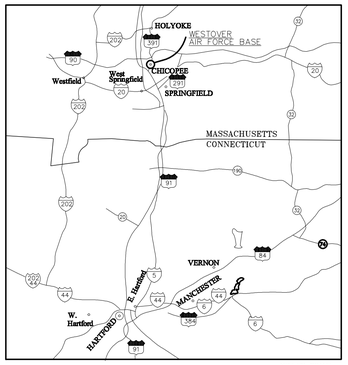
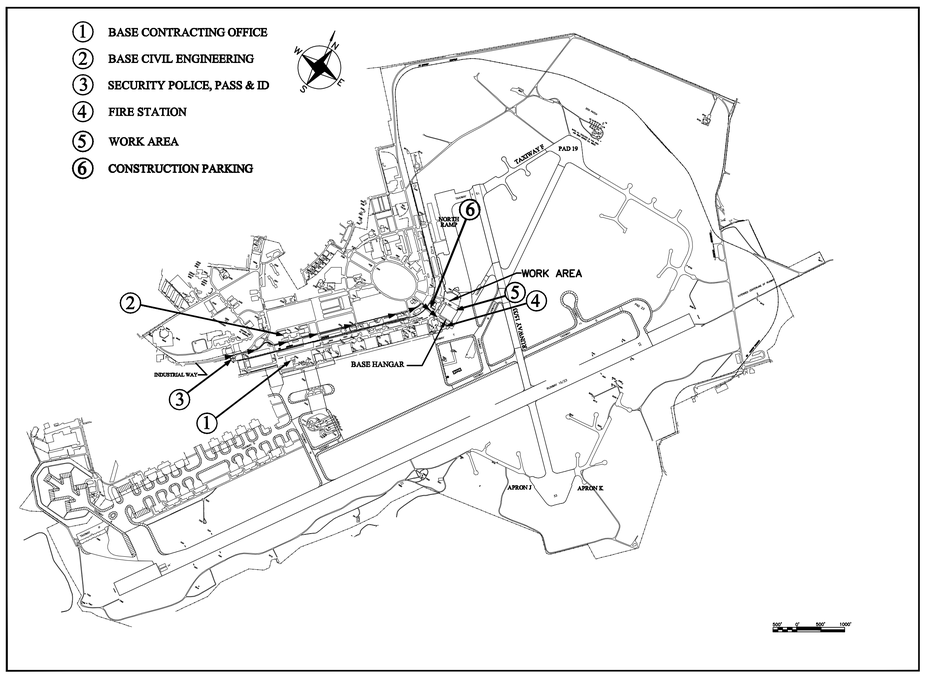
Repair Flight Simulator HVAC, Base Hangar, Bldg 7087

Westover Air Reserve Base



VICINITY MAP



Project Location Plan

Drawing List

Sheet No.	Drawing No.	Drawing Title
1	T-1	Drawing List/Location
2	M-1	Mechanical Notes/Abbreviations/Symbols
3	M-2	Mechanical Demolition
4	M-3	Mechanical New Work
5	M-4	Mechanical Details Sheet 1
6	M-5	Mechanical Details Sheet 2
7	M-6	Mechanical Details Sheet 3
8	M-7	Mechanical Details Sheet 4
9	M-8	Mechanical Schedules
10	MC-1	Controls Demolition
11	MC-2	Controls New Work
12	MC-3	Points List and Sequence of Operation
13	E-1	Electrical Notes and Specifications
14	E-2	Electrical Demolition Work
15	E-3	Electrical New Work
16	E-4	Safety Switch & Primary Pump Starter Mounting Details
17	E-5	Power Connection Diagram
18	E-6	One Line Diagram
	WST-4034	One Line Diagram, Utility Support (Reference Only)

REV	DATE	BY	DESCRIPTION
	02-05-07	JJG	Certified For Construction

DESIGNED JJG
DRAWN JMW
CHECKED JJG
DATE 02-05-07

GMI GEO-MARINE
ENGINEERS, CONSTRUCTORS & ENERGY MANAGERS
146 MARKET PLACE BOULEVARD
KNOXVILLE, TN 37922
VOICE (865) 692-0084 FAX (865) 692-0560

AFCESA Project Number
WEST-6-S-1319

Contract Numbers
FA8903-04-D-8686

WESTOVER ARB PROJ. NO.
YTPM 07-0002

REPAIR FLIGHT SIMULATOR HVAC, BASE HANGAR BLDG 7087, WESTOVER AIR RESERVE BASE

DRAWING LIST / LOCATIONS

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. T-1
SHEET NO. 1 OF 18

ABBREVIATIONS

AFF	ABOVE FINISH FLOOR
AHU	AIR HANDLING UNIT
AL	ALUMINUM
APPROX	APPROXIMATE
AS	AIR SEPARATOR
BFP	BACKFLOW PREVENTER
BLDG	BUILDING
C	CONVECTOR
CAC	COMPUTER AIR CONDITIONER
CH	CHILLED WATER
CHLR	CHILLER
CHR	CHILLED WATER RETURN
CHS	CHILLED WATER SUPPLY
CO	CLEAN OUT
CR	CONDENSATE RETURN
CRU	CONDENSATE RETURN UNIT
CU	CONDENSING UNIT
CUH	CABINET UNIT HEATER
CV	CONTROL VALVE
D	DRAIN LINE
DCW	DOMESTIC COLD WATER
DHW	DOMESTIC HOT WATER
DHWR	DOMESTIC HOT WATER RECIRCULATION
DIA	DIAMETER
DL	DETERGENT LINE
DW	DOMESTIC WATER
DWG	DRAWING
EC	ELECTRIC COIL
EFIS	EXTERIOR FINISH INSULATION SYSTEM
ELEC	ELECTRICAL
EOM	END OF MAIN
ET	EXPANSION TANK
FS	FLOW SWITCH
GM	GAS (NATURAL) METER
GPM	GALLONS PER MINUTE
HC	HEATING COIL
HDR	HEADER
HORIZ	HORIZONTAL
HPS	HIGH PRESSURE STEAM
HW	HOT WATER
HWB	HOT WATER BOILER
HWC	HOT WATER CONVERTER
HWP	HOT WATER PUMP
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
IA	INSTRUMENT COMPRESSED AIR
IH	INFRARED HEATER
LF	LINEAR FEET
LPC	LOW PRESSURE CONDENSATE
LPS	LOW PRESSURE STEAM
MAU	MAKEUP AIR UNIT
MATL	MATERIAL
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
MECH	MECHANICAL
MIN	MINIMUM
MOD	MOTOR OPERATED DAMPER
MPS	MEDIUM PRESSURE STEAM
MW	MAKEUP WATER
MZU	MULTIZONE UNIT
NG	NATURAL GAS
PC	PUMPED CONDENSATE (RETURN)
PD	PUMP DISCHARGE
PG	PRESSURE GAUGE
PICCV	PRESSURE INDEPENDANT CHARACTERIZED CONTROL VALVE
PROP	PROPELLER
PRV	PRESSURE REDUCING VALVE
PS	PUMP SUCTION
RED	REDUCER
RM	ROOM
RPBP	REDUCED PRESSURE BACKFLOW PREVENTER
RTU	ROOF TOP UNIT (HVAC)
SEP	SEPARATOR (AIR)
SHT	SHEET
STL	STEEL
SUH	STEAM UNIT HEATER
TYP	TYPICAL
UH	UNIT HEATER

(NOTE: NOT ALL SYMBOLS MAY BE USED)

GENERAL LEGEND

INDICATES ITEMS TO BE REMOVED

NOTE — NOTES IN "BOXES" ARE FOR SPECIAL ATTENTION

1 — DEMOLITION KEY NOTE

1 — NEW WORK KEY NOTE

NEW WORK TIE IN POINT

SYMBOLS

—MOTOR	—ELECTRIC VALVE
—FLOOR DRAIN	—3—WAY ELECTRIC VALVE
—GATE VALVE	—PRESSURE RELIEF VALVE
—BALL VALVE	—UNION
—CHECK VALVE	—CONCENTRIC REDUCER
—GLOBE VALVE	—ECCENTRIC REDUCER
—BUTTERFLY VALVE	—CAP
—BALANCING VALVE	—Y—STRAINER
—AUTOMATIC BALANCING VALVE	
—PICCV	
—TRIPLE DUTY VALVE	—TEST PLUG
—DRAIN VALVE	—IN—LINE PUMP
—ELBOW DOWN	—STEAM TRAP
—ELBOW UP	—PRESSURE INDICATOR
—TEE, DOWN	—AUTOMATIC AIR VENT
	—TEMP. INDICATOR

(NOTE: NOT ALL SYMBOLS MAY BE USED)

GENERAL NOTES:

1. SAFETY: ALL WORK SHALL COMPLY WITH OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS 29 CFR 1910 AND 1926 AS APPLICABLE. THE CONTRACTOR SHALL SUPPLY ALL NECESSARY EQUIPMENT AND CARE FOR THE PROTECTION OF EMPLOYEES AS WELL AS THE PROTECTION OF AIR FORCE PERSONNEL AND EQUIPMENT. THE GOVERNMENT RESERVES THE RIGHT TO CONTACT OSHA FOR ASSISTANCE IN THE ENFORCEMENT OF THESE STANDARDS. ALL CONSTRUCTION SITE/OPEN TRENCHES MUST HAVE ILLUMINATED BARRICADES EQUIPPED WITH WORKING AMBER FLASHERS AND WILL BE ROPED OFF WITH YELLOW CAUTION TAPE TO PREVENT PERSONNEL FROM ENTERING THE AREA.
2. EXCAVATION: PRIOR TO COMMENCING ANY EXCAVATION WORK, THE CONTRACTOR SHALL OBTAIN FROM THE BASE CIVIL ENGINEERING OFFICE A VALID AND APPROVED AF FORM 103 BASE CIVIL ENGINEERING WORK CLEARANCE REQUEST.
3. EXISTING CONDITIONS: PRIOR TO COMMENCING WORK AND ORDERING MATERIALS AND EQUIPMENT, THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LAYING OUT THE WORK, INCLUDING STAKING, MARKING, SURVEYING AND ADJUSTMENTS NECESSARY TO COMPLETE THE WORK.
4. PRIOR TO ANY WELDING OR OPEN TORCH CUTTING, CONTRACTOR SHALL OBTAIN PERMISSION FROM BASE FIRE DEPARTMENT.
5. ALL PENETRATIONS MADE IN EXTERIOR WALLS SHALL BE FLASHED AND MADE WATER/AIRTIGHT. ANY DAMAGE SHALL BE REPAIRED TO MATCH EXISTING FINISH.
6. PRIOR TO PAINTING, ALL SURFACES SHALL BE CLEANED, LOOSED OR SPALLABLE MATERIAL REMOVED, RUST REMOVED, OILS REMOVED AND ALL UNPRIMED METALS SHALL BE PRIMED AS REQUIRED. RUSTED METALS SHALL BE PRIMED WITH RUST INHIBITIVE PRIMER.
7. CONTRACTOR IS RESPONSIBLE FOR PATCHING ALL EXISTING SURFACES DISTURBED BY HIS WORK. PATCH AND REPAIR ALL DAMAGED SURFACES TO MATCH EXISTING SURFACES. REFER TO MECHANICAL/ELECTRICAL/PLUMBING PLANS AND SPECIFICATIONS FOR ADDITIONAL CUTTING, PATCHING AND FINISHING REQUIREMENTS.
8. CONTRACTOR SHALL REMOVE, STORE, AND RE—INSTALL LAY—IN CEILING TILES AS REQUIRED TO ACCOMPLISH WORK. CONTRACTOR SHALL REPLACE AT NO COST TO OWNER ANY CEILING COMPONENT DAMAGED DURING CONSTRUCTION OR THAT CANNOT BE REUSED DUE TO DEMOLITION TO MATCH EXISTING.
9. CONTRACTOR SHALL COORDINATE DEMO WORK WITH THE GMI CONSTRUCTION MANAGER DURING ALL PHASES OF CONSTRUCTION.
10. CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS. ANY DISCREPANCIES SHALL BE REVIEWED WITH THE GMI CONSTRUCTION MANAGER CONTRACTOR SHALL ALSO VERIFY QUANTITIES BEFORE ORDERING MATERIALS.
11. BIDDERS SHALL VISIT SITE TO BECOME FAMILIAR WITH ADJACENT AREAS, MEANS OF APPROACH TO SITE, ACTUAL JOB CONDITIONS AND EQUIPMENT. FAILURE TO VISIT SITE AND OBSERVE ACTUAL CONDITIONS WILL IN NO WAY RELIEVE THE CONTRACTOR OF RESPONSIBILITY TO FURNISH ANY MATERIALS OR PERFORM WORK REQUIRED TO COMPLETE THE JOB IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
12. CONTRACTOR SHALL VERIFY ALL WORK TO BE REMOVED OR DEMOLISHED AT SITE. ALL ITEMS TO BE REMOVED OR DEMOLISHED WILL BECOME THE PROPERTY OF THE CONTRACTOR AND REMOVED FROM THE SITE UNLESS OTHERWISE NOTED. COORDINATE EQUIPMENT TO BE SALVAGED WITH THE GMI CONSTRUCTION MANAGER.
13. CONTRACTOR SHALL REMOVE, PROTECT AND STORE ALL EXISTING SIGNS, EMBLEMS, AND THE LIKE. REPLACE ONCE THE WORK HAS BEEN COMPLETED.
14. FIRE STOP ALL OPENING IN FIRE RATED WALLS PER NFPA GUIDELINES.
15. THE CONTRACTOR IS RESPONSIBLE FOR THE RELOCATION, REANCHORING, AND RECONNECTION OF SERVICES OF ALL MACHINERY AFFECTED BY THE SCOPE OF THIS WORK.

REV	DATE	BY	DESCRIPTION
	02—05—07	JJG	Certified For Construction

DESIGNED JJG
DRAWN JMW
CHECKED JJG
DATE 02—05—07

439th AIRLIFT WING

GEO-MARINE GMI
ENGINEERS, CONSTRUCTORS & ENERGY MANAGERS
146 MARKET PLACE BOULEVARD
KNOXVILLE, TN 37922
VOICE (865) 692-0084 FAX (865) 692-0560

AFCESA Project Number
WEST—6—S—1319

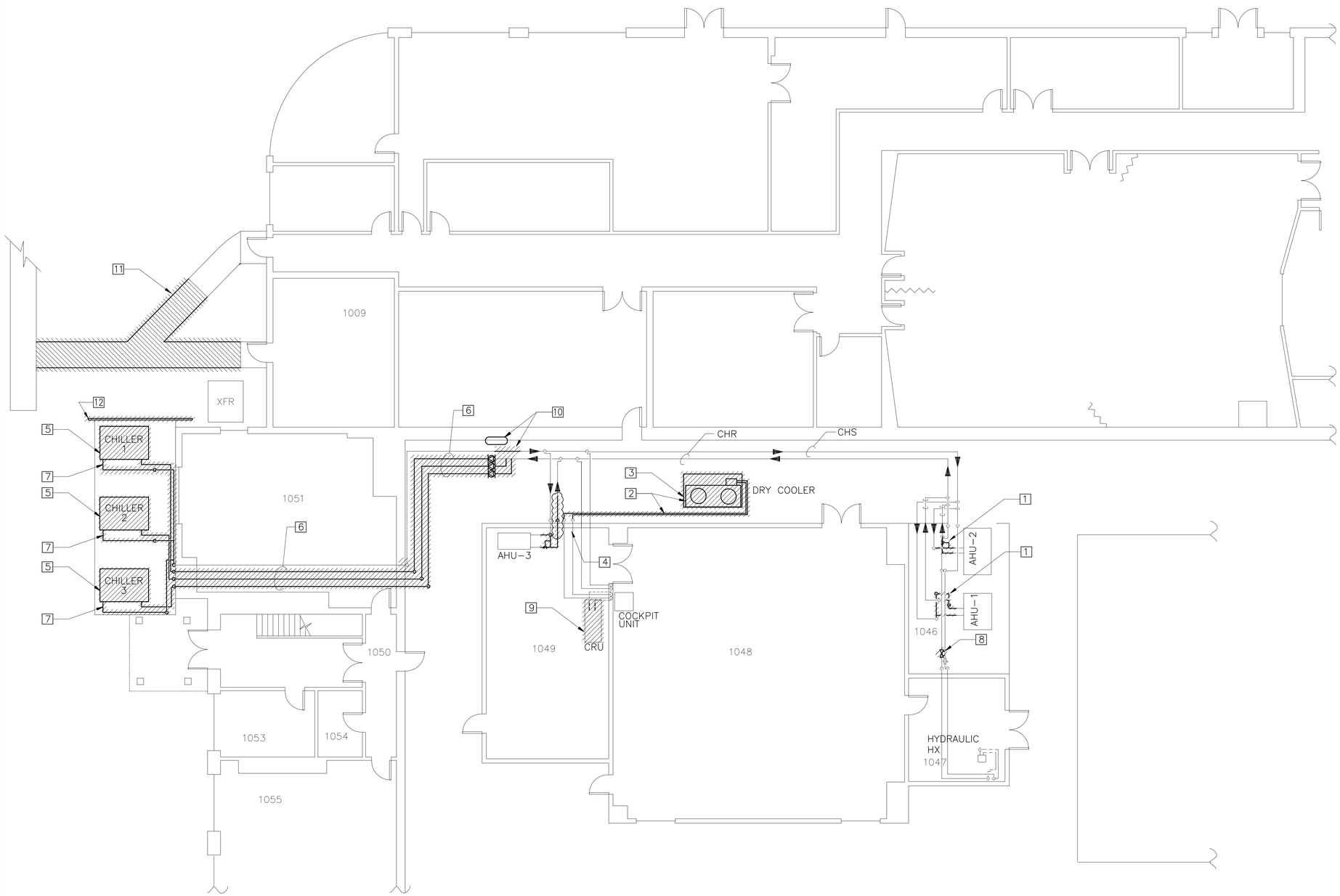
Contract Numbers
FA8903—04—D—8686

WESTOVER ARB PROJ. NO.
YTPM 07—0002

REPAIR FLIGHT SIMULATOR HVAC, BASE HANGAR BLDG 7087, WESTOVER AIR RESERVE BASE

MECHANICAL
NOTES/ABBREVIATIONS/SYMBOLS

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. M—1
SHEET NO. 2 OF 18



GENERAL NOTES:

A. COORDINATE PLANNING AND WORK WITH OTHER CONTRACTORS, GEO–MARINE, AND BASE PERSONNEL.

B. DRAIN APPROXIMATELY 300 GALLONS OF 40% ETHYLENE GLYCOL SOLUTION FROM CHILLED WATER SYSTEM AND CRU/DRY COOLER. CONTRACTOR IS RESPONSIBLE FOR PROPER COLLECTION AND DISPOSAL. PROVIDE CERTIFICATE INDICATING PROPER DISPOSAL.

POINT SOURCE DISCHARGES TO STORM WATER IS PROHIBITED BY THE CLEAN WATER ACT. ANY DISCHARGES TO THE SANITARY SYSTEM SHOULD BE IN COORDINATION WITH THE CITY OF CHICOPEE VIA CEV, TO CONFORM TO THE STANDARDS LISTED IN WESTOVER'S SANITARY DISCHARGE PERMIT. ANY WASTE TRANSPORTED OFF–BASE MUST BE IN ACCORDANCE WITH MANIFESTS REQUIREMENTS AND RCRA REGULATIONS.

DEMOLITION NOTES:

1. SEE DEMOLITION WORK DETAILS ON M–4.
2. REMOVE DRY COOLER, PIPING, VALVES, VALVE TAGS, PIPE HANGERS, SUPPORTS AND INSULATION TO RISER AS SHOWN.
3. REMOVE HOUSE KEEPING PAD.
4. REMOVE EXPANSION TANK AND ASSOCIATED PIPING FROM CEILING ON TOP OF COMPUTER ROOM.
5. DISCONNECT AND REMOVE CHILLERS AS SHOWN. REMOVE REFRIGERANT, OIL, AND OTHER FLUIDS. CONTRACTOR IS RESPONSIBLE FOR PROPER DISPOSAL.
6. DISCONNECT AND REMOVE CHILLED WATER RETURN PIPING AND IN–LINE PUMPS AS SHOWN. EXISTING PIPING IN BUILDING IS APROX. 12' AFF. FILL AND SEAL ALL UNUSED PENETRATIONS. PRESERVE EXISTING PIPE HANGER BRACKETS FOR REUSE UNDER NEW WORK.
7. DISCONNECT AND REMOVE CHILLED WATER SUPPLY PIPING BACK TO RISER AS SHOWN.
8. REMOVE EXISTING BALANCING VALVE.
9. DRAIN AND REMOVE EXISTING CRU UNIT AND PIPING AS SHOWN.
10. REMOVE EXISTING PIPING AS SHOWN. EXISTING EXPANSION TANK AND ASSOCIATED PIPING TO REMAIN,
11. REMOVE EXISTING SIDEWALK AS SHOWN.
12. REMOVE APPROX. 16 LINEAR FEET OF 6' ALUMINUM FENCING. FENCING IS TO BE RELOCATED SEE SHEET M–3.

0 4 8 12 16 20

DRAWING SCALE 1/8"=1'–0"

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	02–05–07	JJG	Certified For Construction

DESIGNED JJG
DRAWN JMW
CHECKED JJG
DATE 02–05–07

439th AIRLIFT WING

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146 MARKET PLACE BOULEVARD
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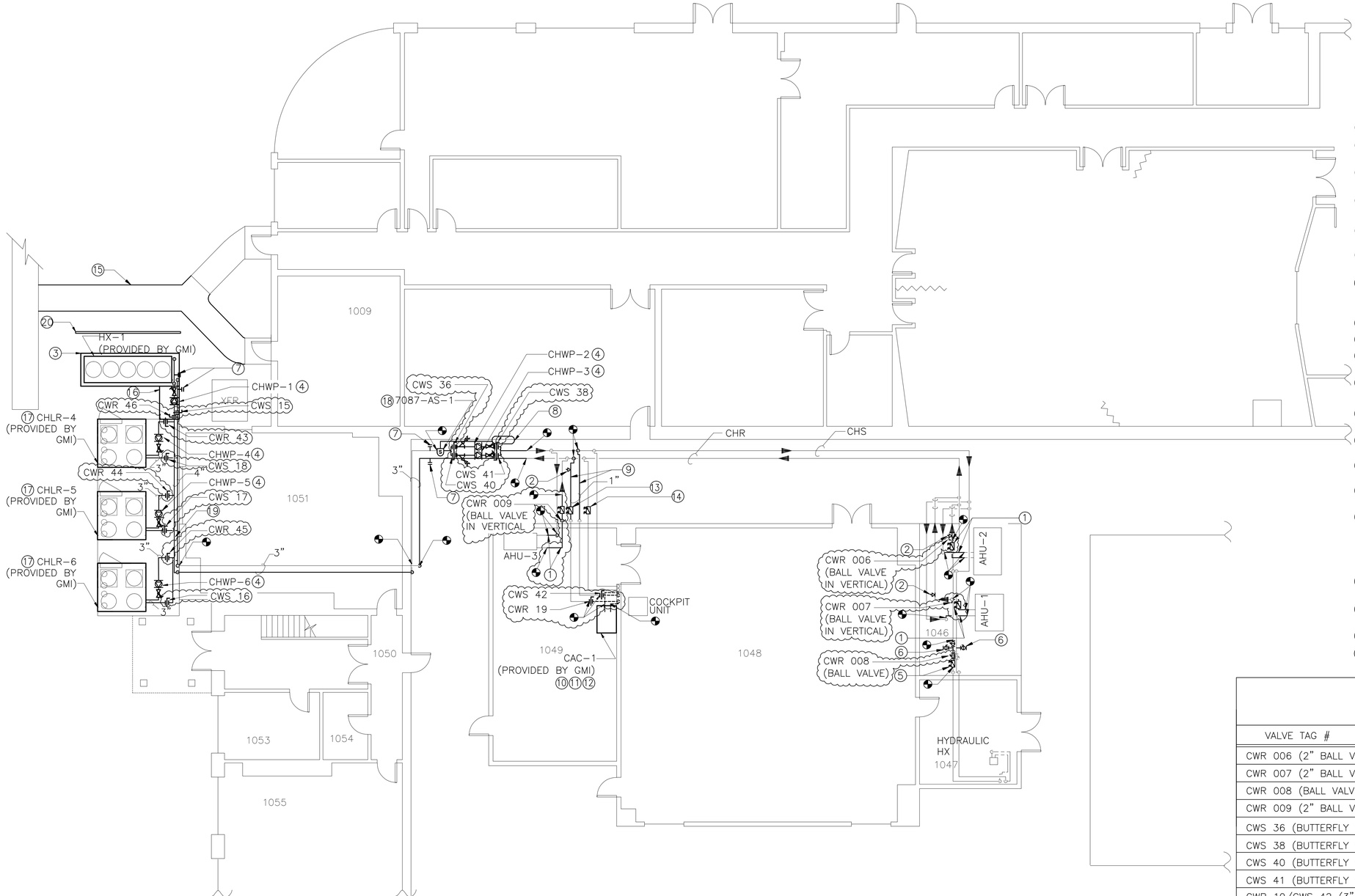
WESTOVER ARB PROJ. NO.
YTPM 07–0002

REPAIR FLIGHT SIMULATOR HVAC, BASE HANGAR BLDG 7087, WESTOVER AIR RESERVE BASE

MECHANICAL DEMOLITION

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. M–2
SHEET NO. 3 OF 18



GENERAL NOTES:

A. COORDINATE PLANNING AND WORK WITH OTHER CONTRACTORS, GEO-MARINE, AND BASE PERSONNEL.
B. CONTRACTOR IS TO FILL CHILLED WATER SYSTEM WITH 40% PROPYLENE GLYCOL SOLUTION.
C. INSTALL NEW PIPING IN BUILDING AT SAME ELEVATION AS EXISTING. REUSE EXISTING PIPE HANGER BRACKETS.
D. COMMISSIONING AND TAB SERVICES WILL BE PROVIDED BY GMI.

NEW WORK NOTES:

1. SEE NEW WORK DETAILS ON M-4.
2. INSTALL AUTOMATIC AIR VENT WITH MANUAL SHUTOFF VALVE ON CHILLED WATER RETURN AS SHOWN.
3. INSTALL CONCRETE PAD. SEE DETAIL ON M-5.
4. INSTALL PUMP PER MANUFACTURER'S RECOMMENDATIONS. SEE DETAIL ON M-5.
5. INSTALL NEW AUTOMATIC BALANCING VALVE FACTORY SET TO 25 GPM.
6. INSTALL NEW 1/4" THREADED BALL VALVE FOR NEW PRESSURE SENSOR AS SHOWN. PRESSURE SENSOR BY CONTROLS CONTRACTOR.
7. PROVIDE 1/2" THREAD-O-LETS FOR CONTROL THERMOWELLS AS SHOWN. THERMOWELLS PROVIDED BY CONTROLLS CONTRACTOR AND INSTALLED BY MECHANICAL CONTRACTOR.
8. RECONNECT EXISTING EXPANSION TANK AS PER DETAIL M-6.
9. INSTALL NEW PIPING AND ASSOCIATED FITTINGS.
10. INSTALL NEW CAC-1, PIPING AND ASSOCIATED FITTINGS. SEE DETAIL M-7.
11. PROVIDE OPENING(S) IN RAISED FLOOR PANELS TO SUIT PIPING AND/OR CONDUIT(S) AND SEAL WITH RUBBER OR FLEXIBLE PLASTIC "GROMMET".
12. MODIFY RAISED FLOOR PANELS TO ENABLE NEW FLOOR STAND TO BE INSTALLED.
13. INSTALL NEW AUTOMATIC BALANCING VALVE FACTORY SET TO 17 GPM.
14. INSTALL NEW AUTOMATIC BALANCING VALVE FACTORY SET TO 18 GPM.
15. INSTALL NEW SIDEWALK AS SHOWN. LEVEL DISTURBED AREAS TO EXISTING GRADE AND RE-ESTABLISH GRASS. SEE DETAIL SHEET M-5.
16. INSTALL 3' WIDE CONCRETE PAD TO CONNECT NEW HX-1 PAD WITH EXISTING CHILLER PAD. SEE DETAIL ON M-5. DOWEL NEW WORK INTO EXISTING PAD WITH #4 REBAR ON 8" CENTERS. INSERT AND EPOXY REBAR A MININUM OF 4" INTO EXISTING WORK AND EXTEND A MININUM OF 8" INTO NEW WORK.
17. INSTALL CHILLER PER MANUFACTOR'S RECOMMENDATIONS. SEE DETAIL ON M-7.
18. NEW AIR SEPERATOR CONNECT TO EXISTING EXPANSION TANK. SEE DETAIL SHEET M-7.
19. PIPES OFFSET FOR CLARITY. SEE DETAIL SHEET M-6.
20. INSTALL FENCING PRESERVED FROM DEMOLITION 3' FROM FROM HX-1. PROVIDE ALL NECESSARY POSTS, SUPPORTS, AND HARDWARE.

VALVE TAG CHARTS
HOT WATER SUPPLY & RETURN

VALVE TAG #	LOCATION	FUNCTION
CWR 006 (2" BALL VALVE)	AREA 1045 BASE HANGER	AHU #2
CWR 007 (2" BALL VALVE)	AREA 1045 BASE HANGER	AHU #1
CWR 008 (BALL VALVE)	AREA 1045 BASE HANGER	HYDROLIC HX
CWR 009 (2" BALL VALVE)	BASE HANGER	AHU #3
CWS 36 (BUTTERFLY VALVE)	BASE HANGER	CHILLED WATER PUMP #2
CWS 38 (BUTTERFLY VALVE)	BASE HANGER	CHILLED WATER PUMP #2
CWS 40 (BUTTERFLY VALVE)	BASE HANGER	CHILLED WATER PUMP #3
CWS 41 (BUTTERFLY VALVE)	BASE HANGER	CHILLED WATER PUMP #3
CWR 19/CWS 42 (3" BUTTERFLY VALVES)	COMPUTER ROOM AREA 1049 BASE HANGER	LIEBERT UNIT
CWS 18/CWR 43 (3" BUTTERFLY VALVES)	BASE HANGER OUTSIDE	CHILLER #4
CWS 17/CWR 44 (3" BUTTERFLY VALVES)	BASE HANGER OUTSIDE	CHILLER #5
CWS 16/CWR 45 (3" BUTTERFLY VALVES)	BASE HANGER OUTSIDE	CHILLER #6
CWS 15/CWR 46 (3" BUTTERFLY VALVES)	BASE HANGER OUTSIDE	DRY COOLER

0 4 8 12 16 20
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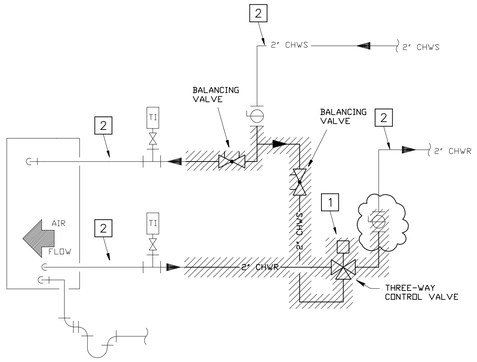
MECHANICAL NEW WORK

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. M-3
SHEET NO. 4 OF 18



AHU-1 CHW COOLING COIL DETAIL-DEMOLITION

NOT TO SCALE

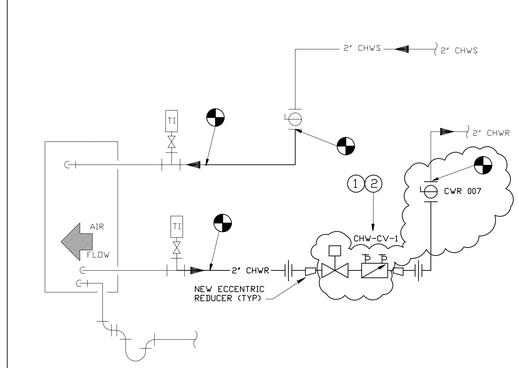
GENERAL NOTES:

1. SELECTIVELY DEMOLISH PIPING AND COMPONENTS AS SHOWN. REFER TO PLAN FOR LOCATIONS AND LENGTHS.

KEYED NOTES:

1 DISCONNECT AND REMOVE BYPASS PIPING AND BALANCING VALVE AS SHOWN. REMOVE THREE-WAY CONTROL VALVE AND ACTUATOR. FOR INSTALLATION OF NEW VALVE SEE NEW WORK DETAIL. COORDINATE DISCONNNECTION OF ACTUATOR WITH CONTROLS CONTRACTOR. WIRING TO BE TEMPORARILY SECURED FOR RECONNECTION TO NEW CONTROL VALVE.

2 RETAIN PIPING ASSEMBLY CONTAINING DRAIN CONNECTION AND THERMOMETER. SEE NEW WORK DETAIL.



AHU-1 CHW COOLING COIL DETAIL-NEW WORK

NOT TO SCALE

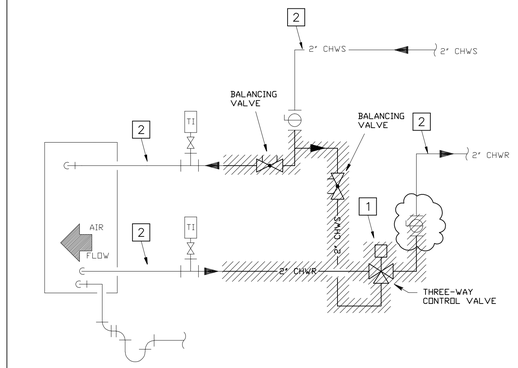
GENERAL NOTES:

1. PROVIDE ANY PIPING, FITTINGS, UNIONS, AND INSULATION AS NECESSARY TO COMPLETE INSTALLATION.

KEYED NOTES:

1 CONTROLS CONTRACTOR TO RECONNECT CONTROL WIRING TO NEW ACTUATOR AND COMMISSION VALVE ACCORDING TO SPECIFICATION SECTION 23 09 00.

2 CONTROL VALVE AND ASSOCIATED FITTINGS TO BE INSULATED TO PREVENT CONDENSATION. THE INSULATION MUST BE APPLIED TO ALLOW ACCESS FOR PROPER OPERATION AND MAINTENANCE OF THE VALVE. ALL PERTINENT VALVE INFORMATION SHOULD BE INCLUDED ON VALVE TAG ATTACHED TO VALVE AND LOCATED OUTSIDE INSULATION.



AHU-3 CHW COOLING COIL DETAIL-DEMOLITION

NOT TO SCALE

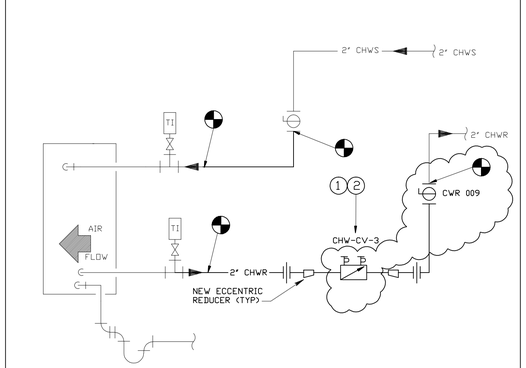
GENERAL NOTES:

1. SELECTIVELY DEMOLISH PIPING AND COMPONENTS AS SHOWN. REFER TO PLAN FOR LOCATIONS AND LENGTHS.

KEYED NOTES:

1 DISCONNECT AND REMOVE BYPASS PIPING AND BALANCING VALVE AS SHOWN. REMOVE THREE-WAY CONTROL VALVE AND ACTUATOR. FOR INSTALLATION OF NEW VALVE SEE NEW WORK DETAIL. COORDINATE DISCONNNECTION OF ACTUATOR WITH CONTROLS CONTRACTOR. WIRING TO BE TEMPORARILY SECURED FOR RECONNECTION TO NEW CONTROL VALVE.

2 RETAIN PIPING ASSEMBLY CONTAINING DRAIN CONNECTION AND THERMOMETER. SEE NEW WORK DETAIL.



AHU-3 CHW COOLING COIL DETAIL-NEW WORK

NOT TO SCALE

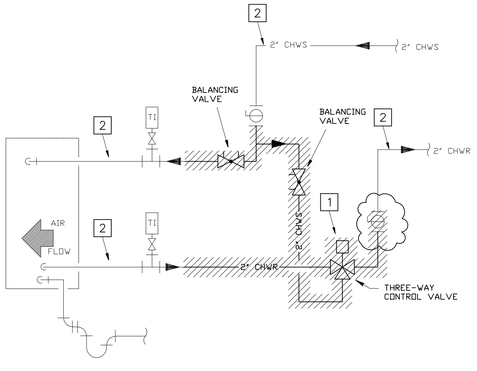
GENERAL NOTES:

1. PROVIDE ANY PIPING, FITTINGS, UNIONS, AND INSULATION AS NECESSARY TO COMPLETE INSTALLATION.

KEYED NOTES:

1 CONTROLS CONTRACTOR TO RECONNECT CONTROL WIRING TO NEW ACTUATOR AND COMMISSION VALVE ACCORDING TO SPECIFICATION SECTION 23 09 00.

2 CONTROL VALVE AND ASSOCIATED FITTINGS TO BE INSULATED TO PREVENT CONDENSATION. THE INSULATION MUST BE APPLIED TO ALLOW ACCESS FOR PROPER OPERATION AND MAINTENANCE OF THE VALVE. ALL PERTINENT VALVE INFORMATION SHOULD BE INCLUDED ON VALVE TAG ATTACHED TO VALVE AND LOCATED OUTSIDE INSULATION.



AHU-2 CHW COOLING COIL DETAIL-DEMOLITION

NOT TO SCALE

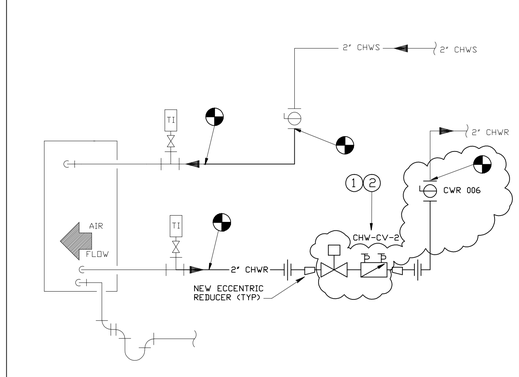
GENERAL NOTES:

1. SELECTIVELY DEMOLISH PIPING AND COMPONENTS AS SHOWN. REFER TO PLAN FOR LOCATIONS AND LENGTHS.

KEYED NOTES:

1 DISCONNECT AND REMOVE BYPASS PIPING AND BALANCING VALVE AS SHOWN. REMOVE THREE-WAY CONTROL VALVE AND ACTUATOR. FOR INSTALLATION OF NEW VALVE SEE NEW WORK DETAIL. COORDINATE DISCONNNECTION OF ACTUATOR WITH CONTROLS CONTRACTOR. WIRING TO BE TEMPORARILY SECURED FOR RECONNECTION TO NEW CONTROL VALVE.

2 RETAIN PIPING ASSEMBLY CONTAINING DRAIN CONNECTION AND THERMOMETER. SEE NEW WORK DETAIL.



AHU-2 CHW COOLING COIL DETAIL-NEW WORK

NOT TO SCALE

GENERAL NOTES:

1. PROVIDE ANY PIPING, FITTINGS, UNIONS, AND INSULATION AS NECESSARY TO COMPLETE INSTALLATION.

KEYED NOTES:

1 CONTROLS CONTRACTOR TO RECONNECT CONTROL WIRING TO NEW ACTUATOR AND COMMISSION VALVE ACCORDING TO SPECIFICATION SECTION 23 09 00.

2 CONTROL VALVE AND ASSOCIATED FITTINGS TO BE INSULATED TO PREVENT CONDENSATION. THE INSULATION MUST BE APPLIED TO ALLOW ACCESS FOR PROPER OPERATION AND MAINTENANCE OF THE VALVE. ALL PERTINENT VALVE INFORMATION SHOULD BE INCLUDED ON VALVE TAG ATTACHED TO VALVE AND LOCATED OUTSIDE INSULATION.

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DESIGNED JJG
DRAWN JMW
CHECKED JJG
DATE 02-05-07

439th AIRLIFT WING

GEO-MARINE GMI
ENGINEERS, CONSTRUCTORS & ENERGY MANAGERS
146 MARKET PLACE BOULEVARD
KNOXVILLE, TN 37922
VOICE (865) 692-0084 FAX (865) 692-0560

AFCESA Project Number
WEST-6-S-1319

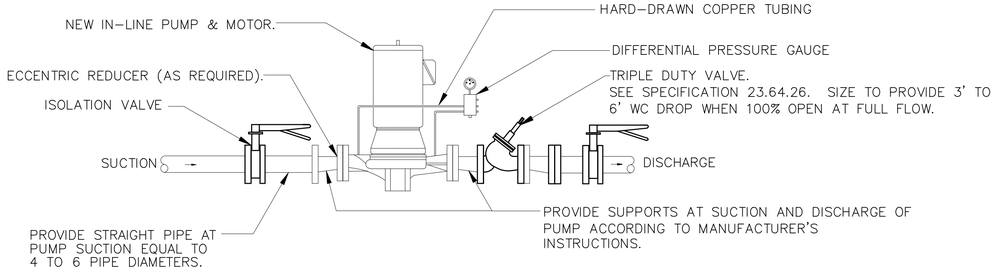
Contract Numbers
FA8903-04-D-8686

WESTOVER ARB PROJ. NO.
YTPM 07-0002

REPAIR FLIGHT SIMULATOR HVAC, BASE HANGAR BLDG 7087, WESTOVER AIR RESERVE BASE

MECHANICAL DETAILS – SHEET 1

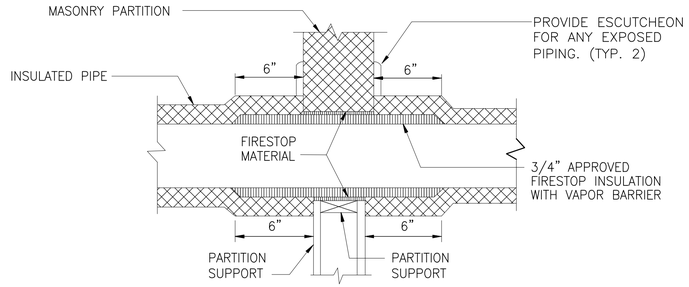
GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. M-4
SHEET NO. 5 OF 18



HORIZONTAL INLINE PUMP INSTALLATION DETAIL

NOT TO SCALE

NOTES:
1. FOR PUMPS CHWP-2 AND 3. PROVIDE 4" CLEVIS HANGERS FOR PUMP SUPPORT. CLEVIS HANGER TO BE EQUAL TO B-LINE B3100-4.
2. FOR PUMPS CHWP-1,4,5,6. PROVIDE 4" PIPE CLAMPS FOR PUMP SUPPORT. PIPE CLAMPS TO BE EQUAL TO B-LINE B2016.
3. PUMP SUPPORTS FOR EXTERIOR USE SHALL BE HOT-DIP GALVANIZED.



PARTITION OR CHASE PENETRATION

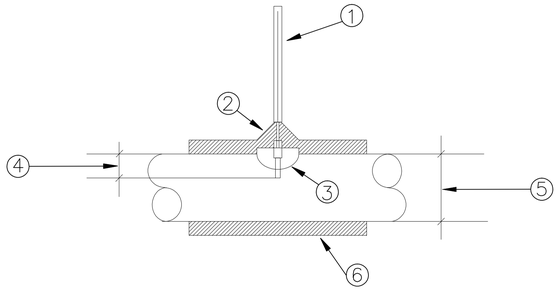
NOTE:
DETAIL APPLIES TO ALL FULL HEIGHT INTERIOR PARTITIONS IN ADDITION TO RATED WALLS AT MECHANICAL ROOM AND CORRIDOR.

PIPE PENETRATION OF FIRE/SMOKE BARRIERS

NOT TO SCALE

NOTE:

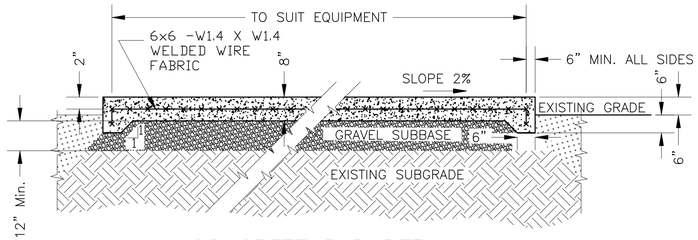
1. APPLICABLE TO PENETRATIONS OF ALL FIRE RATED MEMBRANES, IN ACCORDANCE WITH NFPA 101 AND 90A. REFER TO SPECIFICATIONS SECTION 07 84 00, FIRE STOPPING SYSTEMS.
2. THIS DETAIL APPLIES TO ALL NEW PIPES PENETRATING 1HR MECHANICAL ROOM AND CORRIDOR WALLS.
3. FIRESTOP MATERIAL SHALL BE CAPABLE OF MAINTAINING THE FIRE RESISTANCE RATING OF THE FIRE BARRIER
4. THE OPENING IN THE CONSTRUCTION AROUND THE PIPE SHALL NOT EXCEED 1-INCH.



1. IMMERSION TEMPERATURE SENSOR PROVIDED BY CONTROLS CONTRACTOR.
2. BRASS SENSOR WELL PROVIDED BY CONTROLS CONTRACTOR. COORDINATE AS NECESSARY REGARDING SIZE/DIAMETER OF WELL.
3. THREAD-O-LET WELDED TO PIPE PROVIDED BY MECHANICAL CONTRACTOR.
4. DEPTH WELL ONE-HALF OF PIPE DIAMETER.
5. PIPE DIAMETER.
6. PIPE INSULATION.

TEMPERATURE SENSOR

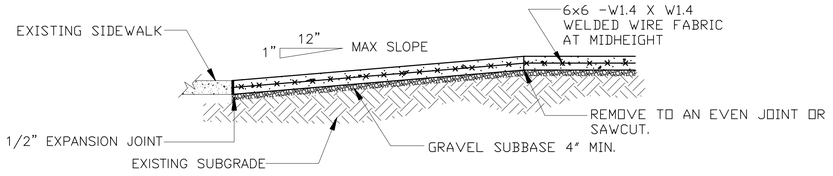
NOT TO SCALE



CONCRETE PAD DETAIL

(TYPICAL SECTION)
NOT TO SCALE

NOTES:
1. IF SOME PHYSICAL OBSTRUCTION EXISTS WHICH PREVENTS THE PLACING OF PAD AS SHOWN, CONTACT THE GMI CONSTRUCTION MANAGER FOR ALTERNATE LOCATION.
2. WOODEN AND OTHER SPACERS WILL NOT BE PERMITTED
3. ALL CONCRETE SHALL BE 3000 PSI MIN. AT 28 DAYS.
4. CONCRETE SURFACE TO BE LIGHT BROOM FINISH.
5. 3/4" CHAMFER AT ALL EXPOSED EDGES.
6. SUBBASE TO BE PEA GRAVEL OR 95% COMPACTED SAND/GRAVEL.
7. PROVIDE SEALENT OR PLASTIC OVER FINISHED SURFACE FOR 7 DAYS.



TYPICAL SIDEWALK CONSTRUCTION

(TYPICAL SECTION)
NOTES: NOT TO SCALE

1. PROVIDE TOOLED OR SAW CUT EXPANSION JOINTS TO MATCH EXISTING AT DISTANCES MATCHING THE WIDTH. PROVIDE EDGING AND FINISH TO MATCH EXISTING.
2. PLACE EXPANSION JOINTS AT CURBS/BRANCH RUNS.
3. IF SOME PHYSICAL OBSTRUCTION EXISTS WHICH PREVENTS THE PLACING OF SIDEWALKS AS SHOWN, CONTACT THE GMI CONSTRUCTION MANAGER FORALTERNATE LOCATION.
4. WOODEN AND OTHER SPACERS WILL NOT BE PERMITTED IN SIDEWALKS.
5. ALL CONCRETE SHALL BE 3000 PSI MIN. AT 28 DAYS.
6. CONCRETE SURFACE TO BE LIGHT BROOM FINISH.
7. CONCRETE SIDEWALK CONSTRUCTION SHALL BE 4" THICK.
8. SUBBASE TO BE PEA GRAVEL OR 95% COMPACTED SAND/GRAVEL.
9. PROVIDE SEALENT OR PLASTIC OVER FINISHED SURFACE FOR 7 DAYS.

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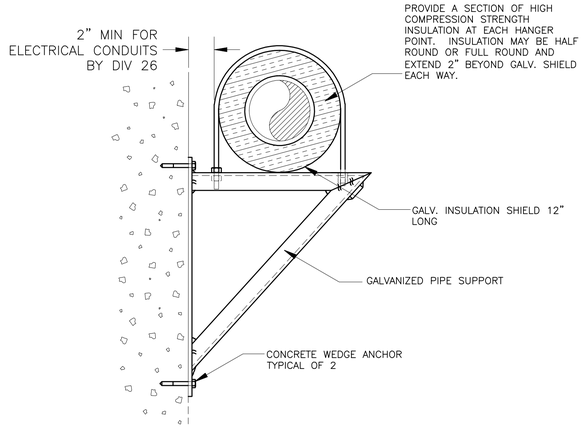
REPAIR FLIGHT SIMULATOR HVAC, BASE HANGAR BLDG 7087, WESTOVER AIR RESERVE BASE

MECHANICAL DETAILS - SHEET 2

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. M-5
SHEET NO. 6 OF 18

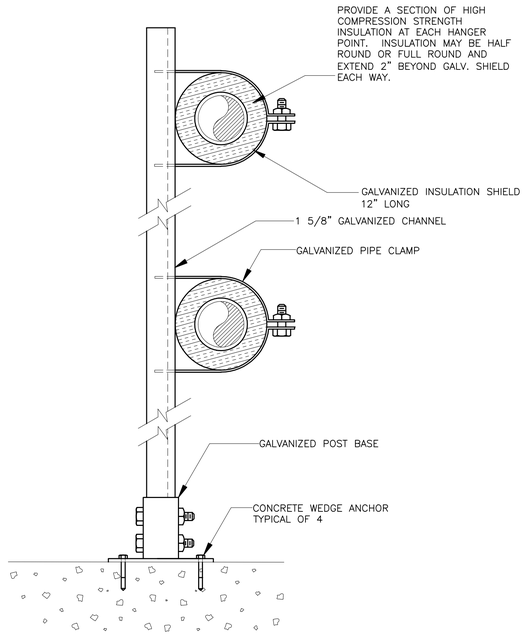


WALL MOUNTED PIPE SUPPORT DETAIL

N.T.S.

NOTES:

1. ALL HARDWARE, FASTENERS, AND INSULATION SHIELDS TO BE GALVANIZED OR OTHERWISE CORROSION RESISTANT.
2. ALL EXTERIOR PIPING TO HAVE ALUMINUM INSULATION JACKET. SEE SPECIFICATION 23 07 00.

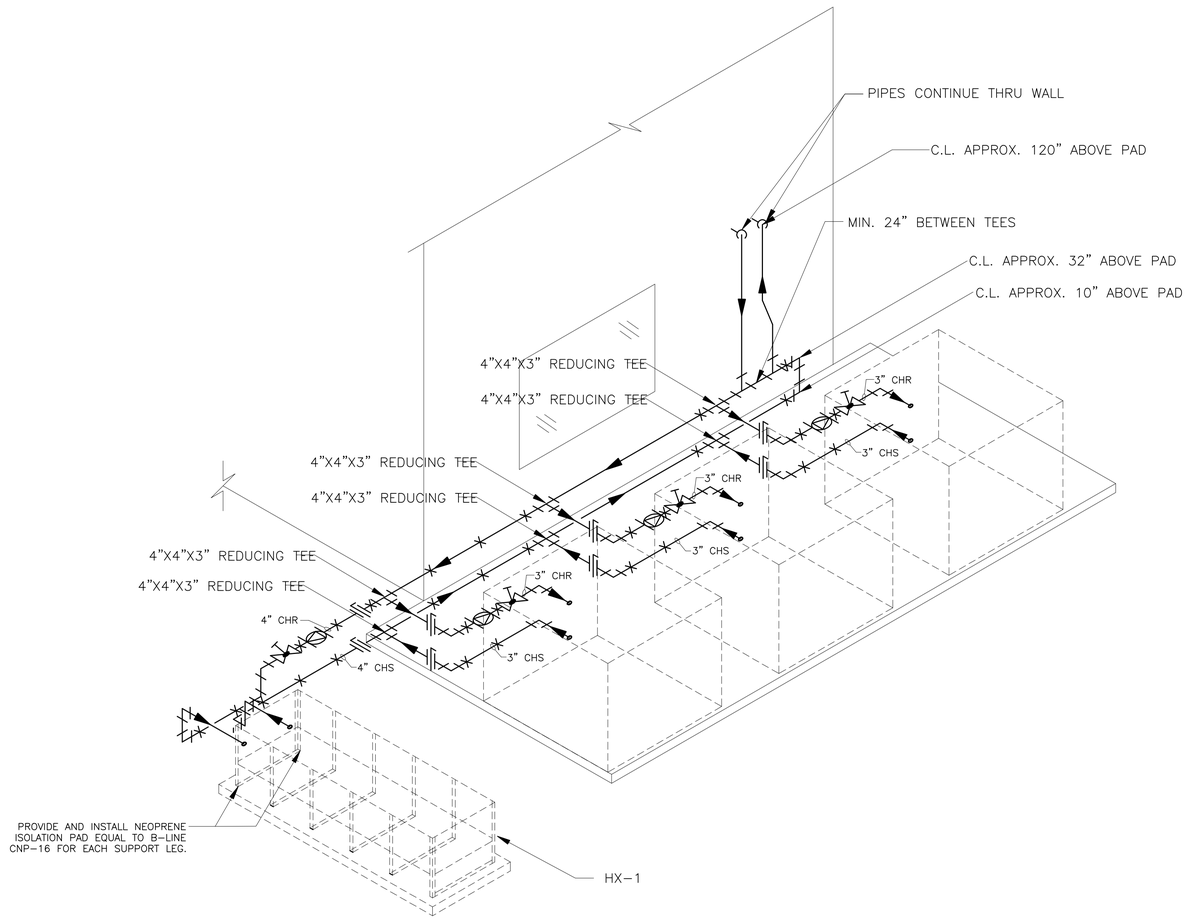


PAD MOUNTED PIPE SUPPORT DETAIL

N.T.S.

NOTES:

1. ALL HARDWARE, FASTENERS, AND INSULATION SHIELDS TO BE GALVANIZED OR OTHERWISE CORROSION RESISTANT.
2. ALL EXTERIOR PIPING TO HAVE ALUMINUM INSULATION JACKET. SEE SPECIFICATION 23 07 00.



CHILLER AND HEAT EXCHANGER CONNECTION DETAIL

N.T.S.

NOTES:

1. ✳ DENOTES PIPE SUPPORTS. SEE DETAILS THIS SHEET.
2. ALL EXTERIOR PIPING TO HAVE ALUMINUM INSULATION JACKET. SEE SPECIFICATION 23 07 00.

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439th AIRLIFT WING

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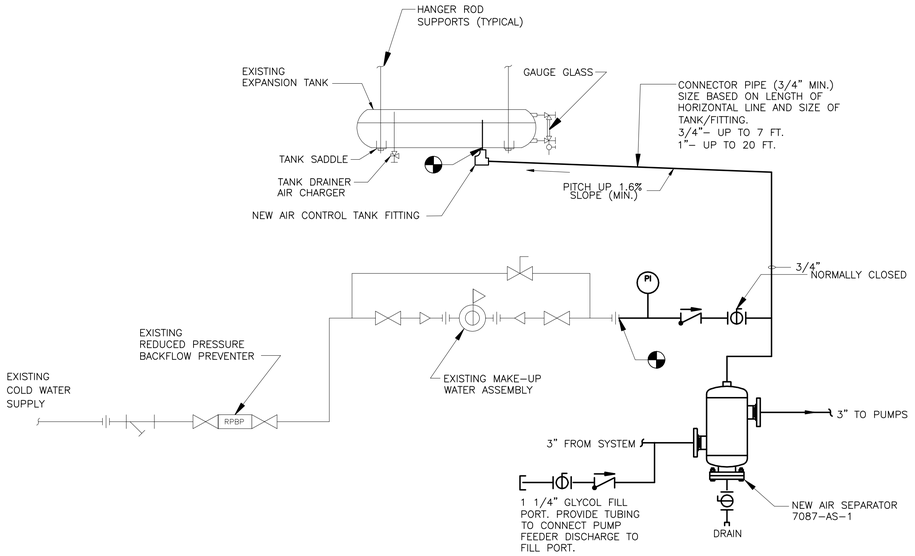
MECHANICAL DETAILS – SHEET 3

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. M-6
SHEET NO. 7 OF 18

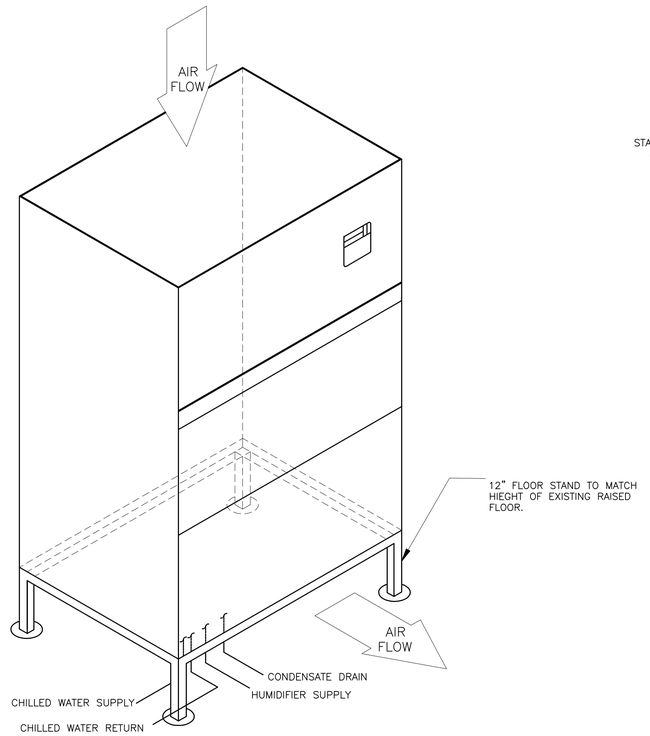


AIR CONTROL & MAKE–UP WATER PIPING CONNECTIONS FOR CHILLED WATER SYSTEMS WITH HORIZONTAL EXPANSION TANK

N.T.S.

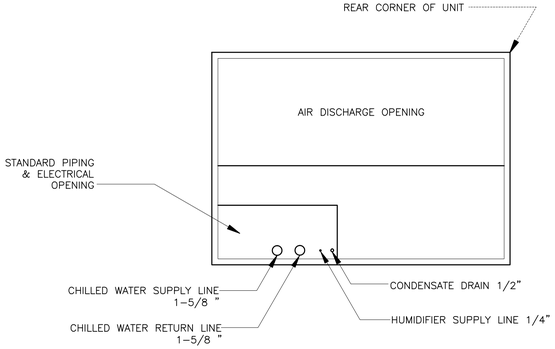
NOTES:

1. SET PRESSURE REDUCING VALVE TO 12 PSIG.



CAC–1 – PIPING DETAIL

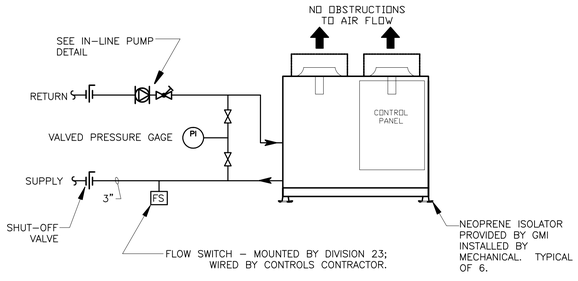
N.T.S.



CAC–1 – PIPING CONNECTION PLAN

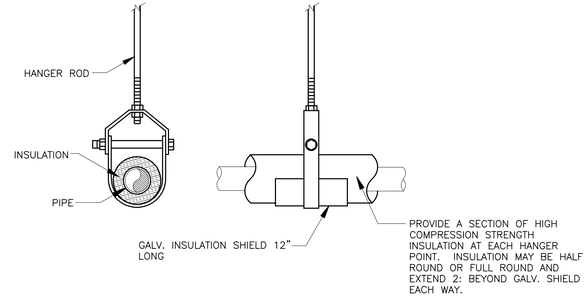
N.T.S.

NOTE: ALL PIPING CONNECTIONS ARE ON THE UNDERSIDE OF THE UNIT.



CHILLER CONNECTION DETAIL

N.T.S.



PIPE HANGER DETAIL

N.T.S.

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VOICE (865) 692-0084 FAX (865) 692-0560

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WESTOVER ARB PROJ. NO.: YTPM 07–0002

REPAIR FLIGHT SIMULATOR HVAC, BASE HANGAR BLDG 7087, WESTOVER AIR RESERVE BASE

MECHANICAL DETAILS – SHEET 4

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. M–7
SHEET NO. 8 OF 18

Air Cooled Chiller Schedule (Provided By GMI)

Mark	Service	Manufacturer	Model	Required Capacity (Tons)	Evaporator Data					Ambient Air Temp. (°F)	Number of Compressors	Electrical Data		Notes
					Fluid	GPM	EWT (°F)	LWT (°F)	Fouling Factor	Maximum Pressure Drop (ft)			Volt/Phase/Hz	MCA	
CHLR-4	7087	Trane	CGAFC40	33.0	40% Propylene Glycol	96	54	44	0.001	10	95	4	460/3/60	80	1-5
CHLR-5	7087	Trane	CGAFC40	33.0	40% Propylene Glycol	96	54	44	0.001	10	95	4	460/3/60	80	1-5
CHLR-6	7087	Trane	CGAFC40	33.0	40% Propylene Glycol	96	54	44	0.001	10	95	4	460/3/60	80	1-5

Notes:
1. Provide chiller with two independent circuits.
2. Provide field installed flow switch (Installed by others).
3. Provide factory installed low ambient controls down to 0 °F.
4. Provide coil guard on condenser coil.
5. Acceptable manufacturers: Trane, Carrier, York.

Computer Room Air Conditioning Unit Schedule (Provided By GMI)

Mark	Service	Unit Configuration	Fan			Cooling (MBH)		Chilled Water (°F)			Entering Air (°F)		Electric Heat Capacity (kW)	Humidification Capacity (lb/hr)	Volt/Phase /Hz	FLA (A)		Notes
			CFM	ESP	Motor (HP)	Sensible	Total	EWT	LWT	GPM	DB	WB				Indoor Unit	Cond.	
CAC-1	1049	Down-Flow	5900	N/A	3.0	96.2	96.2	45.0	57.6	17	72.0	60.1	15.0	11.0	460/3/60	30.3	N/A	1-8

Notes:
1. Provide electric reheat coil.
2. Provide infra-red humidifier.
3. Provide unit mounted smoke detector.
4. Provide valve package for chilled water coil,
5. Provide filter box.
6. Provide floor stand.
7. Service is 40% propylene glycol.
8. Provide unit mounted condensate pump with dual float.

Dry Cooler Schedule (Provided By GMI)

Mark	Service	Manufacturer	Model	Required Capacity (Tons)	Evaporator Data					Ambient Air Temp. (°F)	Number of Fans	Electrical Data		Notes
					Fluid	GPM	EWT (°F)	LWT (°F)	Fouling Factor	Maximum Pressure Drop (ft)			Volt/Phase/Hz	FLA	
HX-1	7087	Data Aire	DAFC 50	35.0	40% Propylene Glycol	96	54	45.2	0.001	21.9	30.0	5	460/3/60	8.0	1

Notes:
1. Provide controls to stage fans based on leaving water temp.

Air Separator Schedule

Equipment Number	Service	Mfr./Model No.	Type	Size Inches	Max. Flow (GPM)	Built-In Strainer Required
7087-AS-1	CHILLED WATER	BELL & GOSSETT/R-3F	CENTRIFUGAL	3	147	YES

Pump Schedule

Mark	Service	Circulating Fluid			Efficiency (%)	Type	Motor			Manufacturer	Model	Notes
		Fluid	Flow (gpm)	Head (ft wc)			Nominal HP	Volt/Phase/Hz	RPM			
CHWP-1	HX-1	40% Propylene Glycol	96	40	49.5	In-line	3	460/3/60	3450	Bell & Gossett	Series 90 2AA	1,2
CHWP-2	Sec. CHW Loop	40% Propylene Glycol	142	117	60.4	In-line	10	460/3/60	3450	Bell & Gossett	Series 90 2A	1
CHWP-3	Sec. CHW Loop	40% Propylene Glycol	142	117	60.4	In-line	10	460/3/60	3450	Bell & Gossett	Series 90 2A	1
CHWP-4	CHLR-4	40% Propylene Glycol	96	28	46.8	In-line	2	460/3/60	3450	Bell & Gossett	Series 90 2AA	1,2
CHWP-5	CHLR-5	40% Propylene Glycol	96	28	46.8	In-line	2	460/3/60	3500	Bell & Gossett	Series 90 2AA	1,2
CHWP-6	CHLR-6	40% Propylene Glycol	96	28	46.8	In-line	2	460/3/60	3500	Bell & Gossett	Series 90 2AA	1,2

Notes:
1. Provide triple-duty valve equal to Bell & Gossett. See specification 23.64.26
2. Provide pump and motor suitable for outdoor installation.

Control Valve Schedule

Mark	Service	Flow (gpm)	Valve			
			Model Number	Type	Size	Notes
CHW-CV-1	EXISTING AHU-1	23.0	PICCV-32-023-PT-LR24-MFT US+NC+P-10019	2-WAY	1 1/4	1-5
CHW-CV-2	EXISTING AHU-2	32.0	PICCV-40-032-PT-LR24-MFT US+NC+P-10019	2-WAY	1 1/2	1-5
CHW-CV-3	EXISTING AHU-3	6.5	PICCV-20-6.5-PT-LR24-MFT US+NC+P-10019	2-WAY	3/4	1-5

NOTES:
1. Belimo Model number.
2. Select actuator based on analog output of controller. Coordinate with controls contractor.
3. Pipe per details on drawing. Refer to piping plan for existing pipe sizes.
4. Control valves provided by controls contractor and installed by mechanical contractor.
5. Service is 40% propylene glycol solution.

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REPAIR FLIGHT SIMULATOR HVAC, BASE HANGAR BLDG 7087, WESTOVER AIR RESERVE BASE

MECHANICAL SCHEDULES

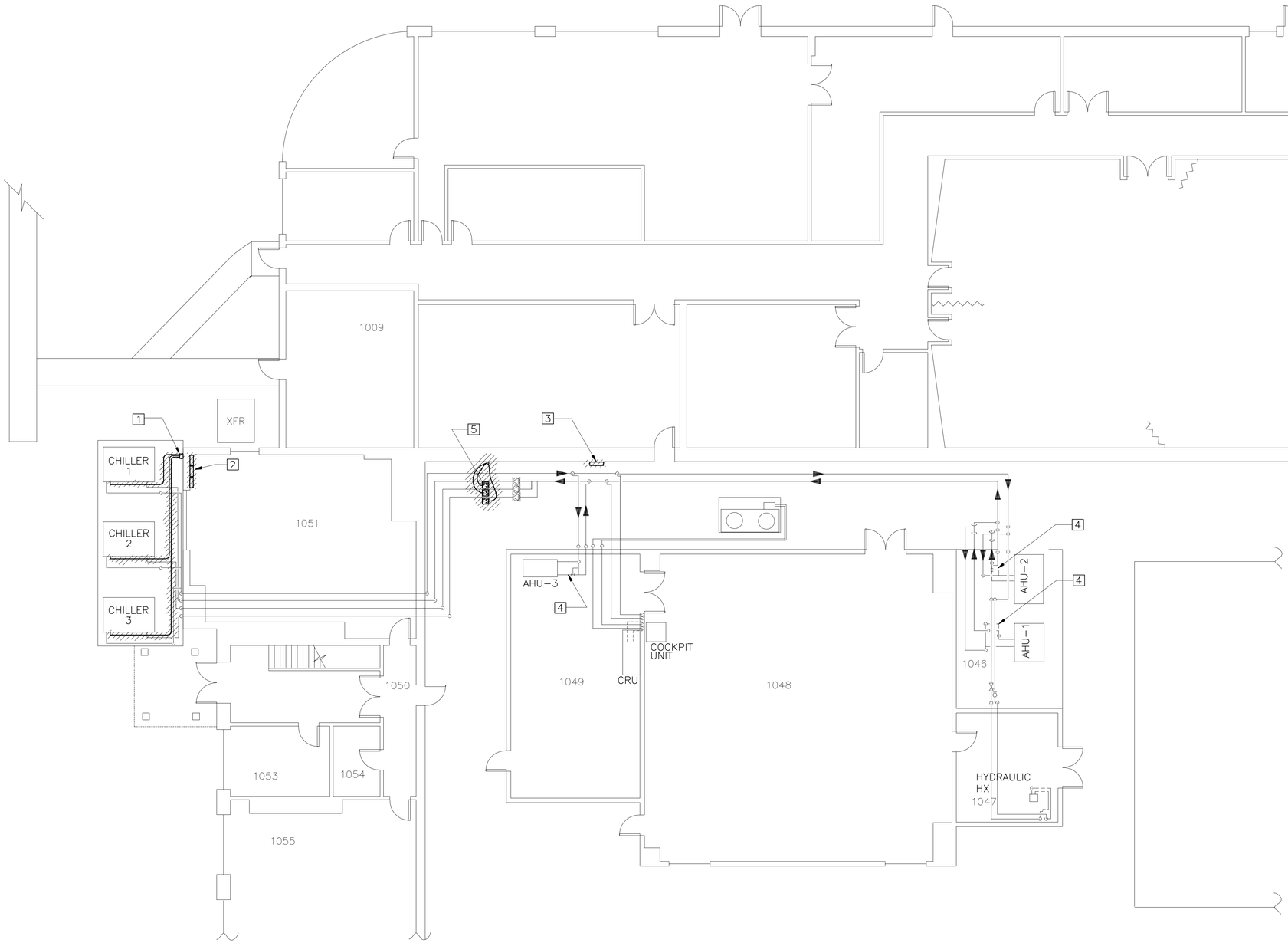
GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. M-8
SHEET NO. 9 OF 18

GENERAL NOTES:

A. COORDINATE PLANNING AND WORK WITH OTHER CONTRACTORS, GEO-MARINE, AND BASE PERSONNEL.

DEMOLITION NOTES:

1. REMOVE CONTROL WIRING AND CONDUIT FROM CHILLER TO JUNCTION BOX ON WALL. REMOVE JUNCTION BOX AND ALL UNUSABLE WIRING AND CONDUIT BACK TO CONTROL PANELS. TYPICAL FOR 3 CHILLERS.
2. REMOVE CONTROLS, CONTROL PANELS, AND ASSOCIATED WIRING. REMOVE ALL NON-REUSABLE CONDUIT. TYPICAL OF FOUR PANELS, FOURTH PANEL IS BENEATH THE THREE SHOWN. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE FEASIBILITY OF RE-USE OF EXISTING CONDUIT, WIRE, AND CONTROL PANELS.
3. REMOVE CONTROLS, CONTROL PANEL, AND ASSOCIATED WIRING. REMOVE ALL NON-REUSABLE CONDUIT. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE FEASIBILITY OF RE-USE OF EXISTING CONDUIT, WIRE, AND CONTROL PANELS.
4. DISCONNECT WIRING FROM EXISTING CONTROL VALVE (TYPICAL 3). PROTECT WIRING FROM SHORTS AND PHYSICAL DAMAGE. WIRING TO BE RECONNECTED TO NEW CONTROL VALVES.
5. DISCONNECT AND REMOVE ALL WIRING AND CONDUIT FROM THREE EXISTING FLOW SWITCHES.



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DRAWING SCALE 1/8"=1'-0"

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439th AIRLIFT WING

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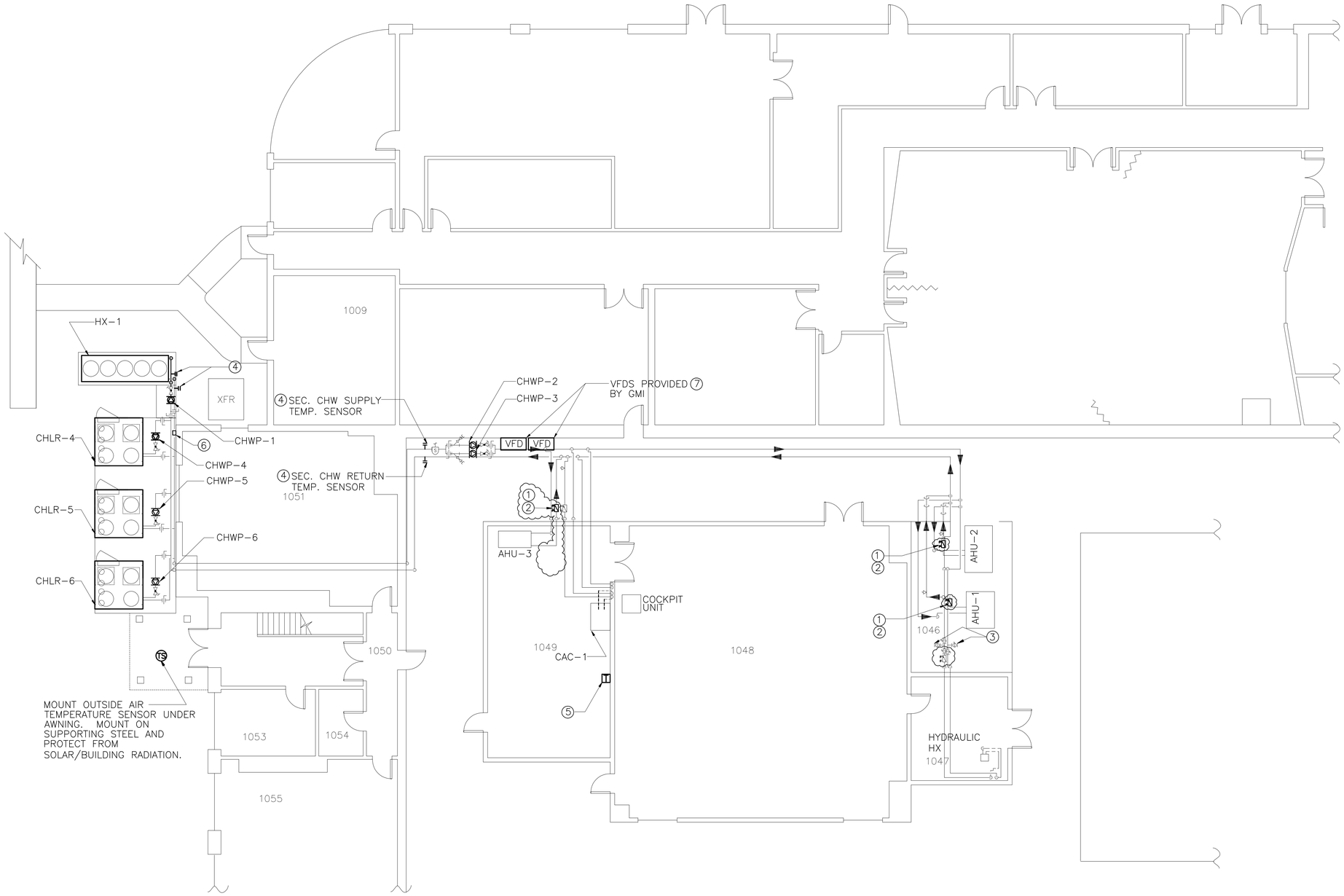
CONTROLS DEMOLITION

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. MC-1
SHEET NO. 10 OF 18



GENERAL NOTES:

A. PROVIDE AND INSTALL NEW DDC CONTROLS TO MEET THE REQUIREMENTS OF THE SPECIFICATIONS AND DRAWINGS.
B. PROVIDE ALL MATERIAL AND LABOR REQUIRED TO PROVIDE A COMPLETE AND FULLY FUNCTIONING SYSTEM.
C. PROVIDE ALL NECESSARY LABOR AND MATERIAL TO INSTALL INTERLOCK BETWEEN CHILLER AND FLOW SWITCH, AND BETWEEN CHILLER AND IT PRIMARY PUMP'S STARTER. TYPICAL OF 3 CHILLERS. STARTERS PROVIDED AND INSTALLED BY DIV 26, FLOW SWITCH PROVIDED WITH CHILLER INSTALLED BY DIV 23.
D. REUSE EXISTING CONDUITS, WIRE, AND CONTROL PANELS WHEREVER POSSIBLE.
E. COORDINATE PLANNING AND WORK WITH OTHER CONTRACTORS,

NEW WORK NOTES:

(1) RECONNECT EXISTING CONTROL WIRING TO NEW CONTROL VALVES. PROVIDE ANY ADDITIONAL WIRING AND CONDUIT NECESSARY. VERIFY PROPER OPERATION.

(2) PROVIDE CONTROL VALVES TO MECHANICAL FOR INSTALLATION. SEE SCHEDULE M-7.

(3) PROVIDE AND INSTALL DIFFERENTIAL PRESSURE SENSOR. PROVIDE ALL FITTINGS, TUBING, AND SNUBBERS AS NECESSARY. TAPS AND ISOLATION VALVES PROVIDED BY MECHANICAL CONTRACTOR.

(4) PROVIDE IMMERSION WELLS FOR TEMPERATURE SENSORS TO MECHANICAL FOR INSTALLATION. SEE POINTS LIST ON MC-3.

(5) COMPUTER ROOM MONITORING TEMPERATURE SENSOR. SEE MC-3.

(6) REPLACE THE CONTROLS PULL BOX NEAR THE CHILLERS WITH A NEMA-3R OR NEMA-4 PULL BOX SIZED FOR NEW WORK.

(7) VFDS PROVIDED BY GMI INSTALLATION AND POWER WIRING BY DIV 26. CONTROL WIRING BY CONTROLS CONTRACTOR.

0 4 8 12 16 20

DRAWING SCALE 1/8"=1'-0"

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Contract Numbers FA8903-04-D-8686
WESTOVER ARB PROJ. NO. YTPM 07-0002

REPAIR FLIGHT SIMULATOR HVAC, BASE HANGAR BLDG 7087, WESTOVER AIR RESERVE BASE

CONTROLS NEW WORK

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. MC-2
SHEET NO. 11 OF 18

Chiller Interface Points List											
	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic	Notes
Evparator Water Pump Request						X		X		X	1,2
Evparator Water Pump Status						X		X		X	1,2
Evparator Leaving Water Temp.					X			X		X	1,2
Evparator Entering Water Temp.					X			X		X	1,2
Maximum Capacity						X		X		X	1,2
Percent Rated Amps.					X			X		X	1,2
Status (Alarm, Running/Disabled)					X			X	X	X	1,2
Chiller Enable/Disable						X		X		X	1,2
Totals	0	0	0	0	4	4	0	8	1	8	

NOTES:
1. Typical of three chillers.
2. All points are to be accessed from the chiller's Lon communication interface.

Chilled Water Distribution System Points List											
	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic	Notes
Outside Air Temp	X							X		X	
Lead Chiller Selection					X					X	
Lead Sec. Pump Selection					X					X	
Sec. CHW Supply Temp.	X							X		X	
Sec. CHW Return Temp.	X							X		X	
CHWP-2 Start/Stop				X				X		X	
CHWP-3 Start/Stop				X				X		X	
Chilled Water System Alarm									X	X	
CHWP-2 Status			X					X	X	X	
CHWP-3 Status			X					X	X	X	
System Enable/Disable						X	X			X	
CHWP-2 Speed		X						X		X	
CHWP-3 Speed		X						X		X	
System Differential Pressure	X							X		X	
Differential Pressure Setpoint					X					X	1
Stand-by Chiller Enable Setpoint					X					X	
Totals	4	2	2	2	4	1	1	10	3	15	

NOTES:
1. Initial setpoint 15 psi.

Heat Exchanger Points List											
	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic	Notes
CHWP-1 Start/Stop				X				X		X	
CHWP-1 Status			X					X		X	
Leaving Water Temp.	X							X		X	
Entering Water Temp.	X							X		X	
Enable/Disable				X				X		X	
Totals	2	0	1	2	0	0	0	5	1	5	

Computer Room Points List											
	Hardware Points				Software Points						
Point Name	AI	AO	BI	BO	AV	BV	Sched	Trend	Alarm	Show On Graphic	Notes
Room Temp.	X							X		X	
Totals	1	0	0	0	0	0	0	1	0	1	

Sequence of Operation

Chilled Water System

When the CHW system is scheduled on the lead secondary chilled water pump will be started. If the lead secondary pump fails to start, the stand-by pump will start. The lead and stand-by secondary pumps will be rotated by an operator override. The lead primary chiller shall be enabled and the chiller will start/stop its own primary pump. When the outside air temperature is below 30°F HX-1 will become the lead chiller and will remain the lead chiller until the outside air temperature rises above 31°F. If the lead chiller fails to start, the next stand-by chiller will be enabled. Lead and stand-by chillers will be rotated by an operator override.

A PID control loop will modulate the lead secondary pump variable frequency drive to maintain the secondary loop differential pressure setpoint (adjustable).

Each chiller is to be set to deliver and maintain a set leaving chilled water temperature (initially set at 44°F) via existing packaged chillers controls. Each chiller is equipped with a Lon interface. See the points list for monitoring and controls points. Staging of the chillers shall be by the EMCS and based on the sequence of operation contained herein.

If the secondary chilled water supply temperature rises above 49°F (adjustable) for a period greater than 5 minutes the next stand-by chiller will be enabled to run. When the secondary chilled water supply temperature drops below 46°F (adjustable) for a period greater than five minutes, a stand-by chiller shall be disabled. If a there is still more than one chiller enabled the DDC system will wait an additional five minutes before disabling the remaining stand-by chiller to ensure that the secondary chilled water supply temperature remains below 46°F.

When HX-1 is the lead chiller, CWP-1 shall be started and then HX-1 will be enabled. HX-1 and its pump shall not run under any circumstances if the outside air temperature is above 32°F.

If the secondary chilled water supply temperature rises above 49°F for a period greater than 15 minutes the DDC system will send an alarm to the EMCS to notify operators of the failure.

Safeties

The chillers will be interlocked with flow switches to prove flow status. Wiring and conduit of the flow switches shall be by the controls contractor. Flow switches to be provided by chiller manufacturer.

Computer Room

The computer room temperature shall be monitored only.

REV	DATE	BY	DESCRIPTION
	02-05-07	JJG	Certified For Construction

DESIGNED JJG
DRAWN JMW
CHECKED JJG
DATE 02-05-07

GMI
ENGINEERS, CONSTRUCTORS & ENERGY MANAGERS
146 MARKET PLACE BOULEVARD
KNOXVILLE, TN 37922
VOICE (865) 692-0084 FAX (865) 692-0560

AFCESA Project Number
WEST-6-S-1319
Contract Numbers
FA8903-04-D-8686
WESTOVER ARB PROJ. NO.
YTPM 07-0002

REPAIR FLIGHT SIMULATOR HVAC, BASE HANGAR BLDG 7087, WESTOVER AIR RESERVE BASE

POINTS LIST AND SEQUENCES OF OPERATION

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. MC-3

ELECTRICAL CONSTRUCTION NOTES:

GENERAL

1. ALL WORK TO CONFORM TO THE REQUIREMENTS OF THE LATEST EDITION OF NFPA–70, THE NATIONAL ELECTRICAL CODE (NEC), AND NFPA–70E, ELECTRICAL SAFETY IN THE WORKPLACE. (CONTRACTOR MUST HAVE AN ELECTRICAL SAFETY PROGRAM, USE LOCK–OUT TAG–OUT PROCEDURES, USE ARC FLASH PROTECTION, AND TRAIN WORKERS).
2. PROVIDE AND USE ARC FLASH PROTECTION GEAR WHENEVER WORKERS ARE EXPOSED TO ENERGIZED (>50–VOLTS) ELECTRICAL EQUIPMENT. THIS INCLUDES TAKING MEASUREMENTS TO VERIFY EQUIPMENT IS DE–ENERGIZED.
3. FURNISH NEW MATERIALS AND EQUIPMENT, UNLESS OTHERWISE NOTED, APPROVED BY UL OR OTHER NATIONALLY RECOGNIZED TESTING LABORATORIES WHENEVER STANDARDS HAVE BEEN ESTABLISHED BY ONE OF THOSE AGENCIES.
4. INSTALL EQUIPMENT IN COMPLIANCE WITH CONTRACT DOCUMENTS, MANUFACTURER'S INSTRUCTIONS, AND WIRING DIAGRAMS FURNISHED WITH EQUIPMENT.
5. ALL COMPONENTS PROVIDED UNDER THIS CONTRACT SHALL BE NEW, IN UNDAMAGED CONDITION, AND UL LISTED.
6. PROVIDE, INSTALL, AND CONNECT ALL WIRING TO FORM COMPLETE AND OPERATING SYSTEMS.
7. ASSIST WITH MECHANICAL STARTUPS AS REQUIRED.
8. COORDINATE PLANNING AND WORK WITH OTHER CONTRACTORS, GEO–MARINE, AND BASE PERSONNEL.

CONDUIT

9. CONDUIT RUNS INDOORS AND ABOVE GRADE SHALL BE ELECTRICAL METALLIC TUBING (EMT) UNLESS OTHERWISE NOTED. CONDUIT RUNS UNDERGROUND SHALL BE RIGID GALVANIZED STEEL (RSC) UNLESS OTHERWISE NOTED. ABOVE GRADE OUTDOOR RUNS SHALL BE RIGID GALVANIZED STEEL CONDUIT UNLESS OTHER WISE NOTED.
10. TERMINATE EMT WITH COMPRESSION TYPE CONNECTORS WITH INSULATED THROATS. USE COMPRESSION TYPE COUPLINGS FOR EMT. SET SCREW TYPE CONNECTORS AND COUPLINGS ARE NOT ACCEPTABLE.
11. SUPPORT CONDUITS IN ACCORDANCE WITH PARAGRAPHS 344.30. 358.30 AND 352.30 OF THE NEC. INSTALL CONDUITS AT RIGHT ANGLES TO OR PARALLEL TO STRUCTURAL MEMBERS.
12. DO NOT SECURE CONDUIT DIRECTLY TO OTHER PIPING. SEPARATE CONDUIT PARALLEL TO OR CROSSING UNINSULATED HOT WATER OR STEAM PIPES BY 12 IN., IF PARALLEL, OR 6 IN. IF CROSSING. WHERE THESE LINES ARE INSULATED, CONDUITS PARALLEL TO OR CROSSING THEM MUST CLEAR INSULATION SURFACE BY AT LEAST 2 IN. SEPARATE CONDUIT FROM COLD WATER LINES BY AT LEAST 3 IN. DO NOT RUN CONDUIT DIRECTLY UNDER COLD WATER LINES.
13. USE LIQUID TIGHT FLEXIBLE STEEL CONDUIT ASSEMBLIES, "SEALTITE" OR APPROVED EQUAL. USE A THOMAS & BETTS SERIES 5300, INSULATED, STRAIGHT OR 90–DEGREE ANGLE CONNECTOR ON EACH END TO TERMINATE LIQUID TIGHT FLEXIBLE STEEL CONDUITS.
14. USE APPROVED WEATHER TIGHT SEALING HUBS FOR CONDUIT BOX TERMINATIONS. USING ONLY LOCKNUTS WITH A GASKET IS NOT ACCEPTABLE.

WIRING

15. WIRING # 10 AWG AND SMALLER FEEDING LIGHTS AND RECEPTACLES MAY BE SOLID. ALL OTHER WIRING SHALL BE STRANDED. MOTOR LEADS & CONTROL WIRING SHALL BE STRANDED.
16. USE # 10 AWG CONDUCTORS FOR 20 AMPERE, 120V BRANCH CIRCUIT HOME RUNS LONGER THAN 75 FT LONG.
17. MAXIMUM PULLING TENSION AND SIDEWALL PRESSURE OF WIRE OR CABLES NOT TO EXCEED MANUFACTURER'S RECOMMENDED VALUES.
18. ALL INSTRUMENTATION WIRING SHALL BE 1 PAIR # 16 AWG. STRANDED TINNED COPPER CONDUCTORS, TEFZEL INSULATION, SHIELDED, BELDEN # 85231 OR EQUAL.
19. ALL WIRING IN CONTROL PANELS SHALL BE 1 CONDUCTOR # 14, TYPE THWN–2 90°C 600–VOLTS, COPPER.
20. ALL WIRING IN CONDUIT SHALL BE THWN–2 90°C 600–VOLT COPPER.
21. EACH END OF THE SHIELD ON SHIELDED CABLES SHALL BE EITHER TERMINATED ON APPROPRIATE TERMINAL BLOCKS OR CUT–OFF. CONNECTING SHIELDS WITH WIRE NUTS IS UNACCEPTABLE. SHIELDS MUST BE GROUNDED. SHIELD SHALL BE GROUNDED AT ONE END ONLY.
22. PANEL WIRING SHALL BE NEATLY FORMED AND EITHER BUNDLED OR PLACED IN A WIREWAY USING PRODUCTS SIMILAR TO THE FOLLOWING:
    * 4–WAY ADHESIVE BACKED MOUNT, 2" x 2", 2 LB. STATIC LOAD, WHITE NYLON, FOR INDOOR USE WITH CABLE TIES, PANDUIT # ABM4H–A–L
    * WIRING DUCT, NORYL, RESTRICTED SLOT WALL, 1.5"W X 2"D X 6' LONG, LT. GREY COLOR, PANDUIT #NEI.5X2LG6, WITH INTERLOCKING COVER, PANDUIT # C1.5LG6.

SPLICES, TAPS AND TERMINATIONS

23. SPLICES & TAPS OF SOLID CONDUCTORS # 10 AWG AND SMALLER (300V OR LESS) TO BE MADE WITH SPLIT BOLT CONNECTORS OR INSULATED WIRE NUTS, THOMAS & BETTS "PIGGY". OVER 300 VOLTS USE SPLIT BOLT CONNECTORS, STRANDED CONDUCTORS SHALL BE PRESSURE CONNECTORS, THOMAS & BETTS "STA–KON" OR INSULATED WIRE NUTS, THOMAS & BETTS "PIGGY".
24. SPLICES OF CONDUCTORS # 8 AWG AND THROUGH # 1 (300V OR LESS) TO BE MADE WITH SPLIT BOLT CONNECTORS, THOMAS & BETTS 2T THROUGH 8T OR WITH COMPRESSION TWO–WAY CONNECTOR, THOMAS & BETTS 54500.
25. TAPS OF CONDUCTORS # 8 AWG AND THROUGH # 1 (300V OR LESS) TO BE MADE WITH SPLIT BOLT CONNECTORS, THOMAS & BETTS 2T THROUGH ST, OR COMPRESSION "C" TAP, THOMAS & BETTS 54700.
26. FOR TERMINATIONS OF # 10 AWG AND SMALLER SOLID CONDUCTORS, BEND CONDUCTOR TO FIT UNDER SCREW HEAD. STRANDED CONDUCTOR SHALL BE TERMINATED USING PRESSURE CONNECTORS, THOMAS & BETTS "STA–KON".
27. FOR TERMINATION OF # 8 AWG AND THROUGH # 1 AWG USE MECHANICAL TYPE ONE HOLE LUG, THOMAS & BETTS # 31000, OR COMPRESSION TYPE ONE–HOLE LUG, THOMAS & BETTS # 54100.

BOXES

28. PROVIDE ELECTRICAL BOXES AS INDICATED AND WHERE REQUIRED FOR SPLICES, TAPS, CONDUCTOR PULLING, EQUIPMENT CONNECTIONS, AND IN COMPLIANCE WITH THE NEC.
29. OUTLET BOXES SHALL BE SIZED PER DRAWINGS WITH KNOCKOUTS SIZED FOR CONDUITS USED. ALL UNUSED KNOCKOUTS ARE TO REMAIN CLOSED OR SHALL BE SEALED WITH KNOCKOUT CLOSURES.
30. DEVICE OR UTILITY BOXES SHALL BE UNIT CONSTRUCTION, SIZE REQUIRED FOR NUMBER OF WIRING DEVICES SPECIFIED. SECTIONAL DEVICE BOXES ARE NOT PERMITTED.
31. PULL AND JUNCTION BOXES SHALL BE SIZED AS SPECIFIED OR IN ACCORDANCE, WITH ARTICLE 370 OF THE NEC.
32. SUPPORT PULL BOXES AND JUNCTION BOXES INDEPENDENT OF CONDUIT.

SUPPORTS

33. FABRICATE CONDUIT SUPPORT HANGERS FROM ANGLE IRON, CHANNEL IRON, OR 'UNISTRUT'.
34. SPACE CONDUIT HANGERS IN ACCORDANCE WITH THE REQUIREMENTS OF THE NEC.
35. FABRICATE EQUIPMENT RACKS FROM P–1000 "UNISTRUT" UTILIZING BOLTED OR OFF–SITE WELDED CONSTRUCTION.
36. DO NOT FASTEN SUPPORTS TO PIPING, DUCTWORK, MECHANICAL EQUIPMENT, OR CONDUIT.
37. DO NOT USE POWDER–ACTUATED ANCHORS OR DRILL STRUCTURAL STEEL MEMBERS.
38. MOUNT EQUIPMENT TO RACKS WITH HEXAGON HEAD BOLTS, SPRING NUTS AND LOCK WASHERS.
39. FASTEN HANGER RODS FOR CONDUIT CLAMPS TO BUILDING STRUCTURE USING BEAM CLAMPS.
40. USE SELF–DRILLING ANCHORS OR EXPANSION ANCHORS ON CONCRETE SURFACES AND SHEET METAL SCREWS IN SHEET METAL STUDS,
41. USE GALVANIZED STRUCTURAL STEEL CHANNEL FOR ELECTRICAL EQUIPMENT MOUNTING FRAMES UNLESS OTHERWISE DIRECTED BY GEO–MARINE.
42. PROTECT ALL NEW INSTALLED PARTS FROM CORROSION. PAINT ALL BARE STEEL INCLUDING MOUNTING CHANNEL ENDS.

GROUNDING

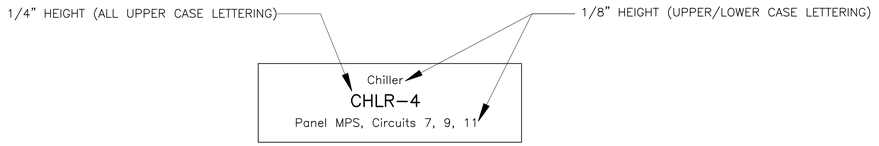
43. PROVIDE GROUNDING CONNECTIONS REQUIRED BY ARTICLE 250 OF THE NEC. MINIMUM REQUIREMENTS OF ARTICLE 250–122 OF THE NEC APPLY WHERE CONDUCTOR SIZES NOT INDICATED.
44. EQUIPMENT GROUNDING CONDUCTOR SHALL BE BARE OR GREEN INSULATED COPPER.
45. CONNECT NON–CURRENT CARRYING METAL PARTS OF ELECTRICAL EQUIPMENT TO THE ELECTRICAL SUPPLY SYSTEM GROUND WITH AN EQUIPMENT GROUNDING CONDUCTOR.
46. INSTALL EQUIPMENT GROUNDING CONDUCTOR IN SAME CONDUIT WITH CURRENT CARRYING CONDUCTORS. USE OF CONDUIT AS THE EQUIPMENT GROUNDING CONDUCTOR IS NOT PERMITTED. GROUNDING CONDUCTORS MAY BE BARE OR INSULATED.

WIRING ISOLATION

47. ROUTE INPUT POWER WIRING, MOTOR LEADS, AND CONTROL WIRING IN SEPARATE CONDUITS.

NAMEPLATES

48. FABRICATE NAMEPLATES IN ACCORDANCE WITH THE SPECIFICATIONS AND AS MODIFIED BY THIS DETAIL. THIS IS A SAMPLE ONLY. SPECIFIC DATA MUST BE GATHERED FROM THE DRAWINGS AND FIELD INSTALLATION. SUBMIT A LISTING TO GMI FOR APPROVAL OF ALL LABELS WITH SPECIFIC WORDING FOR EACH LINE AT LEAST 7 DAYS PRIOR TO FABRICATION.



FIELD QUALITY CONTROL

PANELBOARDS

A. PROVIDE TYPED CIRCUIT DIRECTORY FOR EACH NEW PANELBOARD AND REVISE CIRCUIT DIRECTORY FOR EACH EXISTING PANELBOARD WHERE MODIFICATIONS ARE MADE. SPARE CIRCUITS SHALL BE IDENTIFIED AS SPARE.
B. CHECK PROPER INSTALLATION AND TIGHTNESS OF CONNECTIONS FOR CIRCUIT BREAKERS.
C. CHECK MAIN AND BRANCH BREAKER TRIP RATINGS FOR COMPLIANCE WITH PANEL SCHEDULE.
D. CHECK ALL BREAKERS FOR CORRECT MECHANICAL AND ELECTRICAL OPERATION.
E. VERIFY THAT GROUND CONDUCTORS TERMINATE ON PANELBOARD GROUND BUS.
F. CHECK THAT WIRE CONNECTIONS ARE PROPERLY MADE AND ADEQUATELY TIGHTENED.

WIRING DEVICES –DISCONNECT, SWITCHES, ETC,

G. CHECK EACH WIRING DEVICE FOR DEFECTS.
H. VERIFY EACH DISCONNECT SWITCH CIRCUIT IS ENERGIZED, AFTER INSTALLATION. USE ARC FLASH PROTECTION WHEN EXPOSED TO ENERGIZED CONDUCTORS INCLUDING THE INCOMING LEADS.

REV	DATE	BY	DESCRIPTION
	02–05–07	JJG	Certified For Construction

DESIGNED D. KNOWLES
DRAWN JMW
CHECKED D. KNOWLES
DATE 02–05–07

GMI GEO–MARINE
ENGINEERS, CONSTRUCTORS & ENERGY MANAGERS
ENERGY SERVICES GROUP
146 MARKET PLACE BOULEVARD
KNOXVILLE, TN 37922
VOICE (865) 692–0084 FAX (865) 692–0560

AFCESA Project Number
WEST–6–S–1319

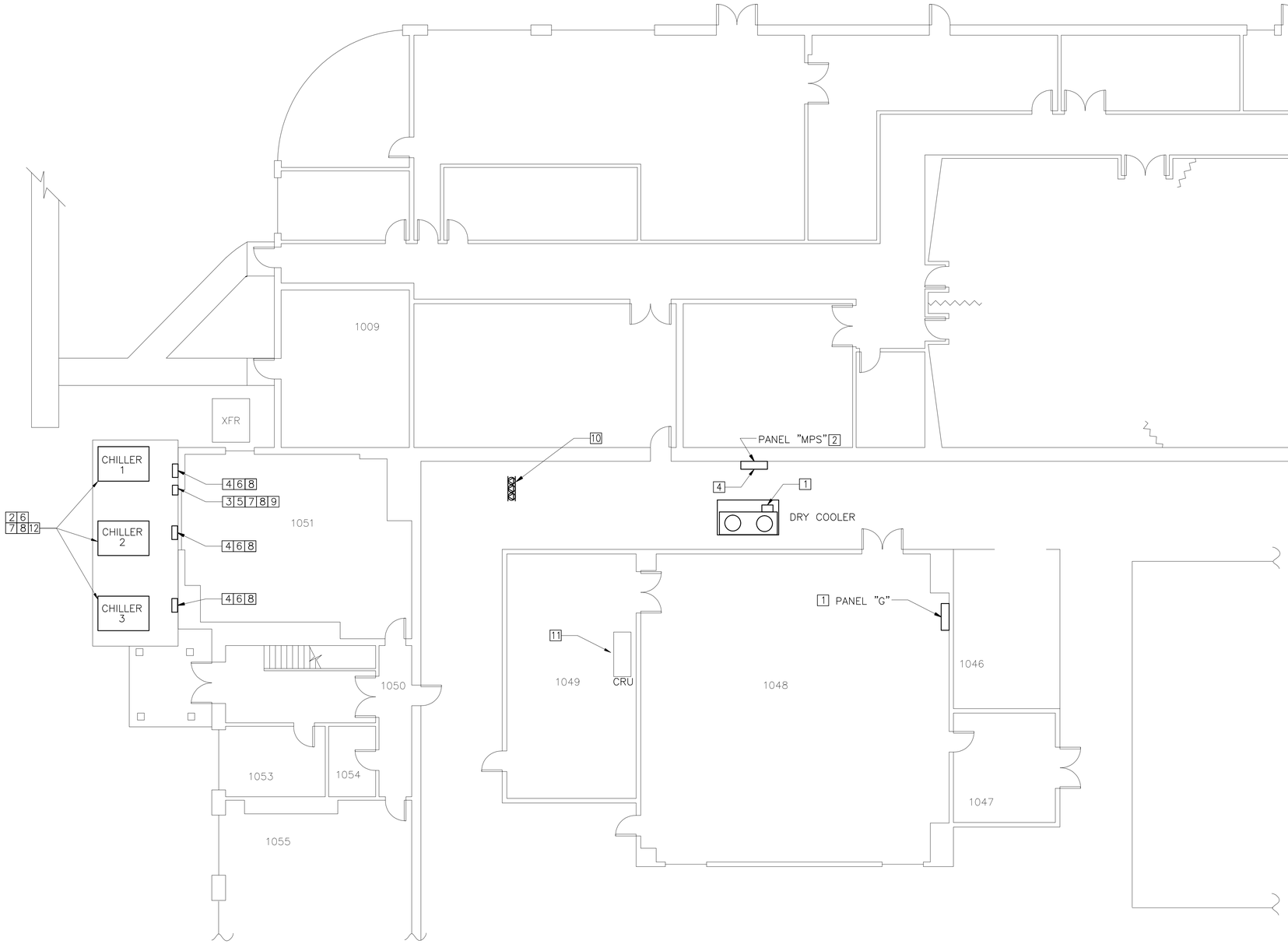
Contract Numbers
FA8903–04–D–8686

WESTOVER ARB PROJ. NO.
YTPM 07–0002

REPAIR FLIGHT SIMULATOR HVAC, BASE HANGAR BLDG 7087, WESTOVER AIR RESERVE BASE

ELECTRICAL NOTES & SPECIFICATIONS

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. E–1
SHEET NO. 13 OF 18



GENERAL:

THE WORK INCLUDES BUT IS NOT LIMITED TO THE LIST BELOW. THIS LIST IS NOT INTENDED TO INCLUDE DETAILED SUB–STEPS SUCH AS PROVIDING SUBMITTALS, ORDERING PARTS, SCHEDULING LABOR, PROCURING AND INSTALLING FUSES, AND THE LIKE. IT ALSO MAY NOT INCLUDE ALL WORK ITEMS. THE CONTRACTOR IS DIRECTED TO CAREFULLY REVIEW ALL OF THE DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL ITEMS.

DEMOLITION NOTES:

1. DE–ENERGIZE AND DISCONNECT EXISTING DRY COOLER. REMOVE CONDUIT AND WIRING BACK TO PANEL "G".
2. DE–ENERGIZE AND DISCONNECT 3 EXISTING 480–VOLT POWER SOURCES FOR CHILLERS 1, 2, & 3.
3. DE–ENERGIZE AND DISCONNECT 3 EXISTING 120–VOLT SOURCES FOR CHILLERS 1, 2, & 3.
4. PRESERVE EXISTING CONDUIT RUNS FOR CHILLERS 1, 2, & 3 FROM THE 480–VOLT DISTRIBUTION PANEL THROUGH THE OUTSIDE WALL.
5. PRESERVE THE EXISTING CONDUIT RUN AND WIRING FROM THE 120–VOLT DISTRIBUTION PANEL TO THE PULL–BOX ON THE OUTSIDE WALL NEAR THE CHILLERS.
6. REMOVE EXISTING POWER WIRING AND CONDUIT (EXCEPT UNDER CONCRETE SLAB) FOR CHILLERS 1, 2, & 3. THE TWO EXISTING HOME RUN CONDUITS WILL BE REUSED BUT WITH NEW WIRING.
7. REMOVE EXISTING 120–VOLT WIRING AND CONDUIT (EXCEPT UNDER CONCRETE SLAB) FROM CHILLERS 1, 2, & 3 BACK TO THE PULL–BOX ON THE OUTSIDE BUILDING WALL NEAR THE CHILLERS. THE HOME RUN WIRING WILL BE REUSED.
8. FOR CHILLERS 1, 2, AND 3 CUT OFF EXISTING 480–VOLT AND 120–VOLT CONDUITS THAT ARE EMBEDDED IN THE CONCRETE AND GRIND EACH END FLUSH WITH SURFACE. FILL EACH CONDUIT END WITH EPOXY FLUSH TO THE SURFACE.
9. REMOVE EXISTING 120–VOLT PULL BOX ON THE OUTSIDE WALL NEAR THE CHILLERS. THE EXISTING INCOMING CONDUIT AND WIRING WILL BE REUSED.
10. DE–ENERGIZE, DISCONNECT, AND REMOVE CONDUIT AND WIRING FOR CHILLED WATER CIRCULATION PUMPS 1, 2 & 3.
11. DE–ENERGIZE AND DISCONNECT EXISTING COMPUTER ROOM AIR CONDITIONING UNIT BACK TO THE EXISTING SAFETY SWITCH. REMOVE CONDUIT BACK TO EXISTING SAFETY SWITCH. THE HOME RUN CONDUIT, WIRING, AND SAFETY SWITCH WILL BE REUSED.

0 4 8 12 16 20

DRAWING SCALE 1/8"=1'–0"

REV	DATE	BY	DESCRIPTION
	02–05–07	JJG	Certified For Construction

DESIGNED D. KNOWLES
DRAWN JMW
CHECKED D. KNOWLES
DATE 02–05–07

439th AIRLIFT WING

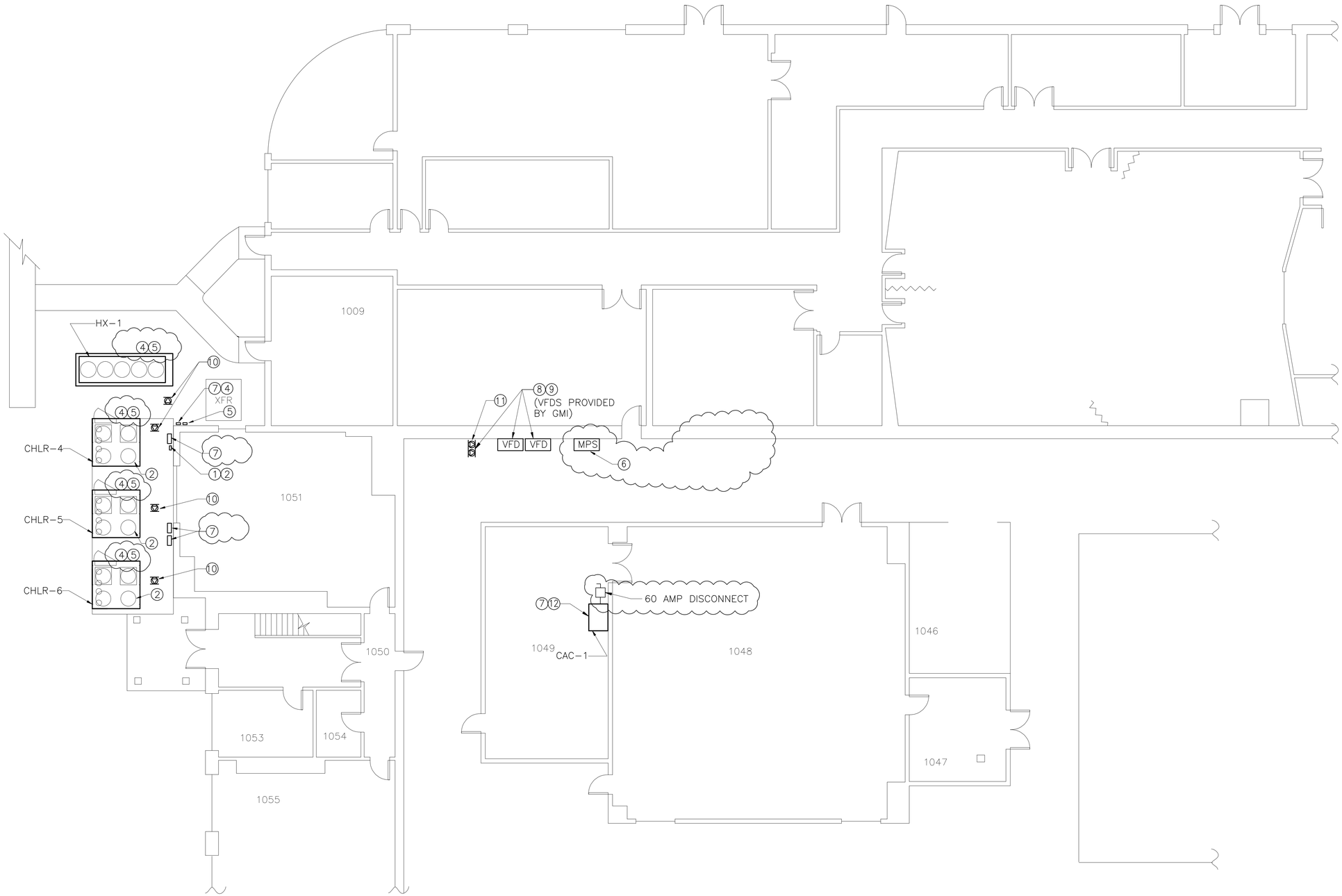
GMI
ENGINEERS, CONSTRUCTORS & ENERGY MANAGERS
ENERGY SERVICES GROUP
146 MARKET PLACE BOULEVARD
KNOXVILLE, TN 37922
VOICE (865) 692-0084 FAX (865) 692-0560

AFCESA Project Number WEST–6–S–1319
Contract Numbers FA8903–04–D–8686
WESTOVER ARB PROJ. NO. YTPM 07–0002

REPAIR FLIGHT SIMULATOR HVAC, BASE HANGAR BLDG 7087, WESTOVER AIR RESERVE BASE

ELECTRICAL DEMOLITION WORK

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. E–2
SHEET NO. 14 OF 18



GENERAL:

THE WORK INCLUDES BUT IS NOT LIMITED TO THE LIST BELOW. THIS LIST IS NOT INTENDED TO INCLUDE DETAILED SUB-STEPS SUCH AS PROVIDING SUBMITTALS, ORDERING PARTS, SCHEDULING LABOR, PROCURING AND INSTALLING FUSES, AND THE LIKE. IT ALSO MAY NOT INCLUDE ALL WORK ITEMS. THE CONTRACTOR IS DIRECTED TO CAREFULLY REVIEW ALL OF THE DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL ITEMS.

NEW WORK NOTES:

1. REPLACE THE 120-VOLT PULL BOX NEAR THE CHILLERS WITH A NEMA 3R OR NEMA 4 PULL BOX OF SIMILAR SIZE.
2. ROUTE 3 NEW CONDUITS FROM THE NEW NEMA 3R OR 4 PULL BOX TO HEAT TRACING CONTROLLERS LOCATED IN EACH CHILLER.
3. PROVIDE, FABRICATE AND INSTALL (2) NEW STEEL MOUNTING CHANNEL FRAMES FOR (3) NEW CHILLER SAFETY SWITCHES, SEE DWG. E-4 AND (3) NEW PRIMARY PUMP STARTERS. EACH CHILLER SAFETY SWITCH WILL BE PAIRED WITH A PRIMARY PUMP COMBINATION STARTER.
4. PROVIDE AND INSTALL NEW SAFETY SWITCHES FOR EACH OF THE 3 NEW CHILLERS AND 1 NEW HEAT EXCHANGER.
5. PROVIDE AND INSTALL NEW COMBINATION STARTERS FOR THE 4 PRIMARY PUMPS.
6. PROVIDE AND REPLACE SIX (6) 480-VOLT CIRCUIT BREAKERS IN PANEL MPS.
7. SUPPORT EQUIPMENT STARTUPS FOR EACH OF 3 CHILLERS, ONE HEAT EXCHANGER, AND COMPUTER ROOM AIR CONDITIONER. EACH PIECE OF EQUIPMENT MAY BE STARTED ON A DIFFERENT DAY.
8. INSTALL TWO NEW 480 3-PHASE 10 HP, VARIABLE FREQUENCY DRIVES (VFDs) FOR NEW SECONDARY CHILLED WATER PUMPS. VDFs ARE SUPPLIED BY GMI. INSTALL NEW WIRE BETWEEN PANEL AND DRIVES, AND BETWEEN THE DRIVES AND MOTORS; THREE #12 AWG WITH #12 GREEN GROUND. REUSE EXISTING CONDUIT WHERE POSSIBLE, PROVIDE NEW CONDUIT AND FITTINGS TO CONNECT EXISTING CONDUITS TO DRIVES AND MOTORS. ROUTE INPUT POWER WIRING, MOTOR WIRING, AND CONTROL WIRING IN SEPARATE CONDUITS. INSTALL ADDITIONAL CONDUIT AS NECESSARY. INSTALL DRIVES PER MANUFACTURER'S RECOMMENDATIONS.
9. SUPPORT VFD STARTUPS. STARTUPS WILL BE PERFORMED BY THE MANUFACTURER UNDER A SEPARATE CONTRACT WITH GMI.
10. PROVIDE AND INSTALL NEW CONDUIT AND WIRING FOR EACH OF 4 NEW PRIMARY CHILLED WATER PUMPS (1, 4, 5, & 6).
11. PROVIDE AND INSTALL NEW CONDUIT AND WIRING FOR EACH OF 2 NEW SECONDARY PUMPS. MOTOR AND PUMP ARE APPROXIMATELY 13-FEET ABOVE-FINISHED-FLOOR (AFF). SUPPLIED THROUGH VFDS (SEE 8 ABOVE).
12. PROVIDE AND INSTALL ELECTRICAL POWER FOR COMPUTER ROOM AIR CONDITIONER (CAC-1). RUN NEW CONDUIT, FLEX, AND WIRING FROM THE EXISTING SAFETY SWITCH NEAR CAC-1 TO CAC-1. REPLACE FUSES IN THE SAFETY SWITCH WITH 40-AMP PER ITEM 16 ON DWG. E4.

0 4 8 12 16 20

DRAWING SCALE 1/8"=1'-0"

REV	DATE	BY	DESCRIPTION
	07-10-07	JJG	As-Built
	02-05-07	JJG	Certified For Construction

DESIGNED D. KNOWLES
DRAWN JMW
CHECKED D. KNOWLES
DATE 02-05-07

ENERGY SERVICES GROUP
146 MARKET PLACE BOULEVARD
KNOXVILLE, TN 37922
VOICE (865) 692-0084 FAX (865) 692-0560

AFCESA Project Number
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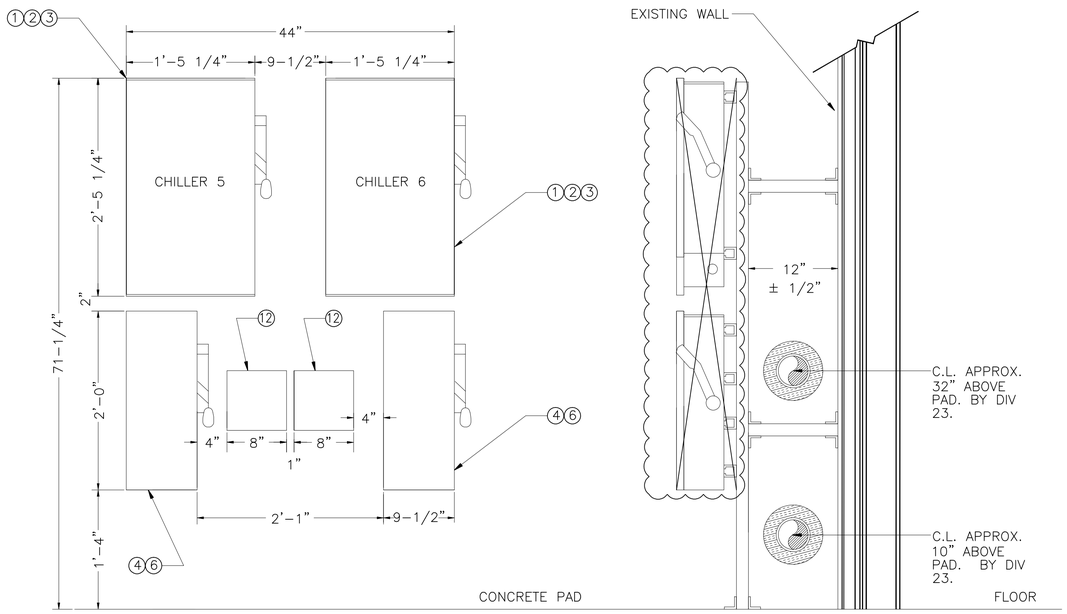
ELECTRICAL NEW WORK

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. E-3
SHEET NO. 15 OF 18

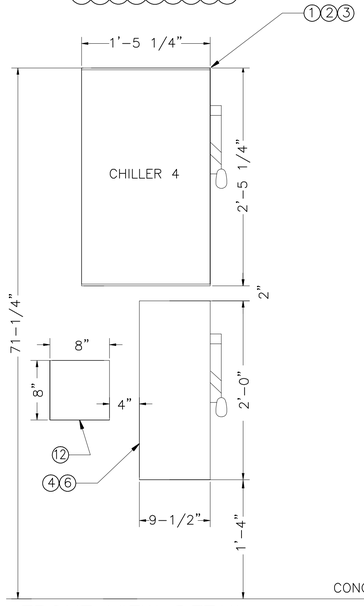


FRONT VIEW DETAIL

(TYPICAL SECTION)
LOCATED ON CHILLERS
NOT TO SCALE

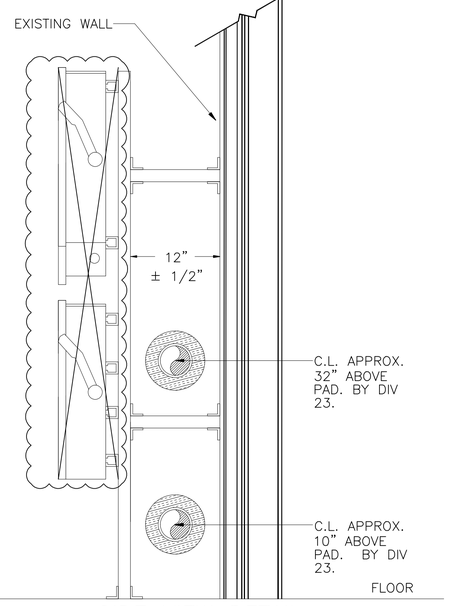
SIDE VIEW DETAIL

(TYPICAL SECTION)
NOT TO SCALE



FRONT VIEW DETAIL

(TYPICAL SECTION)
LOCATED ON CHILLERS
NOT TO SCALE



SIDE VIEW DETAIL

(TYPICAL SECTION)
NOT TO SCALE

PARTIAL ELECTRICAL BILL OF MATERIALS

ITEM #	QUANTITY	DESCRIPTION
1	3	SAFETY SWITCH, 200-AMP, 600-VOLT, 3-PHASE, 60-HERTZ, 125-HP RATED SWITCH, HEAVY DUTY, NEMA 3R, SQUARE D # H364RB
2	9	FUSE REDUCER FOR ITEM 1, 200-AMP TO 100-AMP, BUSSMAN 2621R
3	3	SET OF 3 FUSES FOR ITEM 1 ABOVE, 600-VOLT, 90-AMP, TYPE R, FURNAS TRS90R OR EQUAL, (TOTAL OF 9 FUSES).
4	3	COMBINATION MOTOR STARTER, 600-VOLT, 3 PHASE, 3 POLE, SIZE 0, MAXIMUM OF 5-HP, NEMA 3R ENCLOSURE, 50-VA CONTROL TRANSFORMER, , WITH EXTERNAL RESET SWITCH, MOTOR VOLTAGE 480-VOLTS, CONTROL 120-VOLTS, SQUARE D 8538SBA23V81S 9999SC8, MOTOR FULL LOAD AMPS = 3.4-AMPS, WITH LEGEND PLATE FOR HAND-OFF-AUTO SELECTOR SWITCH READING "RUN-STOP-AUTO".
5	1	COMBINATION MOTOR STARTER, 600-VOLT, 3 PHASE, 3 POLE, SIZE 0, MAXIMUM OF 5-HP, NEMA 3R ENCLOSURE, 50-VA CONTROL TRANSFORMER, WITH EXTERNAL RESET SWITCH, MOTOR VOLTAGE 480-VOLTS, CONTROL 120-VOLTS, SQUARE D 8538SBA23V81S 9999SC8, MOTOR FULL LOAD AMPS = 4.8-AMPS, WITH LEGEND PLATE FOR HAND-OFF-AUTO SELECTOR SWITCH READING "RUN-STOP-AUTO".
6	4	SET OF 3 FUSES FOR ITEMS 4 AND 5 ABOVE, 600-VOLT, 15-AMP, TYPE R, FURNAS TRS15R OR EQUAL, (TOTAL OF 12 FUSES).
7	2	VARIABLE FREQUENCY DRIVE, 480-VOLT, 3-PHASE, 60-HERTZ, 3600 RPM, VERTICAL PACKAGE, WITH INTERNAL BY-PASS, ABB PART # ACH550-VD-015A-4 (SUPPLIED BY GMI).
8	AS NEEDED	INDOOR CONDUIT AND FITTINGS, EMT, GALVANIZED, WITH COMPRESSION FITTINGS AND BOX CONNECTORS
9	AS NEEDED	OUTDOOR CONDUIT AND FITTINGS, INSULATED THROAT, GALVANIZED RIGID STEEL CONDUIT (RSC).
10	AS NEEDED	ELECTRICAL WIRING, 600-VOLT, THWN, 90 DEGREE C (194 F), STRANDED COPPER.
11	11	SPLICE CONNECTORS FOR HEAT EXCHANGER (3) AND GROUNDS (8), SPLIT BOLT CONNECTOR, UL LISTED OR APPROVED EQUAL.
12	12	SPLICE CONNECTORS FOR PRIMARY PUMPS, SPLIT BOLT CONNECTOR, UL LISTED, OR APPROVED EQUAL.
13	3	SIEMENS CIRCUIT BREAKER, 480-VOLT, 3-POLE, 100-AMP, WITH LUGS, SIEMENS # ED43B100L
14	2	SIEMENS CIRCUIT BREAKER, 480-VOLT, 3-POLE, 35-AMP, WITH LUGS, SIEMENS # ED43B035L
15	1	SIEMENS CIRCUIT BREAKER, 480-VOLT, 3-POLE, 20-AMP, WITH LUGS, SIEMENS # ED43B020L
16	1	SET OF 3 FUSES FOR COMPUTER ROOM AIR CONDITIONER, 600-VOLT, 40-AMP, TYPE R, FURNAS TRS40R OR EQUAL (TOTAL OF 3 FUSES). VERIFY EXISTING FUSE HOLDERS WILL ACCEPT THESE FUSES BEFORE PURCHASING.
17	1	SAFETY SWITCH, 60-AMP, 600-VOLT, 3-PHASE, 60-HERTZ, 50-HP RATED SWITCH, HEAVY DUTY, NEMA 3R, SQUARE D # H362RB
18	1	SET OF 3 FUSES FOR ITEM 17 ABOVE, 600-VOLT, 15-AMP, TYPE R, FURNAS TRS15R OR EQUAL, (TOTAL OF 3 FUSES).
19	1	CLASS R FUSE KIT—600 VOLT (ONE KIT PER 3-POLE SWITCH), SQUARE D # RFK06H FOR ITEM 17 ABOVE.

REV	DATE	BY	DESCRIPTION
	07-10-07	JJG	As-Built
	02-05-07	JJG	Certified For Construction

DESIGNED D. KNOWLES
DRAWN JMW
CHECKED D. KNOWLES
DATE 02-05-07

ENERGY SERVICES GROUP
146 MARKET PLACE BOULEVARD
KNOXVILLE, TN 37922
VOICE (865) 692-0084 FAX (865) 692-0560

AFCESA Project Number
WEST-6-S-1319

Contract Numbers
FA8903-04-D-8686

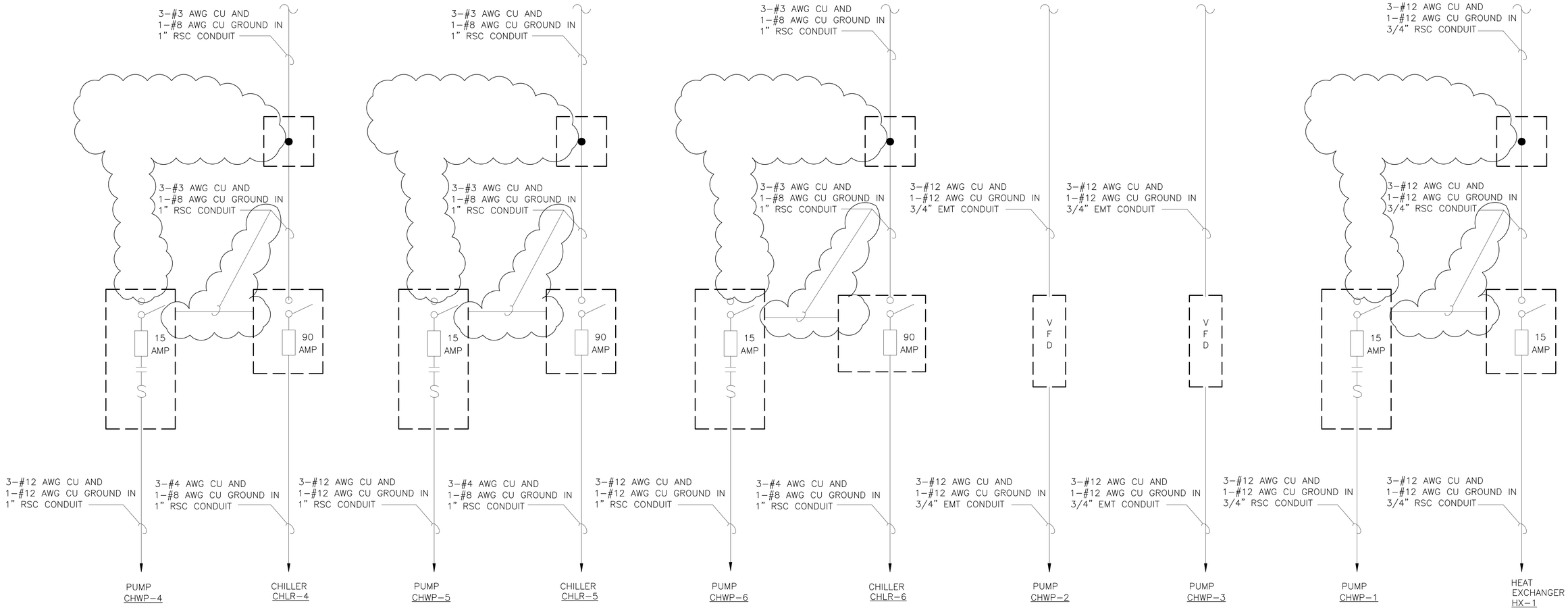
WESTOVER ARB PROJ. NO.
YTPM 07-0002

REPAIR FLIGHT SIMULATOR HVAC, BASE HANGAR BLDG 7087, WESTOVER AIR RESERVE BASE

SAFETY SWITCH & PRIMARY PUMP STARTER MOUNTING DETAILS

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. E-4
SHEET NO. 16 OF 18

FOR CONTINUATION:
SEE ONE LINE DIAGRAM DWG. E-6



REV	DATE	BY	DESCRIPTION
	07-10-07	JJG	As-Built
	02-05-07	JJG	Certified For Construction

DESIGNED D. KNOWLES
DRAWN JMW
CHECKED D. KNOWLES
DATE 02-05-07

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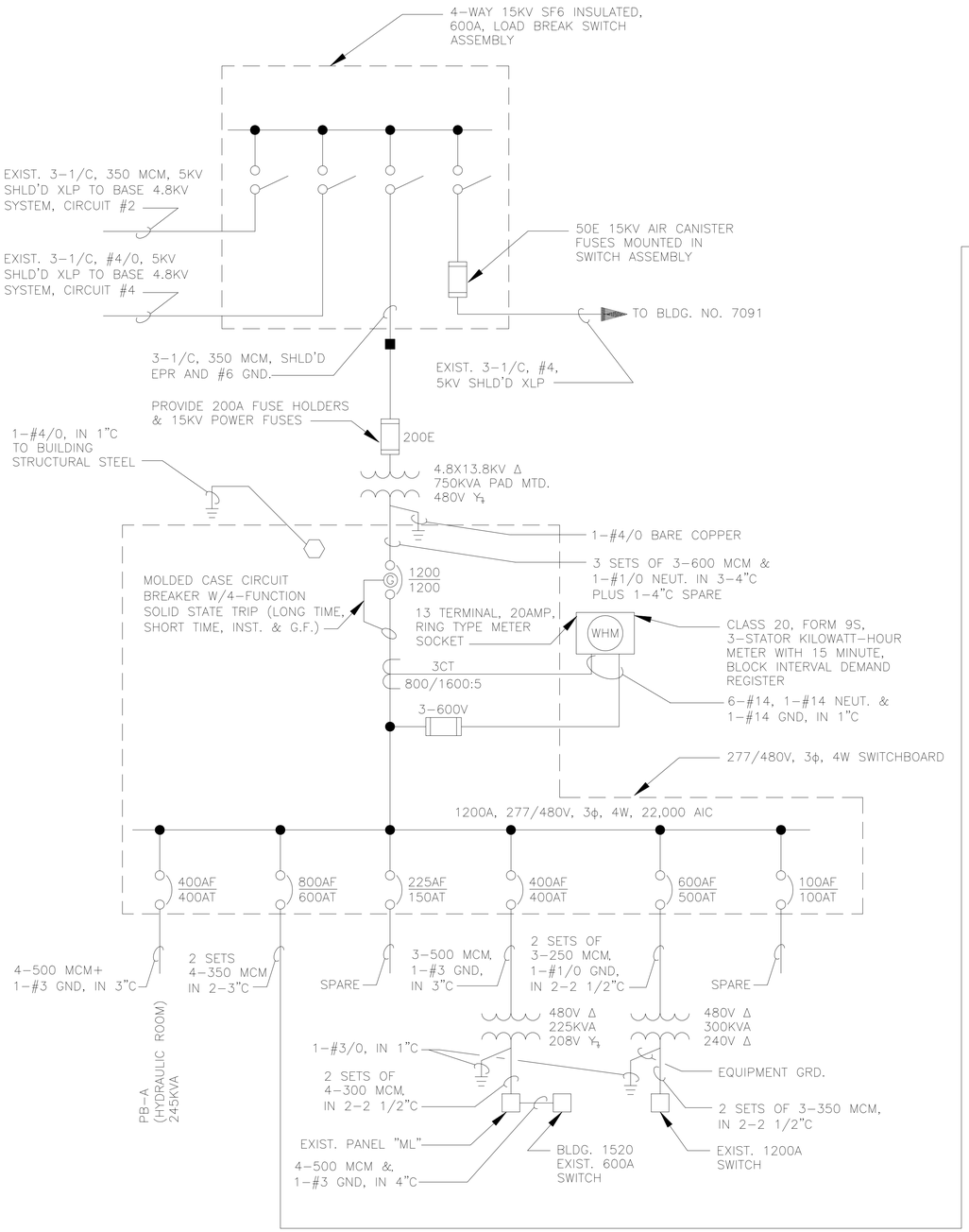
REPAIR FLIGHT SIMULATOR HVAC, BASE HANGAR BLDG 7087, WESTOVER AIR RESERVE BASE

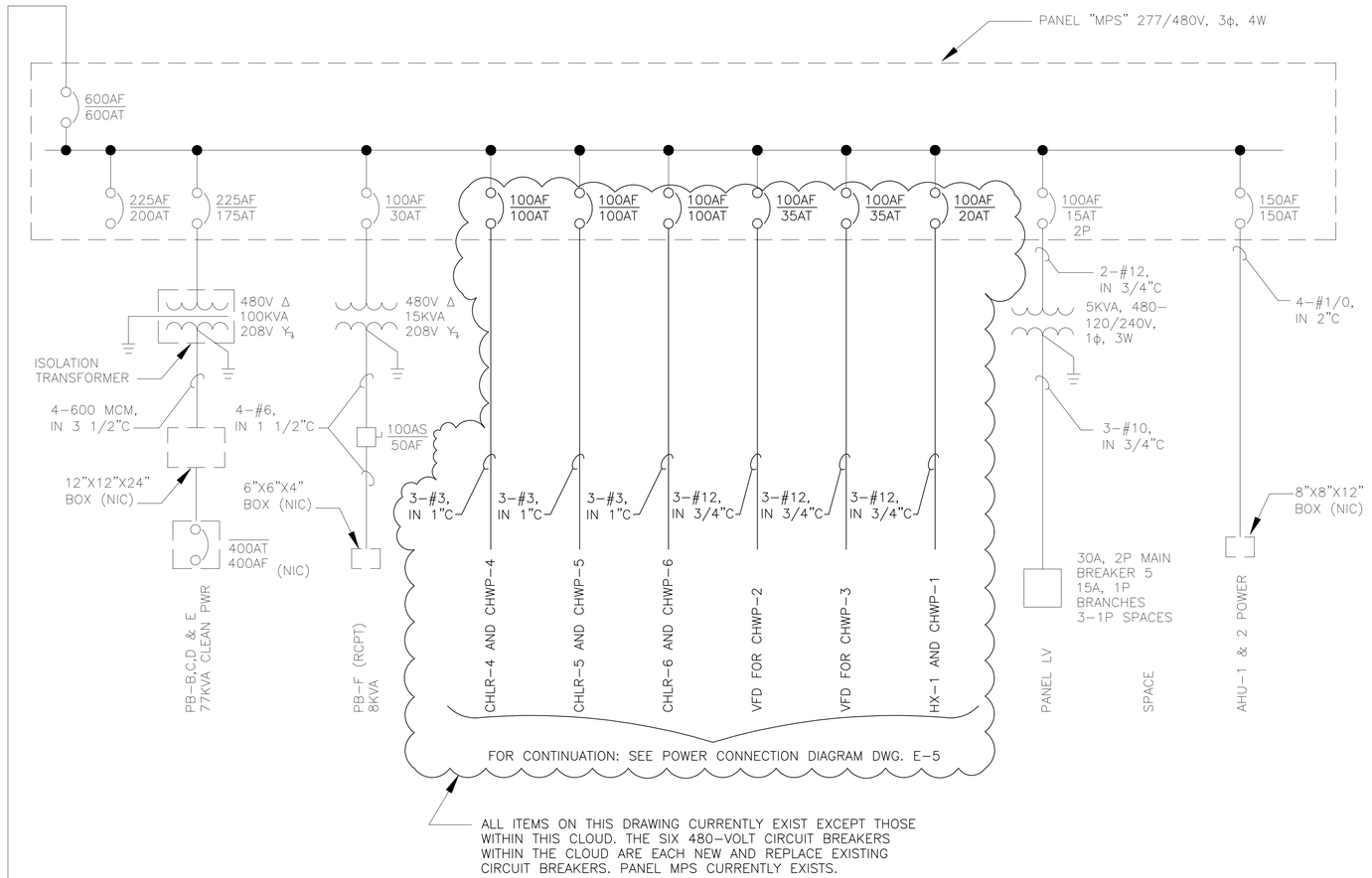
POWER CONNECTION DIAGRAM

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. E-5
SHEET NO. 17 OF 18

GENERAL NOTE:

REFER TO REFERENCE DRAWING: WST 4034, DATED MARCH 20, 1991 FOR EXISTING ONE LINE DIAGRAM.





ALL ITEMS ON THIS DRAWING CURRENTLY EXIST EXCEPT THOSE WITHIN THIS CLOUD. THE SIX 480-VOLT CIRCUIT BREAKERS WITHIN THE CLOUD ARE EACH NEW AND REPLACE EXISTING CIRCUIT BREAKERS. PANEL MPS CURRENTLY EXISTS.

REV	DATE	BY	DESCRIPTION
	02-05-07	JJG	Certified For Construction

DESIGNED D. KNOWLES
DRAWN JMW
CHECKED D. KNOWLES
DATE 02-05-07

439th AIRLIFT WING

GMI GEO-MARINE
ENGINEERS, CONSTRUCTORS & ENERGY MANAGERS
ENERGY SERVICES GROUP
146 MARKET PLACE BOULEVARD
KNOXVILLE, TN 37922
VOICE (865) 692-0084 FAX (865) 692-0560

AFCESA Project Number: WEST-6-S-1319
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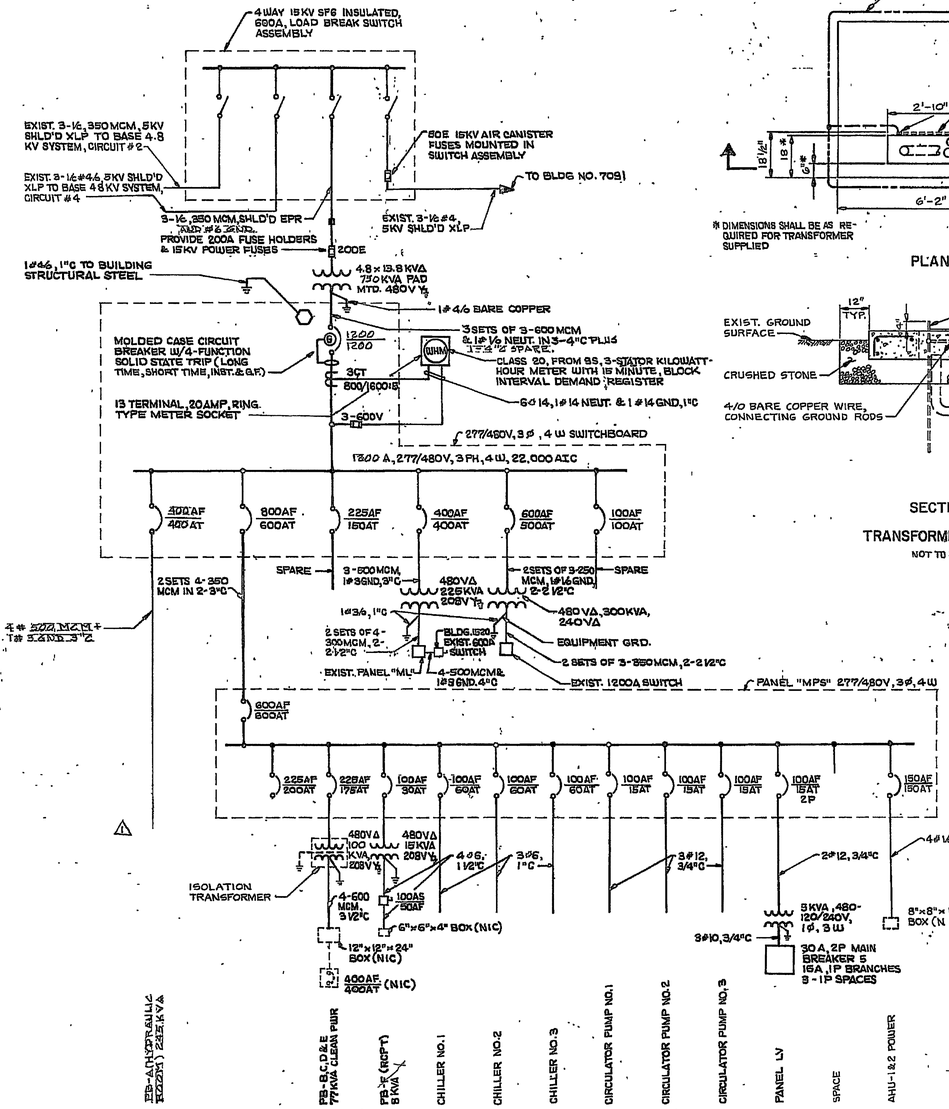
WESTOVER ARB PROJ. NO.: YTPM 07-0002

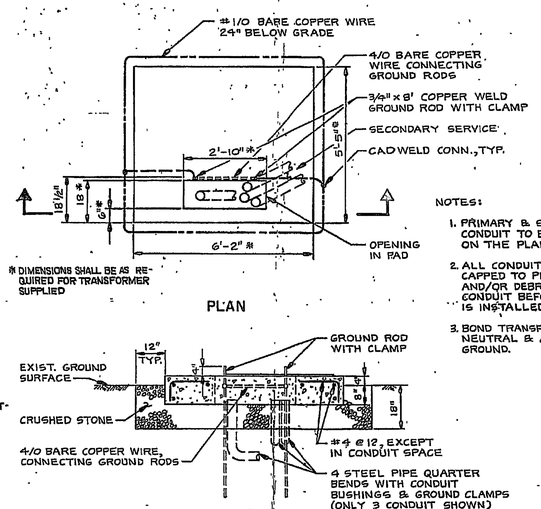
REPAIR FLIGHT SIMULATOR HVAC, BASE HANGAR BLDG 7087, WESTOVER AIR RESERVE BASE

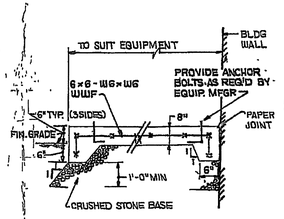
ONE LINE DIAGRAM

GMI JOB NO. 30529.00.05
ISSUED 100%
DRAWING NO. E-6
SHEET NO. 18 OF 18



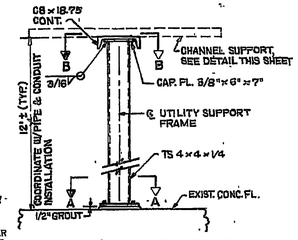
ONE LINE DIAGRAM





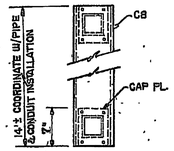
CHILLER PAD - SECTION 1 - 1

N.T.S.



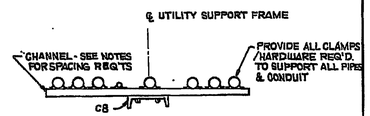
UTILITY SUPPORT FRAME

N.T.S.



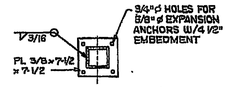
SECTION B-B

N.T.S.



TYPICAL CHANNEL SUPPORT

N.T.S.

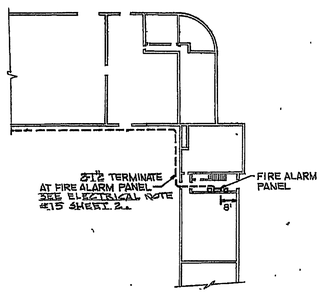


SECTION A-A

N.T.S.

NOTES:

1. LAYOUT AND ARRANGEMENT OF PIPE, CONDUIT, EQUIPMENT AND APPURTENANCES AS SHOWN ON THE HVAC & ELECTRICAL PLANS WHICH ARE TO BE SUPPORTED ARE DIAGRAMMATIC ONLY AND SUBJECT TO FIELD VERIFICATION BY THE CONTRACTOR. COORDINATE LOCATION OF SUPPORT FRAMES & ACTUAL SUPPORT W/ PIPE, CONDUIT & EQUIPMENT INSTALLATIONS
2. PROVIDE BRACKET SUPPORTS, CLAMPS AND HARDWARE FOR ATTACHMENT TO CMU WALLS
3. PROVIDE PIPE SUPPORTS AT 10' ON CENTER (MAX) FOR ALL STEEL PIPE & ALL COPPER PIPE 1 1/2" AND LARGER. SUPPORT ALL COPPER PIPE 1 1/4" AND LESS AT 6' ON CENTER (MAX). PROVIDE SUITABLE PIPE SUPPORTS IN ACCORDANCE WITH MSS SP-58 & MSS SP-69. SUPPORT PUMPS, EXPANSION TANK & BACKFLOW PREVENTERS FROM WALL INDEPENDENT OF PIPING
4. ELECTRICAL CONDUIT SHALL BE SUPPORTED BY 10' ON CENTER (MAX).
5. FOR STRUCTURAL NOTES & SPECIFICATIONS, SEE SH. 2



BASE HANGAR PART PLAN

SCALE: 1/32" = 1'-0"

FOR REFERENCE ONLY

USING AGENCY	1	10JAN92	DISCONTINUE SWITCH DELETION	BTW	ATW
	REV	DATE	DESCRIPTION	DRAWN	APP'D
FIRE CHIEF	AIR FORCE RESERVE				
	CIVIL ENGINEERING				
SAFETY	WESTOVER AIR FORCE BASE CHICOPEE, MASS. 01022				
CORROSION ENGINEER	C-5 SIMULATOR SITEWORK				
	WESTOVER AIR FORCE BASE, MA.				
PROJECT ENGINEER	ONE LINE DIAGRAM, UTILITY SUPPORT FRAME AND MISCELLANEOUS DETAILS				
ARCHITECTURAL/ENVIRONMENTAL	SUBMITTED: CHIEF ENGINEER	RECOMMENDED: BASE ENGINEER	APPROVED: BASE COMMANDER		
	DESIGNED: J.P.S.	SCALE: AS NOTED	DRAWING NUMBER: WST 4034		
	DRAWN: I.P.H.	DATE: MAR 20, 1990	PROJECT NUMBER: WST 91-0031	SHEET 5 OF 5	

FAY, SPOFFORD & THORNDIKE, INC. - ENGINEERS
LEXINGTON, MASSACHUSETTS

1. FAC 7089