

Contents: Davis H. Hart Career Center – Controls Installation

Drawing #	Drawing Title
0.0	Cover - Sheet
1.0	Riser - Diagram
1.1	Communication Bus - Routing
1.2	NAE - Panel Layout
2.0	RTU's - Flow & Controller Diagram
3.0	VVT's - Flow & Controller Diagram
4.0	HVU's - Flow & Controller Diagram
5.0	EUHs - Controller Diagram

Chevron Energy Solutions

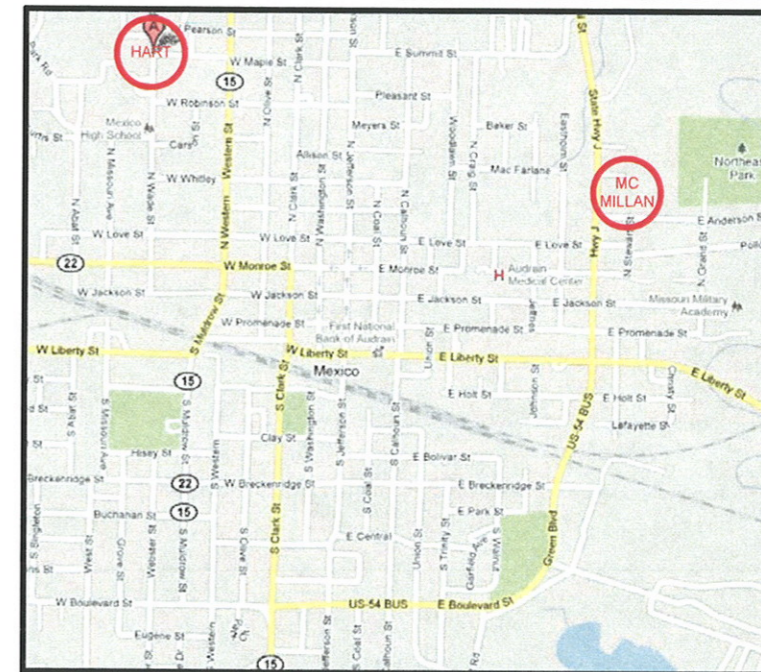
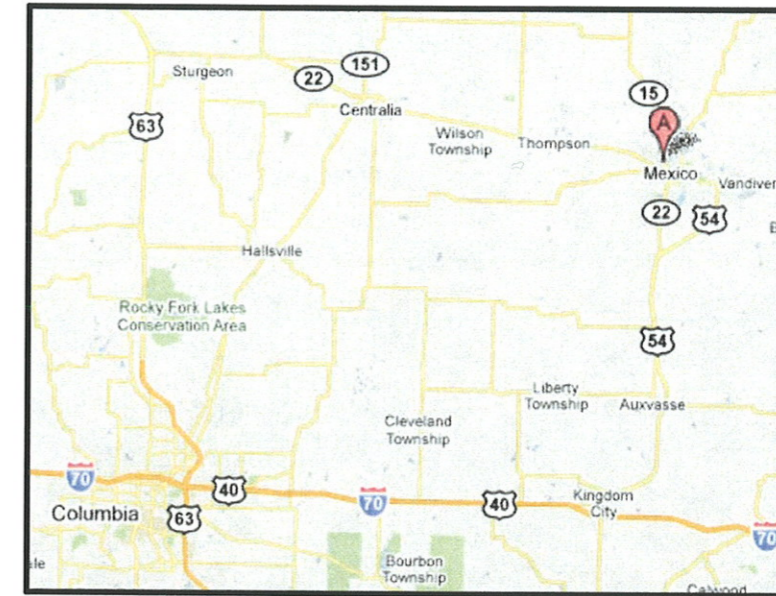
NOTE: Approval applies only to general conformity with Engineer's plans and specifications. Approval does not guarantee accuracy of detail dimensions or quantities

APPROVED REVISE
 APPROVED AS NOTED REVISE AND RESUBMIT

SIGNATURE *Agron Cox*

PRINT NAME Agron 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



XEC, Inc.
7932 Nieman Rd.
Lenexa, KS 66214
P: 913.563.4260
F: 913.563.4269
www.xeccinc.com



Project Title
Mexico Public Schools - Controls Installation
905 North Wade
Mexico, MO 65265

FILE NAME
MPS Hart Career Center-Submittal.vsd

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DATE 4/20/2011 2:53:05 PM

Sales Engineer
TJB

Project Manager
MAR

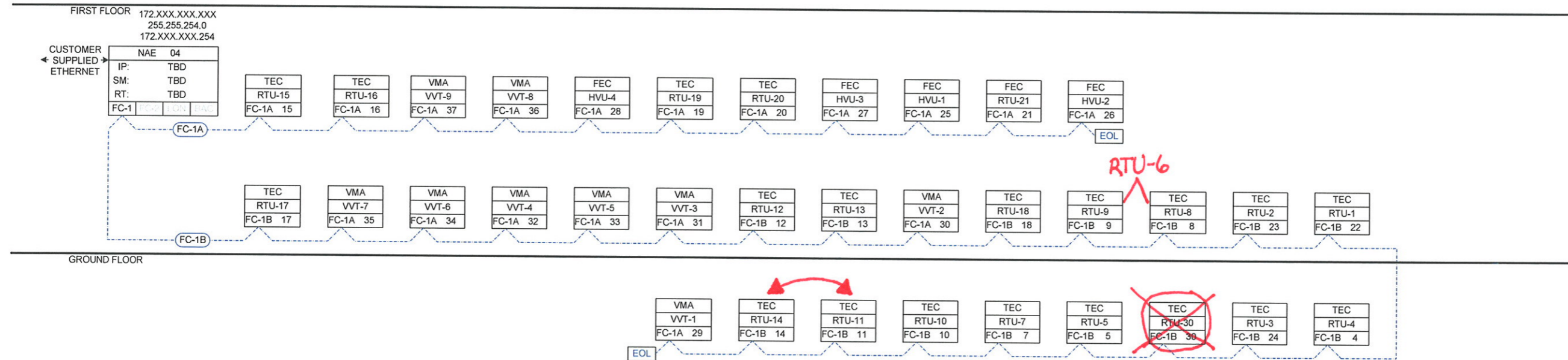
Project Engineer
CB

CONTRACT NUMBER
C1-6009

DRAWING NUMBER
0.0



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 Lenexa, KS 66214
 P: 913.563.4260
 F: 913.563.4269
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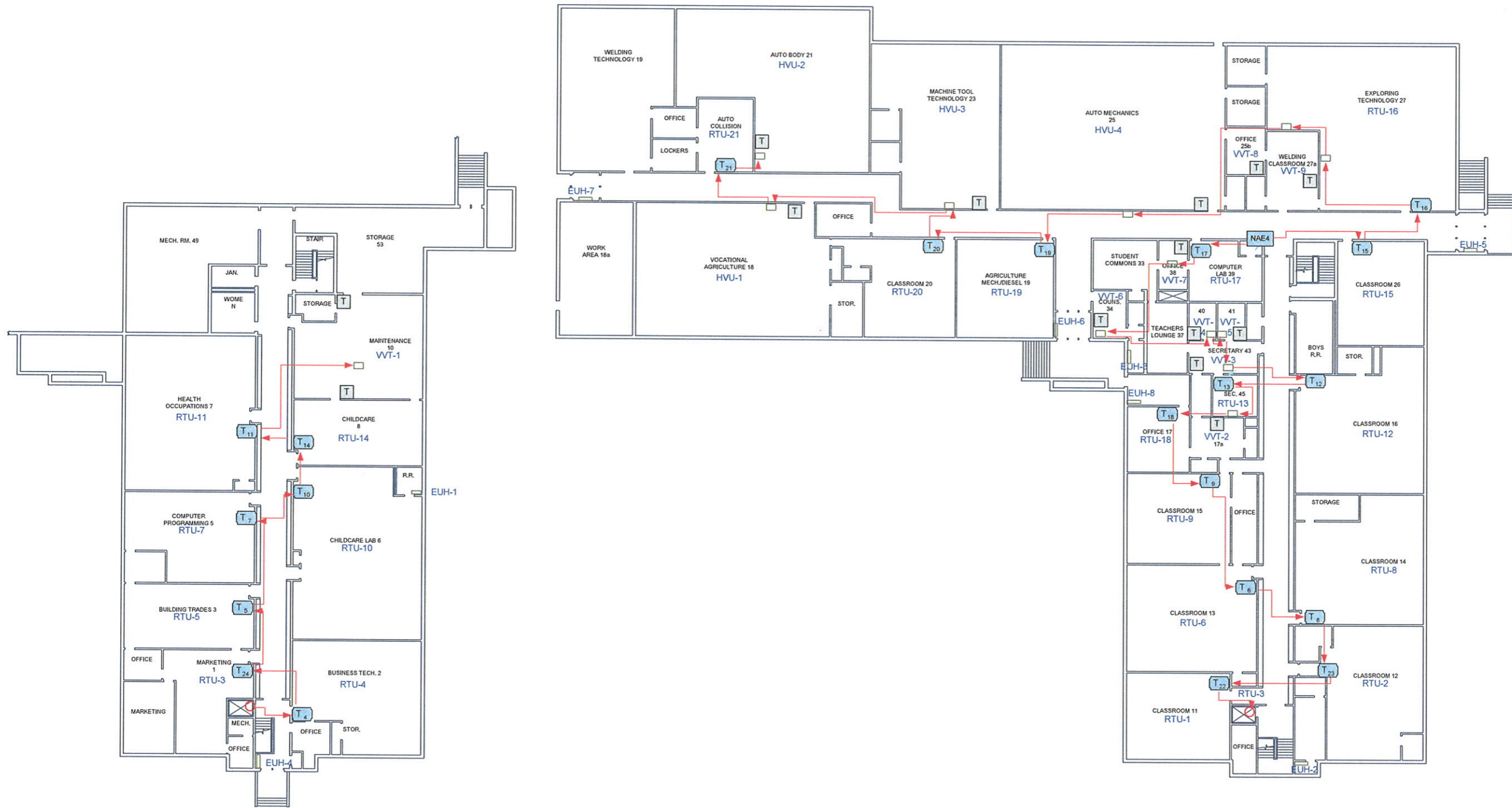
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Project Title
Mexico Public Schools - Controls Installation
 905 North Wade
 Mexico, MO 65265

Revisions
 Drawing Title
Riser Hart Career Center Diagram Submittal Drawing
 File Name
 M.P.S.Hart Career Center.Submittal.vsd
 Sales Engineer
 TJB
 Project Manager
 MAR
 Project Engineer
 CB

CONTRACT NUMBER
C1-6009
 DRAWING NUMBER
1.0

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Drawing Title
 Communication Bus
 Hart Career Center
 Routing
 Submittal Drawing

FILE NAME
 MPS-Hart Career Center.Submittal.vsd

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 CB

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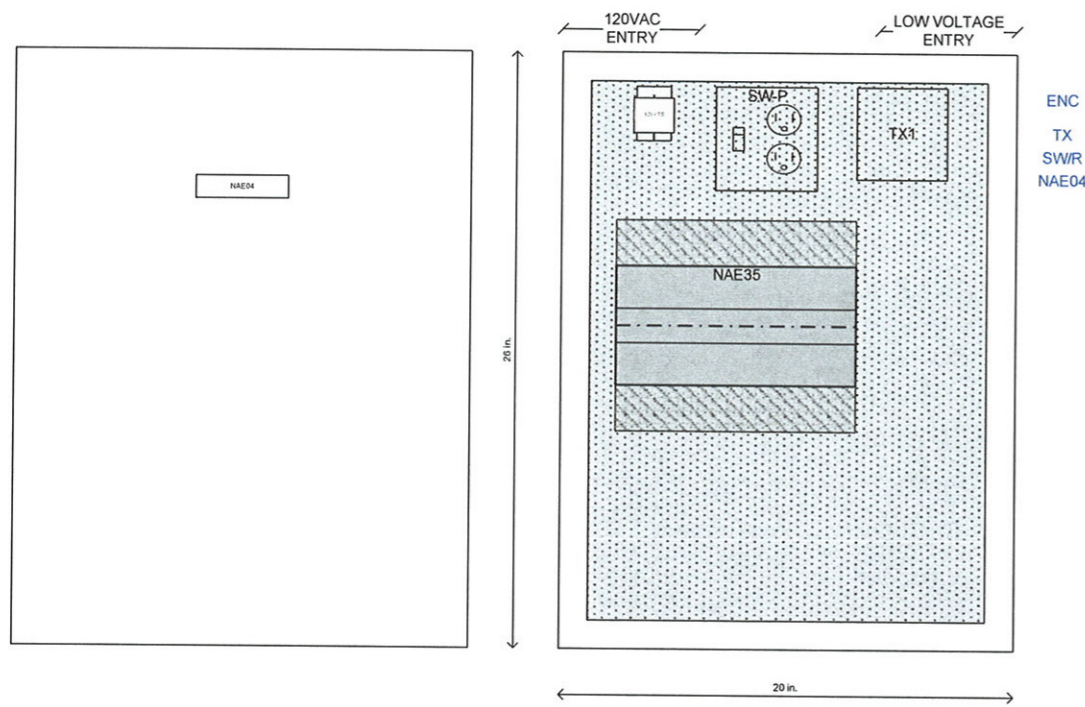
Sales Engineer
 TJB

Project Manager
 MAR

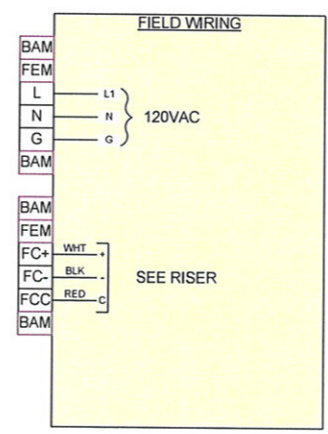
Project Engineer
 CB

CONTRACT NUMBER
 C1-6009

DRAWING NUMBER
 1.1



ENC
TX
SW/R
NAE04



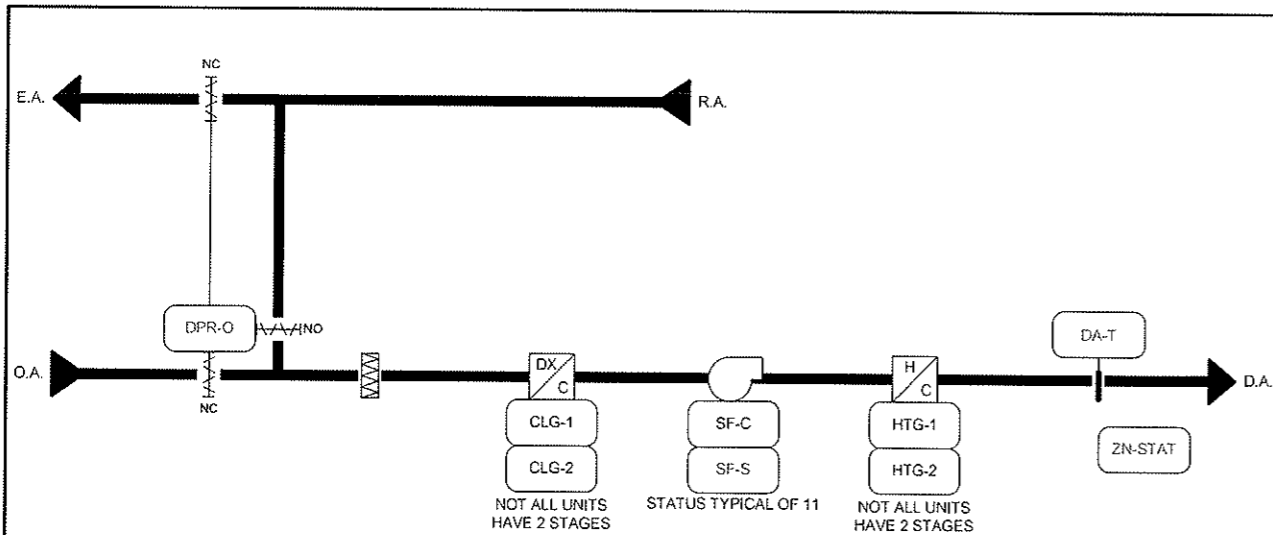
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DIN	1	BAM-1000
ENC	1	RET2620ULP
NAE04	1	MS-NAE3510-2
SW/R	1	S1T20W, RD20W, 4BX21834, 4BXCVRATGDU
TERM	1	M4/6-BK
TERM	1	M4/6-BG
TERM	1	M4/6P
TERM	4	BAM2
TERM	2	FEM6
TX	1	X100CBB



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Project Title Mexico Public Schools - Controls Installation 905 North Wade Mexico, MO 65265	REVISIONS	
Drawing Title NAE Hart Career Center Panel Layout Submittal Drawing FILE NAME MPS:Hart Career Center.Submittal.vsd DRAWN BY CB DATE 4/20/2011 2:53:05 PM	Sales Engineer TJB	
	Project Manager MAR	
	Project Engineer CB	
	CONTRACT NUMBER C1-6009	
DRAWING NUMBER 1.2		



Bill of Material		
Item	QTY	Part
DA-T	21	TE-6361M-1
DPR-O	21	M9206-GGA-2S
SF-S	11	CSD-CF0A0-1
ZN-STAT	21	TEC2604-4

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 7932 Nieman Rd.
 Lenexa, KS 66214
 P: 913.563.4260
 F: 913.563.4269
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Sequence Of Operation

RTU-1 through RTU-21
 (Single Zone, Constant Volume, NG Heating, DX Cooling)
 (Single Zone serving VVTs, 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. 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.

Economizer Control: When the outside air temperature is below the economizer changeover setpoint of 65°F (adj.) and the unit is in the cooling mode, the mixed air dampers shall modulate in sequence to maintain the cooling space temperature setpoint. When the economizer cannot maintain the space temperature setpoint and mechanical cooling is available, the DX cooling system shall be enabled. When the outside air temperature is above the economizer changeover setpoint, the outside air damper shall modulate to the minimum position (adj.). The minimum discharge air temperature shall be 50°F (adj.).

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.

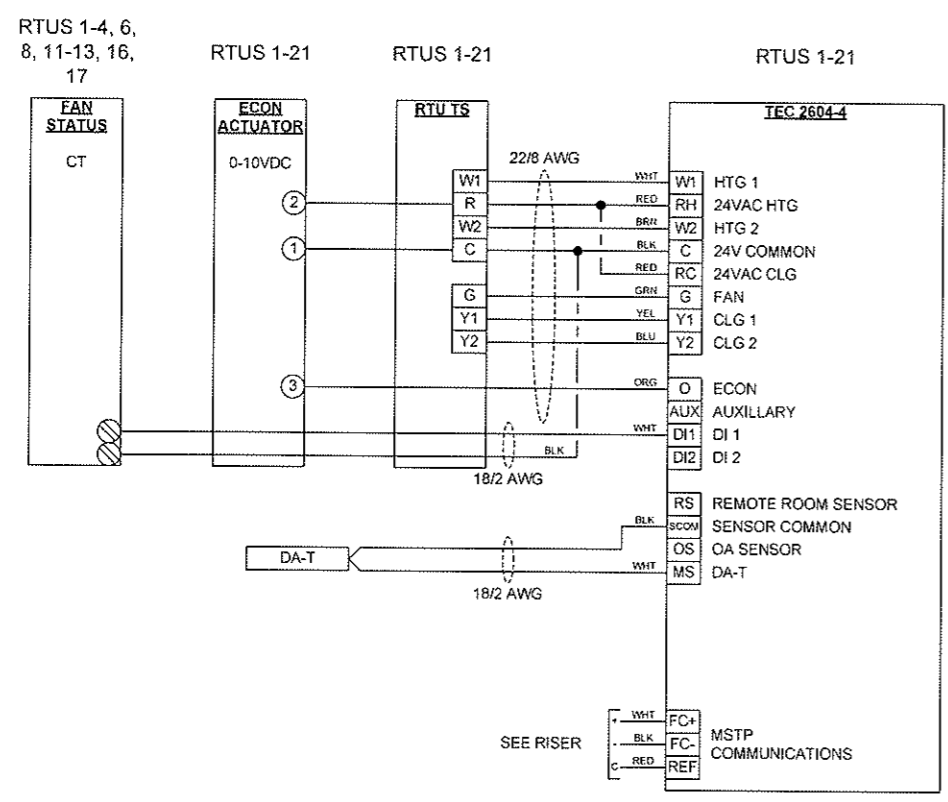
Unoccupied Setback Cycle: The BAS shall monitor the space temperature during the unoccupied period. If the space temperature drops below the setback temperature setpoint of 55°F (adj.) in heating or rises above the setback temperature setpoint of 85°F (adj.) in cooling, the system shall be enabled. The 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.

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.). The units that are associated with VVT's shall also get their temporary occupancy sent to the appropriate RTU.

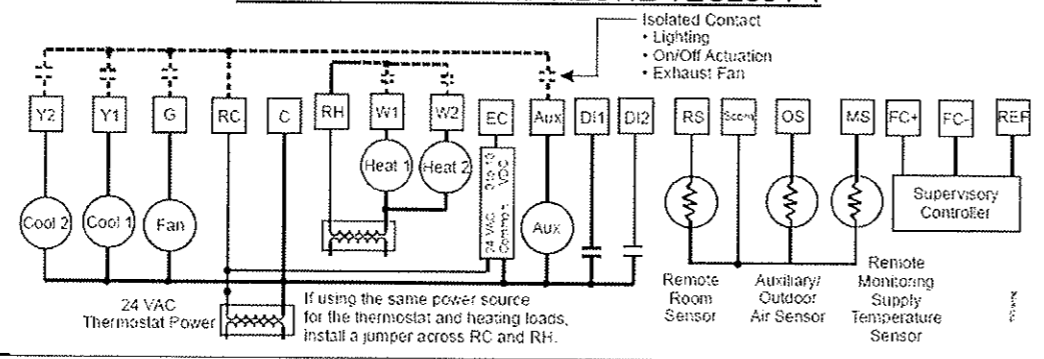
Shutdown: When the unit is shutdown by a stop command or system safety, the unit shall be set as follows:

- Supply fan off
- Outside air damper shall be closed
- Return air damper shall be open
- 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



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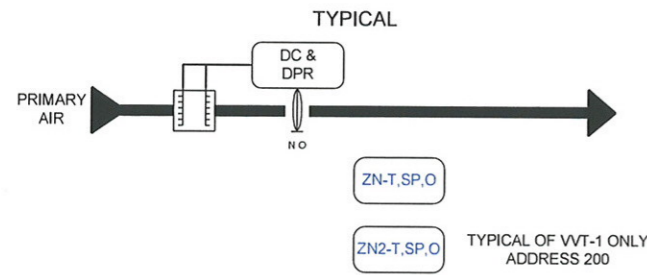
Project Title: Mexico Public Schools - Controls Installation
905 North Wade Mexico, MO 65265

Project Manager: MAR
Project Engineer: CB

Contract Number: C1-6009
Drawing Number: 2.0

DATE: 4/20/2011
TIME: 2:53:05 PM

Drawn By: CB
Checked By: TJB



Bill of Material		
Item	QTY	Part
R:EUH1-EN	1	V100
R:EUH2-EN	1	V100
R:EUH3-EN	1	V100
R:EUH4-EN	1	V100
R:EUH5-EN	1	V100
R:EUH6-EN	1	V100
R:EUH8-EN	1	V100
TX	9	X050CBA
VMA	9	MS-VMA1620-0
ZN-T,SP,O	9	NS-BTB7002-0
ZN2-T,SP,O	1	NS-BTB7003-0

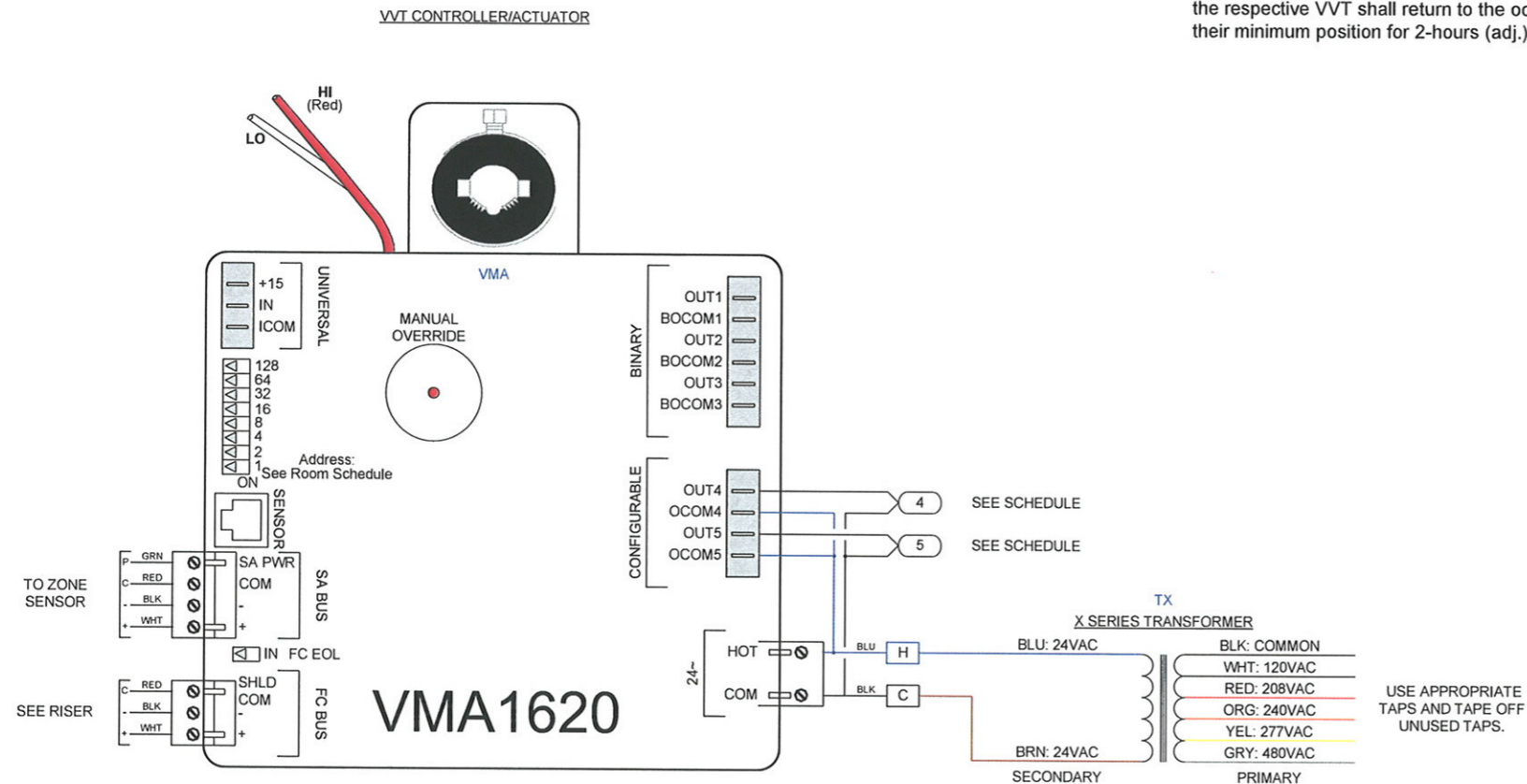
Sequence Of Operation

VVT Control

Occupied Mode: Refer to Standards of Control for Operating Schedule (adj.) Each VVT shall be enabled during the occupied mode. The BAS shall have the capability to schedule each VVT individually. The space temperature setpoint shall be controlled by the occupant or by the BAS and shall initially be 70 °F (adj.) in the heating mode and 74 °F (adj.) in the cooling mode. The VVT shall be in the same mode, heating or cooling, as the associated air handling unit. The VVT damper shall modulate to maintain the space temperature setpoint, when the space temperature is satisfied the VAV damper shall modulate to its minimum position (adj.).

Unoccupied Setback Cycle: During the unoccupied mode, the VVT damper shall remain open. 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.), the VVT shall be enabled and the volume dampers on the remaining VVT's shall modulate to their minimum position until the space temperature at each VVT is 3 °F (adj.) above the setback temperature.

Override: Each space temperature sensor shall be equipped with a manual override. When the override button is activated, the respective VVT shall return to the occupied mode and the volume dampers on the remaining VAV boxes shall modulate to their minimum position for 2-hours (adj.).



CONTROLLER	OUTPUT	COMMAND POINT
WT-1	BO4	EUH1-EN
VVT-1	BO5	EUH4-EN
WT-2	BO4	EUH2-EN
VVT-2	BO5	EUH8-EN
WT-6	BO4	EUH3-EN
VVT-6	BO5	EUH6-EN
WT-9	BO4	EUH5-EN



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 7932 Nieman Rd.
 Lenexa, KS 66214
 P: 913.563.4260
 F: 913.563.4269
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Project Title
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 905 North Wade
 Mexico, MO 65265

Drawing Title
 VVT's
 Hart Career Center
 Flow & Controller Diagram
 Submittal Drawing

FILE NAME
 MPS.Hart Career Center.Submittal.vsd

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 CB

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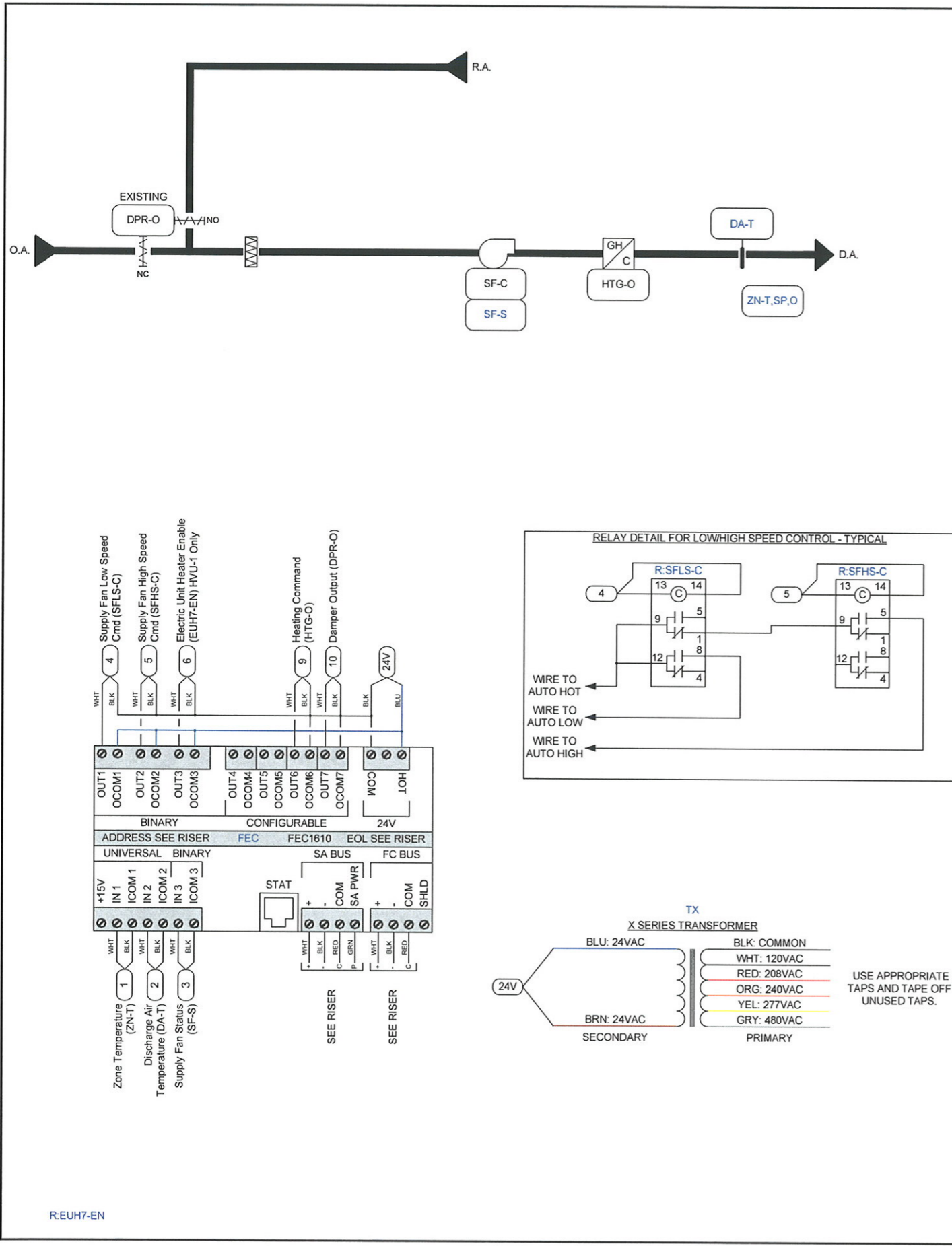
Sales Engineer
 TJB

Project Manager
 MAR

Project Engineer
 CB

CONTRACT NUMBER
C1-6009

DRAWING NUMBER
3.0



Item	QTY	Part
DA-T	4	TE-6311M-1
FEC	4	MS-FEC1611-0
R:EUH7-EN	1	V100
R:SFHS-C	4	RH2B-ULAC24V,SH2B-05
R:SFLS-C	4	RH2B-ULAC24V,SH2B-05
SF-S	4	CSD-CF0A0-1
TX	4	X050CBA
ZN-T,SP,0	4	NS-BTB7002-0

Sequence Of Operation

HVU-1 through HVU-4 (Constant Volume, NG Heating)

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 natural gas heating shall be enabled to attain the space temperature setpoint.

Economizer Control: When the outside air temperature is below the economizer changeover setpoint of 65°F (adj.) and the space requires cooling, the mixed air dampers shall modulate in sequence to maintain the space temperature setpoint. When the outside air temperature is above the economizer changeover setpoint, the outside air damper shall modulate to the minimum position (adj.). The minimum discharge air temperature shall be 50°F (adj.).

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.), heating 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.) 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 shall be enabled until the space temperature reaches 3°F (adj.) above the setback temperature 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
 - Return air damper shall be open
 - Heating shall be disabled

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

*Heating - Supply Fan low Speed
Cooling/ventilation - Supply Fan High Speed*

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XEC, Inc.
 7932 Nieman Rd.
 Lenexa, KS 66214
 P: 913.563.4260
 F: 913.563.4269
 www.xeccinc.com

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<p>Project Title Mexico Public Schools - Controls Installation</p> <p>Project Address 905 North Wade Mexico, MO 65265</p>	<p>REVISIONS</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>NO.</th> <th>DESCRIPTION</th> <th>DATE</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>	NO.	DESCRIPTION	DATE			
NO.	DESCRIPTION	DATE					
<p>Drawing Title HVU's Hart Career Center Flow & Controller Diagram Submittal Drawing</p>	<p>FILE NAME MPS.Hart Career Center.Submittal.vsd</p> <p>DRAWN BY TJB</p> <p>DATE 4/20/2011 2:53:05 PM</p>						
<p>Contract Number C1-6009</p>	<p>Drawing Number 4.0</p>						



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 7932 Nieman Rd.
 Lenexa, KS 66214
 P: 913.563.4260
 F: 913.563.4269
 www.xeccinc.com



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

REVISIONS

Drawing Title
 EUHs
 McMillan Elementary
 Controller Diagram
 Submittal Drawing

FILE NAME
 MPS.Hart Career Center.Submittal.vsd

Sales Engineer
 TJB

Project Manager
 MAR

Project Engineer
 CB

DRAWN BY: CB
 DATE: 4/20/2011
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CONTRACT NUMBER
C1-6009

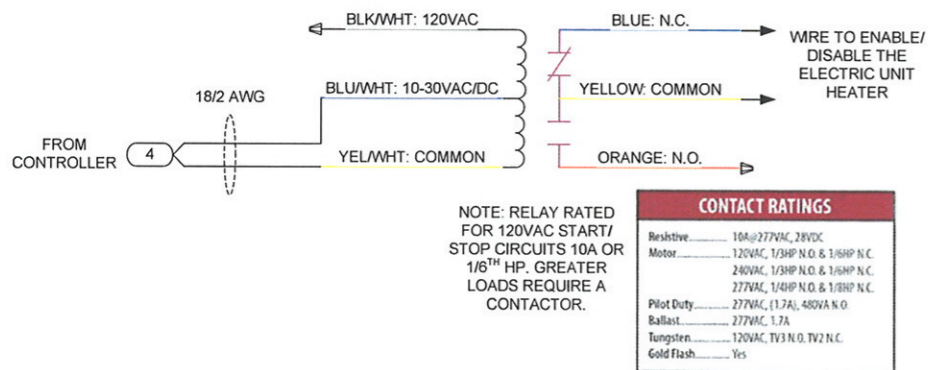
DRAWING NUMBER
5.0

Sequence Of Operation

**EUH-1 through EUH-8
 (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.



CONTROLLER	OUTPUT	COMMAND POINT	REF. PAGE
VVT-1	BO4	EUH1-EN	3.0
VVT-1	BO5	EUH4-EN	3.0
VVT-2	BO4	EUH2-EN	3.0
VVT-2	BO5	EUH8-EN	3.0
VVT-6	BO4	EUH3-EN	3.0
VVT-6	BO5	EUH6-EN	3.0
VVT-9	BO4	EUH5-EN	3.0
HVU-1	BO3	EUH7-EN	4.0