ABBREVIATIONS

AD	ACCESS DOOR
AFF	ABOVE FINISHED FLOOR
AHU	AIR HANDLING UNIT
AP	ACCESS PANEL
ATC	AUTOMATIC TEMPERATURE CONTROL
BD	BAROMETRIC DAMPER
BDD	BACKDRAFT DAMPER
BFP	BACKFLOW PREVENTER
BHP	BRAKE HORSEPOWER
BTU	BRITISH THERMAL UNITS
BTUH	BTU'S PER HOUR
CFM	CUBIC FEET PER MINUTE
DB	DRY BULB
DN	DOWN
EA	EXHAUST AIR
EAT	ENTERING AIR TEMPERATURE
EF	EXHAUST FAN
EL	ELEVATION
ESP	EXTERNAL STATIC PRESSURE
EWT	ENTERING WATER TEMPERATURE
FD	FIRE DAMPER WITH ACCESS DOOR
FPM	FEET PER MINUTE
FZP	FREEZE PROTECTION PUMP
GPM	GALLONS PER MINUTE
HP	HORSEPOWER
INV	INVERT
LAT	LEAVING AIR TEMPERATURE
LWT	LEAVING WATER TEMPERATURE
MBH	THOUSAND BTU'S PER HOUR
MOD	MOTOR OPERATED DAMPER
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NTS	NOT TO SCALE
OA	OUTSIDE AIR
OBD	OPPOSED BLADE DAMPER
RA	RETURN AIR
SA	SUPPLY AIR
SD	SMOKE DAMPER WITH ACCESS DOOR COMBINATION
SD/FD	SMOKE/FIRE DAMPER WITH ACCESS DOOR
SP	STATIC PRESSURE
TOD	TOP OF DUCT
TOP	TOP OF PIPE
TYP	TYPICAL
TSP	TOTAL STATIC PRESSURE
UTR	UP THRU ROOF
VD	VOLUME DAMPER
WB	WET BULB
WG	WATER GAUGE

PIPING NOMENCLATURE

---- CHWR ----	CHILLED WATER RETURN
—— CHWS ——	CHILLED WATER SUPPLY
---- CWR ----	CONDENSER WATER RETURN (TO TOWER)
—— CWS ——	CONDENSER WATER SUPPLY (FROM TOWER)
—— D ——	DRAIN LINE
---- HWR ----	HEATING WATER RETURN
—— HWS ——	HEATING WATER SUPPLY
—— RL ——	REFRIGERANT LIQUID
—— RG ——	REFRIGERANT HOT GAS

ALTERATION/ DEMOLITION SYMBOLS

	POINT OF CONNECTION, NEW TO EXISTING
	TERMINATION OF DEMOLITION, REMOVAL
(E)	EXISTING TO REMAIN
(E)	EXISTING TO REMAIN
(R)	EXISTING TO BE REMOVED
(R)	EXISTING TO BE REMOVED
(RE)	RELOCATE EXISTING
(ER)	EXISTING RELOCATED

PIPING SYMBOLS

	AIR OR STEAM VENT
Ø	DIAMETER
	DIRECTION OF FLOW
	FLEXIBLE CONNECTION
DPT	DIFFERENTIAL PRESSURE TRANSMITTER
	PRESSURE GAUGE AND VALVE
P/T	PRESSURE/TEMPERATURE PLUG
	REDUCER, CONCENTRIC
	REDUCER, ECCENTRIC STRAIGHT CROWN
	REDUCER, ECCENTRIC STRAIGHT INVERT
	RISER OR ELBOW DOWN
	RISER UP AND DOWN, ELBOW UP
	STRAINER
	STRAINER W/GATE VALVE W/NIPPLE & CAP
	THERMOMETER
	THERMOMETER WELL
T	THERMOSTAT
	UNION OR FLANGED CONNECTION
	VALVE, AUTOMATIC FLOW CONTROL
	VALVE, BALANCING
	VALVE, CHECK
NS	VALVE, CHECK NON-SLAM
	VALVE, DRAIN W/NIPPLE & CAP
	VALVE, (BALL VALVE)
	VALVE, PRESSURE REGULATING
	VALVE, RELIEF (SAFETY)
	VALVE, SHUT-OFF
	VALVE, SHUT-OFF LOCK SHIELD
	VALVE, SOLENOID
	VALVE, THROTTLING
	VALVE, THREE-WAY CONTROL
	VALVE, TWO-WAY CONTROL

EQUIPMENT IDENTIFICATION

AHU 1

- SYMBOL OR TYPE (SEE SCHEDULE OR SPECIFICATIONS)
- IDENTIFICATION NUMBER (SEE SCHEDULE)

SPECIFICATIONS

GENERAL PROJECT CONDITIONS

1. THE MECHANICAL CONTRACTOR SHALL PROVIDE ALL LABOR, MATERIAL, EQUIPMENT AND SERVICES NECESSARY FOR THE COMPLETION OF HEATING, VENTILATING AND COOLING SYSTEMS AS SHOWN AND AS SPECIFIED HEREIN. WHERE A CONTRADICTION OCCURS BETWEEN DRAWINGS, NOTES AND SPECIFICATIONS OCCURS, THE MORE STRINGENT SHALL APPLY. THE SCOPE OF WORK IS TO INCLUDE, BUT IS NOT LIMITED TO THE FOLLOWING:
   a. DEMOLITION, RELOCATION, AND NEW WORK
   b. ALL REQUIRED CUTTING, PATCHING AND FINISHING ASSOCIATED WITH THE SYSTEM INSTALLATION.
   c. ALL ELECTRICAL AND MECHANICAL WORK REQUIRED TO MAKE THE SYSTEM CODE COMPLIANT AND FULLY FUNCTIONAL
   d. EARTHWORK, TRENCHING AND EXCAVATING ASSOCIATED WITH UNDERGROUND PIPING SYSTEMS.
2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO INSPECT AND ASSESS THE WORK IN EACH SPACE, AND TO FULFILL THE INTENT OF THE WORK INDICATED BY THE CONTRACT DOCUMENTS. CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS. DEVIATIONS FROM THE CONTRACT DOCUMENTS NECESSITATED BY FIELD CONDITIONS SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE ARCHITECT AND ENGINEER.
3. NOT ALL EXISTING SERVICES HAVE BEEN SHOWN. DO NOT REMOVE OR ABANDON ANY SERVICES UNLESS SPECIFICALLY NOTED OR MADE OBSOLETE BY THESE ALTERATIONS.
4. WHERE SHOWN ON THE DRAWINGS, OR AS REQUIRED, THE MECHANICAL CONTRACTOR SHALL EXTEND EXISTING SYSTEMS OR TIE INTO THE SAME TO PROVIDE A COMPLETE, COORDINATED MECHANICAL SYSTEM TO THE SATISFACTION OF THE OWNER, THE ARCHITECT AND THE ENGINEER. ALL EXISTING WORK NOT MADE OBSOLETE BY THESE ALTERATIONS SHALL BE KEPT IN SERVICE BY THE MECHANICAL CONTRACTOR. ALL EXISTING WORK MADE OBSOLETE BY THESE ALTERATIONS SHALL BE REMOVED BY THE MECHANICAL CONTRACTOR.
5. ALL EXISTING WORK TO REMAIN, BUT DISTURBED OR DISCONNECTED BECAUSE OF NEW CONSTRUCTION, SHALL BE REPLACED/REPAIRED AND PUT IN OPERATING CONDITION.
6. CONTRACTOR SHALL DO WORK NECESSARY TO PERMIT OPERATION OF ALL EXISTING SYSTEMS SERVING AREAS REMAINING IN OPERATION DURING THE CONSTRUCTION PERIOD. ALL WORK AFFECTING SYSTEMS SERVING AREAS REMAINING IN OPERATION SHALL BE PERFORMED AFTER NORMAL WORKING HOURS OR ON WEEKENDS. SCHEDULE WORK REQUIRING SHUTDOWNS WITH OWNER AT LEAST 2 WEEKS IN ADVANCE.
7. THE MECHANICAL CONTRACTOR SHALL PROVIDE ALL WORK SHOWN OR IMPLIED ON FLOOR PLANS, FLOW DIAGRAMS, RISER DIAGRAMS, DETAILS, AND SPECIFICATIONS.
8. ALL WORK SHALL BE PERFORMED IN A NEAT AND WORKMANLIKE MANNER AND IN ACCORDANCE WITH ALL APPLICABLE CODES, RULES AND REGULATIONS AND INDUSTRY STANDARDS. ALL OCCUPIED AREAS SHALL BE KEPT IN "BROOM" CLEAN CONDITION.
9. ALL EQUIPMENT SHALL BE DELIVERED, STORED AND INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND INSTALLATION INSTRUCTIONS. THE MECHANICAL CONTRACTOR SHALL PROVIDE ALL ACCESSORIES, VALVES AND AUXILIARY DEVICES REQUIRED OR RECOMMENDED FOR PROPER EQUIPMENT OPERATION AND MAINTENANCE.
10. POSITION AND INSTALL ALL MATERIAL AND EQUIPMENT TO PERMIT PROPER ACCESS AND IN SUCH A MANNER THAT MAINTENANCE, ADJUSTMENT, CALIBRATION, INSPECTION, REPAIR AND REPLACEMENT OF THE MATERIAL AND EQUIPMENT CAN BE ACCOMPLISHED WITH MINIMUM EFFORT AND COST. EXTEND LUBRICATING FITTINGS ON EQUIPMENT TO AN ACCESSIBLE LOCATION WHERE THEY CAN BE SERVICED WITHOUT REMOVING PANELS OR BELT OR DRIVE GUARDS
11. PERFORM ALL CUTTING, CORING, PATCHING, FIRE STOPPING AND REFINISHING ASSOCIATED WITH THE HVAC SYSTEM INSTALLATION.
12. PREPARE, IN BOOKLET FORM, AND SUBMIT DIRECTLY TO THE ARCHITECT FOR REVIEW AND APPROVAL, SHOP DRAWINGS AND CATALOGUE CUTS OF ALL EQUIPMENT TO BE SUPPLIED. SHOP DRAWINGS TO INCLUDE:
   a. REHEAT COILS
   b. FANS
   c. AIR DEVICES
   d. INSULATION
   e. FLEX DUCT
   f. DUCT ACCESSORIES, FIRE DAMPERS, ETC
   g. DUCTWORK, 3/8" SCALE FABRICATION DWGS INDICATING ALL FITTINGS, JOINTS, DUCT ELEVATIONS
   h. SHOP STANDARDS FOR DUCT FABRICATION APPLICABLE TO THIS PROJECT
   i. ATC SYSTEM: PROVIDE SYSTEM SCHEMATICS, DEVICE WIRING DIAGRAMS, WRITTEN CONTROL SEQUENCES, AND CATALOGUE CUTS WITH PERFORMANCE DATA FOR ALL EQUIPMENT, HARDWARE, DAMPERS AND VALVES.
13. THE CONSTRUCTION MANAGER WILL EMPLOY AN INDEPENDENT BALANCING CONTRACTOR TO BALANCE ALL NEW AND EXISTING AIR DEVICES AND AIR HANDLING EQUIPMENT AFFECTED BY WORK UNDER THIS CONTRACT. THE INDEPENDENT BALANCING CONTRACTOR WILL SUBMIT BALANCING REPORT UPON COMPLETION.
14. MAINTAIN A RECORD SET OF DRAWINGS TO RECORD ALL DEVIATIONS FROM CONTRACT DOCUMENTS. PROVIDE DRAWINGS TO OWNER AT COMPLETION OF PROJECT.
15. PROVIDE 3 COPIES OF EQUIPMENT OPERATION AND MAINTENANCE MANUALS, WHICH SHALL INCLUDE: INSTALLATION INSTRUCTIONS, REPLACEMENT PARTS LIST, MAINTENANCE INSTRUCTIONS AND ANY OTHER PERTINENT INFORMATION PROVIDED BY THE EQUIPMENT MANUFACTURER.
16. MECHANICAL CONTRACTOR SHALL PROVIDE TO OWNER'S STAFF A MINIMUM 8 HOURS IN INSTRUCTION TO INSURE PROPER OPERATION AND MAINTENANCE OF SYSTEMS.
17. INSTALL NEW FILTERS IN ALL AIR HANDLING SYSTEMS(AFFECTED BY THE NEW WORK) AFTER ATC WORK HAS BEEN COMPLETED AND PRIOR TO FINAL AIR BALANCING.
18. THE MECHANICAL CONTRACTOR SHALL CORRECT ANY DEFICIENCIES DETECTED DURING FINAL AIR AND WATER BALANCING PRIOR TO SUBMITTING REQUEST FOR FINAL PAYMENT.
19. THE MECHANICAL CONTRACTOR SHALL COORDINATE ALL WORK WITH THE INDEPENDENT BALANCING FIRM.
20. THE CONTRACT DOCUMENTS ARE DIAGRAMMATIC ONLY, PROVIDE ADDITIONAL OFFSETS AND MODIFY ROUTING AS REQUIRED TO COORDINATE WITH EXISTING CONDITIONS AND THE WORK OF OTHER TRADES.
21. THE MECHANICAL CONTRACTOR IS RESPONSIBLE FOR PROPER SUPPORT OF ALL MECHANICAL EQUIPMENT, DUCTWORK, PIPING AND ACCESSORIES. CONTRACTOR SHALL PROVIDE AND INSTALL ALL REQUIRED AUXILIARY SUPPORT STEEL, HANGERS, VIBRATION ISOLATORS, FLEXIBLE CONNECTIONS, SUPPORT ANCHORS AND SEISMIC RESTRAINTS.
22. FIRE STOP ALL PIPE, CONDUIT AND DUCT PENETRATIONS THROUGH FLOORS AND THROUGH FIRE RATED OR SMOKE RATED WALLS OR PARTITIONS IN ACCORDANCE WITH ARCHITECTURAL SPECIFICATIONS.
23. CONTRACTOR SHALL PROVIDE A 1-YEAR WARRANTY ON ALL WORK INSTALLED UNDER THIS PROJECT. WARRANTY PERIOD TO BEGIN AFTER SYSTEM START-UP AND SUCCESSFUL BALANCING.
24. PROVIDE EXPANSION COMPENSATION FOR ALL PIPING.
25. ALL NEW DUCTWORK AND PIPING SYSTEMS SHALL BE THOROUGHLY CLEANED OF ALL DUST & DEBRIS PRIOR TO SYSTEM START-UP.
26. ALL NEW MATERIALS, EQUIPMENT AND SYSTEMS SHALL BE LISTED AND LABELED BY A LICENSED NATIONALLY RECOGNIZED TESTING LABORATORY AND USED, FOR THE SPECIFIC PURPOSE, ENVIRONMENT OR APPLICATION FOR WHICH IT WAS TESTED AND APPROVED. NO FIELD MODIFICATIONS AND/OR NONCOMPLIANT INSTALLATION WHATSOEVER SHALL BE MADE TO ANY MATERIALS, EQUIPMENT, AND SYSTEMS THAT WOULD VIOLATE THE LISTING AND LABELING.
27. CONTRACT CLOSEOUT
   a. PROVIDE "AS BUILT" RECORD DRAWINGS.
   b. ALL WORK SHALL BE GUARANTEED FOR A PERIOD OF ONE YEAR AGAINST DEFECTS IN EQUIPMENT, WORKMANSHIP, AND/OR INSTALLATION TECHNIQUES.
28. INSTALL EQUIPMENT IN ACCORDANCE WITH EQUIPMENT MANUFACTURER'S INSTRUCTIONS. OBTAIN THESE INSTRUCTIONS WHICH SHALL BE CONSIDERED A PART OF THE CONTRACT DOCUMENTS.

SUBSTITUTIONS/ALTERNATES

1. NO SUBSTITUTIONS SHALL BE PERMITTED. ALL BASE BIDS TO USE BASIS OF DESIGN MANUFACTURERS OR ALTERNATE MANUFACTURERS APPROVED AS EQUAL. ALL ALTERNATE MANUFACTURERS NAMES AND EQUIPMENT MODEL NUMBERS MUST BE INCLUDED WITH BID.
2. ALTERNATES MUST INCLUDE ALL ACCESSORIES NORMALLY PROVIDED WITH BASIS OF DESIGN EQUIPMENT AND ANY OTHER OPTIONS REQUIRED FOR SAFE AND PROPER EQUIPMENT OPERATION.
3. THE MECHANICAL CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CHANGES DUE TO ALTERNATE MANUFACTURERS AT NO COST TO OWNER. THIS INCLUDES ALL EQUIPMENT AND WORK ASSOCIATED WITH, BUT NOT LIMITED TO, SERVICE CHANGES OR ADDITIONS, ELECTRICAL UPGRADES AND EQUIPMENT, DUCTWORK OR PIPING RELOCATION.
4. ALTERNATE MANUFACTURER'S EQUIPMENT WILL BE OF EQUAL CONSTRUCTION AS BASIS OF DESIGN.

PIPE, VALVES AND FITTINGS

1. EACH LENGTH OF PIPE OR FITTING FURNISHED SHALL BE MARKED WITH THE MANUFACTURER'S NAME BRAND AND SPECIFICATION CODE DESIGNATION TO WHICH IT CONFORMS.
2. ALL SCREWED NIPPLES 2 INCHES AND SHORTER IN LENGTH SHALL BE SCHEDULE 80. ALL-THREADED NIPPLES SHALL NOT BE USED.
3. PIPE CONNECTIONS: BLACK STEEL PIPING 2 INCHES AND SMALLER MAY BE THREADED OR WELDED UNLESS OTHERWISE NOTED. THREADED PIPE SHALL BE CAREFULLY CUT, REAMED OR FILED OUT TO SIZE OF BORE, REMOVING ALL CHIPS. PIPE SHALL BE WORKED INTO PLACE WITHOUT SPRINGING. PROVIDE TEFLON TAPE ON THE MALE THREAD ONLY. PROVIDE DIELECTRIC UNIONS AT ALL POINTS WHERE FERROUS PIPING IS CONNECTED TO COPPER OR BRASS PIPING.
4. STRAINERS SHALL BE MUELLER STEAM SPECIALTY OR EQUAL.
5. WELDING SHALL BE DONE BY THE SHIELDED METALLIC ARC METHOD OF FUSION WELDING IN ACCORDANCE WITH THE WELDING PROCEDURES OF THE NATIONAL CERTIFIED PIPE WELDING BUREAU. ALL WELDERS SHALL BE CERTIFIED BY A LOCALLY RECOGNIZED TESTING AUTHORITY.
6. THE DRAWINGS ARE GENERALLY DIAGRAMMATIC AND DUE TO THE SMALL SCALE IT IS NOT POSSIBLE TO INDICATE ALL FITTINGS, VALVES, GAUGES AND SPECIALTIES REQUIRED. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING COMPLETE OPERATING SYSTEMS AND SHALL FURNISH ALL NECESSARY FITTINGS, VALVES, GAUGES AND SPECIALTIES WHETHER OR NOT INDICATED. ALL PIPING SHALL BE INSTALLED IN ACCORDANCE WITH THE BEST PRACTICES OF THE TRADE AND THE LATEST CODE REQUIREMENTS.
7. TEST ALL NEW PIPING AT 1-1/2 TIMES NORMAL OPERATING PRESSURE PRIOR TO INSTALLATION OF INSULATION.
8. SUSPEND AND SUPPORT IN ACCORDANCE WITH APPLICABLE STANDARDS. DO NOT SUPPORT PIPING OR EQUIPMENT FROM STEEL ROOF OR FLOOR DECKS, FROM THIN (LESS THAN 4 INCHES THICK) CONCRETE FLOOR SLABS OR FROM CEILINGS. CUT PIPE SUPPORTING HANGER RODS FLUSH WITH HANGERS.
9. PROVIDE VALVES AT THE LOCATIONS SHOWN, WHERE SPECIFIED AND WHERE REQUIRED TO PROPERLY CONTROL THE PIPING SYSTEM. VALVES RECOMMENDED OR REQUIRED BY EQUIPMENT MANUFACTURERS AND CODES FOR THE PROPER OPERATION AND/OR ISOLATION OF THE EQUIPMENT SHALL BE PROVIDED WHETHER OR NOT INDICATED OR SPECIFIED.
10. VALVES SHALL SUIT THE CHARACTER OF THE PIPE IN WHICH THEY ARE INSTALLED. VALVES SHALL BE DESIGNED FOR A WORKING PRESSURE OF AT LEAST 150 PERCENT OF THE WORKING PRESSURE OF THE SYSTEM IN WHICH THEY ARE INSTALLED, BUT NOT LESS THAN 250 PSIG ON HIGH PRESSURE SYSTEMS, AND 125 PSIG ON LOW PRESSURE SYSTEMS.
11. COMBINATION BALANCING AND SHUTOFF VALVES SHALL BE BELL & GOSSETT "CIRCUIT SETTERS" OR EQUAL WITH QUICK CONNECTORS FOR METER ATTACHMENT.
12. PIPING:
   a. PIPING 2 INCH AND SMALLER SHALL BE HARD DRAWN TYPE 'L' COPPER.
   b. PIPING 2-1/2 TO 10 INCH SHALL BE SCHEDULE 40 BLACK STEEL, NIPPLES TO BE SCHEDULE 80 BLACK STEEL.
   c. JOINTS: SOLDERED FOR COPPER PIPING, WELDED FOR STEEL PIPE.
   d. FITTINGS: WROUGHT COPPER FOR COPPER PIPING. SCHEDULED 40 WELDING FITTINGS FOR STEEL PIPE.
   e. VALVES: 150 PSIG WORKING PRESSURE. BRONZE SOLDER END FOR COPPER PIPING. FLANGED IRON BODY; BRONZE MOUNTED FOR STEEL PIPING.
   f. NONSLAM (SILENT) CHECK VALVE: COMBINATION PUMP VALVE CO. MODEL 36, 300 PSI, WITH UNION END FOR COPPER PIPING. COMBINATION PUMP VALVE CO. MODEL 10D AND 11D, 300 PSI, WAFER TYPE FOR STEEL PIPE. PRESSURE CLASSIFICATION TO SUIT APPLICATION.
   g. SWING CHECK VALVE: STOCKHAM MODEL B309, CLASS 125 FOR COPPER PIPING. STOCKHAM MODEL G931, CLASS 125 FOR STEEL PIPING.
   h. SHUT-OFF VALVE; 2 INCH AND SMALLER, BALL VALVE. TWO PIECE, BRONZE BODY FULL PORT, CHROME PLATED BRONZE BALL, TFE SEATS AND PACKING, 600 PSI CWP AND BLOWOUT PROOF STEM.
   h. SHUT-OFF VALVE; 2 1/2 INCH AND LARGER, LUG TYPE BUTTERFLY VALVE. MSS-SP-67 COMPATIBLE WITH ANSI 125 PSIG FLANGES. BUBBLE-TIGHT, BI-DIRECTION DEAD END SERVICE AT FULL PRESSURE RATING WITHOUT NEED FOR DOWNSTREAM FLANGES. DUCTILE IRON BODY, STAINLESS STEEL DISC AND BUSHING AND A ONE PIECE GEOMETRIC DRIVE STAINLESS STEEL STEM WITH EPDM SEATS AND SEALS. SIZES 2 1/2 INCH THRU 6 INCH, EXTENDED VALVE STEM WITH LEVER OPERATED THROTTLING PLATE. SIZES 8 AND LARGER, ENCLOSED WEATHERPROOF WORM GEAR OPERATORS.
   i. THROTTLING VALVE: STOCKHAM S-216-BR-R-T AND S-216-BR-R-S,CLASS 125, FOR COPPER PIPING. STOCKHAM MODEL G512, CLASS 125 FOR STEEL PIPING.
   j. BALANCING VALVE FOR PIPING 3 INCHES AND SMALLER: PROVIDE POSITIVE SHUTOFF CALIBRATED BALANCING VALVE. ALL BRASS BODY WITH THREADED OR FLANGED ENDS TO SUIT PIPING SYSTEM IN WHICH INSTALLED, POSITION INDICATOR, LOCKING DEVICE FOR BALANCED POSITION AND QUICK CONNECTORS FOR METER ATTACHMENT. PROVIDE ONE (1) FLOW TEST KIT WITH APPROPRIATE VALVING AND HOSES, DIFFERENTIAL METER, QUICK CONNECTORS AND CIRCULAR SLIDE RULE.
   k. BALANCING VALVE FOR PIPING 4 INCHES AND LARGER: PROVIDE FLOW MEASUREMENT VALVE DEVICE, FLOW MEASUREMENT INDEPENDENT OF SETTING POSITION OF VALVE, LOCKING DEVICE FOR BALANCED POSITION AND QUICK CONNECTORS FOR DIFFERENTIAL GAUGE. FLOW MEASUREMENT ACCOMPLISHED BY MEANS OF A FIXED GEOMETRY VENTURI STYLE SENSOR. PROVIDE ONE (1) FLOW TEST KIT WITH APPROPRIATE VALVING AND HOSE, DIFFERENTIAL METER AND FLOW CHART.
13. PROVIDE LABELS ON NEW PIPING SYSTEMS IDENTIFYING PIPING SYSTEM AND DIRECTION OF FLOW. PIPING SHALL BE LABELED EVERY 10-FT ON CENTER.
14. AT EACH POINT WHERE PIPES PASS THROUGH FLOORS, WALLS AND PARTITIONS, PROVIDE SLEEVES AND SEAL AROUND PIPES WITH U.L. LISTED FIRESTOP SYSTEM.

AUTOMATIC TEMPERATURE CONTROLS

1. THE CONSTRUCTION MANAGER WILL EMPLOY AND PAY FOR SERVICES OF THE ATC CONTRACTOR TO EXPAND THE EXISTING DDC SYSTEM TO INCLUDE THE NEW HVAC SYSTEMS AS DESCRIBED IN THE CONTRACT DOCUMENTS.
2. THE EXISTING BUILDING 58 CONTROL SYSTEM IS TAC/INVENSYS.

UNDERGROUND PIPING SYSTEMS

1. REFER TO SPECIFICATION SECTION 23 24 13.

DUCTWORK AND DUCTWORK ACCESSORIES

1. REFER TO SPECIFICATION SECTION 23 30 01.

INSULATION FOR DUCTWORK AND PIPING

1. REFER TO SPECIFICATION SECTION 23 07 01.

DESIGN DATA TABLE	
SYSTEM:	UNDERGROUND CHILLED WATER
DESIGN WORKING PRESSURE:	85 PSIG
DESIGN WORKING TEMPERATURE:	42-52°F
SYSTEM FLUID:	WATER
ASME CODE:	B31.9
PIPING MATERIAL:	PVC CARRIER PIPE, 2 INCHES INSULATION, HDPE JACKET
PIPING COMPONENTS:	MECHANICAL JOINT CAST IRON FITTINGS
EXAMINATION REQUIREMENTS:	
TESTING REQUIREMENTS:	HYDROSTATIC TEST TO 1.5 TIMES WORKING PRESSURE
SPECIFICATION REFERENCE:	SECTION 23 24 13

DESIGN DATA TABLE	
SYSTEM:	HOT WATER SYSTEM
DESIGN WORKING PRESSURE:	50 PSIG
DESIGN WORKING TEMPERATURE:	160-180°F
SYSTEM FLUID:	WATER
ASME CODE:	B31.9
PIPING MATERIAL:	WROUGHT COPPER OR SCHEDULE 40 BLACK STEEL (WELDED)
PIPING COMPONENTS:	WROUGHT COPPER (SOLDERED) OR SCHEDULE 40 BLACK STEEL (WELDED)
EXAMINATION REQUIREMENTS:	
TESTING REQUIREMENTS:	HYDROSTATIC TEST TO 1.5 TIMES WORKING PRESSURE
SPECIFICATION REFERENCE:	SPECIFICATION ON DWG MG.1

DRAWING INDEX

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REV	ZONE	DESCRIPTION	APPR.	DATE
		ISSUE NO. 1 / EPP		02/08/10

REVISIONS

FACILITY USERS		FACILITIES & LOGISTICS	
APPROVED –	DATE –	DESIGNER –	DATE –
APPROVED –	DATE –	DRAWN –	–
APPROVED –	DATE –	CHECKED –	–
APPROVED –	DATE –	APPROVED –	–

Jefferson Lab

TITLE: HVAC INDEX SHEET

SCALE	DRAWING NUMBER	SHEET	REV
NTS	100011-123-M1-STE	MG.1	-

SPECIFICATIONS

PVC DUCTWORK

1. QUALITY ASSURANCE:
   a. DUCTWORK SHALL BE FABRICATED, REINFORCED, INSTALLED, SEALED AND TESTED IN ACCORDANCE WITH REQUIREMENTS AND RECOMMENDATIONS OF THE SMACNA THERMOPLASTIC DUCT (PVC) CONSTRUCTION MANUAL.
   b. THE DUCTWORK PROVIDED SHALL BE MANUFACTURED BY A FIRM WITH AT LEAST FIVE (5) YEARS OF EXPERIENCE IN SIMILAR TYPE APPLICATIONS.
   c. ALL THE DUCT AND DUCT COMPONENTS SHALL BE MANUFACTURED BY A CERTIFIED FABRICATOR AND BEAR THE "FM" LABEL.
2. DUCTWORK INDICATED OR SPECIFIED AS BEING ACID OR CORROSION RESISTANT: MATERIALS SHALL BE AS SPECIFIED AS TROVIDUR SERIES 250 OR EQUIVALENT, TYPE II, GRADE I, PVC CLASS 14333-D, ASTM D-1784. COMPOSITION SHALL INCLUDE INHIBITOR FOR UV RADIATION. THE DUCT SHALL BE KCH SERVICES, INC "FIRE RESIST", OR APPROVED EQUAL.
3. FABRICATION:
4. 4. WELDING
   a. WELDING SHALL BE DONE BY HOT GAS FUSION WELDING METHOD UTILIZING PVC FILTER ROD AS MANUFACTURED FOR THIS PURPOSE. SOLVENT WELDING SHALL NOT BE USED.
   b. WELDING SHALL BE PERFORMED BY WORKMEN ADEQUATELY TRAINED IN THE ART OF PVC WELDING AND CERTIFIED IN ACCORDANCE WITH ASTM 1789 TEST METHODS. WELDING SHALL BE DONE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
   c. DUCTWORK, HOODS AND SIMILAR AIR PASSAGE ENCLOSURES SHALL BE FINISHED COMPLETELY AIR AND WATER TIGHT WITH SMOOTH INTERIOR SURFACES.
   d. DUCTWORK SHALL BE COMPLETELY FREE FROM CRACKS, DISTORTIONS OR OTHER IMPERFECTIONS.
   e. THE FOLLOWING TABLE OUTLINES MINIMUM NUMBER OF WELDING PASSES REQUIRED:

TYPE OF WELDING			
	WALL (INCHES)	ROD (INCHES)	MINIMUM # OF WELDING PASSES
LONGITUDINAL SEAMS	1/8	5/32	4"-12" DIAM. HAND WELDED – ONE
	1/8	--	14"-22" DIAMETER BUTT WELDED
	3/16	--	24"-20" DIAMETER BUTT WELDED
	1/4	--	42"-72" DIAMETER BUTT WELDED
CIRCUMFERENTIAL SEAMS	1/8	5/32	THREE (3) HAND WELDED
	3/16	5/32	THREE (3) HAND WELDED
	1/4	5/32	THREE (3) HAND WELDED
NOTE: WHEREVER POSSIBLE, LONGITUDINAL AND CIRCUMFERENTIAL WELDS SHALL HAVE ONE (1) INTERIOR WELD SEALING THE SEAM IN ADDITION TO OUTSIDE WELDS, FOR MAXIMUM STRENGTH.			
DUCTS-FLANGES AND REINFORCING	1/8	5/32	THREE (3)
	3/16	5/32	THREE (3)
	1/4	5/32	THREE (3)
NOTE: FLANGES TO BE BACK-WELDED A MINIMUM OF ONE (1) PASS.			

5. LONGITUDINAL SEAMS
   a. FOR THERMALLY FORMED ROUND DUCT SECTIONS, LONGITUDINAL SEAMS SHALL BE BUTT WELDED.
   b. ALIGNMENT OF LONGITUDINAL SEAMS IN ADJACENT BUTT WELDED SECTIONS OF DUCT SHALL BE AVOIDED, AND SEAMS SHALL BE STAGGERED.
   c. FOR STRAIGHT RECTANGULAR DUCT, THE CORNERS SHALL BE FORMED. WELDED CORNER SEAMS ARE NOT ACCEPTABLE.
   d. LONGITUDINAL SEAMS SHALL BE BUTT WELDED AND LOCATED AT A DISTANCE OF NOT LESS THAN 1/8 OF THE SPAN WIDTH FROM CORNER OF DUCT.

ELBOWS - ROUND DUCT

   a. UNLESS OTHERWISE SPECIFIED, CENTERLINE RADIUS FOR STANDARD ELBOWS SHALL BE 1.5 TIMES DIAMETER.
   b. ELBOWS MAY ALSO BE CONSTRUCTED BY PRESS FORMING IN HALVES FROM A SHEET. THE HALVES SHALL THEN BE JOINTED BY HOT GAS FUSION WELDING METHOD.
   c. SEGMENTED ELBOWS SHALL BE JOINED BY BUTT WELDING AND NUMBER OF GORES OR SEGMENTS SHALL BE IN ACCORDANCE WITH THE FOLLOWING TABLE.

SEGMENTED ELBOWS		
DUCT DIAMETER OR WIDTH	MINIMUM NUMBER OF SEGMENTS	
	45 DEGREES	90 DEGREES
4 THRU 8 INCHES	2	3
10 THRU 48 INCHES	3	5
50 INCHES AND ABOVE	4	7

6. ELBOWS - RECTANGULAR DUCT
   a. RECTANGULAR ELBOWS SHALL BE FABRICATED FROM FLAT STOCK WITH WELDED CORNER CONSTRUCTION.
   b. UNLESS OTHERWISE SPECIFIED, CENTERLINE RADIUS FOR STANDARD RECTANGULAR ELBOWS SHALL BE 1.5 TIMES DUCT WIDTH.

7. OFFSETS: UNLESS OTHERWISE SPECIFIED, CENTERLINE RADII FOR STANDARD OFFSETS SHALL BE THE SAME AS FORELBOWS.

TRANSITIONS AND REDUCERS

   a. TRANSITION PIECES IN MAINS AND SUB-MAINS SHALL BE TAPERED, 1" CHANGE IN DIAMETER TO EVERY 5 " IN LENGTH.
   b. UNLESS OTHERWISE SPECIFIED, ANGULAR LIMITATIONS FOR TRANSITIONS ILLUSTRATED IN THE SMACNA THERMOPLASTIC DUCT CONSTRUCTION MANUAL SHALL BE HELD WHERE FIELD CONDITIONS PERMIT.

8. BRANCHES ENTERING MAIN
   a. BRANCH DUCTS SHALL ENTER MAIN DUCT NEAR LARGE END OF A TRANSITION, AT AN ANGLE NOT EXCEEDING 45 DEGREES WHEREVER POSSIBLE (30 DEGREES PREFERRED).
   b. BRANCHES SHALL NOT BE POSITIONED DIRECTLY OPPOSITE ONE ANOTHER ON A MAIN OR A SUB-MAIN.
   c. INTERSECTION OF BRANCHES WITH MAINS AND SUB-MAINS SHALL BE CONTINUOUSLY WELDED.

FIBERGLASS BELT DRIVE UPBLAST CENTRIFUGAL ROOF EXHAUSTER (EF-4):

1. FAN WHEEL: THE RESIN USED ON THE SOLID FIBERGLASS FE WHEEL SHALL BE DERAKANE 510-A VINYLESTER. BLADES SHALL BE BACKWARD CURVED TO PROVIDE NON-LOADING, HIGHLY EFFICIENT OPERATION. THE WHEEL SHALL HAVE A TOTALLY ENCAPSULATED ALUMINUM CORE INSERT FOR SECURE ATTACHMENT TO THE SHAFT. THE WHEEL SHALL BE ONE-PIECE, RESIN TRANSFER MOLDED, WITHOUT HAND LAY-UP OR ASSEMBLY COMPONENTS. FAN SHALL BE SUITABLE FOR TEMPERATURES UP TO 125 DEG F.
2. STRUCTURAL PARTS: STRUCTURAL PARTS LOCATED IN THE AIRSTREAM ARE EITHER FIBERGLASS RESIN OR EPOXY COATED 304 STAINLESS STEEL. ALL HARDWARE OUTSIDE THE AIRSTREAM SHALL BE ZINC PLATED. ALL FIBERGLASS SURFACES SHALL BE CONSTRUCTED OF ASHLAND HETRON 693 POLYESTER RESIN AND GLASS FIBER WITH 3% ANTIMONY TRIOXIDE ADDED TO ACHIEVE CLASS I FLAME SPREAD BELOW 25. ALL FIBERGLASS SURFACES SHALL BE PROTECTED WITH A MINIMUM 10 MIL THICKNESS OF CHEMICAL, FLAME, AND ULTRAVIOLET RESIN.
3. HOUSING: THE ENTIRE HOUSING SHALL HAVE A FINISH COAT OF RESIN TO PROVIDE SUPERIOR PROTECTION AND SMOOTH AIRFLOW.
4. SHAFTS AND BEARINGS: FAN SHAFTS ARE TURNED GROUND AND POLISHED. BEARINGS SHALL BE HEAVY DUTY, SELF ALIGNING BALL BEARINGS WITH A MINIMUM 50,000 HOURS L10 LIFE. A NEOPRENE SHAFT SEAL IS PLACED WHERE THE SHAFT LEAVES THE HOUSING.
5. MOTORS: FOOT MOUNT TEFC MOTORS. MOTOR AND DRIVE COMPONENTS ARE PROTECTED FROM THE AIRSTREAM.
6. QUALITY ASSURANCE: THE FAN ASSEMBLY SHALL BE DYNAMICALLY BALANCED AT THE FACTORY PRIOR TO SHIPPING. FANS SHALL BE BALANCED IN ACCORDANCE WITH AMCA STANDARD 204-96, FAN APPLICATION CATEGORY BV-3 (COMPARABLE TO GRADE G6.3). FAN PERFORMANCE SHALL BE BASED ON TESTS CONDUCTED IN AN AMCA ACCREDITED TEST LABORATORY AND IN ACCORDANCE WITH THE LATEST REVISION OF AMCA STANDARD 210 FOR AIR PERFORMANCE AND AMCA STANDARD 300 FOR SOUND.

BELT DRIVE DOWNBLAST CENTRIFUGAL ROOF EXHAUSTER (EF-5):

1. FAN WHEEL: CONSTRUCTED OF ALUMINUM, NON-OVERLOADING, BACKWARD INCLINED CENTRIFUGAL. THE WHEEL CONE AND FAN INLET WILL BE MATCHED AND SHALL HAVE PRECISE RUNNING TOLERANCES FOR MAXIMUM PERFORMANCE AND OPERATING EFFICIENCY
2. STRUCTURAL PARTS: DRIVE FRAME ASSEMBLIES SHALL BE CONSTRUCTED OF HEAVY GAUGE STEEL AND MOUNTED ON VIBRATION ISOLATORS. VIBRATION ISOLATORS SHALL BE DOUBLE STUDDED OR PEDESTAL MOUNT TRUE ISOLATORS WITH NO METAL TO METAL CONTACT, SIZED TO MATCH THE WEIGHT OF THE FAN
3. HOUSING: MOTOR COVER, SHROUD, CURB CAP, AND LOWER WINDBAND SHALL BE CONSTRUCTED OF HEAVY GAUGE ALUMINUM. SHROUD SHALL HAVE A INTEGRAL ROLLED BEAD FOR EXTRA STRENGTH. SHROUD SHALL BE DRAWN FROM A DISC AND DIRECT AIR DOWNWARD. LOWER WINDBAND SHALL HAVE A FORMED EDGE FOR ADDED STRENGTH. ALL HOUSING COMPONENTS SHALL HAVE FINAL THICKNESSES EQUAL TO OR GREATER THEN PREFORMED THICKNESS. CURB CAP SHALL HAVE PRE-PUNCHED MOUNTING HOLES TO ENSURE CORRECT ATTACHMENT. RIGID INTERNAL SUPPORT STRUCTURE. LEAK PROOF
4. SHAFTS AND BEARINGS: FAN SHAFT SHALL BE GROUND AND POLISHED SOLID STEEL WITH AN ANTI CORROSIVE COATING. PERMANENTLY SEALED BEARINGS OR PILLOW BLOCK BALL BEARINGS. BEARING SHALL BE SELECTED FOR A MINIMUM L10 LIFE IN EXCESS OF 100,000 HOURS (EQUIVALENT TO L50 AVERAGE LIFE OF 500,000 HOURS), AT MAXIMUM CATALOGED OPERATING SPEED. BEARINGS ARE 100 PERCENT FACTORY TESTED. FAN SHAFT FIRST CRITICAL SPEED IS AT LEAST 25 PERCENT OVER MAXIMUM OPERATING SPEED.
5. MOTORS: MOTOR ENCLOSURES: TEFC, MOTORS, PERMANENTLY LUBRICATED, HEAVY DUTY BALL BEARING TYPE TO MATCH WITH THE FAN LOAD AND FURNISHED AT THE SPECIFIC VOLTAGE AND PHASE. MOUNT ON VIBRATION ISOLATORS, OUT OF THE AIRSTREAM. FOR MOTOR COOLING THERE SHALL BE FRESH AIR DRAWN INTO THE MOTOR COMPARTMENT THROUGH AN AREA FREE OF DISCHARGE CONTAMINANTS. ACCESSIBLE FOR MAINTENANCE
6. QUALITY ASSURANCE: CONFORM TO AMCA STANDARD 211 AND 311. FANS MUST BE TESTED IN ACCORDANCE WITH ANSI/AMCA STANDARD 210-99 AND AMCA STANDARD 300-96 IN AN AMCA ACCREDITED LABORATORY. FANS SHALL BE CERTIFIED TO BEAR THE AMCA LABEL FOR AIR AND SOUND PERFORMANCE. SEAL CLASSIFICATION FOR SPARK RESISTANT CONSTRUCTION, LEVELS A, B, AND C CONFORM TO AMCA 99. EACH FAN SHALL BE GIVEN A BALANCING ANALYSIS WHICH IS APPLIED TO WHEELS AT THE OUTSIDE RADIUS. THE MAXIMUM ALLOWABLE STATIC AND DYNAMIC IMBALANCE IS 0.05 OUNCES (BALANCE GRADE OF G6.3). COMPLY WITH THE NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA), STANDARDS FOR MOTORS AND ELECTRICAL ACCESSORIES.

BLOWER COIL SPECIFICATIONS (HV-1)

1. GENERAL: PROVIDE HORIZONTAL AIR HANDLING UNITS. UNITSSHALL BE TESTED IN ACCORDANCE WITH ARI 430 AND ARI 260. THE UNIT SHALL COMPLY WITH NFPA 90A ANDSHALL BE UL LISTED IN THE U.S. AIR HANDLER CONSISTS OF A HYDRONIC COIL, AND CENTRIFUGAL FAN WITH MOTOR AND DRIVE MOUNTED IN A COMMON CABINET. DRIVE LOCATION AND COIL CONNECTIONS SHALL BE INDEPENDENT FOR THE SAME SIDE. AIR HANDLERS SHALL BE PROVIDED WITH KNOCKOUTS IN ALL FOUR CORNERS TO INSTALL THE UNIT SUSPENDED FROM THE CEILING WITH THREADED RODS. INSULATE UNIT AND ACCESSOIRES WITH 1", 1-1/2 LB/CU FT DENSITY FOIL FACED FIBERGLASS INSULATION.
2. CASING: (STRUCTURAL COMPONENTS) CONSTRUCT OF HEAVY-GAUGE GALVANIZED STEEL, INSULATE WITH ONE-INCH, 1-1/2 LB DENSITY FIBERGLASS FIRE RESISTANT AND ODORLESS GLASS FIBER MATERIAL TO PROVIDE THERMAL AND ACOUSTICAL INSULATION. FAN HOUSING SIDES DIRECTLY ATTACHED TO THE AIR HANDLER TOP AND BOTTOM PANELSTO STRENGTHEN UNIT ASSEMBLY. LOCATE COIL ACCESS PANELS ON BOTH SIDES OF THE AIR HANDLER TO ALLOW EASY REMOVAL OF THE INTERNAL COILS AND DRAIN PAN. PROVIDE MAIN ACCESS PANELS FOR THE FAN, MOTOR AND DRIVE FROM BOTH SIDES OF THE AIR HANDLER.
3. HEATING COILS: PROVIDE ARE ONE- OR TWO-ROW COIL. COILS SHALL USE HIGHLY EFFICIENT ALUMINUM FINS, MECHANICALLY BONDED TO SEAMLESS COPPPER TUBES. ALL COILSSHALL BE SPECIFICALLY DESIGNED AND CIRCUITED FOR WATER USE. ALL COILS SHALL BE FACTORY TESTED WITH 450 PSI AIR UNDER WATER. MAXIMUM STANDARD OPERATING CONDITIONS: 300 PSIG, 200°F. SWEAT TYPE CONNECTIONS ARE STANDARD.
4. FAN: FORWARD CURVED, CENTRIFUGAL BLOWER TYPE EQUIPPED WITH HEAVY-DUTY ADJUSTABLE SPEED V-BELT DRIVE. FAN SHAFT SUPPORTED BY HEAVY-DUTY, PERMANENTLY SEALED BALL BEARINGS. FAN SHALL BE DYNAMICALLY BALANCED. AIR HANDLERS SHALL HAVE A SINGLE FAN.
5. FILTERS: TWO-INCH PLEATED STANDARD EFFICIENCY (30%). AN ANGLE FILTER RACK SHALL BE USED; THIS IS SIZED FOR LESS THAN 300 FEET PER MINUTE AT NOMINAL AIRFLOW. ALL UNITS AND FILTER RACKS USE STANDARD FILTER SIZES.
6. MOTORS: THREE-PHASE, 460 VOLTAGE OPERATION. MOTOR SHALL HAVE A PLUS OR MINUS 10% VOLTAGE UTILIZATION RANGE. MOTOR SHALL BE OPEN DRIP-PROOF WITH PERMANENTLY SEALED BALL BEARINGS, INTERNAL CURRENT AND THERMAL OVERLOAD PROTECTION, A MINIMUM 1.15 SERVICE FACTOR AND 56 FRAME RESILIENT BASES. MOTORS SHALL BE FACTORY-INSTALLED AND WIRED TO THE AIR HANDLER JUNCTION BOX. PROVIDE FACTORY MOUNTED DISCONNECT AT UNIT FOR SINGLE POINT POWER CONNECTION.

PUMP SPECIFICATIONS (FZP-HV1):

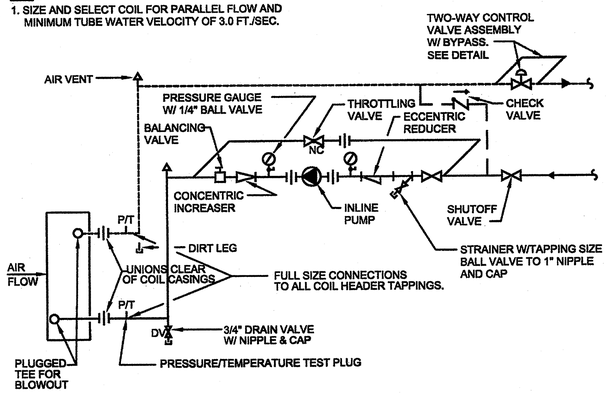
1. GENERAL: FURNISH AND INSTALL PUMPS WITH CAPACITIES AS SHOWN ON PLANS. PUMPS SHALL BE IN-LINE TYPE, CLOSE-COUPLED, SINGLE STAGE DESIGN, FOR INSTALLATION IN VERTICAL OR HORIZONTAL POSITION, AND CAPABLE OF BEING SERVICED WITHOUT DISTURBING PIPING CONNECTIONS
2. CONSTRUCTION: PUMP VOLUTE SHALL BE OF CLASS 30 CAST IRON, AND IMPELLER SHALL BE OF BRONZE/BRASS, ENCLOSED TYPE, KEYED AND SECURED TO THE SHAFT BY A LOCKING CAPSCREW OR NUT. THE LIQUID CAVITY SHALL BE SEALED OFF AT THE MOTOR SHAFT BY AN INTERNALLY FLUSHED MECHANICAL SEAL WITH CERAMIC SEAL SEAT AND CARBON SEAL RING, SUITABLE FOR CONTINUOUS OPERATION AT 225°F. A SHAFT SLEEVE SHALL COMPLETELY COVER THE WETTED AREA UNDER THE SEAL. PUMPS SHALL BE RATED FOR MAXIMUM OF 175 PSI WORKING PRESSURE. CASINGS SHALL HAVE GAUGE PORTS AT NOZZLES, AND VENT AND DRAIN PORTS IN CASING.
3. MOTORS: MOTOR SHALL MEET NEMA SPECIFICATIONS AND SHALL BE THE SIZE, VOLTAGE AND ENCLOSU RE CALLED FOR ON THE PLANS. IT SHALL HAVE HEAVY-DUTY GREASE LUBRICATED BALL BEARINGS, COMPLETELY ADEQUATE FOR THE MAXIMUM LOAD FOR WHICH THE MOTOR IS DESIGNED.
4. QUALITY ASSURANCE: EACH PUMP SHALL BE FACTORY TESTED. IT SHALL THEN BE THOROUGHLY CLEANED AND PAINTED WITH AT LEAST ONE COAT OF HIGH-GRADE MACHINERY ENAMEL PRIOR TO SHIPMENT.

HV-1 SEQUENCE OF OPERATION:

1. OPERATION
   a. THE UNIT SHALL RUN CONTINUOUSLY.
   b. HOT WATER CIRC PUMP SHALL BE ENERGIZED WHENEVER THE OUTSIDE AIR TEMPERATURE IS BELOW 36°F AND THE HEATING COIL VALVE SHALL MODULATE OPEN TO MAINTAIN THE PROGRAMMED SPACE TEMPERATURE SET POINT (60°F).
   c. UPON SENSING SUPPLY AIR SMOKE, THE FAN SHALL BE DE-ENERGIZED.
   d. WHEN THE HEATING COIL DISCHARGE AIR TEMPERATURE FALLS BELOW THE SET POINT OF THE LOW TEMPERATURE LIMIT THERMOSTAT, THE FAN SHALL BE DE-ENERGIZED, AND THE DDC SYSTEM SHALL BE ALARMED.
   e. WHENEVER THE FAN IS DE-ENERGIZED, THE OUTSIDE AIR DAMPER SHALL CLOSE.
   f. EF-4 AND EF-5 SHALL RUN CONTINUOUSLY.
   g. PROVIDE FAN STATUS, PUMP STATUS AND EF STATUS TO SITE DDC SYSTEM.
   h. ALL POINTS ASSOCIATED WITH HV-1 SHALL BE INCLUDED ON SYSTEM GRAPHICS.

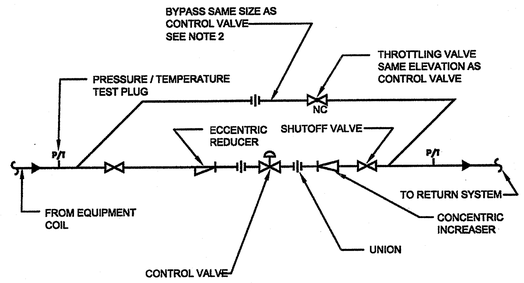
NOTE:

1. SIZE AND SELECT COIL FOR PARALLEL FLOW AND MINIMUM TUBE WATER VELOCITY OF 3.0 FT./SEC.



3 MG.2 SINGLE HOT WATER HEATING COIL AND INLINE PUMP

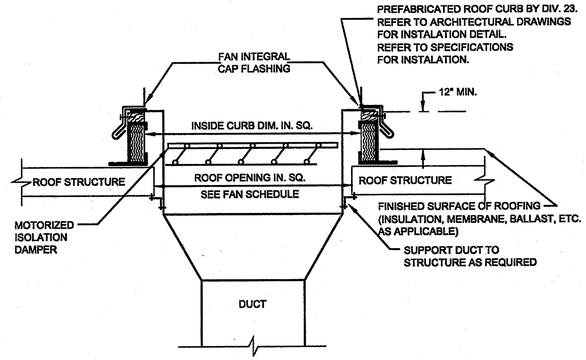
TWO-WAY CONTROL VALVE



NOTE:

1. WHERE TWO CONTROL VALVES ARE SHOWN, SPECIFIED OR REQUIRED, INSTALL BOTH AT SAME ELEVATION PIPED AS SHOWN FOR SINGLE VALVE WITH COMMON BYPASS FOR BOTH VALVES (SEE DIAGRAM ABOVE). MAKE BYPASS ONE PIPE SIZE LARGER THAN LARGER CONTROL VALVE.
2. THE SYMBOL ⟨⟩ ON DRAWINGS OR DETAILS INDICATES CONTROL VALVE TO BE INSTALLED AS SHOWN ON THIS DETAIL.

2 MG.2 TWO WAY WATER CONTROL VALVE ASSEMBLY



1 MG.2 PREFABRICATED ROOF CURB FOR FAN

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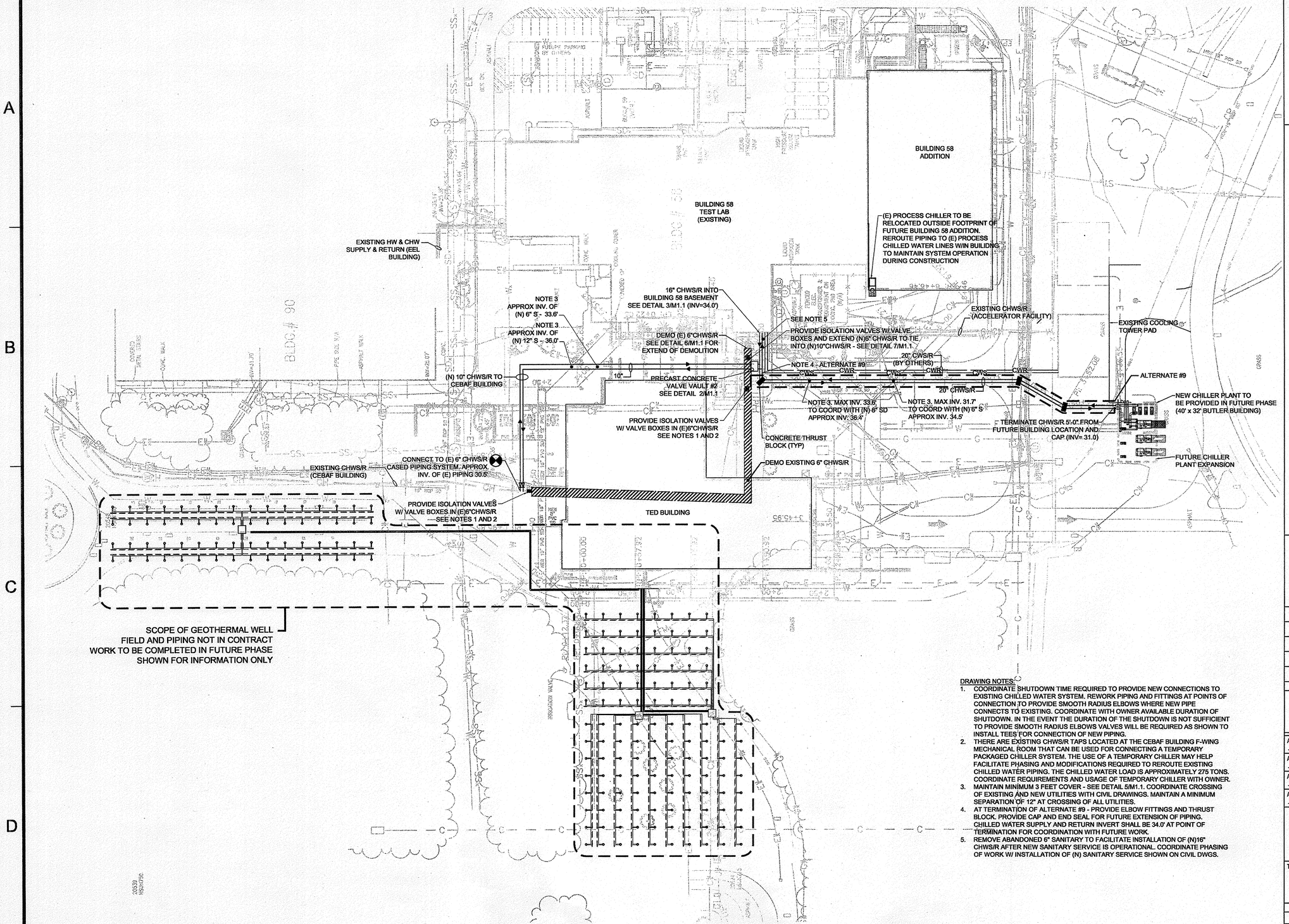
TITLE: SPECIFICATIONS AND DETAILS

SCALE	DRAWING NUMBER	SHEET	REV
NTS	100011-124-M2-STE	MG.2	-



DRAWING NOTES:

1. COORDINATE SHUTDOWN TIME REQUIRED TO PROVIDE NEW CONNECTIONS TO EXISTING CHILLED WATER SYSTEM. REWORK PIPING AND FITTINGS AT POINTS OF CONNECTION TO PROVIDE SMOOTH RADIUS ELBOWS WHERE NEW PIPE CONNECTS TO EXISTING. COORDINATE WITH OWNER AVAILABLE DURATION OF SHUTDOWN. IN THE EVENT THE DURATION OF THE SHUTDOWN IS NOT SUFFICIENT TO PROVIDE SMOOTH RADIUS ELBOWS VALVES WILL BE REQUIRED AS SHOWN TO INSTALL TEES FOR CONNECTION OF NEW PIPING.
2. THERE ARE EXISTING CHWS/R TAPS LOCATED AT THE CEBAF BUILDING F-WING MECHANICAL ROOM THAT CAN BE USED FOR CONNECTING A TEMPORARY PACKAGED CHILLER SYSTEM. THE USE OF A TEMPORARY CHILLER MAY HELP FACILITATE PHASING AND MODIFICATIONS REQUIRED TO REROUTE EXISTING CHILLED WATER PIPING. THE CHILLED WATER LOAD IS APPROXIMATELY 275 TONS. COORDINATE REQUIREMENTS AND USAGE OF TEMPORARY CHILLER WITH OWNER.
3. MAINTAIN MINIMUM 3 FEET COVER - SEE DETAIL 5/M1.1. COORDINATE CROSSING OF EXISTING AND NEW UTILITIES WITH CIVIL DRAWINGS. MAINTAIN A MINIMUM SEPARATION OF 12" AT CROSSING OF ALL UTILITIES.
4. AT TERMINATION OF ALTERNATE #9 - PROVIDE ELBOW FITTINGS AND THRUST BLOCK. PROVIDE CAP AND END SEAL FOR FUTURE EXTENSION OF PIPING. CHILLED WATER SUPPLY AND RETURN INVERT SHALL BE 34.0' AT POINT OF TERMINATION FOR COORDINATION WITH FUTURE WORK.
5. REMOVE ABANDONED 6" SANITARY TO FACILITATE INSTALLATION OF (N)16" CHWS/R AFTER NEW SANITARY SERVICE IS OPERATIONAL. COORDINATE PHASING OF WORK W/ INSTALLATION OF (N) SANITARY SERVICE SHOWN ON CIVIL DWGS.

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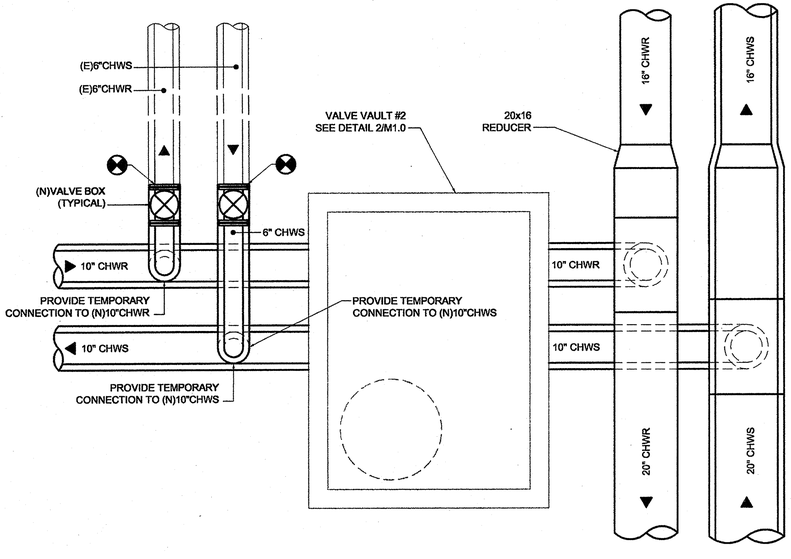
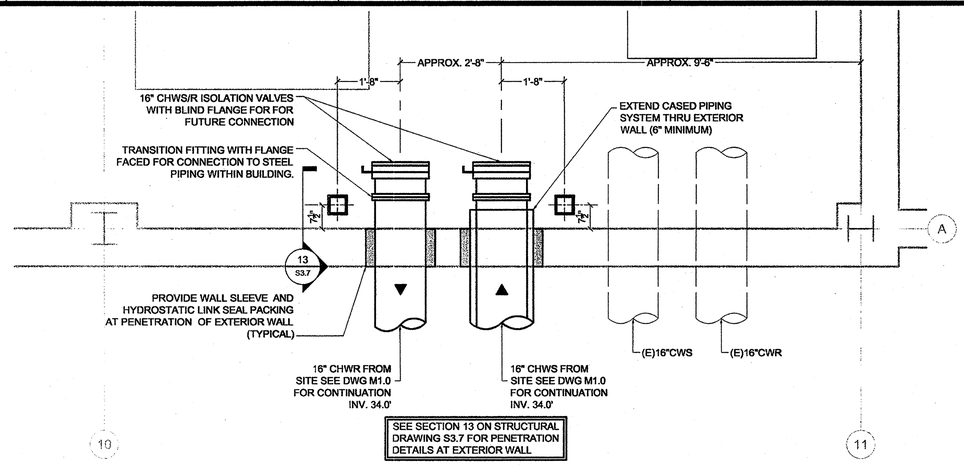
TITLE:

HVAC SITE PLAN

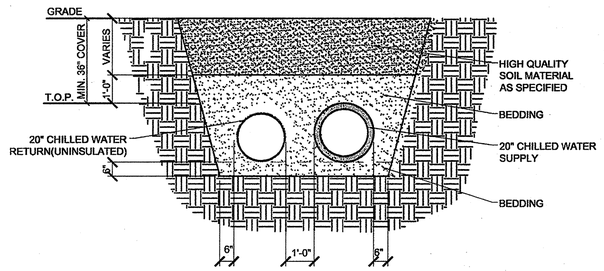
SCALE	DRAWING NUMBER	SHEET	REV
1" = 50'	100011-125-M3-STE	M1.0	-



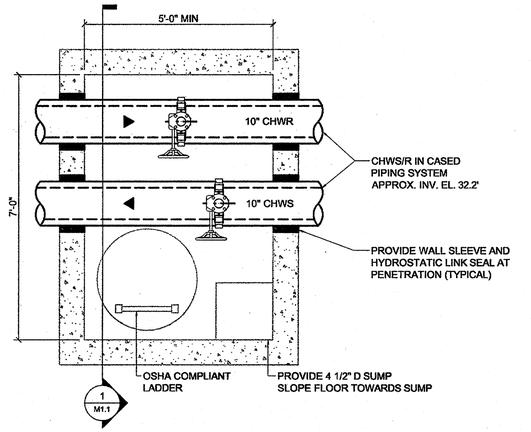
7 M1.1 NONE — PIPING CONNECTION DETAIL - NEW WORK



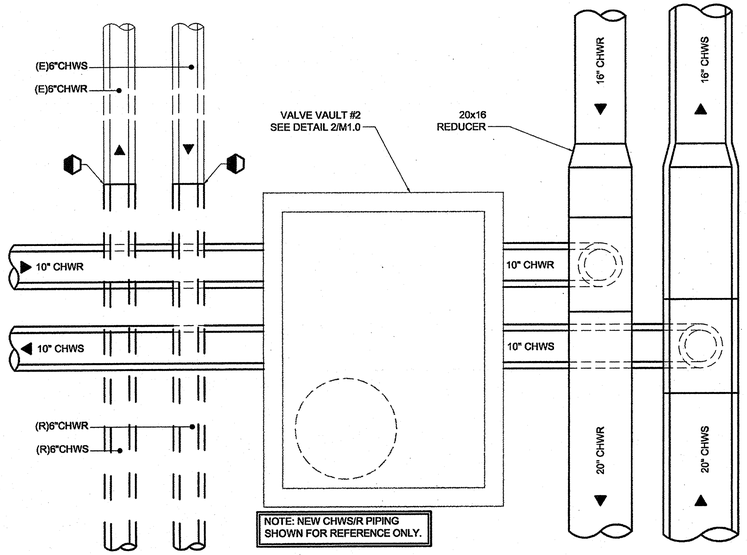
3 M1.1 NONE — WALL PENETRATION DETAIL - BUILDING 58 BASEMENT



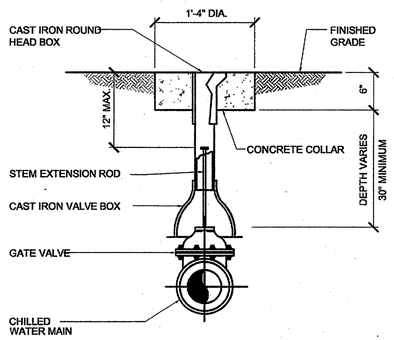
5 M1.1 NONE — TRENCH DETAIL



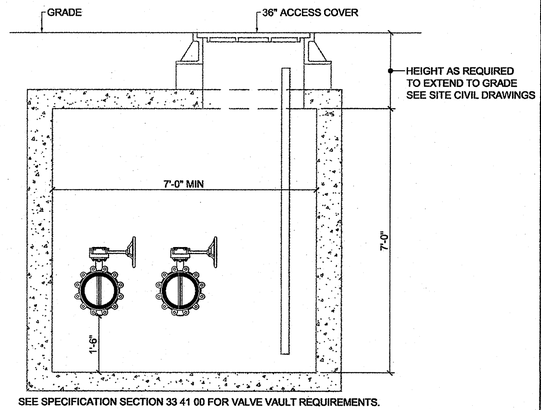
2 M1.1 NONE — VALVE VAULT#2 PLAN



6 M1.1 NONE — PIPING CONNECTION DETAIL - DEMOLITION



4 M1.1 NONE — VALVE BOX DETAIL



SEE SPECIFICATION SECTION 33 41 00 FOR VALVE VAULT REQUIREMENTS.

1 M1.1 NONE — VALVE VAULT#2 SECTION

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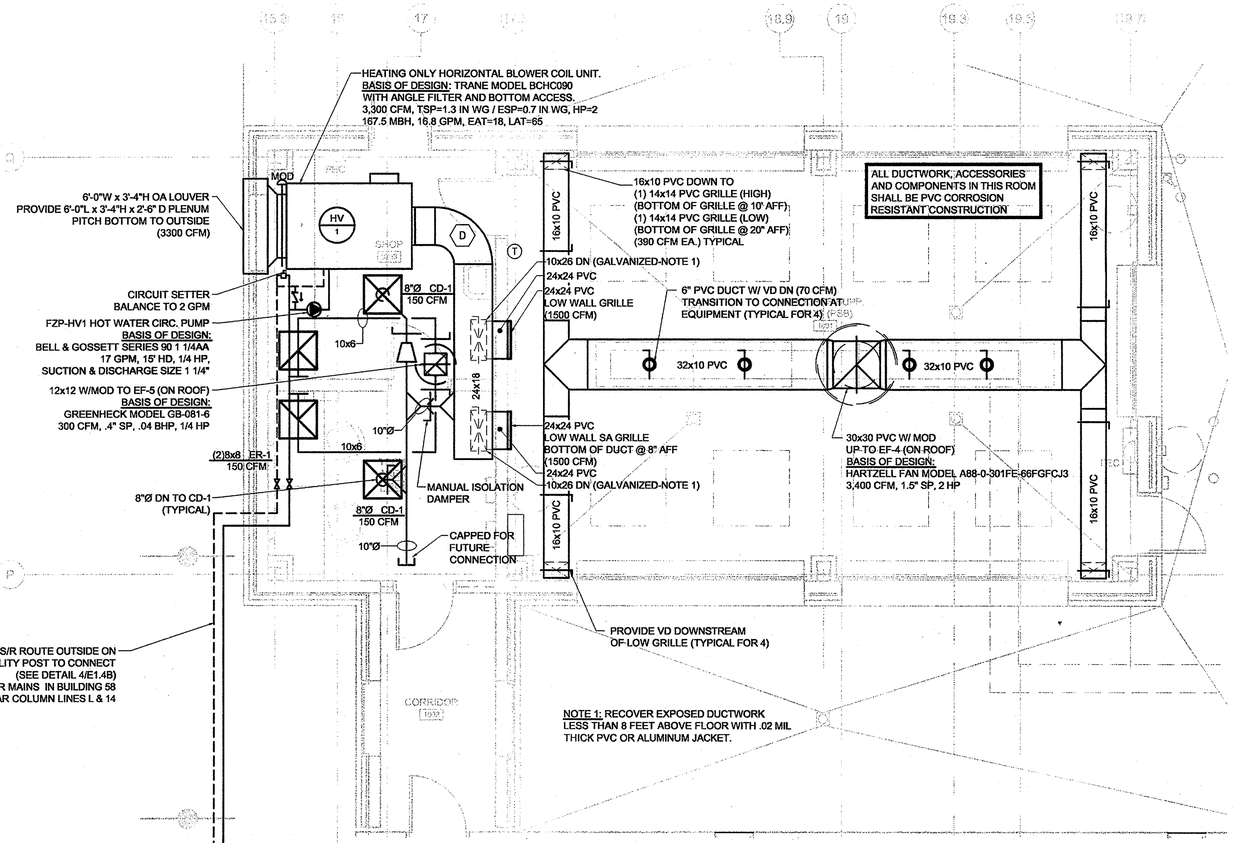
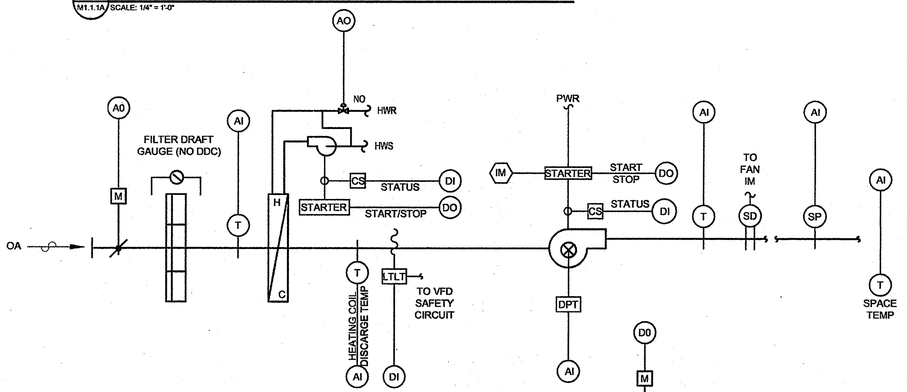
TITLE: HVAC SITE DETAILS

SCALE	DRAWING NUMBER	SHEET	REV
NTS	100011-126-M4-STE	M1.1	–

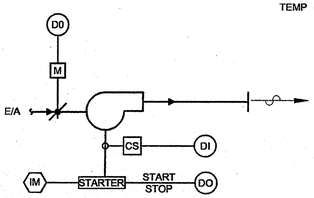
AIR DEVICE SCHEDULE						
SYMBOL	TYPE	DESCRIPTION	NECK SIZE (IN.)	MAX. P.D. (IN. WG)	MAX. N.C.	BASIS OF DESIGN
CD-1	CEILING DIFFUSER	24x24 PANEL CEILING DIFFUSER PANEL FACE DUCT MOUNTED STEEL OR ALUMINUM CONSTRUCTION. BAKED MATTE WHITE FINISH.	SEE PLANS	0.1	30	TITUS/OMNI
ER-1	EXHAUST REGISTER	CEILING MOUNTED EXHAUST REGISTER W/ 0° DEFLECTION & O.B.D	SEE PLANS	0.1	30	TITUS / 350 ZRL



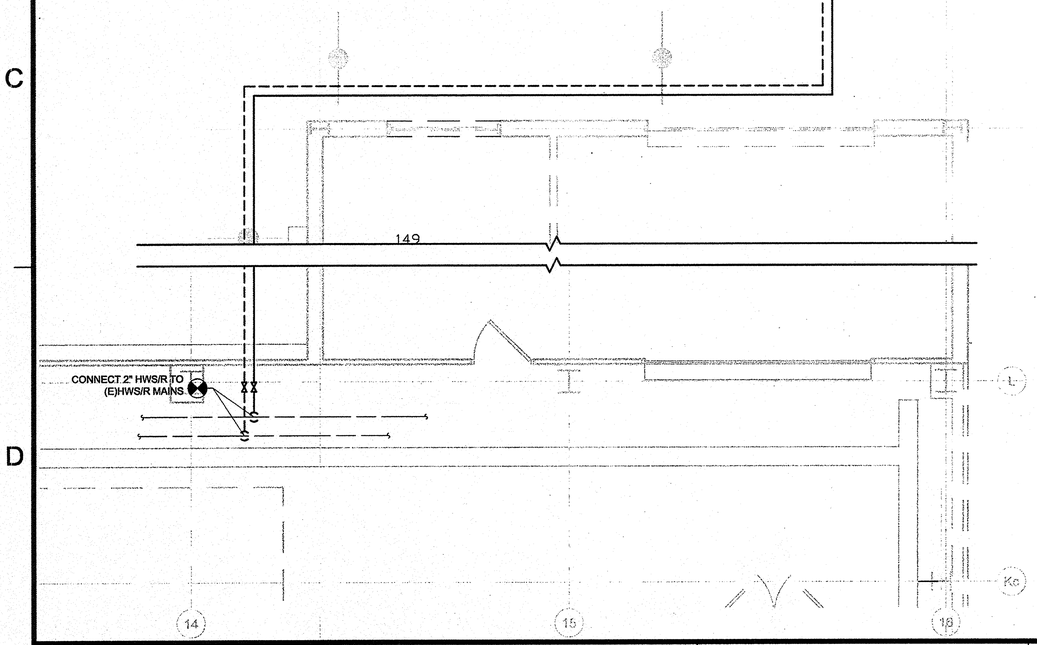
1 M1.1.1A PSB - FIRST FLOOR PLAN
SCALE: 1/4" = 1'-0"



2 M1.1.1A CONTROL DIAGRAM - HV-1



3 M1.1.1A CONTROL DIAGRAM - EF-4
TYPICAL FOR EF-5



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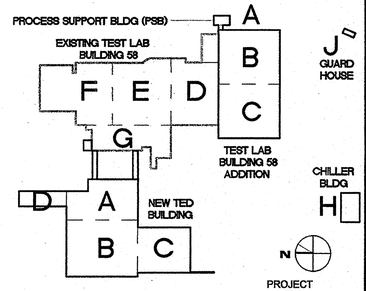

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TITLE:
TEST LAB RENOVATION - BUILDING 58
HVAC - FIRST FLOOR - SEGMENT A (PSB)

SCALE	DRAWING NUMBER	SHEET	REV
1/4" = 1'-0"	100011-127-M5-STE	TLR-M1.1.1A	-