Group2
Architecture
Interior Design

Addendum No. 03

Drumheller Aquaplex Mechanical Upgrades

June 26, 2023
File No. 000c-1309-22

Group2
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general@group2.ca

This addendum forms part of, and will be included with, bidding documents for this project. No consideration will be given to requests for extra costs as a result of contractor being unfamiliar with this addendum. Acknowledge receipt of addendum in space provided in submitted tender.

1. Architectural

1.1 Specifications

.1 Section 01 21 00 – Allowances

.1 ADD Section 01 21 00 Allowances in its entirety. (3 pages)

2. Mechanical

.1 Refer to attached Mechanical Addendum M-02. (41 Pages)

3. Clarifications

.1 Painting scope – is new duct work to be painted?

.1 Painting is only required for piping in the mechanical room and for any wall/ceiling surfaces patched as a result of the work in finished areas only.

.2 Is AHU pre-purchased?

.1 The Owner has pre-purchased the AHU to expedite delivery to ensure that the unit is on site for the Aquaplex facility shutdown in September. Unit is expected to be shipped to site August 15, 2023. Engineered Air Contact is Kevin Whitehead. For warranty purposes the value of AHU-1 is $64,250.00. Refer to paragraph 1.16.4 in Section 01 10 00 Summary of Work regarding Contractor's responsibilities for Owner supplied products. As noted at the walkthrough the AHU is required to come through the existing double doors. Reviewed shop drawings are provided with this Addendum. (8 pages)

.3 Can a lift be operated on the pool deck?

.1 Lift can be used on pool deck as long as floor protection (plywood) is placed over pool deck. Contractor will be responsible for any damage to pool deck.

.4 Is abatement required?

.1 Abatement is not expected / required. Refer to paragraph 1.6 section 01 41 00 Regulatory Requirements regarding hazardous material discovery.

Addendum Pages: 1
Total Attached Pages: 52
Total Pages This Addendum: 53

End of Addendum

Part 1 General

1.1 SECTION INCLUDES

.1 Cash allowances.

.2 Inspection and testing allowances.

1.2 RELATED SECTIONS

.1 Section 01 29 00: Payment Procedures.

.2 Section 01 62 00: Product Exchange Procedures.

.3 Division 21-23: General Mechanical Provisions: Mechanical Cash Allowances.

.4 Division 25-28: General Electrical Provisions: Electrical Cash Allowances.

1.3 CASH ALLOWANCES - GENERAL

.1 Refer to Article GC 4.1 Cash Allowances, of the General Conditions of the Stipulated Price Contract.

.2 Mechanical Cash Allowances shall be administered, coordinated and included in the Prime Mechanical price to the Contractor. Refer to Division 21-23 for list of Mechanical Cash Allowances.

.3 Electrical Cash Allowances shall be administered, coordinated and included in the Prime Electrical price to the Contractor. Refer to Division 25-28 for list of Electrical Cash Allowances.

.4 Consultant Responsibilities:

- .1 Consult with Contractor for consideration and selection of Products, suppliers, and installers.
- .2 Owner and Consultant to select Products.
- .3 Prepare Proposed Change Notice (PCN) and Change Order.

.5 Contractor Responsibilities:

- .1 Assist Consultant in selection of Products, suppliers and installers.
- .2 Obtain proposals from suppliers and installers and offer recommendations.
- .3 On notification of selection by Consultant or Owner, execute purchase agreement with designated supplier and installer.
- .4 Notify Consultant in writing of any effect anticipated by selected product or supplier under consideration on: Construction schedule and Contract amount.
- .5 Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
- .6 Promptly inspect Products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

1.4 EXPENDITURE OF CASH ALLOWANCES

.1 Owner, through Consultant, will provide Contractor with documentation required to permit pricing of a cash allowance item.

.2 Owner, through Consultant, may request Contractor to identify potential Suppliers or Subcontractors, as applicable, and to obtain at least three competitive prices for each cash allowance item. Where a cash allowance includes work that would be most efficiently performed by the Contractor's own forces, provide the Owner with a price proposal for performing own forces work.

.3 Owner, through Consultant, may request the Contractor to disclose originals of all bids, quotations, and other price related information received from potential Suppliers or Subcontractors.

.4 Owner, through Consultant, will determine by whom and for what amount each cash allowance item will be performed. Obtain Owner's prior written approval in the form of a Change Order before entering into a subcontract, amending an existing subcontract, or performing own forces work included in a cash allowance.

.5 When the total maximum amount expended for a cash allowance item is determined, the Contract Price will be adjusted accordingly by change order in accordance with the general conditions of the Contract.

.6 Upon issuance of the Change Order, the Contractor's responsibilities for a cash allowance item shall be the same as for other work of the Contract.

.7 Where expenditure of a cash allowance has been approved by the Owner, the value of completed Work or delivered Products included in the cash allowance may be claimed as part of the Contractor's monthly applications for payment, in accordance with the Contract payment conditions. Cash allowance expenditures claimed must not exceed the maximum expenditure amount authorized by the Owner.

.8 The Owner reserves the right, at its sole discretion, to review and reject any bid deemed to be uncompetitive or unsatisfactory and call, or to have the Contractor call, additional competitive bids from qualified Subcontractors for portions of the Work, to be paid for from cash allowances.

1.5 CASH ALLOWANCES FOR SUPPLY ONLY OF PRODUCTS

.1 Amount of each cash allowance includes:

.1 Cost of Products as invoiced by the Supplier, including delivery and applicable taxes but excluding Value Added Taxes.

.2 Amount of each cash allowance does not include costs of the following items, which costs shall be included in the Contract Price and not in the cash allowance:

.1 Product handling at the site including unloading, uncrating, storage on site, protection of Products from elements and from damage.

.2 Labour costs for installation and finishing, equipment rental and all other related costs.

.3 Overheads and profits, insurance, taxes, bonding if applicable, related to the cash allowance.

.3 Supply Only Cash Allowance Schedule:

.1 **No** supply only cash allowances at this time.

1.6 CASH ALLOWANCES FOR SUPPLY AND INSTALLATION OF PRODUCTS

.1 Amount of each cash allowance includes:

.1 All costs to provide the specified Products, including supply, installation, handling at the site, unloading, uncrating, storage, protection of Products from elements and from damage, labour for installation and finishing, labour costs, taxes, equipment rental.and related costs, excluding Value Added Taxes.

.2 Subcontractor's and sub-Subcontractor's overheads and profits related to the cash allowance.

.2 Amount of each cash allowance does not include Contractor's overhead and profit, insurance, bonding if applicable, and other related costs, which shall be included in the Contract Price and not in the cash allowance.

.3 Supply and Install Cash Allowance Schedule:

.1 Allow the stipulated sum of **$ 30,000.00** for the supply and install of fire smoke dampers.

1.7 CASH ALLOWANCES FOR SERVICES

.1 Amount of each cash allowance includes:

.1 All costs related to the services, excluding Value Added Taxes.

.2 Cost of engaging an inspecting or testing agency; execution of inspecting and tests; and reporting results.

.3 Subcontractor's and sub-Subcontractor's overheads and profits related to the cash allowance.

.2 Amount of each cash allowance does not include the following, which shall be included in the Contract Price and not in the cash allowance.

.1 Contractor's overhead and profit, and other related costs.

.2 Costs of incidental labour and facilities required to assist inspecting or testing agency.

.3 Costs of testing services used by Contractor separate from Contract Document requirements.

.4 Costs of retesting upon failure of previous tests as determined by Consultant.

.3 Payment Procedures:

.1 Submit copy of the inspecting or testing firm's invoice with next application for payment.

.2 Pay invoice on approval by Consultant.

.4 Inspecting and Testing Allowances Schedule:

.1 No Inspection and Testing Allowances at this time.

END OF SECTION

DRAWING TRANSMITTAL SHEET

EngA® ENGINEERED AIR®

JOB NO. **63546(C44703)**

DATE **April 13, 2023**

☑ CALGARY SALES OFFICE
1421 Hastings Cres SE
CALGARY AB
T2G 4C8
(403) 444-4095

CANADIAN HEAD OFFICE
CALGARY AB

CANADIAN FACTORY
CALGARY AB
EDMONTON AB
NEWMARKET ON

OTHER CANADIAN SALES OFFICES
EDMONTON, HALIFAX, HAMILTON, KELOWNA, LONDON, MONCTON, MONTREAL, OTTAWA, REGINA, SASKATOON, SUDBURY, TORONTO, VANCOUVER, WINNIPEG

CONTRACTOR **CONTRACTOR TO BE NAMED**

ADDRESS

AB

ENGINEER **AME GROUP**

JOB NAME **DRUMHELLER AQUAPLEX-MECHANICAL UPGRADE**

☑ THIS ORDER IS SUBJECT TO APPROVAL. MANUFACTURING IS HELD PENDING RETURN OF ONE APPROVED COPY OF THESE FORMS TO THE INDICATED OFFICE.

☐ THIS ORDER IS NOT SUBJECT TO APPROVAL AND IS BEING MANUFACTURED ACCORDING TO THE ATTACHED FORMS.

COPIES ENCLOSED	DESCRIPTION
1	**EngA Submittal Record AHU-1**
1	**EngA Mechanical Drawing 63546M-01-1**
1	**EngA Electrical Data Sheet AHU-1**
1	**EngA Field Wiring Diagram 63546F-01-1**
1	**EngA Installation, Operation and Maintenance Manual (DJ & DG Series)**
1	**EngA Sectional Unit Installation Guidelines**

smp engineering

☒ ELECTRICAL REQUIREMENTS ACCEPTABLE
☐ ELECTRICAL REQUIREMENTS UNACCEPTABLE

THIS SUBMITTAL WAS ONLY REVIEWED FOR ELECTRICAL REQUIREMENTS. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE ELECTRICAL CONTRACTOR ON SITE REGARDING TOLERANCES, CLEARANCES, PROCESSES AND TECHNIQUES OF CONSTRUCTION

SMP PROJECT #: 23-01-0033
REVIEWED BY: CORY BOULET
DATE: 2023/05/09

AME **SHOP DRAWING REVIEW**

BY: Jeff Hill May 1, 2023

PROJECT:
DRUMHELLER AQUAPLEX-MECHANICAL UPGRADE

PROJECT#: 000c-1309-22

☐ REVIEWED
☒ REVIEWED AS MODIFIED
☐ REVISE & RESUBMIT
☐ NOT REVIEWED

COMMENTS:
1- Electrical and Structural consultants to review relevant information.
2-please confirm the opening size listed for the S/A opening has been sized properly.

Reviewed for general design and compliance with contract documents. Dimensions and suitability for the site conditions are the responsibility of the contractor. This review of the drawing shall not relieve the contractor from complying with the conditions of the contract documents. Mechanical contractor shall co-ordinate the electrical characteristics and requirements with the electrical contractor.

Victoria - Vancouver - Calgary
www.AMEgroup.ca

PER **KEVIN WHITEHEAD / LC.**

EngA ENGINEERED AIR

SUBMITTAL RECORD

JOB NAME: DRUMHELLER AQUAPLEX-MECHANICAL UPGRADE **JOB NO:** 63546(C44703)

CUSTOMER: CONTRACTOR TO BE NAMED **ENGINEER:** AME GROUP

EngA MODEL: DJS140/MV **QTY:** 1 **TAG:** AHU-1

SHIPPING AND APPROVAL INFORMATION

MOUNTING Indoor Base Mounted **ACCESS** As Per Drawing

SHIPPING WEIGHT 4700 lb (2132 kg) **OPERATING WEIGHT** 4650 lb (2109 kg)

NO. OF PIECES 4 (Unit in 4 sections)

- Intertek $_{c}$ETL approval.
- Unit operates at the altitude of 0-4500 ft(0-1372 m).
- Refer to mechanical drawing for detailed split unit section weights.
- VFD c/w 3 year warranty

please revise the weight as per comments on page 4

SUPPLY AIR DATA (HIGH / LOW CFM)

AIR FLOW 17,000 / 8,500 ACFM (8,023 / 4,012 l/s) **FAN SIZE** (1) 25/25 FC DIDW

AESP 1.6 in w.c. (398 Pa) **ATSP** 3.14 in w.c. (782 Pa) **RPM** 709

MOTOR SIZE 15 HP (11.19 kW) **TYPE (RPM)** Super 'E' TEFC (1750) **BHP** 13.44 BHP (10.03 kW)

- Supply air fan/motor c/w spring vibration isolation, pillow block bearings, extended grease line from far side bearing to access side and 1 set of spare belt(s).
- Unit mounted ABB adjustable speed drive c/w integral DC link reactors and manual bypass switch. Adjustable speed drive is designed for 8,500 CFM(4,012 l/s) minimum airflow at 30 Hz operating frequency.

AIR OPENING DATA

AIR OPENING	LOCATION	DAMPER TYPE	OPERATION
SUPPLY AIR	Right Side		
RETURN AIR	Top	See Below [1]	Modulating
OUTSIDE AIR	Back	See Below [1]	Modulating

- [1] - TAMCO Series 9000SW Thermally Insulated Low Leakage Aluminum Air-foil Salt Water Parallel Blade

CONSTRUCTION DATA

UNIT CABINET 18 gauge satin coat galvanized sheet metal c/w 1" (25 mm) 1.5 lb/ft³ (24 kg/m³) insulation on entire unit casing.

UNIT FLOOR Satin coat galvanized sheet metal on entire unit floor.

EXTERIOR PAINT Electrostatically applied Alkyd Enamel in Aluminum Gray color on all exterior surface but not including unit underside.

AIRSIDE DOOR All access - hinged c/w lever type door handles

SERVICE DOOR All access - hinged c/w lever type door handles

DRAIN PAN 18 gauge 304 stainless steel drain pan c/w floor drain connection through base frame on mix box section.

- Unit split into 4 Sections. Field wiring is required upon unit assembly. Refer to IOM for details.

ELECTRICAL DATA

CIRCUIT NO	POWER SUPPLY	MINIMUM CIRCUIT AMPACITY	MAXIMUM FUSE(D.E.)	MAXIMUM BREAKER
1	208 / 3 / 60	64.7 AMPS	110 AMPS	110 AMPS
2	120 / 1 / 60	12.0 AMPS	15 AMPS	15 AMPS

- See Electrical Data Sheet for details.
- Unit mounted non fused disconnect switch.
- MCA is based on '46A' rated adjustable speed drive amps and installed supply motor amps is not used .
- (2) marine lights with 10 Watt LED screw in light bulb c/w an on/off switch with indicating light - 120V/1PH/ 60HZ power supply by others.

EngA® ENGINEERED AIR®

SUBMITTAL RECORD

JOB NAME: DRUMHELLER AQUAPLEX-MECHANICAL UPGRADE **JOB NO:** 63546(C44703)

EngA MODEL: DJS140/MV **QTY:** 1 **TAG:** AHU-1

FILTER SECTION DATA - Side Loaded

FILTER TYPE Dafco Pleated Filter with MERV 13 rating c/w Metal Frame

QTY/SIZE 12 - 20 x 25 x 2" (508 x 635 x 51 mm) **QTY/SIZE**

TOTAL GROSS AREA 41.67 SQ.FT. (3.87 SQ. MTRS) **FACE VELOCITY** 408 FPM (2.07 m/s)

- Filters may be shipped loose or mounted in the tracks
- 1 spare set of filters (filter metal frame not included) - shipped loose

BURNER HEATING DATA - INDIRECT FIRED (DJS-140)

POWER BURNER EngA 'HT' Series **HEAT EXCH. MATERIAL** Stainless Steel

FUEL Natural Gas **INLET PRESSURE** 7 in wc. (1743 Pa) **GAS FIELD CONN.** 2" (51 mm)

HEAT INPUT 1,400,000 Btuh (410.20 kW) **HEAT OUTPUT** 1,134,000 Btuh (332.26 kW) **TEMP. RISE** 66.0 °F (36.7 °C)

- EngA (15 : 1) high turndown burner
- Two pass heat exchanger c/w condensate drain connection
- Heat exchanger section has 1"(25 mm) 1.5 lb/ft(24 kg/m³) insulation with 22 gauge solid liner
- Gas manifold c/w auxiliary shutoff valve.
- Heating is controlled by Nexgen Base controller and 0-10VDC signal from BMS (by others)
- Integral low limit auto bypass; set @ 40°F (4.4°C).
- EngA draft hood c/w 10-7/8"(32 mm) outlet connection size.

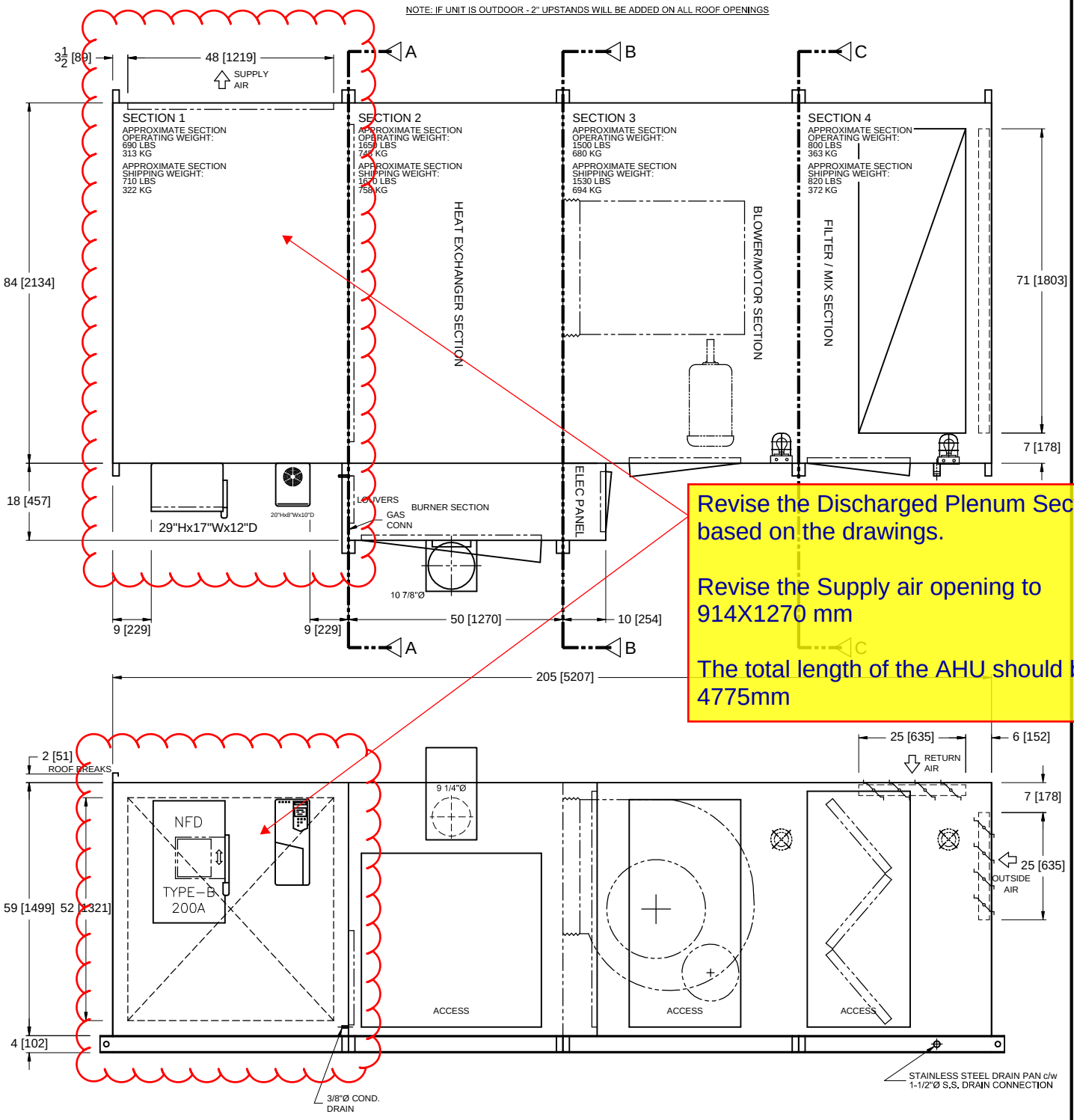
SHIPPED LOOSE ITEMS (See filter section for filters and spare filters)

1 - Draft hood c/w spill switch (See mechanical drawing for details).

1 - 01CT-5LH Discharge Air Sensor

NOTE: AN EXTERIOR ANGLE UP TO 2" MAY BE LOCATED AT THE UNIT CASING SPLITS.
OVERALL UNIT CASING DIMENSION MAY BE UP TO 4" LARGER THAN SHOWN

NOTE: IF UNIT IS OUTDOOR - 2" UPSTANDS WILL BE ADDED ON ALL ROOF OPENINGS



Revise the Discharged Plenum Section based on the drawings.

Revise the Supply air opening to 914X1270 mm

The total length of the AHU should be 4775mm

As per General Notes on M601:

The Approx. opening through the double door is 1700mm H x 1500mm W. The manufacturer will be required to visit the site to verify the opening size and ensure the unit will fit into the Mech. room.

DOOR SIZES AND INTERNAL COMPONENTS ARE APPROX. VALUES. DIMENSIONS SHOWN IN INCHES ONLY UNLESS OTHERWISE NOTED.

63546
TAG: AHU-1

DJS140/MV
INDIRECT FIRED AIR HANDLING UNIT

EngA® ENGINEERED AIR® generated by ProUnit

REVISIONS:			
DATE: APR 06, 2023	DRWN BY: LC	CHKD BY: TDH	DRWG NO.: **63546M-01-1**

EngA® ENGINEERED AIR®

ELECTRICAL DATA

JOB NAME: DRUMHELLER AQUAPLEX-MECHANICAL UPGRADE **JOB NO:** 63546(C44703)

EngA MODEL: DJS140/MV **QTY:** 1 **TAG:** AHU-1

Please specify the model

Circuit No	Power Supply	Minimum Circuit Ampacity	Terminal Block to Accept	Maximum Fuse (Dual Element)	Maximum Breaker
1	208 / 3 / 60	64.7 AMPS	4 Awg	110 AMPS	110 AMPS
2	120 / 1 / 60	12.0 AMPS	14 Awg	15 AMPS	15 AMPS

Components	Circuit No	Model	Minimum Conductor Size	Ampacity FLA / LRA
Motor VFD	1		6 Awg	46.0
120V Control Xfmr	1		14 Awg	7.2
Marine Light Circuit	2		14 Awg	12.0

UNIT CONTROL PANEL(S) SHORT CIRCUIT CURRENT RATING (SCCR)
Short circuit current 5 kA rms symmetrical, 208 V maximum

WIRING DRAWING LEGEND					
APS	Air Proving Switch	DM	Damper Motor	NFD	Non Fused Disconnect
ASF	Auto Fan Switch	FR	Fan Relay	OL	Thermal Overload
AUX	Auxiliary Contact	GND	Ground	PS	Pressure Sensor
BM	Burner Motor	GV	Gas Valve	PV	Pilot Gas Valve
C	Contactor	HL	High Limit	R	Relay
CCH	Compressor Crankcase Heater	HPC	High Pressure Control	RevHL	Reverse Airflow High Limit
CFC	Condenser Fan Control	HR	Heating Relay	TB	Terminal Block
CLC	Compressor Loading Control	IGN	Ignition Control	TDF	Time Delay Fuse
CPM	Compressor Protection Module	ITP	Internal Thermo Protection	TDR	Time Delay Relay
CR	Cooling Relay	LPC	Low Pressure Control	TS	Temperature Sensor
CS	Current Sensor	M	Motor	VFD	Variable Frequency Drive
DHSS	Draft Hood Spill Switch	MV	Main Gas Valve	XFMR	Transformer

JOB NAME: DRUMHELLER AQUAPLEX-MECHANICAL UPGRADE **JOB NO:** 63546(C44703)

EngA MODEL: DJS140/MV **QTY:** 1 **TAG:** AHU-1

UNIT FUNCTION

Unit mounted non-fused disconnect switch 'on', service switch 'on', fire alarm contacts (by others) 'closed' (jumper if not required) , duct high pressure limit (by others) 'closed', VFD fault contact 'closed', .

Unit on/off contact (by others) 'closed', mixbox controlled by 2-10VDC signal from BMS (by others). Blower will delay on and run continuously down to a minimum airflow of 8500 CFM (30 Hz, 50% of maximum airflow). VFD blower/motor speed control via 0-10VDC signal from BMS (by others). The NEXTGEN BASE controller, with a 0-10VDC setpoint signal from BMS (by others), will modulate heating to maintain the required discharge air temperature.

HEAT MODE

NEXTGEN BASE controller will begin modulating the gas heating. The discharge air temperature control band is from 55°F (12.8° C) to 95°F (35°C). .

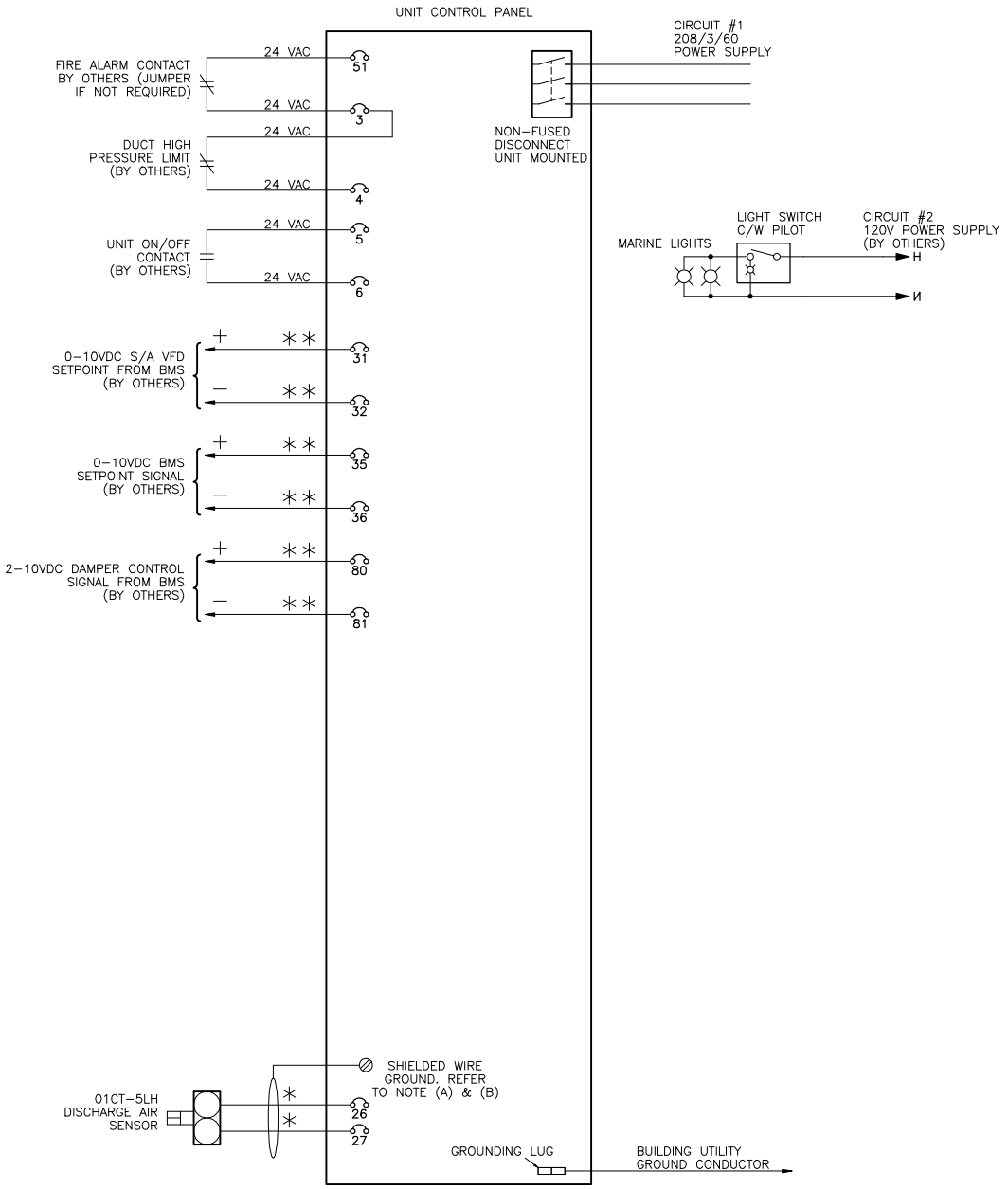
Unit on/off contact (by others) 'open', outside air damper closes, and blower shuts down. Unit is off.

If the fire alarm contacts 'open', equipment operation is disabled immediately. If the discharge air temperature falls below 40° F (4.4° C), the NEXTGEN BASE will shut down the blower, close dampers and indicate alarm.

Note - VFD has an external bypass switch, when activated blower and motor will operate at full speed(60Hz).

Note - Refer to manuals shipped with unit for more detailed explanation of maintenance, components and controls.

Note - Go to http://www.engineeredair.com/index.php/manuals/ for online manual details



MAXIMUM CONTROL CIRCUIT AMPACITY 10.42 AMPS AT 24 VAC

* SHIELDED WIRE IS REQUIRED WITH ELECTRONIC COMPONENTS.

** SHIELDED WIRE IS REQUIRED WITH BMS ANALOG SIGNALS.
TAPE THE GROUND WIRE AND SHIELD TO PREVENT GROUNDING.
TAPE THE ENDS OF ALL UNUSED WIRES.
ANALOG BMS SIGNALS ARE SUBJECT TO GROUND LOOP INTERFERENCE.
SIGNAL ISOLATION MAY BE REQUIRED.
REFER TO THE OPERATION MANUAL OF THE SPECIFIC CONTROLLER.

(A) SHIELDED WIRE TO BE GROUNDED AT MAIN ENG A CONTROL CABINET END ONLY.
TAPE OTHER END OF GROUND WIRE AND SHIELDING TO PREVENT GROUNDING.
TAPE THE ENDS OF ALL UNUSED WIRES.

(B) ENGINEERED AIR STRONGLY RECOMMENDS THAT THE SHIPPED LOOSE DISCHARGE AIR SENSOR BE MOUNTED 5 – 10 FT. DOWN STREAM OF HEAT EXCHANGER OPENING TO AVOID TEMPERATURE SWING CAUSED BY RADIANT HEAT.

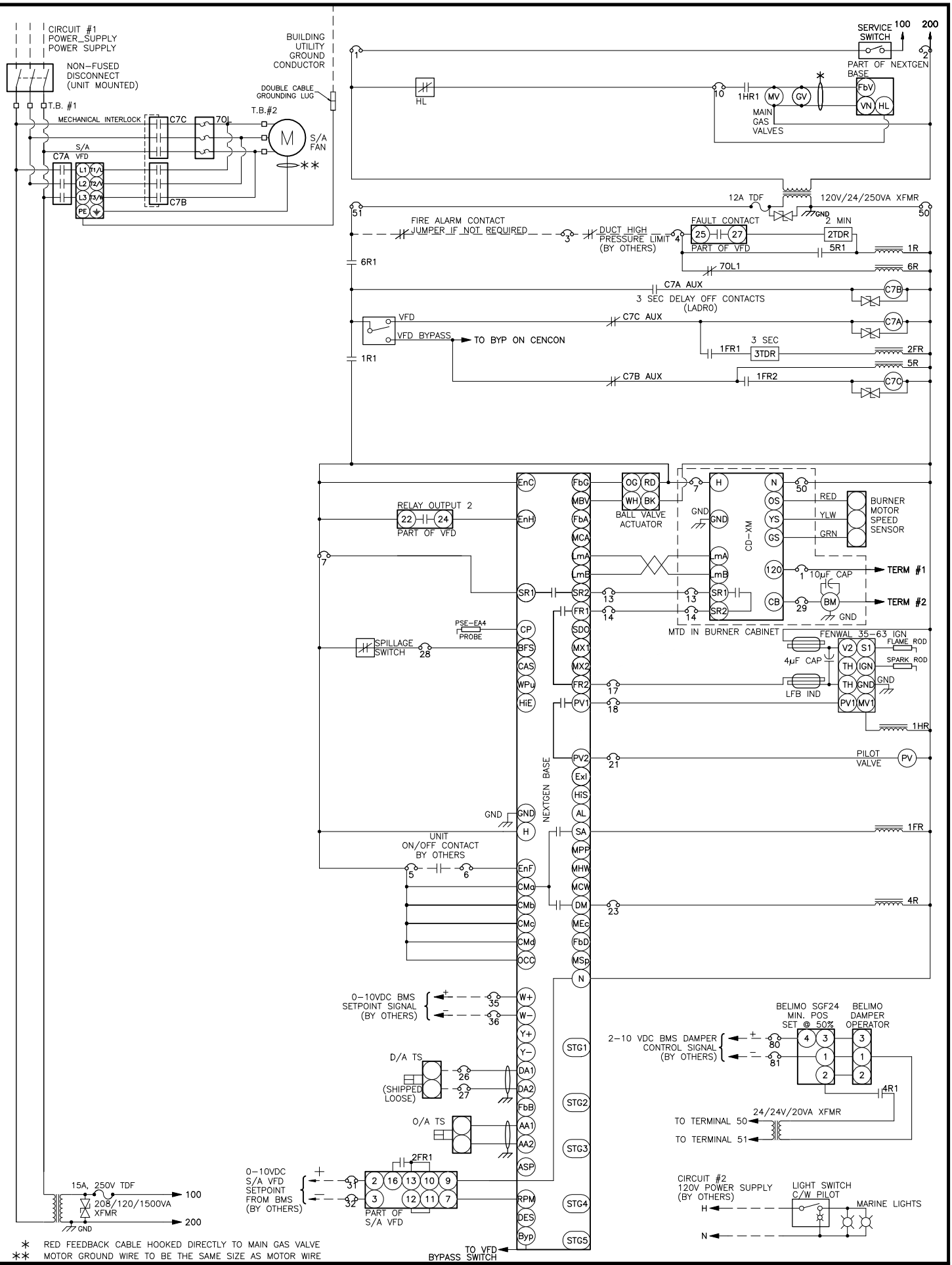
1. FIELD WIRING VOLTAGE DROP NOT TO EXCEED 10%.
2. ALL WIRING SHOWN SHALL BE COMPLETED BY INSTALLER.
3. ALL FIELD WIRING MUST COMPLY WITH ALL NATIONAL AND LOCAL ELECTRICAL CODES.

EngA® ENGINEERED AIR®

TAG: AHU-1

FIELD WIRING DIAGRAM
DJ SERIES

REVISION:	DRN.BY: LC	DWG.NO: 63546F-01-1
DATE: APR 10, 2023	CHKD.BY: TDH	



∗ RED FEEDBACK CABLE HOOKED DIRECTLY TO MAIN GAS VALVE

∗∗ MOTOR GROUND WIRE TO BE THE SAME SIZE AS MOTOR WIRE

EngA® ENGINEERED AIR®

TAG: AHU-1

INTERNAL WIRING DIAGRAM
DJ SERIES

REVISION:	DRN.BY: LC	DWG.NO: 63546E-01-1
DATE: APR 10, 2023	CHKD.BY: TDH	

The following addendum supersedes information contained in drawings and specifications issued for the project to the extent referenced. This Addendum forms part of the Tender Documents and is subject to all of the conditions set out in the contract conditions.

1. DRAWINGS – MECHANICAL

1.1 Drawing No.: M000 Cover Sheet

.1 Revise:

.1 Mechanical drawing list:

.1 Mechanical Details sheet numbers revised to M700 series.

1.2 Drawing No.: M001 Mechanical Drawing List, Legends, and Site Plan

.1 Revise:

.1 Mechanical drawing list:

.1 Mechanical Details sheet numbers revised to M700 series.

1.3 Drawing No.: M002 Mechanical Schedules

.1 Revise:

.1 Boiler schedule:

.1 B-1 and B-2 models revised to Futera III 1000 and Futera III 1250

.2 Fans schedule notes revised. See drawing for details.

.2 Add:

.1 Note #8 added to the boiler schedule

1.4 Drawing No.: M401 Main Floor – HVAC – Renovation Plan

.1 Delete:

.1 Balance damper deleted from R/A duct. See drawing for details.

.2 Revise:

.1 R-1 grille tag revised to include balance damper.

1.5 Drawing No.: M403 Indoor Pool Mech Room – HVAC – Demolition Plan

.1 Add:

.1 Keynote 7 added: demolish existing 250mm combustion air duct

1.6 Drawing No.: M404 Indoor Pool Mech Room – HVAC – Renovation Plan

.1 Add:

.1 Provide new 350x350 combustion air duct complete with cold trap. See drawing for details.

.2 Provide 200mm intake air duct. See 1/M404 for details.

1.7 Drawing No.: M405 Outdoor Pool Mech Room – HVAC – Demolition and Renovation Plan

.1 Add:

.1 Provide 300mm boiler intake duct. See drawing for details.

.2 Revise:

.1 Revise boiler vent size to 250mm

.2 HE-2 note revised to be suspended from the ceiling at high level

1.8 Drawing No.: M501 Indoor Pool Mech Room – Hydronic – Demolition & Renovation Plan

.1 Delete:

.1 Existing decoupling piping deleted. See drawing 1/M501 for details.

.2 Revise:

.1 Revise new decoupling piping. See 2/M501 for details.

1.9 Drawing No.: M502 Outdoor Pool Mech Room – Hydronic – Demolition & Renovation Plan

.1 Revise:

.1 Revise existing piping. See 1/M502 for details.

.2 Revise new piping. See 2/M502 for details.

2. SPECIFICATIONS.:

2.1 Specification No.: 00 00 00 Table of Contents

.1 Delete in its entirety.

.1 Section No. 23 05 48 Vibration and Seismic Control for Mechanical-

2.2 Specification No.: 23 05 01 Acceptable Manufacturers

.1 Revise:

.1 Controls contractor Alberta to read Johnson Controls.

2.3 Specification No.: 23 52 00 Heating Boilers

.1 Replace in its entirety with the attached revised section.

2.4 Specification No.: 25 90 00 Integrated Automation Control Sequences

.1 Replace in its entirety with the attached revised section.

END OF MECHANICAL ADDENDUM NO. 2R1

The following addendum supersedes information contained in drawings and specifications issued for the project to the extent referenced. This Addendum forms part of the Tender Documents and is subject to all of the conditions set out in the contract conditions.

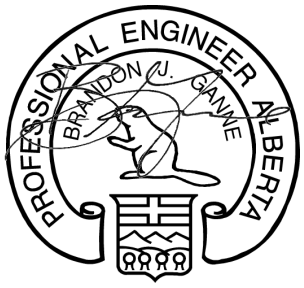
Yours very truly,

The AME Consulting Group Ltd.

Nermeen Aly, B.SC., Mech. Eng

Project Manager - Calgary, AB

Attachment(s): *N/A*



06/23/2023
APEGA ID: 227412

PROFESSIONAL'S SEAL & SIGNATURE

1. GENERAL

1.1 Scope

.1 Boilers, Control and Trim

.2 Hot Water Connections

.3 Fuel Connections

.4 Electrical connections, Controls and Power

.5 Flue, Draft Damper and Flue Stack Connection

1.2 Related Requirements

.1 This section of the Specification forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

.2 Section 01 77 00 Closeout Procedures.

.3 Section 21 05 01 Common Work Results for Mechanical.

.4 Section 23 05 48 Vibration and Seismic Control for Mechanical.

.5 Section 23 51 00 Breeching, Chimneys, and Stacks.

1.3 References

.1 American Boiler Manufacturers Association (ABMA)

.2 ANSI

.1 ANSI Z21.13: Gas-Fired Low Pressure Steam and Hot Water Boilers.

.3 ASME

.1 ASME Boiler and Pressure Vessel Code (BPVC): Section I, Rules for Construction of Power Boilers, High Pressure, High Temperature Water in excess of 160 PSIG/250°F.

.2 ASME BPVC: Section IV, Heating Boilers

.3 ASME BPVC: Section VII-[2017].

.4 ASME CSD-1 [2018], Controls and Safety Devices for Automatically Fired Boilers

.4 CSA Group

.1 CAN1-3.1-[77(R2011)], Industrial and Commercial Gas-Fired Package Boilers.

.2 CSA B51-[14], Boiler, Pressure Vessel, and Pressure Piping Code.

.3 CSA B139-[09], Installation Code for Oil Burning Equipment.

.4 CSA B140.7-05[(R2014)], Oil Burning Equipment: Steam and Hot-Water Boilers.

.5 CSA B149.1-[15], Natural Gas and Propane Installation Code.

.6 ANSI Z21.13-[17]/CSA 4.9-[17], Gas-Fired Low-Pressure Steam and Hot Water Boilers.

.5 Electrical and Electronic Manufacturers Association of Canada (EEMAC)

.6 Underwriters' Laboratories, Inc. (UL) Listed Products

1.4 Action and Informational Submittals

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

.2 Product Data:

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

.3 Shop Drawings:

.1 Submit drawings stamped and signed by professional engineer registered or licensed in Alberat.

.2 Indicate on drawings:

.1 General arrangement showing terminal points, instrumentation test connections.

.2 Clearances for operation, maintenance, servicing, tube cleaning, tube replacement.

.3 Foundations with loadings, anchor bolt arrangements.

.4 Piping hook-ups.

.5 Equipment electrical drawings for power, signal, and control wiring.

.6 Burners and controls.

.7 All miscellaneous equipment, furnished specialties and accessories.

.8 Flame safety control system.

.9 Breeching and stack configuration.

.10 Stack emission continuous monitoring system to measure CO, O, NOx, SO, stack temperature and smoke density of flue gases.

.3 Engineering data to include:

.1 Boiler efficiency at 25%, 50%, 75%, 100%, of design capacity.

.2 Radiant heat loss at 100% design capacity.

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

1.5 Closeout Submittals

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

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

.3 Submit certificate of inspection from ABSA

1.6 Quality Assurance

.1 Boilers to comply with Provincial Regulations and bear the CSA Approval Stamp/Seal.

.2 Boilers shall have Canadian CRN numbers and shall be approved and labelled by the Underwriters Laboratories.

1.7 Maintenance Material Submittals

.1 Extra materials:

.1 Submit maintenance materials in accordance with Section [01 78 00 - Closeout Submittals].

.1 Special tools for burners, access opening, hand holes and Operation and Maintenance.

.2 Spare parts for 1 year of operation.

.3 Spare gaskets.

.4 Spare gauge glass inserts.

.5 Probes and sealants for electronic indication.

.6 Spare burner tips.

.7 Spare burner gun.

.8 Safety valve test gauge.

1.8 Start-Up

.1 Provide the services of a factory trained representative to start up the boiler(s), test the efficiency, and train the operators.

1.9 Warranty

.1 Warranty all electrical components against defects in workmanship and material for a period of one (1) year from date of start-up, and the pressure vessel for a full five (5) years Non Pro-Rated from date of start-up, provided that the unit is installed and operated within the scope of the vessel design and operating capability. Each heater shall be shipped with a complete set of installation and operating instructions including spare parts list and approved drawings.

.2 Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.

.1 Failures include, but are not limited to, the following:

.1 Structural failures including storage tank and supports.

.2 Faulty operation of controls.

.3 Deterioration of metals, metal finishes, and other materials beyond normal use.

.2 Warranty Periods: From date of Substantial Completion.

.1 Commercial, Electric, Domestic-Water Instantaneous Heaters:

.1 Controls and Other Components: Three years.

1.10 Warranty

.1 All equipment is to be guaranteed against defects in materials and/or workmanship for a period of 12 months from date of start-up or 18 months from date of shipment, whichever comes first.

.1 SPEC Warranty Period: Manufacturer’s standard, but not less than 25 years from date of Substantial Completion on the heat exchanger. Warranty shall be non-prorated and not limited to thermal shock.

2. PRODUCTS

2.1 General

.1 Packaged boiler: complete with burner and necessary accessories and controls, and ready for attachment of water supply, return and drain piping, fuel piping, electrical connections, and chimney connection.

.2 Designed and constructed in accordance with ASME Boiler and Pressure vessel Code requirements.

.3 The pressure vessels shall bear Canadian Registration Number (CRN) to CSA B51 for The Province of Alberta before being shipped from the factory.

.4 Boiler/burner package to bear ULC label.

.5 Electrical components CSA approved.

.6 The packaged boiler must receive factory tests to check the construction, controls, and operation of the unit. Boilers to be test fired at rated capacity to, and bearing seal or nameplate certifying compliance with, [CSA B140.7] [CAN1-3.1].

.7 Performance in accordance with American Boiler Manufacturers Association (ABMA), [or ANSI Z21.13/CSA 4.9 (gas burning)] testing procedures.

.8 Include erection and wiring diagrams and an operating and maintenance manual with boiler package.

.9 Check all available drawings and ensure that the boiler proposed will fit in the space allotted and can be maintained and operated in a normal manner without difficulty.

2.2 High Efficiency Boiler

.1 Construction

.1 Combustion Chamber: The combustion chamber shall be constructed of minimum 16-gauge stainless steel. Aluminum or galvanized steel is not acceptable. An access door shall be provided for ease of service and inspection of the heat exchanger.

.2 Heat Exchanger: The heat exchanger shall be inspected and bear the A.S.M.E. Section IV seal of approval. The heat exchanger shall be a four pass heat exchanger with a maximum working pressure of 160 psi. The heat exchanger's vertical design shall provide equal amounts of heat transfer throughout the entire heating surface. Each heat exchanger shall have copper tubes, with an integral copper finned tube of 7/8" I.D., .064" minimum wall thickness, 7 fins per inch, with a fin height of 3/8". Each end of the water tubes shall be strength rolled into the header. The heat exchanger shall be gasketless. Each individual tube can be re-tubed without the disturbance of the surrounding tubes. A pressure relief valve of 50 lb/sq. in. shall be equipped with the boiler and factory mounted. The headers shall be of cast iron construction.The boiler shall be certified and listed by C.S.A. International under the latest edition of the harmonized ANSI Z21.13 test standard for the U.S. and Canada. The boiler shall comply with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 Standard and the minimum efficiency requirements of the latest edition of the ASHRAE 103 Standard. The boiler shall operate at a minimum of 92% thermal efficiency at full fire as registered with AHRI. All models shall operate up to 98% thermal efficiency with return water temperatures at 90°F or below. The boiler shall be certified for indoor installation.

.3 Jackets: 18-gauge brushed stainless steel.

.4 Gas Burner: Metal fiber mat premix burner shall fire to provide equal distribution of heat throughout the entire heat exchanger. Burner composition shall be FecralloyTM. The burner shall be easily removed for maintenance without the disruption of any other major component of the boiler. Ignition electrodes shall be removed for inspection and proper alignment without removing the burner. A window view port shall be provided for visual inspection of the flame during firing.

.5 Ignition Components: Turbo Pilot™ proven spark to pilot ignition system hardware shall consist of an Alumina ceramic insulated ignition electrodes and UV sensing tube permanently arranged to ensure proper ignition electrode and UV alignment. Electrodes must be capable of removal while leaving the burner intact. Hot surface ignition systems of any type will not be accepted. Turbo Pilot™ will produce a stable robust fire of 6,000 BTU's and will operate at minimum gas pressures of 1.5" W.C. and ,aximum pressures of 5.5" W.C. The Gas Regulating valve supplied with the pilot has a full adjustment within these parameters.

.6 Rated Capacity: The boiler shall be capable of operating at rated capacity with pressures as low as 2" W.C. at the inlet to the burner pressure regulator. Boilers that cannot provide full BTUH inputs at 2" W.C. will not be accepted.

.7 The burner shall be capable of 88.1% efficiency without exceeding a NOx reading above 10 ppm.

.8 The burner and gas train shall be provided with the following trim and features:

.1 Burner Firing: TrueFlowTM Full modulation with 4:1 turndown @ Continuous CO2.

.2 Burner Ignition: Intermittent spark

.3 Safety Controls: Energize ignition, limit time for establishing flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, and allow gas valve to open.

.4 Flue Gas Collector: Enclosed combustion chamber with integral combustion air blower and single venting connection.

.5 Gas Train: Manual gas valves (2), main gas valve (motorized), 'B' valve, pilot gas pressure regulator, and automatic pilot gas valve. All components to be factory mounted.

.6 Safety Devices: Optional high/low gas pressure switches, air flow switch, and blocked flue detection switch. All safeties to be factory mounted.

.2 Boiler Trim

.1 Controls: The boiler control package shall be a MTI HeatNet or equivalent, integrated boiler management system. The control system must be integral to each boiler, creating a control network that eliminates the need for a "wall mount" stand-alone boiler system control. Additional stand-alone control panels, independent of a Building Management System (BMS), shall not be allowed to operate the boiler network. The HeatNet control shall be capable of operating in the following ways:

.1 As a stand-alone boiler control system using the HeatNet protocol, with one "Master" and multiple "Member" units.

.2 As a boiler network, enabled by a Building Management System (BMS), using the HeatNet protocol, with one "Master" and multiple "Member" units.

.3 As "Member" boilers to a Building Management System (BMS) with multiple input control methods.

.4 MASTER: A boiler becomes a Master when a resistance type 10K sensor is connected to the J10 "SYS/DHW HEADER" terminals. The sensor shall be auto detected. The Master senses and controls the header/loop temperature utilizing a system setpoint. It uses any boilers it finds "HeatNet Members" or those defined in the control setup menus to accomplish this. The "Master" shall also have the option of monitoring Outside Air Temperature "OA" to provide full outdoor air reset functionality. Only one master shall be allowed in the boiler network.

.5 When operating as a “Master”, the HeatNet control provides a stand-alone method using a PID algorithm to regulate water temperature. The algorithm allows a single boiler “Master” or multiple “Master + Member” boilers in a network of up to 16 total boilers.

.6 The control algorithm is based upon a control band, at the center of which is the setpoint. While below the control band, boilers are staged on and modulated up until the control band is entered. Once in the control band, modulation is used to maintain setpoint. Optimized system efficiency is always accomplished by setting the Modulation Maximum “Mod-Max” setting to exploit each boiler in the network’s inverse efficiency curve. The control shall operate so that the maximum number of boilers required, operate at their lowest inputs until all boilers are firing. Once all boilers are firing, the modulation clamp is removed and all boilers are allowed to fire above this clamped percentage up to 100%. This “boiler efficiency” clamp is defaulted to 80% and thus limits all the boilers individual outputs to 80% until the last boiler fires. The 80% default must be field adjustable for varying operating conditions. All boilers modulate up and down together always at the same modulation rate. Boilers are shut down only when the top of the band is breached, or before the top of the band, if the control anticipates that there is a light load. Timers shall also be included in each control in the network to prevent any boiler from short cycling.

.7 MEMBER: Additional boilers in the network always default to the role of member. The lack of sensors connected to the J10 terminals “SYS/DHW Header” on each additional boiler shall ensure this.

.8 Each “Member” shall sense its supply outlet water temperature and modulate based on signals from a Building Management System (BMS) or “Master” boiler. When operating as a member, starting, stopping, and firing rate shall also be controlled by the “BMS” or “Master” boiler.

.9 When using the HeatNet protocol, the system setpoint shall be sent from the “Master”, along with the modulation value to control firing rate. It also receives its command to start or stop over the HeatNet cable. Each “Member” will continuously monitor its supply outlet temperature against its operating limit. If the supply temperature approaches the operating limit temperature (adjustable), the boilers input control rate is limited and its modulation value decreases to minimize short cycling. If the operating limit is exceeded, the boiler shall shut off.

.10 Each HeatNet control in the boiler network shall have the following standard features:

.1 Digital Communications Control.

.1 Boiler to Boiler: HeatNet

.2 Building Management System (BMS): MODBUS standard protocol.

.3 Building Management System (BMS): BACnet, LonWorks and N2 optional protocols.

.2 Analog 4:20 and 0-10vdc also supported.

.3 Distributed control using HeatNet protocol for up to 16 total boilers.

.4 System/Boiler operating status in English text display.

.5 Interlock, Event, and System logging with a time stamp.

.6 Advanced PID algorithm optimized for specific boilers.

.7 Four dedicated temperature sensor inputs for: Outside Air Temperature, Supply (Outlet)Temperature, Return Temperature (Inlet), and Header Temperature.

.8 Automatically detects the optional temperature sensors on start up.

.9 Menu driven calibration and setup menus with a bright 4-line Vacuum Fluorescent Display.

.10 (8) Dedicated 24vac interlock monitors and 8 dedicated 120vac system monitors used for diagnostics and providing feedback of faults and system status.

.11 Multiple boiler pump or motorized boiler valve control modes.

.12 Combustion Air Damper control with proof time.

.13 Optional USB/RS485 network plug-in to allow firmware updates or custom configurations.

.14 Optional BACnet, LonWorks and N2 interface.

.15 Alarm contacts.

.16 Runtime hours.

.17 Outdoor Air Reset with programmable ratio.

.18 Time of Day clock to provide up to four (4) night setback temperatures.

.19 Failsafe mode when a Building Management System (BMS) is controlling setpoint. If communications is lost, the boiler/system shall run off the Local Setpoint.

.20 Boiler(s) shall be equipped with an integrated web based monitoring system.

.1 Monitoring system shall provide an email or SMS text message notification upon detecting an out of tolerance condition.

.2 The integrated monitoring system shall provide a web portal with performance dashboard displaying key data points for the system and each boiler in the system.

.3 The web portal shall provide the following capabilities;

.1 Detailed status of data points and system set-points

.2 Boiler and System runtime and cycle count

.3 Intelligent diagnostics and troubleshooting guide

.4 Provide original factory test data including as built bill of materials

.5 The ability to enter field service records with file upload capabilities

.6 The ability to view time stamped history of data points and settings

.7 The ability to view detailed event log entries

.8 Video tutorials explaining each section of the web portal

.4 The monitoring system shall have the capability of connecting directly to a 10/100mbps TCP/IP network Optionally when a facility network connection is not available the system shall be capable of utilizing wireless cellular network

.5 The monitoring system shall utilize a non-public proprietary data encryption algorithm

.6 Secure data transmission shall be directly to the cloud from HeatNet enabled system(s) without third party integration

.2 Safety Relief Valve: ASME rated, factory set to protect boiler and piping as per schedule/drawings.

.3 Gauge: Combination water pressure and temperature shipped factory installed. LCD inlet/outlet temperature gauges to be an integral part of the front boiler control panel to allow for consistent easy monitoring of temperatures factory mounted and wired.

.4 Flow Switch: Prevent burner operation when water falls below a safe level or when water flow is low. Flow switch shall be factory mounted and wired. Provision for installation of a low water cut off shall be provided.

.5 Operating Controls: Boiler shall be provided with a Honeywell RM7800 series digital flame safe guard. The flame safeguard shall be capable of prepurge cycles.

.6 Operating Temperature Control: Shall be a manual probe type controller adjustable from 120°F to 240°F, 49°C to 116°C. Control shall be factory mounted and sense the inlet and outlet temperature of the boiler through a resistance sensor.

.7 High Limit: Temperature control with manual reset limits boiler water temperature in series with the operating control. High limit shall be factory mounted and sense the outlet temperature of the boiler through a dry well.

.8 PROVIDE THE FOLLOWING STANDARD TRIM:

.1 Cast iron headers

.2 Low air pressure switch

.3 Blocked flue detection switch

.4 Flow switch (factory mounted and wired)

.5 Modulation control

.6 Temperature/pressure gauge

.7 Manual reset high limit

.8 Air inlet filter

.9 Inlet/outlet temperature display

.10 Full digital text display for all boiler series of operation and failures

.11 Variable frequency drive and combustion air fan

.12 FM and CSD-1 gas train

.9 PROVIDE THE FOLLOWING JOB-SPECIFIC TRIM AND FEATURES

.1 Vent termination hood for exterior termination of vent pipe (shipped loose)

.2 FM or IRI controls and gas train

.3 CSD-1 controls

.4 Diagnostic keyboard display for RM7800 series control

.5 Probe type low water cut off, manual reset (shipped loose)

.6 208V - 24V 1PH (models 1250 - 2000)

.7 208V - 240V, 460/600V 3PH (models 1250 - 2000)

.8 Category I (available on sizes 750 - 2000)

.3 MOTORS

.1 Refer to Division 23 Section “Motors” for factory installed motors.

.2 Boiler Blower Motor: Open drip-proof motors where satisfactorily housed or remotely located during operation. There shall be no requirement to remove gas train components to remove the blower motor. Blower motor shall not exceed 1 HP and not require more than 13 amps.

.4 SOURCE QUALITY CONTROL

.5 Test and inspect boilers according to the ASME Boiler and Pressure Vessel Code, Section IV. Boilers shall be test fired in the factory with a report attached permanently to the exterior cabinet of the boiler for field reference.

.6 Venting Kits

.1 Kit: ASTM A 959, type AL29-4C, stainless steel, vertical vent terminal, roof passage thimble, indoor wall plate, vent, vent adapter, condensate trap and sealant.

.2 Direct Vent system with vertical roof top termination of both the exhaust vent and combustion air. The flue shall be Category IV approved Stainless Steel sealed vent material terminating at the rooftop with the manufacturer’s specified vent termination. A separate pipe shall supply combustion air directly to the boiler from the outside. The air inlet pipe must be sealed and may be other materials listed in the Installation manual. The boiler’s total combined air intake length shall not exceed 100 equivalent feet. The boiler’s total combined exhaust venting length shall not exceed 100 equivalent feet. The air inlet must terminate on the rooftop with the exhaust.

.7 Acid Neutralizer

.1 This contractor is to provide an acid neutralizer recommend by the boiler manufacturer for the specific installation for this project. Provide acid neutralization chips suitable for 2 years operation.

3. EXECUTION

3.1 Examination

.1 Before boiler installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting boiler performance, maintenance, and operations.

.1 Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

.2 Examine mechanical spaces for suitable conditions where boilers will be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 Boiler Installation

.1 Install boilers level on concrete base. Concrete base is specified in Section 23 05 48 Vibration and Seismic Control for Mechanical, and concrete materials and installation requirement are specified in Division 3.

.2 Concrete Bases: Anchor boilers to concrete base.

.1 Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around full perimeter of base.

.2 For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.

.3 Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

.4 Install anchor bolts to elevations required for proper attachment to supported equipment.

.5 Cast-in-place concrete materials and placement requirements are specified in Division 3.

.3 Vibration Isolation: Rubber pads with a minimum static deflection of 0.25 inch. Vibration isolation devices and installation requirements are specified in Section 23 05 48 Vibration and Seismic Control for Mechanical.

.4 Install gas-fired boilers according to CSA B149.1.

.5 Install oil fired boilers in accordance with CSA B139.

.6 Burner pilot light shall be connected to "uninterruptible" gas supply on dual fuel (oil and gas) boilers.

.7 Assemble and install boiler trim.

.8 Arrange boilers so controls and devices that require servicing are accessible. Install electrical devices furnished with boiler but not specified to be factory mounted.

.9 The contractor shall allow for the supply, installation, and full wiring of remote wall mounted boiler kill switches (provide switches at all boiler room exits). The switch shall be wired such that it interrupts all boiler burner controls, allowing the boiler safeties to shut down boiler operation. The switches are to be wall mounted adjacent to all exit doors of the boiler rooms. The switches are to be a mushroom type with manual key activated reset. The switches shall be labeled “Boiler Emergency Shutdown”. All wiring is to be by this contractor, following requirements for wiring application, sizing, and conduits.

3.3 Connections

.1 Piping installation requirements are specified in other Division 23 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

.2 Connect piping to boilers, except safety relief valve connections, with flexible connectors of materials suitable for service. Flexible connectors and their installation are specified in Section 23 05 48 Vibration and Seismic Control for Mechanical.

.3 Connect gas piping full size to boiler gas-train inlet with union.

.4 Connect hot-water piping to supply- and return-boiler tappings with shutoff valve and union or flange at each connection.

.5 Install piping from safety relief valves to nearest floor drain. Run separate discharge from each valve.

.6 Install piping from safety valves to drip-pan elbow and to nearest floor drain.

.7 Install piping from blowdown/drain to blowdown tank/floor drain.

.8 Connect breeching full size to boiler outlet. Refer to Section 23 51 00 Breeching, Chimneys, and Stacks for venting materials.

.9 Install piping adjacent to boiler to allow service and maintenance.

.10 Ground equipment according to Division 26 Section "Grounding and Bonding”.

.11 Connect wiring according to Division 26 Section "Conductors and Cables."

.12 Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

3.4 Startup Service

.1 Engage a factory-authorized service representative to test, inspect, and adjust boiler components and equipment installation and to perform startup service.

.2 Perform installation and startup checks according to manufacturer's written instructions.

.3 Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.

.4 Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.

.5 Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

.6 Adjust initial temperature set points.

.7 Set field-adjustable switches and circuit-breaker trip ranges as indicated.

.8 Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site outside normal occupancy hours for this purpose, without additional cost.

.9 Prepare written report that documents testing procedures and results.

.10 Install acid neutralizer per manufacturer’s recommendations.

3.5 Cleaning

.1 Flush and clean boilers on completion of installation, according to manufacturer’s written instructions.

.2 After completing boiler installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris.

3.6 Demonstration

.1 Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain boilers. Refer to Section 01 77 00 Closeout Procedures.

END OF SECTION

1. GENERAL

1.1 Section Scope

.1 A description of the sequence of operation for each system, including ramping periods and reset schedules.

1.2 Related Requirements

.1 This section of the Specification forms part of the Contract Documents and is to be read, interpreted, and coordinated with all other parts.

.2 Section 21 05 01 – Common Work Results for Mechanical.

.3 Section 23 08 10 – Measurement and Verification Requirements.

.4 Section 25 05 00 – Common Work Results for Integrated Automation.

.5 Section 25 09 -02 – Measurement and Verification Software.

1.3 General

.1 The control sequences contain a general description of the operational intent for the systems to be controlled. The Contractor shall review individual systems to ensure equipment and life safety interlocks are not overridden.

.2 Refer to control diagrams and equipment schedules in the contract drawings for additional requirements. Refer to Mechanical Motor list and points list in the contract drawings, and detailed specification sections for additional requirements.

.3 The Controls Contractor shall provide all necessary programming and equipment required to meet this sequence of operation.

.4 Contractor shall not remove or override any manufacturer's safeties.

.5 This Section includes control sequences for HVAC, lighting, external shading systems, subsystems, and equipment. The section also includes control sequences for integration of other building systems unrelated to the HVAC systems.

.6 Note that the sequences in this section outline overall operational intent. Coordinate all interface requirements with equipment for the sequences in this section to be successfully executed.

.7 Consult with the Mechanical Consultant during the shop drawing stage to finalize the control sequences for each system. The controls contractor shall submit the final sequence of operation during shop drawing phase.

.8 Coordinate the sequence of operation in all Life Safety modes. Mechanical systems shall have hard-wired interface to the Fire Alarm Control Panel (FACP). During activation of Smoke Venting mode (as signaled by the FACP), all required fans and dampers are to operate via the Smoke Venting sequence as defined in this section and noted on the drawings. Only where absolutely necessary shall this Smoke Venting sequence involve the BMS Direct Digital Controls system. Fail-safe sequences (such as interrupting power to spring-return dampers) shall be utilized as much as possible. Special interfaces to fire mode terminals on Variable Frequency Drives for fan operation shall also be used to ensure the highest level of reliability.

.9 Hard-wired pressure safeties: The controls contractor shall provide static pressure safety via pressure sensors mounted upstream and downstream of all fans that have the capability of over-pressurizing AHU casings or ductwork (systems that have motorized dampers or fire smoke dampers that would "seal" the system on either the inlet or outlet side of the fan system). These safeties shall all have adjustable setpoints, be hardwired to

shut down the fan system, and have manual reset type control. This applies to all systems with fans that are capable of generating a static pressure of 500 Pa (2" W.G).

1.4 Abbreviations

.1 The following abbreviations may be used in graphics, schematics, point names, and other control applications where space is at a premium.

AC	Air Conditioning	HTEX	Heat Exchanger
ACU	Air Conditioning Unit	HW	Hot Water
AHU	Air Handling Unit	HWP	Hot Water Pump
AI	Analog Input	HWR	Hot Water Return
AO	Analog Output	HWS	Hot Water Supply
AV	Analog Value	MAX	Maximum
AVG	Average (mean)	MIN	Minimum
AUTO	Automatic	MISC	Miscellaneous
AUX	Auxiliary	N/C	Normally Closed
C	Common	N/O	Normally Open
CHW	Chilled Water	OA	Outdoor Air
CHWP	Chilled Water Pump	OAT	Outdoor Air Temperature
CHWR	Chilled Water Return	OAH	Outdoor Air Humidity
CHWS	Chilled Water Supply	PIU	Powered Induction Unit
COND	Condenser	RA	Return Air
CW	Condenser Water	RF	Return Fan
CWP	Condenser Water Pump	RH	Relative Humidity
CWR	Condenser Water Return	RTU	Roof-top Unit
CWS	Condenser Water Supply	SA	Supply Air
DA	Discharge Air	SF	Supply Fan
DI	Digital Input	SP	Static Pressure
DO	Digital Output	TEMP	Temperature
DV	Digital Value	UH	Unit Heater
EA	Exhaust Air	UV	Unit Ventilator
EF	Exhaust Fan	VAV	Variable Air Volume
EVAP	Evaporator	VVTU	Variable Volume Terminal Unit
FCU	Fan Coil Unit	W/	With
HOA	Hand / Off / Auto	W/O	Without
HP	Heat Pump	WSHP	Water Source Heat Pump
HRU	Heat Recovery Unit		

1.5 Programming Requirements

.1 Provide all programming required to implement the control sequences and to make system operational, as well to meet design intent.

.2 Programs shall be modular in nature and shall be as structured as the language will permit.

.1 Unconditional "GOTO" statements shall be used sparingly and shall always jump forwards. All jumps from the body of a module shall target the end of that module. Similarly, jumps from the body of a sub-module shall target the end of that sub-module.

.2 All conditional "GOTO" statements, which make a single choice from multiple choice sub-module options, shall form the opening lines of code of the module. Each succeeding conditional jump shall direct the execution of software to the relevant sub-module, which shall be in the reverse order of the conditional jump statement. The exit from each sub-module shall jump to the end of the module.

.3 All conditional "GOTO" statements, for "AND"/"OR" choices between sub-modules, shall form the opening line of code in each sub-module which the conditional statement controls.

.4 Do not use double negatives in programming language.

.3 All programs must include a sufficient number of comments to allow another person to make changes to the strategies at a later time.

.4 Additional programming may be provided by the Contractor as desired, so long as it does not affect the intended operation of the specified sequences. Ensure that all equipment will operate in a safe manner.

.5 Programming required for equipment safety may be installed by the Contractor as necessary. The Owner shall be notified of these changes as soon as practical.

.6 All deviations from the specified programming, except those related to equipment safety, must receive prior written approval from the Mechanical Consultant.

.7 All control loops shall be tuned such that they are stable through all seasons and operating conditions including start-up.

.8 All HVAC controls shall implement Building operating modes. Unit system description is modifications to the Building operation modes.

.9 Staggered starting:

.1 Motors must not be allowed to start at the same time. Under all conditions of start-up, return from power failure or panel reset, there must be at least a 15 second delay between the time one motor starts and another is allowed to start.

.10 Motor and equipment status:

.1 All mechanical equipment motors that are enabled by the BMS shall be provided with status and alarm indication by a current sensor. This includes all pumps, fans, and electric motor driven devices.

.2 Equipment status may also be indicated by flow switches as an alternate status indication, with prior acceptance by the Consultant, or where specifically indicated in the Contract Documents.

.3 Exclude small unitary bathroom exhaust fans, domestic range hoods and manually operated fans and devices, unless noted otherwise.

.4 Current sensors shall provide status and an out of range alarm.

2. PRODUCTS

.1 Refer to Section 25 09 01 – Control Systems.

3. EXECUTION

3.1 Building Operating Modes

.1 Four operating modes are required: Purge, Occupied, Unoccupied, and Fire. Mode flags are required for the purge, occupied and fire modes. By definition, unoccupied mode occurs when both purge and occupied mode flags are not set (i.e. off).

.2 An optimum start routine shall be used to determine when the air systems are to begin operation such that adequate comfort conditions are reached just before occupancy begins.

.3 Occupied Mode:

.1 The beginning and ending time of this mode shall be determined by a weekly schedule. An annual holiday schedule shall be used to bypass statutory holidays.

.2 One weekly/annual schedule is required. Required flags: OCCUP (units yes/no).

.3 During this mode, all spaces within the building are to be at occupied comfort conditions. Air systems are to be running. Heating and cooling are to be used as required.

.4 The optimum start routine enables the occupied mode flag prior to scheduled occupancy. This allows the air systems to condition the spaces such that they are comfortable at the time of scheduled occupancy.

.4 Purge Mode:

.1 This mode, indicated by flag PURGE (units yes/no), is used to purge the spaces with cool morning air on warm days or general purge due to high chloramines levels.

.2 Purge is allowed to start as soon as 3 hours before normal occupancy and is stopped as soon as the occupied mode starts or the time is later than 9:00 am. Once started it shall not stop until at least 30 minutes have elapsed or occupied mode has begun.

.3 This mode is allowed only if the outside air temperature is above 8°C and is at least 5°C lower than the average space temperature for free cooling purge. Chloramine purge may happen any time however do not allow space temperature to drop below 23°C.

.4 During this mode, no mechanical cooling or heating shall be allowed.

.5 Purging shall be optimized such that it is only active long enough to bring space temperatures well into the comfort range. A reasonable initial estimate of this time in hours is:

.1 (RTA - 22.5) / (RTa - (OAT + 2)) * 8

.1 Where RTA = average room temperature

.2 OAT = outside air temperature.

.5 Fire Mode:

.1 Refer to specific equipment control sequences and drawings in addition to the requirements of this sub-section.

.2 Fire Alarm Systems in buildings will override BMS control of designated equipment in an alarm condition. The BMS shall monitor a set of contacts output from the fire alarm system for status indication of a building fire alarm. Control sequences of all components that participate during all Fire Alarm modes (such as Smoke Exhaust) shall be hard-wired where possible. Where not possible (such as position of dampers in various positions depending on fire alarm mode), once the signal has been received from the fire alarm control panel the BMS system shall modulate the Fan speed and damper positions as noted below to put the systems in fire mode before fire alarm control panel is to operate unit. The BMS Controls Contractor shall coordinate building equipment that is shut down by the Fire Alarm System.

.3 Prior to control of systems by the fire alarm control panel the following operations are be performed by the BAS system:

.1 Supply and return fans are to operate at design air flow speed as noted on the mechanical equipment schedules.

.2 Outside air and relief air dampers are to open up 100%.

.3 Mixed air damper is to close.

.4 The supply and return fan high duct pressure cut off shall remain active to protect the fan and ductwork.

.4 Upon detection of air handling unit shut down the BMS shall close associated valves and stop associated pumps unless otherwise noted.

.5 Alarms shall be annunciated by the BMS to indicate the equipment failure/shut down and the building fire alarm condition. The BMS shall not annunciate nuisance alarms for monitored input points on systems shut down by the BMS or fire alarm system (e.g. high supply air temperature, low duct static pressure, etc.).

.6 Equipment shut down by the fire alarm system shall not be automatically restarted until the following has occurred:

.1 Building fire alarm condition has been cleared and a registered signal has been received from the fire alarm panel to the BMS.

.2 BMS Operator acknowledges the fire alarm.

.3 BMS Operator with appropriate access level resets the BMS system shut down software point.

.7 Once the above conditions have been satisfied and the BMS receives a Post Fire Alarm Equipment restart command, the BMS shall initiate the restart of any equipment shut down by the fire alarm system. The restart sequence shall provide an orderly start-up of the motors for each individual system with time delay between restarts of individual systems. Start of systems shall be according to normal system start up sequences. Only those motors, which should be operational in accordance with the Occupancy Schedule or application software programming requirements, shall be restarted.

3.2 General Building Conditions

.1 Monitor the following parameters:

.1 Building pressure differential sensors.

.2 Points: Provide all hardware and software points required to achieve the specified sequence including, but not limited to, the following points:

Point Name	Hardware Points				Software Points					Show On Graphic
	AI	AO	DI	DO	AV	DV	Sched	Trend	Alarm	
Building Differential Pressure	X							X		X
Sensor Failure									X	

3.3 Outside Air Conditions

.1 Monitor the following parameters:

.1 Outdoor air temperature.

.2 Outdoor air humidity.

.3 CO_2.

.2 All values shall be made available to the system at all times.

.3 Measurement History: The controller shall monitor and record the high, low, and average readings for each variable. These readings shall be recorded on an hourly, daily, month-to-date and year-to-date basis.

.4 Cooling Degree Day: The controller shall provide a Degree Day index that reflects the energy consumption for the facilities cooling demand. Computations shall use a mean daily temperature of 18°C (adj.). The Degree Day peak value readings shall be recorded on a daily, month-to-date, and year-to-date basis.

.5 Heating Degree Day: The controller shall provide a Degree Day history index that reflects the energy consumption for the facilities heating demand. Computations shall use a mean daily temperature of 18°C (adj.). The Degree Day peak value readings shall be recorded on a daily, month-to-date, and year-to-date basis.

.6 24 Hour Average Outdoor Air Temperature (Rolling Average)

.1 The controller shall calculate and monitor the 24 Hour Average Outdoor Air Temperature.

.2 Recalculate the 24 Hour Average Outdoor Air Temperature in 15 minute intervals using the previous 24 hours of outdoor air temperature readings.

.7 Points: Provide all hardware and software points required to achieve the specified sequence including, but not limited to, the following points:

Point Name	Hardware Points				Software Points					Show On Graphic
	AI	AO	DI	DO	AV	DV	Sched	Trend	Alarm	
Outdoor Air Temp					X			X		X
Outdoor Air Temp, Minimum					X			X		X
Outdoor Air Temp, Maximum					X			X		X
Outdoor Air Temp, Average					X			X		X
Dew Point Temp					X			X		X
Dew Point Temp, Minimum					X			X		X
Dew Point Temp, Maximum					X			X		X
Dew Point Temp, Average					X			X		X
Outdoor Air CO_2					X			X		X
Relative Humidity					X			X		X
Relative Humidity, Minimum					X			X		X
Relative Humidity, Maximum					X			X		X
Relative Humidity, Average					X			X		X
Air Pressure					X			X		X
Air Pressure, Minimum					X			X		X
Air Pressure, Maximum					X			X		X
Air Pressure, Average					X			X		X
Global Radiation					X			X		X
Radiation, Minimum					X			X		X
Radiation, Maximum					X			X		X
Radiation, Average					X			X		X
Precipitation, Absolute					X			X		X
Precipitation, Differential					X			X		X
Precipitation, Intensity					X			X		X
Cooling Degree Day					X			X		X
Heating Degree Day					X			X		X
Sensor Failure									X	
24 Hour Average OAT (Rolling Average)					X			X		X

3.4 Variable Frequency Drive (VFD) Interface

.1 All variable frequency drives (VFDs) shall be native BACnet.

.2 The VFD interface shall be connected directly to the main BMS network trunk to monitor, display, trend ad report the following minimum points. VFD interface shall not be networked indirectly to the main BMS through equipment controllers:

.1 Speed Output

.2 Hand / Auto selection indication

.3 Drive Amps

.3 kW (compare instantaneous value, the connected motor nameplate HP/kW (constant) and the ratio).

.1 kWh

.2 Operating hours

.3 Warnings

.4 Faults

.4 The following points shall be hardwired to the BMS independently of Serial Communications interface so they can be monitored in the event network connection has failed.

.1 VFD Start/Stop

.2 VFD speed and feedback

.3 VFD Fault

3.5 Zone Sensors, Setpoints and Control Loops

.1 General:

.1 Refer to electrical drawings for locations and quantity of motion sensors and daylighting sensors.

.2 Zone Temperature

.1 Each zone shall have separate unoccupied and occupied setpoints, and separate heating and cooling setpoints. All setpoints shall be adjustable.

.2 Unless noted otherwise the occupied heating setpoint shall be 21°C and the occupied cooling setpoint shall be 25°C. The unoccupied heating setpoint shall be 16°C and the unoccupied cooling setpoint shall be 30°C.

.3 Room Temperature Occupied Set-points

Room Type	Set point (°C)	
	Summer	Winter
Pool Hall	27 (50-60%RH)	24 (50-60%RH)
Change Room	24	24
Multipurpose Room / Meeting Room	24	21
Seniors Lounge, Youth, Games, Arts Room	24	21
Pre-School, Indoor Play Area	22	22
Active Studio	19	19
Gymnasium	22	20
Fitness Room	19	18
Administration	24	21

Room Type	Set point (°C)	
	Summer	Winter
Lobby	26	21
Mechanical Room	Uncontrolled	8
Offices /Classrooms	24	21

.1 Setpoint Overlap Restriction:

.1 The software shall maintain a minimum 2°C (adj.) deadband between the heating and cooling setpoints at all times.

.2 Each zone shall have a local occupant setpoint adjustment knob / button limited in software and active only in occupied mode:

.1 As a default, the occupied cooling setpoint shall be limited between 24°C and 26°C (adj.).

.2 As a default, the occupied heating mode setpoint shall be limited between 18°C and 22°C (adj.).

.3 The adjustment shall move both the existing heating and cooling set points upward or downwards by the same amount unless the limit has been reached.

.3 In zones that have 2 or more temperature sensors, the BMS operator shall be able to easily select (globally and individually) between min-average-max comparative control functions. The default shall be set for average unless noted otherwise.

.4 Zone Carbon Dioxide (CO_2) Concentration

.1 Provide a CO_2 sensor(s) for each zone as noted on the drawings or in the sequence of operation.

.2 A proportional-only control loop shall be used to maintain the CO_2 concentration below setpoint by controlling outdoor air damper and/or transfer air fans as noted in the Sequence of Operation.

.5 Occupancy/Vacancy (Motion) Sensor

.1 Provide an occupancy sensor(s) for each zone as noted on the mechanical and electrical drawings and as noted in the Sequence of Operation.

.2 Occupancy sensors will be used to control HVAC and lighting systems as noted in the Sequence of Operations.

.6 Daylight Sensor

.1 Provide daylight sensor(s) for each zone as noted on the electrical drawings and in the Sequence of Operations.

.7 Control Loops:

.1 Two separate control loops shall operate to maintain space temperature at setpoint, the Cooling Loop and the Heating Loop. Both loops shall be continuously active. The Cooling Loop shall maintain the space temperature at the active cooling set point. The output of the loop shall be a virtual point ranging from 0% (no cooling) to +100% (full cooling). The Heating Loop shall maintain the space temperature at the active heating set point. The output of the loop shall be a virtual point ranging from 0% (no heating) to -100% (full heating).

.2 Loops shall use proportional + integral logic or fuzzy logic. Proportional-only control is not acceptable, although the integral gain shall be small relative to the proportional gain. P and I gains shall be adjustable from the Operator Workstation.

.3 Control Modes:

.1 Heating Mode: when the output of the space heating control loop is less than zero.

.2 Cooling Mode: when the output of the space cooling control loop is greater than zero and the output of the heating loop is equal to zero.

.3 Dead band Mode: when not in either the Heating or Cooling Mode.

.8 Zone Modes:

.1 Occupied Mode: A zone is in occupied mode when the time of day is between the system's scheduled occupied start and stop times AND occupancy is detected by the zone motion sensor.

.2 Stand-By Mode: A zone is in stand-by mode when the time of day is between the system's scheduled occupied start and stop times AND occupancy has not been detected in the zone for more than 15 minutes (adj.).

.3 Occupant Override Mode: A timed local override control shall allow an occupant to override the schedule and place the unit into an occupied mode for an adjustable period of time. At the expiration of this time, control of the unit shall automatically return to the schedule. The time of temporary occupied mode shall be initially set to 60 minutes. Timer shall reset each time the zone override button is pressed.

.4 Optimal Start: The unit shall use an adaptive optimal start algorithm for morning start-up. This algorithm shall minimize the unoccupied warm-up or cool-down period while still achieving comfort conditions by the start of scheduled occupied period. The learning adaptive algorithm shall compare the zone temperature to its setpoint at beginning of scheduled occupied period and shall automatically adapt the warm-up or cool-down response time for the next unoccupied period. Refer to the Air handling unit sequence of operation for more information.

.5 Unoccupied Mode: A zone is in unoccupied mode when not in any other mode.

.9 Alarms

.1 High zone temperature: if zone temperature is greater than cooling setpoint by 3°C (adj.) for a minimum of 60 minutes (adj.) continuously, modulate damper to maximum position and annunciate alarm.

.2 Low zone temperature: if zone temperature is less than heating setpoint by 3°C (adj.) for a minimum of 60 minutes (adj.) continuously, modulate damper to minimum position and annunciate alarm.

.3 High Zone CO2 concentration: If the zone CO2 concentration is, greater than 10% (adj.) above setpoint for more than 30 minutes (adj.) annunciate alarm.

.4 Unstable PID loop: If any PID loop continues to cycle its output more than 40% or its range (adj.) 3 times (adj.) in any 60 minute interval, annunciate alarm.

.5 Inhibit alarms after zone set point is changed for a period of 20 minutes per degree of change (e.g. if set point changes from 21°C to 23°C, inhibit alarm for 40 minutes after the change) and while the System is in Warm-up or Cool-down Modes.

.10 Points List

Point Name	Hardware Points				Software Points					Show On Graphic
	AI	AO	DI	DO	AV	DV	Sched	Trend	Alarm	
Zone Temp	X							X		X
Zone CO2 Concentration	X							X		X
Zone Relative Humidity	X							X		X
Zone Daylight Sensor	X							X		X

Zone Motion Detection			X					X		X
Zone Override			X					X		X
Zone Heating Setpoint					X			X		X
Zone Cooling Setpoint					X			X		X
Heating Loop Output					X			X		X
Cooling Loop Output					X			X		X
Zone Dewpoint Temp					X			X		X
Zone Environmental Index					X			X		X
Schedule							X			
High Zone Temp									X	
Low Zone Temp									X	
High Zone CO2 Concentration									X	

3.6 Duct Smoke Detector

.1 Air handling systems serving more than one fire compartment shall be provided with a duct smoke detector in the supply air ductwork, provided by Division 26.

.2 Wire auxiliary contact on smoke detector to air handling unit supply fan starter or contact on variable frequency drive. Each air handling units' smoke detector upon detection of smoke shall stop its respective air handling unit

.3 Status of Air Handling systems shall be displayed on the Fire alarm control panel.

3.7 Static Pressure Control Reset for Multiple Zoned Air Systems

.1 This sequence shall be used for all air systems whose airflow volumes are variable and static pressure control is used. Static pressure set point shall be reset using Trim & Respond logic within the range 35 Pa to 325 Pa (adjustable). When the fan is off, the set point shall be 125 Pa (adjustable). While the fan is proven on, every two minutes, trim the set point by 10 Pa (adjustable) if there are two or fewer zone pressure requests. If there are more than two zone pressure requests, respond by increasing the set point by 15 Pa (adjustable). One zone pressure request is generated when the VAV damper is greater than 85% open until it drops to 70% open. Two pressure requests are generated when the damper is greater than 99% open until it closes to 85%. Contractor to use a standard proportional-integral-derivative (PID) control loop to adjust static pressure set point to maintain the most-open VAV damper position at 90% open.

3.8 Supply Air Temperature Reset for Multiple Zoned Air Systems

.1 This sequence shall be used for all air systems whose air temperature is reset for energy conservation. When the unit initially enters the occupied mode the discharge air temperature shall have a discharge temperature set-point of 14.0 Deg C in the cooling season and 20.0 Deg C in the heating season until room temperature is reached for 15 minutes (adjustable). The discharge temperature shall be reset from 12.8 Deg C to 18.0 Deg C when all of the VAV boxes cooling PID loops are less than 65%. Discharge temperature reset shall increment/decrement at a value of 0.5°F every 15 minutes. All values listed above shall be adjustable. This sequence is general in nature and shall apply unless noted specifically otherwise.

3.9 Heating During Unoccupied Periods

.1 During unoccupied periods in certain areas of the building where air-handling units are not required to run continuously, the AHU's shall be shut down unless space temperature falls below the unoccupied set point at which time the AHU will start in full recirculation mode and the heating coil modulated to maintain set point. Provide a suitable deadband to prevent fan cycling.

3.10 Air System Shutdown

.1 This sequence shall be used for all air systems with central supply and return fans. This sequence is general in nature and shall apply unless noted specifically otherwise. System shut down shall be initiated automatically by the BMS according to Occupancy Schedule requirements, by manual Operator command, or via hardwired interlocks.

.1 On system shut down the BMS shall ramp down the supply and return fan (where applicable) speeds and return the system to the state described for System Off.

.2 The BMS shall shut down the supply fan and the return fan (where applicable) and generate an appropriate alarm message on detection of a supply air temperature of less than 5 Deg. C. This BMS software shutdown sequence shall be disabled during the first ten (10) minutes following system start-up.

.3 System Off - When the system is off:

.1 The return fan (as applicable) shall be off.

.2 The supply fan shall be off.

.3 The outside air dampers and the relief air dampers shall be fully closed.

.4 VSD's shall be set to the minimum speed.

.5 System control loops shall be disabled.

3.11 Natatorium Ventilation Units (AHU-1, HRV-1, RF-1, EF-1)

.1 General:

.1 The air handler (AHU-1) will require modifications to its internal controls dampers to achieve the below sequence of operations. Refer to literature for details.

.2 System is designed as a heating/ cooling/ mixed air and supply air reset, single duct, constant volume air handing unit. Unit will have supply fan on variable speed drive for soft start and balancing purposes. The unit has a modulating gas heating and is interlocked with HRV-4, RF-1 and EF-1.

.3 To minimize evaporation, the pool space temperature must be maintained 1-2°C above the main lap pool temperature. (this is critical because a lower air temperature will result in excessive evaporation).

.4 Normal operation:

.1 The packaged controls shall modulate the supply air fan speed to maintain design airflow rate together with RF-1 and exhaust fan EF-1 to maintain a slight negative pressure within the space. Supply air static pressure high limit software facilities shall be provided to limit the supply fan speed to prevent excessively high static pressures. The supply air static pressure switch trip point shall be Operator adjustable and initially set by the controls contractor with direction from the balancing contractor onsite during the balancing phase of the project.

.5 Free cooling mode:

.1 When ambient air temperatures are above 15°C (adjustable) or space humidity levels exceed 60%, HRV-4 to be off, AHU-1 mixed air damper to close, supply fan to run at full speed, return air fan RF-1 to run at 100%, exhaust fan EF-1 to run at 100%.

.2 It will also operate in free cooling mode when the outdoor temperature is higher than the required supply temperature but the outdoor air enthalpy (or total heat content) is less than the enthalpy of the return air.

.3 The outdoor air damper modulates from minimum position, when the full cooling load can be met by the minimum outside air volume, to the 100% outdoor air position as the outdoor air temperature approaches the required supply air temperature. When outdoor air temperature (or enthalpy) is greater than the return air temperature (or enthalpy), the outdoor air damper should revert back to the minimum setting for ventilation.

.6 Winter Mode: Occupied:

.1 Fans to run continuously.

.2 AHU Outside air damper to be modulated to maintain RH.

.3 Relative humidity within the Natatorium shall be set to 50%. If RH rises, modulate O/A damper & RF-1 to increase air quantities to achieve set point.

.4 Alarm EMCS if R/H drops below 40% or rises above 75%.

.5 Modulate gas heating section to maintain supply air temperature setpoint. Reset supply air temperature according to space demand, measured as an average of temperature sensors. Should a single temperature sensor exceed a 5c differential range then alarm EMCS as faulty sensor.

.6 Disable normally closed outdoor and exhaust air dampers if supply or return fans shut down.

.7 HRV-4 to operate when ambient air is between -10°C and 15°C. confirm defrost set point with manufacturer.

.7 Winter Mode: Unoccupied:

.1 Fans to run continuously.

.2 O/A damper shall close and mixed air damper opens. E/A damper shall open to maintain space static pressure set point.

.3 Maximum relative humidity shall be set to 60%. If RH rises above set point, modulate outdoor air damper to maintain RH setpoint. Close once setpoint is achieved.

.4 Modulate gas heating section to maintain setpoint and prevent freezing when O/A temperature is below 0°C.

.5 Modulate gas heating section to maintain supply air setback temperature setpoint.

.6 Disable normally closed outdoor and exhaust air dampers if supply or return fans shut down.

.7 HRV-4 to operate when ambient air is between -10°C and 15°C. confirm defrost set point with manufacturer.

.8 Summer Mode: Occupied:

.1 Fans to run continuously.

.2 AHU Outside air damper to be set to minimum O/A damper position.

.3 If O/A temperature is above 65 F and no demand for heating, lock out relative humidity control. Allow system to provide 100% O/A to maintain space set point.

.4 If O/A temperature is above 65 F and demand for heating:

.1 Complete a mixed air calculation and modulate gas heating section to achieve building setpoint. Mixed air calculation shall include wb / db calculations to maintain space RH.

.5 HRV-4 to be off when ambient air temperature is above 15°C (adjustable)

.9 Summer Mode: Unoccupied:

.1 Fans to run continuously.

.2 Set AHU O/A damper to minimum position and E/A damper to modulate to maintain static pressure.

.3 If there is a demand for heat:

.1 Complete a mixed air calculation and modulate heating coil valve to achieve building setpoint. Mixed air calculation shall include wb / db calculations to maintain space RH.

.4 HRV-4 to be off when ambient air temperature is above 15°C (adjustable)

.10 Pool hall moisture control

.1 Monitor surface contact temperature sensors in pool hall

.2 Calculate natatorium dew point temperature at each air RH and temperature sensor adjacent to contact sensor.

.3 Increase relative humidity setpoint until dew point temperature is 5degC above coldest contact temperature or user adjusted maximum RH setpoint

.4 Should maximum RH setpoint be reached, reduce supply air fan speed to reach dew point differential. Ensure pressure control is still maintained.

.11 Alarms:

.1 Alarms shall be part of the air handler factory packaged controls and may include most of the alarms listed below.

.2 The low temperature detection device shall be hardwire interlocked to shut down the supply fan and close the outside air and relief air dampers whenever a duct air temperature of 5 Deg. C. or lower is sensed. Device shall be manual reset.

.3 Provide static pressure high limit devices in the supply air duct and return duct hardwire interlocked to shut down the associated fans and the air handling unit system in a high static pressure condition. Devices shall be manually reset.

.4 Freeze protection

.5 Supply fan failure

.6 Supply fan in Hand

.7 Supply fan VFD fault

.8 Pre and final filter change required (differential pressure above definable limit)

.9 High/Low mixed air temperature

.10 High/Low return air temperature

.11 High/Low supply air temperature

.12 Phase monitor for motors and compressors

.2 Control Points

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Final Filter Differential Pressure	×								×		
Mixed Air Temp	×								×		×
Outside Air Temp	×								×		×
Prefilter Differential Pressure	×								×		
Return Air Carbon Dioxide PPM	×								×		×
Return Air Humidity	×								×		×
Return Air Temp	×								×		×
Supply Air Static Pressure	×								×	×	×
Supply Air Temp	×								×		×
Gas Heat Section		×							×		×
Mixed Air Dampers		×							×		×
Return Fan VFD Speed		×							×		×
Supply Fan VFD Speed		×							×		×
Freezestat			×						×	×	×
High Static Shutdown			×						×	×	×
Return Fan Status			×						×		×
Return Fan VFD Fault			×							×	
Supply Air Smoke Detector			×						×	×	×
Supply Fan Status			×						×		×
Supply Fan VFD Fault			×							×	×
Return Fan Start/Stop				×					×		×
Supply Fan Start/Stop				×					×		×
Economizer Mixed Air Temp Setpoint					×				×		×
Supply Air Static Pressure Setpoint					×				×		×
Supply Air Temp Setpoint					×				×		×
Zone Carbon Dioxide PPM					×				×		×
Zone Carbon Dioxide PPM Setpoint					×				×		×
Zone Humidity	×										
Zone Temperature	×										
High Mixed Air Temp										×	
High Return Air Carbon Dioxide Concentration										×	
High Return Air Humidity										×	
High Return Air Temp										×	
High Supply Air Static Pressure										×	
High Supply Air Temp										×	
High Supply Air Temp										×	
High Zone Carbon Dioxide Concentration										×	
Low Mixed Air Temp										×	

	Hardware Points				Software Points						
Point Name	**AI**	**AO**	**BI**	**BO**	**AV**	**BV**	**Loop**	**Sched**	**Trend**	**Alarm**	**Show On Graphic**
Low Return Air Humidity										×	
Low Return Air Temp										×	
Low Supply Air Static Pressure										×	
Low Supply Air Temp										×	
Low Supply Air Temp										×	
Prefilter Change Required										×	×
Return Fan Failure										×	
Return Fan in Hand										×	
Return Fan Runtime Exceeded										×	
Return Fan Command				×							
Supply Fan Failure										×	
Supply Fan in Hand										×	
Supply Fan Output		×									
Supply Fan Status			×								
Exhaust Air Damper Output		×									
Outdoor Air Damper Output		×									
Preheat Output		×									
Preheat temperature	×										
Preheat Stage 1 Command				×							
Return Air Damper		×									
Occupancy Status Display											Multi State output
HRV-4 Command				×							
HRV-4 Status			×								

3.12 Boiler Room Combustion Air Unit Heater (UH-1)

.1 General:

.1 The boiler room combustion air intake consists of:

.1 A duct, open to the outside through a roof or wall.

.2 One temperature sensor adjacent to the cold air trap. Mount temperature sensor approximately 300 AFF.

.3 One temperature sensor in the boiler room to control UH-1

.2 Heater to operate when the temperature outside is below 18 °C (Adjustable).

.2 Control description:

.1 When the outdoor air temperature is below 18 °C (Adjustable), the unit heater fan shall be enabled to recycle heat from the high level of the room. When the room temperature sensor adjacent to the cold air trap indicates the room temperature is below 16°C (Adjustable) the unit heater's gas heating section shall modulate to maintain temperature set point.

.2 If the combustion air falls below 12.8°C (55°F), an alarm shall be registered at the BMS.

.3 When the room temperature sensor adjacent to the cold air trap indicates that the air has reached set point the unit heaters shall stop and the fan shall operate until outdoor air temperature exceeds 18°C.

.3 Miscellaneous:

.1 Filters are not monitored by the BMS.

.4 Alarms:

.1 Low Zone Temp: If the zone temperature is less than 5°C (adj.) for more than 15 minutes (adj.).

.5 Points:

.1 Provide all hardware and software points required to achieve the specified sequence including, but not limited to, the following points.

Point Name	Hardware Points				Software Points					Show On Graphic
	AI	AO	DI	DO	AV	DV	Sched	Trend	Alarm	
Zone Temperature	X							X		X
Fan Status			X					X		X
Fan Start/Stop				X				X		X
Heating Setpoint					X			X		X
Pump HWP-10 VFD Fault			X						X	X
Low Zone Temp									X	

3.13 Pool Boiler (B-1,2)

.1 The EMCS shall control this system.

.2 There is a master boiler tied into the EMCS through BACnet communication protocol, the other boilers communicate to the master boiler. The EMCS will enable the boiler plant but the boiler plant control will be through the integral master controller. The EMCS contractor to provide all wiring as follows:

.1 BACnet connection to master controller.

.2 Wiring from other boilers to master controller.

.3 Wiring from each boiler to associated boiler circulation pump.

.4 Wiring from each boiler to associated combustion air damper.

.3 Upon startup of the heating system, EMCS will enable the hot water boiler. Should the boiler fail to prove its operation an alarm shall be generated at the EMCS.

.4 The primary loop supply temperature setpoint shall be reset by the outdoor air temperature according to the following schedule (schedule to be adjustable):

.5 OAT HWST

.6 -35°C (-31°F) 82°C (180°F)

.7 16°C (60°F) 71°C (160°F)

.8 Sequence of Operation:

.1 A control loop monitoring the pool return water temperature will modulate the heat exchanger control valve in sequence in order to maintain the pool return water temperature at set point. Measure pool supply water temperature.

.2 Boiler and associated boiler circulation pump to activate and run until pool return water temperature is maintained at set point.

.9 Alarms:

.1 All analog temperature and pressure sensors will trigger an alarm at the HIGH or LOW alarm condition, as defined in the system database.

.10 The EMCS will monitor the operation status of the pumps and boilers via current switches. An alarm will be sent to the operator's workstation upon detection of any failed condition. The EMCS will also monitor the general alarm condition of the boilers.

Point Name	Hardware Points				Software Points					Show On Graphic
	AI	AO	DI	DO	AV	DV	Sched	Trend	Alarm	
(B-1) Boiler Command				×						
(B-1) Boiler Output		×								
(B-1) Primary Loop Supply Temperature	X							X		X
(B-1) Primary Loop Return Temperature	X							X		X
(B-1) Boiler Entering Water Temperature	×									
(B-1) Boiler Alarm	×									
(B-1) Boiler Leaving Water Temperature	×									
(B-1) Boiler Status			×							
Outside Air Temperature	X							X		X
(B-1) Boiler Communication Interface	X	X								X
(B-1) Boiler Flow Switch			X							X
(P-1) Start/Stop				X				X		X
(P-1) Status			X					X		X
(HX-1) Heat Exchanger entering Temperature	X									
(HX-1) Heat Exchanger leaving Temperature	X									
(HX-1) Heat Exchanger Valve Output		X								
(HX-1) Heat Exchanger Valve Position Feedback	X									
Primary Heating Water Pump (P-1) Command				X						
Primary Heating Water Pump (P-1) Status			X							
Primary Heating Water Return Temperature	X									
Primary Heating Water Supply Temperature	X									
Point Name	Hardware Points				Software Points					Show On Graphic
	AI	AO	DI	DO	AV	DV	Sched	Trend	Alarm	

Point Name	Hardware Points				Software Points					Show On Graphic
	AI	AO	DI	DO	AV	DV	Sched	Trend	Alarm	
(B-2) Boiler Command				×						
(B-2) Boiler Output		×								
(B-2) Primary Loop Supply Temperature	X							X		X
(B-2) Primary Loop Return Temperature	X							X		X
(B-2) Boiler Entering Water Temperature	×									
(B-2) Boiler Alarm	×									
(B-2) Boiler Leaving Water Temperature	×									
(B-2) Boiler Status			×							
Outside Air Temperature	X							X		X
(B-2) Boiler Communication Interface	X	X								X
(B-2) Boiler Flow Switch			X							X
(P-2) Start/Stop				X				X		X
(P-2) Status			X					X		X
(HX-2) Heat Exchanger entering Temperature	X									
(HX-2) Heat Exchanger leaving Temperature	X									
(HX-2) Heat Exchanger Valve Output		X								
(HX-2) Heat Exchanger Valve Position Feedback	X									
Primary Heating Water Pump (P-2) Command				X						
Primary Heating Water Pump (P-2) Status			X							
Primary Heating Water Return Temperature	X									
Primary Heating Water Supply Temperature	X									

3.14 Division 26 Alarms

.1 The BMS shall monitor Division 26 dry contact alarm outputs provided by Division 26 for recording and annunciation at the OWS(s). Systems to be monitored include Fridge/Freezers, Emergency generators, UPS, Security, Fire Alarm, Transformers etc. Final points list to be clarified with Div. 26.

.2 Wiring between the dry contacts and the BMS panels shall be by Division 26 contractor.

END OF SECTION

DRUMHELLER AQUAPLEX

DRUMHELLER VALLEY

MECHANICAL DRAWING LIST	
DRAWINGS NO.	DESCRIPTION
M000	COVER SHEET
M001	MECHANICAL DRAWING LIST, LEGENDS, AND SITE PLAN
M002	MECHANICAL SCHEDULES
M400	MAIN FLOOR - HVAC DEMOLITION PLAN
M401	MAIN FLOOR - HVAC - RENOVATION PLAN
M402	ROOF - HVAC - DEMOLITION AND RENOVATION PLAN
M403	INDOOR POOL MECH ROOM - HVAC - DEMOLITION PLAN
M404	INDOOR POOL MECH ROOM - HVAC - RENOVATION PLAN
M405	OUTDOOR POOL MECH ROOM - HVAC - DEMOLITION AND RENOVATION PLAN
M501	INDOOR POOL MECH ROOM - HYDRONIC - DEMOLITION & RENOVATION PLAN
M502	OUTDOOR POOL MECH ROOM - HYDRONIC - DEMOLITION & RENOVATION PLAN
M600	HVAC SCHEMATIC
M601	AHU DETAILS
M700	MECHANICAL DETAILS I
M701	MECHANICAL DETAILS II
M702	MECHANICAL DETAILS III

ELECTRICAL DRAWING LIST	
DRAWINGS NO.	DESCRIPTION
E001	COVER SHEET AND SCHEDULES
E002	ELECTRICAL PLAN - MECHANICAL ROOMS
E003	ROOF PLAN, SINGLE LINE DIAGRAM & DETAILS
E004	ELECTRICAL SPECIFICATIONS

MECHANICAL UPGRADE

100 RIVERSIDE DR W

DRUMHELLER, AB. T0J0Y4

ELECTRICAL CONSULTANT

smp engineering

ARCHITECTURAL CONSULTANT

Group2

Architecture
Interior Design

PRIME AND MECHANICAL CONSULTANT

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MECHANICAL GENERAL NOTES

1. THE MECHANICAL SYSTEM SHALL CONSIST OF ALL WORK SHOWN ON THE DRAWINGS, DIAGRAMS, SCHEMATICS AND AS DESCRIBED IN THE SPECIFICATIONS.
2. THE MECHANICAL PLANS ARE DIAGRAMMATIC IN NATURE AND DO NOT ATTEMPT TO SHOW ALL REQUIRED OFFSETS. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR ADDITIONAL CONSTRUCTION DETAILS.
3. COORDINATE THE DRAWINGS WITH THE SPECIFICATIONS AND IN CASES WHERE CONFLICTS OCCUR THE MOST STRINGENT REQUIREMENT SHALL APPLY.
4. CONTRACTOR TO COORDINATE ALL MECHANICAL WORK WITH THAT OF OTHER TRADES TO ENSURE PROPER AND ADEQUATE INTERFACE WITH THE WORK OUTLINED FOR THIS PROJECT.
5. CONTRACTOR TO PROVIDE HORIZONTAL AND VERTICAL CLEARANCE REQUIREMENTS AS PER CEC (CANADIAN ELECTRICAL CODE) FOR ALL INSTALLED EQUIPMENT. OFFSET MECHANICAL WORK AS REQUIRED TO MEET THIS REQUIREMENT.
6. MECHANICAL EQUIPMENT SHALL NOT BE USED FOR TEMPORARY HEATING DURING THE CONSTRUCTION PROCESS. A WRITTEN LETTER FROM THE OWNER IS REQUIRED TO DO SO.
7. ALL DUCTWORK SIZES ARE SHOWN AS INSIDE CLEAR. ADD APPROPRIATE DIMENSION FOR INSULATION OR DUCT LINER TO OBTAIN "TOTAL DUCT SIZE".
8. CONTRACTOR TO ALLOW AND PROVIDE FOR METAL DUCTWORK TRANSITIONS BETWEEN ALL EQUIPMENT AND DUCT CONNECTIONS.
9. PROVIDE DIFFUSERS AND GRILLE COMPATIBLE WITH ARCHITECTURAL CEILING TYPES. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.
10. COORDINATE EXACT LOCATIONS OF ALL ROOM THERMOSTATS AND/OR ROOM TEMPERATURE SENSORS WITH THE DESIGN ARCHITECT BEFORE FINAL INSTALLATION.
11. ALL EXISTING DUCTWORK INDICATED ON PLANS ARE BASED ON AN INITIAL SITE SURVEY AND SHALL NOT BE CONSIDERED 100% ACCURATE. CONTRACTOR SHALL VERIFY LOCATION OF ALL EXISTING SYSTEMS PRIOR TO CONSTRUCTION.
12. IF ASBESTOS IS DISCOVERED ON THE PREMISES, OWNER SHALL BE NOTIFIED AND ALL WORK SHALL CEASE IMMEDIATELY UNTIL ASBESTOS ABATEMENT WORKS ARE COMPLETED.
13. PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL LOCATE AND EXPOSE ANY UTILITY SERVICES CROSSING THE ROUTING OF NEW SERVICES. ENSURE THAT THESE SERVICES REMAIN OPERATIONAL AND ARE NOT DAMAGED DURING OPERATIONS. RECORD THE LOCATION AND TYPE OF SERVICE.
14. ALL NEW DUCTWORK SHALL BE FABRICATED FROM ALUMINUM.

MECHANICAL RENOVATION NOTES

1. THE CONTRACTOR SHALL BE REQUIRED TO ATTEND A PRE-BID WALK THROUGH TO ENSURE A PROPER UNDERSTANDING OF THE MECHANICAL SCOPE OF WORK.
2. CONTRACTOR IS RESPONSIBLE FOR REVIEWING AND VERIFYING ACTUAL ON-SITE CONDITIONS AND EQUIPMENT LOCATIONS PRIOR TO ANY AND ALL DEMOLITION WORK AND/OR EQUIPMENT REMOVAL.
3. CONTRACTOR TO INCLUDE AS A PART OF THE BID ALL COSTS ASSOCIATED WITH CUTTING AND PATCHING THAT IS REQUIRED TO INSTALL ALL NEW MECHANICAL SYSTEMS AS REQUIRED TO MEET THE SITE CONDITIONS AS SHOWN ON THE DRAWINGS. PATCHING SHALL MEET THE AESTHETIC CONDITIONS WHICH WAS THE CONDITION PRIOR TO ANY CUTTING BEING PREFORMED.
4. CONTRACTOR TO PROPERLY SEAL AND REPAIR ANY AND ALL DAMAGE THAT IS A RESULT OF REMOVAL OR DEMOLITION OF MECHANICAL EQUIPMENT. THIS INCLUDES BUT IS NOT LIMITED TO WALL, DOOR, CEILINGS, ETC.
5. THE EXISTING FACILITIES MECHANICAL SYSTEMS SHALL REMAIN OPERATIONAL DURING THE CONSTRUCTION AND RENOVATION PERIOD. CONTRACTOR TO COORDINATE CONSTRUCTION ACTIVITIES AND PHASING WITH OWNER TO MINIMIZE DISRUPTIONS TO OWNERS OPERATIONS AND ACCESS, AND TO ENSURE SAFETY OF THE USERS. PROVIDE ALL MEASURES REQUIRED TO PREVENT HAZARDS TO PEOPLE AND DAMAGE TO ITEMS REMAINING INCLUDING BUT NOT LIMITED TO DAMAGE FROM DUST AND HEAT.
6. THE EXISTING DRAWINGS HAVE BEEN PREPARED, IN PART, ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY OTHERS. AS A RESULT, THE ENGINEER WILL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH HAVE BEEN INCORPORATED INTO THIS DOCUMENT.
7. DURING REMOVAL OF ITEMS SO INDICATED, CAUTION SHOULD BE USED TO PREVENT DAMAGE TO ANY EQUIPMENT HAVING SALVAGE VALUE. ALL REUSABLE SALVAGED MATERIAL SHALL REMAIN THE PROPERTY OF THE OWNER AND BE RETAINED FOR THEIR INSPECTION. ONLY ITEMS AGREED BY THE OWNER SHALL BE DISPOSED OF BY THE CONTRACTOR.
8. CONTRACTOR SHALL COORDINATE AND SCHEDULE WORK WITH FACILITY TO LIMIT INTERFERENCE WITH OPERATIONS.
9. CONTRACTOR TO RE-BALANCE EXISTING AIR TERMINALS TO INDICATED AIR VOLUMES. FLOW RATES ON HEATING COIL BE BALANCED TO MATCH EXISTING SUPPLY AIR TEMPERATURES.
10. INSTALL ALL MECHANICAL WORK AS HIGH AS POSSIBLE.
11. ALL EQUIPMENT CONNECTIONS SHALL HAVE A MINIMUM OF 4 INCH OF REINFORCED CANVAS FLEXIBLE DUCTWORK FOR VIBRATION ISOLATION.
12. COORDINATE LOCATIONS AND MOUNTING HEIGHTS OF ALL THERMOSTATS AND WALL SWITCHES WITH THE INTERIOR DESIGN ARCHITECT PRIOR TO FINAL INSTALLATION.
13. ALL OPEN ENDS OF DUCTWORK DURING DEMOLITION AND INSTALLATION PHASE SHALL BE CAPPED AND KEPT CLEAN.
14. MAXIMUM FLEXIBLE DUCT LENGTH SHALL BE 3' [900mm] UNLESS OTHERWISE NOTED FOR THE SPECIFIC APPLICATION.
15. CONTRACTOR TO SUPPLY AND INSTALL VOLUME DAMPER FOR EACH SUPPLY, RETURN, AND EXHAUST DUCTWORK RUN WITH TWO OR MORE OPENINGS ASSOCIATED WITH THE BRANCH, PROVIDE CONCEALED DAMPER REGULATIONS FOR ALL VOLUME DAMPERS ABOVE INACCESSIBLE CEILINGS AND SOFFITS. REFER TO ARCHITECTURAL DRAWINGS FOR CEILING TYPES.
16. ALL CONTROLS WORK IS TO BE DONE BY BASE BUILDING CONTROLS CONTRACTOR (TO BE CONFIRMED BY CONTRACTOR) WHO SHALL PROVIDE ALL CONTROL WIRING, CONDUITS, RELAYS, INTERFACE COMPONENTS TO MAKE A FULLY FUNCTIONAL CONTROLS SYSTEM.
17. PRIOR TO COMMENCING WORK, THE CONTRACTOR SHALL EXERCISE PROPER PRECAUTIONS TO VERIFY THE ROUTING, INVERT LEVELS, AND SLOPES SHOWN ON THE DRAWING AND BE RESPONSIBLE FOR ERRORS AND ALL EXTRA COSTS OF EXTRA WORK RESULTING FROM FAILURE TO EXERCISE SUCH PRECAUTIONS.
18. CONTRACTOR TO CAP AND SEAL ALL UN-USED DUCTWORK.

MECHANICAL ABBREVIATIONS

AHU	AIR HANDLING UNIT
ARCH	ARCHITECTURAL
BDD	BACKDRAFT DAMPER
BTUH	BRITISH THERMAL UNIT / HOUR
CFM	CUBIC FEET PER MINUTE
CLG	CEILING
CONN	CONNECTION
C/W	COMPLETE WITH
CONT	CONTINUATION
CTE	CONNECT TO EXISTING
DEG	DEGREE
DIA	DIAMETER
DN	DOWN
DWG	DRAWING
E/A	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
EFF	EFFICIENCY
ELEC	ELECTRICAL
ENT	ENTERING
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
FLA	FULL LOAD AMPS
FLR	FLOOR
FPM	FEET PER MINUTE
FT	FEET/FOOT
GAL	GALLONS
GPM	GALLONS PER MINUTE
HCR	HEATING COIL RETURN
HCS	HEATING COIL SUPPLY
HRR	HEAT RECOVERY RETURN
HRS	HEAT RECOVERY SUPPLY
HWR	HEATING WATER RETURN
HWS	HEATING WATER SUPPLY
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IN	INCH
INV	INVERT
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
LBS	POUNDS
LWT	LEAVING WATER TEMPERATURE
MUA	MAKE-UP AIR UNIT
MAX	MAXIMUM
MBH	1000 BRITISH THERMAL UNITS/HOUR
MD	MOTORIZED DAMPER
MECH	MECHANICAL
MIN	MINIMUM
MU	MAKE-UP MECHANICAL WATER
NIC	NOT IN CONTRACT
NC	NOISE CRITERIA/NORMALLY CLOSED
NO	NORMALLY OPEN
NTS	NOT TO SCALE
O/A	OUTDOOR AIR
OED	OPEN ENDED DUCT
OD	OUTSIDE DIAMETER
POC	POINT OF CONNECTION
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
R/A	RETURN AIR
RF	RETURN FAN
RM	ROOM
RPM	REVOLUTIONS PER MINUTE
S/A	SUPPLY AIR
SF	SUPPLY FAN
SS	STAINLESS STEEL
SP	STATIC PRESSURE
SPEC	SPECIFICATION
T/A	TRANSFER AIR
TAD	TRANSFER AIR DUCT
TBC	TO BE CONFIRMED
TBD	TO BE DETERMINED
THRU	THROUGH
TSP	TOTAL STATIC PRESSURE
TYP	TYPICAL
V	VENT
VFD	VARIABLE FREQUENCY DRIVE
LPST	LOW PRESSURE STEAM
LPS	LOW PRESSURE CONDENSATE

MECHANICAL DRAWING LIST

DRAWINGS NO.	DESCRIPTION
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M600	HVAC SCHEMATIC
M601	AHU DETAILS
M700	MECHANICAL DETAILS I
M701	MECHANICAL DETAILS II
M702	MECHANICAL DETAILS III

N.I.C. EXISTING MECH ROOM FOR OUTDOOR POOL

EXISTING OUTDOOR SWIMMING POOL

NORTH

1 / M001 SITE PLAN

SCALE: 1:150

SYMBOL SCHEDULE

SYSTEM MONITORING

DEMOLITION	EXISTING	NEW	
T	T	T	ROOM TEMPERATURE SENSOR
S	S	S	TEMP. SENSOR
H	H	H	HUMIDISTAT

DUCTWORK

			SUPPLY OR OUTDOOR AIR DUCT UP
			SUPPLY OR OUTDOOR AIR DUCT DOWN
			RETURN AIR DUCT UP
			RETURN AIR DUCT DOWN
			EXHAUST AIR DUCT UP
			EXHAUST AIR DUCT DOWN
			TURNING VANES
			ACOUSTIC INSULATION
BD	BD	BD	BALANCING DAMPER (BD)
BDD	BDD	BDD	BACKDRAFT DAMPER (BDD)
MD	MD	MD	MOTORIZED DAMPER (MD)
FD	FD	FD	FIRE DAMPER - VERTICAL (FD)
FSD	FSD	FSD	SMOKE / FIRE DAMPER (FSD)
			DUCT OR PIPE CAP-OFF
			RETURN OR EXHAUST AIR GRILLE
SD	SD	SD	SMOKE DAMPER

EQUIPMENT TAGS

			GRILLE TYPE NECK / GRILLE SIZE AIR VOLUME (L/s)
			EQUIPMENT / FIXTURE TYPE
			KEY NOTE
			DRAWING REVISION
M#	M#	M#	DETAIL NUMBER DRAWING NUMBER
M#	M#	M#	SECTION NUMBER DRAWING NUMBER

PIPING

HWS	HWS	HWS	HEATING WATER SUPPLY
HWR	HWR	HWR	HEATING WATER RETURN
CHWS	CHWS	CHWS	CHILLED WATER SUPPLY
CHWR	CHWR	CHWR	CHILLED WATER RETURN
D	D	CD	CONDENSATE DRAIN
S	S	S	STEAM
C	C	C	CONDENSATE

FITTINGS AND VALVES

			DIRECTION OF FLOW
			PIPE DROP
			PIPE RISE
			PIPE TEE UP
			PIPE TEE DOWN
			PIPE UNION
NO	NO	NO	ISOLATION VALVE (NORMALLY OPEN)
NC	NC	NC	ISOLATION VALVE (NORMALLY CLOSED)
			CHECK VALVE
			2-WAY CONTROL VALVE
			BALANCING VALVE
			CIRCUIT BALANCING VALVE (CBV)
			PRESSURE REDUCING VALVE (PRV)
			STRAINER
			RELIEF VALVE
			BACKFLOW PREVENTOR (BFP)
			AUTOMATIC AIR VENT (AAV)
			TRIPLE DUTY VALVE
			TEMPERATURE GAUGE
			PRESSURE GAUGE
			THERMOMETER
			PUMP

OUTLETS AND DRAINS

			FLOOR DRAIN (FD)
			OPEN DRAIN
			ROOF DRAIN (RD)

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REV.	DATE	DESCRIPTION
A.	2023.02.13	ISSUED FOR AHU-1 PRE-PURCHASE
B.	2023.06.01	ISSUED FOR TENDER/CONSTRUCTION
C.	2023.06.22	ISSUED FOR ADDENDUM #2

DRUMHELLER VALLEY

CONSULTANT:

SEAL:

PROJECT TITLE:
DRUMHELLER AQUAPLEX - MECHANICAL UPGRADE

PROJECT ADDRESS:
DRUMHELLER AQUAPLEX
100 RIVERSIDE DR W
DRUMHELLER, AB
T0J 0Y4

DRAWN BY	MZ
CHECKED BY	JH/BG
SCALE	AS NOTED
DATE	2023, 01, 23

DRAWING TITLE:
MECHANICAL DRAWING LIST, LEGENDS, AND SITE PLAN

PROJECT NO.	DRAWING NO.
000c-1309-22	M001

MECHANICAL MOTORLIST

UNIT NO.	QTY	UNIT DESCRIPTION	UNIT LOCATION	STANDBY PWR (YES/NO)	EMERGENCY PWR (YES/NO)	ELECTRICAL LOAD MCA	FLA	KW	HP	VOLT	PH	EQUIPMENT S	I	C	STARTER S	I	C	TYPE	DISCONNECT S	I	C	CONTROL S	I	C	TYPE	FFCP AUTO ON	AUTO OFF	PNL SWITCH	STATUS	NOTES
AHU-1	1	AIR HANDLING UNIT	INDOOR POOL AREA	N	N	70			15	208	3	Mech	Mech	Elec	MANF	MANF	MANF	MANF	MANF	MANF	MANF	MANF	MANF	MANF	BMS					1, 2, 3
B-1	1	BOILER - GAS FIRED	INDOOR POOL MECH ROOM	N	N		2.3			120	1	Mech	Mech	Elec	Mech	Mech	Elec	PCs	Elec	Elec	Elec	Mech	Mech	Mech	BMS					1
B-2	1	BOILER - GAS FIRED	OUTDOOR POOL MECH ROOM	N	N		2.1			120	1	Mech	Mech	Elec	Mech	Mech	Elec	PCs	Elec	Elec	Elec	Mech	Mech	Mech	BMS					
P-1	1	PUMP - BOILER RECIRCULATION PUMP	INDOOR POOL MECH ROOM	N	N				0.5	115	1	Mech	Mech	Elec	Mech	Mech	Elec	PCs	Elec	Elec	Elec	Mech	Mech	Mech	BMS					
P-2	1	PUMP - BOILER RECIRCULATION PUMP	OUTDOOR POOL MECH ROOM	N	N				0.5	115	1	Mech	Mech	Elec	Mech	Mech	Elec	PCs	Elec	Elec	Elec	Mech	Mech	Mech	BMS					
RF-1	1	RETURN FAN	INDOOR POOL MECH ROOM	N	N				7.50	208	3	Mech	Mech	Elec	Mech	Mech	Elec	VFD	Elec	Elec	Elec	Mech	Mech	Mech	BMS					3
UH-1	1	UNIT HEATER - GAS FIRED	INDOOR MECH ROOM	N	N				FRAC	115	1	Mech	Mech	Elec	Mech	Mech	Elec	PCs	Elec	Elec	Elec	Mech	Mech	Mech	T					3

SUPPLIER / INSTALL / WIRE CODES:
MECH = MECHANICAL
ELEC = ELECTRICAL
MANF = MANUFACTURER
S = SUPPLIED BY
I = INSTALLED BY
C = CONNECTED BY

STARTER CODES:
MAN = MANUFACTURER CONTROLS TO INTERCONNECT AND OPERATE WITH BMS
MAG = MAGNETIC STARTER C/W AUX
STATUS CONTACTS
MRR = MOTOR RATED RELAY, 24 VAC COIL & MOTOR PROTECTION SWITCH
PCS = PACKAGED CONTROL SYSTEM
VFD = VARIABLE FREQUENCY DRIVE
RVS = REDUCED VOLTAGE STARTER
WS = WALL SWITCH
CP = CONTROL PANEL

EMERGENCY POWER CODES:
VP = VITAL POWER
DVP = DELAYED VITAL POWER
CP = CONDITIONAL POWER
NP = NORMAL POWER

CONTROL DEVICE CODES:
AQUA = PUMP CONTROLLED BY AQUASTAT
BMS = BLDG MANAGEMENT SYSTEM
ES = END SWITCH
ET = LINE VOLTAGE T'STAT
FA = FIRE ALARM
FAP = FIRE ALARM PANEL
FS = FLOW SWITCH
GS = GAS SENSOR
H = HUMIDITY SENSOR
I = INTERLOCK, SEE NOTES
LIGHT = WIRED TO LIGHT SWITCH
LS = LEVEL SWITCH
OS = OCCUPANT SENSOR
PS = PRESSURE SWITCH
R. STAT = REVERSE ACTING THERMOSTAT
TC = TIME CLOCK
T = LOW VOLTAGE T'STAT OR SENSOR
TS = TAMPER SWITCH
VS = VARIABLE SPEED SWITCH
WS = WALL SWITCH
MANF = MANUFACTURER CONTROLS TO INTERCONNECT AND OPERATE WITH BMS

ELECTRICAL LOAD CODES:
BHP = BREAK HORSEPOWER
FLA = UNIT FULL LOAD AMPS
HP = UNIT OR MOTOR HORSE POWER
PH = POWER PHASE
MCA = MINIMUM CIRCUIT AMPS
VOLT = REQUIRED SUPPLY VOLTAGE

MISCELLANEOUS CODES:
FFCP = FIRE FIGHTERS CONTROL PANEL
FRAC = FRACTIONAL HORSEPOWER
INT = INTEGRAL PART OF UNIT

GENERAL NOTES:
A. ALL FIRE ALARM DEVICES WIRED BY ELECTRICAL
B. CONTROL PANELS ARE SHIPPED LOSS & REQUIRE FIELD WIRING
C. PCS EQUIPMENT REQUIRES SINGLE SOURCE POWER CONNECTION, UNLESS NOTED OTHERWISE
D. CP, VFD EQUIPMENT REQUIRES POWER WIRING TO AND FROM CONTROL PANEL TO CONTROLLED EQUIPMENT

NOTES:
1. SINGLE POINT POWER CONNECTION (EXCEPT FOR LIGHTS).
2. PROVIDE SEPARATE 120V CIRCUIT FOR MARINE LIGHTS AND CONVENIENCE OUTLET.
3. STANDBY POWER IF POSSIBLE. ELECTRICAL TO ADVISE
4. REQUIRES RECEPTACLE.

AIR HANDLING UNIT

TAG	AHU-1
SERVICE	INDOOR POOL AREA
QUANTITY	1
LOCATION	MECH ROOM
MANUFACTURER	ENGINEERED AIR
MODEL	DJS140/MV/R
SUPPLY FAN	
TOTAL NORMAL VOLUME (LPS)	8,024
OUTDOOR AIR (LPS)	4,011
EXTERNAL STATIC EACH (PA)	400
FAN RPM	700
VFD	YES
TOTAL MOTOR (HP)	15.0
FLA (AMP)	46.0
POWER SUPPLY	208/3/60
HEATING CAPACITY	
SYSTEM TYPE	INDIRECT GAS FIRE
INPUT CAPACITY (KW)	410
OUTPUT CAPACITY (KW)	328.0
TEMP. RISE (DEG C)	36.7
FILTERS	PLEATED
PRE-FILTER	2" MERV 13
MAIN FILTER	
DIMENSIONS LxWxH (MM)	4775x2135x1500
APPROX. WEIGHT (Kg)	1542.0
ELECTRICAL	
VOLTAGE	208 /3 /60
MCA (AMP)	70.0
MAX. FUSE (DUAL ELEMENT)	110.0
MAX. BREAKER	110.0

REMARK:
1. 100% ECONOMIZER CAPABILITY
2. ALL HOA AND VSD STARTER ARE TO BE FACTORY INSTALLED AND BE INSTALLED IN NEMA 1 RATED ENCLOSURES
3. SINGLE POINT POWER CONNECTION TO UNIT (EXCEPT LIGHTING)
4. LIGHTING IS TO BE PROVIDED ON A SEPARATE 120V CIRCUIT.
5. LIGHTS TO BE WIRED BY THE MANUFACTURER BACK TO A SINGLE TERMINAL BLOCK DIV. 26 TO PROVIDE POWER TO THE TERMINAL BOX
6. THE AHU UNIT NEEDS TO BE SPLIT INTO SECTIONS PRIOR TO BE INSTALLED IN THE MECH ROOM. THE APPROX. OPENING THRU THE DOUBLE DOOR IS 1700mm H x 1500mm W. THE MANUFACTURER WILL BE REQUIRED TO VISIT THE SITE TO VERIFY THE OPENING SIZE AND ENSURE THE UNIT WILL FIT INTO THE MECH. ROOM PRIOR TO THE SHOP DRAWING STAGE.

DIFFUSERS AND GRILLES

EQUIPMENT TAG	DESCRIPTION/TYPE	MANUFACTURER	MODEL NUMBER	NOTES
S-1	SUPPLY GRILLE - DOUBLE DEFLECTION, BLADE DEFLECTION 45 DEG., BLADE SPACING 3/4 in.	PRICE	600	ALL
R-1	RETURN GRILLE - DOUBLE DEFLECTION, BLADE DEFLECTION 45 DEG., BLADE SPACING 3/4 in.	PRICE	630	ALL

NOTES:
1. PROVIDE DIFFUSERS AND GRILLES WITH BORDER STYLES THAT ARE COMPATIBLE WITH ADJACENT WALLS AND CEILING SYSTEMS.
2. NC LEVELS BASED ON OCTAVE BANDS 2-7 SOUND POWER LEVELS MINUS A ROOM ABSORPTION OF 10 DB, MEASURED PER ASHRAE 70-91.
3. CUSTOM COLOUR OF PRODUCT TO BE SELECTED BY THE ARCHITECT DURING THE SHOP DRAWINGS SUBMITTAL PROCESS.
4. WHERE A BALANCE DAMPER IS NOT INDICATED ON THE PLANS, PROVIDE A DIFFUSER/GRILLE WITH INTEGRATED OPPOSABLE BLADE DIFFUSER

UNIT HEATER (GAS FIRED)

EQUIPMENT TAG	QTY	SERVICE	LOCATION	MANUFACTURER	MODEL	TYPE	MOUNTING TYPE	AIR FLOW (LPS)	MOTOR (HP)	HGT CAP (KW)	OP. WEIGHT (Kg)	ELEC (V/PH/HZ)	NOTES
UH-1	1	HEATING	INDOOR MECH ROOM	ROSEMEX	UDZ-30	HORIZONTAL	CEILING	215.0	FRAC	8.8	26.0	115/1/60	ALL

NOTES:
1 REFER TO SPECIFICATION FOR FURTHER INFORMATION
2 HORIZONTAL DISCHARGE, HORIZONTAL LOUVERS
3 FACTORY HANGER AND VIBRATION ISOLATION
4 PROVIDE WALL-MOUNTED LINE VOLATGE T-STAT
5 ALUMINUM FINS, AND COPPER TUBES
6 FAN GUARD

EXPANSION TANK

EQUIPMENT TAG	LOCATION	TANK DESCRIPTION	TYPE	MANUFACTURER	MODEL	VOLUME (L)	TANK DIAMETER (MM)	TANK LENGTH (MM)	MAX WORKING PRESS. (KPA)	ARRANGEMENT	SHIP. WEIGHT (Kg)	NOTES
ET-1	INDOOR POOL MECH ROOM	HEATING SYSTEM	DIAPHRAGM	AMTROL	AX-20V	42	305	660	862	VERTICAL	26	ALL
ET-2	OUTDOOR POOL MECH ROOM	HEATING SYSTEM	DIAPHRAGM	AMTROL	AX-20V	42	305	660	862	VERTICAL	26	ALL

NOTES:
1 SHELL: STEEL
2 DIAPHRAGM: HEAVY DUTY BUTYL

AIR SEPARATOR

EQUIPMENT TAG	QTY	LOCATION	TANK DESCRIPTION	MANUFACTURER	MODEL	FLOW (LPS)	MAX PRESSURE DROP (KPA)	TANK DIAMETER (MM)	TANK LENGTH (MM)	ARRANGEMENT	NOTES
AS-1	1	INDOOR POOL MECH ROOM	VORTEX AIR SEPARATOR WITH STRAINER	ARMSTRONG	VAS-3	8.8	861	394	483	VERTICAL	ALL
AS-2	1	OUTDOOR POOL MECH ROOM	VORTEX AIR SEPARATOR WITH STRAINER	ARMSTRONG	VAS-3	8.8	861.00	394	483	VERTICAL	ALL

NOTES:
1 C/W STRAINER, AIR CONTROL AND ELIMINATION
2 PROVIDE ASME RATING
3 PROVIDE AUTOMATIC AIR ELIMINATOR AVV-075
4 PROVIDE DIRT SEPARATOR

BOILER (GAS FIRED)

EQUIPMENT TAG	LOCATION	MANUFACTURER	TYPE	MODEL	INPUT (KW)	OUTPUT (KW)	EFF. (%)	FLOW RATE (LPS)	WATER P. DROP (KPa)	EWT (DEG C)	LWT (DEG C)	OPERATING WEIGHT (Kg)	ELEC (FLA)	POWER (V/PH/HZ)	NOTES
B-1	INDOOR POOL - MECH ROOM	RBI	FULL MODULATION HIGH EFFICIENCY	FUTERA III 1000	293.0	250.0	85	5.5	10.6	71.1	82.2	262	5.3	120/1/60	ALL
B-2	OUTDOOR POOL - MECH ROOM	RBI	FULL MODULATION HIGH EFFICIENCY	FUTERA III 1250	366.0	313.0	85	6.9	6.5	71.1	82.2	305	10	120/1/60	ALL

NOTES:
1 LOW WATER CUT-OFF
2 FULLY MODULATING BURNER
3 TEMPERATURE AND PRESSURE GAUGE
4 RELIEF VALVES, GAS VALVE
5 UL APPROVED
6 BOILER TO BE SUPPLIED WITH PACKAGED CONTROLS SYSTEM FOR BOILER MODULATION, OUTDOOR AIR SENSOR AND DDC SYSTEM MONITOR POINTS
7 PROVIDE WITH ACID NEUTRALIZER
8 BOILER VENTS TO BE AL29-4C

FANS

EQUIPMENT TAG	LOCATION	TYPE	MANUFACTURER	MODEL	AIR FLOW EACH (LPS)	E. S. P. EACH (PA)	FAN (RPM)	MOTOR SIZE EACH (HP)	VFD MOTOR	POWER (V/Ph/Hz)	SOUND LEVEL EACH (SONES)	EQ. WEIGHT TOTAL (KG)	NOTES
RF-1	INDOOR POOL MECH ROOM	MEDIUM PRESSURE AXIAL DIRECT DRIVE	GREENHECK	AX-72-190-0630-A75	8,064	190	1,770	7.5	YES	208/3/60	62	160	ALL

NOTES:
1 CSA LABELED MOTOR
2 REFER TO MECHANICAL MOTOR LIST FOR ELECTRICAL DATA
3 SUSPENDED INSTALLATION, VIBRATION ISOLATORS C/W SEISMIC RESTRAINT CLIPS
4 PROVIDE VSD MOTOR

PUMP SCHEDULE

EQUIPMENT TAG	DESCRIPTION	LOCATION	DESCRIPTION / TYPE	MANUFACTURER	MODEL	FLUID TEMP. (DEG C)	FLUID TYPE	FLOW (EA) (L/s)	HEAD (EA) (kPa)	IMPELLER SIZE (mm)	MOTOR (HP)	MOTOR (RPM)	POWER (V/Ph/Hz)	NOTES
P-1	BOILER RECIRCULATION PUMP	INDOOR POOL MECH ROOM	DRY ROTOR CIRCULATOR - COMPASS R SERIES	ARMSTRONG	R25-140 DI	82.2	NON POTABLE WATER	5.4	36	106.0	0.5	2,000	115/1/60	ALL
P-2	BOILER RECIRCULATION PUMP	OUTDOOR POOL MECH ROOM	DRY ROTOR CIRCULATOR - COMPASS R SERIES	ARMSTRONG	R25-140 DI	82.2	NON POTABLE WATER	6.8	36	106.0	0.5	2,000	115/1/60	ALL

NOTES:
1 ALL BRONZE CONSTRUCTION.
2 NORYL IMPELLER
3 PROVIDE WITH FULL SIZE IMPELLER.
4 PUMP TO BE COMPLETE WITH ECM MOTOR.
5 C/W MODULE FOR CONNECTION TO DDC.

SHELL & TUBE HEAT EXCHANGER

EQUIPMENT TAG	LOCATION	DESCRIPTION	MANUFACTURER	MODEL	HEAT LOAD (KW)	TUBE SIDE - WATER FLOW RATE (LPS)	P-DROP (KPA)	INLET TEMP. (DEG. C)	OUTLET TEMP. (DEG C)	SHELL SIDE - WATER FLOW RATE (lps)	P-DROP (KPA)	INLET TEMP. (DEG. C)	OUTLET TEMP. (DEG. C)	DIM. (DxH) (MM)	OPERATING WEIGHT (Kg)	NOTES
HE-1	INDOOR POOL MECH ROOM	SHELL & TUBE	AIC	B-1000	234.00	5.0	22.0	71.2	60.0	8.3	53.8	29.0	35.5	167 x 895	40.0	ALL

NOTES:
1 TO BE CORROSION RESISTANT.
2 DESIGN, TEST, AND FABRICATION IN ACCORDANCE WITH ASME CODE SEC. VIII, DIV. 1
3 MATERIAL SS316L
4 DESIGN RATING 150 psi AT 208 C

PLATE HEAT EXCHANGER

EQUIPMENT TAG	LOCATION	DESCRIPTION	MANUFACTURER	MODEL	HEAT EXCHANGED (KW)	COLD SIDE - WATER FLOW RATE (Kg/S)	P-DROP (KPA)	INLET TEMP. (DEG. C)	OUTLET TEMP. (DEG C)	HOT SIDE - WATER FLOW RATE (Kg/S)	P-DROP (KPA)	INLET TEMP. (DEG. C)	OUTLET TEMP. (DEG. C)	DIM. (LxWxH) (MM)	WEIGHT (Kg) FULL	NOTES
HE-2	OUTDOOR POOL MECH ROOM	PLATE HEAT EXCHANGER	ARMSTRONG	ABX400H-70	293.00	8.4	52.5	21.1	29.5	6.4	28.5	71.1	60.0	762x321x190	90.0	ALL

NOTES:
1 PLATE MATERIAL SS316, BRAZING MATERIAL NI
2 DESIGN, TEST, AND FABRICATION IN ACCORDANCE WITH ASME
3 GASKET MATERIAL: NBR HT, GASKET MAX. TEMPERATURE:150C
4 CONNECTION TYPE GROOVED HOT AND COLD SIDE 75mm

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B.	2023.06.01	ISSUED FOR TENDER/CONSTRUCTION
C.	2023.06.22	ISSUED FOR ADDENDUM #2

DRUMHELLER VALLEY

CONSULTANT:

SEAL:

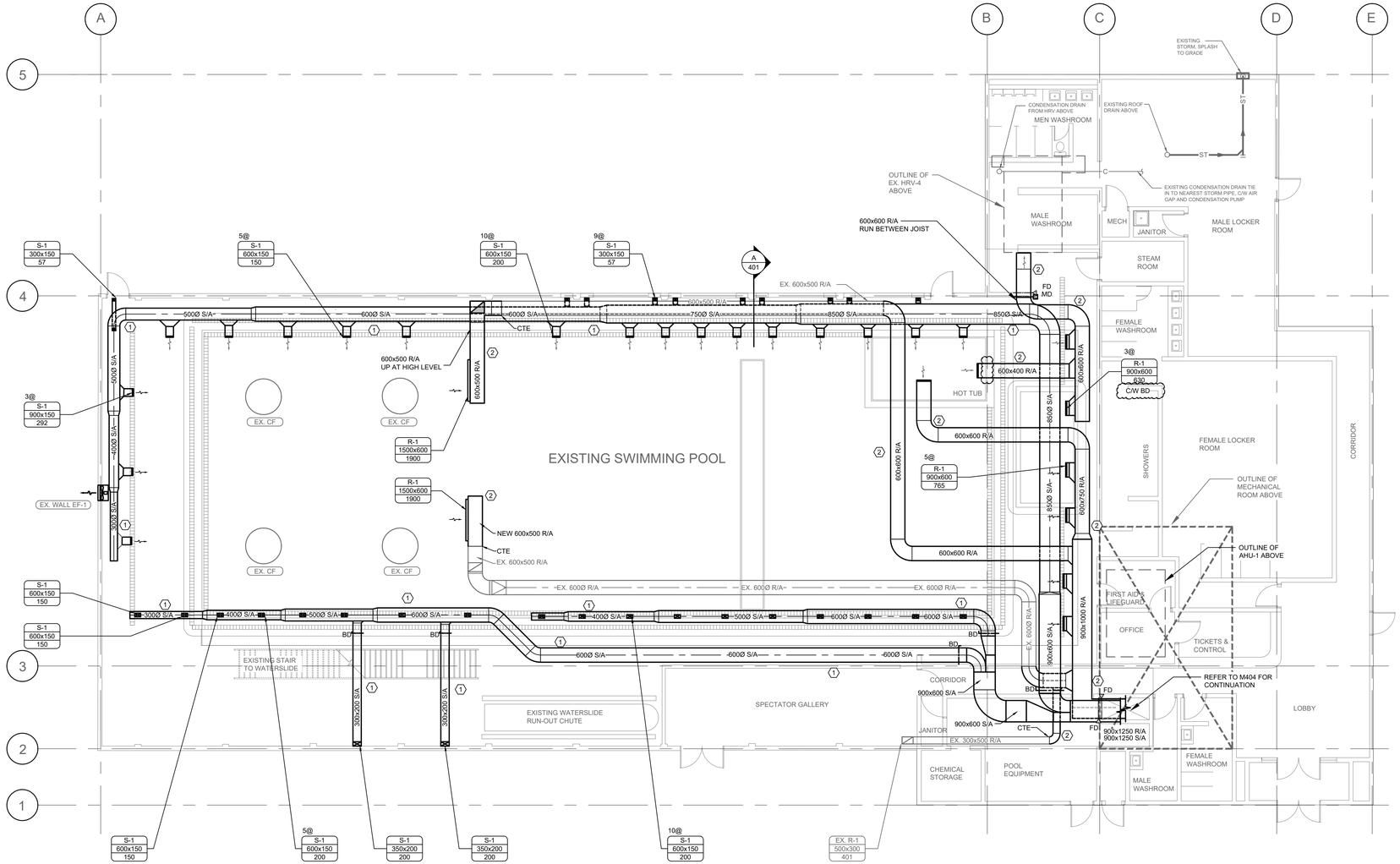
PROJECT TITLE:
DRUMHELLER AQUAPLEX - MECHANICAL UPGRADE

PROJECT ADDRESS:
DRUMHELLER AQUAPLEX
100 RIVERSIDE DR W
DRUMHELLER, AB
T0J 0Y4

DRAWN BY	MZ
CHECKED BY	JH/BG
SCALE	AS NOTED
DATE	2023. 01. 23

DRAWING TITLE:
MECHANICAL SCHEDULES

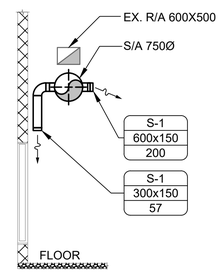
PROJECT NO. 000c-1309-22
DRAWING NO. M002



1 / M401

MAIN FLOOR - HVAC - RENOVATION PLAN

SCALE: 1:100



2 / M401

SECTION A

SCALE: NTS

NORTH

KEY NOTES

1. INSTALL NEW SUPPLY AIR DUCTWORK, INCLUDING ALL ASSOCIATED FITTINGS, AND DIFFUSERS, AND BALANCE DAMPER.
2. INSTALL NEW RETURN AIR DUCTWORK, INCLUDING ALL ASSOCIATED FITTINGS, AND DIFFUSERS, AND BALANCE DAMPER.

GENERAL NOTES

1. COORDINATE EXACT LOCATIONS OF ALL ROOM THERMOSTATS AND/OR ROOM TEMPERATURE SENSORS WITH THE DESIGN ARCHITECT BEFORE FINAL INSTALLATION.
2. ALL DUCTWORK SIZES ARE SHOWN AS INSIDE CLEAR. ADD APPROPRIATE DIMENSION FOR INSULATION OR DUCT LINER TO OBTAIN "TOTAL DUCT SIZE".
3. PROVIDE BALANCING DAMPERS IN DUCTWORK BRANCHES FEEDING INDIVIDUAL DIFFUSERS AND GRILLES, AND AT POINTS ON LOW PRESSURE SUPPLY AND RETURN DUCTS WHERE BRANCHES ARE TAKEN FROM THE LARGER DUCT.
4. RE-BALANCING ALL THE EXISTING GRILLES AND DIFFUSERS AS PER NEW AIRFLOW.
5. ALL DUCTWORK SHALL BE FABRICATED FROM ALUMINUM.

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C.	2023.06.22	ISSUED FOR ADDENDUM #2

DRUMHELLER VALLEY

CONSULTANT:

SEAL:

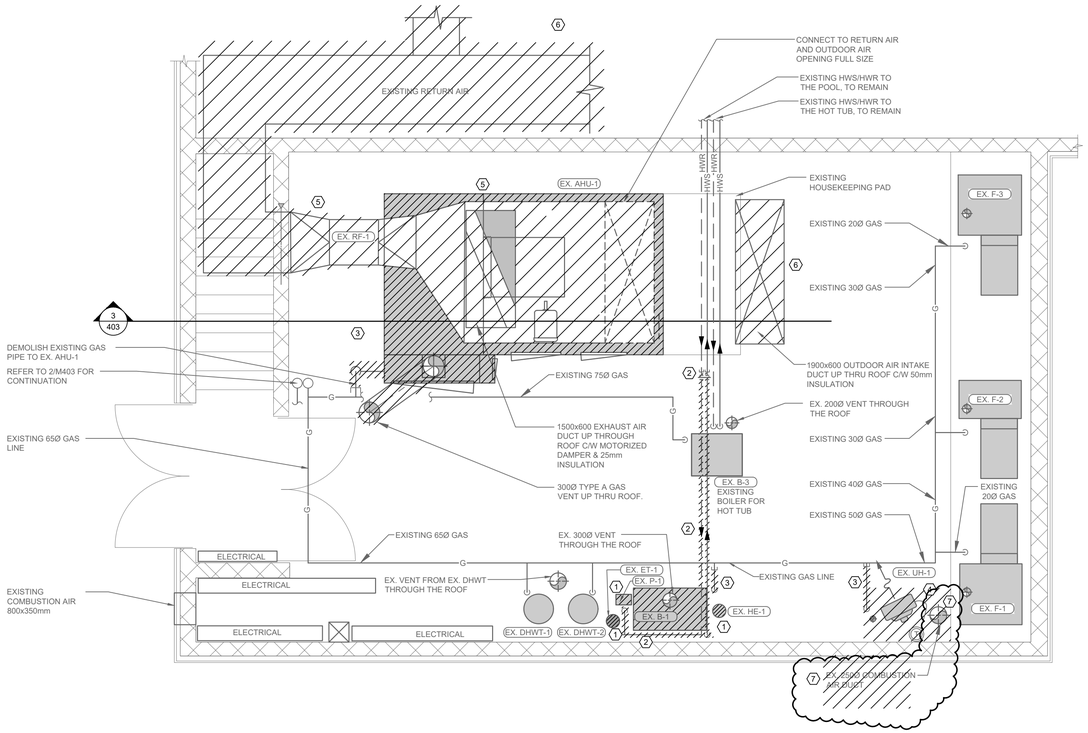
PROJECT TITLE:
DRUMHELLER AQUAPLEX - MECHANICAL UPGRADE

PROJECT ADDRESS:
DRUMHELLER AQUAPLEX
100 RIVERSIDE DR W
DRUMHELLER, AB
T0J 0Y4

DRAWN BY	MZ
CHECKED BY	JH/BG
SCALE	AS NOTED
DATE	2023. 01. 23

DRAWING TITLE:
MAIN FLOOR - HVAC - RENOVATION PLAN

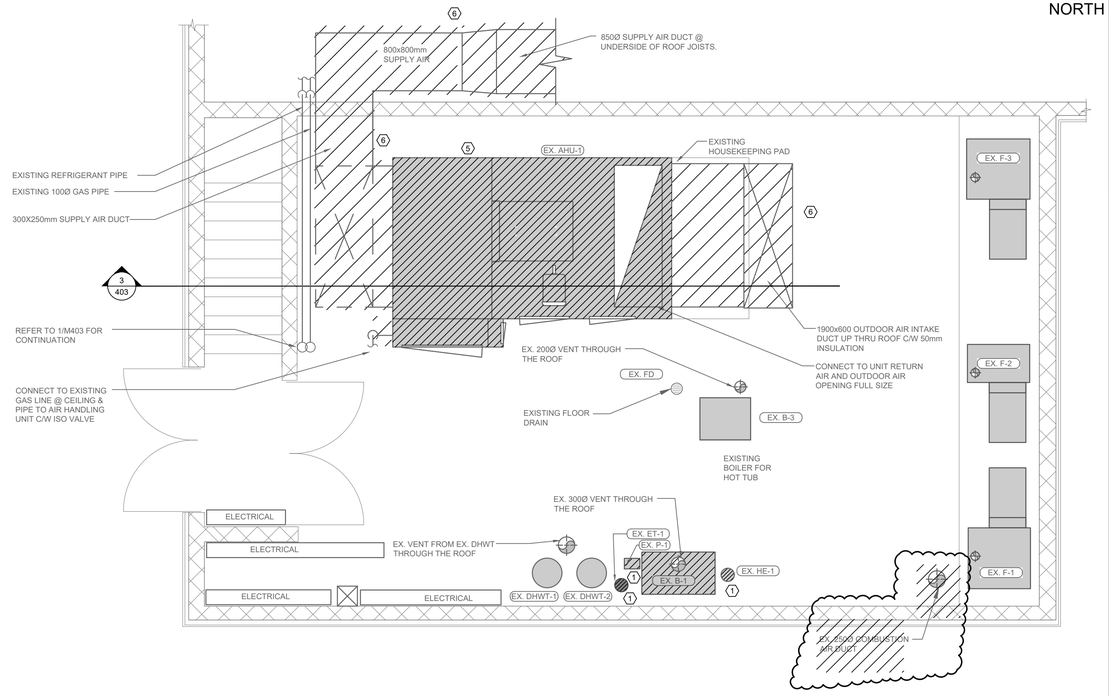
PROJECT NO.	DRAWING NO.
000c-1309-22	M401



1 / M403

MECH. ROOM LAYOUT - DEMOLITION PLAN - HIGH LEVEL

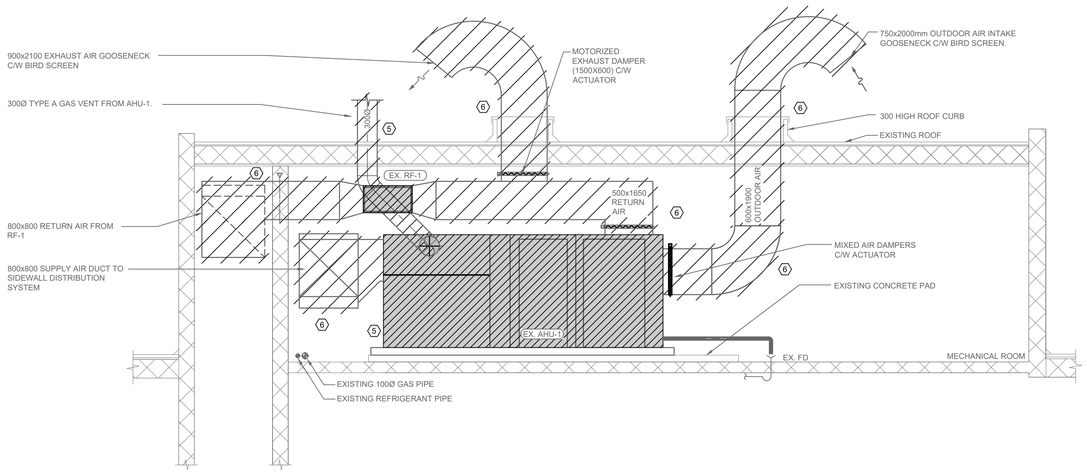
SCALE: 1:50



2 / M403

MECH. ROOM LAYOUT - DEMOLITION PLAN - LOW LEVEL

SCALE: 1:50



3 / M403

MECH. ROOM SECTION - DEMOLITION PLAN

SCALE: 1:50

KEY NOTES

1. DEMOLISH THE EXISTING BOILER, PUMP, EXPANSION TANK, AND HEAT EXCHANGER AND ASSOCIATED ELEMENTS.
2. DEMOLISH THE EXISTING HEATING SUPPLY AND RETURN LINES AND CAP.
3. DEMOLISH THE EXISTING GAS PIPE AND CAP IT
4. DEMOLISH THE EXISTING UNIT HEATER, GAS PIPE, AND VENT TO THE ROOF.
5. DEMOLISH THE EXISTING AHU, DUCTWORK, VENT, AND ASSOCIATED ELEMENTS.
6. DEMOLISH THE EXISTING SUPPLY, OUTDOOR, AND RETURN DUCT, AND ASSOCIATED ELEMENTS
7. DEMOLISH EXISTING 250MM COMBUSTION AIR DUCT, AND ASSOCIATED ELEMENTS.

GENERAL NOTES

1. ALL EXISTING DUCTWORK AND PIPING INDICATED ON PLANS ARE BASED ON AN INITIAL SITE SURVEY AND SHALL NOT BE CONSIDERED 100% ACCURATE. CONTRACTOR SHALL VERIFY LOCATION OF ALL EXISTING SYSTEMS PRIOR TO CONSTRUCTION.
2. THE CONTRACTOR IS RESPONSIBLE FOR ALL DAMAGE INCURRED DURING DEMOLITION AND CONSTRUCTION. CONTRACTOR TO PATCH AND REPAIR ALL DAMAGE AND ANY ABANDONED OPENINGS.

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DRUMHELLER VALLEY

CONSULTANT:

SEAL:

PROJECT TITLE:
DRUMHELLER AQUAPLEX - MECHANICAL UPGRADE

PROJECT ADDRESS:
DRUMHELLER AQUAPLEX
100 RIVERSIDE DR W
DRUMHELLER, AB
T0J 0Y4

DRAWN BY	MZ
CHECKED BY	JH/BG
SCALE	AS NOTED
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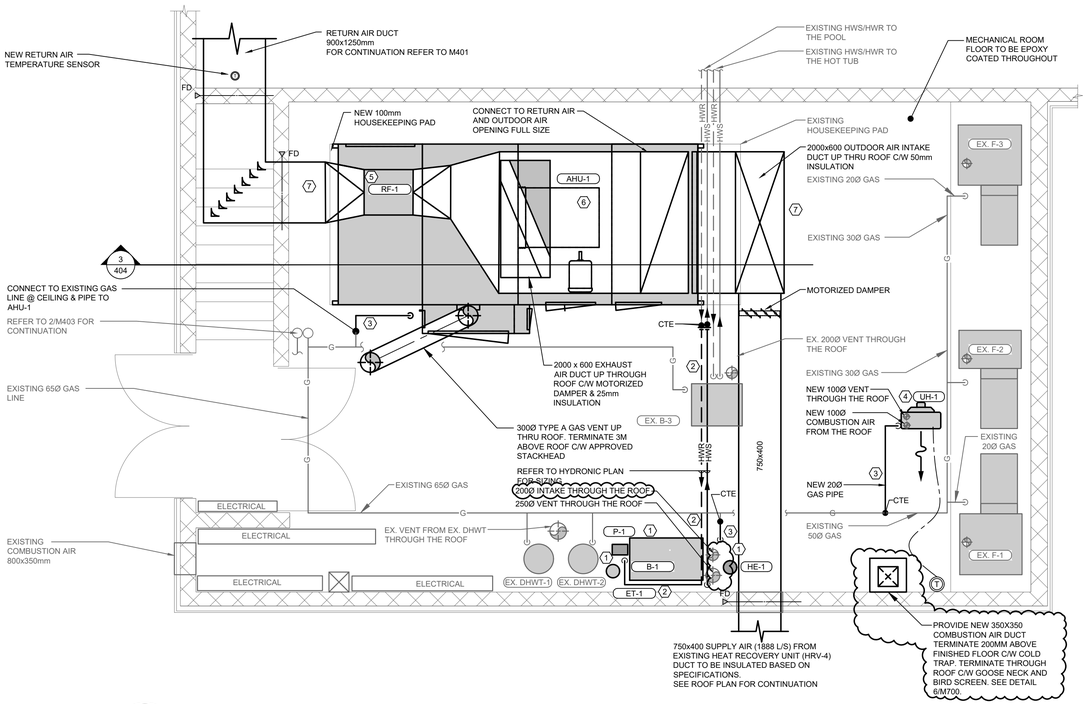
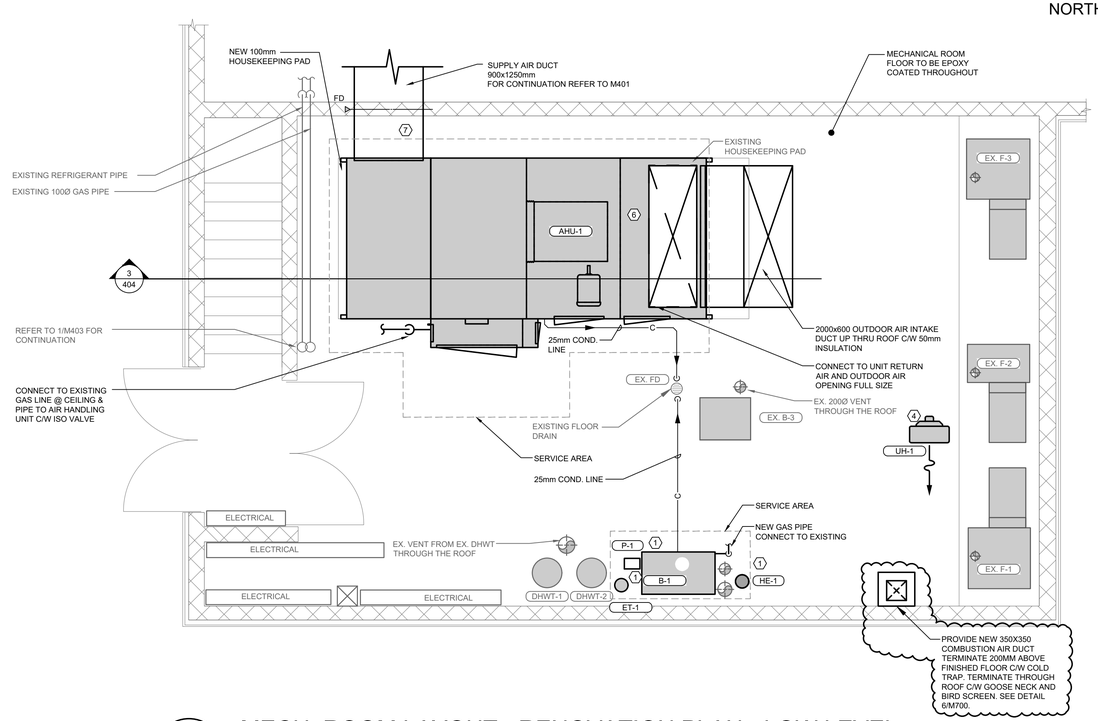
DRAWING TITLE:
INDOOR POOL MECH ROOM - DEMOLITION PLAN

PROJECT NO.	DRAWING NO.
000c-1309-22	M403



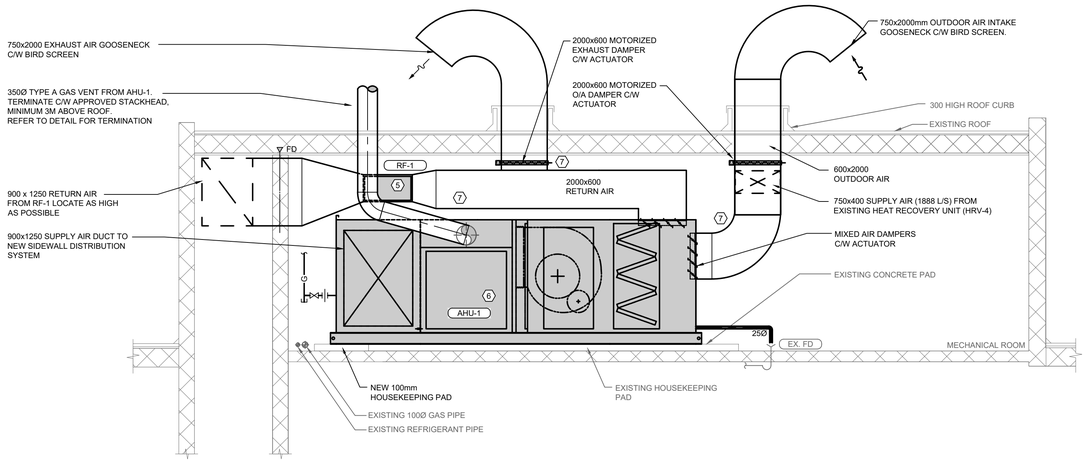
1 / M404 MECH. ROOM LAYOUT - RENOVATION PLAN - HIGH LEVEL

SCALE: 1:50



2 / M404 MECH. ROOM LAYOUT - RENOVATION PLAN - LOW LEVEL

SCALE: 1:50



3 / M404 MECH. ROOM SECTION - RENOVATION PLAN

SCALE: 1:50

KEY NOTES

1. PROVIDE NEW BOILER, PUMP, EXPANSION TANK, AND HEAT EXCHANGER AND ASSOCIATED ELEMENTS.
2. PROVIDE NEW HEATING SUPPLY AND RETURN LINES. CONNECT TO EXISTING. CONTRACTOR TO VERIFY ON SITE.
3. PROVIDE NEW GAS PIPE AND ISO VALVE FOR NEW EQUIPMENT. CONTRACTOR TO VERIFY THE EXISTING GAS PIPE SIZE, PRESSURE AND TOTAL EXISTING BUILDING LOAD ON SITE.
4. PROVIDE NEW UNIT HEATER, GAS PIPE, AND COMBUSTION AIR & VENT.
5. PROVIDE NEW RETURN FAN.
6. PROVIDE NEW AHU, DUCTWORK, VENT, MOTORIZED DAMPER, AND ASSOCIATED ELEMENTS.
7. PROVIDE NEW SUPPLY, RETURN, AND OUTDOOR AIR DUCT, AND ASSOCIATED ELEMENTS.

GENERAL NOTES

1. ALL EXISTING DUCTWORK AND PIPING INDICATED ON PLANS ARE BASED ON AN INITIAL SITE SURVEY AND SHALL NOT BE CONSIDERED 100% ACCURATE. CONTRACTOR SHALL VERIFY LOCATION OF ALL EXISTING SYSTEMS PRIOR TO CONSTRUCTION.
2. PROVIDE AND INSTALL ALL UNITS ACCORDING TO THE MANUFACTURER'S RECOMMENDED CLEARANCES FOR MAINTENANCE. MAINTAIN MINIMUM CLEARANCE MINIMUM CLEARANCE TO ELECTRICAL AND SERVICES ACCESS PANELS AND DISCONNECT.
3. PROVIDE ALL FIRE STOPPING MATERIAL AND ENSURE THAT ALL THE FIRE PENETRATIONS ARE PROTECTED AS REQUIRED BY THE NATIONAL BUILDING CODE - ALBERTA EDITION AND THE LOCAL AUTHORITIES.
4. CONNECT CONDENSATE DRAINS TO SAN PIPING WITH INDIRECT CONNECTION.
5. ALL DUCTWORK SIZES ARE SHOWN AS INSIDE CLEAR. ADD APPROPRIATE DIMENSION FOR INSULATION OR DUCT LINER TO OBTAIN "TOTAL DUCT SIZE".
6. ALL DUCTWORK SHALL BE FABRICATED FROM ALUMINUM.

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DRUMHELLER VALLEY

CONSULTANT:

SEAL:

PROJECT TITLE:
DRUMHELLER AQUAPLEX - MECHANICAL UPGRADE

PROJECT ADDRESS:
DRUMHELLER AQUAPLEX
100 RIVERSIDE DR W
DRUMHELLER, AB
T0J 0Y4

DRAWN BY	MZ
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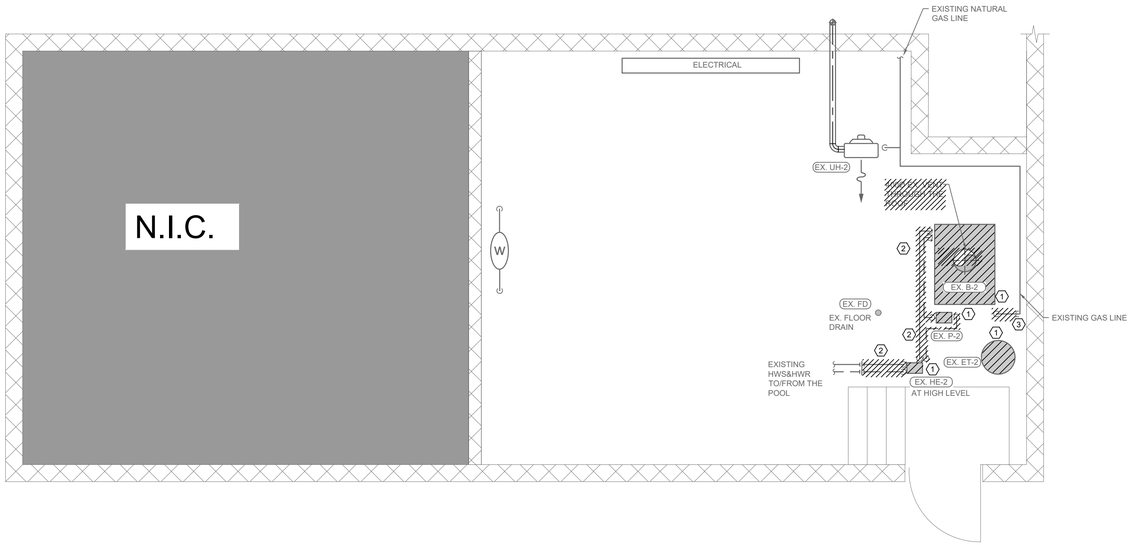
SCALE	AS NOTED
DATE	2023. 01. 23

DRAWING TITLE:
INDOOR POOL MECH ROOM - RENOVATION PLAN

PROJECT NO.	DRAWING NO.
000c-1309-22	M404



1
M405

OUTDOOR POOL MECH. ROOM - DEMOLITION PLAN

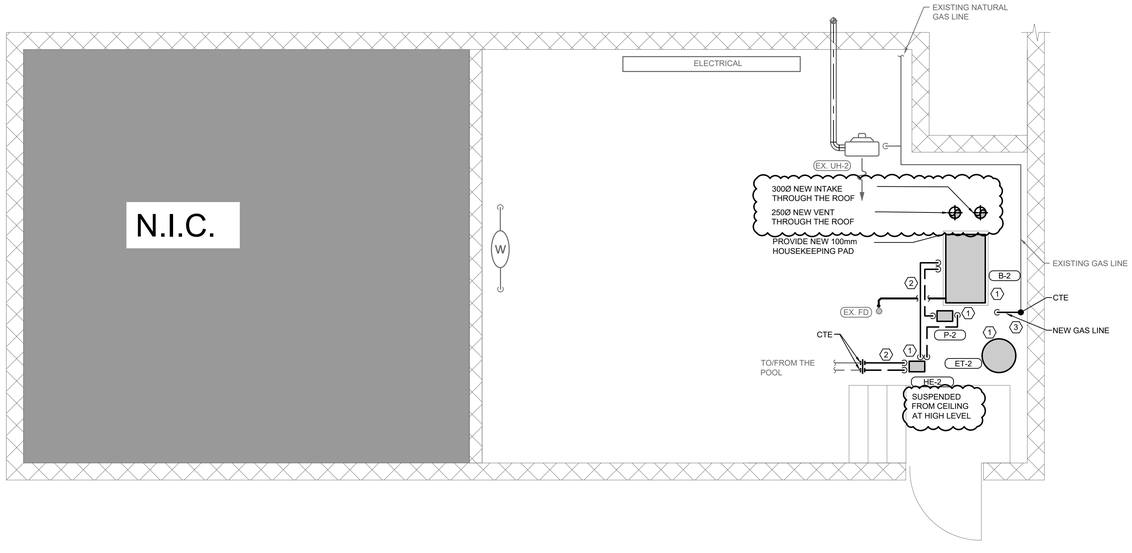
SCALE: 1:50

DEMOLITION KEY NOTES

1. DEMOLISH THE EXISTING BOILER, PUMP, EXPANSION TANK, AND HEAT EXCHANGER AND ASSOCIATED ELEMENTS.
2. DEMOLISH THE EXISTING HEATING SUPPLY AND RETURN LINES AND CAP.
3. DEMOLISH THE EXISTING GAS PIPE AND CAP IT

DEMOLITION GENERAL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR ALL DAMAGE INCURRED DURING DEMOLITION AND CONSTRUCTION. CONTRACTOR TO PATCH AND REPAIR ALL DAMAGE AND ANY ABANDONED OPENINGS.



2
M405

OUTDOOR POOL MECH. ROOM - RENOVATION PLAN

SCALE: 1:50

RENOVATION KEY NOTES

1. PROVIDE NEW BOILER, PUMP, EXPANSION TANK, AND HEAT EXCHANGER AND ASSOCIATED ELEMENTS.
2. PROVIDE NEW HEATING SUPPLY AND RETURN LINES. CONNECT TO EXISTING. CONTRACTOR TO VERIFY ON SITE.
3. PROVIDE NEW GAS PIPE AND ISO VALVE FOR NEW EQUIPMENT. CONTRACTOR TO VERIFY THE EXISTING GAS PIPE SIZE, PRESSURE AND TOTAL EXISTING BUILDING LOAD ON SITE.

RENOVATION GENERAL NOTES

1. PROVIDE AND INSTALL ALL UNITS ACCORDING TO THE MANUFACTURER'S RECOMMENDED CLEARANCES FOR MAINTENANCE. MAINTAIN MINIMUM CLEARANCE MINIMUM CLEARANCE TO ELECTRICAL AND SERVICES ACCESS PANELS AND DISCONNECT.
2. CONNECT CONDENSATE DRAINS TO SAN PIPING WITH INDIRECT CONNECTION.

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DRUMHELLER VALLEY

CONSULTANT:

SEAL:

PROJECT TITLE:
DRUMHELLER AQUAPLEX - MECHANICAL UPGRADE

PROJECT ADDRESS:
DRUMHELLER AQUAPLEX
100 RIVERSIDE DR W
DRUMHELLER, AB
T0J 0Y4

DRAWN BY	MZ
CHECKED BY	JH/BG
SCALE	AS NOTED
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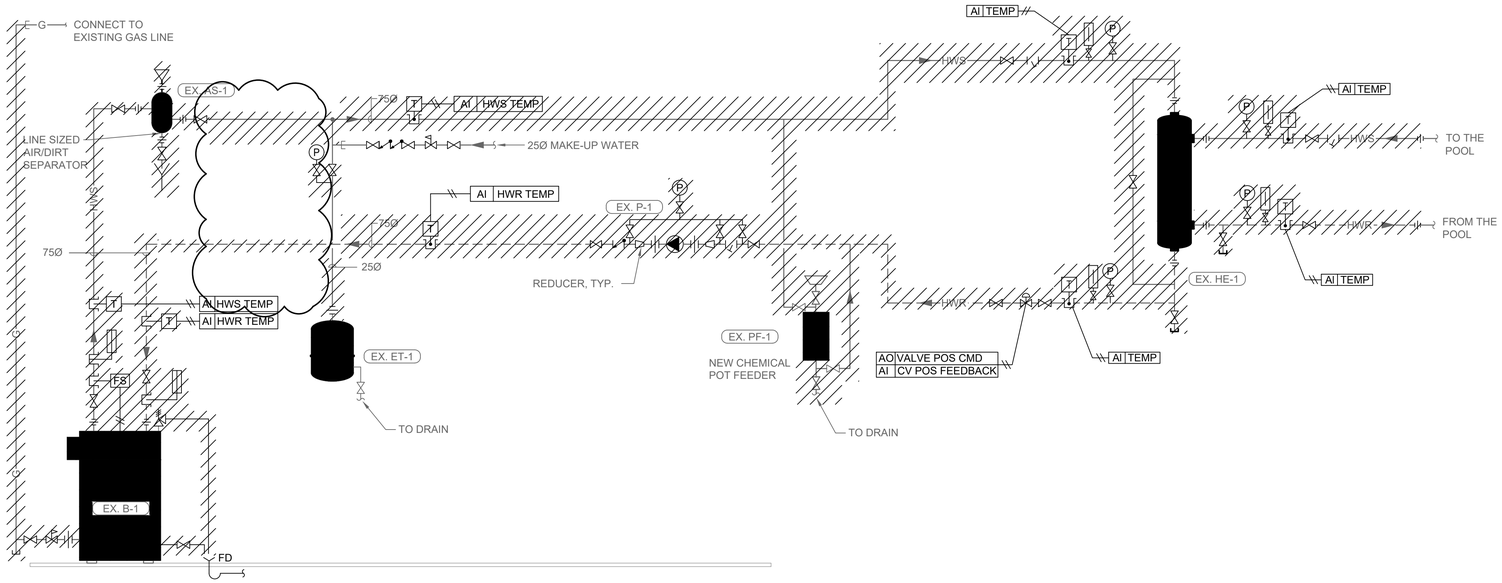
DRAWING TITLE:
OUTDOOR POOL MECH. ROOM - DEMOLITION & RENOVATION PLAN

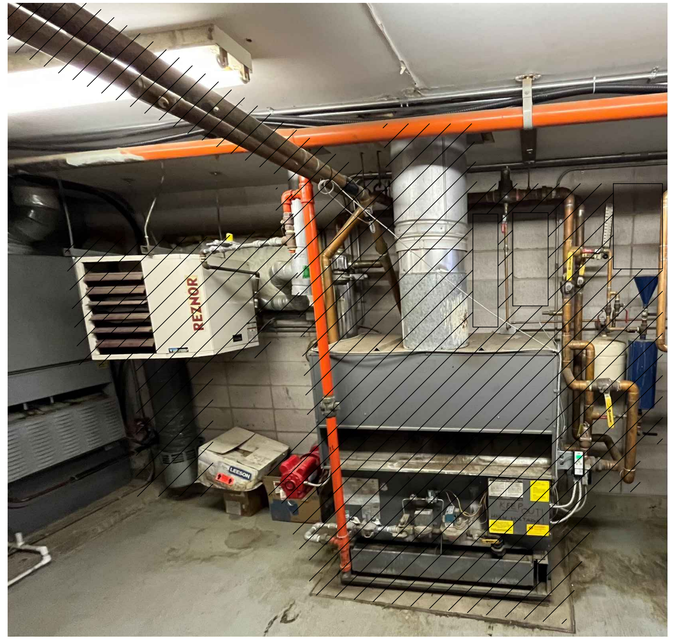
PROJECT NO.	DRAWING NO.
000c-1309-22	M405

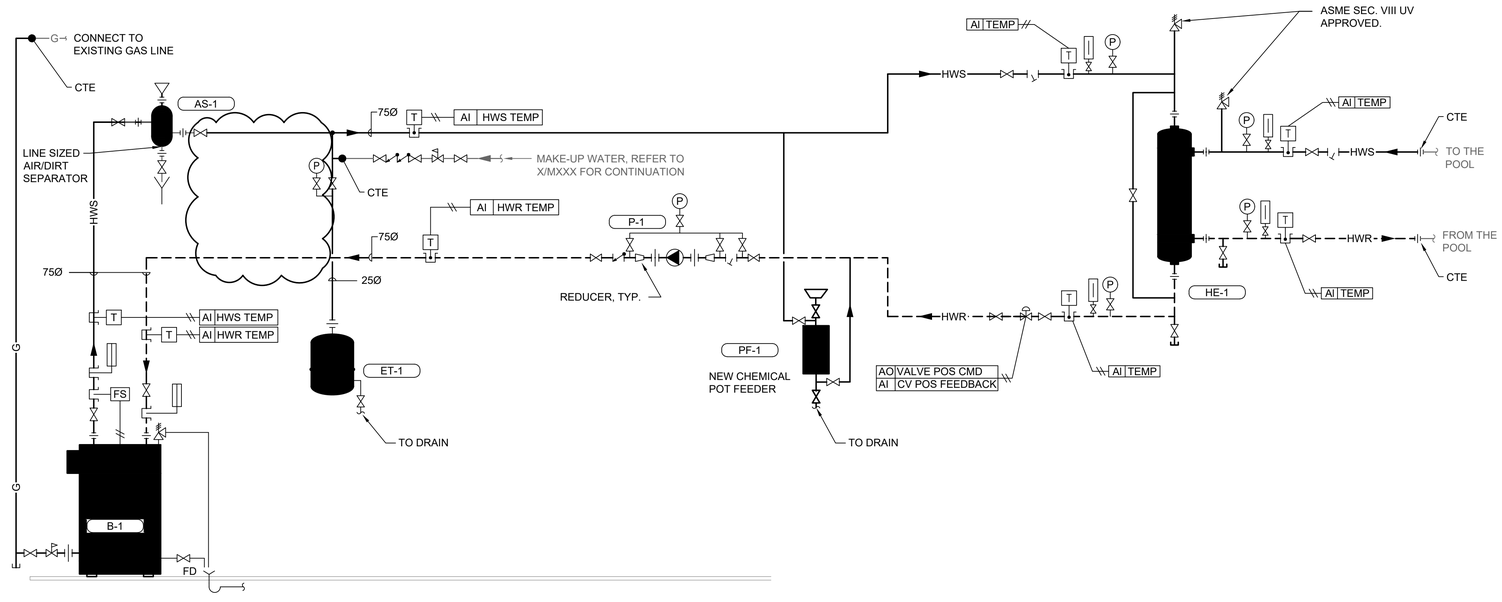


1
M501

INDOOR POOL MECH. ROOM - HYDRONIC SCHEMATIC - DEMOLITION

SCALE: NTS





2
M501

INDOOR POOL MECH. ROOM - HYDRONIC SCHEMATIC - RENOVATION

SCALE: NTS

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PROJECT ADDRESS:
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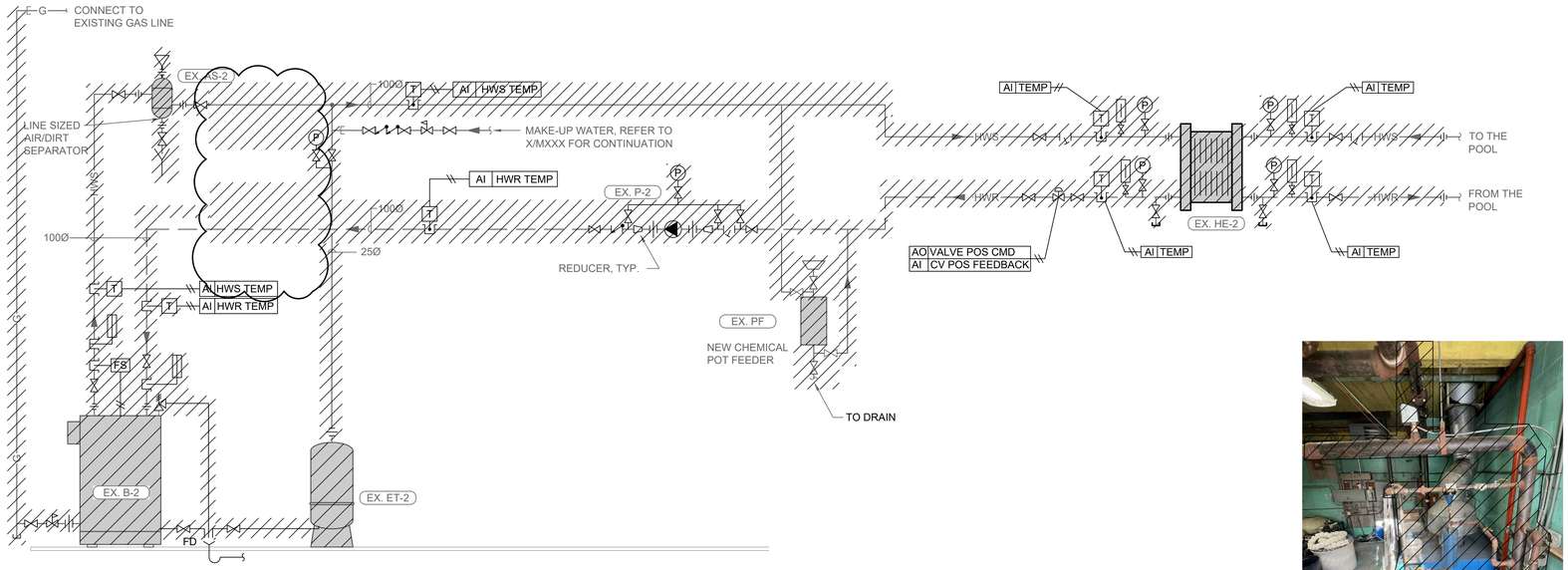
100 RIVERSIDE DR W
DRUMHELLER, AB
T0J 0Y4

DRAWN BY	MZ
CHECKED BY	JH/BG
SCALE	AS NOTED
DATE	2023. 01. 23

DRAWING TITLE:
INDOOR POOL MECH. ROOM - HYDRONIC - RENO & DEMO PLAN

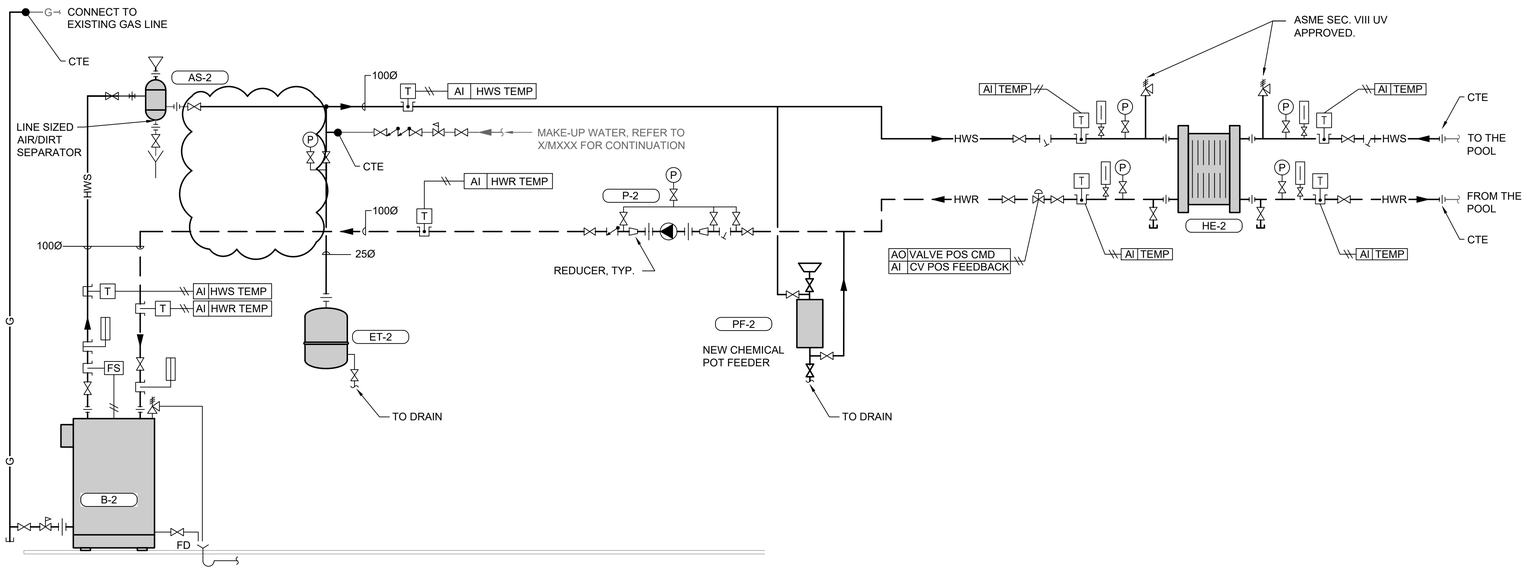
PROJECT NO.	DRAWING NO.
000c-1309-22	M501



1 / M502

OUTDOOR POOL MECH. ROOM - HYDRONIC SCHEMATIC - DEMOLITION

SCALE: NTS



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OUTDOOR POOL MECH. ROOM - HYDRONIC SCHEMATIC - RENOVATION

SCALE: NTS

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REV.	DATE	DESCRIPTION
A.	2023.02.13	ISSUED FOR AHU-1 PRE-PURCHASE
B.	2023.06.01	ISSUED FOR TENDER/CONSTRUCTION
C.	2023.06.22	ISSUED FOR ADDENDUM #2

DRUMHELLER VALLEY

CONSULTANT:

SEAL:

PROJECT TITLE:
DRUMHELLER AQUAPLEX - MECHANICAL UPGRADE

PROJECT ADDRESS:
DRUMHELLER AQUAPLEX
100 RIVERSIDE DR W
DRUMHELLER, AB
T0J 0Y4

DRAWN BY	MZ
CHECKED BY	JH/BG
SCALE	AS NOTED
DATE	2023. 01. 23

DRAWING TITLE:
OUTDOOR MECH. ROOM - HYDRONIC - RENOVATION & DEMOLITION PLAN

PROJECT NO.	DRAWING NO.
000c-1309-22	M502