEAM TO BEAM AND BEAM TO COLUMN CONNECTIONS FOR SHEAR CALCULATED FROM BEAM LOADED TO FLEXURAL CAPACITY WITH UDL LOAD BASED ON SPAN OF BEAM U/NOTED. BEAMS WITH SIGNIFICANT CONCENTRATED LOADS SHALL BE DESIGNED FOR ADDITIONAL SHEAR CONNECTIONS AS REQUIRED.

RENOVATION NOTES

1. THE CONTRACT DOCUMENTS ARE BASED ON ASSUMED AS-BUILT DIMENSIONS FOR THE EXISTING BUILDING STRUCTURE AND ASSUMPTIONS IN ACCORDANCE WITH DETAILING AND PLACING PRACTICE. THESE ASSUMPTIONS MAY VARY FROM THE ACTUAL ON-SITE CONDITIONS. THE CONTRACTOR SHALL IMMEDIATELY INFORM THE CONSULTANT OF ANY ACTUAL VARIATIONS FROM THE ASSUMED CONDITIONS.
2. ENSURE THAT ALL NECESSARY JOB DIMENSIONS ARE TAKEN AND ALL TRADES ARE COORDINATED FOR THE PROPER EXECUTION OF THE WORK. THE CONTRACTOR SHALL ASSUME COMPLETE RESPONSIBILITY FOR THE ACCURACY AND COMPLETENESS OF SUCH DIMENSIONS, AND FOR COORDINATION.
3. PRIOR TO FABRICATION OF ANY STRUCTURAL MEMBERS, THE CONTRACTOR SHALL COMPLETE A SITE REVIEW OF CRITICAL "TIE-IN" DIMENSIONS AND CONFIRM ALL DIMENSIONS TO ENSURE PROPER FIT OF NEW WORK TO EXISTING. REPORT ANY DISCREPANCIES TO BMR STRUCTURAL ENGINEERING PRIOR TO STARTING WORK.
4. COMMENCEMENT OF CONSTRUCTION OR ANY PART THEREOF CONSTITUTES ACCEPTANCE OF EXISTING CONDITIONS AND MEANS DIMENSIONS AND ELEVATIONS HAVE BEEN CONSIDERED, VERIFIED AND ARE ACCEPTABLE.
5. CONNECTIONS FOR NEW STRUCTURAL STEEL FRAMING TO EXISTING STRUCTURAL STEEL SHALL BE ACHIEVED THROUGH WELDED CONNECTIONS UNLESS OTHERWISE NOTED. WELDING OF NEW STEEL TO "OLD" STEEL (STEEL PRODUCED IN EARLY 20TH CENTURY) MAY REQUIRE MODIFICATIONS TO THE STANDARD WELDING PROCEDURES. PROCEDURES OF WELDING NEW STEEL TO "OLD" STEEL SHALL BE PREPARED BY THE CONTRACTOR'S SPECIALTY STRUCTURAL ENGINEER AND REVIEWED AND APPROVED BY BMR. PAINTED EXISTING STEEL SHALL BE TESTED FOR LEAD CONTAINING PAINT AND REMEDIATED BY QUALIFIED PROFESSIONALS AS REQUIRED.

GENERAL NOTES

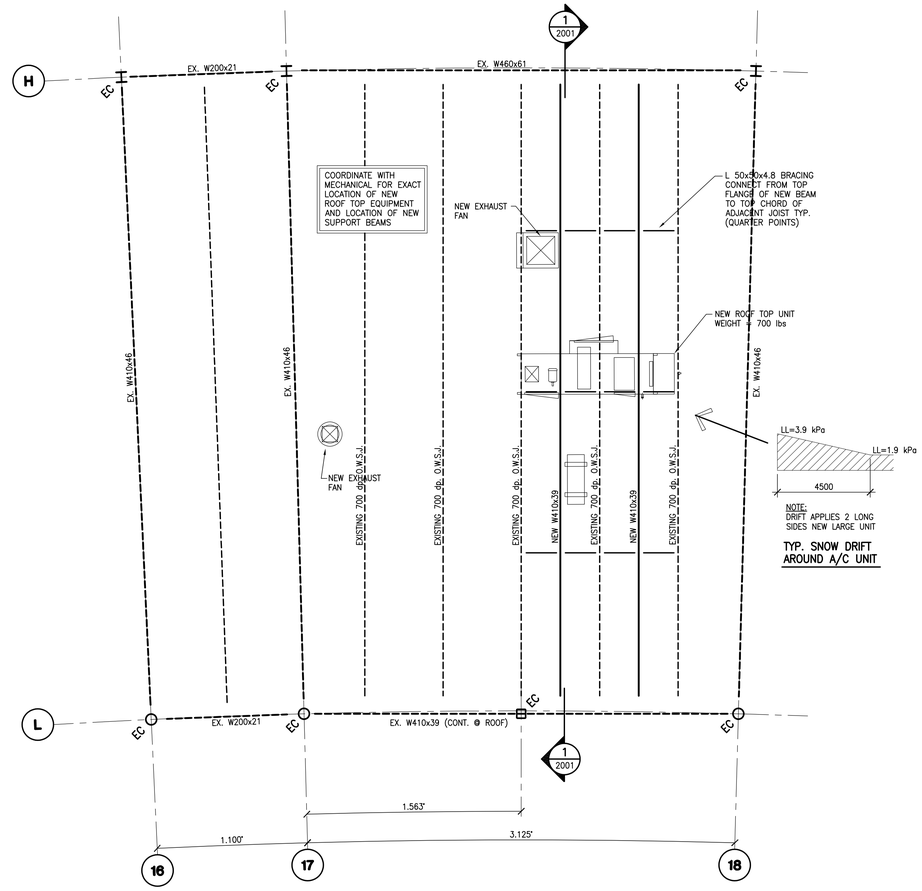
1. ALL WORK AND MATERIALS SHALL CONFORM TO THE 2015 EDITION OF THE NATIONAL BUILDING CODE OF CANADA (NBCC). ALL WORK TO BE CARRIED OUT IN FULL ACCORDANCE WITH THE OCCUPATIONAL HEALTH AND SAFETY ACT OF NOVA SCOTIA, LATEST EDITIONS OF APPLICABLE CSA AND ALL APPLICABLE SAFETY STANDARDS.
2. THE DRAWINGS DO NOT INDICATE ELEMENTS THAT MAY BE NECESSARY FOR CONSTRUCTION SAFETY. THE CONTRACTOR IS RESPONSIBLE FOR ALL SAFETY MEASURES PERTAINING TO THE PROJECT.
3. DO NOT SCALE THE DRAWINGS. NO ALTERATIONS TO STRUCTURAL DETAILS SHALL BE MADE WITHOUT PERMISSION OF THE STRUCTURAL ENGINEER. CONSTRUCTION ERRORS ARE TO BE DOCUMENTED AND REPORTED TO THE STRUCTURAL ENGINEER BEFORE PROCEEDING WITH SUBSEQUENT WORK.
4. THE ELECTRONIC FILE REPRESENTS DRAWINGS WHICH WERE PREPARED FOR THE PURPOSE OF DEPICTING GENERAL LAYOUT CONDITIONS. THE DRAWINGS MAY OR MAY NOT INCORPORATE REVISIONS FROM PREVIOUS DESIGN DRAWINGS, OR REVISIONS RESULTING FROM THE CONSTRUCTION PROCESS. CONSTRUCTED CONDITIONS RESULTING FROM THE USE OF THE DRAWINGS MAY VARY FROM THE DRAWING INFORMATION. BMR STRUCTURAL ENGINEERING ASSUMES NO LIABILITY FOR ERRORS OR OMISSIONS IN THE ELECTRONIC DRAWING FILES. THE RECIPIENT ASSUMES ALL RISK AND EXPENSE INCURRED WITH THE USE OF THE ELECTRONIC DRAWING FILES IN THE PRODUCTION OF THEIR WORK.
5. THE CONTRACTOR SHALL REVIEW ALL THE CONTRACT DRAWINGS & SPECIFICATIONS AND CHECK/COORDINATE DIMENSIONS/ELEVATIONS BEFORE CONSTRUCTION. REPORT ANY DISCREPANCIES BETWEEN STRUCTURAL AND OTHER DISCIPLINE'S DRAWINGS & SPECIFICATIONS FOR CLARIFICATION PRIOR TO PROCEEDING WITH WORK. ALL BUILDING DIMENSIONS, ELEVATIONS, DRAINAGE SLOPES, ETC. SHOWN ON STRUCTURAL DRAWINGS SHALL BE FULLY COORDINATED BY THE CONTRACTOR WITH THE OTHER CONSULTANTS DRAWINGS.
6. THE CONTRACTOR SHALL EXAMINE ALL DRAWINGS AND CHECK ALL DIMENSIONS AGAINST SITE CONDITIONS AND REPORT ANY DISCREPANCIES BEFORE PROCEEDING WITH WORK.
7. DO NOT IMPOSE CONSTRUCTION LOADS ON THE STRUCTURE IN EXCESS OF THE DESIGN LOADS.
8. FOR OPENINGS THROUGH FLOORS, ROOFS, AND WALLS, SEE OTHER CONSULTANTS DRAWINGS FOR SIZE AND LOCATION. NO NEW OPENINGS SHALL BE WITHOUT APPROVAL OF BMR STRUCTURAL ENGINEERING.
9. ALL GEOTECHNICAL MATERIALS BENEATH SLABS ON GRADE (INCLUDING REMOVAL OF NON-ACCEPTABLE MATERIALS AND REPLACEMENT WITH APPROVED MATERIALS) SHALL BE PREPARED AS DETAILED IN THE GEOTECHNICAL REPORT UNLESS SPECIFICALLY NOTED OTHERWISE. SUB BASE UNDER SLABS ON GRADE SHALL BE COMPACTED TO 100% STANDARD PROCTOR DENSITY. COMPACTION SHALL BE VERIFIED IN WRITING BY THE GEOTECHNICAL ENGINEER PRIOR TO CASTING OF SLABS.

DESIGN NOTES

1. ALL REINFORCED CONCRETE ELEMENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH CSA STANDARD A23.3. ALL STRUCTURAL STEEL ELEMENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH CAN/CSA-S16. ALL STRUCTURAL TIMBER ELEMENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH CSA STANDARD O86. ALL STRUCTURAL MASONRY ELEMENTS HAVE BEEN DESIGNED IN ACCORDANCE WITH CSA STANDARD S304.1.
2. ALL LOADS INDICATED ON DRAWINGS ARE SERVICE (UNFACTORED) LOADS UNLESS NOTED.
3. THE STRUCTURE HAS NOT BEEN DESIGNED FOR ANY FUTURE EXTENSIONS U/N.

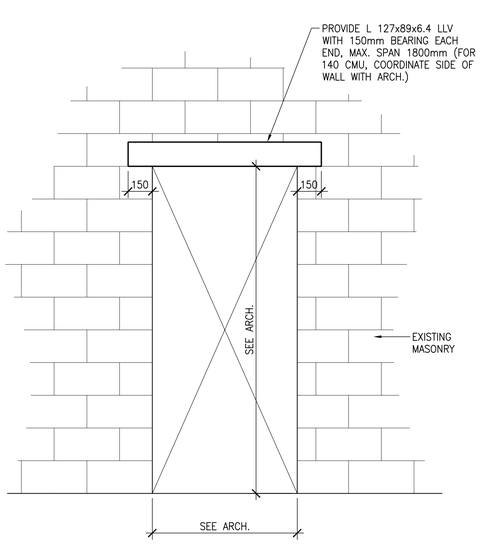
TEMPORARY WORKS NOTES

1. THE CONTRACTOR SHALL DESIGN, PROVIDE, ERECT, MAINTAIN, REMOVE, AND ASSUME FULL AND SOLE RESPONSIBILITY FOR ALL TEMPORARY WORKS REQUIRED FOR THE SAFE AND COMPLETE EXECUTION OF THE WORKS (IE: BRACING, FORM & FALSEWORK, SHORING, ETC.). THE ABOVE WORK IS BEYOND THE SCOPE OF BMR STRUCTURAL ENGINEERING.
2. IN THE EXECUTION OF THE TEMPORARY WORKS AND FOR THE DURATION OF THE CONTRACT, THE CONTRACTOR SHALL MAKE ADEQUATE PROVISION FOR ALL LIKELY CONSTRUCTION LOADING AND PROVIDE SUFFICIENT BRACING AND/OR PROPS TO KEEP THE WORKS IN PLUMB AND ALIGNMENT AND FREE FROM EXCESSIVE DEFLECTION.
3. COSTS OF ALL TEMPORARY WORKS ARE DEEMED TO HAVE BEEN INCLUDED IN THE CONTRACT PRICE.



PART ROOF FRAMING PLAN

SCALE: 1:50



TYPICAL LINTEL - NEW OPENING

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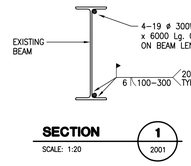
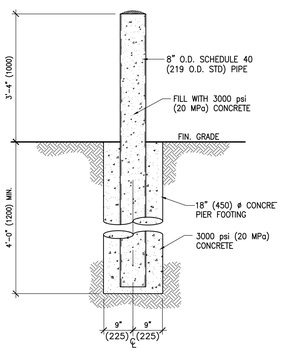
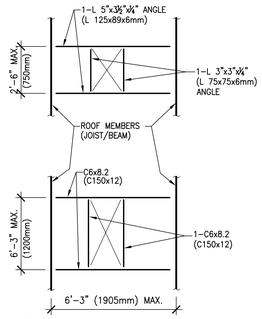


SECTION 1/2001

SCALE: 1:20

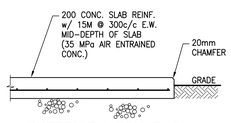


TYPICAL BOLLARD DETAIL



NOTE : FOR LOCATION SEE MECH. & OTHER DWGS. WHERE HEAVY EQUIPMENT IS TO BE SUPPORTED PROVIDE EXTRA JOISTS TO ENGINEERS APPROVAL.

TYPICAL FRAMING AROUND ROOF OPENINGS



EXTERIOR MECH. PAD

FBM
ARCHITECTURE • INTERIOR DESIGN
HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429.4100 architects@fbm.ca fbm.ca
BMR Structural Engineering
5413 Doyle Street
Halifax, Nova Scotia B3J 1H9
ph. (902) 429-3321 fax (902) 422-8650
BMR Project No. 2019-140

No	REVISION	BY	DATE
3	ISSUED FOR TENDER	PR	MAY16/19
2	FOR REVIEW	PR	MAY8/19
1	FOR REVIEW	PR	MAY6/19

STAMP

REGISTERED PROFESSIONAL ENGINEER PROVINCE OF NOVA SCOTIA
DATE 5/14/19
11392

SCALE
DRAWN P.R.
CHECKED M.C.
DATE --/--/--

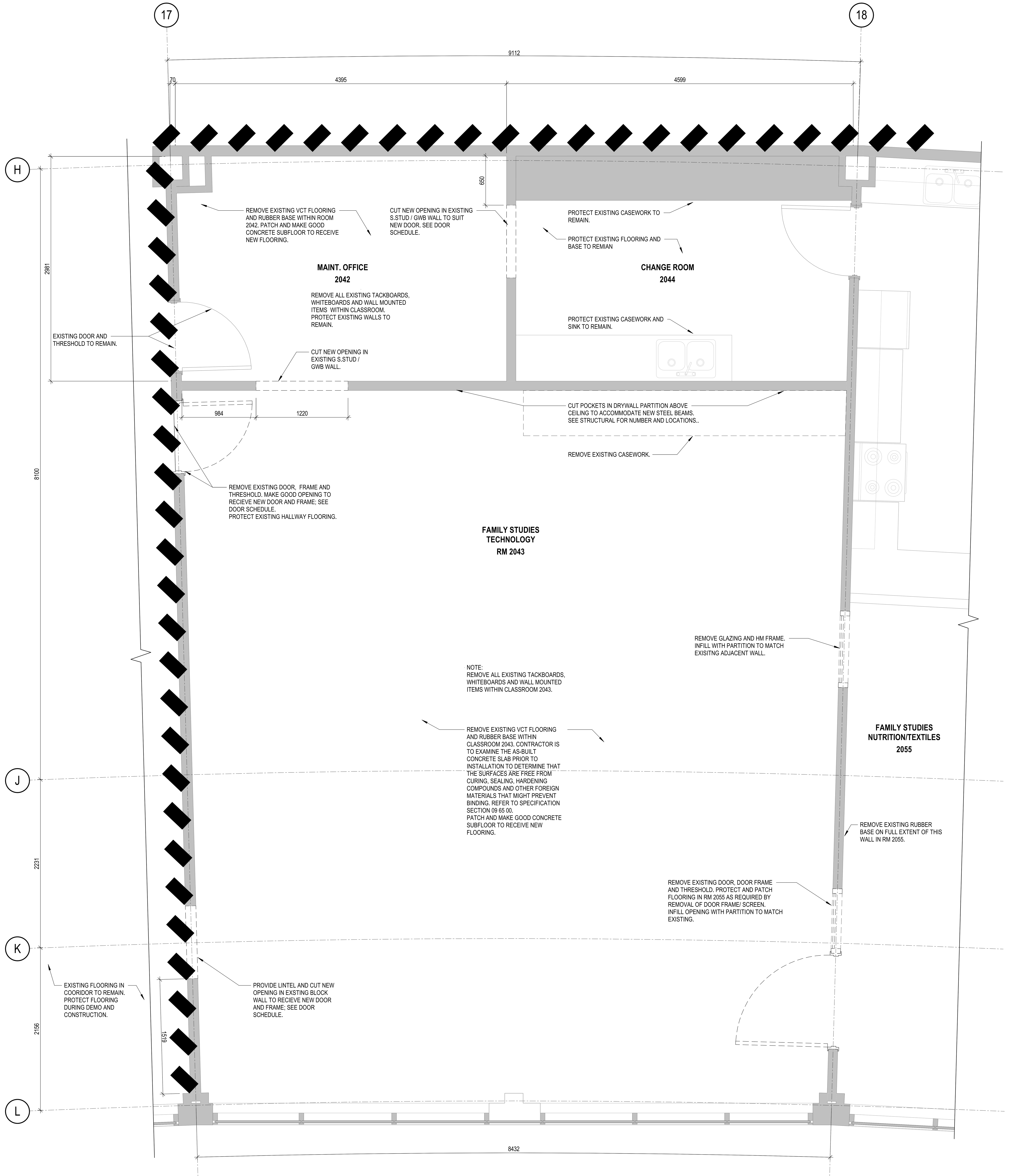
PROJECT
SIR. JOHN A. CULINARY KITCHEN
31 SCHOLARS RD, UPPER TANTALLON, NS

CLIENT
DTIR

PROJECT No. 2018-132

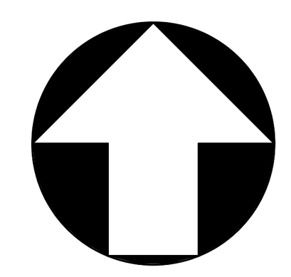
SHEET TITLE
PART ROOF FRAMING PLAN AND DETAILS

2001



1 LEVEL 2 - EXISTING AND DEMOLITION FLOOR PLAN

SCALE: 1 : 25



GENERAL NOTES:

1. REPORT ANY HAZARDOUS MATERIALS FOUND ON SITE TO CONSTRUCTION MANAGER.

2. CEASE OPERATIONS AND NOTIFY CONSTRUCTION MANAGER IF SAFETY OR ANY ADJACENT WORK APPEAR TO BE ENDANGERED.

3. CONTRACTOR TO PROTECT AND MAINTAIN THE INTEGRITY OF EXISTING FINISHES IN ALL AREAS NOT SCHEDULED FOR DEMOLITION WORK. ANY DAMAGE DUE TO DEMOLITION AND / OR NEW CONSTRUCTION TO BE REPAIRED AND MADE GOOD.

4. CONTRACTOR TO REPAIR ANY FIREPROOFING ON STRUCTURAL ELEMENTS AND FIRE-RATED ASSEMBLIES DAMAGED DURING DEMOLITION AND CONSTRUCTION.

5. CONTRACTOR TO REMOVE AND LAWFULLY DISPOSE OFF SITE ALL EQUIPMENT, RUBBISH, AND DEBRIS RESULTING FROM CONSTRUCTION. KEEP PROJECT AREA BROOMCLEAN. WHENEVER APPLICABLE, ALL DEMOLITION DEBRIS TO BE SORTED AND TAKEN TO APPROPRIATE FACILITIES FOR RECYCLING.

6. REMOVE EXISTING TEL. / ELECT. OUTLETS, THERMOSTATS, SWITCHES, CABLING, ETC. FROM WALLS TO BE DEMOLISHED. ALL SERVICES TO BE REMOVED ARE TO BE PULLED BACK TO SOURCE. REFER TO MECHANICAL AND ELECTRICAL DRAWINGS.

7. FOR DEMOLITION WORK DONE WHILE BUILDING IS OCCUPIED, ALLOW FOR PROPER VENTILATION OF THE PREMISES DURING AND AFTER COMPLETION OF DEMOLITION. VENTILATION SYSTEM TO BE PROTECTED FROM DUST AND DEBRIS.

8. REFER TO MECHANICAL, FIRE PROTECTION, AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION NOTES APPLICABLE TO THOSE DISCIPLINES.

9. CONTRACTOR IS RESPONSIBLE FOR THE DESIGN, COORDINATION AND EXECUTION OF CONSTRUCTION METHODS, PROCEDURES AND SCHEDULES. THE OPERATIONAL PROCEDURES AND METHODS ARE THE RESPONSIBILITY OF THE CONTRACTOR INSOFAR AS THEY DO NOT PRESENT HAZARDS TO PERSONNEL OR PROPERTY OR INFRINGE ON WORK SCHEDULES FOR NORMAL SITE ACTIVITY.

LEGEND

ITEMS TO DEMOLISH

EXISTING WALL TO REMAIN

UNRATED FIRE SEPARATION

FBM
ARCHITECTURE • INTERIOR DESIGN
HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429.4100 architects@fbm.ca fbm.ca

No	REVISION	BY	DATE
0	ISSUED FOR TENDER	GF	22 MAY 19

STAMP

SCALE	As indicated
DRAWN	MGD/CS/CK
CHECKED	GPF
DATE	22 MAY 2019

PROJECT

SIR. JOHN A. MACDONALD CULINARY KITCHEN

31 Scholars Rd, Upper Tantallon NS B3Z 0C3

CLIENT

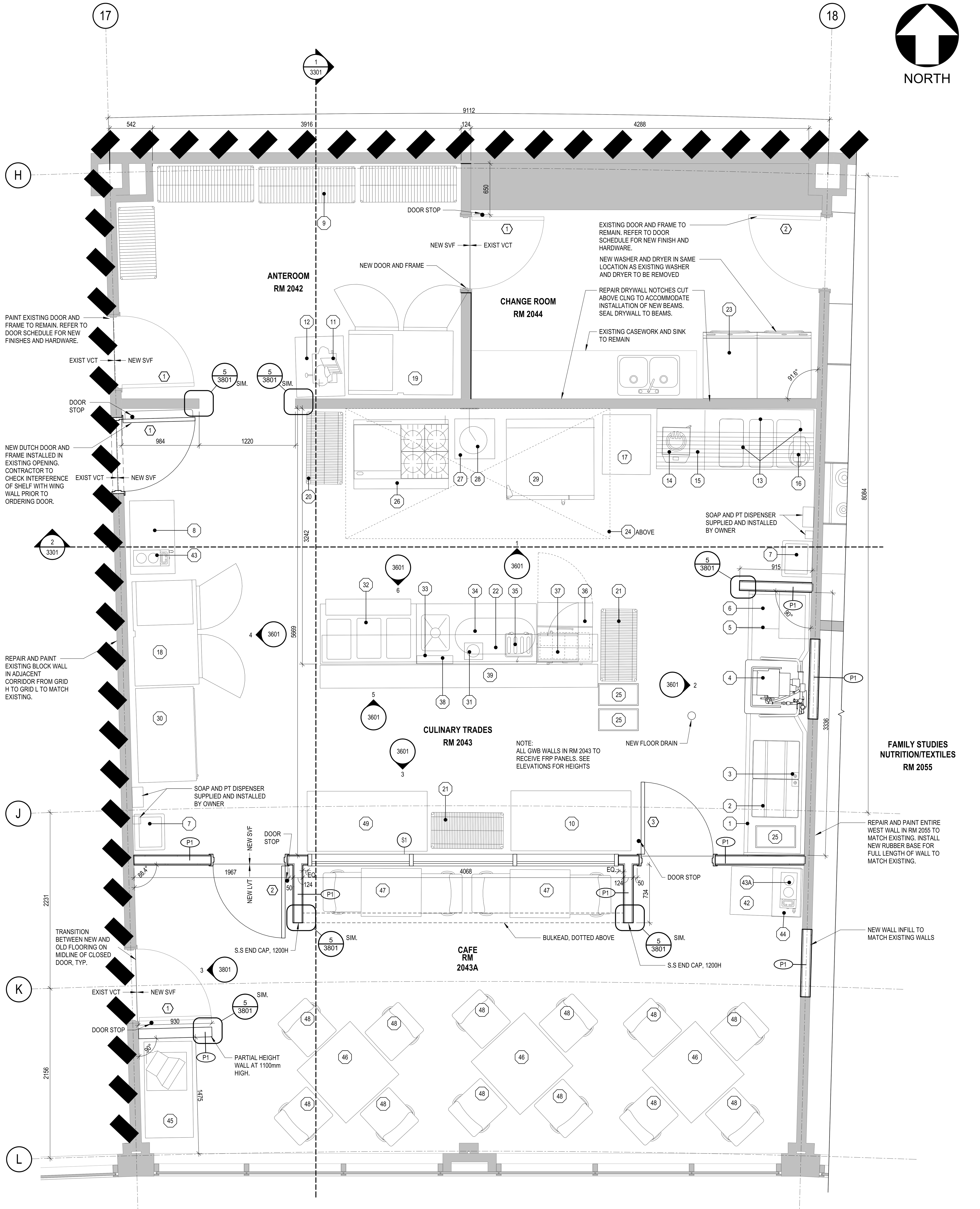
Halifax Regional Centre for Education

PROJECT No. 2018-132

SHEET TITLE

FLOOR PLAN - LEVEL 2 DEMO

3001



1 LEVEL 2 - NEW FLOOR PLAN
SCALE: 1 : 25

SJA KITCHEN EQUIPMENT SCHEDULE

No	DESCRIPTION	Qty	MANUF'R.	MODEL #	SUP.	MECHANICAL SERVICES HOT WATER	COLD WATER	DIRECT DRAIN	INDIRECT DRAIN	PROPANE BTU	PROPANE CONN.	ELECTRICAL SERVICES VOLTS	PHASE	CONN.	HP	Kw	AMPS	REMARKS
1	SOILED DISHTABLE	1	DIAMOND		FSC													
2	DISH RACK SHELF	1	DIAMOND		FSC													
3	DOUBLE POT & PRE RINSE SINK	1	DIAMOND		FSC	1/2"	1/2"	1 1/2"										
4	DISH AND POT WASHER	1	HOBART	AM15VLT	FSC	1/2"	1/2"	1 1/2"				208	3	DIR	1		45.4	350 CFM
5	CLEAN DISHTABLE	1	DIAMOND		FSC													
6	WALK SHELF	1	DIAMOND		FSC													
7	HAND SINKS & EYE WASH	2	TARRISON		FSC	1/2"	1/2"	1 1/2"										
8	SERVERY CART	1	METRO	MW404	FCS													
9	STORAGE SHELF UNITS	4	TARRISON		FSC													
10	MOBILE WORK TABLE	1	DIAMOND		FSC													
11	SLICER	1	HOBART	EDGE 12	FSC							120	1	C&P	1/2		4.0	
12	SLICER STAND	1	DAIMOND	MST2430	FSC													
13	INGREDIENTS BINS	3	R'MAID	3600	FSC													
14	INDUCTION BURNER	1	COOKTEC	ACD1800G	FSC							120	1	C&P				
15	BAKERS TABLE	1	DIAMOND	BT7230D	FSC													
16	MIXER	1	HOBART	N-50	FSC							120	1	C&P	.6		2.9	
17	BUN PAN RACK	1	CROWN	FAZMBR20	FSC													
18	REACH IN COOLER	1	TRAULSAN	20010	FSC							120	1	C&P	1/3		7.5	
19	REACH IN FREEZER	1	TRAULSAN	22010	FSC							120	1	C&P	3/4		7.5	
20	MOBILE UTILITY SHELF CART	1	METRO	BC2030-34MD	FSC	1/2"	1/2"	1 1/2"										
21	MOBILE SHELF UNIT	2	METROMAX		FSC							120	1	DIR		.6	5	
22	UTENSIL RACK	1	DIAMOND		FSC													
23	WASHER AND DRYER	1	GE	GFWN1100DWW	FSC	1/2"	1/2"		1"			120	1	C&P				GFWN110EDWW 208 VOLT
24	EXHAUST HOOD/FAN/FIRE PROTECTION	1	HALTON		MECH							120	1	DIR				LIGHT
25	SPARE NUMBER																	
26	RANGE/OVEN/BURNERS/GRILL	1	GARLAND	GFE48-4G24LL	FSC					232,000	3/4"	120	1	DIR				
27	STOCK POT RANGE	1	GARLAND	G20-SP	FSC					60,000	3/4"							
28	POT FILLER FAUCET	1	T&S	B0610	FSC	1/2"	1/2"											
29	COMBI OVEN	1	ALTO SHAAM	CTP7-20G	FSC		3/4"		1 1/2"	98,000	3/4"	120	1	DIR			6.8	
30	GLASS DOOR COOLER	1	TRUE	GDM 41	FSC							120	1	C&P	1/2		8.0	
31	VEG PROCESSOR	1	ROBOT COUP	R2N	FSC							120	1	C&P	1/2		8.0	
32	HOT FOOD UNIT	1	DIAMOND	HFT48-3D	FSC				1"			208	1	DIR		4.0	19	
33	DOUBLE OVERSHELF/HEAT LAMP	1	DIAMOND	GRA-48	FSC							120	1	DIR		.6	5	
34	WORK TABLE W/SINK	1	DIAMOND		FSC	1/2"	1/2"	1 1/2"										
35	TOASTER	1	HATCO	TPT208	FSC							208	1	C&P		2.6		
36	MICROWAVE OVEN	1	PANASOMIC	NE1064F	FSC							120	1	C&P				
37	SANDWICH COLD TABLE	1	TRAULSON	UST276	FSC							120	1	C&P	1/5		8.6	
38	PIPE CHASE	1	DIAMOND		FSC													
39	PICK UP SHELF AND STORAGE	1	DIAMOND		FSC													
40	SPARE NUMBER																	
41	SPARE NUMBER																	
42	COFFEE/DESSERT STATION	1	CUSTOM		FSC													
43	COFFEE MAKER	1	BUNN	VPR17	FCS							120	1	C&P		1.67	13.9	
43A	COFFEE MAKER	1	BUNN	CWTF-35	FCS		1/2"					120-208	1	DIR		3.8	17.1	
44	ICE MAKER	1	ICE O MATIC	ICEU070A	FCS		1/2"		1"			120	1	C&P			9.7	
45	COMPUTOR TABLE	1	IKEA	102.447.43	FSC													
46	TABLE LG	3	DWD	D3636	FCS													
47	TABLE SM	2	DWD	D2430	FCS													
48	CHAIRS	16	DWD	DWD	FCS													
49	MOBILE WORK TABLE WITH DEMO MIRROR	1	DIAMOND		FSC													

GENERAL NOTES:

1. CONTRACTOR TO MAKE GOOD ALL EXISTING SURFACES AND FINISHES AFFECTED BY THE DEMOLITION AND RENOVATION AS DETAILED AND /OR IMPLIED BY THE DRAWINGS AND SPECIFICATIONS. WHERE NECESSARY REPAIR AND MATCH ADJACENT MATERIALS AND FINISHES, EXTEND PATCH TO NEAREST NATURAL BREAK POINT i.e. INSIDE CORNER, EXIST. JOINT OR LOCATION APPROVED BY THE ARCHITECT.

2. CONTRACTOR TO CUT, PATCH, AND MAKE GOOD EXISTING FLOORS, CEILINGS AND WALLS AS REQUIRED BY THE WORK OF OTHER TRADES WHETHER NOTED ON THE DRAWINGS OR NOT. CONTRACTOR TO COORDINATE WITH MECHANICAL, ELECTRICAL, AND SPRINKLER TRADES.

3. CONTRACTOR TO PROTECT AND MAINTAIN THE INTEGRITY OF EXISTING FINISHES IN ALL AREAS NOT SCHEDULED FOR DEMOLITION WORK. ANY DAMAGE DUE TO DEMOLITION AND/OR NEW CONSTRUCTION TO BE REPAIRED AND MADE GOOD.

4. CONTRACTOR TO REPAIR ANY FIREPROOFING ON STRUCTURAL ELEMENTS AND FIRE-RATED ASSEMBLIES DAMAGED DURING CONSTRUCTION.

5. DO NOT ALLOW ANY ADHESIVE ODOURS AND OTHER FUMES FROM CONSTRUCTION ACTIVITIES TO ENTER MECHANICAL SYSTEMS.

6. CONTRACTOR TO REMOVE AND LAWFULLY DISPOSE OFF SITE ALL RUBBISH AND DEBRIS RESULTING FROM CONSTRUCTION. KEEP PROJECT AREA BROOMCLEAN. WHENEVER APPLICABLE, ALL DEMOLITION DEBRIS TO BE SORTED AND TAKEN TO APPROPRIATE FACILITIES FOR RECYCLING.

7. CONTRACTOR TO SEAL AND REPAIR CUT-OUTS FOR MECHANICAL AND ELECTRICAL PENETRATIONS IN FLOOR, WALLS, AND CEILINGS. PROVIDE FINISHES TO MATCH EXISTING UNLESS OTHERWISE SPECIFIED.

8. CONTRACTOR TO REPAIR AND MAKE GOOD ALL EXISTING FLOORS, WALLS, AND CEILINGS THAT ARE TO REMAIN AFTER DEMOLITION AND PREPARE SURFACES TO RECEIVE NEW FINISHES.

9. REMOVE ALL EXISTING TEL./ELECT. OUTLETS, THERMOSTATS, SWITCHES, CABLING, ETC. FROM WALLS TO BE DEMOLISHED. ALL SERVICES TO BE REMOVED ARE TO BE PULLED BACK TO SOURCE.

10. ALLOW FOR PROPER VENTILATION OF THE PREMISES DURING AND AFTER COMPLETION OF DEMOLITION.

11. ALL EXISTING FLOOR FINISHES TO BE REMOVED IN AREA OF DEMOLITION UNLESS OTHERWISE NOTED.

12. REFER TO MECHANICAL, FIRE PROTECTION, AND ELECTRICAL SECTIONS FOR ANY ADDITIONAL DEMOLITION NOTES APPLICABLE TO THOSE DISCIPLINES.

13. CONTRACTOR IS RESPONSIBLE FOR THE DESIGN, COORDINATION AND EXECUTION OF CONSTRUCTION METHODS, PROCEDURES AND SCHEDULES. THE OPERATIONAL PROCEDURES AND METHODS ARE THE RESPONSIBILITY OF THE CONTRACTOR INSOFAR AS THEY DO NOT PRESENT HAZARDS TO PERSONNEL OR PROPERTY OR INFRINGE ON WORK SCHEDULES FOR NORMAL SITE ACTIVITY.

14. REPORT ANY HAZARDOUS MATERIALS FOUND ON SITE TO HRCE PROJECT MANAGER.

PARTITION TYPES

P1
16mm ABUSE RESISTANT GWB TO 2440, REGULAR ABOVE
92mm STEEL STUDS AT 406mm O.C.
ACOUSTIC BATT INSULATION
16mm ABUSE RESISTANT GWB TO 2440, REGULAR ABOVE

UNRATED FIRE SEPARATION

FBM
ARCHITECTURE • INTERIOR DESIGN
HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429.4100 architects@fbm.ca fbm.ca

No	REVISION	BY	DATE
0	ISSUED FOR TENDER	GF	22 MAY 19

STAMP
LICENSED ARCHITECT
GREGORY FRY
NOVA SCOTIA ASSOCIATION OF ARCHITECTS

SCALE As indicated
DRAWN MGD/CS/CK
CHECKED GPF
DATE 22 MAY 2019

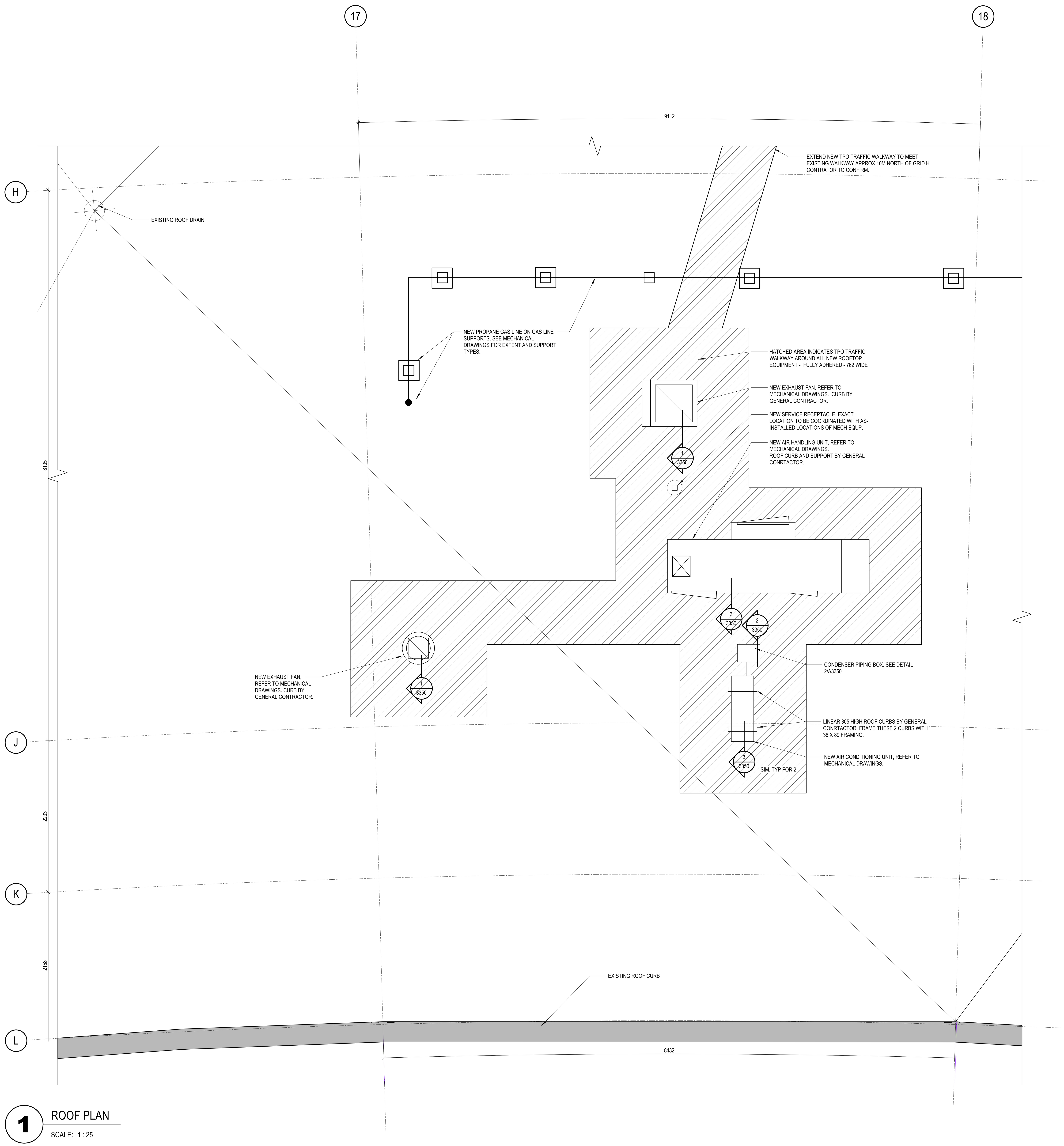
PROJECT
SIR. JOHN A. MACDONALD CULINARY KITCHEN
31 Scholars Rd, Upper Tantallon NS B3Z 0C3

CLIENT
Halifax Regional Centre for Education

PROJECT No. 2018-132

SHEET TITLE
FLOOR PLAN - LEVEL 2

3002



1 ROOF PLAN

SCALE: 1 : 25

FBM
ARCHITECTURE • INTERIOR DESIGN

HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429.4100 architects@fbm.ca fbm.ca

No	REVISION	BY	DATE
0	ISSUED FOR TENDER	GF	22 MAY 19

STAMP

LICENSED ARCHITECT
GREGORY FRY
NOVA SCOTIA ASSOCIATION OF ARCHITECTS

SCALE 1 : 25

DRAWN CS/CK

CHECKED GPF

DATE 22 MAY 2019

PROJECT

SIR. JOHN A. MACDONALD CULINARY KITCHEN

31 Scholars Rd, Upper Tantallon NS B3Z 0C3

CLIENT

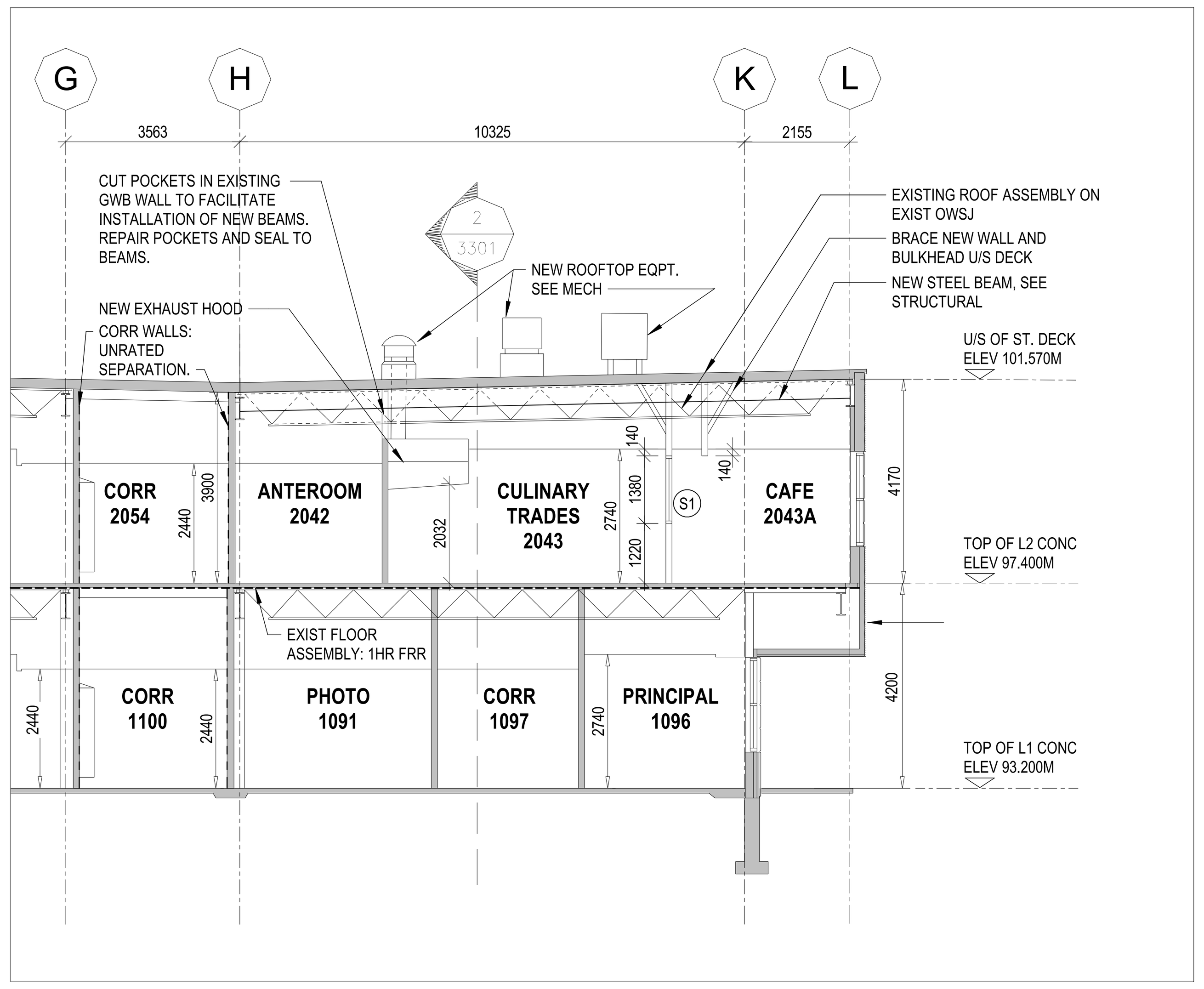
Halifax Regional Centre for Education

PROJECT No. 2018-132

SHEET TITLE

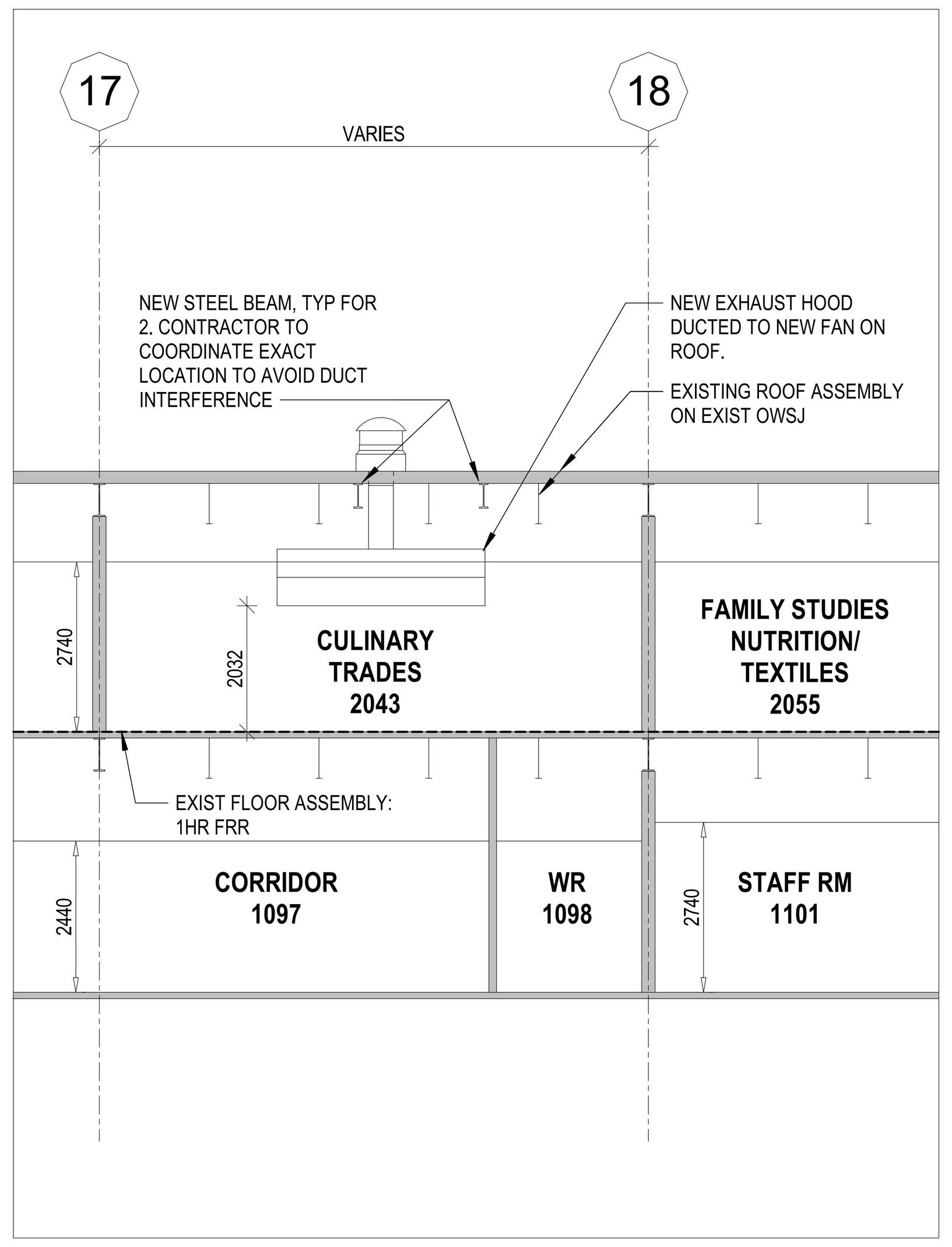
FLOOR PLAN - ROOF

3003



1 PARTIAL N/S BUILDING SECTION

SCALE: 1 : 100



2 PARTIAL E/W BUILDING SECTION

SCALE: 1 : 100

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ARCHITECTURE • INTERIOR DESIGN
HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429.4100 architects@fbm.ca fbm.ca

No	REVISION	BY	DATE
0	ISSUED FOR TENDER	GF	22 MAY 19

STAMP

LICENSED ARCHITECT — GREGORY FRY — NOVA SCOTIA ASSOCIATION OF ARCHITECTS

SCALE 1 : 100

DRAWN CK

CHECKED GF

DATE 22 MAY 2019

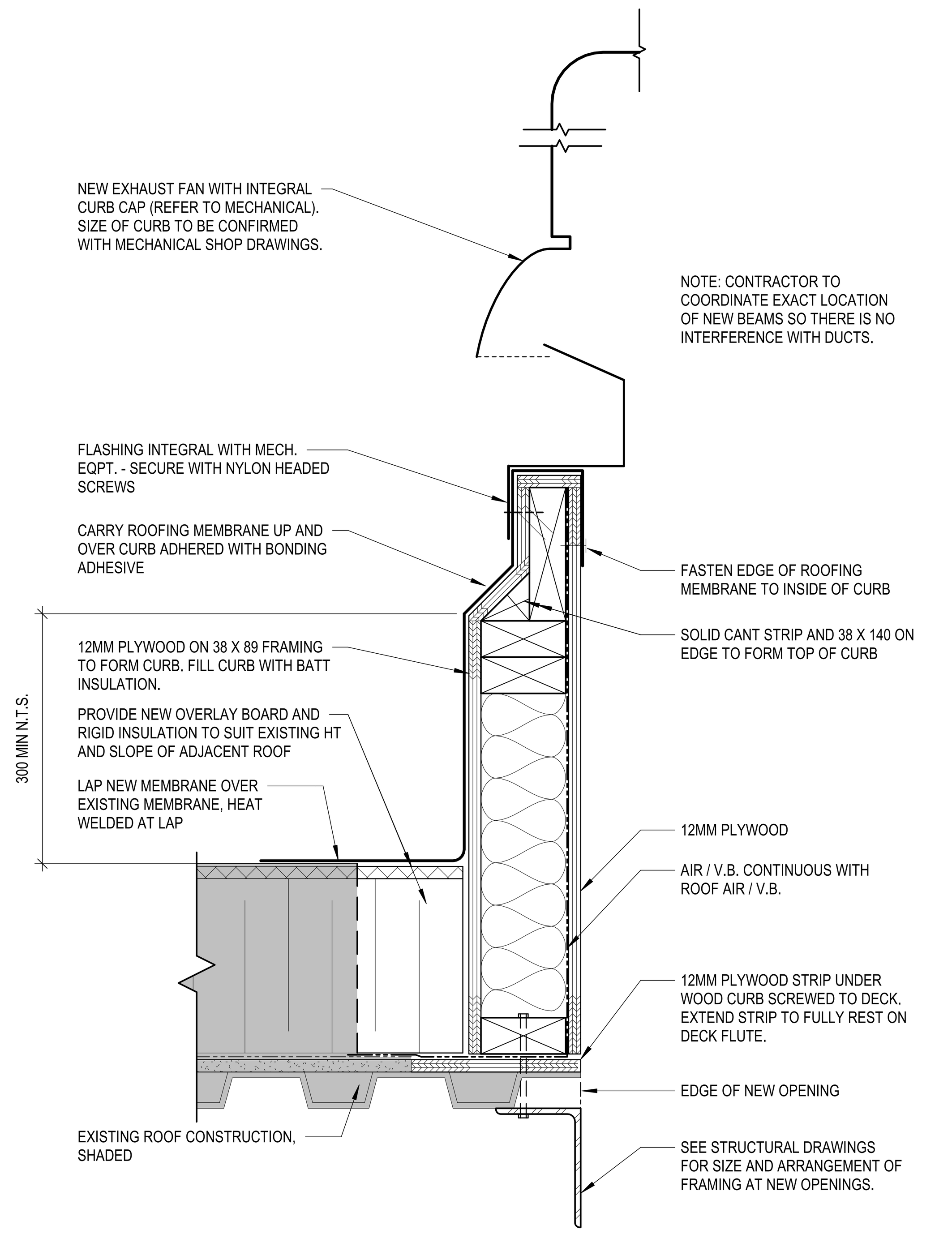
PROJECT
SIR. JOHN A. MACDONALD CULINARY KITCHEN
31 Scholars Rd, Upper Tantallon NS B3Z 0C3

CLIENT
Halifax Regional Centre for Education

PROJECT No. 2018-132

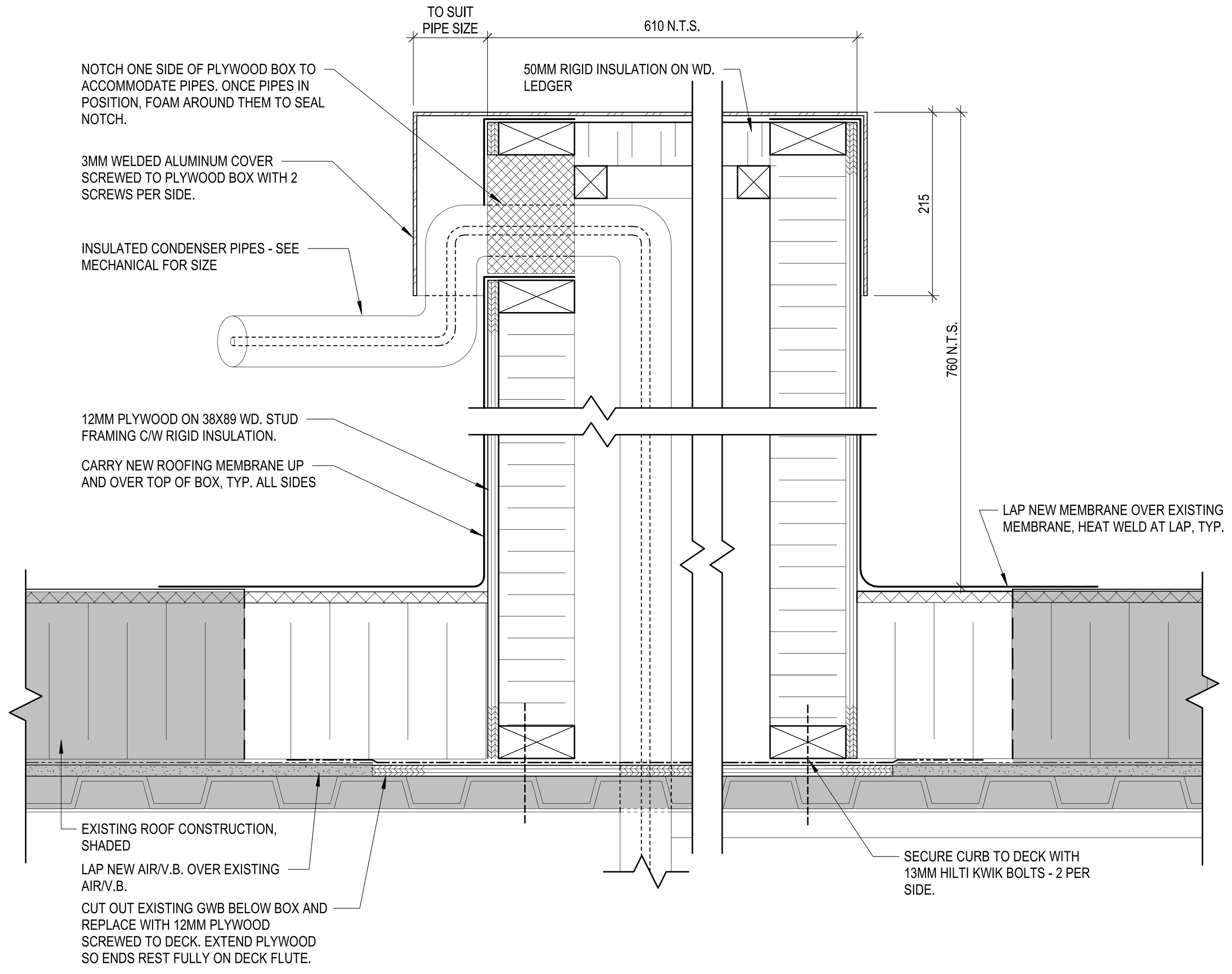
SHEET TITLE
PARTIAL BUILDING SECTIONS

3301



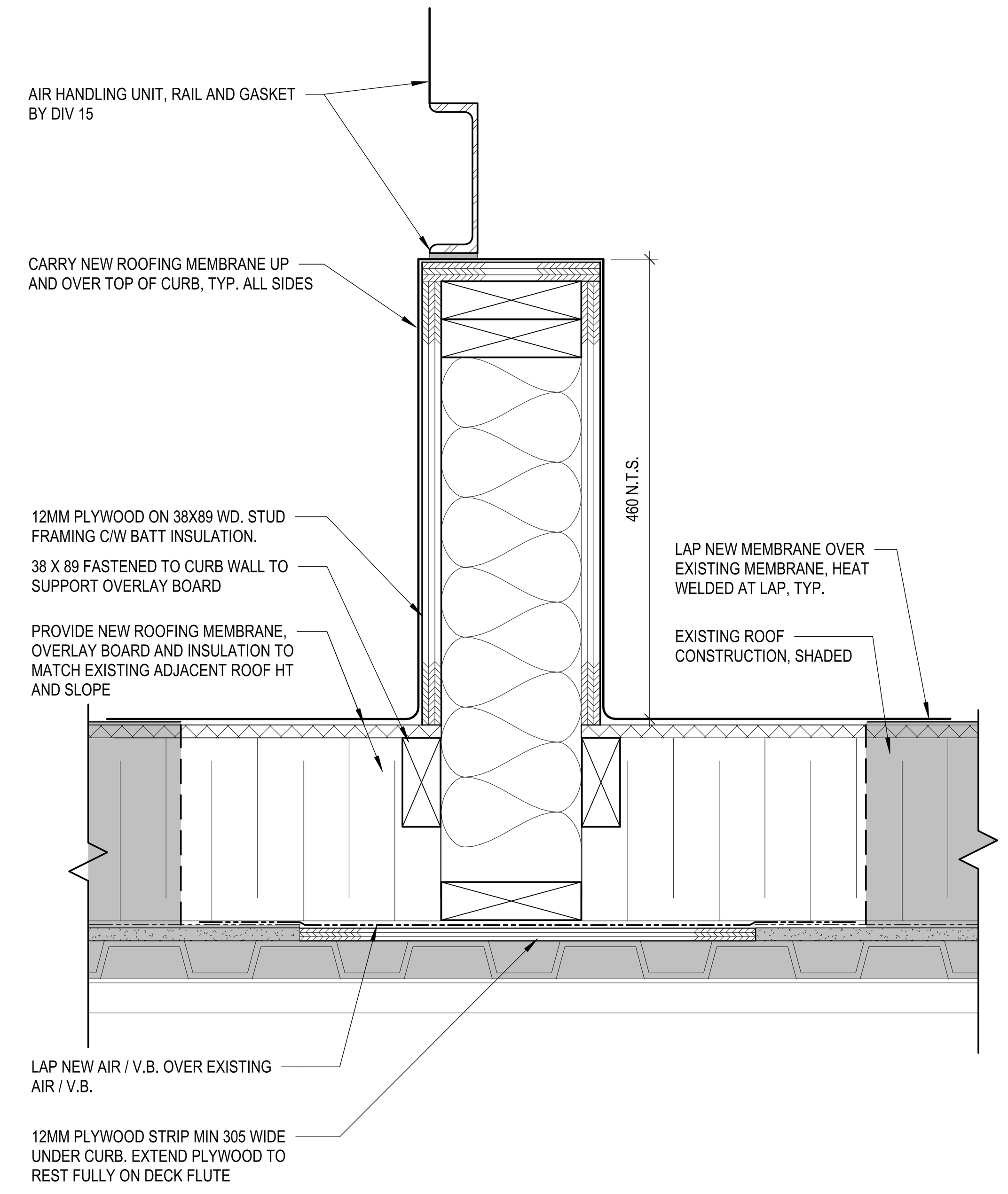
1 SECTION DETAIL - FAN CURB

SCALE: 1 : 5



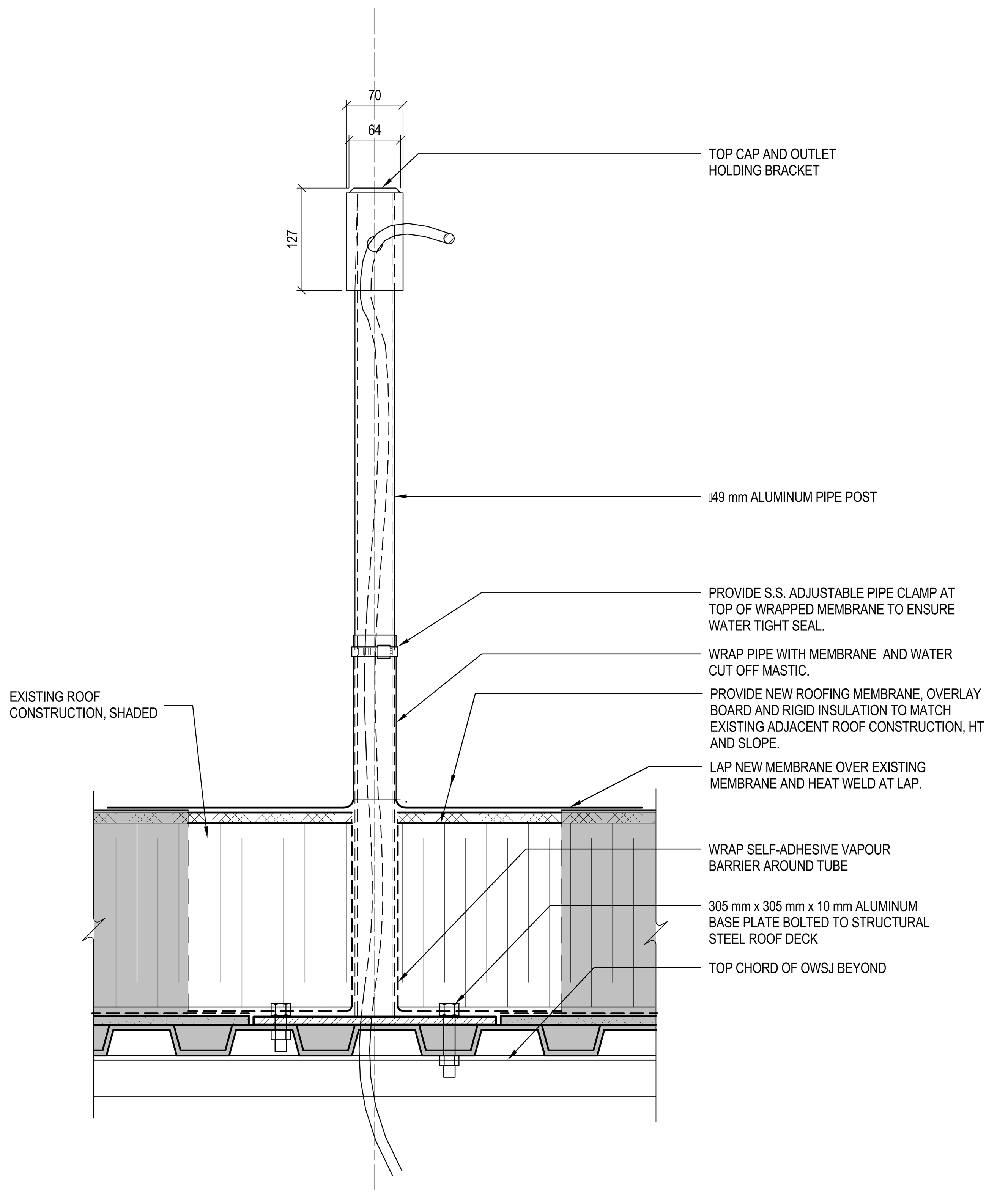
2 SECTION DETAIL - CONDENSER PIPING BOX

SCALE: 1 : 5

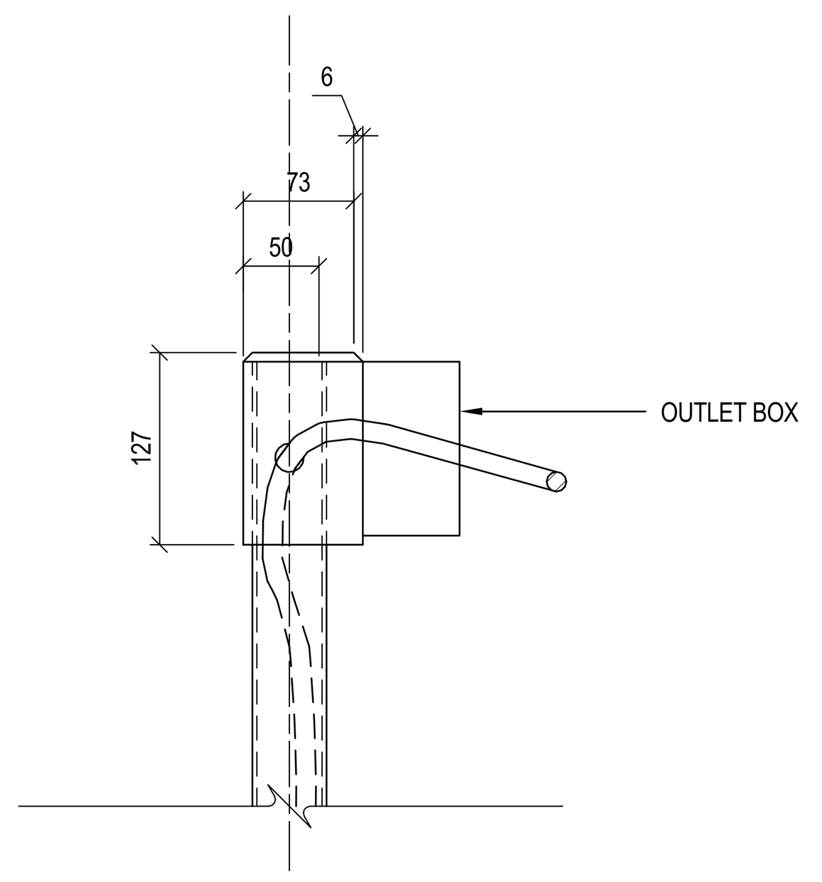


3 SECTION DETAIL - AHU CURB

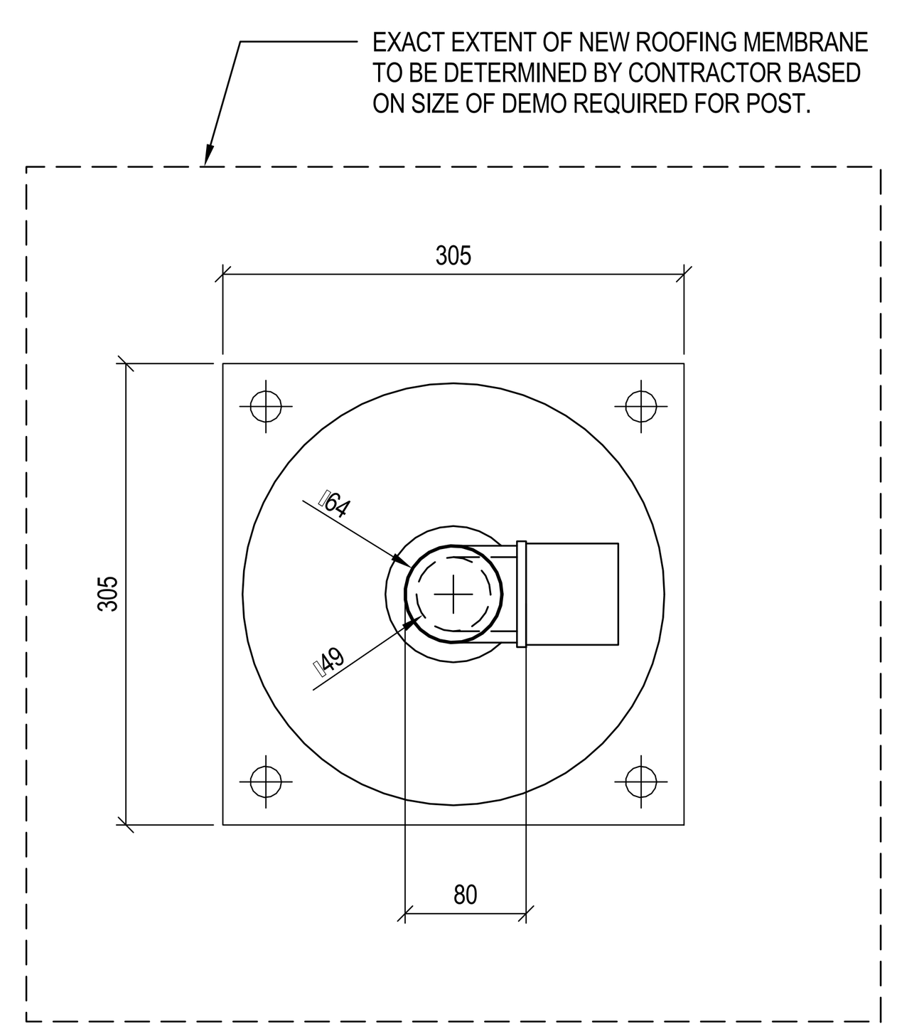
SCALE: 1 : 5



FRONT VIEW



SIDE VIEW



PLAN VIEW

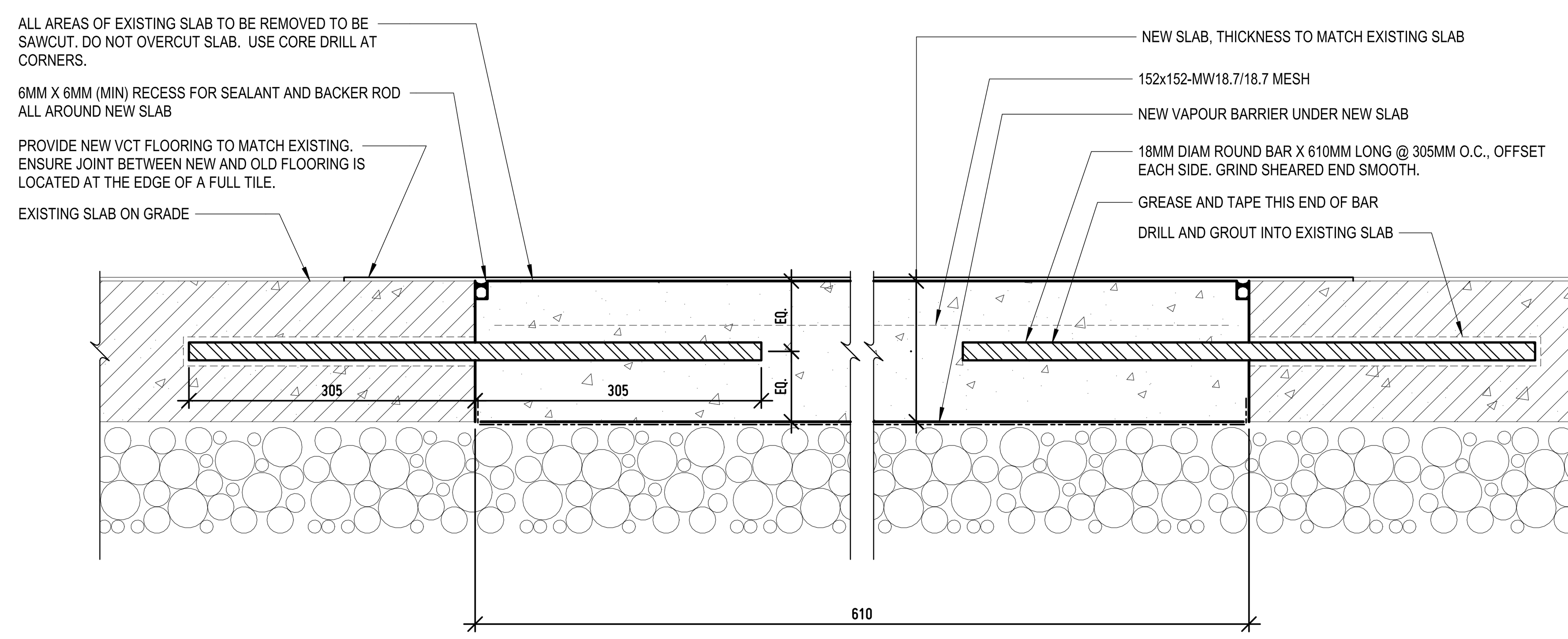
4 ROOF RECEPTACLE

SCALE: 1 : 5

1. ALL CONCRETE, CONCRETE MATERIALS, FORMS, WORKING PROCEDURES AND THE LIKE SHALL CONFORM TO CSA A23.1, LATEST EDITION, UNLESS OTHERWISE NOTED.

2. MINIMUM COMPRESSIVE STRENGTH OF CONCRETE AT 28 DAYS & CLASS OF EXPOSURE SHALL BE 25 MPA/N

3. ALL REINFORCING STEEL SHALL HAVE A MINIMUM YIELD POINT STRENGTH OF 400 MPA AND SHALL CONFORM TO CSA G30.18-M, LATEST EDITION. ALL W.W.F. SHALL CONFORM TO ASTM A82 AND ASTM A185, LATEST EDITION.



5 SECTION DETAIL - TRENCH AT SLAB ON GRADE

SCALE: 1 : 5

C:\Revit Projects\culinary-kitchen_2018_CENTRAL_kentKMJKW.rvt
2019-05-29 2:11:34 PM

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HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429.4100 architects@fbm.ca fbm.ca

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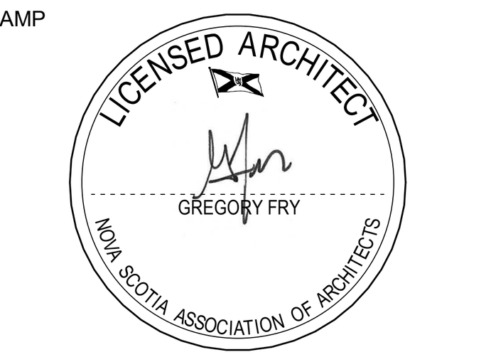


SCALE 1 : 5

DRAWN CK

CHECKED GF

DATE 22 MAY 2019

PROJECT

SIR. JOHN A. MACDONALD CULINARY KITCHEN

31 Scholars Rd, Upper Tantallon NS B3Z 0C3

CLIENT

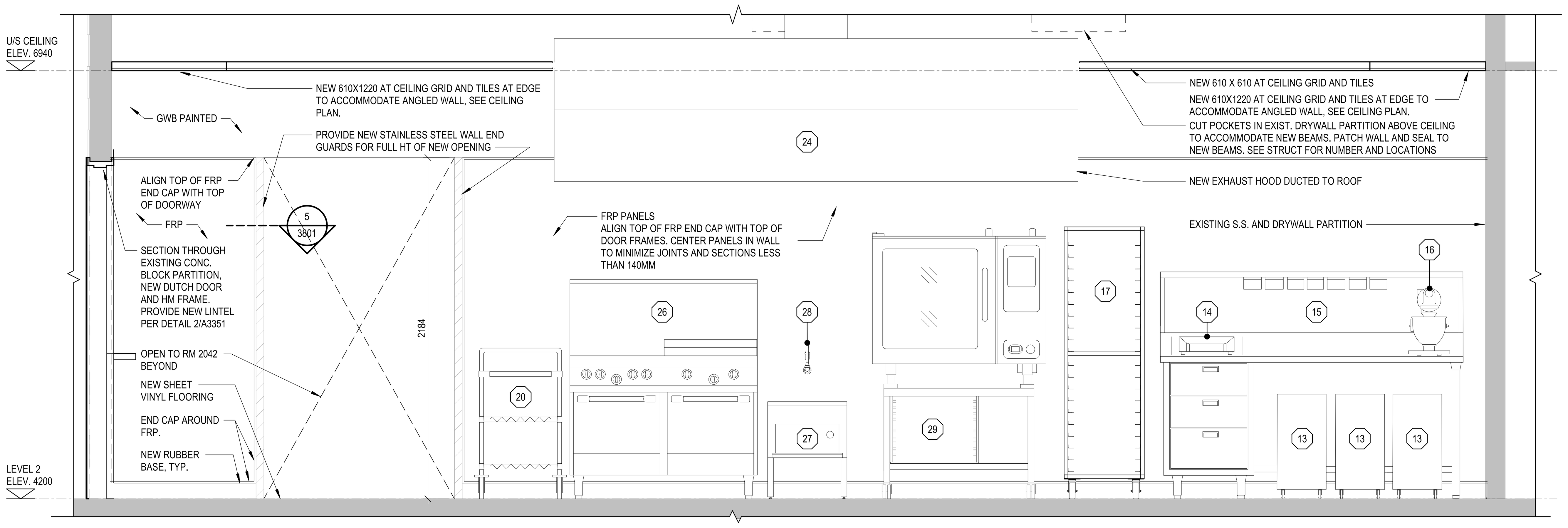
Halifax Regional Centre for Education

PROJECT No. 2018-132

SHEET TITLE

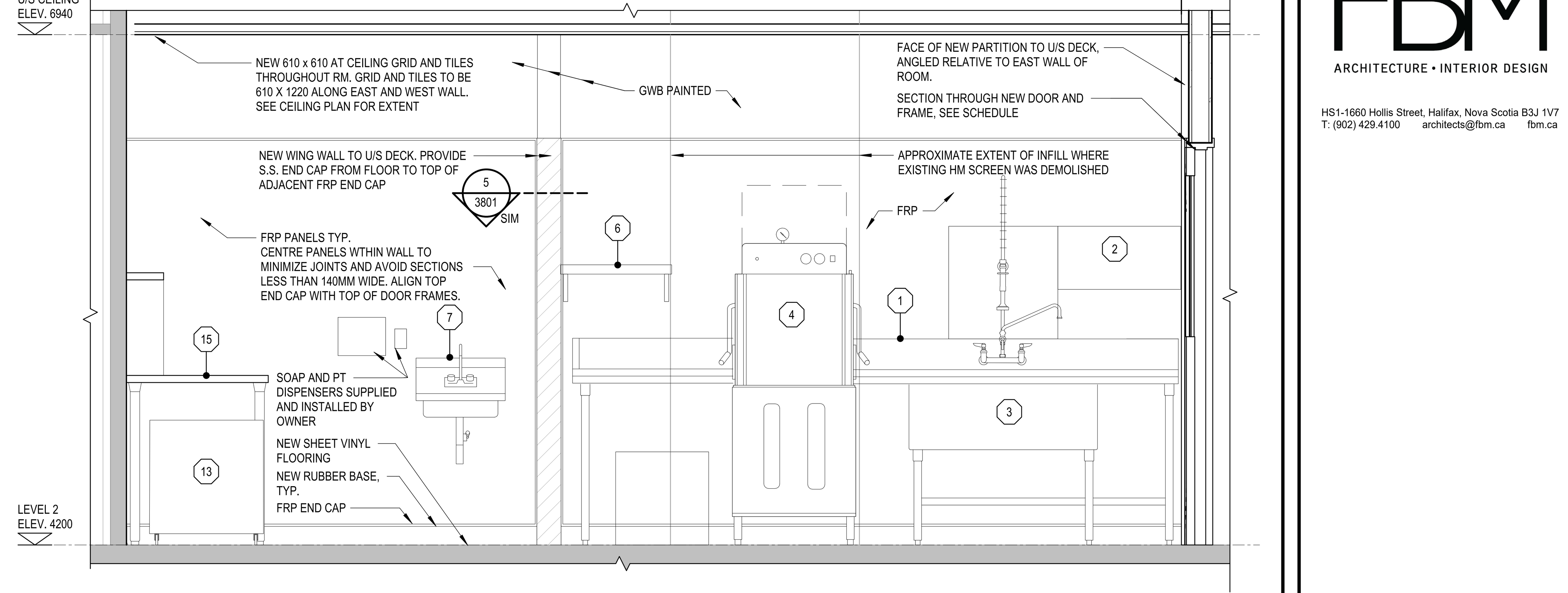
SECTION DETAILS

3350



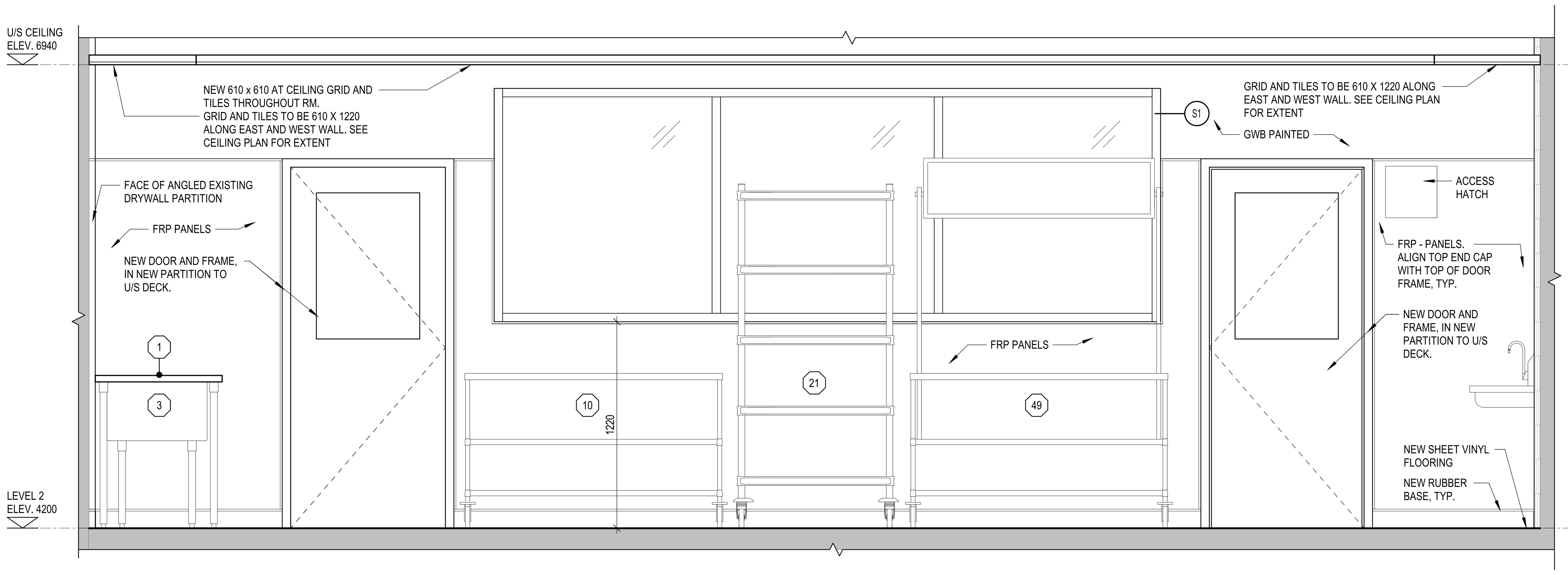
1 INTERIOR ELEVATION - NORTH

SCALE: 1 : 20



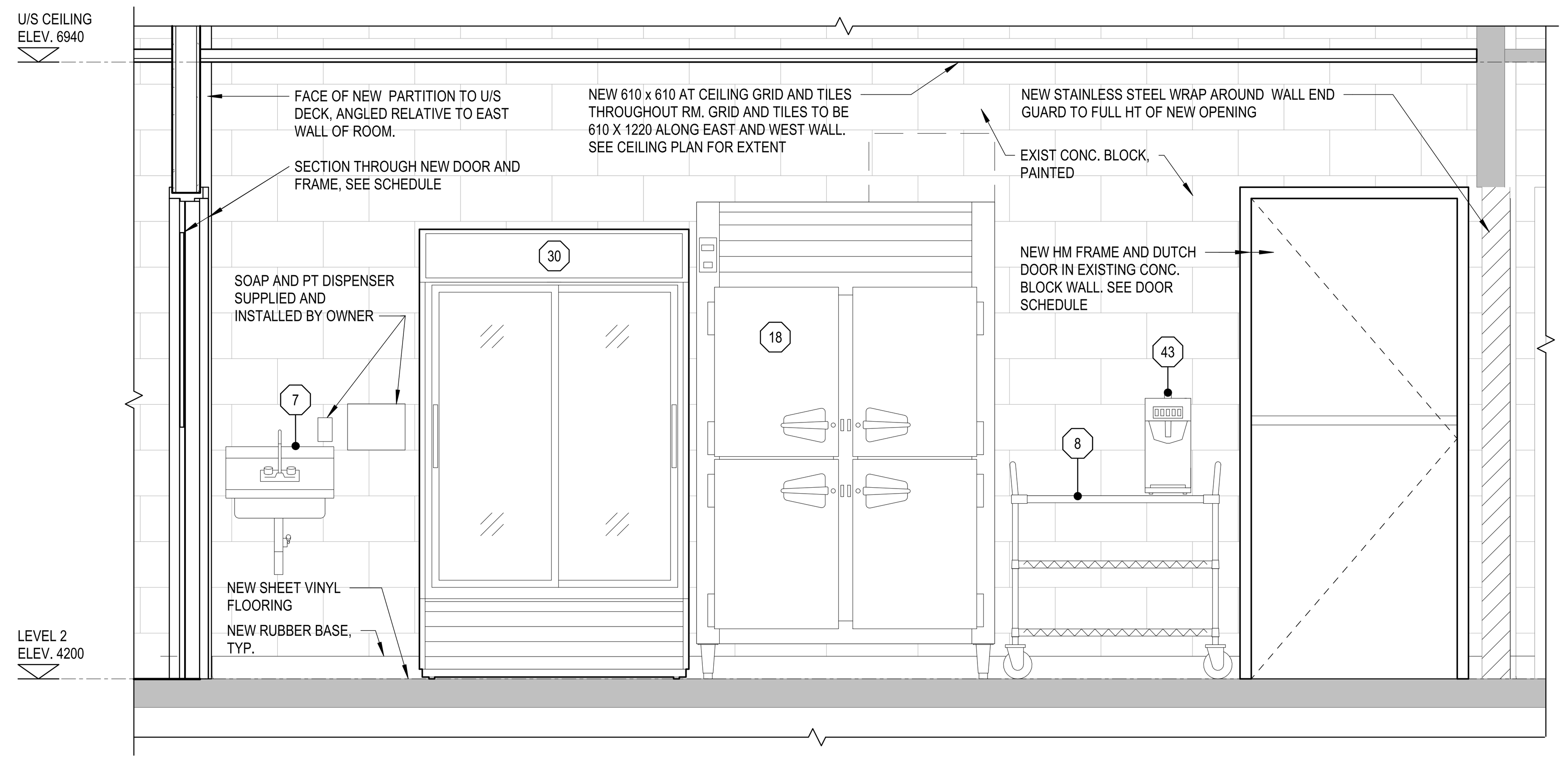
2 INTERIOR ELEVATION - EAST

SCALE: 1 : 20



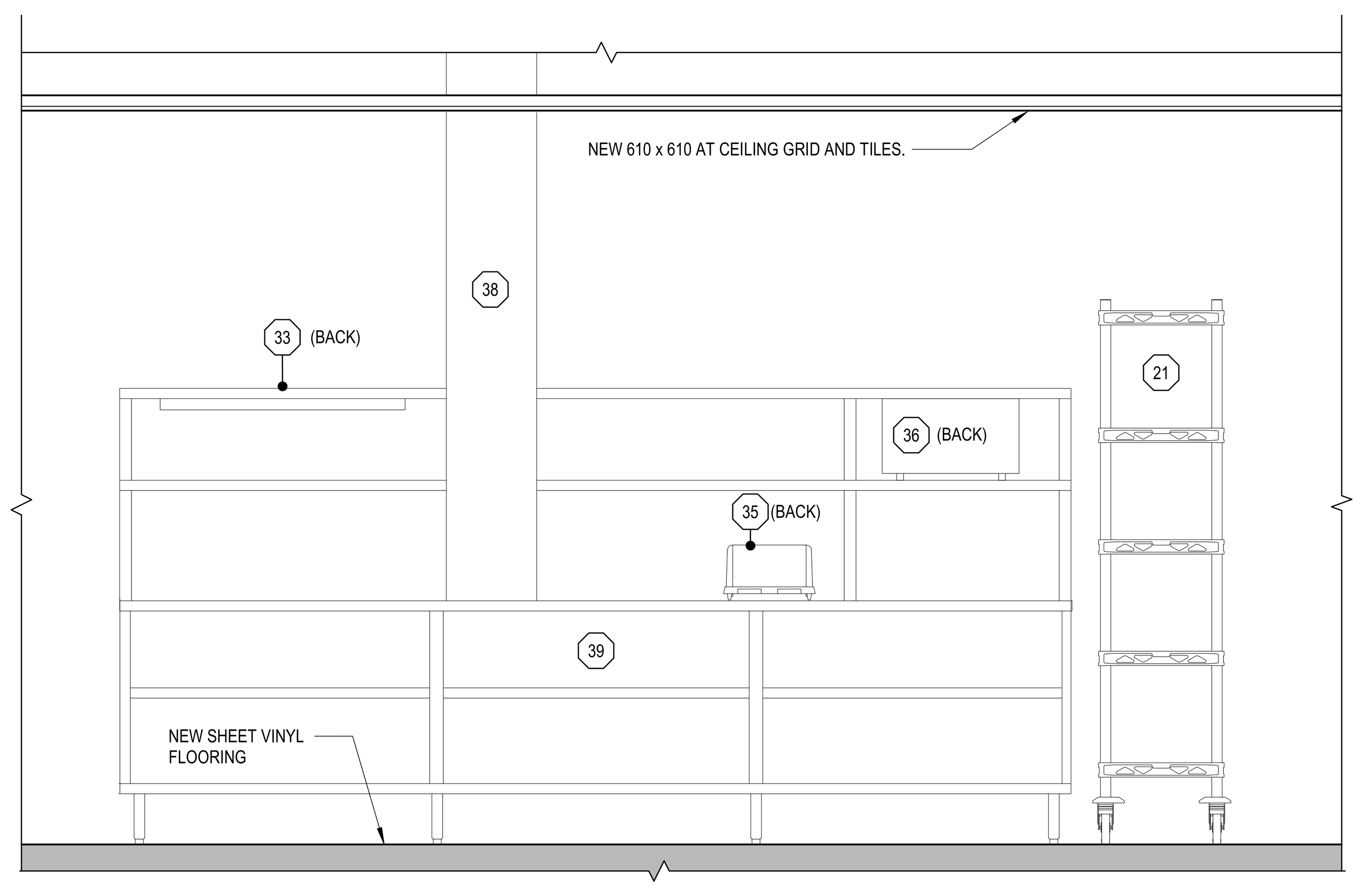
3 INTERIOR ELEVATION - SOUTH

SCALE: 1 : 20



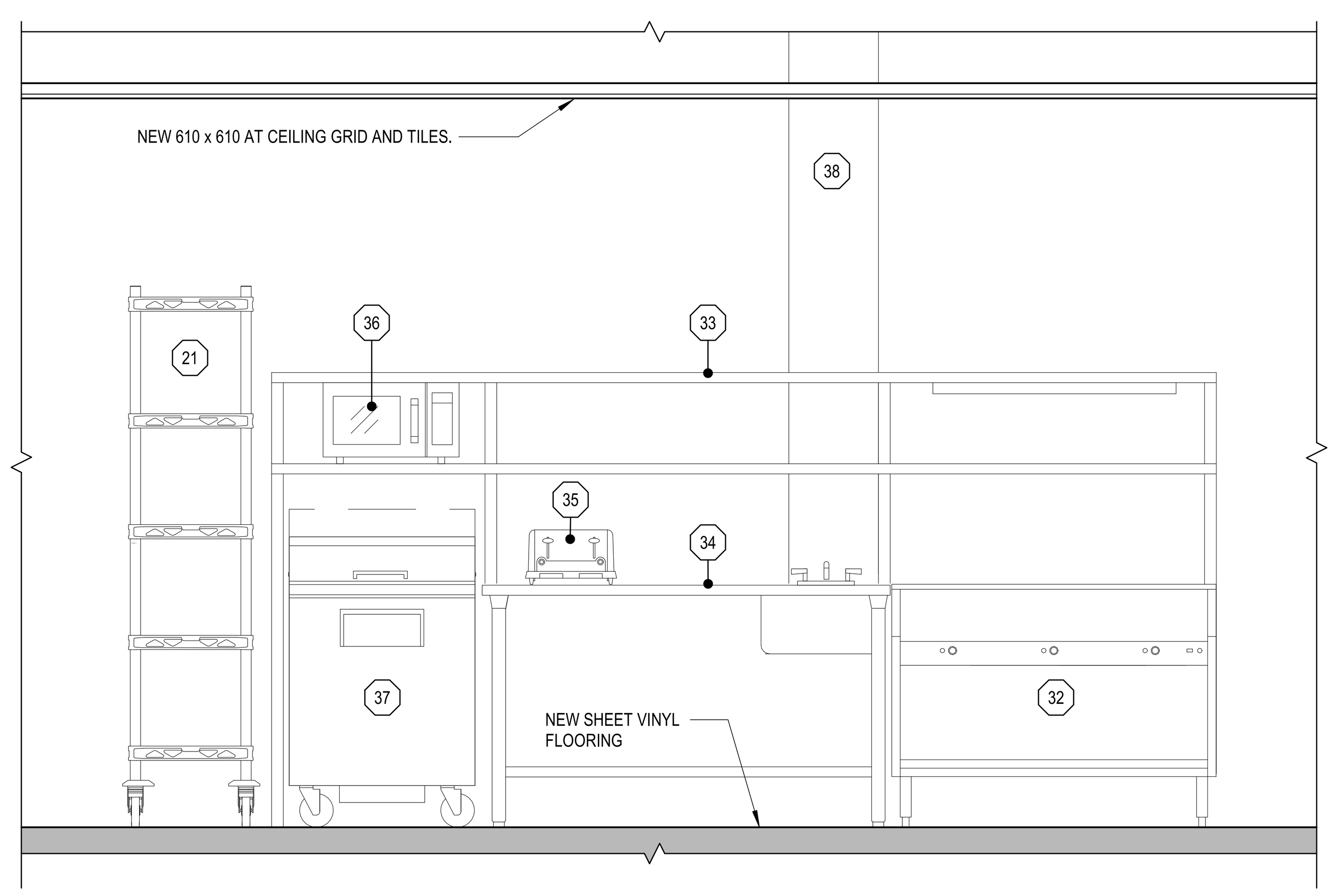
4 INTERIOR ELEVATION - WEST

SCALE: 1 : 20



5 ISLAND ELEVATION - NORTH

SCALE: 1 : 20



6 ISLAND ELEVATION - SOUTH

SCALE: 1 : 20

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ARCHITECTURE • INTERIOR DESIGN
HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429.4100 architects@fbm.ca fbm.ca

No	REVISION	BY	DATE
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LICENSED ARCHITECT
GREGORY FRY
NOVA SCOTIA ASSOCIATION OF ARCHITECTS

SCALE	1 : 20
DRAWN	CK
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PROJECT
SIR. JOHN A. MACDONALD CULINARY KITCHEN
31 Scholars Rd, Upper Tantallon NS B3Z 0C3

CLIENT
Halifax Regional Centre for Education

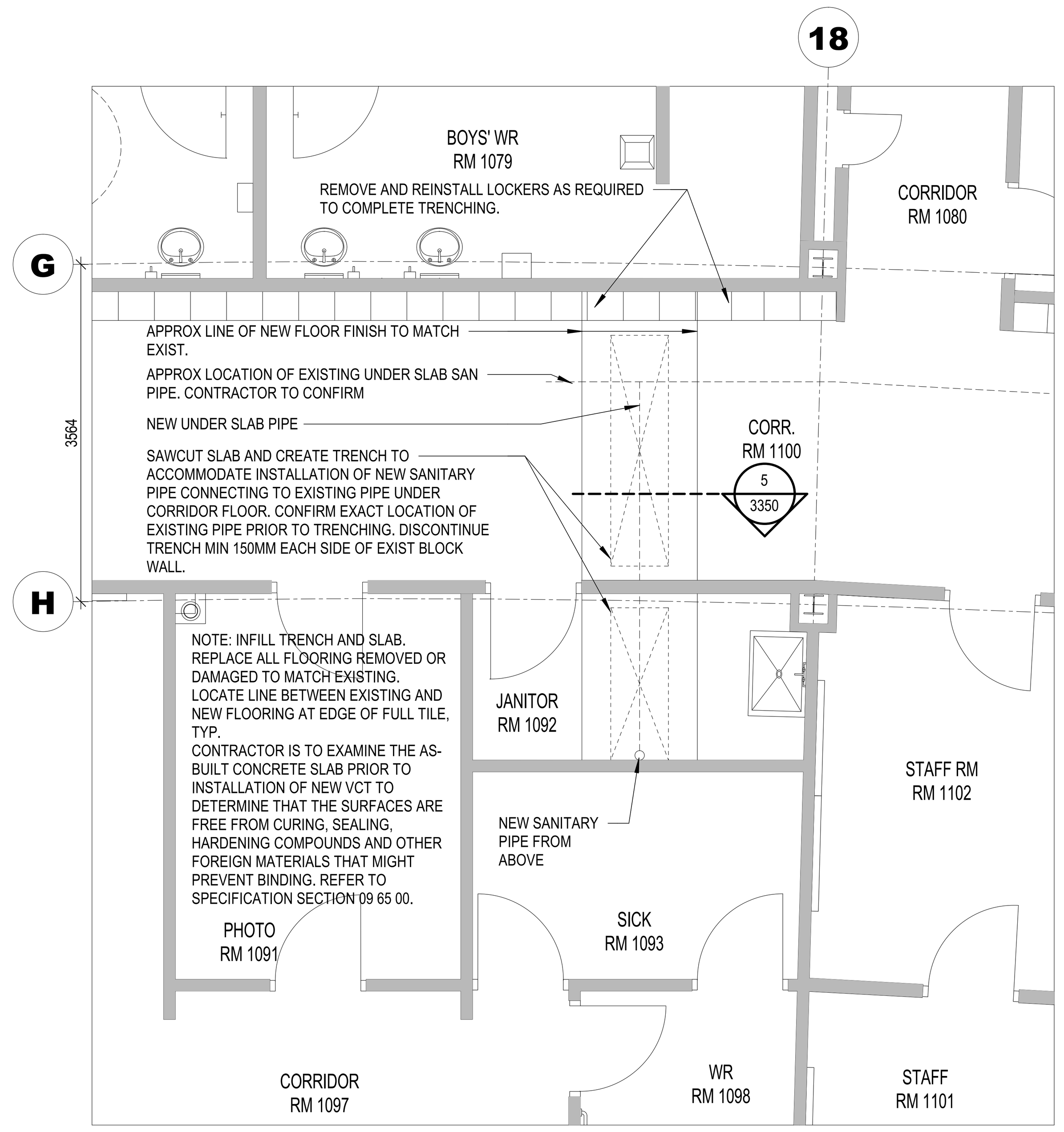
PROJECT No. 2018-132

SHEET TITLE
INTERIOR ELEVATIONS

3601

1 LEVEL 1 EXISTING REFLECTED CEILING PLAN

SCALE: 1 : 50



2 LEVEL 1 - EXISTING FLOOR PLAN

SCALE: 1 : 50

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LICENSED ARCHITECT — GREGORY FRY — NOVA SCOTIA ASSOCIATION OF ARCHITECTS

SCALE	1 : 50
DRAWN	CS/CK
CHECKED	GPF
DATE	22 MAY 2019

PROJECT

SIR. JOHN A. MACDONALD CULINARY KITCHEN

31 Scholars Rd, Upper Tantallon NS B3Z 0C3

CLIENT

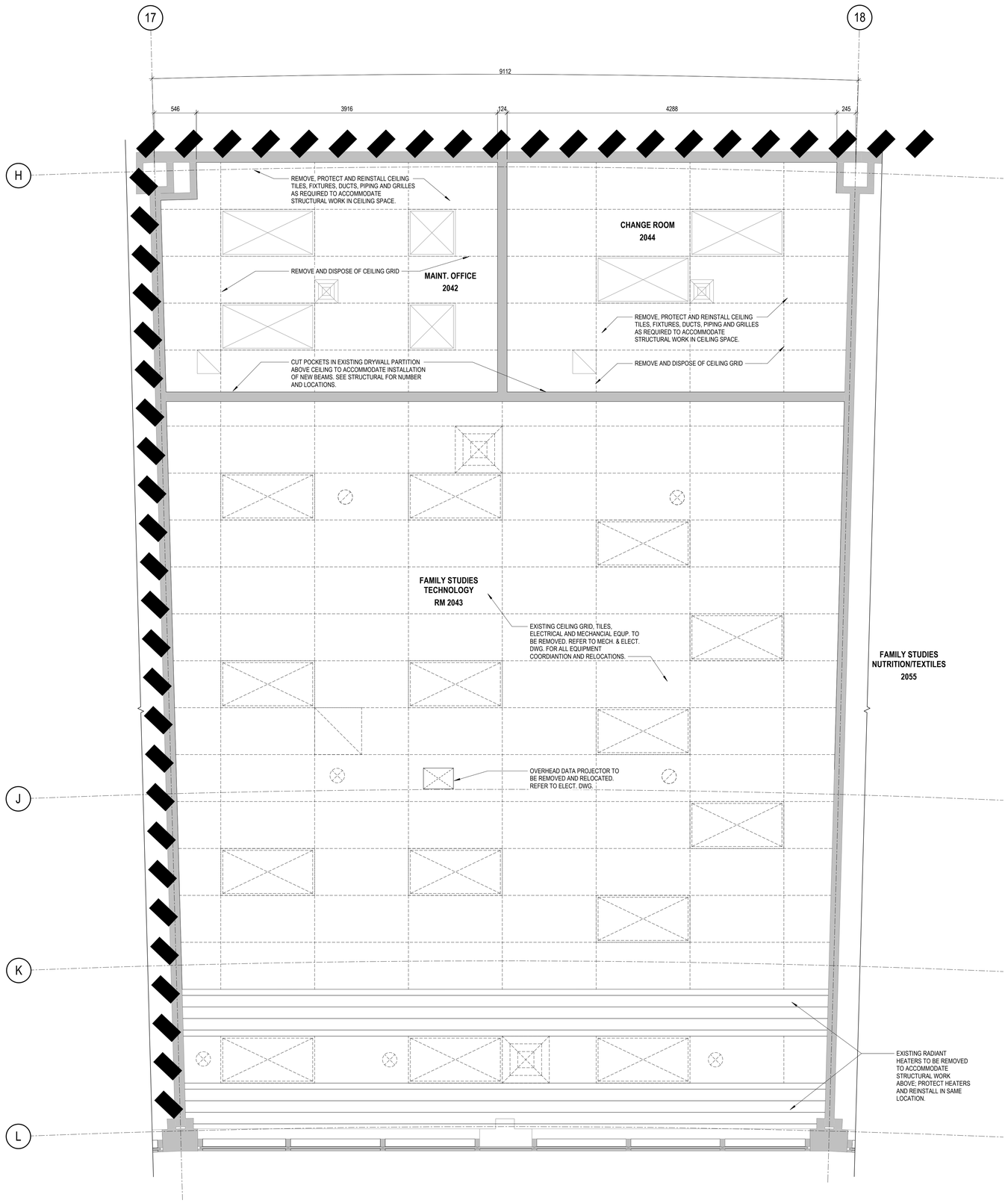
Halifax Regional Centre for Education

PROJECT No. 2018-132

SHEET TITLE

LEVEL 1 - REFLECTED CEILING PLAN AND PARTIAL FLOOR PLAN

3701



1 LEVEL 2 REFLECTED CEILING DEMOLITION PLAN

SCALE: 1 : 25

NORTH

GENERAL NOTES:

1. REPORT ANY HAZARDOUS MATERIALS FOUND ON SITE TO CONSTRUCTION MANAGER.

2. CEASE OPERATIONS AND NOTIFY CONSTRUCTION MANAGER IF SAFETY OR ANY ADJACENT WORK APPEAR TO BE ENDANGERED.

3. CONTRACTOR TO PROTECT AND MAINTAIN THE INTEGRITY OF EXISTING FINISHES IN ALL AREAS NOT SCHEDULED FOR DEMOLITION WORK. ANY DAMAGE DUE TO DEMOLITION AND / OR NEW CONSTRUCTION TO BE REPAIRED AND MADE GOOD.

4. CONTRACTOR TO REPAIR ANY FIREPROOFING ON STRUCTURAL ELEMENTS AND FIRE-RATED ASSEMBLIES DAMAGED DURING DEMOLITION AND CONSTRUCTION.

5. CONTRACTOR TO REMOVE AND LAWFULLY DISPOSE OFF SITE ALL EQUIPMENT, RUBBISH, AND DEBRIS RESULTING FROM CONSTRUCTION. KEEP PROJECT AREA BROOMCLEAN. WHENEVER APPLICABLE, ALL DEMOLITION DEBRIS TO BE SORTED AND TAKEN TO APPROPRIATE FACILITIES FOR RECYCLING.

6. REMOVE EXISTING TEL. / ELECT. OUTLETS, THERMOSTATS, SWITCHES, CABLING, ETC. FROM WALLS TO BE DEMOLISHED. ALL SERVICES TO BE REMOVED ARE TO BE PULLED BACK TO SOURCE. REFER TO MECHANICAL AND ELECTRICAL DRAWINGS.

7. FOR DEMOLITION WORK DONE WHILE BUILDING IS OCCUPIED, ALLOW FOR PROPER VENTILATION OF THE PREMISES DURING AND AFTER COMPLETION OF DEMOLITION. VENTILATION SYSTEM TO BE PROTECTED FROM DUST AND DEBRIS.

8. REFER TO MECHANICAL, FIRE PROTECTION, AND ELECTRICAL DRAWINGS FOR ADDITIONAL DEMOLITION NOTES APPLICABLE TO THOSE DISCIPLINES.

9. CONTRACTOR IS RESPONSIBLE FOR THE DESIGN, COORDINATION AND EXECUTION OF CONSTRUCTION METHODS, PROCEDURES AND SCHEDULES. THE OPERATIONAL PROCEDURES AND METHODS ARE THE RESPONSIBILITY OF THE CONTRACTOR INSOFAR AS THEY DO NOT PRESENT HAZARDS TO PERSONNEL OR PROPERTY OR INFRINGE ON WORK SCHEDULES FOR NORMAL SITE ACTIVITY.

LEGEND

ITEMS TO DEMOLISH

EXISTING WALL TO REMAIN

UNRATED FIRE SEPARATION

REFLECTED CEILING PLAN LEGEND:

ACT-1, ACT-2
ACOUSTIC CEILING TILE

LIGHTING FIXTURES - SEE ELECTRICAL

SPRINKLER HEAD - SEE MECHANICAL DWGS

PA PS SPEAKERS - SEE ELECTRICAL DWGS

P CEILING MOUNTED PROJECTOR - SEE ELECTRICAL

SUPPLY AIR DIFFUSER - SEE MECHANICAL

R/A GRILLE - SEE MECHANICAL DWGS

RADIANT HEATING CEILING PANEL - SEE MECHANICAL

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LICENSED ARCHITECT
GREGORY FRY
NOVA SCOTIA ASSOCIATION OF ARCHITECTS

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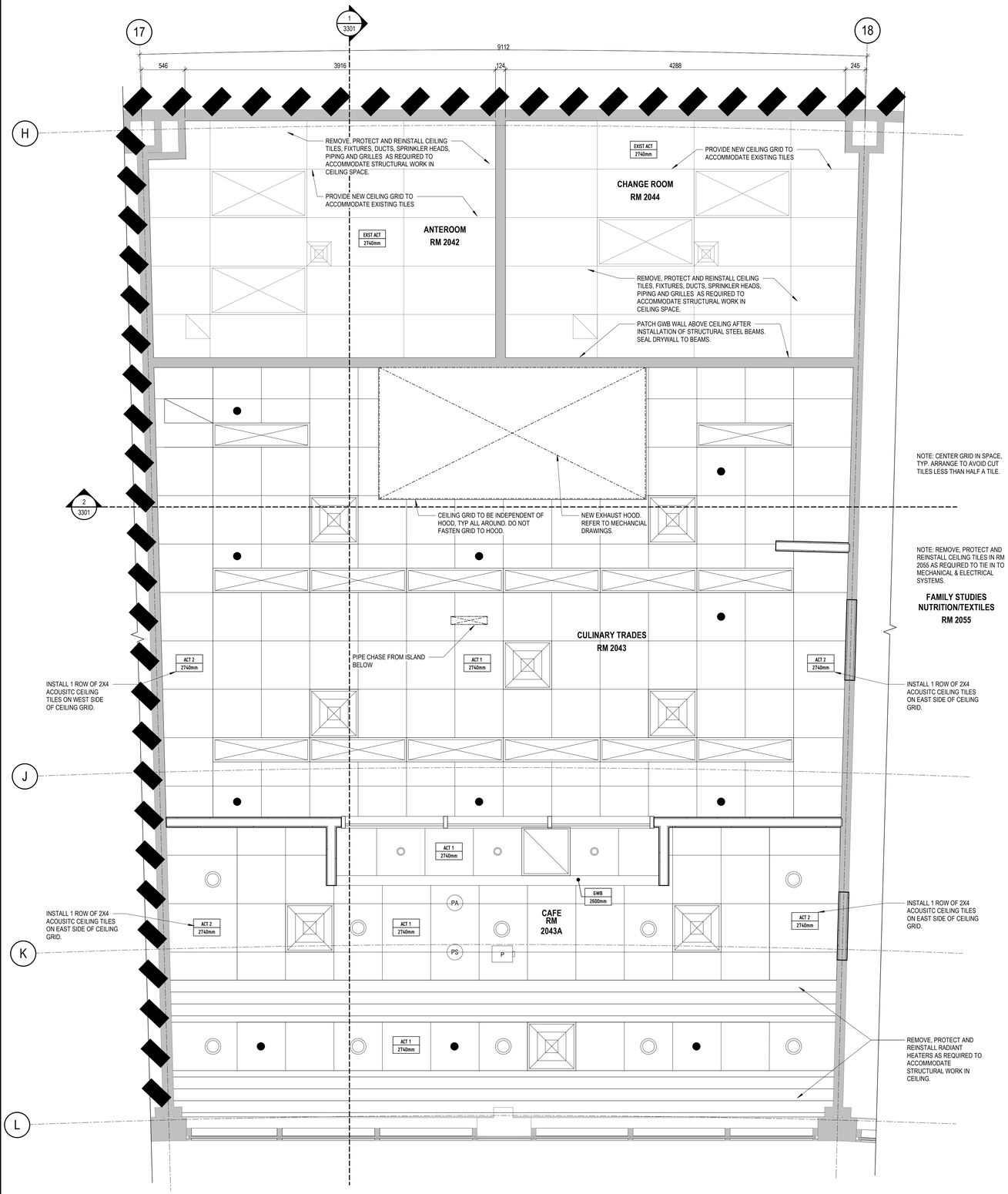
Halifax Regional Centre for Education

PROJECT No. 2018-132

SHEET TITLE
REFLECTED CEILING PLAN - LEVEL 2 DEMO

3702



REFLECTED CEILING PLAN LEGEND:

- ACT-1, ACT-2 ACOUSTIC CEILING TILE
- LIGHTING FIXTURES - SEE ELECTRICAL
- SPRINKLER HEAD - SEE MECHANICAL DWGS
- PA PS SPEAKERS - SEE ELECTRICAL DWGS
- P CEILING MOUNTED PROJECTOR - SEE ELECTRICAL
- SUPPLY AIR DIFFUSER - SEE MECHANICAL
- R/A GRILLE - SEE MECHANICAL DWGS
- RADIANT HEATING CEILING PANEL - SEE MECHANICAL

NOTE: CONTRACTOR IS RESPONSIBLE TO COORDINATE FINAL SPRINKLER LAYOUT TO ENSURE REQUIREMENTS ARE MET. THIS DRAWING IS INTENDED FOR COORDINATION PURPOSES ONLY. CENTRE FIXTURES IN CEILING TILES, TYP.

1 LEVEL 2 - NEW REFLECTED CEILING PLAN

SCALE: 1 : 25

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Halifax Regional Centre for Education

PROJECT No. 2018-132

SHEET TITLE
REFLECTED CEILING PLAN - LEVEL 2

3703

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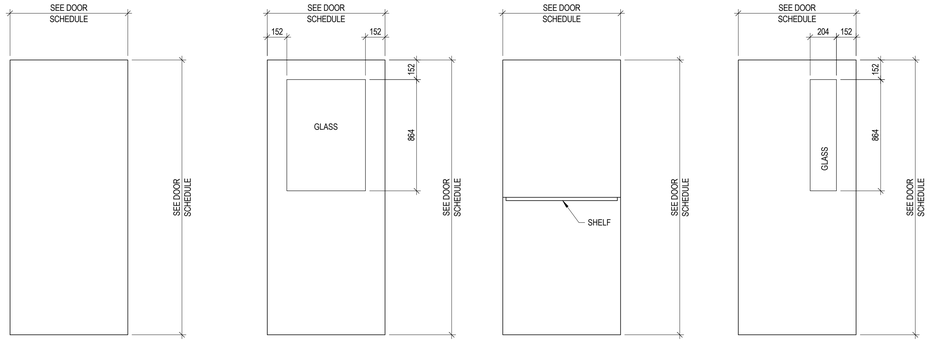
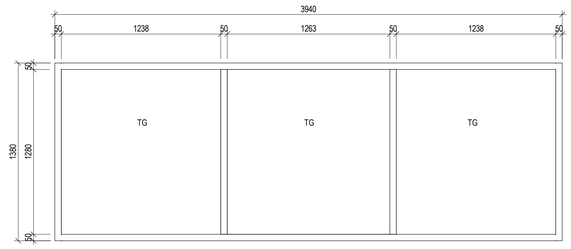
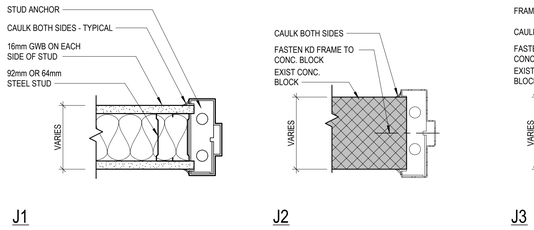




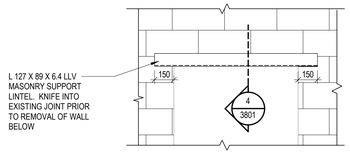
1 DOOR & SCREEN TYPES

SCALE: 1 : 20



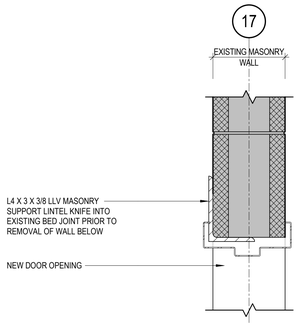
2 3801_2 - DOOR JAMB PLAN DETAILS

SCALE: 1 : 5



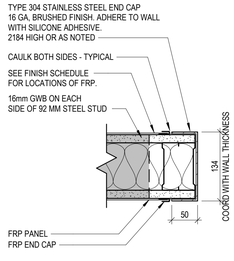
3 ELEVATION -LINTEL AT NEW OPENING

SCALE: 1 : 20



4 LINTEL IN MASONRY WALL - SECTION

SCALE: 1 : 5



5 WALL END DETAIL AT S.S. GUARD

SCALE: 1 : 5

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Halifax Regional Centre for Education

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SHEET TITLE
SCREENS, FRAMES AND DOORS

3801

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PLUMBING

- LAVATORY – VANITY
- LAVATORY – WALL MOUNTED
- SINK – SINGLE STAINLESS STEEL
- SAN — SANITARY ABOVE FLOOR
- SAN — SANITARY BELOW FLOOR
- C.I. — CAST IRON SANITARY
- SANITARY VENT PIPE
- CO — CLEANOUT IN FINISHED FLOOR
- CO — CLEANOUT IN CEILING SPACE
- FD — FLOOR DRAIN WITH TRAP
- FD — FLOOR DRAIN WITHOUT TRAP
- CO — WALL CLEANOUT
- DOMESTIC COLD WATER
- DOMESTIC HOT WATER
- DOMESTIC HOT WATER RECIRCULATION
- WHA–# — WATER HAMMER ARRESTOR (# = SIZE)
- VALVE (SEE SPEC FOR TYPE)
- CHECK VALVE
- CIRCUIT BALANCING VALVE
- ELBOW TURNED UP
- ELBOW TURNED DOWN
- UNION
- DIRECTION OF FLOW
- PRESSURE REDUCING VALVE
- RELIEF VALVE PIPED TO DRAIN
- HOSE END DRAIN VALVE
- TP — TRAP PRIMER LINE. CONNECT TO NEAREST TRAP PRIMER. EXACT ROUTING TO BE DETERMINED ON SITE.
- TRAP PRIMER COMPLETE WITH SHUT–OFF VALVE

HYDRONIC SYSTEMS

- EXISTING RADIANT PANEL TO REMAIN
- HWS — HOT WATER HEATING SUPPLY
- HWR — HOT WATER HEATING RETURN
- ELBOW TURNED UP
- ELBOW TURNED DOWN
- DIRECTION OF FLOW
- VALVE (SEE SPEC FOR TYPE)
- CHECK VALVE
- PRESSURE REDUCING VALVE
- RELIEF VALVE PIPED TO DRAIN
- HOSE END DRAIN VALVE
- "Y" STRAINER
- MEMORY LOCKSHIELD UNION END RAD VALVE WITH FLOW MEASURMENT VENTURI
- CIRCUIT BALANCING VALVE

AIR DISTRIBUTION

- RECTANGULAR AND ROUND SUPPLY AIR DUCT SECTION UP
- RECTANGULAR AND ROUND SUPPLY AIR DUCT SECTION DOWN
- RECTANGULAR AND ROUND RETURN AIR DUCT SECTION UP
- RECTANGULAR AND ROUND RETURN AIR DUCT SECTION DOWN
- RECTANGULAR AND ROUND DUCTWORK (NEW)
- FC — FLEXIBLE CONNECTIONS
- BACKDRAFT DAMPER
- B.D.D. — FIRE/ SMOKE DAMPER (VERTICAL)
- F.D. — FIRE DAMPER (HORIZONTAL)
- BD — MANUAL BALANCING CONTROL DAMPER
- TRANSITION (SQUARE TO ROUND)
- TURNING VANES (SQUARE ELBOW)
- CEILING MOUNTED RETURN GRILLE
- CEILING DIFFUSER
- FLEXIBLE DUCTWORK
- EXISTING DUCTWORK TO REMAIN
- REMOVE EXISTING DUCTWORK
- A / 100 — GRILLE, DIFFUSER, REGISTER TYPE AIR FLOW IN L/s
- EX / 100 — EXISTING GRILLE, DIFFUSER, REGISTER TO REMAIN. AIR FLOW IN L/s
- REB / 100 — RE–BALANCE EXISTING GRILLE, DIFFUSER, REGISTER TO NEW AIR FLOW IN L/s
- REL / 100 — RELOCATE EXISTING GRILLE, DIFFUSER, REGISTER TO NEW AIR FLOW IN L/s

CONTROLS

- AO — ANALOG OUTPUT
- AI — ANALOG INPUT
- BO — BINARY OUTPUT
- BI — BINARY INPUT
- WIRING BY DIVISION 16
- WIRING BY SECTION 13830
- O.A. — OUTSIDE AIR
- R.A. — RETURN AIR
- S.A. — SUPPLY AIR
- E.A. — EXHAUST AIR
- T — TEMPERATURE SENSOR
- MD — MOTORIZED DAMPER

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DUMAC ENERGY LTD.
CONSULTING ENGINEERS
752 BEDFORD HIGHWAY
HALIFAX, N.S.
Tel: (902) 457-1300
Fax: (902) 457-1777
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DATE	19/05/22

PROJECT

SIR. JOHN A. CULINARY KITCHEN

31 SCHOLARS RD, UPPER TANTALLON, NS

CLIENT

DTIR

PROJECT No. 2018-132

SHEET TITLE

MECHANICAL LEGEND

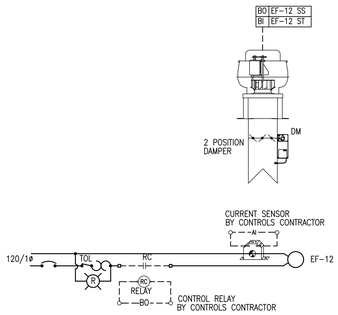
M-001

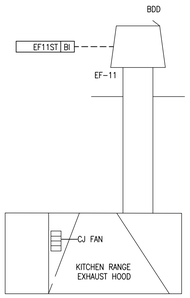
DUMAC #19-014

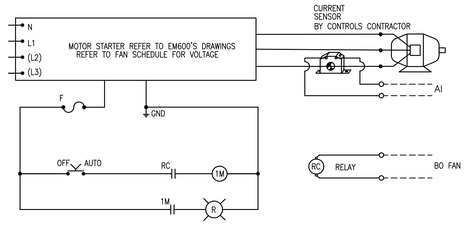
KITCHEN AIR SYSTEM SEQUENCE OF OPERATIONS

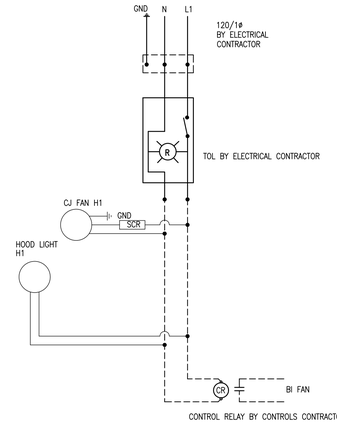
GENERAL OPERATION
WHEN EXHAUST FAN EF-12 IS SCHEDULED ON, THEIR EXHAUST DAMPER OPENS. WHEN THE DAMPER IS FULLY OPEN, THE DAMPER ACTUATOR AUXILIARY CONTACT CLOSES AND STARTS THE EXHAUST FAN.
CURRENT SENSORS INDICATES FAN IS ON.
ALARM IF CURRENT FALLS BELOW NORMAL.

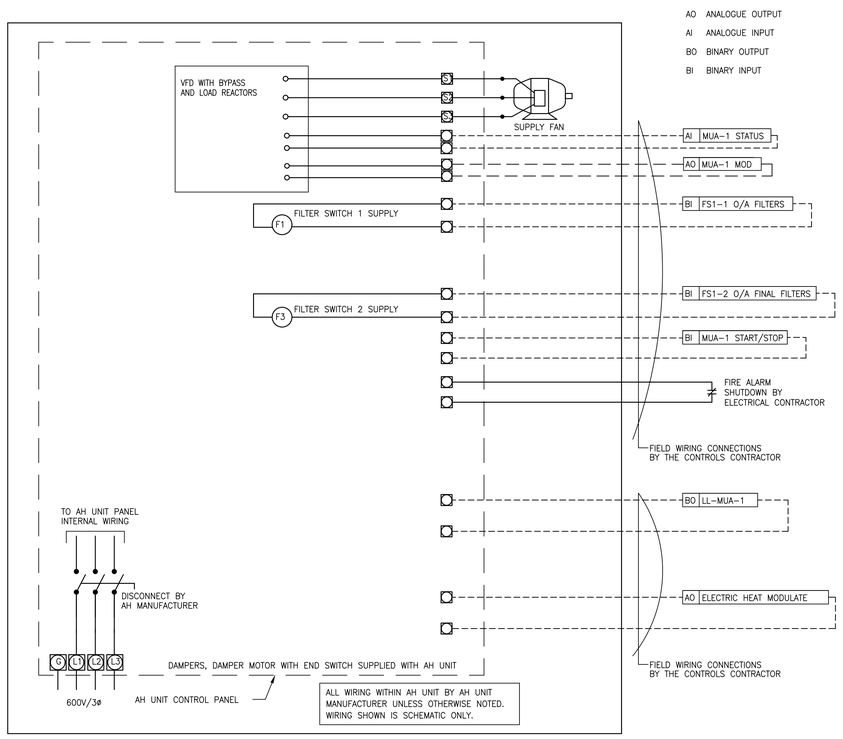
KITCHEN HOOD AND EF-11 ON
WHEN THE KITCHEN HOOD TOGGLE SWITCH IS ON, A CONTROL RELAY SHALL BE ENERGIZED AND PROVIDE SIGNAL TO THE BAS, EF-11 SHALL START, AND MUA-1 IS ENABLED, AND SUPPLY FAN RAMPS UP TO ITS PRESET OPERATING AIRFLOW.
WHEN KITCHEN HOOD AND EF-11 START OR STOP, EF-12 CONTINUES TO RUN INDEPENDENTLY

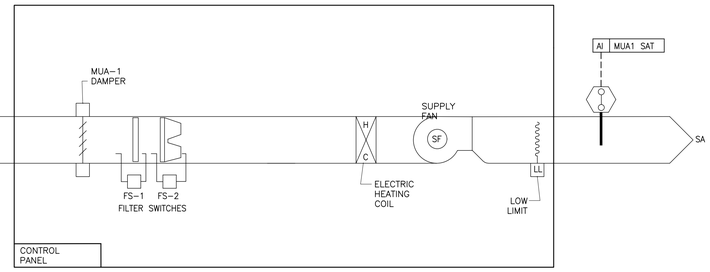












1 MC602 — MUA UNIT, EF-11 AND EF-12 CONTROL SCHEMATIC
NTS

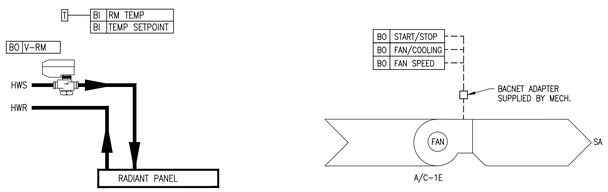
SEQUENCE OF OPERATION

OCCUPIED MODE:
WHEN BUILDING VENTILATION SYSTEM IS ENABLED, A/C-1E SHALL RUN ON LOW SPEED IN FAN ONLY MODE, WHEN THERE IS NO CALL FOR COOLING.

UNOCCUPIED MODE:
ROOM HEATING VALVE SHALL OPEN TO SATISFY SPACE TEMPERATURE SETPOINT.

COOLING MODE:
WHEN TEMPERATURE RISE IN ROOM EXCEEDS SETPOINT, COOLING MODE SHALL BE ENABLED ON A/C-1E FAN WILL INCREASE TO MED. OR HIGH SPEED TO MAINTAIN SPACE COOLING SETPOINT. COOLING SHALL BE INTERLOCKED WITH ROOM HEATING VALVE.

HEATING MODE:
ON A CALL FROM HEAT, ROOM HEATING VALVE SHALL ON TO SATISFY ROOM TEMPERATURE SETPOINT. INTERLOCKED TO PREVENT A/C-1E FROM OPERATING.



2 MC602 — DINNING ROOM CONTROL SCHEMATIC
NTS

NOTES

1. REFER TO DRAWING EM601, FOR MOTOR STARTER AND CONTROL LIST.
2. REFER TO DRAWING MV600'S FOR DAMPERS AND DAMPER MOTORS.
3. SEE DWG. M-001 FOR MECHANICAL LEGEND.
4. CURRENT SENSOR AND RELAY 'RC' PROVIDED BY MECHANICAL CONTRACTOR UNLESS OTHERWISE NOTED IN THE MECHANICAL SPECIFICATIONS.
5. CONTROLS CONTRACTOR TO CONTROL RELAY 'RC'. PROVIDE ADAPTERS AS REQUIRED.
6. CONTROLS CONTRACTOR TO READ CURRENT SENSOR. PROVIDE ADAPTERS AS REQUIRED.
7. ALL DAMPER MOTORS ARE SUPPLIED, INSTALLED AND WIRED BY CONTROLS CONTRACTOR.

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DUMAC ENERGY LTD.
CONSULTING ENGINEERS
752 BEDFORD HIGHWAY
HALIFAX, N.S.
Tel: (902) 457-1300
Fax: (902) 457-1777
Email: DUMAC@DUMAC.NS.CA

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9466

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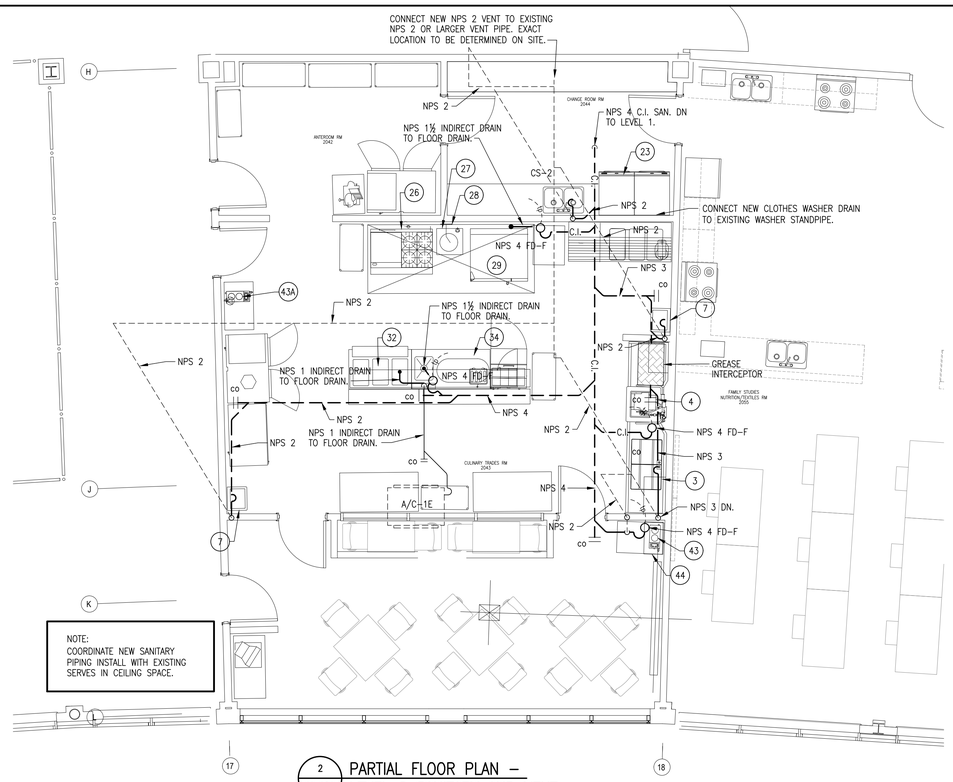
31 SCHOLARS RD, UPPER TANTALLON, NS

CLIENT
DTIR

PROJECT No. 2018-132

SHEET TITLE
CONTROLS

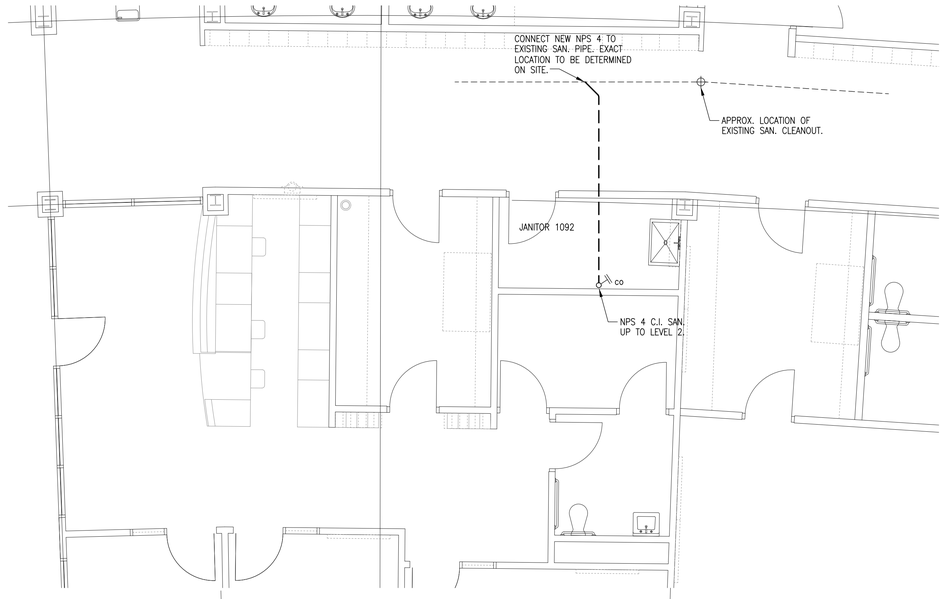
MC601



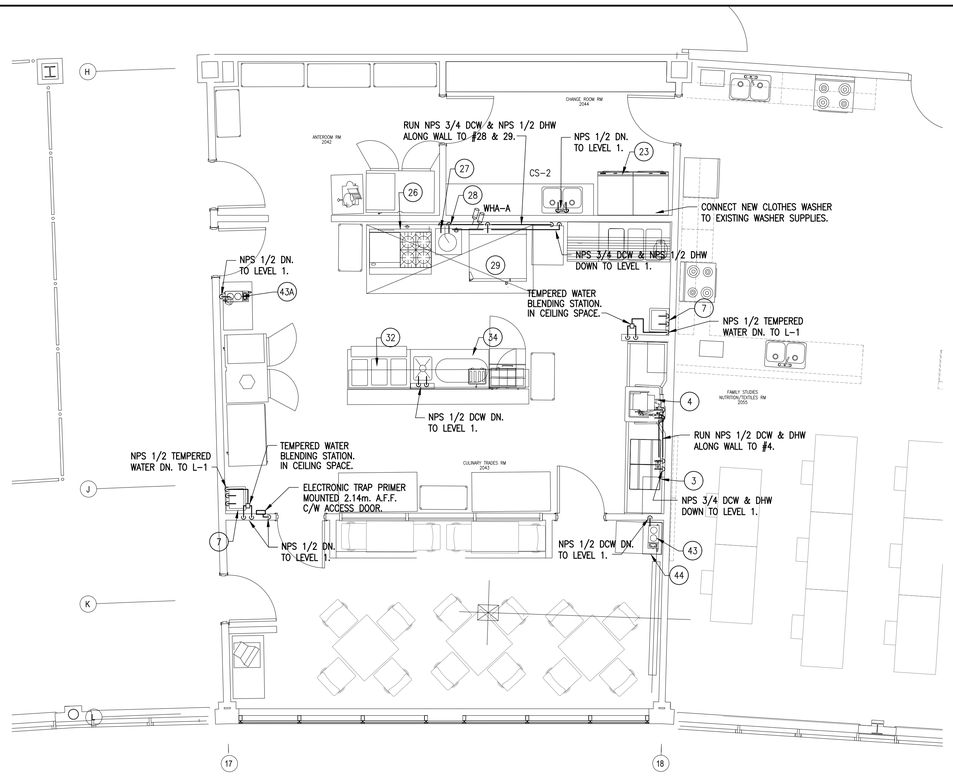
2 M-101 PARTIAL FLOOR PLAN – LEVEL 2 SANITARY AND VENT 1:50

SJA KITCHEN EQUIPMENT SCHEDULE

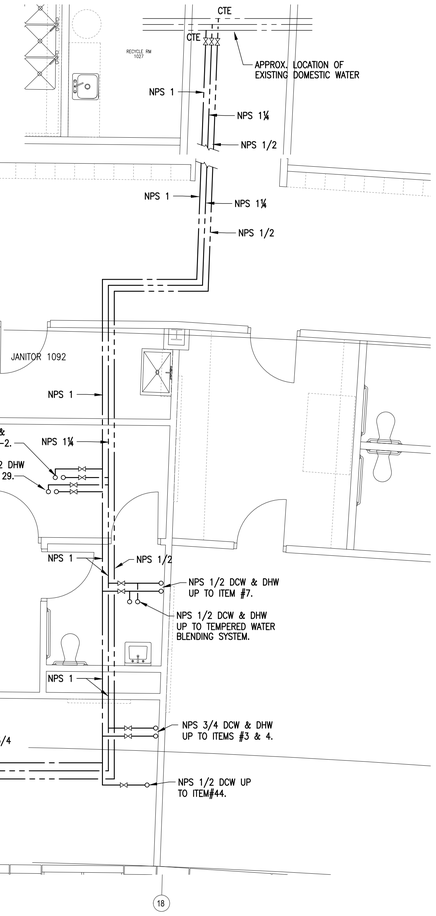
No	DESCRIPTION	Qty	MANUF'R.	MODEL No	SUPPLIER	MECHANICAL SERVICES						REMARKS
						HOT WATER	COLD WATER	DIRECT DRAIN	INDIRECT DRAIN	PROPANE BTU	PROPANE CONN.	
1	DOUBLE POT & PRE RINSE SINK	1	DIAMOND		FSE	1/2"	1/2"	1 1/2"				
4	DISH AND POT WASHER	1	DIAMOND	AM15VLT	FSE	1/2"	1/2"	1 1/2"				350 CFM
7	HAND SINKS AND EYE WASH	2	TARRISON		FSE	1/2"	1/2"	1 1/2"				
23	STACKABLE WASHER AND DRYER	1	GE	GFWN1100DWW	FSE	1/2"	1/2"		1"			GFWN110ETWW 208 VOLT
24	EXHAUST HOOD/FAN/FIRE PROTECTION	1	HALTON		FSE							LIGHT
25	SPARE NUMBER											
26	RANGE/OVEN/BURNERS/GRILL	1	GARLAND	GFE4R-4G24LL	FSE					232,000	3/4"	
27	STOCK POT RANGE	1	GARLAND	G20-SP	FSE					65,000	3/4"	
28	POT FILLER FAUCET	1	T&S	B0810	FSE	1/2"	1/2"					
29	COMBI OVEN	1	ALTO SHAAM	CTP7-20G	FSE		3/4"		1/2"	98,000	3/4"	
32	HOT FOOD UNIT	1	DIAMOND	HF14B-35	FSE				1"			
34	WORK TABLE W/SINK	1	DIAMOND		FSE	1/2"	1/2"	1 1/2"				
43	COFFEE MAKER	1	BUNN	VPS17	OWNER		1/2"					
43A	COFFEE MAKER	1	BUNN	CWTF-35	OWNER		1/2"					
44	ICE MAKER	1	ICE O MATIC	ICEU070A	FSE		1/2"		1"			



1 M-101 PARTIAL FLOOR PLAN – LEVEL 1 SANITARY AND VENT 1:50



3 M-101 PARTIAL FLOOR PLAN – LEVEL 2 DOMESTIC WATER 1:50



4 M-101 PARTIAL FLOOR PLAN – LEVEL 1 DOMESTIC WATER 1:50

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HALIFAX, N.S.
Tel: (902) 457-1300
Fax: (902) 457-1777
Email: DUMAC@DUMAC.NS.CA

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CHECKED	STAFF
DATE	19/05/22

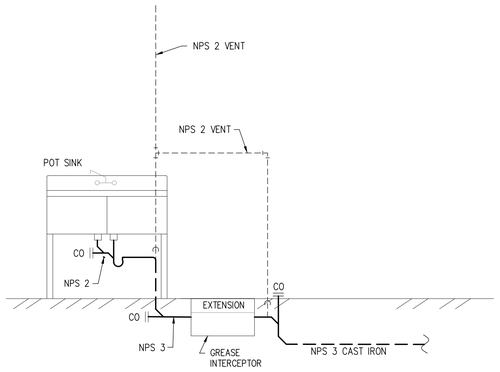
PROJECT
SIR. JOHN A. CULINARY KITCHEN
31 SCHOLARS RD, UPPER TANTALLON, NS

CLIENT
DTIR

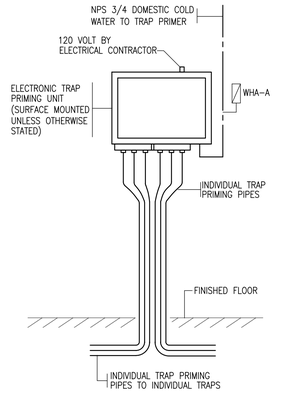
PROJECT No. 2018-132

SHEET TITLE
PARTIAL FL. PLANS LEVELS 1 & 2 PLUMBING

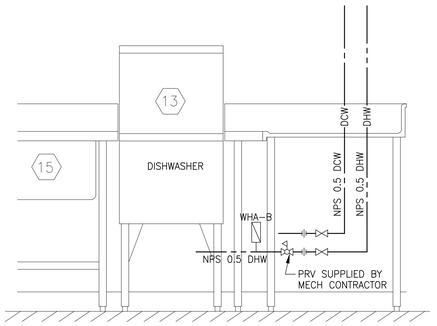
MP101



1 / MP501 POT SINK SCHEMATIC
NTS



2 / MP501 TRAP PRIMING UNITS
NTS



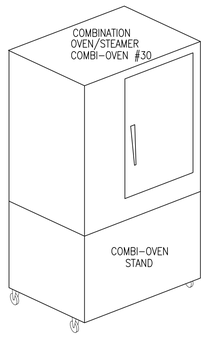
3 / MP501 DISHWASHER SCHEMATIC (KIT. ITEM #13)
NTS

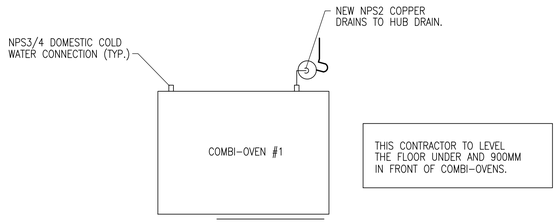
NOTE:
RESTRAINING CHAIN MUST BE FIELD ADJUSTED FOR LENGTH TO ENSURE IT PREVENTS ANY STRESS ON DOMESTIC WATER CONNECTION

NOTE:

TWO NPS 3/4 COLD WATER CONNECTION
NPS 2 DRAIN CONNECTION

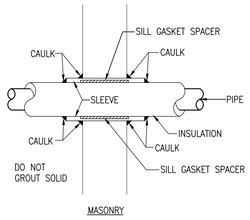
COORDINATE LOCATION WITH INSTALLER OF WET CHEMICAL SUPPRESSION SYSTEM. CONNECTION OF WET CHEMICAL SUPPRESSION SYSTEM EQUIPMENT TO MECHANICAL SOLENOID VALVE BY WET CHEMICAL SUPPRESSION SYSTEM CONTRACTOR.

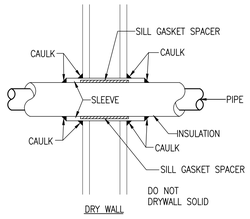




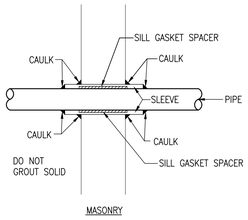
THIS CONTRACTOR TO LEVEL THE FLOOR UNDER AND 900MM IN FRONT OF COMBI-OVENS.

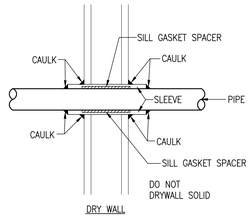
4 / MP501 COMBI-OVEN DETAIL
NTS





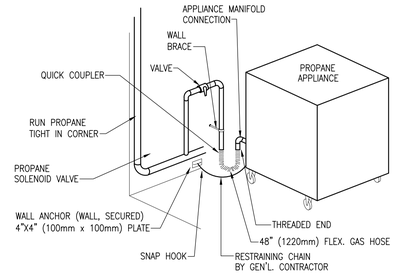
5 / MP501 INSULATED PIPE THRU UNRATED PARTITION
NTS





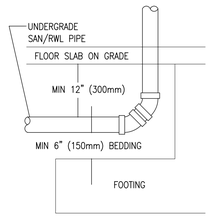
6 / MP501 UNINSULATED PIPE THRU UNRATED PARTITION
NTS

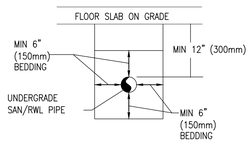
NOTE:
RESTRAINING CHAIN MUST BE FIELD ADJUSTED FOR LENGTH TO ENSURE IT PREVENTS ANY STRESS ON FLEXIBLE GAS HOSE AND/OR FITTING.



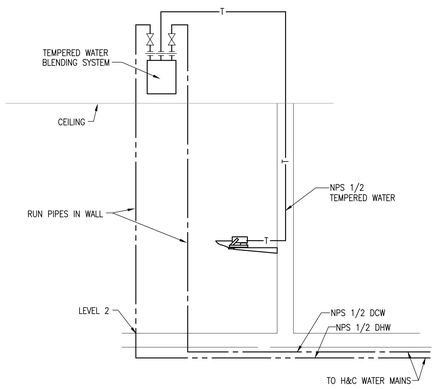
PROVIDE AND INSTALL A MECHANICAL SOLENOID VALVE FOR THE KITCHEN GAS EQUIPMENT. COORDINATE LOCATION WITH INSTALLER OF WET CHEMICAL SUPPRESSION SYSTEM. CONNECTION OF WET CHEMICAL SUPPRESSION SYSTEM EQUIPMENT TO MECHANICAL SOLENOID VALVE BY WET CHEMICAL SUPPRESSION SYSTEM CONTRACTOR.

7 / PS501 TYP. GAS CONNECTION FOR KITCHEN EQUIP
NTS





8 / MP501 BURIED SAN/RWL PIPE
NTS



9 / MP501 EW – EYE WASH DETAIL (WATER UPFED FROM FLR BELOW) NTS

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HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429 4100 architects@fbm.ca fbm.ca

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DUMAC ENERGY LTD.
CONSULTING ENGINEERS
752 BEDFORD HIGHWAY
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9466
PROVINCE OF NOVA SCOTIA

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PROJECT
SIR. JOHN A. CULINARY KITCHEN
31 SCHOLARS RD, UPPER TANTALLON, NS

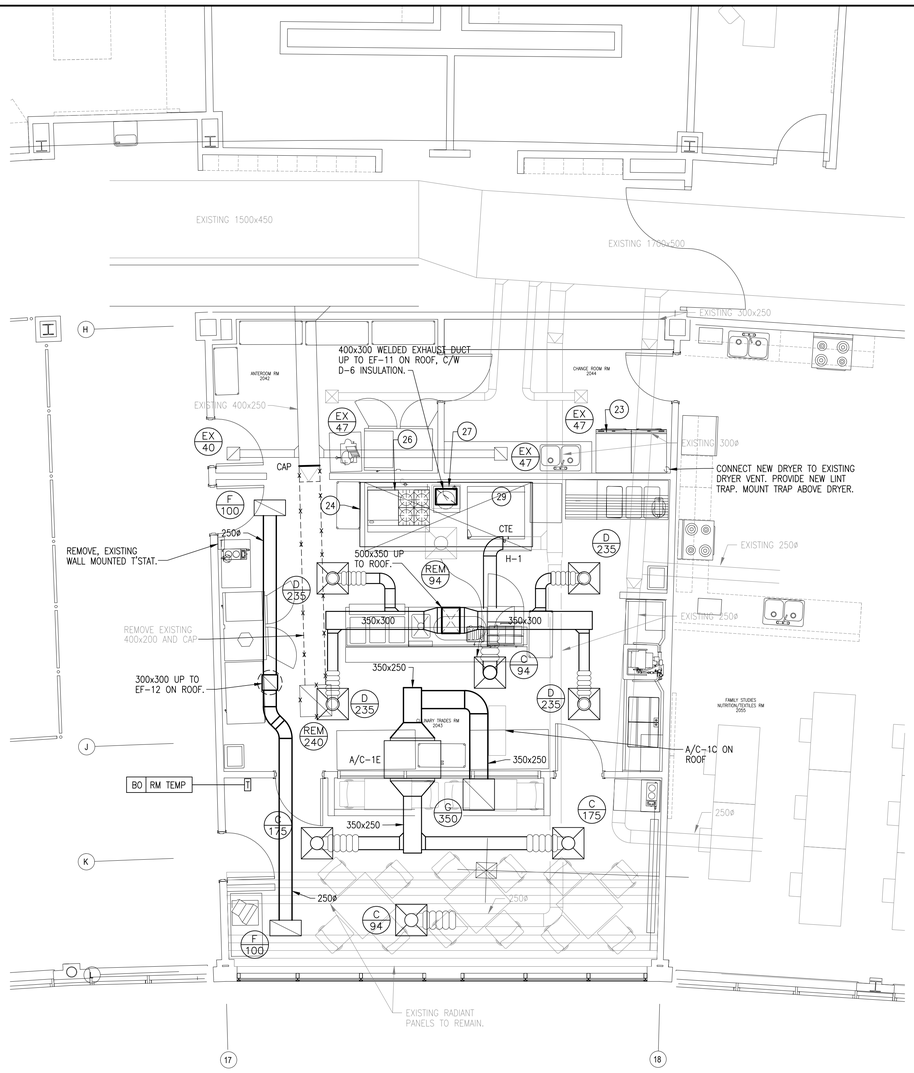
CLIENT
DTIR

PROJECT No. 2018-132

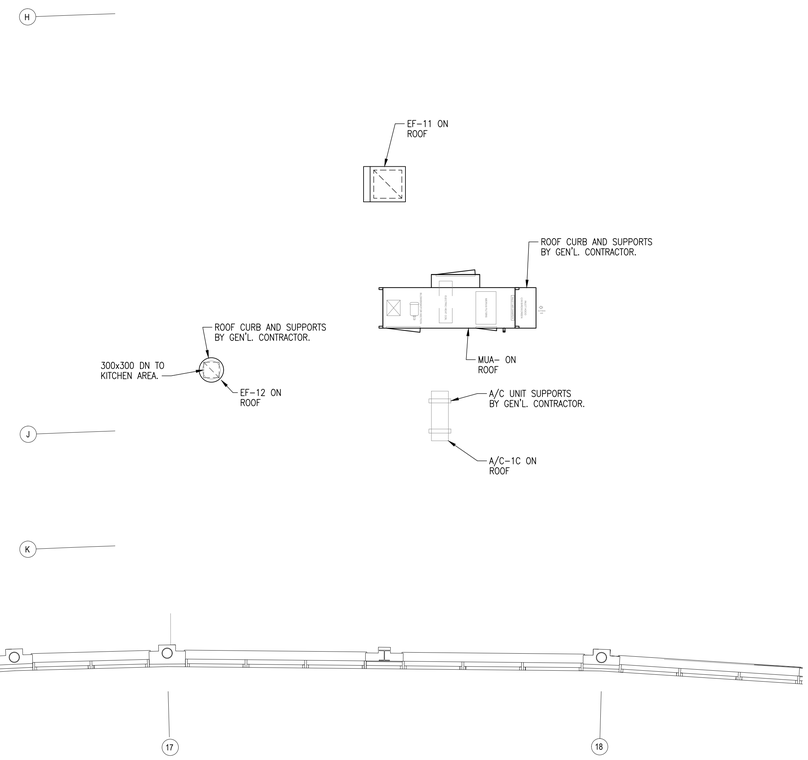
SHEET TITLE
MECHANICAL SCHEDULES AND DETAILS

MP501

DUMAC #19-014



1 M-101 PARTIAL FLOOR PLAN – LEVEL 2 AIR DISTRIBUTION
1:50



2 M-101 PARTIAL ROOF PLAN – AIR DISTRIBUTION
1:50

SJA KITCHEN EQUIPMENT SCHEDULE

No.	DESCRIPTION	Qty	MANUF'R.	MODEL No	SUPPLIER	MECHANICAL SERVICES						REMARKS
						HOT WATER	COLD WATER	DIRECT DRAIN	INDIRECT DRAIN	PROPANE BTU	PROPANE CONN.	
24	EXHAUST HOOD/FAN/FIRE PROTECTION	1	HALTON		FSC							LIGHT
26	RANGE/OVEN/BURNERS/GRILL	1	GARLAND	GFE48-4G24LL	FSC					232,000	3/4"	
27	STOCK POT RANGE	1	GARLAND	G20-SP	FSC					80,000	3/4"	
29	COMBI OVEN	1	ALTO SHAAM	CTP7-20G	FSC		3/4"			98,000		

DUMAC #19-014

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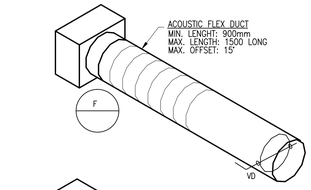
DTIR

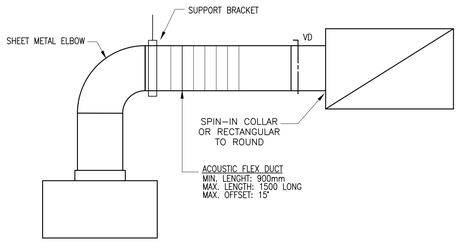
PROJECT No. 2018-132

SHEET TITLE
PARTIAL LEVEL 2 AND ROOF PLAN - AIR DIDISTRIBUTION

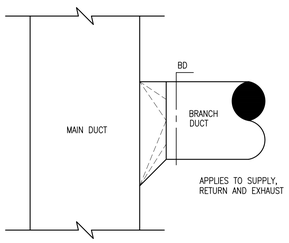
MV101



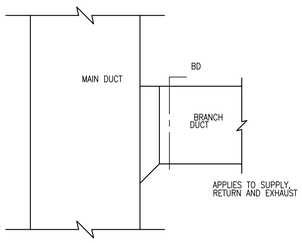
AIRFLOW L/s	BRANCH DUCT
0–55	150
56–113	200
114–200	250
201–300	305
301–425	350
426–600	400



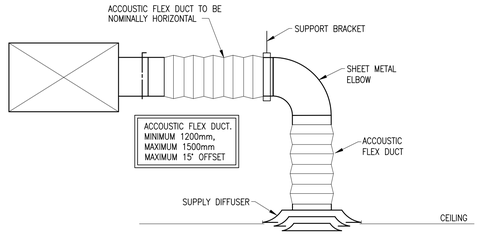
1 / MV501 RETURN GRILLES 'F' & 'G' DETAILS
NTS



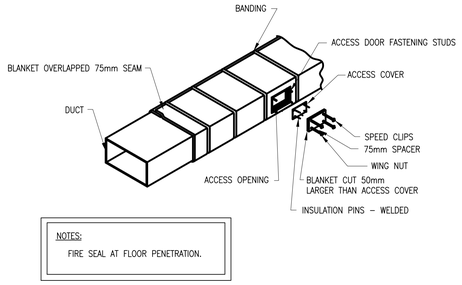
2 / MV501 ROUND BRANCH CONNECTION DETAIL
NTS



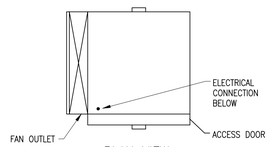
3 / MV501 RETANGULAR BRANCH CONNECTION DETAIL
NTS

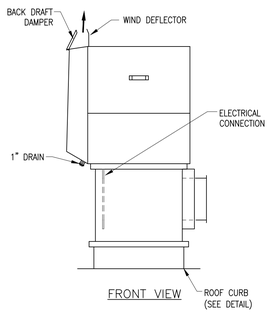


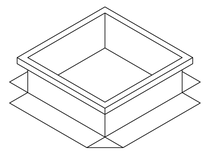
4 / MV501 TYPICAL SUPPLY DIFFUSER CONNECTIONS
NTS



5 / MV501 D–6 BLANKET DETAIL
NTS







6 / MV501 DETAIL – EF–11
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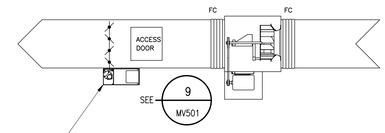
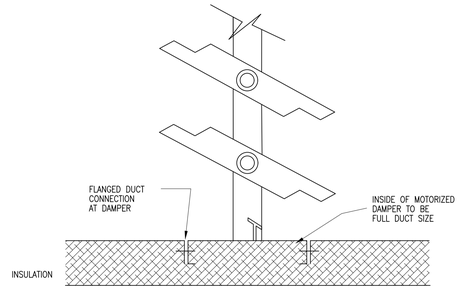
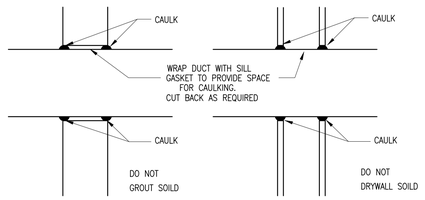


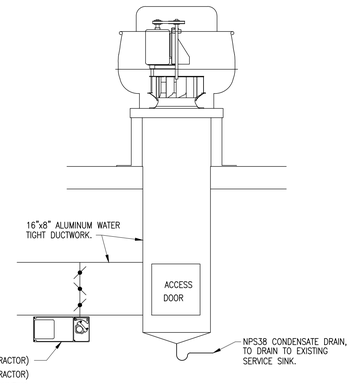
7 / MV501 DAMPER & ACCESS LOCATIONS FOR FANS
NTS



8 / MV501 MOTORIZED DAMPER SUPPLIED BY MECHANICAL CONTRACTOR
NTS DAMPER ACTUATORS BY CONTROLS CONTRACTOR



9 / MV501 DUCT IN UNRATED WALL
NTS



10 / MV501 WATERPROOF DUCTWORK
NTS

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HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429 4100 architects@fbm.ca fbm.ca

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DUMAC ENERGY LTD.
CONSULTING ENGINEERS
752 BEDFORD HIGHWAY
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PROJECT
SIR. JOHN A. CULINARY KITCHEN
31 SCHOLARS RD, UPPER TANTALLON, NS

CLIENT
DTIR

PROJECT No. 2018-132

SHEET TITLE
DETAILS - AIR DISTRIBUTION

MV501

DUMAC #19-014

FAN AND DAMPER SCHEDULE

CONTROL DAMPER MOTORS BY CONTROLS CONTRACTOR. CONTROL DAMPERS (FOR ROOF EF, SIZE DAMPERS TO MATCH FAN REC. ROOF OPENING) BY MECHANICAL CONTRACTOR (M.C.). ROOF CURBS WHERE NOTED BY GENERAL CONTRACTOR (G.C.)

SYMBOL	SERVES	LOCATION	STANDARD OF ACCEPTANCE		AIRFLOW		DRIVE	RPM	BHP	MOTOR			CONTROL DAMPER	DAMPER MOTOR	DISC	SONES	ACCESSORIES AND/OR REMARKS
			MANUFACTURER	MODEL#	L/s	"WG				HP	VOLTAGE	610 ROOF CURB					
EF-11	KITCHEN HOOD (H-1)	ROOF	HALTON	GEF15A	1148	0.75	BELT	1816	1.46	2	600/3	BY MECHANICAL	–	–	Y	–	FLASING COLLAR FOR DUCT FIRE WRAP. PROVIDE 610"X305" GASKETTED ACCESS DOOR IN THE SIDE OF THE INLET CURB OPPOSITE THE EXHAUST DUCT INLET.
EF-12	KITCHEN	ROOF	COOK	120ACE-B-OR91	200	0.25	BELT	881	–	1/6	120/1	BY MECHANICAL	Y	Y	Y	4.1	

AIR HANDLING UNIT SCHEDULE

SYSTEM	SERVICE	LOCATION	STANDARD OF ACCEPTANCE		AIRFLOW @ "SP		ELECTRICAL CHARACTERISTICS				SUPPLY				ELECTRIC HEAT		ACCESSORIES AND/OR REMARKS
			MANUFACTURER	MODEL#	L/s	SP	VOLTAGE	FLA	MCA	MOCP	DRIVE	RPM	BHP	HP	KW	DISC.	
MUA-1	KITCHEN MAKE AIR	ROOF	EngA	A9-9A	938	1.9	600/3	50	61.7	70	BELT	1556	–	2.0	46	Y	VFD MOTOR

KITCHEN HOOD SCHEDULE

SYMBOL	SERVICE	STANDARD OF ACCEPTANCE		OVERALL	AIRFLOW L/s		CONNECTIONS		LIGHTS	ACCESSORIES AND / OR REMARKS
		MANUFACTURER	MODEL		EXHAUST	MAKE UP AIR	EXHAUST	MAKE UP AIR		
H-1	KITCHEN	HALTON	KVE	3300X1625X600	1148	–	400X300	–	LED	SS FILLER STRIP BETWEEN HOOD AND CEILING

GRILLES AND DIFFUSERS SCHEDULE

SYMBOL	STANDARD OF ACCEPTANCE		AIRFLOW L/s	NECK SIZE	MODULE SIZE	ACCESSORIES AND / OR REMARKS
	MANUFACTURER	MODEL				
C	PRICE	SCDA	113-200	250	610x610	BALANCING DAMPER IN BRANCH DUCT SET FOR VERTICAL AIR FLOW
D	HALTON	KCD	188-250	200	610x610	BALANCING DAMPER IN BRANCH DUCT SET FOR VERTICAL AIR FLOW
F	PRICE	PDDR	0-200	250	305x610	PLENUM PAINTED FLAT BLACK ON INTERIOR
G	PRICE	PDDR	201-550	300	610x610	PLENUM PAINTED FLAT BLACK ON INTERIOR

VRF A/C SPLIT SYSTEM SCHEDULE

SYMBOL	SERVES	STANDARD OF ACCEPTANCE		COOLING CAPACITY BTU/H @ ARI	HEATING CAPACITY BTU/H @ 1°F	O/A CFM	L/s @ HI-SPEED	VOLTAGE	ACCESSORIES AND/OR REMARKS
		MANUFACTURER	MODEL						
A/C-1E	CULINARY TRADES	MITSUBISHI	PEAD-A24AA7	24000	–	–	350	208/1	FAN COIL UNIT, ABOVE CEILING MOUNTED, -17°C AMBIENT CONDENSATE PUMP LOCATED IN UNIT, R410A REFRIGERANT
A/C-1C	CULINARY TRADES	MITSUBISHI	PURY-A24NHA7	24000	–	1940	–	208/1	C/W WIND BAFFLE, CONDENSER COIL GUARD, GOLD-FIN CORROSION PROTECTION COATING ON CONDENSER COIL, CMB-P108NU-GA BC CONTROLLER

DUMAC #19-014

FBM
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HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429 4100 architects@fbm.ca fbm.ca

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CLIENT

DTIR

PROJECT No. 2018-132

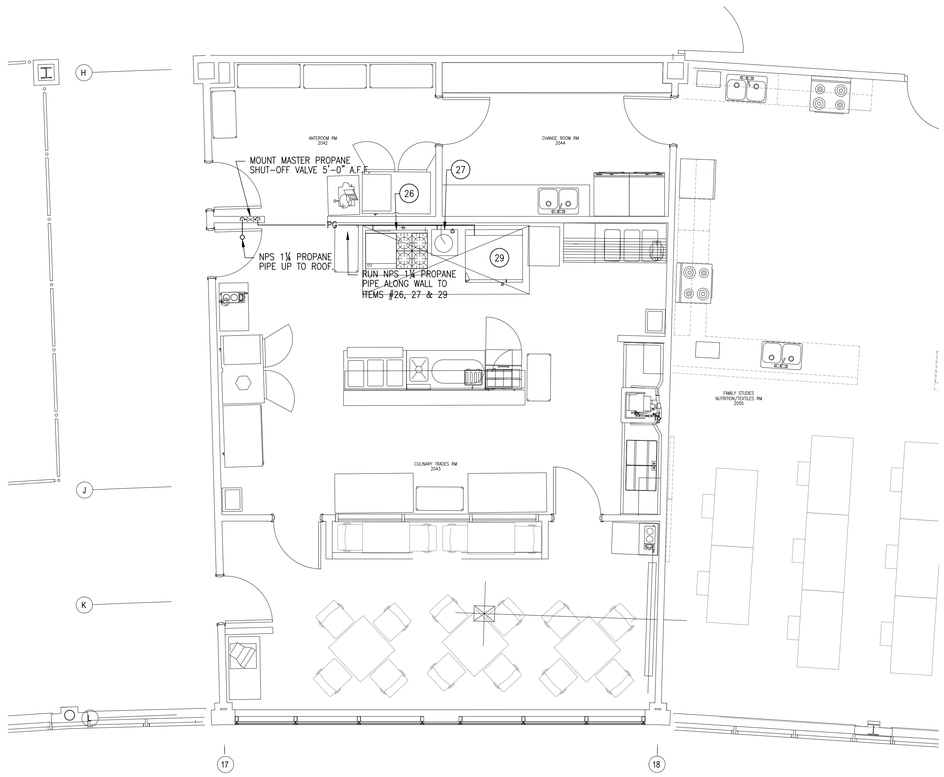
SHEET TITLE

SCHEDULES - AIR DISTRIBUTION

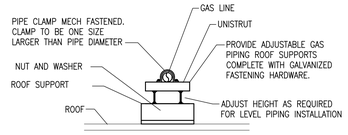
MV601

2 PG101 — PARTIAL ROOF PLAN – PROPANE GAS
1:100

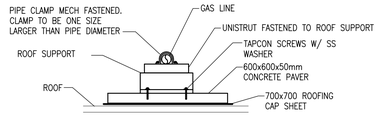
3 PG101 — PARTIAL FLOOR PLAN – LEVEL 1 PROPANE GAS
1:50



1 PG101 — PARTIAL FLOOR PLAN – LEVEL 2 PROPANE GAS
1:50



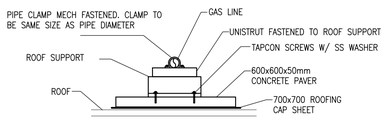
4 PG101 — GAS MOUNTING DETAIL (TYPE #1)
NTS



5 PG101 — GAS MOUNTING DETAIL (TYPE #2)
NTS

SJA KITCHEN EQUIPMENT SCHEDULE

No	DESCRIPTION	Qty	MANUF'R.	MODEL No	SUPPLIER	MECHANICAL SERVICES						REMARKS
						HOT WATER	COLD WATER	DIRECT DRAIN	INDIRECT DRAIN	PROPANE BTU	PROPANE CONN.	
D6	RANGE/OVEN/BURNERS/GRILL	1	GARLAND	GF648-4G24LL	F&C					232,000	3/4"	
D7	STOCK POT RANGE	1	GARLAND	G36-SP	F&C					60,000	1/4"	
D8	COMBI OVEN	1	ALTO SHAAM	CTP7-20G	F&C		3/4"		1/2"	98,000	3/4"	



6 PG101 — GAS ANCHOR DETAIL (TYPE #3)
NTS

DUMAC #19-014

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HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429 4100 architects@fbm.ca fbm.ca

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DUMAC ENERGY LTD.
CONSULTING ENGINEERS
752 BEDFORD HIGHWAY
HALIFAX, N.S.
Tel: (902) 457-1300
Fax: (902) 457-1777
Email: DUMAC@DUMAC.NS.CA

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REGISTERED PROFESSIONAL ENGINEER
D. Spears
9466
PROVINCE OF NOVA SCOTIA

SCALE	1:25
DRAWN	STAFF
CHECKED	STAFF
DATE	19/05/22

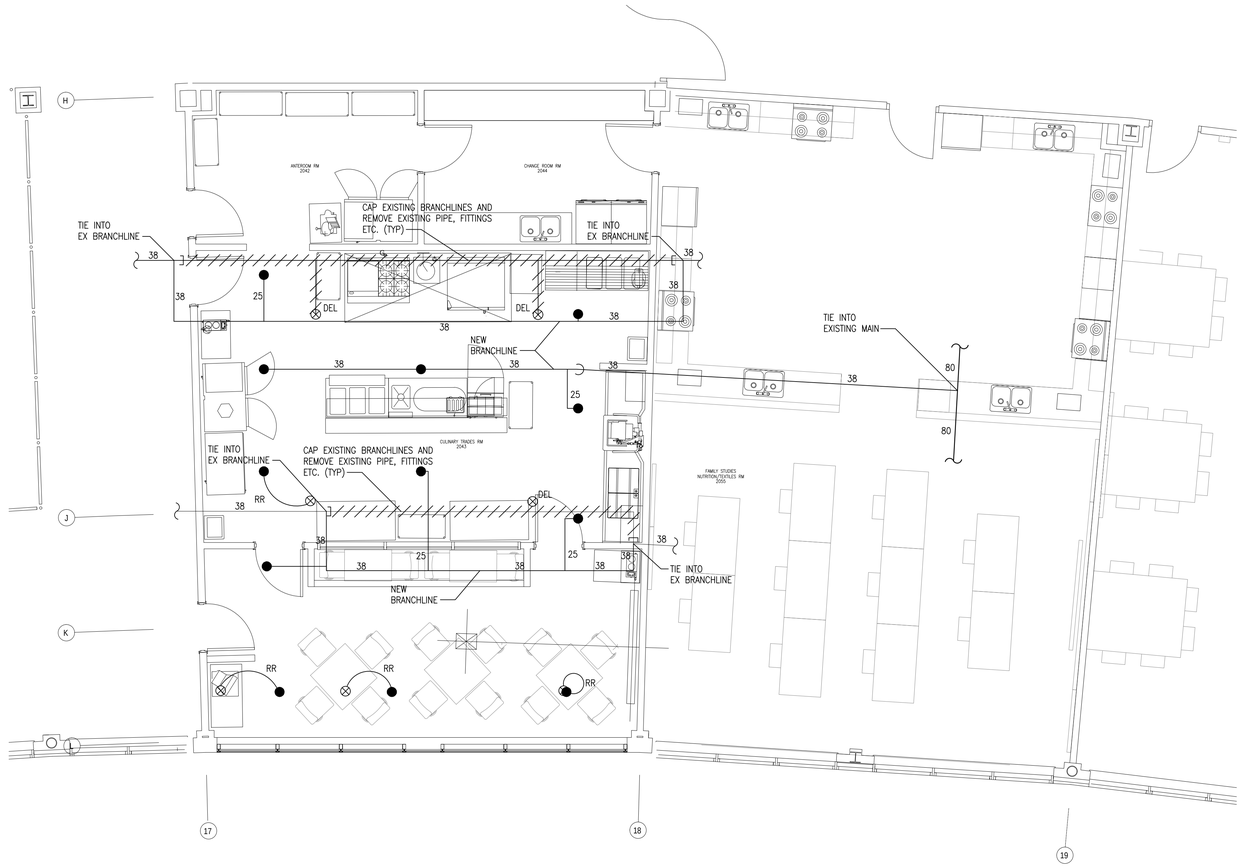
PROJECT
SIR. JOHN A. CULINARY KITCHEN
31 SCHOLARS RD, UPPER TANTALLON, NS

CLIENT
DTIR

PROJECT No. 2018-132

SHEET TITLE
PARTIAL FL. PLANS AND ROOF PLAN PROPANE GAS

PG101



1 / SP101 PARTIAL LEVEL 2 FLOOR PLAN–SPRINKLER

SCALE 1:50

SPRINKLER NOTES

1. ALL WORK SHALL CONFORM TO THE LATEST REQUIREMENTS OF THE NATIONAL BUILDING CODE – 2015, NFPA–13 – 2013, PROVINCIAL AND MUNICIPAL CODES.
2. SPRINKLER CONTRACTOR IS NOT TO CHANGE PIPE SIZES WITHOUT WRITTEN CONSENT FROM THE MECHANICAL CONSULTANT.
3. CO–ORDINATE THIS WORK WITH THE WORK OF THE OTHER TRADES.
4. ALL SPRINKLER PIPE IN ROOMS WITH CEILINGS SHALL BE INSTALLED ABOVE CEILINGS.
5. SPRINKLER CONTRACTOR SHALL INSTALL LOW POINT DRAINS ON ALL TRAPPED SECTIONS AS PER NFPA–13.
6. SPRINKLER CONTRACTOR SHALL ALLOW FOR UP TO (2) ADDITIONAL HEADS INCLUDING ANY ADJUSTMENTS REQUIRED IN THE SPRINKLER PIPING TO ACCOMMODATE ANY ADDITIONAL HEADS. THESE DO NOT ACCOUNT FOR HEADS UNDER DUCTS ETC.
7. ALL OPENINGS IN WALLS AND FLOORS WHERE NEW SPRINKLER PIPES PASS THROUGH TO BE SEALED USING LISTED FIRESTOP MASTIC AND ESCUTCHEON PLATES.
8. SPRINKLER CONTRACTOR TO CO–ORDINATE SPRINKLER HEAD LOCATIONS WITH REFLECTED CEILING PLANS. SPRINKLER HEADS TO BE CENTER OF TILE WHERE POSSIBLE. ALSO CO–ORD WITH ALL OTHER TRADES INCLUDING EXISTING/NEW MECH., ELEC. AND STRUCTURAL. ROUTE PIPE ETC AS REQUIRED.
9. SPRINKLER CONTRACTOR TO PROVIDE 3 SETS OF CONSTRUCTION SHOP DRAWINGS INCLUDING EQUIPMENT SHOP DRAWINGS.
10. SPRINKLER SYSTEM TO BE IN OPERATION AT END OF EACH WORKDAY.
11. SPRINKLER CONTRACTOR TO PROVIDE AND INSTALL A ULC LISTED WET CHEMICAL KITCHEN HOOD SYSTEM.

LEGEND

- ● – NEW ¾" QR TYPE SEMI–REC CHROME PENDENT SPRINKLER
- ⊗ – EXISTING SPRINKLER
- RR ● ⊗ – RELOCATE EXISTING SPRINKLER AND REPLACE WITH ¾" QR TYPE SEMI–REC CHROME PENDENT
- //// – EXISTING SPRINKLER PIPE TO BE REMOVED
- ——— – EXISTING SPRINKLER PIPE
- ——— – NEW SPRINKLER PIPE

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T: (902) 429 4100 architects@fbm.ca fbm.ca

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REGISTERED PROFESSIONAL ENGINEER
PROVINCE OF NOVA SCOTIA
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7810

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PROJECT
SIR. JOHN A. CULINARY KITCHEN
31 SCHOLARS RD, UPPER TANTALLON, NS

CLIENT
DTIR

PROJECT No. 2018-132

SHEET TITLE
LEVEL 2 FLOOR PLAN - SPRINKLER

SP101

DUMAC #19-014

LIGHTING LEGEND

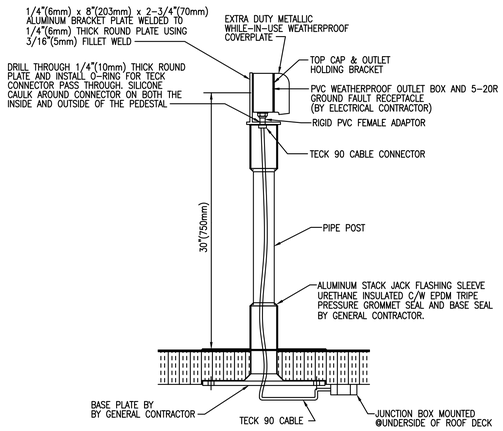
'1'	LIGHTING FIXTURE. NUMBER INDICATES TYPE. REFER TO FIXTURE SCHEDULE.
^{E}	EXISTING LOW VOLTAGE SWITCH
^{ER}	EXISTING LOW VOLTAGE SWITCH TO BE DISCONNECTED, RELOCATED AND RECONNECTED. PROVIDE OUTLET BOX MOUNTED AT 1220mm AFF AND 16mmC STUBBED TO ACCESSIBLE CEILING SPACE. EXTEND EXISTING CIRCUITRY AS REQUIRED.
$	LOW VOLTAGE SWITCH TO MATCH EXISTING. MOUNT AT 1220mm AFF .
(OS)	LINE VOLTAGE OFF ONLY OCCUPANCY SENSOR CEILING MOUNTED REFER TO DETAIL 1/EL101.
$D	DIMMER SWITCH MOUNTED 48" (1200mm) AFF. REFER TO DETAIL 1/EL101.

POWER LEGEND

	125V, 5-15R DUPLEX RECEPTACLE MOUNTED 18" (450mm) AFF. UNLESS OTHERWISE INDICATED
	125V, 5-20R DUPLEX RECEPTACLE MOUNTED 18" (450mm) AFF UNLESS OTHERWISE INDICATED.
	125V, 5-20R DUPLEX RECEPTACLE MOUNTED ABOVE COUNTER
GF RT	125V, 5-20R GFCI DUPLEX SERVICE RECEPTACLE C/W EXTRA DUTY WHILE IN-USE COVERPLATE TO SUIT CANADAIAN ELECTRICAL CODE, SECTIONS 2-314 AND 26-702. MOUNTED ON SERVICE PEDISTAL AT 30" (750mm) ABOVE FINISHED ROOF. REFER TO DETAIL 1/E-001.
C ER	EXISTING PROJECTOR RECEPTACLE IN CEILING SPACE TO BE DISCONNECTED, RELOCATED AND RECONNECTED. EXTEND EXISTING CIRCUITRY AS REQUIRED.
ER	EXISTING RECEPTACLE TO BE DISCONNECTED, RELOCATED AND RECONNECTED. EXTEND EXISTING CIRCUITRY AS REQUIRED.
	BRANCH CIRCUIT WIRING PANEL BOARD
$TOL	MANUAL MOTOR STARTER C/W RED ON PILOT LIGHT
(2)	INDICATES MECHANICAL EQUIPMENT NUMBER. REFER TO MOTOR STARTER AND CONTROL LIST.
(4)	INDICATES KITCHEN EQUIPMENT NUMBER. REFER TO KITCHEN EQUIPMENT SCHEDULE.
NF	NON-FUSED DISCONNECT SWITCH
NF WP	WEATHERPROOF NON-FUSED DISCONNECT SWITCH

SYSTEMS LEGEND

F	FIRE ALARM SYSTEM SIGNALING DEVICE TO MATCH EXISTING. REFER TO DETAIL 1/EP601
R	FIRE ALARM SYSTEM RELAY TO MATCH EXISTING. REFER TO DETAIL 1/EP601
35W	MULTI-TAP VOLTAGE EMERGENCY LIGHTING BATTERY UNIT C/W 2 LED HEADS- CEILING MOUNTED. WATTAGE AS INDICATED.
	EMERGENCY REMOTE LED HEADS (2) - CEILING MOUNTED
DC	D.C. WIRING FOR EMERGENCY LIGHTING. RUN MINIMUM 2#12+#12B-1/2"C
E	EXISTING MULTI-MEDIA OUTLET TO REMAIN.
E	EXISTING DATA OUTLET TO REMAIN.
E TV	EXISTING TV COAX OUTLET TO REMAIN.
E V	EXISTING SPEAKER VOLUME CONTROL TO REMAIN.
WIFI C ER	EXISTING WIFI DATA OUTLET IN ACCESSIBLE CEILING SPACE TO BE DISCONNECTED, REMOVED, REINSTALLED AND RECONNECTED TO ACCOMODATE T-BAR CEILING WORK.
	DUAL DATA OUTLET MOUNTED 18"(450mm)AFF. RUN 2 x CAT 6 DATA BACK TO COMM. RACK AND TERMINATE. PROVIDE MINIMUM 21mm EMT CONDUIT STUBBED OUT IN ACCESSIBLE CEILING SPACE. BUSH END. REFER TO DETAIL 2/EP601
WIFI C	WIFI DATA OUTLET MOUNTED IN ACCESSIBLE CEILING SPACE. RUN 1xCAT 6 DATA BACK TO COMM. RACK AND TERMINATE. REFER TO DETAIL 2/EP601
WIFI C ER	EXISTING WIFI DATA OUTLET IN ACCESSIBLE CEILING SPACE TO BE DISCONNECTED, REMOVED, REINSTALLED AND RECONNECTED.
C	DATA OUTLET MOUNTED IN ACCESSIBLE CEILING SPACE. RUN 1xCAT 6 DATA BACK TO COMM. RACK AND TERMINATE. REFER TO DETAIL 2/EP601
CS ER	EXISTING PUBLIC ADDRESS SYSTEM CALL SWITCH TO BE DISCONNECTED, RELOCATED AND RECONNECTED. EXTEND EXISTING CIRCUITRY AS REQUIRED. PROVIDE SUITABLE SIZED SURFACE BACK BOX AND METALLIC RACEWAY TO ACCESSIBLE CEILING SPACE.
(S) ER	EXISTING PUBLIC ADDRESS SYSTEM CEILING SPEAKER TO BE DISCONNECTED, RELOCATED AND RECONNECTED. EXTEND EXISTING CIRCUITRY AS REQUIRED. PROVIDE VERIFICATION REPORT.
(S)	PUBLIC ADDRESS SYSTEM CEILING SPEAKER TO MATCH EXISTING. WIRE AND CONNECT TO CORRIDOR COMMON AREA PA SPEAKER ZONE. PROVIDE VERIFICATION REPORT.
ER (S)	EXISTING PROJECTOR SYSTEM AMPLIFIED SPEAKER TO BE DISCONNECTED, RELOCATED AND RECONNECTED. EXTEND EXISTING CIRCUITRY AS REQUIRED. PROVIDE VERIFICATION REPORT.
PROJ ER	EXISTING CEILING PROJECTOR, PROJECTOR SUPPORT AND ALL ASSOCIATED MULTI-MEDIA CABLING TO BE DISCONNECTED, RELOCATED AND RECONNECTED.
(MS)	FIRE SUPPRESSION SYSTEM MICROSWITCH BY MECHANICAL CONTRACTOR. WIRED BY ELECTRICAL CONTRACTOR.



1 / E-001 ELECTRICAL OUTLET ROOF SUPPORT

N.T.S.

NOTES
1. THALER CAT. NO. MERS-750A ALUMINUM ELECTRICAL OUTLET SUPPORT OR EQUAL SUPPLIED AND INSTALLED BY ELECTRICAL CONTRACTOR.
2. ROOFING AND STRUCTURAL WORK BY GENERAL CONTRACTOR.

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D.M. DUMARESQ
3369

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PROJECT

SIR. JOHN A. CULINARY KITCHEN

31 SCHOLARS RD, UPPER TANTALLON, NS

CLIENT

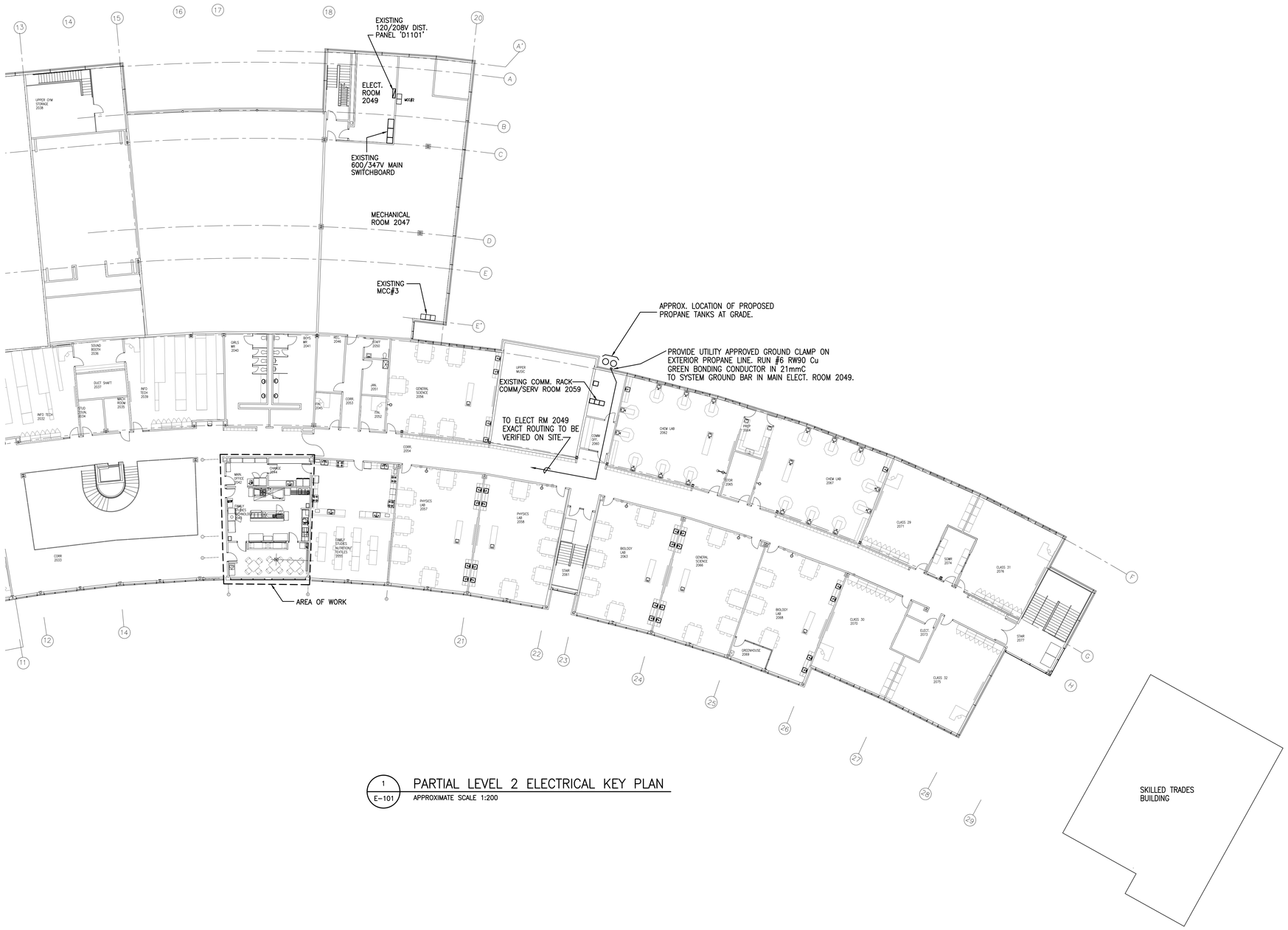
DTIR

PROJECT No. 2018-132

SHEET TITLE

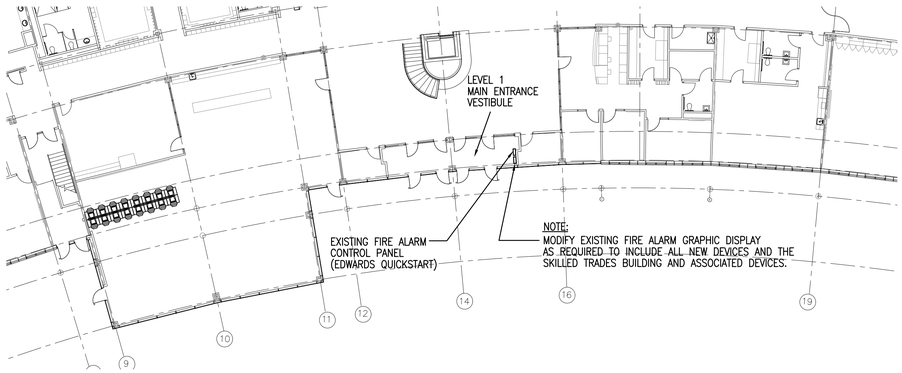
ELECTRICAL LEGEND AND DETAILS

E-001



1 E-101 PARTIAL LEVEL 2 ELECTRICAL KEY PLAN

APPROXIMATE SCALE 1:200



2 E-101 PARTIAL LEVEL 1 ELECTRICAL KEY PLAN

APPROXIMATE SCALE 1:200

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HALIFAX, N.S.
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PROJECT

SIR. JOHN A. CULINARY KITCHEN

31 SCHOLARS RD, UPPER TANTALLON, NS

CLIENT

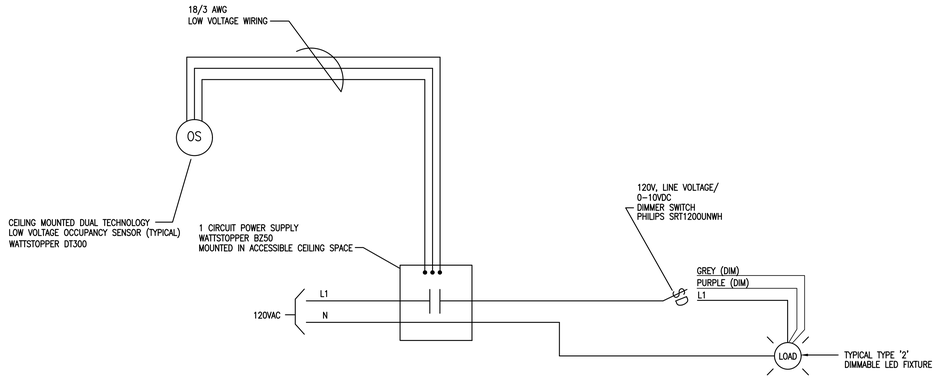
DTIR

PROJECT No. 2018-132

SHEET TITLE

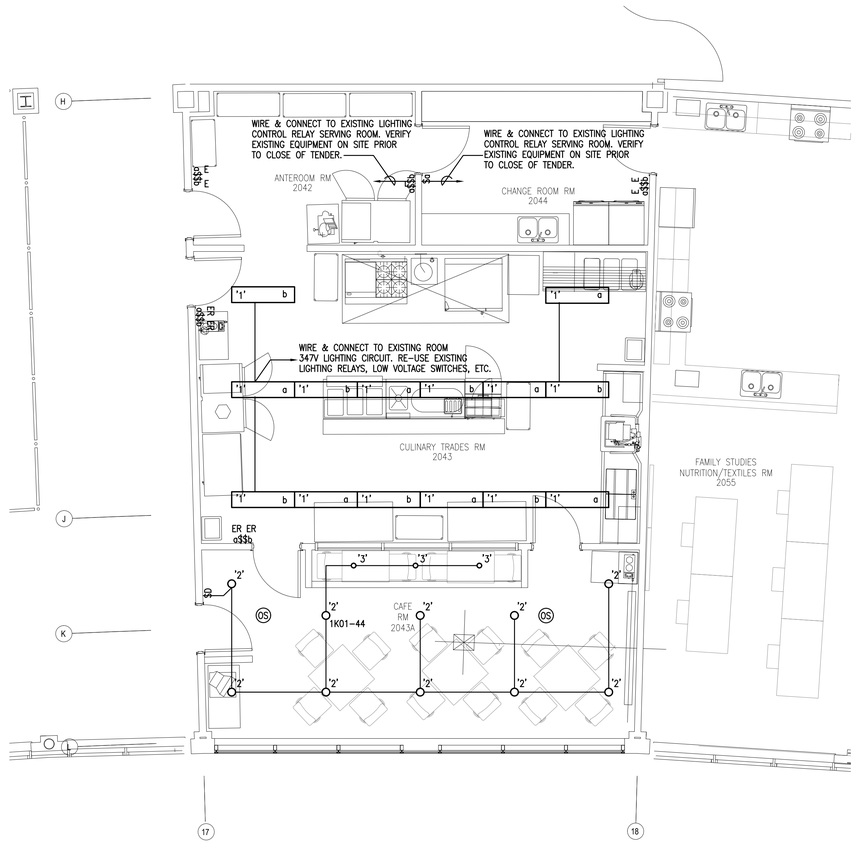
LEVEL 1 AND 2 ELECTRICAL KEY PLANS

E-101



1 / EL101 LIGHTING CONTROL WIRING DETAIL – OCCUPANCY SENSOR WITH LINE VOLTAGE LOCAL CONTROLS

N.T.S. VERIFY WIRING REQUIREMENTS WITH SYSTEM MANUFACTURER PRIOR TO ROUGH-IN.



1 / EL101 PARTIAL LEVEL 2 FLOOR PLAN–LIGHTING

SCALE 1:50

FIXTURE SCHEDULE

TYPE	STANDARD OF ACCEPTANCE MANUFACTURER CAT No.	DESCRIPTION	LED DELIVERED LUMENS	INPUT WATTS	COLOR TEMPERATURE	VOLTS	DRIVER	MOUNTING	REMARKS	ACCEPTABLE MANUFACTURERS
1	PHILIPS 1TG-42L-835-4-FS-02F-347-DIM-3W	305 x 1220mm (1'-0" x 4'-0") RECESSED GASKETED LED. LED – 4200 DELIVERED LUMENS	4200 LUMENS 3500K	44W	3500'K	347	0-10V LED DRIVER	RECESSED IN T-BAR	NEOPRENE GASKET, DOOR FRAME & FIXTURE VINYL GASKET, LENS & DOOR FRAME NEOPRENE GASKET ON FIXTURE TRIM	HUBBELL EATON ACCUITY
2	PHILIPS L5R15AZ10UVA-L5R15835VA-L5RDD	RECESSED 5" (125mm) LED POT LIGHT	1500 LUMENS	16W	3500'K	120	0-10V LED DRIVER	RECESSED		HUBBELL EATON ACCUITY
3	PHILIPS L3RAZ10UVA-L3R08835VA-L3RDD	RECESSED 3" (75mm) LED POT LIGHT	800 LUMENS	11W	3500'K	120	0-10V LED DRIVER	RECESSED		HUBBELL EATON ACCUITY

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PROJECT
SIR. JOHN A. CULINARY KITCHEN
31 SCHOLARS RD, UPPER TANTALLON, NS

CLIENT
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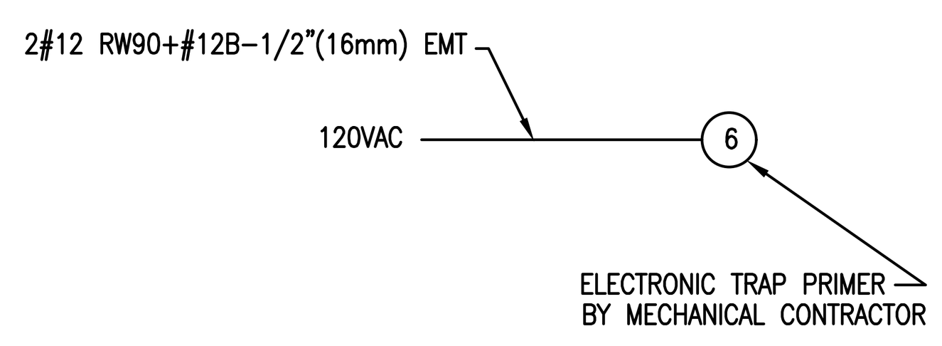
PROJECT No. 2018-132

SHEET TITLE
LEVEL 2 FLOOR PLAN - LIGHTING

EL101

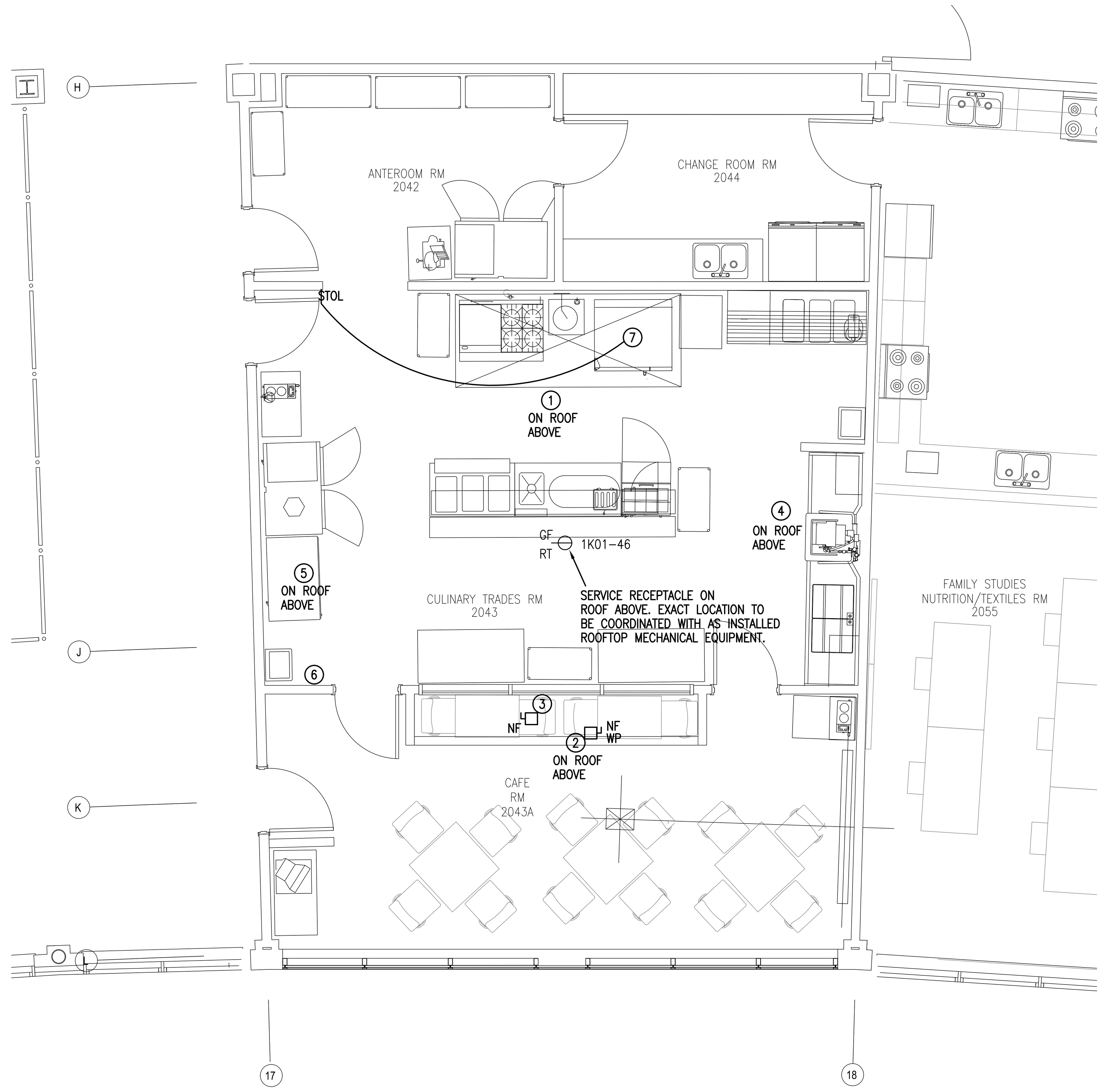
DUMAC #19-014



2 EM101 ELECTRONIC TRAP PRIMER (TYPICAL)

N.T.S.

NOTES:
1.) ALL WIRING BY ELECTRICAL CONTRACTOR



1 EM101 PARTIAL LEVEL 2 FLOOR PLAN–MECHANICAL EQUIPMENT CONNECTIONS

SCALE 1:50

MOTOR STARTER AND CONTROL LIST

E–ELECTRICAL CONTRACTOR
M–MECHANICAL CONTRACTOR
U–USERS EQUIPMENT
X–PROVIDE
S–SITE SERVICES CONTRACTOR

1–WEATHERPROOF STOP–START STATION
2–ON–OFF
3–HAND–OFF–AUTO
4–PILOT LIGHT
5–CONTROL RELAY
6–VARIABLE FREQUENCY DRIVE
7–CO/NO2 DETECTOR
8–AQUASTAT
9–END SWITCH
10–CONTROL VALVE
11–SOLENOID
12–MOTORIZED DAMPER
13–FLOAT SWITCH
14–PRESSURE SWITCH
15–INTEGRAL SWITCH
16–AIRFLOW SWITCH
17–CONTROL TRANSFORMER
18–THERMOSTAT
19–INTEGRAL CONTROL PANEL
20–FIRE ALARM SHUTDOWN
21–CURRENT SWITCH
22–LOW FLOW SWITCH
23–HIGH LIMIT
24–LOW LIMIT
25–BUILDING AUTOMATION SYSTEM
26–5–15R GFCI RECEPTACLE
27–TIME CLOCK
28–RECEPTACLE 5–15R
29–TOGGLE SWITCH UP
30–REMOTE PANEL

EQUIPMENT NO.	LOCATION	EQUIPMENT	SUPPLIED UNDER	INSTALLED UNDER	WIRED UNDER	EQUIPMENT RATING KW	EQUIPMENT RATING HP	VOLTAGE	PHASE	PANEL & CIRCUIT NO.
1	ROOF	EF–11	M	M	E		2	600	3	MCC#3
2	ROOF	AC–1C	M	M	E			208	1	1K01–37,39
3	CAFE RM 2043A	AC–1E	M	M	E			–	–	FED FROM EQUIP#2
4	ROOF	MUA–1	M	M	E	46	2	600	3	MAIN SWBD
5	ROOF	EF–12	M	M	E		1/6	120	1	1K01–41
6	CULINARY TRADES 2043	TRAP PRIMER	M	M	E			120	1	1K01–43
7	CULINARY TRADES 2043	EXHAUST HOOD	M	M	E			120	1	1K01–24
8										
9										
10										
11										
12										
13										
14										

STARTER

EQUIPMENT NO.	MANUAL (IN COVER)	TOGGLE (IN COVER)	PILOT LIGHT (IN COVER)			MAGNETIC	COMBINATION	FUSE TYPE	CONTROL TRANS	AUXILIARY CONTACT	BREAKER TYPE	SIZE EEMAC	NON FUSED TYPE	NOTE	HAND–OFF–AUTO (IN COVER)	AUTO–OFF (IN COVER)	ON–OFF (IN COVER)	ON LIGHT RED	SLOW LIGHT AMBER	SLOW/FAST OFF AUTO	CSA ENCLOSURE TYPE	LEGEND ABOVE	LEGEND ABOVE	SUPPLIED UNDER	INSTALLED UNDER	WIRED UNDER
1						X	X		X	X	X	1				X		X				5	21	E	E	E
2																										
3																										
4																										
5	X	X	X																					E	E	E
6																										
7	X	X	X																					E	E	E

LOCATE AT MOTOR

EQUIPMENT NO.	DISCONNECT SWITCH	VARIABLE FREQUENCY	TERMINAL BLOCK	LEGEND ABOVE	LEGEND ABOVE	LEGEND ABOVE	NOTE	SUPPLIED UNDER	INSTALLED UNDER	WIRED UNDER	DISCONNECT SWITCH	VARIABLE FREQUENCY	TERMINAL BLOCK	LEGEND ABOVE	LEGEND ABOVE	LEGEND ABOVE	NOTE	SUPPLIED UNDER	INSTALLED UNDER	WIRED UNDER
1	X							M	M	E										
2	X							E	E	E										
3	X							E	E	E										
4	X							M	M	E										
5	X							M	M	E										
6																				
7																				

REMOTE CONTROL

EQUIPMENT NO.	LEGEND ABOVE	LEGEND ABOVE	LEGEND ABOVE	LEGEND ABOVE	LEGEND ABOVE	LEGEND ABOVE	SUPPLIED UNDER	INSTALLED UNDER	WIRED UNDER	LEGEND ABOVE	LEGEND ABOVE	LEGEND ABOVE	LEGEND ABOVE	SUPPLIED UNDER	INSTALLED UNDER	WIRED UNDER
1	25						M	M	M							
2																
3																
4	25						M	M	M	20				E	E	E
5																
6																
7																

EQUIPMENT NO.	LINE DIAGRAM	INTERLOCK WITH EQUIP. NO.	INTERLOCK WITH EQUIP. NO.	INTERLOCK WITH EQUIP. NO.	INTERLOCK WIRED BY	FEEDER DETAILS RW90	EQUIPMENT NO.
1						SEE POWER RISER	1
2						3#10+#12B–21mmC	2
3						4#12+#12B–21mmC	3
4						SEE POWER RISER	4
5						2#12+#12B–16mmC	5
6						2#12+#12B–16mmC	6
7						2#12+#12B–16mmC	7
8							8
9							9
10							10
11							11
12							12
13							13
14							14

REFER TO DETAIL 1/MC601. (equipment no. 7)

NOTES:
1. REFER TO WIRING DIAGRAMS ON MECHANICAL DRAWINGS
2. ALL STARTERS INCORPORATING NEUTRAL CONDUCTORS ARE TO BE SUPPLIED WITH NEUTRAL TERMINAL BLOCKS.
3. ROOF PENETRATIONS REQUIRED TO FEED ROOF MOUNTED EQUIPMENT ARE THE RESPONSIBILITY OF THE DIVISION 7. THE ELECTRICAL CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING THE LOCATION OF EACH ROOF TOP PENETRATION, INSTALLATION OF CONDUIT AND WIRE. DIVISION 7 IS RESPONSIBLE FOR MEMBRANE PENETRATION DETAILS TO ENSURE A WATER TIGHT SEAL IN CONFORMANCE WITH CRCA.
4. ALL 120 VAC DAMPER MOTORS ASSOCIATED WITH MECHANICAL EQUIPMENT ARE SUPPLIED, INSTALLED AND WIRED BY MECHANICAL CONTRACTOR.

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HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429.4100 architects@fbm.ca fbm.ca

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CONSULTING ENGINEERS
752 BEDFORD HIGHWAY
HALIFAX, N.S.
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PROJECT
SIR. JOHN A. CULINARY KITCHEN
31 SCHOLARS RD, UPPER TANTALLON, NS

CLIENT
DTIR

PROJECT No. 2018-132

SHEET TITLE
LEVEL 2 FLOOR PLAN - MECHANICAL EQUIPMENT CONNECTIONS

EM101

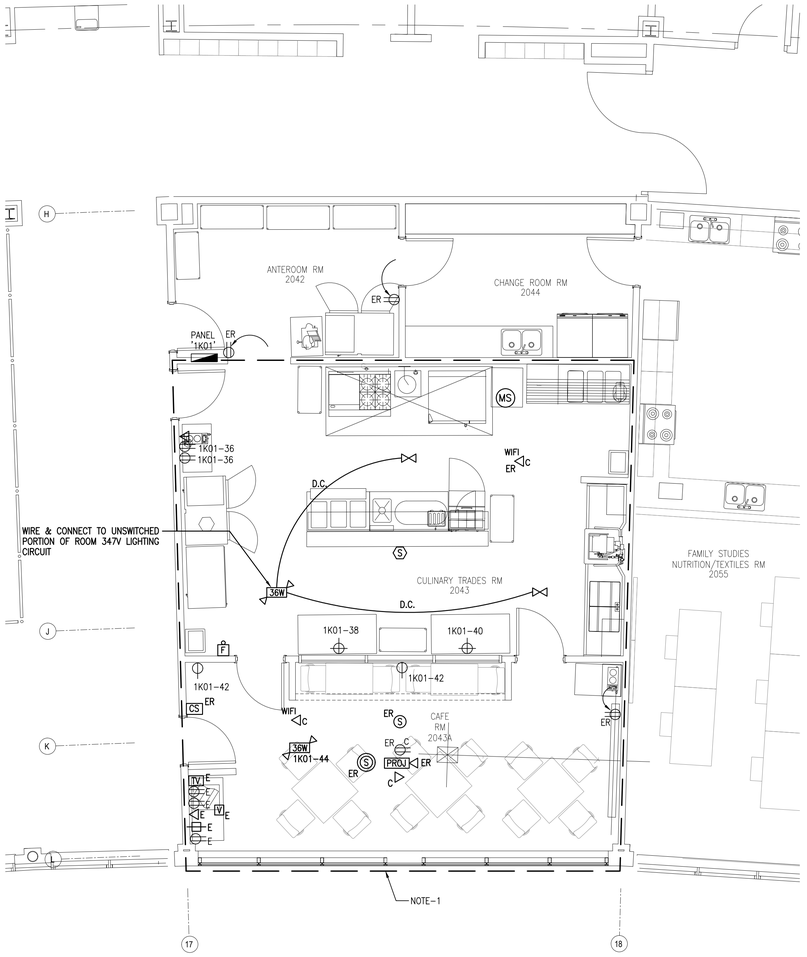
VOLTS 120/208 PANEL '1K01' TYPE
PHASE 3 LOCATION KITCHEN MAINS 225 AMPS
WIRE 4 FED FROM EXISTING D1101 ENTER AT MTG. F

DESIGNATION	WATTS A	WATTS B	WATTS C	CIR. No.	BKR NO	A B C	BKR NO	CIR. No.	WATTS A	WATTS B	WATTS C	DESIGNATION
	5450			1	3P		2P	2	2500			
DISH AND POT WASHER EQ#4		5450		3	60		30	4		2500		INDUCTION BURNER ITEM#14
			5450	5	A			6				
SLICER ITEM#11	480			7	20A		20A	8	800			WASHER ITEM#23a
MIXER ITEM#16		350		9	20A		2P	10		2500		DRYER ITEM#23b
REACH-IN COOLER ITEM#18			900	11	20A		30A	12			2500	
REACH-IN FREEZER ITEM#19	900			13	20A		20A	14	960			GLASS DOOR COOLER ITEM#30
MOBILE SHELF ITEM#21		600		15	15A		2P	16		2000		HOT FOOD UNIT ITEM#32
TOASTER ITEM#35			1300	17	2P		30A	18			2000	
	1300			19	20A		15A	20	600			DOUBLE OVERSHELF UNIT ITEM#33
MICROWAVE OVEN ITEM#36		600		21	20A		15A	22				SPARE
SANDWICH COLD TABLE ITEM#37			1030	23	20A		15A	24			500	EXH. HOOD FAN/LIGHTS ITEM#24
	1900			25	2P		15A	26	500			COMBI OVEN ITEM#29 □
COFFEE MAKER ITEM#43A		1900		27	30A		–	28		–		– □
COFFEE MAKER ITEM#43			1670	29	20A		15A	30			500	RANGE/OVEN ITEM#26 □
ICE MAKER ITEM#44	1160			31	20A		–	32	–			–
VEG PROCESSOR ITEM #31		960		33	20A		15A	34		50		SHUNT TRIP POWER *
				35	15A		15A	36			500	RECEPT-KITCHEN
AC-1C ON ROOF	2000			37	2P		20A	38	500			RECEPT-KITCHEN
		2000		39	25A		20A	40		500		RECEPT-KITCHEN
EF-12			500	41	15A		20A	42			500	RECEPT-SEATING
TRAP PRIMER	50			43	15A		20A	44	400			LIGHTING-SEATING AREA
				45			20A	46		500		SERVICE RECEPT-ROOFTOP
				47			2P	48				SPARE
				49			20A	50				
				51			2P	52				SPARE
				53			15A	54				
				55				56				
				57				58				
△ SPARE				59	15A			60				
SPARE				61	15A			62				
SPARE				63	15A			64				
SPARE				65	20A			66				
SPARE				67	20A			68				
SPARE				69	20A			70				
△ SPARE				71	20A			72				

ø'A' TOTAL 19,100
ø'B' TOTAL 19,400
ø'C' TOTAL 17,350

TOTAL LOAD 55.850 KW 155 AMP

DO NOT SHARE NEUTRALS ON LIGHTING CIRCUITS.
△ GROUND FAULT CIRCUIT INTERRUPTER BREAKER
* LOCKABLE BREAKER
□ SHUNT TRIP BREAKER



1 EP101 PARTIAL LEVEL 2 FLOOR PLAN-POWER AND SYSTEMS
SCALE 1/4"=1'-0"

NOTE-1:
ELECTRICAL CONTRACTOR SHALL DISCONNECT AND REMOVE ALL REDUNDANT ELECTRICAL EQUIPMENT WITHIN THE DASHED AREA (ie: DEVICES, BOXES, CONDUIT, WIRE, LIGHTS, ETC) UNLESS OTHERWISE INDICATED. ENSURE ALL EXISTING TO REMAIN SERVICES STAY ENERGIZED, RELOCATE/RE-ROUTE ELECTRICAL SERVICES AS REQUIRED TO ACCOMODATE NEW CONSTRUCTION. ENSURE ALL NEW AND EXISTING ELECTRICAL EQUIPMENT IN CEILING SPACE IS PROPERLY SUPPORTED TO MEET C.E.C. REQUIREMENT. ENSURE ALL BOX COVERS, K.O. FILLERS, ETC ARE INSTALLED.

FBM
ARCHITECTURE • INTERIOR DESIGN
HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429 4100 architects@fbm.ca fbm.ca

DUMAC
DUMAC ENERGY LTD.
CONSULTING ENGINEERS
752 BEDFORD HIGHWAY
HALIFAX, N.S.
Tel: (902) 457-1300
Fax: (902) 457-1777
Email: DUMAC@DUMAC.NS.CA

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1	ISSUED FOR TENDER	-	19.05.22

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REGISTERED PROFESSIONAL ENGINEER PROVINCE OF NOVA SCOTIA
D.M. DUMAREQ
3369

SCALE	1:25
DRAWN	STAFF
CHECKED	STAFF
DATE	19/05/22

PROJECT
SIR. JOHN A. CULINARY KITCHEN
31 SCHOLARS RD, UPPER TANTALLON, NS

CLIENT
DTIR

PROJECT No. 2018-132

SHEET TITLE
LEVEL 2 FLOOR PLAN - POWER & SYSTEMS

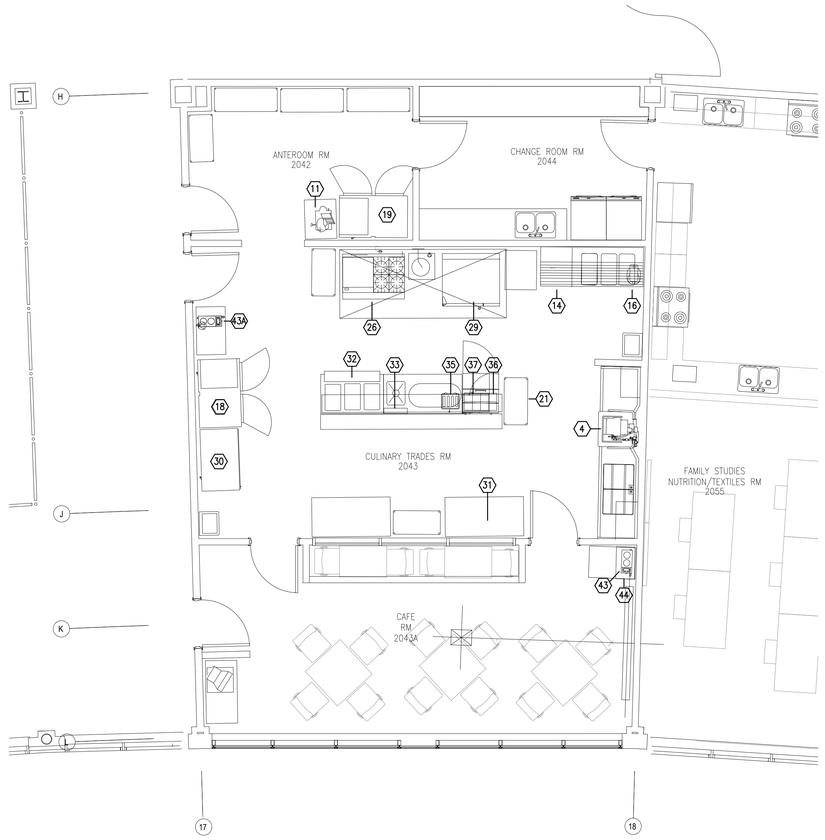
EP101

DUMAC #19-014

KITCHEN EQUIPMENT SCHEDULE

ITEM NO.	DESCRIPTION	VOLTAGE	PHASE	KILOWATTS	HORSE POWER	AMPERAGE	CONNECTION				CIRCUIT	FEEDER (RW90 COPPER)	REMARKS
							DIRECT	RECEPTACLE	JUNTION BOX ON WALL	LOAD PLUGGED INTO ITEM			
4	DISH AND POT WASHER	208	3			45.4	X				1K01-1,3,5	4#6+#8B-27mmC	PROVIDE NON-FUSED, WEATHERPROOF DISCONNECT SWITCH. PROVIDE LIQUID TIGHT METAL FLEX CONDUIT FOR FINAL CONNECTION.
11	SLICER	120	1			4		X			1K01-7	2#12+#12B-16mmC	CSA 5-20R RECEPTACLE
14	INDUCTION BURNER	208	1	5.0				X			1K01-2,4	2#10+#12B-21mmC	CSA L6-30R RECEPTACLE
16	MIXER	120	1			2.9		X			1K01-9	2#12+#12B-16mmC	CSA 5-20R RECEPTACLE
18	REACH IN COOLER	120	1			7.5		X			1K01-11	2#12+#12B-16mmC	CSA 5-20R RECEPTACLE
19	REACH IN FREEZER	120	1			7.5		X			1K01-13	2#12+#12B-16mmC	CSA 5-20R RECEPTACLE
21	MOBILE SHELF	120	1	0.6		5.0	X				1K01-15	2#12+#12B-16mmC	PROVIDE LIQUID TIGHT METAL FLEX CONDUIT FOR FINAL CONNECTION
23a	STACKABLE WASHER	120	1					X			1K01-8	2#12+#12B-16mmC	CSA 5-20R RECEPTACLE
23b	STACKABLE DRYER	208	1					X			1K01-10,12	3#10+#12B-21mmC	CSA 14-30R RECEPTACLE
26	RANGE/OVEN/BURNERS/GRILL	120	1				X				1K01-30	2#12+#12B-16mmC	PROVIDE LIQUID TIGHT METAL FLEX CONDUIT FOR FINAL CONNECTION
29	COMBI OVEN	120	1			6.8	X				1K01-26	2#12+#12B-16mmC	PROVIDE LIQUID TIGHT METAL FLEX CONDUIT FOR FINAL CONNECTION
30	GLASS DOOR COOLER	120	1			8.0		X			1K01-14	2#12+#12B-16mmC	CSA 5-20R RECEPTACLE
31	VEG PROCESSOR	120	1			8.0		X			1K01-33	2#12+#12B-16mmC	CSA 5-20R RECEPTACLE
32	HOT FOOD UNIT	208	1	4.0		19	X				1K01-16,18	2#10+#12B-21mmC	PROVIDE LIQUID TIGHT METAL FLEX CONDUIT FOR FINAL CONNECTION
33	DOUBLE OVERSHELF/HEAT LAMP	120	1	0.6		5.0	X				1K01-20	2#12+#12B-16mmC	PROVIDE LIQUID TIGHT METAL FLEX CONDUIT FOR FINAL CONNECTION
35	TOASTER	208	1	2.6				X			1K01-17,19	2#12+#12B-16mmC	CSA 6-20R RECEPTACLE
36	MICROWAVE OVEN	120	1	1.0				X			1K01-21	2#12+#12B-16mmC	CSA 5-20R RECEPTACLE
37	SANDWICH COLD TABLE	120	1			8.6		X			1K01-23	2#12+#12B-16mmC	CSA 5-20R RECEPTACLE
43	COFFEE MAKER	120	1	1.67		13.9		X			1K01-29	2#12+#12B-16mmC	CSA 5-20R RECEPTACLE
43A	COFFEE MAKER	120/208	1	3.8		17.1	X				1K01-25,27	3#10+#12B-21mmC	PROVIDE LIQUID TIGHT METAL FLEX CONDUIT FOR FINAL CONNECTION
44	ICE MAKER	120	1			9.7		X			1K01-31	2#12+#12B-16mmC	CSA 5-20R RECEPTACLE

NOTE:
CONFIRM RECEPTACLE TYPE WITH ACTUAL KTCHEN EQUIPMENT SHOP DRAWINGS PRIOR TO INSTALLATION.



1 / EP501 PARTIAL LEVEL 2 FLOOR PLAN–KITCHEN EQUIPMENT CONNECTIONS
SCALE 1:50

FBM
ARCHITECTURE • INTERIOR DESIGN
HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429 4100 architects@fbm.ca fbm.ca

DUMAC
DUMAC ENERGY LTD.
CONSULTING ENGINEERS
752 BEDFORD HIGHWAY
HALIFAX, N.S.
Tel: (902) 457-1300
Fax: (902) 457-1777
Email: DUMAC@DUMAC.NS.CA

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SCALE	1:25
DRAWN	STAFF
CHECKED	STAFF
DATE	19/05/22

PROJECT
SIR. JOHN A. CULINARY KITCHEN
31 SCHOLARS RD, UPPER TANTALLON, NS

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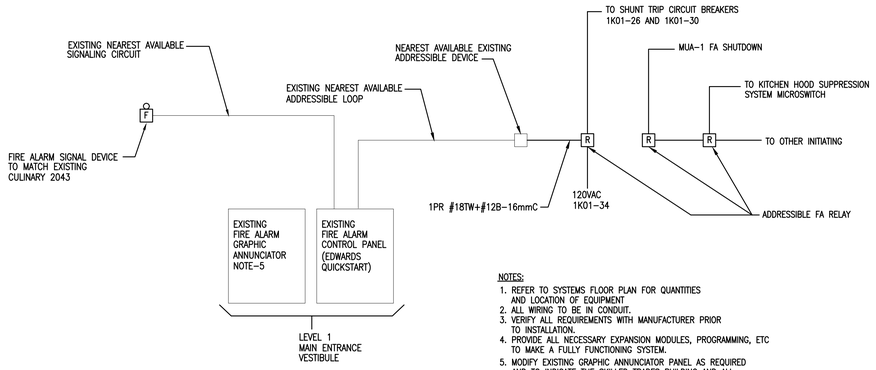
DTIR

PROJECT No. 2018-132

SHEET TITLE
LEVEL 2 FLOOR PLAN KITCHEN EQUIPMENT CONNECTIONS

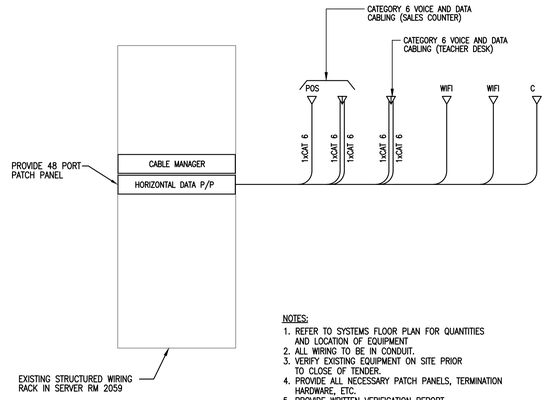
EP501

DUMAC #19-014



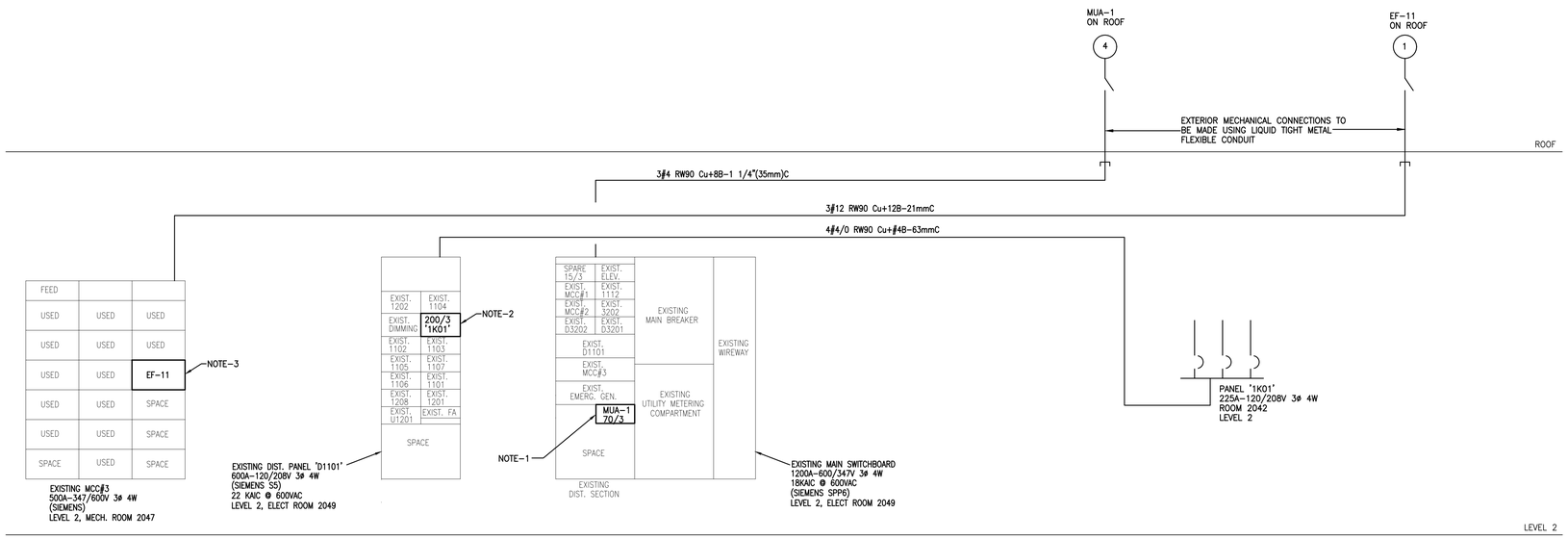
NOTES:
1. REFER TO SYSTEMS FLOOR PLAN FOR QUANTITIES AND LOCATION OF EQUIPMENT
2. ALL WIRING TO BE IN CONDUIT.
3. VERIFY ALL REQUIREMENTS WITH MANUFACTURER PRIOR TO INSTALLATION.
4. PROVIDE ALL NECESSARY EXPANSION MODULES, PROGRAMMING, ETC TO MAKE A FULLY FUNCTIONING SYSTEM.
5. MODIFY EXISTING GRAPHIC ANNUNCIATOR PANEL AS REQUIRED AND TO INDICATE THE SKILLED TRADES BUILDING AND ALL FIRE ALARM DEVICES.
6. PROVIDE WRITTEN FIRE ALARM VERIFICATION REPORT.

1 EP601 — PARTIAL FIRE ALARM ALARM RISER
N.T.S.



NOTES:
1. REFER TO SYSTEMS FLOOR PLAN FOR QUANTITIES AND LOCATION OF EQUIPMENT
2. ALL WIRING TO BE IN CONDUIT.
3. VERIFY EXISTING EQUIPMENT ON SITE PRIOR TO CLOSE OF TENDER.
4. PROVIDE ALL NECESSARY PATCH PANELS, TERMINATION HARDWARE, ETC.
5. PROVIDE WRITTEN VERIFICATION REPORT.

2 EP601 — PARTIAL STRUCTURED WIRING RISER DIAGRAM
N.T.S.



NOTE-1:
SUPPLY AND INSTALL NEW 70A/3P BREAKER TO FEED PROPOSED MUA-1 ON ROOF. BREAKER TYPE TO MATCH EXISTING. PROVIDE ALL NECESSARY MOUNTING HARDWARE, BUS JUMPERS, ETC AS REQUIRED. MODIFY PANEL COVER AS REQUIRED. PROVIDE LAMICOID IDENTIFICATION.

NOTE-2:
SUPPLY AND INSTALL NEW 200A/3P BREAKER TO FEED PROPOSED PANEL '1K01'. BREAKER TYPE TO MATCH EXISTING. PROVIDE ALL NECESSARY MOUNTING HARDWARE, BUS JUMPERS, ETC AS REQUIRED. MODIFY PANEL COVER AS AS REQUIRED. PROVIDE LAMICOID IDENTIFICATION.

NOTE-3:
SUPPLY AND INSTALL NEW SIZE 1 WRAPPER FOR 2HP EXHAUST FAN EF-11. WRAPPER TO MATCH EXISTING SIEMENS EQUIPMENT.

3 EP601 — PARTIAL POWER RISER DIAGRAM
N.T.S.

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FBM
ARCHITECTURE • INTERIOR DESIGN
HS1-1660 Hollis Street, Halifax, Nova Scotia B3J 1V7
T: (902) 429 4100 architects@fbm.ca fbm.ca

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CONSULTING ENGINEERS
752 BEDFORD HIGHWAY
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SHEET TITLE
ELECTRICAL RISER DETAILS

EP601