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SOLICITATION AMENDMENT
MODIFICATION DE L'INVITATION

The referenced document is hereby revised; unless otherwise indicated, all other terms and conditions of the Solicitation remain the same.

Ce document est par la présente révisé; sauf indication contraire, les modalités de l'invitation demeurent les mêmes.

Comments - Commentaires

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Title - Sujet Rooftop Units and Boiler Replacemen	
Solicitation No. - N° de l'invitation EW038-181808/A	**Amendment No. - N° modif.** 003
Client Reference No. - N° de référence du client CSC EW038-181808	**Date** 2017-12-20
GETS Reference No. - N° de référence de SEAG PW-$PWU-183-11262	
File No. - N° de dossier PWU-7-40185 (183)	**CCC No./N° CCC - FMS No./N° VME**
Solicitation Closes - L'invitation prend fin **at - à 02:00 PM** **on - le 2018-01-02**	**Time Zone** **Fuseau horaire** Mountain Standard Time MST
F.O.B. - F.A.B. **Plant-Usine:** ☐ **Destination:** ☐ **Other-Autre:** ☐	
Address Enquiries to: - Adresser toutes questions à: Tikhonovitch (RPC), Alex	**Buyer Id - Id de l'acheteur** pwu183
Telephone No. - N° de téléphone (780) 901-7940 ( )	**FAX No. - N° de FAX** (780) 497-3510
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Canada

MECHANICAL ADDENDUM NO. TWO

PROJECT:

Pe Sakastew AHU & Boilers Upgrade

JOB #217-13

ENGINEER:

BACZ ENGINEERING INC.

December 18, 2017

1.0 GENERAL

1.1 The following information shall constitute an Addendum to the Specifications and Drawings for the "Pe Sakastew Rooftop AHU & Boilers Replacement"

1.2 This construction shall confirm to the original Drawings and Specifications, unless otherwise stated herein to be revised or deleted.

1.3 This addendum shall become part of the original Contract documents and all items listed below shall be carried out as part of the construction required to complete the project.

2.0 REVISION TO DRAWINGS, SPECIFICATIONS AND PREVIOUSLY ISSUED MECHANICAL ADDENDUM #1:

1. Mechanical Section 235200
   New heating boilers to have minimum thermal efficiency of 85%.

2. Mechanical drawings - Existing Boiler Room layouts
   Exact location of the existing mechanical equipment to be coordinated on site. Existing Boiler Rooms layouts are for reference only and may not exactly represent the actual equipment layout. As an example the existing equipment in the Building E Boiler Room is offset approx. 4ft towards east.

3. Mechanical addendum # 1:
Heating coils serving E-AH1 and E-AH2 to be replaced along with all associated connections.

.4 Mechanical addendum # 1:
Existing condensing units serving E-AH1 to be replaced with new.

.5 Mechanical addendum # 1:
All new indoor ductwork to be painted. Paint to match surrounding wall colour.

.6 Mechanical addendum # 1:
SKM2 to read "Partial Floor Plan – Bldg.C" Refer to the attached SKM-2R.

.7 Mechanical addendum#1:
MAU-1 and EF-1E to be activated by on/off switch complete with Timer (adjustable). Provide control points on BMS.

.8 Mechanical addendum # 1:
Section 14.2 – MAU-2 to serve Building C and to be interlock with EF-1C. Replace any reference to EF-1P in this sub-section with EF-1C. MAU-2 and EF-1C to be activated by on/off switch complete with Timer (adjustable). Provide control points on BMS.
MAU-2 weight to not exceed 1200 Ibs. Structural steel stand to match unit footprint. This contractor to coordinate mounting detail with MAU-2 manufacturer.

.9 Mechanical addendum # 1:
Section 14.3 – shall read Penn Fumex FX12BH or equal.

.10 Mechanical addendum # 1:
Section 13 referencing exhaust fans in Building P shall be revised to section 15.
This section shall be revised as follow:
Exhaust fans EF-1P shall be serving the following rooms: P110, P102. Exhaust fans serving rooms P103 AND P-104 to be deleted. New ceiling mounted exhaust fans EF-2P to be provided for the following rooms: P105, P109 and Resource Centre Study Room. EF-2P to be Penn Zephyr model 8S (or equal), complete with 8" diameter exhaust air ducts to wall caps. Each EF-2P shall have exhaust air capacity of 200 cfm @ .25 in. w.c. external static pressure, fractional hp motor, 120/1/60. Each EF-2P to be interlock with on/off switch complete with timer located close to the entrance door.
Refer to attached sketch SKM4R.

.11 Mechanical addendum # 1:
Propane heaters to be used as a temporary source of heat at Contractors cost.

.12 Mechanical addendum # 1:
Contractor to provide designated laptop in each mechanical room and central computer station in the maintenance office, interlock with BMS.

.13 Mechanical specifications Section 236510:
Existing condensing units voltage to be verified on site. Based on the site observation larger condensers (building E) are 575V/3/60 and smaller units (building P,M &C) are 208/3/60. Contractor to confirm voltage on site.

.14 Existing Air Handling Units to be upgraded:

.1 Bldg. E

- 1x E-AH1 York model AP-170-FS-HC-FF-AB-EE-FF.
- 1x E-AH2 York model AP-105-FS-HC-FF-AB-EE-FF.

.15 Existing Air Handling Units to be replaced:

.1 Bldg. P

- 1 x Eng_A model DJ40, S/A = 4,000 cfm, R/A = 3,500 cfm, heating capacity: 300 MBH, 12/12 fans size, electrical: 575V/3/60, complete with DX cooling coil.

.2 Bldg. M

- 1 x Eng_A model DJ20, S/A = 2,400 cfm, R/A = 2,000 cfm, heating capacity: 120 MBH, 10/10 fans size, electrical: 575V/3/60, complete with DX cooling coil.

.3 Bldg. C

- 2 x Eng_A model DJ20, S/A = 3,400 cfm, R/A = 2,900 cfm, heating capacity: 150 MBH, 12/12 fans size, electrical: 575V/3/60, complete with DX cooling coil.

This contractor to ensure that new rooftop units configuration (supply and return air openings, access doors, filter sections and cooling coil sections match existing rooftop units).

.16 Existing direct fired make-up air units serving Buildings P &M to be re-used along with the associated exhaust fans.

.17 Air handlers and make-up air units to be tied into BMS to show unit on/off status and dirty filter indicator. All new exhaust fans to be tied into BMS c/w on/off status and failure alarm.

.18 Mechanical addendum # 1:
Ground level make-up air units, and condensing units to be provided at Building C by the Contractor, Contractor to provide 4" housekeeping pad and an 8' chain link fence c/w lockable double man doors.

.19 Installation of ducting within Building C to be coordinated with the site to minimize impact to artwork on the building interior walls.

.20 Contractors will be escorted for all project work within the site. All equipment inside the institution perimeter must be locked at all times (eg. storage, job boxes, site trailers, dumpers, portable toilets). The Building M parking lot can be used for a site trailer, storage, lay-down.

.21 Site toilet facilities will not be available for Contractor use.

.22 Condensate drain on Building C roof to be piped to roof drain.

.23 MUA-1 to be installed on sleepers c/w internal vibration isolation.

.24 Amend Specification to include the following sections:
233113 - Ductwork
233400 - Fans
235501 - Direct Fired Units
237313 – Air Handling Units
230930 – EMCS Point Schedule (new equipment)
Delete section 237311.

.25 Mechanical addendum # 1 (section 14.3):
All indoor ductwork to be completed with 1" acoustic insulation. Ductwork to be painted to match existing walls.

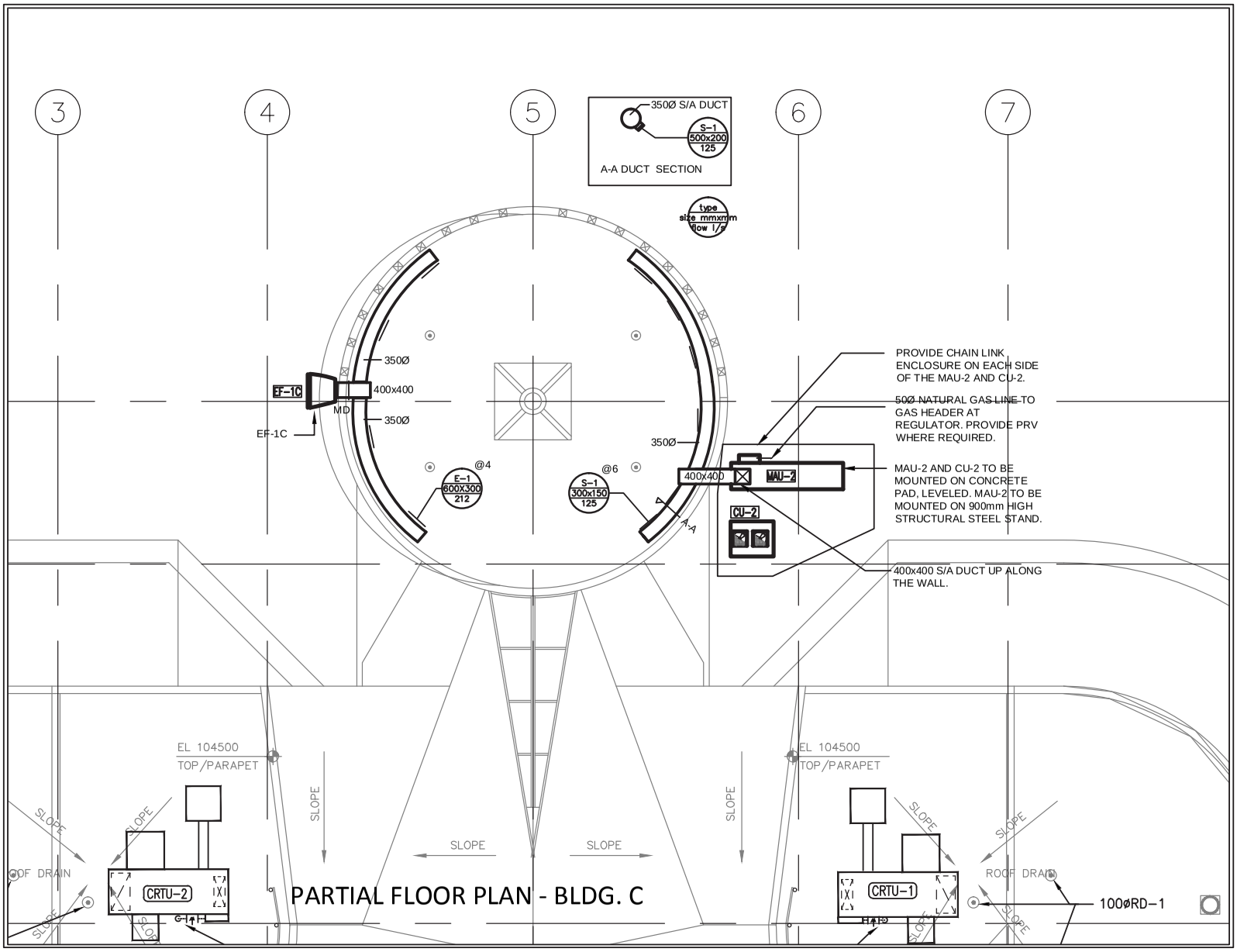
.26 Mechanical addendum # 1 (SKM-4):
Amend SKM4 as per attached sketch SKM4R.

.27 Mechanical addendum # 1(section 4.0)
Referenced specification section 15950 shall read 230923.

.28 Mechanical addendum # 1 (section 13.1 & 13.2):
Mechanical contractor is responsible to carry all electrical cost required to re-connect existing mechanical equipment and provide new electrical connections to the new mechanical equipment as outlined in Addendum #1.

.29 Refer to attached Appendix A for the existing site photographs.

END OF MECHANICAL ADDENDUM NO. TWO



PARTIAL FLOOR PLAN - BLDG. C

PROJECT: PÊ SÂKÂSTÊW CENTRE REPLACEMENT OF ROOFTOP UNITS AND BOILERS

DATE: DEC.18, 2017

JOB NO.: 217-13

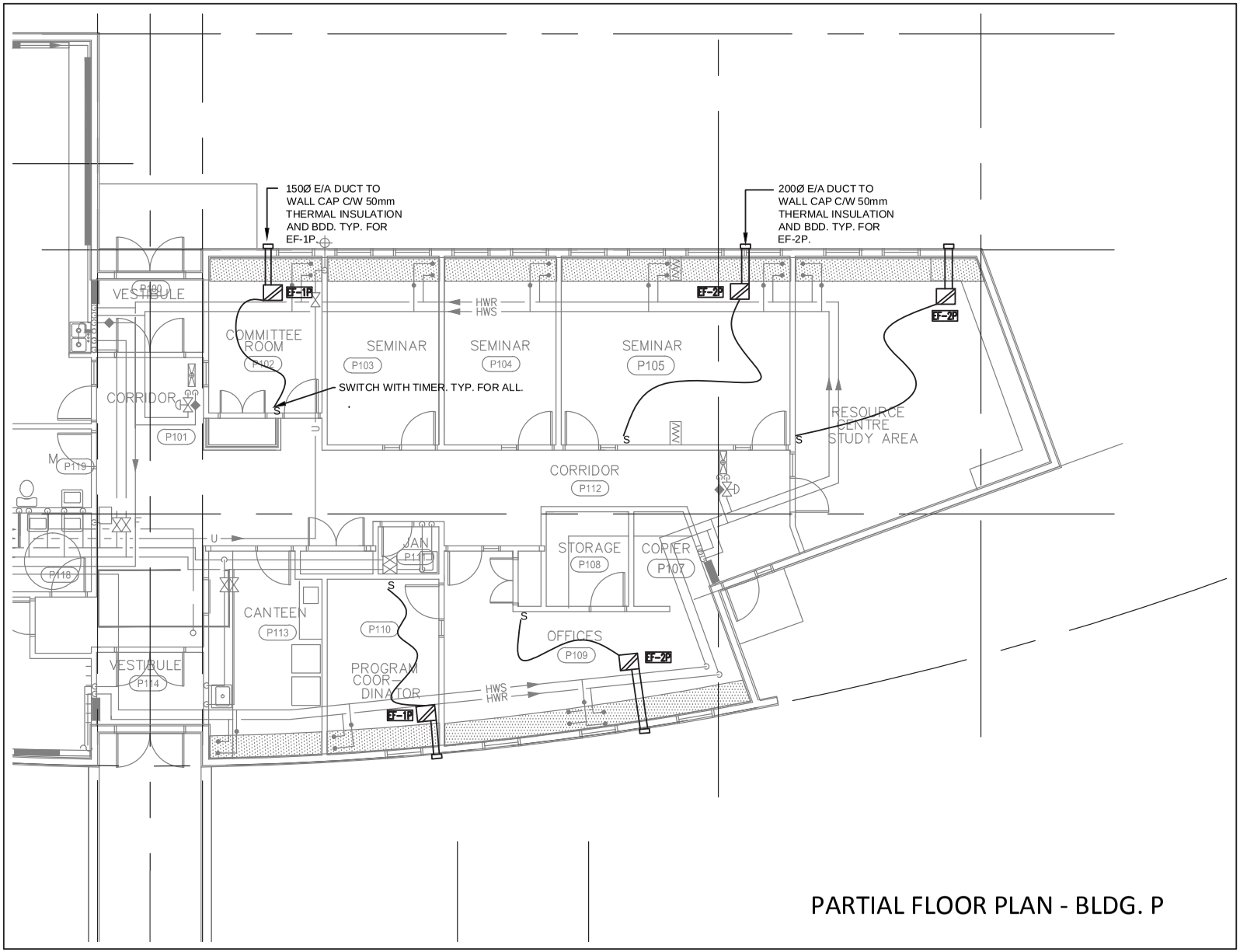
DRAWN BY: SS

SCALE: 1:150

DRAWING NAME: SKM-2R

ISSUE: MECH. ADDENDUM #1

bacz ***ENGINEERING Inc.***, *10567-116 STREET, EDMONTON, ALBERTA, T5H 3L8, TEL:780-428-0243, FAX: 780-426-7895, EMAIL: bacz@caisnet.com*



PARTIAL FLOOR PLAN - BLDG. P

PROJECT: PÊ SÂKÂSTÊW CENTRE REPLACEMENT OF ROOFTOP UNITS AND BOILERS

DATE: DEC.18, 2017

JOB NO.: 217-13

DRAWN BY: SS

SCALE: 1:150

DRAWING NAME: SKM-4R

ISSUE: MECH. ADDENDUM #2

bacz ***ENGINEERING Inc.***, *10567-116 STREET, EDMONTON, ALBERTA, T5H 3L8, TEL:780-428-0243, FAX: 780-426-7895, EMAIL: bacz@caisnet.com*

ENERGY MANAGEMENT CONTROL SYSTEM — POINT DATABASE SCHEDULE														
System: MAU-1				**Digital**				**Analog**						
Point Type		**SYSTEM**	**POINT**	**OUTPUT**	**NORMAL**	**INPUT**	**ALARM**	**OUTPUT**	**FAIL**	**INPUT**	**Alarm Limits**		**Legend:** **O = Open** **C = Closed** **F = Full Pressure** **Z = Zero Pressure**	**NOTES**
POINT DESCRIPTION					**O/C**				**F/Z**		**L**	**H**	**Remarks**	
Supply Air Temperature										X				
Supply Fan Start / Stop				X										
Supply Fan Status						X	X							
Heating Enable				X										
Exhaust Fan Status						X								
Exhaust Fan Interlock				X										

ENERGY MANAGEMENT CONTROL SYSTEM — POINT DATABASE SCHEDULE														
System: MAU-2				**Digital**				**Analog**						
Point Type		**SYSTEM**	**POINT**	**OUTPUT**	**NORMAL**	**INPUT**	**ALARM**	**OUTPUT**	**FAIL**	**INPUT**	**Alarm Limits**		**Legend:** **O = Open** **C = Closed** **F = Full Pressure** **Z = Zero Pressure**	**NOTES**
POINT DESCRIPTION					**O/C**				**F/Z**		**L**	**H**	**Remarks**	
Supply Air Temperature										X				
Supply Fan Start / Stop				X										
Supply Fan Status						X	X							
Heating Enable				X										
Exhaust Fan Status						X								
Exhaust Fan Interlock				X										

1. General

1.1 REFERENCE DOCUMENTS

.1 American Society for Testing and Materials (ASTM):

.1	ASTM A653/A653M-09	Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process

.2 National Fire Protection Association (NFPA):

.1	NFPA 90A-2009	Standard for the Installation of Air Conditioning and Ventilation Systems
.2	NFPA 90B-2009	Standard for the Installation of Warm Air Heating and Air Conditioning Systems

.3 Model National Energy Building Code of Canada for Buildings, 1997

.4 Sheet Metal and Air Conditioning National Contractors Association (SMACNA):

.1 SMACNA IAQ Guideline for Occupied Building Under Construction

.5 South Coast Air Quality Management District, California State (SCAQMD):

.1 SCAQMD Rule 1168, Adhesive and Sealant Applications

1.2 ALTERNATIVES

.1 Size round ducts installed in place of rectangular ducts indicated from ASHRAE table of equivalent rectangular and round ducts. No variation of duct configuration of sizes permitted except by written permission.

1.3 DEFINITIONS

.1 Low Pressure: Static pressure in duct less than 0.5 kPa and velocities less than 10 m/s.

.2 Medium Pressure: Static pressure in duct less than 1.5 kPa and velocities greater than 10 m/s.

.3 High Pressure: Static pressure over 1.5 kPa and less than 2.5 kPa and velocities greater than 10 m/s.

.4 Duct Sizes: Inside clear dimensions. For acoustically lined or internally insulated ducts, maintain sizes inside ducts.

1.4 SUBMITTALS

.1 Shop Drawings:

.1 Submit shop drawings and samples of duct fittings for approval, including particulars such as thicknesses, welds and configurations prior to start of work.

.2 Submit shop drawings for fibrous glass ducts including manufacturers fabrication and installation manual.

.2 Submit written inspection report of manufacturers acceptance of fabrication and installation of fibrous glass ductwork. Confirm ductwork has been fabricated and installed in accordance with recommendations and SMACNA standards. Inspection shall occur at beginning of installation.

1.5 QUALITY ASSURANCE

.1 Ductwork shall meet the requirements of NFPA 90A, Air Conditioning and Ventilating Systems, NFPA No. 90B, Standard for the Installation of Warm Air Heating and Air Conditioning Systems.

.2 Fabricate in accordance with SMACNA duct manuals and ASHRAE handbooks.

2. Products

2.1 MATERIALS

.1 Ducts: Galvanized steel lock forming quality, having galvanized coating to ASTM A653M, G90 designation for both sides.

.2 Fasteners: Use rivets and bolts throughout; sheet metal screws accepted on low pressure ducts.

.3 Sealant: Water resistant, fire resistive, compatible with mating materials.

2.2 FABRICATION

.1 Complete metal ducts with themselves with no single partition between ducts. Where width of duct exceeds 450 mm cross break for rigidity. Open corners are not acceptable.

.2 Lap metal ducts in direction of air flow. Hammer down edges and slips to leave smooth duct interior.

.3 Construct tees, bends, and elbows with radius of not less than 1 1/2 times width of duct on centre line. Where not possible and where rectangular elbows used, provide approved type air foil turning vanes. Where acoustical lining is provided, provide turning vanes of perforated metal type with fibreglass inside.

.4 Increase duct sizes gradually, not exceeding 15 degree divergence wherever possible. Maximum divergence upstream of equipment to be 30 degree and 45 degree convergence downstream.

.5 Rigidly construct metal ducts with joints mechanically tight, substantially airtight, braced and stiffened so as not to breathe, rattle, vibrate or sag. Caulk duct joints and connections with sealant as ducts are being assembled.

.6 Provide easements where low pressure ductwork conflicts with piping and structure where easements exceed 10% duct area, split into two ducts maintaining original duct area.

.7 Provide necessary baffling in mixed air plenums to ensure good mixed air temperature with variations of not more than ± 15°C under all operating conditions.

.8 Fabricate continuously welded medium and high pressure round and oval duct fittings of one gauge heavier than gauges indicated for duct size. Joints shall be 100 mm cemented slip joint, brazed or electric welded. Prime coat welded joints. Fabricate elbows of five piece construction. Provide standard 45° take-offs unless otherwise indicated where conical 90° tee take-off connections may be used. Adequately brace with truss couplings or comparison angle flanges with asbestos gaskets bolted at 150 mm centers.

.9 Fabricate plenums and casings to configurations shown on drawings. Construct plenums of galvanized panels joined standing seams on outside of casing riveted or bolted on approximately 300 mm centers. Reinforce with suitable angles and provide diagonal bracing as required. Tightly fit at apparatus and caulk with sealant.

.10 Provide 75 mm reinforced concrete curb for plenum walls and floor mounted casings. At floor, rivet panels on 200 mm centers to angles. Where floors are acoustically insulated, provide liner at 1.2 mm galvanized expanded metal mesh, turned up 300 mm at sides with sheet metal shields.

.11 Reinforce door frames with angle iron tied to horizontal and vertical plenum supporting angles. Install hinged access doors where shown, specified or where required for access to equipment for cleaning and inspection.

.12 Fabricate acoustic plenums of galvanized steel. Provide 1.6 mm back facing and 0.8 mm perforated front facing with 3 mm diameter holes on 4 mm centers. Construct panels 75 mm thick packed with 72 kg/m^3 minimum fibrous glass media, on inverted channels of 1.6 mm on 75 mm reinforced concrete curb.

.13 Fabricate fibrous glass ducts and fittings by fabrication machine. Make only minor on site manual adjustments. Wipe clean surfaces being joined. Join with heat activated chemical bonding closure strip equal to Johns-Manville ThermLock closure system. Provide at duct support locations, an extra wrapping of closure strip.

.14 Fabricate seams and joints in kitchen exhaust ducts liquid tight with continuous external welds.

3. Execution

3.1 INSTALLATION

.1 Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pivot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

.2 Clean duct systems with high power vacuum machines. Protect equipment which may be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into ductwork for cleaning purposes.

.3 Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

.4 Set plenum doors 150 mm to 300 mm above floor. Arrange door swings so that fan static holds door in closed position.

3.2 LOW PRESSURE DUCT THICKNESSES (MINIMUM)

.1 Rectangular Ducts

Maximum Width	mm
Up to 300 mm	0.6
330 mm to 760 mm	0.8
790 mm to 1370 mm	0.8
1400 mm to 2130 mm	1.0
2160 mm and Over	1.2

.2 Round Ducts

Duct Diameter	mm
Up to 330 mm	0.6
350 mm to 550 mm	0.8
580 mm to 1270 mm	0.8
890 mm to 910 mm	1.0
1300 mm to 1520 mm	1.2
1550 mm to 2130 mm	1.6

3.3 PLENUM GAUGES

.1 Fabricate fan plenums and plenums downstream of fan in accordance with duct gauges.

.2 Fabricate plenums upstream of fan between apparatus of 1.6 mm.

.3 Fabricate plenums upstream of filters of 1.2 mm

END OF SECTION

1. General

1.1 PRODUCT OPTIONS AND SUBSTITUTIONS

.1 Refer to Division 01.

.2 Substitute products shall not decrease motor wattage, increase noise level, increase tip speed by more than 10%, or increase inlet air velocity by more than 20%, from that specified.

1.3 SUBMITTALS

.1 Shop Drawings:

.1 Submit with shop drawings acoustical data and fan curves showing fan performance with fan and system operating point plotted on curves.

1.4 QUALITY ASSURANCE

.1 Conform to AMCA Bulletins regarding construction and testing. Fans shall bear AMCA certified rating seal.

2. Products

2.1 GENERAL

.1 Statically and dynamically balance fans so no objectionable vibration or noise is transmitted to occupied areas of the building.

.2 Provide balanced variable sheaves for motors 10 kW and under and fixed sheave to 15 kW and over.

.3 Fans shall be capable of accommodating static pressure variations of $\pm$10% with no objectionable operating characteristics.

2.2 CENTRIFUGAL FANS

.1 Fabricate with multi-blade wheels in heavy gauge steel housing reinforced for service encountered.

.2 Provide V-belt drives with fan and motor mounted on reinforced, rigid steel base with adjustable motor mount.

.3 Provide heavy duty, self-aligning, anti-friction bearings with external lubrication.

.4 Provide where indicated variable inlet vanes.

.5 Provide access door and drain connection to scroll.

.6 Except for packaged air units, belted vent sets and as otherwise noted, centrifugal fans over 430 mm diameter shall have die formed air foil blades welded to side and back plate.

2.3 ROOF MOUNTED FANS

.1 Provide V-belt drives with fan and motor mounted to main housing through neoprene anti-vibration pads.

.2 Heavy aluminum dome type housings shall be reinforced as necessary on sizes with 500 mm wheel and larger.

.3 Provide with multi-blade, rattle free, backdraft damper with felt lined blade edges, birdscreen, disconnect switch and curb caps.

2.4 BELTED VENT SETS

.1 Comply generally with requirements of centrifugal fans suitable for pressures to 1 kPa

.2 Provide with multi-blade rattle free backdraft damper with felt lined blades edges.

2.5 CEILING EXHAUST FANS

.1 Provide multi-blade, forward curved wheel in steel housing for between stud mounting.

.2 Resiliently mount direct driven fan and motor. Motor shall be plug-in type with permanently lubricated bearings.

.3 Provide one piece aluminum intake grille.

3. Execution

3.1 PERFORMANCE

.1 Fan performance: as per Mechanical Addendums #1&2.

3.2 INSTALLATION

.1 Where inlet or outlet is exposed, provide safety screen.

.2 Provide belt guards on belt driven fans.

.3 Supply and install sheaves as necessary for final air balancing.

.4 Set roof mounted fans on curbs 200 mm minimum above roof. Provide acoustic insulation on duct to below roof line and on fan inlet plenum, and drip pan for collecting condensation.

3.3 PRIMING

.1 Prime coat fan wheels and housing factory inside and outside. Prime coating on aluminum parts is not required.

END OF SECTION

1. General

1.2 SUBMITTALS

.1 Product Data:

.1 Submit manufacturer's product data.

.1 Submit copies of manufacturer's product literature, specifications and datasheets.

1.3 QUALITY ASSURANCE

.1 Comply with local and Provincial Regulations and have CSA approval.

.2 Factory test to check construction, controls and operation of unit and provide certification.

.3 Operationally test after installation.

2. Products

2.1 GENERAL CONSTRUCTION

.1 Construct heater casing and components of 1.3 mm steel panels, reinforced with structural angles and channels to ensure rigidity under normal handling. Provide access panels to burner and blower motor assemblies from either side of unit.

.2 Locate observation port on burner section for observing main and pilot flames.

.3 Insulate complete unit with 25 mm neoprene faced fibrous glass insulation.

.4 Finish casing and components with heat resistant baked enamel.

.5 For suspended installations, provide service platforms complete with handrails and access ladder.

.6 For outdoor installation, provide weatherproofed casing with intake louver or hood.

2.2 FILTERS

.1 Provide filter section complete with removable 25 mm thick fibrous glass disposable filters in metal frames.

2.3 BURNER

.1 Provide raw gas burner suitable for natural gas and capable of modulating turn down ratio of 25:1. Burner assembly and gas piping arrangement to include electric modulating main gas valve, motorized shutdown valve, main and pilot gas regulators, pilot electric gas valve, manual shut-off valve, and pilot adjustment valve.

.2 Furnish gas burner with electrically ignited supervised pilot. Pilot automatically ignited by spark rod through high voltage ignition transformer.

.3 Provide motorized damper complete with end switch to prove position before burner will fire.

2.4 FAN

.1 Provide statically and dynamically balanced centrifugal fan mounted on solid steel shaft with heavy duty self-aligning pre-lubricated ball bearings and V-belt drive with matching motor sheaves and belts.

2.5 CONTROLS

.1 Pre-wire unit completely so connection of power supply and field wiring from unit to remote control panel shall make unit operative.

.2 Remote control panel shall contain on-off ,auto switch , indicating lights for supply fan, pilot operation, burner operation, clogged filter indication.

.3 Interlock unit to start when exhaust fan is running. Interlock burner to operate when flow switch located in exhaust duct proves flow.

.4 Fan discharge thermostat shall control modulating gas valve to maintain supply air temperature.

.5 Provide time clock to operate fan system.

.6 Provide safety controls to provide correct air flow before energizing pilot and to sense pilot ignition before activating main gas valve.

.7 Provide manual reset low and high limit controls to maintain supply air temperature between set points and shut fan down if temperatures are exceeded.

.8 Provide purge period timer to delay burner ignition and automatically bypass low limit control.

2.6 REFRIGERATION PACKAGE

.1 Evaporator Coil: Copper tube aluminum fin coil assembly with galvanized drain pan and expansion valve.

.2 Compressor: Hermetic, 3600 r/min maximum resiliently mounted with positive lubrication, crankcase heater, high pressure control, motor overload protection, service valves and drier.

.3 Condenser: Aluminum fin and copper tube coil, direct drive axial fan resiliently mounted, galvanized fan guard.

.4 Operating Controls: Low voltage, adjustable room thermostat controls compressor, condenser fan and supply fan to maintain room temperature setting.

.5 Capacity: As per mechanical Addendum #1 & 2.

3. Execution

3.1 PERFORMANCE

.1 As per mechanical Addendum #1 & 2.

END OF SECTION

1. General

1.1 REFERENCES

.1 American National Standards Institute/National Fire Prevention Association (ANSI/NFPA)

.1 ANSI/NFPA-90A-1999, Standard for the Installation of Air Conditioning and Ventilating Systems.

.2 Canadian General Standards Board (CGSB)

.1 CGSB 1-GP-181M-99, Ready-Mixed Organic Zinc-Rich Coating.

.3 Sheet Metal and Air-Conditioning Contractors' National Association (SMACNA)

1.2 SHOP DRAWINGS AND PRODUCT DATA

.1 Product Data:

.1 Submit manufacturer's instructions, printed product literature and data sheets for insulation, filters, adhesives, and paints and include product characteristics, performance criteria, physical size, finish and limitations.

.2 Shop Drawings:

.1 Indicate on drawings: fan curves showing point of operation, motor drive bearings, filters, mixing box, dampers and coil; include performance data.

1.3 CLOSEOUT SUBMITTALS

.3 Operation and Maintenance Data: submit operation and maintenance data for air handling equipment for incorporation into manual.

.4 Include following: fan, bearings, motor, damper, air volume total cooling sensible cooling, EDB, EWB, OAT.

1.4 MAINTENANCE MATERIAL SUBMITTALS

.1 Provide 1 spare sets of filters.

.2 Provide list of individual manufacturer’s recommended spare parts for equipment such as bearings and seals, and addresses of suppliers, together with list of specialized tools necessary for adjusting, repairing or replacing, for placement into operating manual.

1.5 DELIVERY, STORAGE AND HANDLING

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

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

.5 Storage and Handling Requirements:

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

.2 Store and protect air handling equipment from nicks, scratches, and blemishes.

.3 Replace defective or damaged materials with new.

1.6 EXTRA MATERIALS

.4 Furnish list of individual manufacturer's recommended spare parts for equipment such as bearings and seals, and addresses of suppliers, together with list of specialized tools necessary for adjusting, repairing or replacing, for placement into operating manual.

2. Products

2.1 AIR HANDLING UNITS

.1 Air Handling Units shall be built to the level of quality as herein specified and to match existing units on site. Units configuration, footprint and details to be coordinated with the existing replacement equipment on site, prior to shop drawings submission.

.2 Unless stated otherwise, air handling units are to be shipped to the job in one piece, factory assembled. All equipment shall be factory tested prior to shipment.

.3 The Air Handling Units shall be the product of a Canadian owned firm, built in Canada, with all components made in Canada, where possible. The air handling units and major components shall be products of manufacturers regularly engaged in the production of such equipment and with a minimum of fifteen continuous years of proven production experience.

.4 Air Handling Units shall be as shown on mechanical plans, suitable for outdoor installation and to match existing roof curbs.

2.2 UNIT CONSTRUCTION

.1 Unit casing shall be of minimum 18 (1.3mm) gauge satin coat galvanized sheet metal. Surfaces shall be cleaned with a degreasing solvent to remove oil and metal oxides and primed with a two part acid based etching primer. Finish coat shall be electrostatically applied enamel. to all exposed surfaces. All unprotected metal and welds shall be factory coated.

.2 All walls, roofs and floors shall be of formed construction, with at least two breaks at each joint. Joints shall be secured by sheet metal screws or pop rivets. Wall and floor joints shall be broken in and roof joints broken out (exposed) for rigidity. All joints shall be caulked with a water resistant sealant.

.3 The full height and length of the unit body shall be provided with a 22 gauge (.85mm) solid galvanized metal liner over 2" 1.5 lb./cu.ft. Insulation.

.4 Units shall be provided with access doors to the following components:

- Fans and Motors
- Filters
- Dampers and Operators (on both sides)

.5 Access Doors shall be large enough for easy access. Removal of screwed wall panels will not be acceptable.

.6 Provide lift out access doors, secured with two or more cam lock fasteners.

.7 Provide hinged access door, fully lined, and with zinc plated piano hinges and brass pins, with a minimum of two cams lock fasteners for filter section only.

.8 Casings shall be supported on formed galvanized steel channel or structural channel supports, designed and welded for low deflections. Integral lifting lugs shall be provided for hoisting.

.9 All units shall be internally insulated with 50mm thick 24 kg. /cu.m. Density, neoprene coated fibre glass thermal insulation secured to metal panels with a fire retardant adhesive and welded steel pins at 400mm o/c. All longitudinal insulation joints and butt ends shall be covered by a sheet metal break to prevent erosion of exposed edges. Drain pans and all floor areas shall be insulated on the underside. Perforated metal liner shall be applied to the insulation.

2.3 FANS

.1 Centrifugal fans shall be rated in accordance with AMCA Standard Test Code, Bulletin 210. Fan manufacturer shall be a member of AMCA. All fans and fan assemblies shall be dynamically balanced during factory test run. Fan shafts shall be selected for stable operation at least 20% below the first critical RPM. Fan shafts shall be provided with a rust inhibiting coating.

.2 All forward curved fan assemblies shall be equipped with grease able pillow block bearings, supported on a rigid structural steel frame. Ensure that grease nipples that are difficult to access must have extended grease fittings.

.3 The ratio of blast area to nominal outlet area for forward curved fans shall be 60% or greater.

.4 Drives shall be adjustable on fans with motors 5 HP (3.73 kW) or smaller. On fans with larger motors, fixed drives shall be provided. All drives shall be provided with a rust inhibiting

coating. The air balancer shall provide for drive changes (if required) during the air balance procedure.

.5 Motor, fan bearings and drive assembly shall be located inside the fan plenum to minimize bearing wear and to allow for internal vibration isolation of the fan-motor assembly, where required. Motor mounting shall be adjustable to allow for variations in belt tension.

.6 Fan-motor assemblies shall be provided with vibration isolators. Isolators shall be bolted to steel channel welded to unit floor which is welded to the structural frame of the unit. The isolators shall be neoprene-in-shear type for single 15" (380mm) forward curve fans. Fans shall be attached to the discharge panel by a heavy glass fabric, neoprene impregnated, with a double locking fabric to metal connection.

7. Fan motors shall be open drip proof, ODP high efficiency.

2.4 GAS HEAT SECTION

.1 Heating units shall have an indirect natural gas fired heating section that is C.G.A. approved for both sea level and high altitude areas.

.2 Heat exchanger shall be a primary drum and multi-tube secondary assembly constructed of titanium stainless steel with multi-plane metal turbulators, and shall be of a floating stress relieved design. Heat exchanger shall be provided with condensate drain connection. Ensure that this drain is piped to floor drain.

.3 The burner assembly shall be a blow through positive pressure type with a fully modulating discharge and proportional combustion air control system to provide a high seasonal efficiency. Flame surveillance shall be with a solid state programmed flame relay c/w flame red. The burner and gas train shall be in a cabinet enclosure. Insulation in the burner section shall be covered by a heat reflective galvanized steel liner. Atmospheric burners or burners requiring power assisted venting are not acceptable.

.4 Operating natural gas pressure shall be 750 Pa.

.5 Installation and venting provisions must be in accordance with C.G.A. Standard B149.1 - M86, or latest edition.

.6 Gas fired units shall be approved for operation in -40^{o} F locations.

2.5 FILTERS

.1 Filter sections shall be provided with adequately sized access doors to allow easy removal of filters. Filter removal shall be from one side as noted on the drawings.

.2 For units with filter banks 1825mm high or less, the filter modules shall be designed to slide out of the unit. Side removal 50mm filters shall slide into a formed metal track, sealing against metal spacers at each end of the track.

.3 50mm Replaceable Media Filters: Disposable glass fibre media type enclosed in permanent cardboard frames, 2 inches.

.4 All filter media shall meet U.L. Class 2 standards for flame spread and smoke development as noted in the schedule.

2.6 DIRECT EXPANSION REFRIGERANT COILS

.1 Serpentine type, Straight tube type arranged to prevent trapping of oil.

.1 Liquid distributors to ensure even distribution of liquid refrigerant to all circuits.

.1 Silver solder or braze joints in refrigerant tubing.

.2 Evacuate and charge coil with nitrogen and seal before sending to site.

.2 Tubes: copper.

.3 Fins: copper or aluminum plate.

.4 Headers: copper.

.5 Pressure tests: to Canadian Refrigeration Code. Dehydrated. Sealed with nitrogen charge.

2.7 DAMPERS

.1 Damper frames shall be hat-shaped galvanized metal sections securely screwed or welded to the air handling unit chassis. Pivot rods of 13mm high-grade carbon steel, cadmium plated, shall turn in bronze bushings, fabricated from self-oiling bronze. Rods shall be secured to the blade by means of straps and set screws.

.2 Blades shall be 18 gauge (1.3mm) galvanized metal with two breaks on each edge and three breaks on centreline for rigidity. The pivot rad shall "nest" in the centreline break. Damper edges shall interlock. Maximum length of damper between supports shall be 1070mm.

.3 Damper linkage brackets shall be 16 gauge (1.6mm) cadmium plated steel with bronze bushings, and shall be self aligning to prevent binding.

.4 Damper blade ends shall be sealed with an adhesive backed foamed polyurethane gasketing. Damper blades exposed to outside air shall be sealed with an adhesive backed foamed polyurethane gasketing on all interlocking edges.

.5 Mixing dampers shall be parallel blade type.

2.8 PRE-WIRED EQUIPMENT AND FACTORY INSTALLED CONTROLS

.1 Air handling units shall be factory wired and tested, and shall be certified by C.G.A., with C.S.A., approved components.

.2 Wiring shall be in accordance with the Canadian Electrical Code, Part 1, and pertinent sections of Part 2 of the Code pertaining to specific equipment type and purpose.

.3 All electrical circuits shall undergo a dielectric strength test (CSA C22.2-0), and shall be factory tested and checked as to proper function.

.4 Pre-wired air handling units shall bear an approved bilingual label with all the necessary identification marks, electrical data, and any necessary cautions as required by the Canadian Electrical Code, Part 2.

.5 Provide a system of motor control, including all necessary terminal blocks, motor contactors, and motor overload protection, grounding lugs, control transformers, auxiliary contactors and terminals for the connection of external control devices or relays. Gas fired units shall also include high limit and combustion air
flow switch.

.6 Automatic controls shall be housed in a control panel mounted in or on the air handling unit, which will meet the C.S.A. standard of the specific installation.

.7 Purge System: The unit shall be provided with a purge system to allow a percentage of outdoor air to sweep through the exhaust air sector, to eliminate the possibility of exhaust air to the supply air.

2.9 CONTROLS

.1 Electronic control complete with solid state analyzer and discharge thermostat to maintain set point discharge air temperature and provide rapid response to small changes in discharge air temperature, incorporating:

.1 Modulating gas valve and constant combustion air complete with room override thermostat and metal guard. Supply and Return blowers shall be interlocked and run continuously.

.2 Provide discharge set point adjustment (set at 16 degrees C in integral control panel).

.3 Provide modulating damper section motor complete with T991A mixed air temperature controller.

.4 Unit to be supplied with BacNet compatible controls.

.5 Air handling unit controls to be open and integratible with the BAS systems.

3. Execution

3.1 ASSEMBLY

.1 Assemble low and medium pressure units by bolting sections together to make single unit.

.2 Assemble high pressure units by bolting sections together except for fan section. Isolate fan section with flexible duct connections.

.3 Install unit on vibration isolators, as per manufacturer requirements.

3.2 PERFORMANCE

.1 To match existing air handling units.

.2 E-AHU1

.4 E-CC1: 10 ton nominal cooling, dual circuit to match E-CU1.

.5 E-CC2: 10 ton nominal cooling, dual circuit to match E-CU2.

.6 C-RTU1: 1,605 L/s supply air at 125 PA ESP with 1,369 L/s return air. Input: 44 kW natural gas. Provide nominal cooling DX cooling coil capacity of 7.5 tons. Electrical to match existing.

.7 C-RTU2: 1,605 L/s supply air at 125 PA ESP with 1,369 L/s return air. Input: 44 kW natural gas. Provide nominal cooling DX cooling coil capacity of 7.5 tons. Electrical to match existing.

.8 M-RTU1: 1,133 L/s supply air at 249 PA ESP with 944 L/s return air. Input: 31 kW natural gas. Provide nominal cooling DX cooling coil capacity of 5 tons. Electrical to match existing.

.9 P-RTU1: 1,888 L/s supply air at 186 PA ESP with 1,652 L/s return air. Input: 88 kW natural gas. Provide nominal cooling DX cooling coil capacity of 7.5 tons. Electrical to match existing.

END OF SECTION

Pe Sakastew AHU & Boilers Upgrade – Mechanical Addendum #2 – APPENDIX A - BLDG. C

C-B1 & C-B2

EXISTING BOILERS VENTING

EXISTING PUMPS

C-RTU1

CEREMONIAL ROOM - OUTSIDE

CEREMONIAL ROOM - INSIDE

EXISTING CONDESER SERVIBNG C-RTU1

CEREMONIAL ROOM - INSIDE

Pe Sakastew AHU & Boilers Upgrade – Mechanical Addendum #2 – APPENDIX A - BLDG. E

E-AH1

E-AH1

E-AH1

E-AH1

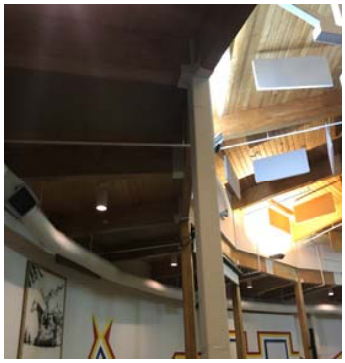
E-AH2

E-CU2

E-CU2

ROOF OVER MECH. ROOM

EXISTING DUCTWORK



Pe Sakastew AHU & Boilers Upgrade – Mechanical Addendum #2 – APPENDIX A - BLDG. E

E-B1 & E-B2

EXIST. BMS

EXISTING VENTING

EXISTING PUMPS

EXISTING PANELS

INCOMING WATER SERVICE

Pe Sakastew AHU & Boilers Upgrade – Mechanical Addendum #2 – APPENDIX A - BLDG. P&M

BOILER PLANT – BLDG.M

BOILERS BREECHING – BLDG.M

M-RTU1

C-RTU1

BOILER PLANT – BLDG.P

BOILERS BREECHING – BLDG.P

P-RTU1

P-CU1