Orange County
Tibet Butler Hvac Replacement

BID DOCUMENTS

NOVEMBER 09, 2017

Orange County Government

Capital Planning Division

400 East South Street, Suite 500
Orlando, FL 32801

GENERAL SCOPE OF WORK

1. THIS PROJECT INVOLVES THE INSTALLATION OF A NEW GROUND MOUNTED PACKAGED DX SYSTEM TO SERVE THE EXISTING CLASSROOM AND EXHIBIT/MUSEUM AREA AND DIRECT-EXPANSION SPLIT HEAT PUMP SYSTEM TO SERVE THE ADMINISTRATION BUILDING. MINIMUM ALLOWABLE SEER FOR EACH UNIT WILL BE 15.
2. NEW MECHANICAL CONTROLS CONNECTED TO CAMPUS WIDE NETWORK SYSTEM. CONTROLS SYSTEM BASIS OF DESIGN: JOHNSON CONTROLS.
3. ELECTRICAL MODIFICATIONS REQUIRED FOR HVAC MODIFICATIONS.

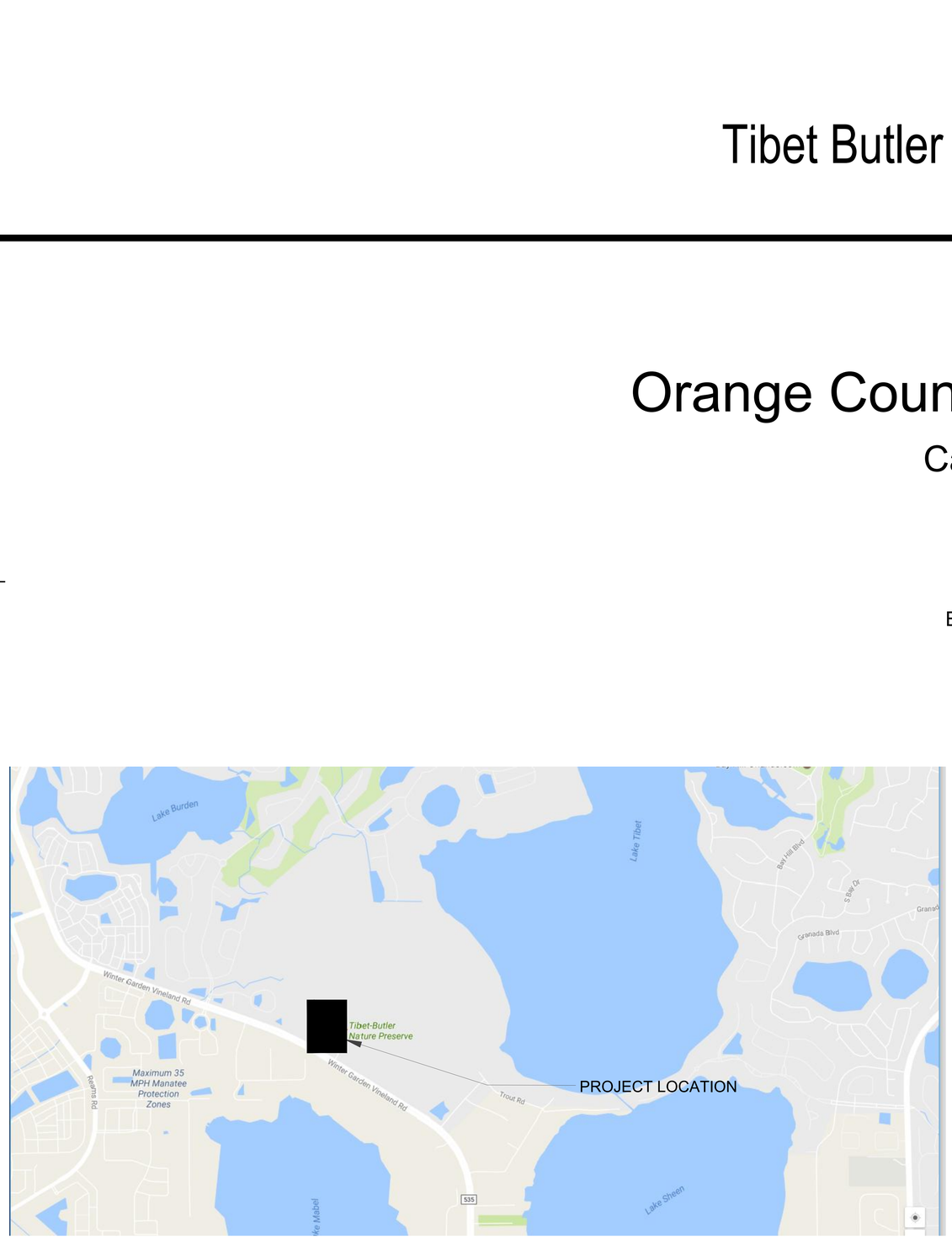
SHEET INDEX

MECHANICAL

M001	OVERALL PROJECT LOCATION PLAN
MD101	MECHANICAL DEMOLITION
MD102	MECHANICAL DEMOLITION
M101	MECHANICAL NEW HVAC
M102	MECHANICAL NEW HVAC
M201	MECHANICAL DETAILS
M301	MECHANICAL SCHEDULES
M401	MECHANICAL CONTROLS

ELECTRICAL

E001	Electrical General Information
E100	Electrical Lighting Plans
E101	Electrical Power Plans
E102	Electrical Site Plan and Panel Schedules



KEY PLAN

BOARD OF COUNTY COMMISSIONERS

MAYOR - TERESA JACOBS

DISTRICT 1 COMMISSIONER - BETSY VANDERLEY

DISTRICT 2 COMMISSIONER - BRYAN NELSON

DISTRICT 3 COMMISSIONER - PETE CLARKE

DISTRICT 4 COMMISSIONER - JENNIFER THOMPSON

DISTRICT 5 COMMISSIONER -EMILY BONILLA

DISTRICT 6 COMMISSIONER - VICTORIA P. SIPLIN

PROJECT TEAM

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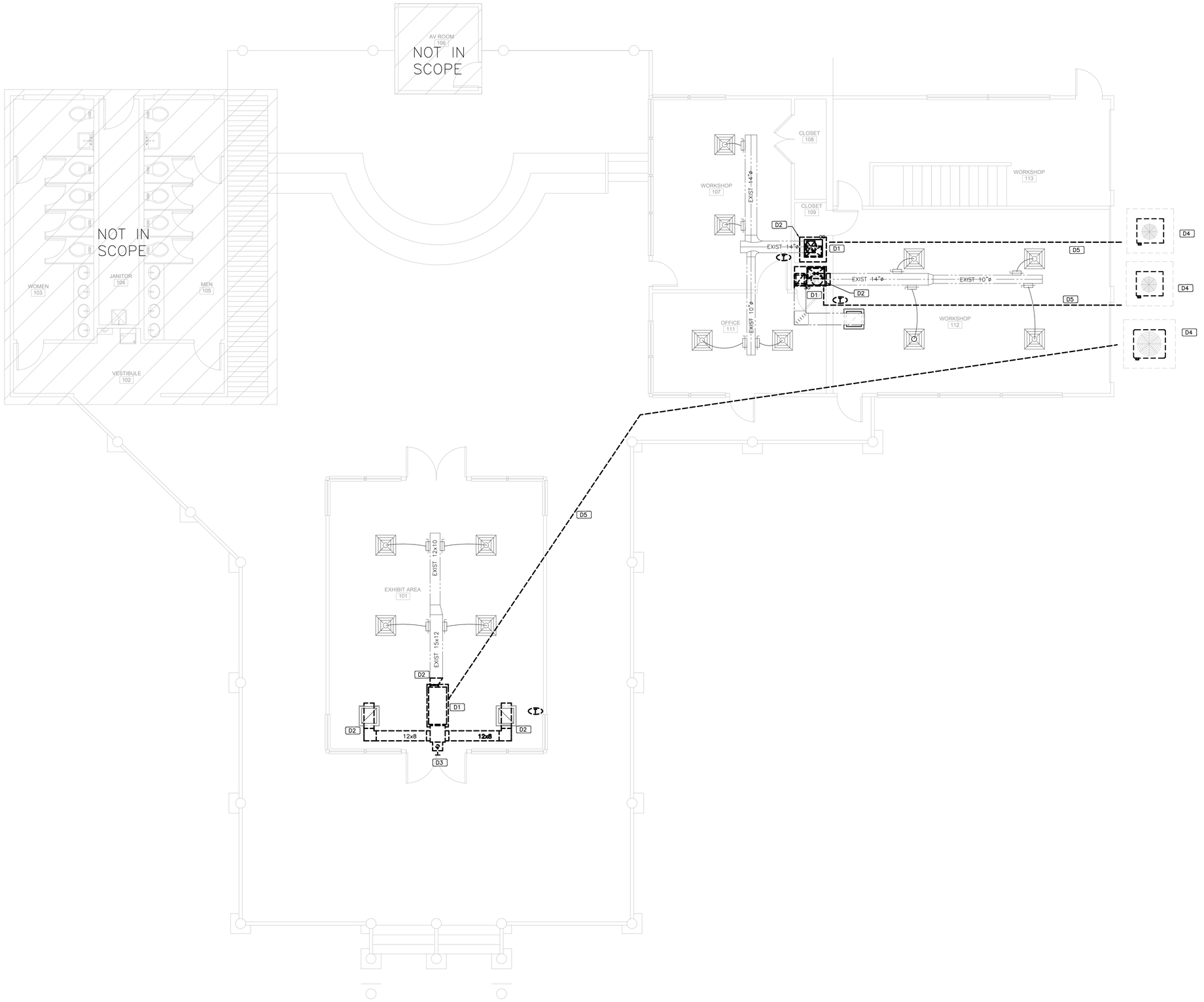


1 NATURE CENTER - DEMOLITION MECHANICAL PLAN

NORTH

0 2' 4' 8' 12'

1/4" = 1'-0"

GENERAL NOTES

1. CLEAN MECHANICAL ROOM OF ALL UNUSED CONDUITS AND DEBRIS. PREPARE AREA FOR NEW UNIT INSTALLATION.

2. PATCH AND SEAL BUILDING ENVELOPE TO MATCH EXISTING CONDITIONS.

DEMO. PLAN NOTES. D#

D1 REMOVE AND DISCARD EXISTING AHU AND CORRESPONDING COMPONENTS. CONTRACTOR SHALL REMOVE AND DISCARD AIR DISTRIBUTION SYSTEM IN ITS ENTIRETY INCLUDING: POWER(UNLESS OTHERWISE NOTED), REFRIGERANT PIPES, DUCTWORK, SUPPORTS, ETC.

D2 DEMOLISH DUCT TO POINT SHOWN AND PREPARE FOR CONNECTION TO NEW DUCT.

D3 REMOVE AND DISCARD EXISTING OA DUCT AND INTAKE PATCH AND SEAL BUILDING ENVELOPE TO MATCH EXISTING.

D4 REMOVE AND DISCARD EXISTING CONDENSING UNIT AND CORRESPONDING COMPONENTS INCLUDING: CONCRETE PAD, POWER (UNLESS OTHERWISE NOTED) ETC.

D5 REMOVE AND DISCARD EXISTING REFRIGERANT PIPING. CAPTURE REFRIGERANT AND SAFELY CONTAIN PRIOR TO REFRIGERANT PIPE DEMOLITION.

rtm engineering consultants
925 S. Semoran Blvd . Suite 100 . Winter Park, FL 32792
T: 407.678.2005 . www.rtmassociates.com

Client:

Consultants:

EOR Stamp:

Engineer of Record

11/09/2017

Project:

TIBET BUTLER HVAC REPLACEMENT DESIGN

Location:

8777 Winter Garden Vineland Rd, Orlando, FL 32836

Issuance:

Bid Documents

Revisions:

#	Date	Description

Date:

05.08.2017

Project Number:

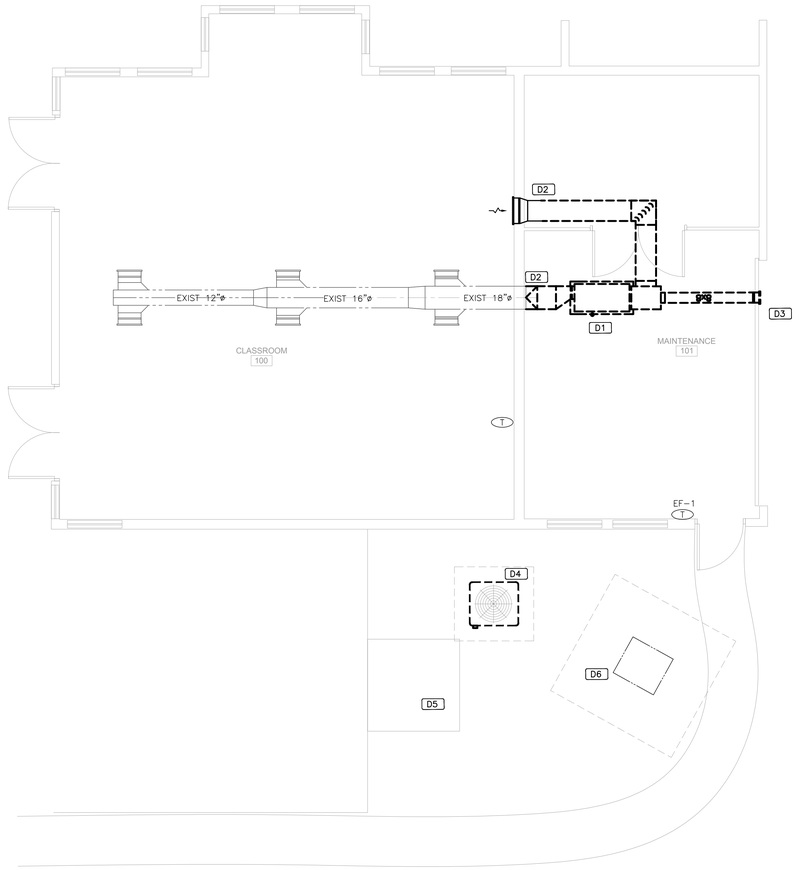
16.OC.030

Drawn By:	Checked By:
TB	DL

MECHANICAL DEMOLITION PLAN

Sheet No.:

MD-101



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D2 DEMOLISH DUCT TO POINT SHOWN AND PREPARE FOR CONNECTION TO NEW DUCT.

D3 REMOVE AND DISCARD EXISTING OA DUCT AND INTAKE PATCH AND SEAL BUILDING ENVELOPE TO MATCH EXISTING.

D4 REMOVE AND DISCARD EXISTING CONDENSING UNIT AND CORRESPONDING COMPONENTS INCLUDING: CONCRETE PAD, POWER (UNLESS OTHERWISE NOTED) ECT.

D5 RELOCATE TURTLE DWELLING WITH HEATER TO NEW LOCATION AS SHOWN ON SHEET M201.

D6 EXISTING TRANSFORMER TO REMAIN IN PLACE.

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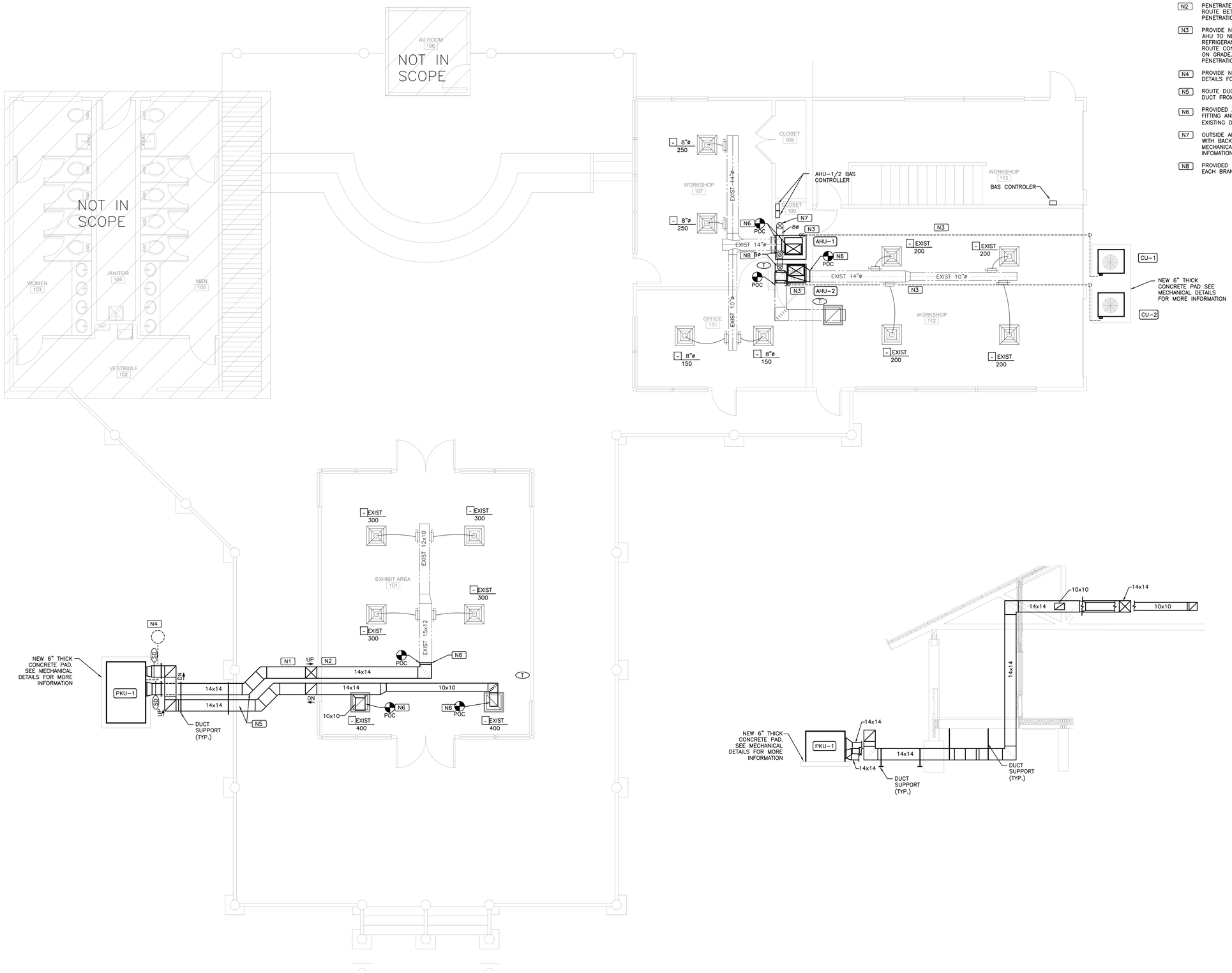
MECHANICAL DEMOLITION PLAN - CLASSROOM

Sheet No.:

MD-102



1 NATURE CENTER - NEW HVAC MECHANICAL PLAN

NORTH

0 2' 4' 8' 12'

1/4" = 1'-0"

NEW PLAN NOTES. N#

- N1 PENETRATE WOODEN DECK FROM BELOW AND ROUTE UP TIGHT TO OUTSIDE WALL. SEAL PENETRATION WATER TIGHT.
- N2 PENETRATE WALL INTO ATTIC SPACE AND ROUTE BETWEEN JOIST. SEAL PENETRATION WATER TIGHT.
- N3 PROVIDE NEW REFRIGERANT PIPING FROM AHU TO NEW CONDENSING UNIT. ROUTE REFRIGERANT PIPING UNDER FLOOR. ROUTE CONDENSATE PIPING AND SPILL ON GRADE. SEAL ALL PIPE PENETRATIONS WATER TIGHT.
- N4 PROVIDE NEW DRYWELL, SEE MECHANICAL DETAILS FOR MORE INFORMATION.
- N5 ROUTE DUCT BELOW DECK. SUPPORT DUCT FROM UNDERSIDE OF DECK
- N6 PROVIDED ALL REQUIRED DUCTWORK, FITTING AND TRANSITION TO CONNECT TO EXISTING DUCT AND/OR DIFFUSER.
- N7 OUTSIDE AIR DUCT UP TO ROOF JACK WITH BACKDRAFT DAMPER, SEE MECHANICAL DETAIL FOR MORE INFOMATION.
- N8 PROVIDED MANUAL BALANCING DAMPER AT EACH BRANCH.

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MECHANICAL HVAC PLAN

Sheet No.:

M-101

NEW PLAN NOTES. N#

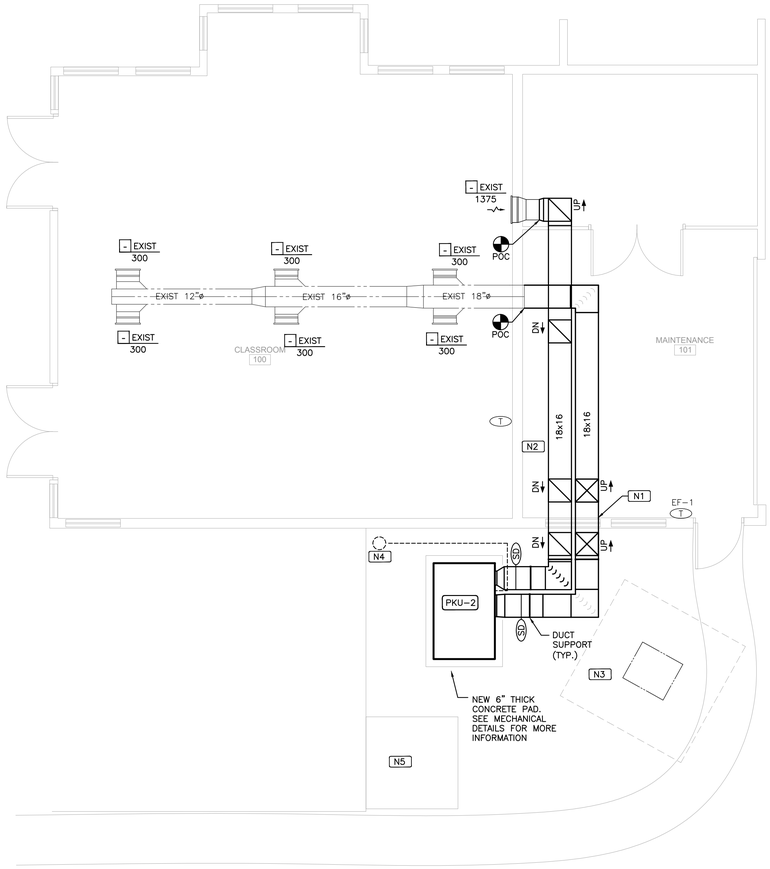
N1 REMOVE EXISTING WINDOW AND ROUTE NEW DUCTWORK THROUGH OPENING. SEAL OPENING WATER TIGHT.

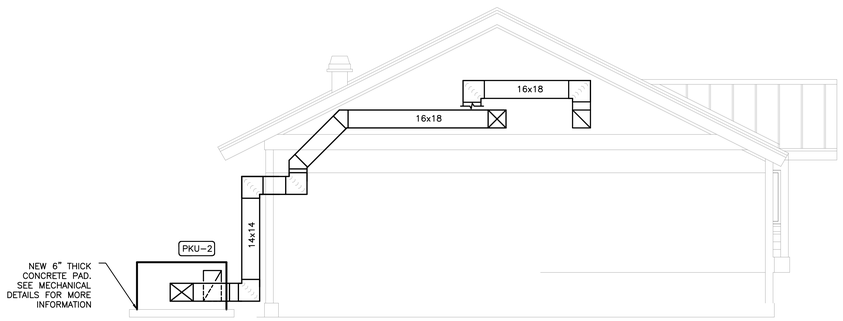
N2 PENETRATE EXISTING HARD CEILING AND ROUTE DUCTWORK BETWEEN JOIST. FIELD VERIFY JOIST LOCATIONS BEFORE START OF WORK.

N3 MAINTAIN MINIMUM 3'-0" CLEARANCE FROM ELECTRICAL TRANSFORMER.

N4 PROVIDE NEW DRYWELL, SEE MECHANICAL DETAILS FOR MORE INFORMATION.

N5 RELOCATED TURTLE DWELLING WITH ELECTRIC HEATER. RELOCATE AS REQUIRE TO MAINTAIN CLEARANCE FOR NEW PACKAGE UNIT.





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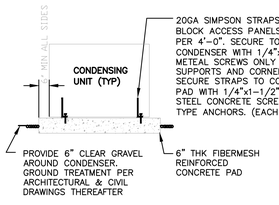
MECHANICAL HVAC PLAN - CLASSROOM

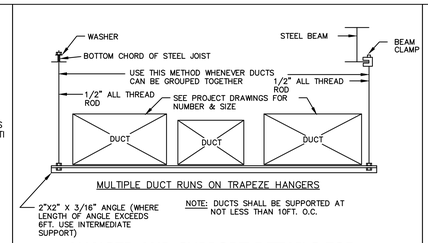
Sheet No.:

M-102



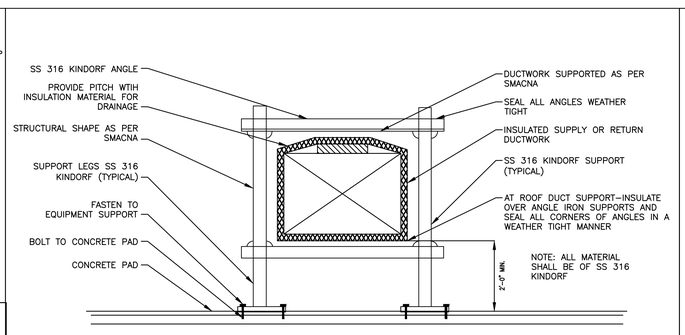
TYPICAL CONC PAD MOUNTED CU DETAIL

NOT TO SCALE



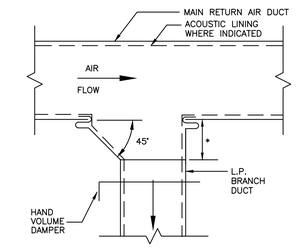
HANGER AND SUPPORT DETAILS FOR LOW PRESSURE DUCTWORK (UP THRU 2" WG)

(VARIOUS METHODS OF ATTACHMENT) NOT TO SCALE



DUCT SUPPORT ON GRADE DETAIL

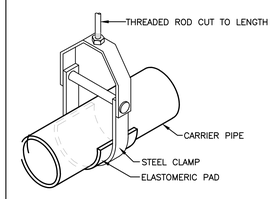
NOT TO SCALE



*-EQUALS WIDTH OF BRANCH DUCT UP TO 12". 12" FOR ALL BRANCH DUCTS LARGER THAN 12".

TYPICAL SUPPLY AIR BRANCH DUCT TAKE-OFF

NOT TO SCALE



CLEVIS TYPE PIPE SUPPORT FOR NONMETALLIC PIPE

NOT TO SCALE

SMOKE DETECTOR SPECIFICATIONS

COMPANY : SIMPLEXGRINNELL (OR APPROVED ALTERNATIVE)

SMOKE DETECTOR TYPE : PHOTOELECTRIC 4 WIRE

GENERAL NOTES:
1. DUCT DETECTORS SHALL BE CONNECTED TO FIRE ALARM CONTROL PANEL AS A SUPERVISORY SIGNAL ONLY (WHERE APPLICABLE).
2. EACH DUCT DETECTOR CONNECTED TO FIRE ALARM, SHALL BE ON ITS OWN ONE.

SMOKE DETECTOR SPECIFICATIONS

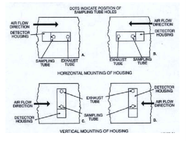
COMPANY : SYSTEM SENSOR
CONTACT : 1-800-SENSOR 2

SMOKE DETECTOR TYPE : PHOTOELECTRIC 4 WIRE
MODEL # : DH100 AC DCLP

ALARM INDICATION TYPE : AUDIBLE, VISIBLE, TEST
MODEL #: SSK451
PS24LOW
PS 12/245 LENSW

NOTES:
PROVIDE SUBMITTAL IF OTHER MANUFACTURER/MODELS ARE BID.

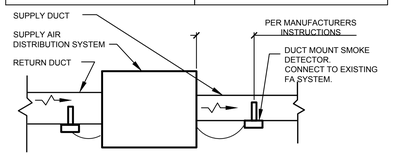
TUBE MOUNTING CONFIGURATION W/VARYING AIR FLOW DIRECTION



SAMPLING TUBE/DUCT WIDTHS

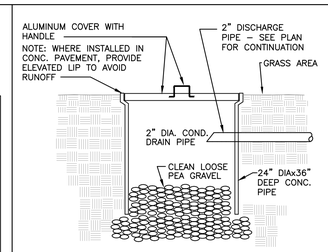
Outside Duct Width	Sampling Tube Recommended*
1 to 2 ft.	ST-1.5
2 to 4 ft.	ST-3
4 to 8 ft.	ST-5
8 to 12 ft.	ST-10

*Must extend a minimum of 1/3 the duct width



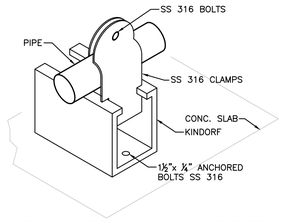
TYPICAL SMOKE DETECTOR MOUNTING DETAIL

NOT TO SCALE



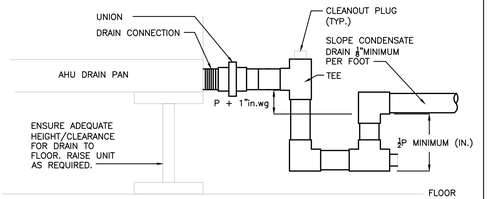
DRY WELL DETAIL

NOT TO SCALE



PIPE SUPPORT ON CONC. PAD DETAIL

NOT TO SCALE



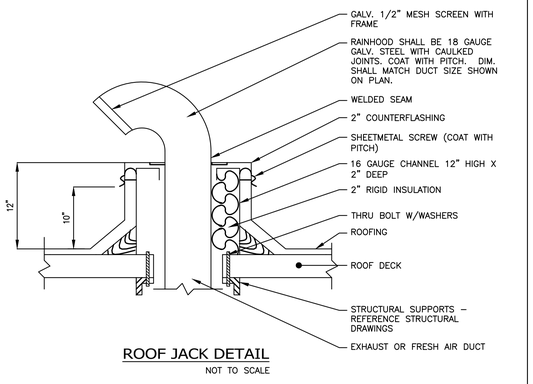
P - STATIC PRESSURE (in.wg) IN COOLING COIL PLUS ALL UPSTREAM STATIC PRESSURE.

GENERAL NOTES:

1. PRIOR TO ORDERING AHU, CONTRACTOR SHALL COORDINATE ALL BASE RAIL OR EQUIPMENT HEIGHTS TO OBTAIN PROPER CONDENSATE TRAP HEIGHTS AS ILLUSTRATED.
2. FILL CONDENSATE DRAIN TRAP PRIOR TO UNIT START-UP.
3. SIZE CONDENSATE DRAIN PIPING ACCORDING TO DRAWINGS. PIPE SIZE SHALL BE NO LESS THAN MANUFACTURER'S RECOMMENDED PIPE SIZE.

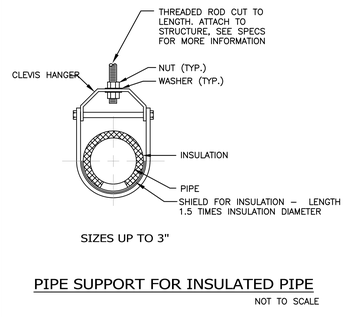
CONDENSATE TRAP DETAIL

NOT TO SCALE



ROOF JACK DETAIL

NOT TO SCALE



SIZES UP TO 3"

PIPE SUPPORT FOR INSULATED PIPE

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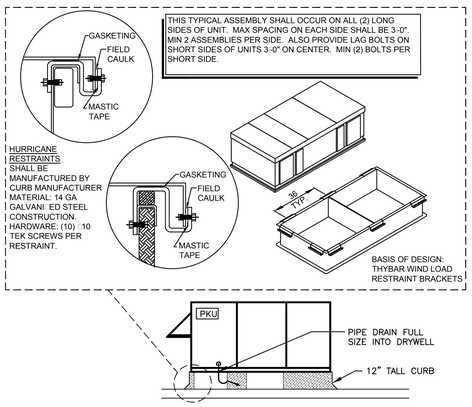


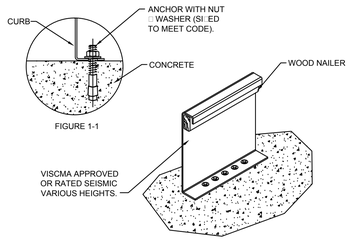
PACKAGE UNIT INSTALLATION AND HURRICANE REINFORCEMENT DETAIL

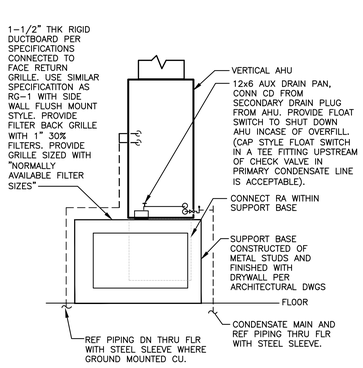
RATING UP TO 180 MPH WIND FORCE NOT TO SCALE

150 MPH WIND LOAD UN-INSULATED CURB INSTALLATION INSTRUCTIONS

The curbs should be anchored to concrete as follows:

- Anchors should be CODE APPROVED with nut □ washer.
- Anchors should be placed in every hole provided in the base plate of the curb.
- Anchors should pass through the base plate □ be embedded into the concrete.
- Follow anchor manufacturers instructions for grilling holes □ installation into concrete.





TYPICAL BASE MOUNTED AHU DETAIL

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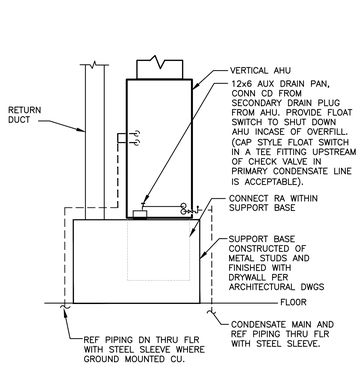

TYPICAL BASE MOUNTED AHU DETAIL

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MECHANICAL DETAILS

Sheet No.:

M-201

FBC ENERGY CONSERVATION C403.2.1 HVAC SIZING CALCULATIONS

Project Name/Owner	Tibet Butler HVAC Replacement Design
Project Address	Orlando, Fl
Sizing method used	Peak load sizing
Outdoor Dry bulb used	**92.3 F**
Outdoor wet bulb used	**79.2 F**
Indoor Dry Bulb	**72.0 F**
Max RH used	**60% %RH**

		Cooling Capacity			Grains of water/ LB Air			Heating Capacity
Zone	Area	Total	Sensible	Latent				TOTAL
	SQFT	MBH	MBH	MBH	Entering	Leaving	Difference	(MBH)
AHU-1	473	31.0	28.1	2.9	60.9	56.7	4.2	41.1
AHU-2	523	19.3	16.5	2.8	65.2	59.2	6.0	40.3
PKU-1	569	58.2	44.9	13.3	71.0	62.1	8.9	77.9
PKU-2	896	58.7	41.8	16.9	76.0	63.9	12.1	97.1

* Above listed capacitied include Outside Air required to meet ASHRAE 62

GROUND MOUNTED PACKAGED DX A/C SCHEDULE

	UNIT DESIGNATION	PKU-1	PKU-2
S/A FAN	TYPE	DIRECT DRIVE	DIRECT DRIVE
	TOTAL AIR C.F.M.	1200	1800
	OUTSIDE AIR C.F.M.	300	425
	NUMBER OF FANS	1	1
	EXT. STATIC PRESSURE (IN H2O)	1.00	1.00
	MOTOR HP	0.50	0.50
PERFORMANCE	MIN. EFFICENCY (EER)	15	15
	MIN. TOTAL CAPACITY (MBH)	34.8	58.8
	MIN. SENSIBLE CAPACITY (MBH)	25.3	38.1
	ENTERING AIR TEMPERATURE °Fdb/wb	77.1/63.9	79.7/67.3
	LEAVING AIR TEMPERATURE °Fdb/wb	56.0/54.3	56.0/54.9
	FILTER TYPE AND THICKNESS	2" PLEATED	2" PLEATED
COMP	QUANTITY	1	1
	RLA	15.4	25.0
COND	NUMBER OF FANS	1	1
	AMBIENT AIR TEMPERATURE °Fdb	95°	95°
	FULL LOAD AMPS	1.5	2.5
FIRE ALARM	SUPPLY AND RETURN SMOKE DETECTION	YES	YES
	FIRE ALARM SHUT DOWN (DIV-16)	YES	YES
	KEYED SWITCH WITH ALARM (NO)	NO	NO
ELECTRIC	HEATER KW (AT SERVICE VOLTAGE)	10	10
	HEATER STAGES	2	2
	ELECTRIC SERVICE	208/1	208/1
	MINIMUM CIRCUIT AMPACITY (MCA)	52.6	54.6
	MAXIMUM OVERCURRENT PROTECTION	60	60
	OPERATING WEIGHT (LBS)	1000	1000
	DESIGN MFGR	TRANE	TRANE
	MODEL #	THC036	THC060
	UNIT NOTES	ALL	ALL
	CONTROL NOTES	ALL	ALL

Unit Notes -
Manufacturer shall provide the following options:
- Trane Communications Interface
- Complete coat on condenser coil unit and evaporator coil
- High effeciency motors
- Hinged access doors
- Single Zone Constant Volume Motor
- Return air sensor
- Supply/return smoke detector
- Through base electrical with factor mount disconnect switch
- BACnet comm Interface
- Low Ambient controls to 30F
- Hail Guards
- Manual outside air damper

Control Notes - See schedule for final selections on each equipment
See control diagrams for more information

DX SPLIT SYSTEM SCHEDULE

	NOMINAL SYSTEM CAPACITY (TONS)	2.5	3
	MIN EFFECIENCY (SEER)	15	18
AIR HANDLING UNIT	UNIT TAG	AHU-1	AHU-2
	FILTER TYPE AND THICKNESS	1" PLEATED	1" PLEATED
	SUPPLY AIR (CFM)	800	800
	OUTSIDE AIR (CFM)	55	65
	FAN MAX ESP (IN-H20)	0.5	0.5
	ENTERING AIR TEMPERATURE °Fdb/wb	76.1/62.3	77.7/63.1
	LEAVING AIR TEMPERATURE °Fdb/wb	56.0/53.7	56.0/53.6
	NUMER OF REFRIGERANT CIRCUITS	1	1
	ELECTRICAL SERVICE VOLTAGE/ PHASE	230/1	230/1
	FAN HP	1/3	1/3
	ELECTRIC HEAT KW (AT V/PH LISTED)	3.8	4.8
	ELEC CIRCUIT-1 MCA/MOCP	24/25	29/30
	ELEC CIRCUIT-2 MCA/MOCP	-	-
	SMOKE DETECTOR LOCATION	-	-
	SHUT DOWN RELAY TO FACP	-	-
	OPERATING WEIGHT (LBS)	200	200
	MANUFACTURER	TRANE	TRANE
	MODEL NUMBER	TEM6A0B30H1	TEM6A0B30H1
CONDENSING UNIT DATA	UNIT TAG	CU-1	CU-2
	NUMER OF REFRIGERANT CIRCUITS	1	1
	NUMBER OF COMPRESSORS	1	1
	COMPRESSOR RLA	8.3	15.6
	NUMBER OF CONDENSER FANS	1	1
	FLA OF EACH FAN	0.74	0.74
	AMBIENT AIR TEMPERATURE °Fdb	95°	95°
	ELECTRICAL SERVICE VOLTAGE/ PHASE	230/1	230/1
	ELEC CIRCUIT-1 MCA/MOCP	11/15	11/15
	ELEC CIRCUIT-2 MCA/MOCP		
	OPERATING WEIGHT (LBS)	300	300
	MANUFACTURER	TRANE	TRANE
	MODEL NUMBER	ATWR5024G1	ATWR5024G1
	UNIT NOTES	All	All

Unit Notes - See schedule for final selections on each equipment (not all are used)
1. See plan and coordinate location of access doors and verify all clearances are met prior to ordering equipment - Submission or submittals or shop drawings constitutes this item has been performed by manufacturer.
2. Provide condenser coil guards
3. Provide extreme condition mount kit
4. Provide rubber isolators for condensing unit.
5. Provide plenum stand
6. Provide (2) extra set of filters - replace (1) set at Certificate of Occupancy
7. Provide low ambient controls to 0 degrees F.
8. Provide 7-day programmable thermostat.
9. Refrigerant R-410A
10. Provide bacnet MS/TP interface controller for all units with 24 V stepdown transformer
11. See mechanical control sheet M401 for more information.

AIR BALANCE SCHEDULE

(Offices)

System	Intake (cfm)	Exhaust (cfm)	
AHU-1	65		
AHU-2	65		
TOTAL	130	0	
BUILDING PRESSURE		130	(pos)

AIR BALANCE SCHEDULE

(Exhibit)

System	Intake (cfm)	Exhaust (cfm)	
PKU-1	300		
TOTAL	300	0	
BUILDING PRESSURE		300	(pos)

AIR BALANCE SCHEDULE

(Classsroom)

System	Intake (cfm)	Exhaust (cfm)	
PKU-2	425		
TOTAL	425	0	
BUILDING PRESSURE		425	(pos)

VENTILATION SCEHDULE

SPACE	TYPE	NOTES	GROSS AREA Az' (SF)	NET AREA Az (SF)	Table 403.3 Default Occupant Density (People/1000SF)	No. of People (Rounded) Pz	Table 403.3 OUTDOOR AIR RATE PEOPLE Rp (CFM/Person)	Table 403.3 OUTDOOR AIR RATE AREA Ra (CFM/SF)	Outdoor Airflow Rate Required in the Breathing Zone (in Occupied Space) Vbz (CFM)	Table 403.3.1.2 Zone Air Distrib. Effectiveness Ez	Zone Outdoor Airflow Vot(m) = Voz (CFM)	Approx. Outdoor Air Intake Flow Rate Vot (CFM)
PKU-2												
CLASSROOM	Education: Classrooms (ages 5-8)	1	896	**896**	25	23	10	0.12	338	0.8	422	425
TOTAL						**23**			**338**		**422**	**425**
PKU-1												
101 - EXHIBIT AREA	Retail stores, sales floors and showroom floors: Sales	1	569	**569**	15	9	7.5	0.12	136	0.8	170	170
TOTAL						**9**			**136**		**170**	**170**
AHU-1												
107 - WORKSHOP	Offices: Office spaces	1	261	**261**	5	2	5	0.06	26	0.8	32	32
108 - CLOSET	Retail stores, sales floors and showroom floors: Storage	1	32	**32**	0	0	0	0.12	4	0.8	5	5
110 - CLOSET	Retail stores, sales floors and showroom floors: Storage	1	8	**8**	0	0	0	0.12	1	0.8	1	5
111 - OFFICE	Offices: Office spaces	1	172	**172**	5	1	5	0.06	15	0.8	19	20
TOTAL						**3**			**46**		**57**	**62**
AHU-2												
109 - CLOSET	Retail stores, sales floors and showroom floors: Storage	1	19	**19**	0	0	0	0.12	2	0.8	3	5
112 - WORKSHOP	Offices: Office spaces	1	504	**504**	5	3	5	0.06	45	0.8	57	60
TOTAL						**3**			**48**		**59**	**65**

NOTES:
1. BASED ON VENTILATION REQUIREMENTS FROM FLORIDA BUILDING CODE MECHANICAL FIFTH EDITION

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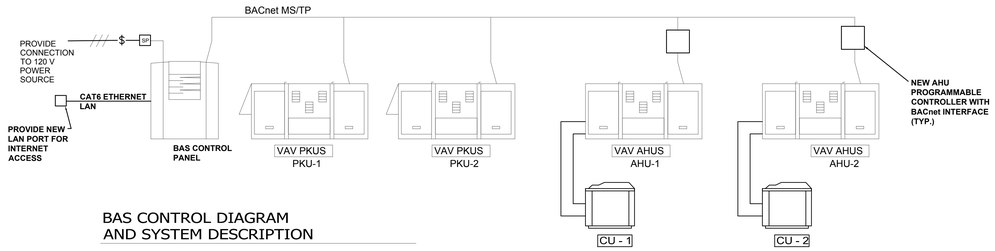
MECHANICAL SCHEDULES

Sheet No.:
M-301



BAS CONTROL DIAGRAM AND SYSTEM DESCRIPTION

THE BUILDING AUTOMATION SYSTEM (BAS) SHALL BE A WEB-BASED ICI CONTROLWEB-BASED ICI CONTROLLER. SUPERVISORY CONTROLLER SHALL BE CAPABLE OF COMMUNICATION VIA CANET MS/TP AND LONTALK PROTOCOL SIMULTANEOUSLY AT THE SYSTEM LEVEL TO ALLOW FOR SEAMLESS INTEGRATION WITH FUTURE EQUIPMENT EXPANSIONS. USER INTERFACE SHALL BE WEB BASED WITH ACCESS AVAILABLE VIA ANY STANDARD INTERNET BROWSER. SYSTEMS EMPLOYING LOCAL WORKSTATIONS OR PROPRIETARY PC SOFTWARE TO FACILITATE REMOTE ACCESS SHALL NOT BE ACCEPTABLE.

SINGLE ZONE PACKAGE UNITS (PKU'S) SHALL BE EQUIPPED WITH INTEGRAL FACTORY CONTROL BOARDS CAPABLE OF INTERFACING WITH THE BAS VIA BACNET MS/TP PROTOCOL. FACTORY CONTROL BOARDS SHALL BE CAPABLE OF ACHIEVING ALL SEQUENCES OF OPERATION AND SERVING UP ALL REQUIRED MONITORING POINTS WITHOUT MODIFICATION. THE USE OF ANCILLARY PANELS OR I/O BAORDS TO CONTROL OR MONITOR SINGLE ZONE PKU'S SHALL NOT BE ACCEPTABLE.

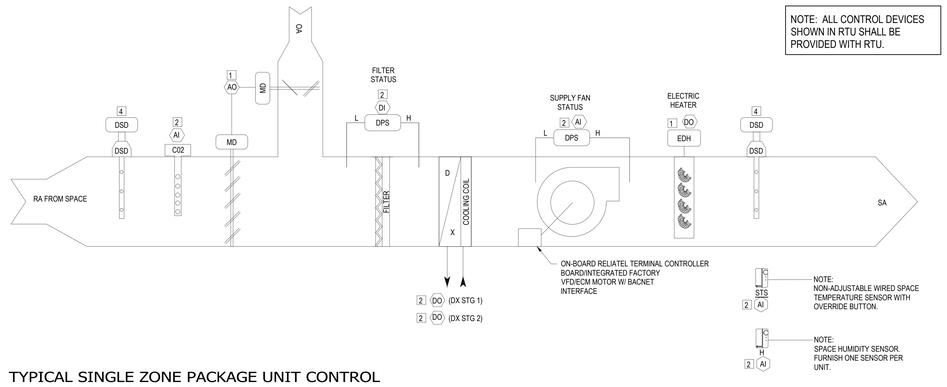
CONSTANT VOLUME SPLIT SYSTEMS SHALL BE EQUIPPED WITH FULLY PROGRAMMABLE CONTROLLERS (ICI). CONTROLLERS SHALL BE CAPABLE OF INTERFACING WITH THE BAS VIA BACNET MS/TP PROTOCOL AND ACCEPTING CUSTOM PROGRAMMING AS NEEDED TO ACHIEVE ALL SEQUENCES OF OPERATION. THE USE OF NON-PROGRAMMABLE OR APPLICATION SPECIFIC CONTROLLERS SHALL NOT BE ACCEPTABLE. EACH SYSTEM MUST BE EQUIPPED WITH AN INDEPENDENT CONTROLLER. THE CONTROL OF MULTIPLE SPLIT SYSTEM BY A SINGLE CONTROLLER SHALL NOT BE ACCEPTABLE.

AIR HANDLING UNITS SHALL BE DAISY CHAINED.

PROVIDE GRAPHICS DISPLAY FOR ALL HVAC COMPONENTS UTILIZING BUILDING CAD FLOOR PLANS. USE SINGLE LINE DUCT INDICATING SPACES AHU IS SERVING.

BASIS OF DESIGN: JOHSNON CONTROLS (JCI), ONLY ACCEPTABLE ALTERNATIVES: TRANE, RELIABLE CONTROLS, AND AUTOMATED LOGIC CORPORATION.

NOTE: ALL CONTROL DEVICES SHOWN IN RTU SHALL BE PROVIDED WITH RTU.



TYPICAL SINGLE ZONE PACKAGE UNIT CONTROL DIAGRAM AND SEQUENCE OF OPERATION

PKU-1, PKU-2

BUILDING AUTOMATION SYSTEM INTERFACE
THE BUILDING AUTOMATION SYSTEM (BAS) SHALL SEND THE RTU OCCUPIED BYPASS, MORNING WARM-UP / PRE-COOL, OCCUPIED /UNOCCUPIED AND HEAT / COOL MODE COMMANDS. THE BAS SHALL ALSO SEND A SPACE TEMPERATURE SET POINT. IF COMMUNICATION IS LOST WITH THE BAS, THE RTU SHALL OPERATE USING DEFAULT MODES AND SET POINTS.

OCCUPIED MODE
DURING OCCUPIED PERIODS, THE SUPPLY FAN, DX COOLING AND ELECTRIC HEATING SHALL BE ENABLED TO MAINTAIN SPACE TEMPERATURE SET POINT. THE OUTDOOR AIR DAMPER SHALL OPEN TO MINIMUM POSITION.

UNOCCUPIED MODE
DURING UNOCCUPIED PERIODS, THE SUPPLY FAN, DX COOLING AND ELECTRIC HEATING SHALL CYCLE TO MAINTAIN THE SPACE TEMPERATURE AT THE UNOCCUPIED SPACE SET POINT. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED AND THE RETURN AIR DAMPER SHALL REMAIN OPEN DURING UNOCCUPIED MODE.

OPTIMAL START
THE BAS SHALL MONITOR THE SCHEDULED OCCUPIED TIME. OPTIMAL START WINDOW, OCCUPIED SPACE SET POINT, SPACE TEMPERATURE, AND THE OPTIMAL START RATE TO CALCULATE WHEN THE OPTIMAL START OCCURS.

PRE-COOL
DURING OPTIMAL START, IF THE SPACE TEMPERATURE IS ABOVE THE OCCUPIED SET POINT, PRE-COOL MODE SHALL BE ACTIVATED. WHEN PRE-COOL IS INITIATED, SUPPLY FAN AND DX COOLING SHALL BE ENABLED. THE OUTSIDE AIR DAMPER SHALL REMAIN CLOSED. WHEN THE SPACE TEMPERATURE REACHES OCCUPIED SET POINT, THE UNIT SHALL TRANSITION TO OCCUPIED MODE.

OCCUPIED BYPASS
WHEN AN OCCUPIED BYPASS REQUEST IS INITIATED VIA THE SPACE SENSOR, THE UNIT SHALL OPERATE IN OCCUPIED MODE UNTIL THE BYPASS EXPIRES OR IS CANCELED.

COOLING MODE
WHEN THE SPACE TEMPERATURE RISES ABOVE SET POINT, THE DX COOLING SHALL BE ACTIVATED AND STAGED TO MAINTAIN THE DISCHARGE AIR TEMPERATURE SET POINT. THE SUPPLY FAN SHALL MODULATE TO MAINTAIN SPACE TEMPERATURE SET POINT. ONCE THE SPACE TEMPERATURE FALLS BELOW THE SET POINT THE COMPRESSORS SHALL BE DEACTIVATED.

HEATING MODE:
WHEN THE SPACE TEMPERATURE DROPS BELOW SET POINT, THE ELECTRIC HEAT SHALL BE ACTIVATED. THE SUPPLY FAN WILL REMAIN AT FULL SPEED DURING ELECTRIC HEAT OPERATION. ONCE THE SPACE TEMPERATURE RISES ABOVE SET POINT, THE ELECTRIC HEAT SHALL BE DISABLED AND THE SUPPLY FAN WILL RETURN TO STANDARD OPERATION.

HUMIDITY CONTROL:
PRIMARY HUMIDITY CONTROL SHALL BE ACCOMPLISHED BY VARYING THE SUPPLY AIR CFM IN RESPONSE TO BUILDING LOAD TEMPERATURE VARIATION. THE TARGET RANGE OF RH SHALL BE 45-60%. IF SPACE SETPOINT RISES ABOVE 60% FOR 5 MINS, LOWER SETPOINT BY 1 DEG F FOR EVERY 5 MINS UP TO 5 DEG F UNTIL HUMIDITY RETURNS TO NORMAL.

DEMAND CONTROL VENTILATION
WHEN RETURN AIR CO2 CONCENTRATION RISES ABOVE SET POINT, THE OUTSIDE AIR DAMPER SHALL MODULATE OPEN UNTIL THE CO2 LEVEL FALLS BELOW SET POINT OR IT REACHES THE MAXIMUM OPEN POSITION. DAMPER POSITION AND OPENING RATE SHALL ADJUST TO ACCOUNT FOR CHANGES IN SUPPLY FAN SPEED. ONCE THE CONCENTRATION FALLS BELOW SET POINT, THE DAMPER SHALL RETURN TO MINIMUM POSITION. IF THE MIXED AIR TEMPERATURE DROPS TO 40° F, THE DEMAND CONTROL VENTILATION SEQUENCE SHALL BE DISABLED. ONCE MIXED AIR TEMPERATURE RISES TO 43°F, THE SEQUENCE SHALL BE RE-ENABLED.

SUPPLY FAN OPERATION
THE SUPPLY FAN SHALL BE ENABLED DURING OCCUPIED MODE AND CYCLED ON AS NEEDED DURING THE UNOCCUPIED MODE. THE BAS SHALL MONITOR THE OPERATIONAL STATUS OF THE SUPPLY FAN. IF A POSITIVE STATUS SIGNAL IS NOT RECEIVED WITH FORTY SECONDS FOLLOWING START COMMAND, A SUPPLY FAN FAILURE ALARM SHALL BE GENERATED.

FILTER STATUS
THE BAS SHALL MONITOR THE STATUS OF THE DIRTY FILTER SWITCH WHEN THE PU IS IN OPERATION. IF THE SWITCH REMAINS CLOSED FOR TWO MINUTES, A DIRTY FILTER ALARM SHALL BE GENERATED.

LEGEND

⬡	INPUT/OUTPUT POINT TO DDC CONTROL PANEL
TS -	TEMPERATURE SENSOR
V -	CONTROL VALVE
DI -	DIGITAL INPUT
DO -	DIGITAL OUTPUT
AI -	ANALOG INPUT
AO -	ANALOG OUTPUT

General note: all setpoints shall be user ad.ustable through the web-based front end graphics without need for programming editor or additional software beyond front end□

CONTROLS LEGEND

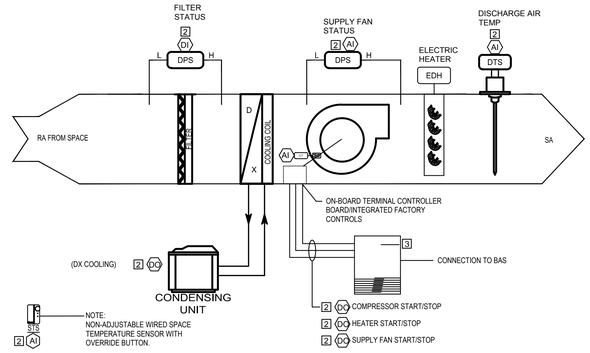
SYMBOL	ABB.	DESCRIPTION	SYMBOL	ABB.	DESCRIPTION
	AHU	AIR HANDLING UNIT		DTS	DUCT TEMPERATURE SENSOR
	ATS	AVERAGING TEMPERATURE SENSOR		EDH	ELECTRIC DUCT HEATER
	CO2	CARBON DIOXIDE SENSOR - WALL MOUNTED		FLT	FILTER
	OC	OCCUPANCY SENSOR (DUAL TECHNOLOGY - IR/MOTION). CEILING MOUNTED.		FRT	FREEZE STAT
	CC	COOLING COIL		MP581	PROGRAMMABLE CONTROLLER
	CCP	CENTRAL CONTROL PANEL		OTS	OUTSIDE TEMPERATURE SENSOR
2-WAY 3-WAY	CHWV	CHILLED WATER VALVE		SP	SURGE PROTECTION
	CSS	CURRENT SENSING SWITCH		STS	SPACE TEMPERATURE SENSOR
	CSSR	CURRENT SENSING SWITCH WITH RELAY		VFD	VARIABLE FREQUENCY DRIVE
	CT	CURRENT TRANSMITTER		DSD	DUCT SMOKE DETECTOR
	MD	MOTORI ED DAMPER		DHS	DUCT HUMIDITY SENSOR
	DPS	DIFFERENTIAL PRESSURE SWITCH		AFM	AIR FLOW MONITORING STATION
	DPT	DIFFERENTIAL PRESSURE TRANSMITTER		WFM	WATER FLOW SENSOR
SCO-1	DCO	DUCT CARBON DIOXIDE SENSOR	TS	TS	WATER TEMPERATURE SENSOR
SP	SCO	SPACE CARBON DIOXIDE SENSOR			
	SP	SURGE PROTECTOR			

PROVISION AND RESPONSIBILITY

1. VARIABLE FREQUENCY DRIVE W/BYPASS AND DISCONNECT PROVIDED PACKAGE UNIT MANUFACTURER. LOW VOLTAGE WIRING BY CONTROLS SUB. HIGH VOLTAGE WIRING BY DIV-16.
2. DISCONNECT SWITCH PROVIDED, MOUNTED, AND HIGH VOLTAGE WIRING BY DIV-16.
3. 120V CONTROLS FEEDER BY DIV-16, TRANSFORMER IF REQUIRED BY CONTROLS SUBCONTRACTOR
4. DOOR DISCONNECT SWITCH PROVIDED BY MANUFACTURER

ALL VALVES WHICH ARE CONTROLLED THROUGH THE CONTROL SYSTEM SHALL BE PROVIDED BY CONTROLS SUBCONTRACTOR, INSTALLED BY DIV-15, AND WIRED FOR LOW VOLTAGE BY CONTROLS SUBCONTRACTOR. IF ANY VALVES REQUIRE HIGH VOLTAGE WIRING, BY DIV-16.

[1] CONTROL OUTPUT FROM CONTROL PANEL
[2] CONTROL INPUT TO CONTROL PANEL
[3] CONTROL INPUT & OUTPUT FROM CONTROL PANEL
[4] CONNECT TO FA SYSTEM AND LOCAL SHUT DOWN OF AHU



SEQUENCE OF OPERATION

AHU-1, AHU-2

BUILDING AUTOMATION SYSTEM INTERFACE: THE BUILDING AUTOMATION SYSTEM (BAS) WILL SEND THE CONTROLLER OCCUPIED / UNOCCUPIED MODES. THE BAS WILL ALSO SEND SPACE TEMPERATURE SETPOINT. IF A BAS IS NOT PRESENT, OR COMMUNICATION IS LOST WITH THE BAS, THE CONTROLLER WILL OPERATE USING DEFAULT MODES AND SETPOINTS.

OCCUPIED MODE
THE UNIT CONTROLLER WILL CYCLE THE COOLING AND HEATING TO MAINTAIN THE SPACE TEMPERATURE TO THE OCCUPIED COOLING AND HEATING SETPOINTS (ADJ).

UNOCCUPIED MODE
THE UNIT CONTROLLER WILL CYCLE THE FAN, COOLING AND HEATING TO MAINTAIN THE SPACE TEMPERATURE TO THE UNOCCUPIED SPACE COOLING AND HEATING SETPOINTS (ADJ).

OCCUPIED BYPASS
WHEN AN OCCUPIED BYPASS REQUEST IS INITIATED VIA ANY ASSOCIATED SPACE SENSOR, THE SYSTEM SHALL OPERATE IN OCCUPIED MODE UNTIL THE BYPASS EXPIRES OR IS CANCELED.

COOLING MODE
THE UNIT CONTROLLER USES SPACE TEMPERATURE AND SPACE TEMPERATURE SETPOINT TO DETERMINE WHEN TO INITIATE REQUESTS FOR COOLING. WHEN THE SPACE TEMPERATURE RISES ABOVE THE SETPOINT, THE CONTROLLER WILL ENABLE THE STAGE OF COOLING. THE COMPRESSOR WILL ENERGIZE AFTER ITS MINIMUM 3-MINUTE OFF TIME HAS EXPIRED.ONCE THE SPACE TEMPERATURE FALLS BELOW THE SETPOINT THE COMPRESSOR WILL BE DEACTIVATED.

HEATING MODE
THE UNIT CONTROLLER USES SPACE TEMPERATURE AND SPACE TEMPERATURE SETPOINT TO DETERMINE WHEN TO INITIATE REQUESTS FOR HEAT. WHEN THE SPACE TEMPERATURE DROPS BELOW THE SETPOINT, THE CONTROLLER WILL ENABLE STAGE-1 OF HEAT. ONCE THE SPACE TEMPERATURE RISES ABOVE THE SETPOINT THE HEATING STAGES WILL BE DISABLED.

SUPPLY FAN OPERATION
THE SUPPLY FAN WILL BE ENABLED WHILE IN THE OCCUPIED MODE AND CYCLED ON DURING THE UNOCCUPIED MODE. A DIFFERENTIAL PRESSURE SWITCH WILL MONITOR FAN MOTOR STATUS. IF THE SWITCH DOES NOT OPEN WITHIN 30 SECONDS (ADJ) AFTER A REQUEST FOR FAN OPERATION A FAN FAILURE ALARM WILL BE ANNUNCIATED, THE UNIT WILL STOP REQUIRING A MANUAL RESET.

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MECHANICAL CONTROLS

Sheet No.:
M-401

GENERAL ELECTRICAL NOTES

1. THE ELECTRICAL WORK IS SUBJECT TO ALL OF THE PURCHASER'S TERMS, CONDITIONS AND SPECIFICATIONS, INCLUDING WORKMANSHIP.
2. GENERAL WORK PRACTICES FOR ELECTRICAL CONSTRUCTION SHALL BE IN ACCORDANCE WITH NECA 1 STANDARD FOR GOOD WORKMANSHIP IN ELECTRICAL CONSTRUCTION" (ANSI).
3. IT IS THE INTENT OF THESE ELECTRICAL DRAWING SHEETS TO CALL FOR FINISHED WORK; TESTED, AND READY FOR OPERATION. FOR THE ELECTRICAL WORK, "PROVIDE" IS AN ALL–INCLUSIVE TERM REQUIRING CONTRACTOR TO PROCURE, FABRICATE, FURNISH, INSTALL, MOUNT, WIRE, CONNECT AND SUPPLY ALL MATERIAL AND LABOR NECESSARY TO COMPLETE THE WORK TO THE ACCEPTANCE OF THE OWNER AND THE AUTHORITY HAVING JURISDICTION (AHJ).
4. ALL MATERIAL PROVIDED BY THE CONTRACTOR SHALL BE NEW AND FREE OF DEFECTS, LISTED/LABELED FOR THE INTENDED PURPOSE BY UNDERWRITERS LABORATORY (UL) OR OTHER ORGANIZATION THAT IS ACCEPTABLE TO THE AHJ,
5. ALL MATERIAL SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S WRITTEN INSTRUCTIONS. UNLESS OTHERWISE NOTED.
6. CONTRACTOR SHALL INSPECT SITE FOR FIELD VERIFICATION OF ALL ASPECTS OF THE WORK PRIOR TO BIDDING.
7. ALL DISCREPANCIES ON DRAWING SHALL BE BROUGHT TO THE ATTENTION OF THE ARCHITECT IN WRITING PRIOR TO SUBMISSION OF BIDS. CONTRACTORS SUBMISSION OF A BID CONSTITUTES ACCEPTANCE OF ALL CONDITIONS INCLUDING FIELD CONDITIONS.
8. NOT USED.
9. THE ELECTRICAL SHEETS ARE DIAGRAMMATICAL IN NATURE AND INDICATE THE GENERAL LOCATION OF OUTLETS, EQUIPMENT, AND THE CIRCUIT ARRANGEMENT OF THE REQUIRED WIRING. ALTHOUGH THE DRAWINGS DO NOT NECESSARILY INDICATE THE ACTUAL ROUTES OF CONDUITS, WHERE INDICATED, THEY SHALL BE FOLLOWED AS CLOSELY AS PROPER COORDINATION WITH THE WORK OF OTHER TRADES AND SPACE WILL PERMIT. WHERE CONDUIT RUNS ARE NOT SHOWN ON THE DRAWINGS, COORDINATE CONDUIT RUNS WITH THE WORK OF OTHER TRADES AND STRUCTURE. SIMPLIFY INSTALLATION WHEREVER POSSIBLE, BUT SUBJECT TO APPROVAL BY THE ARCHITECT FOR VISUAL AND STRUCTURAL REASONS. IT IS NOT WITHIN THE SCOPE OF THE DRAWINGS TO SHOW ALL NECESSARY OFFSETS, BENDS, PULL BOXES, AND OBSTRUCTIONS. THE DRAWINGS ARE NOT INTENDED TO BE SCALED, REFER TO THE ARCHITECTURAL DRAWINGS FOR DIMENSIONS. IN CASE OF DISCREPANCY BETWEEN ELECTRICAL AND ARCHITECT SHEET SET FOR MOUNTING ELEVATIONS OR REFLECTED CEILINGS, FOLLOW ARCHITECT SHEETS.
10. MAINTAIN ON THE JOB SITE, IN GOOD CONDITION, ONE SET OF UP–TO–DATE ELECTRICAL DRAWINGS. PROGRESSIVELY, NEATLY, LEGIBLY, AND EXACTLY RECORD ON THESE DRAWINGS THE LOCATION OF ALL CONCEALED CONDUIT RUNS AND ALL WORK WHICH IS INSTALLED DIFFERENTLY THAN IN THE LOCATION AND MANNER INDICATED ON THE DRAWINGS. ON COMPLETION OF THE WORK, THE DRAWINGS SHALL BE TURNED OVER TO THE ARCHITECT FOR APPROVAL AND POSSESSION AS A PERMANENT AND COMPLETE RECORD DOCUMENT OF THE ELECTRICAL WORK.
11. WHEN FOLLOWED BY THE PHRASE "OR EQUAL", SPECIFIC MANUFACTURERS PRODUCTS ARE USED AS AS A BASIS OF DESIGN. ALTERNATE PRODUCT MAY BE PROVIDED IF APPROVED "AS EQUAL" BY THE ENGINEER OF RECORD AND THE AHJ.
12. FOR ALL ELECTRICAL & COMMUNICATIONS DEVICES AND CIRCUITS, CONTRACTOR SHALL FIELD VERIFY WIH OWNER AND COORDINATE WITH ALL OTHER TRADES FINAL LOCATION(S) PRIOR TO ROUGH IN.
13. PRIOR TO FINAL ACCEPTANCE, CLEAN ALL SWITCHES, CABINETS, DEVICE PLATES, FIXTURES, AND OTHER ITEMS FURNISHED UNDER THIS CONTRACT,AND ENSURE THAT ALL PANEL BOARD DIRECTORIES ARE IN PLACE AND COMPLETED OR REVISED AS REQUIRED BY THE WORK, AND THAT ALL MARKING AND IDENTIFICATION OF ALL EQUIPMENT, JUNCTION BOXES, AND OTHER ITEMS IS COMPLETED. REPAIR OR REPLACE, AS DIRECTED BY THE OWNER, ANY ITEMS DAMAGED DUE TO INSTALLATION OR RELOCATION OF EQUIPMENT OR DEVICES AT NO ADDITIONAL COST TO THE OWNER.
14. UPON THE COMPLETION OF THE WORK, THE ENTIRE ELECTRICAL SYSTEM SHALL BE TESTED AND SHALL BE SHOWN TO BE IN PROPER WORKING CONDITION IN ACCORDANCE WITH THE INTENT OF THE SPECIFICATIONS AND DRAWINGS, IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO HAVE ALL SYSTEMS READY FOR OPERATION AND TO HAVE AN ELECTRICIAN AVAILABLE TO OPERATE SAME IN ACCORDANCE WITH OR UNDER THE SUPERVISION OF THE ARCHITECT/ENGINEER AND OR AHJ.
THE CONTRACTOR SHALL BE AVAILABLE TO ASSIST IN REMOVAL OF PANEL FRONTS. ETC. TO PERMIT INSPECTION AS REQUIRED.
15. ALL WORK SHALL MEET OR EXCEED THE REQUIREMENTS OF THE FLORIDA BUILDING CODE, NATIONAL ELECTRIC CODE (NFPA 70), LOCAL ORDINANCES AND THE AUTHORITY HAVING JURISDICTION.
16. FLEXIBLE CONDUIT INSTALLED OUT OF DOORS, IN ANY MECHANICAL EQUIPMENT ROOM, OR IN NORMALLY WET AREAS SHALL BE LIQUID TIGHT FLEX WITH SUITABLE FITTINGS.
17. COORDINATE WITH ALL MECHANICAL TRADES FOR SPACE REQUIREMENTS IN MECHANICAL ROOMS, CORRIDORS, SHAFTS, ABOVE CEILING, ETC. THIS INCLUDES SPACE ABOVE PANELS WHERE DUCTS AND PIPING ARE PROHIBITED.
18. FOR EXACT LOCATIONS OF MECHANICAL EQUIPMENT, SEE MECHANICAL PLANS.
19. PROVIDE CONDUIT EXPANSION FITTINGS WITH BONDING JUMPERS FAR ALL CONDUITS PASSING THROUGH EXPANSION JOINTS.
20. SEE ARCHITECTURAL REFLECTED CEILING PLANS FOR EXACT LOCATION OF ALL CEILING MOUNTED EQUIPMENT.
21. ALL RECEPTACLES BESIDE SINKS SHALL BE LOCATED AT LEAST 6" HORIZONTALLY FROM THE TOWEL DISPENSER. UNDER NO CONDITION SHALL A RECEPTACLE BE LOCATED UNDER A TOWEL DISPENSER.
22. CONTRACTOR SHALL VERIFY AND COORDINATE ALL MOUNTING HEIGHTS OF ALL DEVICES MOUNTED IN CASEWORK OR IN OR ABOVE COUNTERS WITH EXISTING EQUIPMENT AND EQUIPMENT FURNISHED.

ABBREVIATIONS

A	AMPERE
AF	AMPERE FRAME
AFC	AVAILABLE FAULT CURRENT
AFCI	ARC FAULT CIRCUIT INTERRUPTER
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLER UNIT (HVAC)
AHJ	AUTHORITY HAVING JURISDICTION
AIC	AMPERE INTERRUPTING CAPACITY
AT	AMPERE TRIP
AWG	AMERICAN WIRE GAUGE
BKR	BREAKER
C	CONDUIT OR CONDUCTOR
CB	CIRCUIT BREAKER
CLG	CEILING
CO	CONDUIT ONLY
CPT	CONTROL POWER TRANSFORMER
CU	CONDENSING UNIT (HVAC), COPPER
DS	DISCONNECT (SAFETY) SWITCH
EC	EMPTY CONDUIT
EF	EXHAUST FAN
EL	EMERGENCY LIGHT (UNSWITCHED)
ELE	ELECTRICAL, ELECTRIC
EM	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
ENT	ELECTRICAL NONMETALLIC TUBING
EWH	ELECTRIC WATER HEATER
EX	EXISTING
FBC	FLORIDA BUILDING CODE
FDS	FUSED DISCONNECT (SAFETY) SWITCH
FLOUR	FLUORESCENT
FMC	FLEXIBLE METAL CONDUIT
FMT	FLEXIBLE METAL TUBING
GND	GROUND (ELECTRICAL)
GEN	GENERATOR
GFI	GROUND FAULT INTERRUPTER
GWH	GAS WATER HEATER
HH	HAND HOLE
HID	HIGH INTENSITY DISCHARGE LIGHT
HP	HORSE POWER
HPS	HIGH PRESSURE SODIUM LIGHT
HZ	HERTZ (ELECTRICAL)
ICCB	INSULATED CASE CIRCUIT BREAKER
IG	ISOLATED GROUND
IMC	INTERMEDIATE METAL CONDUIT
JB	JUNCTION BOX
KCMIL	THOUSAND CIRCULAR MILS
KVA	KILOVOLT–AMPERE
KW	KILOWATT
KWH	KILOWATT–HOUR
LTG	LIGHT, LIGHTING
LFMC	LIQUIDTIGHT FLEXIBLE METAL CONDUIT
LFNC	LIQUIDTIGHT FLEXIBLE NONMETALLIC CONDUIT
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCCB	MOLDED CASE CIRCUIT BREAKER
MDP	MAIN DISTRIBUTION PANEL
MH	METAL HALIDE LIGHT, MAN HOLE
MLO	MAIN LUGS ONLY
N, NEUT	NEUTRAL (ELECTRICAL)
NEC	NATIONAL ELECTRICAL CODE)
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSN.
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NL	NIGHT LIGHT
P	POLE
PB	PULL BOX
PCB	POWER CIRCUIT BREAKER
PH	PHASE (ELECTRICAL)
PNL	PANEL
PNLB	PANELBOARD
PVC	PLASTIC CONDUIT
PWR	POWER (ELECTRICAL)
RCPT	RECEPTACLE
RMC	RIGID METAL CONDUIT
RNC	RIGID NONMETALLIC CONDUIT
RTU	ROOF TOP UNIT (HVAC)
SD	SMOKE DETECTOR
SF	SUPPLY FAN
SH	SHIELDED
SW	SWITCH
SWBD	SWITCHBOARD
TEL	TELEPHONE
TTB	TELEPHONE TERMINAL BOARD
UG	UNDERGROUND
UL	UNDERWRITERS LABORATORY
UPS	UNINTERRUPTABLE POWER SUPPLY
UON	UNLESS OTHERWISE NOTED
V, VAC	VOLT, VOLT AC
W	WATT
WP	WEATHERPROOF
XFMR	POWER TRANSFORMER

NOT ALL ABBREVIATIONS ARE USED IN EVERY DESIGN

RENOVATION/DEMOLITION LEGEND

SYMBOL:	DESCRIPTION:
<E>	EXISTING TO REMAIN.
	EXISTING TO BE REMOVED.
<R>	EXISTING TO BE RELOCATED.

CONDUIT RACEWAY ▯ WIRING LEGEND

SYMBOL:	DESCRIPTION:
	RACEWAY CONDUIT CONCEALED ABOVE CEILING OR WITHIN WALL UNLESS OTHERWISE NOTED. EACH CIRCUIT SHALL CONSIST OF PHASE, NEUTRAL AND GROUND CONDUCTORS. EVERY CIRCUIT SHALL HAVE IT'S OWN INDIVIDUAL NEUTRAL. FOR LIGHTING CIRCUITS PROVIDE REQUIRED SWITCH LEGS TO ACHIEVE SWITCHING INDICATED ON PLANS.
A–1;3	HOME RUN TO PANEL ALL HOMERUNS SHALL BE #10 AWG, 3/4"C., MINIMUM. WIRING HOME RUN: LETTER INDICATES PANEL; NUMBER IS BRANCH CIRCUIT(S)
	GROUNDING CONDUCTOR.
	CONDUIT IN/UNDER SLAB OR UNDERGROUND.
DN	CONDUIT STUB–DOWN.
UP	CONDUIT STUB–UP.

POWER PLAN LEGEND

SYMBOL:	DESCRIPTION:
	DUPLEX RECEPTACLE, NEMA 5–20R, MOUNT 18" AFF UON.
	DUPLEX RECEPTACLE, NEMA 5–20R, MOUNT 42" AFF OR ABOVE COUNTER.
	QUAD RECEPTACLE, 2 OF NEMA 5–20R, MOUNT 18" AFF UON.
	SPECIAL PURPOSE OUTLET, NEMA CONFIGURATION AS SHOWN.
GFI	DUPLEX RECEPTACLE, NEMA 5–20R, MOUNT 18" AFF UON (GROUND FAULT CIRCUIT INTERRUPTED)
	JUNCTION BOX WITH BLANK PLATE; BRACKET INDICATES WALL MOUNTED.
	PANELBOARD (RECESSED FLUSH–MOUNTED UON).
	ELECTRICAL MAIN DISTRIBUTION PANELBOARD OR SWITCHBOARD
SD	SMOKE DETECTOR (NOT PART OF FIRE ALARM SYSTEM)
	REMOTE SHUNT TRIP DEVICE IN "BREAK GLASS" WEATHERPROOF BOX
X	SAFETY (DISCONNECT) SWITCH, NON–FUSED NUMBER = DISCONNECT RATING
X / X	FUSED SAFETY (DISCONNECT) SWITCH TOP NUMBER = FUSE RATING, BOTTOM NUMBER = DISCONNECT RATING USE ALL RK–1 FUSES.
	TRANSFORMER (UTILITY)
M	METER SOCKET, PROVIDE PER UTILITY COMPANY REQUIREMENTS.
$M	MANUAL MOTOR STARTER, 125/277VAC, 20A, MOUNT 48" AFF UON.
FACP	FIRE ALARM CONTROL PANEL

NOT ALL SYMBOLS ARE USED IN EVERY DESIGN

CODE DISCLAIMERS

ELECTRICAL DESIGN IN ACCORDANCE WITH 2011 NATIONAL ELECTRIC CODE (NFPA–70), AS INCORPORATED BY THE 2014 FLORIDA BUILDING CODE AND 2014 EDITION OF THE FLORIDA FIRE PREVENTION CODE.

ALL MAIN FEEDERS HAVE BEEN SIZED FOR A MAXIMUM OF 2% VOLTAGE DROP AND ALL BRANCH CIRCUIT FEEDERS HAVE BEEN SIZED FOR A MAXIMUM OF 3% VOLTAGE DROP PER FBC–5TH EDITION.

SUBMITTAL/ SHOP DRAWING DATA

PROVIDE 6–SETS (EACH) OF MANUFACTURER'S DATA, O&M MANUALS, ELECTRICAL DATA, DIMENSIONAL DATA AND CLEARANCES, CONNECTION DATA, COLOR SAMPLES (IF REQUIRED), AND TEST DATA FOR THE FOLLOWING:

LIGHTING FIXTURES, PANELS, SWITCHBOARDS, TRANSFORMERS, GENERATORS, UPS,

SHOP DRAWINGS MUST BE SUBMITTED AND APPROVED PRIOR TO ORDERING OF EQUIPMENT. ENGINEER WILL REQUIRE 7 WORKING DAYS TO REVIEW DRAWINGS. ANY ITEM FURNISHED AND/OR INSTALLED WITHOUT THE BENEFIT OF REVIEW AND ACCEPTANCE FOUND TO BE DEFICIENT SHALL BE SUBJECT TO REPLACEMENT AT THE DIRECTION OF THE ENGINEER AND AT THE CONTRACTOR'S SOLE EXPENSE. ENGINEER WILL REQUIRE DETAILED, COMPLETED SUBMITALS. IF ENGINEER IS REQUIRED TO REVIEW SUBMITTAL DATA MORE THAN TWICE, THAN THE CONTRACTOR WILL BE CHARGED $125 PER HOUR FOR ADDITIONAL ENGINEERING TIME TO RELEASE SUBMITTALS.

LIGHTING PLAN LEGEND

SYMBOL:	DESCRIPTION:
	WALL MOUNTED LIGHTING FIXTURE,

FIRE ALARM LEGEND

SYMBOL:	DESCRIPTION:
FACP	FIRE ALARM CONTROL PANEL
R	FAN SHUT DOWN RELAY
D	DUCT SMOKE DETECTOR.

TIBET BUTLER NATURE PRESERVE		
Number	Sheet Name	PERMIT
E001	ELECTRICAL GENERAL INFORMATION	X
E100	ELECTRICAL LIGHTING PLANS	X
E101	ELECTRICAL POWER PLANS	X
E102	ELECTRICAL SITE PLAN AND PANEL SCHEDULES	X

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11/09/2017
Mitesh K. Smart, PE 52772 (FL)

Project:

TIBET BUTLER HVAC REPLACEMENT DESIGN

Location:
8777 Winter Garden Vineland Rd, Orlando, FL 32836

Issuance:
Bid Documents

Revisions:

#	Date	Description

Date:
05.08.2017

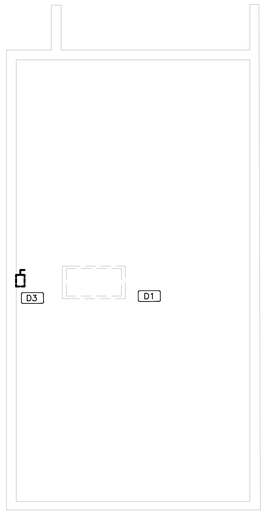
Project Number:
16.OC.030

Drawn By:	Checked By:
ME	MKS

ELECTRICAL GENERAL INFORMATION

Sheet No.:

E-001

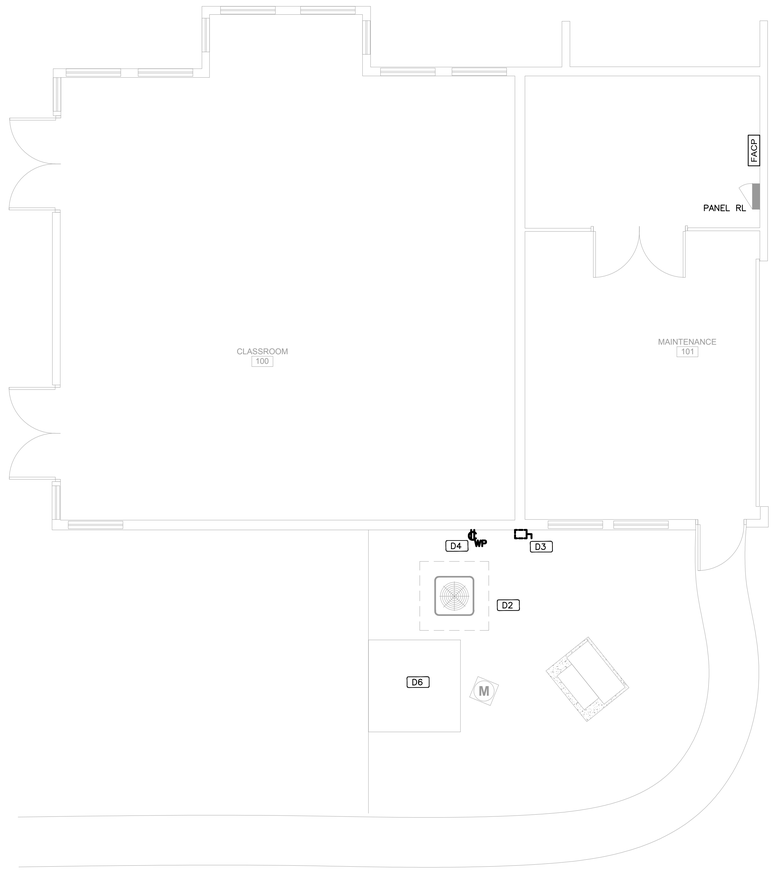


2 DEMO - CLASSROOM BUILDING ATTIC - POWER PLAN

NORTH

0 2' 4' 8' 12'

1/4" = 1'-0"



1 DEMO - CLASSROOM BUILDING - POWER PLAN

NORTH

0 2' 4' 8' 12'

1/4" = 1'-0"

POWER DEMO PLAN NOTES

D1 EXISTING AIR HANDLING UNIT TO BE REMOVED. REMOVE WIRING BACK TO SOURCE, REPLACE CONDUIT AS NECESSARY FOR NEW WIRE SIZING.

D2 EXISTING CONDENSING UNIT TO BE REMOVED. REMOVE WIRING BACK TO SOURCEREPLACE CONDUIT AS NECESSARY FOR NEW WIRE SIZING.

D3 EXISTING DISCONNECT SWITCH TO BE REMOVED. REMOVE WIRING BACK TO SOURCEREPLACE CONDUIT AS NECESSARY FOR NEW WIRE SIZING.

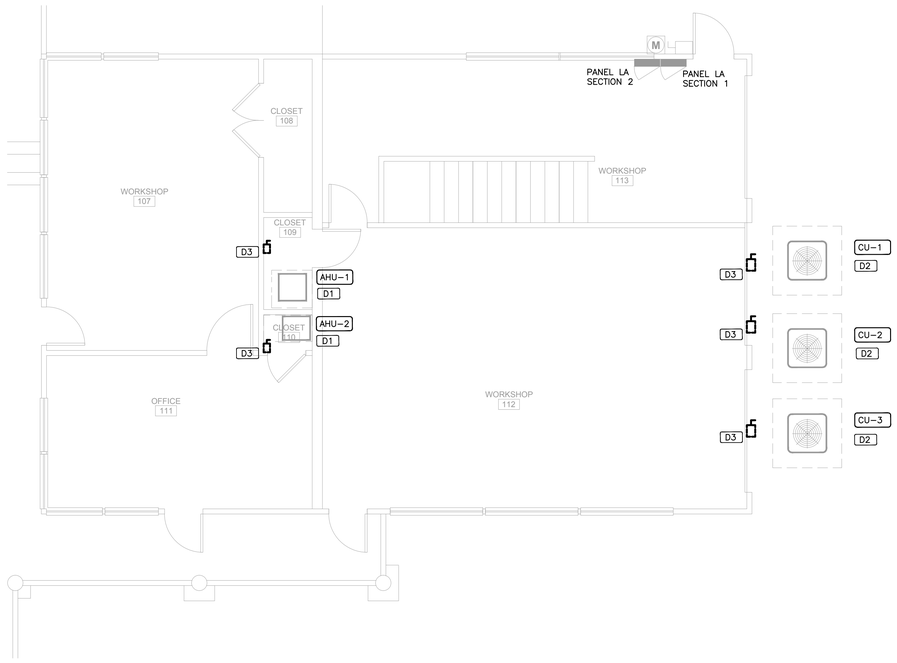
D4 EXISTING WEATHER PROOF RECEPTACLE TO BE REMOVED. PRESERVE WIRING AND CONDUIT FOR NEW INSTALLATION.

D5 EXISTING AIR HANDLING UNIT TO BE REMOVED. REMOVE WIRING AND CONDUIT BACK TO SOURCE.

D6 RELOCATE TURTLE DWELLING WITH HEATED TO NEW

LIGHTING DEMO PLAN NOTES

LD1 EXISTING LIGHTING FIXTURE TO BE RELOCATED. PRESERVE WIRING AND CONDUIT.

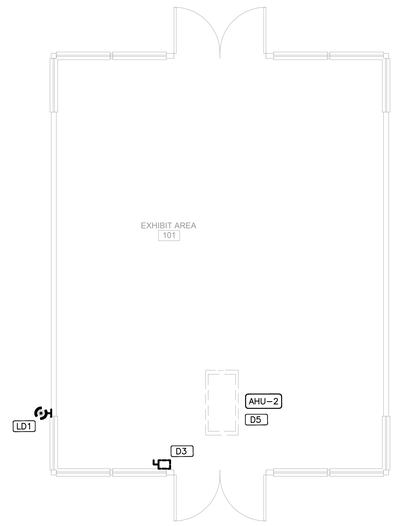


4 DEMO - ADMIN BUILDING - POWER PLAN

NORTH

0 2' 4' 8' 12'

1/4" = 1'-0"



3 DEMO - EXHIBIT BUILDING - POWER PLAN

NORTH

0 2' 4' 8' 12'

1/4" = 1'-0"

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Mitesh K. Smart, PE 52772 (FL)

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ME	MKS

ELECTRICAL DEMO PLANS

Sheet No.:

E-100

LIGHTING NEW PLAN NOTES

L1 NEW LOCATION FOR RELOCATED EXISTING LIGHTING FIXTURE. CONNECT TO EXISTING LIGHTING CIRCUIT, MATCH AND EXTEND WIRING AS NEEDED.

POWER NEW PLAN NOTES

1 NEMA 3R, 2 POLE FUSED DISCONNECT SWITCH MOUNTED ON A UNISTRUT.

2 2P-30A DISCONNECT SWITCH.

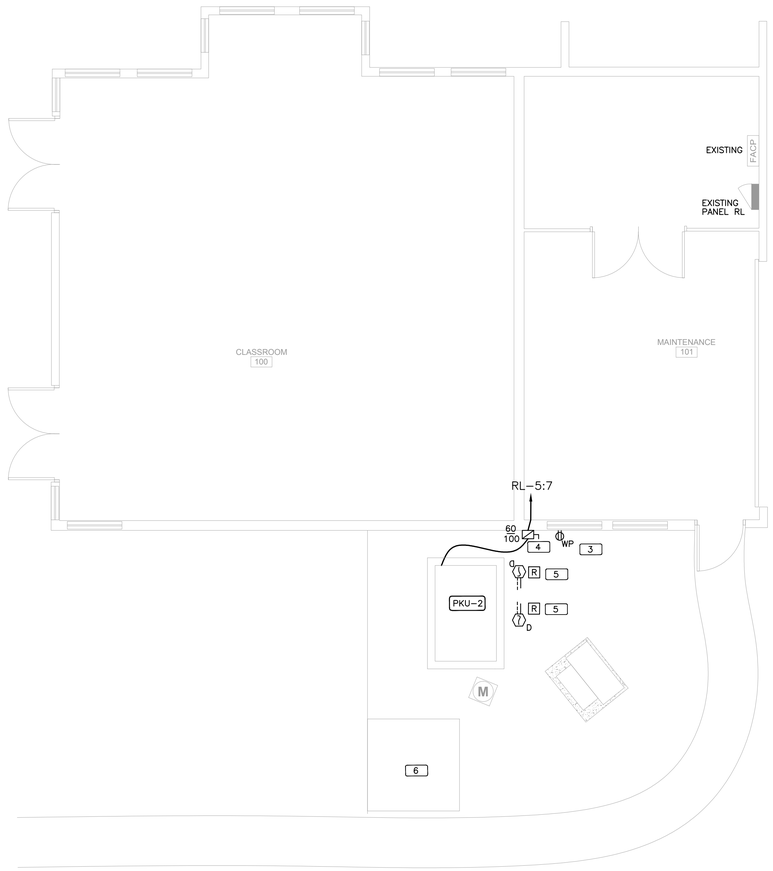
3 RELOCATED WEATHER PROOF RECEPTACLE. MATCH AND EXTEND WIRING AND CONDUIT TO NEW LOCATION.

4 NEMA 3R, 2 POLE FUSED DISCONNECT SWITCH.

5 CONNECT DUCT SMOKE DETECTOR TO NEAREST FIRE ALARM INITIATING DEVICE, WIRE RELAY TO SHUT DOWN UPON A FIRE ALARM SIGNAL. PROVIDE WEATHER PROOF DUCT SMOKE DETECTORS.

6 RELOCATED TURTLE DWELLING WITH ELECTRIC HEATER, MATCH AND EXTEND WIRING AND CONDUIT AS NECESSARY. RELOCATE AS REQUIRED TO MAINTAIN CLEARANCE FOR NEW PACKAGE UNIT.

7 PROVIDE STEP DOWN TRANSFORMER, TO 24V.



1 NEW - CLASSROOM BUILDING - POWER PLAN

NORTH

0 2' 4' 8' 12'

1/4" = 1'-0"

2 NEW - EXHIBIT BUILDING - POWER PLAN

NORTH

0 2' 4' 8' 12'

1/4" = 1'-0"

3 NEW - ADMIN BUILDING - POWER PLAN

NORTH

0 2' 4' 8' 12'

1/4" = 1'-0"

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ME	MKS

ELECTRICAL NEW PLANS

Sheet No.:

E-101

EXISTING PANEL LA SECTION 1

UPDATED: 5/8/2017 5:52 pm
ISSUED FOR: APPROVAL

LOCATION: ELEC RM
VOLTAGE: 120/240V
TRIM: SURFACE

MAIN: 400A MLO
SYSTEM: 1ϕ, 3W
BUS RATING 400A

CONN. LOAD: 72 KVA
FEED: TOP
GROUND BUS: YES COPPER

CKT	LOAD SERVED	COND	PHASE	NEUT	GND	BKR	DMD	L1	L2	L3	DMD	BKR	COND	PHASE	NEUT	GND	LOAD SERVED	CKT
1	LIGHTS – 111&112					20/1	L	500 / 500			L	20/1					LIGHTS – 101	2
3	LIGHTS – 107,108&109					20/1	L		800 / 1000		L	20/1					EXTERIOR LIGHTS	4
5	LIGHTS – 113					20/1	L	500 / 500			L	20/1					EXTERIOR LIGHTS & FANS	6
7	LIGHTS – 103&104					20/1	L		500 / 1000		L	20/1					EXTERIOR LIGHTS	8
9	FUTURE TRACK – 101					20/1	N	500 / 1000			L	20/1					EXTERIOR LIGHTS	10
11	FUTURE TRACK – 101					20/1	N		500 / 800		L	20/1					PADDLE FNAS & LIGHTS – 101	12
13	FUTURE TRACK – 101					20/1	N	500 / 500			L	20/1					LIGHTS – 104&106	14
15	FUTURE TRACK – 101					20/1	N		500 / **1320**		**A**	**20/2**		**ϕ10**	**ϕ10**	**ϕ10**	**CU–1**	16
17	REC – 112&113					20/1	R	800 / **1320**			**A**			**ϕ10**				18
19	FANS – 113					20/1	N		800 / **1320**		**A**	**20/2**		**ϕ10**	**ϕ10**	**ϕ10**	**CU–2**	20
21	REC – 113					20/1	R	800 / **1320**			**A**			**ϕ10**				22
23	REC – 107&111					20/1	R		800 / 1000		N	20/1					EF–1 & EF–2	24
25	REC – 107&EXTERIOR					20/1	R	800 / 1000			N	20/1					EF–3 & EF–4	26
27	REC – 101					20/1	R		800 / 1000		N	20/1					EF–5	28
29	REC – FROG DISPLAY					20/1	R	800 / 400			R	20/1					REC – 106	30

INTERRUPT RATING: 10,000 — 12240 | 12140 — FROM:

LOADS (IN VA)	CONNECTED	DEMAND FACTOR	MINIMUM FEEDER
LIGHTING	9100	1.25	11375
RECEPTS TO 10 KVA	7200	1.0	7200
RECEPTS REMAINING	0	0.5	0
SPACE HEATING	0	0.0	0
AIR CONDITIONING	30558	1.0	30558

LOADS	CONNECTED	DEMAND FACTOR	MINIMUM FEEDER
NON–SEASONAL MOTORS	0	1.0	0
LARGEST MOTOR	0	0.25	0
WATER HEATING	0	1.0	0
KITCHEN EQUIP.	0	1.0	0

REMAINING CONTINUOUS LOADS	0	1.25	0
REMAINING NON–CONTINUOUS LOADS	25100	1.0	25100
DEMAND LOADS	0	1.0	0
TOTAL CONNECTED LOAD	72	KVA	299.8 AMPS
MIN. FEEDER/PANEL CAP.	74.2	KVA	309.3 AMPS
OVERALL DEMAND FACTOR	1.03		

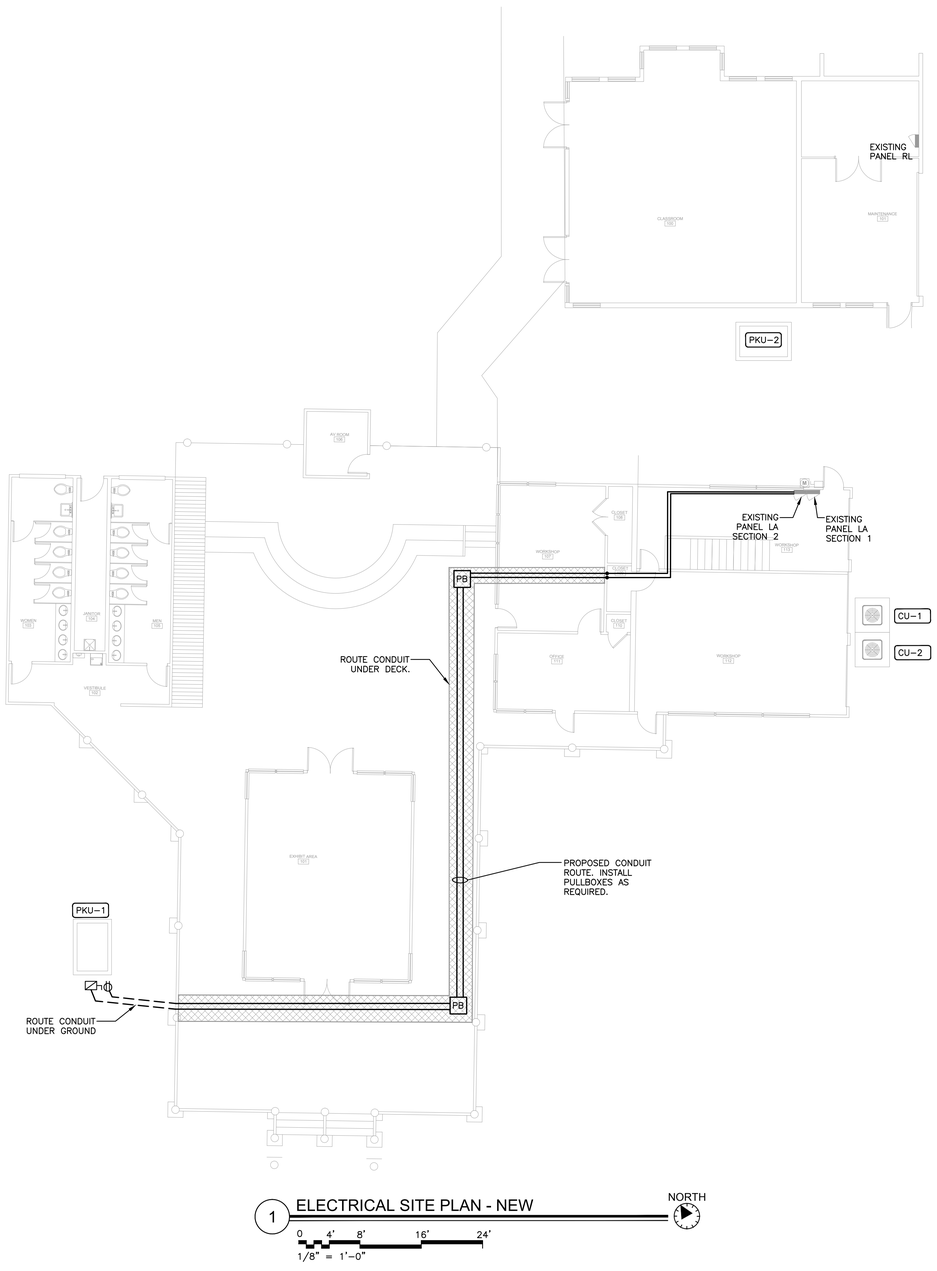
EXISTING PANEL LA SECTION 2

UPDATED: 5/8/2017 6:00 pm
ISSUED FOR: APPROVAL

LOCATION: ELEC RM
VOLTAGE: 120/240V
TRIM: SURFACE

CKT	LOAD SERVED	COND	PHASE	NEUT	GND	BKR	DMD	L1	L2	L3	DMD	BKR	COND	PHASE	NEUT	GND	LOAD SERVED	CKT
31	**PKU–1**	**1–1/4"**	**#4**	**#4**	**#8**	**60/2**	**A**	**6279**										32
33			**#4**				**A**		**6279**									34
35	**EXTERIOR RECEPTACLE**	**3/4"**	**#10**	**#10**	**#10**	**20/1**	R	200 / **2880**			**A**	**25/2**	**3/4"**	**#10**	**#10**	**#10**	**AHU–1**	36
37	REC – EWC –102&104	3/4"	#12	#12	#12	20/1	R		1200 / **2880**		**A**			**#10**				38
39	FUTURE TRACK – EXTERIOR	3/4"	#12	#12	#12	20/1	L	500 / 800			N	20/1	3/4"	#12	#12	#12	FUTURE TRACK – EXTERIOR	40
41	FUTURE TRACK – EXTERIOR	3/4"	#12	#12	#12	20/1	L		500 / 800		N	20/1	3/4"	#12	#12	#12	FUTURE TRACK – EXTERIOR	42
43	HAND DRYER – 103	3/4"	#12	#12	#12	20/1	N	800 / **3480**			**A**	**30/2**	**3/4"**	**#10**	**#10**	**#10**	**AHU–2**	44
45	HAND DRYER – 105	3/4"	#12	#12	#12	20/1	N		800 / **3480**		**A**			**#10**				46
47	EXISTING LOAD	3/4"	#12	#12	#12	20/1	N	1000 / 200			N	20/1	3/4"	#12	#12	#12	F/A	48
49	EXISTING LOAD	3/4"	#12	#12	#12	20/1	N		1000 / 1000		N	20/1	3/4"	#12	#12	#12	EXISTING LOAD	50
51	W/H	3/4"	#12	#12	#12	20/1	N	1000 / –			–	**20/1**	–	–	–	–	**SPARE**	52
53	EXISTING LOAD	3/4"	#12	#12	#12	20/1	N		1000 / –		–	**20/1**	–	–	–	–	**SPARE**	54
55	EXISTING LOAD	1"	#6	#6	#10	50/2	N	3500 / 1000			N	20/1	3/4"	#12	#12	#12	EXISTING LOAD	56
57			#6				N		3500 / 1000		N	20/1	3/4"	#12	#12	#12	EXISTING LOAD	58
59	KRONAS CLOCK	3/4"	#12	#12	#12	20/1	N	500 / 1000			N	20/1	3/4"	#12	#12	#12	EXISTING LOAD	60

INTERRUPT RATING: 23439 | 24139 — FROM:



EXISITNG PANEL RL

UPDATED: 5/8/2017 5:07 pm
ISSUED FOR: APPROVAL

LOCATION: ELEC RM
VOLTAGE: 120/240V
TRIM: SURFACE

MAIN: 250A MLO
SYSTEM: 1ϕ, 3W
BUS RATING 250A

CONN. LOAD: 30.5 KVA
FEED: TOP
GROUND BUS: YES COPPER

CKT	LOAD SERVED	COND	PHASE	NEUT	GND	BKR	DMD	L1	L2	L3	DMD	BKR	COND	PHASE	NEUT	GND	LOAD SERVED	CKT
1	RECEPT/CLASS					20/1	R	1080 / 400			R	20/1					RECEPT/CLASS	2
3	RECEPT/MAINT/RM					20/1	R		1080 / 400		R	20/1					RECPT/OUTSIDE GFI	4
5	**PKU–2**	**1–1/4"**	**#4**	**#8**	**60/2**	**A**	**6279**				–	–					**SPACE**	6
7			**#4**			**A**		**6279**			–	–					**SPACE**	8
9	CLASSROOM LTS					20/1	L	500 / 800			C	20/1					FACP	10
11	CLASSROOM RECEPT					20/1	R		1200 / 200		–	–					CLASSROOM LTS	12
13	MAINTANCEROOM LTS					20/1	L	500 / 1000			L	20/1					OUTSIDE LIGHTS	14
15	TRACK LTS					20/1	L		1000 / 400		R	20/1					CLASSROOM RECEPTS	16
17	CLASSROOM RECEPT					20/1	R	400 / 1000			R	20/1					VENDING MACHINE	18
19	EF–ROOF					20/1	A		800 / 1000		R	20/1					VENDING MACHINE	20
21	VENDING MACHINE					20/1	R	1000 / 1000			N	20/1					MOTORIZED DOOR	22
23	ATTIC/LIGHTS					20/1	L		600 / 800		N	20/1					CEILING/FAN	24
25	CEILING/FAN					20/1	N	800 / 500			L	20/1					TRACK LTS	26
27	FLOOR RECEPT					20/1	R	400 / –			–	–	–	–	–	–	SPACE	28
29	FLOOR RECEPT					20/1	R		400 / 1000		C	20/1					HEATING PAD	30
31	FLOOR RECEPT					20/1	R	400 / –			–	–	–	–	–	–	SPACE	32
33	SPACE	–	–	–	–	–	–	– / –			–	–	–	–	–	–	SPACE	34
35	SPACE	–	–	–	–	–	–		– / –		–	–	–	–	–	–	SPACE	36
37	SPACE	–	–	–	–	–	–	– / –			–	–	–	–	–	–	SPACE	38
39	SPACE	–	–	–	–	–	–		– / –		–	–	–	–	–	–	SPACE	40
41	SPACE	–	–	–	–	–	–	– / –			–	–	–	–	–	–	SPACE	42

INTERRUPT RATING: 16359 | 14659 — FROM:

LOADS (IN VA)	CONNECTED	DEMAND FACTOR	MINIMUM FEEDER
LIGHTING	4100	1.25	5125
RECEPTS TO 10 KVA	8960	1.0	8960
RECEPTS REMAINING	0	0.5	0
SPACE HEATING	0	0.0	0
AIR CONDITIONING	13358	1.0	13358

LOADS	CONNECTED	DEMAND FACTOR	MINIMUM FEEDER
NON–SEASONAL MOTORS	0	1.0	0
LARGEST MOTOR	0	0.25	0
WATER HEATING	0	1.0	0
KITCHEN EQUIP.	0	1.0	0

REMAINING CONTINUOUS LOADS	1500	1.25	1875
REMAINING NON–CONTINUOUS LOADS	2600	1.0	2600
DEMAND LOADS	0	1.0	0
TOTAL CONNECTED LOAD	30.5	KVA	127.2 AMPS
MIN. FEEDER/PANEL CAP.	31.9	KVA	133 AMPS
OVERALL DEMAND FACTOR	1.05		

OLD CU LOCATION. RELABEL AS SPARE.

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ELECTRICAL SITE PLAN AND PANEL SCHEDULES

Sheet No.:

E-102