Arlington County Detention Facility

Kitchen Air Handling Unit Replacement

1435 N. Courthouse RD, Arlington, VA 22201

INDEX OF DRAWINGS

OWNER:

ARLINGTON COUNTY
DEPARTMENT OF ENVIRONMENTAL SERVICES
1400 N UHLE ST
SUITE 601
ARLINGTON, VA 22201
CONTACT: ALBERTO ABOSAID, PE
PHONE: (703) 228-7516
aabosaid@arlingtonva.us

MEP CONSULTING:

B2E CONSULTING ENGINEERS, P.C.
116-N EDWARDS FERRY ROAD, NE
LEESBURG, VA 20176
TEL: (703) 737-0400
EMAIL: b2@b2epc.com

ORIGINAL CODE:

BOCA NATIONAL BUILDING CODE 1990
STATEWIDE UNIFORM BUILDING CODE

APPLICABLE CODES:

INTERNATIONAL BUILDING CODE 2015
INTERNATIONAL MECHANICAL CODE 2015
INTERNATIONAL ENERGY CONSERVATION CODE 2015
INTERNATIONAL FUEL GAS CODE 2015

CONSTRUCTION CLASSIFICATION:

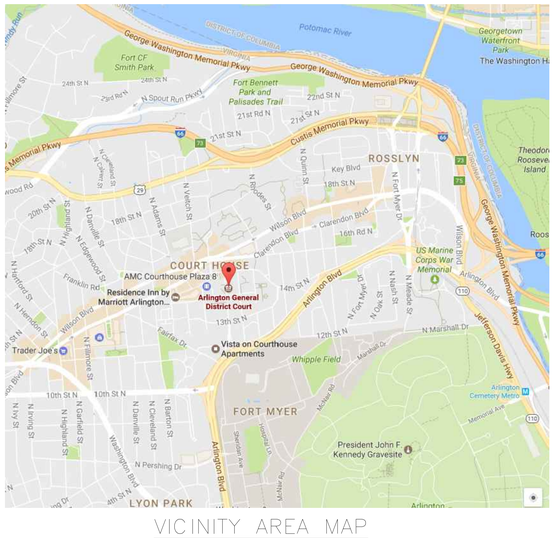
ARLINGTON DETENTION CENTER: TYPE 2A
(MODIFIED IB IN ACCORDANCE WITH SECTION 602.0)

BUILDING USE

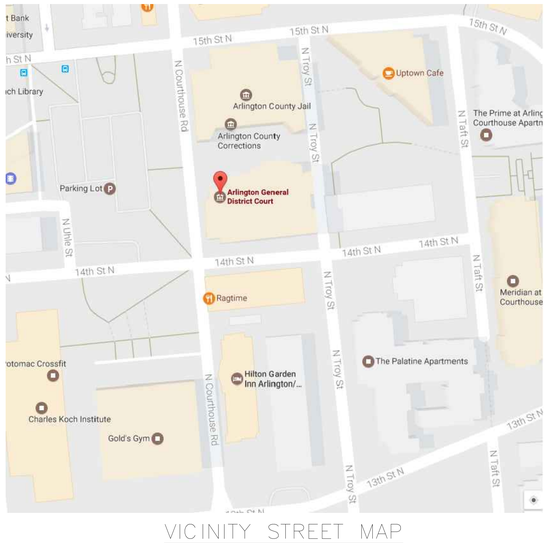
ARLINGTON DETENTION CENTER: USE GROUP I3 – DETENTION CENTERS

BUILDING AREA OF WORK:

ARLINGTON DETENTION CENTER: 5,000 SQUARE FEET.



VICINITY AREA MAP



VICINITY STREET MAP

SUMMARY OF THE SCOPE OF WORK

1.1 SUMMARY

A. THE FOLLOWING PRELIMINARY SCOPE OF WORK FOR THIS PROJECT IS FOR INFORMATION ONLY AND SHALL NOT BE CONSIDERED AN ALL INCLUSIVE LIST OF THE ENTIRE SCOPE OF WORK FOR THIS PROJECT.

B. THE CONTRACTOR SHALL PROVIDE ALL MATERIALS AND LABOR A NECESSARY FOR THE COMPLETE REPLACEMENT OF EXISTING AIR HANDLER (AHU-2) WHICH SERVES THE EXISTING LAUNDRY AND THE EXISTING KITCHEN HOOD. THE NEW AIR HANDLER (AHU-2) SHALL BE RECONFIGURED TO SERVE HEATING, COOLING AND VENTILATION TO THE KITCHEN AND THE KITCHEN HOOD. THE KITCHEN LOADS SHALL BE REMOVED FROM EXISTING AIR HANDLER (AHU-1) AND THE AHU-1 RETURN FAN (RAF-1) DAMPER SYSTEM SHALL BE PERMANENTLY MODIFIED TO SERVE AIR TO THE LAUNDRY DRYER COMBUSTION AIR PLENUM.

C. THE CONTRACTOR SHALL INSTALL ALL MATERIALS, COMPONENTS AND EQUIPMENT IN ACCORDANCE WITH THE MANUFACTURERS WRITTEN INSTRUCTIONS AND RECOMMENDATIONS.

D. THE CONTRACTOR SHALL INSTALL ALL MATERIALS, COMPONENTS AND EQUIPMENT WITH ADEQUATE SERVICE ACCESS AS REQUIRED BY THE MANUFACTURER AND IN ACCORDANCE WITH LOCAL CODE REQUIREMENTS.

E. FIRE ALARM
1. EXISTING FIRE ALARM DEVICES THAT NEED TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLER SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANGER AND WITH THE FIRE ALARM TRADE TO MINIMIZE OUTAGES.

F. SPRINKLER
1. EXISTING SPRINKLER PIPING AND HEADS THAT NEED TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLER AND DUCTWORK SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANGER AND WITH THE SPRINKLER TRADE TO MINIMIZE OUTAGES.

G. SECURITY
1. EXISTING SECURITY DEVICES THAT NEED TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLER AND DUCTWORK SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANGER AND WITH THE SECURITY TRADE TO MINIMIZE OUTAGES.

H. MISCELLANEOUS ELECTRIC CONDUIT

1. THE EXISTING MISCELLANEOUS ELECTRIC CIRCUIT THAT NEEDS TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLER AND DUCTWORK SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANAGER AND WITH THE ELECTRICAL TRADE TO MINIMIZE OUTAGES.

I. MISCELLANEOUS LIGHTING
1. THE EXISTING MISCELLANEOUS LIGHTING THAT NEEDS TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLERS AND DUCTWORK SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANGER AND WITH THE ELECTRICAL TRADE TO MINIMIZE OUTAGES.

1.2 SUMMARY OF THE SCOPE OF WORK

A. GENERAL:

1. THE CONTRACTOR SHALL OBTAIN AND PAY FOR ALL PERMITS REQUIRED TO COMPLETE THE CONTRACT SCOPE OF WORK.
2. THE CONTRACTOR SHALL PLAN AND SCHEDULE ALL ACTIVITIES AS NECESSARY TO MEET THE PROJECT SUBSTANTIAL COMPLETION DEADLINE.
3. THE CONTRACTOR SHALL PROVIDE ALL OVERTIME, WEEKEND, AND HOLIDAY AND NIGHT WORK LABOR AS NEEDED TO MINIMIZE HEATING HOT WATER, CHILLED WATER AND AIR HANDLER OUTAGES AND MEET THE PROJECT SUBSTANTIAL COMPLETION DEADLINE IN THEIR BID PRICE.

B. ARCHITECTURAL:

1. EPOXY PAINT THE HOUSEKEEPING PAD FOR AHU-2 IN THE DETENTION FACILITY TO MATCH EXISTING FLOOR COLOR.
2. PROVIDE OPENINGS IN THE EXISTING BLOCK WALLS TO INSTALL THE RETURN AIR DUCTWORK. THE OPENINGS SHALL BE MAINTAINED SECURE AT ALL TIMES WITH TEMPORARY STEEL PLATES ON BOTH SIDES OF THE WALL BOLTED THRU THE WALL. THESE TEMPORARY SECUREMENTS SHALL REMAIN UNTIL THE SECURITY BARS ARE PERMANENTLY INSTALLED IN THE THRU WALL DUCT OPENINGS.
3. REPAIR THE OPENINGS AND SEAL THE HOLES WITH A STEEL FRAME TO MATCH THE THICKNESS OF THE EXISTING WALL. THIS WORK SHALL BE SCHEDULED AND PERFORMED UNDER THE SUPERVISION OF THE ARLINGTON COUNTY (DES) AND THE SHERRIFF'S DEPARTMENT.
4. INSTALL SECURITY BARS IN THE EXISTING WALL AT THE DUCT PENETRATIONS INDICATED TO BE PROVIDED WITH THE SECURITY BARS ON THE CONSTRUCTION DOCUMENTS. PROVIDE FIRE DAMPERS ON THE NON-SECURE SIDE OF THE WALLS WHERE FIRE DAMPERS ARE INDICATED ON THE CONSTRUCTION DOCUMENTS.
5. PATCH, REPAIR AND PAINT WALLS TO MATCH ADJACENT CONSTRUCTION.

C. STRUCTURAL:

1. PROVIDE STEEL LINTEL OVER DUCT PENETRATIONS (OPENINGS IN WALLS) TO SUPPORT REMAINING BLOCK ABOVE. PROVIDE W8 X 40 WIDE FLANGE BEAM WITH TNEMEC OR ASTM A123 GALVANIZED COATING. LINTEL SHALL EXTEND 16-INCHES BEYOND OPENING ON EACH SIDE AND SHALL BE THE SAME THICKNESS AS THE PENETRATION THRU THE EXISTING WALL.
2. EXTEND EXISTING CONCRETE HOUSEKEEPING PAD FOR AHU-2 TO MATCH HEIGHT OF EXISTING PAD AS INDICATED ON MECHANICAL PLANS. PROVIDE CHAMFERED EDGE TO MATCH EXISTING.
3. PATCH HOLE IN FLOOR WHEN FLOOR DRAIN IS REMOVED AND CORE DRILL NEW HOLE FOR NEW OPEN SITE FLOOR DRAIN IN NEW LOCATION. HUMIDIFIER DRAIN SHALL ALSO BE REMOVED AND THE FLOOR SHALL BE PATCHED AND FINISHED TO MATCH ADJACENT CONSTRUCTION.
4. PROVIDE CORE DRILL THROUGH EXISTING FLOOR FOR NEW OPEN SITE FLOOR DRAIN WITH DEEP SEAL TRAP. GBR TEST CONCRETE FLOOR AND DRAW REBAR TO MISS BEAMS AND REBAR PRIOR TO CORE DRILLING.
5. PROVIDE GBR TESTING FOR WALL PENETRATIONS FOR RETURN DUCTWORK AND DRAW REBAR OR CONDUIT ON WALL TO MISS BEAMS, REBAR OR CONDUIT WHERE POSSIBLE.

D. MECHANICAL: COURTS POLICE - PHASE 1

1. INSTALL DUCT FROM DISCHARGE SIDE OF AIR HANDLER (AHU-3 AND/OR AHU-1) RETURN FAN (RAF-3 AND/OR RAF-1) TO TEMPORARILY SERVE THE LAUNDRY DRYER PLENUM AND BALANCE AIRFLOW TO SET FAN SPEED TO DELIVER 5,000 CFM. PROVIDE MANUAL DAMPER(S) IN DUCTWORK TO DIVERT AIR RETURN AIR INTO DRYER VENTILATION AIR DUCT. TEMPORARY DUCT CONNECTIONS SHALL BE FLEXIBLE OR HARD METAL DUCTWORK.
2. REPLACE THE EXISTING RETURN AND RELIEF DAMPERS ON AHU-1 WITH NEW ULTRA LOW LEAK DAMPERS AND WITH ELECTRONIC DDC DAMPER OPERATORS.
3. SHUT DOWN AIR HANDLER (AHU-2) AND MAKE SAFE FOR DEMOLITION. DISCONNECT POWER FROM THE EXISTING MOTOR CONTROL CENTER, SHUT-OFF EXISTING HOT WATER PIPING AND CAP-OFF FAN REUSE FOR NEW HEATING COILS.
4. REMOVE EXISTING HEATING ONLY AIR HANDLER (AHU-2) BY DISMANTLING IT AND CARRYING IT THROUGH THE EXISTING SECURITY DOOR (44" WIDE X 83" HIGH). INTO THE HALLWAY THAT LEADS INTO THE LOADING DOCK. SEAL THE EXISTING 60" X 60" OUTSIDE AIR DUCT AND MAKE READY TO CONNECT TO AHU-2 MIXING BOX (END CONNECTION).
5. COORDINATE WITH THE AC (DES) REPRESENTATIVE TO SHUT DOWN THE CHILLED WATER PUMPS IN THE LOWER MECHANICAL ROOM AND DRAIN THE PIPING FOR THE PIPE MODIFICATIONS IN THE UPPER MECHANICAL ROOM. CUT-IN A 5-INCH TEE AND RUN A 4-INCH LINE TO THE NEW AIR HANDLER (AHU-2) FOR COOLING.
6. REMOVE THE EXISTING FLOOR DRAIN AND STEAM HUMIDIFIER DRAIN AND PATCH THE FLOOR TO MAKE ROOM FOR THE NEW HOUSEKEEPING PAD EXTENSION.
7. LAYOUT THE HOUSEKEEPING PAD EXTENSION TO BE 4-INCHES WIDER THAN THE FOOTPRINT OF THE UNIT ALL AROUND AND POUR THE PAD EXTENSION. PROVIDE 1-INCH CHAMFER ALL AROUND.
8. DIAMOND GRIND OFF THE EXISTING PAINT AND EPOXY PAINT THE HOUSEKEEPING PAD WHEN IT IS DRIED OUT ENOUGH BASED ON MOISTURE ANALYSIS, BUT NOT SOONER THAN THREE WEEKS FROM THE DATE THE CONCRETE IS POURED. PROVIDE HEATER TO ACCELERATE DRYING OF CONCRETE IF NEEDED.
9. SET THE NEW AIR HANDLER IN PLACE WITH A MINIMUM OF 3-FEET CLEAR TO THE EXISTING VARIABLE SPEED DRIVES LOCATED ON THE END OF THE EXISTING MOTOR CONTROL CENTER.
10. THE AIR HANDLER (AHU-2) MUST BE BROKEN DOWN TO GET INTO THE ROOM. BUILD THE UNIT IN PLACE ON THE EXTENDED HOUSEKEEPING PAD.
11. REWORK THE AIR HANDLER (AHU-2) DUCTWORK WHILE KEEPING EXISTING AIR HANDLER (AHU-1) OPERATIONAL (BECAUSE IT SERVES THE KITCHEN) UNTIL AIR HANDLER (AHU-2) IS STARTED-UP AND RUNNING WITH CHW CONNECTIONS.
12. INSTALL NEW RETURN AIR DUCTWORK FROM THE UPPER LEVEL (GROUND LEVEL) MECHANICAL ROOM TO THE KITCHEN. COORDINATE WITH THE ARLINGTON COUNTY (DES) PROJECT MANAGER FOR RELOCATION OF EXISTING FIRE ALARM DEVICES, SPRINKLER HEADS, SECURITY DEVICES, ELECTRICAL CONDUIT, LIGHTING FIXTURES, ETC. TO INSTALL THE RETURN DUCTWORK TIGHT TO THE UNDERSIDE OF THE EXISTING STRUCTURE.
13. INSTALL SECURITY BARS FOR DUCT PENETRATIONS THROUGH EXISTING WALLS INDICATED AND PROVIDE TEMPORARY SECUREMENTS AND SUPERVISION AS NECESSARY TO SATISFY THE ARLINGTON COUNTY (DES) AND THE DETENTION FACILITY SHERRIFF'S DEPARTMENT.
14. CONNECT THE CHILLED WATER PIPING AND AUTOMATIC TEMPERATURE CONTROL VALVE AND HYDRONIC SPECIALTIES IN ACCORDANCE WITH THE SCHEMATIC FLOW CONTROL DIAGRAM AND DETAILS.
15. PRIOR TO START-UP COORDINATE AND OUTAGE WITH AC (DES) REPRESENTATIVE TO SWITCH OVER THE KITCHEN SUPPLY DUCT FROM AIR HANDLER (AHU-1) TO AIR HANDLER (AHU-2) AS INDICATED ON THE PLANS.
16. CONNECT THE PRE-HEAT COIL WITH FREEZE PROTECTION PUMP ON THE PREHEAT COIL IN ACCORDANCE WITH THE SCHEMATIC FLOW CONTROL DIAGRAM AND DETAILS.
17. ONCE AHU-2 HAS THE KITCHEN CONNECTED HAVE THE TAB CONTRACTOR SET AHU-2 SUPPLY AIR FAN SPEED TO MINIMUM OF 12,500 CFM TO MATCH THE EXISTING AIRFLOW FOR THE KITCHEN EXHAUST HOOD AND DISHWASHER EXHAUST AIRFLOW RATE. THE MAXIMUM DESIGN AIRFLOW IS 15,000 CFM.
18. INTERLOCK THE BAS CONTROLS TO THE EXISTING KITCHEN HOOD EXHAUST FAN CONTROLS AND THE EXISTING LAUNDRY EXHAUST FAN CONTROLS.
19. PRE-COMMISSION AIR HANDLER (AHU-2) TO MAKE SURE THE UNIT INSTALLATION IS COMPLETE AND IS OPERATING IN ACCORDANCE WITH THE SEQUENCE OF OPERATION ALLOWING THE MULTIPLE ZONE VAV UNITS TO MODULATE TO MAINTAIN THE AIRFLOW IN ACCORDANCE WITH THE SEQUENCE OF OPERATION SPECIFIED.
20. REMOVE THE TEMPORARY DUCT SERVING THE LAUNDRY FROM AIR HANDLER (AHU-3 AND/OR AHU-1) AND SEAL THE OPENING IN THE RETURN DUCT SERVING RETURN FAN (RAF-3 AND/OR RAF-1).
21. MAKE THE FINAL CONNECTION TO THE LAUNDRY DUCT SERVING THE LAUNDRY PLENUM FROM AIR HANDLER (AHU-1) RETURN FAN (RAF-1). SET THE FINAL RETURN FAN SPEED TO DELIVER 6,750 CFM IN LAUNDRY MODE. ENSURE THE DAMPERS ARE CONTROLLED FROM THE BAS TO AFFECT THE SEQUENCE OF OPERATION SPECIFIED.
22. PRE-COMMISSION RETURN AIR FAN (RAF-1) TO MAKE SURE THE INSTALLATION IS COMPLETE AND IS OPERATING IN ACCORDANCE WITH THE SEQUENCE OF OPERATION.
23. ONCE THE AIR HANDLER (AHU-2) AND RETURN FAN (RAF-1) HAVE BEEN WORKING WITHOUT PROBLEMS FOR ONE WEEK THE AC (DES) REPRESENTATIVE WILL PROVIDE A NOTICE TO PROCEED TO PHASE 2.

MECHANICAL PHASE 2

1. COORDINATE WITH THE AC (DES) REPRESENTATIVE FOR WORKING HOURS IN THE KITCHEN ABOVE THE CEILING. THIS WORK SHALL BE PERFORMED AFTER NORMAL BUSINESS HOURS FROM 7 PM UNTIL 6 AM. ALL TOOLS AND EQUIPMENT MUST BE LOCATED AND LOCKED-UP IN THE MECHANICAL ROOM BY 6 AM. THE METAL PAN CEILING TILES MUST BE REINSTALLED SO THERE IS NO ACCESS BY OCCUPANTS IN THE KITCHEN TO ANY OF THE EXISTING SYSTEMS ABOVE THE CEILING.
2. REMOVE THE METAL PAN SLIP-IN CEILING TILES AND GRID IN SMALL AREAS TO FACILITATE REMOVAL OF THE EXISTING VAV BOXES AND ASSOCIATED CONTROLS.
3. DISCONNECT AND REMOVE THE HOT WATER PIPING CONNECTION TO THE VAV BOXES. PIPING IS IN REVERSE RETURN ARRANGEMENT. REWORK EXISTING HOT WATER PIPING WITH NEW HYDRONIC SPECIALTIES AND CONTROLS IN ACCORDANCE WITH THE DETAILS AND P&ID FLOW DIAGRAMS. DO NOT REDUCE THE EXISTING AIR TERMINAL UNIT (VAV OX) PIPE RUNOUT SIZES. PIPE SIZES SHALL MATCH THE EXISTING PIPE SIZES. COORDINATE ANY HEATING SYSTEM OUTAGES WITH THE AC (DES) REPRESENTATIVE AT LEAST TWO (2) WEEKS PRIOR TO PLANNED OUTAGES.
4. DISCONNECT THE EXISTING PNEUMATIC CONTROLS AT EACH VAV BOX OUTLET AND REMOVE THE HOT WATER VALVES AND HYDRONIC SPECIALTIES. CAP-OFF PNEUMATIC TUBING TO ENSURE THE PNEUMATIC CONTROL MODIFICATIONS DO NOT AFFECT THE FUNCTION IN THE REMAINDER OF THE BUILDING.
5. REMOVE THE VAV BOX AND TURN THE EXISTING SUPPLY AIR FLEX DUCT SERVING THE VAV BOX DOWN BELOW THE CEILING TO DISTRIBUTE AIR INTO THE KITCHEN UNTIL THE VAV BOX IS REPLACED WITH NEW HYDRONIC SPECIALTIES AND CONTROLS.
6. REINSTALL THE METAL PAN CEILING TILES AFTER EACH AIR TERMINAL UNIT (VAV BOX) IS COMPLETED AND AT THE END OF THE WORK DAY.
7. ONCE A VAV BOX IS REMOVED AND THE NEW DUCTWORK AND AIR OUTLETS ARE COMPLETED, MOVE TO THE NEXT VAV BOX AND REPEAT THE PROCESS UNTIL THE WORK IS COMPLETED.
8. PROVIDE TESTING ADJUSTING AND BALANCING (TAB) FOR THE ENTIRE SYSTEM, INCLUDING AIR HANDLERS (AHU-2 AND AHU-1) AND RETURN FAN (RAF-1) TO ENSURE THE SYSTEMS ARE OPERATING TO DESIGN VALUES.
9. PROVIDE FINAL COMMISSIONING OF THE SYSTEMS TO ENSURE THE JOB IS COMPLETE AND THE EQUIPMENT IS OPERATING IN ACCORDANCE WITH THE SEQUENCE OF OPERATION SPECIFIED.
10. PROVIDE BAS GRAPHICS DISPLAY AT THE FACILITIES OFFICE COMPUTER IN THE COURTS POLICE BUILDING ON THE 13TH FLOOR. THE GRAPHICS SHALL BE TESTED DURING THE COMMISSIONING PROCESS.
11. PROVIDE CLOSE-OUT DOCUMENTATION, INCLUDING FINAL BALANCE REPORT, EXTRA MATERIALS, OPERATION AND MAINTENANCE MANUALS, WARRANTIES, AS-BUILT DRAWING, TRAINING AND OTHER DELIVERABLES AS INDICATED IN DIVISION 1 FINAL CONTRACT DOCUMENTS.

No.	Date	Revision

b2E
consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE E. BEDDOW
No. 021238
04-20-2020
PROFESSIONAL ENGINEER

FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

Sheet Name:
COVER SHEET

Drawn By: b2E
Checked By: B2

Date: 06-15-2020

JOB # 18608

Sheet Number:
T-001

ABBREVIATION LIST

∠	ANGLE
@	AT
ABV	ABOVE
AC	ARLINGTON COUNTY OR AIR-COOLED
ACC	AIR COOLED CHILLER
ACM	ASBESTOS CONTAINING MATERIAL
ACPR	ARLINGTON COUNTY PARKS AND RECREATION
ACT	ACOUSTICAL CEILING TILE
AD	AUTOMATIC DAMPER
AFD	ADJUSTABLE FREQUENCY DRIVE
AFF	ABOVE FINISH FLOOR
AFMS	AIR FLOW METERING STATION
AFUE	AIR FUEL UTILIZATION EFFICIENCY
AGA	AMERICAN GAS ASSOCIATION
AHU	AIR HANDLING UNIT
AMCA	AIR MOVEMENT AND CONTROL ASSOCIATION
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
ARCH.	ARCHITECT
ARI	AMERICAN REFRIGERATION INSTITUTE
A.S.	AS SHOWN
ASHRAE	AMERICAN SOCIETY OF HEATING AND REFRIGERATION AND AIR-CONDITIONING ENGINEERS
ASPE	AMERICAN SOCIETY OF PLUMBING ENGINEERS
ASSE	AMERICAN SOCIETY OF SANITARY ENGINEERING
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS
ATC	AUTOMATIC TEMPERATURE CONTROL
ATU	AIR TERMINAL UNIT
AUTO	AUTOMATIC
AUX	AUXILIARY
AV	AIR VENT, AUTOMATIC
BAS	BUILDING AUTOMATION SYSTEM
BCP	BOILER CONTROL PANEL
BFP	BACKFLOW PREVENTER
BG	BOTTOM GRILLE
BLDG	BUILDING
BLW	BELOW
BOT	BOTTOM
BTU	BRITISH THERMAL UNIT
BSCP	BOILER SEQUENCING CONTROL PANEL
BV	BRICK VENT
BVPS	BOILER VENT PRESSURE SYSTEM
BWV	BACK WATER VALVE
CCP	CHILLER CONTROL PANEL
CD	CEILING DIFFUSER/ CONDENSATE DRAIN
CEF	CEILING EXHAUST FAN
CFH	CUBIC FEET PER HOUR
CFM	CUBIC FEET PER MINUTE
CG	CEILING GRILLE
CH	CHILLER
CHW	CHILLED WATER (S = SUPPLY) (R = RETURN)
CHWP	CHILLED WATER PUMP
CHR	CHILLER ROOM
CI	CAST IRON
CISPI	CAST IRON SOIL PIPE INSTITUTE
CLG	CEILING
CMD	CONSTRUCTION MANAGEMENT DIVISION
CO	CLEANOUT PLUG
CONC	CONCRETE
COND	CONDESATE
CONN	CONNECTION
CP	COURTS POLICE
CR	CEILING REGISTER
CUH	CABINET UNIT HEATER
CV	CONTROL VALVE/CHECK VALVE/CONSTANT VOLUME
CXA	COMMISSIONING AUTHORITY
dB	DECIBELS
DB	DRY BULB
DCW	DOMESTIC COLD WATER
DDC	DIRECT DIGITAL CONTROL
DES	DEPARTMENT OF ENVIRONMENTAL SERVICES
DESIG	DESIGNATION
DET	DETAIL
DF	DETENTION FACILITY
DHW	DOMESTIC HOT WATER
DIA	DIAMETER
D-SK	DEEP SINK
DN	DOWN
DP	DIFFERENTIAL PRESSURE SWITCH OR DEW POINT
DPW	DEPARTMENT OF PUBLIC WORKS
DS	DISCONNECT SWITCH
DWG	DRAWING
DW	DOMESTIC WATER
(E)	EXISTING
EA	EACH
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
EL	ELEVATION
ELEV	ELEVATION
EPA	ENVIRONMENTAL PROTECTION AGENCY
EMCS	ENVIRONMENTAL MANAGEMENT AND CONTROL SYSTEM
EOR	ENGINEER OF RECORD
EQ	EQUAL
EQUIP.	EQUIPMENT
ER	EXHAUST REGISTER
ESP	EXTERNAL STATIC PRESSURE
EWC	ELECTRIC WATER COOLER
EWH	ELECTRICAL WALL HEATER
EWLCP	ELECTRONIC WATER LEVEL CONTROL PANEL
EWT	ENTERING WATER TEMPERATURE
EXH	EXHAUST
EXP.	EXPANSION
EF	EXHAUST FAN
FACP	FIRE ALARM CONTROL PANEL
FC	FLEXIBLE CONNECTION
FCU	FAN COIL UNIT
FD	FIRE DAMPER
FIN.	FINISH
FL	FULL LENGTH
FLD.	FLOOR DRAIN
FLR	FLOOR
FLEX.	FLEXIBLE
FM	FLOW MEASURING STATION; FORCE MAIN; FACTORY MUTUAL
FPI	FINS PER INCH
FPM	FEET PER MINUTE
FT	FOOT, FEET
FTG	FITTING
FV	FACE VELOCITY
F&T	FLOAT AND THERMOSTATIC
G	GUIDE OR GAS PIPING
GAL	GALLON
GLHX	GROUND LOOP HEAT EXCHANGER
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GSHP	GROUND SOURCE HEAT PUMP
GV	GRAVITY VENT
H	HEIGHT
HB	HOSE BIB
HOA	HAND-OFF-AUTO SWITCH
HR	HEAT RECOVERY
HRC	HEAT RECOVERY CHILLER
HRU	HEAT RECOVERY UNIT
HTR	HEATER
H&V	HEATING AND VENTILATING UNIT
HW	HOT WATER (S = SUPPLY) (R = RETURN)
HWB	HOT WATER BOILER
HWH	HOT WATER HEATER
HWP	HOT WATER PUMP
HWR	DOMESTIC HOT WATER RETURN
HWST	DOMESTIC HOT WATER STORAGE TANK
HX	HEAT EXCHANGER
HZ	FREQUENCY
IBC	INTERNATIONAL BUILDING CODE
IBR	INSTITUTE FOR BOILER RESEARCH
ID	INSIDE DIAMETER
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS
IEF	INDUCED DRAFT FAN
IMC	IN-LINE EXHAUST FAN
IN.	INTERNATIONAL MECHANICAL CODE INCH(ES)
INV	INVERT
ILF	IN-LINE FAN
IPC	INTERNATIONAL PLUMBING CODE
IRI	INDEP. RISK INSURERS
KW	KILOWATT
LAT	LEAVING AIR TEMPERATURE
LAV	LAVATORY
LBS./#	POUNDS
LBS/HR	POUNDS PER HOUR
LCD	LIQUID CRYSTAL DISPLAY
LF	LINEAR FEET
LG	LONG; LENGTH
MAV	MANUAL AIR VENT
MAX	MAXIMUM
MBH	THOUSAND BTU PER HOUR
MCC	MOTOR CONTROL CENTER
MECH	MECHANICAL
MER	MECHANICAL EQUIPMENT ROOM
MFGR	MANUFACTURER
MHP	MOTOR HORSEPOWER
MOD	MOTOR OPERATED DAMPER OR MODULATING
MSS	MANUFACTURERS STANDARDIZATION SOCIETY
MUW	MAKE UP WATER
NC	NOISE CRITERION, NORMALLY CLOSED
NEC	NATIONAL ELECTRIC CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURER'S ASSOCIATION
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NO./#	NUMBER, NORMALLY OPEN
NRCA	NATIONAL ROOFING CONTRACTORS ASSOCIATION
NSF	NATIONAL SANITATION FOUNDATION
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OAC	OPEN ABOVE CEILING (IN WALL)
OAL	OUTSIDE AIR INTAKE LOUVER
OC	ON CENTER
OD	OUTSIDE DIAMETER
OBD	OPPOSED BLADE DAMPER
OED	OPEN END DUCT W/ 1/2" WIRE MESH
OFD	OVER FLOW DRAIN
O&M	OPERATION AND MAINTENANCE
OSHA	OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
OV	OUTLET VELOCITY
PCB	POLYCHLORINATED BIPHENYL
PCF	POUNDS PER CUBIC FOOT
PE	PIPE ENCLOSURE
PH	PENTHOUSE
PHU	POOL HEAT RECOVERY UNIT
PRESS.	PRESSURE
PRV	PRESSURE REDUCING VALVE
PRV	POWER ROOF VENTILATOR
PSD	PUMP SUCTION DIFFUSER
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSID	POUNDS PER SQUARE INCH DIFFERENTIAL
PSIG	POUNDS PER SQUARE INCH GAUGE
PW	POOL WATER (S = SUPPLY) (R = RETURN)
(R)	REMOVE
R	RADIUS; RISER
RA	RETURN AIR
REC	RECOVERY
REG	REGISTER
REQ'D	REQUIRED
RF	RETURN FAN
RHC	REHEAT COIL
RR	RETURN REGISTER
(RL)	RELOCATED
RL	REFRIGERANT LINES (RL = LIQUID) (RS = GAS)
RVD	REMOTE VOLUME DAMPER OPERATOR
ø	ROUND (DIAMETER)
SA	SUPPLY AIR, SOUND ABSORBER OR SHOCK ABSORBER
SAN	SANITARY
SCR	SILICON CONTROLLED RECTIFIER
SD	DUCT SMOKE DETECTOR; SUCTION DIFFUSER
SF	SQUARE FEET
SFD	SMOKE/FIRE DAMPER
SG	STEAM GENERATOR
SH	SHOWER
SW	SOLAR HOT WATER (S = SUPPLY) (R = RETURN)
SWP	SOLAR HOT WATER PUMP
SK	SINK
SMACNA	SHEET METAL ASSOCIATION OF CONTRACTORS NATIONAL ASSOCIATION
SP	SOIL PIPE
SPD	STATIC PRESSURE DROP
SR	SUPPLY REGISTER
SS	STAINLESS STEEL
SSA	SUMMER SUPPLY AIR
SZ VAV	SINGLE ZONE VARIABLE AIR VOLUME
TAB	TESTING, ADJUSTING AND BALANCING
TCV	TEMPERATURE CONTROL VALVE
TDV	TRIPLE DUTY VALVE
TEMP	TEMPERATURE; TEMPORARY
TG	TRANSFER GRILLE, TOP GRILLE
THRU	THROUGH
TT	TEMPERATURE TRANSMITTER
TYP	TYPICAL
TU	TERMINAL UNIT
UBJ	UP BETWEEN JOIST SPACE
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORIES
UTR	UP THRU ROOF
V	VENT OR VALVE
VAV	VARIABLE AIR VOLUME
VB	VAPOR BARRIER
VD	VOLUME (BALANCING) DAMPER
VENT	VENTILATION
VIB.	VIBRATION
VIV	VALVE IN VERTICAL
VP	VENT PIPE
VS1	VIESSMANN SYSTEM 1
VS2	VIESSMANN SYSTEM 2
VTA	VENT TO ATMOSPHERE
VTR	VENT THRU ROOF
VUSBC	VIRGINIA UNIFORM STATEWIDE BUILDING CODE
VVT	VARIABLE AIR VOLUME AND TEMPERATURE
W	WIDTH
W/	WITH
W/O	WITHOUT
WB	WET BULB
WC	WATER CLOSET
WCO	WALL CLEANOUT
WF	WALL FAN
WG	WATER GAUGE
WH	WALL HYDRANT
WP	WASTE PIPE
WSA	WINTER SUPPLY AIR
WT	WEIGHT OR WATER TREATMENT
WTR, H2O	WATER
XFMR	TRANSFORMER

SYMBOLS KEY

DUCTWORK SYMBOLS

- NEW WORK: EQUIPMENT TO BE INSTALLED
- DIRECTION OF FLOW
- DUCT SIZE, FIRST FIGURE IS SIDE SHOWN (300/500)
- DUCT SECTION, POSITIVE PRESSURE, FIRST FIGURE IS TOP (500/250)
- DUCT SECTION, NEGATIVE PRESSURE (500/250)
- CHANGE OF ELEVATION, (R) RISE (D) DROP (R)
- ACCESS DOORS, VERTICAL OR HORIZONTAL (AD 250/250)
- ACOUSTICAL LINING (INSULATION)
- FLEXIBLE CONNECTION (FC)
- FLEXIBLE DUCT
- SOUND ATTENUATOR (SA)
- TRANSITION (500/250, 380/200)
- TURNING VANES
- DETECTORS, FIRE AND/OR SMOKE (D, S)
- BACK DRAFT DAMPER (BDD)
- MOTOR OPERATED DAMPER
- FIRE DAMPER AND SLEEVE (FD, AD)
- SMOKE/FIRE DAMPER AND SLEEVE (SFD, AD)
- MANUAL VOLUME DAMPER (AD, VD)
- FIRE DAMPER AND SLEEVE, MANUAL SPLITTER
- SMOKE DAMPER (AD, SD)
- STANDARD BRANCH, SUPPLY OR RETURN, NO SPLITTER
- ANGLE OF INSTALL (REGISTER) (45)

PIPING SYMBOLS

- CHILLED WATER SUPPLY (CHWS)
- CHILLED WATER RETURN (CHWR)
- HEATING HOT WATER SUPPLY (HWS)
- HEATING HOT WATER RETURN (HWR)
- CONDENSATE DRAIN (CD)
- COLD WATER, DOMESTIC
- CONNECTION, BOTTOM
- CONNECTION, TOP
- ELBOW, 90°
- ELBOW, 45°
- ELBOW, TURNED UP
- ELBOW, TURNED DOWN
- LATERAL
- PITCH OF PIPE, RISE (R) DROP (D) (R)
- TEE
- TEE, OUTLET UP
- TEE, OUTLET DOWN
- TEE, REDUCING (SHOW SIZES) (5, 4, L2)
- TEE, SINGLE SWEEP

PIPING SPECIALTY SYMBOLS

- AIR VENT, AUTOMATIC (AV)
- AIR VENT, MANUAL (MV)
- AIR SEPARATOR (S)
- CAP
- FLEXIBLE CONNECTOR (OR)
- FLOW DIRECTION (FLOW, FLOW)
- FLOOR DRAIN (FLD.)
- FUNNEL DRAIN, OPEN
- PUMP (USE INDICATED) (CHWP-1)
- PUMP SUCTION DIFFUSER (PSD)
- TRIPLE DUTY VALVE (TDV)
- REDUCER, CONCENTRIC
- REDUCER, ECCENTRIC STRAIGHT INVERT
- FLANGED CONNECTION
- SPOOL PIECE, FLANGED
- STRAINER w/ BLOW DOWN
- THERMOMETER
- THERMOMETER WELL, ONLY (TW)
- UNION, SCREWED
- UNION, FLANGED

VALVE SYMBOLS

- BALL VALVE
- BUTTERFLY VALVE
- CHECK VALVE, SPRING
- CHECK VALVE, SWING GATE
- GATE VALVE
- NEEDLE VALVE
- PLUG VALVE
- PRESSURE GAUGE AND COCK
- PRESSURE REDUCING VALVE (PR, PRV)
- PRESSURE SWITCH (PS)
- RELIEF (R) OR SAFETY (S) VALVE
- SQUARE HEAD COCK
- SOLENOID VALVE (S)
- THREE WAY VALVE
- CALIBRATED BALANCING VALVE

CONTROLS SYMBOLS

- BALANCING ACTUATOR
- PNEUMATIC AUTOMATIC MODULATING ACTUATOR (M)
- GEAR ACTUATOR (G)
- ELECTRIC AUTOMATIC MODULATING ACTUATOR (M)
- ELECTRIC SOLENOID AUTOMATIC 2-POSITION ACTUATOR (S)
- PRESSURE GAUGE w/ NEEDLE VALVE
- THERMOMETER
- THERMOSTAT, ELECTRONIC (T)
- TIME CLOCK (TC)
- SOLENOID VALVE (S)
- THERMOSTAT, SELF CONTAINED (T)
- THERMOSTAT, REMOTE BULB (T)
- PRESSURE SWITCH (P)
- PRESSURE SWITCH, DUAL (HIGH-LOW) (P)
- PRESSURE SWITCH, DIFF. OIL PRES. (P)
- FLOW SWITCH (BINARY) (FS, D)
- FLOW TRANSMITTER (ANALOG) (FT, D)
- TEMPERATURE TRANSMITTER (TT, D)
- ELECTRIC SIGNAL
- DESIGN AIRFLOW (CFM) (500)
- FAN (USE INDICATED) (F-1)
- SMOKE DETECTOR, CEILING MOUNTED (S)
- SMOKE DETECTOR, DUCT MOUNTED (SD)
- HEAT (THERMAL) (T)
- MOTOR (USE INDICATED) (M-1)
- MOTOR CONTROL (MC)
- PRESSURE TRANSDUCER (PT)

MISCELLANEOUS SYMBOLS

- DISCONNECT SWITCH, UN-FUSED (U DS)
- DISCONNECT SWITCH, FUSED (F DS)
- ADJUSTABLE FREQUENCY DRIVE (A.F.D.)
- AIR DEVICE DESIGNATION (A)
- DEMOLITION POINT
- DEMOLITION NOTES (#)
- NEW WORK CONSTRUCTION NOTES (#)
- NEW WORK CONNECTION POINT
- REFERENCE POINT
- REVISION NUMBER (#)
- SECTION (# / M-#)
- CENTER LINE
- CARBON DIOXIDE SENSOR (CO_2 OR CO_2)
- PIPING RISER DESIGNATION (XXX / #)
- DUCT RISER DESIGNATION (XXX / #)
- CUBIC FEET PER MINUTE OF AIRFLOW (CFM)

INSTRUMENT & CONTROL DEVICE SYMBOLS

- EMCS LOGIC CONTROL
- LOCALLY MOUNTED DEVICE NOT ON PANEL OR ASSEMBLY
- PANEL MOUNTED DEVICE
- DEVICE MOUNTED INSIDE ENCLOSURE
- LOGIC SYMBOL-DIGITAL OR RELAY (L)
- VARIABLE (MEASURED OR INITIATING) — INSTRUMENT CODE (SEE LIST)
- INSTRUMENT FUNCTION
- CLARIFYING SYMBOL (IF REQUIRED) (CO_2)
- INSTRUMENT OR DEVICE IDENTIFICATION NO. (P SK 15000)

INSTRUMENT TYPE CODES

FIRST LETTER VARIABLE

A	ANALYSIS
B	BURNER FLAME
C	CONDUCTIVITY
D	DEWPOINT
E	VOLTAGE
F	FLOW
G	GAUGING
H	HAND (MANUAL)
I	CURRENT
J	POWER
K	TIME
L	LEVEL
M	MOISTURE (HUMIDITY) OR (M) MOTOR
N	SMOKE
P	PRESSURE OR VACUUM
S	SPEED OR SOLENOID
T	TEMPERATURE
U	MULTI-VARIABLE
V	VIBRATION
W	WEIGHT
X	SPECIAL (REFER TO CLARIFYING SYMBOLS)
Y	STRAIN
Z	POSITION

SECOND OR SUCCEEDING LETTERS (INSTRUMENT FUNCTION)

A	ALARM
C	CONTROL
D	DIFFERENTIAL
E	PRIMARY ELEMENT
G	GLASS
H	HIGH
I	INDICATE
L	LIGHT (PILOT), LOW
Q	INTEGRATE, TOTALIZE
R	RECORDER
S	SWITCH
T	TRANSMITTER
V	VALVE OR DAMPER
W	WELL
X	SPECIAL (REFER TO CLARIFYING SYMBOLS)
Y	RELAY-SIGNAL CONVERTER, COMPUTING
Z	POWER POSITIONER/CONTROL DRIVE

CLARIFYING SYMBOLS LIST

VARIABLE BESIDE OR ON BOTTOM OF INSTRUMENT & CONTROL DEVICE SYMBOLS

AI	ANALOG INPUTS
AO	ANALOG OUTPUT
BI	BINARY INPUT
BO	BINARY OUTPUT
DA	DIRECT ACTING
I/P	CURRENT TO PNEUMATIC TRANSDUCER
CO	CARBON MONOXIDE
CO_2	CARBON DIOXIDE
P/I	PNEUMATIC TO CURRENT TRANSDUCER
RA	REVERSE ACTING
SM	SMOKE OR IONIZATION
SP	SET POINT
△	DIFFERENTIAL
√	SQUARE ROOT
∫	INTEGRAL
≮	NOT LESS THAN
≯	NOT GREATER THAN
<	LESS THAN
>	GREATER THAN
±	BIASING OR ADDER/SUBTRACTOR
×	MULTIPLIER
÷	DIVIDER
Σ	SUMMER
Ω	RESISTIVITY
H.O.A.	HAND-OFF-AUTO SWITCH (AFD BYPASS)
HZ	FREQUENCY

No.	Date	Revision

b2E consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE E. BEDDOW
No. 021238
04-20-2020
PROFESSIONAL ENGINEER

FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

Sheet Name:
SYMBOLS, ABBREVIATIONS, AND INDEX

Drawn By: b2E
Checked By: B2

Date: 06-15-2020

JOB # 18608

Sheet Number:
M-001

AIR BALANCING

HVAC UNIT AIR BALANCING SCHEDULE

GENERAL (A)		OCCUPIED MODE (B)			UNOCCUPIED MODE (C)		ECONOMIZER (D)		REMARKS (E)
TAG	LOCATION AND/OR SERVICE	SUPPLY AIR [CFM]	RETURN AIR [CFM]	OUTSIDE AIR [CFM]	SUPPLY AIR [CFM]	RETURN AIR [CFM]	SUPPLY AIR [CFM]	RETURN AIR [CFM]	
AHU-2	GROUND LEVEL MECH ROOM	15,000	2500	12500	6000	1000	12500	0	1,2,3,4

NOTES

(A) GENERAL
- TAG: UNIT NUMBERING DESIGNATION ON PLAN.
- LOCATION AND/OR SERVICE: THE LOCATION OF UNIT AND WHAT AREA IT SERVES IN THE BUILDING.

(B) OCCUPIED MODE
- SUPPLY AIR [CFM]: TAB DESIGN BALANCED SUPPLY AIRFLOW RATE IN CUBIC FEET PER MINUTE.
- RETURN AIR [CFM]: TAB DESIGN BALANCED RETURN AIRFLOW RATE IN CUBIC FEET PER MINUTE.
- OUTSIDE AIR [CFM]: TAB DESIGN BALANCED OUTSIDE AIRFLOW RATE IN CUBIC FEET PER MINUTE.

(C) UNOCCUPIED MODE
- SUPPLY AIR [CFM]: TAB DESIGN BALANCED SUPPLY AIRFLOW RATE IN CUBIC FEET PER MINUTE.
- RETURN AIR [CFM]: TAB DESIGN BALANCED RETURN AIRFLOW RATE IN CUBIC FEET PER MINUTE.

(D) ECONOMIZER
- SUPPLY AIR [CFM]: TAB DESIGN BALANCED SUPPLY AIRFLOW RATE IN CUBIC FEET PER MINUTE.
- RETURN AIR [CFM]: TAB DESIGN BALANCED RETURN AIRFLOW RATE IN CUBIC FEET PER MINUTE.

(E) REMARKS
1. AHU-2 SHALL RUN WHENEVER THE KITCHEN HOOD EXHAUST FAN IS RUNNING.
2. MODULATE SPEED OF AHU-2 SUPPLY AIR FAN BASED ON THE SEQUENCE OF OPERATION IN SECTION 23 09 93.
3. VERIFY SUPPLY AIR FANS AND MONITORING STATION OUTSIDE AIR ARE READING CORRECT AIRFLOW RATES IN ACCORDANCE WITH THE TAB READOUTS AT THE BAS.
4. ECONOMIZER: MAXIMIZE RETURN AIR CAPACITY TO 12500 CUBIC FEET PER MINUTE AND ADJUST SUPPLY AIR VOLUMETRIC FLOW RATE TO MATCH FOR BALANCING WHEN THE KITCHEN EXHAUST SYSTEM IS ON.
5. UNOCCUPIED MODE: SET UP UNIT FOR 12500 CFM SUPPLY AIR AND 12500 RETURN AIR.

MECHANICAL GENERAL NOTES

(THESE NOTES APPLY TO ALL MECHANICAL DRAWINGS.)

1. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF APPLICABLE LOCAL, STATE AND NATIONAL CODES ALONG WITH ALL OSHA & ADA REGULATIONS.
2. CONTRACTOR IS RESPONSIBLE FOR ALL COSTS FOR TRADE PERMITS AND INSPECTIONS.
3. PERFORM ALL WORK IN ACCORDANCE WITH ALL APPLICABLE AC INFRASTRUCTURE DESIGN AND CONSTRUCTION STANDARDS.
4. REVIEW THE ARCHITECTURAL, STRUCTURAL, AND ELECTRICAL DRAWINGS FOR NOTES, DIMENSIONS, ETC. AND COORDINATE WORK WITH OTHER TRADES INVOLVED. COORDINATE ALL WORK WITH THE CONTRACTOR'S CONSTRUCTION PHASING PLAN (SEQUENCE OF WORK) SPECIFIED FOR THE PROJECT AND WITH ALL OTHER TRADES PRIOR TO FABRICATION OR INSTALLATION OF ANY WORK.
5. COORDINATE ALL ELECTRICAL REQUIREMENTS OF MECHANICAL EQUIPMENT WITH OTHER TRADES PRIOR TO ORDERING EQUIPMENT.
6. COORDINATE ALL OPENINGS, FRAMING AND SUPPORTS, FOR ACTUAL MECHANICAL EQUIPMENT PURCHASED, AND FOR REQUIREMENTS OF INSTALLATION METHODS USED. ALL EQUIPMENT SHALL BE SUPPORTED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS. ALL PENETRATIONS AND LOCATIONS SHALL BE SUBMITTED FOR REVIEW AND APPROVED BY THE STRUCTURAL ENGINEER PRIOR TO STARTING ANY WORK.
7. SUBMIT REQUEST AND OBTAIN APPROVAL FROM STRUCTURAL ENGINEER BEFORE ANY CORE DRILLING FOR WALLS AND PENETRATIONS REQUIRED FOR ANY WORK. THE PENTHOUSE HAS A POST TENSION CONCRETE SLAB. NO NOT CORE DRILL OR OTHERWISE PENETRATE THE FLOOR SLAB FOR ANY REASON. BUILDING DAMAGE DUE TO THE CONTRACTOR'S FAILURE TO OBTAIN APPROVAL SHALL BE ENTIRELY THE RESPONSIBILITY OF THE CONTRACTOR.
8. PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR SHALL SUBMIT PROPOSED PROCEDURES AND METHODS FOR PROTECTING BUILDING AND EQUIPMENT THEREIN FROM DAMAGE. THESE SUBMITTALS SHALL BE FOR REVIEW BY OWNER AND ENGINEER – IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN A WEATHER TIGHT AND SECURE BUILDING. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE ALL NECESSARY SAFEGUARDS, TO MAINTAIN ALL PARTS OF THE STRUCTURE IN A SAFE CONDITION AT ALL TIMES DURING THE PROCESS OF CONSTRUCTION AND TO PROTECT THE BUILDING FROM DAMAGE. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO WORK AND EQUIPMENT CAUSED BY FAILURE OF PROTECTIVE MEASURES.
9. BUILDING DAMAGE CAUSED BY WORK DONE UNDER THIS CONTRACT SHALL BE RESTORED TO THE DESIGN CONDITION OR BETTER AT NO COST TO THE OWNER.
10. PROTECTION OF EQUIPMENT, WALLS AND FLOORS SHALL BE PROVIDED WITH 6 MIL FIRE RETARDANT POLYETHYLENE AND MASONITE BOARD. REPAIR ANY BUILDING DAMAGE IMMEDIATELY.
11. CONTRACTOR SHALL INCLUDE IN THEIR PRICE AFTER HOURS AND/OR WEEKEND LABOR FOR ALL WORK REQUIRED TO MEET THE CONTRACT MILESTONE DEADLINES AND COMPLETION SCHEDULES. REQUESTS FOR ADDITIONAL PAYMENT FOR AFTER HOURS AND/OR WEEKEND AND/OR OVERTIME WORK WILL NOT BE CONSIDERED.
12. MAINTAIN INTEGRITY OF BUILDING INSULATION MATERIALS WHERE CONDUIT, PIPING OR EQUIPMENT PASSES THROUGH OR RUNS WITHIN INSULATED WALLS AND ADJACENT EXPOSED INSULATION.
13. MAINTAIN CLEARANCES FROM ALL ELECTRICAL EQUIPMENT PER APPLICABLE CODES AND MANUFACTURER'S RECOMMENDATIONS. DO NOT RUN PIPING OR DUCTWORK THROUGH ELECTRICAL ROOMS. PIPING ABOVE ELECTRICAL PANELS OR EQUIPMENT SHALL BE PROVIDED WITH A FIRE RATED CEILING AND/OR DRIP PANS UNDER ENTIRE LENGTH OF PIPE.
14. ALL CONTROLS, INTERLOCK WIRING, AND CONDUIT SHALL BE CONCEALED, EXCEPT IN MECHANICAL EQUIPMENT ROOMS.
15. RUN ALL CONTROLS, CONDUIT AND CABLES THRU UL LISTED FIRE RATED PENETRATION SYSTEM IN RATED WALLS. CONTRACTOR SHALL PROVIDE UL LISTED FIRE STOPPING SYSTEM FOR ALL PENETRATIONS.
16. RUN ALL PIPING THRU UL LISTED FIRE RATED PENETRATION SYSTEM IN RATED WALLS. CONTRACTOR SHALL PROVIDE UL LISTED FIRE STOPPING SYSTEM FOR ALL PENETRATIONS.
17. RUBBISH AND DEBRIS SHALL NOT BE ALLOWED TO ACCUMULATE IN THE BUILDING OR ON THE ROOF AT ANY TIME. CONTRACTOR SHALL REMOVE DEBRIS DAILY FROM THE BUILDING AND SWEEP FLOORS.
18. PRIOR TO BIDDING, THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL DIMENSIONS, ELEVATIONS, ETC., NECESSARY FOR THE PROPER CONSTRUCTION AND ALIGNMENT OF NEW WORK WITH THE STRUCTURE. THE CONTRACTOR SHALL MAKE ALL MEASUREMENTS NECESSARY FOR PROPER FABRICATION AND ERECTION OF STRUCTURAL MEMBERS.
19. ALL DIMENSIONS AND LOCATIONS OF EQUIPMENT, STRUCTURE, CONSTRUCTION, WORK, ETC. SHALL BE FIELD VERIFIED PRIOR TO STARTING CONSTRUCTION. COORDINATION OF DIMENSIONS IS THE CONTRACTOR'S RESPONSIBILITY. FIELD MEASUREMENTS TAKE PRECEDENCE OVER PLAN SCALES.
20. THOROUGHLY REVIEW THE COMPLETE PLAN DOCUMENT PRIOR TO SUBMITTING BID PRICE. REQUESTS FOR ADDITIONAL PAYMENT DUE TO CONTRACTOR'S FAILURE TO REALIZE THE EXTENT OF THE WORK, AND/OR FAILURE TO COORDINATE BETWEEN TRADES WILL NOT BE CONSIDERED.
21. MECHANICAL EQUIPMENT SUPPORTS: SUBMIT SHOP DRAWINGS OF STRUCTURAL STEEL MEMBERS ERECTION AND CONNECTION DETAILS FOR APPROVAL BEFORE PROCEEDING WITH THE WORK. THE CONTRACTOR SHALL CHECK ALL DIMENSIONS AND ACCEPT FULL RESPONSIBILITY FOR DIMENSIONAL CORRECTNESS. (REFER TO STRUCTURAL FOR OTHER APPLICABLE REQUIREMENTS).
22. REVIEW THE DRAWINGS AND APPLICABLE DIVISION 5 SPECIFICATION SECTIONS FOR STRUCTURAL STEEL FRAMING FOR DUCT PENETRATION REQUIREMENTS.
23. SUBMIT FOR APPROVAL MANUFACTURER'S CERTIFIED SHOP DRAWINGS FOR ALL EQUIPMENT SPECIFIED AND AS REQUIRED BY THE ENGINEER. PROVIDE ADDITIONAL INFORMATION FOR ANY EQUIPMENT SUBMITTED TO THE ENGINEER OR REQUESTED BY THE ENGINEER AT NO ADDITIONAL COST TO THE OWNER.
24. NOT EVERY ELEMENT OF CONSTRUCTION IS INDICATED IN EVERY PLAN, SECTION, DIAGRAM OR DETAIL. CONSULT ALL OF THE DOCUMENTS AND PROVIDE EVERY ITEM, WHETHER OR NOT INDICATED OR SPECIFIED, OR NECESSARY TO PROVIDE A COMPLETE OPERATING SYSTEM.
25. THERE SHALL BE NO ASBESTOS CONTAINING MATERIAL (ACM) IN ANY NEW MECHANICAL EQUIPMENT, INSULATION, OR ANY INCIDENTAL ITEMS USED IN THE INSTALLATION OF THIS PROJECT.
26. PROVIDE MISCELLANEOUS STEEL AS REQUIRED TO PROPERLY SUPPORT SUSPENDED PIPING, CONDUIT, AND EQUIPMENT. STEEL SHALL BE SUPPORTED FROM STRUCTURAL FRAMING MEMBERS AND FLOOR MOUNTED PIPE AND EQUIPMENT SUPPORTS. STEEL SHALL BE HOT DIPPED IN ACCORDANCE WITH ASTM A123.
27. WHEREVER PLANS INDICATE TO "PROVIDE" EQUIPMENT, PROCURE AND INSTALL THE EQUIPMENT PER PLANS AND SPECIFICATIONS AND IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS AND CAUTIONS.
28. PROVIDE RISES/DROPS IN DUCTWORK WHERE REQUIRED TO AVOID CONFLICTS WITH STRUCTURE AND OTHER TRADES WORK. DUCT RUNS SHALL BE CAREFULLY COORDINATED WITH STRUCTURE AND ALL TRADES PRIOR TO FABRICATION AND INSTALLATION TO MINIMIZE RISES/DROPS IN DUCTWORK.
29. DUCTWORK DIMENSIONS FOR INSULATED AND ACOUSTICALLY LINED DUCTWORK INDICATED ON DRAWINGS ARE INSIDE CLEAR.
30. REFER TO SECTION 23 31 13 "METAL DUCTS" FOR DUCT CONSTRUCTION REQUIREMENTS.
31. PROVIDE FIRE DAMPERS AT ALL DUCT PENETRATIONS OF RATED FLOOR ASSEMBLIES, RATED SHAFTS, AND CORRIDORS AND RATED PARTITIONS AS REQUIRED PER CODE.
32. PROVIDE ACCESS DOORS IN DUCTWORK PER SMACNA RECOMMENDATIONS WHERE REQUIRED FOR ACCESS TO SYSTEM COMPONENTS INCLUDING THE FOLLOWING:
    a. AUTOMATIC DAMPERS.
33. BAS SENSORS SHALL BE INSTALLED BY DIV. 23: ALL SENSORS, TRANSDUCERS, SWITCHES, AND METERS SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ACCURATE READING AND A COMPLETE OPERATING SYSTEM.
34. BALANCE AIR DISTRIBUTION SYSTEMS TO QUANTITIES INDICATED ON DRAWINGS. REFER TO SECTION 23 FOR TESTING, ADJUSTING, BALANCING, AND REPORTING REQUIREMENTS.
35. UPON COMPLETION OF WORK, PERFORMANCE TEST ENTIRE INSTALLATION FOR AC DES REPRESENTATIVE'S AND ARCHITECT/ENGINEER APPROVAL AND ACCEPTANCE. PRESENT THE OWNER WITH A CERTIFICATE FOR FINAL INSPECTION FROM THE LOCAL AUTHORITY.
36. PROVIDE SYSTEMS DEMONSTRATIONS SPECIFIED IN SUMMER SEASON FOLLOWING COMPLETION OF CONSTRUCTION. DEMONSTRATIONS SHALL BE INCLUDED IN THE BASE CONTRACT TO BE COORDINATED WITH AC DES REPRESENTATIVE AND ENGINEER TO OCCUR DURING PEAK SUMMER CONDITIONS. NOTIFY THE ENGINEER PRIOR TO SUBMITTING A BID OF ANY SPECIFIED ITEMS THAT HAVE LONG-LEAD TIME WHICH MAY IMPACT THE PROJECT SCHEDULE. NO ALTERNATIVE EQUIPMENT (SUBSTITUTIONS) SHALL BE USED UNLESS PRIOR APPROVAL IS GRANTED BY THE OWNER.
37. WARRANTY: AIR HANDLERS SHALL BE PROVIDED WITH A 5 YEAR PARTS AND LABOR WARRANTY. REFER TO PROJECT MANUAL FOR WARRANTY REQUIREMENTS.
38. O&M MANUALS: REFER TO THE PROJECT MANUAL FOR PROJECT CLOSEOUT REQUIREMENTS.
39. EQUIPMENT SHALL BE INSTALLED, IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS TO CONFIRM WITH THE DETAILS AND APPLICATION INDICATED. INSTALLATION SHALL FIT INTO THE SPACE ALLOTTED AND SHALL ALLOW ADEQUATE, ACCEPTABLE, CLEARANCES FOR ENTRY, SERVICING AND MAINTENANCE.
40. SERVICE ACCESS
    A. CONTRACTOR IS RESPONSIBLE FOR COORDINATION OF EXACT LOCATION AND TYPE.
    B. ALL MECHANICAL EQUIPMENT MUST BE INSTALLED IN A MANNER WHICH ALLOWS REASONABLE AND ADEQUATE ACCESS TO CONTROLS, SYSTEM COMPONENTS USED FOR BALANCING AND MAINTENANCE, ELECTRICAL/POWER, COIL REMOVAL, FAN REMOVAL, FAN BELT REPLACEMENT FILTER REPLACEMENTS, ISOLATION VALVE OPERATION, AND OTHER COMPONENTS REQUIRING SERVICE CLEARANCE.
    C. SERVICE ACCESS CLEARANCE SHALL NOT BE LESS THAN THE MINIMUM ALLOWANCE DISTANCE REQUIRED BY THE MANUFACTURER.
41. DUCTWORK
    A. ALL DUCTWORK THAT IS NOT INTERNALLY LINED SHALL HAVE EXTERNAL WRAP OR DUCT BOARD INSULATION. REFER TO SPECIFICATION DIVISION 23 FOR ADDITIONAL INFORMATION AND INSULATION REQUIREMENTS.
    B. DUCT FITTINGS ARE INDICATED SYMBOLICALLY. REFER TO DETAILS, CONFIGURATION OF FITTING, TAPS AND CONNECTIONS. DUCT CONSTRUCTION SHALL COMPLY WITH SMACNA CONSTRUCTION STANDARDS. ALL 90 DEGREE ELBOWS SHALL BE LONG RADIUS TYPE UNLESS SPACE IS LIMITED. THEN PROVIDE SQUARE ELBOWS. SHORT RADIUS ELBOWS IN SUPPLY DUCT WITH TURNING VANES.
    C. REFER TO SPECIFICATIONS FOR DUCTWORK CONSTRUCTION CLASSES, SEAL AND LEAKAGE CLASSES.
    D. VERIFY ALL EQUIPMENT CONNECTIONS WITH MANUFACTURER'S CERTIFIED DRAWINGS. VERIFY AND PROVIDE DUCT TRANSITIONS TO FURNISHED EQUIPMENT. FIELD VERIFY AND COORDINATE ALL DIMENSIONS BEFORE FABRICATION.
    E. PROVIDE FLEXIBLE CONNECTIONS ON ALL DUCTS CONNECTING TO ALL MECHANICAL EQUIPMENT. ALL DUCTS TO BE GROUNDED ACROSS FLEXIBLE CONNECTION WITH FLEXIBLE COPPER GROUNDING STRAPS.
    F. PROVIDE OFFSETS AND TRANSITIONS IN DUCTWORK AND PIPING AS REQUIRED TO AVOID INTERFERENCE AT NO ADDITIONAL COST TO THE OWNER.
    G. DUCT SYSTEMS SHALL BE BALANCED TO AIRFLOW RATE (CFM) INDICATED ON DRAWINGS. FANS SHALL BE FIELD TESTED TO PROVE COMPLIANCE WITH SCHEDULED FAN PERFORMANCE AND SCHEDULED AIR FLOW AT DESIGN TOTAL STATIC PRESSURE.
    H. PROVIDE VOLUME DAMPERS AT ALL BRANCH DUCT TAKEOFFS, AT EACH AIR AIR RUNOUT TO INLET AND OUTLET, AND WHERE OTHERWISE INDICATED.
    I. SHEET METAL FITTINGS SHOWN SHALL BE PROVIDED. NO SUBSTITUTES SHALL BE ALLOWED WITHOUT PRIOR CONSENT FROM ENGINEER.
    J. ALL OPEN DUCT SHALL BE SEALED AND COVERED DURING CONSTRUCTION TO PREVENT DUST OR MATERIAL ENTERING DUCTWORK, OR ENTIRE SYSTEM SHALL BE CLEANED PRIOR TO START UP.
42. HANGERS
    A. ALL THREAD RODS INSTALLED SHALL NOT BE OUT OF TRUE DISTANCE EQUAL TO OR GREATER THAN 2% OF ITS INSTALLED LENGTH. RODS THAT ARE DEFICIENT SHALL BE REPLACED AT NO ADDITIONAL COST TO THE OWNER.
    B. PROVIDE HANGERS, CLAMPS, OFFSETS, EXPANSION JOINTS, ANCHORS AND GUIDES AS NECESSARY TO PREVENT STRESS ON PIPING AND EQUIPMENT.
    C. SUPPORT ALL EQUIPMENT, PIPING AND DUCTWORK FROM TOP OF BLDG STRUCTURE TO PROVIDE A VIBRATION FREE INSTALLATION. NOTIFY STRUCTURAL ENGINEER OF ALL WEIGHTS AND METHODS OF SUPPORT.
    D. CONCENTRATE LOADS USING HANGERS AT JOIST/BEAM LOCATIONS. PROVIDE ANGLE BRACES WHERE CONCENTRATED LOADS OCCUR AT OTHER LOCATIONS. ALL HANGER SUPPORTS SHALL BE SUPPORTED FROM THE TOP OF STRUCTURE. WHERE THE STRUCTURE HAS SPRAY-ON FIRE PROOFING CAREFULLY REMOVE MATERIAL AT CLAMP CONNECTION ONLY.
43. PIPING
    A. INSULATE PIPING AS SPECIFIED: PERFORM TESTS SPECIFIED BEFORE INSULATING.
    B. INSULATE ALL WATER PIPING IN ACCORDANCE WITH SECTION 23 07 00.
    C. PROVIDE VENTS AT HIGH POINTS IN PIPING SYSTEMS AND DRAIN VALVES AT LOW POINTS.
    D. ALL DRAIN LINES SHALL BE PIPED AS INDICATED, BUT NOT LESS THAN, 1-INCH OR FULL SIZE OF THE UNIT DRAIN OUTLET.
44. ALL WORK SHALL BE COORDINATED WITH ALL TRADES INVOLVED. OFFSETS IN PIPING AND DUCTS (INCLUDING DIVIDED DUCTS) AND TRANSITIONS AROUND OBSTRUCTIONS SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER. MECHANICAL CONTRACTOR SHALL COORDINATE HIS WORK WITH OTHER TRADES BEFORE FABRICATION AND INSTALLATION.
45. PROVIDE INFORMATION AND HARDWARE AS NECESSARY TO COORDINATE CONCRETE PADS AND STEEL PLATFORMS REQUIRED FOR MECHANICAL WORK.
46. ALL CONTROL WIRE AND CONDUIT SHALL COMPLY WITH NEC AND DIVISION 26 OF SPECIFICATIONS.
    A. ALL SENSORS IN PIPING SHALL BE INSTALLED USING WELD-O-LETS, AND IMMERSION WELLS.
    B. ALL FLOW METERS SHALL BE HOT TAP TYPE FOR INSTALLATION AND REMOVAL WITHOUT DRAINING PIPES SYSTEM.
47. ALL MATERIALS AND EQUIPMENT SHALL BE PROVIDED NEW UNDER THIS CONTRACT.
48. INSTALL ALL EQUIPMENT LEVEL AND PLUMBING. PROVIDE SPRING VIBRATION ISOLATORS AND ASSOCIATED CONCRETE INERTIA PADS AS REQUIRED FOR A COMPLETE LEVEL OPERATING SYSTEM.
49. ALL UNINSULATED PIPING SHALL BE PAINTED IN ACCORDANCE WITH SECTION 230500.

GENERAL NOTES – PIPING

1. REFER TO SHEET M-001 FOR SYMBOLS AND ABBREVIATIONS.
2. REFER TO PROJECT MANUAL FOR TECHNICAL SPECIFICATIONS AND OTHER APPLICABLE REQUIREMENTS.
3. REVIEW STRUCTURAL, AND ELECTRICAL DRAWINGS AND COORDINATE THE WORK BETWEEN TRADES.
4. ALL PENETRATIONS THROUGH RATED WALLS SHALL BE FIRE RATED WITH UL LISTED FIRE STOPPING SYSTEM FOR ACTUAL SIZE, TYPE AND MATERIALS USED.
   - REFER TO PIPE AND DUCT FIRE STOPPING SCHEDULE FOR ACCEPTABLE UL LISTED FIRE STOPPING DETAILS.
   - REFER TO PROJECT MANUAL DIVISION 7 FOR FIRE STOPPING TECHNICAL SPECIFICATIONS.
   - COORDINATE BETWEEN TRADES AND INCLUDE ALL QUANTITIES AND SIZES AS REQUIRED FOR A COMPLETE OPERATING SYSTEM.
5. MAINTENANCE, SERVICE & INSPECTION: LOCATE EACH PIECE OF EQUIPMENT WITH THE MANUFACTURER'S RECOMMENDED CLEARANCES MAINTAINED.OBTAIN MANUFACTURERS MINIMUM REQUIRED CLEARANCE FOR MAINTENANCE, SERVICE AND INSPECTION AND PROVIDE THESE MINIMUM CLEAR DIMENSIONS IN THEIR WORK.
6. PIPE CONNECTIONS: ALL PIPE CONNECTIONS 2-1/2 INCH AND LARGER FROM MAIN SHALL BE OFF THE BOTTOM OF THE PIPE; OR SIDE WHERE NOT OTHERWISE PRACTICAL CONNECTIONS 2-INCH AND SMALLER MAY BE 45° OFF BOTTOM OR SIDE OF PIPE.
7. ALL PIPE ELBOWS, TEES, RISES, DROPS, NOT INDICATED ON DRAWINGS. THE CONTRACTOR SHALL COORDINATE AND PROVIDE ALL PIPING RISES, DROPS, ELBOWS, ETC. TO FIT PIPING AROUND THE BUILDING STRUCTURE, AND OTHER TRADES WORK.

GENERAL NOTES – DUCTWORK

1. REFER TO SHEET M-001 FOR SYMBOLS AND ABBREVIATIONS.
2. REFER TO SPECIFICATIONS FOR OTHER APPLICABLE REQUIREMENTS.
4. MEASURE SIZE AND LOCATION OF STRUCTURAL JOISTS, TRUSSES, GIRDERS, ETC. PRIOR TO FABRICATING DUCTWORK. PROVIDE ALL TRANSITIONS, FITTINGS, ELBOWS, ETC. FOR A COMPLETE OPERATING SYSTEM.
5. MAXIMUM FLEXIBLE DUCTWORK LENGTH SHALL BE 6-FEET LONG. RUN FLEX FROM HARD METAL DUCTWORK TO DIFFUSER. DO NOT EXCEED 6-FEET MAXIMUM FLEX DUCT LENGTH.
6. COORDINATE BETWEEN TRADES TO LOCATE EQUIPMENT AND DUCTWORK IN ORDER TO MAKE ROOM FOR OTHER TRADES WORK AND MAXIMIZE CLEAR HEIGHT BELOW BOTTOM ELEVATION OF EQUIPMENT.
7. REMOVE AND REINSTALL ANY EQUIPMENT, INCLUDING PLUMBING, PIPING, CONDUIT, ETC. WHICH IS IN THE WAY OF THE DUCTWORK AND EQUIPMENT AS NECESSARY TO ACHIEVE A COMPLETE OPERATING SYSTEM.
8. CLEANUP THE WORK AREA, INCLUDING VACUUMING AND TRASH REMOVAL AT THE END OF EACH DAY.

HAZARDOUS MATERIAL GENERAL NOTES

(THESE NOTES APPLY TO ALL MECHANICAL DRAWINGS.)

1. NO ASBESTOS, PCB OR LEAD PAINT OR PRODUCTS CONTAINING ASBESTOS, PCB OR LEAD HAVE BEEN KNOWINGLY SPECIFIED FOR THIS PROJECT. NO ASBESTOS, PCB'S, OR LEAD CONTAINING MATERIALS SHALL BE USED ON THIS PROJECT.

BAS GENERAL NOTES

(THESE NOTES APPLY TO ALL MECHANICAL DRAWINGS)

1. REFER TO THE PROJECT MANUAL SECTION 23 09 00 AND 23 09 93 FOR OTHER APPLICABLE REQUIREMENTS.
2. THE EXISTING BUILDING AUTOMATION SYSTEM (BAS) IS PROVIDED BY SIEMENS. INTEGRATE THE EQUIPMENT PROVIDED UNDER THIS CONTRACT TO THE EXISTING SIEMENS BAS GRAPHICS VIA BACNET.
3. THE FOLLOWING EQUIPMENT SHALL BE INTEGRATED TO THE SIEMENS BAS THROUGH BACNET.
   - 3.1. DETENTION FACILITY
     - 3.1.1. SA FANS: AHU-1, AHU-2
     - 3.1.2. RA FAN: AHU-1
     - 3.1.3. DAMPERS: AHU-1, AHU-2
     - 3.1.4. HW CONTROL VALVES: AHU-2 (TCV-1)
     - 3.1.5. CHW CONTROL VALVE: AHU-2 (TCV-2)

SPRINKLER-GENERAL NOTES

1. COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANAGER FOR THE RELOCATION OF EXISTING SPRINKLER HEADS AS NECESSARY TO INSTALL DUCTWORK. COORDINATE WITH THE ARLINGTON COUNTY SUBCONTRACTOR FIRE ALARM TRADE FOR A FIRE WATCH WHERE ANY SPRINKLERS ARE TEMPORARILY REMOVED FROM SERVICE. COORDINATE REPLACEMENT OF EXISTING SPRINKLER SYSTEM BACK IN SERVICE EACH DAY PRIOR TO COMPLETING THE WORK AT HAND.

O&M TRAINING – GENERAL NOTES

(THESE NOTES APPLY TO ALL MECHANICAL DRAWINGS)

1. REFER TO THE PROJECT MANUAL FOR OTHER APPLICABLE REQUIREMENTS.
2. O&M MANUALS: PROVIDE FINAL APPROVED O&M MANUALS TO EACH TRAINEE FOR USE DURING TRAINING.
   A. MANUALS SHALL BE SEPARATING INTO VOLUMES BY DIVISION. MULTIPLE VOLUMES MAY BE USED FOR EACH DIVISION IF NEEDED.
   B. PROVIDE MIN. 12 COPIES FOR TRAINING.
3. ON-SITE EQUIPMENT AND EMS TRAINING: PROVIDE TRAINING FOR DIVISION 23 EQUIPMENT AS SPECIFIED IN THE SECTION PERTAINING TO THAT EQUIPMENT.
   A. ALL ON-SITE TRAINING SHALL BE VIDEO TAPED FOR USED BY ARLINGTON COUNTY.
   B. PROVIDE ONE CD-ROM OF ALL TRAINING VIDEOS FOR A PARTICULAR DIVISION IN THAT DIVISION Q&M MANUAL SLEEVE.
   C. EMS TRAINING: ALL SYSTEMS SHALL BE FULLY OPERATIONAL AND FIRST SEASON SYSTEMS DEMONSTRATION COMPLETED TO THE SATISFACTION OF THE ENGINEER, THE CXA AND THE OWNER PRIOR TO TRAINING.
4. ON SITE TRAINING: PROVIDE ON SITE EQUIPMENT TRAINING OF ARLINGTON COUNTY PERSONNEL (MIN. 4 PERSONS)
   A. PROVIDE ON SITE TRAINING FOR THE NEW AIR HANDLERS (AHU-2) PROVIDED UNDER THIS CONTRACT.

COMMISSIONING GENERAL NOTES

1. THE EOR (CxA) WILL COMMISSION ALL REQUIRED SYSTEMS IN ACCORDANCE WITH THE OWNER'S FUNDAMENTAL COMMISSIONING (Cx) REQUIREMENTS.
2. THE COMMISSIONED SYSTEMS AND APPLICABLE CONTRACTOR REQUIREMENTS ARE OUTLINES IN THE Cx PLAN WHICH IS INCLUDED IN DIVISION 1 OF THE CONTRACT SPECIFICATIONS.
3. THE CONTRACTORS ARE RESPONSIBLE FOR DEVELOPING AND COMPLETING ALL PRE-FUNCTIONAL CHECKLISTS AND COMPLETING MANUFACTURER START-UP REPORTS FOR EACH COMMISSIONED EQUIPMENT OR SYSTEM.
4. THE CxA WILL DEVELOP THE FUNCTIONAL PERFORMANCE TEST (FPT) PROCEDURES. THE CONTRACTORS WILL ASSIST THE CxA IN COMPLETING THE FPT BY DEMONSTRATING EQUIPMENT/SYSTEM FUNCTIONALITY AS OUTLINES IN THE PROCEDURES.
5. ALL SPECIALTY EQUIPMENT REQUIRED TO PERFORM THE FPTS SHALL BE PROVIDED BY THE CONTRACTORS.

TEMPORARY HEAT

1. PROVIDE TEMPORARY HEAT AS NECESSARY TO MAINTAIN PROPER TEMPERATURE CONDITIONS TO PROTECT THE HVAC SYSTEMS FROM FREEZING AND TO COMPLETE WORK.
2. ANY BUILDING OR BUILDING SYSTEMS DAMAGE DUE TO FREEZING SHALL BE CORRECTED IMMEDIATELY BY THE CONTRACTOR.

FIRESTOPPING GENERAL NOTES

(THESE NOTES APPLY TO ALL MECHANICAL DRAWINGS)

1. REVIEW THE DRAWINGS PRIOR TO SUBMITTING THEIR BID PRICE. PROVIDE ALL REQUIRED FIRE DAMPERS WHETHER OR NOT INDICATED ON THE MECHANICAL DRAWINGS.
2. WHEREVER FIRE DAMPERS ARE INDICATED ON MECHANICAL DRAWINGS OR REQUIRED AS INDICATED BY A TWO-HOUR OR GREATER FIRE RATING ON THE PLANS, THOSE WALLS SHALL BE CONSIDERED FIRE RATED WALLS. ANY PENETRATIONS OF PIPING, CONDUIT, AND DUCTWORK, ETC., THROUGH THOSE WALLS SHALL BE FIRESTOPPED IN ACCORDANCE WITH THE DETAILS INDICATED ON THE DRAWINGS AND DIVISION 7 SECTION "FIRESTOPPING".
3. MAINTAIN FIRE RATINGS WHERE MECHANICAL ITEMS PENETRATE FIRE RATED BUILDING ELEMENTS.

FIRE ALARM – GENERAL NOTES

1. PROVIDE DUCT SMOKE DETECTOR IN THE RA AND THE SA STREAM AND INTERLOCK TO SHUT-DOWN AHU-2 AND SIGNAL TROUBLE ALARM AT THE FIRE ALARM CONTROL PANEL.
2. COVER SMOKE DETECTORS TO PREVENT NUISANCE TRIPPING DUE TO DUST IN AREAS UNDER CONSTRUCTION.
3. COORDINATE WITH THE ARLINGTON COUNTY (DES) PROJECT MANAGER FOR THE RELOCATION OF EXISTING FIRE ALARM DEVICES AS NECESSARY TO INSTALL DUCTWORK. COORDINATE WITH THE ARLINGTON COUNTY SUBCONTRACTOR FIRE ALARM TRADE FOR A FIRE WATCH WHERE ANY FIRE ALARM DEVICES ARE TEMPORARILY REMOVED FROM SERVICE. COORDINATE REPLACEMENT OF EXISTING FIRE ALARM DEVICES BACK IN SERVICE EACH DAY PRIOR TO COMPLETING THE WORK AT HAND.

IDENTIFICATION – GENERAL NOTES

(THESE NOTES APPLY TO ALL MECHANICAL DRAWINGS)

1. REFER TO SHEET M-001 FOR SYMBOLS AND ABBREVIATIONS.
2. REFER TO PROJECT MANUAL SECTION 23 01 00 FOR TECHNICAL SPECIFICATIONS AND OTHER APPLICABLE REQUIREMENTS.
3. THE HVAC SYSTEMS IDENTIFICATION SHALL BE COMPLETED FOR EACH PHASE OF CONSTRUCTION.
4. THE CONTRACTOR SHALL COORDINATE ALL EQUIPMENT IDENTIFICATION TO MATCH THE DESIGNATIONS USED BY THE BAS CONTRACTOR IN THE BAS CONTROL SUBMITTAL.

GENERAL NOTES – TAB

(THESE NOTES APPLY TO ALL MECHANICAL DRAWINGS)

1. REFER TO SHEET M-001 FOR GENERAL NOTES, SYMBOLS AND ABBREVIATIONS.
2. REFER TO PROJECT MANUAL DIVISION 23 FOR TECHNICAL SPECIFICATIONS AND OTHER APPLICABLE REQUIREMENTS.
3. SUBMIT QUALIFICATION FOR REVIEW AND APPROVAL.
4. SUBMIT BALANCING PROCEDURES PLAN FOR EACH HYDRONIC AND AIR SYSTEM FOR REVIEW AND APPROVAL.
5. SUBMIT SCHEDULE INDICATING BALANCING SCHEDULE AND SHOW HOW IT COINCIDES WITH BUILDING CONSTRUCTION SCHEDULE.
6. THE TAB CONTRACTOR SHALL BALANCE THE BUILDING AT THE COMPLETION OF CONSTRUCTION.
   A. INITIAL BALANCING: THE CONTRACTOR SHALL READ WATER FLOWS AND AIR FLOWS FOR ALL SYSTEMS. THE TAB SHALL PROVIDE A SUBMITTAL SHOWING ALL PIPING AND AIR-SIDE SYSTEMS. MAKE ADJUSTMENTS AS NECESSARY TO MAINTAIN PROPER WATER AND AIRFLOW RATES TO EXISTING HVAC SYSTEMS.
7. PERFORM OTHER APPLICABLE WORK AS SPECIFIED IN THE PROJECT MANUAL.

No.	Date	Revision

consulting
engineers

116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

BRUCE R. BEDDOW
No. 021239
04-20-2020

FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

Sheet Name:
GENERAL
NOTES

Drawn By: b2E
Checked By: B2

Date: 06-15-2020

JOB # 18608

Sheet Number:
M-002

PROPOSED PHASING PLAN

1. MECHANICAL – DENTENTION FACILITY BUILDING

A. PHASE 1 – REFER TO THE PROPOSED PHASING PLAN IN THIS SECTION 01 95 00 AND ON SHEET M003.

1. PROVIDE AN INITIAL AIR BALANCE OF AHU-1 AIR TERMINAL UNITS (VAV BOXES) SERVING THE KITCHEN AND THE CORRIDOR NEXT TO THE KITCHEN (TYP. OF 6 ATU'S) AND THE KITCHEN HOOD EXHAUST FAN AND THE LAUNDRY EXHAUST FAN ON THE ROOF AND SUBMIT THE AIRFLOW TEST REPORT FOR REVIEW.
2. MAKE A TEMPORARY DUCT CONNECTION FROM THE RETURN DUCT DOWNSTREAM OF AIR HANDLER (AHU-3 AND/OR AHU-1) RETURN AIR FAN (RAF-3 AND/OR RAF-1) INTO THE LAUNDRY SUPPLY DUCT PREVIOUSLY SERVED FROM AIR HANDLER (AHU-2).
3. POSITION THE RELIEF DAMPER FOR AIR HANDLER (AHU-3 AND/OR AHU-1) CLOSED TO DIVERT THE RELIEF AIR (5,000 CFM) TO THE EXISTING CLOTHES DRYER PLENUM IN THE LAUNDRY.
3. ONCE THE DRYER DUCT PLENUM IS SUPPLIED WITH AIR FROM AIR HANDLER (AHU-3 AND/OR AHU-1) THE AIR HANDLER (AHU-2) CAN BE SHUT-DOWN AND DEMOLISHED.
4. THE EXISTING AIR HANDLER (AHU-1) SERVES THE EXISTING KITCHEN AIR DISTRIBUTION SYSTEM AND SHALL REMAIN OPERATIONAL THROUGHOUT THE DURATION OF CONSTRUCTION.
5. THE EXISTING 2 ½" HEATING HOT WATER PIPING SERVING THE AHU-2 SHALL BE REWORKED TO SERVE THE NEW AHU-2 PREHEAT COIL. DO NOT DRAIN OR CONNECT THE HW PIPING UNTIL THE END OF THE HEATING SEASON TO PREVENT HEATING SYSTEM OUTAGE.
6. THE NEW AIR HANDLER (AHU-2) 4-INCH COOLING COIL PIPING SHALL BE RUN FROM THE EXISTING 5-INCH BRANCH MAIN BEFORE IT REDUCES TO 4-INCH IN THE MECHANICAL ROOM. THE PIPING SHALL BE ROUGHED-IN AND CONNECTED TO AHU-2 WITH ALL HYDRONIC SPECIALTIES PRIOR TO THE COOLING SEASON.
7. THE SECONDARY CHILLED WATER PUMPS VARIABLE SPEED DRIVES SHALL BE TESTED, ADJUSTED AND BALANCED TO PROVIDE ADDITIONAL FLOW TO AHU-2.
8. THE EXISTING DUCTWORK SERVING THE KITCHEN SHALL BE DISCONNECTED FROM AHU-1 AND SHALL BE CONNECTED TO THE NEW AHU-2 ALONG WITH THE EXISTING DUCTWORK SERVING THE MAKE-UP AIR TO THE KITCHEN EXHAUST HOOD. AN AUTOMATIC DAMPER SHALL BE INSTALLED IN THE EXISTING MAKE-UP AIR DUCT SERVING THE KITCHEN HOODS IN THE CORRIDOR BETWEEN THE LOADING DOCK AND THE KITCHEN.
9. THE NEW AIR HANDLER (AHU-2) SHALL BE STARTED-UP AND SHALL BE TESTED ADJUSTED AND BALANCED TO THE DESIGN AIRFLOW RATE.
10. THE NEW AIR HANDLER (AHU-2) CONTROLS SHALL BE COMPLETED TO AFFECT THE SEQUENCE OF OPERATION SPECIFIED.
11. THE TEMPORARY DUCT CONNECTION FROM AHU-3 AND/OR AHU-1 (RAF-3 AND/OR RAF-1) TO THE LAUNDRY WHALL BE REMOVED AND SHALL BE PERMANENTLY CONNECTED TO AHU-1 (RAF-1) TO SERVE THE LAUNDRY CLOTHES DRYER PLENUM.
12. THE AIR HANDLERS (AHU-1 AND AHU-2) SHALL BE COMMISSIONED PRIOR TO COMPLETING PHASE 1 AND ONCE THE SYSTEM IS FUNCTIONING CORRECTLY THE CONTRACTOR SHALL PROCEED TO PHASE 2.

B. PHASE 2 – REFER TO THE PROPOSED PHASING PLAN IN THIS SECTION 01 95 00 AND ON SHEET M003.

1. REMOVE THE METAL PAN CEILING TILES IN THE KITCHEN TO ALLOW THE EXISTING AIR TERMINAL UNITS (VARIABLE AIR VOLUME BOXES) TO BE REMOVED ONE AT A TIME AS INDICATED.
2. THE OPEN CEILINGS SHALL BE CLOSED AT THE END OF EACH WORK DAY TO MAINTAIN HEALTH DEPARTMENT STANDARDS.
3. THE EXISTING HOT WATER PIPING SERVING THE VARIABLE AIR VOLUME (VAV) BOXES SHALL BE DISCONNECTED FROM THE EXISTING NEW HYDRONIC SPECIALTIES SHALL BE INSTALLED AND CONNECTED TO THE NEW AIR TERMINAL UNITS. THE EXISTING PIPING IS IN A REVERSE RETURN ARRANGEMENT.
4. WHEN THE VAV BOXES ARE REMOVED THE FLEX DUCT SERVING THE VAV BOX SHALL BE TURNED DOWN TO BLOW AIR INTO THE KITCHEN AND THE LOW PRESSURE DUCTWORK SHALL BE MODIFIED TO FIT THE NEW ATU (VAV BOX) INTO THE EXISTING DUCTED AIR DISTRIBUTION SYSTEM.
5. THE VAV BOXES SHALL BE REPLACED ONE AT A TIME IN SMALLER AREAS OF THE KITCHEN TO ALLOW THE CEILING TILE REMOVAL TO BE LIMITED TO THE AREAS OF WORK. ONCE THE VAV BOX IS REMOVED THE NEW AIR TERMINAL UNIT (VAV BOX) SHALL BE INSTALLED INCLUDING THE ASSOCIATED BAS CONTROLS AND HOT WATER PIING SPECIALTIES.
6. UPON COMPLETING AIR TERMINAL UNIT (VAV BOX) THE CEILING TILES SHALL BE REINSTALLED AND THE NEXT VAV BOX SHALL BE REPLACED AND SO ON UNTIL ALL THE AIR TERMINAL UNITS (VAV BOXES) IN THE KITCHEN ARE REPLACED.
7. THE NEW AHU-2 SHALL BE RE-TESTED, RE-ADJUSTED AND REBALANCED (TAB) AFTER THE AIR TERMINAL UNITS (VAV BOXES) ARE REPLACED AND THE BAS CONTROLS ARE FUNCTIONING. EACH EXISTING DUCT AIR OUTLET (DIFFUSER) SHALL BE BALANCED TO THE AIRFLOW INDICATED FOR AIR HANDLER (AHU-2) AT THE DESIGN AIRFLOW.
8. THE EXISTING AIR HANDLER (AHU-1) SHALL BE REBALANCED TO THE AIRFLOW (15,000 CFM) SPECIFIED AND THE DUCT STATIC PRESSURE SETPOINT SHALL BE ADJUSTED ACCORDINGLY.
9. THE AIR HANDLER (AHU-2) SHALL BE RECOMMISSIONED PRIOR TO SUBSTANTIAL COMPLETION IN ACCORDANCE WITH THE COMMISSIONING PLAN TO AFFECT THE SEQUENCE OF OPERATION SPECIFIED.
10. PROVIDE CLOSE-OUT DOCUMENTATION SUCH AS OPERATION AND MAINTENANCE MANUALS, WARRANTIES, AS-BUILTS DOCUMENTS, AND TRAINING. REFER TO DIVISION 1 FOR OTHER APPLICABLE REQUIREMENTS.

C. ARCHITECTURAL/STRUCTURAL

THE ARCHITECTURAL/STRUCTURAL WORK REQUIRED FOR THE HVAC REPLACEMENT CONSISTS OF THE FOLLOWING:

1. PROVIDE GBR TESTING FOR WALL OPENINGS AND CORE DRILLING OR SAW CUTTING PENETRATIONS IN THE GROUND LEVEL BOILER ROOM WALLS AND THE CORRIDOR WALLS AND THE KITCHEN WALLS WHERE PENETRATIONS ARE INDICATED ON THE CONSTRUCTION DOCUMENTS.
2. PROVIDE OPENINGS IN SECURE AREAS UNDER ARLINGTON COUNTY (DES) AND SHERRIFF'S DEPARTMENT SUPERVISION. OPENINGS SHALL BE TEMPORARILY SECURED WITH METAL PLATES BOLTED THROUGH THE WALL UNTIL THE DUCTWORK SECURITY BARS ARE PERMANENTLY INSTALLED. TEMPORARY DUST CONTROLS AND EXHAUST FANS SHALL BE USED TO REMOVE DUST AND DEBRIS. THE AREA SHALL BE CLEANED EACH DAY TO MAINTAIN ACCEPTABLE INDOOR AIR QUALITY CONDITIONS.
3. COORDINATE REQUIREMENTS AND SCHEDULE REMOVAL AND REINSTALLATION OF THE EXISTING LOW VOLTAGE DEVICES, LIGHT FIXTURES, AND SPRINKLER HEADS PRIOR TO PENETRATING EXISTING WALLS FOR AHU-2 RETURN DUCTWORK INSTALLATION. THE WORK WILL BE PERFORMED BY THE ARLINGTON COUNTY SUBCONTRACTOR FOR RELOCATION OF EXISTING LIGHTING, MISCELLANEOUS CONDUIT, SPRINKLER PIPING, FIRE ALARM AND SECURITY DEVICES FOR INSTALLATION OF THE AHU-2 RETURN DUCTWORK.
4. PROVIDE PIPE SUPPORTS FOR HANGING OR SUPPORTING PIPE FROM EXISTING CONCRETE STRUCTURES. SUPPORTS SHALL BE ASTM A123 OT DIPPED GALVANIZED BEAM BRACKETS.
5. PROVIDE EXTENDED HOUSEKEEPING PAD AND PROVIDE EPOXY COATING FOR ENTIRE PAD FOR SUPPORTING AIR HANDLER (AHU-2).
6. REMOVE AND REPLACE CEILINGS AS NECESSARY TO COMPLETE WORK. ALL LOW VOLTAGE DEVICES, LIGHTING, SPRINKLER HEADS, ETC., THAT ARE TEMPORARILY REMOVED SHALL BE REPLACED BACK IN THE ORIGINAL LOCATION PRIOR TO STARTING THE WORK.
7. COORDINATE REQUIREMENTS AND SCHEDULE REMOVAL AND REINSTALLATION OF THE LOW VOLTAGE DEVICES, LIGHTING, SPRINKLER HEADS, ETC., THAT ARE IN THE WAY OF INSTALLING THE AHU-2 RETURN AIR DUCTWORK IN THE CORRIDORS, THE TRASH ROOM AND THE LOADING DOCK TO MISS THE NEW SHEET METAL RETURN AIR DUCTWORK.
8. PROVIDE HIGH PERFORMANCE EPOXY FLOOR COATING IN THE DETENTION FACILITY HOUSEKEEPING PAD FOR AHU-2.
9. PATCH, PAINT, REPAIR AND FINISH ANY WALLS, FLOORS OR CEILING DAMAGE THROUGHOUT THE DURATION OF CONSTRUCTION.

D. WALL OPENINGS

1. WHEN INSTALLING THE RETURN DUCT WITH PENETRATIONS THROUGH THE EXISTING SECURE WALLS THE OPENINGS SHALL BE GUARDED BY THE ARLINGTON COUNTY SHERRIFFS DEPARTMENT. THE DRILLING AND ALL WIRING ACTIVITY WORK SHALL OCCUR DURING REGULAR HOURS FROM 6:00 AM UNTIL 8:00 PM. EACH OPENING SHALL BE SEALED WITH EITHER THE FINAL SECURITY BAR BOLTED AND WELDED ASSEMBLY OR A TEMPERORARY BOLTED BARRIER. HOWEVER, A TEMPORARY BOLTED BARRIER CANNOT BE LEFT FOR MORE THAN 24 HOURS BEFORE THE FINAL BOLTED AND WELDED ASSEMBLY IS INSTALLED. THE FIRE DAMPER SHALL BE INSTALLED ON THE LESS SECURE SIDE OF THE WALL AND SHALL BE PROVIDED WITH AN ACCESS DOOR FOR DAMPER AND SECURITY BAR INSPECTION.

E. KITCHEN METAL PAN CEILING

1. PROVIDE REMOVAL AND REPLACEMENT OF THE METAL PAN CEILING PANELS IN THE KITCHEN DAILY FOR ACCESS TO THE EXISTING AIR TERMINAL UNT (VAV BOXES). FOR REMOVAL AND REPLACEMENT WITH NEW HOT WATER VAV BOXES WITH NEW PIPING SPECIALTIES AND ELECTRONIC DIRECT DIGITAL CONTROLS.

F. FIRE ALARM

1. EXISTING FIRE ALARM DEVICES THAT NEED TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLER AND DUCTWORK SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANGER AND WITH THE FIRE ALARM TRADE TO MINIMIZE OUTAGES.

G. SPRINKLER

1. EXISTING SPRINKLER DEVICES THAT NEED TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLER AND DUCTWORK SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANGER AND WITH THE SPRINKLER TRADE TO MINIMIZE OUTAGES.

H. SECURITY

1. EXISTING SECURITY DEVICES THAT NEED TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLER AND DUCTWORK SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANGER AND WITH THE SECURITY TRADE TO MINIMIZE OUTAGES.

I. MISCELLANEOUS ELECTRIC CONDUIT

1. THE EXISTING MISCELLANEOUS ELECTRIC CIRCUIT THAT NEEDS TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLER AND DUCTWORK SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANAGER AND WITH THE ELECTRICAL TRADE TO MINIMIZE OUTAGES.

J. MISCELLANEOUS LIGHTING

1. THE EXISTING MISCELLANEOUS LIGHTING THAT NEEDS TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLERS AND DUCTWORK SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANGER AND WITH THE ELECTRICAL TRADE TO MINIMIZE OUTAGES.

No.	Date	Revision

b2E consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE E. BEDDOW
No. 021233
4-20-2020
PROFESSIONAL ENGINEER

FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

Sheet Name:
PROPOSED PHASING PLAN

Drawn By: b2E
Checked By: B2

Date: 06-15-2020

JOB # 18608

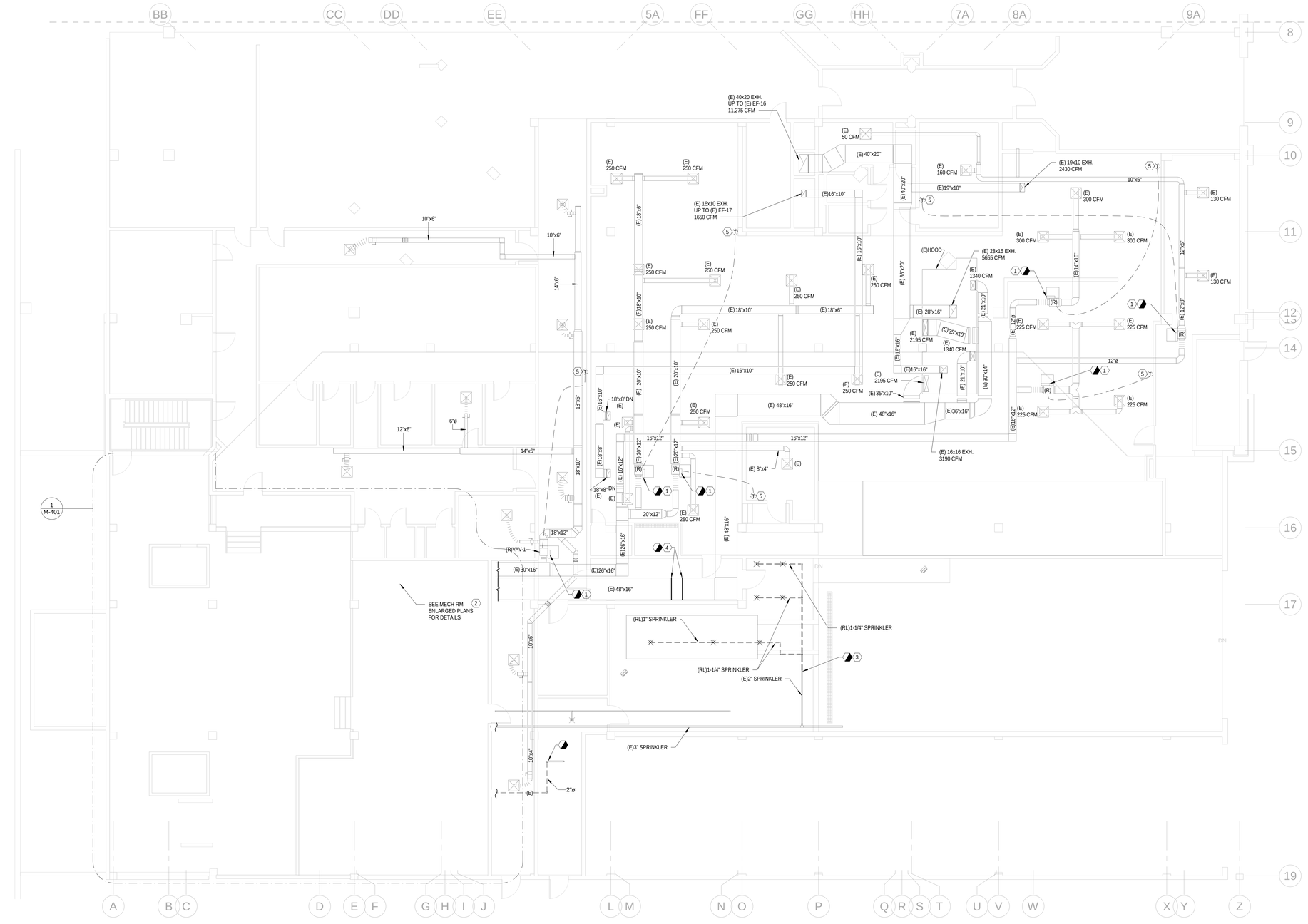
Sheet Number:
M-003

GENERAL NOTES:

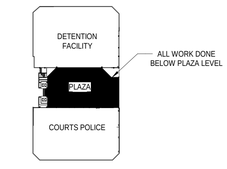
1. REFER TO SHEET M001 FOR SYSTEMS AND ABBREVIATIONS.
2. REFER TO SHEET M002 FOR GENERAL NOTES.
3. REFER TO THE PROJECT MANUAL FOR TECHNICAL SPECIFICATIONS.
4. REFER TO THE PROJECT MANUAL FOR THE PROPOSED PHASING PLAN.
5. COORDINATE WITH THE AC SHERIFFS DEPARTMENT AND THE FACILITIES MANAGEMENT PROJECT MANAGER FOR ALL OUTAGES AT LEAST 2-WEEKS PRIOR TO THE OUTAGE. OUTAGES SHALL BE AFTER HOURS NO LONGER THAN 10-HOURS LONG BETWEEN THE HOURS OF 8PM UNTIL 6 AM.

DEMOLITION NOTES: (#)

1. REMOVE EXISTING ATU (VAV BOX) AND ASSOCIATED DUCT CONNECTIONS, PIPING CONNECTIONS AND CONTROLS.
   - CAP-OFF PIPING FOR CONNECTION TO NEW ATU (VAV BOX)
2. REFER TO SHEETS M-401 - M-402 FOR PHASE 1 CONSTRUCTION.
3. RELOCATE EXISTING SPRINKLER TO MAKE ROOM FOR RETURN DUCT. - REFER TO SHEET MH-101.
4. CUT EXISTING DUCTWORK FOR INSTALLATION OF NEW MOTOR OPERATED DAMPERS.
5. PNEUMATIC THERMOSTATS (TYP. OF 6): REMOVE EXISTING PNEUMATIC THERMOSTATS WHERE INDICATED.



1 KITCHEN FLOOR PLAN - PHASE 2 - DEMOLITION
1/8" = 1'-0"



GROUND FLR. - KEY PLAN

NO. | DATE | REVISION

b2 engineering
consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Fax: 703 737 0440
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE E. BEDDOW
No. 021233
04-20-2020
PROFESSIONAL ENGINEER

FOR BID

Project Title:
ARLINGTON CO. DETENTION CENTER
AHU-2 REPLACEMENT
ARLINGTON, VIRGINIA

Sheet Name:
KITCHEN FLOOR PLAN - PHASE 2 - DEMOLITION

Drawn By:
Checked By:

Date: 06-15-2020

JOB # 17608

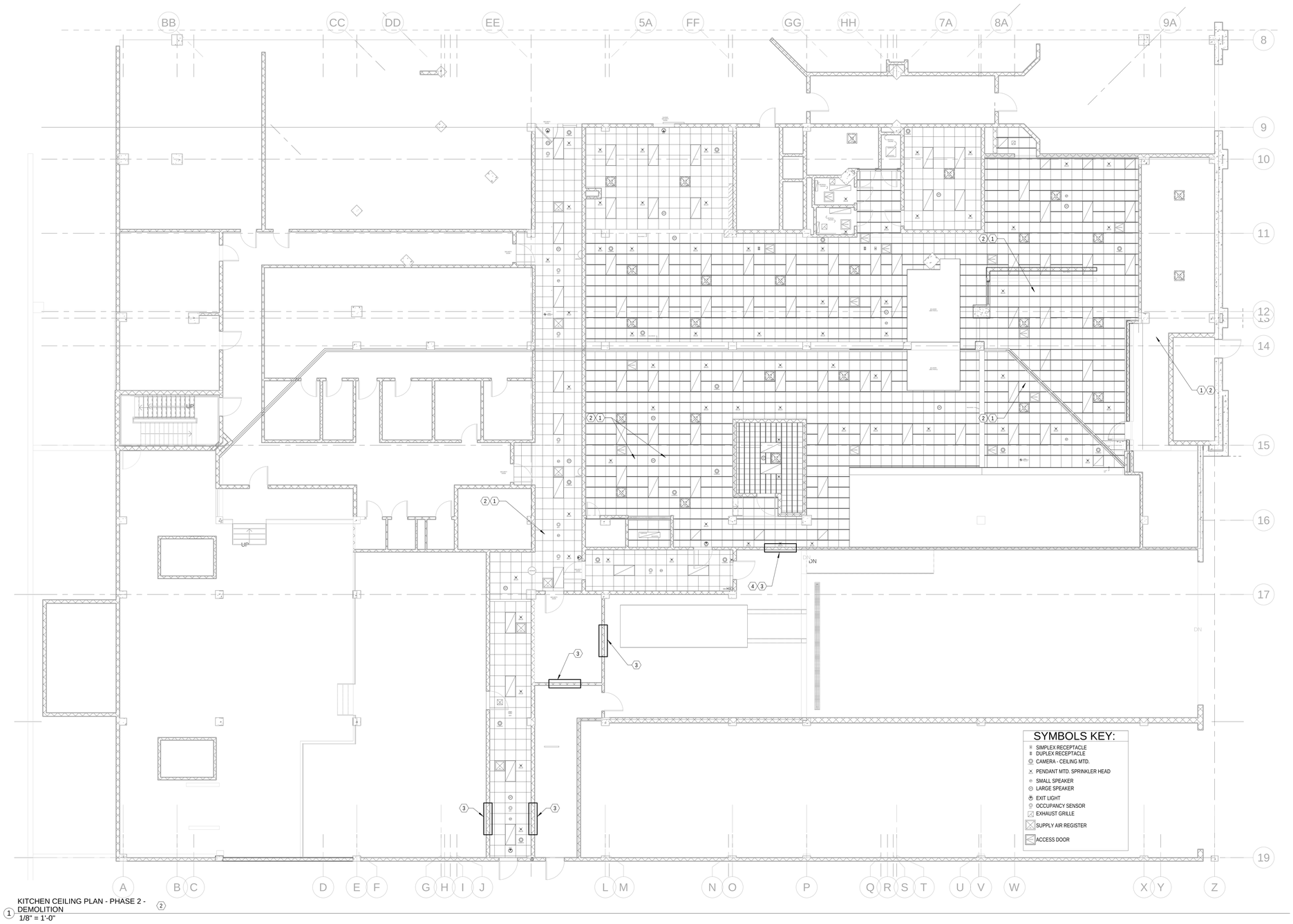
Sheet Number:
MD-101

GENERAL NOTES:

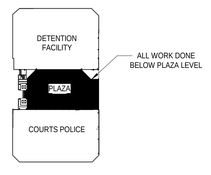
1. REFER TO SHEET M001 FOR SYSTEMS AND ABBREVIATIONS.
2. REFER TO SHEET M002 FOR GENERAL NOTES.
3. REFER TO THE PROJECT MANUAL FOR TECHNICAL SPECIFICATIONS.
4. REFER TO THE PROJECT MANUAL FOR THE PROPOSED PHASING PLAN.
5. COORDINATE WITH THE AC SHERIFFS DEPARTMENT AND THE FACILITIES MANAGEMENT PROJECT MANAGER FOR ALL OUTAGES AT LEAST 2-WEEKS PRIOR TO THE OUTAGE. OUTAGES SHALL BE AFTER HOURS NO LONGER THAN 10-HOURS LONG BETWEEN THE HOURS OF 8PM UNTIL 6 AM.

DEMOLITION NOTES: (#)

1. REMOVE AND REPLACE CEILING TILES (TYP.). REMOVE AND REPLACE CEILING TILES AS NECESSARY TO REPLACE VAV BOX AND ASSOCIATED DUCTWORK, PIPING AND CONTROLS.
2. REPLACE EXISTING CEILING TILE BACK TO ORIGINAL CONDITION AS INDICATED ON THIS REFLECTED CEILING PLAN.
3. AREA OF WORK FOR RETURN AIR DUCT PENETRATION THROUGH EXISTING WALL.
   - REFER TO DETAIL #3 ON SHEET M-502.
4. REFER TO DETAIL #1 ON SHEET M-503.



1 KITCHEN CEILING PLAN - PHASE 2 - DEMOLITION (2)
1/8" = 1'-0"



GROUND FLR. - KEY PLAN

NO.	DATE	REVISION

b2e consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Fax: 703 737 0440
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE T. BEDDOW
No. 021238
04-10-2020
PROFESSIONAL ENGINEER

FOR BID

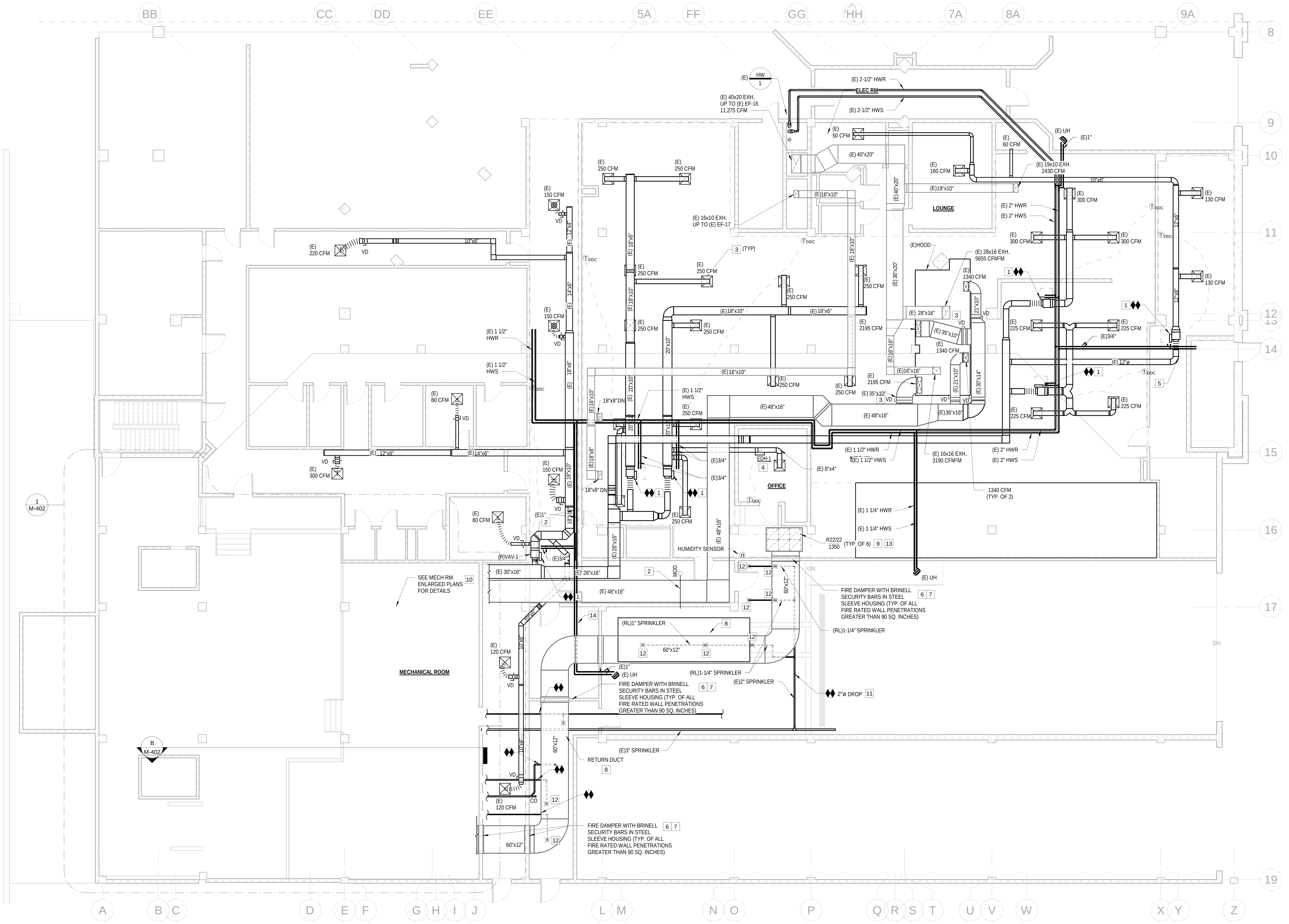
Project Title:
ARLINGTON CO. DETENTION CENTER
AHU-2 REPLACEMENT
ARLINGTON, VIRGINIA

Sheet Name:
KITCHEN CEILING PLAN - PHASE 2 - DEMOLITION

Drawn By:
Checked By:
Date: 06-15-2020

JOB # 17608

Sheet Number:
MD-102



1 KITCHEN FLOOR PLAN - PHASE 2 - NEW WORK
1/8" = 1'-0"

GENERAL NOTES:

1. REFER TO SHEET M001 FOR SYSTEMS AND ABBREVIATIONS.
2. REFER TO SHEET M002 FOR GENERAL NOTES.
3. REFER TO THE PROJECT MANUAL FOR TECHNICAL SPECIFICATIONS.
4. REFER TO THE PROJECT MANUAL FOR THE PROPOSED PHASING PLAN.
5. COORDINATE WITH THE AC SHERIFFS DEPARTMENT AND THE FACILITIES MANAGEMENT PROJECT MANAGER FOR ALL OUTAGES AT LEAST 2-WEEKS PRIOR TO THE OUTAGE. OUTAGES SHALL BE AFTER HOURS NO LONGER THAN 10-HOURS LONG BETWEEN THE HOURS OF 8PM UNTIL 6 AM.

CONSTRUCTION NOTES:

1. PROVIDE ATU (VAV BOX): CONNECT TO EXISTING DUCTWORK. MODIFY EXISTING DUCTWORY AS REQUIRED FOR LEAK FREE INSTALLATION.
   - CONNECT HYDRONIC PIPING, CONTROL VALVE AND SPECIALTIES IN ACCORDANCE WITH DETAIL #7 ON SHEET M-502.
   - PROVIDE VAV BOX CONTROLLER AND INTERLOCK COMMUNICATION WIRING BACK TO SIEMENS BAS.
2. PROVIDE OPPOSED MULTI-BLADE MOTOR OPERATED DAMPER (LOW LEAKAGE) AND INTERLOCK TO THE BAS TO AFFECT THE SEQUENCE OF OPERATIONS SPECIFIED.
3. DIFFUSERS (TYP.): BALANCE EXISTING DAMPERS TO AIRFLOW INDICATED.
4. ELECTRIC DUCT HEATER: PROVIDE SCR CONTROLLED ELECTRIC DUCT HEATER WITH WALL MOUNTED TEMPERATURE SENSOR.
   - INTERLOCK EDH TO BAS.
   - MOUNT IN 12/10 DUCT
5. PROVIDE INSULATED SPIRAL WOUND ROUND MEDIUM PRESSURE DUCTWORK WHERE IN EXPOSED SPACES ON INLET SIDE OF VAV BOX.
6. PROVIDE BRINEL (SECURITY) BARS AT DUCT PENETRATION THRU BLOCK WALL (TYP.).
   - REFER TO DETAIL #3 ON SHEET M-502.
7. PROVIDE FIRE DAMPERS AT DUCT PENETRATIONS THRU BLOCK WALL (TYP.).
   - REFER TO DETAIL #2 ON SHEET M-503.
8. PROVIDE 4-INCH MEDIUM PRESSURE CLASS RETURN DUCTWORK.
   - DUCTWORK SHALL BE HELD TIGHT TO UNDERSIDE OF STRUCTURE.
   - THE FOLLOWING SYSTEM COMPONENTS SHALL BE RELOCATED BY ARLINGTON COUNTY (DES) SUBCONTRACTOR. COORDINATE WITH THE ARLINGTON COUNTY SUBCONTRACTOR BELOW OR BESIDE THE NEW RETURN DUCTWORK.
   - LIGHT FIXTURES
   - SPRINKLER PIPING.
   - FIRE ALARM DEVICES.
   - ELECTRICAL CONDUIT.
   - LOW VOLTAGE CONDUIT.
   - SECURITY CAMERAS.
9. RETURN AIR INLETS (TYP. OF 6): PROVIDE 72" X 48" PLENUM BOX ABOVE CEILING WITH SIX (6) 2X2 RETURN CIRCUITS.
   - TAP SIDE OR INSULATED RETURN AIR PLENUM BOX WITH 60" X 12" RETURN DUCT.
10. REFER TO SHEETS M-401 THRU M-402 FOR PHASE 1 CONSTRUCTION.
11. COORDINATE WITH THE ARLINGTON COUNTY (DES) PROJECT MANAGER AND THE ARLINGTON COUNTY SUBCONTRACTOR TO PROVIDE SPRINKLER DROPS AND NEW HORIZONTAL SPRINKLER FEED IN THE SAME SIZE AND ROUTING (6" LOWER) TO ALLOW FOW UPRIGHT HEADS UNDER DUCTWORK.
12. COORDINATE WITH THE ARLINGTON COUNTY (DES) PROJECT MANAGER AND THE ARLINGTON COUNTY SUBCONTRACTOR TO RELOCATE EXISTING SPRINKLER, LIGHTING, CONDUIT, ETC. AS REQUIRED TO ACCOMODATE DUCT INSTALLATION. THEN RE-INSTALL BELOW DUCTWORK.
13. REFER TO "RETURN AIR PLENUM AND GRILLE DETAIL" #3 ON SHEET M-502 FOR ADDITIONAL APPLICABLE INFORMATION.
14. RELOCATE EXISTING HOT WATER SUPPLY AND RETURN PIPING IN THE TRASH ROOM TO MAKE ROOM FOR THE RETURN DUCTWORK.

NO.	DATE	REVISION

consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Fax: 703 737 0440
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE E. BEDDOW
No. 021238

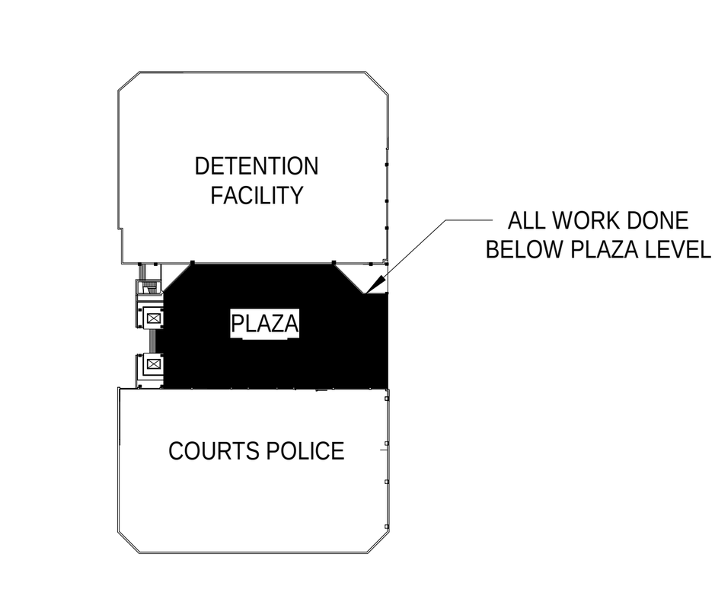
FOR BID

Project Title:
ARLINGTON CO. DETENTION CENTER
AHU-2 REPLACEMENT
ARLINGTON, VIRGINIA

Sheet Name:
KITCHEN FLOOR PLAN - PHASE 2 - NEW WORK

Drawn By:
Checked By:
Date: 06-15-2020
JOB # 17608

Sheet Number:
MH-101



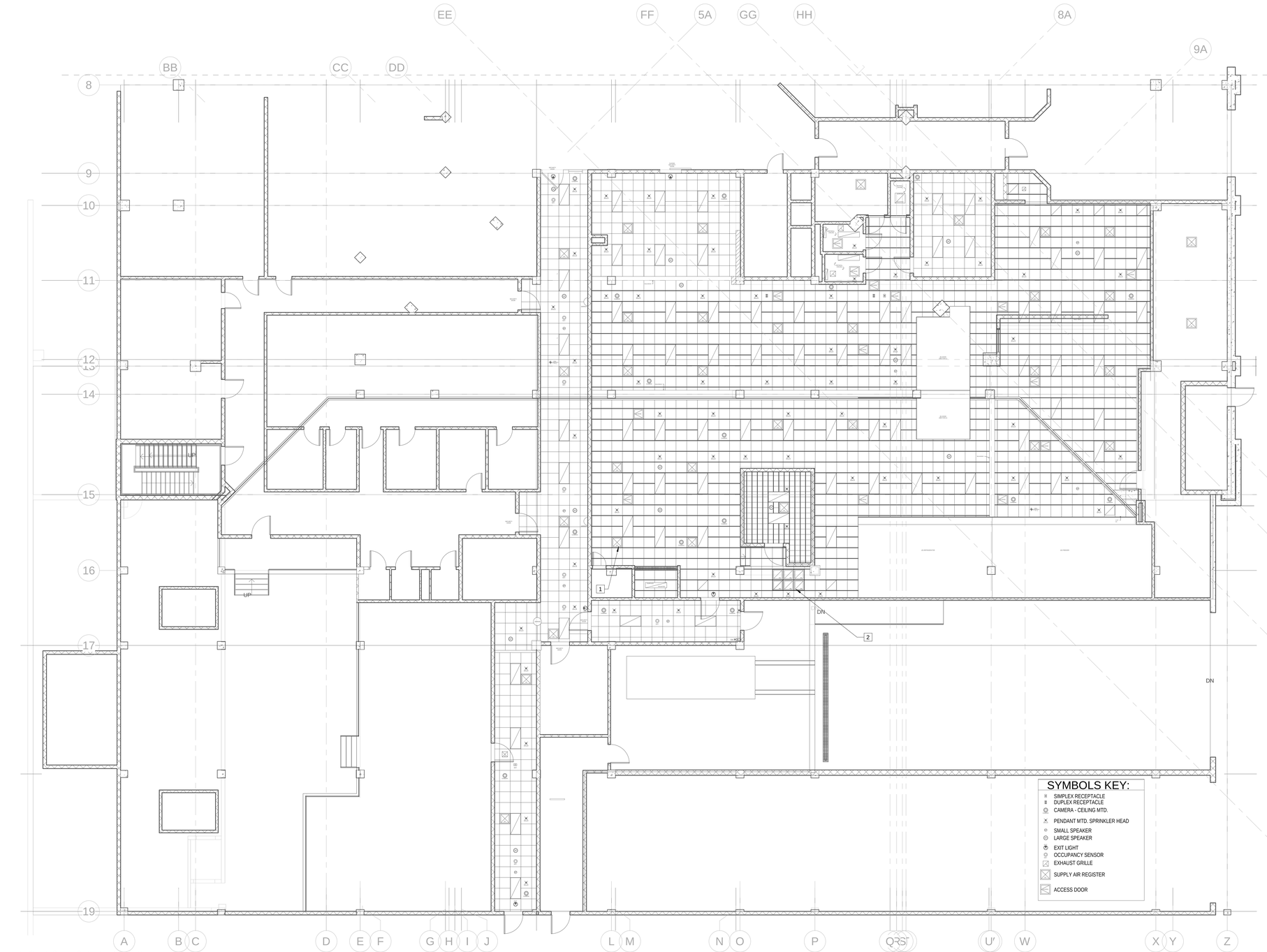
GROUND FLR. - KEY PLAN

GENERAL NOTES:

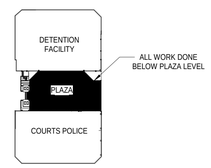
1. REFER TO SHEET M001 FOR SYSTEMS AND ABBREVIATIONS.
2. REFER TO SHEET M002 FOR GENERAL NOTES.
3. REFER TO THE PROJECT MANUAL FOR TECHNICAL SPECIFICATIONS.
4. REFER TO THE PROJECT MANUAL FOR THE PROPOSED PHASING PLAN.
5. COORDINATE WITH THE AC SHERIFFS DEPARTMENT AND THE FACILITIES MANAGEMENT PROJECT MANAGER FOR ALL OUTAGES AT LEAST 2-WEEKS PRIOR TO THE OUTAGE. OUTAGES SHALL BE AFTER HOURS NO LONGER THAN 10-HOURS LONG BETWEEN THE HOURS OF 8PM UNTIL 6 AM.

CONSTRUCTION NOTES:

1. BALANCE EXISTING AIR OUTLETS (TYP.): BALANCE 2X2 AIR OUTLETS TO AIRFLOW INDICATED
   - SIX (6) ATUS SHALL BE BALANCED ALONG WITH ALL ASSOCIATED AIR OUTLETS.
   - ONE (1) RETURN AIR DUCT AND ASSOCIATED GRILLES
   - AIR OUTLETS FOR THE EXISTING HOODS.
2. REFER TO "RETURN AIR PLENUM AND GRILLE DETAIL" #3 ON SHEET M-502 FOR ADDITIONAL APPLICABLE INFORMATION.



1 KITCHEN CEILING PLAN - PHASE 2 - NEW WORK
1/8" = 1'-0"



GROUND FLR. - KEY PLAN

NO.	DATE	REVISION

consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Fax: 703 737 0440
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE T. BEDDOW
No. 021238
04-10-2020
PROFESSIONAL ENGINEER

FOR BID

Project Title:
ARLINGTON CO. DETENTION CENTER
AHU-2 REPLACEMENT
ARLINGTON, VIRGINIA

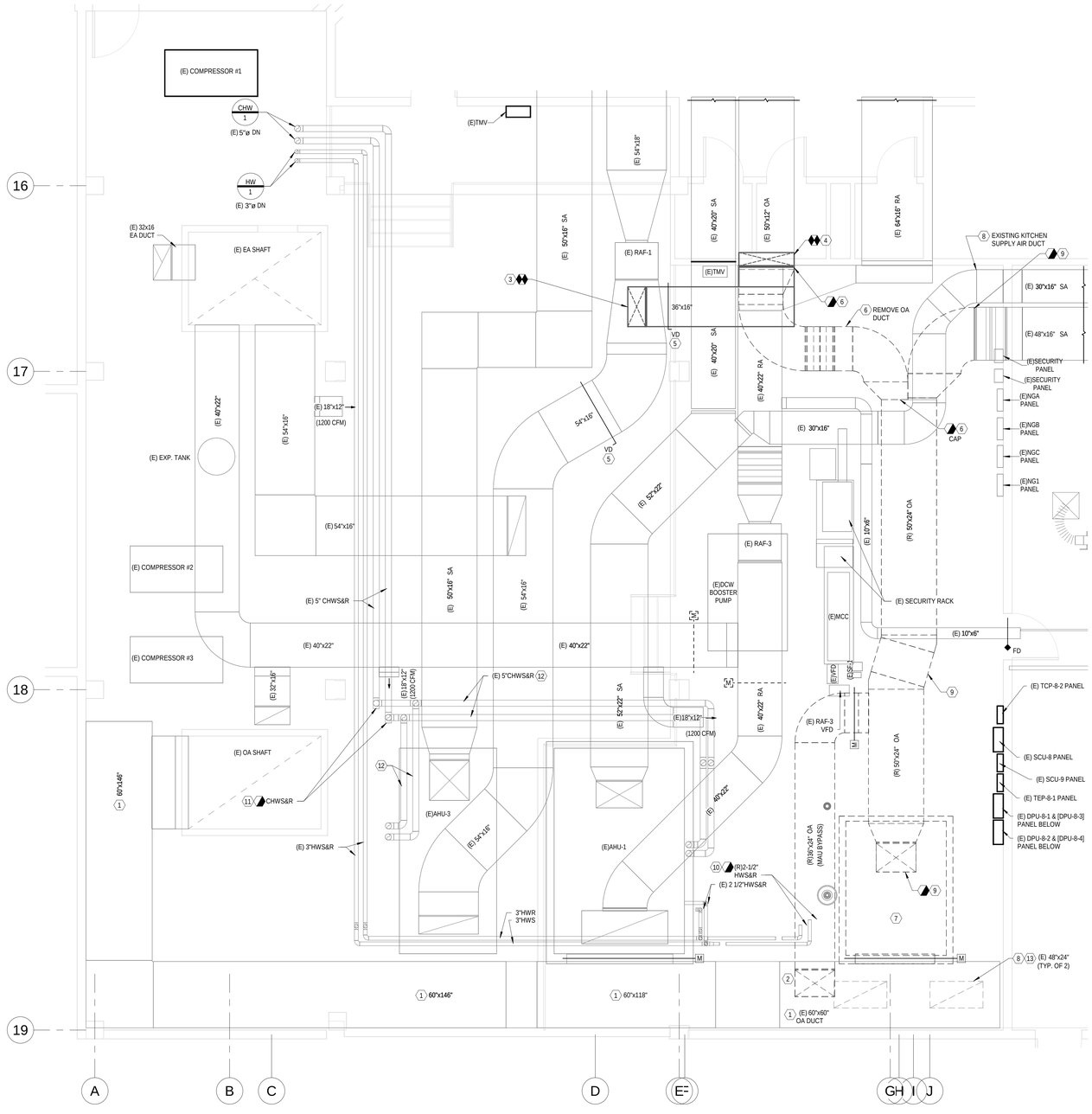
Sheet Name:
KITCHEN CEILING PLAN - PHASE 2 - NEW WORK

Drawn By:
Checked By:

Date: 06-15-2020

JOB # 17608

Sheet Number:
MH-102



1 MECHANICAL RM ENLARGED PLAN - PHASE 1 - DEMOLITION
1/4" = 1'-0"

GENERAL NOTES:

1. REFER TO SHEET M001 FOR SYSTEMS AND ABBREVIATIONS.
2. REFER TO SHEET M002 FOR GENERAL NOTES.
3. REFER TO THE PROJECT MANUAL FOR TECHNICAL SPECIFICATIONS.
4. REFER TO THE PROJECT MANUAL FOR THE PROPOSED PHASING PLAN.
5. COORDINATE WITH THE AC SHERIFFS DEPARTMENT AND THE FACILITIES MANAGEMENT PROJECT MANAGER FOR ALL OUTAGES AT LEAST 2-WEEKS PRIOR TO THE OUTAGE. OUTAGES SHALL BE AFTER HOURS NO LONGER THAN 10-HOURS LONG BETWEEN THE HOURS OF 8PM UNTIL 6 AM.

DEMOLITION NOTES: (#)

1. EXISTING OUTSIDE AIR DUCT SHALL REMAIN.
2. PROVIDE INSULATED DUCT CAP CLOSURE WHEN BYPASS CONNECTION IS REMOVED.
3. CONNECT 36X16 TEMPORARY DUCT TO BOTTOM OF EXISTING RETURN AIR DUCT. RUN UNDER EXISTING AHU-1 SUPPLY AND RETURN DUCTS AND CONNECT TO EXISTING LAUNDRY VENTILATION DUCT
   - OPTION: PROVIDE MULTIPLE FLEX DUCT CONNECTIONS TO MISS MISC. PIPING IN THIS AREA. QUANTITY AND SIZE SHALL BE EQUIVALENT TO 36x16.
4. CONNECT TEMPORARY DUCT TO EXISTING 52/12 LAUNDRY VENTILATORS DUCT. TRANSITION DUCTWORK AS NECESSARY TO MAKE TEMPORARY CONNECTION.
   - OPTION: PROVIDE MULTIPLE FLEX DUCT CONNECTION TO MISS MISC. PIPING IN THIS AREA. QUANTITY AND SIZE SHALL BE EQUIVALENT TO 36x16.
5. PROVIDE TEMPORARY MANUAL LOW LEAK VOLUME DAMPERS TO ALLOW BALANCING OF RETURN AIR TO BE REDIRECTED TO THE LAUNDRY VENTILATION DUCT.
6. REMOVE EXISTING VENTILATION SUPPLY DUCT TO THE LAUNDRY. COORDINATE THE REMOVAL AND CAPPING OFF OF THE EXISTING SUPPLY WITH BACKFEEDING THE TEMPORARY RETURN AIR CONNECTION FROM RAF-1.
7. REMOVE EXISTING AHU-2 AND ASSOCIATED HW PIPING, POWER AND CONTROLS
   - EXISTING CONTROL POINTS SHALL BE REMOVED BACK TO THE EXISTING CONTROL PANEL TO ENSURE EXISTING PNEUMATIC SYSTEM REMAINS FULLY OPERATIONAL THROUGHOUT THE BUILDING.
8. EXISTING AHU-1 SUPPLY AIR DUCT SHALL REMAIN OPERATIONAL THROUGHOUT THE DURATION OF CONSTRUCTION.
9. REMOVE AHU-2 SUPPLY AIR DUCTS. TAKE EXTREME CARE WHEN REMOVING EXISTING DUCTWORK ABOVE EXISTING MOTOR CONTROL CENTER AND RACK MOUNTED COMPUTER EQUIPMENT.
10. DISCONNECT FROM EXISTING HWS&R PIPING SERVING AHU-2 AND CAP-OFF FOR CONNECTION TO NEW AHU-2 PREHEAT COIL.
11. DISCONNECT FROM EXISTING CWS&R PIPING FOR CONNECTION TO NEW AHU-2 COOLING COIL.
    - CHW SYSTEM SHALL BE DRAINED AND EXISTING AIR HANDLERS SHALL OPERATE ON ECONOMIZER MODE.
    - REMOVE ELBOW AND REPLACE WITH TEE FOR EXTENSION OF PIPING TO AHU-2.
12. EXISTING CWS&R PIPING SERVING AHU-1 AND AHU-3.
13. EXISTING OA MAKE-UP AIR DUCTS SERVING GARAGE BELOW TO REMAIN.

NO. | DATE | REVISION

b2e consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Fax: 703 737 0440
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE T. BEDDOW
No. 021233
06-16-2020
PROFESSIONAL ENGINEER

FOR BID

Project Title:
ARLINGTON CO. DETENTION CENTER
AHU-2 REPLACEMENT
ARLINGTON, VIRGINIA

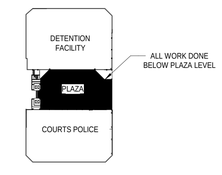
Sheet Name:
MECHANICAL RM ENLARGED PLAN - PHASE 1 - DEMOLITION

Drawn By:
Checked By:

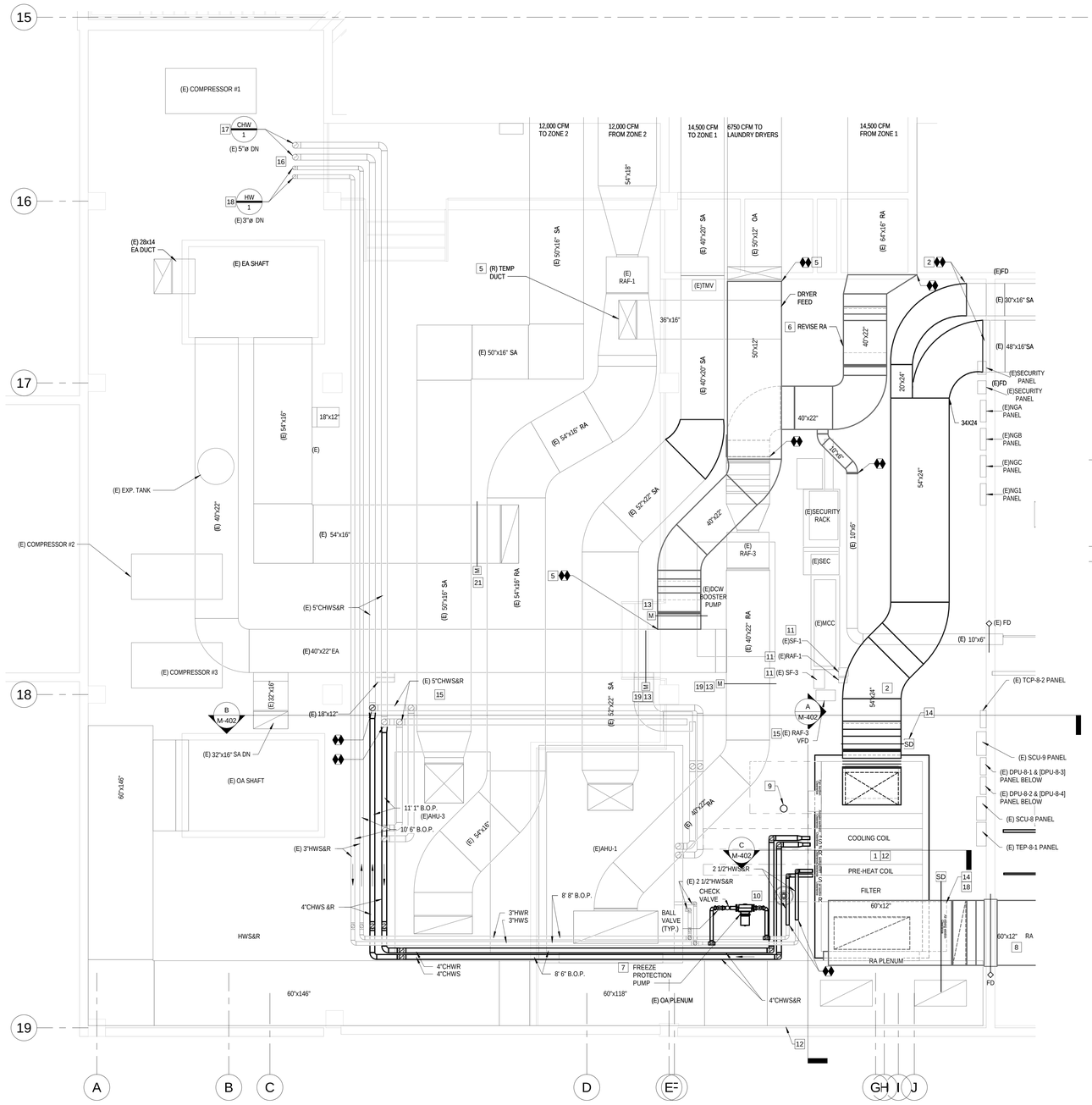
Date: 06-15-2020

JOB # 17608

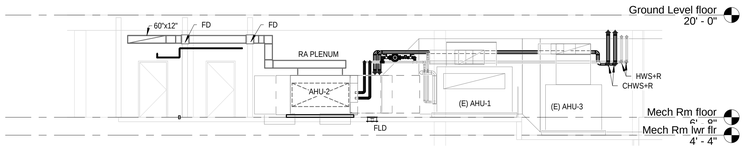
Sheet Number:
M-401



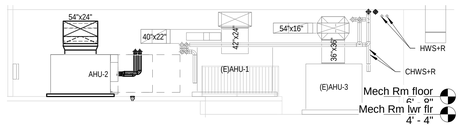
GROUND FLR. - KEY PLAN



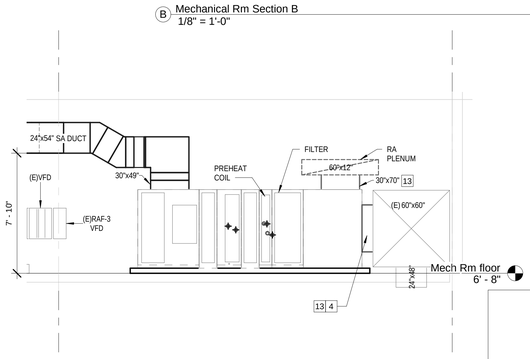
1 MECH RM ENLARGED PLAN - PHASE 1 - NEW WORK
1/4" = 1'-0"



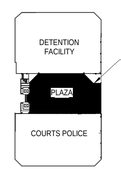
C AHU-2 SECTION C
1/8" = 1'-0"



B Mechanical Rm Section B
1/8" = 1'-0"



A AHU-2 SECTION A
1/4" = 1'-0"



GROUND FLR. - KEY PLAN

GENERAL NOTES:

1. REFER TO SHEET M001 FOR SYSTEMS AND ABBREVIATIONS.
2. REFER TO SHEET M002 FOR GENERAL NOTES.
3. REFER TO THE PROJECT MANUAL FOR TECHNICAL SPECIFICATIONS.
4. REFER TO THE PROJECT MANUAL FOR THE PROPOSED PHASING PLAN.
5. COORDINATE WITH THE AC SHERIFFS DEPARTMENT AND THE FACILITIES MANAGEMENT PROJECT MANAGER FOR ALL OUTAGES AT LEAST 2-WEEKS PRIOR TO THE OUTAGE. OUTAGES SHALL BE AFTER HOURS NO LONGER THAN 10-HOURS LONG BETWEEN THE HOURS OF 8PM UNTIL 6 AM.

CONSTRUCTION NOTES:

1. PROVIDE NEW AHU-2 WITH HOUSEKEEPING PAD.
2. EXTEND 54X24 SA TO POINT OF CONNECTION INDICATED.
3. EXTEND 60X12 RA TO NEW KITCHEN RA GRILLE. SEE KITCHEN PLAN FOR CONTINUATION.
4. CONNECT OA TRAQ DAMPER TO EXISTING OA DUCT (END CONNECTION). MODIFY CONNECTION AND REINFORCE DUCT CASING TO MATCH EXISTING CONSTRUCTION.
5. PROVIDE NEW SA TAP ON RA DUCT UP STREAM OF EXISTING RA FAN AND EXTEND TO EXISTING 50/12 DUCT FOR DRYER MAKE-UP AIR.
   - REMOVE TEMPORARY DUCT CONNECTION TO RF-1 AND PATCH RF-1 DUCT.
6. PROVIDE REVISED RETURN AIR DUCTWORK ROUTING AS INDICATED.
7. PROVIDE IN-LINE CENTRIFUGAL FREEZE PROTECTION PUMP IN PARALLEL ARRANGEMENT TO PREHEAT COIL.
   - SIZE PUMP TO MATCH PREHEAT COIL DESIGN FLOW RATE.
   - REFER TO P & ID FLOW DIAGRAM AND COIL PIPING DETAIL.
8. PROVIDE NEW 60/12 RA DUCTWORK OFFSET TO CONNECTION TO RA MIXING BOX.
   - PROVIDE WITH 1-INCH THICK DUCT LINER IN MECHANICAL ROOM.
9. INSTALL 2" INSULATED COPPER CONDENSATE DRAIN (CD) WITH P-TRAP AND CLEANOUT CAP TO POINT INDICATED.
10. PROVIDE NEW OPEN SITE DRAIN AS INDICATED. EXISTING FLOOR DRAIN SHALL BE REMOVED PRIOR TO POURING HOUSEKEEPING PAD.
11. EXISTING AFD'S SHALL REMAIN.
    - IF LONGER THAN THE BASIS OF DESIGN AIR HANDLER LENGTH IS PROVIDED THEN EXISTING RAF-3 AFD SHALL BE RELOCATED.
12. SUPPLY AIR FLOW MONITORING STATION: PROVIDE AIR FLOW MONITORING STATION WITH A VELOCITY SENSOR AND BUILT-IN TO THE SUPPLY FANS.
13. AHU-1 UNIT MOUNTED DAMPERS: PROVIDE RETURN AIR DAMPER AND OA DAMPER AS INDICATED.
    - PROVIDE MODULATING OPPOSED BLADE DAMPERS WITH END SWITCHES.
    - ULTRA LOW LEAK DAMPERS
    A. RAF-1 RETURN
    B. RAF-1 RELIEF
    C. RAF-1 LAUNDRY
14. INSTALL NEW DUCT SMOKE DETECTORS PROVIDED BY DIV 26. INTERLOCK TO THE EXISTING FIRE ALARM SYSTEM TO SHUT DOWN THE AIR HANDLER AND INITIATE A TROUBLE ALARM UPON DETECTING PRODUCTS OF COMBUSTION.
    - PROVIDE DUCT SMOKE DETECTORS THAT ARE COMPATIBLE WITH THE EXISTING FIRE ALARM SYSTEM.
15. EXISTING CHW TAP SHOWN FEEDS AHU-1 & AHU-3.
16. EXISTING CHW AND HW BRANCH MAIN PIPINGFROM LOWER LEVEL MECHANICAL ROOM.
17. EXISTING 5" CHWS&R DOWN TO LOWER MECHANICAL ROOM. THIS RISER SHALL SERVE AHU-1, AHU-2, AND AHU-3.
18. EXISTING 3" HWS&R DOWN TO LOWER MECHANICAL ROOM. THIS RISER SHALL SERVE AHU-1 AHU-2, AND AHU-3.
19. EXISTING DUCT MOUNTED OPPOSED BLADE DAMPERS SHALL BE PROVIDED WITH ELECTRONIC DDL MOTOR OPERATORS.

b2e consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Fax: 703 737 0440
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE E. BEDDOW
No. 021233
04-10-2020
PROFESSIONAL ENGINEER

NO. | DATE | REVISION

FOR BID

Project Title:
ARLINGTON CO. DETENTION CENTER
AHU-2 REPLACEMENT
ARLINGTON, VIRGINIA

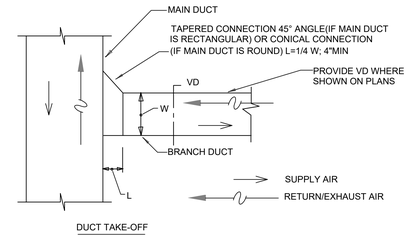
Sheet Name:
MECHANICAL RM ENLARGED PLAN - PHASE 1 - NEW WORK

Drawn By:
Checked By:
Date: 06-15-2020
JOB # 17608

Sheet Number:
M-402

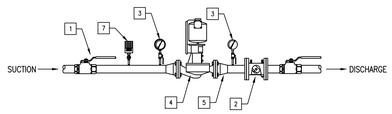
MEDIUM PRESSURE DUCT FITTINGS	LOW PRESSURE DUCT FITTINGS	TERMINAL UNIT CONNECTIONS
CONICAL TEE REDUCING	RADIUS 90° ELBOW SQUARE 90° ELBOW NOTE: VANES REQ'D IN ALL SQUARE ELBOWS	
CONICAL TEE	RADIUS OFFSET 45° TRANSITION	
SHORT RADIUS ELBOW W/VANES	45° TAP AND DUCT CONTINUATION	SQUARE TO ROUND ENLARGED ECCENTRIC
RADIUS 90° ELBOW	3-WAY SPLIT	ENLARGED SQUARE TO ROUND
RADIUS OFFSET	SQUARE TEE	CONICAL TAP ROUND
2-WAY SPLIT	RADIUS TEE ZEE OFFSET	BELLMOUTH
RADIUS TEE	SQUARE 45° ELBOW RADIUS 45° ELBOW RADIUS ELBOW W/VANES	CONICAL TAP

7 STANDARD SHEETMETAL DETAILS
NOT TO SCALE



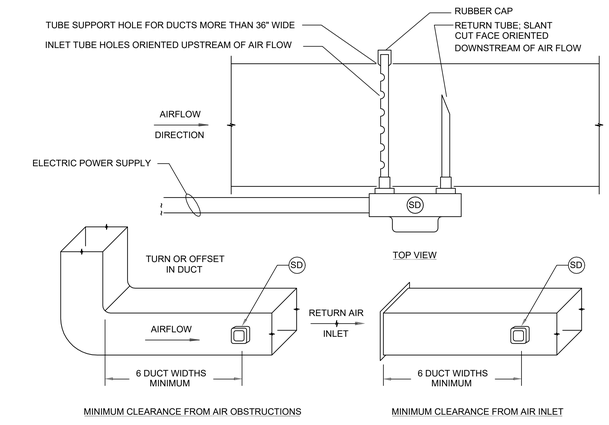
DUCT TAKE-OFF

13 BRANCH TAKE-OFF SUPPLY, RETURN AND EXHAUST
NOT TO SCALE



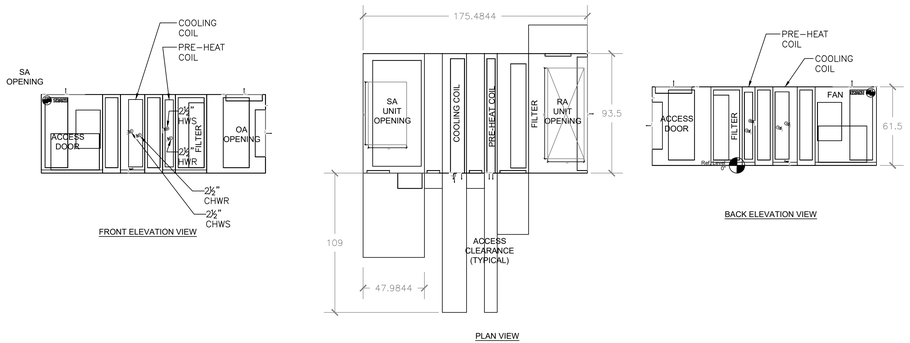
1. PROVIDE ISOLATION VALVE (TYPICAL): PROVIDE BALL VALVE FOR 2-INCH AND SMALLER: PROVIDE HIGH PERFORMANCE BUTTERFLY VALVE FOR 2½-INCH AND LARGER.
2. CALIBRATED BALANCING VALVE: PROVIDE VALVE SIZED WITHIN CONTROLLABLE RANGE FOR ACTUAL SYSTEM FLOW RATE (GPM).
   - PROVIDE DIFFERENTIAL PRESSURE GAUGE WITH FLOW CALCULATOR AND TURN OVER TO OWNER.
3. PRESSURE GAUGE (0-100 PSIG) (TYP.).
   - PROVIDE 1/2-INCH NEEDLE VALVE OR BALL VALVE.
4. PROVIDE INLINE PUMP WITH BUILT-IN VARIABLE SPEED DRIVE: PROVIDE PRESSURE INDICATORS ON SUCTION AND DISCHARGE PIPING.
   - WHERE MOTOR MOUNTED HORIZONTAL, PROVIDE PUMP WITH MOTOR HANGER SHIELD TO PREVENT MOTOR DAMAGE TO THE COUPLING DUE TO EXCESSIVE WEIGHT ON THE PUMP COUPLING.
5. PROVIDE CONCENTRIC REDUCER FITTING (TYP.)
6. REFER TO DETAILS WHICH INCLUDE STACKING IN-LINE PUMPS FOR OTHER APPLICABLE REQUIEMRENTS.
7. TEMPERATURE INDICATOR WITH IMMERSION WELL (HW:0-200°F; DHW 0-200°F) (TYPICAL).

10 TYPICAL INLINE FREEZE PROTECTION PUMP DETAIL
N.T.S.

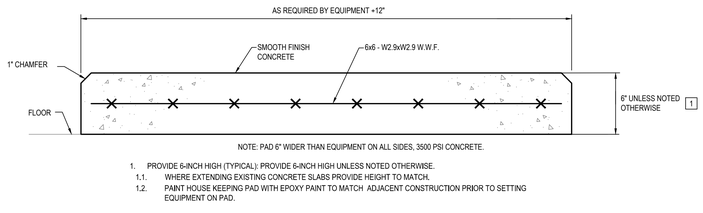


NOTES:
1. INLET TUBE LENGTH SHALL BE EQUAL TO FULL WIDTH OF DUCT.
2. RETURN TUBE SHALL BE AS RECOMMENDED BY THE DETECTOR'S MANUFACTURER.
3. CLEARANCES FROM OBSTRUCTIONS, INLETS AND PROPER LOCATION IN THE SYSTEM SHALL BE IN ACCORDANCE WITH NEMA: "GUIDE FOR PROPER USE OF SMOKE DETECTORS IN DUCT APPLICATIONS, NFPA 90A, U.L. STANDARD 268A AND NFPA 72E.

6 DUCT SMOKE DETECTOR INSTALLATION
NOT TO SCALE



3 AIR HANDLING UNIT (AHU-2) - PLANS AND ELEVATIONS
NOT TO SCALE

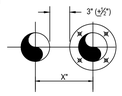


NOTE: PAD 6" WIDER THAN EQUIPMENT ON ALL SIDES, 3500 PSI CONCRETE.

1. PROVIDE 6-INCH HIGH (TYPICAL): PROVIDE 6-INCH HIGH UNLESS NOTED OTHERWISE.
   1.1. WHERE EXTENDING EXISTING CONCRETE SLABS PROVIDE HEIGHT TO MATCH.
   1.2. PAINT HOUSE KEEPING PAD WITH EPOXY PAINT TO MATCH ADJACENT CONSTRUCTION PRIOR TO SETTING EQUIPMENT ON PAD.

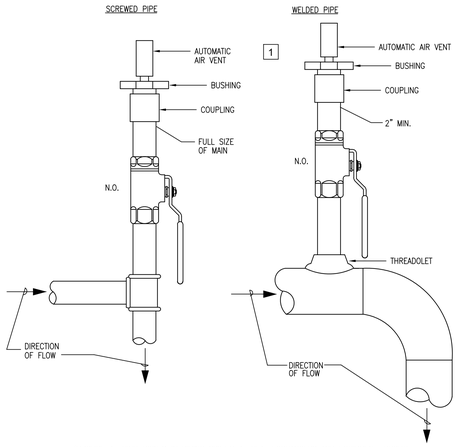
12 TYPICAL INDOOR EQUIPMENT CONCRETE PAD DETAIL
NTS

PIPE SIZE	24	20	18	16	14	12	10	8	6	4	3	2	½	1
1	20	18	16	16	14	13	12	11	10	8	8	7	6	6
½	20	18	17	16	15	14	12	11	10	9	8	7	7	
2	20	18	17	16	15	14	12	11	11	9	8	7		
3	21	19	17	17	15	14	13	12	11	9	9			
4	21	19	18	17	16	15	13	12	12	10				
6	22	20	19	18	17	16	14	13	13					
8	23	21	20	19	18	17	15	14						
10	24	22	21	20	19	18	16							
12	25	23	22	21	20	19								
14	26	24	23	22	21									
16	27	25	24	23										
18	28	26	25											
20	29	27												
24	31													



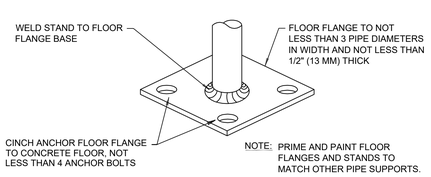
NOTE
LINE SPACING SHOWN IN CHART IS FOR UN-INSULATED PIPES. INSULATION THICKNESS SHALL BE ADDED FOR INSULATED PIPES.

9 STANDARD PIPE SPACING - 150# FLANGES
NTS



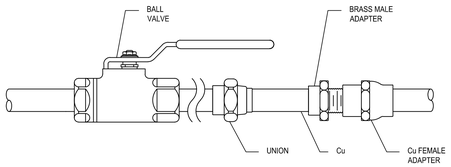
(PROVIDE AT HIGH POINTS IN PIPING SYSTEM AT HEAT EXCHANGERS AND EQUIPMENT. PROVIDE QUANTITY AS REQUIRED TO COMPLETELY ELIMINATE AIR IN PIPING SYSTEMS)

5 TYPICAL AUTOMATIC AIR VENT DETAIL FOR WATER SYSTEMS
NTS



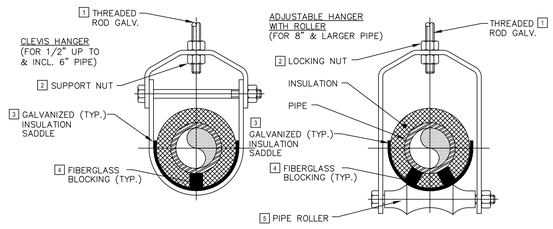
NOTE: PRIME AND PAINT FLOOR FLANGES AND STANDS TO MATCH OTHER PIPE SUPPORTS.

2 FLOOR FLANGE FOR USE AS PIPE OR EQUIPMENT SUPPORT
NOT TO SCALE



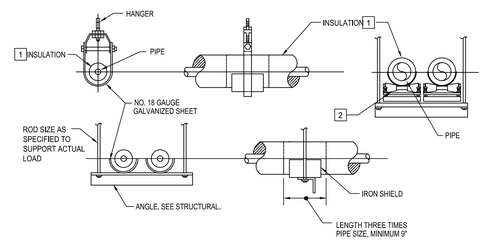
11 TYPICAL UNION ASSEMBLY
NTS

NOTE: DIELECTRIC UNIONS NOT ALLOWED.



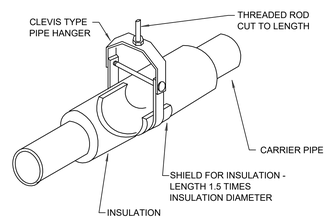
1. REFER TO SPECIFICATION FOR HANGER SPACING AND THREADED ROO SIZE.
2. PROVIDE GALV. LOCKING NUT AND SUPPORT NUT WITH WASHER (TYP.).
3. GALVANIZED INSULATION SADDLE: PROVIDE SHEET METAL GAUGE AND SADDLE LENGTH IN ACCORDANCE WITH BASIS OF DESIGN MANUFACTURER'S RECOMMENDATIONS AS FOLLOWS:
   A. TABLE FOR GALVANIZED STEEL FLARED AND CORNERED SADDLES.
   - 2" TO 5-1/2" PIPE OD (INCHES): SADDLE LENGTH = 12", 22 GA THICK
   - 6" TO 11" PIPE OD (INCHES): SADDLE LENGTH = 12", 20 GA THICK
   - 11-1/2" TO 14" PIPE OD (INCHES): SADDLE LENGTH = 15", 20 GA THICK
   - 15" TO 16" PIPE OD (INCHES): SADDLE LENGTH = 18", 18 GA THICK
4. FIBERGLASS INSULATION BLOCKING: PROVIDE THICKNESS TO MATCH INSULATION THICKNESS, PROVIDE QUANTITY AND LENGTH IN ACCORDANCE WITH THE BASIS OF DESIGN MANUFACTURER'S RECOMMENDATIONS AS FOLLOWS:
   A. TABLE FOR FIBERGLASS BLOCKING.
   - 1/2" TO 1-1/2" PIPE: NO BLOCKS NEEDED; PROVIDE FLARED AND CORNERED SADDLE.
   - 2" TO 5" PIPE: USE (1) 6" LONG FIBERGLASS BLOCK; PROVIDE FLARED AND CORNERED SADDLE.
   - 6" TO 8" PIPE: USE (2) 6" LONG FIBERGLASS BLOCK; PROVIDE FLARED AND CORNERED SADDLE.
   - 10" TO 12" PIPE: USE (3) 9" LONG FIBERGLASS BLOCK; PROVIDE FLARED AND CORNERED SADDLE.
   - 14" TO 16" PIPE: USE (4) 12" LONG FIBERGLASS BLOCK; PROVIDE FLARED AND CORNERED SADDLE.
5. ROLLER HANGER: PROVIDE GALV. STEEL ROLLER HANGER FOR PIPE SIZES 8" AND LARGER. PROVIDE HANGER AND ROLLER TO MATCH INSULATED PIPE SIZE. OPTION TO ROLLER HANGER FOR 8" AND 10" PIPE: BUCKAROOS SLIDING SADDLES MODEL TRU-BALANCE 2550FS.
6. BASIS OF DESIGN: BUCKAROOS, INC OR APPROVED EQUAL.

8 PIPE HANGER SUPPORT
NTS



1. PROVIDE A SECTION OF HIGH COMPRESSION STRENGTH "FOAM-GLASS" INSULATION AT EACH VAPOR BARRIER HANGER POINT. INSULATION MAY BE HALF-ROUND OR FULL-ROUND AND EXTEND 4" BEYOND GALVANIZED SHIELD EACH WAY.
2. PROVIDE PIPE ROLLERS FOR 6" AND LARGER PIPE WITH RUNS LONGER THAN 20 FEET.

4 HANGERS FOR HYDRONIC WATER PIPING - TYPICAL
NTS



HANGER ROD SIZING	
NOMINAL PIPE SIZE (INCHES)	MINIMUM ROD DIAMETER (INCHES)
2	3/8
3	1/2
3 1/2	1/2
4	5/8
5	5/8
6	3/4
8	7/8

1 CLEVIS TYPE PIPE HANGER DETAIL
NOT TO SCALE

No.	Date	Revision

b2E consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE E. BEDDOW
No. 021233
04-20-2020
PROFESSIONAL ENGINEER

FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

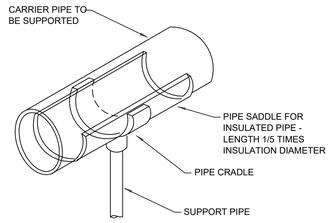
Sheet Name:
MECHANICAL DETAILS

Drawn By: b2E
Checked By: B2

Date: 06-15-2020

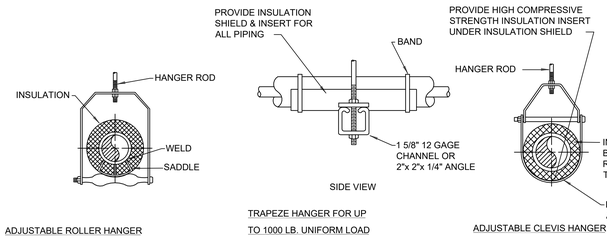
JOB # 18608

Sheet Number:
M-501



11 PIPE CRADLE FOR FLOOR SUPPORT

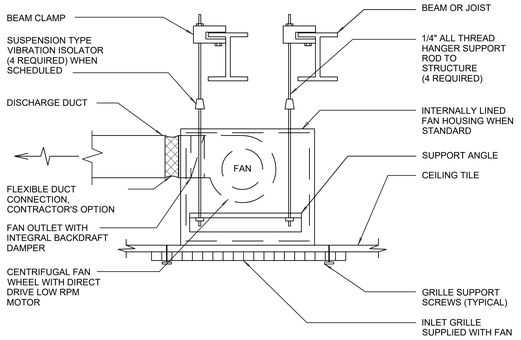
NOT TO SCALE



TYPICAL PIPE HANGER SPACING											
MAXIMUM PIPE/TUBING SUPPORT SPACING, FEET											
NOM. SIZE	THRU 3/4"	1	1¼"	1½"	2"	2½"	3"	4"	5"	6"	8"	10"
PIPING (STL)	7 FT.	7	7	7	9	10	10	10	10	15	15	20
TUBING (Cu)	5 FT.	6	6	7	7	8	9	8	8	8	8	--
NOTE: FOR TRAPEZE HANGER TAKE SPACING OF SMALLEST SIZE ON TRAPEZE.											

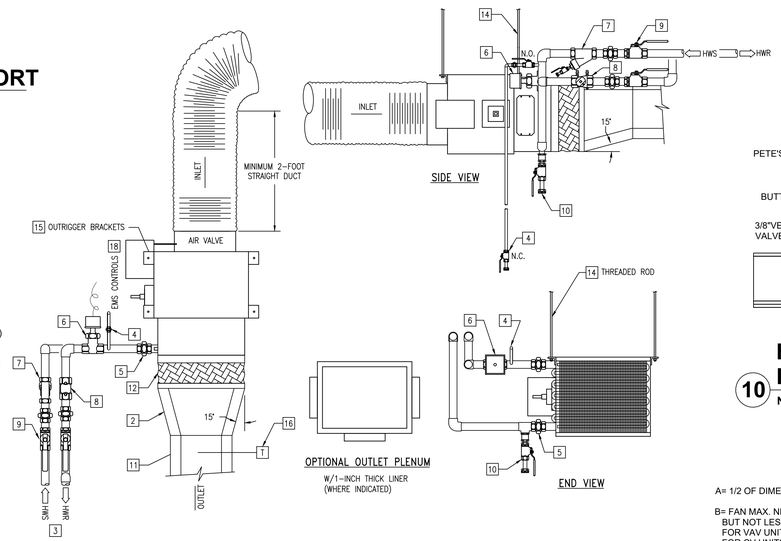
8 PIPE HANGERS, RODS AND SPACING REQUIREMENTS

NOT TO SCALE



4 CEILING MOUNTED EXHAUST FAN DETAIL

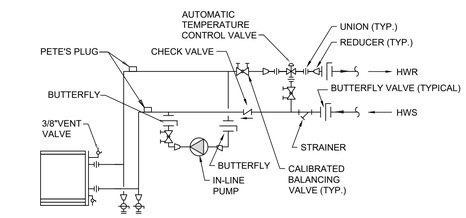
NOT TO SCALE



1. SHUTOFF AIR TERMINAL UNIT WITH HYDRONIC REHEAT COIL: REFER TO EQUIPMENT SCHEDULE FOR CAPACITY AND DIMENSIONS.
2. DUCT TRANSITION: PROVIDE DUCT TRANSITION WITH MAX. 15° ANGLE TO COIL FROM DUCT DIMENSION INDICATED ON PLANS.
3. HOT WATER PIPING: ROUTE PIPING AS HIGH AS POSSIBLE. ELBOW DOWN TO COIL CONNECTIONS.
4. MANUAL AIR VENT WITH UNION: PROVIDE 1/2-INCH MAV WITH UNION FOR EASE OF REMOVAL AND ROUTE PIPE TO LOCATION WHERE CONVENIENT TO PURGE AIR FROM SYSTEM (IN CEILING SPACE). MOUNT A 1/2-INCH BALL VALVE AT RUN OUT AND ANOTHER 1/2-INCH BALL VALVE AT 3'-6" A.F.F. DRAIN VALVE: WATTS REGULATOR SERIES B-6000-CC OR APPROVED EQUAL.
5. UNION (TYP.): PROVIDE BRASS UNION AT REHEAT COIL (RHC) PIPING CONNECTIONS. PROVIDE DIELECTRIC COUPLING AT CONNECTIONS OF DISSIMILAR METALS.
6. TWO-WAY MODULATING AUTOMATIC CONTROL VALVE: INSTALL CONTROL VALVE IN RETURN-SIDE PIPING WITH VALVE OPERATOR TOP OR SIDE AS DIRECTED BY BAS CONTRACTOR. VALVE SHALL BE POWERED BY DIV. 23 AND INTERLOCKED TO BAS BY THE BAS CONTRACTOR.
7. Y-STRAINER: INSTALL BRASS STRAINER ON SUPPLY SIDE WITH 1/2-INCH BLOW DOWN CONNECTION. INSTALL 1/2-INCH BALL VALVE WITH THREADED HOSE CONNECTION, BRASS CAP AND CHAIN. VALVE: WATTS SERIES B-6000-CC OR APPROVED EQUAL.
8. CALIBRATED BALANCING VALVE: INSTALL ON RETURN-SIDE AFTER CONTROL VALVE WITH ADEQUATE CLEARANCE FOR CONNECTING TEST TOOL FOR MEASURING PRESSURE DROP ACROSS VALVE. PROVIDE DIFFERENTIAL PRESSURE TEST KIT AND FLOW CALCULATOR.
9. ISOLATION VALVE (TYP.): INSTALL TWO-PIECE BRASS BALL VALVE FOR ISOLATION OF ATU TO ALLOW MAINTENANCE AND REPAIR/REMOVAL OF HYDRONIC SPECIALTIES.
10. DRAIN VALVE: INSTALL 3/4-INCH DRAIN VALVE WITH THREADED HOSE CONNECTION, BRASS CAP AND CHAIN. VALVE: WATTS REGULATOR SERIES B-6000-CC OR APPROVED EQUAL. OFFSET DRAIN VALVE HORIZONTALLY (OR REDUCE TO 1/2-INCH) WHERE CONFLICT EXISTS WITH ARCHITECTURAL CEILING HEIGHT.
11. CONNECT TO EXISTING LOW PRESSURE DUCTWORK.
12. FLEXIBLE DUCT CONNECTION: PROVIDE MIN. 4-INCH LONG.
13. MEDIUM PRESSURE FLEXIBLE DUCTWORK: PROVIDE MIN. 2-FOOT STRAIGHT DUCT AT INLET TO ATU. MAX. FLEXIBLE DUCT LENGTH SHALL BE 4-FEET. PROVIDE CLASS "0" UL 181 RATED SYSTEM WITH 2-INCH THICK INSULATION.
14. THREADED ROD: PROVIDE MIN. 3/8-INCH DIAMETER THREADED ROD.
15. OUTRIGGER BRACKETS: SHALL BE FACTORY FABRICATED AND INSTALLED. (TYP. OF 4 PER UNIT)
16. ATU-DISCHARGE AIR TEMPERATURE SENSOR: PROVIDE AND INSTALL ATU OUTLET FROM EACH ATU INTERLOCK TO MONITOR TEMPERATURE LEAVING ATU AND READ OUT ON DDC BAS GRAPHICS SCREEN FOR EACH ATU (VAV BOX) DIGITAL ADDRESS.
17. SHUT-OFF AIR TERMINAL UNIT DETAIL WITHOUT REHEAT IS SIMILAR.
18. PROVIDE REQUIRED CLEARANCES PER THE NEC FOR ALL ELECTRICAL CONNECTIONS.

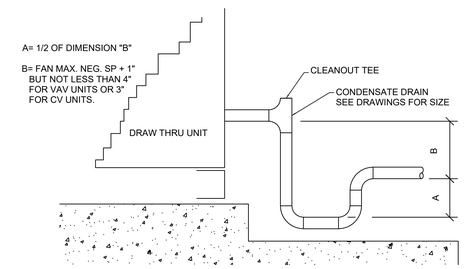
7 TYPICAL SHUT-OFF ATU (VAV BOX) DETAIL

NOT TO SCALE



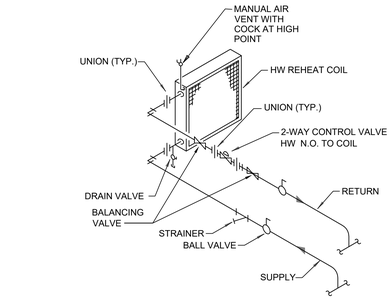
10 HW COIL WITH FREEZE PROTECTION PUMP

NOT TO SCALE



6 AHU CONDENSATE TRAP DETAIL

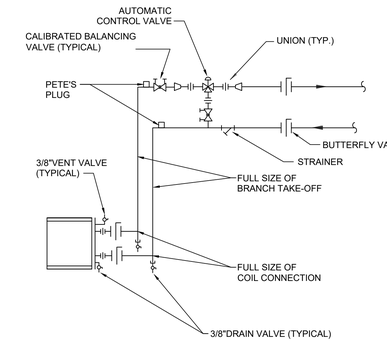
NOT TO SCALE



HOT WATER VAV BOX PIPING DETAIL

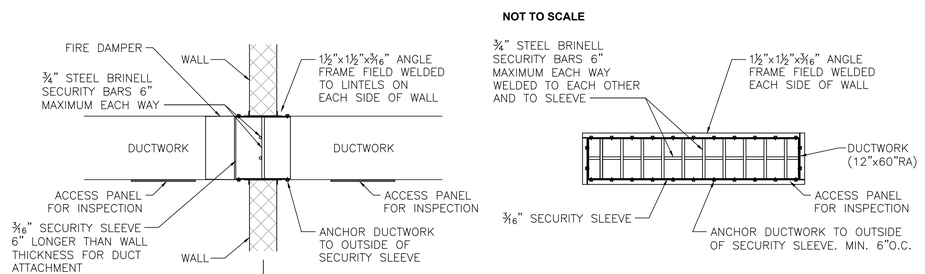
9

NOT TO SCALE



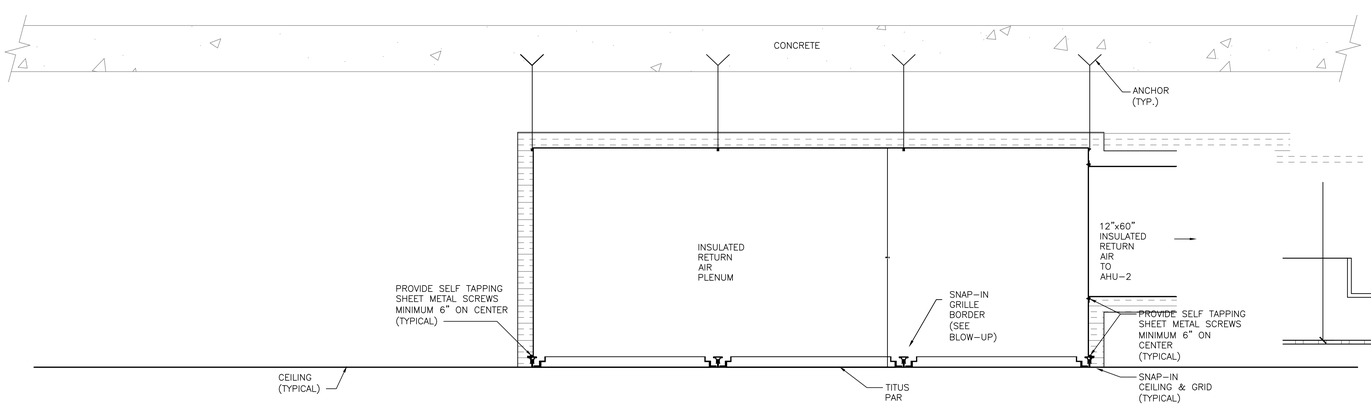
3-WAY AHU CHW COIL PIPING (2-1/2" AND LARGER)

5

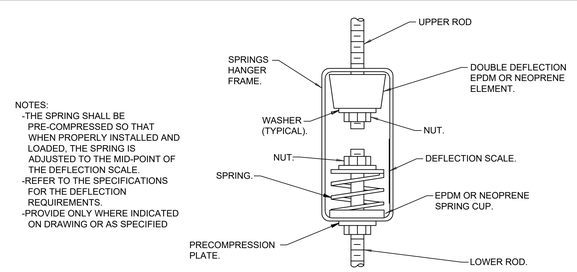


3 SECURITY DUCT SLEEVE AT WALL PENETRATION DETAILS

NOT TO SCALE



2



NOTES:
- THE SPRING SHALL BE PRE-COMPRESSED SO THAT WHEN PROPERLY INSTALLED AND LOADED, THE SPRING IS ADJUSTED TO THE MID-POINT OF THE DEFLECTION SCALE.
- REFER TO THE SPECIFICATIONS FOR THE DEFLECTION REQUIREMENTS.
- PROVIDE ONLY WHERE INDICATED ON DRAWING OR AS SPECIFIED

SPRING ISOLATED HANGER FOR PIPE OR EQUIPMENT DETAIL

1

NOT TO SCALE

No.	Date	Revision

b2E consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE E. BEDDOW
No. 021233
04-20-2020
PROFESSIONAL ENGINEER

FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

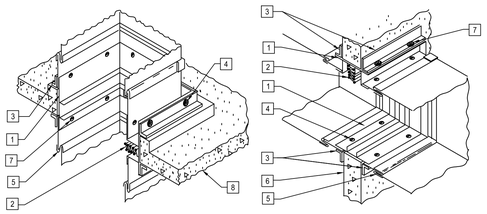
Sheet Name:
MECHANICAL DETAILS

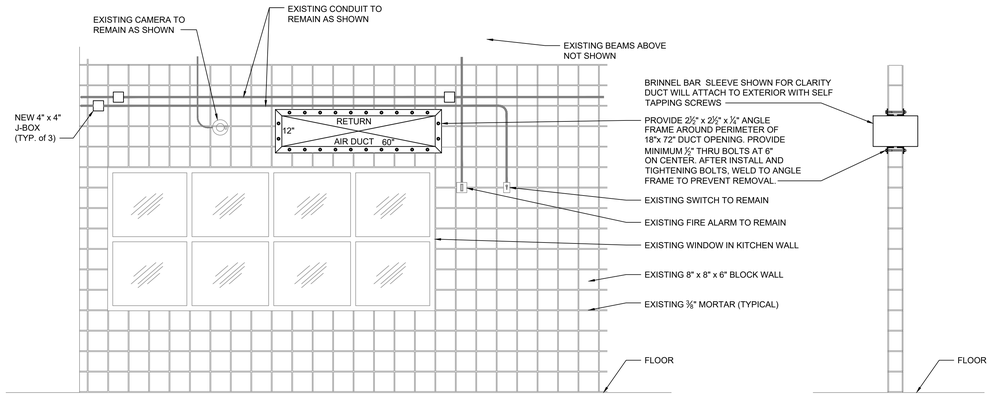
Drawn By: b2E
Checked By: B2

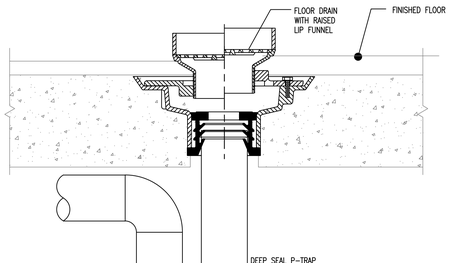
Date: 06-15-2020

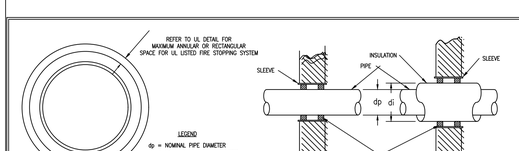
JOB # 18608

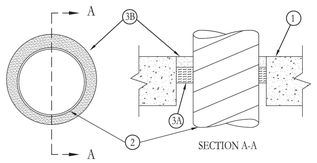
Sheet Number:
M-502

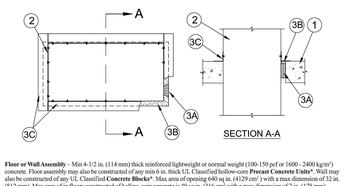


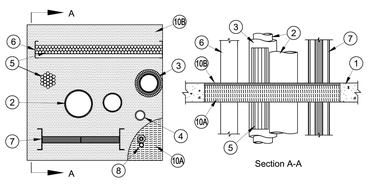


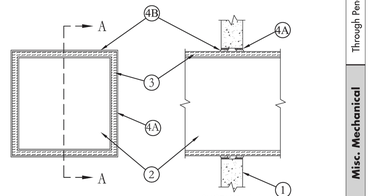












1. WALL SLEEVE
2. FIRE DAMPER
3. MOUNTING ANGLES
4. BOLT, SCREW OR RIVET BETWEEN SLEEVE AND DAMPER
5. BREAK-AWAY JOINT
6. WALL
7. BOLT, SCREW OR RIVET BETWEEN SLEEVE AND DAMPER
8. FLOOR

2 TYPICAL FIRE DAMPER INSTALLATION DETAIL

NTS

WALL ELEVATION

WALL SECTION

1 RETURN AIR PLENUM AND GRILLE DETAIL

NOT TO SCALE

GENERAL NOTES

1. REFER TO SHEETM001 FOR SYSTEMS AND ABBREVIATIONS.
2. REFER TO SHEET M002 FOR GENERAL NOTES.
3. REFER TO THE PROJECT MANUAL FOR TECHNICAL SPECIFICATIONS.
4. REFER TO THE PROJECT MANUAL FOR THE PROPOSED PHASING PLAN.
5. COORDINATE WITH THE AC SHERIFFS DEPARTMENT AND THE FACILITIES MANAGEMENT PROJECT MANAGER FOR ALL OUTAGES AT LEAST 2-WEEKS PRIOR TO THE OUTAGE. OUTAGES SHALL BE AFTER HOURS NO LONGER THAN 9-HOURS LONG BETWEEN THE HOURS OF 7PM UNTIL 4AM.

DUCT FIRE STOPPING

MAX. DUCT HEIGHT (dh) (INCHES)	MAX. DUCT WIDTH (dw) (INCHES)	MAX. OPENING AREA (AO) (SQ. INCHES)	MIN. DUCT GAUGE	PARTITIONS, FLOORS, CEILINGS (CMU/CONC) 1-HR/2-HR	METAL STUD DRYWALL/SHAFTWALL 1-HR/2-HR	FIRE RESISTANCE RATING
RECTANGLE (CMU/CONC)						
30	18	576	24	C-AJ-7076	---	2-HR
30	24	1015	24	W-J-7030	---	2-HR
96	96	9800	18	W-J-7036	---	1-HR
ROUND (CMU/CONC)						
16"ø	---	18"ø	24	C-AJ-7003	---	2-HR
RECTANGLE (GYPSUM METAL STUD)						
30	18	640	24	---	W-L-7091	2-HR
36	30	1216	24	---	W-L-7008	2-HR
96	96	9,800	18	---	W-L-7063	1-HR
ROUND (GYPSUM METAL STUD)						
4"ø	---	5"ø	28	---	W-L-7016	2-HR
6"ø	---	7"ø	28	---	W-L-7032	1-HR
16"ø	---	17-1/2"ø	24	---	W-L-7043	1-HR
18"ø	---	19-1/2"ø	24	---	W-L-7045	1-HR

DUCT FIRESTOPPING:

A) ALL DUCTWORK PENETRATIONS THRU RATED WALLS SHALL BE OF EQUAL OR HEAVIER GAUGE THAN INDICATED ON THIS SCHEDULE AND SHALL MEET THE SPECIFIC GAUGE REQUIRED BY THE LOCAL AUTHORITIES HAVING JURISDICTION.

B) FLOOR PENETRATIONS: THE UL LISTED FIRE STOPPING DETAIL IS PROVIDED AS AN ACCEPTABLE, TESTED ASSEMBLY FOR PENETRATIONS THRU A CONCRETE FIRE RATED ASSEMBLY SYSTEM. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE THE ACTUAL REQUIREMENTS FOR PROPER INSTALLATION OF THE DUCT PENETRATION TO ENSURE IT MEETS ALL REQUIREMENTS OF THE UNDERWRITERS LABORATORY (UL) DETAIL, OWNER'S REPRESENTATIVE AND THE AUTHORITIES HAVING JURISDICTION.

C) WALL PENETRATIONS: THE UL LISTED FIRE STOPPING DETAIL IS PROVIDED AS AN ACCEPTABLE, TESTED ASSEMBLY FOR PENETRATIONS THRU A FIRE RATED WALL ASSEMBLY AS LISTED. (REFER TO ARCHITECTURAL SHEET FOR FIRE RATED WALL DETAILS). THE CONTRACTOR IS RESPONSIBLE TO COORDINATE THE ACTUAL REQUIREMENTS FOR PROPER INSTALLATION OF THE DUCT PENETRATION TO ENSURE IT MEETS ALL REQUIREMENTS OF THE UNDERWRITERS LABORATORY (UL) DETAIL, THE OWNER'S REPRESENTATIVE AND THE LOCAL AUTHORITIES HAVING JURISDICTION. COORDINATE DRAWINGS OF EACH PENETRATION TYPE SHALL BE PROVIDED TO THE ARCHITECT FOR REVIEW AND APPROVED PRIOR TO ORDERING EQUIPMENT OR STARTING THE WORK.

D) FIRE DAMPER: PROVIDE UL 155 LISTED FIRE DAMPER OR UL 155-S LISTED COMBINATION SMOKE/FIRE DAMPER AT ALL FIRE RATED PENETRATIONS. PROVIDE ACCESS DOORS IN BOTH DUCTWORK AND ARCHITECTURAL CONSTRUCTION TO INSPECT DAMPERS AS NECESSARY.

1 OPEN SITE DRAIN w/ LIPPED FUNNEL – DETAIL

NOT TO SCALE

System No. C-AJ-7003

October 05, 2006
F Rating – 3 Hr
T Rating – 0 Hr
L Rating At Ambient – 1 CFM/sq ft (See Item 3)
L Rating At 400 F – less than 1 CFM/sq ft (See Item 3)
W Rating – Class I (See Item 3B)

1. **Floor or Wall Assembly** – Min 4-1/2 in. (114 mm) thick lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 18 in. (457 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

1A. **Steel Sleeve** – Nom 6 in. (152 mm) diam (or smaller) Schedule 40 (or heavier) steel pipe sleeve, cast into floor or wall flush with floor or wall surfaces.

2. **Through Penetrant** – One steel duct to be installed either concentrically or eccentrically within the firestop system. An annular space of min 1/2 in. (13 mm) to max 1-1/2 in. (38 mm) is required within the firestop system. Steel duct to be rigidly supported on both sides of floor or wall assembly. The following sizes of steel ducts may be used:
   A. **Steel Duct** – Nom 16 in. (406 mm) diam (or smaller) No. 24 gauge (or heavier) spiral wound galv steel duct.
   B. **Steel Vent Duct** – Nom 10 in. (254 mm) diam (or smaller) No. 28 gauge (or heavier) galv steel vent duct.
3. **Firestop System** – The firestop system shall consist of the following:
   A. **Packing Material** – Nom 1 in. (25 mm) thickness of tightly-packed mineral wool batt insulation firmly packed into opening as a permanent form. Polyethylene backer rod or nom 1 in. (25 mm) thick glass fiber insulation may be used with steel vent ducts (Item 2B) in lieu of mineral batt insulation. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of caulk fill material.
   B. **Fill, Void or Cavity Materials* – Caulk or Sealant** – Min 1 in. (25 mm) thickness of fill material applied within the annulus, flush with top surface of floor or both surfaces of wall assembly. W Rating applies only when FB-3000 WT sealant is used. Water resistance of through penetrant (Item 2) must be considered in addition to water resistance of firestop system.
      3M COMPANY – CP 25WB+ or FB-3000 WT
      (Note: W Rating applies only when FB-3000 WT sealant is used.)

*Bearing the UL Classification Marking

Through Penetrations
Misc. Mechanical
7000 Series
Concrete
CAJ

This material was extracted and drawn by 3M Fire Protection Products from the 2007 edition of the UL Fire Resistance Directory.

3M Fire Protection Products
www.3m.com/firestop
C-AJ-7003 • 1 of 1
Product Support Line: 1-800-328-1687
Choose option 4 for FAX ON DEMAND
553

System No. C-AJ-7076

March 15, 2007
F Rating – 2 Hr
T Rating – 0 Hr

1. **Floor or Wall Assembly** – Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600 - 2400 kg/m³) concrete. Floor assembly may also be constructed of any min 6 in. thick UL Classified hollow-core **Precast Concrete Units***. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max area of opening 640 sq in. (4129 cm²) with a max dimension of 32 in. (812 mm). Max area of in floors constructed of hollow-core concrete is 49 sq in. (316 cm² with a max dimension of 7 in. (178 mm).
   See **Concrete Blocks** (CAZT) and **Precast Concrete Units** (CFTV) categories in Fire Resistance Directory for names of manufacturers.
2. **Steel Duct** – Nom 30 by 18 in. (762 by 457 mm) (or smaller) No. 24 gauge (or heavier) steel duct to be installed concentrically or eccentrically within opening. Annular space between duct and periphery of opening shall be shall be min 0 in. (point contact) to max 2 in. (51 mm). Duct to be rigidly supported on both sides of floor or wall assembly.
3. **Firestop System** – The firestop system shall consist of the following:
   A. **Packing Material** – Min 3 in. (76 mm) thickness of min 4 pcf or (64 kg/m³) mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material. In floors constructed of hollow-core concrete, packing material to be recessed from top and bottom surfaces of floor as required to accommodate the required thickness of fill material.
      A1. **Forming Material*** – As an alternate to the packing material in Item 3A, nom 4 in. (102 mm) wide strips of min 1/2 in (13 mm) thick compressible mat to be stacked to a thickness greater than the width of the annular space and compression-fitted, edge-first, to fill the annular space to a min 4 in. (102 mm) depth. Top of forming material to be recessed from top surface of floor or from both surfaces of wall as necessary to accommodate the required thickness of caulk fill material. In floors constructed of hollow-core concrete, forming material to be recessed from top and bottom surfaces of floor as required to accommodate the required thickness of fill material.
      3M COMPANY – Fire Barrier Packing Material
   B. **Fill, Void or Cavity Materials* – Caulk or Sealant** – Min 1/2 in. (13 mm) thickness of caulk applied within the annulus, flush with top surface of floor or with both surfaces of wall. In floors constructed of hollow-core concrete, min 1/2 in. (13 mm) thickness of caulk applied within the annulus, flush with top and bottom surfaces of floor. Min 1/4 in. (6 mm) diam bead of caulk applied to the duct/concrete interface at the point contact location on the top surface of floor or both surfaces of wall or hollow-core concrete.
      3M COMPANY – IC 15WB+, CP 25WB+ caulk, or FB-3000 WT sealant
   C. **Retaining Angles** – Min 16 GA galv steel angles sized to lap duct a min of 2 in. (51 mm) and lap periphery of opening a min of 1 in. (25 mm). Angles attached to all four sides of steel duct on top surface of floor or both surfaces of wall with No. 10 (or larger) steel sheet metal screws spaced a max 1 in. (25 mm) from each end and max 6 in. (152 mm) OC.

*Bearing the UL Classification Mark

Through Penetrations
Misc. Mechanical
7000 Series
Concrete
CAJ

This material was extracted and drawn by 3M Fire Protection Products from the 2007 edition of the UL Fire Resistance Directory.

556
3M Fire Protection Products
www.3m.com/firestop
C-AJ-7076 • 1 of 1
Product Support Line: 1-800-328-1687
Choose option 4 for FAX ON DEMAND

System No. C-AJ-8113

ANSI/UL1479 (ASTM E814)	CAN/ULC S115
F Rating - 2 Hr	F Rating - 2 Hr
T Rating - 0, 1/4, 1/2, 3/4 and 2 Hr (See Items 2 through 9)	FT Rating - 0, 1/4, 1/2, 3/4 and 2 Hr (See Items 2 through 9)
	FH Rating - 2 Hr
	FTH Rating - 0, 1/4, 1/2, 3/4 and 2 Hr (See Items 2 through 9)

1. **Floor or Wall Assembly -** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max area of opening is 1024 sq in. (0.66 m2) with a max height of 32 in. (813 mm) when installed in a wall or a max width of 32 in. (813 mm) when installed in a floor.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.
2. **Metallic Penetrants -** One or more metallic pipes, conduits or tubes to be installed within the opening. Annulus between penetrants is min 0 in. (point contact) to max 5 in. (127 mm). Annulus between penetrants and periphery of opening is 0 in. (point contact) to max 6 in. (152 mm). Penetrants rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   A. **Steel Pipe -** Nom 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe -** Nom 12 in. (305 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit -** Nom 6 in. (152 mm) diam (or smaller) rigid steel conduit, nom 4 in. (102 mm) diam (or smaller) electrical metallic tubing (EMT), or nom 4 in. (102 mm) diam (or smaller) steel Flexible Metal Conduit#.

Specified Technologies Inc. 210 Evans Way Somerville, NJ 08876
Reproduced courtesy of Underwriters Laboratories, Inc.
Created or Revised: August 24, 2011
(800)992-1180 • (908)526-8000 • FAX (908)231-8415 • E-Mail:techserv@stifirestop.com • Website:www.stifirestop.com
C-AJ-8113
PAGE 1 OF 4

LEGEND
dp = NOMINAL PIPE DIAMETER
di = dp + INSULATION THICKNESS

PIPE DIAMETER DETAIL

UNINSULATED PIPE PENETRATION SECTION

INSULATED PIPE PENETRATION SECTION

D. **Copper Pipe or Tube -** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe or Type M (or heavier) copper tube.

Type of Metallic Penetrant	Max Dim of Throught Penetrants, In.(mm)	T Rating, Hr
Steel or Iron Pipe, Conduit	12 (305)	0
Copper Pipe or Tube	6 (152)	0
Steel or iron Pipe, Conduit or EMT	4 (102)	1/4
Steel or iron Pipe, Conduit or EMT	2 (51)	1/2
Steel or iron Pipe, Conduit or EMT	1(25)	3/4

2A1. **Firestop Device* -** (Optional, Not Shown) - When used in conjunction with Item 2A, 2B, or 2C, single layer of coolant wrap provided with collar to be continuously wrapped around the outer circumference of each penetrant and temporarily held in place with tape. Edge of coolant wrap to be offset from the surface of floor or both sides of the wall in order to allow for installation of restraining collar. Restraining collar to be installed such that an edge is flush with top surface of the floor or both surfaces of wall and coolant wrap is nominally centered within pocket of restraining collar. Restraining collar to overlap itself by min 1/8 in. (3 mm) and secured in place around penetrant with nom 1/2 in. (13 mm) wide stainless steel hose clamps nominally centered on both flanges. Min clearance between pipes to be 2-1/2 in. (64 mm). **When Item 2A1 is used, the maximum hourly T Rating is 2 Hr for penetrants 4 in. (102 mm) diam (or smaller).**
SPECIFIED TECHNOLOGIES INC - SpecSeal T-Collar

3. **Pipe Insulation -** (Optional) - The following types of pipe insulations may be installed on one or more of the max 4 in. (102 mm) diam metallic pipes or tubes:
   A. **Pipe and Equipment Covering Materials* -** Nom 1 in. (25 mm) thick hollow cylindrical heavy density (min 3.5 pcf or 56 kg/m3) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. **When Item 3A is used, T Rating is 3/4 Hr**.
      See Pipe and Equipment Covering Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
   B. **Pipe Covering Materials* -** Nom 2 in. (51 mm) thick unfaced mineral fiber pipe insulation having a nom density of 3.5 pcf (56 kg/m3) (or heavier) and sized to the outside diam of the pipe or tube. Pipe insulation secured with min 8 AWG steel wire spaced max 12 in. (305 mm) OC. When **Item 3B is used, T Rating is 2 Hr**.
      IIG MINWOOL L L C - High Temperature Pipe Insulation 1200, High Temperature Pipe Insulation BWT and High Temperature Pipe Insulation Thermaloc
   C. **Sheathing Material* -** Use in conjunction with Item 3B. Foil-scrim-kraft or all service jacket material shall be wrapped around the outer circumference of the pipe insulation (Item 3B) with the kraft side exposed. Longitudinal and transverse joints sealed with metal fasteners or butt tape.
      See **Sheathing Materials** (BVDV) category in the Building Materials Directory for names of manufacturers. Any sheathing material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
   D. **Tube Insulation-Plastics## -** Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. **When Item 3D is used, T Rating is 1/2 Hr**.
      See **Plastics** (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation meeting the above specifications and having a UL 94 Flammability Classification of 94-5VA may be used.

Specified Technologies Inc. 210 Evans Way Somerville, NJ 08876
Reproduced courtesy of Underwriters Laboratories, Inc.
Created or Revised: August 24, 2011
(800)992-1180 • (908)526-8000 • FAX (908)231-8415 • E-Mail:techserv@stifirestop.com • Website:www.stifirestop.com
C-AJ-8113
PAGE 2 OF 4

E. **Pipe Covering Materials* - Cellular Glass Insulation -** Nom 2 to 3 in. (51 to 76 mm) thick cellular glass units sized to the outside diam of the pipe or tube and supplied in nom 24 in. (610 mm) long half sections or nom 18 in.(457 mm) long segments. Pipe insulation installed on pipe in accordance with the manufacturer's instructions. **When Item 3E is used, T Rating is 2 Hr.**
   PITTSBURGH CORNING CORP - FOAMGLAS

F. **Metal Jacket -** Used in conjunction with Item 3E. Min 12 in. (305 mm) long jacket formed from min 0.010 in. (0.25 mm) thick aluminum sheet cut to wrap tightly around the pipe insulation with a min 2 in. (51 mm) lap and secured using bands and seals of a similar material or min No. 18 AWG steel tie wire. Bands or steel tie wire to be located within 2 in. (51 mm) of each end of the jacket and spaced max 10 in. (254 mm) OC. Jacket installed with edge abutting surface of fill material (Item 9A) on top surface of floor or both surfaces of wall. Metal jacket to be used in addition to any other jacketing material which may be required on the pipe covering.

G. **Pipe and Equipment Covering Materials* -** Nom 2 to 3 in. (51 to 76 mm) thick hollow cylindrical calcium silicate (min 14 pcf or 224 kg/m3) units sized to the outside diam of the pipe or tube. Pipe insulation secured with stainless steel bands or min 8 AWG stainless steel wire spaced max 12 in. (305 mm) OC. **When Item 3G is used, T Rating is 2 Hr.**

4. **Nonmetallic Penetrants -** One or more nonmetallic pipes, conduits or tubes to be installed within the opening. Annulus between penetrants and periphery of opening is min 1 in. (25 mm) to max 6 in. (152 mm). Separation between metallic and nonmetallic penetrants is min 6 in. Penetrants rigidly supported on both sides of floor or wall assembly. The following types and sizes of nonmetallic pipes, conduits or tubing may be used:
   A. **Polyvinyl Chloride (PVC) Pipe -** Nom 2 in. (51 mm) diam (or smaller) solid or cellular core Schedule 40 PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe -** Nom 2 in. (51 mm) diam (or smaller) SDR13.5 CPVC pipe for use in closed (process or supply) piping systems.
   C. **Rigid Nonmetallic Conduit+ -** Nom 2 in. (51 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with the National Electrical Code (NFPA 70).
   D. **Electrical Nonmetallic Tubing (ENT)+ -** Nom 2 in. (51 mm) diam (or smaller) corrugated wall ENT formed of polyvinyl chloride (PVC) installed in accordance with the National Electrical Code (NFPA 70).
   E. **Optical Fiber Raceway+ -** Nom 2 in. (51 mm) diam (or smaller) optical fibner raceway (innerduct). Optical fiber raceway installed in accordance with Article 770 of the National Electrical Code (NFPA 70).
   When Item 4 is used, the T Rating of the firestop system is 2 hr.
5. **Cables -** Nom 4 in. (102 mm) diam (or smaller) tight bundle of cables. Annulus between cable bundle and periphery of opening is min 0 in. (point contact) to max 6 in. (152 mm). Separation between cable bundle and metallic or nonmetallic penetrants shall be min 6 in. (152 mm). Cable bundle rigidly supported on both sides of floor or wall assembly. The following types and sizes of cables may be used:
   A. Max 1/C - 1000 kcmil cable with polyvinyl chloride (PVC) or cross-linked polyethylene (XLPE) insulation and jacket.
   B. Max 7/C - No. 12 AWG cable with PVC-nylon insulation and PVC jacket.
   C. Max 400 pair - No. 24 AWG copper conductor telephone cable with PVC insulation and jacket.
   D. Max RG/U coaxial cables with fluorinated ethylene jacket and insulation.
   E. Multiple fiber optic cables with PVC insulation.
   F. **Through Penetrating Products*** - Max 4/C with ground No. 2/O AWG **Metal-Clad Cable+.**
   AFC CABLE SYSTEMS INC
   When cables are used, T Rating is 1/2 hr.
6. **Cable Tray -** Max 30 in. (762 mm) wide by max 6 in. (152 mm) deep open ladder cable tray with channel-shaped side rails formed from min 0.060 in. (1.5 mm) thick (No. 16 MSG) galv steel or min 0.060 in. (1.5 mm) thick aluminum with rungs spaced max 9 in. (229 mm) OC. A max of two cable trays may be installed within the opening with a min separation of 8 in. (203 mm) between trays. Annulus between the cable tray and the periphery of the opening is min 0 in. (point contact) to max 6 in. (152 mm). Separation between cable tray and metallic or nonmetallic penetrants is min 6 in. (152 mm). Cable trays to be rigidly supported on both sides of the floor or wall assembly. Aggregate cross-sectional area of cables in cable tray not to exceed 40 percent of the cross-sectional area of the cable tray based on a max 3 in. (76 mm) cable loading depth within tray. Any combination of the cable types specified in Item 5 may be used. **When cable tray is used, T Rating is 1/2 hr.**

Specified Technologies Inc. 210 Evans Way Somerville, NJ 08876
Reproduced courtesy of Underwriters Laboratories, Inc.
Created or Revised: August 24, 2011
(800)992-1180 • (908)526-8000 • FAX (908)231-8415 • E-Mail:techserv@stifirestop.com • Website:www.stifirestop.com
C-AJ-8113
PAGE 3 OF 4

---

7. **Busway+ -** Nom 19 in. (483 mm) wide (or smaller) by 6 in. (152 mm) deep "I" shaped aluminum enclosure containing factory-mounted copper bars rated for 600 V, 5000 A or max 26 in. (660 mm) wide by max 6 in. (152 mm) deep "I" shaped aluminum enclosure containing factory-mounted aluminum bars rated for 600 V, 4000 A. . A max of two busways may be installed within the opening. The annular space between the busway and the periphery of the opening shall be a min 0 in. (point contact) to a max 5 in. (125 mm). Busways spaced min 6 in. (152 mm) from all other penetrants. Busway to be rigidly supported on both sides of floor or wall assembly. The busway shall bear the UL Listing Mark and shall be installed in accordance with all provisions of the National Electrical Code, NFPA 70. **When busway is used, the T Rating is 1/4 hr.**
8. **Air Conditioning (AC) Line Set -** One or more AC line sets installed within opening. Each AC line set consists of two pipes or tubes (Item 8A), tubing insulation (Item 8B) and a thermostat cable (Item 8C). The space between the AC line sets shall be min 2 in. (51 mm). The space between the AC line sets and the periphery of the opening shall be min 0 in. (point contact) to max 6 in. (152 mm). The AC line sets shall be spaced min 6 in. from uninsulated metallic penetrants and shall be rigidly supported on both sides of the floor or wall assembly.

8A. **Through Penetrant -** A max of two pipes or tubes to be installed in each AC line set. Of the two pipes or tubes, only one may have a nom diam greater than 1/2 in. (13 mm). The following types and sizes of through penetrants may be used:
   A. **Steel Pipe -** Nom 1 in. (25 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.
   B. **Iron Pipe -** Nom 1 in. (25 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Copper Pipe -** Nom 1 in. (25 mm) diam (or smaller) Regular (or heavier) copper pipe.
   D. **Copper Tube -** Nom 1 in. (25 mm) diam (or smaller) Type L (or heavier) copper tube.

8B. **Tube Insulation - Plastics# -** Nom 3/4 in. (19 mm) thick acrylonitrile butadiene/polyvinyl chloride (AB/PVC) flexible foam furnished in the form of tubing. The tube insulation may be installed on one max 3/4 in. (19 mm) diam pipe or tube in each AC line set. The space between the insulated and uninsulated pipes or tubes within each AC line set shall be 0 in. (point contact).
   See **Plastics** (QMFZ2) category in the Plastics Recognized Component Directory for names of manufacturers. Any Recognized Component tube insulation meeting the above specifications and having a UL 94 Flammability Classification of 945VA may be used.

8C. **Cable -** One 4 pair No. 18 AWG (or smaller) thermostat cable with polyvinyl chloride (PVC) insulation and jacket materials may be installed with each AC line set.
   When Item 8 is used, the T Rating of the firestop system is 1/4 hr.

9. **Steel Duct -** (Not Shown) Nom 12 in. (305 mm) diameter (or smaller) No. 30 GA (or heavier) steel duct installed within opening when opening contains no cables or cable tray. A max of two steel ducts may be installed within the through-opening. Ducts to be spaced min 4 in. (102 mm) apart and min 8 in. (203 mm) from insulated penetrants and nonmetallic penetrants. Annulus between the steel duct and the periphery of the opening shall be min 0 in. (point contact) to max 6 in. (0 to 152 mm). Steel ducts to be rigidly supported on both sides of floor or wall assembly. **When steel duct is used, the T Rating is 0 hr.**
10. **Firestop System -** The firestop system shall consist of the following items:
   A. **Packing Material -** Min 4 in. (102 mm) thickness of min 4 pcf (64 kg/m3) mineral wool batt insulation tightly packed into opening. Packing material recessed from top surface of floor assembly or from both surfaces of wall or precast concrete units to accommodate the required thickness of fill material.
   B. **Fill, Void or Cavity Materials*-Sealant -** Min 1/2 in. (13 mm) depth of fill material applied within the annulus, flush with top surface of floor assembly or with both surfaces of the wall assembly. Additional fill material forced into interstices of grouped cables and grouped cables within cable trays. At point contact location between through penetrant and concrete, a min 3/8 in. (9.6 mm) diam of fill material shall be applied at through penetrant/concrete interface on top surface of floor or both surfaces of the wall.
   SPECIFIED TECHNOLOGIES INC - SpecSeal Series SSS Sealant or SpecSeal LCI Sealant
   *Bearing the UL Classification Mark
   #Bearing the UL Recognized Components Mark
   +Bearing the UL Listing Mark

Specified Technologies Inc. 210 Evans Way Somerville, NJ 08876
Reproduced courtesy of Underwriters Laboratories, Inc.
Created or Revised: August 24, 2011
(800)992-1180 • (908)526-8000 • FAX (908)231-8415 • E-Mail:techserv@stifirestop.com • Website:www.stifirestop.com
C-AJ-8113
PAGE 4 OF 4

System No. W-J-7030

May 19, 2005
F Rating – 2 Hr
T Rating – 2 Hr

1. **Wall Assembly** – Min 6 in. (152 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete wall. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max size of opening is 1015 sq. in. (6548 cm²) with a max dimension of 35 in. (889 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.
2. **Steel Air Duct** – Nom 30 in. by 24 in. (762 mm by 610 mm) min 24 gauge (or heavier) galv steel air duct to be installed either concentrically or eccentrically within the opening. Duct to be rigidly supported on both sides of wall assembly.
3. **Duct Insulation*** – Nom 1-1/2 in (38 mm) thick glass fiber blanket insulation jacketed on the outside with foil-scrim-kraft facing. Longitudinal and transverse joints sealed with foil-scrim kraft tape. A nominal 1 in. (25 mm) annular space shall be maintained between the insulated duct and the periphery of the opening.
   See **Batts and Blankets** (BKNV) category in the Building Materials Directory for names of manufacturers. Any batts and blankets material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used.
4. **Firestop System** – The firestop system shall consist of the following:
   A. **Wrap Strip** – One layer of nom 1/8 in. (3.2 mm) thick intumescent material supplied in 2 in. (51 mm) wide strips tightly wrapped around duct insulation and held in place with 2 in. (51 mm) wide min 3 mil foil tape. Wrap strip slid into annulus on both sides of wall such that wrap strips extend approx 1/2 in. (13 mm) beyond both surfaces of wall. Exposed portion of wrap strip to be completely covered with min 3 mil foil tape.
      3M COMPANY – Ultra GS
   B. **Fill, Void or Cavity Materials* – Caulk or Sealant** – Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall assembly
      3M COMPANY – CP 25WB+, IC 15WB+ caulk or FB-3000 WT sealant

*Bearing the UL Classification Mark

Through Penetrations
Misc. Mechanical
7000 Series
Concrete
WJ

This material was extracted and drawn by 3M Fire Protection Products from the 2007 edition of the UL Fire Resistance Directory.

3M Fire Protection Products
www.3m.com/firestop
W-J-7030 • 1 of 1
Product Support Line: 1-800-328-1687
Choose option 4 for FAX ON DEMAND
561

PIPE INSULATION (ASHRAE 90.1)

PIPE FIRE STOPPING

SIZE (IN.)	INSULATION THICKNESS (INCHES) (A)						DIMENSIONS (B)					UL DETAILS (C) (D)			
	INDOOR SERVICE						INSULATED DIAMETER (di)					UNINSULATED		INSULATED	
COPPER (dp)	SHW	CHW	CW/GW	DHW	DCW	SPRINKLER	SHW	CHW	CW/GW	DHW	SPRINKLER	PARTITIONS AND FLOORS/CEILINGS (CMU/CONC) (1-HR/2-HR)	METAL STUD DRYWALL/SHAFT WALL (1-HR/2-HR)	PARTITIONS AND FLOORS/CEILINGS (CMU/CONC) (1-HR/2-HR)	METAL STUD DRYWALL/SHAFT WALL (1-HR/2-HR)
1/2	1	0.5	0.5	1	0.5	---	2.5	1.5	1.5	2.5	---	C-AJ-8113	W-L-1003	C-AJ-8113	W-L-5011
3/4	1	0.5	0.5	1	0.5	---	2.75	1.75	1.75	2.75	---	C-AJ-8113	W-L-1003	C-AJ-8113	W-L-5011
1	1	0.5	0.5	1	0.5	---	3	2	2	3	---	C-AJ-8113	W-L-1003	C-AJ-8113	W-L-5011
1-1/4	1.5	0.75	0.75	1	0.5	---	4.25	2.75	2.75	3.25	---	C-AJ-8113	W-L-1003	C-AJ-8113	W-L-5011
1-1/2	1.5	0.75	0.75	1	0.5	---	4.5	3	3	3.5	---	C-AJ-8113	W-L-1003	C-AJ-8113	W-L-5011
2	1.5	0.75	0.75	1	0.5	---	5	3.5	3.5	4	---	C-AJ-8113	W-L-1003	C-AJ-8113	W-L-5011
2-1/2	2	1	1	1.5	0.5	---	6.5	4.5	4.5	5.5	---	C-AJ-8113	W-L-1003	C-AJ-8113	W-L-5011
STEEL (dp)	SHW	CHW	CW/GW	DHW	DCW	SPRINKLER	SHW	CHW	CW/GW	DHW	SPRINKLER	WALLS, FLOORS/CEILINGS (CMU/CONC)	WALLS STUD DRYWALL/SHAFT WALL	WALLS, FLOORS/CEILINGS (CMU/CONC)	WALLS STUD DRYWALL/SHAFT WALL
3	2	1	1	1.5	0.5	---	7	5	5	6	---	C-AJ-8113	W-L-1003	C-AJ-8113	W-L-5010
4	2	1	1	1.5	0.5	---	8	6	6	7	---	C-AJ-8113	W-L-1003	C-AJ-8113	W-L-5010
5	3.5	1	1	1.5	0.5	---	12 (9)	7	7	8	---	C-AJ-8113	W-L-1003	C-AJ-8113	W-L-5010
6	3.5	1	1	1.5	0.5	---	13 (10)	8	8	9	---	C-AJ-8113	W-L-1003	C-AJ-8113	W-L-5010
8	3.5	1	1	1.5	0.5	---	15 (12)	10	10	11	---	C-AJ-8113	W-L-1003	C-AJ-8113	W-L-5010
10	3.5	1	1	1.5	0.5	---	17 (14)	12	12	13	---	C-AJ-8113	W-L-1003	C-AJ-8113	W-L-5010

PIPE PENETRATION NOTES:

A) ALL PIPE INSULATION SHALL MEET OR EXCEED THE MATERIAL THICKNESS INDICATED ON THIS SCHEDULE AND IN SPECIFICATION 15080.

B) ALL PIPE INSULATION MATERIAL SHALL BE MINERAL FIBER TYPE IN ACCORDANCE WITH SPECIFICATION SECTION 230700, EXCEPT CERTAIN UL DETAILS REQUIRE THE USE OF CELLULAR GLASS INSULATION AT THE PENETRATION WITH A MATERIAL THICKNESS NOT TO EXCEED 2-INCHES THICK. CELLULAR GLASS PENETRATION di DIAMETER ARE INDICATED AS ( ).

C) FLOOR PENETRATIONS: THE UL LISTED FIRE STOPPING DETAIL IS PROVIDED AS AN ACCEPTABLE, TESTED ASSEMBLY FOR PENETRATIONS THRU CONCRETE FIRE RATED ASSEMBLY SYSTEM. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE THE ACTUAL REQUIREMENTS FOR PROPER INSTALLATION OF THE PIPING PENETRATION TO ENSURE IT MEETS ALL REQUIREMENTS OF THE UNDERWRITERS LABORATORY (UL) DETAIL, OWNER'S REPRESENTATIVE AND THE AUTHORITIES HAVING JURISDICTION.

PIPE PENETRATION NOTES (CONT.):

D) WALL PENETRATIONS: THE UL LISTED FIRE STOPPING DETAIL IS PROVIDED AS AN ACCEPTABLE, TESTED ASSEMBLY FOR PENETRATIONS THRU A FIRE RATED WALL ASSEMBLY AS LISTED. (REFER TO ARCHITECTURAL SHEET FOR FIRE RATED WALL DETAILS). THE CONTRACTOR IS RESPONSIBLE TO COORDINATE THE ACTUAL REQUIREMENTS FOR PROPER INSTALLATION OF THE PIPING PENETRATION TO ENSURE IT MEETS ALL REQUIREMENTS OF THE UNDERWRITERS LABORATORY (UL) DETAIL, THE OWNER'S REPRESENTATIVE AND THE LOCAL AUTHORITIES HAVING JURISDICTION. COORDINATE DRAWINGS OF EACH PENETRATION TYPE SHALL BE PROVIDED TO THE ARCHITECT FOR REVIEW AND APPROVED PRIOR TO ORDERING EQUIPMENT OR STARTING THE WORK.

E) INSULATED PIPE SIZES DENOTED BY (G) SHALL BE LIMITED TO MAX 2-INCH INSULATION THICKNESS. TRANSITION THICKNESS OF INSULATION TO ( ) DIMENSIONS AT PENETRATION. REFER TO UL DETAIL FOR SPECIFIC INSULATION MATERIAL REQUIREMENTS.

No.	Date	Revision

b2E
consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

BRUCE E. BEDDOW
No. 021233
04-20-2020

FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

Sheet Name:
MECHANICAL DETAILS

Drawn By: b2E
Checked By: B2

Date: 06-15-2020

JOB # 18608

Sheet Number:
M-503

1

ELECTRIC DUCT HEATER SCHEDULE

GENERAL (A)		CAPACITY (B)				PERFORMANCE (C)			ELECTRICAL (D)			DIMENSIONS (E)	REMARKS (F)	BASIS OF DESIGN
TAG	LOCATION / SERVICE	CAPACITY [KW]	AIRFLOW [CFM]	STAGES [NO.]	SCR	EAT [°F]	LAT [°F]	MIN. VELOCITY [FPM]	VOLTAGE / PHASE	MCA	MOCP	WxH [IN.]	NOTES	MAKE / MODEL
EDH-1	KITCHEN - OFFICE	1	90	1	YES	50	90	500	277/1	6.7	20	12 x 10	1 THRU 7	INDEECO

NOTES:

(A) GENERAL:
- TAG: UNIT DESIGNATION.
- LOCATION / SERVICE: IDENTIFIES LOCATION IN BUILDING AND SYSTEM SERVED.

(B) CAPACITIES:
- CAPACITY [KW]: MINIMUM ALLOWABLE HEATING CAPACITY IN KILOWATTS.
- AIRFLOW [CFM]: DESIGN AIRFLOW IN CUBIC FEET PER MINUTE; SHALL NOT FALL BELOW 75 CFM/KW.
- STAGES: MINIMUM NUMBER OF CAPACITY CONTROL STAGES.
- SCR: SILICON CONTROLLER RECITFIER MODULATING OUTPUTL; WHEN MORE THAN ONE STAGE, MODULATION SHALL BE ON FINAL STAGE; MINIMUM TURNDOWN 5:1.

(C) PERFORMANCE:
- EAT [°F]: ENTERING AIR TEMPERATURE IN DEGREES FAHRENHEIT.
- LAT [°F]: LEAVING AIR TEMPERATURE IN DEGREES FAHRENHEIT.
- MIN. VELOCITY [FPM]: MINIMUM ALLOWABLE AIR VELOCITY IN FEET PER MINUTE THROUGH THE COIL.

(D) ELECTRICAL:
- VOLTAGE / PHASE: POWER REQUIREMENTS IN VOLTAGE AND PHASE.
- MCA: MINIMUM CIRCUIT AMPACITY IN AMPS.
- MOCP: MAXIMUM OVERCURRENT PROTECTION IN AMPS.

(E) DIMENSIONS:
- WxH [IN.]: DUCT WIDTH AND HEIGHT IN INCHES.

(F) REMARKS:
1) PROVIDE UL LISTED DUCT MOUNTED HEATER WITH CONTROL PANEL.
2) CONTROL PANEL SHALL HAVE INTEGRAL DISCONNECT SWITCH.
3) PROVIDE INTEGRAL PRIMARY AND SECONDARY FUSES.
4) PROVIDE WATTAGE DENSITY IN BLACK HEAT RANGE TO PREVENT HEATING COILS FROM GLOWING RED.
5) PROVIDE HIGH LIMIT HEAT SWITCH TO SHUT OFF UNIT IN THE EVENT OF OVERHEATING.
6) PROVIDE AIRFLOW PROVING SAFETY SWITCH.
7) REFER TO SPECIFICATIONS SECTION 23 82 16 FOR OTHER APPLICABLE REQUIREMENTS.

ADJUSTABLE FREQUENCY DRIVE SCHEDULE

GENERAL (A)				MOTOR CHARACTERISTICS (B)				REMARKS (C)	BASIS OF DESIGN (D)
TAG	EQUIPMENT SERVED	LOCATION OF AFD	MOUNTING	[HP]	VOLT/Ø	MOTOR TYPE	EFFICIENCY [%]		
DETENETION FACILITY BUILDING									
AFD-1	AHU-2	LOWER LEVEL MECH ROOM	UNIT	30	460/3	TEFC	94.1	1 - 16	TRANE

NOTES
(A) GENERAL
- TAG: ADJUSTABLE FREQUENCY DRIVE NUMBER DESIGNATION.
- EQUIPMENT SERVED: EQUIPMENT TAG DESIGNATION SERVED BY AFD.
- LOCATION: PHYSICAL LOCATION OF AFD
- MOUNTING: WALL = REMOTE WALL MOUNTED WITH FIELD INSTALLED WIRING; UNIT = MOUNTED ON UNIT WITH FACTORY INSTALLED WIRING AND CONTROLS; FIELD = FIELD INSTALLED WIRING.

(B) MOTOR CHARACTERISTICS
- [HP]: RATED MOTOR HORSEPOWER FOR THE AFD. PROVIDE BUILT-IN BREAKER SIZED TO PROTECT MOTOR.
- VOLT/Ø: NOMINAL VOLTAGE AND PHASE RATING OF THE AFD. REFER TO ELECTRICAL FOR AVAILABLE VOLTAGE AND PHASE. CONTRACT INCLUDES COORDINATION AND PROVISION OF AFD WITH CORRECT VOLTAGE AS PROVIDED BY ELECTRICAL.
- MOTOR TYPE: TEFC = TOTALLY ENCLOSED FAN-COOLED, INVERTER DUTY RATED; ODP = OPEN DRIP PROOF, INVERTER DUTY RATED.
- EFFICIENCY [%]: EFFICIENCY OF THE MOTOR AS A PERCENTAGE.

(C) REMARKS
1) PULSE WIDTH MODULATING (PWM) DESIGN. BIPOLAR TRANSISTOR, GTO'S AND SCR'S ARE NOT ACCEPTABLE.
2) AFD EFFICIENCY SHALL EXCEED 96% AT 100% SPEED LOAD.
3) LINE SIDE DISPLACEMENT FACTOR NOT LESS THAN 0.95 REGARDLESS OF SPEED AND LOAD.
4) ONE MINUTE OVERLOAD CURRENT RATING OF 100% FOR VARIABLE TORQUE LOADS AND 150% FOR CONSTANT TORQUE LOADS.
5) CAPABLE OF OPERATING ANY NEMA 8 SQUIRREL CAGE INDUCTION MOTOR.
6) LIMIT HARMONIC DISTORTION BY ADDITION OF DRIVE LINE REACTANCE OF MULTI-CONVERTER PHASE SHIFTING. TUNED HARMONIC FILTERS ARE NOT ACCEPTABLE.
7) SHALL BE CAPABLE OF STARTING A SPINNING MOTOR IN EITHER DIRECTION.
8) TOTAL HARMONIC DISTORTION (THD) AT AFD SUPPLY BUS SHALL NOT EXCEED 10% (CURRENT MEASURE) OF 5% VOLTAGE MEASURE.
9) PROVIDE SMART CARD INTERFACE FOR COMPLETE MONITORING AND CONTROL OF THE AFD FROM EMS.
10) CIRCUIT BREAKER DISCONNECT SWITCH WITH PADLOCK.
11) HAND-OFF-AUTO SWITCH WITH CONTACTOR BYPASS ELECTRICALLY AND MECHANICALLY INTERLOCKED WITH BYPASS CONTACTOR AND RUN RELAY.
12) AUXILLARY DRIVE STATIS FOR POSITIVE STATUS FEEDBACK TO EMS.
13) PUSH TO TEST INDICATOR LIGHTS.
14) HUMAN INTERFACE PANEL WITH LED DISPLAY.
15) PROVIDE POWER MONITORING AND PROTECTION FROM LOW VOLTAGE (BROWNOUT), PHASE INBALANCE, PHASE LOSS, PHASE ROTATION WITH TIME DELAY AUTO RESET UP TO THREE ATTEMTS TO START.
16) REFER TO SECTION 23 26 90 AND 23 64 00 FOR OTHER APPLICABLE REQUIREMENTS.

(D) BASIS OF DESIGN: MANUFACTURER AND MODEL NUMBER USED AS THE BASIS OF DESIGN.

PUMP SCHEDULE

GENERAL (A)			CAPACITY (B)					ELECTRICAL DATA (C)			REMARKS (D)	BASIS OF DESIGN (E)
TAG	LOCATION AND/OR SERVICE	TYPE	FLOW [GPM]	HEAD [FT WG]	[RPM]	IMPELLER DIA [IN]	MIN EFF [%]	[HP]	VOLTAGE	PHASE		
COURTS POLICE BUILDING												
HWCP-1	UPPER LEVEL MECH ROOM	IN-LINE	60	30	1750	6.22	66.0	1	460	3	1 - 7	BELL & GOSSET MODEL 616T

NOTES
(A) GENERAL
- TAG: PUMP DESIGNATION.
- LOCATION: PHYSICAL LOCATION OF PUMP.
- TYPE: IN-LINE = IN-LINE PUMP WITH OVER / UNDER PIPING ARRANGEMENT, BASE = BASE MOUNTED END-SUCTION WITH SIDE BY SIDE PIPING ARRANGEMENT.

(B) CAPACITY
- FLOW [GPM]: PUMP DESIGN FLOW RATE IN GALLONS PER MINUTE.
- HEAD [FT WG]: MAXIMUM DESIGN HEAD PRESSURE AT DESIGN FLOW RATE IN FEET WATER COLUMN.
- RPM: PUMP MOTOR SPEED IN REVOLUTIONS PER MINUTE.
- IMPELLER DIA [IN]: DIAMETER OF THE IMPELLER IN INCHES.
- MIN EFF [%]: MINIMUM ALLOWABLE MECHANICAL PUMP EFFICIENCY AT DESIGN FLOW AND PRESSURE AS A PERCENTAGE.

(C) ELECTRICAL DATA
- [HP]: NOMINAL MOTOR HORSE POWER (NEMA MOTOR SIZE). PROVIDE OPEN DROP PROOF (ODP) MOTOR ENCLOSURE FOR CONSTANT SPEED DRIVEN PUMP, EXCEPT PROVIDE TOTALLY ENCLOSED FAN COILED (TEFC) MOTOR ENCLOSURES FOR ALL AFD DRIVEN PUMPS.
- VOLTAGE: MOTOR OPERATING VOLTAGE.
- PHASE: MOTOR ELECTRICAL PHASE. PROVIDE ALL 1/2 HP MOTOR AND SMALLER AS SINGLE PHASE, AND 3/4 HP MOTORS AND LARGER AS THREE PHASE.

(D) REMARKS
1) PROVIDE C.I. CASING, BRONZE IMPELLER, BRONZE WEAR RING, S.S. SHAFT SLEEVE, CERAMIC MECHANICAL SEAL SEAT, CARBON ROTATING FACE, ETHYLENE PROPOLYNE ELASTOMER, S.S. SPRING, COPPER SEAL FLUSH LINE.
2) INSTALL PER UNIT MANUFACTURER'S RECOMMENDATIONS.
3) PROVIDE COUPLINGS AND SEALS ON ALL VERTICAL IN-LINE AFD DRIVEN PUMPS SUITABLE FOR ADJUSTABLE FREQUENCY DRIVE (INVERTER) OPERATION. PROVIDE ONE (1) EXTRA SET COUPLINGS AND SEALS FOR EACH PUMP.
4) FRAME MOUNTED, VERTICAL IN-LINE STACKED ARRANGEMENT. FASTEN BOTTOM PUMP FRAME TO LEVEL CONCRETE HOUSEKEEPING PAD. FASTEN UPPER PUMP TO FLOOR WITH PIPE STANCHIONS.
5) PROVIDE STANDARD IMPELLER WITH BUILT-ON ADJUSTABLE FREQUENCY DRIVE. CONTRACTOR SHALL INCLUDE IN PRICE PROGRAMMING AND SETUP WITH THE BALANCING CONTRACTOR TO ENSURE PUMP IS OPERATION ON THE OPTIMAL SPEED FOR THE ACTUAL SYSTEM CURVE TO MAXIMIZE ENERGY SAVING PERFORMANCE.
6) PROVIDE HYDRONIC SPECIALTIES AS INDICATED ON THE IN-LINE PUMP DETAIL.
7) COORDINATE THE HEIGHT OF THE PUMPS TO ENSURE THE UPPER PUMPS CAN BE MAINTAINED IN ACCORDANCE WITH THE MANUFACTURER'S CLEARANCE AND MAINTENANCE ACCESS REQUIREMENTS.

(E) BASIS OF DESIGN: MANUFACTURER AND MODEL NUMBER USED AS THE BASIS OF DESIGN.

KITCHEN AIR HANDLING UNIT SCHEDULE

(A) GENERAL				(B) AIR FLOW											(C) PREHEAT COIL													(D) COOLING COIL													(E) FILTERS		(F) ELECTRICAL				(G) DIMENSIONS		(H) BASIS OF DESIGN		
				AIR FLOW [CFM]				TOT. SP [IN W.G.		EXT. SP [IN W.G.					CAPACITY [MBH]				EAT	LAT	HOT WATER FLOW							CAPACITY [MBH]				ENT. AIR		LVG. AIR		CHILLED WATER FLOW					MERV 8												
AHU TAG	TYPE	AHU CONST.	LOCATION AND/OR SERVICE	SA [CFM]	RA [CFM]	MIN. OA [CFM]	MIN. OA [%]	SA	RA	SA	RA	WHEEL TYPE	FAN SPEED [RPM]	MOTOR HP	AFD CONTROLLER	MOTOR V/Ø	CAP. [MBH]	MAX. FACE VELOCITY [FPM]	MAX. FIN SPACING [FPI]	MIN. ROWS	DB [°F]	DB [°F]	EWT [°F]	LWT [°F]	GPM	WPD [FT H2O]	MEDIUM	TOTAL	SENS.	MAX. FACE VEL. [FPM]	MAX. FIN SPACING [FPI]	MIN. ROWS	DB [°F]	WB [°F]	DB [°F]	WB [°F]	EWT [°F]	LWT [°F]	GPM	WPD [FT H2O]	MEDIUM	FPM	SPD [IN WG]	VOLT / Ø	FLA	MCA	MOCP	WEIGHT [LBS]	DIMENSIONS LxWxH [IN.]	MANUFACTURER	MODEL NUMBER	REMARKS (H)
AHU-2	VAV	INDOOR	LOWER MECHANICAL ROOM	15000	2500	12500	83.3	PER MFGR	N/A	3	N/A	DUAL PLENUM	1800	(2) 15	YES	460/3	730.4	522	7	2	20	65	150	120	50	1	WATER	1056	608	500	8.25	8	91.6	75.4	55.1	54.9	44	56	180	13.3	WATER	265	0.56	460 / 3	40	50	80	7895	176 x 93.5 x 61.8	TRANE	CSAA030	1 THRU 13

NOTES:

(A) GENERAL:
- AHU TAG: AIR HANDLER DESIGNATION
- TYPE: CV= CONSTANT VOLUME, SINGLE ZONE, HORIZONTAL DRAW-THRU ARRANGEMENT: VAV= MULTIPLE ZONE, VARIABLE AIR VOLUME, DISCHARGE AIR CONTROL, OA FLOW MEASURING STATION, HORIZONTAL DRAW THRU ARRANGEMENT.
- AHU CONST. = AHU CONSTRUCTION: INDOOR = INDOOR MODULAR AIR HANDLING UNIT; OUTDOOR = OUTDOOR ROOFTOP WEATHERPROOF CONSTRUCTION AIR HANDLER WITH FACTORY INSULATED CURB. SHIP CURBS PRIOR TO AHU'S AS NECESSARY TO MEET THE CONSTRUCTION MILESTONE DEADLINES AND CONSTRUCTION COMPLETION SCHEDULES.
- LOCATION/SERVICE: LOCATION= PHYSICAL LOCATION OF AHU IN BUILDING; SERVICE = SPACE SERVED.

(B) AIRFLOW:
- AIRFLOW (CFM): DESIGN AIRFLOW THRU UNIT AT MAXIMUM OPERATING CONDITIONS.
- MINIMUM OUTSIDE AIR (CFM): MINIMUM DESIGN OUTSIDE AIR FLOW BALANCED AT TRAQ/MIXING BOX. UNIT SHALL BE PROVIDED WITH AN ECONOMIZER CAPABLE OF A MIN. OF QUANTITY = 85% OF SUPPLY AIRFLOW.
- TOTAL STATIC PRESSURE (IN. WG.): MAX ALLOWABLE T.S.P. SHALL BE PROVIDED BY THE MANUFACTURER FOR ACTUAL UNIT PURCHASED. THE CONTRACTOR IS RESPONSIBLE TO COORDINATE WITH THE VENDOR THE TOTAL SYSTEM STATIC PRESSURE DROP AND THE REQUIRED FAN MOTOR HORSEPOWER NECESSARY TO MEET THE DESIGN AIRFLOW RATES SCHEDULED PRIOR TO SUBMITTING BID PRICE. WHERE THE STATIC PRESSURE REQUIRES AN INCREASE IN THE SCHEDULED FAN MOTOR HORSEPOWER, THE CONTRACTOR SHALL PROVIDE ELECTRICAL SERVICE SIZE (SUCH AS WIRE, CONDUIT, MOTOR STARTER, CIRCUIT BREAKERS, ETC.) TO MATCH THE OVERCURRENT PROTECTION FOR THE ACTUAL UNITS PURCHASED. THE INSTALLATION SHALL BE IN COMPLIANCE WITH ALL APPLICABLE ARTICLES OF THE NATIONAL ELECTRIC CODE (NEC) NFPA 70.
- EXTERNAL STATIC PRESSURE (IN. WG.): INCLUDES DUCT MOUNTED SOUND ABSORBERS, DUCTWORK AND AIR OUTLETS; IT DOES NOT INCLUDE UNIT DAMPERS, MIXING BOX, PRE-FILTERS, FINAL FILTERS, HEATING COIL, COOING COIL AND CASING LOSSES.
- WHEEL TYPE: WHEEL SHALL BE DOUBLE WIDTH/DOUBLE INLET; FC = FORWARD CURVED, BI = BACKWARD INCLINED, AF = AIR FOIL TYPE FAN, PL = PLENUM TYPE BACKWARD INCLINED; FAN SHALL BE DIRECT DRIVE, BELTS NOT ALLOWED.
- FAN SPEED: PROVIDE MIN. CLASS II FAN CONSTRUCTION; RPM = MAXIMUM REVOLUTIONS PER MINUTE; SA = SUPPLY AIR FAN; EA = EXHAUST AIR FAN.
- MOTOR HORSEPOWER; MINIMUM ALLOWABLE NOMINAL MOTOR HORSEPOWER. PROVIDE PREMIUM MOTOR EFFICIENCY AND TOTALLY ENCLOSED FAN-COOLED (TEFC) MOTORS. REFER TO SECTION 230513 FOR MINIMUM ALLOWABLE MOTOR EFFICIENCY; SA = SUPPLY AIR, EA = EXHAUST AIR, V/Ø = VOLTAGE AND PHASE.
- AFD CONTROLLER: ADJUSTABLE FREQUENCY DRIVE MOTOR CONTROLLER. REFER TO SECTION 232690 FOR TECHNICAL SPECIFICATIONS; YES = PROVIDE AFD MOTOR CONTROLLER, NO = PROVIDE CONSTANT SPEED STARTER WITH HAND-OFF-AUTO (HOA) SWITCH.
- FAN MOTOR: PROVIDE OPEN DRIP-PROOF (ODP) WHERE MOTOR IS IN AIRSTREAM; PROVIDE TOTALLY ENCLOSED FAN-COOLED WHERE MOTOR IS OUT OF AIR STREAM OR CONTROLLED BY AN ADJUSTABLE FREQUENCY DRIVE (AFD).

(C) PREHEAT COIL:
- CAPACITY (MBH): HOT WATER COIL SIZED BASED ON 10°F DB AMBIENT OUTDOOR TEMPERATURE.
- MAX. FACE VELOCITY (FPM): SELECT UNIT CASING SIZE NOT TO EXCEED 550 FPM FACE VELOCITY ACROSS COIL.
- MAX. FIN SPACING (FPI): MINIMUM ADJUSTABLE FIN SPACING.
- MIN. ROWS: MINIMUM ALLOWABLE NUMBER OF COIL ROWS.
- ENT. AIR: ENTERING AIR TEMPERATURE (DEG F); DB = DRYBULB.
- LVG. AIR: LEAVING AIR TEMPERATURE (DEG F); DB = DRYBULB.
- HOT WATER FLOW: EWT = ENTERING WATER TEMPERATURE (DEG F); LWT = LEAVING WATER TEMPERATURE (DEG F); GPM = FLOW RATE IN (GALLONS PER MINUTE); WPD = MAXIMUM ALLOWABLE WATER PRESSURE DROP THRU COIL (FT. WG.).
- MEDIUM: WATER = WATER WITH CORROSION INHIBITOR AND BIOCIDE ADDITIVES REFER TO "HVAC CHEMICAL TREATMENT SECTION 232500".

(D) COOLING COIL:
- CAPACITY (MBH): CHILLED WATER COIL SIZED BASED ON 92°F DB/76°F WB AMBIENT OUTDOOR TEMPERATURE.
- MAX. FACE VELOCITY (FPM): SELECT UNIT CASING SIZE NOT TO EXCEED 550 FPM FACE VELOCITY ACROSS COOLING COIL.
- MAX. FIN SPACING (RPI): MINIMUM ADJUSTABLE FIN SPACING.
- MIN. ROWS: MINIMUM ALLOWABLE NUMBER OF COIL ROWS.
- ENT. AIR: ENTERING AIR TEMPERATURE (°F); DB = DRY BULB; WB = WET BULB.
- LVG. AIR: LEAVING AIR TEMPERATURE (°F); DB = DRY BULB; WB = WET BULB.
- CHILLED WATER FLOW: ENTERING WATER TEMPERATURE (°F); LWT = LEAVING WATER TEMPERATURE (°F); GPM = FLOW RATE IN (GALLONS PER MINUTE); WPD = WATER PRESSURE DROP THRU COIL (FT. WG.).
- MEDIUM: WATER = WATER WITH CORROSION INHIBITOR AND BIOCIDE ADDITIVES TO PROTECT PIPING SYSTEM IN ACCORDANCE WITH SECTION 232500 "HVAC CHEMICAL TREATMENT".

(E) FILTERS: PROVIDE TRACK FOR 2-INCH THICK PLEATED MEDIA FRAME MERV 8 (30% EFFICIENT) FILTER;
- PRESSURE LOSS INDICATED IN SCHEDULE IS WITH CLEAN FILTERS AT FACE VELOCITY INDICATED.
- FILTER: SIZE FAN TOTAL STATIC PRESSURE DROP FOR DIRTY FILTERS AT 0.5-INCH WG.
- EXAMPLE: EXT. SP + INT. SP = TOT. SP.
- FPM: MAXIMUM ALLOWABLE AIRFLOW RATE ACROSS FILTER IN FEET PER MINUTE.
- SPD: MAXIMUM ALLOWABLE STATIC PRESSURE LOSS ACROSS FILTER IN INCHES WATER COLUMN AT DESIGN FACE VELOCITY.

(F) ELECTRICAL
- VOLTAGE / Ø: NOMINAL POWER VOLTAGE AND PHASE (SINGLE POINT POWER).
- FLA: FULL LOAD AMPERAGE.
- MLA: MINIMUM CIRCUIT AMPACITY.
- MOCP: MAXIMUM OVERCURRENT PROTECTION AMPERAGE.

(G) DIMENSIONS
- WEIGHT [LBS]: MAXIMUM ALLOWABLE OPERATING WEIGHT OF THE UNIT IN POUNDS.
- DIMENSIONS LxWxH [IN.]: MAXIMUM ALLOWABLE LENGTH WIDTH AND HEIGHT OF THE UNIT IN INCHES.

(H) REMARKS: AHU FEATURES AND ACCESSORIES.
1) INTERNAL VIBRATION ISOLATION: FAN ASSEMBLY ASHRAE TYPE 3 SPRING VIBRATION ISOLATORS
2) DOUBLE WALL, 2-INCH THICK INSULATED WITH SOLID METAL INNER WALL
3) FIELD INSTALLED DDC BAS SENSORS, TRANSDUCERS, ETC.
4) STAINLESS STEEL 2-WAY SLOPING IAQ DRAIN PAN WITH ACCESS FOR CLEANING
5) EXTENDED GREASE LINES
6) ACCESS DOORS WITH LATCHES FOR EACH SECTION.
7) PIPING & ACCESS: INDOOR UNITS: PROVIDE ACCESS FROM BOTH SIDES. AUTHORITIES HAVING JURISDICTION, OWNER, AND ARCHITECT.
8) UNIT DISSASSEMBLY: COMPLETELY DISSASSEMBLE AND REASSEMBLE UNIT INSIDE MECHANICAL ROOM.
9) SUPPLY AIR FAN: PROVIDE FAN WITH BUILT-IN AIRFLOW MONITORING PITOT AND TRANSDUCER FOR UNIT SUPPLY AIR (TYP OF 2) AND INTERLOCK TO BAS FOR FAN AIRFLOW RATE MONITORING AT THE BAS GRAPHICS.
10) OUTDOOR AIR FLOW MONITORING STATION: PROVIDE OA FLOW STATION FACTORY INSTALLED IN END OF MIXING BOX. INTERLOCK TO BAS FOR OA FLOW RATE MONITORING AND CONTROL AT THE BAS GRAPHICS.
11) PROVIDE INTERNAL OA AND RA DAMPERS. INTERLOCK TO BAS TO AFFECT THE SCEQUENCE OF OPERATION SPECIFIED REFER TO SCHEDULE ON THIS SHEET.
12) POWER: PROVIDE SINGLE POINT POWER CONNECTIONS. CONTROL PANEL SHALL BE PROVIDED WITH SEPERATE 120 VOLT, SINGLE PHASE POWER CIRCUIT.
13) USA COIL: PROVIDE SENTRY BURST PROOF COILS FOR HW AND CHW COILS.
14) UNIT DISSASSEMBLY: THE UNIT SHALL BE DISASSEMBLED AND RIGGED INTO THE MECHANICAL ROOM AND REASSEMBLED.

No.	Date	Revision

b2e consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE E. BEDDOW
No. 021233
04-20-2020
PROFESSIONAL ENGINEER

FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

Sheet Name:
MECHANICAL SCHEDULES

Drawn By: b2E
Checked By: B2

Date: 06-15-2020

JOB # 18608

Sheet Number:
M-601

ULTRA LOW LEAK CONTROL DAMPERS

TAG	MAX AIR FLOW [CFM]	DAMPER TYPE	TORQUE [IN LB]	DAMPER SIZE [IN]	PRESSURE LOSS [IN WC]	REMARKS	BASIS OF DESIGN [MANUFACTURER/VENDOR, MODEL NUMBER]
DETENTION FACILITY							
AHU-2 (SA)	10000	OPPOSED BLADE AIRFOIL	180	48 / 16	0.1	1-4	RUSKIN CD50 OR ARROW AFD-20
RAF-1 (RA)	10000	OPPOSED BLADE AIRFOIL	180	40 / 22	0.1	1-4	RUSKIN CD50 OR ARROW AFD-20
RAF-1 (REL)	10000	OPPOSED BLADE AIRFLOIL	180	40 / 22	0.1	1-4	RUSKIN CD50 OR ARROW AFD-20
RAF-1 (LAUNDRY)	6750	OPPOSED BLADE AIRFLOIL	180	40 / 22	0.1	1-4	RUSKIN CD50 OR ARROW AFD-20

NOTES

TAG: DESIGNATION USED TO INDICATE DAMPER ON THE PLANS.
MAX AIR FLOW [CFM]: MAXIMUM ALLOWABLE AIRFLOW THROUGH THE DAMPER IN CUBIC FEET PER MINUTE.
DAMPER TYPE:
TORQUE [IN LB]: MINIMUM ALLOWABLE DAMPER ACUTATOR TORQUE IN INCH POUNDS.
DAMPER SIZE [IN]: THE DUCT SIZE THE DAMPER SHALL SERVE IN INCHES OF WIDTH AND HEIGHT FOR RECTANGULAR DUCT OF DIAMETER FOR ROUND DUCT.
PRESSURE LOSS [IN WC]: MAXIMUM ALLOWABLE PRESSURE LOSS THROUGH THE DAMPER AT MAX AIR FLOW IN INCHES OF WATER COLUMN.
REMARKS:
1. PROVIDE ULTRA LOW LEAK CONTROL DAMPERS WHICH COMPLY WITH IECC-2015.
2. PROVIDE EXTRUDED ALUMINUM BLADE SINGLE SECTION FRAME DAMPERS WITH RUBBER BLADE SEALS.
3. PROVIDE BELIMO ACTUATORS MODEL AFX24-SR WITH ENDSWITCH.
4. PROVIDE SPRING RETURN.
- AHU-2 (SA): FAIL OPEN
- RAF-1 (RA): FAIL OPEN
- RAF-1 (RELIEF): FAIL CLOSED
- RAF-1 (LAUNDRY): FAIL OPEN.

DIFFUSERS, REGISTERS AND GRILLES SCHEDULE

TAG	MAX CFM	NECK / COLLAR SIZE [INCHES]	SHELL SIZE [INCHES]	MAX STATIC PRESSURE LOSS [IN WG]	MAX NOISE COEFFICIENT	MOUNTING / TYPE	NOTES	BASIS OF DESIGN
SUPPLY AIR DIFFUSERS - RECTANGULAR SNAP-IN								
A6	85	6 ø	22 X 22	0.120	20	ROUND INLET - SNAP-IN w/OBD	1,2,3,4,5	TITUS: 24x24 2 26 D-75
A8	150	8 ø	22 X 22	0.120	20	ROUND INLET - SNAP-IN w/OBD	1,2,3,4,5	TITUS: 24x24 2 26 D-75
A10	225	10 ø	22 X 22	0.120	20	ROUND INLET - SNAP-IN w/OBD	1,2,3,4,5	TITUS: 24x24 2 26 D-75
A12	400	12 ø	22 X 22	0.120	20	ROUND INLET - SNAP-IN w/OBD	1,2,3,4,5	TITUS: 24x24 2 26 D-75
RETURN AIR GRILLES - RECTANGULAR SNAP-IN								
R22/22	400	22 x 22	24 x 24	0.073	20	RECTANGULAR INLET - SNAP-IN w/OBD	3,4,6	TITUS: PAR 22x22 24x24 2 26 AG-95
BRINELL (100-120) SECURITY BARS								
BSB	N/A	N/A	N/A	N/A	N/A	STEEL ALL WELDED CONSTRUCTION	7	TITUS: SG-BG-SLV
SUPPLY AIR GRILLE - RECTANGULAR								
FS20	1000	20 x 20	19.25 x 19.25	0.033	14	RECTANGULAR INLET - SCREW-IN w/OBD	1,2,3,4,5	TITUS 300FS

NOTES

1. PROVIDE DUCT RUNOUTS FROM THE MAIN DUCT THE SAME SIZE AS THE NOMINAL DUCT INSLET SIZE. THE MAXIMUM ALLOWABLE LENGTH OF FLEXIBLE DUCT SHALL BE SIX FEET.
2. PROVIDE FACTORY FABRICATED MANUAL BALANCING DAMPER WITH STANDOFF AND LOCKING QUADRANT FOR EACH SUPPLY AND RETURN DUCT RUNOUT FROM THE MAIN DUCT.
- BASIS OF DESIGN: NAILOR OR APPROVED EQUAL.
3. PROVIDE FACTORY FABRICATED OPPOSED BLADE DAMPER.
- BASIS OF DESIGN: TITUS AG-75 OPPOSED BLADE DAMPER (OBD), OR APPOVED EQUAL.
4. PROVIDE SNAP-IN FRAME AND MARGIN SUITABLE FOR ADJACENT CONSTRUCTION.
- SUBMIT SAMPLE DIFFUSER/REGISTER/GRILLE, BORDER, AND FINISHES TO ARCHITECT FOR REVIEW AND APPROVAL PRIOR TO ORDERING EQUIPMENT.
5. SUPPLY GRILLES: PROVIDE STEEL GRILL AND SNAP-IN BORDER (TYPE - 2).
- CONTRACTOR SHALL (BEFORE INSTALLATION) SET OUTER BLADES TO 45 DEGREES, OPPOSED AND THE INNER BLADES TO ZERO DEGREES.
- WELDED BORDER WITHOUT MITER SEAMS.
- BORDER TYPE SHALL BE PROVIDED AS APPLICABLE FOR INSTALLATION. COORDINATE WITH ARCHITECT AND OBTAIN APPROVAL BEFORE ORDERING.
- COUNTER SUNK SCREW HOLES.
- EACH GRILLE SHALL BE BALANCED WITH DUCT MOUNTED MANUAL VOLUME DAMPER. IF MANUAL VOLUME DAMPER CANNOT BE INSTALLED, PROVIDE OPPOSED BLADE DAMPER BEHIND GRILLE FOR BALANCING.
6. RETURN GRILLES: PROVIDE STEEL PERFORATED GRILLE AND SNAP-IN BORDER (TYPE - 2).
- WELDED BORDER WITHOUT MITER SEAMS.
- BORDER TYPE SHALL BE PROVIDED AS APPLICABLE FOR INSTALLATION. COORDINATE WITH ARCHITECT AND OBTAIN APPROVAL BEFORE ORDERING.
- COUNTER SUNK SCREW HOLES.
- EACH GRILLE SHALL BE BALANCED WITH DUCT MOUNTED MANUAL VOLUME DAMPER. IF MANUAL VOLUME DAMPER CANNOT BE INSTALLED, PROVIDE OPPOSED BLADE DAMPER BEHIND GRILLE FOR BALANCING.
7. BRINELL SECURITY BARS: PROVIDE WITH TWO FRAMES CONSISTING OF 1-1/2" x 1-1/2" x 3/16" STEEL ANGLE IRON THAT WILL BE SHIPPED LOOSE FOR FIELD WELDING (MILL FINISHED), 3/16" STEEL SLEEVE WITH 3/4" DIAMETER SECURITY BRINELL BARS ON 6" SPACING VERTICALLY AND HORIZONTALLY AND ALL WELDED CONTRUCTION, FINISH: #26 WHITE. 74" OVERALL WIDTH AND 18" OVERALL HEIGHT (TO ALLOW FOR 1" DUCT LINING) RETURN AIR DUCT WHICH WILL REQUIRE THREE (3) SG-BG-SLV SECTIONS TO ACCOMMODATE DUCT SIZE OR CUSTOM MANUFACTURER FABRICATED ASSEMBLY TO ACCOMMODATE ACTUAL DUCT SIZE COORDINATE WITH MANUFACTURER FOR ASSEMBLY REQUIREMENTS. FIELD COORDINATE SLEEVE LENGTH TO ACCOMMODATE ACTUAL WALL THICKNESS TO PROVIDE MINIMUM 1-1/2" SLEEVE EXTENSION BEYOND ANGLE IRON WALL FRAME TO ALLOW FOR DUCT CONNECTION. PROVIDE BREAK METAL COVER FOR LEADING EDGE OF DUCT LINER TO PREVENT AIR FROM LOOSENING LINER.

AUTO TEMPERATURE CONTROL VALVES

TAG	DESIGN FLOW [GPM]	VALVE TYPE	CLOSE-OFF PRESSURE	MIN Cv	VALVE SIZE [IN]	PRESSURE LOSS [FT HD]	REMARKS	BASIS OF DESIGN
DETENTION FACILITY								
TCV-PH-1	60	3-WAY	230	28	1 1/2	5	1,2,3,4,5,6	BELIMO G340 VALVE-BODY WITH AF24-MFT-X1 ACTUATOR
TCV-CC-1	180	2-WAY	123	90	3	4	1,2,3,4,5,6	BELIMO G680 VALVE-BODY WITH 2-GMX24-MFT-XI ACTUATORS
TCV-VAV-1	1.49	2-WAY	250	0.4	1/2	6	1,2,3,4,5,6	BELIMO G212 VALVE-BODY WITH NVD24-MFT-US ACTUATOR
TCV-VAV-2	2.12	2-WAY	250	1.3	1/2	4	1,2,3,4,5,6	BELIMO G213 VALVE-BODY WITH NVD24-MFT-US ACTUATOR
TCV-VAV-3	2.21	2-WAY	250	1.3	1/2	4	1,2,3,4,5,6	BELIMO G213 VALVE-BODY WITH NVD24-MFT-US ACTUATOR
TCV-VAV-4	1.15	2-WAY	250	0.4	1/2	6	1,2,3,4,5,6	BELIMO G212 VALVE-BODY WITH NVD24-MFT-US ACTUATOR
TCV-VAV-5	0.6	2-WAY	250	0.4	1/2	3	1,2,3,4,5,6	BELIMO G212 VALVE-BODY WITH NVD24-MFT-US ACTUATOR
TCV-VAV-6	1.15	2-WAY	250	0.4	1/2	6	1,2,3,4,5,6	BELIMO G212 VALVE-BODY WITH NVD24-MFT-US ACTUATOR

NOTES

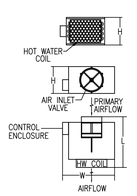
TAG: DESIGNATION USED TO INDICATE TEMPERATURE CONTROL VALVES ON THE PLANS.
DESIGN FLOW [GPM]: DESIGN FLOW RATE OF THE WORKING FLUID THROUGH THE TEMPERATURE CONTROL VALVES IN GALLONS PER MINUTE.
VALVE TYPE: 3-WAY=THREE WAY MIXING VALVE; 2-WAY=TWO WAY THROTTLING CONTROL VALVE.
CLOSE-OFF PRESSURE: MAXIMUM PRESSURE WHICH THE VALVE CAN CLOSE AGAINST. CLOSE-OFF PRESSURE SHALL NOT BE LESS THAN THIS VALUE.
MIN CV: MINIMUM ALLOWABLE FLOW FACTOR FOR THE MODULATING TEMPERATURE CONTROL VALVES.
PRESSURE LOSS [FT HD]: PRESSURE LOSS OF THE WORKING FLUID THROUGH THE TEMPERATURE CONTROL VALVE AT THE DESIGN FLOW RATE IN FEET OF HEAD.
REMARKS:

1. WHERE AUTOMATIC MODULATING TEMPERATURE CONTROL VALVE IS SMALLER DIAMETER THAN THE PIPE SIZE, PROVIDE REDUCER FITTING ON INLET AND OUTLET SIDES OF THE VALVE.
2. WORK WITH TAB CONTRACTOR AND SET FLOW AT CALIBRATED BALANCING VALVES TO DESIGN FLOW RATE WITH ADJUSTABLE SPEED DRIVE AT 60 Hz SPEED.
3. MOUNT VALVE IN PIPING AT CLEAR POSITION FOR EASE OF MAINTENANCE AND ADJUSTMENT. DO NOT BLOCK AHU ACCESS DOORS.
4. SELECT CONTROL VALVES AT THE CV INDICATED ON THE SCHEDULE OF THE CLOSEST VALUE PLUS OR MINUS WITHOUT EXCEEDIG 6 PSI PRESSURE LOSS AT FULL OPEN POSITION.
5. BASIS OF DESIGN PROVIDE : MANUFACTURER AND MODEL NUMBER PROVIDE SPRING RETURN N.O. FOR HEATING AND NON-SPRING RETURN N.C. FOR COOLING VALVES.
6. CLOSE-OFF PRESSURE SHALL BE 120 PSI MINIMUM OR AS INDICATED OTHERWISE.

SHUT-OFF AIR TERMINAL UNIT W/ HW REHEAT SCHEDULE

ATU TAG	TYPE (A)	AIRFLOW (B)					NC (MAX)	ELECTRICAL (DDC)		BOX DIMENSIONS (D)				HEATING HOT WATER (E)									REMARKS (F)	BASIS OF DESIGN
		VALVE CFM (MAX)	VALVE CFM (MIN)	INLET SIZE	BOX INLET S.P. (MIN)	BOX P.D. (MAX)		CONTROL	VOLTAGE	L (INCH)	W (INCH)	H (INCH)	MAX. WEIGHT (LBS.)	CAPACITY (MBH)	EAT (°F)	LAT (°F)	AIR PD (IN.WG.)	EWT (°F)	LWT (°F)	GPM	WATER PD (FTWG)	ROWS (MIN)	PIPING RUNOUTS DIA. (IN.)		
VAV-1	SO	1370	50%	10	0.75"	0.63"	35	DDC	24V	11.5	11.5	9.5	35	22.2	55	85	0.10	140	110	1.5	0.38	2	1/2	1-5	TRANE MODEL VCWF 10
VAV-2	SO	1750	50%	14	0.75"	0.29"	35	DDC	24V	11.5	11.5	9.5	35	28.4	55	85	0.10	140	110	2.12	0.21	2	1/2	1-5	TRANE MODEL VCWF 14
VAV-3	SO	1850	50%	14	0.75"	0.32"	35	DDC	24V	11.5	11.5	9.5	35	30.0	55	85	0.10	140	110	2.21	0.22	2	1/2	1-5	TRANE MODEL VCWF 14
VAV-4	SO	900	50%	10	0.75"	0.32"	35	DDC	24V	11.0	12.5	11.5	40	14.6	55	85	0.10	140	110	1.15	0.23	2	1/2	1-5	TRANE MODEL VCWF 10
VAV-5	SO	500	50%	6	0.75"	0.63"	35	DDC	24V	12.0	15.5	13.5	50	8.10	55	85	0.10	140	110	0.59	0.24	2	1/2	1-5	TRANE MODEL VCWF 6
VAV-6	SO	900	50%	10	0.75"	0.32"	35	DDC	24V	13.0	18.5	15.5	65	14.6	55	85	0.10	140	110	1.15	0.23	2	3/4	1-5	TRANE MODEL VCWF 10

ARRANGEMENT



SHUT OFF ATU (VAV BOX)

A) GENERAL
- ATU TAG: ATU UNIT DESIGNATION
- TYPE: SO = SHUT-OFF VAV BOX.

B) AIRFLOW
- VALVE CFM (MAX.): PROVIDE VAV BOX FAN FACTORY SET SCHEDULED MAX. AIRFLOW CFM. CONTRACTOR SHALL COORDINATE BALANCING WITH CALIBRATION OF VAV BOX DAMPER POSITION AND AIR FLOW OUTPUT READING AT DDC CONTROL SYSTEM.
- VALVE CFM (MIN.): PROVIDE VAV BOX MINIMUM POSITION FACTORY SET TO PERCENTAGE OF DESIGN AIRFLOW CFM SCHEDULED. CONTRACTOR SHALL COORDINATE BALANCING WITH CALIBRATION OF VAV BOX DAMPER POSITION AND AIR FLOW OUTPUT READING AT DDC CONTROL SYSTEM.
- INLET SIZE: PROVIDE VALVE (INLET) SIZE TO MEET SOUND CRITERIA SPECIFIED. WHERE VALVE SIZE MUST BE INCREASED TO MEET SOUND CRITERIA SPECIFIED, PROVIDE INCREASED VALVE SIZE, INLET FLEX. DUCT, AND SHEET METAL DUCT RUNOUT MIN. 150% OF VAV BOX INLET DUCT CROSS SECTIONAL AREA.
- BOX INLET S.P (MIN.).:
- BOX P.D. (MAX.): MAX. VAV BOX STATIC PRESSURE DROP ACROSS THE ASSEMBLY FOR THE INLET SIZE AT THE AIRFLOW INDICATED, THE INLET STATIC PRESSURE INDICATED, AND WITH FULLY OPEN DAMPER IN ACCORDANCE WITH ARI 880-89.
- NC: REFER TO SPECIFICATION FOR MAX. ALLOWABLE RADIATED SOUND NOISE AT 1.0" INLET STATIC PRESSURE. CONTRACTOR SHALL SUBMIT SOUND DATA FOR EACH ATU AT EACH DESIGN AIRFLOW LISTED AND THE RESULTING NC CURVE AND FREQUENCY BAND SOUND POWER VALUES FOR EACH ATU (VAV BOX), INCLUDING DISCHARGE AND RADIATED SOUND ATTENUATION FOR ACTUAL CEILING AND DUCT CONSTRUCTION.

C) ELECTRICAL
- CONTROL: DIRECT DIGITAL CONTROL (ELECTRONIC)
- VOLT: CONTROL VOLTAGE

D) BOX DIMENSIONS
- LENGTH: LENGHT IN INCHES.
- WIDTH: WIDTH IN INCHES.
- HEIGHT: HEIGHT IN INCHES.
- MAX. WEIGHT: MAXIMUM VAV BOX WEIGHT.

E) HEATING HOT WATER
- CAPACITY: MINIMUM ALLOWABLE HEATING CAPACITY IN THOUSAND BRITISH THERMAL UNITS.
- EAT: ENTERING AIR TEMPERATURE IN DEGREES FAHRENHEIT.
- LAT: LEAVING AIR TEMPERATURE IN DEGREES FAHRENHEIT.
- AIR P.D.: MAXIUM ALLOWABLE PRESSURE DROP ACROSS HOT WATER COIL IN INCH WATER GAUGE.
- EWT: ENTERING WATER TEMPERATURE IN DEGREES FAHRENHEIT.
- LWT: LEAVING WATER TEMPERATURE IN DEGREES FAHRENHEIT.
- GPM: MAXIMUM FLOW RATE IN GALLONS PER MINUTE.
- WATER MAX. P.D.: MAXIMUM WATER PRESSURE DROP THROUGH COIL IN FEET WATER GAUGE.
- # ROWS: MINIMUM NUMBER OF ROWS.
- PIPING RUNOUTS DIA.: HOT WATER PIPING RUNOUT SIZE IN INCHES.

F) REMARKS
1) WHERE VAV BOX INLET DIAMETER EXCEEDS MED. PRESS TRUNK DUCT HEIGHT MINUS 3-INCHES PROVIDE RECTANGULAR TO ROUND TRANSITION WITH TAPERED TAP. MAINTAIN MIN. 150% OF INLET CROSS SECTIONAL AREA FOR RECTANGULAIR TAP.
2) THE CONTRACTOR SHALL COORDINATE WITH THE ATU VENDOR AND PROVIDE IN THE BID PRICE CONTROL POWER TRANSFORMERS (CPT) AS NECESSARY TO POWER ALL VAV BOX CONTROLLERS. CONTRACTOR IS RESPONSIBLE TO SIZE THE CPTs TO HANDLE ALL ASSOCIATED VA LOADS AT EACH VAV BOX. REQUESTS FOR ADDITIONAL PAYMENT DUE TO THE CONTRACTORS FAILURE TO COORDINATE WITH EQUIPMENT VENDORS(S) AND OTHER TRADES AND PROVIDE ELECTRICAL TO MATCH ATU NAME PLATE DATA WILL NOT BE CONSIDERED.
3) ACCESSORIES:
- FACTORY INSTALLED PRESSURE INDEPENDENT CONTROLS;
- OUTRIGGER BRACKETS FOR SUSPENDING UNIT;
- BELIMO HOT WATER CONTROL BALL VALVES;
- MIN. 1-INCH THICK, DOUBLE WALL ACOUSTICAL CONSTRUCTION;
- PROVIDE 2-ROW COIL AS REQUIRED TO MEET HEATING CAPACITY AND AIR PRESSURE LOSS SCHEDULED.
4) CONTROLS SHALL BE PROVIDED BY SIEMENS FOR A COMPLETE OPERATING SYSTEM IN ACCORDANCE WITH THE P&ID CONTROLS, THE POINTS LIST AND THE SEQUENCE OF OPERATION SPECIFIED.

No.	Date	Revision

b2E consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE E. BEDDOW
No. 021233
04-20-2020
PROFESSIONAL ENGINEER

FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

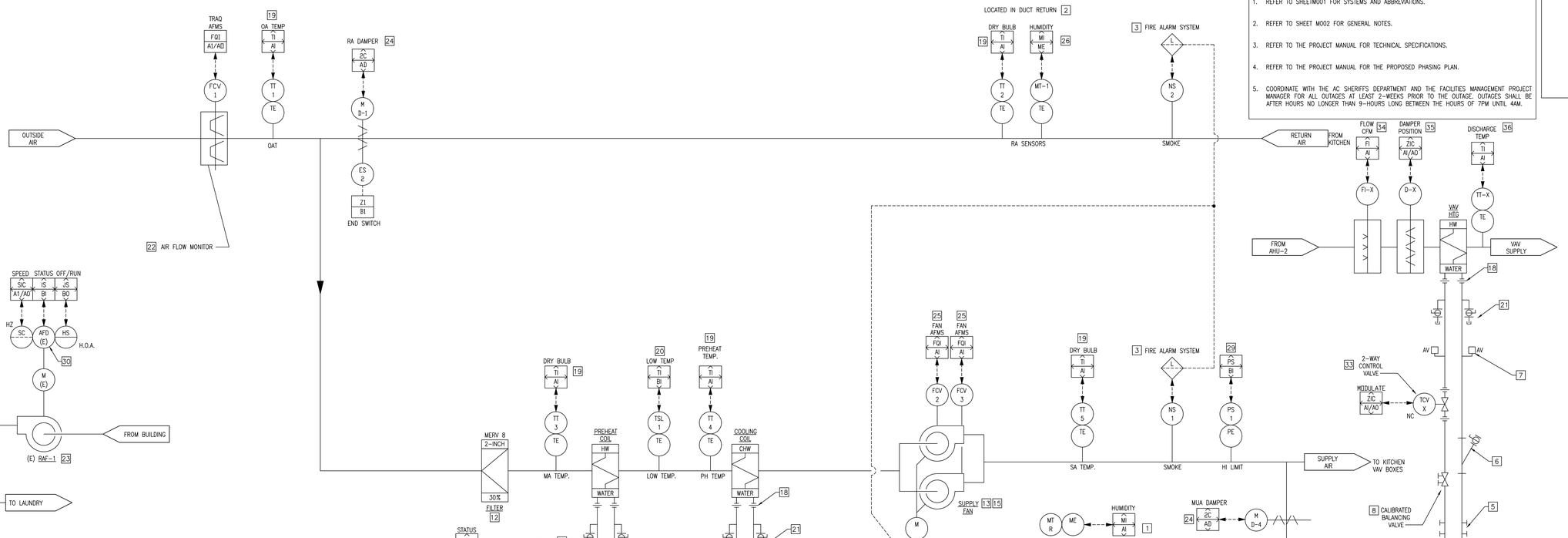
Sheet Name:
MECHANICAL SCHEDULES

Drawn By: b2E
Checked By: B2

Date: 06-15-2020

JOB # 18608

Sheet Number:
M-602



GENERAL NOTES

1. REFER TO SHEETM001 FOR SYSTEMS AND ABBREVIATIONS.
2. REFER TO SHEET M002 FOR GENERAL NOTES.
3. REFER TO THE PROJECT MANUAL FOR TECHNICAL SPECIFICATIONS.
4. REFER TO THE PROJECT MANUAL FOR THE PROPOSED PHASING PLAN.
5. COORDINATE WITH THE AC SHERIFFS DEPARTMENT AND THE FACILITIES MANAGEMENT PROJECT MANAGER FOR ALL OUTAGES AT LEAST 2-WEEKS PRIOR TO THE OUTAGE. OUTAGES SHALL BE AFTER HOURS NO LONGER THAN 9-HOURS LONG BETWEEN THE HOURS OF 7PM UNTIL 4AM.

RETURN FAN DAMPER ARRANGEMENT FOR AHU-1

NTS

NOTE: PROVIDE BAS INTERLOCK TO LAUNDRY DRYERS TO DIVERT AIR TO THE LAUNDRY WHEN DRYERS ARE RUNNING.

AC DETENTION FACILITY-KITCHEN SYSTEM POINT LIST

SYSTEM POINT DESCRIPTION	GRAPHICS = YES	ANALOG															BINARY											SYSTEMS FEATURES																										NOTES
		INPUT										OUTPUT					INPUT						OUTPUT					ALARMS									PROGRAMS																	
AHU-2		TEMPERATURE	PRESSURE	HUMIDITY	PPM	GPM	PHASE AMPS	PHASE VOLTS	PERCENT	PERCENT RLA	CFM	DDC	PRESSURE	SETPOINT ADJ.			PNEU. TRANSDUCER	STATUS ON/OFF	FILTER STATUS	GAS VALVE STATUS	STATUS		OFF/ON	OPEN/CLOSE	MAX. CAPACITY	ENABLE/DISABLE	LIMIT WARNING	HIGH ANALOG	LOW ANALOG	FLAME FAILURE	COMMERCIAL POWER	SENSOR FAIL	FLOW FAIL	COMM. FAIL	DIAGNOSTICS	FLOW OVERRIDE	TIME SCHEDULING	OPT. START/STOP	DEMAND LIMITING	RESET	EVENT PROGRAM	PUMP RAMP	ALARM	MAINT. WK. ORD.	PUMP RUN TIME	EXP. MESSAGE	SET BACK/SET UP	NIGHT PURGE	TENANT BILLING	BOILER SEQUENCING	TOTALIZING	TIMED OVERRIDE	BACNET COMM.	
AHU-2																																					X	X					X				X					X	X	1, 2, 3
SUPPLY FAN	X								X					X							X		X																															1, 2, 3
TT-1 (OA TEMP.)	X	X																																																				1, 2, 3
TT-2 (RA TEMP.)	X	X																																																				1, 2, 3
TT-3 (MA TEMP.)	X	X																																																				1, 2, 3
TT-4 (PH TEMP)	X	X																																																				1, 2, 3
TT-5 (SAT)	X	X																																																				1, 2, 3
MT-1 (RA HUMIDITY)	X			X																																																		1, 2, 3
RETURN FAN	X								X					X							X		X																															1, 2, 3
D-1 (AHU-2 RA)	X								X					X							X																																	1, 2, 3
D-2 (RAF-1)	X								X					X							X																																	1, 2, 3
(E) D-3 (RAF-1)	X								X					X							X																																	1, 2, 3
FCV-1 AFMS (CFM)	X										X																																											1, 2, 3
FCV-2 SAF (CFM)	X										X																																											1, 2, 3
FCV-3 SAF (CFM)	X										X																																											1, 2, 3
FCV-4 SA (HOOD)	X										X																																											1, 2, 3
TCV-1 (PH)	X									X				X																																								1, 2, 3
TCV-2 (CHW)	X									X				X																																								1, 2, 3
TCV-X (VAV RH)	X									X				X																																								1, 2, 3
TSL-1 (LOW TEMP.)	X																				X																						X											1, 2, 3 HARDWIRE SHUTDOWN
TT-G (GLOBAL)	X	X																																																				1, 2, 3 (TYP. OF 2)
TT-X (ROOM)	X	X																																																				1, 2, 3 (TYP. OF 6)
MT-X (ROOM)	X																																																					1, 2, 3
HWCP-1 (HW)	X																				X		X																				X											1, 2, 3
MT-G (GLOBAL)	X			X																																																		1, 2, 3 (TYP. OF 2)
PS-1	X																				X																						X											1, 2, 3 HARDWIRE SHUTDOWN
DUCT SMOKE	X																																										X											1, 2, 3 HARDWIRE SHUTDOWN
F1-X (VAV)	X	X									X																																											1, 2, 3 (TYP. OF 6)
D-X (VAV)	X													X							X																																	1, 2, 3 (TYP. OF 6)
TT-X (VAV)	X													X							X																																	1, 2, 3 (TYP. OF 6)
(E) KE FAN	X																				X		X																															1, 2, 3
(E) DW FAN	X																				X		X																															1, 2, 3
MUA DAMPER (D-4)	X							X						X																																								1, 2, 3

GENERAL NOTES:
1. REFER TO PROJECT MANUAL SECTION 23 09 00 & 23 09 93 FOR "BUILDING AUTOMATION SYSTEM AND AUTOMATIC TEMPERATURE CONTROL SYSTEM (BAS)".
2. GRAPHICS SHALL BE DESIGNED BY THE EMS CONTRACTOR AND SHALL CONFORM TO THE LATEST AC GRAPHICS STANDARD.
3. WHERE CONFLICT OCCURS BETWEEN THIS POINTS LIST AND SPECIFICATIONS, THE SPECIFICATIONS SHALL GOVERN.

① AHU-2 SCHEMATIC FLOW CONTROL DIAGRAM

NTS

GENERAL NOTES

1. REFER TO SHEET M0.01 FOR SYMBOLS & ABBREVIATIONS.
2. REFER TO SHEET M0.02 FOR GENERAL NOTES.
3. REFER TO PROJECT MANUAL FOR TECHNICAL SPECIFICATIONS.
4. INTERLOCK CONTROLS TO AFFECT THE SEQUENCES OF OPERATION. PROVIDE ALL POINTS ON POINTS LISTS, AND CONTROL DIAGRAMS.
5. ALL CONTROLS SHALL BE DDC ELECTRONIC TYPE. PNEUMATIC CONTROLS SHALL NOT BE REUSED.

VAV BOX CONTROL (TYP. of 6)

NTS

DRAWING KEY NOTES

1 REFER TO PLANS FOR SPACE SENSOR LOCATIONS. WHERE NOT INDICATED ON PLANS CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE AND LOCATE AS DIRECTED BY OWNER.
- PROVIDE SIX (6) ROOM TEMPERATURE SENSOR IN THE KITCHEN FOR AHU-2.
- PROVIDE ONE (1) HUMIDITY SENSOR IN THE RETURN AIR DUCT AS INDICATED FOR AHU-2.

2 RETURN DUCT MOUNTED SENSOR LOCATIONS. WHERE NOT INDICATED ON PLANS CONTRACTOR SHALL BE RESPONSIBLE TO PROVIDE AND LOCATE AS DIRECTED BY OWNER.

3 DUCT SMOKE DETECTORS. LOCATE UL LISTED FIRE ALARM SHUTDOWN RELAY WITHIN 3-FEET OF AFD AS REQUIRED BY NFPA 72. INTERLOCK TO FIRE ALARM SYSTEM AND PROGRAM FACP TO SHUT-DOWN UNIT AND CLOSE ALL SMOKE DAMPERS UPON SENSING PRODUCTS OF COMBUSTION.
- TYPICAL OF TWO (2) DUCT SMOKE DETECTORS FOR EACH AHU.

4 ISOLATION VALVE (TYP.):
- BALL VALVE FOR 2 INCH AND SMALLER.
- HIGH PERFORMANCE BUTTERFLY VALVE FOR 2-1/2 INCH AND LARGER (TYP.).

5 TEST PLUGS (TYP.)
- PROVIDE TEST PLUG GAUGE KIT, AND TURN-OVER TO OWNER.

6 Y-STRAINER WITH 3/4-INCH BLOW DOWN VALVE (TYP.).
-BALL VALVE WITH HOSE CONNECTION, BRASS CAP AND CHAIN (TYP.): WATTS REGULATOR SERIES B-6000-CC.

7 AUTOMATIC AIR VENT (TYP.): PROVIDE FOR EACH WATER COIL.
- PROVIDE AT HIGH POINT IN PIPING SYSTEM.

8 CALIBRATED BALANCING VALVE (TYP.).
-PROVIDE DIFF. PRESSURE MEASURING GAUGE KIT WITH FLOW CALCULATOR, AND TURN OVER TO OWNER.

9 AUTOMATIC MODULATING FLOW CONTROL VALVE (TYP.).
-PROVIDE MOTOR OPERATED VALVE OPERATOR WITH MANUAL OVERRIDE.
-REFER TO SHEET M6.01 FOR VALVE SCHEDULE.

10 PARALLEL BLADE BACKDRAFT DAMPER (TYP.).
- WEIGHT DAMPER AS NECESSARY TO KEEP CLOSED AND ONLY OPEN WHEN AHU RUNS.

11 OUTSIDE AIR DAMPER WITH MIN. OA AND ECONOMIZER
-AIR FLOW MONITORING SYSTEM (AFMS)
-PROVIDE PRESSURE INDEPENDENT AIR FLOW MONITORING AND CONTROL AT DDC EMS.
-SET TO AUTOMATICALLY MAINTAIN MIN. AIRFLOW SET POINT (CFM).

12 FILTER SECTION (TYP.): PROVIDE ANGLED FILTER RACK FOR FILTERS.
-PROVIDE 2-INCH THICK FILTER (MERV 8).

13 SUPPLY AIR FAN WITH AFD (TYP.).
- AFD SHALL BE MOUNTED INSIDE AHU CASING BY MANUFACTURER.
- REFER TO SECTION 23 26 90 FOR MOTOR TECHNICAL SPECIFICATION AND MINIMUM ALLOWABLE EFFICIENCY.

14 BAS CONTROL PANEL: PROVIDE AND LOCATE OUTSIDE AHU OR IN NEMA 4X CONTROL BOX MOUNTED ON UNIT.

15 AIRFLOW MONITORING SYSTEM (AFMS) FOR SA FANS (TYP.): FANS SHALL BE PROVIDED WITH BUILT-IN AMS VELOCITY SENSORS TO MEASURE AIRFLOW CFM CONTINUOUSLY AT BAS GRAPHICS.

16 INLINE CIRCULATION PUMP: PROVIDE PUMP SIZED TO MATCH PREHEAT COIL WATER FLOW RATE.
- PROVIDE CONSTANT SPEED MOTOR CONTROLLER WITH HOA SWITCH.
- HOA SWITCH SHALL BE PROVIDED WITH INDICATING LIGHTS AND CURRENT SENSING RELAY INTERLOCKED TO THE BAS.

17 GLOBAL OUTDOOR TEMP. AND HUMIDITY SENSORS (TYP. OF 2): PROVIDE FOR USE BY ENTIRE BAS.
- ADDITIONAL OUTDOOR SENSORS MAY BE REQUIRED FOR STAND-ALONE EQUIPMENT.

18 UNION OR FLANGED CONNECTION (TYP.).
- PROVIDE ELECTRICAL COUPLINGS FOR CONNECTION OF DISSIMILAR METALS.

19 TEMPERATURE SENSOR (TYP.)
-PROVIDE POINT TYPE TEMPERATURE SENSOR IN AHU.
-PROVIDE AVERAGING TYPE TEMPERATURE SENSOR IN AHU FOR MIXING AIR STREAM (1E MIXED AIR AND PREHEAT AIR).

20 LOW TEMPERATURE SENSOR: PROVIDE LOW TEMPERATURE SENSOR IN DOWNSTREAM SIDE OF FIRST COIL.
-PROVIDE ONE LOW TEMP. SENSOR FOR EACH 20 SF OF COIL AREA.
-HARDWIRE AND SET TO SHUT-DOWN UNIT UPON TEMP. < 35° F.
-PROVIDE MANUAL RESET TYPE LOW TEMP. SENSOR.

21 DRAIN VALVES (TYP.): PROVIDE ¾" BALL VALVES WITH HOSE CONNECTION, BRASS CAP AND CHAIN.

22 AIRFLOW MONITORING STATION: PROVIDE AIR FLOW MONITORING STATION IN MIXING BOX FOR OUTSIDE AIR.
- CALIBRATE WITH TAB TO READ ACCURATELY.
- BASIS OF DESIGN: TRANE TRAQ

23 EXISTING RETURN AIR FAN RAF-1 SHALL REMAIN. REBALANCE FAN TO AIRFLOW INDICATED.

24 RETURN AIR DAMPER: PROVIDE OPPOSED BLADE DAMPER WITH MOTOR OPERATED DAMPER IN AHU-2 RA DUCT.
- PROVIDE END SWITCH AND INTERLOCK TO THE BAS.

25 SA FAN AIRFLOW MONITOR: PROVIDE SUPPLY AIR FAN WITH BUILT-IN VELOCITY SENSOR WITH TRANSDUCER AND INTERLOCK TO THE BAS.
- CALIBRATE WITH TAB TO READ ACCURATELY.

26 PROVIDE AVERTING TYPE HUMIDITY SENSOR IN RETURN AIR DUCT.

27 PRESSURE GAUGE: PROVIDE 4-INCH PRESSURE INDICATING GAUGE (0-50 PSI).

28 CHECK VALVE: PROVIDE CHECK VALVE IN HWS TO PREVENT BAVKFLOW WITH FREEZE PROTECTION PUMP RUNNING.

29 PROVIDE DUCT OVER-PRESSURE SWITCH TO SHUT-DOWN SAF UPON DETECTING >3-INCH WG (ADJ.) IN THE SA DUCTWORK.

30 EXISTING AFD FOR RAF-1 SHALL BE CONTROLLED VIA THE EMS TP PROVIDE THE SEQUENCE OF OPERATION SPECIFIED.

31 PROVIDE MOTOR OPERATED DAMPER ACTUATOR ON EXISTING DAMPER ASSEMBLY.

32 PROVIDE DAMPERS AND ELECTRONIC DAMPER ACTUATORS TO AFFECT THE SEQUENCE OF OPERATION SPECIFIED.

33 PROVIDE 3-WAY AUTOMATIC MODULATING TEMPERATURE CONTROL VALVE.
- REFER TO VALVE SCHEDULE FOR SIZING.
- BASIS OF DESIGN: BELIMO

34 VELOCITY RING WITH TRANSDUCER: INTERLOCK TO BAS FOR AIRFLOW MONITORING AND CONTROL OF VAV BOX IN CFM ON GRAPHICS INTERFACE.

35 MODULATING DAMPER IN VAV BOX FOR ADJUSTING FLOW RATE TO CONTROL SPACE TEMPERATURE: INTERLOCK TO BAS FOR MONITORING AND CONTROL OF DAMPER POSITION IN VAV BOX FOR DISPLAY ON GRAPHICS INTERFACE.

36 DISCHARGE AIR TEMPERATURE: PROVIDE IN VAV BOX FAN MONITORING DISCHSRGE AIR TEMPERATURE AND DISPALY ON BAS GRAPHICS INTERFACE.

37 MAKE-UP AIR OPPOSED BLADE CONTROL DAMPER TO KITCHEN EXHAUST HOOD.

38 MAKE-UP AIRFLOW MONITORING STATION.
- BASIS OF DESIGN: RUSKIN MODEL IAQ.

No.	Date	Revision

b2E
consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

BRUCE E. BEDDOW
No. 021233
04-20-2020

FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

Sheet Name:
KITCHEN AHU SCHEMATIC CONTROL DIAGRAM
Drawn By: b2E
Checked By: B2

Date: 06-15-2020

JOB # 18608

Sheet Number:
M-801

ELECTRICAL SYMBOLS

RECEPTACLES AND WIRING DEVICES

MOUNTING HEIGHT		
+ 18"	Φ	SINGLEPLEX RECEPTACLE OUTLET WITH GROUND, 125V, 20 AMP
+ 18"	Φ	DUPLEX RECEPTACLE OUTLET WITH GROUND, 125V, 20 AMP
+ 18"	Φ K	ORANGE COLORED DUPLEX ISOLATED GROUND OUTLET, 125V, 20 AMP RECEPTACLE CONNECTED TO K-13 RATED TRANSFORMER
+ 18"	Φ GFCI	GROUND FAULT CIRCUIT INTERUPTED OUTLET
FLOOR LVL.	⊡ J	BELOW DECK FLOOR MOUNTED DUPLEX RECEPTACLE OUTLET WITH GROUND, 125V, 20 AMP. REFER TO DETAILS ON SHEET E-XXX FOR FLOOR MOUNTED RECEPTACLES.
CLG MTD.	⊡ K	CEILING ABOVE DECK FLOOR MOUNTED DUPLEX RECEPTACLE OUTLET WITH GROUND, 125V, 20 AMP. REFER TO DETAIL X ON SHEET E-XXX FOR FLOOR MOUNTED RECEPTACLES.
+18"	⊕	QUADRAPLEX RECEPTACLE OUTLET, 125V, 20 AMP
+18"	◐	DUPLEX RECEPTACLE OUTLET WITH GROUND, SIDE STRAPS CUT FOR SWITCHING AS NOTED ON PLANS
AS REQD.	⊗	SPECIAL NEMA TYPE RECEPTACLE, SEE KEY NOTES
AS REQD.	Ⓙ	JUNCTION BOX MOUNTED ABOVE THE CEILING OR FLUSH IN FINISHED CEILING U.O.N. SIZE PER N.E.C.
AS REQD.	⊢Ⓙ	WALL MOUNTED JUNCTION BOX, SIZE PER N.E.C. OR AS OTHERWISE INDICATED. MOUNT FLUSH IN FINISHED SPACES OR SURFACE MOUNT IN UNFINISHED SPACES U.O.N.

POWER DISTRIBUTION EQUIPMENT

MOUNTING HEIGHT		
+36-60"	□ 3/60/40	FUSED DISCONNECT, SAFETY SWITCH FUSE SIZE FRAME SIZE NO. OF POLES
+36-60"	● 3/60/40	ENCLOSED CIRCUIT BREAKER TRIP SETTING FRAME SIZE NO. OF POLES
	☒	MOTOR CONTROLLER
+36-60"	☒ 3/60/40	MOTOR CONTROLLER WITH INTEGRAL FUSED SAFETY SWITCH FUSE SIZE FRAME SIZE NO. OF POLES
PER CODE	▨	480/277V, 3ø PANELBOARD
PER CODE	▭	208/120V, 3ø PANELBOARD
SEE PLANS	TX TX	TRANSFORMER. SEE PLANS AND SCHEDULE FOR MORE INFORMATION.
AS NOTED	⌒	MOLDED CASE OR CONVENTIONAL CIRCUIT BREAKER
AS REQD.	⏚	GROUND, GROUND CONNECTION
N/A	———	NEW – EQUIPMENT/CIRCUIT/CONDUIT (DARK)
N/A	— — —	NEW UNDERGROUND – EQUIPMENT/CIRCUIT/CONDUIT (DARK)
AS REQD.	▲	SPECIAL EQUIPMENT CONNECTION. SUBSCRIPT INDICATES DESIGNATION. SEE HVAC EQUIPMENT CONNECTION SCHEDULE FOR POWER CONNECTION, MOTOR CONTROL, AND DISCONNECT REQUIREMENTS.
+12"	⊤	BUILDING GROUNDING ELECTRODE SYSTEM (BGES) – MAIN GROUNDING BAR IN MAIN ELECTRIC ROOM (B001).

MISCELLANEOUS

MOUNTING HEIGHT		
N/A	∼	BRANCH CIRCUIT SCHEMATIC CONNECTION
AS NOTED	——]	HARD CONDUIT (RIGID, EMT, ETC) WITH END CAP
N/A	—⏚	CONNECTION TO GROUND
AS NOTED	- - - -]	CONDUIT OR CIRCUITING CONCEALED IN STRUCTURE, SEE DRAWING AND KEY NOTES
N/A	E E E	EMERGENCY CIRCUIT
AS REQD.	TC	TIME CLOCK (SEE SPECIFICATIONS OR DRAWING NOTES)
AS REQD.	Ⓙ	JUNCTION BOX
AS REQD.	Ⓙ⊣	WALL MOUNTED JUNCTION BOX (SEE DRAWING NOTES)
AS REQD.	R	RELAY
+8'-10"	R◁	REFRIGERANT LEAK ALARM HORN & LIGHT

NOTATION KEYS

MOUNTING HEIGHT		
N/A	1	NEW WORK DRAWING KEY NOTE
N/A	7 / E-7	SECTION OR ELEVATION NUMBER SECTION OR ELEVATION REFERENCE DRAWING WHERE SECTION OR ELEVATION IS LOCATED
N/A	▚	POINT OF DISCONNECTION BETWEEN NEW AND EXISTING SYSTEMS
N/A	⊗	POINT OF CONNECTION BETWEEN NEW AND EXISTING SYSTEMS

ELECTRICAL ABBREVIATIONS

∟L	ANGLE
@	AT
A,AMPS	AMPERE
ABV	ABOVE
AC	ARMORED CABLE (NOT ALLOWED), ALTERNATING CURRENT, OR ARLINGTON COUNTY
ACM	ASBESTOS CONTAINING MATERIAL
ACU	AIR CONDITIONING UNIT
AFD	ADJUSTABLE FREQUENCY DRIVE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINAL GRADE
AHJ	AUTHORITY HAVING JURISDICTION
AHU	AIR HANDLING UNIT
ARA	AREA OF RESCUE ASSISTANCE
ARCH	ARCHITECT
AS	AS SHOWN
ATC	AUTOMATIC TEMPERATURE CONTROL
ATS	AUTOMATIC TRANSFER SWITCH
ATU	AIR TERMINAL UNIT
AUTO	AUTOMATIC
AUX	AUXILIARY
AWG	AMERICAN WIRE GAGE
AV,A/V	AUDIO/VISUAL
BAS	BUILDING AUTOMATION SYSTEM
BC	BRANCH CONTROLLER UNIT
BCP	BUILDING CONTROL PANEL
BHP	BRAKE HORSE POWER
BLDG	BUILDING
BLW	BELOW
BOT	BOTTOM
BSCP	BUILDING SEQUENCE CONTROL PANEL
BVPS	BOILER VENT PRESSURE SYSTEM
C,COND	CONDUIT
CAT6	CATEGORY (6) NETWORK CABLE
CB	CIRCUIT BREAKER
CD	CANDELA RATING
CEF	CEILING EXHAUST FAN
CH	CHILLER
CHWP	CHILLED WATER PUMP
CKT	CIRCUIT
CLG	CEILING
CO	CONDUIT ONLY
CDP	CONDENSATE PUMP
CM	CITI-MULTI UNIT
COMM	COMMUNICATION
CONC	CONCRETE
CONN	CONNECTION
CT	CURRENT TRANSFORMER
CU	COPPER, CONDENSER UNIT
CUH	CABINET UNIT HEATER
CV	CONTROL VALVE
CWP	CONDENSER WATER PUMP
D	DELTA CONNECTION
dB	DECIBEL
DB	DISTRIBUTION BOARD
DBL	DOUBLE
DC	DIRECT CURRENT OR DISTRICT OF COLUMBIA
DCPS	DISTRICT OF COLUMBIA PUBLIC SCHOOLS
DDC	DIRECT DIGITAL CONTROL
DESIG	DESIGNATION
DET,DTL	DETAIL
DES	DEPARTMENT OF ENVIRONMENTAL SERVICES
DHWB	DOMESTIC HOT WATER BOILER
DIA	DIAMETER
DISC	DISCONNECT
DLCP	DIGITAL LIGHTING CONTROL PANEL
DLCS	DIGITAL LIGHTING CONTROL SYSTEM
DLS	DAY LIGHT SENSOR
DN	DOWN
DP	DOUBLE-POLE
DPB	DISTRIBUTION PANELBOARD
DS	DISCONNECT SWITCH, DUCT SMOKE DETECTOR
DSS	DUCTLESS SPLIT SYSTEM
DVP	DOMINION VIRGINIA POWER
DWG	DRAWING
E	EMERGENCY
EA	EACH
EC	ELECTRICAL CONTRACTOR
ECH	ELECTRIC CEILING HEATER
EF	EXHAUST FAN
ELEC	ELECTRIC
ELEV	ELEVATOR
EMS	ENERGY MANAGEMENT SYSTEM
EMT	ELECTRIC METALLIC TUBING
ENT	ELECTRIC NON-METALLIC TUBING
EQ	EQUAL
EQUIP	EQUIPMENT
ERU	ENERGY RECOVERY UNIT
EUH	ELECTRIC UNIT HEATER
EWC	ELECTRIC WATER COOLER
EWH	ELECTRIC WALL HEATER
EXIST	EXISTING
EXP	EXPANSION TANK
FA	FIRE ALARM
F	FUSE
°F	FAHRENHEIT
FAC	FIRE ALARM CABLE
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FATC	FIRE ALARM TERMINAL CABINET
FC	FLEXIBLE CONDUIT, FOOTCANDLES
FCU	FAN COIL UNIT
FIN	FINISH
FIXT	FIXTURE
FLA	FULL LOAD AMPS
FLR	FLOOR
FLOUR	FLUORESCENT
FLEX	FLEXIBLE
FMC	FLEXIBLE METAL CONDUIT
FMT	FLEXIBLE METALLIC TUBING
FP	FIRE PROTECTION
FT	FOOT
G,GND	GROUND CONDUCTOR
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GFI,GFCI	GROUND FAULT CIRCUIT INTERRUPTER
H	HEIGHT
HD	HAND DRYER
HID	HIGH INTENSITY DISCHARGE
HOA	HAND-OFF-AUTO SWITCH
HP	HORSEPOWER, HEAT PUMP
HPS	HIGH PRESSURE SODIUM
HTR	HEATER
HRV	HEAT RECOVERY UNIT
HTC	HEAT TRACE CABLE
HV	HEATING & VENTILATING UNIT
HWH	HOT WATER HEATER
HWP	HOT WATER PUMP
HWRP	HOT WATER RECIRCULATING PUMP
HWST	HOT WATER STORAGE TANK
HZ	HERTZ
IBC	INTERNATIONAL BUILDING CODE
IC	INTERRUPTING CAPACITY
ICC	INTERNATIONAL CODE COUNCIL
IDF	INTERMEDIATE DISTRIBUTION FRAME
IECC	INTERNATIONAL ENERGY CONSERVATION CODE
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONIC ENGINEERS
IEF	IN-LINE EXHAUST FAN
IES	ILLUMINATING ENGINEERING SOCIETY
IG	ISOLATED GROUND
IMC	INTERMEDIATE METAL CONDUIT
IN	INCH (ES)
INCAN	INCANDESCENT
INV	INVERT
IR	IMPACT RESISTANT, INFRARED
JB	JUNCTION BOX

K	KELVIN TEMTERATURE
KCMIL	THOUSAND CIRCULAR MILS
KEF	KITCHEN EXHAUST FAN (HOOD)
KV	KILOVOLT
KVA	KILOVOLT-AMPS
KW	KILOWATT
LAV	LAVATORY
LBS	POUNDS
LBS/HR	POUNDS PER HOUR
LC	LIGHTING CONTACTOR
LD	LINEAR DIFFUSER
LFMC	LIQUID-TITE FLEXIBLE METALLIC CONDUIT
LFNC	LIQUID-TITE FLEXIBLE NON-METALLIC CONDUIT
LG	LONG, LENGTH
LRA	LOCKED ROTOR AMPS
LRP	LIGHTING RELAY PANEL
LS	LIFE SAFETY
LTG	LIGHTING
LV	LOW VOLTAGE
MAX	MAXIMUM
MC	METAL-CLAD CABLE (NOT ALLOWED), MOTOR CONTROLLER (STARTER), MECHANICAL CONTRACTOR
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCM	THOUSAND CIRCULAR MILS
MCP	MOTOR CONTROL PANEL
MD	MOTION DETECTOR
MDF	MAIN DISTRIBUTION FRAME
MDP	MAIN DISTRIBUTION PANEL
MECH	MECHANICAL
MER	MECHANICAL EQUIPMENT ROOM
MFGR	MANUFACTURER
MH	METAL HALIDE
MIN	MINIMUM
MLO	MAIN LUGS ONLY
MHP	MOTOR HORSEPOWER
MOCP,MOP	MAXIMUM OVERCURRENT PROTECTION (AMPS)
MOD	MOTOR OPERATED DAMPER
MTD	MOUNTED
MV	MERCURY VAPOR
N	NEUTRAL
NC	NOISE CRITERION, NORMALLY CLOSED
NEC	NATIONAL ELECTRIC CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION
NF	NON-FUSED
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NLS	NON-LIFE SAFETY
NO	NUMBER, NORMALLY OPEN
NRCA	NATIONAL ROOFING CONTRACTORS ASSOCIATION
NTS	NOT TO SCALE
O	OPEN
OA	OUTSIDE AIR
OAC	OPEN ABOVE CEILING (IN WALL)
OC	ON CENTER
OS	OCCUPANCY SENSOR
P	POLE
PB	PULL BOX
PC	PHOTOCELL
PCB	POLYCHLORINATED BIPHENOL
PCF	POUNDS PER CUBIC FOOT
PE	PIPE ENCLOSURE
Pf	POWER FACTOR
PH	PHASE
PNL	PANEL/PANELBOARD
PRESS	PRESSURE
PRV	POWER ROOF VENTILATOR
PTZ	PAN, TILT, ZOOM (CAMERA)
PVC	RIGID POLYVINYL CHLORIDE
PWR	POWER
R	RADIUS, RISER
RC	RIGID CONDUIT
REC,RECPT	RECEPTACLE
REQD	REQUIRED
RLA	RUNNING LOAD AMPS
RM	ROOM
RMC	RIGID METAL CONDUIT (GALVANIZED)
RMCP	REFRIGERANT MONITORING CONTROL PANEL
RNC	RIGID NON-METALLIC CONDUIT
RTU	ROOFTOP HVAC UNIT
S	SMOKE DETECTOR
SAF	SUPPLY AIR FAN
SCH	SCHEDULE
SD	SMOKE DETECTOR, SMOKE DAMPER
SEC	SERVICE ENTRANCE CABLE
SF	SQUARE FOOT
SHWP	SOLAR HOT WATER PUMP
SN	SOLID NEUTRAL
SP	SINGLE-POLE
SPKR	SPEAKER
SS	STAINLESS STEEL
S/T	SHUNT-TRIP
STL	STEEL
SW	SWITCH
SWBD	SWITCHBOARD
SYSTIMAX	MANUFACTURER FOR DATA/COMM SYSTEM EQUIPMENT
T,TX	TRANSFORMER
TBD	TO BE DETERMINED
TEMP	TEMPERATURE, TEMPORARY
THD	TOTAL HARMONIC DISTORTION
TJW	THROUGH JOIST WEB
TMV	THERMOSTATIC MIXING VALVE
TU	TERMINAL UNIT
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
TYP	TYPICAL
24	TWENTY-FOUR HOUR OPERATING DEVICE (SEE DRAWINGS & NOTES)
UBJ	UP BETWEEN JOIST SPACE
UH	UNIT HEATER
UL	UNDERWRITERS LABORATORIES
UON	UNLESS OTHERWISE NOTED
USE	SERVICE ENTRANCE CABLE
UTR	UP THROUGH ROOF
UV,VUVE	UNIT VENTILATOR
V	VOLTS
VFD	VARIABLE FREQUENCY DRIVE
VOIP	VOICE OVER INTERNET PROTOCOL
VUSBC	VIRGINIA UNIFORM STATEWIDE BUILDING CODE
W	WATTS, WIDTH
W/	WITH
W/O	WITHOUT
WA	WIRELESS ACCESS POINT
WG	WIRE-GUARD
WP	WEATHERPROOF
WT	WEIGHT
WTR,H_2O	WATER
XFMR	TRANSFORMER
Y	WYE CONNECTION

FIRESTOPPING GENERAL NOTES

1. REVIEW THE ARCHITECTURAL DRAWINGS PRIOR TO SUBMITTING BID PRICE. ALL REQUIRED FIRE DAMPERS WHETHER OR NOT INDICATED ON THE ELECTRICAL DRAWINGS.
2. WHEREVER FIRE DAMPERS ARE INDICATED ON ELECTRICAL DRAWINGS OR REQUIRED AS INDICATED BY A (2) HOUR OR GREATER FIRE RATING ON THE ARCHITECTURAL PLANS, THOSE WALLS SHALL BE CONSIDERED FIRE RATED WALLS. ANY PENETRATIONS OF PIPING, CONDUIT, AND DUCTWORK, ETC., THROUGH THOSE WALLS SHALL BE FIRESTOPPED IN ACCORDANCE WITH THE DETAILS INDICATED ON THE ARCHITECTURAL AND DIVISION-7 SECTION "FIRESTOPPING".
3. FIRESTOPPING SHALL BE BY GENERAL CONTRACTOR.
4. MAINTAIN FIRE RATINGS WHERE MECHANICAL ITEMS PENETRATE FIRE RATED BUILDING ELEMENTS.

HAZARDOUS MAT. GENERAL NOTES

1. REFER TO SPECIFICATIONS FOR OTHER APPLICABLE REQUIREMENTS.
2. ASBESTOS CONTAINING MATERIAL ACM, PCB, AND LEAD PAINT MAY BE PRESENT.
3. THE OWNER'S ASBESTOS MANAGEMENT PLAN FOR THIS FACILITY IS AVAILABLE FOR REVIEW AT THE OWNER'S FACILITIES OFFICE TO DETERMINE WHICH MATERIALS ARE UNDER SURVEILLANCE.
4. IF DURING CONSTRUCTION THE CONTRACTOR ENCOUNTERS MATERIAL SUSPECTED TO CONTAIN ACM, PCB, OR LEAD PAINT, HE/SHE SHALL NOTIFY THE CONSTRUCTION PROJECT MANAGER FOR INSTRUCTIONS AS HOW TO PROCEED.
5. NO ASBESTOS, PCB, OR LEAD PAINT OR PRODUCTS CONTAINING ASBESTOS, PCB, OR LEAD HAVE BEEN KNOWINGLY SPECIFIED FOR THIS PROJECT. NO ASBESTOS, PCB's, OR LEAD CONTAINING MATERIALS SHALL BE INSTALLED ON THIS PROJECT.
6. THE GENERAL CONTRACTOR SHALL PROVIDE A WRITTEN STATEMENT TO THE OWNER (COPY ARCHITECT) THAT NO ASBESTOS, PCB, OR LEAD-CONTAINING MATERIALS WERE INSTALLED ON THIS PROJECT. PRIOR TO THE ARCHITECT ISSUING A CERTIFICATE FOR SUBSTANTIAL COMPLETION.

GENERAL NOTES

THESE NOTES APPLY TO ALL ELECTRICAL DRAWINGS.

1. REVIEW ARCHITECTURAL, STRUCTURAL, MECHANICAL DRAWINGS AND THE SPECIFICATIONS FOR OTHER APPLICABLE REQUIREMENTS.
2. REVIEW THE STRUCTURAL, AND MECHANICAL DRAWINGS FOR NOTES, DIMENSIONS, ETC. AND COORDINATE WORK WITH OTHER TRADES INVOLVED. PERFORM THIS COORDINATION PRIOR TO ROUGH-IN OF ANY CIRCUIT, EQUIPMENT, OR DEVICE INSTALLATION.
3. PAY FOR AND OBTAIN ALL PERMITS, AND UPON COMPLETION OF WORK, PRESENT THE OWNER WITH A CERTIFICATE FOR FINAL INSPECTION FROM THE LOCAL AUTHORITY.
4. ALL WORK SHALL CONFORM TO REQUIREMENTS OF APPLICABLE ARLINGTON COUNTY AC-DES AND NATIONAL CODES AND AS REQUIRED BY THE LOCAL AUTHORITIES HAVING JURISDICTION.
5. ELECTRICAL WORK SHALL BE IN ACCORDANCE WITH THE MOST RECENT ADOPTED NFPA, NATIONAL ELECTRICAL CODE, AND LOCAL CODES AS REQUIRED BY THE LOCAL AUTHORITIES HAVING JURISDICTION.
6. ALL MATERIALS, DEVICES, APPLIANCES, AND EQUIPMENT SHALL BE NEW AND LABEL LISTED BY AN APPROVED THIRD PARTY TESTING AGENCY APPROVED BY THIS STATE.
7. ELECTRICAL CONTRACTOR SHALL GUARANTEE ALL WORK AND MATERIALS FOR (2) YEARS, EFFECTIVE THE DAY THE PROJECT IS ACCEPTED BY THE OWNER.
8. THE ELECTRICAL CONTRACTOR SHALL REVIEW ALL TRADES PLANS AND SPECIFICATIONS TO FAMILIARIZE THEMSELVES WITH THE PROJECT AND THE EXTENT OF WORK REQUIRED PRIOR TO SUBMISSION OF BID. INCLUDE ALL COSTS IN BID PRICE.
9. INCLUDE AFTER HOURS AND/OR WEEKEND LABOR FOR ALL WORK REQUIRED TO MEET CONSTRUCTION SCHEDULES.
10. INSPECT EXISTING SITE PRIOR TO BIDDING TO VERIFY ALL EXISTING CONDITIONS FOR THE WORK.
11. PROVIDE TEMPORARY PROTECTION AS REQUIRED AND AS DIRECTED BY AC DES PROTECTION SHALL BE PROVIDED WITH (6) MIL FIRE RETARDANT AND ANTI-STATIC POLYETHYLENE.
12. PROVIDE WET/DRY HIGH SUCTION INDUSTRIAL VACUUM CLEANER FOR GENERAL CLEANING OF WORKPLACE. WHEN DRILLING CONCRETE FOR ANCHORS. ETC. USE VACUUM CLEANER ALONG WITH WET SPONGE AROUND DRILL TO TRAP AND REMOVE DUST.
13. THERE SHALL BE NO ACM, PCB'S OR LEAD PAINT MATERIALS IN ANY ELECTRICAL EQUIPMENT, INSULATION OR ANY INCIDENTAL ITEMS USED IN THE INSTALLATION OF THIS PROJECT.
14. HVAC, PLUMBING AND BUILDING AUTOMATION CONTROL WIRING 24-VOLTS AND BELOW, SHALL BE FURNISHED AND INSTALLED BY THE MECHANICAL SUBCONTRACTOR. CONCEALED RACEWAY AND OUTLET BOX ROUGH-INS SHALL BE PROVIDED BY THE ELECTRICAL CONTRACTOR.
15. CONTRACTOR SHALL PROVIDE MISCELLANEOUS STEEL AS REQUIRED TO PROPERLY SUPPORT SUSPENDED FIXTURES, CONDUIT AND EQUIPMENT. STEEL SHALL BE SUPPORTED FROM STRUCTURAL FRAMING MEMBERS STEEL SHALL BE GALVANIZED.
16. COORDINATE AND PROVIDE ALL ELECTRICAL REQUIREMENTS PER MECHANICAL EQUIPMENT NAMEPLATE DATA.
17. MAINTAIN SERVICE CLEARANCES FROM ALL ELECTRICAL EQUIPMENT PER NEC, MANUFACTURER'S RECOMMENDATIONS, AND ALL APPLICABLE CODES.
18. COORDINATE ALL WORK WITH THE CONSTRUCTION COMPLETION SCHEDULE SPECIFIED FOR THE PROJECT, AND WITH ALL OTHER TRADES TO ENSURE THAT PROJECT IS COMPLETED ON SCHEDULE.
19. FLUSH MOUNT ALL SWITCHES AT 46" A.F.F. U.O.N.
20. MAINTAIN INTEGRITY OF BUILDING MATERIALS WHERE CONDUIT, BOXES OR EQUIPMENT PASSES THROUGH OR RUNS WITHIN FIRE RATED WALLS, CEILINGS.
21. SUBMIT FOR APPROVAL CERTIFIED SHOP DRAWINGS FOR PROPOSED SEQUENCE OF WORK, MAIN ELECTRIC SWITCHBOARD WORK, SWITCHES, PANELBOARDS, ADJUSTABLE FREQUENCY DRIVES, CONDUIT DEVICES, WIRING, GROUNDING, ETC. AS SPECIFIED.
22. UPON COMPLETION OF WORK ASSIST IN PERFORMANCE TESTING ENTIRE INSTALLATION FOR THE OWNER'S REPRESENTATIVES APPROVAL AND ACCEPTANCE. PROVIDE ELECTRICIANS DURING COMMISSIONING AND SYSTEMS DEMONSTRATIONS.
23. CONTRACTOR SHALL COORDINATE ALL OPENINGS, FRAMING AND SUPPORTS FOR ACTUAL ELECTRICAL EQUIPMENT PURCHASED, AND FOR REQUIREMENTS OF INSTALLATION METHODS USED.
24. INCLUDE SYSTEMS DEMONSTRATION ASSISTANCE AS REQUIRED IN SUMMER SEASONS, FOLLOWING COMPLETION OF CONSTRUCTION. DEMONSTRATIONS SHALL BE INCLUDED TO COORDINATE WITH THE OWNER'S REPRESENTATIVE AND ENGINEER, TO OCCUR DURING PEAK SUMMER CONDITIONS.
25. FLUSH MOUNT ALL RECEPTACLES, SWITCHES, DEVICES AND CONDUIT WHERE EXPOSED IN FINISHED, MECH/ELEC OR OTHER UNFINISHED ROOMS.
26. INCLUDE IN PRICE COORDINATION AND PROVISION OF STARTERS WITH DISCONNECT SWITCH, CIRCUIT BREAKER, WIRE SIZES AND OVERCURRENT PROTECTION, IN ACCORDANCE WITH NAMEPLATE DATA FOR ACTUAL EQUIPMENT PROVIDED.
27. PROVIDE NEUTRAL WIRE ON ALL MECHANICAL EQUIPMENT CIRCUITS WHICH REQUIRE A NEUTRAL PER MANUFACTURERS RECOMMENDATIONS FOR ACTUAL EQUIPMENT PURCHASED, AND PER NEC REQUIREMENTS.
28. PROVIDE ALL BRANCH CIRCUITS WITH A SEPARATE COPPER GROUND CONDUCTOR SIZED PER ARTICLE 250 OF THE NEC. PROVIDE SEPARATE GROUND BUS AND NEUTRAL BAR IN ALL PANELBOARDS. BOX BOND SHALL BE USED SOLELY FOR BONDING BACK-BOX.
29. RUN ALL ELECTRICAL CONDUIT AND SIGNAL CONDUIT THROUGH UL LISTED FIRE RATED PENETRATION SYSTEM IN RATED WALLS, CEILINGS AND FLOORS. CABLES AND CONDUIT SHALL BE GANGED TOGETHER AS MUCH AS POSSIBLE TO REDUCE NUMBER OF PENETRATIONS THROUGH EXISTING CONSTRUCTION. PROVIDE ALL PENETRATIONS WITH MIN. 16-GAUGE STEEL SLEEVE.
    - A. DO NOT RUN SIGNAL AND POWER CABLES WITHIN 12-INCHES OF EACH OTHER.
    - B. DO NOT RUN VIDEO CABLES WITHIN 12-INCHES OF POWER OR SIGNAL CABLES.
30. PATCH, REPAIR AND PAINT ALL WALLS AND FLOORS DAMAGED DURING CONSTRUCTION, TO MATCH ADJACENT CONSTRUCTION.
31. DO NOT REUSE ANY EXISTING ELECTRICAL CONDUIT, RACEWAYS, OUTLET BOXES, SWITCHES, SWITCH BOXES, PULL BOXES AND OTHER DEVICES FOR NEW WORK.
32. DEMOLITION WORK INCLUDES TRACING ALL EXISTING CIRCUITS BACK TO SOURCE, IF REMOVAL OF EXISTING EQUIPMENT PANELBOARDS AFFECTS ANY EXISTING CIRCUITS, PROVIDE CIRCUIT BREAKERS, WIRING, CONDUIT, ETC. REQUIRED TO RECONNECT EXISTING TO REMAIN ELECTRICAL EQUIPMENT TO NEW PANELBOARDS TO FULL WORKING CONDITION.
33. MAXIMUM LENGTH FOR 12 AWG COPPER CONDUCTORS FOR THE FOLLOWING VOLTAGE. -120V/1-PHASE=50-FEET, USE 10 AWG FOR 51 TO 75 FEET, USE LARGER WIRE AS REQUIRED BEYOND 75-FEET. -208V, 1-PHASE, 3-WIRE: 110-FEET MAXIMUM, USE 10 AWG FROM 111-FEET TO 175 FEET, USE LARGER WIRE SIZE AS REQUIRED BEYOND 175-FEET. -120/208V, 3-PHASE, 4-WIRE: 110-FEET MAXIMUM, USE 10 AWG FROM 111 TO 175 FEET, USE LARGER WIRE SIZE AS REQUIRED BEYOND 175-FEET. -277V/1-PHASE: 125-FEET, USE TO 10 AWG FROM 126 TO 200 FEET, USE LARGER WIRE SIZE AS REQUIRED BEYOND 200-FEET. -460V/3-PHASE, 3-WIRE 250-FEET, USE 10 AWG FOR 251 TO 400 FEET, USE LARGER WIRE SIZE, AS REQUIRED BEYOND 400-FEET. -277/460-VOLT, 3-PHASE, 4-WIRE: 250 FEET, USE 10 AWG FOR 251 TO 400 FEET, USE LARGER SIZE, AS REQUIRED BEYOND 400-FEET.
34. COORDINATE WORK AND ALL OTHER TRADES WORK TO ENSURE THAT ACCESS TO PULL BOXES AND J-BOXES ARE NOT BLOCKED. DO NOT MOUNT PULL BOXES AND J-BOXES DIRECTLY ABOVE OTHER EQUIPMENT IN CEILING SPACE. A. DO NOT LOCATE PULL BOXES OR JUNCTION BOXES ABOVE INACCESSIBLE CEILINGS.
35. CONTROL WIRING AND CONDUIT SHALL BE FURNISHED AND INSTALLED BY MECHANICAL CONTRACTOR. MECHANICAL CONTRACTOR SHALL PROVIDE CONTROL CONDUIT AND WIRING REQUIRED FOR THE EMS SYSTEM IN ACCORDANCE WITH DIVISION-26. POWER CONDUIT AND WIRING SHALL BE FURNISHED AND INSTALLED BY THE ELECTRICAL CONTRACTOR. COORDINATE POWER REQUIREMENTS WITH BAS CONTRACTOR.
36. IN ADDITION TO ANY OTHER ROOFING WARRANTY REQUIREMENTS IN DIVISION-7 OF THE PROJECT SPECIFICATIONS, PROVIDE ALL ROOF PENETRATION WORK UTILIZING METHODS AND MATERIALS NECESSARY TO MAINTAIN THE INTEGRITY OF THE ROOF SYSTEM PERFORMANCE AND INSTALLER WARRANTIES. PRESENT TO THE OWNER A WRITTEN WARRANTY ON THE WEATHERPROOF INTEGRITY OF ANY AND ALL ROOF PENETRATIONS INSTALLED AS PART OF THIS WORK.
37. WIRING SHALL BE COPPER SINGLE CONDUCTOR. ALL BRANCH CIRCUIT WIRING SHALL BE COPPER CONDUCTORS; #8 AND LARGER SHALL BE TYPE THHN OR THWN STRANDED; #12 THROUGH #10 SHALL BE THHN OR THWN SOLID. WIRE LIGHT FIXTURES AS REQUIRED BY U.L. LABEL COLOR CODE CONDUCTORS.
38. CONDUITS SHALL BE EMT, IMC OR RMC IN EXPOSED INDOOR SPACES.
    - A. INDOOR: EMT, IMC OR RMC (GALVANIZED) SHALL BE USED FOR SIZES 3/4" THROUGH 4" (NO EXCEPTIONS). .
    - B. 1/2" CONDUIT NOT ALLOWED.
39. CONNECT ALL HVAC, AND OTHER CONTRACTOR FURNISHED TEMPORARILY AND PERMANENT EQUIPMENT. CHECK EQUIPMENT SHOP DRAWINGS AND COORDINATE WITH HVAC AND ALL OTHER EQUIPMENT CONTRACTORS, DISCONNECT SWITCH, CONDUIT, WIRING REQUIREMENTS, FUSE AND BREAKER SIZES, AND VOLTAGE REQUIREMENTS. PROVIDE CONNECTION TO ACTUAL EQUIPMENT USED ON THIS PROJECT AT NO ADDITIONAL COST TO THE OWNER.
40. ALL STRAPPING OF CONDUIT SHALL COMPLY WITH LOCAL BUILDING CODES. SUPPORT ALL CONDUITS WITH STRAPS AND CLAMPS.
41. HVAC PLUMBING EQUIPMENT SCHEDULES (TYP.): REFER TO THE HVAC EQUIPMENT SCHEDULES FOR POWER CONNECTION REQUIREMENTS. PROVIDE ALL WIRING, CONDUIT, ENCLOSED CONTROLLERS, DISCONNECTS, FUSES, CIRCUIT BREAKERS, ETC., FOR A COMPLETE OPERATING SYSTEM.
    - A. INCREASE CIRCUIT WIRES AND CONDUIT PER NEC TO PREVENT EXCESSIVE VOLTAGE DROP BASED ON ACTUAL CIRCUIT DISTANCE.

GENERAL NOTES

THESE NOTES APPLY TO ALL ELECTRICAL DRAWINGS.

42. PANEL BOARD SCHEDULES (TYP.): REFER TO THE PANEL SCHEDULES FOR CIRCUIT BREAKER SIZES.
    - A. NOMINAL CIRCUIT WIRE SIZING IS SCHEDULED ON PANELBOARD SCHEDULE. INCREASE WIRE SIZE TO PREVENT VOLTAGE DROP FROM EXCEEDING 2% BASED ON CIRCUIT BREAKER SERVING PANEL, OR EQUIPMENT (LOAD INFORMATION) AND ACTUAL DISTANCE AS DETERMINED BY DIVISION-26.
43. SHORT CIRCUIT FAULT CURRENT COORDINATION STUDY: PROVIDE DRAFT COPY OF STUDY PRIOR TO OR AT SAME TIME OF GEAR SUBMITTALS.
    - A. PROVIDE FINAL VERSION OF STUDY FOR REVIEW AND APPROVAL UPON RECEIPT OF APPROVED GEAR SUBMITTALS.
    - B. PROVIDE MINIMUM KAIC RATINGS PER FAULT CURRENT COORDINATION STUDY, BUT NOT LESS THAN 100-KAIC FOR SWITCHBOARDS, 65-KAIC FOR MAIN DISTRIBUTION PANELBOARDS, 42-KAIC FOR 480/277V AND 14-KAIC FOR 208/120V SUB-PANELS.
44. AVAILABILITY FAULT CURRENT ON SECONDARY TERMINALS OF DRY TYPE TRANSFORMERS ARE LISTED BELOW:

TRANSFORMER SIZE	AVAILABLE FAULT CURRENT
15 KVA	869 AMPS
30 KVA	1,634 AMPS
45 KVA	2,605 AMPS
75 KVA	4,085 AMPS
112.5 KVA	7,622 AMPS
150 KVA	9,690 AMPS
225 KVA	11,793 AMPS

45. PROVIDE MIN. 24" HORIZONTAL SEPARATION BETWEEN BOXES INSTALLED IN OPPOSITE SIDE OF A SAME FIRE-RATED WALL, AS INDICATED IN N.E.C. 300.21.
46. THE FIRE ALARM DRAWINGS ARE DIAGRAMMATIC ONLY. THE FIRE ALARM CONTRACTOR IS RESPONSIBLE FOR DESIGNING AND OBTAINING ALL PERMITS FOR THE FIRE ALARM SYSTEM. ANY ADDITIONAL DEVICES REQUIRED BY CODE OR AS DETERMINED BY THE LOCAL AUTHORITY HAVING JURISDICTION SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.
47. AC FIRE MARSHALL APPROVAL OF FIRE ALARM INTERLOCK TO REFRIGERANT MONITORING SYSTEM. SHOP DRAWINGS SHALL BE ON SITE BEFORE CHILLERS ARE STARTED-UP AND INSPECTIONS ARE PERFORMED. PROJECTS WITHOUT APPROVED SHOP DRAWINGS ON SITE WILL HAVE CHILLER START-UP WITHHELD.
48. ALL DISCONNECTS SHALL BE HEAVY DUTY RATED, AND SHALL HAVE A MECHANICAL INTERLOCK TO PREVENT THE DOOR FROM BEING OPENED, WITHOUT DEFEATING THE INTERLOCK. THE MECHANICAL INTERLOCK SHALL ALSO PREVENT ACTIVATING THE SWITCH WHEN THE DOOR IS OPEN. THE MECHANICAL INTERLOCK SHALL BE ABLE TO BE DEFEATED BY A SPECIAL TOOL, AND SHALL BE U.L. LISTED AS PART OF THE DISCONNECT.
49. BREAKERS THAT FEED CONTACTORS OR TIME-CLOCKS SHALL BE CURRENT LIMITING TO ALLOW A MAXIMUM LET THROUGH OF 22-KAIC WITH 80-KAIC AVAILABLE.
50. ALL TERMINATIONS ON PANELS SHALL HAVE DUAL RATED 60°C/75°C LUGS.
51. CONTRACTOR SHALL USE MULTI-POLE BRANCH BREAKERS FOR ALL SHARED NEUTRAL CIRCUITS, OR PROVIDE SEPARATE NEUTRAL FOR EACH BRANCH CIRCUIT, AND ADJUST PANEL SCHEDULES ACCORDINGLY, TO MEET N.E.C. 210.4.
52. ALL CONDUCTORS SHALL BE COPPER AND CONFORM TO N.E.C. 230.6.
53. CONTRACTOR'S PRICE INCLUDES NEUTRAL WIRE ON ALL MECHANICAL EQUIPMENT CIRCUITS WHICH REQUIRE A NEUTRAL PER MANUFACTURERS RECOMMENDATIONS FOR ACTUAL EQUIPMENT PURCHASED, AND PER N.E.C. REQUIREMENTS. DO NOT INSTALL MORE THAN (3) CURRENT CARRYING CONDUCTORS IN A CONDUIT.
54. CONTRACTOR SHALL RUN ALL ELECTRIC CONDUIT AND SIGNAL CONDUIT THROUGH UL LISTED FIRE RATED PENETRATION SYSTEM IN RATED WALLS, CEILINGS AND FLOORS. CABLES AND CONDUIT SHALL BE GANGED TOGETHER AS MUCH AS POSSIBLE TO REDUCE NUMBER OF PENETRATIONS THROUGH RATED CONSTRUCTION. ALL CONDUIT PENETRATIONS THROUGH RATED ASSEMBLIES SHALL BE EMT, IMT OR RMC.
55. MOUNT OUTLET DEVICES WITH BOTTOM OF BOX AT 18" A.F.F. TO CENTERLINE U.O.N. WHERE MULTIPLE DEVICES OCCUR AT SAME HEIGHT, THE CONTRACTOR IS RESPONSIBLE TO ENSURE DEVICES ARE UNIFORMLY MOUNTED WITH THE BOTTOM OF BOX @ 18" A.F.F. TO CENTERLINE.
56. ALL ADJUSTABLE FREQUENCY DRIVES SHALL BE PROVIDED BY DIVISION-23. REFER TO THE MECHANICAL DRAWINGS FOR THE EQUIPMENT SCHEDULE OF ADJUSTABLE FREQUENCY DRIVES.

FIRE ALARM – GENERAL NOTES

1. PROVIDE DUCT SMOKE DETECTOR IN THE RA AND THE AIR STREAM AND INTERLOCK TO SHUT-DOWN AHU-2 AND SIGNAL TROUBLE ALARM AT THE FIRE ALARM CONTROL PANEL.
2. COVER SMOKE DETECTORS TO PREVENT NUISANCE TRIPPING DUE TO DUST IN AREAS UNDER CONSTRUCTION.
3. RELOCATE FIRE ALARM DEVICES AS NECESSARY TO INSTALL DUCTWORK. PROVIDE A FIRE WATCH WHERE ANY FIRE ALARM DEVICES ARE TEMPORARILY REMOVED FROM SERVICE. PLACE FIRE ALARM DEVICES BACK IN SERVICE EACH DAY PRIOR TO COMPLETING THE WORK AT HAND.

DEMOLITION GENERAL NOTES

THESE NOTES REFER TO ALL AREAS IN THE EXISTING BUILDING.

1. GENERAL:
    - a) THE GENERAL EXTENT OF EXISTING ELECTRICAL WORK TO BE DISMANTLED AND REMOVED SHALL BE SURVEYED BY THE CONTRACTOR. THE EXISTING ELECTRICAL POWER SYSTEM SHALL BE SELECTIVELY REMOVED AND MODIFIED TO POWER THE MECHANICAL EQUIPMENT PROVIDED UNDER THIS CONTRACT.
        - – SALVAGE: AC DES HAS THE RIGHT TO SALVAGE ANY EQUIPMENT REMOVED BY THE CONTRACTOR.
    - b) ALL COMPONENTS OF SYSTEMS AND EQUIPMENT ARE NOT INDICATED INDIVIDUALLY WHERE AND WHEN ITEMS ARE TO BE REMOVED OR RELOCATED. COORDINATE THE DEMOLITION ACTIVITY WITH THE CONTRACTOR'S PHASING PLANS.
    - c) REQUEST CLARIFICATION FROM THE OWNER'S REPRESENTATIVE AND ARCHITECT/ENGINEER BEFORE STARTING WORK WHEN UNSURE WHETHER A PARTICULAR ITEM IS TO BE REMOVED.
2. DISPOSITION:
    - a) UNLESS OTHERWISE INDICATED. ALL ITEMS AND MATERIAL DEMOLISHED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND SHALL BE DISPOSED OF OFF-SITE IN ACCORDANCE WITH LOCAL REGULATIONS.
3. PROTECTION:
    - a) PROTECT FROM DAMAGE THE EXISTING BUILDING STRUCTURE AND ANY EQUIPMENT. INDICATED IN THE DRAWINGS TO REMAIN WHICH IS DAMAGED DURING THE COURSE OF THE WORK SHALL BE REPLACED WITH MATERIALS AND EQUIPMENT CONFORMING TO THE SPECIFICATIONS AND INSTALLED TO MATCH EXISTING CONDITIONS.
4. EXISTING ELECTRICAL CONDUIT AND PIPING EXISTS IN OR UNDER CONCRETE FLOORS OR ROOF SLABS AND IN WALLS:
    - a) EXAMINE EXISTING PLAN DOCUMENTS AVAILABLE AT THE DGS FACILITIES OFFICE, AND TO TEST AND INVESTIGATE AS NECESSARY AT THE SITE TO LOCATE EXISTING ELECTRICAL CONDUIT AND PIPING (EQUIPMENT) IN OR UNDER CONCRETE FLOOR OR ROOF SLABS, AND IN WALLS. MAKE SAFE BY DISCONNECTING ALL EXISTING ELECTRICAL CIRCUITS PRIOR TO DEMOLITION.
    - b) REPLACE WITH NEW ANY EXISTING BUILDING COMPONENTS INDICATED TO REMAIN ON DRAWINGS WHICH IS DAMAGED OR CUT DURING THE COURSE OF WORK.
5. TERMINATION PATCHING AND REPAIR:
    - a) DISCONNECT EXISTING-TO-BE-REMOVED EQUIPMENT FROM EXISTING-TO REMAIN AT THE POINTS INDICATED. IF NOT INDICATED, VERIFY POINT WITH THE OWNER'S REPRESENTATIVE PRIOR TO DISCONNECTION.
    - b) DISCONNECT AND REMOVE EQUIPMENT AND DISPOSE OFFSITE. DO NOT ABANDON UNUSED PIPING AND/OR CONDUIT IN PLACE
    - c) PATCH AND REPAIR ALL EXISTING BUILDING CONSTRUCTION AFFECTED DURING THE COURSE OF THE WORK TO MATCH EXISTING CONDITIONS PRIOR TO STARTING CONSTRUCTION.
6. EXISTING CONDITIONS DRAWINGS:
    - a) COORDINATE EXISTING CONDITIONS WITH DEMOLITION DRAWINGS TO ENSURE ALL EXISTING SYSTEMS TO REMAIN ARE LEFT TO THEIR ORIGINAL LOCATION AND UNDAMAGED CONDITION.

ELECTRICAL WORK – KEY PLAN

No.	Date	Revision

b2E
consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

BRUCE E. BEDDOW
No. 021238

FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

Sheet Name:
SYMBOLS, NOTES, AND INDEX

Drawn By: b2E
Checked By: B2

Date: 06-15-2020

JOB # 18608

Sheet Number:
E-001

PROPOSED PHASING PLAN

1. MECHANICAL – DENTENTION FACILITY BUILDING

A. PHASE 1 – REFER TO THE PROPOSED PHASING PLAN IN THIS SECTION 01 95 00 AND ON SHEET M003.

1. PROVIDE AN INITIAL AIR BALANCE OF AHU-1 AIR TERMINAL UNITS (VAV BOXES) SERVING THE KITCHEN AND THE CORRIDOR NEXT TO THE KITCHEN (TYP. OF 6 ATU'S) AND THE KITCHEN HOOD EXHAUST FAN AND THE LAUNDRY EXHAUST FAN ON THE ROOF AND SUBMIT THE AIRFLOW TEST REPORT FOR REVIEW.
2. MAKE A TEMPORARY DUCT CONNECTION FROM THE RETURN DUCT DOWNSTREAM OF AIR HANDLER (AHU-3 AND/OR AHU-1) RETURN AIR FAN (RAF-3 AND/OR RAF-1) INTO THE LAUNDRY SUPPLY DUCT PREVIOUSLY SERVED FROM AIR HANDLER (AHU-2).
3. POSITION THE RELIEF DAMPER FOR AIR HANDLER (AHU-3 AND/OR AHU-1) CLOSED TO DIVERT THE RELIEF AIR (5,000 CFM) TO THE EXISTING CLOTHES DRYER PLENUM IN THE LAUNDRY.
3. ONCE THE DRYER DUCT PLENUM IS SUPPLIED WITH AIR FROM AIR HANDLER (AHU-3 AND/OR AHU-1) THE AIR HANDLER (AHU-2) CAN BE SHUT-DOWN AND DEMOLISHED.
4. THE EXISTING AIR HANDLER (AHU-1) SERVES THE EXISTING KITCHEN AIR DISTRIBUTION SYSTEM AND SHALL REMAIN OPERATIONAL THROUGHOUT THE DURATION OF CONSTRUCTION.
5. THE EXISTING 2 ½" HEATING HOT WATER PIPING SERVING THE AHU-2 SHALL BE REWORKED TO SERVE THE NEW AHU-2 PREHEAT COIL. DO NOT DRAIN OR CONNECT THE HW PIPING UNTIL THE END OF THE HEATING SEASON TO PREVENT HEATING SYSTEM OUTAGE.
6. THE NEW AIR HANDLER (AHU-2) 4-INCH COOLING COIL PIPING SHALL BE RUN FROM THE EXISTING 5-INCH BRANCH MAIN BEFORE IT REDUCES TO 4-INCH IN THE MECHANICAL ROOM. THE PIPING SHALL BE ROUGHED-IN AND CONNECTED TO AHU-2 WITH ALL HYDRONIC SPECIALTIES PRIOR TO THE COOLING SEASON.
7. THE SECONDARY CHILLED WATER PUMPS VARIABLE SPEED DRIVES SHALL BE TESTED, ADJUSTED AND BALANCED TO PROVIDE ADDITIONAL FLOW TO AHU-2.
8. THE EXISTING DUCTWORK SERVING THE KITCHEN SHALL BE DISCONNECTED FROM AHU-1 AND SHALL BE CONNECTED TO THE NEW AHU-2 ALONG WITH THE EXISTING DUCTWORK SERVING THE MAKE-UP AIR TO THE KITCHEN EXHAUST HOOD. AN AUTOMATIC DAMPER SHALL BE INSTALLED IN THE EXISTING MAKE-UP AIR DUCT SERVING THE KITCHEN HOODS IN THE CORRIDOR BETWEEN THE LOADING DOCK AND THE KITCHEN.
9. THE NEW AIR HANDLER (AHU-2) SHALL BE STARTED-UP AND SHALL BE TESTED ADJUSTED AND BALANCED TO THE DESIGN AIRFLOW RATE.
10. THE NEW AIR HANDLER (AHU-2) CONTROLS SHALL BE COMPLETED TO AFFECT THE SEQUENCE OF OPERATION SPECIFIED.
11. THE TEMPORARY DUCT CONNECTION FROM AHU-3 AND/OR AHU-1 (RAF-3 AND/OR RAF-1) TO THE LAUNDRY WHALL BE REMOVED AND SHALL BE PERMANENTLY CONNECTED TO AHU-1 (RAF-1) TO SERVE THE LAUNDRY CLOTHES DRYER PLENUM.
12. THE AIR HANDLERS (AHU-1 AND AHU-2) SHALL BE COMMISSIONED PRIOR TO COMPLETING PHASE 1 AND ONCE THE SYSTEM IS FUNCTIONING CORRECTLY THE CONTRACTOR SHALL PROCEED TO PHASE 2.

B. PHASE 2 – REFER TO THE PROPOSED PHASING PLAN IN THIS SECTION 01 95 00 AND ON SHEET M003.

1. REMOVE THE METAL PAN CEILING TILES IN THE KITCHEN TO ALLOW THE EXISTING AIR TERMINAL UNITS (VARIABLE AIR VOLUME BOXES) TO BE REMOVED ONE AT A TIME AS INDICATED.
2. THE OPEN CEILINGS SHALL BE CLOSED AT THE END OF EACH WORK DAY TO MAINTAIN HEALTH DEPARTMENT STANDARDS.
3. THE EXISTING HOT WATER PIPING SERVING THE VARIABLE AIR VOLUME (VAV) BOXES SHALL BE DISCONNECTED FROM THE EXISTING NEW HYDRONIC SPECIALTIES SHALL BE INSTALLED AND CONNECTED TO THE NEW AIR TERMINAL UNITS. THE EXISTING PIPING IS IN A REVERSE RETURN ARRANGEMENT.
4. WHEN THE VAV BOXES ARE REMOVED THE FLEX DUCT SERVING THE VAV BOX SHALL BE TURNED DOWN TO BLOW AIR INTO THE KITCHEN AND THE LOW PRESSURE DUCTWORK SHALL BE MODIFIED TO FIT THE NEW ATU (VAV BOX) INTO THE EXISTING DUCTED AIR DISTRIBUTION SYSTEM.
5. THE VAV BOXES SHALL BE REPLACED ONE AT A TIME IN SMALLER AREAS OF THE KITCHEN TO ALLOW THE CEILING TILE REMOVAL TO BE LIMITED TO THE AREAS OF WORK. ONCE THE VAV BOX IS REMOVED THE NEW AIR TERMINAL UNIT (VAV BOX) SHALL BE INSTALLED INCLUDING THE ASSOCIATED BAS CONTROLS AND HOT WATER PIING SPECIALTIES.
6. UPON COMPLETING AIR TERMINAL UNIT (VAV BOX) THE CEILING TILES SHALL BE REINSTALLED AND THE NEXT VAV BOX SHALL BE REPLACED AND SO ON UNTIL ALL THE AIR TERMINAL UNITS (VAV BOXES) IN THE KITCHEN ARE REPLACED.
7. THE NEW AHU-2 SHALL BE RE-TESTED, RE-ADJUSTED AND REBALANCED (TAB) AFTER THE AIR TERMINAL UNITS (VAV BOXES) ARE REPLACED AND THE BAS CONTROLS ARE FUNCTIONING. EACH EXISTING DUCT AIR OUTLET (DIFFUSER) SHALL BE BALANCED TO THE AIRFLOW INDICATED FOR AIR HANDLER (AHU-2) AT THE DESIGN AIRFLOW.
8. THE EXISTING AIR HANDLER (AHU-1) SHALL BE REBALANCED TO THE AIRFLOW (15,000 CFM) SPECIFIED AND THE DUCT STATIC PRESSURE SETPOINT SHALL BE ADJUSTED ACCORDINGLY.
9. THE AIR HANDLER (AHU-2) SHALL BE RECOMMISSIONED PRIOR TO SUBSTANTIAL COMPLETION IN ACCORDANCE WITH THE COMMISSIONING PLAN TO AFFECT THE SEQUENCE OF OPERATION SPECIFIED.
10. PROVIDE CLOSE-OUT DOCUMENTATION SUCH AS OPERATION AND MAINTENANCE MANUALS, WARRANTIES, AS-BUILTS DOCUMENTS, AND TRAINING. REFER TO DIVISION 1 FOR OTHER APPLICABLE REQUIREMENTS.

C. ARCHITECTURAL/STRUCTURAL

THE ARCHITECTURAL/STRUCTURAL WORK REQUIRED FOR THE HVAC REPLACEMENT CONSISTS OF THE FOLLOWING:

1. PROVIDE GBR TESTING FOR WALL OPENINGS AND CORE DRILLING OR SAW CUTTING PENETRATIONS IN THE GROUND LEVEL BOILER ROOM WALLS AND THE CORRIDOR WALLS AND THE KITCHEN WALLS WHERE PENETRATIONS ARE INDICATED ON THE CONSTRUCTION DOCUMENTS.
2. PROVIDE OPENINGS IN SECURE AREAS UNDER ARLINGTON COUNTY (DES) AND SHERRIFF'S DEPARTMENT SUPERVISION. OPENINGS SHALL BE TEMPORARILY SECURED WITH METAL PLATES BOLTED THROUGH THE WALL UNTIL THE DUCTWORK SECURITY BARS ARE PERMANENTLY INSTALLED. TEMPORARY DUST CONTROLS AND EXHAUST FANS SHALL BE USED TO REMOVE DUST AND DEBRIS. THE AREA SHALL BE CLEANED EACH DAY TO MAINTAIN ACCEPTABLE INDOOR AIR QUALITY CONDITIONS.
3. COORDINATE REQUIREMENTS AND SCHEDULE REMOVAL AND REINSTALLATION OF THE EXISTING LOW VOLTAGE DEVICES, LIGHT FIXTURES, AND SPRINKLER HEADS PRIOR TO PENETRATING EXISTING WALLS FOR AHU-2 RETURN DUCTWORK INSTALLATION. THE WORK WILL BE PERFORMED BY THE ARLINGTON COUNTY SUBCONTRACTOR FOR RELOCATION OF EXISTING LIGHTING, MISCELLANEOUS CONDUIT, SPRINKLER PIPING, FIRE ALARM AND SECURITY DEVICES FOR INSTALLATION OF THE AHU-2 RETURN DUCTWORK.
4. PROVIDE PIPE SUPPORTS FOR HANGING OR SUPPORTING PIPE FROM EXISTING CONCRETE STRUCTURES. SUPPORTS SHALL BE ASTM A123 OT DIPPED GALVANIZED BEAM BRACKETS.
5. PROVIDE EXTENDED HOUSEKEEPING PAD AND PROVIDE EPOXY COATING FOR ENTIRE PAD FOR SUPPORTING AIR HANDLER (AHU-2).
6. REMOVE AND REPLACE CEILINGS AS NECESSARY TO COMPLETE WORK. ALL LOW VOLTAGE DEVICES, LIGHTING, SPRINKLER HEADS, ETC., THAT ARE TEMPORARILY REMOVED SHALL BE REPLACED BACK IN THE ORIGINAL LOCATION PRIOR TO STARTING THE WORK.
7. COORDINATE REQUIREMENTS AND SCHEDULE REMOVAL AND REINSTALLATION OF THE LOW VOLTAGE DEVICES, LIGHTING, SPRINKLER HEADS, ETC., THAT ARE IN THE WAY OF INSTALLING THE AHU-2 RETURN AIR DUCTWORK IN THE CORRIDORS, THE TRASH ROOM AND THE LOADING DOCK TO MISS THE NEW SHEET METAL RETURN AIR DUCTWORK.
8. PROVIDE HIGH PERFORMANCE EPOXY FLOOR COATING IN THE DETENTION FACILITY HOUSEKEEPING PAD FOR AHU-2.
9. PATCH, PAINT, REPAIR AND FINISH ANY WALLS, FLOORS OR CEILING DAMAGE THROUGHOUT THE DURATION OF CONSTRUCTION.

D. WALL OPENINGS

1. WHEN INSTALLING THE RETURN DUCT WITH PENETRATIONS THROUGH THE EXISTING SECURE WALLS THE OPENINGS SHALL BE GUARDED BY THE ARLINGTON COUNTY SHERRIFFS DEPARTMENT. THE DRILLING AND ALL WIRING ACTIVITY WORK SHALL OCCUR DURING REGULAR HOURS FROM 6:00 AM UNTIL 8:00 PM. EACH OPENING SHALL BE SEALED WITH EITHER THE FINAL SECURITY BAR BOLTED AND WELDED ASSEMBLY OR A TEMPEROARY BOLTED BARRIER. HOWEVER, A TEMPORARY BOLTED BARRIER CANNOT BE LEFT FOR MORE THAN 24 HOURS BEFORE THE FINAL BOLTED AND WELDED ASSEMBLY IS INSTALLED. THE FIRE DAMPER SHALL BE INSTALLED ON THE LESS SECURE SIDE OF THE WALL AND SHALL BE PROVIDED WITH AN ACCESS DOOR FOR DAMPER AND SECURITY BAR INSPECTION.

E. KITCHEN METAL PAN CEILING

1. PROVIDE REMOVAL AND REPLACEMENT OF THE METAL PAN CEILING PANELS IN THE KITCHEN DAILY FOR ACCESS TO THE EXISTING AIR TERMINAL UNT (VAV BOXES) FOR REMOVAL AND REPLACEMENT WITH NEW HOT WATER VAV BOXES WITH NEW PIPING SPECIALTIES AND ELECTRONIC DIRECT DIGITAL CONTROLS.

F. FIRE ALARM

1. EXISTING FIRE ALARM DEVICES THAT NEED TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLER AND DUCTWORK SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANGER AND WITH THE FIRE ALARM TRADE TO MINIMIZE OUTAGES.

G. SPRINKLER

1. EXISTING SPRINKLER DEVICES THAT NEED TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLER AND DUCTWORK SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANGER AND WITH THE SPRINKLER TRADE TO MINIMIZE OUTAGES.

H. SECURITY

1. EXISTING SECURITY DEVICES THAT NEED TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLER AND DUCTWORK SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANGER AND WITH THE SECURITY TRADE TO MINIMIZE OUTAGES.

I. MISCELLANEOUS ELECTRIC CONDUIT

1. THE EXISTING MISCELLANEOUS ELECTRIC CIRCUIT THAT NEEDS TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLER AND DUCTWORK SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANAGER AND WITH THE ELECTRICAL TRADE TO MINIMIZE OUTAGES.

J. MISCELLANEOUS LIGHTING

1. THE EXISTING MISCELLANEOUS LIGHTING THAT NEEDS TO BE RELOCATED TO INSTALL THE DUCTWORK SHALL BE RELOCATED BY A SEPARATE CONTRACTOR PROVIDED BY ARLINGTON COUNTY.
2. THE CONTRACTOR RESPONSIBLE FOR INSTALLING THE NEW AIR HANDLERS AND DUCTWORK SHALL COORDINATE WITH ARLINGTON COUNTY (DES) PROJECT MANGER AND WITH THE ELECTRICAL TRADE TO MINIMIZE OUTAGES.

No.	Date	Revision

b2E consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE E. BEDDOW
No. 021233
4-20-2020
PROFESSIONAL ENGINEER

FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

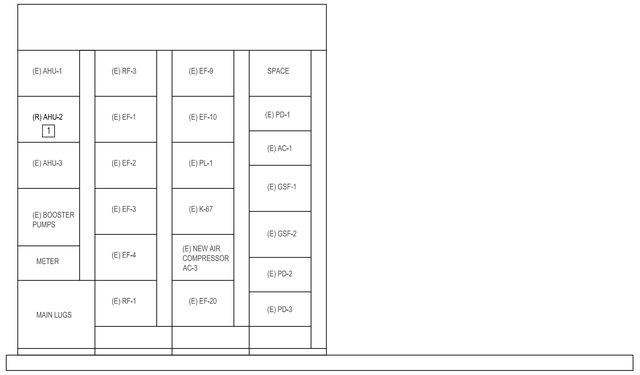
Sheet Name:
PROPOSED PHASING PLAN

Drawn By: b2E
Checked By: B2

Date: 06-15-2020

JOB # 18608

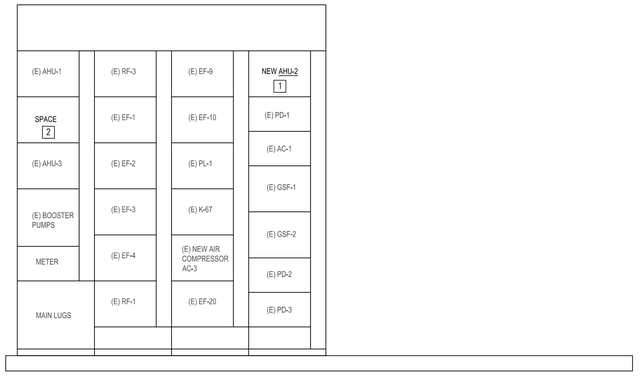
Sheet Number:
E-002



1 DISCONNECT POWER AND MAKE SAFE FOR DEMOLITION. REMOVE EXISTING CIRCUITS FROM THE EXISTING MCC-2 AND ASSOCIATED CONDUIT SERVING THESE LOADS.

DETENTION CENTER MECHANICAL ROOM EXISTING MOTOR CONTROL CENTER (MCC-2) – EXISTING & DEMO

3 3/4" = 1'-0"



1 PROVIDE NEW 80A 480V/3ø BREAKER TO THIS BUCKET TO PROVIDE POWER TO THE NEW AHU-2 AND DISCONNECT SWITCH.

2 LABEL AS SPACE.

DETENTION CENTER MECHANICAL ROOM EXISTING MOTOR CONTROL CENTER (MCC-2) – NEW WORK

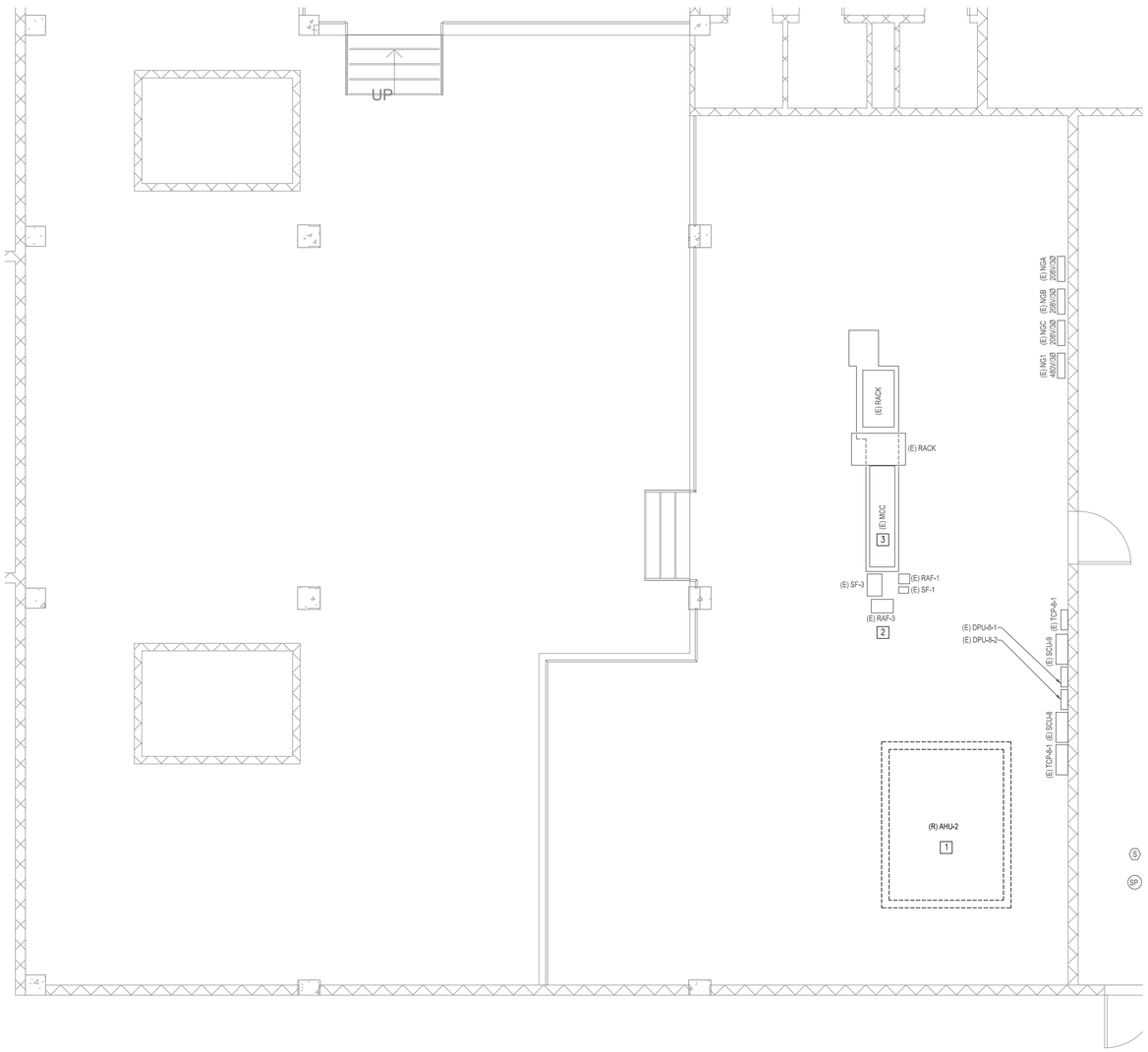
4 3/4" = 1'-0"

GENERAL NOTES

1. REFER TO LEGEND AND DRAWING LIST ON SHEET E-001.
2. REFER TO PROJECT MANUAL FOR TECHNICAL INFORMATION.
3. REFER TO THE MECHANICAL PLANS FOR DUCTWORK AND PIPING INFORMATION. THE EXISTING MECHANICAL ROOM IS VERY CONGESTED WITH EQUIPMENT, DUCTWORK, PIPING, PANELS, SECURITY RACKS, ETC. ROUTING CONDUIT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR FOR A COMPLETE CODE COMPLIANT ELECTRICAL SYSTEM.
4. VISIT THE SITE AND EXAMINE THE EXISTING CONDITIONS PRIOR TO SUBMITTING YOUR BID PRICING. EXAMINE THE SITE AND INCLUDE THE NECESSARY MATERIALS AND LABOR IN THE BID PRICE TO COMPLETE THE WORK. ADDITIONAL COSTS PRESENTED TO THE OWNER ASSOCIATED WITH FAILURE TO OBSERVE THE EXISTING CONDITIONS AT THE SITE PRIOR TO BID WILL NOT BE CONSIDERED.

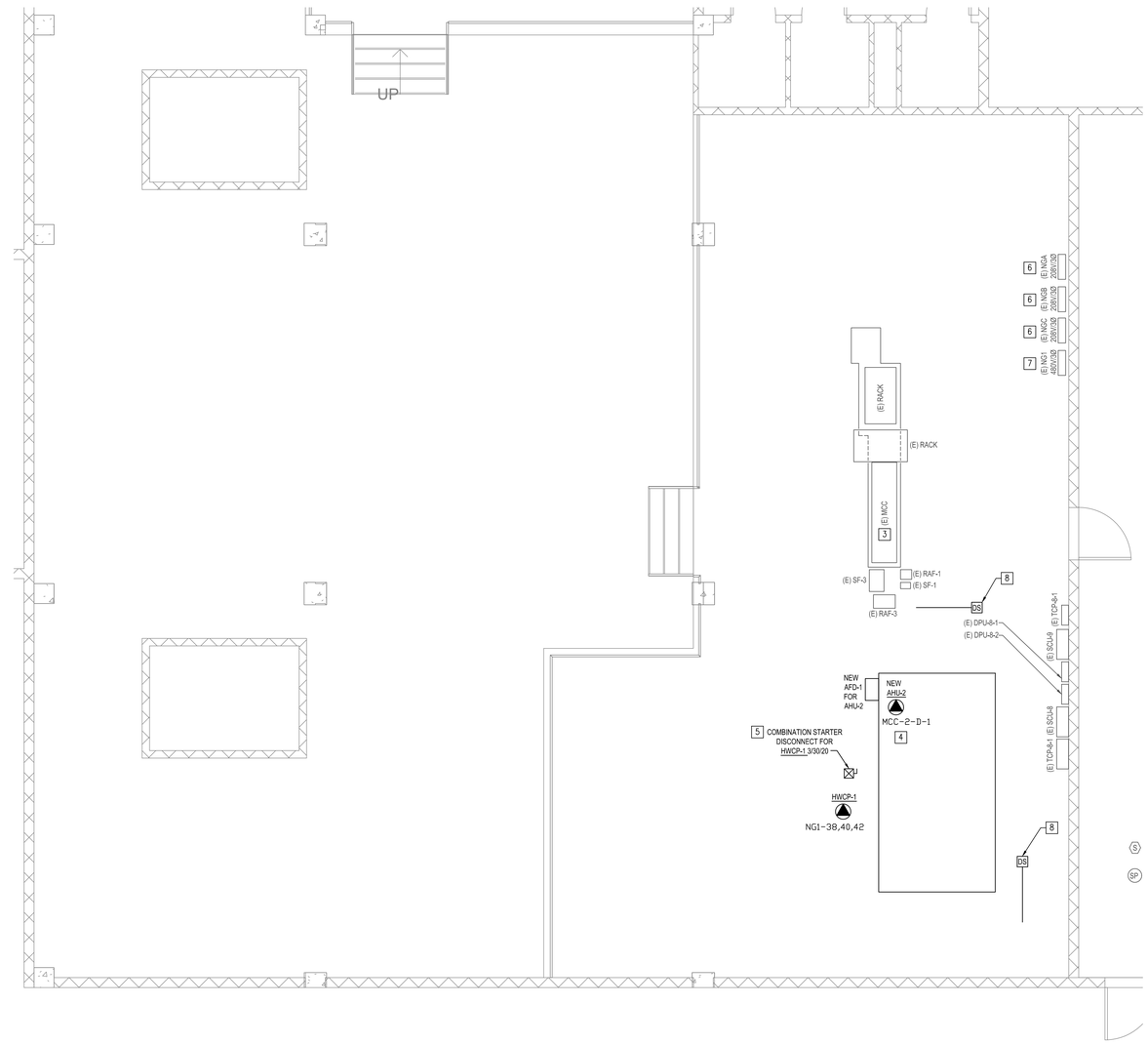
CONSTRUCTION NOTES

1. EXISTING AHU-2: REMOVE AND MAKE SAFE FOR DEMOLITION AHU-2 AND ALL ASSOCIATED CIRCUITS, CONDUITS, AND DISCONNECT SWITCHES BACK TO SOURCE.
2. EXISTING RAF-3 VFD SHALL REMAIN.
3. EXISTING MCC-2: REFER TO DETAILS 3 & 4 ON THIS SHEET FOR DEMO AND NEW WORK RESPECTIVELY.
4. NEW AHU-2: PROVIDE NEW AHU-2 WHERE INDICATED. PROVIDE POWER CONNECTION FROM EXISTING MCC-2. REFER TO DETAIL #4 ON THIS SHEET.
5. PROVIDE COMBINATION STARTER WITH FUSED DISCONNECT SWITCH FOR HWCP-1.
6. EXISTING 208V PANELS NGA, NGB, AND NGC SHALL REMAIN. PROVIDE (2) 20A 120V/1ø POWER CONNECTION FOR THE AUTO TEMP CONTROL AND PROVIDE (2) 20A 120V/1ø POWER CONNECTIONS FOR THE BAS CONTROL PANELS FROM THE AVAILABLE SPACES IN PANEL "NGB".
7. EXISTING 480V PANEL NG1 SHALL REMAIN. PROVIDE A 480V/3ø POWER CONNECTION FOR THE FREEZE PROTECTION PUMP (HWCP-1) FROM THE PANEL'S AVAILABLE SPACES.
8. PROVIDE NEW DUCT SMOKE DETECTORS. INTERLOCK TO THE EXISTING FIRE ALARM SYSTEM TO SHUT DOWN THE AIR HANDLER AND INITIATE A TROUBLE ALARM UPON DETECTING PRODUCTS OF COMBUSTION.
   - PROVIDE DUCT SMOKE DETECTORS THAT ARE COMPATIBLE WITH THE EXISTING FIRE ALARM SYSTEM.



DETENTION CENTER MECHANICAL ROOM – ELECTRICAL EXISTING & DEMO

1 1/4" = 1'-0"



DETENTION CENTER MECHANICAL ROOM – ELECTRICAL NEW WORK

2 1/4" = 1'-0"

No.	Date	Revision

b2e consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE E. BEDDOW
No. 021233
04-20-2020
PROFESSIONAL ENGINEER

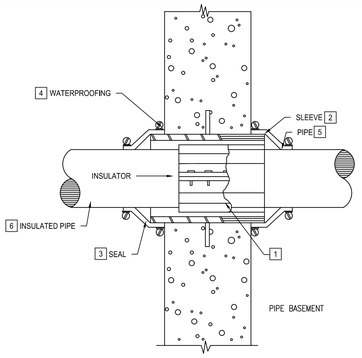
FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

Sheet Name:
DETENTION CENTER MECHANICAL ROOM - ELECTRICAL

Drawn By: B2E
Checked By: B2
Date: 06-15-2020
JOB # 18608

Sheet Number:
E-101



NOTE: FOR PENETRATION ABOVE GRADE, USE SEAL AT BOTH SIDES OF WALL.

1. MECHANICAL SLEEVE SEAL: PROVIDE SEAL SIZED FOR PIPE AND SLEEVE. TIGHTEN BOLTS TO MANUFACTURER'S RECOMMENDED TORQUE VALUE.
2. DUCTILE IRON PIPE SLEEVE: PROVIDE SLEEVE WITH SEAL FLANGE FOR POURED-IN-PLACE APPLICATION.
3. RUBBER BOOT SEAL: PROVIDE STAINLESS STEEL BAND CLAMPS. TIGHTEN TO PROVIDE WATERPROOF SEAL.
4. WATERPROOFING: PROVIDE AS REQUIRED BY ARCHITECT FOR FOUNDATION SEAL.
5. HYDRONIC PIPING: PROVIDE FOR STEEL CHWS&R.

CONDUIT PENETRATION THRU BUILDING WALL (ABOVE GRADE) - DETENTION FACILITY

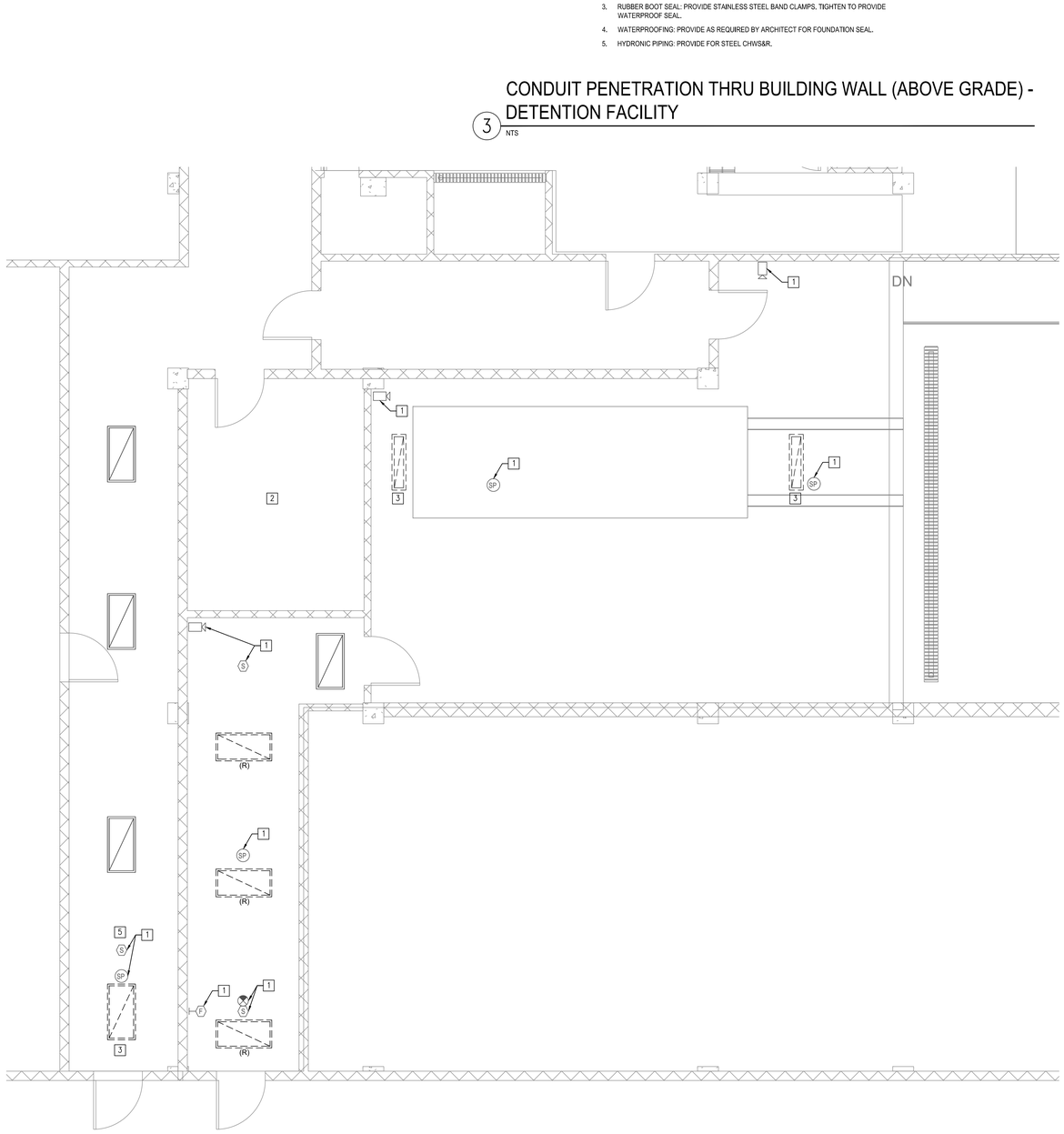
3 NTS

GENERAL NOTES

1. REFER TO LEGEND AND DRAWING LIST ON SHEET E-001.
2. REFER TO PROJECT MANUAL FOR TECHNICAL INFORMATION.
3. REFER TO THE MECHANICAL PLANS FOR DUCTWORK AND PIPING INFORMATION. THE EXISTING MECHANICAL ROOM IS VERY CONGESTED WITH EQUIPMENT, DUCTWORK, PIPING, PANELS, SECURITY RACKS, ETC. ROUTING CONDUIT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR FOR A COMPLETE CODE COMPLIANT ELECTRICAL SYSTEM.
4. VISIT THE SITE AND EXAMINE THE EXISTING CONDITIONS PRIOR TO SUBMITTING YOUR BID PRICING. EXAMINE THE SITE AND INCLUDE THE NECESSARY MATERIALS AND LABOR IN THE BID PRICE TO COMPLETE THE WORK. ADDITIONAL COSTS PRESENTED TO THE OWNER ASSOCIATED WITH FAILURE TO OBSERVE THE EXISTING CONDITIONS AT THE SITE PRIOR TO BID WILL NOT BE CONSIDERED.

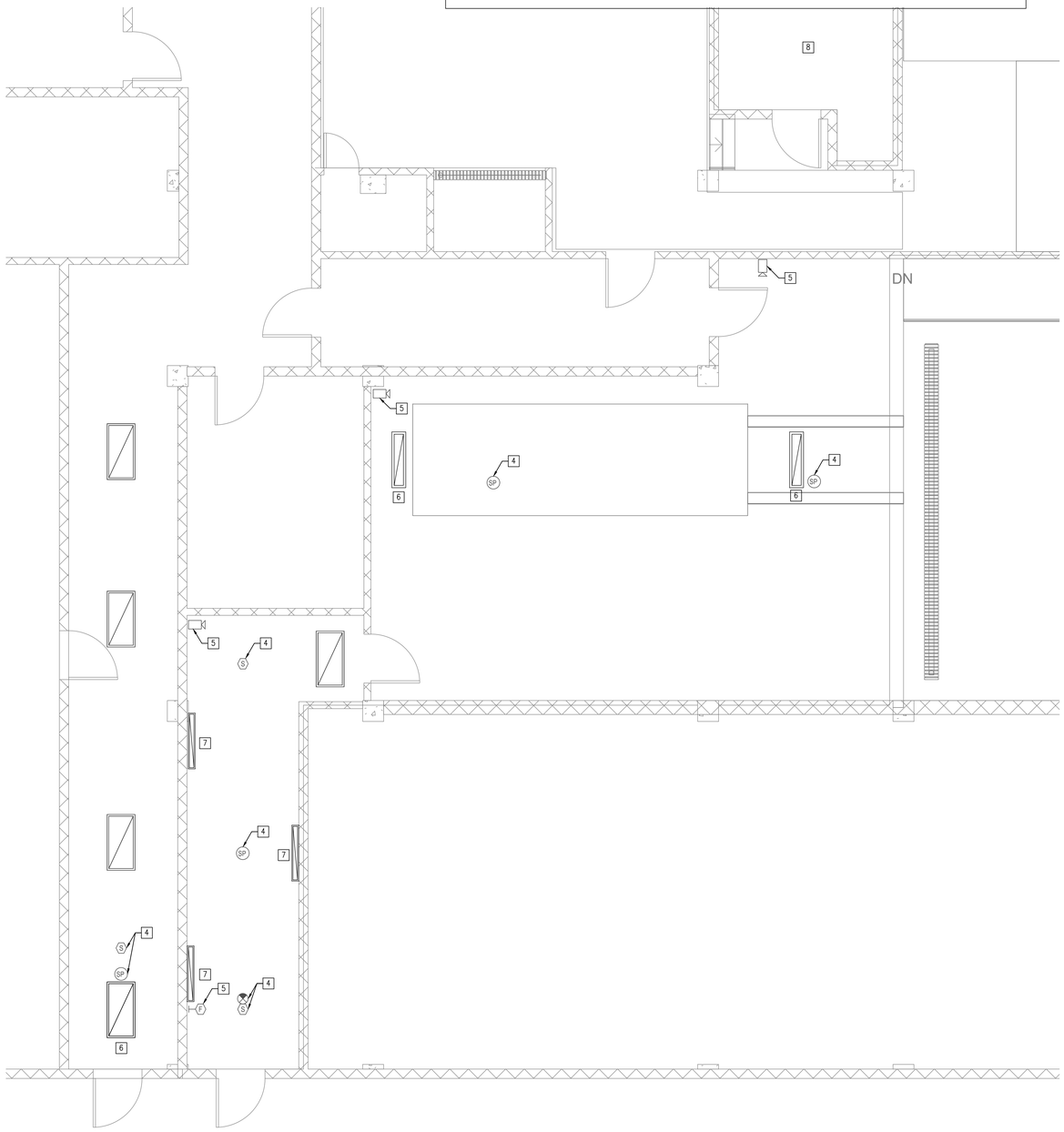
CONSTRUCTION NOTES

1. COORDINATE RELOCATION OF SPEAKERS, CAMERAS, EXIT LIGHTS AND SMOKE DETECTORS FOR REINSTALLATION UPON COMPLETION OF RA DUCT INSTALLATION WITH THE ARLINGTON COUNTY <DES> SUBCONTRACTOR. REFER TO MECHANICAL SHEETS FOR THE EXACT LOCATION OF THE EXISTING RA DUCT.
2. CONTRACTOR AND THE ARLINGTON COUNTY <DES> SUBCONTRACTOR SHALL SURVEY TRASH ROOM TO LOCATE DEVICES FOR RELOCATION. COORDINATE RELOCATION OF SPRINKLER HEADS AND LIGHTS AFTER COMPLETION OF RA DUCT INSTALLATION WITH THE ARLINGTON COUNTY <DES> SUBCONTRACTOR. SPRINKLER HEADS AND LIGHTS SHALL BE RE-INSTALLED UNDER NEW RA DUCT BY THE ARLINGTON COUNTY <DES> SUBCONTRACTOR.
3. REMOVE LIGHTS FOR RELOCATION BY THE ARLINGTON COUNTY <DES> SUBCONTRACTOR AFTER COMPLETION OF NEW RA DUCT INSTALLATION.
4. ONCE NEW RA DUCT IS INSTALLED, THE ARLINGTON COUNTY <DES> SUBCONTRACTOR SHALL REINSTALL SPEAKERS, EXIT LIGHTS, AND SMOKE DETECTORS TO BE MOUNTED TO THE BOTTOM OF THE NEW RA DUCT. THE ARLINGTON COUNTY <DES> SUBCONTRACTOR SHALL PROVIDE ALL REQUIRED HANGERS, UNISTRUT, ALL-THREAD, CONDUIT, ETC FOR DEVICES RE-INSTALL.
5. ONCE NEW RA DUCT IS INSTALLED, THE ARLINGTON COUNTY <DES> SUBCONTRACTOR SHALL LOWER THE SECURITY CAMERAS AND FIRE ALARM STROBES SO THAT THE TOP OF THESE DEVICES ARE AT MAXIMUM 8'-0" AFF.
6. ONCE NEW RA DUCT IS INSTALLED, THE ARLINGTON COUNTY <DES> SUBCONTRACTOR SHALL RE-INSTALL LIGHTS UNDER NEW RA DUCTWORK. THE ARLINGTON COUNTY <DES> SUBCONTRACTOR SHALL PROVIDE ALL REQUIRED HANGERS, UNISTRUT, ALL-THREAD, CONDUIT, ETC FOR LIGHT RE-INSTALL.
7. PROVIDE NEW WALL MOUNTED STRIP LIGHT FIXTURE WHERE INDICATED.
   - MODEL NUMBER: COLUMBIA LIGHTING LXEM4-35ML-RP-EDU-TP
   - TOP OF THE FIXTURE SHALL BE MAXIMUM 8'-0" AFF.
8. PROVIDE A 277V, 1ø, 20A POWER CONNECTION TO THE ELECTRIC DUCT HEATER (EDH-1) LOCATED IN THE KITCHEN OFFICE.
   - PROVIDE POWER FROM AN EXISTING 20A SPARE BREAKER ON EXISTING PANEL NG1 ON SHEET E-101.
   - REFER TO MECHANICAL SHEET MH-101 FOR EXACT LOCATION OF THE EDH-1 LOCATED IN THE KITCHEN OFFICE.



1 DETENTION CENTER KITCHEN PLAN – ELECTRICAL EXISTING & DEMO

1/4" = 1'-0"



2 DETENTION CENTER KITCHEN PLAN – ELECTRICAL NEW WORK

1/4" = 1'-0"

No.	Date	Revision

b2E consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE E. BEDDOW
No. 021233
04-20-2020
PROFESSIONAL ENGINEER

FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

Sheet Name:
KITCHEN PLAN - ELECTRICAL

Drawn By: b2E
Checked By: B2

Date: 06-15-2020

JOB # 18605

Sheet Number:
E-102

(E) MOTOR CONTROL CENTER - MCC-2

BUS NUMBER: 100 AMP RATING: 600 VOLTAGE (L-L): 480 PHASE: 3
SERVED FROM: UTIL MAIN TYPE: MAIN LUGS VOLTAGE (L-N): 277 WIRE: 3
MIN. KAIC: 25
REMARKS: UPPER MECHANICAL ROOM

EQUIPMENT BRANCH CIRCUIT WIRING											COMBINATION STARTER/DISCONNECT SWITCH			VERTICAL BUSS AMPERAGE (600 MAX)			
UNIT NO.	EQUIPMENT DESCRIPTION	HP	VOLTS	PHASE	SETS	PHASE/NEUT. NO	PHASE/NEUT. SIZE	GND SIZE	MIN CND SIZE	C/B	STARTER	F/S AMPS	NEMA SIZE	A	B	C	D
A-1	(E) AHU-1	25	480	3	1	3	6	8	1	--	•	60	2	34			
A-2	(R) AHU-2	15	480	3	1	3	10	10	1	--	•	60	2	21			
A-3	(E) AHU-3	15	408	3	1	3	10	10	1	--	•	60	2	21			
A-4	(E) BOOSTER PUMPS	3-20 1-7.5	480	3	1	3	1	3	1 1/2	125/3	--	--	--	92			
A-5	(E) METER																
A-6	(E) MAIN LUGS																
B-1	(E) RF-3	5	480	3	1	3	12	12	3/4	--	•	30	1		7.6		
B-2	(E) EF-1	15	480	3	1	3	10	10	1	--	•	60	2		21		
B-3	(E) EF-2	15	480	3	1	3	10	10	1	--	•	60	2		21		
B-4	(E) EF-3	15	480	3	1	3	10	10	1	--	•	60	2		21		
B-5	(E) EF-4	15	480	3	1	3	10	10	1	--	•	60	2		21		
B-6	(E) RF-1	7.5	480	3	1	3	12	12	3/4	--	•	30	1		11		
C-1	(E) EF-9	3/4	480	3	1	3	12	12	3/4	--	•	30	1			1.6	
C-2	(E) EF-10	2	480	3	1	3	12	12	3/4	--	•	30	1			3.4	
C-3	(E) PL-1	5	480	3	1	3	12	12	3/4	--	•	30	1			7.6	
C-4	(E) K-67	15 KW	480	3	1	3	10	10	3/4	30/3	•		1			18	
C-5	(E) AC-3	(2) 7.5	480	3	1	3	10	10	3/4	30/3	--	--	1			22	
C-6	(E) EF-20	1.5	480	3	1	3	12	12	3/4	--	•	30	1			3	
D-1	SPARE																
D-2	(E) PD-1	2	480	3	1	3	12	12	3/4	20/3	--	--	--				3.4
D-3	(E) AC-1	(2) 7.5	480	3	1	3	10	10	3/4	30/3	--	--	1				22
D-4	(E) GSF-1	10	480	3	1	3	10	10	3/4	30/3	•		1				14
D-5	(E) GSF-2	10	480	3	1	3	10	10	3/4	30/3	•		1				14
D-6	(E) PD-2	5	480	3	1	3	12	12	3/3	20/2	--	--	--				7.6
D-7	(E) PD-3	5	480	3	1	3	12	12	3/4	20/3	--	--	--				7.6
													SUB-TOTALS	168	102.6	55.6	68.6
													TOTAL		394.8		

DETENTION CENTER MECHANICAL ROOM EXISTING MOTOR CONTROL CENTER (MCC-2) - EXISTING & DEMO

2 NTS

(E) MOTOR CONTROL CENTER - MCC-2 - NEW WORK

BUS NUMBER: 100 AMP RATING: 600 VOLTAGE (L-L): 480 PHASE: 3
SERVED FROM: UTIL MAIN TYPE: MAIN LUGS VOLTAGE (L-N): 277 WIRE: 3
MIN. KAIC: 25
REMARKS: UPPER MECHANICAL ROOM

EQUIPMENT BRANCH CIRCUIT WIRING											COMBINATION STARTER/DISCONNECT SWITCH			VERTICAL BUSS AMPERAGE (600 MAX)			
UNIT NO.	EQUIPMENT DESCRIPTION	HP	VOLTS	PHASE	SETS	PHASE/NEUT. NO	PHASE/NEUT. SIZE	GND SIZE	MIN CND SIZE	C/B	STARTER	F/S AMPS	NEMA SIZE	A	B	C	D
A-1	(E) AHU-1	25	480	3	1	3	6	8	1	--	•	60	2	34			
A-2	SPACE																
A-3	(E) AHU-3	15	408	3	1	3	10	10	1	--	•	60	2	21			
A-4	(E) BOOSTER PUMPS	3-20 1-7.5	480	3	1	3	1	3	1 1/2	125/3	--	--	--	92			
A-5	(E) METER																
A-6	(E) MAIN LUGS																
B-1	(E) RF-3	5	480	3	1	3	12	12	3/4	--	•	30	1		7.6		
B-2	(E) EF-1	15	480	3	1	3	10	10	1	--	•	60	2		21		
B-3	(E) EF-2	15	480	3	1	3	10	10	1	--	•	60	2		21		
B-4	(E) EF-3	15	480	3	1	3	10	10	1	--	•	60	2		21		
B-5	(E) EF-4	15	480	3	1	3	10	10	1	--	•	60	2		21		
B-6	(E) RF-1	7.5	480	3	1	3	12	12	3/4	--	•	30	1		11		
C-1	(E) EF-9	3/4	480	3	1	3	12	12	3/4	--	•	30	1			1.6	
C-2	(E) EF-10	2	480	3	1	3	12	12	3/4	--	•	30	1			3.4	
C-3	(E) PL-1	5	480	3	1	3	12	12	3/4	--	•	30	1			7.6	
C-4	(E) K-67	15 KW	480	3	1	3	10	10	3/4	30/3	•		1			18	
C-5	(E) AC-3	(2) 7.5	480	3	1	3	10	10	3/4	30/3	--	--	1			22	
C-6	(E) EF-20	1.5	480	3	1	3	12	12	3/4	--	•	30	1			3	
D-1	NEW AHU-2	30	480	3	1	3	4	8	1	80/3	--	--	--				40
D-2	(E) PD-1	2	480	3	1	3	12	12	3/4	20/3	--	--	--				3.4
D-3	(E) AC-1	(2) 7.5	480	3	1	3	10	10	3/4	30/3	--	--	1				22
D-4	(E) GSF-1	10	480	3	1	3	10	10	3/4	30/3	•		1				14
D-5	(E) GSF-2	10	480	3	1	3	10	10	3/4	30/3	•		1				14
D-6	(E) PD-2	5	480	3	1	3	12	12	3/3	20/2	--	--	--				7.6
D-7	(E) PD-3	5	480	3	1	3	12	12	3/4	20/3	--	--	--				7.6
													SUB-TOTALS	147	102.6	55.6	108.6
													TOTAL		413.8		

DETENTION CENTER MECHANICAL ROOM EXISTING MOTOR CONTROL CENTER (MCC-2) - NEW WORK

3 NTS

EXISTING PANEL "NG1"

BUS NUMBER: -
SERVED FROM: EXISTING PANEL EDP-1
MOUNTING: SURFACE/RECESSED
LOCATION: UPPER LEVEL MECHANICAL ROOM

[1] AMPERE RATING: 225A BUSS
MAIN TYPE: 225A MAIN CIRCUIT BREAKER (MCB)
LUG OPTIONS: -

VOLTAGE (L-L): 480 PHASE: 3
VOLTAGE (L-N): 277 WIRE: 4
MINIMUM KAIC RATING: 35

CKT. NO.	CIRCUIT BREAKER TRIP	CIRCUIT BREAKER P	LOAD DESCRIPTION	CODE	LOAD KVA A	LOAD KVA B	LOAD KVA C	BRANCH CIRCUIT A SETS	BRANCH CIRCUIT A PHASE/ NEUT. NO.	BRANCH CIRCUIT A PHASE/ NEUT. SIZE	BRANCH CIRCUIT A GND. SIZE	BRANCH CIRCUIT A MIN. COND. SIZE	BRANCH CIRCUIT B SETS	BRANCH CIRCUIT B PHASE / NEUT. NO.	BRANCH CIRCUIT B PHASE / NEUT. SIZE	BRANCH CIRCUIT B GND. SIZE	BRANCH CIRCUIT B MIN. COND. SIZE	LOAD KVA A	LOAD KVA B	LOAD KVA C	CODE	LOAD DESCRIPTION	CIRCUIT BREAKER TRIP	CIRCUIT BREAKER P	CKT. NO.
1	20	1	LEG HOLDING/INTRIC (EXISTING)	L	0.50													0.50			L	LEG HOLDING N-W (EXISTING)	20	1	2
3	20	1	LEG HOLDING/INTRIC (EXISTING)	L		0.50													0.50		L	LIGHTING CORR N-W (EXISTING)	20	1	4
5	20	1	LEG INMT STOG GHR (EXISTING)	L			0.50													0.50	L	LIGHTING RECORDS & R.R. (S) (EXISTING)	20	1	6
7	20	1	LEG C. STORE & LAUNDRY (EXISTING)	L	0.50													0.50			L	LIGHTING OFFICE/ISTORE S-W (EXISTING)	20	1	8
9	20	1	LIGHTING COMSR/SHP/NINTE (EXISTING)	L		0.50													0.50		L	LGE STAIR #12-G-11 (EXISTING)	20	1	10
11	20	1	LIGHTING COORIDOR S-W (EXISTING)	L			0.50													0.50	L	LEG CENTER MECH ROOM (EXISTING)	20	1	12
13	20	1	LIGHTING STAIRS #3 L-G-12 (EXISTING)	L	0.50													0.50			L	LIGHTING STAIR #2 L-G-11 (EXISTING)	20	1	14
15	20	1	LIGHTING VIS/LOBY/OFF/FILE (EXISTING)	L		0.50													0.50		L	LIGHTING STAIR#1 L-G-12 (EXISTING)	20	1	16
17	20	1	LIGHTING WILSTR/MEST/FILE (EXISTING)	L			0.50													0.50	L	LIGHTING KITCHEN E./BLK STOR (EXISTING)	20	1	18
19	20	1	LEG ELEV LBY/ETHR/1 DUCT (EXISTING)	L	0.50													0.50			L	LIGHTING KITCH C/CULY/RR (EXISTING)	20	1	20
21	20	1	LIGHTING LDG DOC/RAMP ENTR. (EXISTING	L		0.50													0.50		L	LIGHTING KITCH W/M. OFF. (EXISTING)	20	1	22
23							0.94						1	2	12	12	3/4			1.50	H	EDH-1 (KITCHEN OFFICE) (1.5 KW)	20	1	24
25	20	3	AC1 2HP (EXISTING)	M	0.94																	SPARE	20	1	26
27						0.94																SPARE	20	1	28
29							0.94															SPARE	20	1	30
31	20	3	AC2 2HP (EXISTING)	M	0.94													0.50							32
33						0.94													0.50		M	PARKING GARAGE DOORS (EXISTING)	20	3	34
35							6.90													0.50					36
37	35	3	TRASH COMPACTOR (EXISTING)	M	6.90													0.60							38
39						6.90							1	3	12	12	3/4		0.60		M	HWCP-1 (1 HP)	20	3	40
41	20	1	ELEC DUCT HEATER 1KW KITCHEN OFFICE	H			1.00	1	2	12	12	3/4								0.60					42
					10.78	10.78	11.28											3.10	3.10	4.10		PHASE TOTALS			

		NEC ARTICLE 220 LOAD CATEGORY	NEC ART. 220 TOTAL CONNECTED LOAD (KVA)	NEC ART. 220 DEMAND FACTOR	NEC ART. 215 PANEL LOAD (KVA)
	A	HOSPITAL LIGHTING	0.00	0.4[1]	0.00
	B	HOTEL/MOTEL LIGHTING	0.00	0.5[2]	0.00
	C	SPACE COOLING *	0.00	1.25	0.00
	D	OTHER HVAC LOADS	0.00	1.25	0.00
	H	SPACE HEATING	2.50	1.25	3.13
No. KIT EQPT[4] 1	K	KITCHEN APPLIANCES	0.00	1.00	0.00
	L	GENERAL LIGHTING	11.00	1.25	13.75
	M	MISC. CONTINUOUS	29.64	1.25	37.05
	N	MISC. NONCONTINUOUS	0.00	1.00	0.00
	R	RECEPTACLES	0.00	1.00[3]	0.00
	W	WAREHOUSE LIGHTING	0.00	1.00[5]	0.00
	X	** LARGEST CONTINUOUS LOAD	1.25	1.25	0.00
		TOTAL:	43.14	TOTAL:	53.93

PANEL PHASE TOTALS:	13.88	13.88	15.38
PHASE BALANCE (% of 3 PHASE LOAD):	96.52	96.52	106.95

		PERCENTAGE
PANEL CONNECTED LOAD (AMPS):	64.86	28.83%
AVAILABLE UNUSED CAPACITY (AMPS):	160.14	71.17%
FUTURE CAPACITY (AMPS):	45.00	20.00%
FEEDER SIZE (AMPS):	225	
***FUTURE CAPACITY ADEQUATE (YES/NO):		YES

(1) HOSPITAL LIGHTING: FIRST 50 KVA OR LESS = 40%, REMAINDER OVER 50 KVA = 20%
(2) HOTEL/MOTEL LIGHTING: FIRST 20 KVA OR LESS = 50%, FROM GREATER THAN 20 KVA TO 100 KVA = 40%, AND REMAINDER OVER 100 KVA = 30%
(3) KITCHEN-BASED ON NUMBER OF KITCHEN EQUIPMENT (UNITS): UP TO 2 UNITS = 100%, 3 UNITS = 90%, 4 UNITS = 80%, 5 UNITS = 70%, 6 AND OVER = 65%
(4) RECEPTACLES: FIRST 10 KVA OR LESS = 100%, REMAINDER OVER 10 KVA = 50%
(5) WAREHOUSE LIGHTING: FIRST 12.5 KVA OR LESS = 100%, REMAINDER OVER 12.5 KVA = 50%

* NON-COINCIDENTAL LOADS. LARGEST LOAD INCLUDED IN TOTAL.
** LARGEST CONTINUOUS LOAD INCLUDED IN CATEGORIZED LOADS.
*** IF AVAILABLE CAPACITY PERCENTAGE IS GREATER THAN 20% MINIMUM REQUIRED CAPACITY FOR FUTURE, THEN YES, ELSE NO.

[1] EXISTING GROUND IS UNDERSIZED PER ARTICLE 250 TABLE 250.122. THE PANEL RATING IS 225 AMPS. EXISTING GROUND IS CURRENTLY #6. TABLE 250.122 STATES THE GROUND SHALL BE #4. REMOVE EXISTING #6 GROUND AND PULL AND INSTALL NEW #4 IN COMPLIANCE WITH CODE.

DETENTION CENTER EXISTING PANEL NG1 - EXISTING AND NEW WORK

1 NTS

No.	Date	Revision

b2e consulting engineers
116-N Edward's Ferry Road, NE
Leesburg, VA 20176
Phone: 703 737 0400
Email: b2@b2epc.com

COMMONWEALTH OF VIRGINIA
BRUCE E. BEDDOW
No. 021233
4-20-2020
PROFESSIONAL ENGINEER

FOR BID

Project Title:
ARLINGTON JUSTICE CENTER
KITCHEN HVAC REPLACEMENT
ARLINGTON, VIRGINIA

Sheet Name:
SCHEDULES

Drawn By: b2E
Checked By: B2

Date: 06-15-2020

JOB # 18608

Sheet Number:
E-601