Addendum # 2
Bid Opportunity: 24-7558-RFT - MacGregor Senior Public-School Phase 4 HVAC North Wing & Boiler Upgrade
Closing Date: Thursday, April 25, 2024 2:00 PM

The following issued by the Board shall form part of the Bid / Proposal Solicitation document. The revisions and additions noted herein along with any attachments shall be read in conjunction with all other related documents. This Addendum shall, take precedence over the previously issued documents where differences occur. Receipt of this addendum must be acknowledged in the Bidding System, bids&tenders.

If you have already submitted a Bid / Proposal, it will be automatically withdrawn as a result of this addendum. You must resubmit the Bid / Proposal acknowledging all addenda and revising your Bid / Proposal to comply with all addenda.

Addendum #2

Tender No.	23-7558-RFT
Project:	**MacGregor Senior Public School Phase 4 – HVAC and Electrical Upgrades - North Wing (West Side)**
Project No.:	21965
Date:	April 22th, 2024

The following information supplements and/or supersedes the bid documents **ISSUED FOR TENDER dated April 05, 2024**

This Addendum forms part of the contract documents and is to be read, interpreted, and coordinated with all other parts. The cost of all contained herein is to be included in the contract sum. The following revisions supersede the information contained in the original drawings and specifications issued for the above-named project to the extent referenced and shall become part thereof.

Addenda Documents attached herein:

MECHANICAL AND ELECTRICAL ADDENDUM NO. 2, issued April 15th, 2024

1. Refer to attached MNE Addendum No. 2 for general modifications to Mechanical drawings.

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END OF ADDENDUM 2
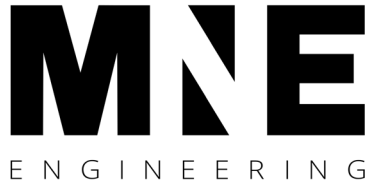
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ADDENDUM 02

To:	**LGA Architectural Partners**	Date:	April 15, 2024
		Project:	MacGregor Senior Public School Ventilation & Boiler Upgrade
cc:		**Project No:**	23097

This addendum forms part of the contract documents and amends the drawings and specifications.

Mechanical

1.   Reference Specification Division 25:

    a.   Append the attached graphical control sequence drawings to specification.

End of Addendum

T
Ex.

Boiler Pump
1 HP, 208 V, 1750 RPM

Primary Loop Pumps
5 HP, 575 V, 1760 RPM

TS18
TS18
TS18

P-2
P-3

Status
P-1
CS3

HWS to North Wing
HWS to East Wing
HWS to West Wing
HWS to Office/Admin
HWS to UH

HWR to North Wing
HWR to East Wing
HWR to West Wing
HWR to Office/Admin
HWR to UH
HWR to Music and Gym

Dif P
DP1

HWS to Music and Gym

P-2 VFD
| En | Spd | Alm | Fbk |

P-3 VFD
| En | Spd | Alm | Fbk |

CBV

HWR to Staff Room
HWS to Staff Room

Boiler 1

11.8 L/s
1440 MBh
120 V

Heating Loop Pump
1/8 HP, 120 V, 3250 RPM

V1

HWR to Bsmt AHU
HWS to Bsmt AHU

P-4

Status
CS3

E/D   Status   Alarm
Mod ||
CS3

Field

Cx

| AI |

| AI | AI | DO | AI | AO | DI | AI |
0..5 V   0..5 V
0..20 A   0..20 A
                0..10 V
                0..100 %

| AI |

| DO | AO | DI | AI |
0..10 V   0..10 V
0..100 % 0..100 %

| DO | AO | DI | AI |
0..10 V   0..10 V
0..100 % 0..100 %

| AI |
10..2 V
0..100 %

| DO | AI |
0..5 V
0..20 A

| AI |
0..10 V
0..30 psi

① Notes:
Boiler Pump is wired by
others to be controlled by
the boiler to run when the
boiler is on.

② Ex. Z5.1 Rad Valve
Disconnect and reconnect
existing valve

| | Job #: | Owner:
Waterloo Region
District School Board | Drawn By: | Title: **Hot Water Heating System** | 1 |
| | Job Name: MacGregor Public School | | Revision Date:
April 15, 2024 | | |

SEQUENCE OF OPERATION

The boiler system is shut down when the outside air temperature exceeds 15°C (2°C dead-band). Between May 15 and Sept. 15, this setpoint is reduced to 4°C. When heating is disabled the boiler and pumps are off.

The boiler hot water supply temperature sensor cycles boiler B1 to maintain setpoint which is reset from outside air temperature as follows:
OAT___SWT
 15°C   50°C
-20°C 80°C

As the hot water return temperature increases the supply water temperature is reset down from 0° to -5°C in order encourage condensing in the boilers as follows:
RWT____Reset
55°C   -5°C
50°C   0°C

Heating Loop Pumps
Loop pump pairs P2 or P3 operate continuously when heat is enabled with weekly lead/lag operation (lag pump starts if lead pump fails or is in alarm). The operating pump speed is modulated to maintain the differential water pressure at setpoint.

The single loop pumps operate continuously when heat is enabled. Pump status is monitored with current sensor.

The heating loop supply water temperature in each loop is controlled to setpoint by modulating their control valve. The setpoint is reset by the outdoor air temperature and room temperature deviation from setpoint.
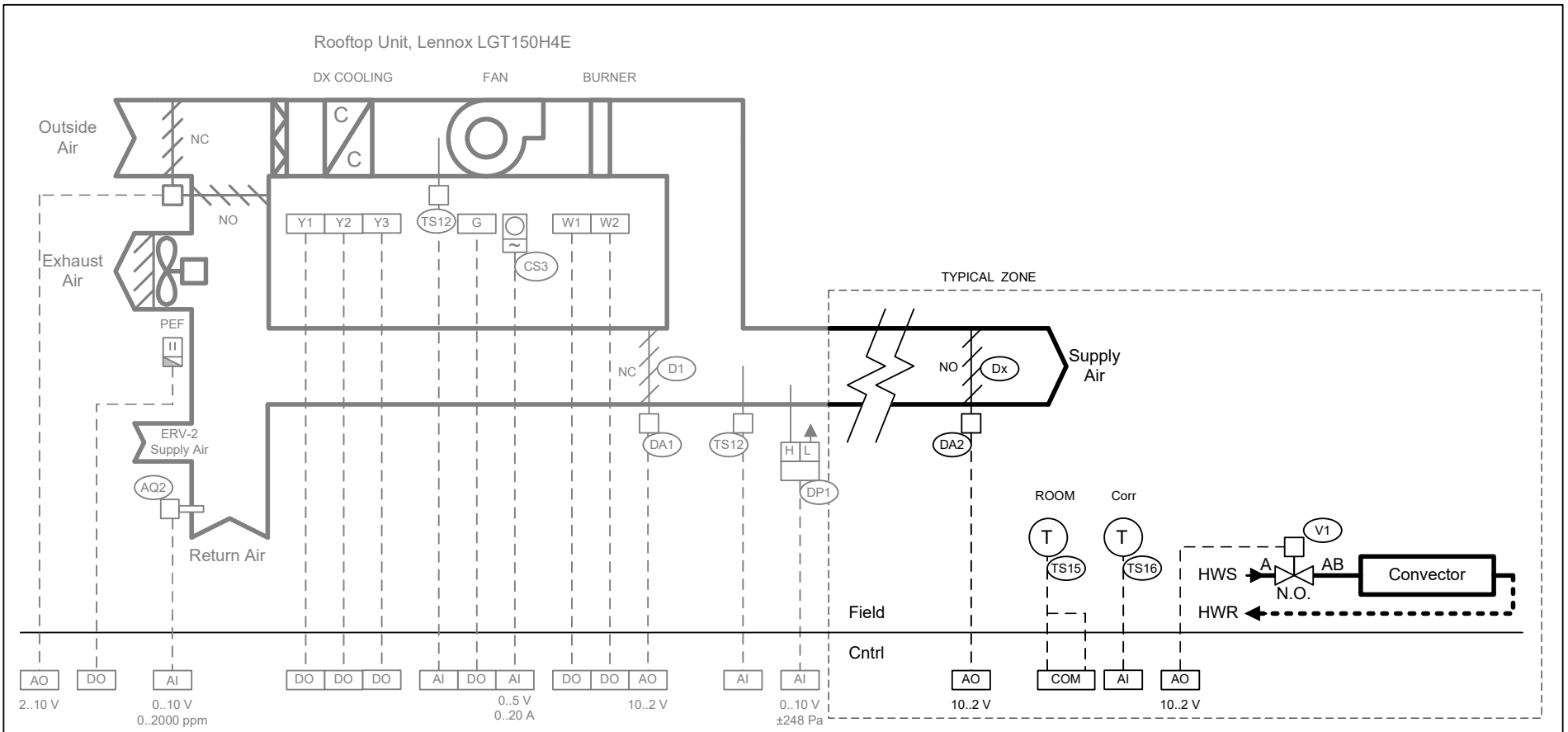
Limits and Safeties
1) The boiler system is shut down when the outside air temperature exceeds 15°C (2°C deadband). Between May 15 and Sept. 15, this setpoint is reduced to 4°C.
2) The boiler system is shut down if there is no pump status for either of the main heating pumps P4 or P5.
3) Pumps have a delay-off time of 5 minutes.

Alarms
1) Hot water supply temperature too low (-12/-10°C dev. from setpoint, 30 min. delay) or too high (12/10°C deviation, 15 minute delay).
2) Hot water return temperature too low (25/27°C) or too high (80/78°C).
3) Any pump in incorrect state or VFD alarm.
4) Any boiler alarm.
5) Differential pressure is too high.

	Job #:	Owner:	Drawn By:	Title: **Hot Water Heating System**	
	Job Name: MacGregor Public School	Waterloo Region District School Board	Revision Date: April 15, 2024		2

Rooftop Unit, Lennox LGT150H4E

DX COOLING   FAN   BURNER

Outside Air
NC
NO

Exhaust Air

PEF

ERV-2 Supply Air

AQ2

Return Air

Y1 Y2 Y3   TS12   G   W1 W2

CS3

TYPICAL ZONE

NC   D1

DA1   TS12   H L   DP1

NO   Dx

DA2

Supply Air

Field

Cntrl

ROOM   Corr

T (TS15)   T (TS16)

V1
A   AB
HWS   N.O.   Convector
HWR

AO	DO	AI		DO	DO	DO	AI	DO	AI	DO	DO	AO		AI	AI		AO	COM	AI	AO
2..10 V		0..10 V					0..5 V			10..2 V					0..10 V		10..2 V			10..2 V
		0..2000 ppm					0..20 A								±248 Pa					

Three Systems As Shown

Unit	Serves	Rooftop (cfm)	Clg (ton)	Zones	Stages (Clg)	Stages (Htg)	Power EF	Rads	Cntrl
HVAC-7	North Wing - East	4375	12.5	5	3	2	Yes	4	C7

Perimeter Radiation

Zone	Room	Flow (L/s)	(gpm)	Valve (Vx)	Notes
7.1	Corr 812		-		TS16*, no clg
7.2	Class 5	0.267	4.23	Ex.	Existing TS15 on C8
7.3	Class 6	0.267	4.23	Ex.	Existing TS15 on C8
7.4	Class 7	0.267	4.23	V1	TS15
7.5	Class 8	0.267	4.23	V1	TS15

*new sensor for existing FFH in Corridor 812

SEQUENCE OF OPERATION

UNOCCUPIED MODE
The supply fan is off, the power exhaust fan is off, the mixing dampers are in the 0% outside air position, the heating is off and the cooling is off. The bypass damper is in the 100% open position. The zone dampers are in the 50% open position. The system cycles on a call for unoccupied heating, with the supply air static pressure setpoint increased by 20%. If the override pushbutton is pressed, the system will switch to the occupied mode for 2 hours (adjustable).

OCCUPIED MODE
Fan Operation
The supply fan operates continuously.   An optimized start routine is provided for heating and cooling.

Zone Damper
The room sensor modulates the zone damper between minimum and maximum settings to maintain setpoint. The setpoint is adjustable ±1°C at the sensor. The control is reverse acting when the supply air temperature is more than 1°C above room temperature and direct acting when the supply air temperature is more than 1°C below room temperature. If the system mode is different from the zone mode (e.g. system is in heating mode, but zone requires cooling), the zone damper closes to a reduced minimum position to minimize overheating/overcooling.

System Heating/Cooling Decision Process
The system mode is determined by the number of zones that deviate from their respective zone heating/cooling setpoints.   If the total number of zones requesting heating outnumber (or are equal to) the total number of zones requesting cooling, the system will go to heating mode. If the total number of zones requesting cooling outnumber the total number of zones requesting heating, the system will go to cooling mode.   Once in the heating or cooling mode, the reference zone becomes the zone with the greatest call. The system will lock in the selected mode until all zones are satisfied. If any zone is deprived of ventilation air for more than 20 minutes, the system will "unlock", go into forced ventilation mode for 5 minutes, and then reselect the required mode of operation. Zones designated as "slave zones" (typically corridors) cannot request heating or cooling but will utilize heating/cooling when it is available. The rad valves provide the first stage of heat in unoccupied and occupied mode.

Ventilation Mode
The system operates in ventilation mode (no heating or cooling) under the following conditions:
1) No zones are calling for heating or cooling.
2) System is switching between heating and cooling (system operates in ventilation mode for 5 minutes).
3) One or more zones have been operating at a reduced minimum position for more than 20 minutes (system operates in forced ventilation mode for 5 minutes).

System Heating Control
Stage 1 and stage 2 heating are controlled from the reference zone as follows:

	Reference Zone Call for Heat
Stage 1 On	1.0°C
Stage 1 Off	0.5°C
Stage 2 On	1.5°C
Stage 2 Off	1.0°C

System Cooling Control
Stage 1, stage 2 and stage 3 cooling are controlled from the reference zone as follows:

	Reference Zone Call for Cooling
Stage 1 On	1.2°C
Stage 1 Off	0.7°C
Stage 2 On	1.4°C
Stage 2 Off	0.9°C
Stage 3 On	1.6°C
Stage 3 Off	1.1°C

Job #:	Owner:	Drawn By:	Title: **VVT Rooftop Unit**	
Job Name: MacGregor Public School	Waterloo Region District School Board	Revision Date: April 15, 2024	**Sequence of Operation**	4

SEQUENCE OF OPERATION (CONTINUED)

Economizer Operation

Economizer operation will be substituted for first stage cooling when the outside air temperature is suitable. For units with power exhaust, the exhaust fan runs when the outside air damper is more than 50% open. The CO_2 sensor will increase the amount of minimum outside air as the CO_2 level increases from 1000 ppm to 1200 ppm. During morning warm-up or cool-down the outside air minimum position is set to zero.

Bypass Operation

The supply air static pressure sensor modulates the bypass damper between minimum and maximum settings to maintain setpoint.

Limits & Safeties (VVT ver. 3)

1) If the outside air temperature exceeds the free cooling setpoint based on outdoor air temperature and outdoor air relative humidity, the mixing dampers return to minimum outside air position.

2) The maximum amount of outside air is limited based on the outside air temperature to prevent excessively low supply air temperatures during startup.

3) The mixed air temperature sensor acts as a low limit to ensure temperature does not fall below setpoint. In applications where the mixed air sensor is located after the DX coil, the setpoint is reduced when DX cooling is enabled.

4) The supply air temperature sensor acts as a high limit for heating (70/55°C, 60/45°C) and a low limit for cooling (5/10°C, 8/13°C).

5) The supply air temperature sensor acts as a software freezestat (1/5°C, 3 minutes delay, auto reset after 5 minutes delay).

6) The supply fan has a delay-off time of 90 seconds.

7) DX cooling has a minimum-off time of 5 minutes.

8) DX cooling is disabled when the outside air temp. is below the global DX disable setpoint or when the fan is off.

9) Gas heating is disabled when the outside air temp. is above the global heating disable setpoint or when the fan is off.

10) Stage 1 gas heating has a minimum run time of 3 minutes.

11) During ventilation mode, if the supply air temperature falls below 15°C for more than two minutes, stage 1 heating will turn on until the temperature exceeds 25°C (to improve comfort).

12) The default zone setpoint is increased by 1°C when mechanical cooling is enabled (providing heating is disabled).

13) When the ventilation lockout switch is engaged, the outside air dampers close, and the system switches to unoccupied mode of operation.

14) Minimum outside air is set to zero when the global ventilation schedule is off (stand-by occupancy).

Alarms

An alarm will be generated upon the following conditions:

1) Fan status does not match start/stop signal.

2) Mixed air temperature too high (50/48°C) or too low (5/7°C).

3) Supply air temperature too high (65/63°C) or too low (5/7°C).

4) Space temperature too high (42/40°C) or too low (14/16°C).

5) Supply air static pressure too low (10/20 Pa) or too high (240/230 Pa).

6) Weekly fan runtime limit exceeded.

7) Return air CO_2 too high (1700/1650 ppm) or too low (250/300 ppm).

8) Software freezestat tripped.

	Job #:	Owner:	Drawn By:	Title: **VVT Rooftop Unit**	
		Waterloo Region District School Board		**Sequence of Operation 2**	5
	Job Name: MacGregor Public School		Revision Date: April 15, 2024		

HOT WATER UNIT HEATERS

1/20 hp

H
C

Status   HWR   HWS

T
TS16

Field

Cntrl

| DO | AI | AI |

0..5 V
0..20 A
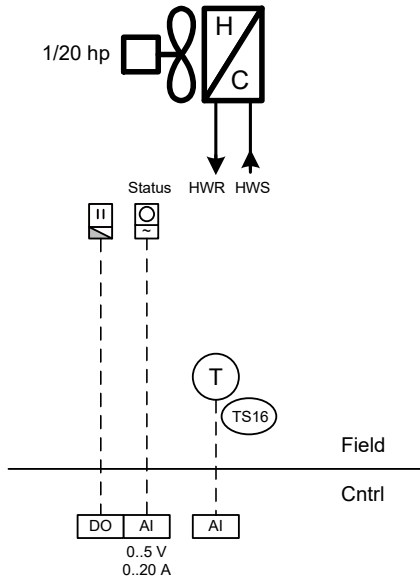
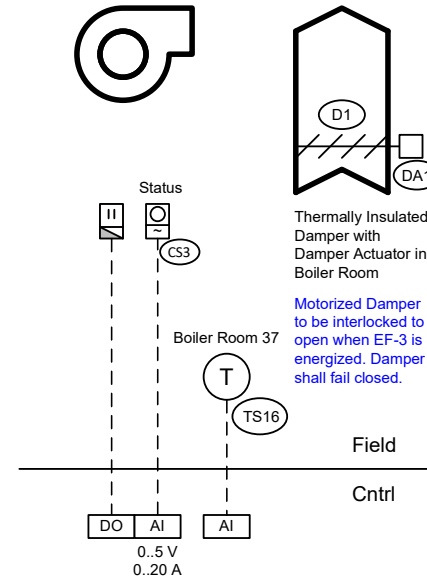| 1 Systems as Shown			
Room	Heater	Cntrl	Notes
Cust. Rm 39	UH1	Cx	

SEQUENCE OF OPERATION
Room temperature sensor TS16 cycles the fan to
maintain the occupied (19°C) or unoccupied heating
setpoint. Heating is locked out when the outside air
temperature exceeds 10°C.

Alarms:
1) The room temperature is too low (14/16°C) or too
high (38/36°C).
2) The fan status does not match the start/stop signal.

EXHAUST FANS

D1

DA1

Status

CS3

Thermally Insulated
Damper with
Damper Actuator in
Boiler Room

Motorized Damper
to be interlocked to
open when EF-3 is
energized. Damper
shall fail closed.

Boiler Room 37

T
TS16

Field

Cntrl

| DO | AI | AI |

0..5 V
0..20 A

2 Systems as Shown				
UNIT	(cfm)	(hp)	Serves	Cntrl
EF-3	500	0.25	Boiler Room 37	Cx
EF-5	100	-	Cust. 39 WR	Cx

SEQUENCE OF OPERATION
The exhaust fan cycles on when the room
temperature exceeds the cooling setpoint (Initially
23°C).This setpoint is increased when unoccupied.

Alarms:
1) The room temperature is too high (38/36°C).
2) The fan status does not match the start/stop
signal.

				CONTROL DAMPER SCHEDULE				
Unit	Width (in)	Height (in)	Area (ft²)	Required Torque (in·lb)	Blade Type	Room	ACTUATOR
VVT 7.1	12	Round	0.79	5.5	Single	Corridor 812	BELIMO LMB24-SR
VVT 7.2	16	14	1.56	10.9	Parallel	Classroom 5	BELIMO LMB24-SR
VVT 7.3	16	14	1.56	10.9	Parallel	Classroom 6	BELIMO LMB24-SR
VVT 7.4	16	14	1.56	10.9	Parallel	Classroom 7	BELIMO LMB24-SR
VVT 7.5	16	14	1.56	10.9	Parallel	Classroom 8	BELIMO LMB24-SR
BPD-7.0	32	20	4.44	31.1	Parallel	Bypass Damper	BELIMO LMB24-SR

END OF ADDENDUM