

Contents: McMillan Elementary – Controls Installation

Drawing #	Drawing Title
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1.1	Communication Bus - Diagram
1.2	NAE - Panel Layout
2.0	RTU's - Flow & Controller Diagram
3.0	RTU's Sharing TEC - Flow & Controller Diagram
4.0	EUHs - Controller Diagram

**Chevron Energy Solutions**

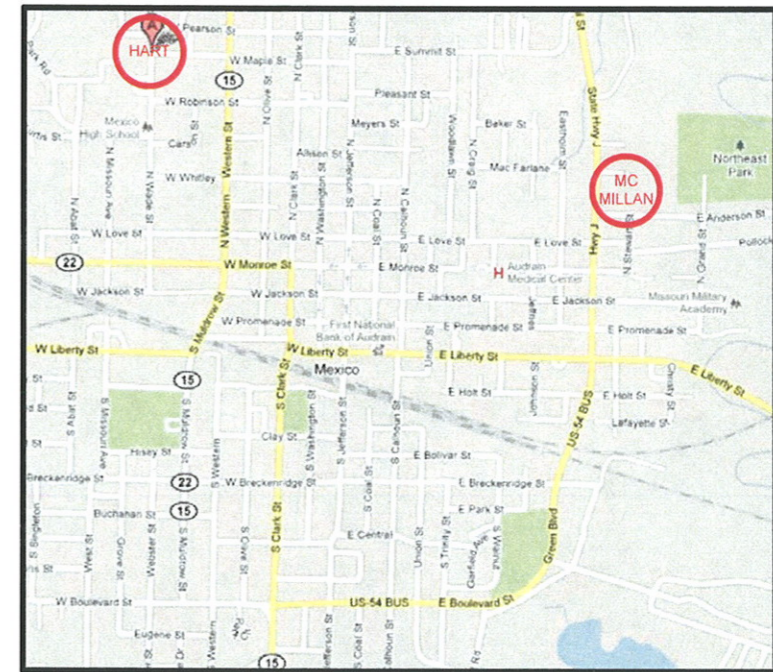
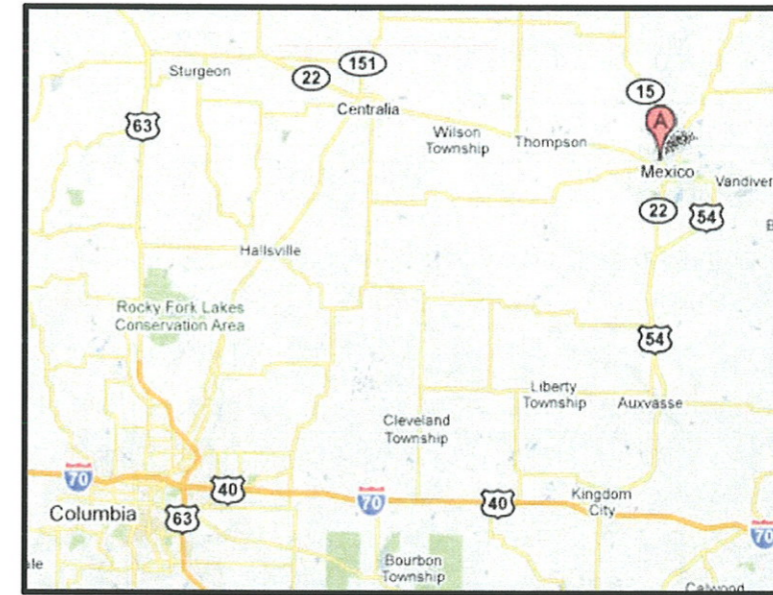
NOTE: Approval applies only to general conformity with Engineer's plans and specifications. Approval does not guarantee accuracy of detail dimensions or quantities

<input type="checkbox"/> APPROVED	<input type="checkbox"/> REVISE
<input checked="" type="checkbox"/> APPROVED AS NOTED	<input type="checkbox"/> REVISE AND RESUBMIT
<input type="checkbox"/>	

SIGNATURE *Aaron Cox*

PRINT NAME Aaron Cox

DATE 4/29/11



MCMILLAN ELEMENTARY SCHOOL  
1101 E ANDERSON ST  
MEXICO, MO 65265

DAVIS H. HART CAREER CENTER  
905 N. WADE  
MEXICO, MO 65265

TYPICAL WIRE SIZE UNLESS NOTED  
N2 BUS 18/3  
FC BUS 22/3  
SA BUS 22AWG/2PAIR  
CONTROL WIRE 18AWG  
24VAC POWER 14AWG

- TERMINAL STRIP TAG
- SINGLE WIRE TAG
- COMPONENT TERMINAL /TAG
- WIRE GROUP TAG
- PNEUMATIC TAG



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Project Title <b>Mexico Public Schools - Controls Installation 1101 East Anderson Street Mexico, MO 65265</b>	REVISIONS

Drawing Title <b>Cover McMillan Elementary Sheet Submittal Drawing</b>	FILE NAME MPS-McMillan Elementary-Submittals.vsd
	DRAWN BY CB
Sales Engineer <b>TJB</b>	DATE 4/20/2011 2:54:42 PM
	Project Manager <b>MAR</b>
Project Engineer <b>CB</b>	CONTRACT NUMBER <b>C1-6009</b>
	DRAWING NUMBER <b>0.0</b>



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Project Title  
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 Mexico, MO 65265

REVISIONS

Drawing Title  
**Riser McMillan Elementary Diagram Submittal Drawing**

FILE NAME  
 MPS.McMillan Elementary.Submittals.vsd

SALES ENGINEER  
 TJB

PROJECT MANAGER  
 MAR

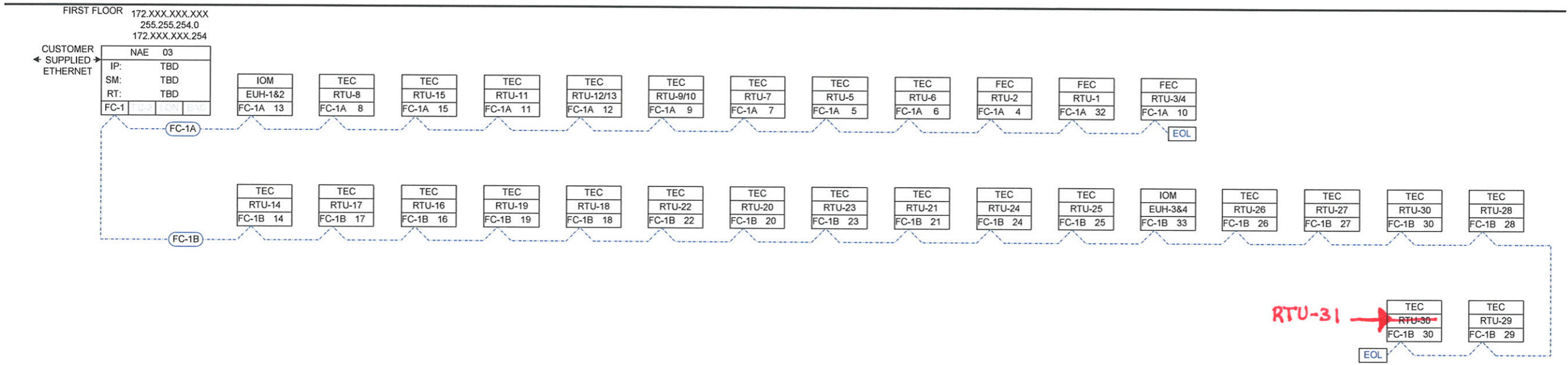
PROJECT ENGINEER  
 CB

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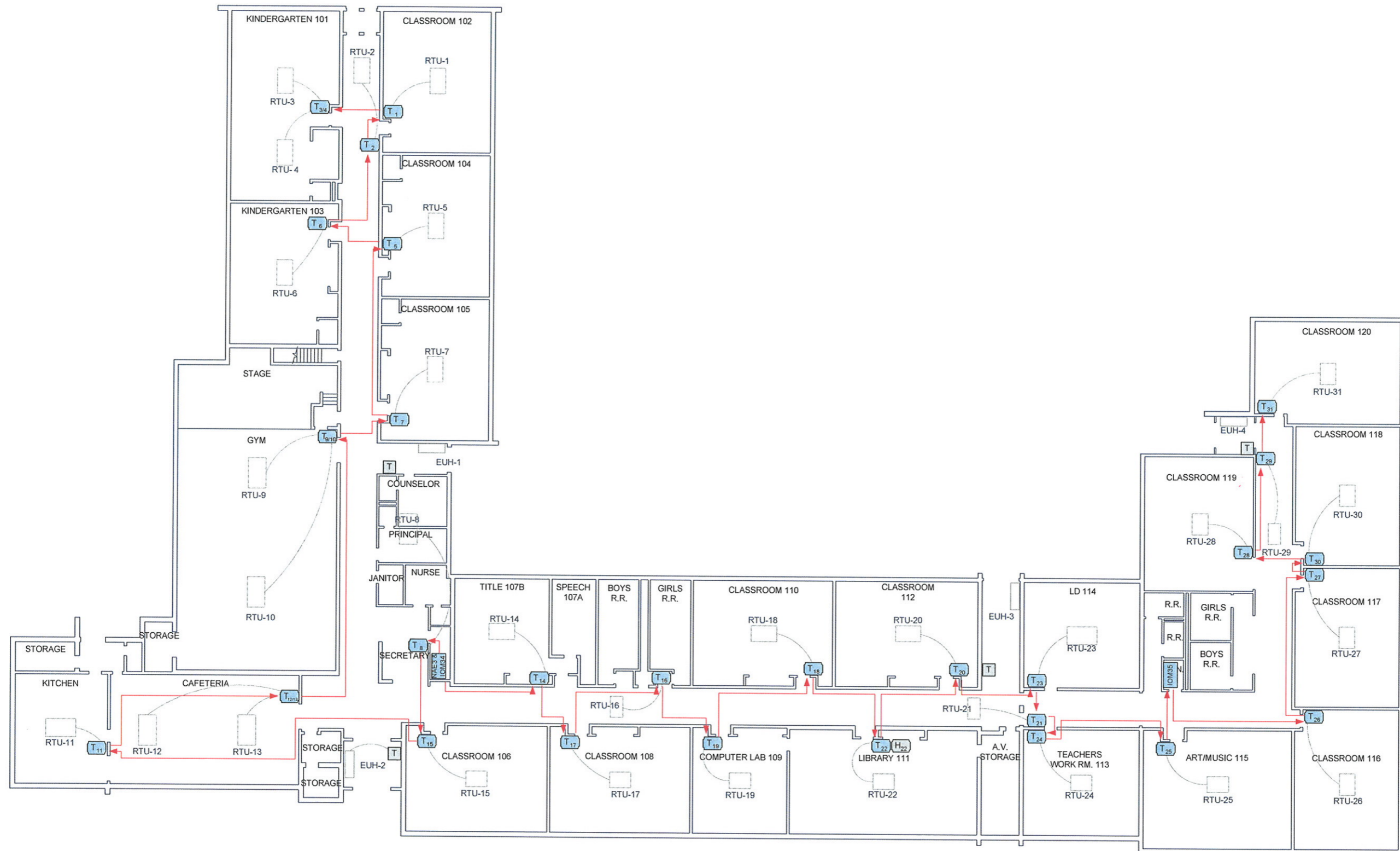
DRAWN BY  
 CB

CONTRACT NUMBER  
**C1-6009**

DRAWING NUMBER  
**1.0**



Bill of Material		
Item	QTY	Part
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**Drawing Title**  
 Communication Bus  
 McMillan Elementary  
 Diagram  
 Submittal Drawing

**FILE NAME**  
 MPS.McMillan Elementary.Submittals.vsd

**SALES ENGINEER**  
 TJB

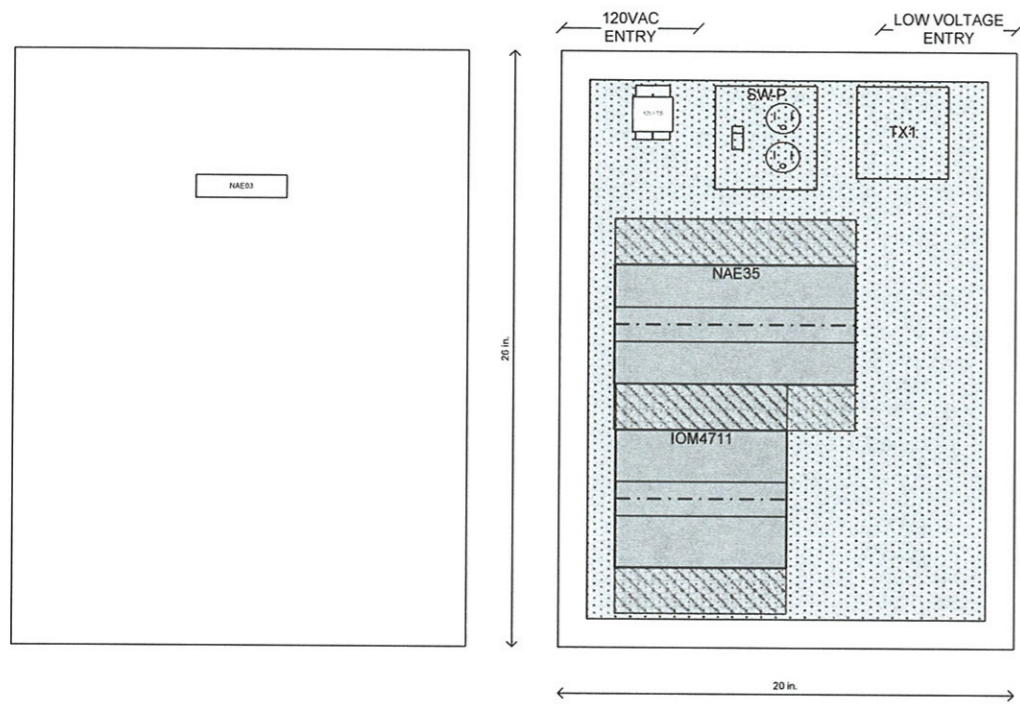
**PROJECT MANAGER**  
 MAR

**PROJECT ENGINEER**  
 CB

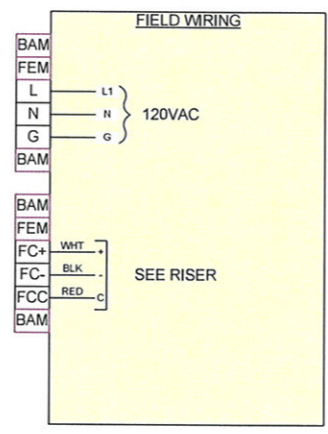
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**CONTRACT NUMBER**  
 C1-6009

**DRAWING NUMBER**  
 1.1



ENC  
TX  
SW/R  
NAE03



Bill of Material		
Item	QTY	Part
DIN	1	BAM-1000
ENC	1	RET2620ULP
NAE03	1	MS-NAE3510-2
SW/R	1	S1T20W, RD20W, 4BX21834, 4BXCVRATGDU
TERM	1	M4/6-BK
TERM	1	M4/6-BG
TERM	1	M4/6P
TERM	4	BAM2
TERM	2	FEM6
TX	1	X100CBB



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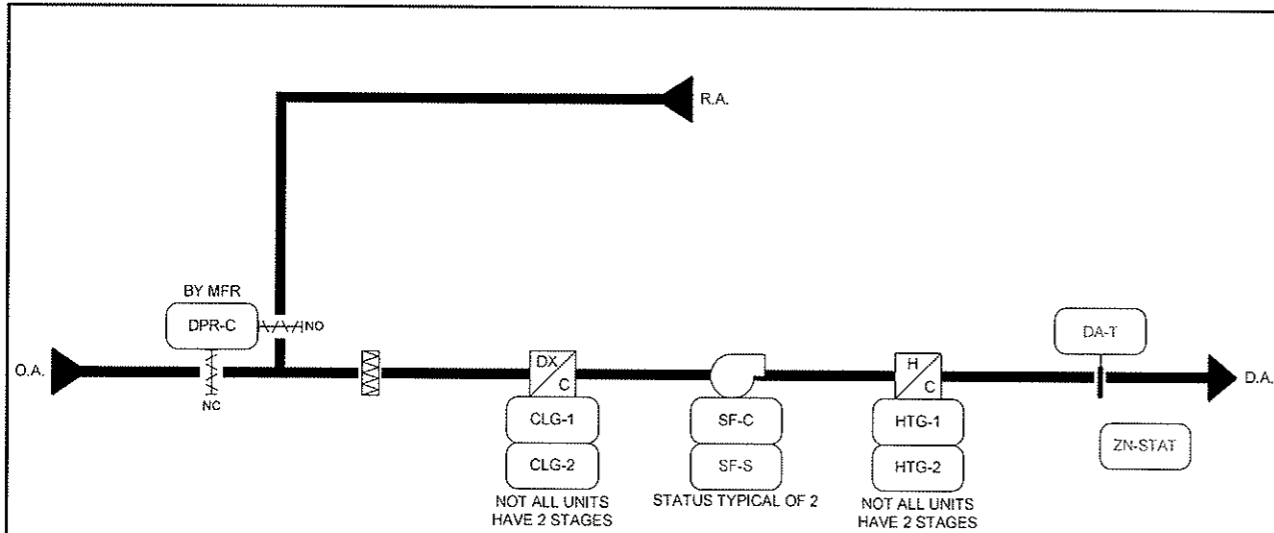


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**Mexico Public Schools - Controls Installation**  
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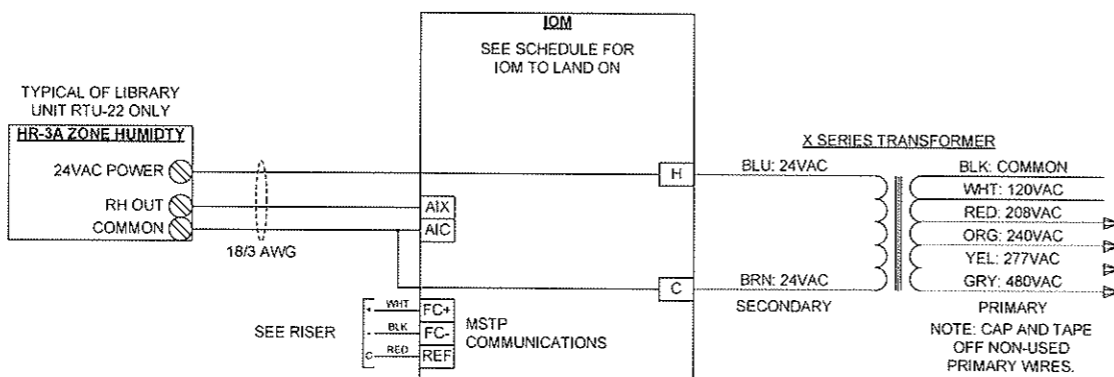
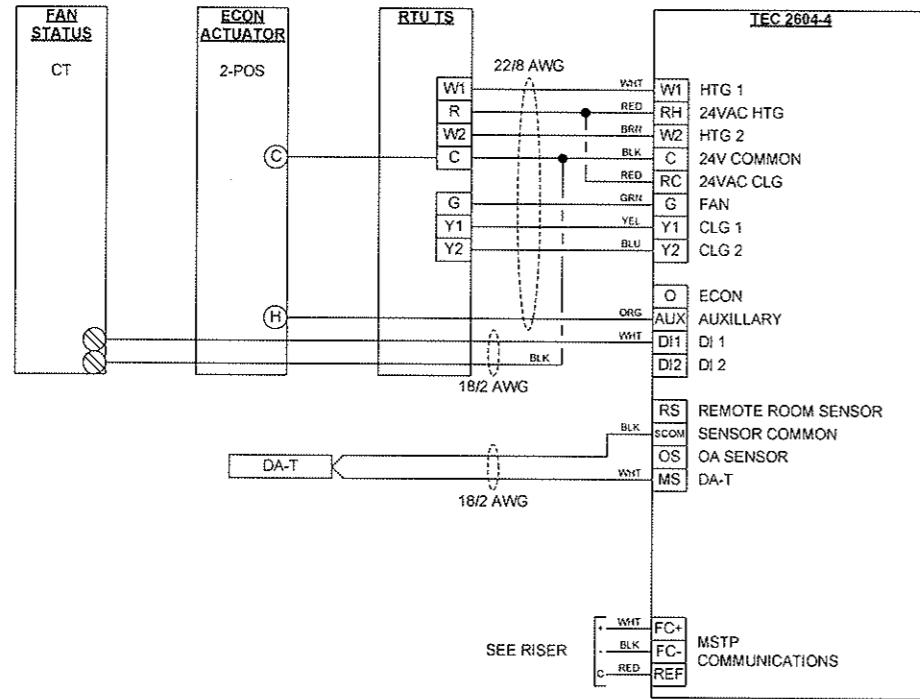
Drawing Title <b>NAE          McMillan Elementary          Panel Layout          Submittal Drawing</b>	FILE NAME MP5.McMillan Elementary.Submittals.vsd	DRAWN BY CB	DATE 4/20/2011 2:54:42 PM
	Sales Engineer <b>TJB</b>	Project Manager <b>MAR</b>	
	Project Engineer <b>CB</b>		

CONTRACT NUMBER  
**C1-6009**

DRAWING NUMBER  
**1.2**



RTUS 8,11, 23  
RTUS 1, 2, 5-8, 11, 14-31  
RTUS 1, 2, 5-8, 11, 14-31  
RTUS 1, 2, 5-8, 11, 14-31



Bill of Material		
Item	QTY	Part
DA-T	25	TE-6361M-1
SF-S	2	CSD-CF0A0-1
ZN-STAT	25	TEC2604-4

**Sequence of Operation**  
(Single Zone, Constant Volume, NG Heating, DX Cooling)

**Occupied Mode:** Refer to Standards of Control for Operating Schedule (adj.)

**Supply Fan Optimal Start:** The supply fan shall be started and run continuously during the occupied mode with start/stop scheduling and optimal start via the BAS. The BAS shall use the space temperature sensor and the outside air temperature to determine when to enable the system. If the supply fan status does not match the commanded value within 30 seconds (adj.), an alarm shall be sent to the operator work station. The BAS shall monitor and create trend logs of the fan's runtime.

**Morning Warm-up:** The BAS shall go through a morning warm-up cycle when the optimal start routine is enabled. The outside air damper shall remain closed and the return air damper shall remain open unless the economizer can be used for cooling. The DX cooling or natural gas heating shall be enabled to attain the space temperature setpoint.

**Outside Air Damper:** During occupied periods, when the fan is running, the outside air damper shall be open. During unoccupied periods the outside air damper shall be closed.

**NG Heating Control:** During occupied periods when the fan is running and the outside air temperature is below 55 °F (adj.), the BAS shall stage/cycle the natural gas heating system to maintain the heating space temperature setpoint of 70 °F (adj.). When the outside air temperature is above 55 °F (adj.), the natural gas heating system shall be locked out.

**DX Cooling Control:** During occupied periods when the fan is running and the outside air temperature is above 60 °F (adj.), the BAS shall enable the DX cooling system and shall stage/cycle compressors to maintain the cooling space temperature setpoint of 74 °F (adj.). Once a stage is cycled off, it shall not be enabled for 5 minutes (adj.). When the outside air is below 60 °F (adj.), the DX cooling system shall be locked out.

**Unoccupied Setback Cycle:** The BAS shall monitor the space temperature during the unoccupied period. If the space temperature drops below the setback temperature setpoint of 55°F (adj.) in heating or rises above the setback temperature setpoint of 85 °F (adj.) in cooling, the system shall be enabled. The supply fan shall be enabled, the outside air damper shall remain closed, the return air damper shall remain open and the NG heating/DX cooling shall be enabled until the space temperature reaches 3 °F (adj.) above the setback temperature setpoint for heating or 3 °F (adj.) below the setback temperature setpoint for cooling.

**Humidity Control (RTU-22 Only):** During the unoccupied period, if the space humidity rises above the setpoint (adj.), the units shall be enabled until the space humidity falls below the setpoint.

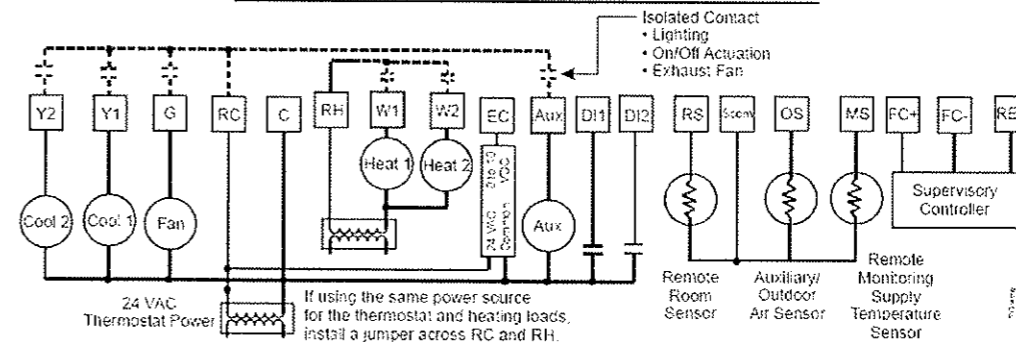
**Override:** The space temperature sensor shall be equipped with a manual override. When the override button is activated, the unit shall return to the occupied mode for 2-hours (adj.).

**Shutdown:** When the unit is shutdown by a stop command or system safety, the unit shall be set as follows:

- Supply fan off
- Outside air damper shall be closed
- Heating shall be disabled
- Cooling shall be disabled

All existing hardwired safeties, such as smoke detectors, low temperature detectors, fire stats and motor overloads shall remain functional and intact.

**TYPICAL RTU STAND ALONE TEC2604-4**



**XEC Controls**

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TECHNICAL TRAINING LEARNING

Project Title  
Mexico Public Schools - Controls Installation  
1101 East Anderson Street  
Mexico, MO 65265

Project Engineer  
TJB

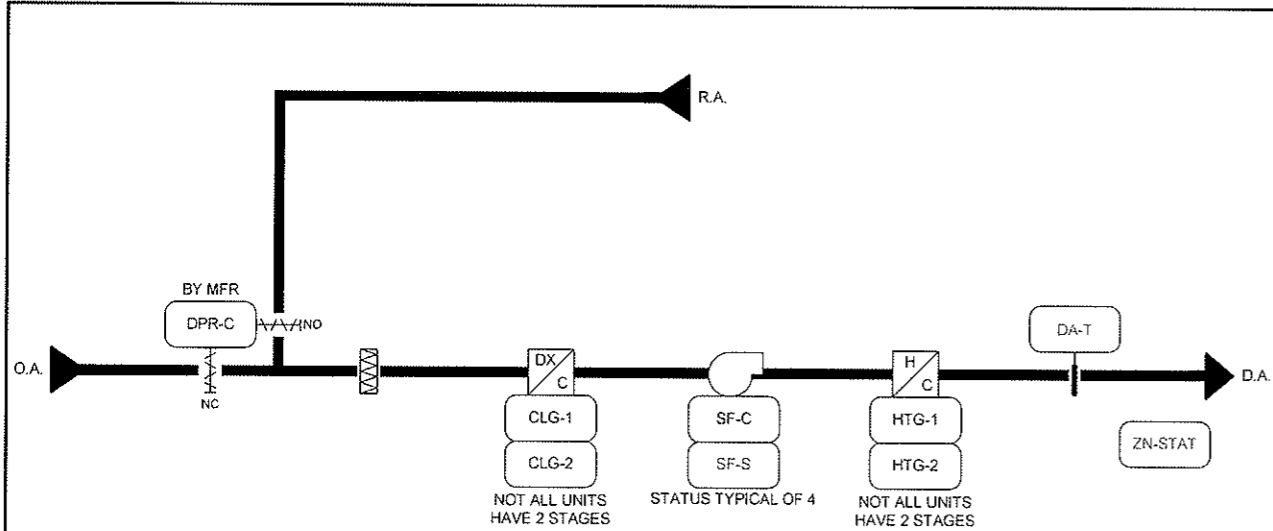
Project Manager  
MAR

Project Engineer  
CB

CONTRACT NUMBER  
**C1-6009**

DRAWING NUMBER  
**2.0**

DATE  
4/20/2011  
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Bill of Material		
Item	QTY	Part
DA-T	3	TE-6361M-1
R:E	3	RH2B-ULAC24V, SH2B-05
R:G	3	RH2B-ULAC24V, SH2B-05
R:W1	3	RH2B-ULAC24V, SH2B-05
R:W2	2	RH2B-ULAC24V, SH2B-05
R:Y1	3	RH2B-ULAC24V, SH2B-05
R:Y2	2	RH2B-ULAC24V, SH2B-05
SF-S	4	CSD-CF0A0-1
ZN-STAT	3	TEC2604-4

**Sequence of Operation**  
(Single Zone, Constant Volume, NG Heating, DX Cooling)

**Occupied Mode:** Refer to Standards of Control for Operating Schedule (adj.)

**Supply Fan Optimal Start:** The supply fan shall be started and run continuously during the occupied mode with start/stop scheduling and optimal start via the BAS. The BAS shall use the space temperature sensor and the outside air temperature to determine when to enable the system. If the supply fan status does not match the commanded value within 30 seconds (adj.), an alarm shall be sent to the operator work station. The BAS shall monitor and create trend logs of the fan's runtime.

**Morning Warm-up:** The BAS shall go through a morning warm-up cycle when the optimal start routine is enabled. The outside air damper shall remain closed and the return air damper shall remain open unless the economizer can be used for cooling. The DX cooling or natural gas heating shall be enabled to attain the space temperature setpoint.

**Outside Air Damper:** During occupied periods, when the fan is running, the outside air damper shall be open. During unoccupied periods the outside air damper shall be closed.

**NG Heating Control:** During occupied periods when the fan is running and the outside air temperature is below 55 °F (adj.), the BAS shall stage/cycle the natural gas heating system to maintain the heating space temperature setpoint of 70 °F (adj.). When the outside air temperature is above 55 °F (adj.), the natural gas heating system shall be locked out.

**DX Cooling Control:** During occupied periods when the fan is running and the outside air temperature is above 60 °F (adj.), the BAS shall enable the DX cooling system and shall stage/cycle compressors to maintain the cooling space temperature setpoint of 74 °F (adj.). Once a stage is cycled off, it shall not be enabled for 5 minutes (adj.). When the outside air is below 60 °F (adj.), the DX cooling system shall be locked out.

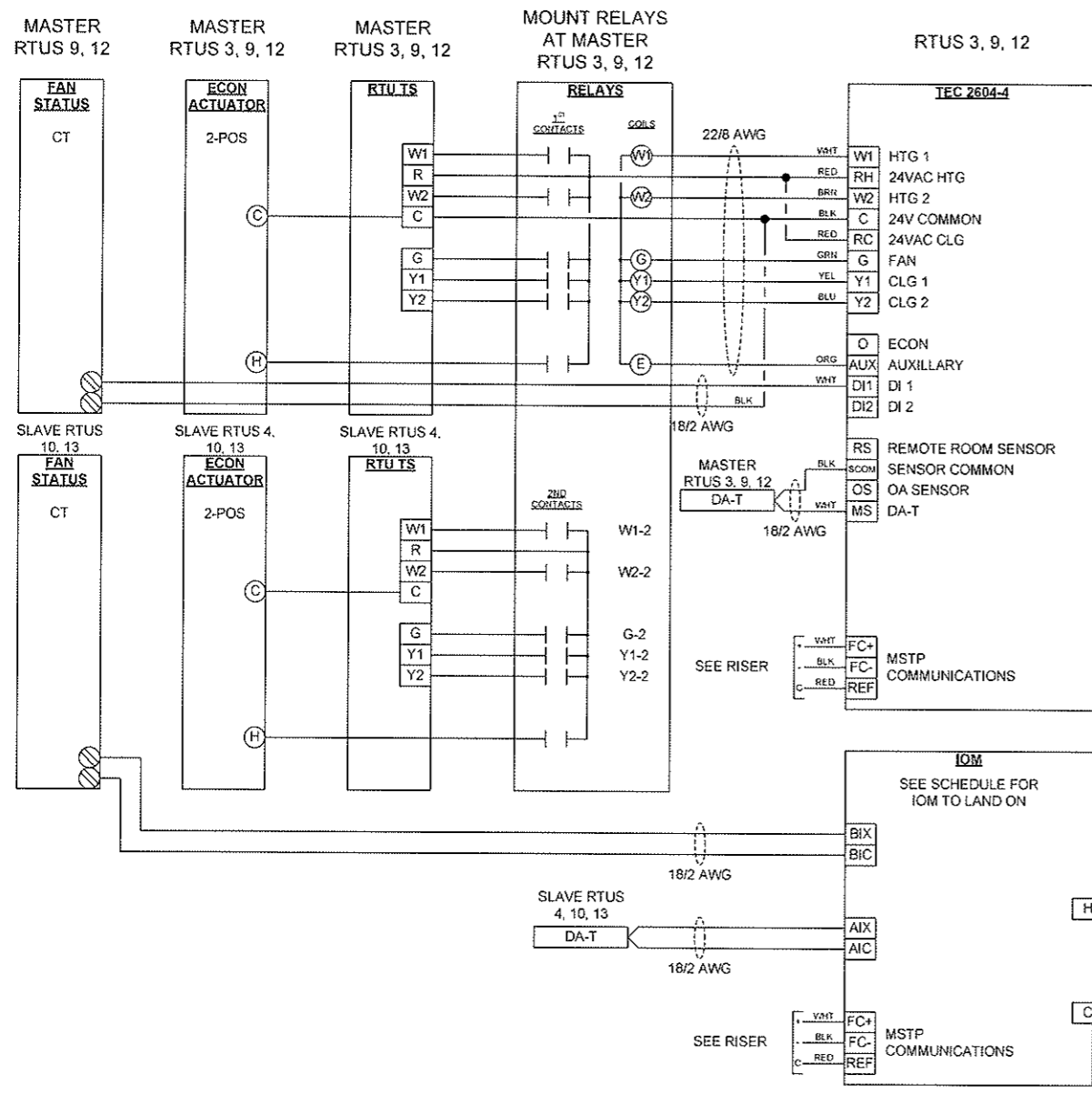
**Unoccupied Setback Cycle:** The BAS shall monitor the space temperature during the unoccupied period. If the space temperature drops below the setback temperature setpoint of 55 °F (adj.) in heating or rises above the setback temperature setpoint of 85 °F (adj.) in cooling, the system shall be enabled. The supply fan shall be enabled, the outside air damper shall remain closed, the return air damper shall remain open and the NG heating/DX cooling shall be enabled until the space temperature reaches 3 °F (adj.) above the setback temperature setpoint for heating or 3 °F (adj.) below the setback temperature setpoint for cooling.

**Humidity Control (RTU-22 Only):** During the unoccupied period, if the space humidity rises above the setpoint (adj.), the units shall be enabled until the space humidity falls below the setpoint.

**Override:** The space temperature sensor shall be equipped with a manual override. When the override button is activated, the unit shall return to the occupied mode for 2-hours (adj.).

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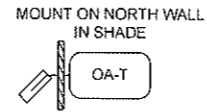
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Project Title <b>Mexico Public Schools - Controls Installation</b> 1101 East Anderson Street Mexico, MO 65265	REVISIONS <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>NO.</th> <th>DESCRIPTION</th> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> </table>	NO.	DESCRIPTION				
NO.	DESCRIPTION						
Drawing Title <b>RTU's Sharing TEC McMillan Elementary Flow &amp; Controller Diagram Submittal Drawing</b>	Sales Engineer <b>TJB</b> Project Manager <b>MAR</b> Project Engineer <b>CB</b>						
CONTRACT NUMBER <b>C1-6009</b>							
DRAWING NUMBER <b>3.0</b>							



Item	QTY	Part
ENC	1	RET1812ULP-DB
EUH1-T	1	KTR85
EUH2-T	1	KTR85
EUH3-T	1	KTR85
EUH4-T	1	KTR85
IOM	2	MS-IOM4711-0
OA-T	1	TE-6313P-1
R:EUH1-C	1	V100
R:EUH2-C	1	V100
R:EUH3-C	1	V100
R:EUH4-C	1	V100
RTU10:DA-T	1	TE-6311M-1
RTU13:DA-T	1	TE-6311M-1
RTU22:ZN-H	1	HWX3XSX
RTU4:DA-T	1	TE-6311M-1
TX	2	TX50CBA



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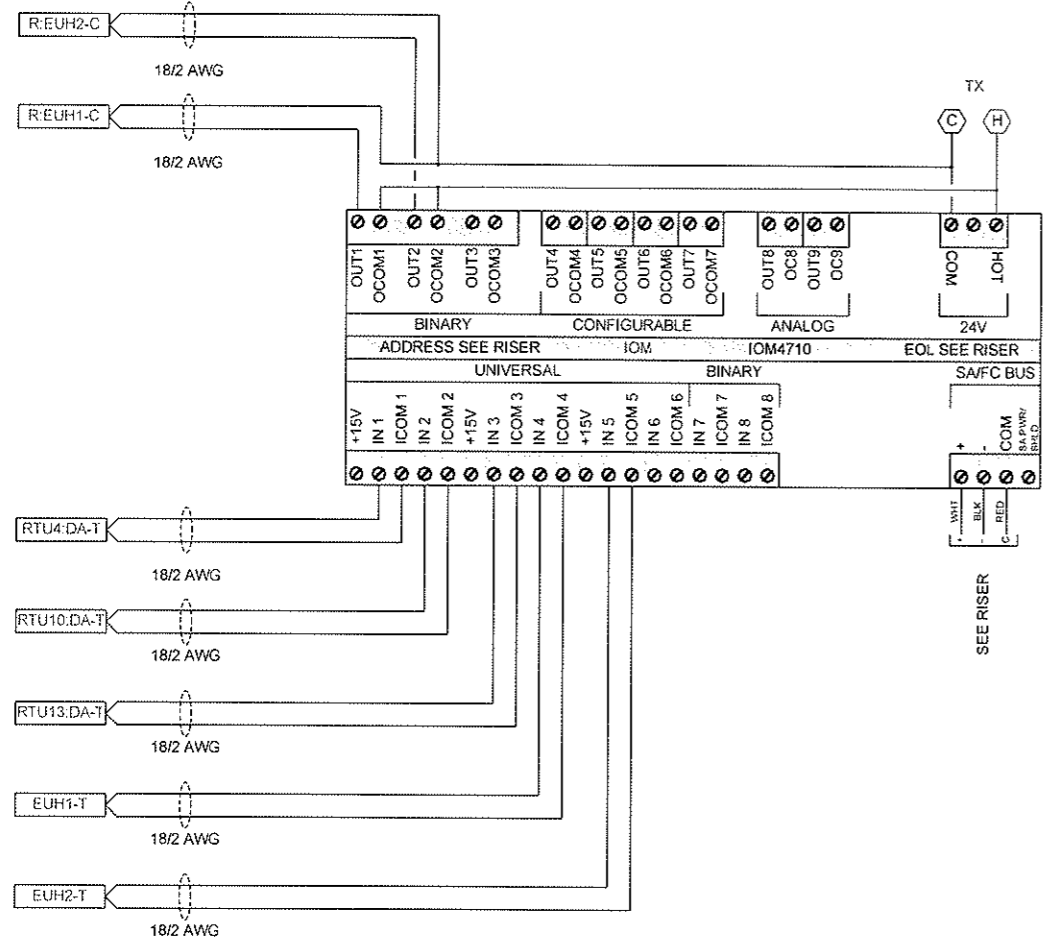


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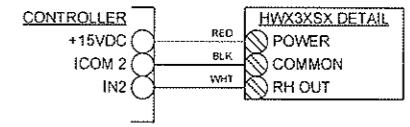
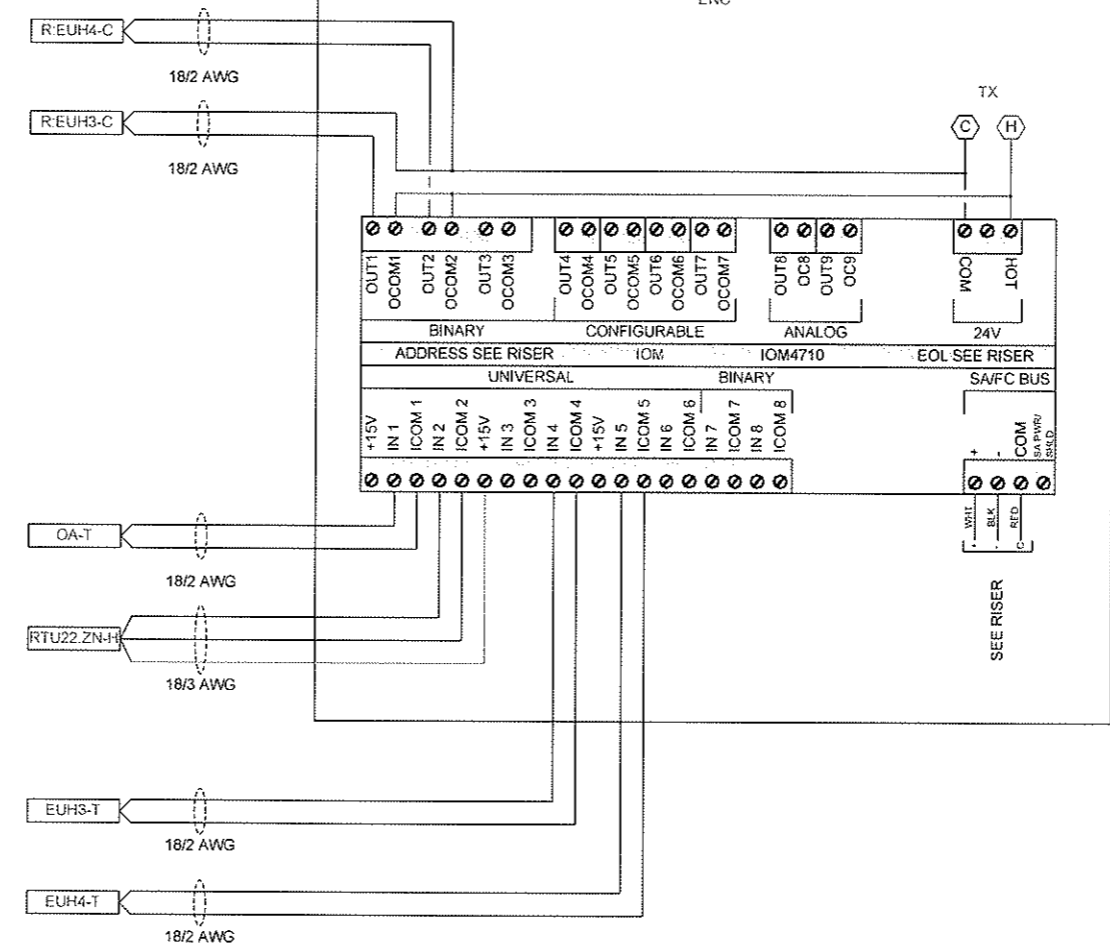
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 DESIGNED BY  
**CB**  
 DATE  
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 SALES ENGINEER  
**TJB**  
 PROJECT MANAGER  
**MAR**  
 PROJECT ENGINEER  
**CB**

CONTRACT NUMBER  
**C1-6009**  
 DRAWING NUMBER  
**4.0**

LOCATE IN THE NAE CONTROL PANEL



LOCATE ABOVE CEILING AS SHOWN ON DWG 1.1



**Sequence of Operation**

**EUH-1 through EUH-4 (Electric Unit Heaters)**

**Occupied Mode:** Refer to Standards of Control for Operating Schedule (adj.)

During occupied periods when the outside air temperature is below 55 °F (adj.), the BAS shall enable the electric unit heaters; the units shall cycle to maintain the space temperature through their local controls. During the unoccupied periods when the outside air temperature is 40 °F (adj.) or above the units shall be disabled. When the outside air temperature is below 40 °F (adj.), the units shall remain enabled.

All existing hardwired safeties, such as smoke detectors, low temperature detectors, fire stats and motor overloads shall remain functional and intact.

