

**Attachments** ASK-085 (originally issued with ASI-050).

Product Data Sheets from IDEC for Range Hood Lighting Switch and Range Hood Fan Switch.

Full Sheet Revisions:

TC 0.00 r2

TC 0.20 r1

TC 2.10 r2

TC 2.21 r2

TC 2.31 r2

TC 2.41 r1

TC 5.22 r2

TC 5.23 WIRING DETAILS (**New Sheet**)

TC 6.00 r2

TC 6.01 r2

TC 6.10 r2

TC 6.11 r2

TC 6.171 MUAU SEQUENCE OF OPERATION (CONT.) (**New Sheet**)

TC 6.172 MUAU SEQUENCE OF OPERATION (CONT.) (**New Sheet**)

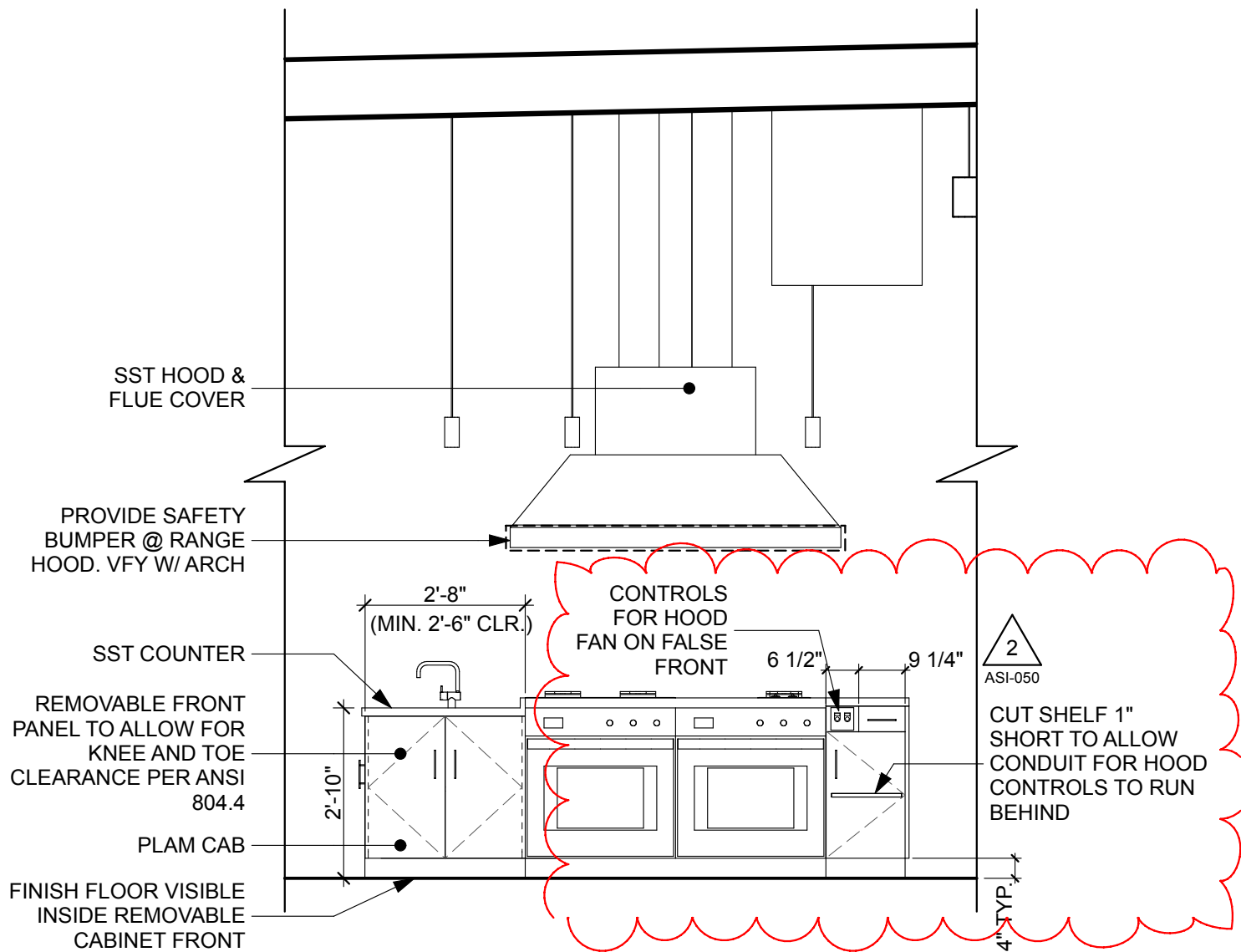
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- [ ] 1. The work described herein is a clarification of the Contract Documents. Proceeding with the work indicates your acknowledgement that there will be no change in the Contract Sum or Contract Time.
- [ ] 2. You are hereby directed to proceed as outlined herein. Submit an itemized proposal for change (Increase or Decrease) in the Contract Sum & Contract Time, prepared in accordance with the General & Supplementary General Conditions of the Contract, within (15) days. A formal Change Order will be issued after approval of the proposal by the Owner & the Architect.
- [ ] 3. You are NOT authorized to proceed with this work. Submit an itemized proposal for changes (Increase or Decrease) in the Contract Sum and Contract Time, prepared in accordance with the General and Supplementary General Conditions of the Contract, within (15) days.
- [ ] 4. You are hereby directed to proceed with the work herein, to be performed on a T/M basis; General Contractor's overhead and profit shall be per the OWNER/CONTRACTOR agreement. Submit a proposal for changes in Contract Time, if any, within (15) days.

**Description:**

*Locate Controls for Range Hood at Island Casework*



Locate all controls for the range hood (fan and lighting) at face of casework per attached ASK-085. Provide two low voltage switches using a single box with a separator and a single cover plate. Locate the relays to interface the Siemens system and control the light in the 2<sup>nd</sup> floor control panel. Make revisions to Automated Controls as required per attached TC Sheets. See attached IDEC sheets for switches.



RANGE HOOD LIGHTING SWITCH



2-Position Selector Switches

Contact	Mounting	Operator Position		Handle	Maintained	Spring Return from Right
						
Operator Only				Knob Lever	HWⓈS-2T HWⓈS-2L	HWⓈS-21T HWⓈS-21L
1NO	1	0	X	Knob Lever	HWⓈS-2TF10 HWⓈS-2LF10	HWⓈS-21TF10 HWⓈS-21LF10
1NO-1NC	1	0	X	Knob Lever	HWⓈS-2TF11 HWⓈS-2LF11	HWⓈS-21TF11 HWⓈS-21LF11
	2	X	0			
2NO	1	0	X	Knob Lever	HWⓈS-2TF20 HWⓈS-2LF20	HWⓈS-21TF20 HWⓈS-21LF20
	2	0	X			
2NO-2NC	1	X	0	Knob Lever	HWⓈS-2TF22 HWⓈS-2LF22	HWⓈS-21TF22 HWⓈS-21LF22
	2	0	X			
	3	X	0			
	4	0	X			

- 
1. In place of Ⓢ enter 1 for plastic bezel or 4 for metal bezel.

2. For nameplates, see page 630.

3. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.

4. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).

5. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.

6. Standard color for knob and lever is black.

7. Optional colors available for lever type. Must order in components. See next page for part numbers.

8. Additional contact configurations available (up to 6 total contacts).

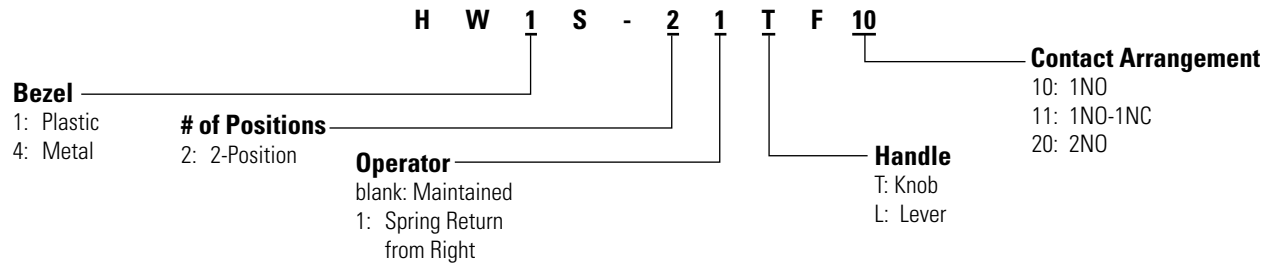
9. For Truth Tables see page 642.

Ⓢ Bezel Type

Type	Code
Plastic	1
Metal	4



## Part Number Structure



## Selector Switches 2-Position (Replacement Parts)

Contact Blocks	+	Mounting Adaptor	+	Safety Lever Lock	+	Anti-Rotation Ring	+	Operator	=	Completed Unit
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## Contact Blocks

Style	Contacts	1NO	1NC
	Standard Fingersafe (IP20)	HW-F10	HW-F01
		HW-F10R (early make)	HW-F01R (late break)
	Spring-Up Terminal	HW-G10	HW-G01
		HW-G10R (early make)	HW-G01R (late break)
	Exposed Screw Terminal	HW-C10	HW-C01
		HW-C10R (early make)	HW-C01R (late break)
	Dummy Block	TW-DB	

## Anti-Rotation Ring

Style	Part Number
	HW9Z-RL



Use with notched panel cutout to prevent unit rotation.

## Operators

Style	Description	Handle	Plastic Bezel	Metal Bezel
	Maintained	Knob	HW1S-2T	HW4S-2T
		Lever	HW1S-2	HW4S-2
	Spring Return from Right	Knob	HW1S-21T	HW4S-21T
		Lever	HW1S-21	HW4S-21



- Knob operator comes with black handle.
- To order lever type, lever and inserts must be ordered separately, along with lever operator. See part numbers below.

## Contact Block Mounting Adaptor

Style	Part Number
	HW-CB2C



- Used to mount contact blocks to operator (first pair only).
- IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

## Safety Lever Lock

Style	Part Number
	HW9Z-LS

## Levers &amp; Inserts

Style	Part Number
	ASWHHL-①
	TW-HC1-①



Standard lever color is black. Standard insert color is white.

## ① Handle/Insert Color Code

Color	Code
Black*	B
Blue	S
Green	G
Red	R
Yellow	Y
White†	W



- \* Lever color inserts not available in black.
- † Lever not available in white.

W-AU REVIEW



Selector Switches 4- & 5-Position (Assembled)

RANGE HOOD FAN SWITCH



W\_AU  
REVIEW

4-Position Selector Switches

Contact	Mounting	Operator Position				Handle	Maintained
		1	2	3	4		
Operator Only						Knob Lever	HWⓈS-4T HWⓈS-4L
1NO- 2NC	1	X	0	0	0	Knob Lever	HWⓈS-4TF12 HWⓈS-4LF12
	2	0	X	0	0		
	3	0	0	X	0		
	4	0	0	0	0		
1NO- 3NC	1	0	X	X	X	Knob Lever	HWⓈS-4TF13N6 HWⓈS-4LF13N6
	2	0	X	0	0		
	3	0	0	X	0		
	4	0	0	0	X		
2NO- 2NC	1	X	0	0	0	Knob Lever	HWⓈS-4TF22N3 HWⓈS-4LF22N3
	2	0	X	0	0		
	3	0	0	X	0		
	4	0	0	0	X		

5-Position Selector Switch

Contact	Mounting	Operator Position					Handle	Maintained
		1	2	3	4	5		
Operator Only							Knob Lever	HWⓈS-5T HWⓈS-5L
2NO- 2NC	1	X	0	0	0	0	Knob Lever	HWⓈS-5TF22N3 HWⓈS-5LF22N3
	2	0	X	0	0	0		
	3	0	0	0	X	0		
	4	0	0	0	0	X		



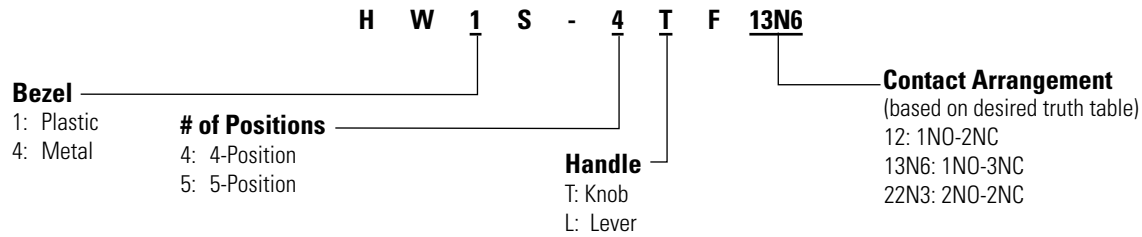
1. In place of Ⓢ enter 1 for plastic bezel or 4 for metal bezel.
2. Knob operator includes black knob/lever operator includes black lever.
3. For nameplates, see page 630.
4. For contact assembly part numbers, see page 634.
5. Five position circuit cannot be made to make five independent contact closures.
6. All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
7. Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
8. Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
9. Standard color for knob and lever is black.
10. Optional colors available for lever type. Must order in components. See next page for part numbers.
11. Additional contact configurations available (up to 6 total contacts).
12. For Truth Tables see page 642.

⑤ Bezel Type

Type	Code
Plastic	1
Metal	4

W\_AU  
REVIEW

## Part Number Structure



## Selector Switches 4- &amp; 5-Position (Replacement Parts)

Contact Blocks	+	Mounting Adaptor	+	Safety Lever Lock	+	Anti-Rotation Ring	+	Operator	=	Completed Unit
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## Contact Blocks

Style	Contacts	1NO	1NC
	Standard Fingersafe (IP20)	HW-F10	HW-F01
		HW-F10R (early make)	HW-F01R (late break)
	Spring-Up Terminal	HW-G10	HW-G01
		HW-G10R (early make)	HW-G01R (late break)
	Exposed Screw Terminal	HW-C10	HW-C01
		HW-C10R (early make)	HW-C01R (late break)
	Dummy Block	TW-DB	

## Anti-Rotation Ring

Style	Part Number
	HW9Z-RL



Use with notched panel cutout to prevent unit rotation.

## Operators

Style	Position	Description	Handle	Plastic Bezel	Metal Bezel
	4	Maintained	Knob	HW1S-4T	HW4S-4T
			Lever	HW1S-4	HW4S-4
	5	Maintained	Knob	HW1S-5T	HW4S-5T
			Lever	HW1S-5	HW4S-5



- Knob operator comes with black handle.
- To order lever type, lever and inserts must be ordered separately, along with lever operator. See part numbers below.

## Contact Block Mounting Adaptor

Style	Part Number
	HW-CB2C



- Used to mount contact blocks to operator (first pair only).
- IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

## Safety Lever Lock

Style	Part Number
	HW9Z-LS

## Levers &amp; Inserts

Style	Part Number
	ASWHHL-①

	Lever Color Insert	TW-HC1-①
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Standard lever color is black. Standard insert color is white.

## ① Handle/Insert Color Code

Color	Code
Black*	B
Blue	S
Green	G
Red	R
Yellow	Y
White†	W



- \* Lever color inserts not available in black.
- † Lever not available in white.

W\_AU REVIEW

### Nameplates - HW Series

	HWAM-Black Plastic	HWAQ-Black Plastic	HWAS-Black Plastic	HWAV-Yellow Plastic
Nameplate (blank engraving plate included)	HWAM-OB	HWAQ-OB	HWAS-OB	HWAV-0 HWAV5-0†
Nameplate (en-graved)	HWAM-①	HWAQ-①	HWAS-①	HWAV-27* HWAV5-27†
Additional Insert (blank)	HWNP-0	HWNP-0	HWNP Dimensions 	
Additional Insert (engraved)	HWNP-①	HWNP-①		



1. In place of ①, insert either the standard legend code from table below or custom engraving delimited by " ".
2. Standard engravings are available at no charge.
3. \* HWAV-27 comes engraved "Emergency Stop" as shown in drawing.
4. † HWAV5-27 and HWAV5-0 for 60mm diameter E-Stops (80mm diameter nameplate).

FOR 5-POSITION FAN  
KNOB: CUSTOM  
"OFF-LOW-HIGH"

#### Standard Legend Codes

Pushbuttons				Pushbuttons/Selector Switches				Selector Switches	
Legend	Code	Legend	Code	Legend	Code	Legend	Code	Legend	Code
AUTO	101	OPEN	116	AUTO-MAN	201	REV-FOR	216	AUTO-MAN-OFF	301
CLOSE	102	OUT	117	CLOSE-OPEN	202	RUN-JOG	217	AUTO-OFF-MAN	302
DOWN	103	RAISE	118	DOWN-UP	203	RUN-SAFE	218	CLOSE-OFF-OPEN	303
EMERG.STOP	104	RESET	119	FAST-SLOW	204	SAFE-RUN	219	DOWN-OFF-SLOW	304
FAST	105	REVERSE	120	FOR-REV	205	SLOW-FAST	220	FAST-OFF-SLOW	305
FORWARD	106	RUN	121	HAND-AUTO	206	START-STOP	221	FOR-OFF-REV	306
HAND	107	SLOW	122	HIGH-LOW	207	STOP-START	222	LEFT-OFF-RIGHT	307
HIGH	108	START	123	JOG-RUN	208	UP-DOWN	223	LOWER-OFF-RAISE	308
IN	109	STOP	125	LEFT-RIGHT	209	Ol (Int'l OFF ON)	250	OFF-MAN-AUTO	309
INCH	110	TEST	126	LOWER-RAISE	210			OFF-SLOW-FAST	310
JOG	111	UP	127	MAN-AUTO	211			OFF-1-2	311
LOW	112	I (Int'l On)	150	OFF-ON	212			OPEN-OFF-CLOSE	312
LOWER	113	O (Int'l Off)	151	ON-OFF	213			SLOW-OFF-FAST	313
OFF	114	EMO	152	OPEN-CLOSE	214			SUMMER-OFF-WINTER	314
ON	115			RAISE-LOWER	215			UP-OFF-DOWN	315
								1-OFF-2	316
								HAND-OFF-AUTO	317



1. To order engraved nameplates, add legend code to nameplate part number.
2. Character height based on the number of characters and size of nameplate. Standard character size is 3/16".
3. Nameplates with standard legends are the same list price as blank nameplates.
4. Nameplates have built-in anti-rotation feature for use with notched panel cut-outs. Additional anti-rotation ring (HW9Z-RL) is not necessary.

FOR LIGHTING

## Nameplates Order Form — HW Series

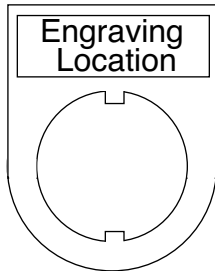
Copy this order form and use it to specify Letter Height, Custom Engravings, Location of Engraving on Nameplate, and Quantity Desired.

To ensure engraving accuracy, fax it to your IDEC representative or Distributor.

Your Company: \_\_\_\_\_  
 Name: \_\_\_\_\_  
 Telephone: \_\_\_\_\_  
 Fax & Email: \_\_\_\_\_

IDEC Rep/Distributor Contact: \_\_\_\_\_  
 PO number (if known): \_\_\_\_\_  
 IDEC Rep/Distributor Phone: \_\_\_\_\_  
 IDEC Rep/Distributor Fax & Email: \_\_\_\_\_

## HWAM Nameplate



**Step 1.**  
**Choose Letter Size - 7/64" or 1/8".**  
 Check the box for the letter size you want.  
 Then write your lettering in box below the  
 check boxes. Note: 1/8" size letters cannot  
 exceed 9 characters.

**Step 2.**  
**Specify Quantity.**  
 Enter the number of nameplates  
 desired in the box on the right.

Qty

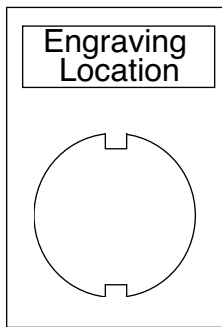
Letter Size ☐ 7/64" (for 7/64" size letters) 11 characters maximum  
 Letter Size ☐ 1/8" 9 characters maximum (for 7/8" size letters)

1 2 3 4 5 6 7 8 9 10 11

Sample Letter Sizes  
 7/64" Letters: A B C D  
 1/8" Letters: A B C D

ONE W/ "Range Hood Fan"  
 AND ONE W/ "Range Hood  
 Lights". Provide submittal for  
 review and final text.

## HWAQ Nameplate



**Step 1.**  
**Choose Letter Size - 7/64" or 1/8".**  
 Check the box for the letter size you want.  
 Then write your lettering in box below the  
 check boxes. Note: 1/8" size letters cannot  
 exceed 9 characters.

**Step 2.**  
**Specify Quantity.**  
 Enter the number of nameplates  
 desired in the box on the right.

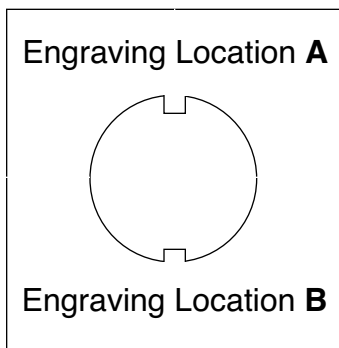
Qty

7/64" Letter Size ☐ 11 characters maximum (for 7/64" size letters)  
 1/8" Letter Size ☐ 9 characters maximum (for 7/8" size letters)

1 2 3 4 5 6 7 8 9 10 11

Sample Letter Sizes  
 7/64" Letters: A B C D  
 1/8" Letters: A B C D

## HWAS Nameplate



**Step 1.**  
**Choose Letter Size - 3/32" or 1/8".**  
 Check the box for the letter size you want.  
 Then write your lettering in box below the  
 check boxes. Note: 1/8" size letters cannot  
 exceed 9 characters.

**Step 2.**  
**Specify Quantity.**  
 Enter the number of nameplates  
 desired in the box on the right.

Qty

**Step 3.**  
**Specify Location.**  
 Enter the location of engraving  
 (A or B or Both), in box on the right.

Location

3/32" Letter Size ☐ 20 characters maximum (for 3/32" size letters)  
 1/8" Letter Size ☐ 14 characters maximum (for 7/8" size letters)

A 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20  
 B 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20

Sample Letter Sizes  
 3/32" Letters: A B C D  
 1/8" Letters: A B C D

Switch Engraving Order Form – HW Series

Copy this order form and use it to specify Letter Height, Maximum Number of Lines and Text to be engraved.  
To ensure engraving accuracy, fax it to your IDEC representative or Distributor.

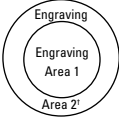
Your Company: \_\_\_\_\_  
Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
PO: \_\_\_\_\_

Telephone: \_\_\_\_\_  
Fax: \_\_\_\_\_  
Email: \_\_\_\_\_  
Part Number to be Engraved: \_\_\_\_\_

Please check one of the boxes below to indicate your choice of engraving options:



ø29mm, ø40mm Mushroom Head



	# of Lines	Letter Height	Max. Characters Per Line
<input type="checkbox"/>	1	5/32	5
<input type="checkbox"/>		1/8	6
<input type="checkbox"/>	2	5/32	5
<input type="checkbox"/>		1/8	6
<input type="checkbox"/>	3	1/8	6
<input type="checkbox"/>	4	3/32	5

	# of Lines	Letter Height	Max. Characters Per Line
<input type="checkbox"/>	1	5/32	5
<input type="checkbox"/>		1/8	5
<input type="checkbox"/>	2	5/32	5
<input type="checkbox"/>		1/8	6
<input type="checkbox"/>	3	1/8	5
<input type="checkbox"/>	4	3/32	5

		# of Lines	Letter Height	Max. Characters Per Line
<input type="checkbox"/>	Engraving Area 1	1	5/32	5
<input type="checkbox"/>			1/8	5
<input type="checkbox"/>	Engraving Area 2	1	5/32	7
<input type="checkbox"/>			1/8	7



- 1. Above mentioned specifications hold true for standard size pushbuttons (round and square).
- 2. \*Engraving Area 2 can be engraved for 40mm mushroom Head non-Illuminated push button only.
- 3. Engraving is done on the button itself for non-Illuminated push buttons and on marking plate for illuminated push buttons and pilot lights.
- 4. Please enter text exactly how you want it engraved, take care to emphasize capital or small letters.

Enter text to be engraved:

Line 1: \_\_\_\_\_  
Line 2: \_\_\_\_\_  
Line 3: \_\_\_\_\_  
Line 4: \_\_\_\_\_

Sample Letter Sizes

1/8 Letters: OPEN  
5/32 Letters: OPEN

For IDEC Internal Use Only:  
Work Order #: \_\_\_\_\_

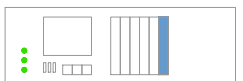


Network Diagram

Work Stations, Servers, Computers



Existing Siemens Operator Work Station  
Located in FS10



Existing Siemens Server  
Furnish and install a new 3TB  
RAID array to be dedicated to FS18  
archival data storage for LEED M&V

To other facilities with  
Siemens and Alerton  
control Systems

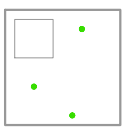
Existing City of Seattle  
DOIT Data Center  
Router  
DIOT to provide routing  
table/path from the new  
Mitsubishi OWS to FS18

Field Panels and Equipment

Siemens  
Modular  
PXM  
Controller

Located in Mech 005  
Serves the following equipment and  
functions:

1. Mitsubishi monitoring, B, and 1st Floor
2. DHW monitoring
3. EH-1 and 2
4. UH-1 and 3



Mitsubishi GB-50 Central Controller with:  
PC Monitoring software option  
PC Scheduling software option  
Error e-mail software option  
Online Maintenance Tool software option  
Personal We Browser software option  
BACnet Interface software option  
Locate the controller in a NEMA 1 enclosure in the Com 003.

Mitsubishi PUY-A12 Outdoor  
Unit ACC-2 with MNet Adapter



Mitsubishi PURY-P192  
Outdoor Unit ACC-1

Mitsubishi PKFY-P06 Fan  
Coil Unit FCU-7

Mitsubishi PAC-SF46EPA  
Transmission Booster  
Located with FCU-7

Operator Work Station (OWS)  
Functions and details as noted

Rack Mounted Server  
Functions and details as noted

Control System Field Panels  
Function and details as noted

Controlled Equipment  
Function and details as noted

Wiring and Field Devices

Wire and Cable

BACnet/IP  
MNet/IP  
Siemens P2/IP  
MNet

Management and Automation Level Network Cabling  
Function as indicated, typically Ethernet CAT5 or CAT6. See  
specifications for detailed requirements. Light line weights  
indicate existing cabling

Mitsubishi VRF system proprietary network cable, typically #16  
Twisted Shielded Pair (TSP). Coordinate with Mitsubishi during  
submittals to verify cable specifics. See the specifications and  
drawing details for additional information regarding wiring  
requirements.

Mitsubishi VRF remote controller cable, typically #18 TSP.  
Coordinate with Mitsubishi during submittals to verify cable  
specifics. See the specifications and drawing details for  
additional information regarding wiring requirements.

Low voltage cable bundle; #18 TSP. "xx" indicates the number  
of cables, typically 1 cable per I/O device unless otherwise  
noted.

Line voltage conduit and wire providing interlock and line  
voltage control functions. Hash mark indicates one conductor.  
A short hash mark indicates a green grounding conductor. A  
hash mark with a dot indicates a neutral conductor An "S" next  
to a hash mark indicates a spare conductor. Contractor to  
coordinate conductor and concuit size with the requirements of  
the branch circuit associated with the function based on the  
requirements of the NEC and other applicable codes and the  
requirements of the electrical divisions of the specifications.

Lines cross each other at different elevations

Line broken for presentation purposes to show something that is  
below it more clearly

Field Devices

Space temperature sensor with set point adjustment  
Remote space temperature controller with multiple functions  
including On/Off, operating mode, set point adjustment, fan speed  
adjustment, and air flow direction (where available)

Damper with actuator; see point list and narrative for details

Air differential pressure switch or transmitter; see point list and  
narrative for details

Duct humidity transmitter  
Duct temperature transmitter; rigid averaging sensor

Freezestat; Hardwired safety interlock

Spring wound interval timer switch

Relay interlocking hardwired safties with a motor starter or VFD  
and providing a mointoring input to the DDC system

Relay interfacing the DDC system with the control system in a  
piece of equipment to enable the equipment for operation under  
the control of its own control and safety interlock system

Motor starter or Variable Speed Drive with indicated control  
functions and interfaces

Supply fan start/stop  
Supply fan proof of operation  
Supply fan speed command  
Supply fan speed feedback  
Network card

Analog position feedback signal from actuator  
Momentary Single Pole Double Throw Center Off Switch  
Maintained Double Pole Single Throw Switch  
Pilot Light  
End switch; Digital input changes state at the end of the actuator  
stroke  
Duct temperature transmitter - high temperature thermocouple  
sensing element  
Emergency stop switch; Mushroom head emergency stop switch  
hard wired to shut down the indicated equipment  
Specialty switch provided by the referenced equipment factory;  
Hardwired; Function as indicated  
Current transformer; analog sensor used for proof and  
approximate power consumption calculation  
Freezestat; Hardwired interlock; Responds to the coldest  
temperature over 1 foot of the element  
Flexible averaging duct temperature sensor; Provide 1 foot of  
sensing element for every 4 sq.ft. of duct/coil/AHU cross-section  
Surface Temperature Sensor; Adhere to clean pipe per  
manufacturer's instructions; Insulate and vapor seal; See detail  
Liquid or gas pressure transmitter; provide service valve and a tee  
with a test port and service valve on the test port.  
Pipe temperature transmitter with well and a second calibration  
well

Field Devices (Continued)

Retransmitted signal from a utility meter

Analog output driving a Silicon Controlled Rectifier (SCR) in an  
electric heater or similar final control element. Coordinate output  
type (1-5 vdc, 4-20 ma, etc.) with equipment vendor.

Relay interfacing the DDC system with a piece of equipment that  
has staged capacity control; one relay per stage, coordinate with  
equipment vendor for contact requirements.

Carbon Monoxide detector/transmitter

Nitrous Oxide detector/transmitter

Carbon Dioxide detector/transmitter

Combination Nitrous Oxide and Carbon Monoxide alarm and  
ventilation controller with outputs re-transmitting the gas levels  
for monitoring by the Siemens system.  
Electric meter; See specs, point list and metering detail for  
requirements

Voltage meter; See specs, point list and metering detail for  
requirements

Phase angle/power factor meter; See specs, point list and metering  
detail for requirements

Positive displacement gas meter with pulse output See specs, point  
list and metering details for requirements

Compound water meter with pulse output; See specs, point list, and  
metering detail for requirements

Position switch; Analog input, changes value as the actuator  
strokes to provide position feedback

Occupancy sensor; automatically turns on immediately and off  
after an adjustable time limit based on motion detection

Vacancy sensor; manually turned on by occupant, automatically  
turns of if not motion is detected after an adjustable time limit

Modulating damper; NO = Normally Open, NC = Normally Closed,  
NS = No Spring Return

Two Position damper; NO = Normally Open, NC = Normally Closed,  
NS = No Spring Return

Outdoor air temperature and relative humidity transmitter

Analog output interface to a modulating controlled device

Dry contact monitor

Two position selector switch

Five position selector switch

Point provided as a part of a factory control package and not  
directly monitored or controlled by Siemens. The point may be  
available as a network object if a network interface is supported  
by the factory control package

Freezestat provided as a part of a factory control package and not  
directly monitored or controlled by Siemens. The point may be  
available as a network object if a network interface is supported  
by the factory control package

Fire alarm system interface

Control Panel Hardware and Wiring Details

Twisted shielded pair; shield drain  
wire grounded at the control panel  
location and cut and taped to insulated  
it from grounds at the field location.

Disconnecting terminal with switch and test jacks; Phoenix Type  
UK5-MTK-P/P or equal

Grounding terminal; Phoenix Type USLKG4 or equal

Disconnecting fused terminal with 1 amp fuse or fused sized to  
match the load and coordinated to blow on a fault before the main  
panel fuse or circuit breaker; Phoenix Type UK10.3-HESI or equal.  
Provide 5 spare fuses per panel location

Load resistor terminal block with precision resistor selected to  
convert 4-20 ma to 2-10 vdc; Phoenix Type Type UDK 4-DUR 499 -  
2775250 or equal

Drawing List	
Number	Description
TC0.00	Drawing list, Symbols General Notes
TC0.10	Heat Recovery Ventilator HRV-1 Point List
TC0.11	Heat Recovery Ventilator HRV-2 Point List
TC0.12	Heat Recovery Ventilator HRV-3 Point List
TC0.20	MUAU-1 Point List
TC0.21	VRF Indoor Unit Point List
TC0.22	VRF Outdoor Unit Point List
TC0.31	Apparatus Bay Point List
TC0.40	ODU-1 and IDU-1 Point List
TC0.41	Miscellaneous Point List
TC0.42	Miscellaneous Point List Notes
TC2.11	Basement Floor Plan
TC2.21	First Floor Plan
TC2.31	Second Floor Plan
TC2.41	Roof Plan
TC5.11	Installation Details
TC5.21	Wiring Details
TC5.22	Wiring Details
TC5.23	KEF Wiring Details
TC6.00	Control System Network Diagram - Overview
TC6.01	Control System Network Diagram - Details
TC6.10	HRV-1 System Diagram - Overview
TC6.11	HRV-1 System Diagram - NW
TC6.12	HRV-1 System Diagram NE
TC6.13	HRV-1 System Diagram NE and SE
TC6.14	HRV-1 System Diagram SE
TC6.15	HRV-1 System Diagram SW
TC6.16	HRV-1 Sequence of Operation
TC6.17	MUAU Sequence of Operation
TC6.19	HRV-2 and 3Sequence of Operation
TC6.191	HRV-2 and 3Sequence of Operation (Continued)
TC6.20	Variable Flow Refrigeration System Diagram and Sequence
TC6.21	Variable Flow Refrigeration Sequence Continued
0.00	0.00

Miscellaneous

Sheet note reference; see the number specified in the list of  
sheet specific notes.



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SHEET TITLE  
Symbols and Abbreviations,  
Drawing List

SHEET NUMBER  
TC 0.00



MUAU Point List																		
Point	Number [BACnet Object ID], Note 7	System and Service	Sensor								Features							Notes
Name			Type	Accuracy	Alarms				Trending									
					Limit		Warning		Samples1	Commissioning5			Operating5					
					Hi	Lo	Hi	Lo		Time2	Local3	Archive4	Time2	Local3	Archive4			
Analog Inputs																		
	Supply filter differential pressure	Supply filter differential pressure	0-2 in.w.c. input,, 4-20 ma output transmitter	+/-1% full scale						24	1 hour	✓	✓	1 day	✓	✓	Note 6	
	Supply air temperature	Air temperature leaving the furnace	Flexible averaging 1,000 Ω Pt-RTD with close coupled transmitter	Note 8, 9						60	1 min	✓	✓	1 min	✓	✓	Note 18	
	MUAU-1 amps	MUAU 1 amps for proof of operation and energy	Current transformer							60	1 min	✓	✓	1 min	✓	✓	Note 7, 23	
	Exhaust fan amps	Exhaust fan amps for proof of operation and energy	Current transformer							60	1 min	✓	✓	1 min	✓	✓	Note 7, 19, 23	
	MUAU-1 speed feedback	MUAU 1 speed feedback	4-20 or 2-10 vdc VFD programmable output							60	1 min	✓	✓	1 min	✓	✓	Note 23,26	
Analog Outputs																		
	Gas Heat Modulation	Modulates gas burner	4-20 ma output	N/A						60	1 min	✓	✓	1 min	✓	✓		
	Supply fan modulation	Modulates the supply fan VFD	4-20 ma output	N/A						60	1 min	✓	✓	1 min	✓	✓	Note 24	
Digital Inputs																		
Digital Outputs (All digital outputs to include local override capability and indication)																		
	MUAU Enable	Enables MUAU fan and internal controls	Relay output	N/A						10	COV	✓	✓	COV	✓	✓	Note 12, 23	
	KEF Fan 1 Enable	Enables KEF Fan 1	Relay output	N/A						10	COV	✓	✓	COV	✓	✓	Note 16, 23	
	KEF Fan 2 Enable	Enables KEF Fan 2	Relay output	N/A						10	COV	✓	✓	COV	✓	✓	Note 16, 23	
	KEF Fan 3 Enable	Enables KEF Fan 3	Relay output	N/A						10	COV	✓	✓	COV	✓	✓	Note 16, 23	
	KEF Fan 4 Enable	Enables KEF Fan 4	Relay output	N/A						10	COV	✓	✓	COV	✓	✓	Note 16, 23	
	KEF Fan 1 and 3 damper	Enables KEF Fan 4	24 vac 2 position damper	N/A						10	COV	✓	✓	COV	✓	✓	Note 16, 25	
	KEF Fan 2 and 4 damper	Enables KEF Fan 4	24 vac 2 position damper	N/A						10	COV	✓	✓	COV	✓	✓	Note 16, 25	
Hard Wired Points																		
	Intake damper	Motorized MUAU intake damper	Provided as part of the MUAU factory package	N/A						0	N/A	N/A	N/A	N/A	N/A	N/A		
	Intake damper limit switch	Interlocks MUAU operation with damper	Provided as part of the MUAU factory package	N/A						0	N/A	N/A	N/A	N/A	N/A	N/A		
Safety Interlocks (Hardwired to shut down the system. Safeties shall function no matter what position the equipment's Hand-Off-Auto, Inverter-Bypass, or other selector switches are in)																		
	Fire alarm shut-down	Fire alarm system interlock	Software programmed based on fire alarm system input	N/A						0	N/A	N/A	N/A	N/A	N/A	N/A	Note 14	
	Freeze stat	Low discharge temperature safety	Provided as part of the MUAU factory package	N/A						0	N/A	N/A	N/A	N/A	N/A	N/A	Notes 23, 28	
	Furnace high limit	High limit switch safety on furnace	Provided as part of the MUAU factory package	N/A						0	N/A	N/A	N/A	N/A	N/A	N/A	Notes 23, 28	
Network Points																		
Virtual Points																		
	Supply air temperature set point	Set point	Control process set point	N/A						5	COV	✓	✓	COV	✓	✓		
	Power failure recovery	Internal point monitoring controller power	Used to trigger a power failure recovery sequence	N/A						5	COV	✓	✓	COV	✓	✓		
	MUAU Speed Management	Set point	MUAU-1 speed for EF-1 operation	N/A						5	COV	✓	✓	COV	✓	✓	Note 20, 23	
	MUAU Speed Management	Set point	MUAU-1 speed for EF-1 and 2 operation	N/A						5	COV	✓	✓	COV	✓	✓	Note 20, 23	
	MUAU Speed Management	Set point	MUAU-1 speed for EF-1, 2, and 3 operation	N/A						5	COV	✓	✓	COV	✓	✓	Note 20, 23	
	MUAU Speed Management	Set point	MUAU-1 speed for EF-1, 2, 3, and 4 operation	N/A						5	COV	✓	✓	COV	✓	✓	Note 20, 23	
Notes:																		
1.																		
2.	Time indicates the required sampling time for the trending function.																	
3.	A check in the local column indicates that the trending only needs to be running in the local controller and the most recent value can write over the last value when the trend buffer fills up.																	
4.	A check in the archive column indicates that the trend data must be archived to the system hard disc when trend buffer fills up so that a continuous trend record is maintained.																	
5.	Commissioning trending requirements only need to be implemented during the start-up and warranty year. After the start-up and warranty process, the control contractor should set the trending parameters to the operating requirements listed if they differ from the commissioning requirements.																	
6.	Use flow and pressure drop to trend filter life cycle cost and trigger filter changes based on life cycle cost. See control logic and narrative for additional information.																	
7.	Monitor amps to provide a proof of operation in put and create a virtual meter to track energy use. Monitor amps to provide a proof of operation in put and create a virtual meter to track energy use. Accumulate and display current demand level, kWh for the day, and kWh for the previous day, calendar month, and calendar year. Archive data to the data to the dedicated archival data storage drive in the City's Data Center. See Network Diagram.																	
8.	0.75% of span for sensor plus transmitter combined.																	
9.	2 feet of element for every 4 sq.ft. of duct area, 6 ft. minimum length.																	
10.	Wire safety devices to pilot a relay and keep it energized in normal operation so that a safety trip de-energizes the relay. Use relay contacts to interlock the supply fan VFD, the exhaust fan VFD, and to provide a digital status input to the DDC system. Safeties shall function no matter what the position of the starter Hand-Off-Auto selector switch is.																	
11.	Provide interface relay (one per point) wired per vendor wiring diagrams. Verify the interface relay current draw with both relays energized will not overload the vendor's control power transformer.																	
12.	Enable point allows factory control circuit to start and stop the various motors, drives and actuators associated with the AHU.																	
13.	Multistage electric resistance heater shall have an SCR for the first stage. Logic shall be arranged to provide modulated capacity through the entire operating range by coordinating the operation of the SCR controlled stage with the remaining across the line stages.																	
14.	Wire to contacts in a device furnished and installed by fire alarm contractor in the supply duct per the requirements of NFPA 90A, NFPA 72 and the City of Seattle Fire Code.																	
15.	Part of the factory package; set for 38°F with a 10 minute delay on start-up.																	
16.	KEF consists of 4 fans which are staged up from 1 to 4 fans as the fan speed switch moves from minimum to maximum speed.																	
17.	This is a 5 position selector switch that will be mounted in the casework below the range hood. The switch is a center off switch but the design intent is for CW rotation to take the KEF fans from 0 to 4 (low to high exhaust). To accomplish this, the switch us used as an input to the Siemens control system and logic in the control system sequences the fans. The narrative sequence includes truth tables and logic for accomplishing this.																	
18.	5 position center off switch, early make, late break contacts, black handle, knob lever with white insert and metal bezel, custom engraved nameplate; see narrative sequence for truth table.																	
19.	Furnish and install one CT that monitors the current to the four fans in the hood, but not the lights. Coordinate with the Cx provider and TAB contractor during start-up to document the current levels associated with 1, 2, 3, and 4 fan operation and include this information in a table on the graphic for the system.																	
20.	See the truth tables and logic in the narrative sequence for details regarding how this point is used. In general terms, it allows a MUAU speed to be associated with the combination of KEF fans that are in operation.																	
21.	Use one CT to monitor the total amps to the unit. Coordinate with the Cx provider and TAB contractor during start-up to document the current levels associated with fan operation and burner blower operation and document them in a table on the system graphic.																	
22.	2 position maintained switch, black handle, knob lever with white insert and metal bezel, custom engraved nameplate;. Furnish and install this switch adjacent to the fan speed switch and wired it to control the hood light directly. Provide a device partition in the electrical box to separate the low voltage and high voltage wiring devices and associated connections. See detail on TC5.11.																	
23.	ASI 049; Reflects the control requirements for a four speed kitchen exhaust hood and variable flow make-up air instead of an "On-Off" hood and make up air.																	
24.	If a 2-10 vdc input is required at the VFD, provide a load resistor terminal block at the VFD location; Entrelec M 4/6.CA I/U - 500 with FEM6D end section or equal. If a variable resistance input is required, furnish and install a Greystone Electronics Analog Resistance Module, Model GT-ARES with the resistance range selected to match the VFD control system requirements.																	
25.	There are two ducts associated with the kitchen exhaust fan. Each duct serves two of the four blowers. Software logic will be used to open the correct damper or dampers based on which fans are in operation. Field verify which fans are associated with which ducts.																	
26.	Coordinate with the VFD/MUAU supplier to have one of the drive programmable outputs set up to provide an analog speed feedback signal.																	
27.	Provide BACnet, Modbus or Siemens P2 network card. Coordinate communication protocol/networking requirements with City of Seattle DOIT. Map all internally available points across the interface so they are visible at the Facility Operations OWS. Coordinate presentation details during submittals.																	
28.	Provided with the factory control package; no direct monitoring by Siemens.																	
Formatted Blank Rows																		

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ASI 049



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SHEET TITLE  
**MUAU Point List**

SHEET NUMBER  
**TC 0.20**

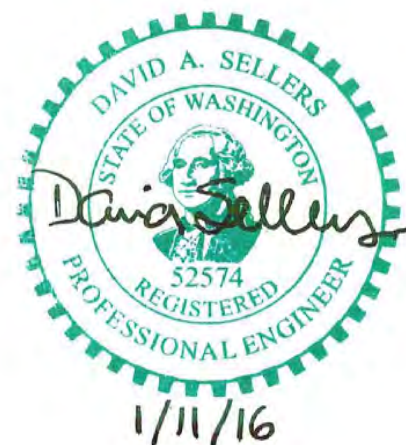




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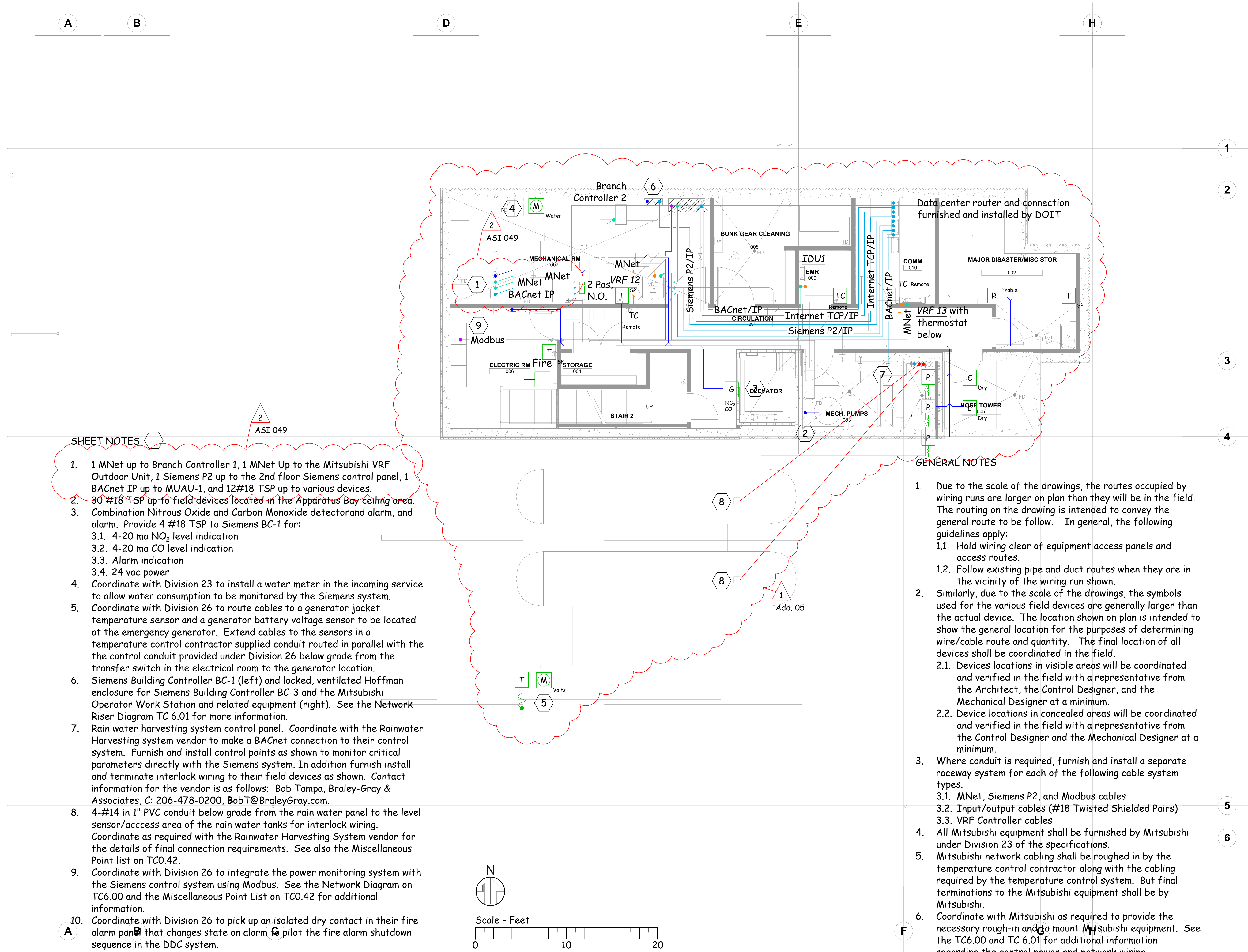
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3	
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5	
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SHEET TITLE	
Basement Floor Plan	
SHEET NUMBER	
TC 2.10	



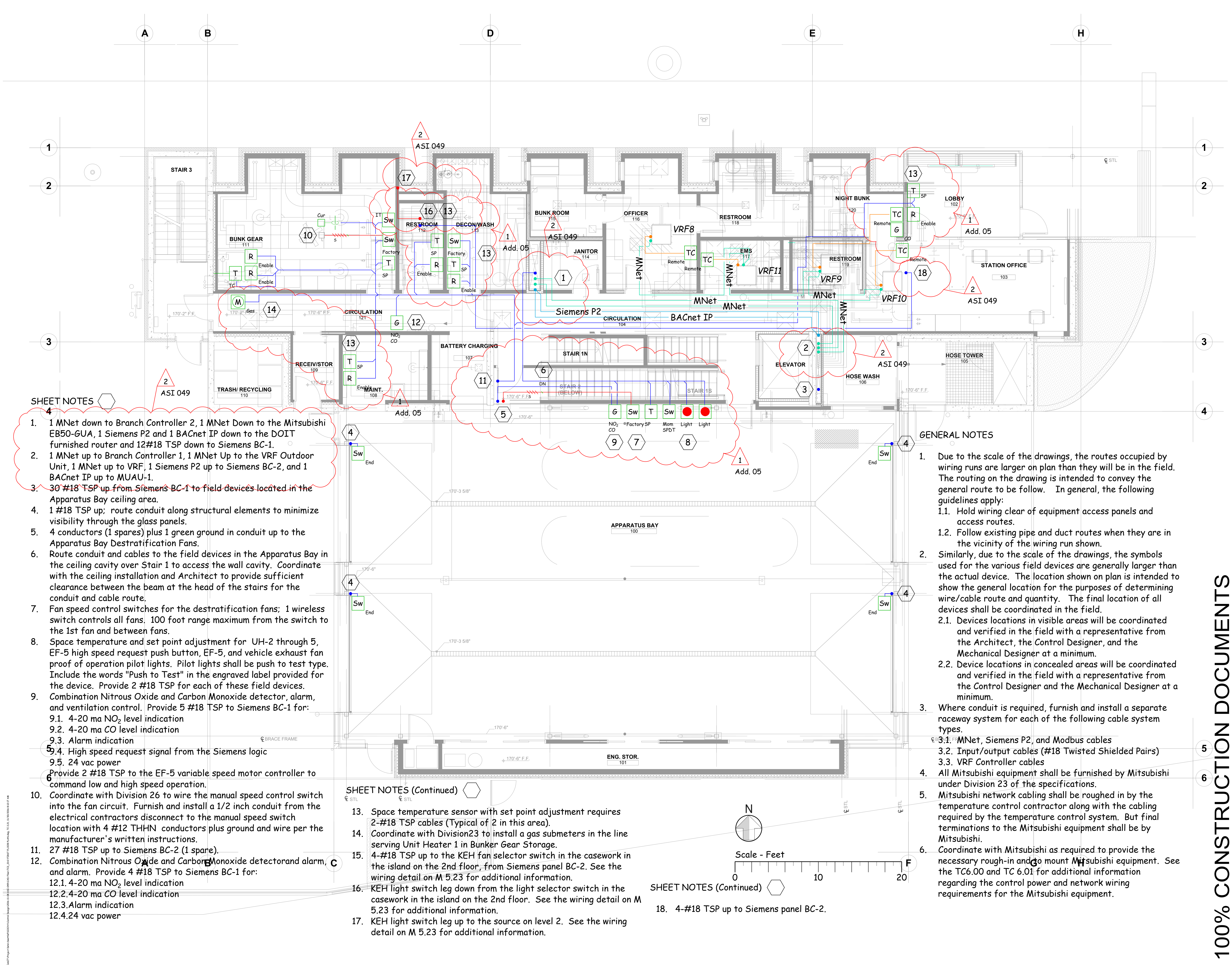
SHEET NOTES

- 1 MNet up to Branch Controller 1, 1 MNet Up to the Mitsubishi VRF Outdoor Unit, 1 Siemens P2 up to the 2nd floor Siemens control panel, 1 BACnet IP up to MUAU-1, and 12#18 TSP up to various devices.
- 30 #18 TSP up to field devices located in the Apparatus Bay ceiling area.
- Combination Nitrous Oxide and Carbon Monoxide detector and alarm, and alarm. Provide 4 #18 TSP to Siemens BC-1 for:
  - 3.1. 4-20 ma NO<sub>2</sub> level indication
  - 3.2. 4-20 ma CO level indication
  - 3.3. Alarm indication
  - 3.4. 24 vac power
- Coordinate with Division 23 to install a water meter in the incoming service to allow water consumption to be monitored by the Siemens system.
- Coordinate with Division 26 to route cables to a generator jacket temperature sensor and a generator battery voltage sensor to be located at the emergency generator. Extend cables to the sensors in a temperature control contractor supplied conduit routed in parallel with the the control conduit provided under Division 26 below grade from the transfer switch in the electrical room to the generator location.
- Siemens Building Controller BC-1 (left) and locked, ventilated Hoffman enclosure for Siemens Building Controller BC-3 and the Mitsubishi Operator Work Station and related equipment (right). See the Network Riser Diagram TC 6.01 for more information.
- Rain water harvesting system control panel. Coordinate with the Rainwater Harvesting system vendor to make a BACnet connection to their control system. Furnish and install control points as shown to monitor critical parameters directly with the Siemens system. In addition furnish install and terminate interlock wiring to their field devices as shown. Contact information for the vendor is as follows: Bob Tampa, Braley-Gray & Associates, C: 206-478-0200, BobT@BraleyGray.com.
- 4-#14 in 1" PVC conduit below grade from the rain water panel to the level sensor/access area of the rain water tanks for interlock wiring. Coordinate as required with the Rainwater Harvesting System vendor for the details of final connection requirements. See also the Miscellaneous Point list on TC0.42.
- Coordinate with Division 26 to integrate the power monitoring system with the Siemens control system using Modbus. See the Network Diagram on TC6.00 and the Miscellaneous Point List on TC0.42 for additional information.
- Coordinate with Division 26 to pick up an isolated dry contact in their fire alarm panel that changes state on alarm to pilot the fire alarm shutdown sequence in the DDC system.

GENERAL NOTES

- Due to the scale of the drawings, the routes occupied by wiring runs are larger on plan than they will be in the field. The routing on the drawing is intended to convey the general route to be follow. In general, the following guidelines apply:
  - 1.1. Hold wiring clear of equipment access panels and access routes.
  - 1.2. Follow existing pipe and duct routes when they are in the vicinity of the wiring run shown.
- Similarly, due to the scale of the drawings, the symbols used for the various field devices are generally larger than the actual device. The location shown on plan is intended to show the general location for the purposes of determining wire/cable route and quantity. The final location of all devices shall be coordinated in the field.
  - 2.1. Devices locations in visible areas will be coordinated and verified in the field with a representative from the Architect, the Control Designer, and the Mechanical Designer at a minimum.
  - 2.2. Device locations in concealed areas will be coordinated and verified in the field with a representative from the Control Designer and the Mechanical Designer at a minimum.
- Where conduit is required, furnish and install a separate raceway system for each of the following cable system types.
  - 3.1. MNet, Siemens P2, and Modbus cables
  - 3.2. Input/output cables (#18 Twisted Shielded Pairs)
  - 3.3. VRF Controller cables
- All Mitsubishi equipment shall be furnished by Mitsubishi under Division 23 of the specifications.
- Mitsubishi network cabling shall be roughed in by the temperature control contractor along with the cabling required by the temperature control system. But final terminations to the Mitsubishi equipment shall be by Mitsubishi.
- Coordinate with Mitsubishi as required to provide the necessary rough-in and to mount Mitsubishi equipment. See the TC6.00 and TC 6.01 for additional information regarding the control power and network wiring requirements for the Mitsubishi equipment.





- SHEET NOTES**
- 1 MNet down to Branch Controller 2, 1 MNet Down to the Mitsubishi EB50-GUA, 1 Siemens P2 and 1 BACnet IP down to the DOIT furnished router and 12#18 TSP down to Siemens BC-1.
  - 1 MNet up to Branch Controller 1, 1 MNet Up to the VRF Outdoor Unit, 1 MNet up to VRF, 1 Siemens P2 up to Siemens BC-2, and 1 BACnet IP up to MUAU-1.
  - 30 #18 TSP up from Siemens BC-1 to field devices located in the Apparatus Bay ceiling area.
  - 1 #18 TSP up; route conduit along structural elements to minimize visibility through the glass panels.
  - 4 conductors (1 spares) plus 1 green ground in conduit up to the Apparatus Bay Destratification Fans.
  - Route conduit and cables to the field devices in the Apparatus Bay in the ceiling cavity over Stair 1 to access the wall cavity. Coordinate with the ceiling installation and Architect to provide sufficient clearance between the beam at the head of the stairs for the conduit and cable route.
  - Fan speed control switches for the destratification fans; 1 wireless switch controls all fans. 100 foot range maximum from the switch to the 1st fan and between fans.
  - Space temperature and set point adjustment for UH-2 through 5, EF-5 high speed request push button, EF-5, and vehicle exhaust fan proof of operation pilot lights. Pilot lights shall be push to test type. Include the words "Push to Test" in the engraved label provided for the device. Provide 2 #18 TSP for each of these field devices.
  - Combination Nitrous Oxide and Carbon Monoxide detector, alarm, and ventilation control. Provide 5 #18 TSP to Siemens BC-1 for:  
9.1. 4-20 ma NO<sub>2</sub> level indication  
9.2. 4-20 ma CO level indication  
9.3. Alarm indication  
9.4. High speed request signal from the Siemens logic  
9.5. 24 vac power  
Provide 2 #18 TSP to the EF-5 variable speed motor controller to command low and high speed operation.
  - Coordinate with Division 26 to wire the manual speed control switch into the fan circuit. Furnish and install a 1/2 inch conduit from the electrical contractors disconnect to the manual speed switch location with 4 #12 THHN conductors plus ground and wire per the manufacturer's written instructions.
  - 27 #18 TSP up to Siemens BC-2 (1 spare).
  - Combination Nitrous Oxide and Carbon Monoxide detector and alarm, and alarm. Provide 4 #18 TSP to Siemens BC-1 for:  
12.1. 4-20 ma NO<sub>2</sub> level indication  
12.2. 4-20 ma CO level indication  
12.3. Alarm indication  
12.4. 24 vac power

- SHEET NOTES (Continued)**
- Space temperature sensor with set point adjustment requires 2 #18 TSP cables (Typical of 2 in this area).
  - Coordinate with Division 23 to install a gas submeters in the line serving Unit Heater 1 in Bunker Gear Storage.
  - 4 #18 TSP up to the KEH fan selector switch in the casework in the island on the 2nd floor, from Siemens panel BC-2. See the wiring detail on M 5.23 for additional information.
  - KEH light switch leg down from the light selector switch in the casework in the island on the 2nd floor. See the wiring detail on M 5.23 for additional information.
  - KEH light switch leg up to the source on level 2. See the wiring detail on M 5.23 for additional information.
  - 4-#18 TSP up to Siemens panel BC-2.

- GENERAL NOTES**
- Due to the scale of the drawings, the routes occupied by wiring runs are larger on plan than they will be in the field. The routing on the drawing is intended to convey the general route to be follow. In general, the following guidelines apply:  
1.1. Hold wiring clear of equipment access panels and access routes.  
1.2. Follow existing pipe and duct routes when they are in the vicinity of the wiring run shown.
  - Similarly, due to the scale of the drawings, the symbols used for the various field devices are generally larger than the actual device. The location shown on plan is intended to show the general location for the purposes of determining wire/cable route and quantity. The final location of all devices shall be coordinated in the field.  
2.1. Devices locations in visible areas will be coordinated and verified in the field with a representative from the Architect, the Control Designer, and the Mechanical Designer at a minimum.  
2.2. Device locations in concealed areas will be coordinated and verified in the field with a representative from the Control Designer and the Mechanical Designer at a minimum.
  - Where conduit is required, furnish and install a separate raceway system for each of the following cable system types.  
3.1. MNet, Siemens P2, and Modbus cables  
3.2. Input/output cables (#18 Twisted Shielded Pairs)  
3.3. VRF Controller cables
  - All Mitsubishi equipment shall be furnished by Mitsubishi under Division 23 of the specifications.
  - Mitsubishi network cabling shall be roughed in by the temperature control contractor along with the cabling required by the temperature control system. But final terminations to the Mitsubishi equipment shall be by Mitsubishi.
  - Coordinate with Mitsubishi as required to provide the necessary rough-in and to mount Mitsubishi equipment. See the TC6.00 and TC 6.01 for additional information regarding the control power and network wiring requirements for the Mitsubishi equipment.

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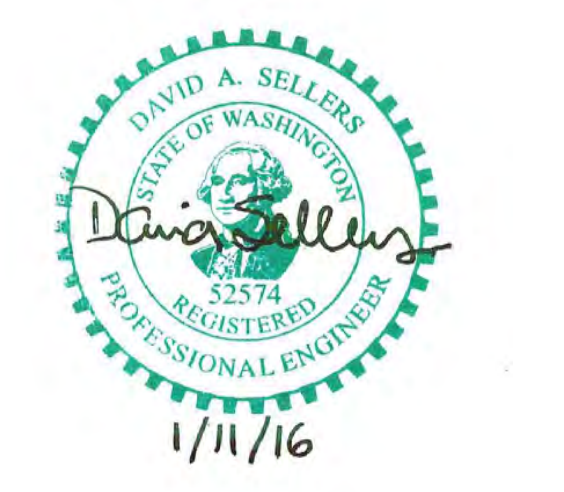
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**Fire Station 22**  
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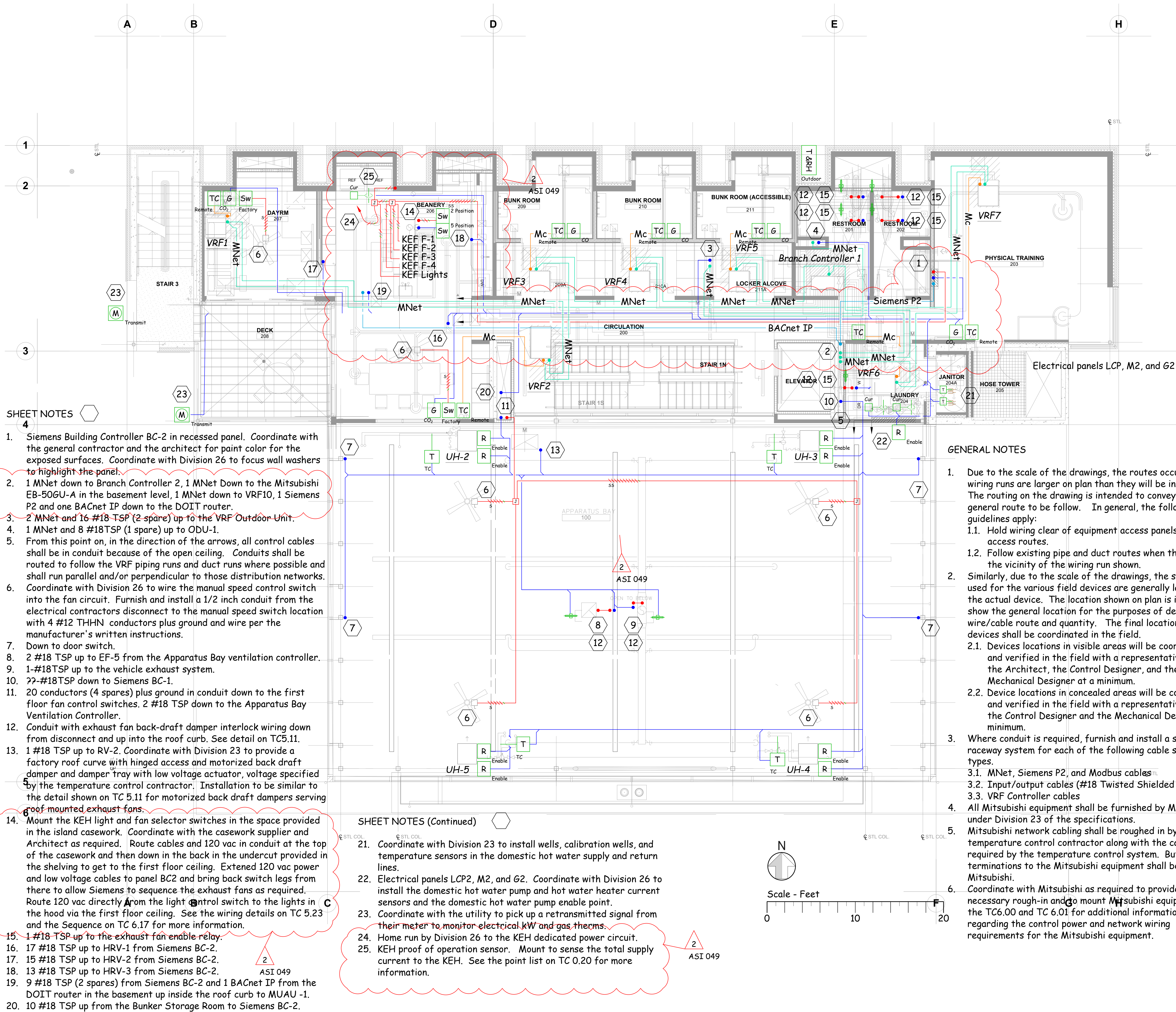
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Δ	
Δ	
Δ	
SHEET TITLE	First Floor Plan
SHEET NUMBER	TC 2.21





#### SHEET NOTES

1. Siemens Building Controller BC-2 in recessed panel. Coordinate with the general contractor and the architect for paint color for the exposed surfaces. Coordinate with Division 26 to focus wall washers to highlight the panel.
2. 1 MNet down to Branch Controller 2, 1 MNet Down to the Mitsubishi EB-50GU-A in the basement level, 1 MNet down to VRF10, 1 Siemens P2 and one BACnet IP down to the DOIT router.
3. 2 MNet and 16 #18 TSP (2 spare) up to the VRF Outdoor Unit.
4. 1 MNet and 8 #18TSP (1 spare) up to ODU-1.
5. From this point on, in the direction of the arrows, all control cables shall be in conduit because of the open ceiling. Conduits shall be routed to follow the VRF piping runs and duct runs where possible and shall run parallel and/or perpendicular to those distribution networks.
6. Coordinate with Division 26 to wire the manual speed control switch into the fan circuit. Furnish and install a 1/2 inch conduit from the electrical contractors disconnect to the manual speed switch location with 4 #12 THHN conductors plus ground and wire per the manufacturer's written instructions.
7. Down to door switch.
8. 2 #18 TSP up to EF-5 from the Apparatus Bay ventilation controller.
9. 1-#18TSP up to the vehicle exhaust system.
10. ??-#18TSP down to Siemens BC-1.
11. 20 conductors (4 spares) plus ground in conduit down to the first floor fan control switches. 2 #18 TSP down to the Apparatus Bay Ventilation Controller.
12. Conduit with exhaust fan back-draft damper interlock wiring down from disconnect and up into the roof curb. See detail on TC5.11.
13. 1 #18 TSP up to RV-2. Coordinate with Division 23 to provide a factory roof curve with hinged access and motorized back draft damper and damper tray with low voltage actuator, voltage specified by the temperature control contractor. Installation to be similar to the detail shown on TC 5.11 for motorized back draft dampers serving roof mounted exhaust fans.
14. Mount the KEH light and fan selector switches in the space provided in the island casework. Coordinate with the casework supplier and Architect as required. Route cables and 120 vac in conduit at the top of the casework and then down in the back in the undercut provided in the shelving to get to the first floor ceiling. Extended 120 vac power and low voltage cables to panel BC2 and bring back switch legs from there to allow Siemens to sequence the exhaust fans as required. Route 120 vac directly from the light control switch to the lights in the hood via the first floor ceiling. See the wiring details on TC 5.23 and the Sequence on TC 6.17 for more information.
15. 1 #18 TSP up to the exhaust fan enable relay.
16. 17 #18 TSP up to HRV-1 from Siemens BC-2.
17. 15 #18 TSP up to HRV-2 from Siemens BC-2.
18. 13 #18 TSP up to HRV-3 from Siemens BC-2.
19. 9 #18 TSP (2 spares) from Siemens BC-2 and 1 BACnet IP from the DOIT router in the basement up inside the roof curb to MUAU -1.
20. 10 #18 TSP up from the Bunker Storage Room to Siemens BC-2.

#### SHEET NOTES (Continued)

21. Coordinate with Division 23 to install wells, calibration wells, and temperature sensors in the domestic hot water supply and return lines.
22. Electrical panels LCP2, M2, and G2. Coordinate with Division 26 to install the domestic hot water pump and hot water heater current sensors and the domestic hot water pump enable point.
23. Coordinate with the utility to pick up a retransmitted signal from their meter to monitor electrical kW and gas therms.
24. Home run by Division 26 to the KEH dedicated power circuit.
25. KEH proof of operation sensor. Mount to sense the total supply current to the KEH. See the point list on TC 0.20 for more information.

#### GENERAL NOTES

1. Due to the scale of the drawings, the routes occupied by wiring runs are larger on plan than they will be in the field. The routing on the drawing is intended to convey the general route to be follow. In general, the following guidelines apply:
  - 1.1. Hold wiring clear of equipment access panels and access routes.
  - 1.2. Follow existing pipe and duct routes when they are in the vicinity of the wiring run shown.
2. Similarly, due to the scale of the drawings, the symbols used for the various field devices are generally larger than the actual device. The location shown on plan is intended to show the general location for the purposes of determining wire/cable route and quantity. The final location of all devices shall be coordinated in the field.
  - 2.1. Devices locations in visible areas will be coordinated and verified in the field with a representative from the Architect, the Control Designer, and the Mechanical Designer at a minimum.
  - 2.2. Device locations in concealed areas will be coordinated and verified in the field with a representative from the Control Designer and the Mechanical Designer at a minimum.
3. Where conduit is required, furnish and install a separate raceway system for each of the following cable system types.
  - 3.1. MNet, Siemens P2, and Modbus cables
  - 3.2. Input/output cables (#18 Twisted Shielded Pairs)
  - 3.3. VRF Controller cables
4. All Mitsubishi equipment shall be furnished by Mitsubishi under Division 23 of the specifications.
5. Mitsubishi network cabling shall be roughed in by the temperature control contractor along with the cabling required by the temperature control system. But final terminations to the Mitsubishi equipment shall be by Mitsubishi.
6. Coordinate with Mitsubishi as required to provide the necessary rough-in and go mount Mitsubishi equipment. See the TC6.00 and TC 6.01 for additional information regarding the control power and network wiring requirements for the Mitsubishi equipment.



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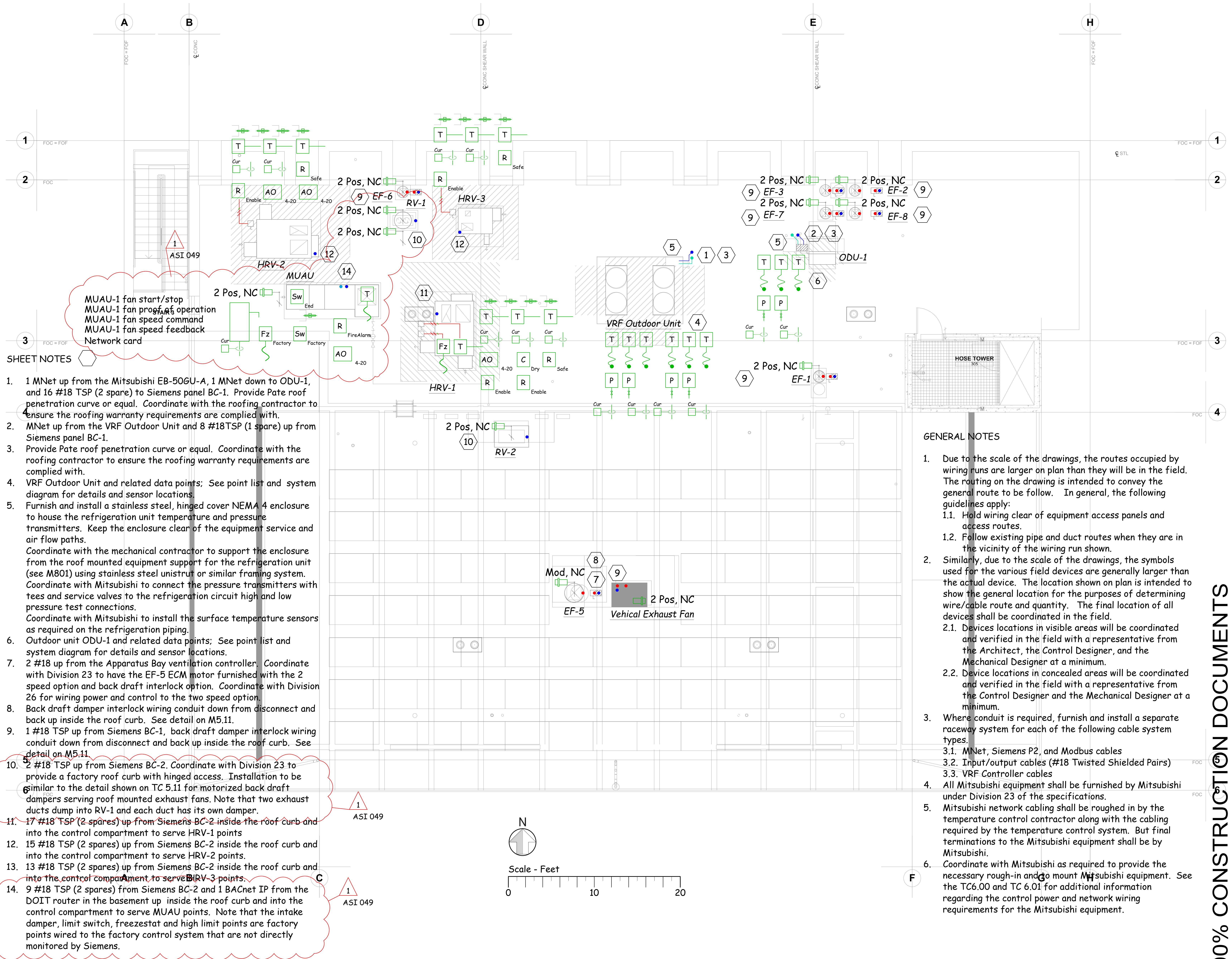
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SHEET TITLE  
Second Floor Plan

SHEET NUMBER  
TC 2.31





SHEET NOTES

- 1 MNet up from the Mitsubishi EB-50GU-A, 1 MNet down to ODU-1, and 16 #18 TSP (2 spare) to Siemens panel BC-1. Provide Pate roof penetration curve or equal. Coordinate with the roofing contractor to ensure the roofing warranty requirements are complied with.
- MNet up from the VRF Outdoor Unit and 8 #18TSP (1 spare) up from Siemens panel BC-1.
- Provide Pate roof penetration curve or equal. Coordinate with the roofing contractor to ensure the roofing warranty requirements are complied with.
- VRF Outdoor Unit and related data points; See point list and system diagram for details and sensor locations.
- Furnish and install a stainless steel, hinged cover NEMA 4 enclosure to house the refrigeration unit temperature and pressure transmitters. Keep the enclosure clear of the equipment service and air flow paths. Coordinate with the mechanical contractor to support the enclosure from the roof mounted equipment support for the refrigeration unit (see M801) using stainless steel unistrut or similar framing system. Coordinate with Mitsubishi to connect the pressure transmitters with tees and service valves to the refrigeration circuit high and low pressure test connections. Coordinate with Mitsubishi to install the surface temperature sensors as required on the refrigeration piping.
- Outdoor unit ODU-1 and related data points; See point list and system diagram for details and sensor locations.
- 2 #18 up from the Apparatus Bay ventilation controller. Coordinate with Division 23 to have the EF-5 ECM motor furnished with the 2 speed option and back draft interlock option. Coordinate with Division 26 for wiring power and control to the two speed option.
- Back draft damper interlock wiring conduit down from disconnect and back up inside the roof curb. See detail on M5.11.
- 1 #18 TSP up from Siemens BC-1, back draft damper interlock wiring conduit down from disconnect and back up inside the roof curb. See detail on M5.11.
- 2 #18 TSP up from Siemens BC-2. Coordinate with Division 23 to provide a factory roof curb with hinged access. Installation to be similar to the detail shown on TC 5.11 for motorized back draft dampers serving roof mounted exhaust fans. Note that two exhaust ducts dump into RV-1 and each duct has its own damper.
- 17 #18 TSP (2 spares) up from Siemens BC-2 inside the roof curb and into the control compartment to serve HRV-1 points
- 15 #18 TSP (2 spares) up from Siemens BC-2 inside the roof curb and into the control compartment to serve HRV-2 points.
- 13 #18 TSP (2 spares) up from Siemens BC-2 inside the roof curb and into the control compartment to serve HRV-3 points.
- 9 #18 TSP (2 spares) from Siemens BC-2 and 1 BACnet IP from the DOIT router in the basement up inside the roof curb and into the control compartment to serve MUUAU points. Note that the intake damper, limit switch, freezestat and high limit points are factory points wired to the factory control system that are not directly monitored by Siemens.

GENERAL NOTES

- Due to the scale of the drawings, the routes occupied by wiring runs are larger on plan than they will be in the field. The routing on the drawing is intended to convey the general route to be follow. In general, the following guidelines apply:
  - Hold wiring clear of equipment access panels and access routes.
  - Follow existing pipe and duct routes when they are in the vicinity of the wiring run shown.
- Similarly, due to the scale of the drawings, the symbols used for the various field devices are generally larger than the actual device. The location shown on plan is intended to show the general location for the purposes of determining wire/cable route and quantity. The final location of all devices shall be coordinated in the field.
  - Devices locations in visible areas will be coordinated and verified in the field with a representative from the Architect, the Control Designer, and the Mechanical Designer at a minimum.
  - Device locations in concealed areas will be coordinated and verified in the field with a representative from the Control Designer and the Mechanical Designer at a minimum.
- Where conduit is required, furnish and install a separate raceway system for each of the following cable system types.
  - MNet, Siemens P2, and Modbus cables
  - Input/output cables (#18 Twisted Shielded Pairs)
  - VRF Controller cables
- All Mitsubishi equipment shall be furnished by Mitsubishi under Division 23 of the specifications.
- Mitsubishi network cabling shall be roughed in by the temperature control contractor along with the cabling required by the temperature control system. But final terminations to the Mitsubishi equipment shall be by Mitsubishi.
- Coordinate with Mitsubishi as required to provide the necessary rough-in and to mount Mitsubishi equipment. See the TC6.00 and TC 6.01 for additional information regarding the control power and network wiring requirements for the Mitsubishi equipment.



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SHEET TITLE  
**Roof Plan**

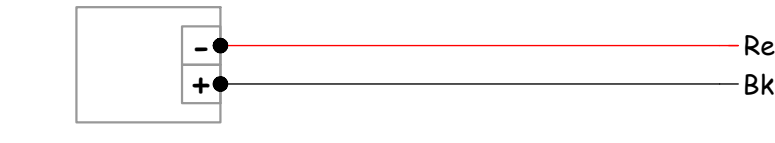
SHEET NUMBER  
**TC 2.41**



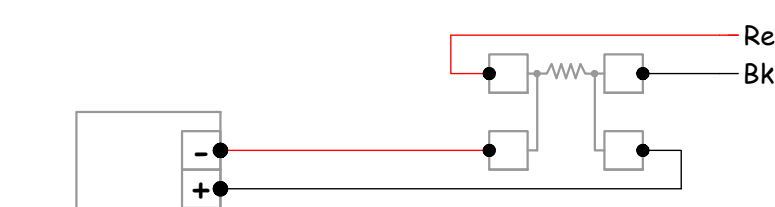
Siemens Control Panel BC-2

MUAU-1 VFD

MUAU-1 Supply  
Fan Speed Feedback  
Analog Output  
Range - Per point list

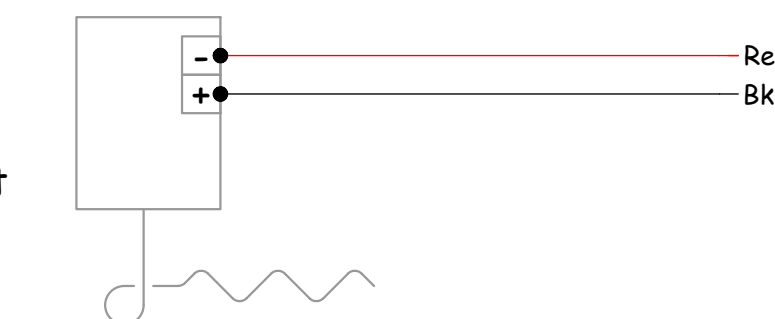


MUAU-1 Supply  
Fan Speed Control  
Analog Output  
Range - Per point list



MUAU-1 Fan Compartment

MUAU-1 supply  
temperature  
Flexible averaging  
temperature  
sensor  
Output - Per point list  
Range - Per point list



Siemens Controller

Analog Outputs

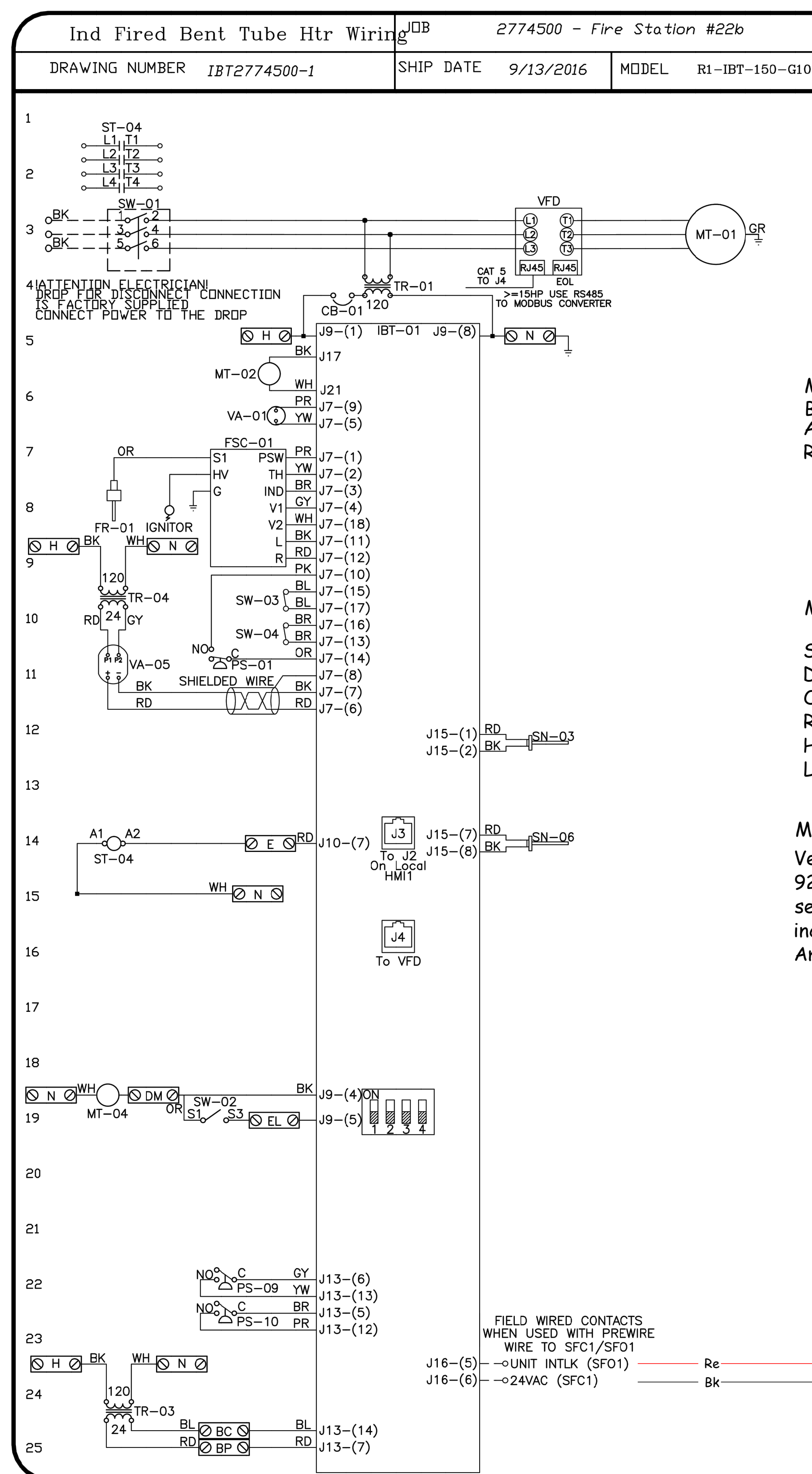
MUAU-1 Supply  
Fan Speed  
Command

Analog Inputs

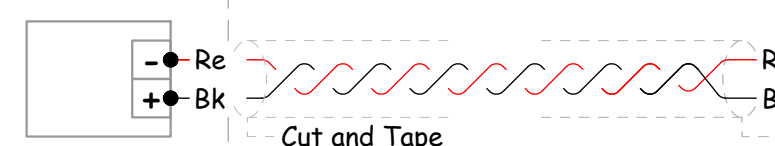
MUAU-1 Supply  
Fan Speed  
Command

MUAU-1 Supply  
Temperature

MUAU-1 Control Compartment



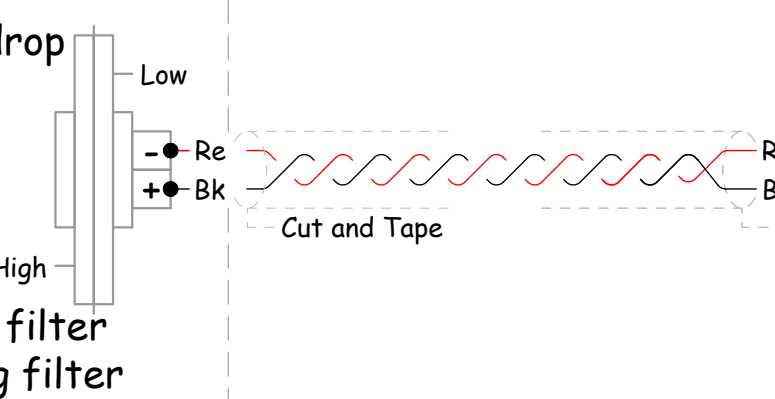
MUAU-1 Gas  
Burner Modulation  
Analog Output  
Range - Per point list



Analog Outputs

MUAU-1 Burner  
Modulation  
Command

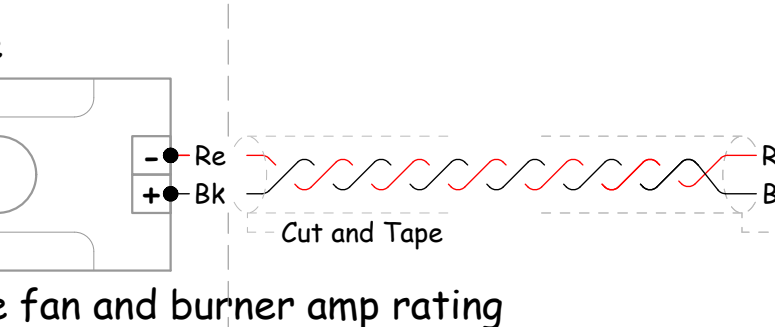
MUAU filter pressure drop  
Setra Model 264  
DP Transmitter;  
Output - Per point list  
Range - Per point list  
Hi connection -Entering filter  
Low Connection - Leaving filter



Analog Inputs

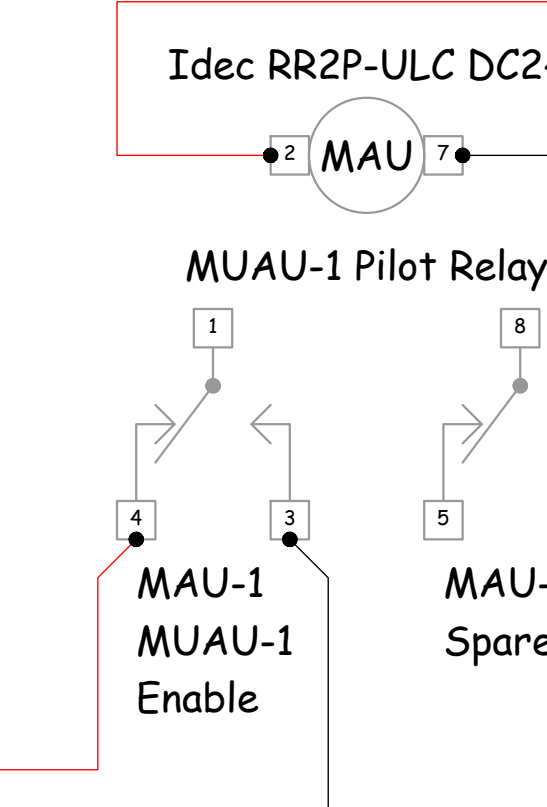
MUAU-1 Filter DP

MUAU-1 Total Amperage  
Veris Hawkeye  
921 current  
sensor on VFD  
incoming line;  
Amp setting - Coordinate fan and burner amp rating



Digital Outputs

MUAU-1  
Enable/Disable



1  
Add. 05  
2  
ASI 049

MUAU-1 Interlock Wiring

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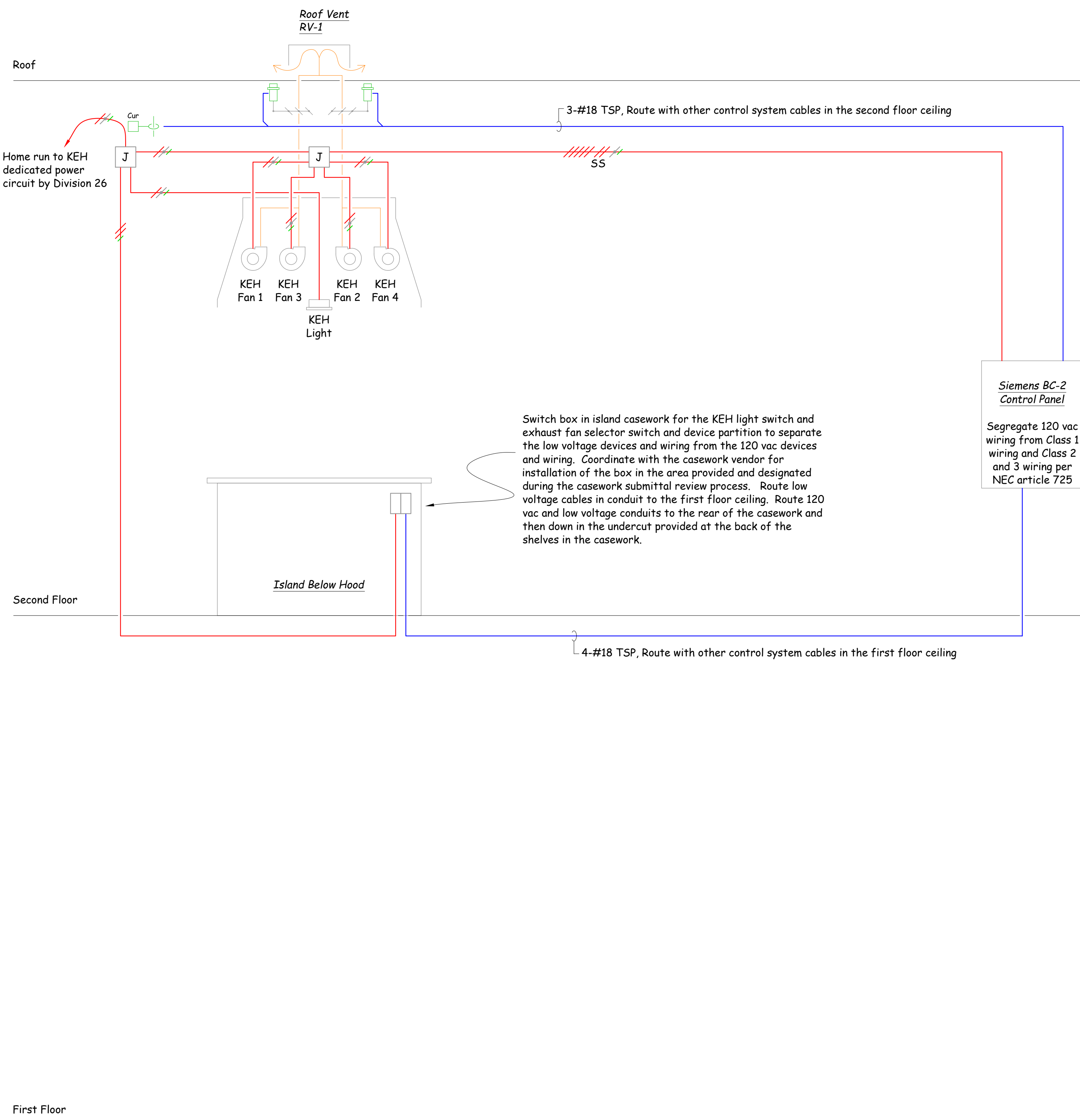
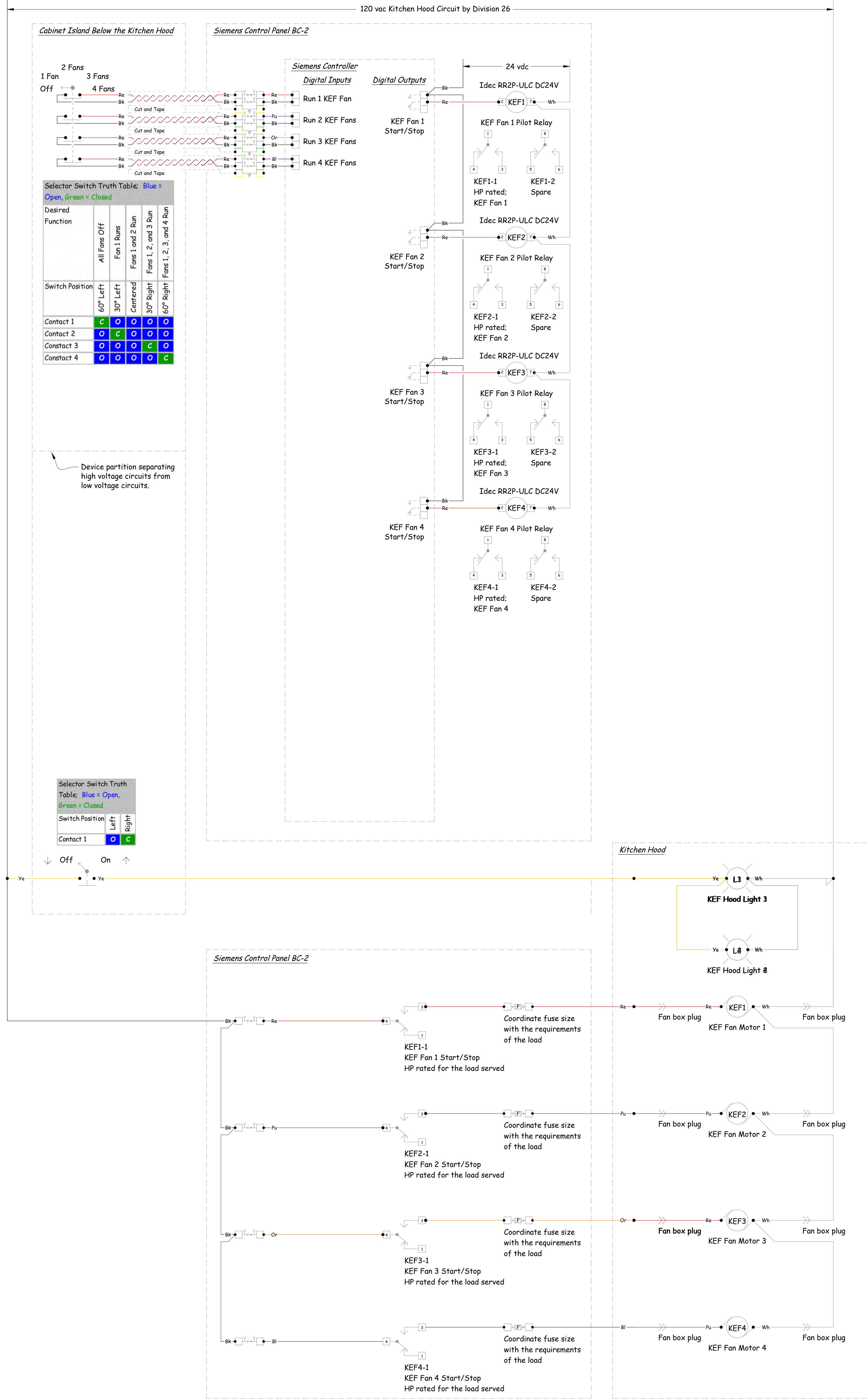
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SHEET TITLE	Wiring Details
SHEET NUMBER	TC 5.22





KEH Conduit and Cable Riser Diagram



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ASI-049



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SHEET TITLE	WIRING DETAILS
SHEET NUMBER	TC5.23

ASI 049









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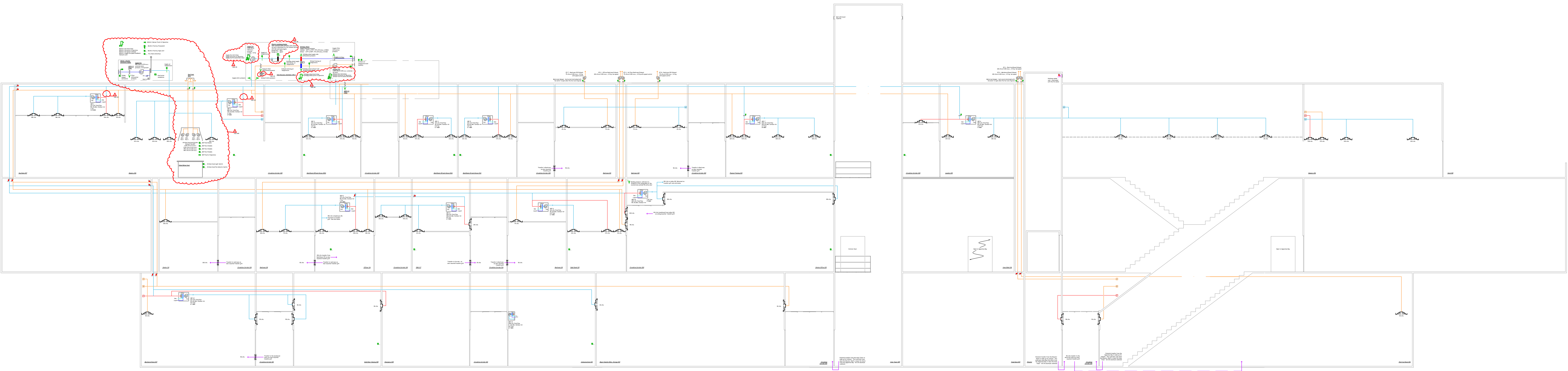
	
	
	
	

SHEET NUMBER

**TC 6.00**







Heat Recovery Ventilator HRV1 and Make Up Air Unit MUAU Zone Summary (Includes Variable Flow Refrigeration Zones VRF-1 Through 13)

Outdoor Unit Number	Branch Controller	Floor	Unit	Supply cfm	Return cfm	Outdoor Air cfm	Imbalance, cfm (Note 1)	Room Number	Service	Indoor Unit Supply cfm	Return cfm	Transfer Air, cfm (+ is in and - is out)	Outdoor Air Directly from HRV or MAU, cfm	HRV Exhaust, cfm	Direct Exhaust, cfm	Infiltrate (+) or Exfiltrate (-)	Imbalance, cfm (Note 1)	Interconnected Area Outdoor air to Exhaust Imbalance (Note 1, 2)	Notes
Outdoor Unit	BC-1	2nd	VRF-1	371	316	55	0	207	Day Room	371	316	0	0	55	0	0	0	(310)	Note 3
	BC-1	2nd	VRF-2	883	708	175	0	206	Beanery	883	708	0	900	175	900	0	0		
	BC-1	2nd	VRF-3	212	172	40	0	209/209A	Bunk Room	212	172	0	0	40	0	0	0		
	BC-1	2nd	VRF-4	212	172	40	0	210/210A	Bunk Room	212	172	0	0	40	0	0	0		
	BC-1	2nd	VRF-5	212	172	40	0	209/209A	Bunk Room	212	172	0	0	40	0	0	0		
	BC-1	2nd	VRF-6	494	129	55	310	204	Laundry	184	0	0	0	215	0	0	(31)	Note 4,5	
								200	Circulation Corridor	260	129	(100)	0	0	0	0	31		
								201	Restroom	25	0	50	0	0	75	0	0		
								202	Restroom	25	0	50	0	0	75	0	0		
	BC-1	2nd	VRF-7	600	435	165	0	203	Physical Training	600	435	0	0	165	0	0	0	(215)	
	None	1st Floor	None	N/A	N/A	N/A	N/A	114	Janitor	0	0	100	0	100	0	0	0		
	BC-1	1st Floor	VRF- 8	371	250	55	66	115	Bunk Room	150	0	(150)	0	0	0	0	0		
								116	Officer	146	250	100	0	100	0	0	(104)		
								118	Restroom	75	0	50	0	0	100	0	25		
	None	1st Floor	None	N/A	N/A	N/A	N/A	119	Restroom	0	0	50	0	0	75	0	(25)	(60)	
	BC-1	1st Floor	VRF -9	212	172	40	0	120	Night Bunk	212	172	0	0	40	0	0	0		
	BC-1	1st Floor	VRF-10	494	439	55	0	103	Station Office	300	439	144	0	0	0	0	5		
								102	Lobby	194	0	(144)	0	0	0	(50)	0		
	BC-1	1st Floor	VRF-11	300	125	100	75	117	EMS	20	0	(20)	0	0	0	0	0		
								104	Corridor	280	125	(130)	0	0	0	0	25		
	BC-2	Basement	VRF-12	212	162	40	10	001	Corridor	122	72	(50)	0	0	0	0	0	(60)	
								008	Bunk Gear Cleaning	90	90	0	0	0	0	0	0		
	None	Basement	None	N/A	N/A	N/A	N/A	006	Electrical Room	0	0	50	0	0	50	0	0		
	None	Basement	None	N/A	N/A	N/A	N/A	007	Mechanical	0	0	50	0	0	50	0	0		
	None	Basement	Direct from HRV-1	N/A	N/A	N/A	N/A	002	Major Disaster	0	0	0	30	30	0	0	0		
ODU-1	BC-2	Basement	VRF-13					010	Comm	208	208	0	0	0	0	0	0		
ODU-1	None	Basement	None	N/A	N/A	N/A	N/A	9	Emergency	399	0	0	0	0	0	0	0		
		MUAH Supply Flow - cfm -	900																
		HRV-1 Total Supply Flow, cfm -	890																
		HRV-1 Total Exhaust Flow, cfm-	1,325																
		HRV-1 Imbalance, cfm -	(435)																
Notes																			
1. This should be zero																			
2. An interconnected area is an area served by one or more system where air could transfer from one system to another to achieve an over-all flow balance																			
3. The directly introduced outdoor air totals include the flow from the Kitchen makeup unit MUAU.																			
4. Does not include the impact of the dryer vent when the dryer is running.																			
5. Does not include combustion air for the domestic hot water heater.																			



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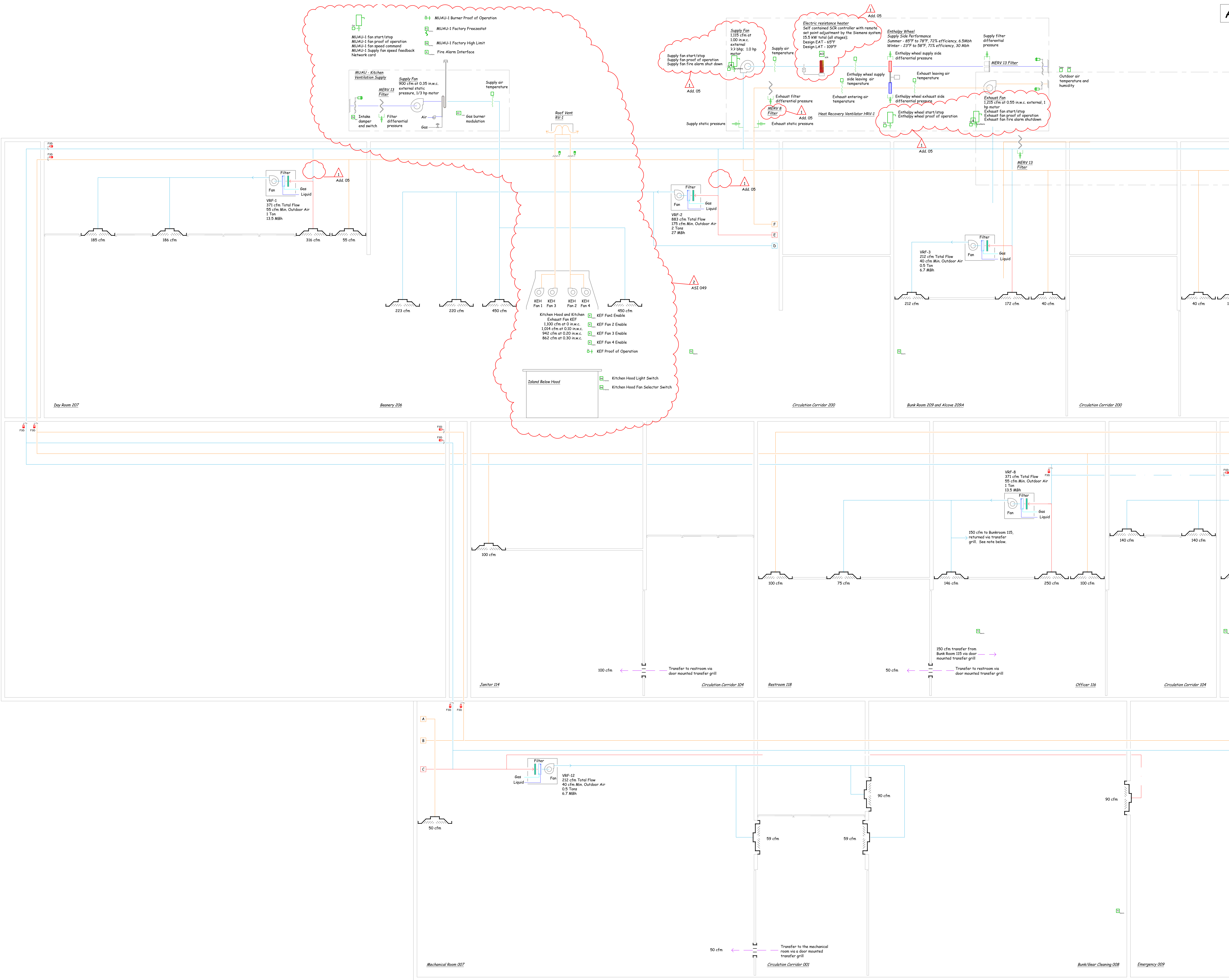
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SHEET TITLE  
HRV1 and MUAU System  
Diagram

SHEET NUMBER  
TC 6.10

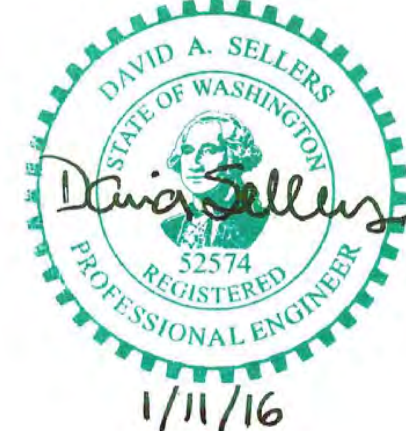




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HRV1 and MUAU System  
Diagram -NW Detail

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TC 6.11



MUAU Sequence of Operation (Continued)

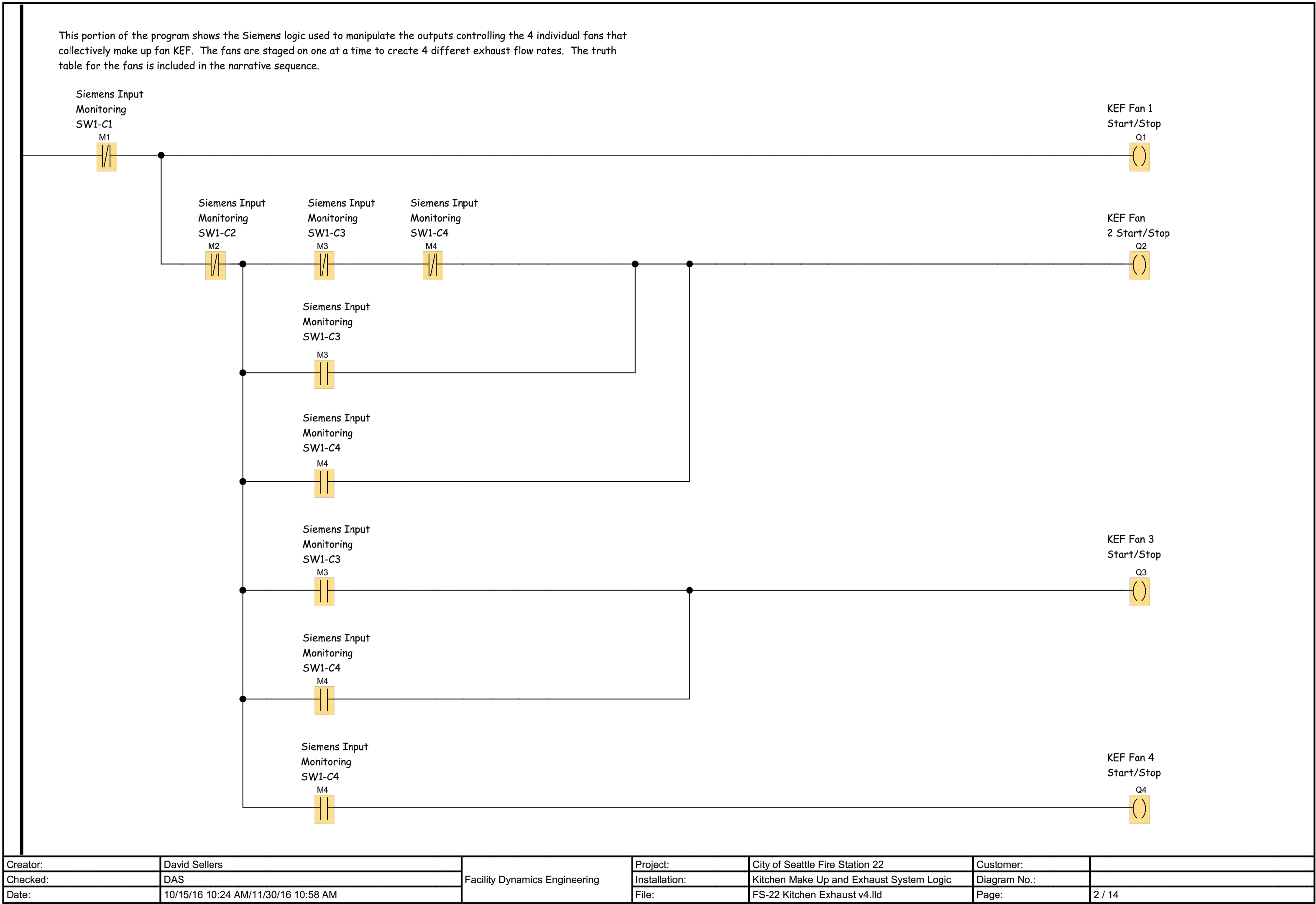
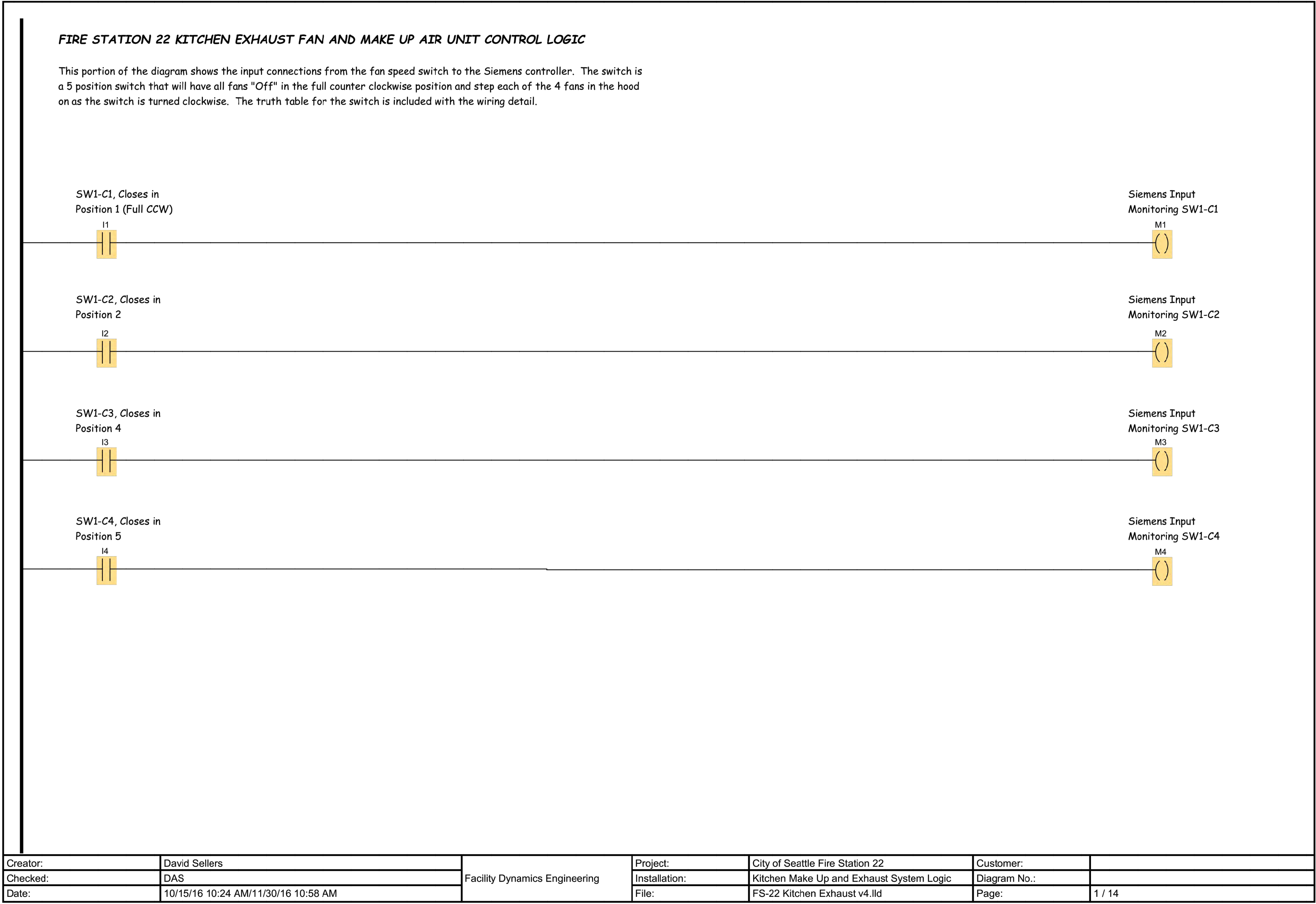
(Continued from TC 6.17)

Burner intake and discharge firestats furnished as part of the factory control system shall shut down and lock out the unit if the temperatures they sense are exceeded. Set points are as follows:

- Intake firestat - 135°F (adjustable from the factory control panel)
- Discharge firestat - 240°F (adjustable from the factory control panel)

Note that this feature can also be disabled from the unit control panel.

Selector Switch Truth Table					
Desired Function	All Fans Off	Fan 1 Runs	Fans 1 and 2 Run	Fans 1, 2, and 3 Run	Fans 1, 2, 3, and 4 Run
Switch Position	60° Left	30° Left	Centered	30° Right	60° Right
Contact 1	Closed	Open	Open	Open	Open
Contact 2	Open	Closed	Open	Open	Open
Constact 3	Open	Open	Open	Closed	Open
Constact 4	Open	Open	Open	Open	Closed
Exhaust Fan Truth Table					
Switch Position	60° Left	30° Left	Centered	30° Right	60° Right
Fan 1	Off	On	On	On	On
Fan 2	Off	Off	On	On	On
Fan 3	Off	Off	Off	On	On
Fan 4	Off	Off	Off	Off	On
MAU Speed Truth Table					
Logic Block Switch Position	60° Left (Note 1)	25%	50%	75%	100%
SW1	Off	Off	Off	On	On
SW2	Off	Off	On	Off	On



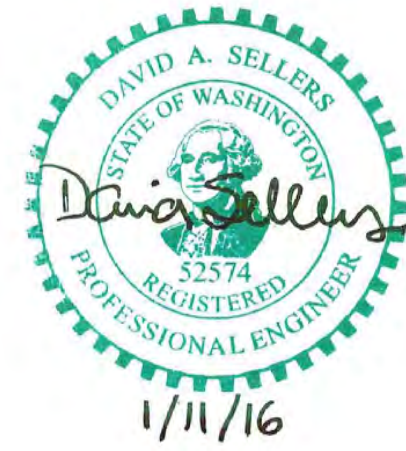
KEH Exhaust Fan Logic (Continued on TC6.172)



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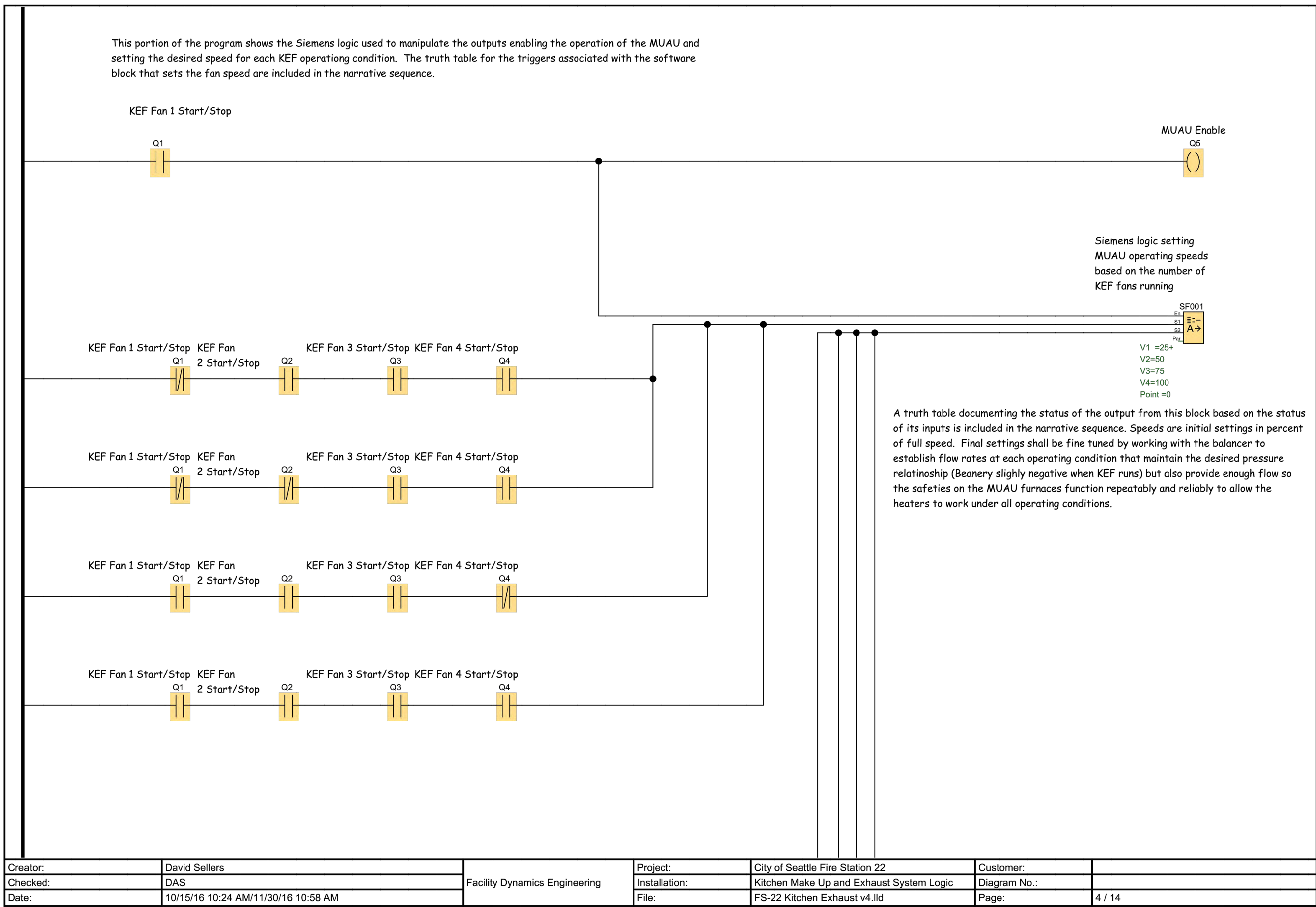
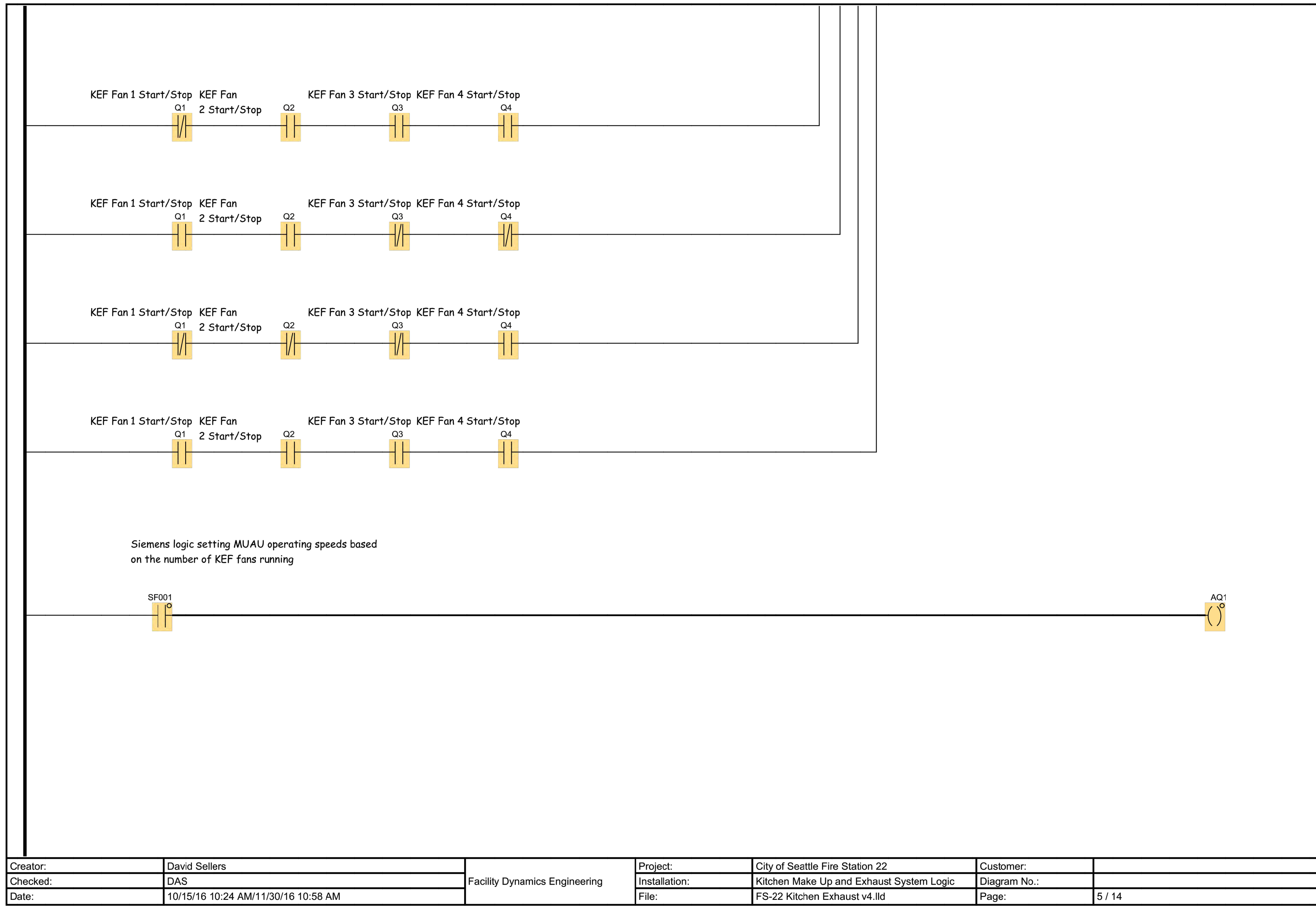
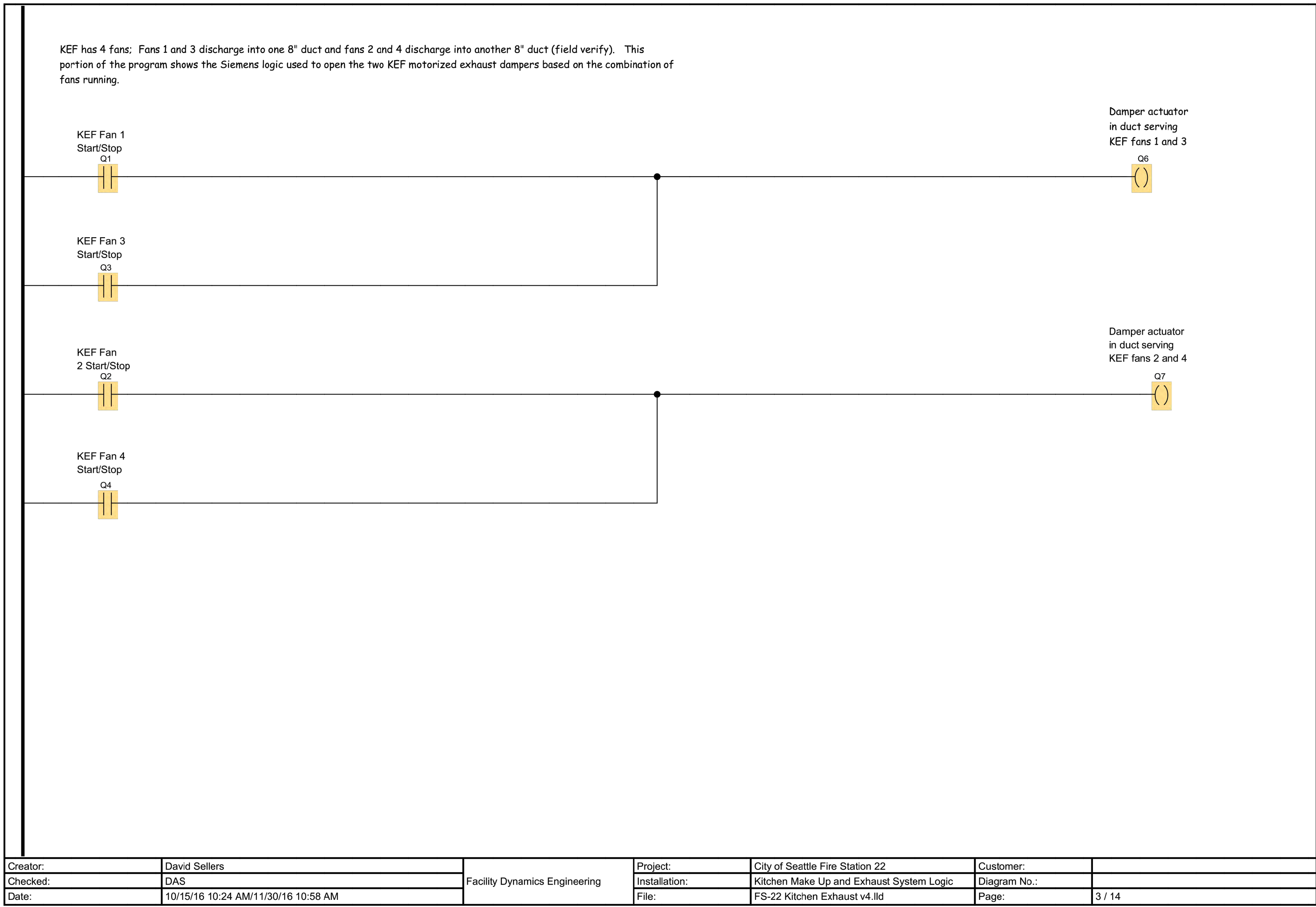
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SHEET TITLE	
MUAU Sequence of Operation (Continued)	
SHEET NUMBER	
TC 6.171	

ASI 049





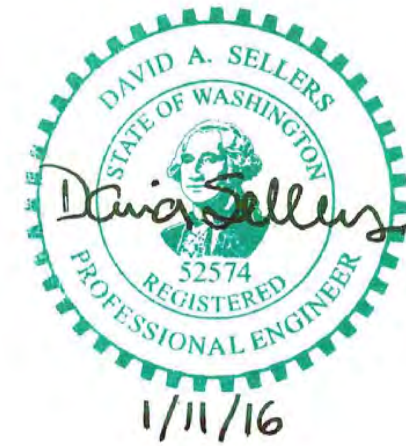
KEH Exhaust Fan Logic (Continued from TC 6.171)



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PROJECT-NO	13004
DRAWN	DAS
CHECKED BY	CBM
DATE	11/30/16
REVISIONS	DATE
Revision 1 - ASI 049 - 2016-11-30	
SHEET TITLE	MUAU Sequence of Operation (Continued)
SHEET NUMBER	TC 6.172