ISSUED FOR BID/CONSTRUCTION

D UTILITIES & ELECTRIC SERVICES B516 (MC) REPAIR B516 (R/

GRAND FORKS AFB, NORTH DAKOTA

MINOT

BISMARCK

STATE OF NORTH DAKOTA-VICINITY MAP

GRAND

FORKS

AFB

JAMESTOWN

GRAND

FORKS

/ FARGO

KOHLAN E-12025

WILLISTON

NO SCALE

20 APRIL 2010

1. IN THE EVENT OF DISCREPANCIES WITHIN THE DRAWINGS OR SPECIFICATIONS, THE GREATER QUALIT AND QUANTITY OF THE ITEMS IN QUESTION SHALL BE UTILIZED AT ALL LOCATIONS WHERE SUCH DISCREPANCIES OCCUR.

- THE CONTRACTOR SHALL PROTECT EXISTING BUILDING AND SITE MATERIALS SCHEDULED TO REMAIN, AND SHALL BE RESPONSIBLE FOR DAMAGE TO SAME RESULTING FROM WORK UNDER THIS CONTRACT. THE CONTRACTOR SHALL RESTORE DAMAGED EXISTING BUILDING AND SITE MATERIALS TO THEIR ORIGINAL CONDITION.
- CONTRACTOR SHALL EXERCISE CAUTION TO AVOID ANY DAMAGE WHEN PERFORMING EARTHWORK, PAVING, OR ANY CONSTRUCTION IN THE VICINITY OF EXISTING UTILITIES, BUILDINGS, AND LANDSCAPING.
- ALL LANDSCAPED AREAS OF SITE WHICH ARE DISTURBED BY WORK OF THIS PROJECT SHALL BE FINE-GRADED AND SODDED TO RETURN THE AREA TO ITS ORIGINAL CONDITION
- CONTRACTOR SHALL INSPECT SITE AND FIELD VERIFY ALL DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING CONSTRUCTION. NOTIFY CONTRACTING OFFICER IMMEDIATELY OF ANY DISCREPANCIES.
- THE CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS, AND SHALL BE RESPONSIBLE FOR THE SAME. COORDINATE ALL WORK AND SHOP DRAWINGS WITH OTHER TRADES.
- 7. THE CONTRACTOR SHALL COORDINATE ON-SITE STORAGE OF BUILDING MATERIALS, EQUIPMENT, AND TRASH CONTAINERS WITH GOVERNMENT PRIOR TO COMMENCEMENT OF WORK.
- 8. ALL WORK SHALL COMPLY WITH APPLICABLE CODES, REGULATIONS, AND ORDINANCES.
- 9. ALL MATERIALS AND EQUIPMENT OF THE SAME TYPE SHALL BE SUPPLIED BY THE SAME MANUFACTURER, AND SHALL BE NEW, OF THE BEST QUALITY AND DESIGN, AND FREE FROM DEFECTS.
- 10. ALL ITEMS ARE NEW UNLESS SPECIFICALLY IDENTIFIED AS EXISTING.
- 11. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION OF ALL WORK. CONTRACTOR SHALL ANTICIPATE AREAS WHERE THE INSTALLATION OF MECHANICAL AND ELECTRICAL WORK WILL BE RESTRICTED, CONGESTED, OR DIFFICULT TO INSTALL, AND SHALL COORDINATE INSTALLATION BETWEEN THE TRADES.
- 12. CONTRACTOR SHALL COORDINATE ALL MECHANICAL AND ELECTRICAL ITEMS WITH THE GENERAL CONSTRUCTION.

ASBESTOS AWARENESS

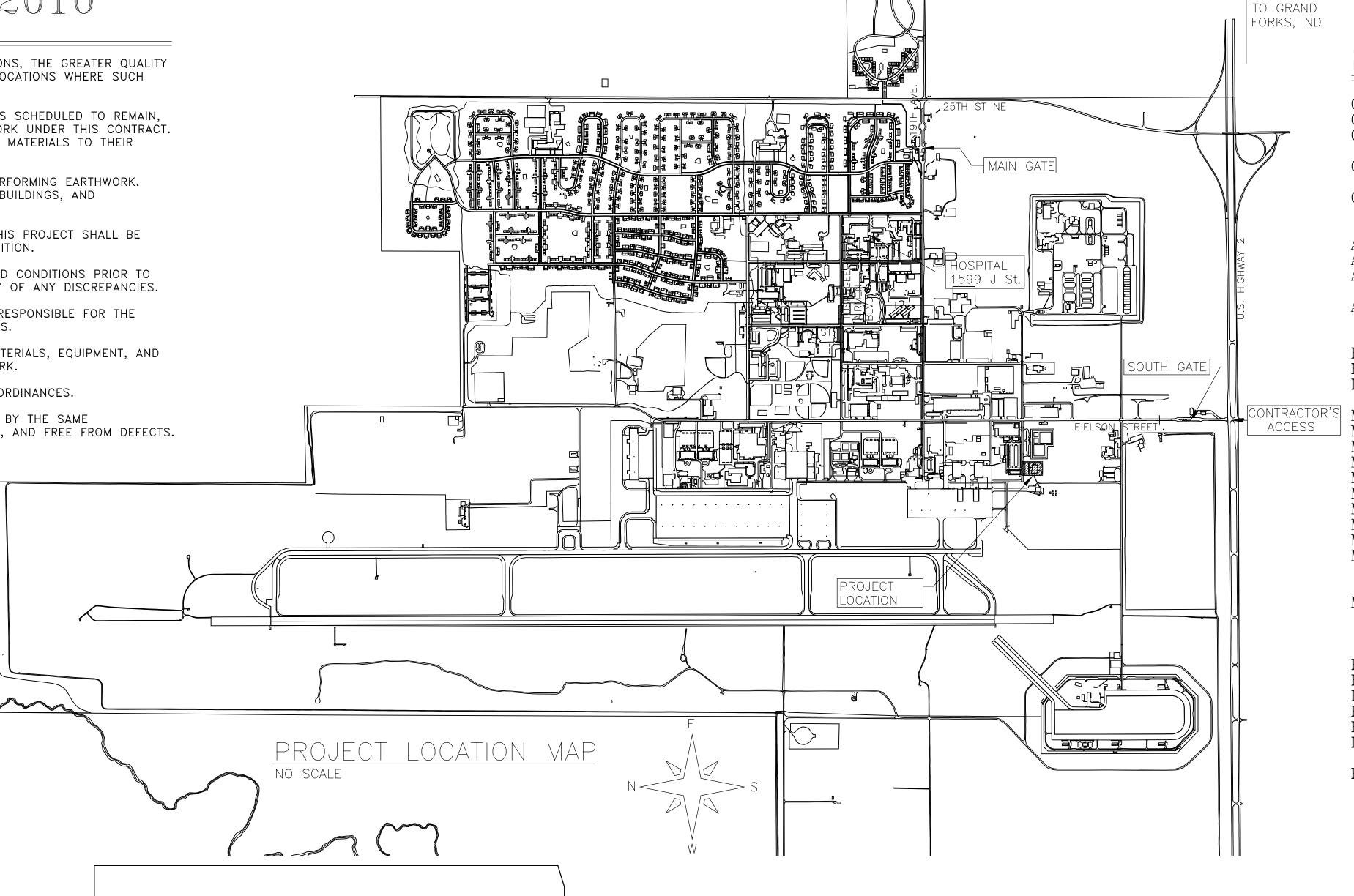
THERE IS KNOWN ASBESTOS IN WORK AREAS ASSOCIATED WITH THIS PROJECT. SEE SPEC. SECTION 02 82 14 FOR ADDITIONAL INFORMATION. IF, DURING REMOVAL WORK, THE CONTRACTOR DISCOVERS ANY OTHER MATERIAL WHICH HE SUSPECTS MAY CONTAIN ASBESTOS, HE SHALL IMMEDIATELY NOTIFY THE GOVERNMENT CONSTRUCTION REPRESENTATIVE AND CEASE WORK IN CLOSE PROXIMITY TO THE SUSPECTED ASBESTOS-CONTAINING MATERIALS. THE GOVERNMENT CONSTRUCTION REPRESENTATIVE WILL THEN ARRANGE FOR THE TESTING AND REMOVAL OF ANY ASBESTOS MATERIALS, IF NECESSARY, TO ALLOW THE CONTRACTOR TO PERFORM THE WORK IN THIS PROJECT.

LEAD-BASED PAINT AWARENESS

TESTING HAS BEEN PERFORMED ON PAINTED SURFACES IN SOME PORTIONS OF THE PROJECT AREA FOR LEAD CONTENT. LEAD CAN BE PRESENT IN OLDER PAINTED FINISHES, AND THE CONTRACTOR IS HEREBY ADVISED THAT A POTENTIAL FOR LEAD HAZARD EXISTS.

THE CONTRACTOR, AT HIS DISCRETION, MAY EMPLOY CHEMICAL SPOT-TESTING OR OTHER MEANS TO IDENTIFY LEAD COATINGS WHERE MANUAL DEMOLITION IS DESIRABLE, OR PRIOR TO ANY EMPLOYEE TASK THAT MIGHT SUBJECT WORKERS TO LEAD HAZARDS. COMPLY WITH OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) 29 CFR 1926.62. THIS REGULATION REQUIRES THE CONTRACTOR TO DEVELOP WORK STRATEGIES THAT MINIMIZE EXPOSURE TO LEAD HAZARDS.

ALL COSTS ASSOCIATED WITH LEAD PAINT TESTING, REMOVAL AND PRECAUTIONS (IF REQUIRED) ARE THE RESPONSIBILITY OF THE CONTRACTOR.



JFSD200976A&B

SCHEDULE OF DRAWINGS

G-001 COVER SHEET G-002 ABBREVIATIONS

G-003 ABBREVIATIONS AND SYMBOLS

CD101 SITE REMOVAL AND SITE LAYOUT PLANS

AND DETAILS CU101 EXISTING SITE UTILITY PLAN AND

COST BREAK-OUT PLAN

AD101 REMOVAL PLAN

A-101 FLOOR/SITE PLAN AND DETAILS

A-102 ROOM FINISH SCHEDULE, CEILING PLAN AND WALL TYPES

A-601 DOOR AND FRAME SCHEDULE, DOOR TYPES,

AND FRAME TYPES

F-101 EGRESS AND OCCUPANCY PLAN

FX101 FIRE SUPPRESSION PLANS

FIRE SUPPRESSION DETAILS

MECHANICAL/ELECTRICAL SITE PLAN

HVAC DEMOLITION PLAN

MD102 HVAC PIPING DEMOLITION PLAN

MH101 HVAC PLAN

MP101 HVAC PIPING PLAN M-501 MECHANICAL DETAILS

M-502 MECHANICAL DETAILS AND SYMBOLS LEGEND

MECHANICAL SCHEDULES

M-602 MECHANICAL SCHEDULES

M-603 VAV TERMINAL AND DUAL TEMPERATURE

WATER SYSTEM DIAGRAMS AND CONTROL SEQUENCES

M-604 AIR HANDLING UNIT AND EMERGENCY

GENERATOR DIAGRAMS AND CONTROL SEQUENCES

E-001 ELECTRICAL LEGEND AND GENERAL NOTES

ELECTRICAL DEMOLITION PLAN

EL101 LIGHTING PLAN

EP101 POWER PLAN

SPECIAL SYSTEMS PLAN ELECTRICAL ONE-LINE RISER DIAGRAM

AND SCHEDULES

E-602 ELECTRICAL SCHEDULES

SHEET REFERENCE NUMBER G - 001

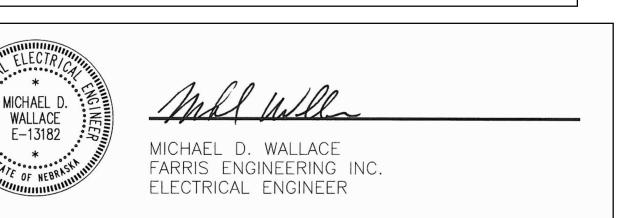
Sheet <u>**01**</u> of <u>30</u>

MORRISSEY E-5857 JOHN M. MORRISSEY FARRIS ENGINEERING INC. MECHANICAL ENGINEER

ARCHITECT

KĚNNETH J. HAHN

KENNETH HAHN ARCHITECTS, INC.



DONNA G. KOHLAN, PE

FARRIS ENGINEERING, INC.

FIRE PROTECTION ENGINEER

DISSEM

D & M

DISC

DIST

DN

DP

DR

DRN

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DWG

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EA.

EΑ

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F.D.

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FEB

FEC

FΗ

FHC

FIG.

FIN.

FIX.

FLASH

FLUOR

FLEX

FLG

FOS

F.O.

FPM

FPRF

FR

FRG

F.S.

FSF

FT.

FTG.

FW

FWC

FP

F.E.S

EQUIP.

C (cont.)

CHIMNEY

CURB INLET

CONTROL JOINT

CAST IRON

CIRCULAR

CHECKED

CENTER LINE

CIRCUIT

CEILING

CLERK

CAULKING

CLOSET

CLOSED

COUNTER

CLEANOUT

COLUMN

COMMON

COMBINATION

COMBUSTION

CONCRETE

CONFERENCE

CONNECTION

CONTINUOUS

CORNER

CORRIDOR

COVERED

CARPET

CARRIAGE

CASEMENT

COUNTER SINK

CAST STONE TILE

TRANSFORMER

CONDENSING UNIT

CABINET UNIT HEATER

CERAMIC WALL TILE

PENNY (as in nail - 10d)

DOWELED CONTROL JOINT

DUMMY CONTOL JOINT

DRINKING FOUNTAIN

CARPET TILE

CUBIC YARDS

CEILING VENT

COLD WATER

CYLINDER

DATUM

DRY BULB

DOUBLE

DEGREE

DETAIL

DOUBLE ACTING

DIRECT CURRENT

DOOR CLOSER

DEPRESSION

DEPARTMENT

DOUBLE HUNG

DUCT HEATER

DIAMETER

DIAGONAL

DIMENSION

DIRECTOR

CENTER

COURSE

CONSTRUCTION

CONSTRUCTION JOINT

CEMENT PLASTER

CYCLES PER SECOND (HERTZ)

CORROSIVE RESISTANT STEEL

CERAMIC TILE or CURRENT

CLEAR TEMPERED INSULATING GLASS

CLEAR TEMPERED GLASS

COMPRESSIBLE

COMMUNICATIONS

CARBON DIOXIDE

CKT BKR or CB CIRCUIT BREAKER

C.F.C.I.

C.F.G.I.

CHIM

C.I.

CI

CIR

CJ

CKD

CKT

CLG

CLK

CLKG

CLO

CLOS

CMP

CMU

CNTR

CO

 CO_2

COL

COM

COMB

COMB

COMP

COMM

CONC.

CONF.

CONN

CONT

COR

CORR

COV

CPL

CPT

CRES

CRG

CRSE

CS

CST

CSMT

СТ

CTG

CTIG

CTL

CTR

CU

 CV

CW

CWT

CYL

DA

DB

DBL

DC

D.C.J.

DCJT

DCL

DEG

DEPR

DEPT

DET

DH

DH

DIAG

DIM

DIR

DIA or Ø

CUH

CU YD

C.P.S. ∼

CONSTR

CONSTR

C or CL

CONTRACTOR FURNISHED

CONTRACTOR FURNISHED

CONTRACTOR INSTALLED

GOVERNMENT INSTALLED

CORRUGATED METAL PIPE

CONCRETE MASONRY UNITS

D (cont.)
DISSEMANATION
DISCONNECT
DISTRIBUTION
DRESSED & MATCHE

DOWN DAMPPROOFING DOOR DRAIN DOWN SPOUT

> DOWELS DIRECT EXPANSION

EAST EACH EXHAUST AIR

DRAWING

ENTERING AIR TEMPERATURE EMERGENCY EYEWASH & SHOWER EXTERIOR INSULATION & FINISH SYSTEM EXPANSION JOINT

EL or ELEV. ELEVATION — GRADE OR BUILDING ELECTRIC or ELECTRICAL ELEVATOR ESTIMATED MAXIMUM DEMAND ENCLOSURE

ENTRANCE EXPLOSION PROOF EQUAL EQUIPMENT EACH SIDE ESTIMATE

ELECTRIC WATER COOLER ENTERING WATER TEMPERATURE EXCAVATE EXIT DEVICE

EXD EXH EXHAUST EXISTING EXIST. EXP EXPOSED EXPL EXPLOSION EXPN EXPANSION EXT EXTERIOR

> FAHRENHEIT FRESH AIR FOOT CANDLE

FACING FLOOR CONSTRUCTION JOINT FLOOR CLEANOUT FLOOR DRAIN FIRE DAMPER FOUNDATION FIRE EXTINGUISHER FIRE EXTINGUISHER BRACKET FIRE EXTINGUISHER CABINET FLARED END SECTION

FIRE HYDRANT FIRE HOSE CABINET FIGURE FINISH FIXTURE

FLOOR FL or FLR FLASHING FLEXIBLE FLOORING FLUORESCENT FACE OF STUD FIBER OPTIC FIRE PROTECTION FEET PER MINUTE

FIRE PROOF FRAME FURRING

FULL SIZE FABRIC SILT FENCE FEET FOOTING FIRE WATER FABRIC WALL COVERING G

GAS GUTTER GΑ GAGE or GAUGE GAL GALLON GALV GALVANIZED G.C.O. GROUND CLEANOUT GEN GENERAL G.F.C.I. GOVERNMENT FURNISHED CONTRACTOR INSTALLED G.F.G.I. GOVERNMENT FURNISHED GOVERNMENT INSTALLED GFE

GOVERNMENT FURNISHED EQUIPMENT G.F.I. or GFI GROUND FAULT INTERRUPTOR GFRP GLASS FIBER REINFORCED PLASTER GALVANIZED IRON GLASS

GND or GRND GROUND GOVT. GOVERNMENT GALLONS PER MINUTE GPM GR GRADE GALVANIZED RIGID STEEL CONDUIT

GRS GRTG GRATING GRAZED STRUCTURAL UNITS GSU GWB GYPSUM WALLBOARD GWT GLAZED WALL TILE GYP GYPSUM

GI

GL

HB HOSE BIBB HBD HARDBOARD HC HANDICAPPED HCD HALON CONTAINMENT DAMPER HD HEAD HDR

HEADER HDRL HANDRAIL HDW HARDWARE HOLLOW METAL НМ HP HORSE POWER HIGH PRESSURE LAMINATE FLOORING HIP HIGH PRESSURE

H.PT. HIGH POINT HR HOUR H.S. HIGH STRENGTH HSGYP HIGH-STRENGTH GYPSUM PLASTER HT HEIGHT

HTG HEATING HTR HEATER H.W. HEADWALL HWHOT WATER HOT WATER HEATER HWHHYD HYDRAULIC HERTZ Hz

l or EF IRON IC INTERCOM I.D. INSIDE DIAMETER IDS INTRUSION DETECTION SYSTEM I.E. INVERT ELEVATION IES ILLUMINATING ENGINEERING SOCIETY

IN INCH INSULATION INSUL. INT. INTERIOR INV. INVERT or INVERTER I.P. IRON PIPE

JB or J-BOX JUNCTION BOX JC JANITOR CLOSET JCT JUNCTION JST JOIST

JOINT

kcmil or KCM KILO CIRCULAR MIL KEENE'S CEMENT PLASTER KCP KIP KILOPOUND (1000 LBS) KIT KITCHEN ΚL KEY LOCK KICK PLATE KΡ KILOVOLTS kV kVA KILOVOLT AMPERES KILOVOLT AMPERES REACTIVE kvar KILOWATT kW

LAB

LAT

LAU

LAV

LWT

MTD

LUMEN LABORATORY LEAVING AIR TEMPERATURE LAUNDRY LAVATORY LUMBER

LBR LBS POUNDS LD LOAD LDG LOADING LG LENGTH LIN LINEAR LIS LAWN IRRIGATION SYSTEM LNTL LINTEL LONG LONGITUDINAL LP LOW POINT

LPS LIGHT PROOF SHADE LR LIVING ROOM L.R. LONG RADIUS LT LIGHT LTG LIGHTING LT. WT.

LIGHT WEIGHT LEAVING WATER TEMPERATURE

THOUSAND MACHINE MACH MAINTENANCE MAINT. MASONRY MAS MAT or MATL MATERIAL MAX MAXIMUM MATCHED & BEADED M & B MEDICINE CABINET MC MCJ MASONRY CONTROL JOINT MDF MEDIUM DENSITY FIBERBOARD MECH MECHANICAL MER MECHANICAL EQUIPMENT ROOM MET. METAL MFG MANUFACTURING MFR MANUFACTURER MG MOTOR GENERATOR MGT MATTE - GLAZED TILE MGMT MANAGEMENT MANHOLE М.Н. MINIMUM MIN

ML METAL LATH MLDG MOULDING MO MASONRY OPENING MONO MONOLITHIC MOT MOTOR MS MOTOR STARTER MSTC MASTIC ΜT METAL THRESHOLD

MOUNTED

NORTH NORMALLY CLOSED N.C. NCO NON COMMISSIONED OFFICER NEC NATIONAL ELECTRICAL CODE NEMA NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION NFPA NATIONAL FIRE PROTECTION ASSOCIATION NIC NOT IN CONTRACT NU OR NO. NUMBER N.O. NORMALLY OPEN N.R. NOT REQUIRED

COMMAND

₹ 819 319

SHEET REFERENCE NUMBER G - 002Sheet <u>02</u> of <u>30</u>

BUR

C or CND CAP CATV CC

СВ CE CEM CFM

CFT

COVER ELEVATION CEMENT CUBIC FEET PER MINUTE CERAMIC FLOOR TILE

ANCHOR BOLT

ACOUSTIC

ACCESS DOOR

AREA DRAIN

AGGREGATE

AREA INLET

ALUMINUM

ALTERNATE

APPROVED

APPROXIMATE

INSTITUTE

ASBESTOS

ASPHALT

ASSISTANT

AUTOMATIC

AVERAGE

ANGLE

AMPERE

ACTIVE LEAF

ALTERNATING CURRENT

ALUMINUM CONDUCTOR

STEEL REINFORCED

ABOVE FINISH FLOOR

AIR HANDLING UNIT

AMPS INTERRUPTING

AMERICAN NATIONAL

ACCESS PANEL

STANDARDS INSTITUTE

AMERICAN REFRIGERATION

ACOUSTICAL TILE CEILING

AMERICAN WIRE GAUGE

BRICK EXPANSION JOINT

BATT INSULATION

BOOKCASE

BOUNDARY

BITUMINOUS

BUILDING

BLOCKING

BENCH MARK

BULLET RESISTANT

BRITISH THERMAL UNIT

CONDUIT (FOR RACEWAY —

CATCH BASIN (OR CIRCUIT BREAKER)

ELECTRICAL SHEETS)

CABLE TELEVISION

CENTER TO CENTER

BTU PER HOUR

BUILT-UP ROOFING

BOTTOM OF

BOTTOM

BRACING

BRIDGING

BEARING

BRACKET

CAPACITY

BRICK

BENT

BLOCK

BEAM

BUILDING LINE

BOARD

BULLETIN BOARD

ACOUSTICAL WALL COVERING

ARCHITECTURAL OR ARCHITECT

CAPACITY (SYM RMS)

AMERICAN INSTITUTE of

STEEL CONSTRUCTION

AMERICAN CONCRETE INSTITUTE

ADMINISTRATION/ADMINISTRATIVE

AQUEOUS FILM FORMING FOAM

AUTOMATED ENTRY CONTROL SYSTEM

AIR CONDITIONING

AC

A/C

ACI

ACSR

ACST

AD

A.D.

ADMIN

AECS

A.F.F.

AFFF

AGG

AHU

A.I.

AIC

AISC

A.L.

ALT

AMP

ANSI

AΡ

APPD

ARCH

A.R.I.

ASB

ASPH

ATC

AUTO

AVG

AWC

ВC

BD

BDY

BEJ

BIT

BLDG

BLK

ВМ

B.M.

В.О.

BOT

BR

BRCG

BRDG

BRG

BRK

BRKT

BT

BTU

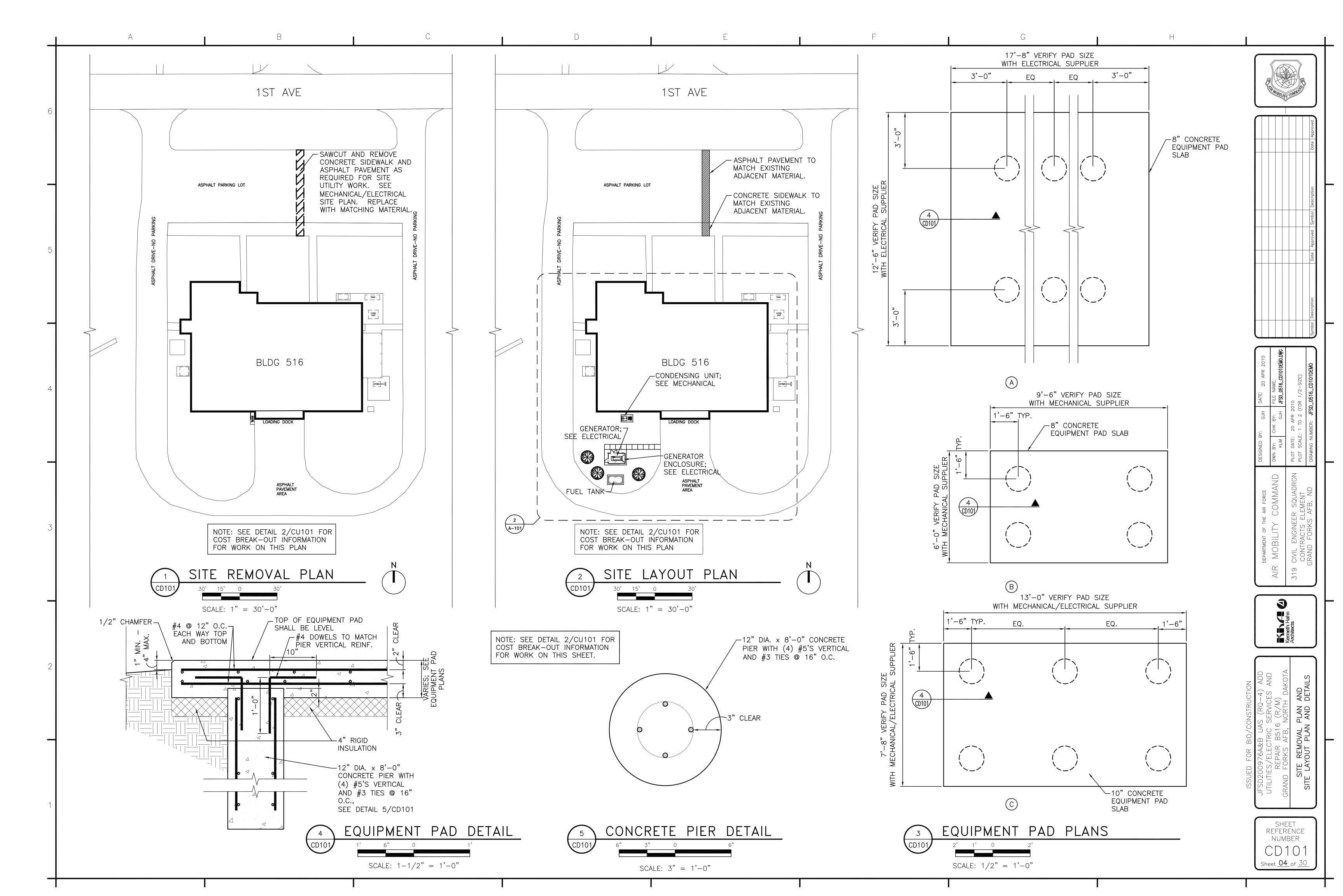
BTUH

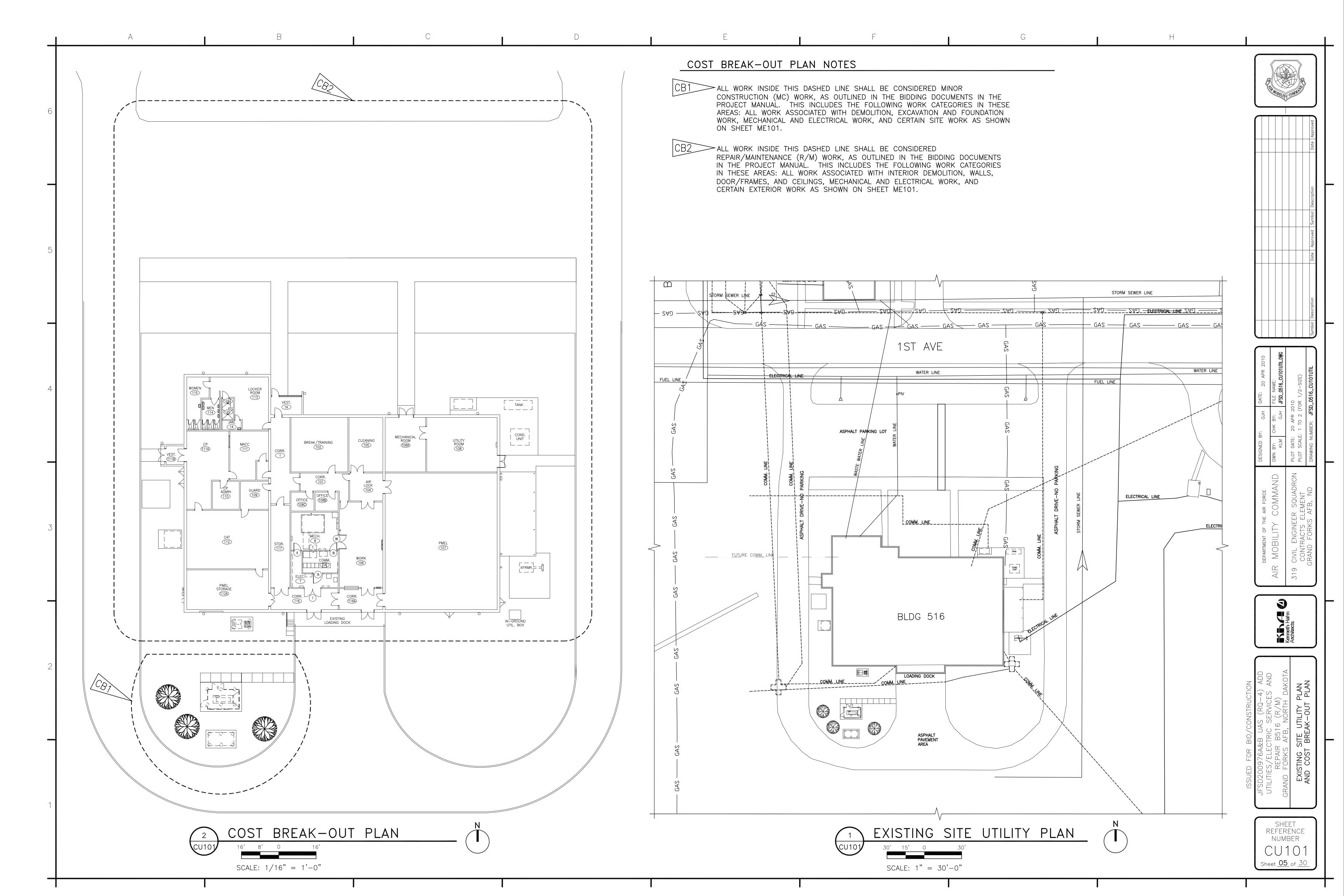
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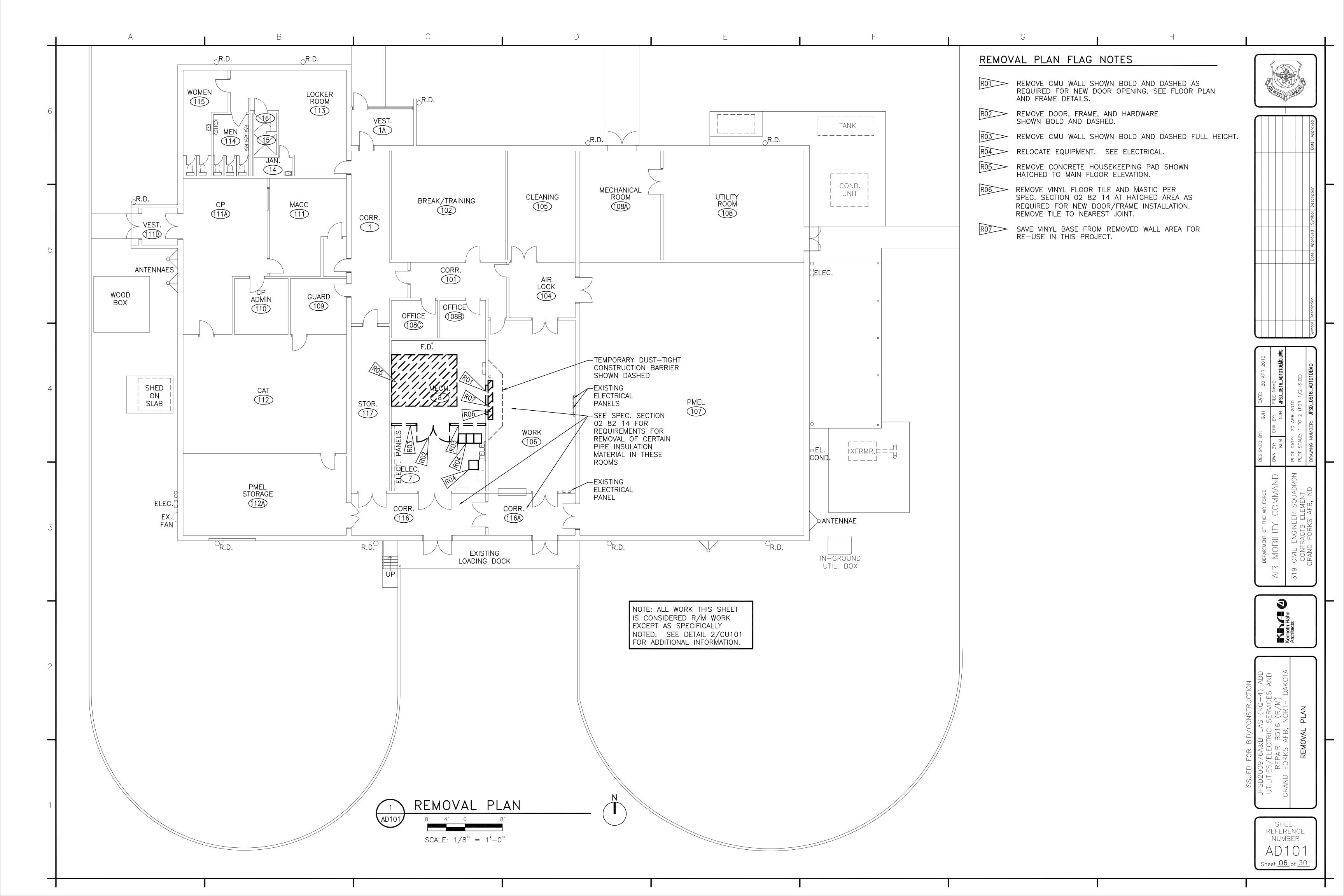
BATT INSUL

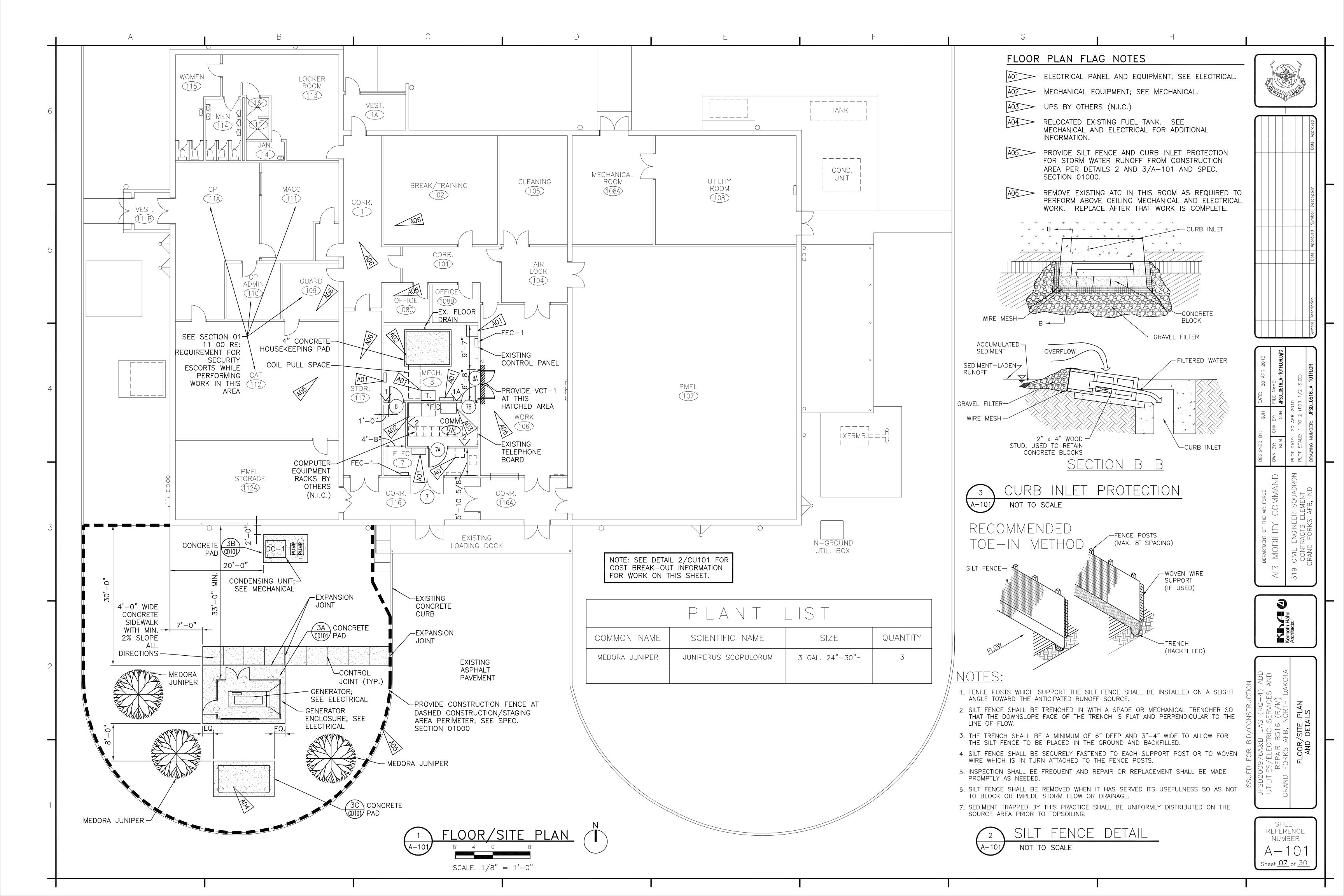
ASSIST.

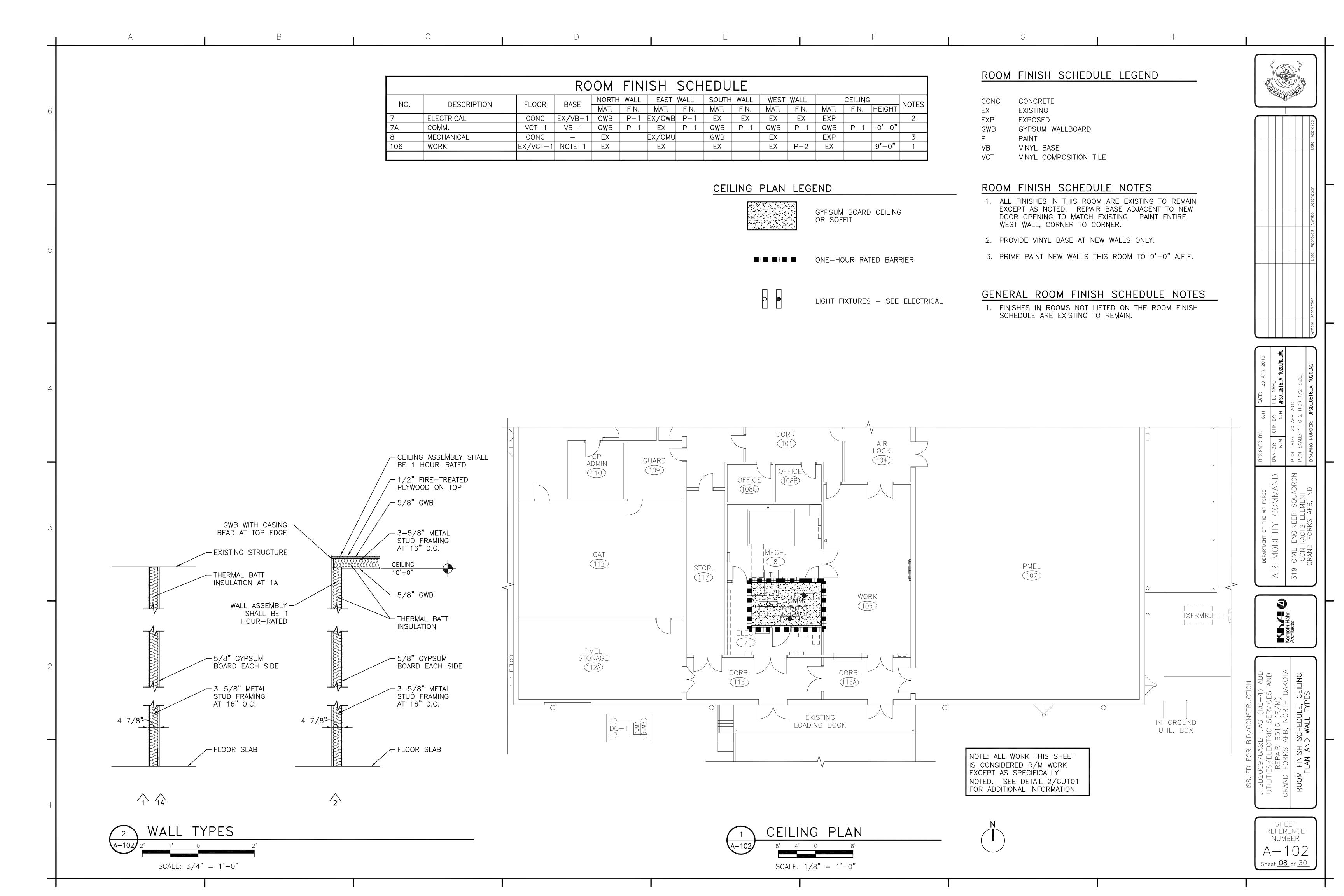
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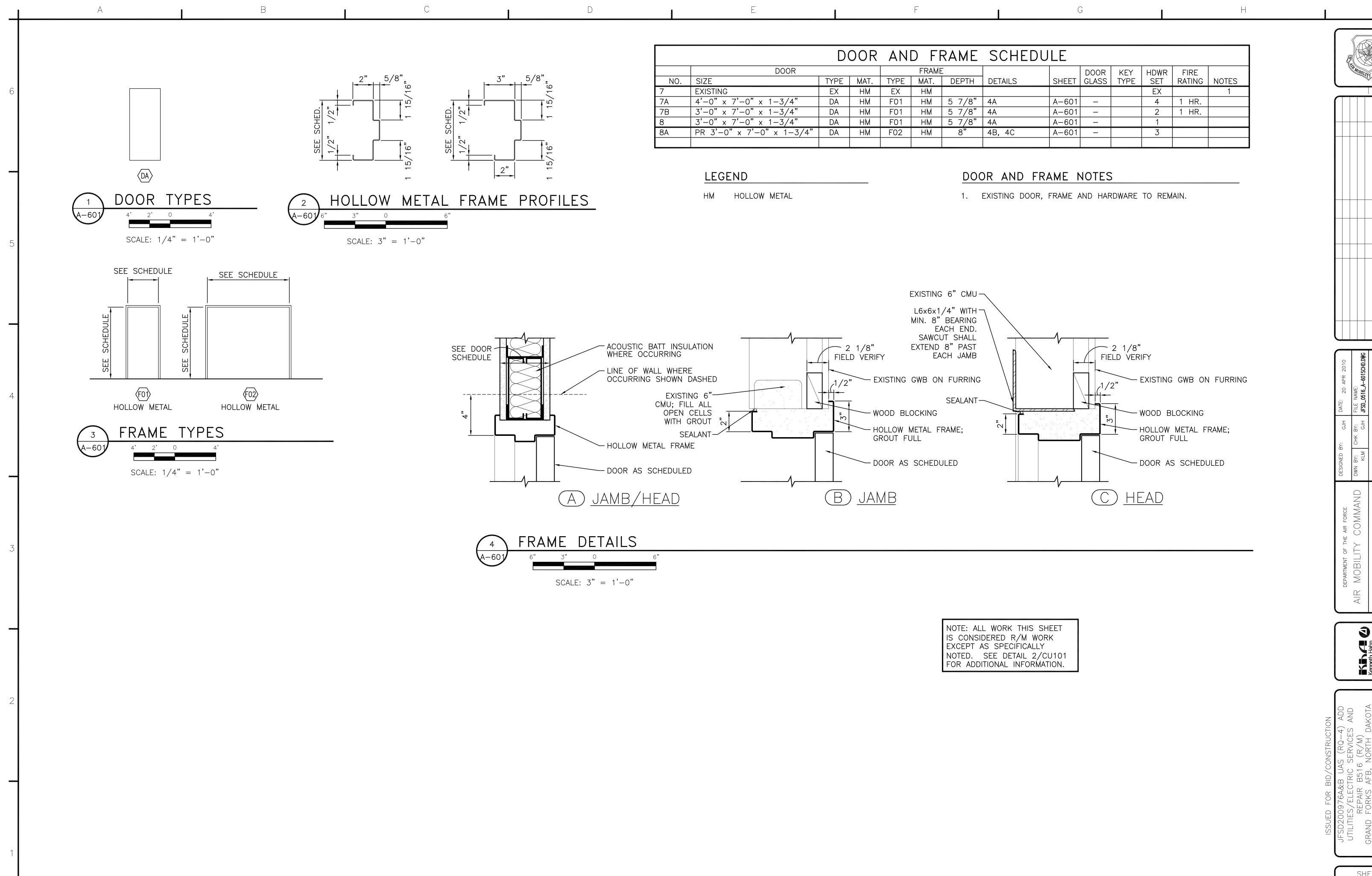




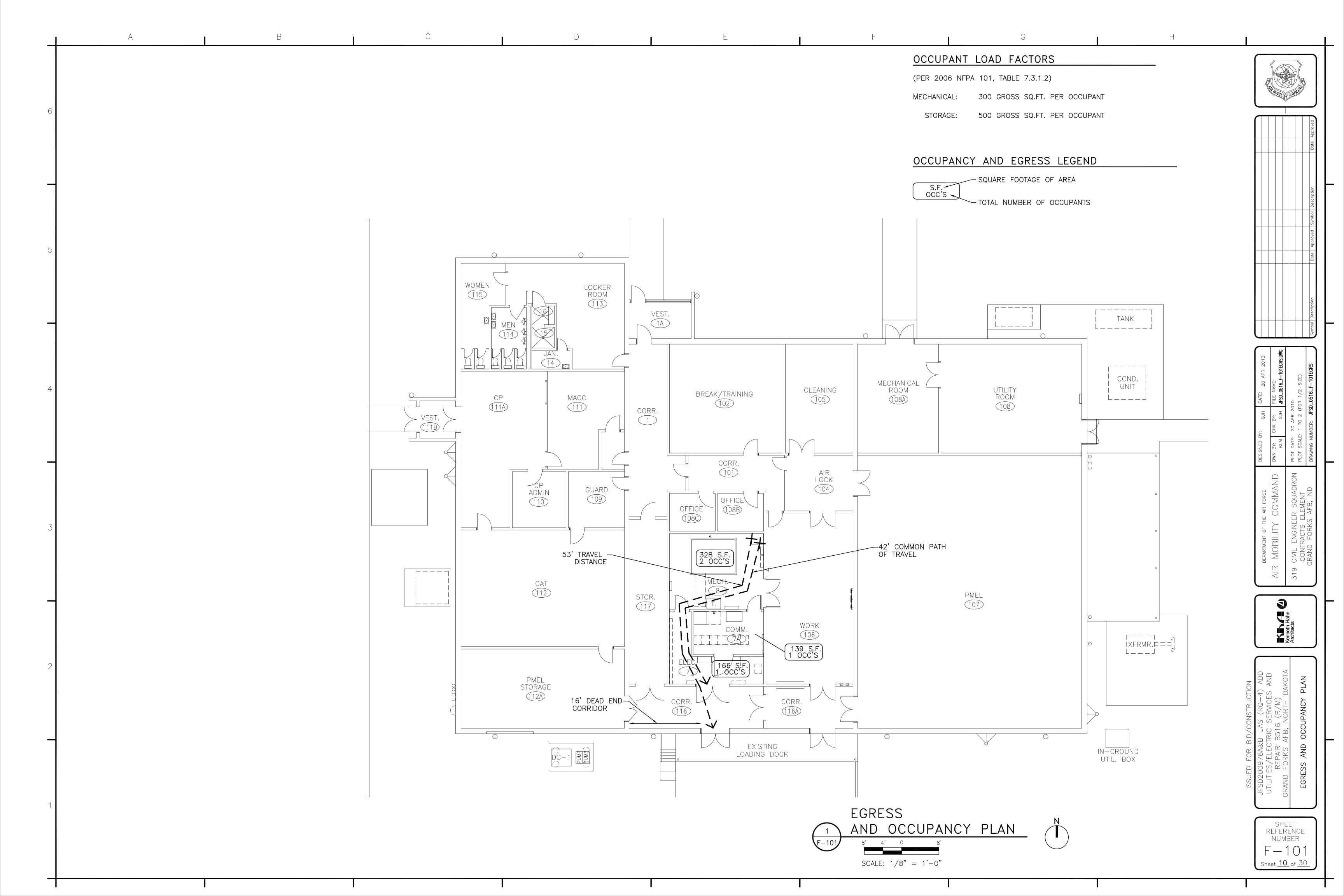


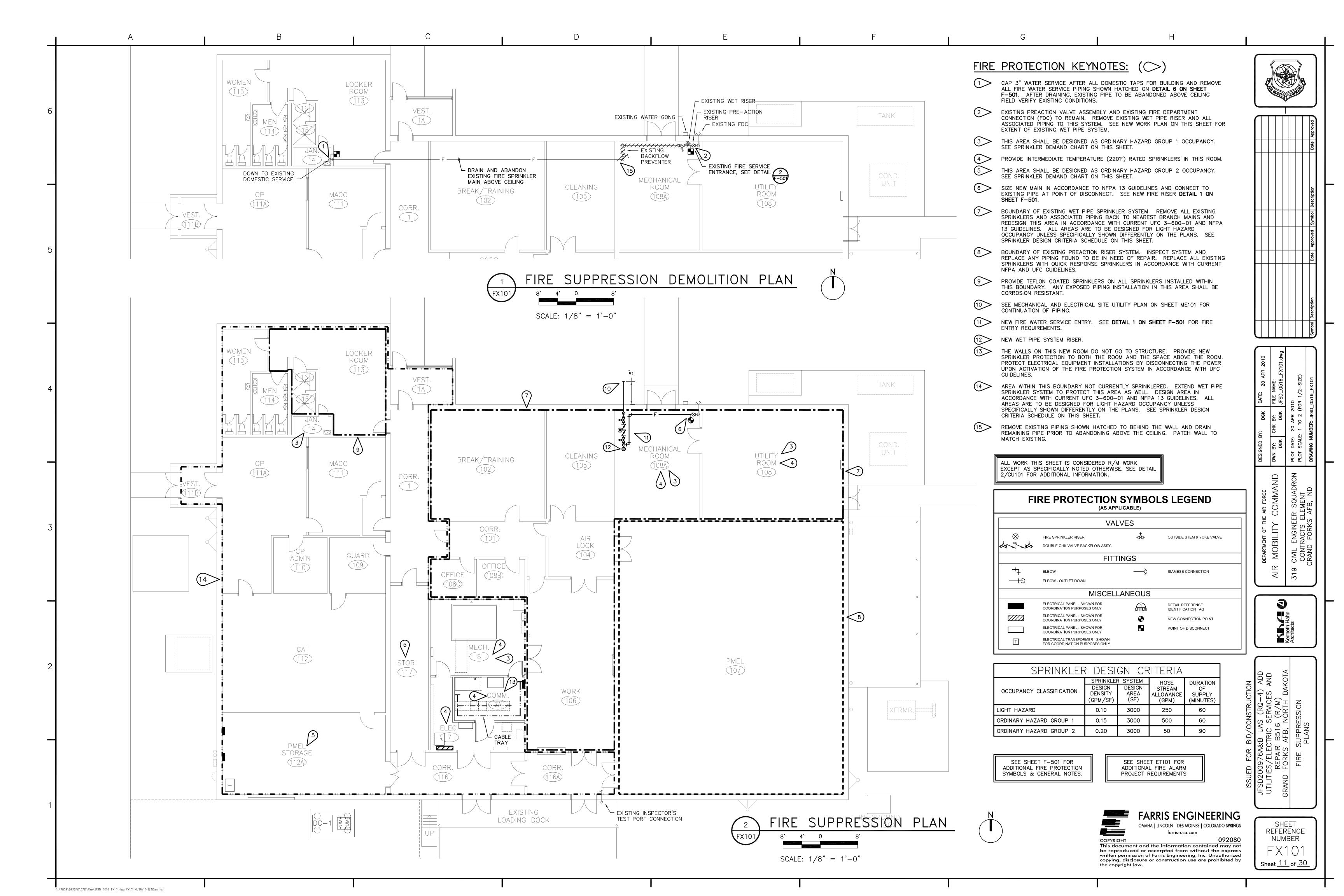


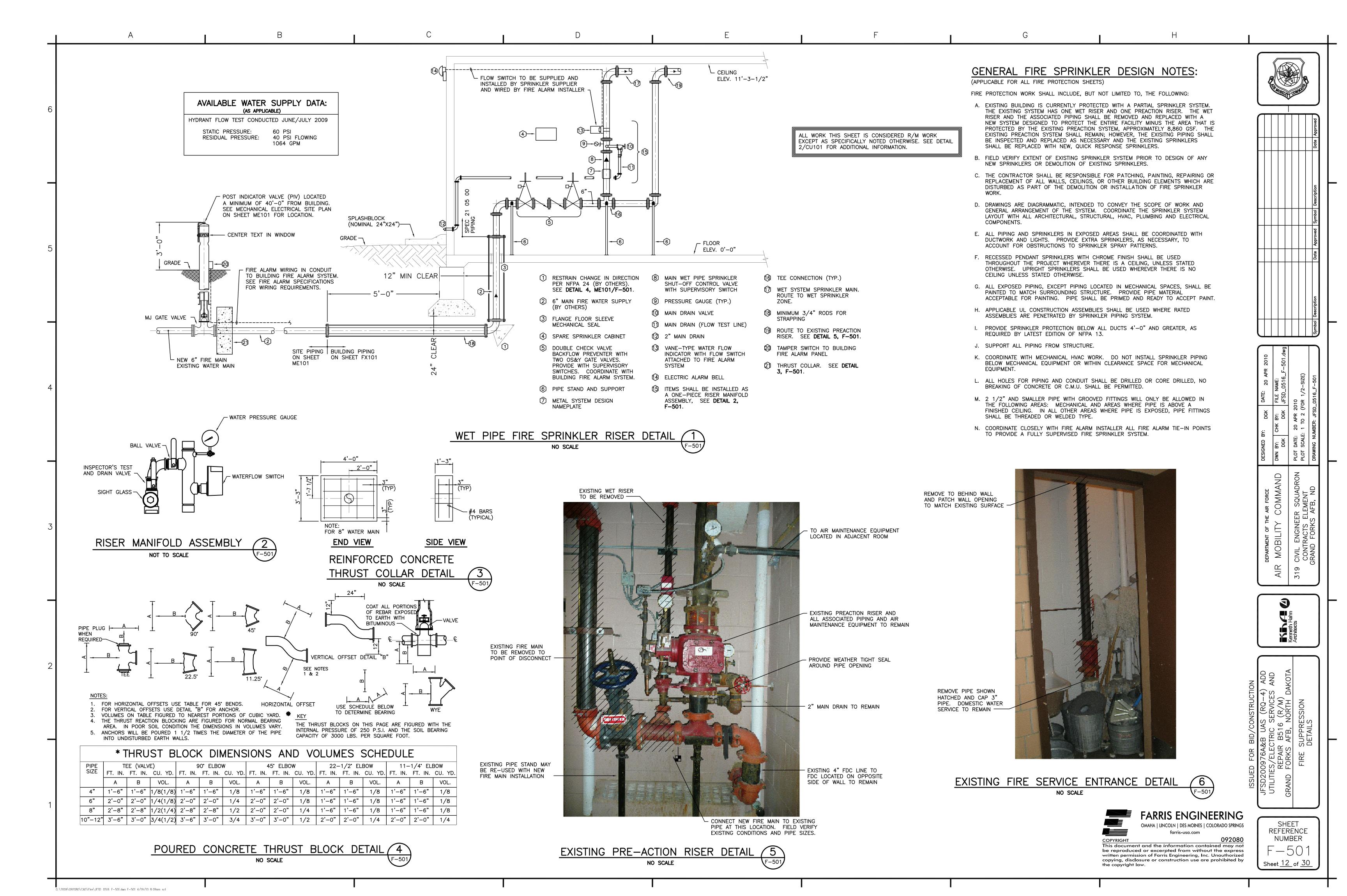


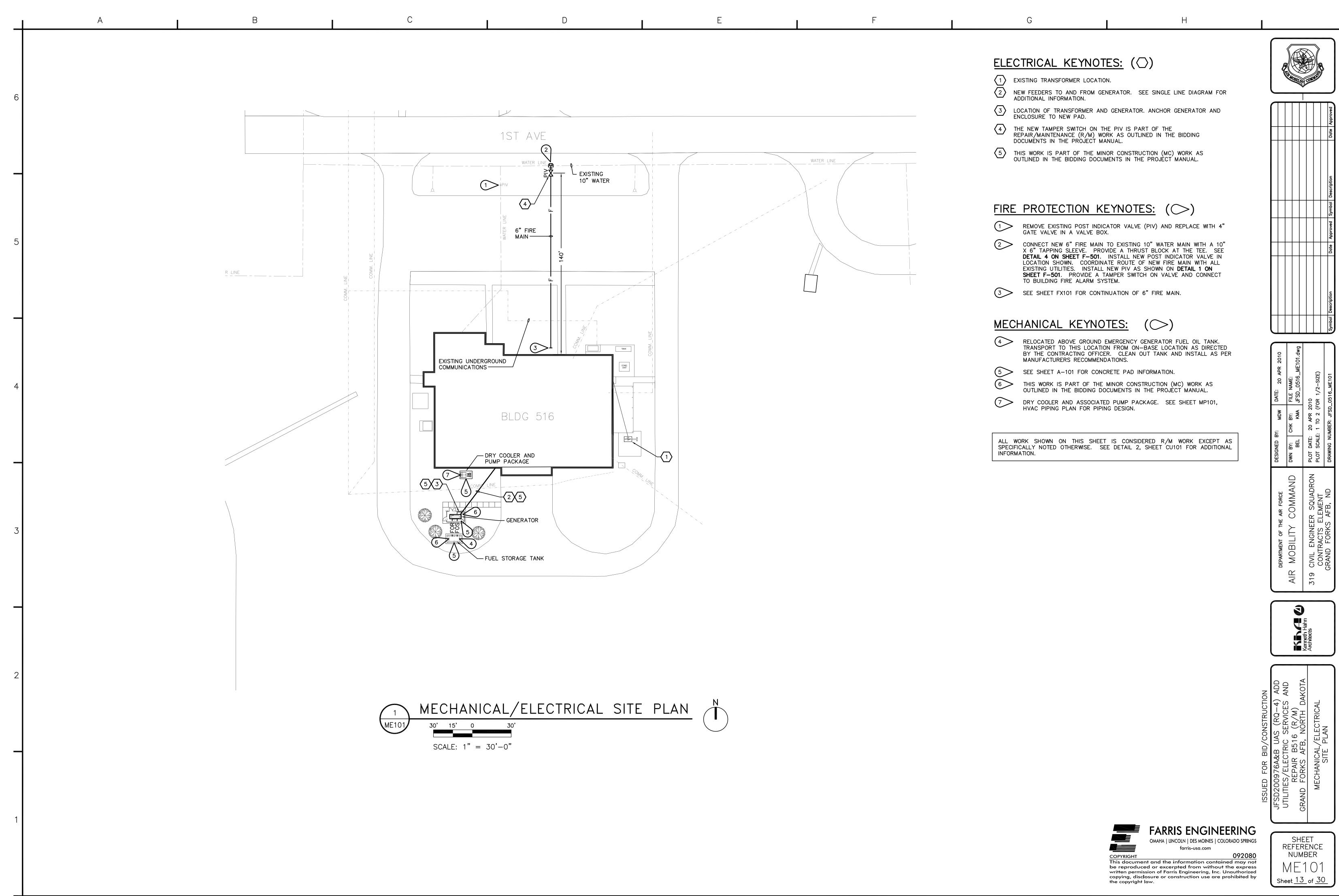


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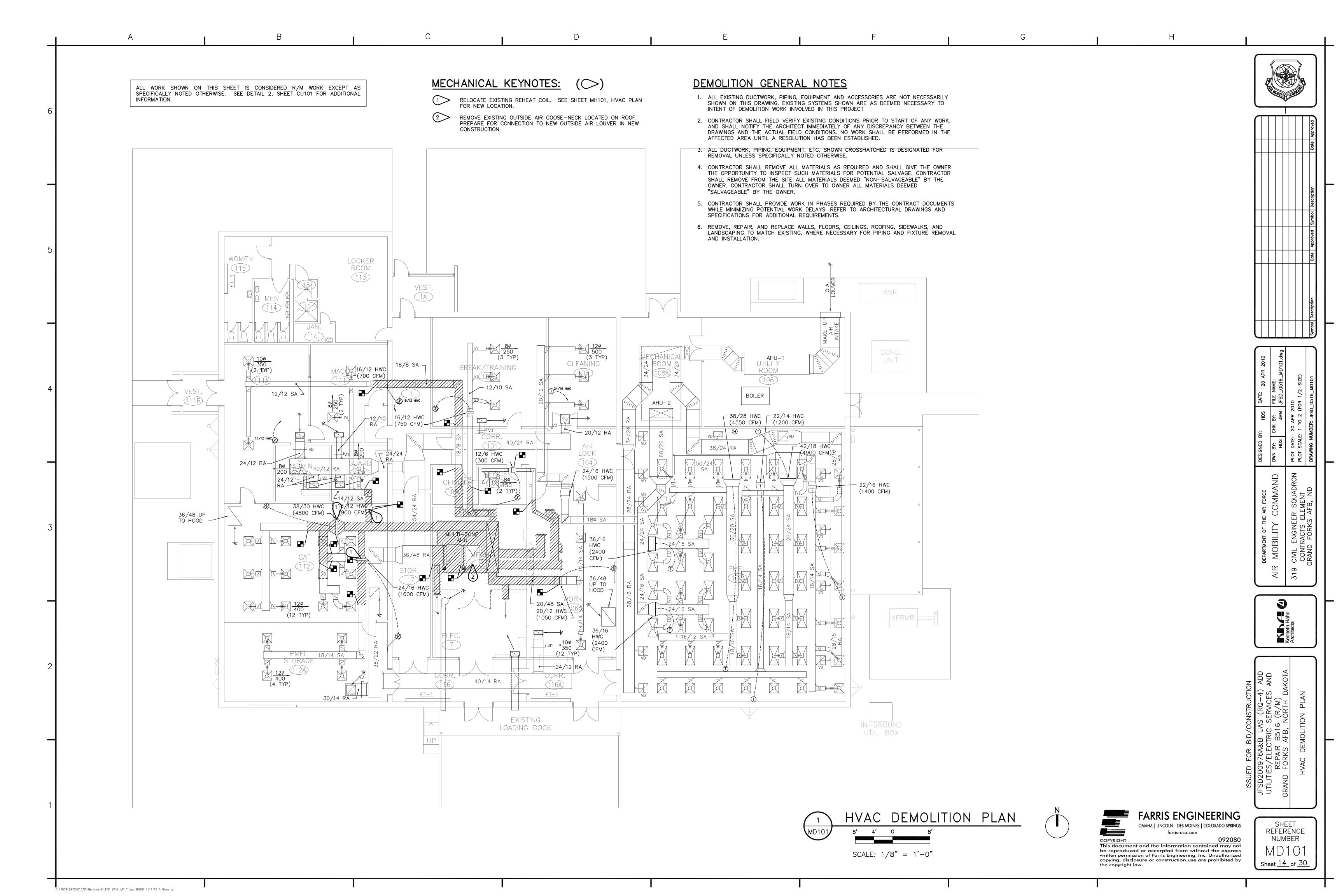


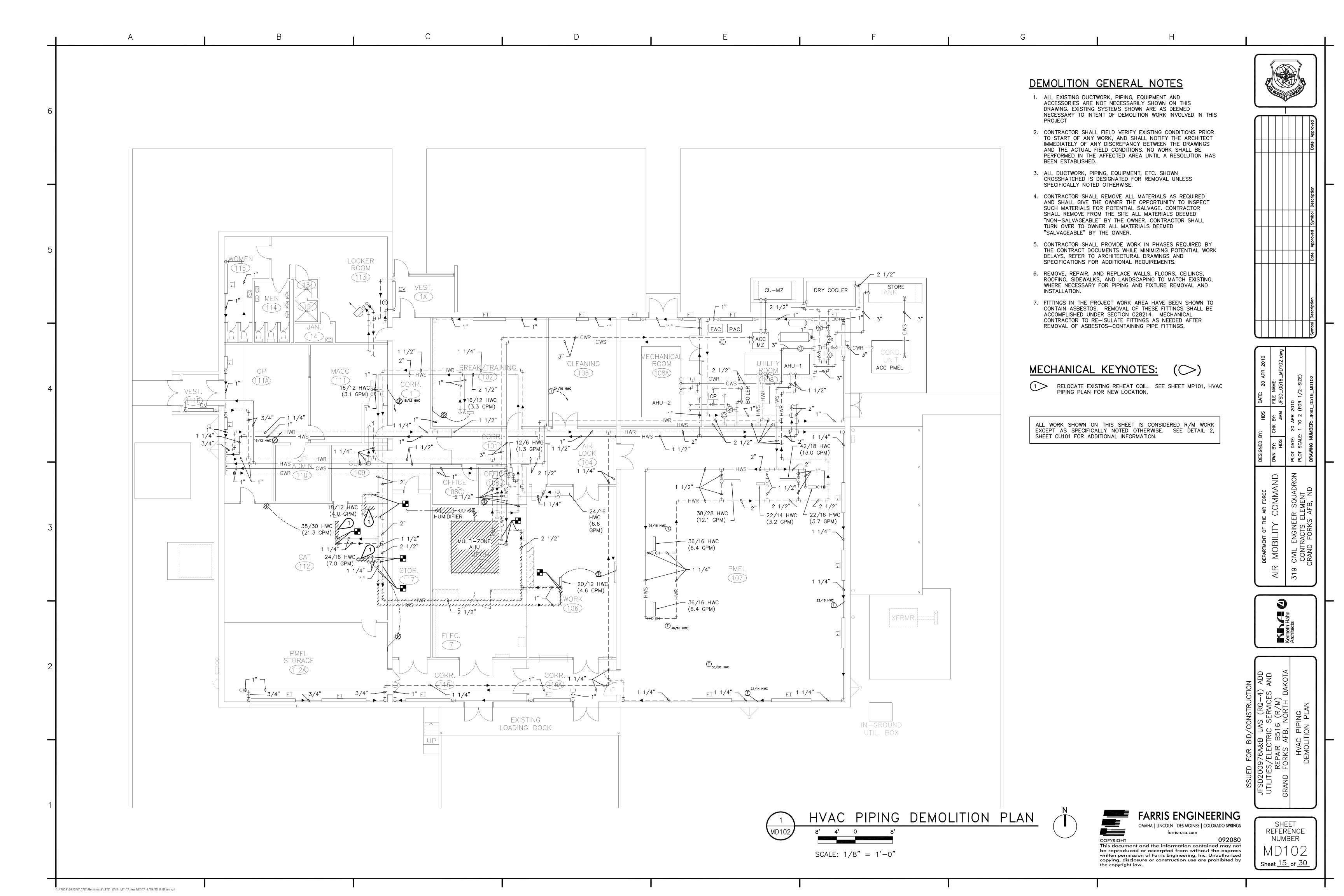


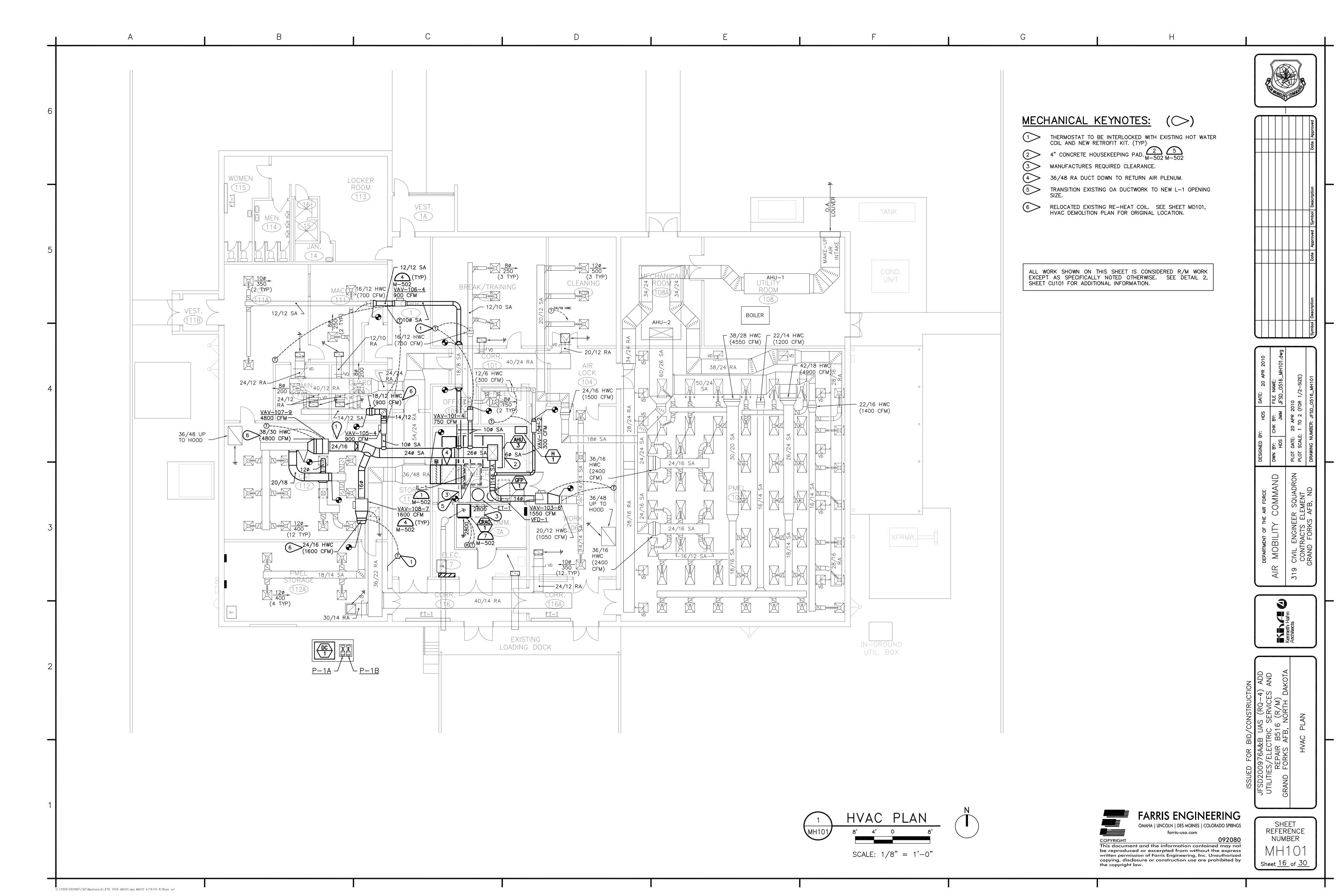


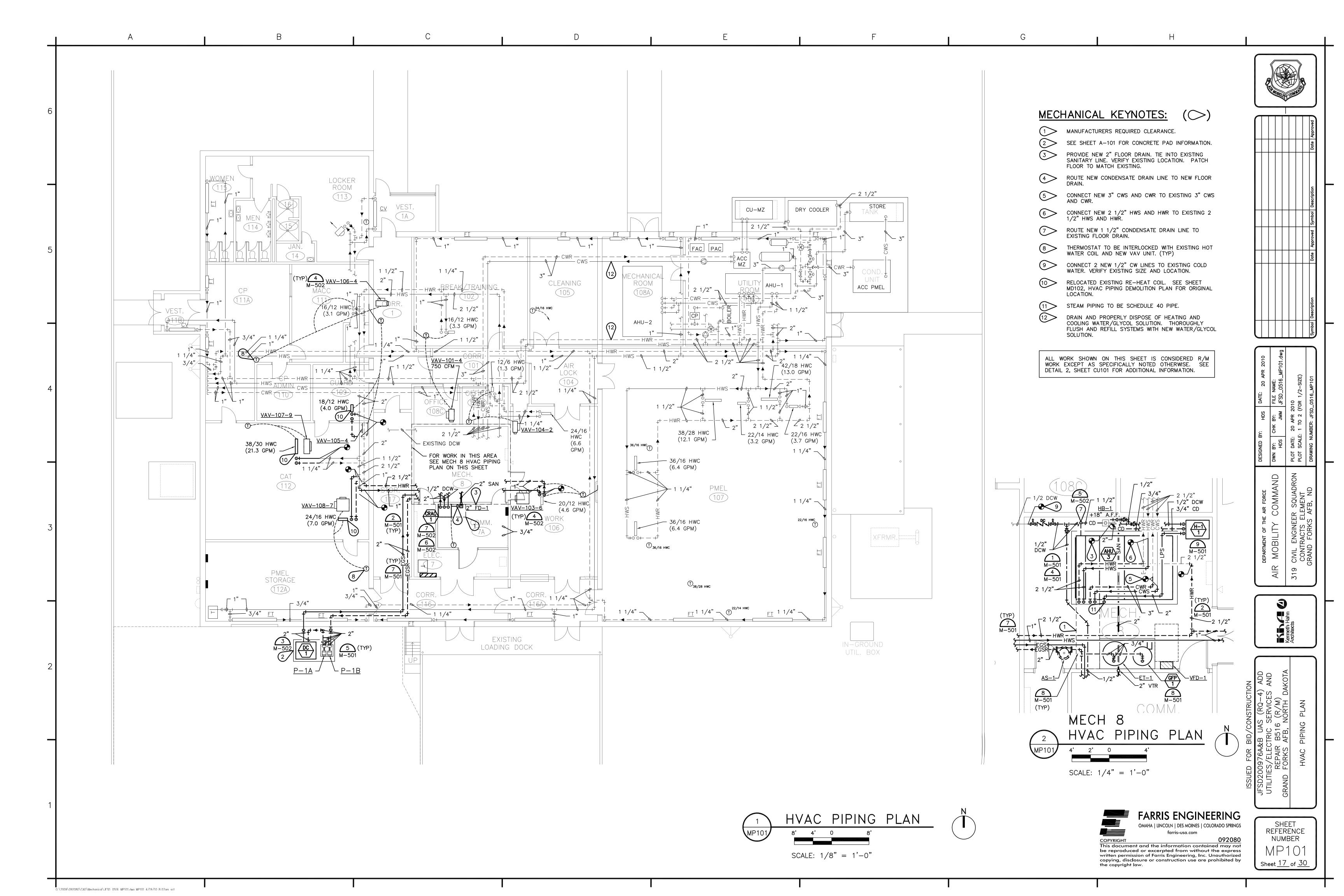


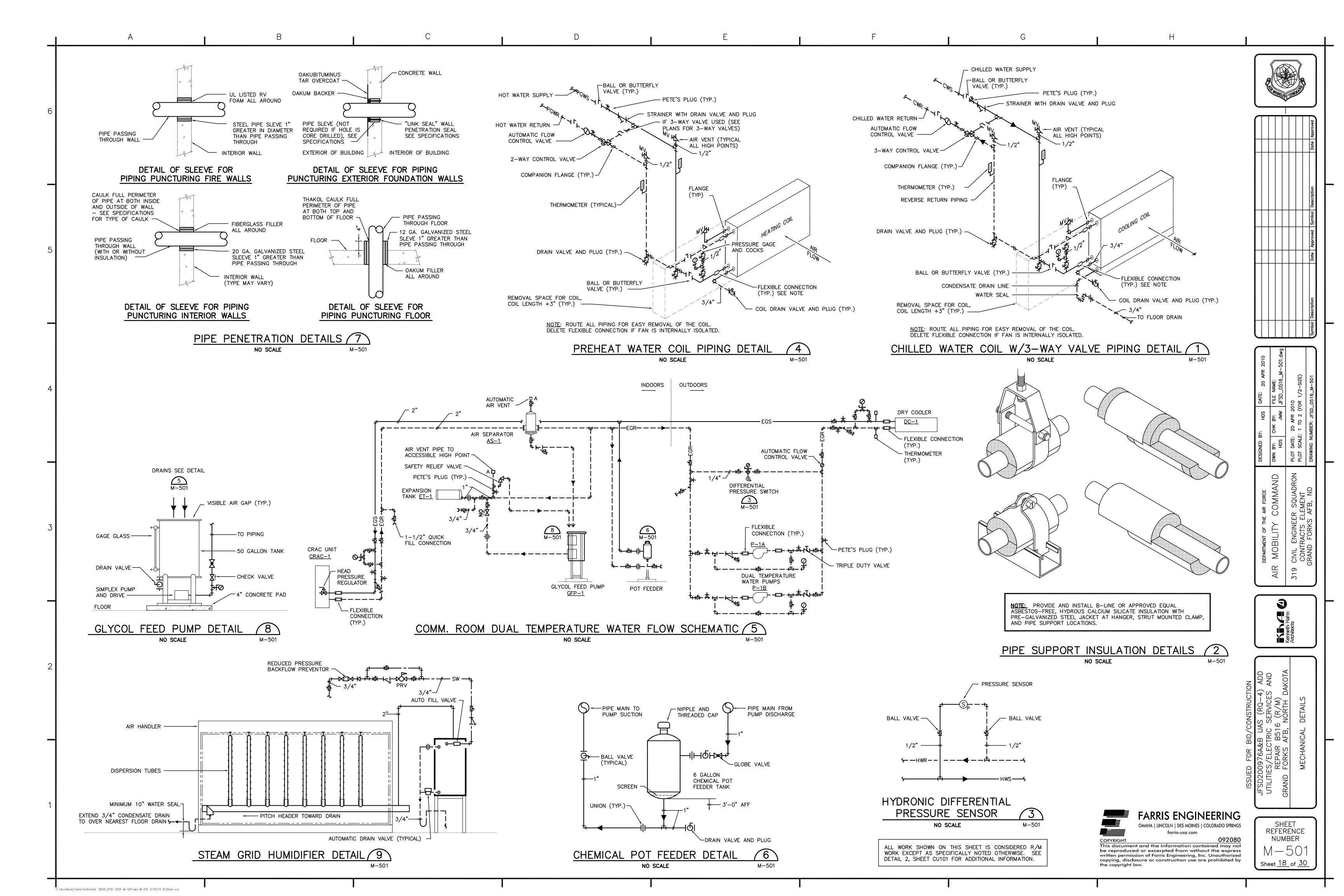
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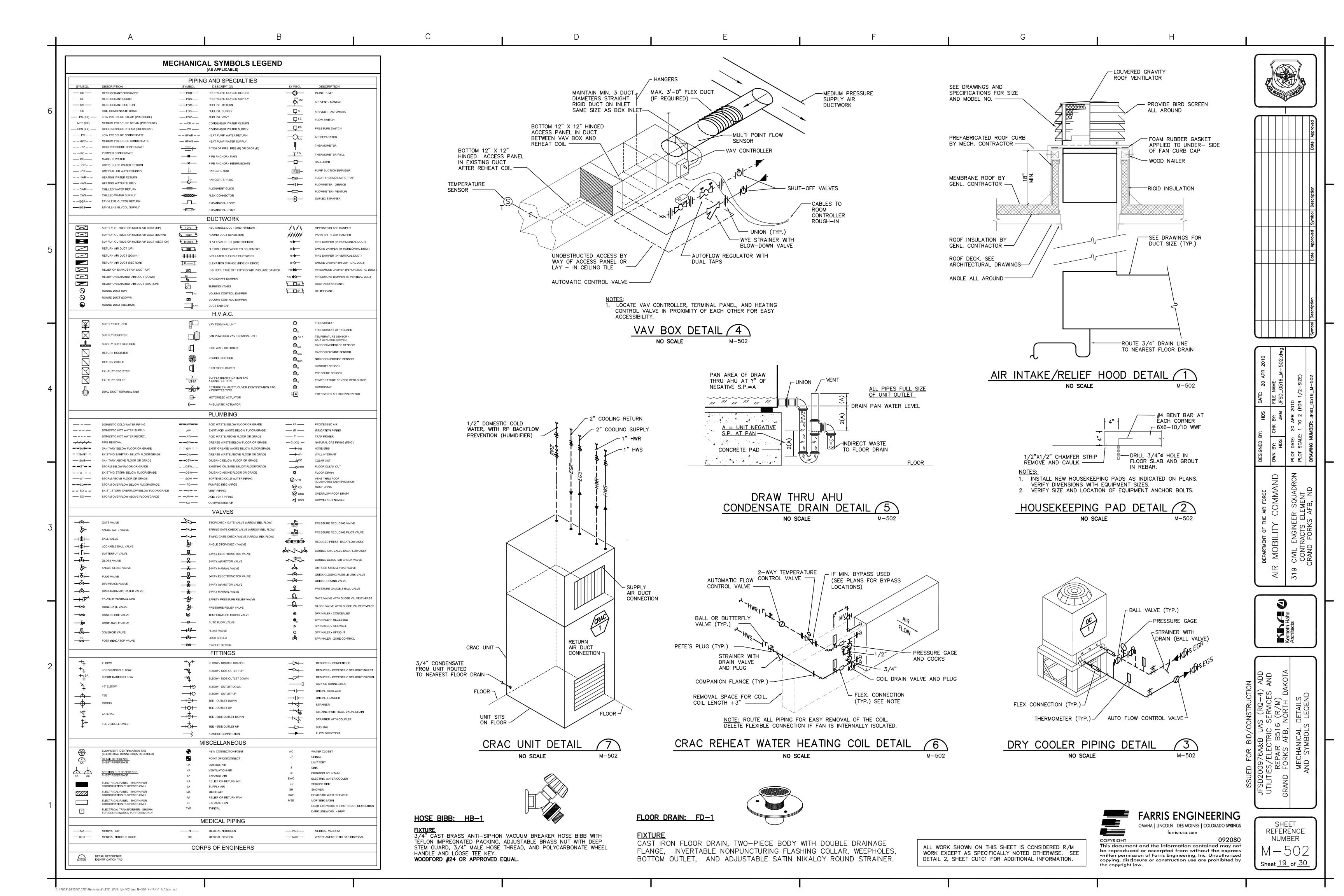












MARK		AHU-3
LOCATION		MECH 8
SERVES		WEST & CENTER OF BUILDING 516
DRAW THRU / BLOW THRU	_ m	DRAW THRU
COOL / HEAT / COOL & HEAT	UNIT TYPE	COOL & HEAT
VAV / DUAL DUCT / MULTI-ZONE		VAV
COOL MED / HEAT MED HORIZONTAL / VERTICAL	45	CHILLED WATER/HEATING HOT WATER HORIZONTAL
FLOOR MOUNTED / CEILING SUSPENDED	ARRANG.	FLOOR MOUNTED
DISCHARGE	ARF	TOP VERTICAL
PRESSURE CLASS (LOW / MED / HIGH)		MEDIUM
NOMINAL COIL FACE AREA (SQ. FEET)		23.2
MANUFACTURER		MCQUAY
MODEL NUMBER		CAH021GDAC
UNIT COMPONENT CONFIGURATION (ORDER IS IN DIRECTION OF AIRFLOW)		PREFILTER SECTION ACCESS SECTION
CONDENTE IN DIRECTION OF AIM LOW,		PREHEAT COIL
		HUMIDIFIER
		ACCESS SECTION
		COOLING COIL
		ACCESS SECTION
		FAN SECTION
		ACCESS SECTION
MARK	 	PF-3
MARK BOX CONSTRUCTION	-	FLAT FILTER
FILTER TYPE	PRE-FILTER ASSEMBLY	PLEATED (MERV8)
RATED EFFICIENCY	E-FII	70%
FACE VELOCITY (FPM)	A PR	436
INITIAL / FINAL A.P.D. (IN. OF WATER)		.33/1.00
		Luz
MARK FACE AREA (SQ. FEET)	4	HC-1 19.25
FACE VELOCITY (FPM)	+	519
AIRFLOW CFM	\dashv	10,000
ENTERING AIR TEMP. D.B. / W.B. (°F)	┤▗	43 D.B.
LEAVING AIR TEMP. D.B. / W.B. (°F)		90.4 D.B.
MAXIMUM A.P. DROP (IN. OF WATER)	Ž	0.25
MINIMUM ROWS	HOT WATER HEATING COIL	2
MAXIMUM FINS (PER FOOT)	TER	13
TOTAL CAPACITY (MBH)	_	517,871
GPM	_ 유	38.1
WATER TEMP. E.W.T. / L.W.T. (°F)	4	180.0/149.8
MAX. A.P. DROP (FEET OF WATER) MANUFACTURER	\dashv	3.7 MCQUAY
MODEL NUMBER	\dashv	5WB1302B
MARK		CC-1
FACE AREA (SQ. FEET)		20.1
FACE VELOCITY (FPM)		497
AIRFLOW CFM		10,000
ENTERING AIR TEMP. D.B. / W.B. (°F)	_ <u>5</u>	77.5/64.5
LEAVING AIR TEMP. D.B. / W.B. (°F) MAXIMUM A.P. DROP (IN. OF WATER)		53.2/52.8 0.50
MINIMUM ROWS		8
MAXIMUM FINS (PER FOOT)	⊢ ËR (10
TOTAL CAPACITY (MBH)	⊢ MA	344,662
SENSIBLE CAPACITY (MBH)	CHILLED WATER COOLING COIL	265,274
GPM		61.5
WATER TEMP. E.W.T. / L.W.T. (°F)		44.0/56.1
MAX. WATER P.D. (FEET OF WATER)		4.6
MANUFACTURER	_	MQUAY
MODEL NUMBER		5WM1008A
MARK		SAF-1
AIRFLOW CFM	\dashv	10,000
EXTERNAL S.P. (IN. OF WATER)	7	2
TOTAL S.P. (IN. OF WATER)	3	3.42
BHP / RPM		9.45
VARIABLE CONTROL	SUPPLY FAN	VFD
UNIT VIBRATION ISOLATORS		SPRING
WHEEL (NO / SIZE / BLADE TYPE)	_	1/19.69/AIRFOIL 2
MANUFACTURER MODEL NUMBER	_	MCQUAY
MODEL NUMBER		NA

CHILLED WATER SYSTEM COMPOSED OF 30% ETHYLENE GLYCOL. HOT WATER

DRAIN AND PROPERLY DISPOSE HEATING AND COOLING WATER/GLYCOL.

THROUGHLY FLUSH AND REFILL SYSTEMS WITH NEW WATER/GLYCOL

HEATING SYSTEM COMPOSED OF 50% ETHYLENE GLYCOL.

SERVES	AIR	REHEAT	Alf	R VOLUME (C	FM)	REHEAT	REHEAT	SUPPLEMENTAL		OCCUPANCY
ROOM	TERMINAL UNIT	CAPABILITY	coo	LING	HEATING	COIL	SIZING	HEAT	EXHAUST	SWITCH/
NO.	DESIGNATION	(BTU/H)	MIN.	MAX.	IILATINO	(GPM)	(GPM)	FINTUBE		SENSOR
BREAK/TRAINING 102	VAV-101-4	33,000	225	750	450	NA	3.3	NO		
PMEL STORAGE 112A	VAV-102-7	73,000	480	1600	960	NA	7.3	NO		
STORAGE 106	VAV-103-6	46,000	465	1550	930	NA	4.6	NO		
OFFICES 108B, 108C	VAV-104-2	13,000	90	300	180	NA	1.3	NO		
GUARD 109, CP ADMIN 110, MACC 111	VAV-105-4	40,000	270	900	540	NA	4.0	NO		
OP 111A	VAV-106-4	32,000	270	900	540	NA	3.2	NO		
CAT 112	VAV-107-9	213,000	1440	4800	2880	NA	21.3	NO		
Totals		450,000	3,240	10,800	6,480	0.00	45.00			

			HUMIDII	FIER SCHE	DULE		
MARK	SERVES	SUPPLY STEAM PRESSURE (PSIG)	TYPE	CAPACITY LBS/HR	MANUFACTURER & MODEL NO.	DISTRIBUTION HEADER SIZE	REMARKS
H-3	AHU-3	NA	ELECTRIC-TO-STEAM	100	DRI-STEEM RAPID-SORB VLC 42-2	2"	1, 2

REMARKS:

- HUMIDIFIER TO BE PROVIDED WITH SUPPORT LEGS, EVAPORATING CHAMBER INSULATION, INTERNAL CONTROLS FOR SKIMMER OPERATION, WATER LEVEL CONTROL, END OF SEASON DRAIN, AND OTHER DIANOSTICS FUNCTIONS.
- PROVIDE RABID-SORB 1.5" DISTRIBURION GRID (6" SPACING) ON A 2" HEADER FOR FIELD MOUNTING. PROVIDE PIPE INSULATION ON HEADER.

		VAV	TERMINA	L UNIT	SCHEDUL	E		
MARK	SELECTION RANGE (CFM)	SELECTION MAX ΔPS	USABLE RANGE (CFM)	USABLE MAX ΔPS	INLET SIZE	OUTLET SIZE	REHEAT COIL	REMARKS
VAV-1	0-200	0.106	65-350	0.33	5 INCH	12 x 8 INCH	3 - ROW	1, 2, 3, 4,
VAV-2	201-400	0.478	80-450	0.61	6 INCH	12 x 8 INCH	3 - ROW	1, 2, 3, 4,
VAV-3	401-650	0.50	145-750	0.75	8 INCH	12 x 10 INCH	3 - ROW	1, 2, 3, 4,
VAV-4	651-900	0.46	230-1100	0.67	10 INCH	14 x 12 INCH	3 - ROW	1, 2, 3, 4,
VAV-5	901-1250	0.43	325-1600	0.71	12 INCH	16 x 16 INCH	3 - ROW	1, 2, 3, 4,
VAV-6	1251-1550	0.21	450-2200	0.68	14 INCH	20 x 18 INCH	3 - ROW	1, 2, 3, 4,
VAV-7	1551-2300	0.50	580-2750	0.70	16 INCH	24 x 18 INCH	3 - ROW	1, 2, 3, 4,
VAV-8	2301-4300	0.71	1400-4300	0.71	24 X 16 INCH	38 x 18 INCH	3 - ROW	1, 2, 3, 4,
VAV-9	201-400	0.478	80-450	0.61	6 INCH	12 x 8 INCH	NONE	1, 2, 3

- TERMINAL UNITS TO BE FURNISHED WITH FIBRE FREE DUCT LINER.
- TERMINAL UNITS TO BE FURNISHED LESS CONTROLS, AND ACTUATORS. FLOW SENSOR TO BE FACTORY MOUNTED , AND READY FOR CONNECTION TO FIELD INSTALLED CONTROL SYSTEM
- AND ACTUATORS.
- HOT WATER REHEAT COIL TO BE SHIPPED SEPARATE. PROVIDE ACCESS DOOR IN DUCT BETWEEN
- 5. 140 DEG F ENTERING WATER TEMPERATURE, 110 DEG F LEAVING WATER TEMPERATURE.

			ABBRE\	VIATION:			
E	ELECTRICAL CONTRACTOR	HP	HORSEPOWER	4X	NEMA 4X	V	VOLTAGE
М	MECHANICAL CONTRACTOR	KW	KILOWATTS	PH	PHASE	VFD	VARIABLE FREQUENCY
I	INTEGRAL WITH EQUIPMENT	MR	PER MANUFACTURER'S	RE	REVERSING		DRIVE
С	COMBINATION STARTER AND		RECOMMENDATION	RV	REDUCED VOLTAGE	2S	TWO SPEED
	SAFETY SWITCH	NF	NON-FUSED	SF	FUSE HOLDER WITH SWITCH	38	THREE SPEED
СВ	CIRCUIT BREAKER	NR	NON-REVERSING	SS	SAFETY SWITCH		
FV	FULL VOLTAGE	N1	NEMA 1	SH	HP RATED SWITCH		
FLA	FULL LOAD AMPS	3R	NEMA 3R	ST	THERMAL ELEM. SWITCH		

FLA	FULL LOAD AMPS		3R	NEMA 3	₹		ST	THERMAL	_ ELEM. S	SWITCH			
			REF	ER TO S	PECIFICATIO	NS FOR A	DDITIONAL	. REQUIRE	MENTS				
			RATING			DIS	CONNECT			МОТС	R STARTE	R	
MARK	DESCRIPTION			Γ	FURNISH/		RATING	FUSE		FURNISH/	TYPE/		REMARKS
		LOAD	V	PH	INSTALL BY	TYPE	(AMPS)	SIZE	ENCL.	INSTALL BY	NEMA SIZE	ENCL.	
GFP-1	GLYCOL FEED PUMP	1/3 HP	120	1	-	-	-	-	-	-	-	-	CORD AND PLUG
AHU-3	AIR HANDLING UNIT	15 HP	480	3	E/E	SF	30	MR	N1	E/E	FVNR/1	N1	VFD
H-3	HUMIDIFIER	50.5 FLA	480	3	E/E	SF	100	MR	N1	-	-	-	
CRAC-1	AIR CONDITIONING UNIT	20.8 FLA	480	3	I	-	-	-	-	I	-	-	
DC-1	DRYCOOLER	4.7 FLA	480	3	I	-	-	-		I	-	-	4

GENERAL NOTES:

- CONTRACTOR SHALL VERIFY/COORDINATE ALL RATINGS FOR EQUIPMENT SUPPLIED BY THE SELECTED MANUFACTURER. WHERE SUCH RATINGS ARE OTHER THAN AS INDICATED ON MECHANICAL/ELECTRICAL COORDINATION SCHEDULE, DISCONNECTS, MOTOR STARTERS, OVERCURRENT DEVICES AND RELATED REVISIONS SHALL BE PROVIDED ACCORDINGLY. THE CONTRACTOR THAT FURNISHES EQUIPMENT WITH RATINGS OTHER THAN AS INDICATED SHALL BE RESPONSIBLE FOR ALL COORDINATION AND COSTS FOR REVISIONS TO ACCOMMODATE SELECTED EQUIPMENT.
- CONTRACTOR SHALL VERIFY WIRING REQUIREMENTS FOR ALL FURNISHED EQUIPMENT AND PROVIDE NEUTRAL WIRE TO SINGLE AND THREE PHASE EQUIPMENT WHERE REQUIRED.
- ALL FRACTIONAL HORSEPOWER MOTORS SHALL BE PROVIDED WITH INTEGRAL OVERLOAD PROTECTION.
- EQUIPMENT LISTED IN SCHEDULE MAY APPEAR IN NUMEROUS LOCATIONS. EQUIPMENT MARKS ARE DESIGNATED BY UNIQUE IDENTIFIERS ON THE PLANS; I.E., HP-1.1, HP-1.2. IN THESE INSTANCES, THE ELECTRICAL REQUIREMENTS DO NOT CHANGE FROM ONE MARK TO THE NEXT, ONLY THE UNIQUE IDENTIFIER CHANGES.
- HORSEPOWER RATED SWITCHES (SH): FOR 120 V MOTORS LESS THAN 1/2 HP, PROVIDE FUSEHOLDER WITH SWITCH, FUSED PER MANUFACTURER'S RECOMMENDATION AND NEC REQUIREMENTS. FOR 120 V MOTORS RATED 1/2 HP OR 3/4 HP, PROVIDE HP RATED TOGGLE SWITCH (WHERE BRANCH CIRCUIT OVERCURRENT DEVICE MEETS NEC REQUIREMENTS FOR SHORT-CIRCUIT PROTECTION) OR FUSED SAFETY SWITCH.

REMARKS:

- EXHAUST FAN MOTOR SHALL BE FACTORY WIRED TO WEATHERPROOF JUNCTION BOX INTEGRAL WITH FAN. ELECTRICAL CONTRACTOR TO PROVIDE WEATHERPROOF HORSEPOWER RATED SWITCH (SEE GENERAL NOTES ABOVE).
- LOCKABLE DISCONNECT SHALL BE FURNISHED INTEGRAL WITH VFD.
- DISCONNECT AND STARTER FURNISHED BY ELECTRICAL INTEGRAL WITH MOTOR CONTROL CENTER. DRYCOOLER PUMP PACKAGE TO BE FED POWER OUT OF DRYCOOLER CONTROL CABINET, CONTRACTOR TO FIELD WIRE PUMP PACKAGE.

		GLYCOL F	EED S	YSTE	M SCH	HEDULE	
MARK	SERVES	TYPE	GPM	HEAD TDH	GEAR PUMP	MANUFACTURER & MODEL NO.	REMARKS
GFP-1	CRAC-1.1	PACKAGED UNIT	1 - 2	100 PSIG	1/3 HP	JL WINGERT - GL50-E1	1, 2

- MANUFACTURER'S PRESSURE SETTING = CODE 1.
- 50% ETHYLENE.

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	DEPARTMENT OF THE AIR FORCE AIR MOBILITY COMMA
·	319 CIVIL ENGINEER SQUAD CONTRACTS ELEMENT



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			COI	MPUTER RO	OOM AC UI	NIT SCHED	ULE		
INDOOR UNIT MARK	AIR FLOW RATE (CFM)	COOLING O	SAP. (BTUH) SENSIBLE	ELEC. HEATING CAPACITY	WATER FLOW RATE (GPM)	WATER PRES. DROP (FT. WC)	NOMINAL COOLING CAPACITY (TONS)	MANUFACTURER & MODEL NO.	REMARKS
CRAC-1	1,800	35,200	35,200	24.1 KW	20	14.2	3	LIEBERT 3000 BU046WG	1, 2, 3, 4, 6, 7, 8, 9, 10

- 1. SEE MECHANICAL/ELECTRICAL COORDINATION SCHEDULE FOR ELECTRICAL DATA.
- 2. COOLING CAPACITY BASED ON ROOM TEMPERATURE OF 72 DEG F WITH A 50% RELATIVE HUMIDITY, AND AN OUTSIDE
- AMBIENT CONDITION OF 91 DEG F. ELECTRIC REHEAT COILS SHALL PROVIDE 22.5 KW OF HEATING.
- 3. CRAC UNITS TO BE PROVIDED WITH R-407C REFRIGERANT. PROVIDE 5 YEAR WARRANTY ON ALL COMPRESSORS.
- 4. UNIT TO BE PROVIDED WITH ELECTRIC INFRARED HUMIDIFIER WITH 11.0 LBS./HR. CAPACITY WHILE USING 4.8 KW ELEC. POWER.
- 5. UNIT TO BE PROVIDED WITH DIGITAL SCROLL REFRIGERANT COMPRESSOR(S) WITH VARIABLE CAPACITY CONTROL
- 6. PROVIDE OPTIONAL ECONOMIZER GLYCOL COOLING COIL PACKAGE WITH CAPACITY TO MATCH CONDITIONS LISTED ABOVE.
- UNITS TO BE PROVIDED WITH AUDIBLE/VISUAL ALARMS, EXTRA ALARM CONTACTS, NON-LOCKING DISCONNECT SWITCH, 2 INCH PLEATED MERV 8 FILTER, CRANKCASE HEATERS, SMOKE DETECTOR, DISCHARGE AIR TURNING VANES, ZONE LEAK DETECTION (30 FT. CABLE), COMPRESSOR SHORT CYCLE CONTROL, AND 4 MINUTE MIN. ADJUSTABLE AUTO RESTART CONTROL.
- 8. UNITS SHALL BE SUITED FOR UP FLOW AIR DELIVERY CONFIGURATION.
- UNITS SHALL BE CAPABLE OF INTERFACING WITH THE BUILDING AUTOMATION SYSTEM THROUGH A LONWORKS INTERFACE DEVICE.
- 10. PROVIDE LIQUID LEAK DETECTORS, FIRESTAT, SMOKE DETECTOR, AND DISCONNECT SWITCH.

		LO	UVEI	R ANI	D HO	OD S	CHED	ULE		
MARK	TYPE	FUNCTION	CFM	AIR P.D.	WIDTH	SIZE HEIGHT	DEPTH	MATERIAL	SCREEN TYPE	REMARKS
IL-1	LOUVERED GRAVITY	INTAKE	11,600	0.05"	58"	58.00"	35"	ALUMINIUM	INSECT	1, 2, 3, 4, 5

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- INTAKE LOUVER/HOOD SIZE BASED ON PERFORMANCE THROAT AIR VELOCITY OF LESS THAN 500 FPM.
- PROVIDE ROOF CURB, RUBBER CURB CAP STRIPPING, HOOD INSULATION.
- VERIFY COLOR AND FINISH WITH ARCHITECT.
- LOUVER SHALL BEAR AMCA CERTIFIED RATING SEAL FOR PERFORMANCE AND WATER PENETRATION.
- LOUVER FACE VELOCITY TO BE LESS THAN 500 FPM.

						EXPA	NSION TA	NK SY	STEM					
MARK	SYSTEM	SYSTEM VOLUME (GALLONS)	SYSTEM MIN TEMP	SYSTEM MAX TEMP	INITIAL TANK PSIG	PRV FILL PSIG @ TANK	RELIEF VALVE PSIG	MAX PSIG @TANK	TANK SIZE (GALLONS)	C.W. FILL SIZE (INCH)	ACCEPTANCE VOLUME (GAL.)	MANUFACTURER & MODEL NO.	AIR SEPARATOR WITH SCREEN	REMARKS
ET-1	CRAC-1.1	77	-30 DEG F	140 DEG F	12.0	12.0	75.0	65.0	10.0	1"	3.6	B&G B-35LA	SPIROTHERM 2" VHT-1B	1, 2

- 1. EXPANSION TANKS TO HAVE REPLACEABLE BUTYL RUBBER BLADDER WITH WATER/PROPYLENE GLYCOL IN THE BLADDER.
- 2. SYSTEM TO CONTAIN 50% ETHYLENE GLYCOL/50% WATER SOLUTION.

						D	RY COOL	ER SCHEDU	JLE			
MARK	SERVES	AMBIENT TEMP.	NO.	NDENSER HP(EA)	FANS FLA(EA)	NO. OF INTERNAL CIRCUITS	TOTAL FLOW RATE (GPM)	TOTAL HEAT REJECT. (BTUH)	FLUID ENTERING TEMP (DEG F)	PRESSURE DROP (FT. OF WATER)	MANUFACTURER & MODEL NO.	REMARKS
DC-1	CRAC -1	110 DEG F	1	0.75	-	4	20.0	67,040	130.0	8.9	LIEBERT DDD-O-069-A	1, 2, 3, 4, 5

- SEE MECHANICAL/ELECTRICAL COORDINATION SCHEDULE FOR ELECTRICAL DATA.
- RATINGS ARE BASED ON A 50% ETHYLENE GLYCOL SOLUTION
- RATINGS ARE BASED ON A ENTERING AIR TEMPERATURE OF 110 DEG F.
- DRY COOLERS SHALL BE PROVIDED WITH DRY CONTACT FOR REMOTE STARTING, FACTORY MOUNTED DISCONNECT SWITCH, AND THREE CURRENT SENSING RELAYS FOR REMOTE INDICATION OF FAN OPERATION.
- DRY COOLER SHALL BE PROVIDED WITH 8 POLE FAN MOTORS FOR QUIET OPERATION, AND HAIL GUARDS FOR PROTECTING THE COILS.
- DRY COOLER SHALL BE PROVIDED WITH DUPLEX PUMP PACKAGE WITH UNIT DISCONNECT SWITCH, AND FACTORY WIRED PUMP CONTROLS
- WITH AUTOMATIC PUMP SWITCHING FOR EVEN PUMP WEAR. CONSULT MANUFACTURER FOR PROPER PUMP SIZING.

		VARIAE	BLE FREQUEN	CY DRIVE SCHEDULE	
MARK	SERVES	TYPE	STATIC PRESSURE CONTROL SIGNAL	MANUFACTURER & MODEL NO.	REMARKS
VFD-1	AHU-3	PULSE WIDTH MODULATING	4 - 20 mA or 0 - 10 Vdc	ROCKWELL INTERNATIONAL VTAC 9VT-1541H0N-B3P	1, 2, 3

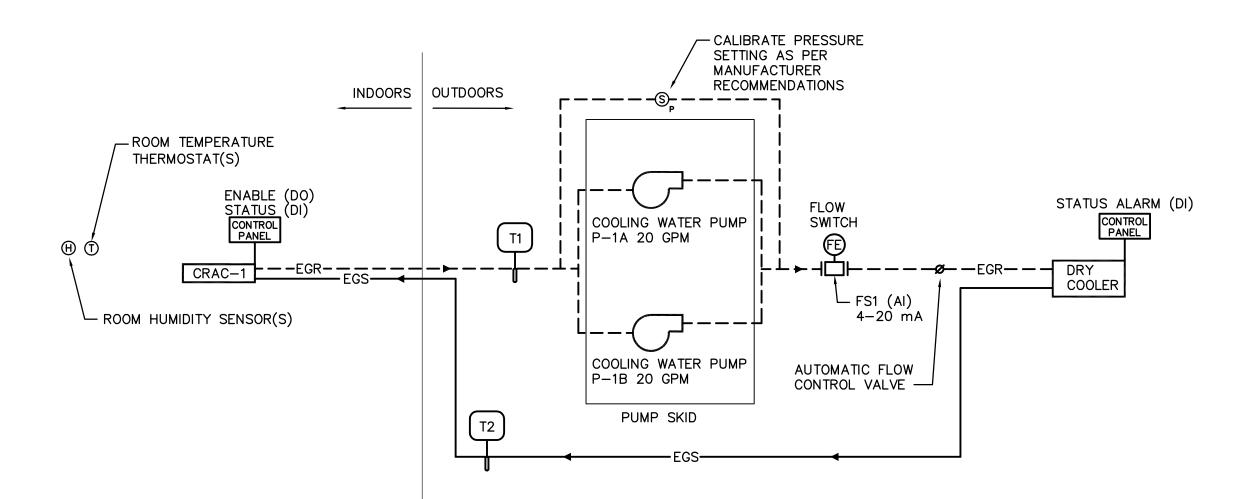
- SEE MECHANICAL/ELECTRICAL COORDINATION SCHEDULE FOR ELECTRICAL DATA.
- PROVIDE MAIN INPUT DISCONNECT, INPUT FUSES.
- PROVIDE THREE CONTACTOR BYPASS WITH COVER CONTROL



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COMM. ROOM DUAL TEMPERATURE WATER DIAGRAM

COMM. ROOM DUAL TEMPERATURE HYDRONIC SYSTEMS:

GENERAL: THE DUAL TEMPERATURE WATER PUMPS P-1A AND P-1B SHALL BE CONTROLLED BY THE DRYCOOLER. PROVIDE A START/STOP DIGITAL OUT (DO) CONTROL POINT.

<u>DUAL TEMPERATURE WATER PUMP CONTROL:</u> THE DRYCOOLER CONTROLLER SHALL DESIGNATE P-1A AS THE LEAD PUMP, AND P-1B AS THE LAG PUMP. THE WATER SYSTEM SHALL OPERATE AS NEEDED TO PROVIDE COOLING FOR THE CRAC UNIT IN THE BUILDING. THE DRYCOOLER WILL BE CAPABLE OF PERIODIC AUTOMATIC SWITCHING OF LEAD AND LAG PUMPS FOR EVEN WEAR. PUMP DIFFERENTIAL SWITCH SHALL ALARM AT HIGH PRESSURE (SET PER MANUFACTURER).

CRAC UNIT CONTROL: PROVIDE A LONWORKS INTERFACE CARD FOR THE CRAC UNIT THAT WILL GIVE THE DDC CONTROLLER THE ABILITY TO MONITOR SPACE TEMPERATURE, SPACE HUMIDITY, MOISTURE SENSOR ALARM CONDITIONS, AND OTHER SYSTEM ALARM CONDITIONS WITHIN THE CRAC UNIT.

PROVIDE A STOP/START ANNUNCIATION (DI) CONTROL POINT FOR THE CRAC UNIT. AND THE SPACE MOUNTED TEMPERATURE SENSOR.

THE CRAC UNIT SHALL BE ACTIVATED BY THE DDC CONTROLLER. THE DDC CONTROLLER SHALL RECEIVE A SIGNAL THAT THE CRAC UNIT HAS BEEN ACTIVATED. UPON ACTIVATION OF THE CRAC UNIT, THE UNIT SHALL VERIFY THAT FLOW HAS BEEN PROVEN. AND THEN START THE UNIT. THE CRAC UNIT WILL THEN OPERATE AUTOMATICALLY TO MAINTAIN SPACE TEMPERATURE SETPOINT AS PROGRAMMED IN THE CONTROLLER OF THE CRAC UNIT.

DRYCOOLER CONTROL: PROVIDE THREE STATUS ALARM (DI) CONTROL POINTS. THE DRYCOOLER HAS THREE CURRENT SENSING TRANSFORMERS THAT WILL INDICATE THE DRYCOOLER FAN FAILURE.

UPON ACTIVATION OF THE CRAC UNITS, THE CRAC UNIT SHALL START THE DRYCOOLER. THE DRYCOOLER SHALL HAVE SELF-CONTAINED TEMPERATURE CONTROLS WITHIN THE UNIT THAT WILL ACTIVATE THE REQUIRED NUMBER OF FAN(S) TO PROVIDE A DISCHARGE WATER TEMPERATURE AT SETPOINT.

IN THE EVENT THAT A STATUS ALARM CONDITION OCCURS ON A DRYCOOLER, THE CRAC UNIT CONTROLLER SHALL SHUT DOWN THE

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THE DRYCOOLER SHALL RECEIVE A SIGNAL FROM THE CRAC UNIT TO START THE LEAD PUMP, AND FLOW WILL BE PROVEN IN GLYCOL LOOP BY FLOW SWITCH (FS-1). THIS PROOF OF FLOW WILL THEN ALLOW THE COOLING SYSTEM IN THE CRAC UNIT TO OPERATE. UPON A LOSS OF FLOW AT THE FLOW SWITCH, THE DRYCOOLER WILL BRING ON THE STANDBY PUMP AND ANNUNCIATE A LOSS OF FLOW IN THE LEAD PUMP TO THE DRYCOOLER.

LOSS OF POWER: THESE CRAC SYSTEMS ARE ON BUILDING UPS. IF THE SYSTEMS SHUT DOWN ON POWER FAILURE, IT SHALL RESTART WHEN EMERGENCY POWER IS AVAILABLE. BUILDING LOSS OF POWER SHALL BE A CRITICAL ALARM.

<u>DUAL TEMPERATURE WATER TEMPERATURE CONTROL:</u> PROVIDE A TEMPERATURE SENSOR T2 IN THE DUAL TEMPERATURE WATER SUPPLY HEADER, AND A TEMPERATURE SENSOR T1 IN THE DUAL TEMPERATURE WATER RETURN HEADER. THE TEMPERATURE SENSORS ARE FOR INDICATION PURPOSES TO MONITOR THE CONDITIONS OF THE WATER LOOP. T1 AND T2 SHALL BE USED TO GENERATE HIGH AND LOW TEMPERATURE ALARMS FOR BOTH OPERATING MODES. THESE SHALL BE BASED ON MANUFACTURER'S RECOMMENDATIONS.

THAT WILL SEND AN ALARM CONDITION TO THE DDC WHEN THE GLYCOL LEVEL IN THE STORAGE TANK GETS TO A LOW LEVEL CONDITION.

GLYCOL FEED PUMP: PROVIDE A STATUS ALARM (DI) CONTROL POINT

FAN CONTROL: UPON ACTIVATION OF THE CRAC SYSTEM, THE SUPPLY FAN SHALL RUN CONTINUOUSLY. UPON CRAC SYSTEM SHUTDOWN, FAN SHALL STOP THROUGH THE CRAC FACTORY CONTROLLER.

HUMIDIFIER CONTROL: MOUNT FACTORY SUPPLIED HUMIDITY SENSOR TO CRAC UNIT CONTROL PANEL. THE CRAC UNIT CONTROLLER SHALL THEN ENERGIZE THE INFRARED HUMIDIFIER UPON A CALL FOR INCREASED HUMIDITY LEVELS. THE CRAC UNIT CONTROLLER SHALL ACTIVATE THE REFRIGERANT SYSTEM AND HOT WATER RE-HEAT COIL UPON A CALL FOR HUMIDITY LEVEL REDUCTION BASED ON THE READING OF THE HUMIDITY SENSOR.

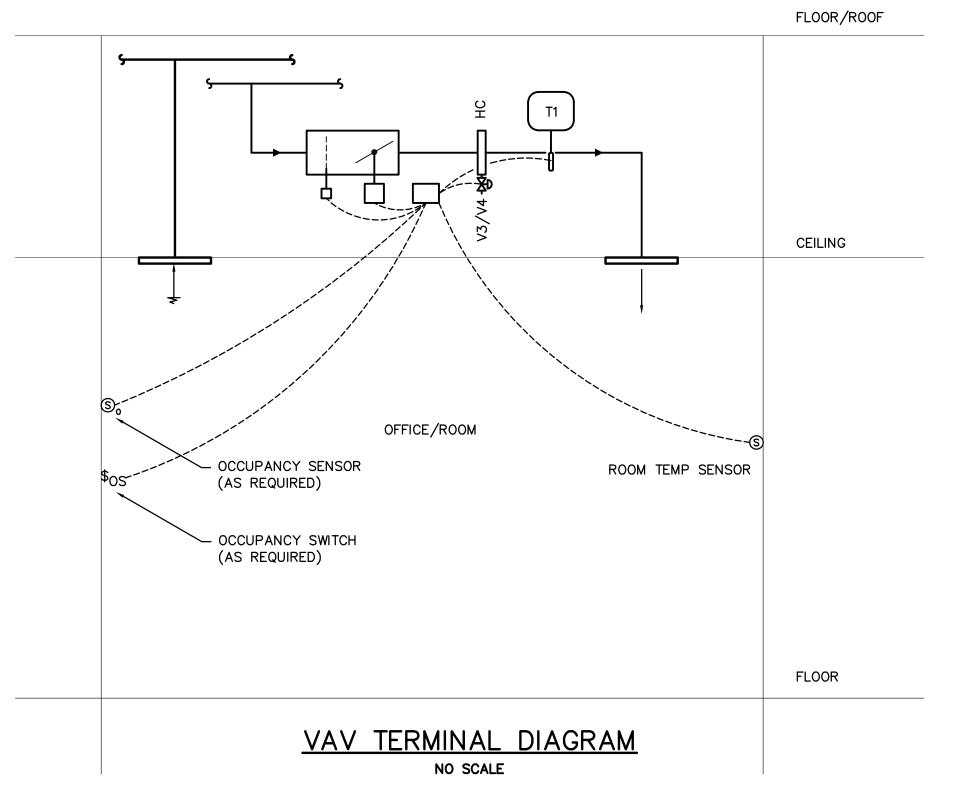
FIELD WIRING: PROVIDE FIELD WIRING OF THE TEMPERATURE AND HUMIDITY SENSORS IN THE ROOM. THE TEMPERATURE CONTROL CONTRACTOR SHALL ALSO PROVIDE WIRING BETWEEN THE DRYCOOLER AND FLOW SWITCH (FS-1), BETWEEN THE DRYCOOLER AND THE CRAC UNIT, AND WIRING BETWEEN CRAC UNIT AND DRYCOOLER TO INDICATE STANDBY PUMP OPERATION.

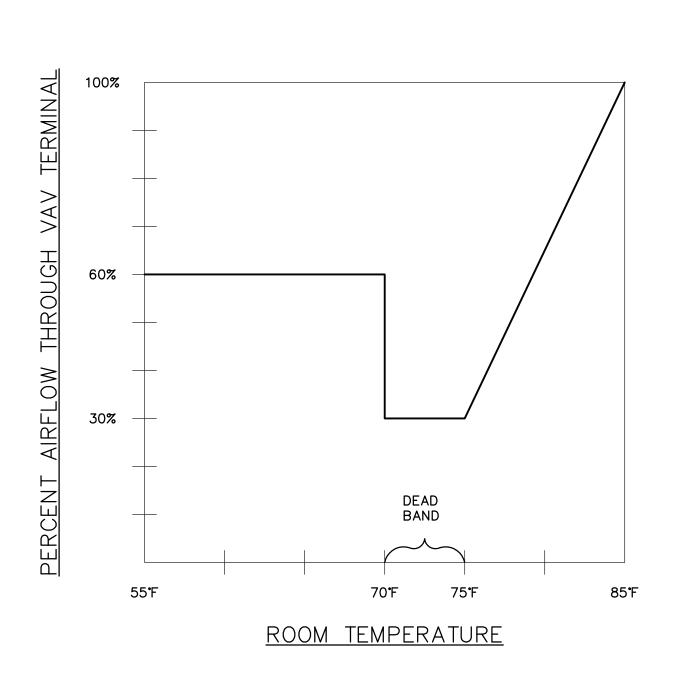
GLYCOL FEED PUMP:

PROVIDE A CONTACT WITH THE GLYCOL FILL TANK THAT INDICATES A LOW GLYCOL LEVEL CONDITION. UPON CLOSING THIS CONTACT THE DDC SYSTEM SHALL PROVIDE AN ALARM CONDITION ON THE DDC COMPUTER SCREEN ALERTING THE OWNER OF THIS CONDITION.

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ALL WORK SHOWN ON THIS SHEET IS CONSIDERED R/M WORK EXCEPT AS SPECIFICALLY NOTED OTHERWISE. SEE DETAIL 2, SHEET CU101 FOR ADDITIONAL INFORMATION.





*SEE ALSO HEATING AND COOLING MINIMUMS AS LISTED ON VAV SUPPLY TERMINAL UNIT SCHEDULE.

VAV TERMINAL CONTROL GRAPH NO SCALE

VAV SYSTEM CONTROL:

TERMINAL UNIT CONTROL: THE VAV TERMINAL UNITS SHALL BE CONTROLLED BY THE SPACE TEMPERATURE SENSORS, AND THE DDC CONTROLLER. THE TERMINAL UNITS SHALL PROVIDE BOTH HEATING AND COOLING, WITH THE EXCEPTION OF THE COOLING-ONLY TERMINALS. TERMINAL UNITS SHALL BE FURNISHED WITH 2-ROW HEATING COILS.

TERMINAL UNITS SHALL MAINTAIN A MINIMUM AIR FLOW AS SHOWN ON THE VAV SUPPLY TERMINAL UNIT SCHEDULE. IF THE TEMPERATURE IN THE SPACE EXCEEDS THE SET POINT, THE DDC CONTROLLER SHALL OPEN THE DAMPER AND REHEAT 2-WAY/3-WAY VALVE AS NECESSARY TO MAINTAIN SPACE TEMPERATURE.

AS COOLING LOAD INCREASES, TERMINAL DAMPER SHALL MODULATE OPEN TO FULL FLOW CONDITION. AS HEATING LOAD INCREASES, TERMINAL DAMPER SHALL OPEN TO 60% OPEN TO ENSURE ADEQUATE VELOCITY, AT THE DIFFUSER AND OPEN THE REHEAT 2-WAY/3-WAY VALVE TO PROVIDE HEAT TO THE SPACE.

LOSS OF POWER: IF THE RESPECTIVE AIR HANDLER IS SHUT DOWN, OR THERE IS A BUILDING LOSS OF POWER, TERMINAL UNIT 2-WAY/3-WAY VALVES SHALL FAIL IN PLACE AND DAMPERS SHALL FAIL IN PLACE.

FINNED TUBE CONTROL: AS A ROOM'S VAV IS IN HEATING MODE, THE ROOMS FINNED TUBE (IF THERE IS FINNED TUBE) SHALL ALSO BE TURNED ON TO TEMPER ROOM. THE TERMINAL UNIT, REHEAT VALVE, AND FINTUBE HEATING VALVE SHALL OPEN/CLOSE SIMULTANEOUSLY.

BUILDING CONTROL SHALL BE PROVIDED BY HONEYWELL XL-800.

BUILDING CONTROL:

BUILDING NO. Grand Forks Service							HA	۱R	D۷	VAF	₹E	•													S	OF	- Τ\	NΑ	RE	•							
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GRAPHIC DISPLAY POINT DESCRIPTION	CONTROL R	SOLENOID	OFF / AUTO	START/STOP	VFD 4-20 MA SIGN	CONTROL DAMPERS	FAN SPEED	PRESSURE SWITCH DIFFERENTIAL PRE	FLOW SWITCH	CONTACT CLOSURE	WALEK LEVE VED STATLIS	ROOM TEMF	SUPPLY AIR	AIR FLOW RATE	WATER TEMPERATURE	ELEC. USAGE (KWHR)	ELEC. DEMA	FAN FAILURE	WATER DET	ROOM TEMP	PUMP FAILURE HIGH ROOM TE	LOW LIMIT	RUN TIME	SCHEDULE	OPTIMUM ST	DUTY CYCLING	DEMAND LIMITING	ECONOMIZER	VENTILATIO	HOT / COLD DECK RE REHEAT COIL RESET	STEAM BOILER	HOT WATER	HW OA RESEI CHILLER SELECTION	CHILLED WATER RESET	CONDENSER WATER RECHILLER DEMAND INIT	CHILLER DEIMAIND L	REMOTE BOIL
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Symbol	Symbol Description	Date	Approved	Symbol	Date Approved Symbol Description	Dat

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1MAND	DWN BY: CHK BY: HDS JMN	CHK BY: JMM	FILE NAME: JFSD_0516_M-603.dwg
UADRON NT	PLOT DATE: PLOT SCALE	PLOT DATE: 20 APR 2010 PLOT SCALE: 1 TO 2 (FOR	PLOT DATE: 20 APR 2010 PLOT SCALE: 1 TO 2 (FOR 1/2—SIZE)
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SHEET REFERENCE NUMBER M - 603

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EMERGENCY DIESEL GENERATOR AND STORAGE TANK

NO SCALE

EMERGENCY DIESEL GENERATOR AND STORAGE TANK CONTROL

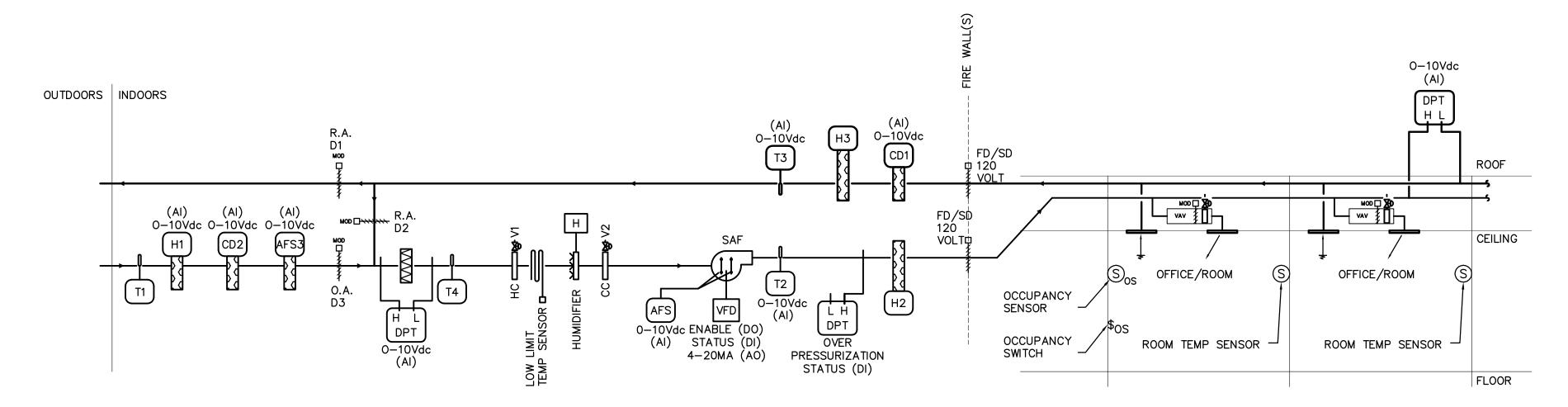
GENERATOR: EMERGENCY GENERATOR SHALL HAVE INTEGRAL DAY TANK UNDER ENGINE. FUEL TANK SHALL HAVE A LOW LEVEL SWITCH, HIGH LEVEL SWITCH, AND HIGH LEVEL SWITCH AND ALARM. ALARM SHALL BE LOCALLY AUDIBLE AND BE A CRITICAL ALARM. ALARM SHALL NOT IMPEDE OPERATION OF THE GENERATOR.

<u>FUEL TRANSFER</u>: GENERATOR SHALL HAVE INTEGRAL TRANSFER PUMP, REVERSE PUMP, AND SOLENOID ISOLATION VALVE. AS DAY TANK REACHES LOW LEVEL, SOLENOID VALVE SHALL OPEN AND TRANSFER PUMP SHALL START. AS HIGH LEVEL IS REACHED. PUMP SHALL STOP AND SOLENOID VALVE SHALL CLOSE. HIGH-ALARM SHALL ALSO STOP PUMP AND CLOSE THE SOLENOID VALVE, AS WELL AS START REVERSE PUMP TO PREVENT OVERFLOW.

STORAGE TANK: THE DIESEL STORAGE TANK SHALL BE DOUBLE—WALL WITH LEAK DETECTOR AND OVERFILL PROTECTION. TANK SHALL HAVE 7 GALLON OVERFILL PROTECTION.

ALL GENERATOR WOR SHOWN ON THIS SHEET IS CONSIDERED M/C WORK. SEE DETAIL 2, SHEET CU101 FOR ADDITIONAL INFORMATION.

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AHU-3: AIR HANDLING UNIT DIGRAM

NO SCALE

AIR HANDLING UNIT 3 CONTROL

AS THE FAN IS SHUT DOWN, EITHER BY THE DDC CONTROLLED FROM THE DDC CONTROLLER BASED ON CONTROLLER OR THE SAFETY CIRCUITS, DAMPERS D1 AND D3 SHALL CLOSE, D2 SHALL OPEN, VALVE V1 SHALL OPEN, VALVE V2 SHALL CLOSE, AND THE SMOKE DAMPERS SHALL CLOSE.

AHU-CONTROL: THE AIR HANDLER SHALL BE

THE AIR HANDLING UNIT WILL HAVE A MORNING

SHALL CYCLE ON/OFF TO MAINTAIN SETBACK

IN (DI) CONTROL POINT FOR THE VFD.

ALLOW THE BUILDING TEMPERATURE DROP TO 55

TEMPERATURE, OCCUPANCY, ETC.

RUN CONTINUOUSLY.

PARAMETERS SUCH AS TIME OF DAY, OUTSIDE AIR

WARM-UP/MORNING COOL-DOWN SCHEDULE (SETBACK) TO

(ADJUSTABLE) DEG F (DURING WINTER MONTHS) AND RISE

TO 80 (ADJUSTABLE) DEG F (DURING SUMMER MONTHS)

DURING NON-OCCUPANCY PERIODS. THE AIR HANDLING

UNITS WILL SWITCH TO NORMAL OPERATION AT 7:00 AM

(ADJUSTABLE) AND GO BACK TO SETBACK TEMPERATURE

DURING WEEKENDS, AIR HANDLING UNITS WILL OPERATE ON

SETBACK SCHEDULE. DURING SETBACK OPERATION, FANS

TEMPERATURE. UNDER NORMAL OPERATION, FANS SHALL

FAN CONTROL: THE VARIABLE FREQUENCY DRIVE (VFD) FOR THE SUPPLY AIR FAN (SAF) SHALL BE CONTROLLED

BY THE DDC CONTROL SYSTEM. PROVIDE A START/STOP

DIGITAL OUT (DO) CONTROL POINT, A 4 - 20 MA ANALOG

OUT (AO) CONTROL POINT, AND A STATUS ALARM DIGITAL

THE DDC CONTROLLER SHALL START THE SAF AND THE

FAN SHALL RUN CONTINUOUSLY. UPON FAN START UP.

DIFFERENTIAL PRESSURE SWITCHES. IF THE DAMPERS ARE

PRESSURE SWITCH SHALL TRIP OUT, AND SHUT THE VFD

DOWN ON A HIGH PRESSURE CONDITION. THE OVER

THE ASSOCIATED SMOKE DAMPERS SHALL BE PROVEN

OPEN THROUGH THE DUCT OVER PRESSURIZATION

CLOSED, THE OVER PRESSURIZATION DIFFERENTIAL

AT 5:00 PM (ADJUSTABLE) MONDAY THROUGH FRIDAY.

HAND-OFF-AUTO: WHEN THE SWITCH ON THE VFD IS IN THE "OFF" POSITION, THE FAN SHALL BE SHUT OFF. WHEN THE SWITCH ON THE VFD IS IN THE "HAND" POSITION, THE FAN SPEED SHALL BE ADJUSTED MANUALLY THROUGH A POTENTIOMETER. WHEN THE SWITCH IS IN THE "AUTO" POSITION, THE FAN SHALL OPERATE AS DIRECTED BY THE DDC CONTROLLER.

FLOW TRACKING: PROVIDE AN AIRFLOW MEASURING STATION IN THE BELL HOUSING INLET OF THE SAF.

THE AIRFLOW MEASURING STATIONS SHALL BE OF THE VORTEX SHEDDING TYPE WITH AN ELECTRONIC TRANSMITTER TO DELIVER AN AI SIGNAL TO THE DDC CONTROLLER. THE AI SIGNAL SHALL REFERENCE A CALIBRATED AIRFLOW RATE FOR THE RESPECTIVE FAN. AIRFLOW MEASURING STATION SHALL NOT AFFECT FAN PERFORMANCE.

THE OUTSIDE AIR AIRFLOW STATION SHALL BE USED TO MONITOR PERCENT OUTSIDE AIR.

SUPPLY AIR FAN (SAF) CONTROL: PROVIDE DIFFERENTIAL PRESSURE TRANSMITTERS IN THE SUPPLY DUCT AND RETURN DUCT AS SHOWN ON THE DRAWINGS. THE DDC CONTROLLER SHALL ADJUST THE SPEED OF THE FAN TO PROVIDE A DUCT PRESSURE SETTING OF 1.0" W.C. (ADJUSTABLE).

SUPPLY AIR TEMPERATURE CONTROL: PROVIDE AN AIR TEMPERATURE SENSOR T2 DOWN STREAM OF THE SUPPLY AIR FAN. PROVIDE SEPARATE ELECTRONIC ACTUATORS FOR THE RELIEF AIR DAMPERS D1, RETURN AIR DAMPERS D2, AND THE OUTSIDE AIR DAMPERS D3. DAMPERS D2 AND D3 SHALL OPERATE INVERSELY. AS D2 OPENS, D3 SHALL CLOSE. D1 SHALL OPERATE INDEPENDENTLY, AND SHALL OPEN UPON START-UP OF SAF. D1 & D3 SHALL CLOSE UPON SAF SHUT DOWN.

PROVIDE A THREE-WAY HOT WATER HEATING CONTROL VALVE V1 TO SERVE THE HEATING COIL. PROVIDE A THREE-WAY CHILLED WATER CONTROL VALVE V2 TO SERVE THE COOLING COIL.

WINTER CONDITIONS (O.A. BELOW 55 (ADJUSTABLE) DEG F): DAMPERS D2 AND D3 SHALL MODULATE OPEN/CLOSED TO MAINTAIN AN AIR TEMPERATURE OF 55 (ADJUSTABLE) DEG F AT T4. DAMPER D3 SHALL HAVE A MINIMUM SETTING BASED ON OCCUPANCY OPEN TO VENTILATE THE SPACE AND MAINTAIN A POSITIVE PRESSURE IN THE BUILDING. WHEN THE DDC CONTROLLER IS CALLING FOR HEAT, D3 SHALL GO TO THE MINIMUM SETTING (30% OUTSIDE AIR), AND THE DDC CONTROLLER SHALL OPEN VALVE V1 TO PROVIDE HEAT TO THE AIR, HEATING IT TO 55 (ADJUSTABLE) DEG F AT T2.

SUMMER CONDITIONS (O.A. ABOVE 55 (ADJUSTABLE) DEG F): DAMPER D2 SHALL REMAIN OPEN, AND D3 SHALL GO TO THE MINIMUM OPEN POSITION BASED ON OCCUPANCY. AS THE AIR TEMPERATURE AT T2 EXCEEDS 55 (ADJUSTABLE) DEG F, THE DDC CONTROLLER SHALL OPEN VALVE V2 TO MAINTAIN A 55 (ADJUSTABLE) DEG F TEMPERATURE AT T2.

<u>VENTILATION CONTROL:</u> PROVIDE A CARBON DIOXIDE SENSOR CD1 IN THE RETURN DUCT. UPON SENSING A CARBON DIOXIDE LEVEL OF 1200 PPM OR MORE. THE DDC

FILTER CONDITIONS: PROVIDE A DIFFERENTIAL PRESSURE SENSOR ACROSS THE FILTER BANK FOR PRESSURE DROP INDICATION ONLY. THE DDC CONTROLLER SHALL ACTIVATE AN ALARM CONDITION WHENEVER THE PRESSURE DROP EXCEEDS A PRESET HIGH LIMIT CONDITION.

LOW LIMIT TEMPERATURE SENSOR: PROVIDE A SERPENTINE LOW LIMIT TEMPERATURE SENSOR ON THE DISCHARGE OF THE HEATING COIL. THIS LOW LIMIT TEMPERATURE SENSOR SHALL BE CONNECTED TO THE SAFETY CIRCUIT OF THE VFD. UPON SENSING A LOW LIMIT CONDITION OF 38 DEG F, THE TEMPERATURE SENSOR SHALL SHUT BOTH SUPPLY AND RETURN FANS DOWN. THIS LOW LIMIT TEMPERATURE SENSOR SHALL BE OF THE MANUAL RESET TYPE.

SMOKE SENSORS AND DAMPERS: UPON SENSING A SMOKE OR FIRE ALARM CONDITION THROUGH THE BUILDING'S FIRE ALARM SYSTEM. THE SAF AND RAF SHALL SHUT DOWN THROUGH A RELAY IN THE SAFETY CIRCUIT OF THE VFD'S. UPON FAN SHUTDOWN, THE ASSOCIATED FIRE/SMOKE DAMPERS SHALL CLOSE.

LOSS OF POWER: WHEN THERE IS A LOSS OF POWER, AHU-3 SHALL SHUT DOWN AND IS NOT CONNECTED TO EMERGENCY POWER. DAMPERS D1 AND D3 SHALL CLOSE, IN PART TO PREVENT FREEZING THE BUILDING. BUILDING LOSS OF POWER SHALL BE A CRITICAL ALARM.

HUMIDIFY CONTROL: THE HUMIDIFIER ON AHU-3 SHALL ADD HUMIDITY TO THE AIR STREAM. THE RESULTING RELATIVE HUMIDITY SHALL BE 50-55% AT 70 DEG F DURING THE WINTER. HUMIDIFIER SHALL BE CONTROLLED BY THE DDC CONTROLLER, USING THE HUMIDITY SENSOR, H3. HUMIDITY SENSOR H2 SHALL ACT AS A HIGH LIMIT HUMIDITY SENSOR AND OVERRIDE H3 UPON SENSING A SATURATED DISCHARGE AIR CONDITION.

GENCY SHUT DOWN SWITCH: AN EMERGENCY SHUT SWITCH SHALL BE LOCATED IN CORR 116. THIS H SHALL SHUT DOWN AHU-3 UPON ACTIVATION OF THE GENCY SHUT DOWN SWITCH.

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SHEET REFERENCE NUMBER M - 604Sheet <u>23</u> of <u>30</u>

BUILDING NO. Grand Forks Service Add & Repair B516 SYSTEM(S) AHU-3 OCCUPANCY TIME GENERAL CONTROL WALLE RESERVE SAMUCH INTIME REFERENCE ALARM INTIME REFERENCE SOFTEM INTIME S			CONS	SIDEREI	D R	OLER UI /M WOR ORMATIC	K. SE					S SHEE CU101								S
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	Add & Repair 5516	DIGITAL	ANAL	og	DIGI	TAL	ANALO)G		IGITA	L	ANALOG	;		APPL	LICATION	ON PR	OGRAN	/15	
	OCCUPANCY TIME GENERAL DISPLAY CRITICAL ALARM DISPLAY C	CONTROL RELAY START/STOP	dw	ONTROL VALY	FFERENTIAL PRESSURE SWIT	AUXILIARY CONTACT VFD STATUS TEMPERATURE (DEGREES F)	% RELATIVE HUMIDITY AIR FLOW MEASUREMENT STATIC AIR PRESSURE	CARBON DIOXIDE KILOWATT	OF AI	OVEF	LOBBY AHU SHUT-OFF SWITCH LOW LIMIT FREEZE ALARM	HUMIDITY HIGH LIMIT HUMIDIFIER ALARM RUN TIME	SCHEDULED START / STOP OPTIMUM START / STOP	DUTY CYCLING DEMAND LIMITING	DAY / NIGHT SETBACK ECONOMIZER	VENTILATION / RECIRCULATION SUPPLY/RET. FAN FLOW TRACKING	REHEAT COIL RESET HOT WATER BOILER SELECTION	HW OA RESET CHILLER SELECTION	CONDENSER WATER RESET	CHILLER DEMAND LIMIT LIGHTING CONTROL
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ELECTRICAL SYMBOLS LEGEND (AS APPLICABLE) SWITCHING SYMBOL DESCRIPTION DESCRIPTION SINGLE POLE SWITCH - LETTER INDICATES SWITCH LEG \$м MOMENTARY CONTACT SWITCH \$2 DOUBLE POLE SWITCH KEY OPERATED SWITCH THREE-WAY SWITCH \$3 PILOT LIGHT SWITCH FOUR-WAY SWITCH TIMER SWITCH DIMMER SWITCH \$D \$os OCCUPANCY SENSOR - WALL SWITCH DASHED LINE INDICATES \$н HORSEPOWER RATED SWITCH OCCUPANCY SENSOR - CEILING MOUNTED GROUPS OF LUMINAIRES TO BE FUSED SWITCH CONTROLLED BY OCCUPANCY OCCUPANCY SENSOR - WALL MOUNTED LOW VOLTAGE SWITCH - LETTER INDICATES TYPE \$LVa LIGHTING FLUORESCENT LUMINAIRE WALL MOUNTED LUMINAIRE WALL MOUNTED LUMINAIRE - NIGHT LIGHT FLUORESCENT LUMINAIRE - LAMPS SWITCHED SEPARATE WALL MOUNTED LUMINAIRE - EMERGENCY FLUORESCENT LUMINAIRE WITH AUXILIARY LIGHT EXIT SIGN FLUORESCENT LUMINAIRE - EMERGENCY PHOTOCELL, DAYLIGHT SENSOR FLUORESCENT LUMINAIRE - NIGHT LIGHT EXTERIOR LUMINAIRE - POLE MOUNTED \Box FLUORESCENT WALL MOUNTED LUMINAIRE EXTERIOR LUMINAIRE - POLE MOUNTED FLUORESCENT WALL MOUNTED LUMINAIRE - EMERGENCY EXTERIOR LUMINAIRE - POLE MOUNTED FLUORESCENT WALL MOUNTED LUMINAIRE - NIGHT LIGHT EXTERIOR LUMINAIRE - POLE MOUNTED FLUORESCENT STRIP LUMINAIRE -FLOOD LIGHT LUMINAIRE FLUORESCENT STRIP LUMINAIRE - EMERGENCY \Box EMERGENCY BATTERY PACK FLUORESCENT STRIP LUMINAIRE - NIGHT LIGHT ablaEMERGENCY LUMINAIRE REMOTE HEADS LUMINAIRE TRACK LUMINAIRE LUMINAIRE - NIGHT LIGHT LUMINAIRE - EMERGENCY POWER DEVICES SINGLE RECEPTACLE LIGHTING & APPLIANCE PANELBOARD DUPLEX RECEPTACLE POWER DISTRIBUTION EQUIPMENT FOUR-PLEX RECEPTACLE - TWO DUPLEX RECEPTACLES TRANSFORMER RANGE RECEPTACLE ENCLOSED CIRCUIT BREAKER SPECIAL RECEPTACLE CABINET (TYPE INDICATED) DUPLEX RECEPTACLE - GROUND-FAULT CIRCUIT-INTERRUPTER ÐG \boxtimes MOTOR STARTER, LIGHTING CONTACTOR ÐIG DUPLEX RECEPTACLE - ISOLATED GROUND NON- FUSED SAFETY SWITCH DUPLEX RECEPTACLE - \Box ₩R FUSED SAFETY SWITCH WEATHER-RESISTANT GROUND-FAULT CIRCUIT-INTERRUPTER \boxtimes_1 COMBINATION MOTOR STARTER & SAFETY SWITCH ₽A DUPLEX RECEPTACLE - ON APPLIANCE CIRCUIT 10/ MOTOR Әт DUPLEX RECEPTACLE - TAMPER-RESISTANT (J)— CORD DROP (J-BOX AT CEILING) ÐF DUPLEX RECEPTACLE - ARC-FAULT RATED CORD DROP (SPECIAL RECEPTACLE AT CEILING) ₩ DUPLEX RECEPTACLE - MOUNTED IN MILLWORK MULTI-OUTLET ASSEMBLY Әв DUPLEX RECEPTACLE - MOUNTED BELOW COUNTER DUPLEX RECEPTACLE - CEILING MOUNTED FLUSH FLOOR BOX FLUSH POKE-THRU DUPLEX RECEPTACLE - BOTTOM HALF SWITCHED SPLIT-WIRE RECEPTACLE DAMPER JUNCTION BOX SOLENOID **RACEWAYS /** T **/** HOME RUN TO PANEL TELEPHONE CONDUIT UNSWITCHED LIGHTING CIRCUIT CONDUIT UP MASTER SATELLITE FIXTURE CONNECTION CONDUIT DOWN EMERGENCY CIRCUIT CONDUIT SEAL / NL < NIGHT LIGHTING CIRCUIT CABLE TRAY __s__ SOUND SYSTEM RACEWAY □]#" CONDUIT SLEEVE (NUMBER INDICATES SIZE) MISCELLANEOUS NON-FUSED **EQUIPMENT IDENTIFICATION TAG** WEATHER-PROOF WIRE GUARD FACP FIRE ALARM CONTROL PANEL EXPLOSION PROOF FAAP FIRE ALARM ANNUNCIATOR PANEL 30/3/10/3R RATED AMPACITY/NO. POLES/FUSING REQ'D/NEMA ENCL. NO. \mathbb{P}_{X} PROJECTOR INPUT STATION - LETTER INDICATES TYPE HOA HAND-OFF-AUTO \Box CCT. CIRCUIT PROJECTOR CONTROL STATION LIGHT LINEWORK = EXISTING OR DEMOLITION PART. CCT. PARTIAL CIRCUIT DARK LINEWORK = NEW TVSS SURGE SUPPRESSION COMMUNICATIONS TELEPHONE CABINET CLOCK HANGER OUTLET ⋖W TELEPHONE OUTLET - WALL MOUNTED CLOCK - WALL MOUNTED TELEPHONE OUTLET BOX \mathbb{C}_2 CLOCK - CEILING MOUNTED (DOUBLE FACE) NUMBER BY SYMBOL INDICATES <1# DATA OUTLET BOX QUANTITY OF JACKS. ZERO CS CLASSROOM CLOCK & SPEAKER PHONE OUTLET BOX - CEILING MOUNTED INDICATES EMPTY OUTLET BOX, BLANK PLATE AND CONDUIT. PROGRAM BELL DATA OUTLET BOX - CEILING MOUNTED INTERCOM CALL SWITCH COMBINATION TELEPHONE/DATA OUTLET BOX - ONE JACK EACH **→**X INTERCOM ADMINISTRATION STATION (LETTER INDICATES TYPE) DATA OUTLET BOX - BLANK PLATE, 1" CONDUIT INTERCOM CLASSROOM/STAFF STATION (LETTER INDICATES TYPE) --DxMICROPHONE OUTLET (NUMBER INDICATES QUANTITY) AUDIO/VISUAL AUXILIARY OUTLET (LETTER INDICATES TYPE) —⊗x MICROPHONE OUTLET - WALL MOUNTED (NUMBER INDICATES QUANTITY) T.V. ANTENNA OUTLET □# LINE INPUT OUTLET (NUMBER INDICATES QUANTITY) INTERCOM/PAGING VOLUME CONTROL HL]# LINE INPUT OUTLET - WALL MOUNTED (NUMBER INDICATES QUANTITY) Ю SOUND SYSTEM VOLUME CONTROL S INTERCOM/PAGING SPEAKER - CEILING MOUNTED 11 GROUND BAR HS INTERCOM/PAGING SPEAKER - WALL MOUNTED NOTE: SYMBOLS SHOWN "STACKED" ON THE FLOOR PLANS HS◀ NDICATE THAT THE DEVICES ARE TO BE LOCATED IN THE SAME INTERCOM/PAGING SPEAKER HORN - WALL MOUNTED OUTLET BOX AND FACEPLATE. (I.E. ___1 S SOUND SYSTEM SPEAKER - CEILING MOUNTED HS) SOUND SYSTEM SPEAKER - WALL MOUNTED SECURITY PUSHBUTTON STATION MOTION DETECTOR PUSHBUTTON STATION, 'P' INDICATES PILOT KEYPAD ES DOOR MONITOR SWITCH ELECTRIC STRIKE DOOR SWITCH CR CARD READER PS DOOR BELL CHIME/BUZZER POWER SUPPLY \square DOOR CONTACT SECURITY CAMERA

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GENERAL ELECTRICAL NOTES

- A. ALL WIRING SHALL BE INSTALLED IN CONTINUOUS RACEWAY.
- B. ALL CONDUITS IN NEW WALLS, EXISTING STUD WALLS, OR IN AREAS WITH
- SUSPENDED CEILINGS SHALL BE INSTALLED CONCEALED.
- C. BRANCH CIRCUIT AND SPECIAL SYSTEMS WIRING FOR DEVICES ON EXISTING WALLS OR EXPOSED CEILINGS WHERE RACEWAY CANNOT BE CONCEALED SHALL BE INSTALLED IN SURFACE METAL RACEWAY.
- D. ALL EXPOSED RACEWAY IN ROOMS TO BE PAINTED SHALL BE PAINTED TO MATCH SURROUNDING SURFACE. COORDINATE FINISHES WITH ARCHITECT. ALL EXPOSED RACEWAY AND FITTINGS IN ROOMS WHICH ARE NOT TO BE PAINTED SHALL BE WIREMOLD #V500 OR #V700 OR #V2400 SERIES WITH FACTORY IVORY FINISH.
- E. SURFACE RACEWAY FOR TELECOMMUNICATION CABLE SHALL NOT BE SMALLER THAN WIREMOLD #V2400. ALL FITTINGS FOR TELECOMMUNICATION RACEWAYS SHALL COMPLY WITH EIA STANDARDS FOR BEND RADIUS.
- F. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PATCHING, PAINTING, REPAIRING OR REPLACEMENT OF ALL WALLS, CEILINGS, OR OTHER BUILDING ELEMENTS WHICH ARE DISTURBED AS PART OF THE DEMOLITION OR INSTALLATION OF ELECTRICAL WORK.
- G. REFER TO MECHANICAL/ELECTRICAL COORDINATION SCHEDULE SHEET M__ FOR ADDITIONAL REQUIREMENTS FOR DISCONNECTS, MOTOR STARTERS, ETC.
- H. CONTRACTOR SHALL COORDINATE LOCATION OF LIGHT FIXTURES, SPEAKERS, ETC. WITH FIRE RATED CEILINGS AND PROVIDE ENCLOSURES AS REQUIRED TO MAINTAIN THE FIRE INTEGRITY RATING OF THE CEILING. COORDINATE EXACT LOCATIONS OF FIRE RATED CEILINGS WITH ARCHITECTURAL DRAWINGS. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
- I. LABELING FOR PANELBOARD DIRECTORIES, FIRE ALARM PANEL PROGRAMMING, ETC. SHALL USE ROOM NUMBERS ASSIGNED BY OWNER AND NOT ROOM NUMBERS LISTED ON DRAWINGS. LABELS ON PANELBOARD DIRECTORY SHALL INCLUDE A DESCRIPTION OF LOAD SUCH AS LIGHTS, RECEPTACLES, MECH. UNIT LOCATIONS, ETC.
- J. EMERGENCY LIGHTING FIXTURES WITH GENERATOR TRANSFER DEVICE (GTD)
 REQUIRE MULTIPLE CIRCUIT CONNECTIONS SUCH AS: NORMAL POWER UNSWITCHED,
 NORMAL POWER SWITCHED, AND EMERGENCY POWER UNSWITCHED. UPON NORMAL
 POWER FAILURE, THE GTD SHALL CONNECT THE FIXTURE TO THE UNSWITCHED
 EMERGENCY POWER CIRCUIT.
- K. IN AREAS WITH PRECAST PANELS, COORDINATE INSTALLATION OF FLUSH MOUNTED DEVICE BOXES AND CONCEALED CONDUITS WITH PRECAST PANEL SUPPLIER SUCH THAT ALL CONDUIT, BOXES, ETC. ARE CAST WITHIN EACH WALL SECTION. ELECTRICAL CONTRACTOR SHALL FURNISH CONDUIT AND BOXES TO PRECAST SUPPLIER FOR EMBEDDING INTO WALLS.
- L. LOCATIONS AND QUANTITIES OF OCCUPANCY SENSORS SHOWN ON THE DRAWINGS ARE DIAGRAMMATIC AND INDICATE ONLY THE ROOM/AREA TO BE CONTROLLED BY THE SENSORS. ADDITIONAL SENSORS AND RELATED EQUIPMENT MAY BE REQUIRED FOR COMPLETE COVERAGE AND SWITCHING ARRANGEMENTS AS SHOWN ON DRAWINGS. SEE SPECIFICATION 16950 FOR ADDITIONAL INFORMATION.
- M. MULTIWIRE BRANCH CIRCUITS AS DEFINED BY THE NATIONAL ELECTRICAL CODE (CIRCUITS WITH COMMON NEUTRAL) SHALL NOT BE USED. EXCEPTION: WHERE AN EQUIPMENT MANUFACTURER REQUIRES A MULTIWIRE BRANCH CIRCUIT FOR ONLY ONE UTILIZATION EQUIPMENT AND WHERE ALL UNGROUNDED CONDUCTORS OF THAT CIRCUIT ARE OPENED SIMULTANEOUSLY BY THE BRANCH CIRCUIT OVERCURRENT DEVICE.
- A CABLE OR RACEWAY TYPE WIRING METHOD, INSTALLED IN EXPOSED OR CONCEALED LOCATIONS NEAR METAL—CORRUGATED SHEET ROOF DECKING, SHALL BE INSTALLED AND SUPPORTED SO THE NEAREST OUTER SURFACE OF THE CABLE OR RACEWAY IS NOT LESS THAN 6 INCHES FROM THE NEAREST SURFACE OF THE ROOF DECKING. EXCEPTION: RIGID METAL CONDUIT AND INTERMEDIATE METAL CONDUIT SHALL NOT BE REQUIRED TO MAINTAIN THIS CLEARANCE.

GENERAL ELECTRICAL DEMOLITION NOTES

- A. THE CONTRACTOR SHALL COMPLETELY REMOVE ALL ELECTRICAL WIRING, CONDUIT, SWITCHES, DISCONNECTS, LIGHTING FIXTURES AND OTHER ASSOCIATED ITEMS AS SHOWN (CROSSHATCHED). THE ITEMS INDICATED SPECIFICALLY ON THE DRAWINGS TO BE REMOVED ARE ONLY TO INDICATE IN GENERAL TO THE CONTRACTOR THE AMOUNT OF DEMOLITION WORK INVOLVED. A SITE INVESTIGATION BY THE CONTRACTOR SHOULD BE PERFORMED TO AID IN DETERMINING THE COMPLETE EXTENT OF WORK INVOLVED.
- B. THE CONTRACTOR SHALL COORDINATE AND SCHEDULE ALL NECESSARY POWER OUTAGES WITH THE OWNERS REPRESENTATIVE PRIOR TO PROCEEDING WITH SUCH WORK TO INSURE THAT OPERATIONS IN ADJACENT OCCUPIED PORTIONS OF THE BUILDING ARE NOT INTERRUPTED OR RESTRICTED WITHOUT PRIOR APPROVAL.
- C. ALL EXISTING BRANCH CIRCUITS BEING REMOVED SHALL BE REMOVED AS COMPLETELY AS POSSIBLE. EXISTING CONDUCTORS SHALL BE REMOVED COMPLETELY FROM THEIR RACEWAYS, DISPOSED OF AS SCRAP, REMOVED FROM SITE AND NOT REUSED EXCEPT WHERE SPECIFICALLY NOTED OTHERWISE. WHERE AN EXISTING DEVICE IS SHOWN REMOVED FROM AN EXISTING CIRCUIT, NEW WIRING SHALL BE PROVIDED AS REQUIRED TO ENSURE CONTINUITY OF EXISTING CIRCUIT. ELECTRICAL RACEWAYS WHERE STUBBED FROM A CONCRETE FLOOR OR WALL SHALL BE CHISELED 2 INCHES BELOW SURFACE, GROUTED AND SCREED.
- D. ALL EXISTING LIGHT FIXTURES, LAMPS, AND ELECTRICAL EQUIPMENT SHOWN TO BE REMOVED SHALL BE REMOVED BY THE CONTRACTOR. EXISTING FIXTURES AND EQUIPMENT CONSIDERED SALVAGEABLE BY THE OWNER AND NOT SHOWN TO BE REUSED SHALL BE TURNED OVER TO THE OWNER OR REMOVED FROM SITE AS DIRECTED BY OWNER. LAMPS AND BALLASTS THAT ARE CONSIDERED AS HAZARDOUS WASTE SHALL BE DISPOSED OF PROPERLY.
- E. ALL EXISTING SURFACE MOUNTED BACKBOXES, CONDUIT, WIREWAY, JUNCTION BOXES, ETC. SHOWN REMOVED SHALL BE REMOVED IN THEIR ENTIRETY. ALL RECESSED BACKBOXES, JUNCTION BOXES SHOWN REMOVED SHALL BE ABANDONED IN PLACE AND COVERED WITH STAINLESS STEEL COVER PLATES. ALL RECESSED CONDUIT SHALL BE ABANDONED IN PLACE AND CAPPED OFF IN A SUITABLE MANNER PER LOCAL INSPECTORS REQUIREMENTS.
- F. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PATCHING, PAINTING, REPAIRING OR REPLACEMENT OF ALL WALL, CEILING, OR OTHER BUILDING ELEMENTS WHICH ARE DISTURBED AS PART OF THE DEMOLITION OR INSTALLATION OF ELECTRICAL WORK.
- REMOVE ELECTRICAL CONNECTIONS TO ALL MECHANICAL EQUIPMENT BEING REMOVED BY DIVISION 23. COORDINATE EQUIPMENT REMOVAL LOCATIONS WITH MECHANICAL DRAWINGS.
- H. COORDINATE EXISTING BOXES AND CONDUIT WHICH ARE TO BE REUSED WITH NEW WORK AS INDICATED ON LIGHTING AND POWER DRAWINGS.



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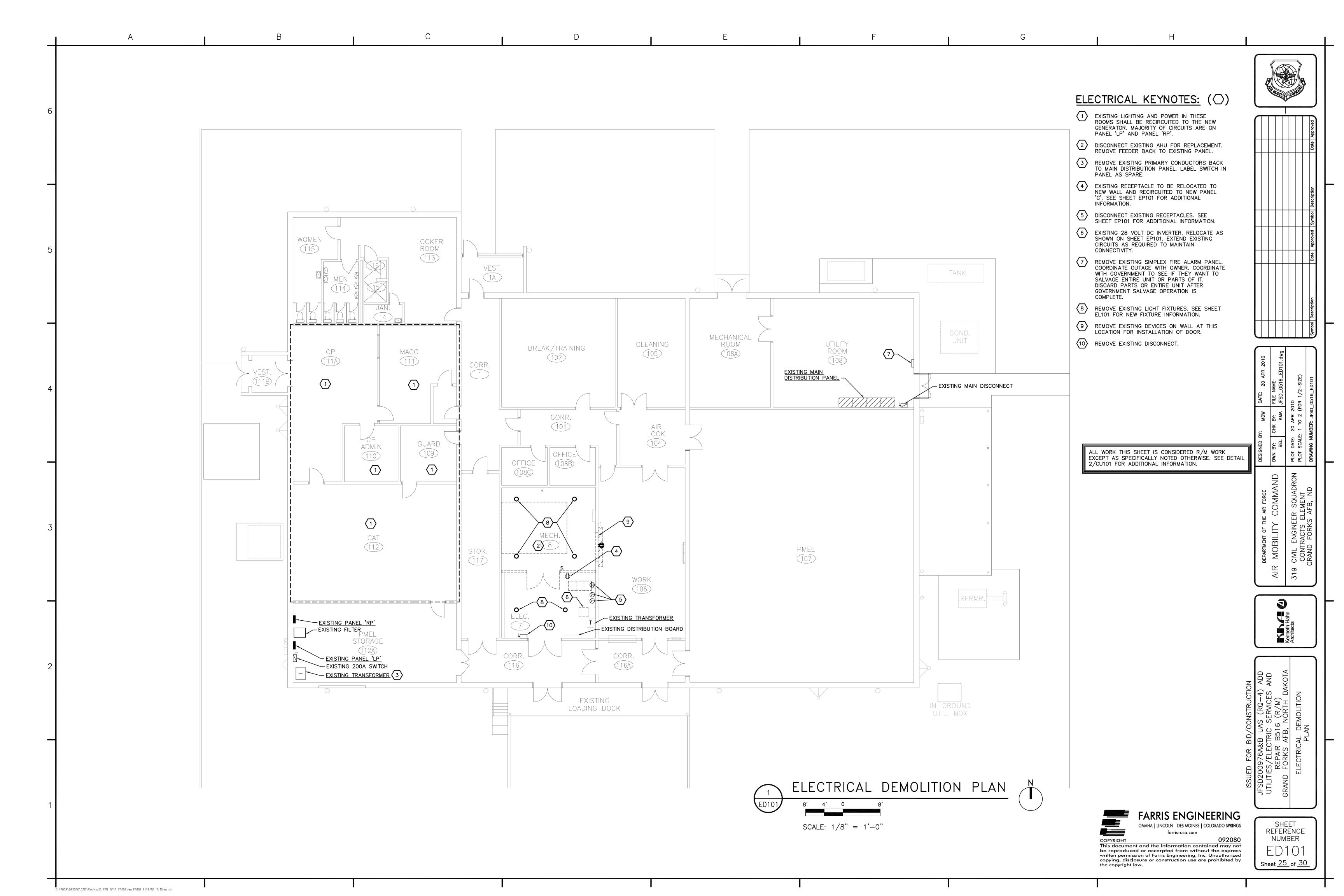
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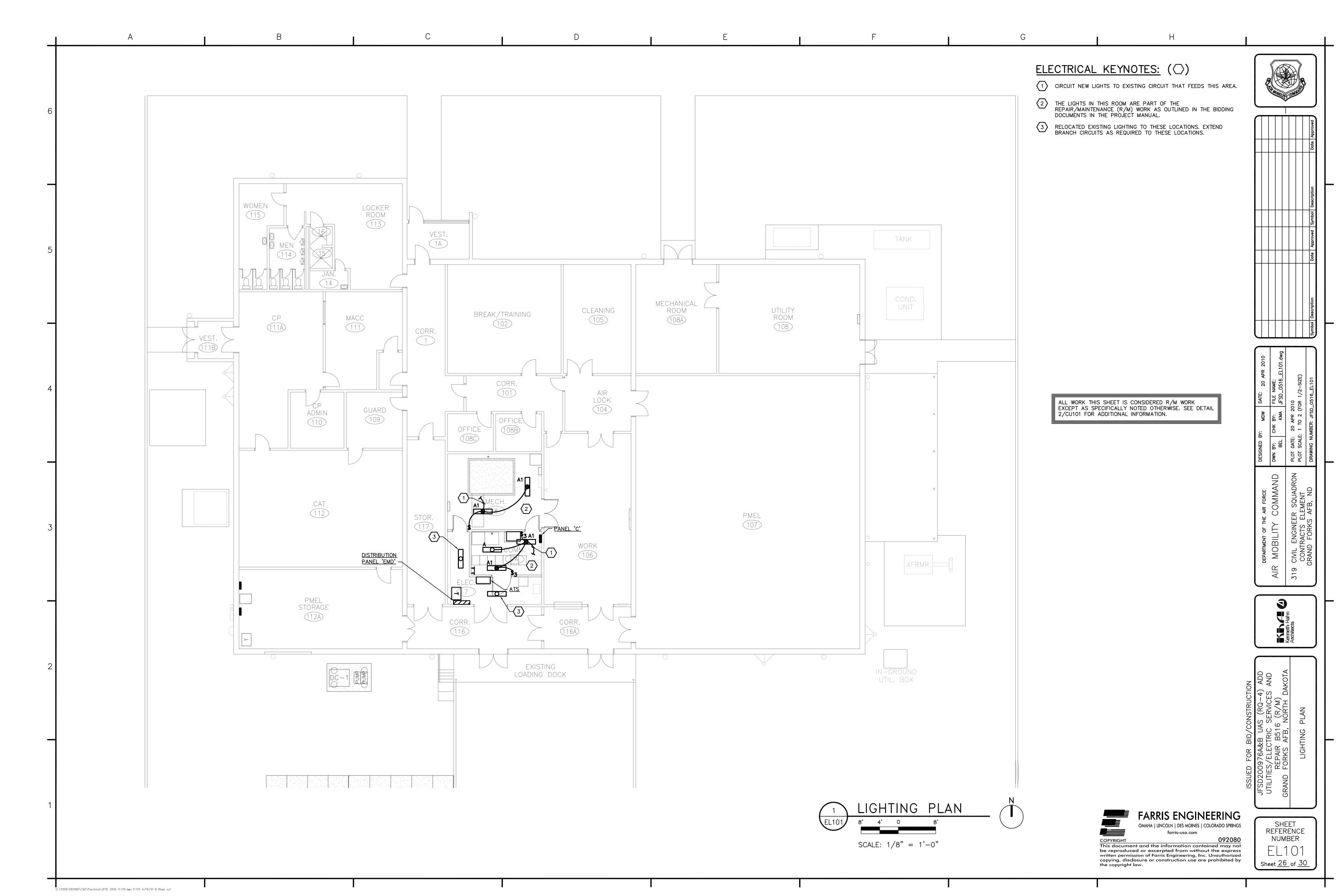
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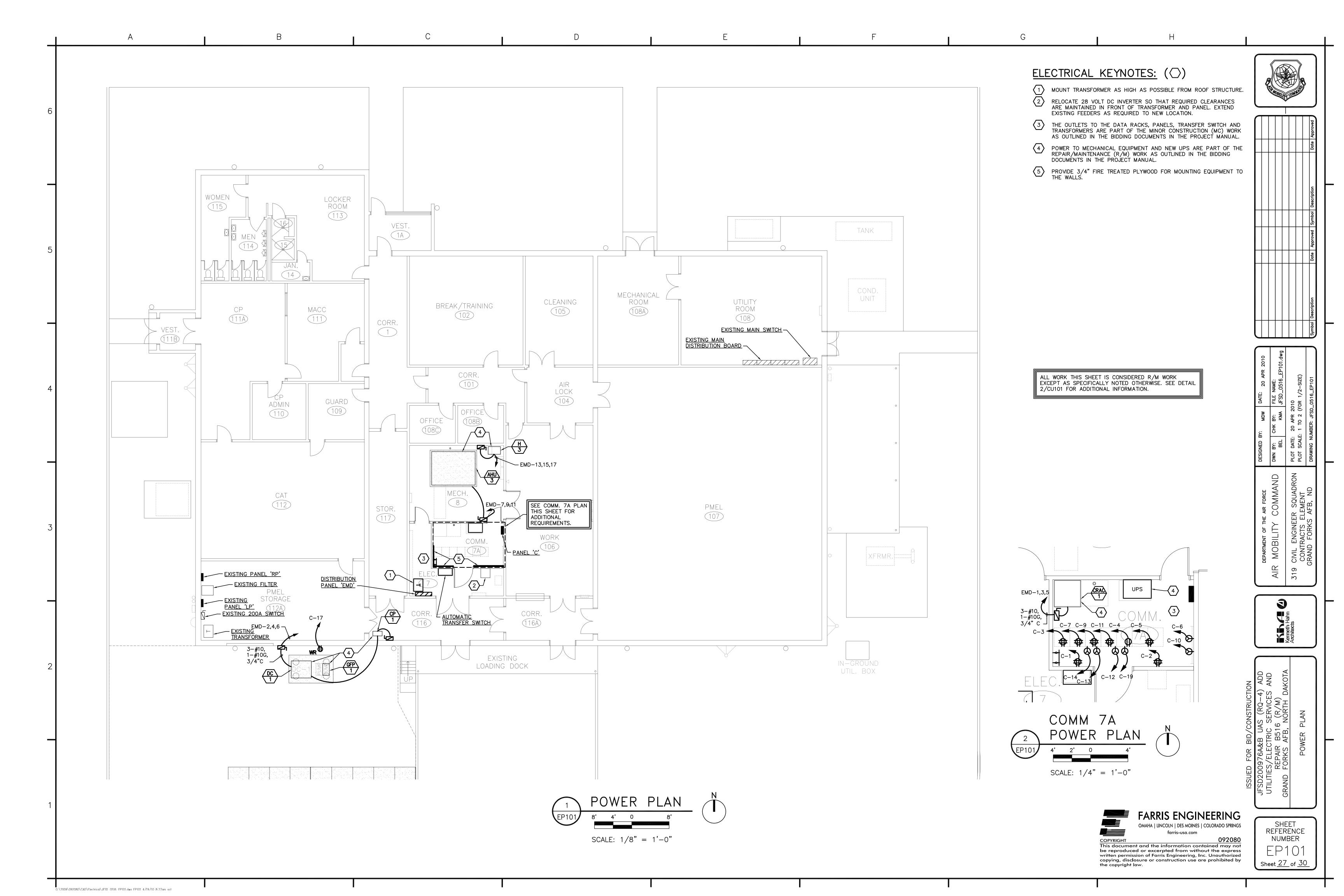
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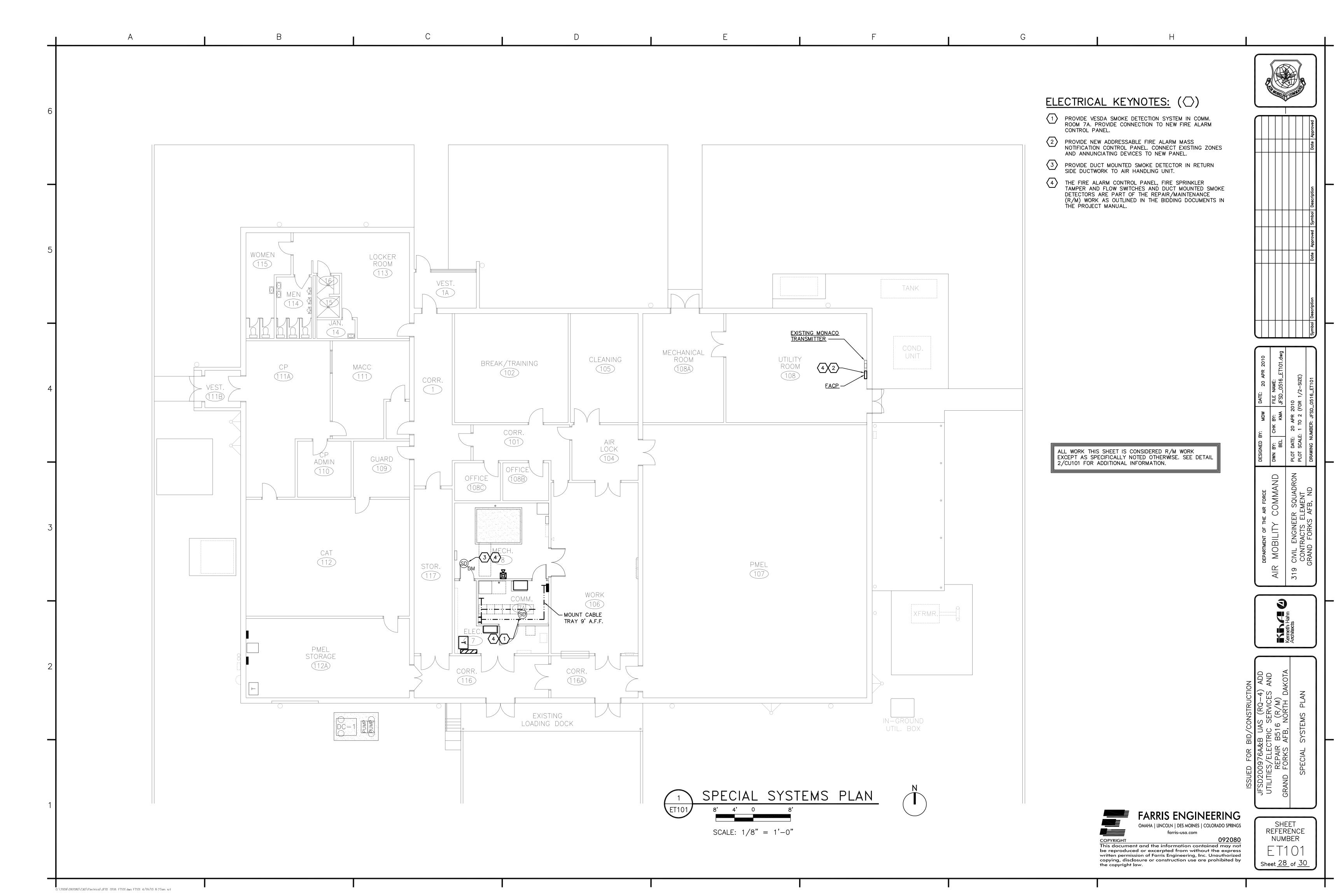
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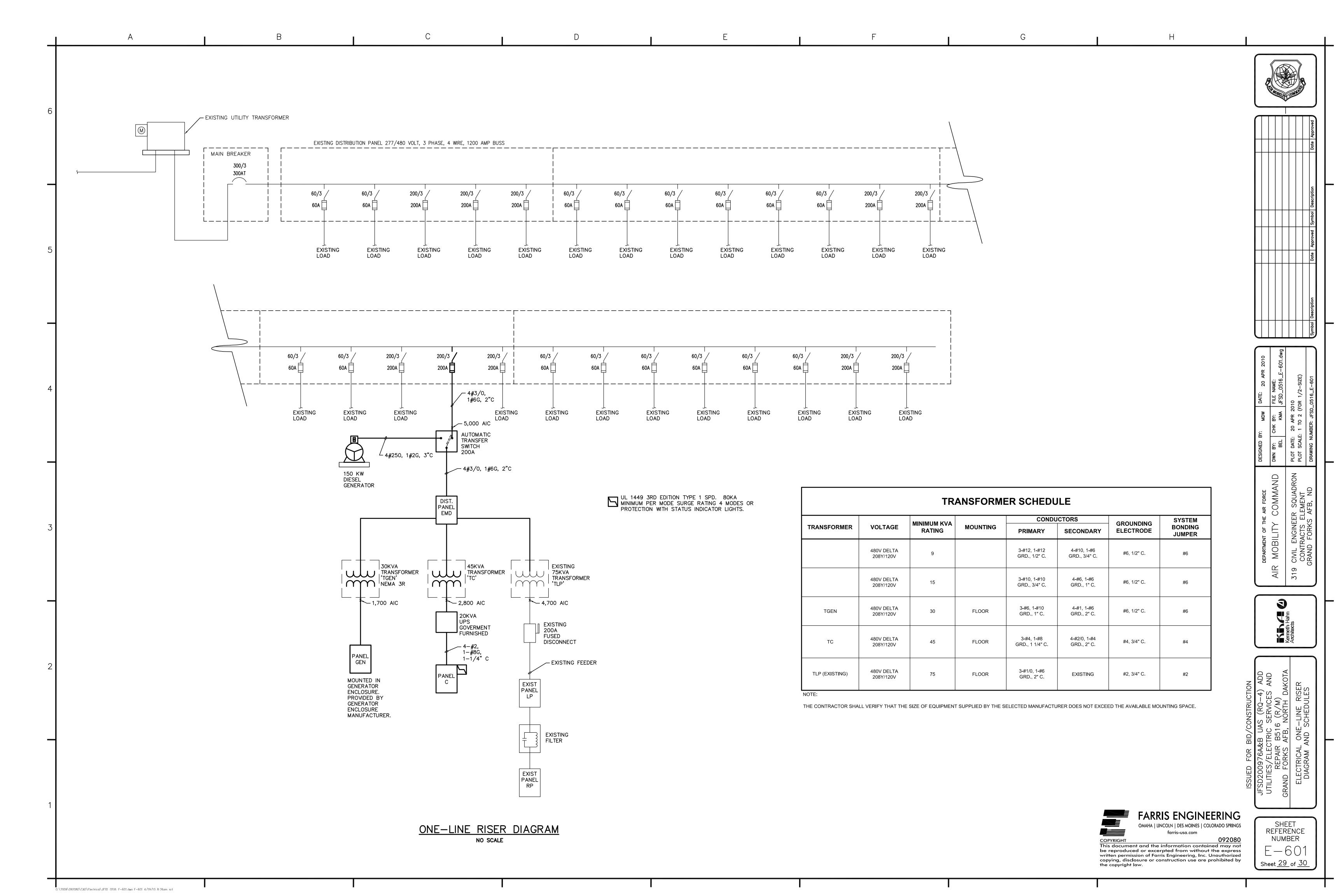
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PANEL EMD																
277/480 VOLT, 3 PHASE, 4 WIRE																
200 AMP MAIN BREAKER																
SURFACE MOUNTED																
СС		L	R		R						R		R	1		СС
T	LOAD	T	E	LOAD DESCRIPTION	E	Р	AMP	ø	AMP	Р	E	LOAD DESCRIPTION	E	T	LOAD	T
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1	19764			CRAC-1		3	30	Α	15	3		DC-1			2844	2
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25				SPARES		1	20	Α	20	1		SPARE				26
27				SPARES		1	20	В	20	1		SPARE				28
29				SPARES		1	20	С	20	1		SPARE				30
31				SPARES		1	20	Α	20	1		SPARE				32
33				SPARES		1	20	В	20	1		SPARE	_			34
35				SPARES	_	1	20	С	20	1		SPARE				36
37				SPARES		1	20	Α	20	1		SPARE				38
39				SPARES		1	20	В	20	1		SPARE				40
41				SPARES		1	20	С	20	1		SPARE				42

REMARKS:

- G = PROVIDE GFI TYPE CIRCUIT BREAKER.
- L = PROVIDE LOCKING HANDLE DEVICE.
- S = PROVIDE SHUNT TRIP TYPE CIRCUIT BREAKER.

	LUMINAIRE SCHEDULE														
MARK	MANUFACTURER CATALOG NO.		LAMPS QTY TYPE		FINISH	MOUNTING	VOLTS	REMARKS	ACCEPTABLE MANUFACTURERS						
А		NL-13	2	F32T8/835	WHITE	CHAIN AT 9'-0"	277		1						
A1		NL-13	2	F32T8/835	WHITE	CHAIN AT 9'-0"	277		1, 2						

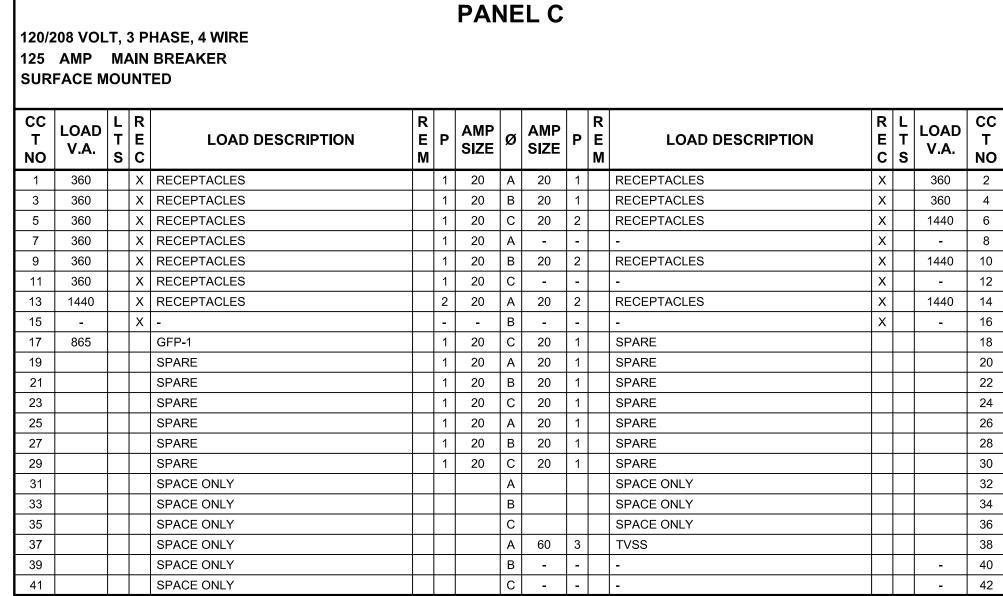
LUMINAIRE SCHEDULE REQUIREMENTS

- ALL FLUORESCENT LUMINAIRES SHALL BE PAINTED AFTER FABRICATION. HOUSINGS FOR RECESSED FLUORESCENT LUMINAIRES SHALL HAVE A MINIMUM DEPTH OF 4". PROVIDE EXTRUDED ALUMINUM TYPE DOOR FRAMES WHERE LUMINAIRES ARE SPECIFIED WITH ALUMINUM DOOR FRAMES.
- SUBMIT SHOP DRAWINGS FOR EACH BALLAST AND LAMP TYPE USED ON PROJECT.
- BALLASTS FOR LINEAR FLUORESCENT T8 LAMPS SHALL BE GE ULTRASTART SERIES (OR EQUAL BY ADVANCE OPTANIUM SERIES). BALLAST CHARACTERISTICS SHALL BE: PROGRAMMED START, OPERATING VOLTAGE RANGE OF 120-277V ± 10%, BALLAST FACTOR GREATER THAN 0.85 (UNLESS OTHERWISE NOTED), T.H.D. OF 10% OR LESS, P.F. GREATER THAN 0.95, AND A FIVE YEAR WRITTEN REPLACEMENT WARRANTY FROM DATE OF MANUFACTURE.
- UNIVERSAL LIGHTING TECHNOLOGIES, OSRAM/SYLVANIA, ADVANCE, G.E., VENTURE, HOLOPHANE, TRIAD AND LUTRON ARE ACCEPTABLE BALLAST MANUFACTURERS FOR H.I.D. AND COMPACT FLUORESCENT LAMPS.
- ALL NON-DIMMED FLUORESCENT LAMPS SHALL BE LOW MERCURY TCLP COMPLIANT TYPE.
- PHILIPS, OSRAM/SYLVANIA, G.E. AND VENTURE ARE ACCEPTABLE LAMP MANUFACTURERS.
- CONTRACTOR SHALL FIELD VERIFY VOLTAGE OF ALL LUMINAIRES PRIOR TO ORDERING.
- PROVIDE FACTORY INSTALLED INTEGRAL DISCONNECTING MEANS FOR FLUORESCENT LIGHT LUMINAIRES PER 2008 NEC ARTICLE 410.73.(G). NOTE THAT EXCEPTION NO. 4 AND EXCEPTION NO. 5 WILL NOT BE ACCEPTED.

LUMINAIRE SCHEDULE REMARKS

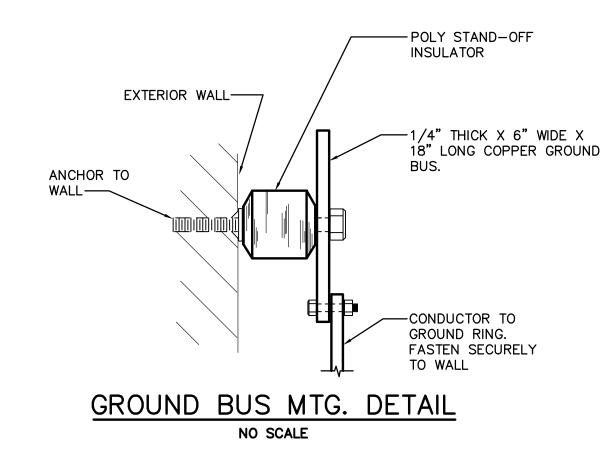
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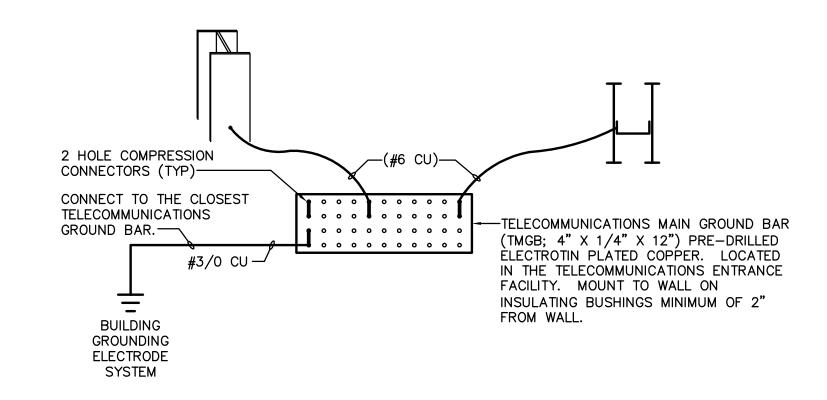
- COLUMBIA, DAY-BRITE, LITHONIA, LIGHTOLIER AND METALUX ARE ACCEPTABLE MANUFACTURERS FOR LUMINAIRE TYPE INDICATED.
- PROVIDE A BODINE #B50ST-PE5-75 EMERGENCY BALLAST WITH TWO POLE REMOTE TEST SWITCH (INSTALLED ADJACENT TO LUMINAIRE) FOR TWO LAMP OPERATION AT 1350 LUMEN MINIMUM OUTPUT.



REMARKS:

- G = PROVIDE GFI TYPE CIRCUIT BREAKER.
- L = PROVIDE LOCKING HANDLE DEVICE.
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