Grimes County Courthouse Upgrade

BY: Open Tech

17401 VILLAGE GREEN DR.

HOUSTON,TX 77040

TEL: (713) 983-6500

FAX: (713) 983-6900





ACTIVITY	DATE
SUBMITTED FOR APPROVAL	4-27-2010

hagan
luzzi
117
Houston
1

DWG. NO.	DRAWING INDEX
1	COVER & LEGEND PAGE
2	SETTINGS AND SETPOINTS
3 - 4	BILL OF MATERIALS
5 - 6	WIRE & TUBING SCHEDULE - WIRE & CABLE SPECIFICATION
7	BCM DETAIL
8 - 9	NETWORK COMMUNICATIONS
10 - 19	MS/TP LAYOUT
20 - 22	DDC PANEL
23	CHILLED WATER SYSTEM SEQUENCE OF OPERATIONS
24	HOT WATER SYSTEM SEQUENCE OF OPERATIONS
25 - 26	CHILLED WATER AND HOT WATER SYSTEM CONTROL DIAGRAM
27 - 28	CHILLED WATER SYSTEM CONTROL POINTS
29	AIR HANDLING UNIT SEQUENCE OF OPERATIONS
30 - 31	AIR HANDLING UNIT CONTROL DIAGRAM
32	ROOF TOP UNIT SEQUENCE OF OPERATIONS
33	ROOF TOP UNIT CONTROL DIAGRAM
34	DX SPLIT SYSTEM SEQUENCE OF OPERATIONS
35	DX SPLIT SYSTEM CONTROL DIAGRAM
36 - 37	UNIT VENTILATOR SEQUENCE OF OPERATIONS
38	UNIT VENTILATOR CONTROL DIAGRAM
39	UNIT HEATER CONTROL DIAGRAM
40	EXHAUST FAN CONTROL DIAGRAM
41	CHILLER POWER MONITOR
42 - 43	FLOW METER SCHEDULE
44	MISCELLANEOUS WIRING DETAILS
45	DEVICE WIRING DETAILS
46	VALVE SCHEDULE
47 - 139	I/O SUMMARIES
140+	PRODUCT DATA SHEETS

DDC System Settings Grimes County Courthouse

NOTE: OpenTech will write the DDC program using the specified values. If no specified values are listed then OpenTech will use the default values unless alternate settings are marked on the submittal or otherwise communicated.

											Unoccupied	Unoccupied
			Occupied	Cooling	Occupied	Heating					Cooling	Heating
TEMPERATURES	Unit #	Area Served	Setpoi	nt	Setpoi	nt	CO2 S	etpoint	Heating	Offset	Setpoint	Setpoint
			Specified	Default	Specified	Default	Specified	Default	Specified	Default		
Unit Ventilators			74°F		70°F		1100					
AHUs			74°F		70°F		1100					
DX AHUs			74°F		70°F		1100				80°F	65°F

	Occupied	d Hours	Occupied	l Hours	Unoccupio	ed Hours	Unoccupie Saturda	
OPERATING HOURS	Monday the	ru Friday	Saturday &	y & Sunday Monday thru Friday		iday Sunday		
	Specified	Default	Specified	Default	Specified	Default	Specified	Default
		5:00 am -		5:00 am -		8:01 pm -		8:01 pm -
Unit Ventilators		8:00 pm		8:00 pm		4:59 am		4:59 am
		5:00 am -		5:00 am -		8:01 pm -		8:01 pm -
AHUs		8:00 pm		8:00 pm		4:59 am		4:59 am

FIELD DEVICE & SYSTEM SETTINGS

		Specified	Default
Chilled	Water	40°F - 44°F	
Hot Wat	er	180°F	

\bigcirc	pen -	Tech
		curity solutions Green Drive 7040

	PROJECT:
Tel:(713) 983-6500	ARCHITECT:
Fax:(713) 983-6900	ENGINEER:

PROJECT:	Grimes County Courthous Upgrade

APPROVED:	DATE:	DESCRIPTION:	REV:

System Settings

SYMBOL	PRODUCT	QUANTITY	PART NUMBER	DETAIL NUMBER	MANUFACTURER	DESCRIPTION
000000000	100 BASE T NETWORK SWITCH	1	F\$105	SEE DATA SHEETS	NETGEAR	ETHERNET 5-PORT SWITCH
DC PS	DC POWER SUPPLY	1	DCP-1.5W	SEE DATA SHEETS	KELE	24 VAC TO 24VDC, 1.50 AMP (36 VA) POWER SUPPLY
BCM-MS/TP	BCM - MS/TP	1	BCM-MS/TP	SEE DATA SHEET	ALERTON	BACtalk VISUAL GLOBAL CONTROLLER MS/TP MODULE
		•				
	BACnet CONTROL MODULE	х	VLC-1188	SEE DATA SHEETS	ALERTON	BACtalk VISUAL LOGIC CONTROLLER
	BACnet CONTROL MODULE	76	VLC-853	SEE DATA SHEETS	ALERTON	BACtalk VISUAL LOGIC CONTROLLER
	BACnet CONTROL MODULE	4	VLC-550	SEE DATA SHEETS	ALERTON	BACtalk VISUAL LOGIC CONTROLLER
	BACtalk WALL SENSOR	80	MS-2000H-BT	SEE DATA SHEET	ALERTON	BACtalk WALL SENSOR WITH MULTIFUNCION LCD
811	BACtalk WALL SENSOR	80	MS-2000H-BT	SEE DATA SHEET	ALERTON	READOUT, FUNCTION KEYS, AND HUMIDITY SENSOR
-	BACtalk WALL SENSOR	2	TS-1101-WA-10-AA	SEE DATA SHEETS	ALERTON	BACtalk STAINLESS STEEL WALL SENSOR
DT	10K DUCT TEMPERATURE SENSOR	76	TS-2008-GD-10-AA	SEE DATA SHEETS	ALERTON	10K OHM THERMISTOR, TEMPERATURE SENSOR DUCT PROBE
T1	BACtalk IMMERSION SENSOR	6	TS-2104-MH-10-AA / TS-3106-CI-00-AA	SEE DATA SHEETS	ALERTON	10K OHM THERMISTOR, TEMPERATURE SENSOR 6" IMMERSION w/ S.S. 1/2" TEMPERATURE WELL
T2	BACtalk IMMERSION SENSOR	10	TS-2106-GH-10-AA / TS-3106-CI-00-AA	SEE DATA SHEETS	ALERTON	10K OHM THERMISTOR, TEMPERATURE SENSOR 6" IMMERSION w/ S.S. 1/2" TEMPERATURE WELL
T3	BACtalk IMMERSION SENSOR	6	TS-2104-GH-10-AA / TS-3104-CI-00-AA	SEE DATA SHEETS	ALERTON	10K OHM THERMISTOR, TEMPERATURE SENSOR 4" IMMERSION w/ S.S. 1/2" TEMPERATURE WELL
FRZ	LOW TEMPERATURE SWITCH	12	CTE-3017	SEE DATA SHEETS	KREUTER	LOW LIMIT TEMPERATURE CONTROL FREEZESTAT W/ MANUAL RESET AND AVERAGING ELEMENT
<u> </u>	TEMPERATURE SENSOR GUARD	6	BA/BG2	SEE DATA SHEETS	KELE	CLEAR LOCKABLE THERMOSTAT / TEMPERATURE SENSOR GUARD OR SECURE HOUSING
CO2	CARBON DIOXIDE SENSOR	11	C7632B1002	SEE DATA SHEETS	HONEYWELL	DUCT MOUNTED CARBON DIOXIDE SENSOR
<u> </u>						

-	Brotain inimeratori del 1001	Ü	10 2104 WIT 10 70 (7 10 0100 01 00 70)	022 571171 011221 0	7.22.11.011	6" IMMERSION w/ S.S. 1/2" TEMPERATURE WELL
T2	BACtalk IMMERSION SENSOR	10	TS-2106-GH-10-AA / TS-3106-CI-00-AA	SEE DATA SHEETS	ALERTON	10K OHM THERMISTOR, TEMPERATURE SENSOR
-	BACIAIR IIVIIVIERSION SENSOR	10	13-2100-GH-10-AA7 13-3100-CI-00-AA	SEE DATA SHEETS	ALEKTON	6" IMMERSION w/ S.S. 1/2" TEMPERATURE WELL
ТЗ	BACtalk IMMERSION SENSOR	6	TS-2104-GH-10-AA / TS-3104-CI-00-AA	SEE DATA SHEETS	ALERTON	10K OHM THERMISTOR, TEMPERATURE SENSOR
	BACIAIK IIVIIVIETOIGIA GENOCIT	0	10-2104-011-10-AA7 10-3104-01-00-AA	GEE BATTA GITEET G	ALLICION	4" IMMERSION w/ S.S. 1/2" TEMPERATURE WELL
FRZ	LOW TEMPERATURE SWITCH	12	CTE-3017	SEE DATA SHEETS	KREUTER	LOW LIMIT TEMPERATURE CONTROL FREEZESTAT
2	EOW TEIMI ENATORE OWITCH	12	01E-3017	GEE BATTA GITEET G	MEGTER	w/ MANUAL RESET AND AVERAGING ELEMENT
	TEMPERATURE SENSOR GUARD	6	BA/BG2	SEE DATA SHEETS	KELE	CLEAR LOCKABLE THERMOSTAT / TEMPERATURE
	TEMPERATURE SENSOR GOARD	OR GUARD 6 BAVEG2 SEE DATA SHEETS NELE		KEEL	SENSOR GUARD OR SECURE HOUSING	
CO2	CARBON DIOXIDE SENSOR	11	C7632B1002	SEE DATA SHEETS	HONEYWELL	DUCT MOUNTED CARBON DIOXIDE SENSOR
U	CARBON DIOXIDE SENSOR	""	C/032B1002	OLL DATA SHLETO	TIONE I WELL	
	CARBON DIOXIDE SENSOR	65	C7632A1004	SEE DATA SHEETS	HONEYWELL	ROOM SURFACE MOUNTED CARBON DIOXIDE SENSOR
	CARBON DIOXIDE SENSOR	03	C7632A1004	SEE DATA SHEETS	TIONE TWEEL	w/ 4-20mA TRANSMITTER
	MOTION DETECTOR /	65	DT-300	SEE DATA SHEETS	WATT STOPPER	360° DUAL TECHNOLOGY OCCUPANCY SENSOR
	OCCUPANCY SENSOR	03	D1-300	SEE DATA SHEETS	WATTSTOFFER	CEILING MOUNT
AFS -	AIR FLOW SWITCH	11	11 ADPS-03-1-N	SEE DATA SHEETS	DWYER	DUCT MOUNTED DIFFERENTIAL PRESSURE SWITCH
† †	AIR FLOW SWITCH	11	ADF3-03-1-N	SEE DATA SHEETS	DWIEK	USED FOR AIR SERVICE
DC 3	PHOTOCELL CONTROL	1	EM-24A2	SEE DATA SHEETS	KELE	PHOTOCELL CONTROL
PC •	PHOTOCELL CONTROL	ı	EIVI-24A2	SEE DATA SHEETS	KELE	
Ø	DAMPER ACTUATOR	67	LF24-SR	OFF DATA OUFFTO	BELIMO	DIRECT COUPLED ACTUATOR - 2-10VDC
	DAMPER ACTUATOR	0/	LF24-5R	SEE DATA SHEETS	BELIMO	CONTROL 35 IN-LBS TORQUE 24VAC
DDT	WATER DP TRANSMITTER	3	MOOD COEPD O	OFF DATA OUFFTO	SETRA / KELE	DIFFERENTIAL PRESSURE TRANSMITTER, WATER SER
DPT	WATER DP TRANSMITTER	3	M230-025PD-C	SEE DATA SHEETS	SETRA/ KELE	0-25 PSI RANGE 4-20mA OUTPUT
OH OT	OUTDOOR AIR TEMP/HUMIDITY	4	DUT O	SEE DATA SHEETS	DWYER	OUTDOOR AIR TEMPERATURE & HUMIDITY
	OUTDOOR AIR TEMP/HUMIDITY SENSOR	1 1	RHT-O	SEE DATA SHEETS	DWYER	TRANSMITTER w/ SUNSHIELD

Open ⁷	Tech
CONTROL & SECTION 17401 VIllage G	

PROJECT:	Grimes County Courthouse Upgrade
ARCHITECT:	
ENGINEER:	

Tel:(713) 983-6500 Fax:(713) 983-6900

REV:	DESCRIPTION:	DATE:	APPROVED:	

Bill of Materials 1

SYMBOL	PRODUCT	PART NUMBER	MANUFACTURER	DESCRIPTION
W1	2 CONDUCTOR - 18 AWG WIRE	OTS18/2-Y	DATATECH	GENERAL APPLICATION - YELLOW JACKET TWISTED SHIELDED PAIR PLENUM GRADE
W2	3 CONDUCTOR - 18 AWG WIRE	OTS18/3-Y	DATATECH	GENERAL APPLICATION - DARK YELLOW JACKET TWISTED SHIELDED 3 CONDUCTOR PLENUM GRADE
W4	8 CONDUCTOR - 24 AWG WIRE	OTEC5-B	DATATECH	ETHERNET CATEGORY 6 GRADE 10/100 BLUE JACKET PLENUM GRADE
W5	2 CONDUCTOR - 18 AWG WIRE	OTT18/2-MG-S	DATATECH	TRUNK - MINT GREEN JACKET TWISTED SHIELDED 2 CONDUCTOR
W6	2 CONDUCTOR - 22 AWG COMMUNICATIONS WIRE	OTMSTP-22/2-R-S	DATATECH	MS/TP COMMUNICATIONS - PURPLE JACKET TWISTED SHIELDED 2 CONDUCTOR
W7	2 CONDUCTOR - 14 AWG			GENERAL APPLICATION - THHN 600VOLT JACKET
-0-T1-0-	1/4" HARD DRAWN COPPER			HARD DRAWN COPPER PROCESS TUBING
_o_T2_o_	1/4" FR POLYETHYLENE			FIRE RETARDANT BLACK POLYETHYLENE TUBING
_o_T3_o_	CLEAR BLUE POLYETHYLENE			CLEAR BLUE POLYETHYLENE TUBING
-0-T40-	1/4"FR POLYETHYLENE IN EMT			FIRE RETARDANT BLACK POLYETHYLENE TUBING INSTALLED IN EMT CONDUIT
_0_T5_0_	3/8" HARD DRAWN COPPER			HARD DRAWN COPPER PROCESS TUBING - MAIN AIR
-o-T6o-	1/2" HARD DRAWN COPPER			HARD DRAWN COPPER PROCESS TUBING - MAIN AIR

Oper	nTech
	& SECURITY SOLUTIONS le Green Drive 77040

Tel:(713) 983-6500	ARCHITECT:
Fax:(713) 983-6900	ENGINEER:

PROJECT:	Grimes County Courthouse Upgrade
RCHITECT:	

REV:	DESCRIPTION:	DATE:	APPROVED:

Wiring and Tubing Schedule

Part Number: W1 -- OTS18/2-Y

Specification

Construction: 18 AWG 7/0152 stranded bare copper, 2 conductors.

Color Code: black and white

Insulation: 0.007 inch, low smoke polyvinylchloride

Shielding: overall aluminum mylar shield 100% coverage w/stranded drain wire

Capacitance: n/a

Resistance: 6.92 ohms per 1000 feet at 68 deg. F

Temp/voltage: 75 degrees C / 300 volts

Jacket: Yellow 0.015 inch, low smoke polyvinylchloride - 0.152" Nom. O.D.

Print Legend: OpenTech Device 2 OTS18/2-Y on 1' center

Misc.: 2.5 inch left hand lay, 22 lbs./mft

UL: NEC CL3P/CMP

Part Number: W2 -- OTS18/3-Y

Specification

Construction: 18 AWG 7/0152 stranded bare copper, 3 conductors.

Color Code: black, red, and white

Insulation: 0.007 inch, low smoke polyvinylchloride

Shielding: overall aluminum mylar shield 100% coverage w/stranded drain wire

Capacitance: n/a

Resistance: 6.92 ohms per 1000 feet at 68 deg. F

Temp/voltage: 75 degrees C / 300 volts

Jacket: Yellow 0.015 inch, low smoke polyvinylchloride - 0.162" Nom. O.D.

Print Legend: OpenTech Device 3 OTS18/3-Y on 1' center

Misc.: 2.5 inch left hand lay, 28 lbs./mft

UL: NEC CL3P / CMP

Part Number: W4 – EIA-568 Category 6

Specification

Construction: 23 AWG solid copper, 4 twisted pair

Color Code: white/blue. blue

Insulation: 0.019 inch. CommFlex

Shielding: none

Capacitance: 4.6 nF/100m nominal

Resistance: 6.66 ohms per 100m Max

Temperature: 60 degrees C

Jacket: CommFlex

UL: Communications Cable per ETL Type CMP, CSA C(ETL) CMP

Part Number: W5 -- OTT18/2-MG-S

Specification

Construction: 18 AWG 7/0152 stranded bare copper, 2 conductors.

Color Code: black and white

Insulation: 0.007 inch, low smoke polyvinylchloride

Shielding: overall aluminum mylar shield 100% coverage w/stranded drain wire

Capacitance: n/a

Resistance: 6.92 ohms per 1000 feet at 68 deg. F

Temp/voltage: 75 degrees C / 300 volts

Jacket: Mint Green 0.015 inch, low smoke polyvinylchloride - 0.152" Nom. O.D.

Print Legend: OpenTech Trunk OTT18/2-MG on 1' center

Misc.: 2.5 inch left hand lay, 22 lbs./mft

UL: NEC CL3P/CMP

Part Number: W6 -- OTMSTP22/2-R-S

Specification

Construction: 22 AWG 7/0096 stranded bare copper, 2 conductors.

Color Code: black and white

Insulation: 0.016 inch, foam-fep

Shielding: overall aluminum poly foil 100% coverage w/stranded drain wire

Capacitance: 12.1 pF/ft nominal

Resistance: 17.5 ohms per 1000 feet at 68 deg. F

Temp/voltage: 75 degrees C / 300 volts

Jacket: Purple 0.015 inch, low smoke polyvinylchloride - 0.15" nominal O.D.

Print Legend: OpenTech MS/TP OTMSTP22/2-R-S on 1' center

Misc.: 2. inch left hand lay, 13.41 lbs./1000ft

UL: NEC CMP

Part Number: W7 -- #14 THHN

Specification

Construction: 14 AWG solid bare copper, single conductor.

Color Code: black, white, or green

Insulation: 0.015 mils, low smoke polyvinylchloride

Temp/voltage: 75 degrees C wet or dry 90 degrees C dry / 600 volts VW-1 rated

Jacket: black, white, or green -- 0.11" Nominal O.D.

Print Legend: Essex 14 AWG Type THHN UL E14656

UL: File Number E14656 or E53446

Federal Government Specification J-C-30A

\bigcirc	pen :	Tech
		CURITY SOLUTIONS Preen Drive
	ton, TX 7	

Tel:(713) 983-6500 ARCHITECT: Fax:(713) 983-6900 ENGINEER:

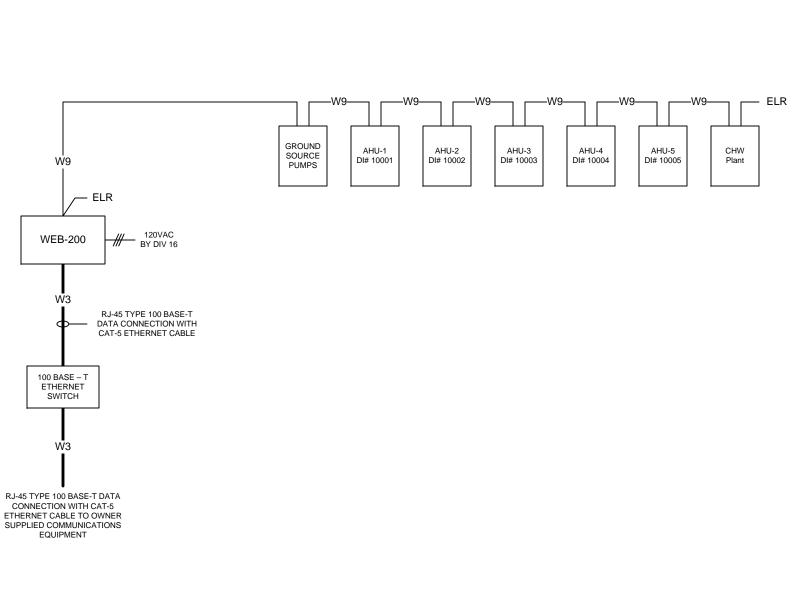
PROJECT: Grimes County Courthouse Upgrade

REV: DESCRIPTION: DATE: APPROVED:

Wire and Cable Specifications

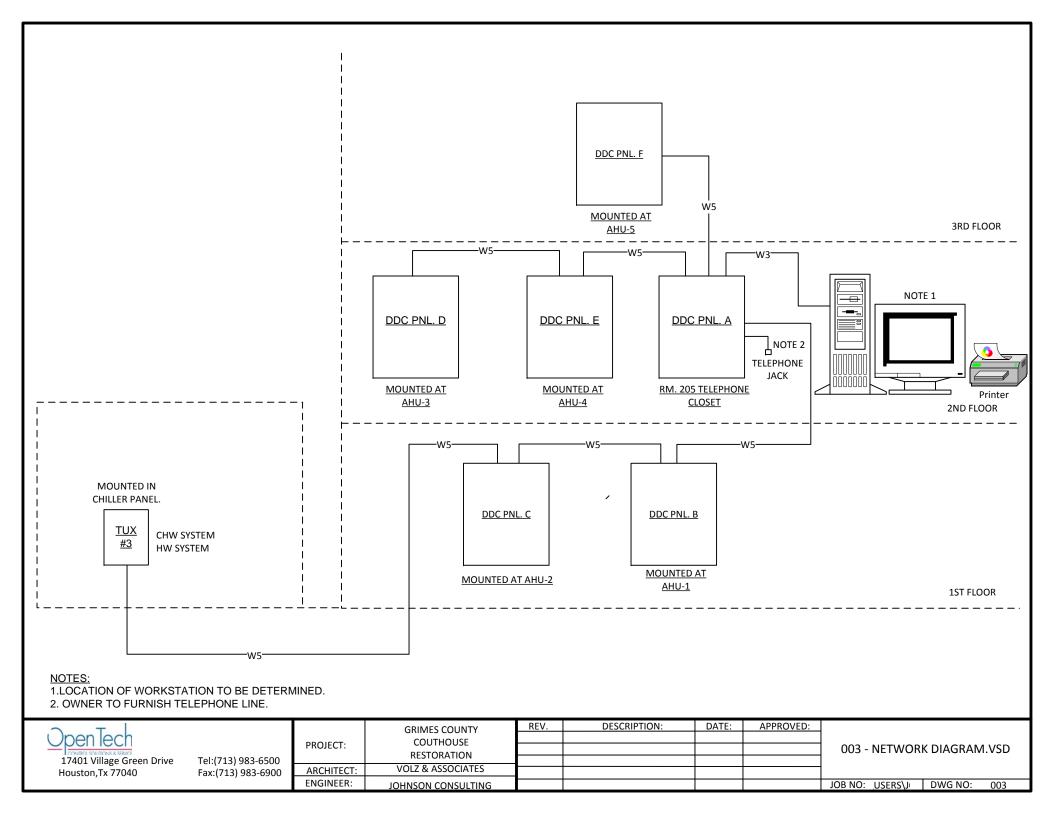
JOB NO: RH100117 DWG NO:

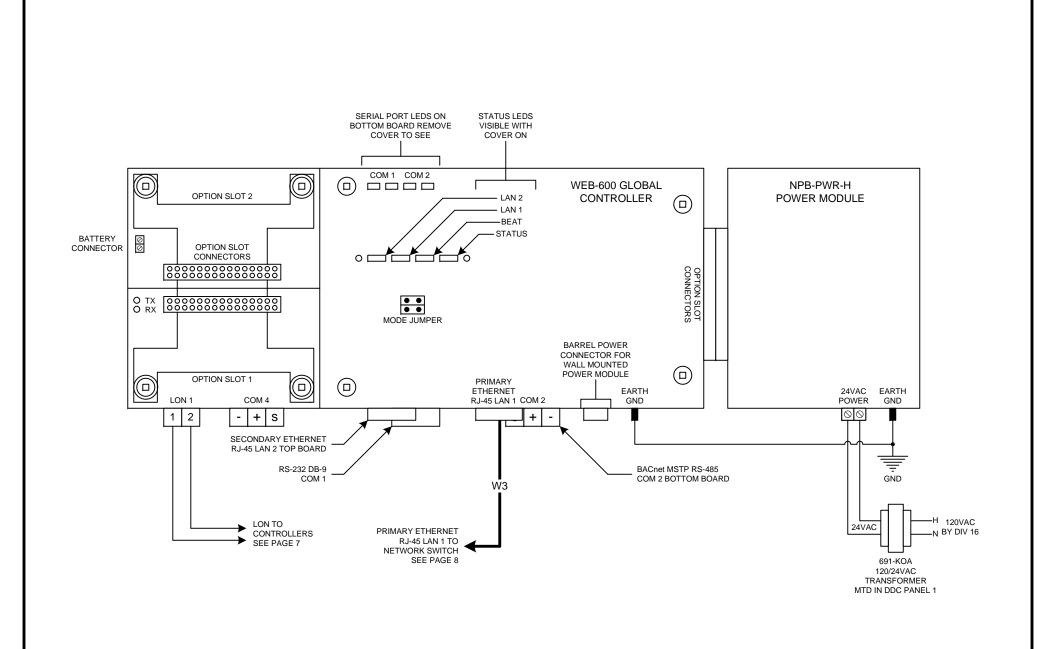
OUTT/ DWG NO.



ELR - END OF LINE RESISTOR

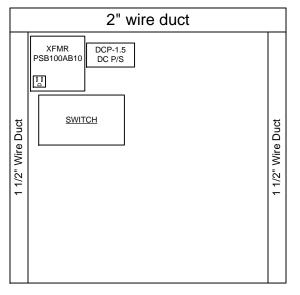
OpenTech		PROJECT:	Grimes County Courthouse	REV:	DESCRIPTION:	DATE:	APPROVED:	Network Communications
Oportiodii			Upgrade					Network Communications
17401 Village Green Drive	Tel:(713) 983-6500	ARCHITECT:						
Houston, TX 77040	Fax:(713) 983-6900	ENGINEER:						JOB NO: RH100117 DWG NO: 6



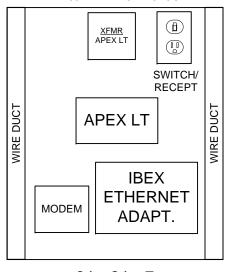


Open Tech		PROJECT:	Grimes County Courthouse	REV:	DESCRIPTION:	DATE:	APPROVED:	Network Communications
<u> </u>			Upgrade					Schematic
17401 Village Green Drive	Tel:(713) 983-6500	ARCHITECT:						
Houston, TX 77040	Fax:(713) 983-6900	ENGINEER:						JOB NO: RH100117 DWG NO: 7



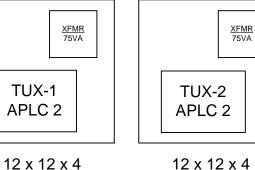


EXISTING DDC PANEL A RM. 205 TELEPHONE CLOSET



DDC PANEL B DDC PANEL C AHU-1 AHU-2

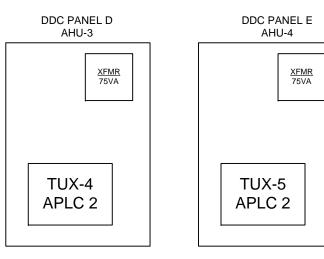
EXISTING



24 x 24 x 7

24 x 24 x 7 LOCATED IN BOY'S COACH'S OFFICE

Tel:(713) 983-6500 Fax:(713) 983-6900



TUX-6
APLC 2

12 x 12 x 4

12 x 12 x 4

12 x 12 x 4

Open lech	1
TONTROL & SECURITY SOLUTION 17401 Village Green Driv Houston, TX 77040	

PROJECT:	Grimes County Courthouse Upgrade
ARCHITECT:	
ENGINEER:	

	REV:	DESCRIPTION:	DATE:	APPROVED:	
-					
					IOD

DDC Panel 1, 3

SEQUENCE OF OPERATION

THE CHILLED WATER SYSTEM CONSISTS OF AN AIR COOLED CHILLER AND TWO (2) PUMPS, CHWP-1 & 2. THE CHILLED WATER SYSTEM SHALL START THROUGH THE BCAS WHEN AN AIR HANDLING UNIT IS OPERATING AND THE OUTSIDE AIR TEMPERATURE IS ABOVE 45°F (ADJUSTABLE AT THE BCAS OPERATOR STATION). THE CHILLER SHALL START, ONLY WHEN A PUMP IS OPERATING AND MAINTAIN ITS SUPPLY WATER SETPOINT THROUGH ITS INTERNAL CONTROLS. THE CHILLER'S SUPPLY WATER SETPOINT IS ADJUSTABLE FROM THE BCAS OPERATOR STATION. ON SYSTEM SHUT-DOWN, THE PUMP SHALL RUN 5 MINUTES AFTER THE CHILLER STOP COMMAND TO ALLOW FOR CHILLER PUMP-DOWN.

THE PUMPS SHALL OPERATE IN A LEAD – STANDBY MODE. IF THE LEAD PUMP FAILS, THE STANDBY PUMP WILL START. THE LEAD PUMP WILL ALTERNATE WEEKLY THROUGH THE BCAS.

WHEN THE OUTSIDE AIR TEMPERATURE DROPS TO 35°F, THE LEAD PUMP SHALL START BUT THE CHILLER SHALL BE DISABLED.

EACH CHILLER SAFETY SHUTDOWN ALARM SHALL BE MONITORED, THROUGH A COMMON ALARM OUTPUT, AT THE BCAS.

)	-	г
\bigcirc	oen	lech
		URITY SOLUTIONS
1740	1 Village G	reen Drive
Hous	ton, TX 77	7040

	PROJECT:
	ADOLUTEOT
Tel:(713) 983-6500	ARCHITECT
Fax:(713) 983-6900	ENGINEER:

PROJECT:	Grimes County Courthouse Upgrade
RCHITECT:	

REV:	DESCRIPTION:	DATE:	APPROVED:

Chilled Water System Sequence of Operations

SEQUENCE OF OPERATION HEATING WATER SYSTEM

THE SYSTEM CONSISTS OF ONE (1) BOILER AND TWO (2) PUMPS. THE BCAS SHALL ISSUE A START COMMAND TO THE HOT WATER PUMPS AND THE BOILER CONTROL SYSTEM WHEN ANY SPACE TEMPERATURE SENSOR DEMANDS HEATING. THE PUMPS SHALL OPERATE IN A LEAD/LAG MODE. THE LEAD PUMP SHALL ALTERNATE WEEKLY AND THE LAG PUMP SHALL START IF THE LEAD FAILS. THE BOILER CONTROL SYSTEM SHALL MAINTAIN SUPPLY WATER SETPOINT (ADJUSTABLE AT THE BOILER PANEL). THE PUMP SHALL RUN FOR A MINIMUM FIVE (5) MINUTES AFTER THE BOILER SYSTEM SHUT-DOWN.

Open ⁻	Tech
17401 Village G	Green Drive

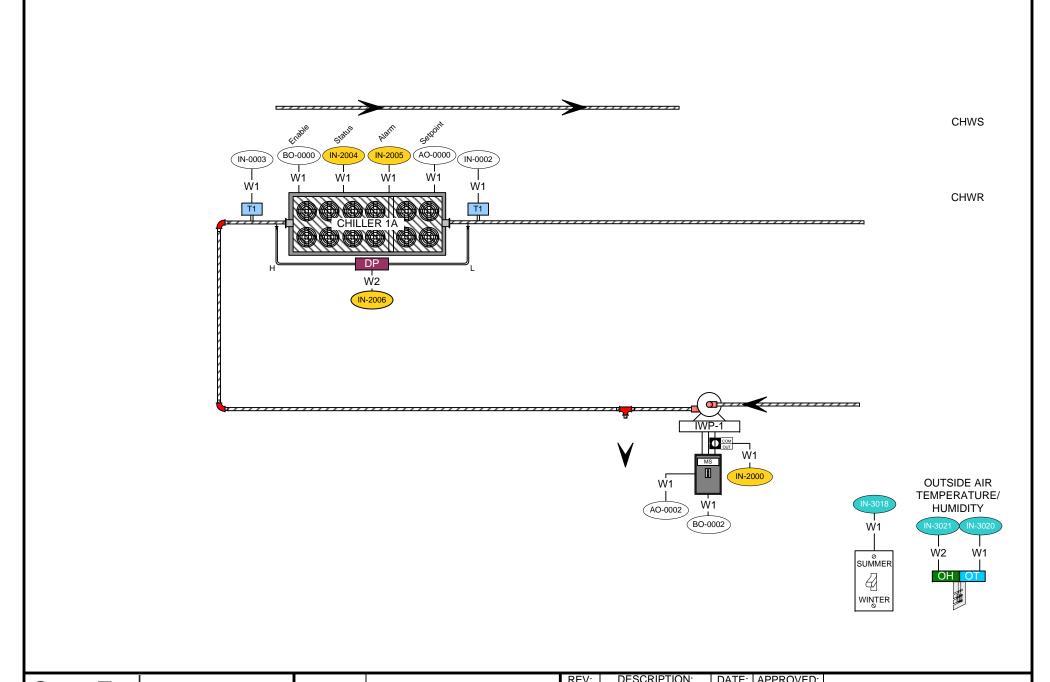
	l
Tel:(713) 983-6500	L
Fax:(713) 983-6900	I

ENGINEER:

PROJECT:	Grimes County Courthouse Upgrade
ARCHITECT:	

REV:	DESCRIPTION:	DATE:	APPROVED:

Hot Water System Sequence of Operations



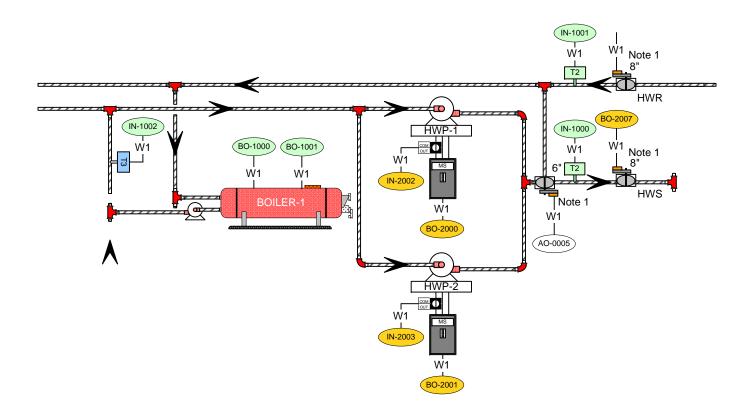
\bigcirc	pen Tech
1740	CONTROL & SECURITY SOLUTIONS 1 Village Green Drive ton, TX 77040

Tel:(713) 983-6500
Fax:(713) 983-6900

PROJECT:	Grimes County Courthouse Upgrade
ARCHITECT:	
ENGINEER:	

	DEGOTTI TON.	DAIL.	ALLINOVED.	
				-

Chilled Water System Control Diagram



NOTE 1: Existing Valve to be controlled with new system.

()non Toch		PROJECT:	Grimes County Courthouse	REV:	DESCRIPTION:	DATE:	APPROVED:	Hot Water System
Open lech			Upgrade					Control Diagram
17401 Village Green Drive	Tel:(713) 983-6500	ARCHITECT:						5 5 1 1 1 5 G 1 5 1 5 1 5 1 5 1 5 1 5 1
Houston, TX 77040	Fax:(713) 983-6900	ENGINEER:						JOB NO: RH100117 DWG NO: 14

SEQUENCE OF OPERATION

THE AIR HANDLING UNIT SUPPLY FAN SHALL BE CONTROLLED BY THE H-O-A SWITCH ON THE MOTOR STARTER. WHEN THE H-O-A SWITCH IS IN THE AUTO POSITION, THE FAN SHALL BE STARTED AND STOPPED THROUGH THE BCAS. WHEN THE SWITCH IS IN THE HAND POSITION, THE FAN SHALL START MANUALLY. THE SUPPLY FAN RUN STATUS SHALL BE INDICATED AT THE BCAS OPERATOR STATION BY A CURRENT SENSING RELAY.

A SPACE TEMPERATURE SENSOR THROUGH A DDC CONTROLLER SHALL MODULATE THE CHILLED WATER CONTROL VALVE IN SEQUENCE WITH THE HOT WATER CONTROL VALVE TO MAINTAIN DESIRED COOLING AND HEATING SETPOINTS. SETPOINTS ARE ADJUSTABLE FROM THE BCAS OPERATOR STATION. WHEN ONE VALVE IS OPEN THE OTHER IS CLOSED. A FREEZESTAT ON THE INTAKE OF THE HEATING COIL, WHEN TEMPERATURE DROPS BELOW 35°F, SHALL STOP THE UNIT FAN, AND OPEN THE VALVES. DURING NORMAL OPERATION, THE VALVES SHALL CLOSE TO THE COIL WHEN THE UNIT IS OFF.

SMOKE DETECTORS IN THE SUPPLY AND RETURN AIR DUCTS SHALL SEND A SIGNAL TO THE FIRE ALARM SYSTEM TO SHUT-DOWN THE AIR UNIT DURING AN ALARM CONDITION.

MIXED AND SUPPLY AIR TEMPERATURES AND SUPPLY AIR CFM ARE DISPLAYED AT THE OPERATOR STATION.

DIFFERENTIAL PRESSURE SWITCH ACROSS THE FILTER SHALL INDICATE A DIRTY FILTER CONDITION AT THE BCAS OPERATOR STATION.

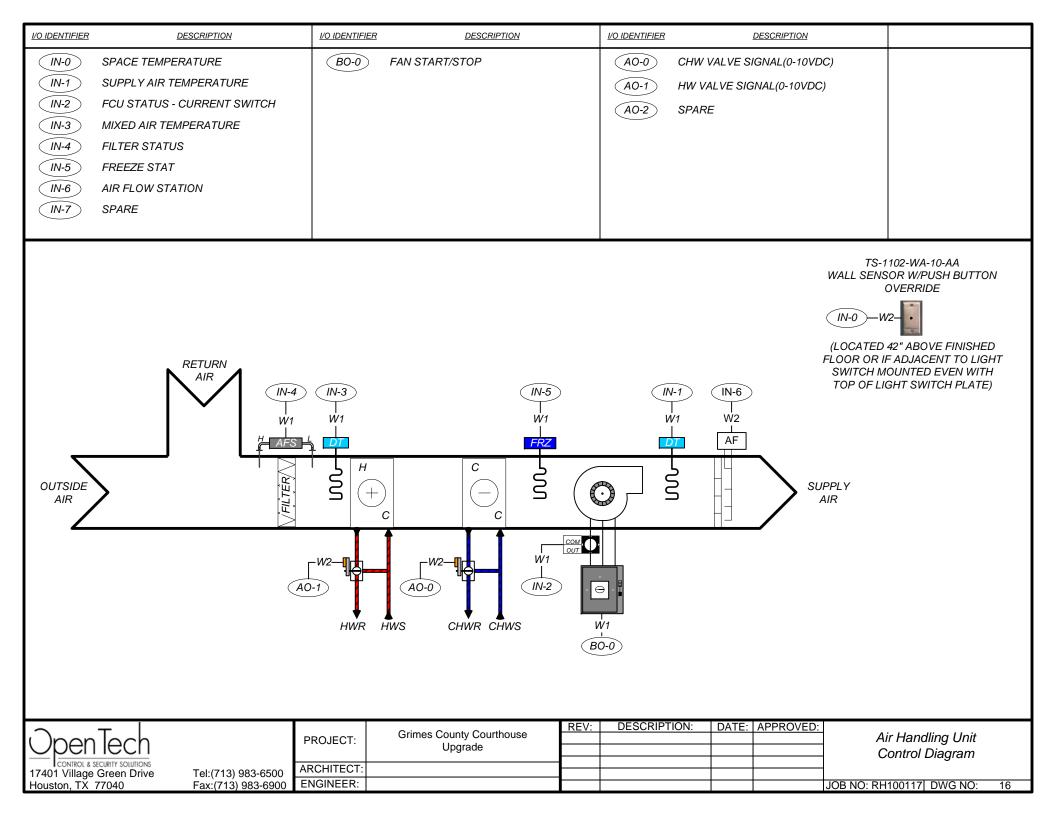
Open Tec	h
CONTROL & SECURITY SOLU 17401 Village Green D	
Houston, TX 77040	

	PROJECT:	Grimes County Courthouse Upgrade		
	ADOLUTEOT			
Tel:(713) 983-6500	ARCHITECT:			
Fax:(713) 983-6900	ENGINEER:			

REV:

DESCRIPTION: DATE: APPROVED:

Air Handling Unit
Sequence of Operations 1



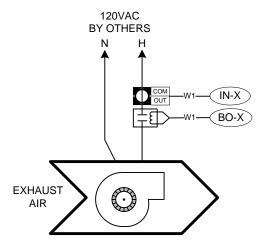
I/O IDENTIFIER DESCRIPTION	I/O IDENTIFIER DESCRIPTION	I/O IDENTIFIER DESCRIPTION	
IN-0 EF-X STATUS	BO-0 EF-X START/STOP		

	Exhaust Fan Schedule											
TAG	TEMP SENSOR	STATUS	START/STOP	DI#	PANEL	LOCATION	INTERLOCK					
EF-1	N/A	IN-0	BO-0	XXXXX	xxxxx	Boiler Room						
EF-2	N/A	IN-1	BO-1	xxxxx	xxxxx	Boiler Room						

Exhaust Fan Sequence of Operations

General Exhaust Fans

Provide start/stop and status of each fan. Status shall be by current switch.

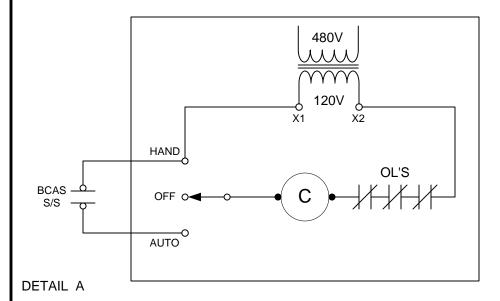


NOTE

1. Field verify quantity of Exhaust Fans.

Open Tech		PROJECT:	Grimes County Courthouse	REV:	DESCRIPTION:	DATE:	APPROVED:	
001110011			Upgrade					Exhaust Fan Control Drawing
17401 Village Green Drive	Tel:(713) 983-6500	ARCHITECT:		l				
Houston, TX 77040	Fax:(713) 983-6900	ENGINEER:						JOB NO: RH100117 DWG NO: 17

PUMP STARTER WIRING

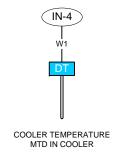


EMERGENCY AHU SHUTDOWN



REMOVED FROM COACHES OFFICE AND MOUNTED IN ADMINISTRATION DI# 208047

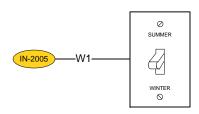
KITCHEN COOLER TEMPERATURE



MOUNT TEMPERATURE SENSORS AWAY FROM ENTRY DOOR

WIRE COOLER TEMPERATURE TO VLC-208042.

SUMMER / WINTER SWITCH



MOUNTED IN PANEL 2

DETAIL C



PROJECT:

Tel:(713) 983-6500
Fax:(713) 983-6900

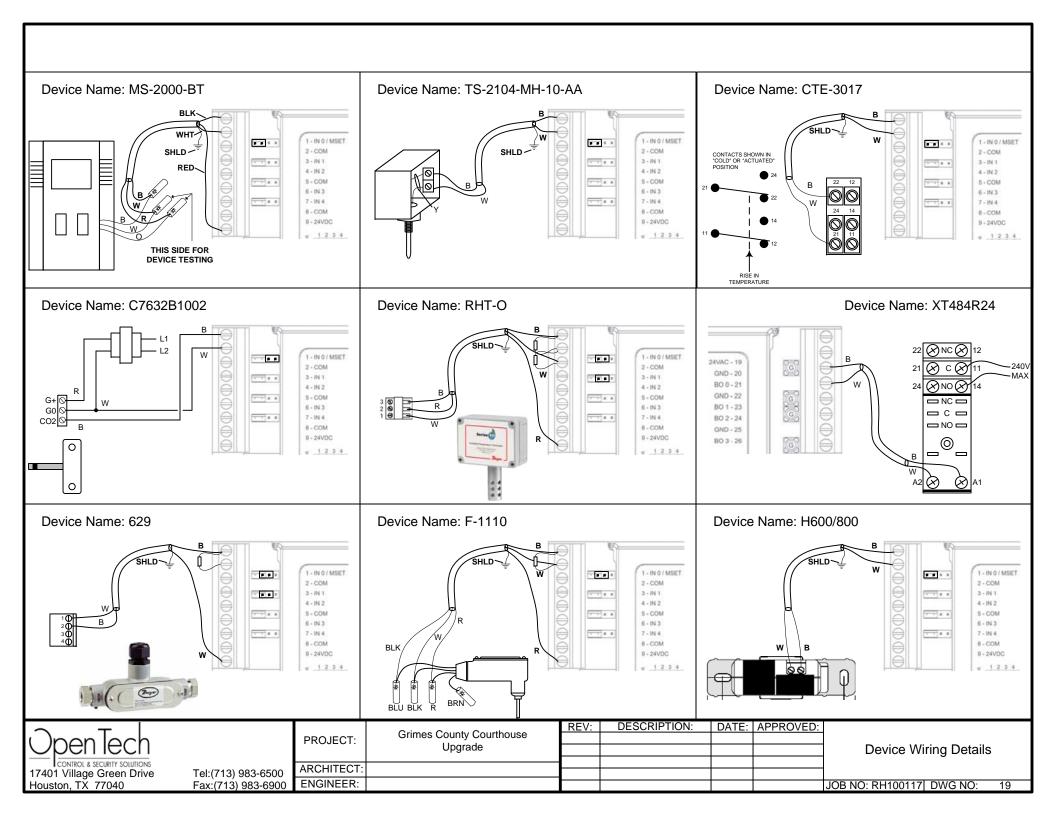
ROGINEER:

PROJECT: Grimes County Courthouse Upgrade

ARCHITECT:

REV: DESCRIPTION: DATE: APPROVED:

Wiring Details



SEQUENCE OF OPERATION

THE AIR HANDLING UNIT SUPPLY FAN SHALL BE CONTROLLED BY THE H-O-A SWITCH ON THE MOTOR STARTER. WHEN THE H-O-A SWITCH IS IN THE AUTO POSITION, THE FAN SHALL BE STARTED AND STOPPED THROUGH THE BCAS. WHEN THE SWITCH IS IN THE HAND POSITION, THE FAN SHALL START MANUALLY. THE SUPPLY FAN RUN STATUS SHALL BE INDICATED AT THE BCAS OPERATOR STATION BY A CURRENT SENSING RELAY.

OUTSIDE AIR DAMPER (NORMALLY CLOSED) SHALL OPEN 35% AND THE RETURN AIR DAMPER (NORMALLY OPEN) SHALL REMAIN 100% OPEN WHEN THE FAN STARTS. A WALL MOUNTED CARBON DIOXIDE SENSOR TRANSMITTER THROUGH THE DDC CONTROLLER (TUX) SERVING AHU-4 SHALL MONITOR THE CO2 LEVEL IN THE COURTROOM. WHEN THE CO2 LEVEL EXCEEDS 1000 PPM THE OUTSIDE AIR DAMPER SHALL OPEN 100% AND THE RETURN AIR DAMPER SHALL MOVE TO THE 70% OPEN POSITION. THE CO2 LEVEL SETPOINT IS ADJUSTABLE FROM THE OPERATOR STATION.

A SPACE TEMPERATURE SENSOR THROUGH A DDC CONTROLLER (TUX) SHALL MODULATE THE CHILLED WATER CONTROL VALVE IN SEQUENCE WITH THE HOT WATER CONTROL VALVE TO MAINTAIN DESIRED COOLING AND HEATING SETPOINTS. SETPOINTS ARE ADJUSTABLE FROM THE BCAS OPERATOR STATION. WHEN ONE VALVE IS OPEN THE OTHER IS CLOSED. A FREEZESTAT ON THE INTAKE OF THE HEATING COIL, WHEN TEMPERATURE DROPS BELOW 35°F, SHALL STOP THE UNIT FAN, AND OPEN THE VALVES. DURING NORMAL OPERATION, THE VALVES SHALL CLOSE TO THE COIL WHEN THE UNIT IS OFF.

SMOKE DETECTORS IN THE SUPPLY AND RETURN AIR DUCTS SHALL SEND A SIGNAL TO THE FIRE ALARM SYSTEM TO SHUT-DOWN THE AIR UNIT DURING AN ALARM CONDITION.

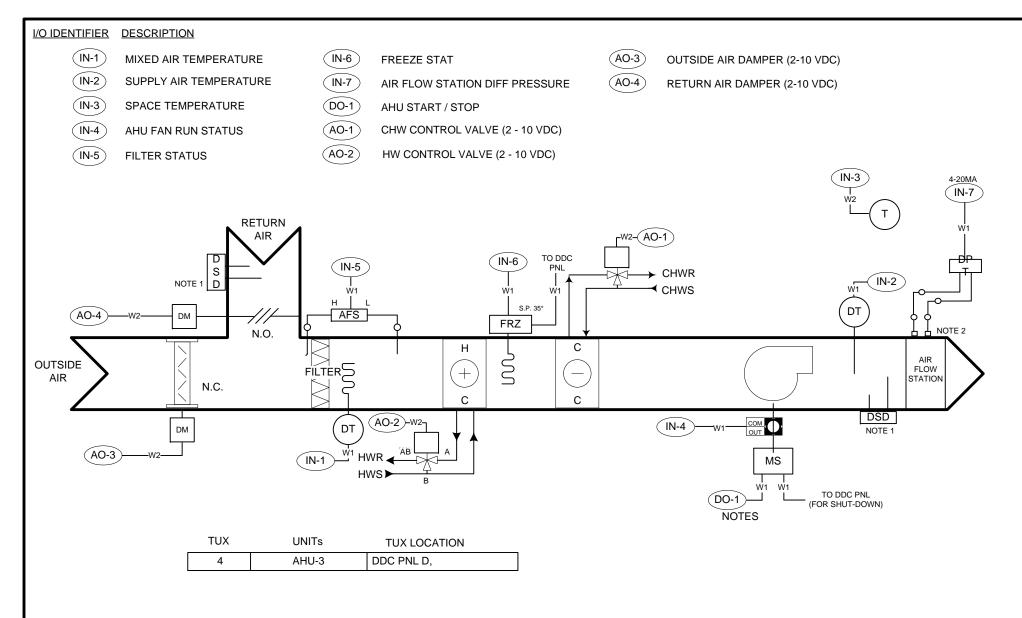
MIXED AND SUPPLY AIR TEMPERATURES AND SUPPLY AIR CFM ARE DISPLAYED AT THE OPERATOR STATION.

DIFFERENTIAL PRESSURE SWITCH ACROSS THE FILTER SHALL INDICATE A DIRTY FILTER CONDITION AT THE BCAS OPERATOR STATION.

Oper	nTech
	& SECURITY SOLUTIONS le Green Drive 77040

Tel:(713) 983-6500 Fax:(713) 983-6900

	Orienta Occupita Occupita	REV:	DESCRIPTION:	DATE:	APPROVED:	
PROJECT:	Grimes County Courthouse					
	Upgrade					
ARCHITECT:]
ANGITTEGT.						
ENGINEER:						JOB NO: RH100117



NOTES:

- 1. DUCT SMOKE DETECTOR FURNISHED, MOUNTED AND WIRED FOR UNIT SHUT-DOWN BY DIV. 16.
- 2. DPT MOUNTED NEAR AIRFLOW STATION.

^ T			0: 0 1 0 1	REV:	DESCRIPTION:	DATE:	APPROVED:		
(C)nen lech		PROJECT:	Grimes County Courthouse						
∪pen lech			Upgrade						
CONTROL & SECURITY SOLUTIONS	T-1-/740) 000 0500	ARCHITECT:							
17401 Village Green Drive	161.(713) 963-6500							IOD NO: DH100117 DWC NO:	21
Houston, TX 77040	Fax:(713) 983-6900	ENGINEER:						JOB NO: RH100117 DWG NO:	21

SEQUENCE OF OPERATION

THE AIR HANDLING UNIT SUPPLY FAN SHALL BE CONTROLLED BY THE HO-A SWITCH ON THE MOTOR STARTER. WHEN THE H-O-A SWITCH IS IN THE AUTO POSITION, THE FAN SHALL BE STARTED AND STOPPED THROUGH THE BCAS. WHEN THE SWITCH IS IN THE HAND POSITION, THE FAN SHALL START MANUALLY. THE SUPPLY FAN RUN STATUS SHALL BE INDICATED AT THE BCAS OPERATOR STATION BY A CURRENT SENSING RELAY.

OUTSIDE AIR DAMPER (NORMALLY CLOSED) SHALL OPEN 35% AND THE RETURN AIR DAMPER (NORMALLY OPEN) SHALL REMAIN 100% OPEN WHEN THE FAN STARTS. A WALL MOUNTED CARBON DIOXIDE SENSOR TRANSMITTER THROUGH A DDC CONTROLLER (TUX) SHALL MONITOR THE CO2 LEVEL IN THE COURTROOM. WHEN THE CO2 LEVEL EXCEEDS 1000 PPM THE OUTSIDE AIR DAMPER SHALL OPEN 100% AND THE RETURN AIR DAMPER SHALL MOVE TO THE 70% OPEN POSITION. THE CO2 LEVEL SETPOINT IS ADJUSTABLE FROM THE OPERATOR STATION.

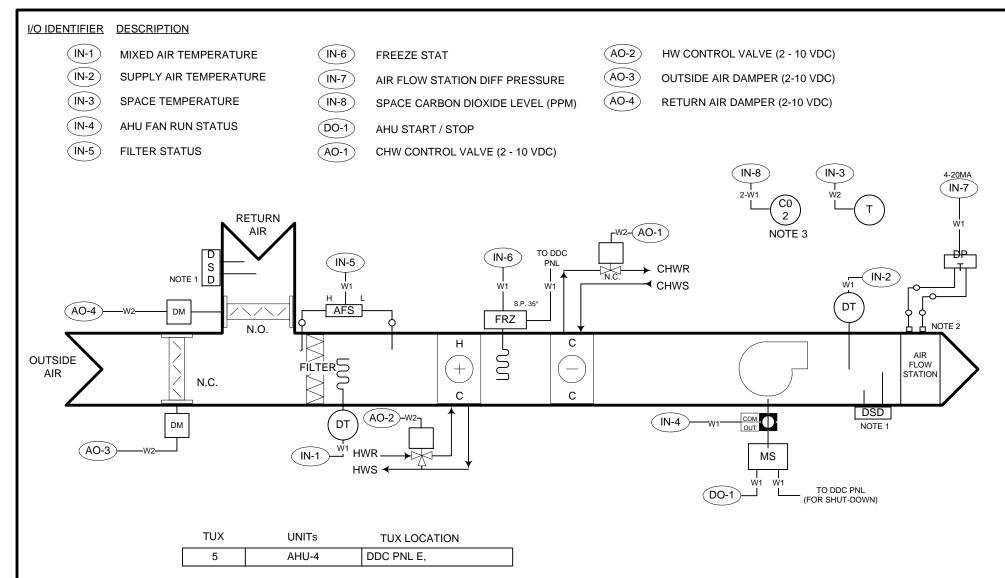
A SPACE TEMPERATURE SENSOR THROUGH A DDC CONTROLLER (TUX) SHALL MODULATE THE CHILLED WATER CONTROL VALVE IN SEQUENCE WITH THE HOT WATER CONTROL VALVE TO MAINTAIN DESIRED COOLING AND HEATING SETPOINTS. SETPOINTS ARE ADJUSTABLE FROM THE BCAS OPERATOR STATION. WHEN ONE VALVE IS OPEN THE OTHER IS CLOSED. A FREEZESTAT ON THE INTAKE OF THE HEATING COIL, WHEN TEMPERATURE DROPS BELOW 35°F, SHALL STOP THE UNIT FAN, AND OPEN THE VALVES. DURING NORMAL OPERATION, THE VALVES SHALL CLOSE TO THE COIL WHEN THE UNIT IS OFF.

SMOKE DETECTORS IN THE SUPPLY AND RETURN AIR DUCTS SHALL SEND A SIGNAL TO THE FIRE ALARM SYSTEM TO SHUT-DOWN THE AIR UNIT DURING AN ALARM CONDITION.

MIXED AND SUPPLY AIR TEMPERATURES AND SUPPLY AIR CFM ARE DISPLAYED AT THE OPERATOR STATION.

DIFFERENTIAL PRESSURE SWITCH ACROSS THE FILTER SHALL INDICATE A DIRTY FILTER CONDITION AT THE BCAS OPERATOR STATION.

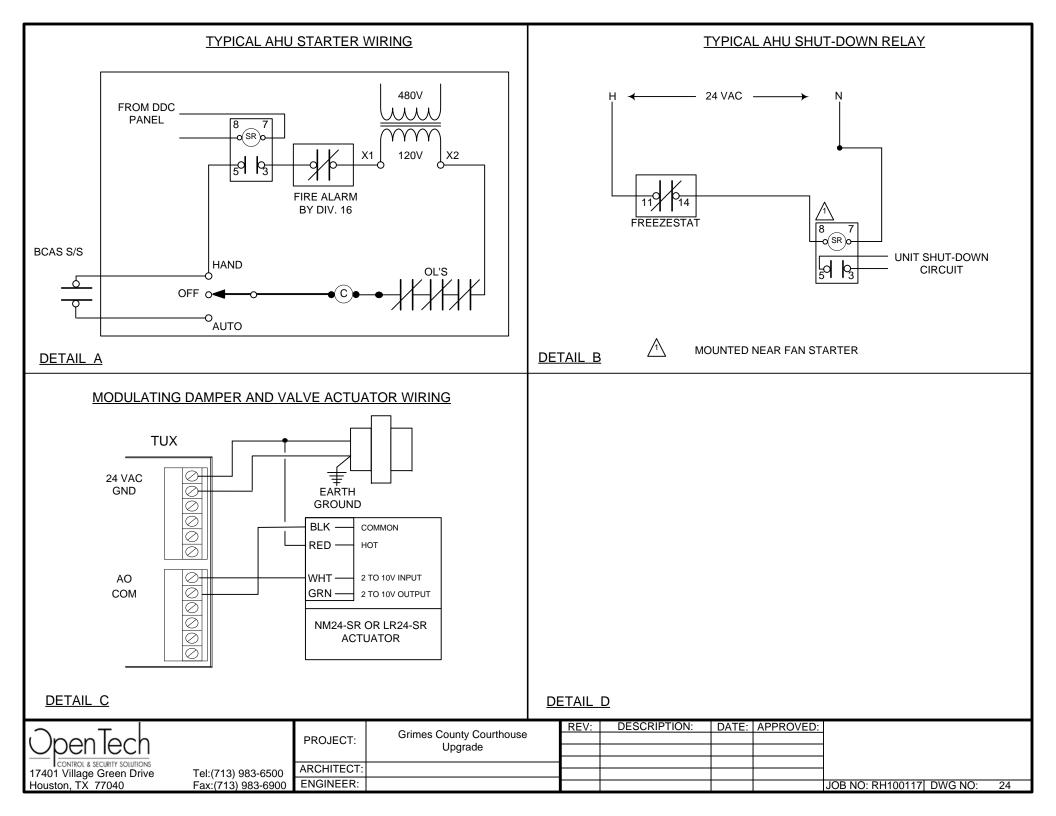
		Orienza Oranata Oranathana	REV:	DESCRIPTION:	DATE:	APPROVED:		
	PROJECT:	,						
		Upgrade						
Tal./742\ 000 0500	ARCHITECT:							
161:(713) 363-6500							IOB NO: RH100117L DWG NO:	22
	161:(713) 963-6500	ADCHITECT.	Upgrade Tel:(713) 983-6500 ARCHITECT:	PROJECT: Grimes County Courthouse Upgrade Tel:(713) 983-6500 ARCHITECT:	PROJECT: Grimes County Courthouse Upgrade Tel:(713) 983-6500 ARCHITECT:	PROJECT: Grimes County Courthouse Upgrade Tel:(713) 983-6500 ARCHITECT:	PROJECT: Grimes County Courthouse Upgrade Tel:(713) 983-6500 ARCHITECT:	PROJECT: Grimes County Courthouse Upgrade Tel:(713) 983-6500 ARCHITECT:

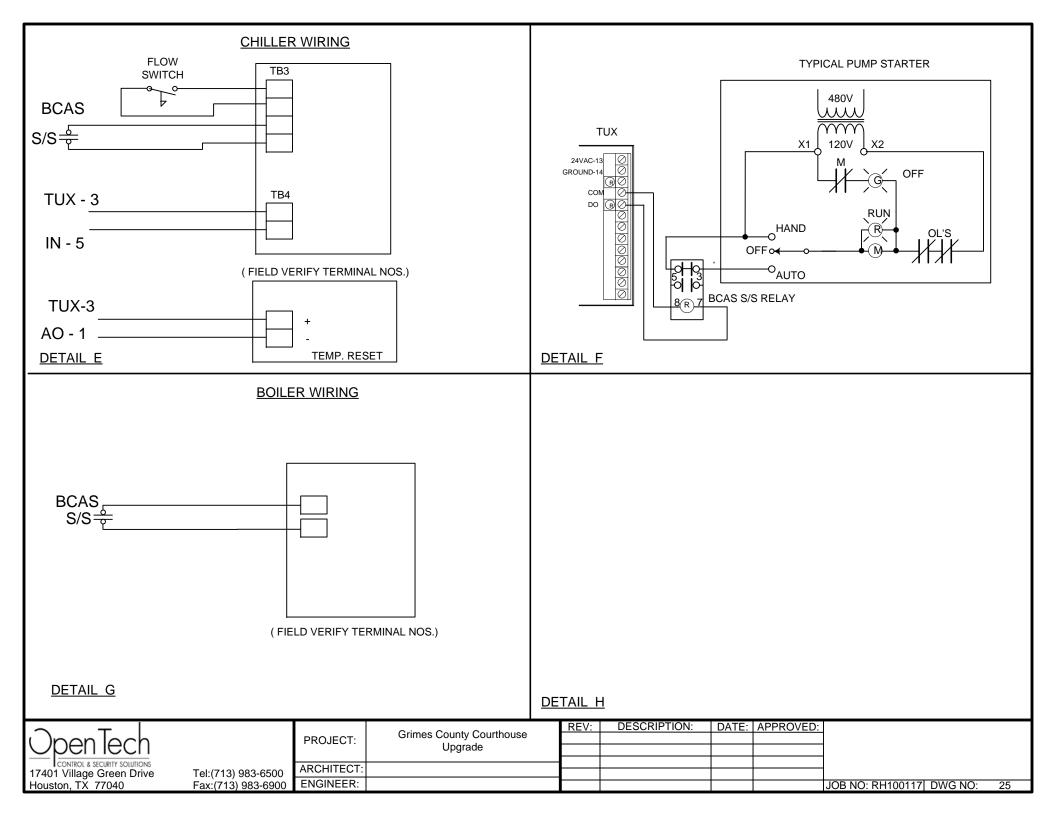


NOTES:

- 1. DUCT SMOKE DETECTOR FURNISHED, MOUNTED AND WIRED FOR UNIT SHUT-DOWN BY DIV. 16.
- 2. DPT MOUNTED NEAR AIRFLOW STATION.
- 3. WALL MOUNTED NEAR CEILING IN COURTROOM 200. SEE PLANS SHEET M-4 FOR EXACT LOCATION.

^ F			Orienza Osarata Osarathara	REV:	DESCRIPTION:	DATE:	APPROVED:		
()non loch		PROJECT:	Grimes County Courthouse						
Open lech			Upgrade						
CONTROL & SECURITY SOLUTIONS	Tal./742) 002 6500	ARCHITECT:							
17401 Village Green Drive Houston, TX 77040	Tel:(713) 983-6500 Fax:(713) 983-6900	ENGINEER:						JOB NO: RH100117 DWG NO:	23





EXISTING CONTROL DAMPER SCHEDULE

TAG	QTY.	LOCATION	SERVICE	SIZE	SECTIONS	DAMPER MANF.	MODEL	BLADES	ACTUATOR
DM1	1	AHU-3	OUTSIDE	18 X 16	1	DELTA	COABH	OPPOSED	BELIMO NM24SR
DM2	1	AHU-3	RETURN	34 X 24	1	DELTA	COABH	OPPOSED	BELIMO NM24SR
DM1	1	AHU-4	OUTSIDE	18 X 16	1	DELTA	COABH	OPPOSED	BELIMO NM24SR
DM2	1	AHU-4	RETURN	34 X 24	1	DELTA	COABH	OPPOSED	BELIMO NM24SR

\bigcirc	pen ⁻	Tecl	n
	CONTROL & SEC		
Hous	_	7040	

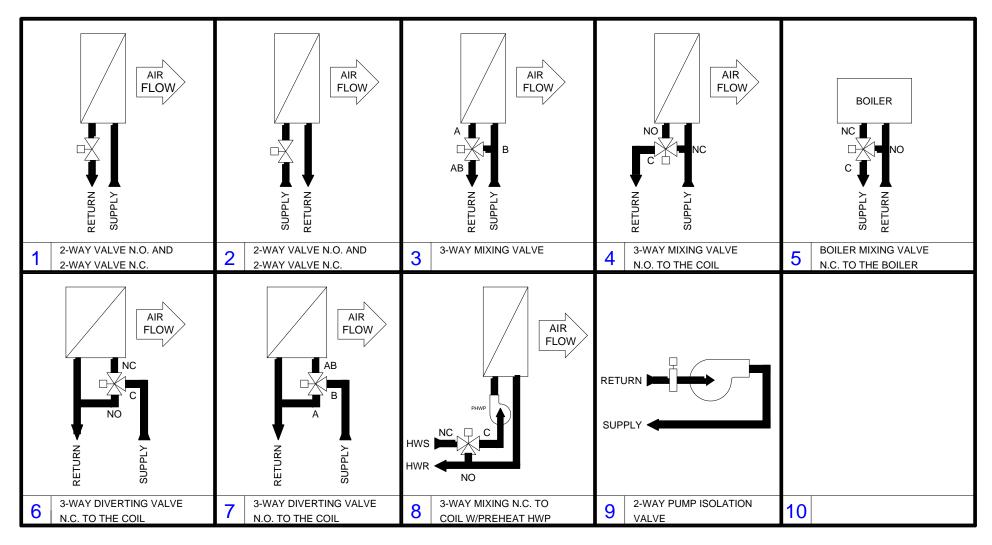
	PROJECT:	T: Grimes County Courthouse		DESCRIPTION:	DATE:	APPROVED:	
		Upgrade					
Tel:(713) 983-6500	ARCHITECT:						
	ENGINEER:						JOB NO: RH100117 DWG NO:

EXISTING CONTROL VALVE SCHEDULE

UNIT	SERVICE	GPM	Cv	SIZE	DP, PSI	PATTERN	TYPE	MANF.	MODEL	PIPING DET.
AHU-1	CHW	18.6	10	1"	3.46	3 WAY	BALL-SCREW	BELIMO	B323-NM24SR	3
AHU-2	CHW	15	7.4	3/4"	4.12	3 WAY	BALL-SCREW	BELIMO	B318-LR24SR	3
AHU-3	CHW	40	25	1 1/4"	2.56	3 WAY	BALL-SCREW	BELIMO	B331-NM24SR	3
AHU-4	CHW	40	25	1 1/4"	2.56	3 WAY	BALL-SCREW	BELIMO	B331-NM24SR	3
AHU-5	CHW	15	7.4	3/4"	4.12	3 WAY	BALL-SCREW	BELIMO	B318-LR24SR	3
AHU-1	HW	10	4.7	1/2"	4.54	3 WAY	BALL-SCREW	BELIMO	B313-LR24SR	3
AHU-2	HW	8	4.7	1/2"	2.89	3 WAY	BALL-SCREW	BELIMO	B313-LR24SR	3
AHU-3	HW	17	10	1"	2.89	3 WAY	BALL-SCREW	BELIMO	B323-NM24SR	3
AHU-4	HW	17	10	1"	2.89	3 WAY	BALL-SCREW	BELIMO	B323-NM24SR	3
AHU-5	HW	8.5	4.7	1/2"	3.28	3 WAY	BALL-SCREW	BELIMO	B313-LR24SR	3
·										

Open ⁻	Tech
CONTROL & SECTION 17401 VIllage G	

		Octobra Octobra Octobra	REV:	DESCRIPTION:	DATE:	APPROVED
	PROJECT:	Grimes County Courthouse				
		Upgrade				
Tel:(713) 983-6500	ARCHITECT:					
Fax:(713) 983-6900	ENGINEER:					



N.O. - NORMALLY OPEN

N.C. - NORMALLY CLOSED

				REV:	DESCRIPTION:	DATE:	APPROVED:		
U)nen lech		PROJECT:	Grimes County Courthouse						
Obelliecii			Upgrade						
CONTROL & SECURITY SOLUTIONS	T-1 (740) 000 0500	ARCHITECT:							
17401 Village Green Drive	Tel:(713) 983-6500								
Houston, TX 77040	Fax:(713) 983-6900	ENGINEER:						JOB NO: RH100117 DWG NO:	28

EXISTING AIR FLOW MEASURING STATION SCHEDULE

TAG	QTY.	LOCATION	SERVICE	SIZE	MANUF.	MODEL NO.	DESIGN CFM	Vp(IN. W.C.)	REMARKS
AHU-1SA	1	AHU-1	SUPPLY AIR	22" 0	AIR MONITOR	FAN - E	2950	0.080	
AHU-2SA	1	AHU-2	SUPPLY AIR	22" X 14"	AIR MONITOR	FAN - E	2400	0.080	
AHU-3SA	1	AHU-3	SUPPLY AIR	38" X 16"	AIR MONITOR	FAN - E	5000	0.088	
AHU-4SA	1	AHU-4	SUPPLY AIR	38" X 16"	AIR MONITOR	FAN - E	5000	0.088	
AHU-5SA	1	AHU-5	SUPPLY AIR	28" X 12"	AIR MONITOR	FAN - E	2450	0.069	
								·	
							_		

0	oen ⁻	Tech
1740°	1 Village C	curity solutions Green Drive
Hous	ton, TX 7	7040

Tel:(713) 983-6500 Fax:(713) 983-6900

PROJECT:	Grimes County Courthouse Upgrade	REV:	DESCRIPTION:	DATE:	APPROVED:		
ADOLUTECT.	13						
ARCHITECT:							
ENGINEER:						JOB NO: RH100117	DWG NO: