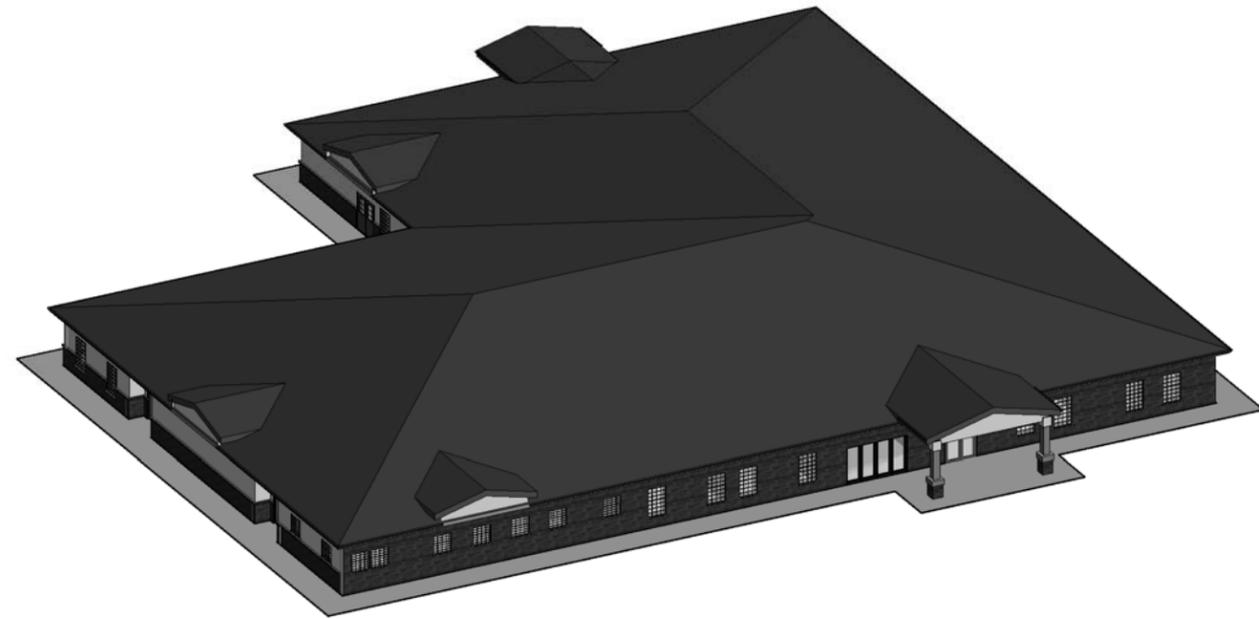




**US Army Corps of
Engineers®**
ENGINEERING AND SUPPORT CENTER,
HUNTSVILLE
HUNTSVILLE, AL



ARMY COMMUNITY SERVICE CENTER (ACSC) EXTRA LARGE

CENTER OF STANDARDIZATION

LOCATION:

CONTRACT NUMBER : N/A

SOLICITATION NUMBER : N/A

PREPARED: JUNE 2014

STATUS: 65% ENERGY CONSERVATION
DESIGN PACKAGE

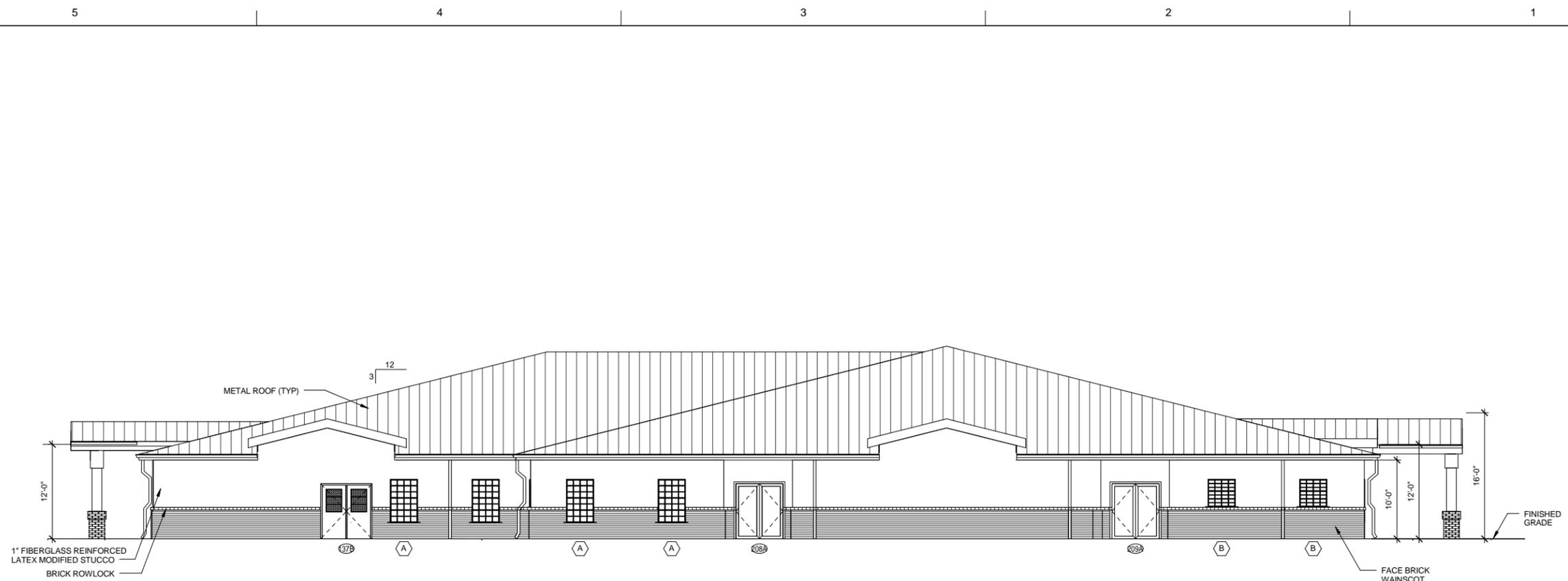
*ENERGY CONSERVATION MEASURES AND LEED/SUSTAINABLE DESIGN FEATURES
HAVE BEEN CONSIDERED FOR THIS PROJECT.

ANTICIPATE LEED: 60 CREDIT POINTS.

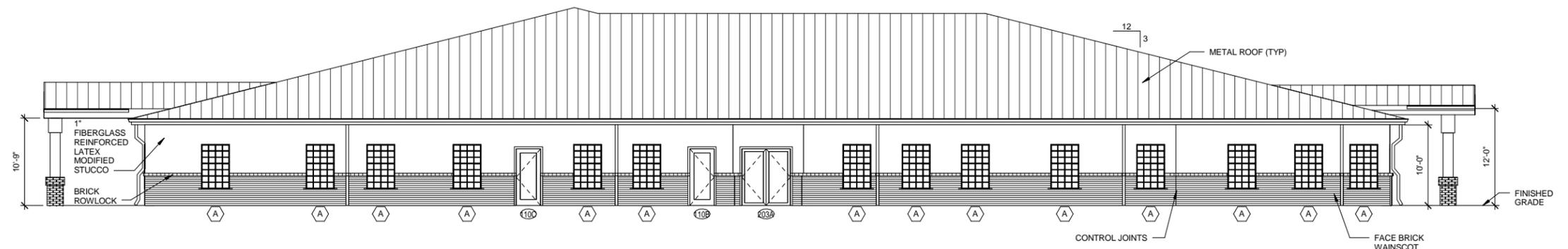
U.S. ARMY CORPS OF ENGINEERS ENGINEERING AND SUPPORT CENTER, HUNTSVILLE			
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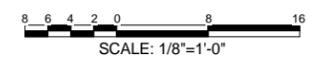
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3 WEST ELEVATION
 SCALE: 1/8" = 1'-0"



4 EAST ELEVATION
 SCALE: 1/8" = 1'-0"



US Army Corps of Engineers® HUNTSVILLE CENTER	
DESIGN BY: JRS	DATE: JUNE 2014
DRAWN BY: CMB	SOLICITATION NO.:
SEAL BY: APR	CONTRACT NO.:
PLANNED BY: APR	CONTRACT DATE: 01/20/14
PROJECT NO.:	CONTRACT NO.:
FILE NAME:	CATEGORY CODE:
U.S. ARMY CORPS OF ENGINEERS ENGINEERING AND SUPPORT CENTER - HUNTSVILLE	4820 UNIVERSITY SQ HUNTSVILLE, AL 35816
ARMY COMMUNITY SERVICE CENTER SERVICE CENTER (ACSC) EXTRA LARGE	EXTERIOR ELEVATIONS
PLATE REFERENCE NUMBER A-202	SHEET 22 OF 88

ABBREVIATIONS

SYMBOLS

GENERAL NOTES:

A		KW	KILOWATT
A/C	AIR CONDITION (-ING, -ER, -ED)	KWH	KILOWATT-HOUR
ABS	ABSOLUTE		
AC UNIT	AIR CONDITIONING UNIT	L	LOUVER
ACH	AIR CHANGES PER HOUR	LAT	LEAVING AIR TEMPERATURE
ADA	AMERICANS WITH DISABILITIES ACT	LB	POUNDS
ADP	APPARATUS DEW POINT	LF	LINEAR FEET
AFF	ABOVE FINISHED FLOOR	LG	LENGTH
AHU	AIR HANDLING UNIT	LHG	HEAT GAIN, LATENT
ALT	ALTITUDE	LMTD	LEAST MEAN TEMPERATURE DIFFERENCE
AMB	AMBIENT	LPS	LOW PRESSURE STEAM
APPROX	APPROXIMATE	LWT	LEAVING WATER TEMPERATURE
AS	AIR SEPARATOR		
ATM	ATMOSPHERE	M	MAXIMUM
AUX	AUXILIARY	MAX	1000 * BRITISH THERMAL UNIT
AVG	AVERAGE	MBH	MINUTE
		MIN	MINUTE
B		MIN	MINIMUM
B	BOILER	MPS	MEDIUM PRESSURE STEAM
BBD	BOILER BLOWDOWN		
BF	BOILER FEED SYSTEM	N	NOT APPLICABLE
BHP	BRAKE HORSEPOWER	N/A	NOT APPLICABLE
BLDG	BUILDING	NC	NOISE CRITERIA
BOD	BOTTOM OF DUCT	NC	NORMALLY CLOSED
BOP	BOTTOM OF PIPE	NC	NOT IN CONTRACT
BP	BOILING POINT	NO	NORMALLY OPEN
BP	BOILER PUMP	NO / #	NUMBER
BT	BUFFER TANK	NTS	NOT TO SCALE
BTU	BRITISH THERMAL UNIT		
		O	OUTSIDE AIR
CFM	FLOW, CUBIC FEET PER MINUTE	OA	OUTSIDE AIR
CH	CHILLER	OAT	OUTSIDE AIR TEMPERATURE
CHWR	CHILLED WATER, SUPPLY	OZ	OUNCE
CHWR	CHILLED WATER, RETURN		
CLG LOAD	COOLING LOAD	P	PRIMARY CHILLED WATER PUMP
CMRP	COMPRESSOR	PCHWP	PRIMARY CHILLED WATER PUMP
CO	CARBON MONOXIDE	PCWP	PRIMARY CONDENSER WATER PUMP
CO2	CARBON DIOXIDE	PH	PHASE, ELECTRICAL
COEF	COEFFICIENT	PHWP	PRIMARY HOT WATER PUMP
COND	CONDENS(-ER, -ING, -ATION)	PPM	PARTS PER MILLION
CRP	CONDENSATE RETURN PUMP	PRESS	PRESSURE
CT	COOLING TOWER	PRV	PRESSURE REDUCING VALVE
CT	COOLING TOWER	PSF	POUNDS PER SQUARE FOOT
CU FT	CUBIC FEET	PSI	POUNDS PER SQUARE INCH
CU IN	CUBIC INCH	PSIA	PSI, ABSOLUTE
CV	COEFFICIENT, VALVE FLOW		
CWR	CONDENSER WATER, RETURN	R	THERMAL RESISTANCE
CWS	CONDENSER WATER, SUPPLY	RA	RETURN AIR
		RAT	RETURN AIR TEMPERATURE
D	DAMPER	REFR	REFRIGERANT
DB	DRY BULB TEMPERATURE	RG	RETURN AIR GRILLE
DBA	DECIBEL	RH	RELATIVE HUMIDITY
DEG	DEGREE	RPM	REVOLUTION PER MINUTE
DENS	DENSITY		
DIA	DIAMETER	S	ENTROPY
DIFF	DIFFERENCE	SA	SUPPLY AIR
DP	DIFFERENTIAL PRESSURE	SAT	SUPPLY AIR TEMPERATURE
DPT	DEW POINT TEMPERATURE	SC	SHADING COEFFICIENT
DX	DIRECT EXPANSION	SCFM	CFM, STANDARD CONDITIONS
		SCFS	CUBIC FEET PER SECOND, STANDARD
E	EXHAUST AIR	SCHWP	SECONDARY CHILLED WATER PUMP
EAT	ENTERING AIR TEMPERATURE	SD	SUCTION DIFFUSER
EER	ENERGY EFFICIENCY RATIO	SD	SUPPLY AIR DIFFUSER
EF	EXHAUST FAN	SF	SUPPLY FAN
EFF	EFFICIENCY	SF	SAFETY FACTOR
EG	EXHAUST AIR GRILLE	SG	SPECIFIC GRAVITY
ENT	ENTERING	SG	SUPPLY AIR GRILLE
ESP	EXTERNAL STATIC PRESSURE	SHG	SENSIBLE HEAT GAIN
ET	EXPANSION TANK	SHGC	SENSIBLE HEAT GAIN COEFFICIENT
EVAP	EVAPOR(-E, -ING, -ED, -OR)	SHR	SENSIBLE HEAT RATIO
EWT	ENTERING WATER TEMPERATURE	SHWP	SECONDARY HOT WATER PUMP
EXP	EXPANSION	SP	STATIC PRESSURE
		SP HT	SPECIFIC HEAT
F	TEMPERATURE FARENHEIT	SPEC	SPECIFICATION
FA	FREE AREA	SQ	SQUARE
FC	FLUID COOLER	STD	STANDARD
FC	FLEX CONNECTOR	SUCT	SUCTION
FPM	FEET PER MINUTE		
FPS	FEET PER SECOND	T	THERMOSTAT
FT	FEET	T STAT	TEST AND BALANCE
		TAB	TEMPERATURE
G		TG	TRANSFER AIR GRILLE
GAL	GALLONS	TON	TON OF REFRIGERATION (12,000 BTU)
GPH	FLOW, GALLONS PER HOUR	TXV	THERMOSTATIC EXPANSION VALVE
GPM	FLOW, GALLONS PER MINUTE		
GR	GRAINS	U	UNIT
GSHP	GROUND SOURCE HEAT PUMPE	UH	UNIT HEATER
		V	VALVE
H	ENTHALPY	VAV	VARIABLE AIR VOLUME
HG	MERCURY	VD	VOLUME DAMPER
HGT	HEIGHT	VENT	VENTILATION
HP	HEAT PUMP	VFD	VARIABLE FREQUENCY DRIVE
HPS	HIGH PRESSURE STEAM	VP	VELOCITY PRESSURE
HR	HOUR	VSD	VARIABLE SPEED DRIVE
HTHW	HIGH TEMPERATURE HOT WATER (>200 F)		
HVU	HEATING VENTILATING UNIT	W	
HWR	HYDRONIC HOT WATER, RETURN	W	WATT
HWS	HYDRONIC HOT WATER, SUPPLY	WB	WET BULB TEMPERATURE
HX	HEAT EXCHANGER	WC	WATER COLUMN
HZ	FREQUENCY	WSHP	WATER SOURCE HEAT PUMP
		WT	WEIGHT
I			
I.E.	INVERT ELEVATION	Y	
IH	INFRARED HEATER	YD	YARD
IN	INCH	YR	YEAR
K			
K	THERMAL CONDUCTIVITY		

PIPING		DUCTWORK	
	BALL VALVE		EXISTING DUCTWORK TO BE REMOVED
	BUTTERFLY VALVE		RECTANGULAR DUCT, FIRST DIMENSION IS SIDE SHOWN, DIMENSIONS ARE FREE AREA
	CHECK VALVE		45 DEG BRANCH TAKE-OFF
	GATE VALVE		DUCT TRANSITION
	AUTOMATIC FLOW CONTROL VALVE		MITERED ELBOW WITH TURNING VANES
	MANUAL CALIBRATED BALANCE VALVE		RECT. TO ROUND SPIN-IN FITTING W/DAMPER
	GLOBE VALVE		ROUND DUCT WITH DIAMETER SIZE DIMENSIONS ARE FREE AREA
	PRESSURE REDUCING VALVE		FLEXIBLE DUCT
	3-WAY CONTROL VALVE, DDC		SUPPLY /OUTDOOR AIR DUCT
	2-WAY CONTROL VALVE, DDC		RETURN AIR DUCT
	WYE STRAINER		EXHAUST AIR DUCT
	PRESSURE GAUGE		MANUAL VOLUME DAMPER
	THERMOSTAT		CONTROL/MOTORIZED DAMPER
			FIRE DAMPER
			THERMOSTAT
			EMERGENCY SHUTDOWN SWITCH
			TEMPERATURE SENSOR
			CARBON DIOXIDE SENSOR
			HUMIDITY SENSOR/HUMIDISTAT

GENERAL NOTES:	
A	"HVAC GENERAL NOTES" APPLY TO HVAC DRAWINGS. "PLAN NOTES" APPLY ONLY TO THE SHEETS ON WHICH THEY APPEAR. THE WORD "PROVIDE" MEANS "FURNISH AND INSTALL".
B	MECHANICAL DRAWINGS ARE DIAGRAMMATIC TO SHOW DESIGN INTENT. PROVIDE ANY ADDITIONAL DROPS, RISES, OR OFFSETS REQUIRED FOR A COMPLETE SYSTEM INSTALLATION. COORDINATE EXACT ROUTING OF MECHANICAL WORK WITH ALL OTHER TRADES AND OBSTRUCTIONS PRIOR TO BEGINNING WORK. COORDINATE EXACT LOCATIONS OF CEILING MOUNTED EQUIPMENT WITH LIGHTS, CEILING GRID, SPRINKLERS AND OTHER OBSTRUCTIONS. FIELD VERIFY EXISTING CONDITIONS IF APPLICABLE.
C	EQUIPMENT SHOWN ON THE DRAWINGS WAS OBTAINED FROM COMMON MANUFACTURERS OF HVAC EQUIPMENT AND ACCOUNTS FOR CLEARANCES AND OVERALL DIMENSIONS. SELECT AND PROVIDE HVAC EQUIPMENT THAT WILL FIT IN THE MECHANICAL SPACES PROVIDED, WHILE MAINTAINING MANUFACTURER'S MAINTENANCE CLEARANCES.
D	COORDINATE WITH ROOF CONTRACTOR WATERPROOFING OF ROOF PENETRATIONS AND SUPPORTS OF ROOF MOUNTED EQUIPMENT. PROVIDE FLASHING FOR ROOF CURBS AND DUCTWORK. PROVIDE BOOTHS FOR PIPES. PROVIDE PITCH POCKETS FOR REFRIGERANT LINES AND ROOF SUPPORTS THAT ARE NOT PIPES OR CURBS.
E	ROUTE HORIZONTAL DUCT AS HIGH AS POSSIBLE & AVOID INTERFERENCE WITH OTHER DUCTS, PIPING, LIGHTS, AND STRUCTURE. ROUTE HORIZONTAL PIPES PARALLEL TO WALLS AND ABOVE CEILINGS & AVOID INTERFERENCE AND CONTACT WITH DUCTS, OTHER PIPING, LIGHTS, AND STRUCTURE.
F	DO NOT INSTALL ANY EQUIPMENT OR FABRICATE ANY DUCTWORK PRIOR TO VERIFICATION OF ROUTING AND AVAILABILITY OF SPACE. COORDINATE SPACE REQUIREMENT WITH ALL OTHER TRADES.
G	PROVIDE SUPPORT FOR ALL DUCTWORK, PIPING, AND MECHANICAL EQUIPMENT. FIELD VERIFY ALL EQUIPMENT DIMENSIONS PRIOR TO FABRICATION OF EQUIPMENT SUPPORTS. WHERE INDICATED ON DRAWINGS, FLOOR MOUNTED EQUIPMENT SHALL HAVE HOUSEKEEPING PADS EXTENDING 4 INCHES OUTSIDE THE EQUIPMENT ENVELOPE AND MINIMUM 4 INCHES HIGH FOR EQUIPMENT WITHOUT DRAINS OR 6 INCHES HIGH FOR EQUIPMENT WITH DRAINS.
H	COORDINATE WITH GENERAL CONTRACTOR ACCESS PANEL LOCATIONS IN WALLS AND DRYWALL CEILINGS FOR ACCESS TO VALVES, DAMPERS, CONTROLS, EQUIPMENT REQUIRING SERVICING, AND DUCTWORK ACCESS PANELS. DUCTWORK ACCESS PANELS SHALL BE PROVIDED FOR FIRE DAMPERS, AND ACTUATORS IN THE DUCTWORK. PANEL SIZE SHALL BE AS REQUIRED PER THE SPECIFICATIONS.
I	DUCT DIMENSIONS NOTED ON THE DRAWINGS ARE INSIDE FREE AREA DIMENSIONS. DIFFUSER AND GRILLE NECK SIZES ARE THE SAME DIMENSIONS AS THE DUCTWORK RUN-OUT TO THE DEVICE, UNLESS OTHERWISE NOTED.
J	INSULATED FLEXIBLE DUCT SHALL BE USED TO CONNECT SUPPLY AIR DIFFUSERS, UNLESS SHOWN OTHERWISE. THE MAXIMUM LENGTH OF RUN FOR FLEXIBLE DUCT SHALL BE 5'-0" AND SHALL BE INSTALLED FREE OF KINKS AND ABRUPT TURNS. MAXIMUM UNSUPPORTED LENGTH SHALL BE 3'-0". FLEXIBLE DUCT TO DIFFUSER SHALL BE SAME SIZE AS DIFFUSER NECK, UNLESS OTHERWISE NOTED.
K	BRANCH TAPS SHALL USE EITHER A 45 DEGREE OR BELL ENTRY. BRANCH EXTRACTORS ARE NOT TO BE USED. PROVIDE TRANSITIONS AT ALL CHANGES IN DUCT SIZE, INCLUDING DIFFUSERS AND GRILLES, UNLESS SHOWN OR NOTED OTHERWISE. FLEXIBLE DUCT CONNECTIONS SHALL BE USED TO ISOLATE ALL FAN-POWERED EQUIPMENT.
L	SUPPLY, RETURN AND EXHAUST DIFFUSERS/GRILLES SHALL HAVE BALANCE DAMPERS IN THE DUCT, UNLESS DAMPERS ARE NOTED IN THE AIR DEVICE SCHEDULE. LOCATE BALANCE DAMPERS AS NEAR AS POSSIBLE TO DUCT BRANCH TAKEOFF WHILE MINIMIZING ACCESS DIFFICULTIES. DAMPERS TO AIR DEVICES SHALL BE LOCKING QUADRANT TYPE, WITH A STAND-OFF FOR DUCTS WITH INSULATION.
M	REFER TO ARCHITECTURAL DRAWINGS AND PLANS FOR EXACT LOCATIONS OF DIFFUSERS, LINEAR SLOT DIFFUSERS, REGISTERS, GRILLES AND LOUVERS.
N	EXPOSED DUCT IN OCCUPIED SPACES TO BE PAINTED, COLOR TO BE SELECTED BY ARCHITECT.
O	RUN-OUT PIPES TO COILS 3/4" UNLESS OTHERWISE NOTED. NOTED PIPE SIZES THE SAME IN DIRECTION OF DECREASING FLOW TILL CHANGED BY ANOTHER PIPE SIZE NOTE.
P	USE FITTINGS FOR ALL PIPE CHANGES IN DIRECTION AND SIZE AND BRANCH CONNECTIONS. EXTRUDED TEE CONNECTIONS AND BUSHINGS SHALL NOT BE USED. PROVIDE ISOLATION VALVES ON ALL BRANCHES OFF MAIN PIPE.
Q	FOR HYDRONIC PIPES, INSTALL MANUAL AIR VENTS AT HIGH POINTS AND DRAIN VALVES AT THE LOW POINTS OF THE PIPE. FOR EQUIPMENT WITH DRAINS, PROVIDE DRAIN PIPE FROM THE EQUIPMENT TO A FLOOR DRAIN OR MOP SINK.

DESIGNER NOTES:	
1	PLEASE NOTE THAT THE MECHANICAL DESIGN PROVIDED HEREIN IS FOR INFORMATION ONLY. THE MECHANICAL DRAWINGS ARE NOT MANDATORY AND ARE PROVIDED TO GIVE DESIGNERS SUGGESTIONS ON HOW AN ACSC FACILITY COULD BE MECHANICALLY DESIGNED.
2	THE MECHANICAL DESIGNER WILL BE ENTIRELY RESPONSIBLE FOR SELECTING THE APPROPRIATE EQUIPMENT AND SYSTEMS FOR ANY SPECIFIC SITE DESIGN.
3	THE DESIGN PROVIDED HEREIN IS BASED UPON A FICTIONAL SITE LOCATED IN FORT BRAGG, NORTH CAROLINA.
4	THE DESIGNER OF RECORD SHALL VERIFY VENTILATION REQUIREMENTS MEET ASHRAE 62.1 FOR EACH SPACE WITHIN THE BUILDING. OCCUPANCIES USED FOR VENTILATION CALCULATIONS SHOULD BE VERIFIED WITH THE CUSTOMER AS SITE SPECIFIC REQUIREMENTS MAY VARY FROM THOSE USED IN THIS STANDARD DESIGN.
5	THE WATER SOURCE HEAT PUMPS AS SCHEDULED, ARE A GENERAL REPRESENTATION OF THE RANGE ON A GEOTHERMAL WELL FIELD. SHOULD THE DESIGNER OF RECORD NOT UTILIZE A GEOTHERMAL WELL FIELD THE UNITS ENTERING WATER TEMPERATURE RANGE CAN BE TYPICAL OF A FLUID COOLER/COOLING TOWER SYSTEM.

ATFP NOTES:	
1	EXTERIOR EQUIPMENT: LOCATE A MINIMUM OF 33 FEET FROM BUILDING. IF CONDITIONS REQUIRE THAT EQUIPMENT BE LOCATED LESS THAN 33 FEET FROM THE BUILDING, THEN THE EQUIPMENT SHALL BE LOCATED AND ARRANGED SO THAT AN OBJECT OVER SIX INCHES IN HEIGHT WOULD BE READILY OBSERVED BY BUILDING OCCUPANTS.
2	AIR INTAKES: LOCATE A MINIMUM OF 10 FEET ABOVE THE GROUND.
3	EMERGENCY SHUTOFF SWITCH: PROVIDE A SHUTOFF SWITCH IN THE HVAC CONTROL SYSTEM THAT CAN IMMEDIATELY SHUT DOWN THE AIR DISTRIBUTION SYSTEMS THROUGHOUT THE BUILDING. LOCATE THE SWITCH TO BE EASILY ACCESSIBLE BY BUILDING OCCUPANTS.
4	DAMPERS: FIT OUTSIDE AIR INTAKES, RELIEF, AND EXHAUST OPENINGS WITH LOW LEAKAGE DAMPERS THAT AUTOMATICALLY CLOSE WHEN THE AIR SHUTOFF SWITCH IS ACTIVATED. THE LOW LEAKAGE DAMPERS SHALL HAVE A LEAKAGE RATE OF LESS THAN 3 CFM/SQUARE FOOT AT A PRESSURE DIFFERENTIAL OF 3.0 INCHES STATIC PRESSURE.
5	OVERHEAD EQUIPMENT WEIGHING OVER 30 POUNDS: DESIGN ALL EQUIPMENT MOUNTINGS TO RESIST A FORCE 0.5 TIMES THE WEIGHT OF THE EQUIPMENT IN ANY HORIZONTAL DIRECTION AND 1.5 TIMES THE EQUIPMENT WEIGHT IN THE DOWNWARD DIRECTION. THIS REQUIREMENT IS SEPARATE FROM OTHER MOUNTING REQUIREMENTS FOR SEISMIC OR OTHER FORCES.

US Army Corps of Engineers
HUNTSVILLE CENTER

DATE	SOLICITATION NO.	CONTRACT NO.	PLOT DATE	CATEGORY CODE
JUNE 2014			6/20/14	67% DESIGN PACKAGE

DESIGN BY	CWD BY	SUBMIT BY	PLOT SCALE	FILE NAME
JAS			1/4" = 1'-0"	

4820 UNIVERSITY SQ
HUNTSVILLE, AL 35816

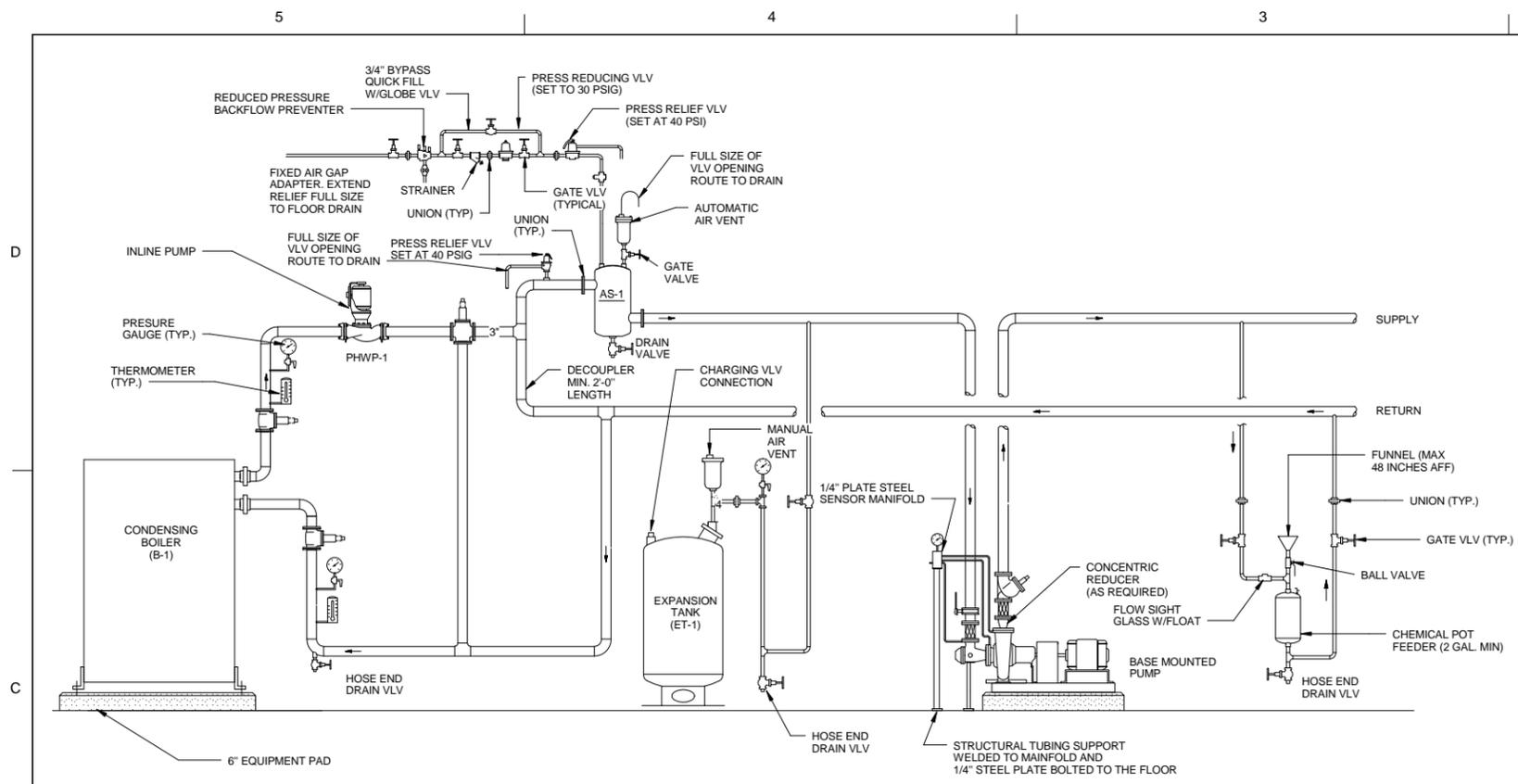
ARMY COMMUNITY SERVICE CENTER (ACSC) EXTRA LARGE

HVAC LEGEND

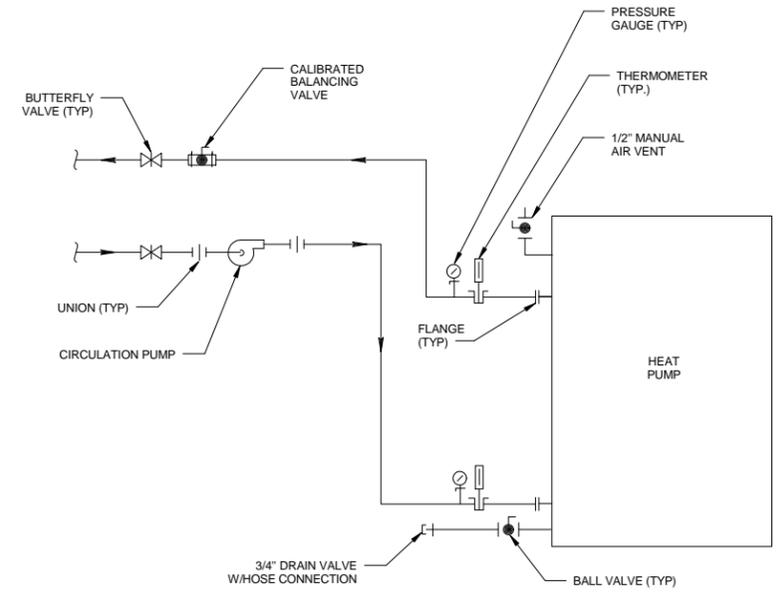
PLATE REFERENCE NUMBER

M-001

SHEET 49 OF 88



1 CONDENSER WATER PIPING SCHEMATIC
NOT TO SCALE



2 HEAT PUMP PIPING SCHEMATIC
NOT TO SCALE



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DESIGN BY: JCS	DATE: JUNE 2014
DRAWN BY: JCS	SOLICITATION NO.:
CHK BY:	CONTRACT NO.:
SBMT BY:	PLT DATE: 6/9/2014 2:12:02 PM
4820 UNIVERSITY SQ HUNTSVILLE, AL 38816	CATEGORY CODE: 65% DESIGN PACKAGE
FILE NAME:	SIZE D: 27 x 34"
SYMBOL	DESCRIPTION
DATE	BY

ARMY COMMUNITY
SERVICE CENTER (ACSC)
EXTRA LARGE
HVAC DETAILS

PLATE
REFERENCE
NUMBER
M-502
SHEET 64 OF 88

