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IOWA DEPARTMENT OF TRANSPORTATION ANALYTICAL LAB VAV BOX REPLACEMENT

AMES, IOWA
 PROJECT #BG-XXXXX-XXXX

IOWA DEPARTMENT OF TRANSPORTATION
 MATERIALS BUILDING
 ANALYTICAL LAB VAV BOX REPLACEMENT
 AMES, IOWA

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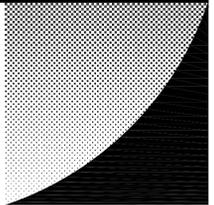
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SHEET TITLE
 COVER SHEET

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I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.	Signature _____ Date _____	PROJECT LOCATION AMES, IOWA
	SUSAN R. OLTROGGE, P.E. My license renewal date is December 31, 2015	PROJECT NUMBER 15044
	Pages or sheets covered by this seal. ALL MECHANICAL SHEETS	ISSUE DATE 02-29-2016
	Date Issued: 02-29-2016	SHEET NUMBER G-101

MECHANICAL LEGEND



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AIR TERMINALS

- DIFFUSER SQUARE CEILING. ARROW INDICATES AIRFLOW. SIDE ABSENT ARROW BLANKED, UNLESS OTHERWISE NOTED. SEE SCHEDULE.
- DIFFUSER LINEAR SLOT CEILING WITH PLENUM. SEE SCHEDULE.
- DIFFUSER LINEAR SLOT CEILING WITH PLENUM. SEE SCHEDULE.

DUCT

- 12"x10" SA DUCTWORK SHOWING SIZE (INCH) AND SYSTEM. SA INDICATES SUPPLY AIR SYSTEM.
- 12"x10" EXH DUCT SHOWING SIZE (INCH) AND SYSTEM. EA INDICATES EXHAUST AIR SYSTEM.
- 12"x10" OA DUCT SHOWING SIZE (INCH) AND SYSTEM. OA INDICATES OUTSIDE AIR SYSTEM.
- 12"x12" RA DUCT SHOWING SIZE (INCH) AND SYSTEM. RA INDICATES RETURN AIR SYSTEM.
- DUCTWORK WITH ACOUSTICAL LINING. SEE SPECIFICATIONS.
- DUCT SECTION - SUPPLY
- DUCT SECTION - EXHAUST / RETURN
- DUCT SECTION - OUTSIDE AIR
- BACKDRAFT DAMPER
- FIRE DAMPER
- FIRE/SMOKE DAMPER
- FLEXIBLE DUCT CONNECTION
- HUMIDIFIER
- INCLINED RISE (R) OR DROP (D) - ARROW IN DIRECTION OF RISE OR DROP
- MANUAL DAMPER
- MOTOR OPERATED DAMPERS
- SMOKE DAMPER
- SECURITY BAR
- TURNING VANES. SEE SPECIFICATIONS

HVAC EQUIPMENT

- HUMIDISTAT
- THERMOSTAT WALL MOUNT UNLESS OTHERWISE INDICATED

MISC. PIPING AND INSTRUMENTATION

- AIR VENT - AUTOMATIC
- AIR VENT - MANUAL
- "AQUASTAT" TEMPERATURE SENSOR/CONTROLLER
- BUCKET TRAP
- CONCENTRIC TRANSITION
- ECCENTRIC TRANSITION
- EXPANSION JOINT
- FLEXIBLE PIPE CONNECTION
- FLOAT TRAP
- FLOAT & THERMOSTATIC TRAP
- FLOW SENSOR
- FLOW CONTROLLER
- FLOW MEASURING STATION
- FLOW DIRECTION ARROW
- PIPE SLEEVE OR GUIDE
- PIPE ANCHOR
- GAUGES - P FOR PRESSURE T FOR TEMPERATURE
- PRESSURE TEMPERATURE SENSOR
- STRAINER
- UNION

PIPE FITTINGS

- CLEANOUT TO GRADE
- END CAP
- END OF LINE CLEANOUT
- HOSE BIB

VALVES MISC

- AUTOMATIC CONTROL VALVE (TWO WAY)
- AUTOMATIC CONTROL VALVE (THREE WAY)
- BALL DRIP VALVE
- CHECK VALVE
- OUTSIDE STEM & YOKE VALVE - OS&Y
- PRESSURE REDUCING VALVE
- PLUG COCK
- POST INDICATOR VALVE
- SHUTOFF VALVE SEE SPECIFICATIONS FOR TYPE, FOR SYSTEM.
- STOP COCK
- SOLENOID VALVE

SCHEMATIC PIPE

- | | | | |
|-----|------------------------------|-----|-------------------------------------|
| CHS | CHILLED WATER SUPPLY | NPW | NON-POTABLE WATER |
| CHR | CHILLED WATER RETURN | RO | REVERSE OSMOSIS WATER |
| CD | CONDENSATE DRAIN | ROR | REVERSE OSMOSIS WATER RECIRCULATING |
| CDS | CONDENSER WATER SUPPLY | SS | SANITARY WASTE |
| CDR | CONDENSER WATER RETURN | V | SANITARY VENT |
| HWS | HEATING WATER RETURN | ST | STORM PIPING |
| HWR | HEATING WATER SUPPLY | OFD | OVERFLOW STORM PIPING |
| LWS | GEOTHERMAL WATER SUPPLY | DI | DEIONIZED WATER |
| LWR | GEOTHERMAL WATER RETURN | DIR | DEIONIZED WATER RECIRCULATING |
| HPS | HIGH PRESSURE STEAM | CW | DOMESTIC COLD WATER |
| HPC | HIGH PRESSURE CONDENSATE | HW | DOMESTIC HOT WATER |
| MPS | MEDIUM PRESSURE STEAM | RHW | DOMESTIC HOT WATER RECIRCULATING |
| MPC | MEDIUM PRESSURE CONDENSATE | TW | DOMESTIC TEMPERED WATER |
| LPS | LOW PRESSURE STEAM | AV | ACID VENT |
| LPC | LOW PRESSURE CONDENSATE | AW | ACID WASTE |
| RS | REFRIGERANT SUCTION | G | NATURAL GAS |
| RL | REFRIGERANT LIQUID | O | OXYGEN |
| RBP | REFRIGERANT BYPASS | A | MEDICAL AIR |
| FC | FIRE PROTECTION - CHEMICAL | VAC | VACUUM |
| FP | FIRE PROTECTION - MAIN | | |
| SP | FIRE PROTECTION - WET PIPING | | |
| DP | FIRE PROTECTION - DRY PIPING | | |
| F | FIRE PROTECTION - STANDPIPE | | |

STANDARD ANNOTATION SYMBOLS

- EQUIPMENT IDENTIFICATION
- DETAIL MARK - SEE DRAWING 1 ON SHEET 8.2
- RISER REFERENCE
- CONNECTION TO EXISTING (NEW TO EXISTING)
- ELEVATION MARK - SEE DRAWING A ON THIS SHEET
- REVISION DELTA
- NOTE REFERENCE
- SECTION MARK - SEE DRAWING 2 ON THIS SHEET 8.3

STANDARD DRAWING ABBREVIATIONS

- | | | | |
|--------|--|------|------------------------------------|
| AF | ABOVE FINISHED FLOOR | KO | KNOCK OUT |
| AFG | ABOVE FINISHED GRADE | KVA | KVA KILOVOLT AMPERES (ELEC) |
| ASHRAE | "AMERICAN SOCIETY OF HEATING REFRIGERATING & AIR CONDITIONING ENGINEERS" | KW | KW KILOWATTS (ELEC) |
| ASTM | AMERICAN SOCIETY FOR TESTING & MATERIALS | NEC | NATIONAL ELECTRICAL CODE |
| BOC | BOTTOM OF CURB | NC | NORMALLY CLOSED |
| BTU | BRITISH THERMAL UNIT | NO | NORMALLY OPEN (ELEC) |
| BTUH | BRITISH THERMAL UNIT PER HOUR | OA | OUTSIDE AIR |
| C | CONDUIT (ELEC) | PNL | PANEL |
| CKT | CIRCUIT | PL | PILOT LIGHT (ELEC) |
| CO | CLEAN OUT | PT | POTENTIAL TRANSFORMER (ELECTRICAL) |
| CW | COLD WATER, DOMESTIC | PWR | POWER |
| DC | DIRECT CURRENT (ELEC) | RA | RETURN AIR |
| DEMO | DEMOLITION | RCP | REINFORCED CONCRETE PIPE (MECH) |
| EA | EXHAUST AIR | RHW | RECIRCULATING HOT WATER, DOMESTIC |
| FACP | FIRE ALARM CONTROL PANEL | SA | SUPPLY AIR |
| G. GND | GROUND (ELEC) | SWBD | SWITCHBOARD |
| GPM | GALLONS PER MINUTE | SWGR | SWITCHGEAR |
| HP | HORSEPOWER (GENERAL) | V | VOLT(S) (ELEC) |
| HW | HOT WATER, DOMESTIC | V | VENT (MECH) |
| IG | ISOLATED GROUND (ELEC) | VA | VOLT AMPERE |
| JB | JUNCTION BOX | VTR | VENT THRU ROOF |
| | | W | WASTE (MECH) |
| | | W | WATTS (ELEC) |

STANDARD EQUIPMENT ABBREVIATIONS

- | | | | |
|-------|----------------------------------|-------|--|
| AD- | AREA DRAIN | HX- | HEAT EXCHANGER |
| AE- | AIR ELIMINATION DEVICE | HP- | HEAT PUMP |
| AF- | AIR FITTING | L- | LAVATORY |
| AHU- | AIR HANDLING UNIT | LT- | LAVATORY TRIM |
| BFA- | BACKFLOW ASSEMBLY | MAU- | MAKE-UP AIR UNIT |
| B- | BOILER | MB- | MOP BASIN |
| BFU- | BOILER FEED UNIT | MH- | MANHOLE |
| C- | CONDENSER | OD- | OVERFLOW DRAIN |
| CB- | CATCH BASIN | PCD- | CONDENSATE DRAIN PUMP |
| CCW- | CHILLED WATER COIL | PCH- | CHILLED WATER PUMP |
| CDX- | DX COIL | PCW- | CONDENSER WATER PUMP |
| CF- | CARBON DIOXIDE FITTING | PDI- | DEIONIZED WATER PUMP |
| CH- | CHILLER | PDR- | DOMESTIC DRINKING WATER RECIRCULATING PUMP |
| CHC- | HEATING COIL | PF- | FIRE PUMP |
| CON- | CONVECTOR | FFO- | FUEL OIL SYSTEM PUMP |
| CPH- | PREHEAT COIL | PHP- | HEAT PUMP SYSTEM PUMP |
| CRE- | EXHAUST RECLAIM COIL | PHR- | DOMESTIC WATER RECIRCULATING PUMP |
| CRH- | REHEAT COIL | PHW- | HEATING WATER PUMP |
| CRI- | INTAKE RECLAIM COIL | PIR- | IRRIGATION PUMP |
| CRP- | CONDENSATE RETURN PUMP | PPB- | DOMESTIC PRESSURE BOOSTER PUMP |
| CRU- | COMPUTER ROOM UNIT | PR- | PANEL RADIATOR |
| CT- | COOLING TOWER (MECHANICAL) | PRA- | PRESSURE REDUCING ASSEMBLY |
| CT | CURRENT TRANSFORMER (ELECTRICAL) | PRC- | RECLAIM SYSTEM PUMP |
| CU- | CONDENSING UNITS | PRO- | REVERSE OSMOSIS WATER PUMP |
| CUH- | CABINET UNIT HEATER | PRV- | PRESSURE RELIEF VALVE |
| DA- | DEAERATOR | PSE- | SANITARY SEWAGE EJECTOR PUMP |
| DC- | DRY COOLER | PST- | STORM AND FOOTING DRAIN SUMP PUMP |
| DD- | DECK DRAIN | RC- | RETURN - CEILING MOUNTED |
| DF- | DRINKING FOUNTAIN | RD- | RETURN - DUCT MOUNTED |
| DS | DOWNSPILT | RDR- | ROOF DRAIN |
| DWC- | DRINKING WATER CHILLER | RF- | RETURN - FLOOR MOUNTED |
| DWH- | DOMESTIC WATER HEATER | RTU- | ROOF TOP UNIT |
| EEW- | EMERGENCY EYE WASH | RWC- | REMOTE WATER CHILLER |
| EF- | EXHAUST FAN | S- | SINK |
| EFC- | EVAPORATIVE FLUID COOLER | SA- | SOUND ATTENUATOR |
| ES- | EMERGENCY SHOWER | SC- | SUPPLY - CEILING MOUNTED |
| ET- | EXPANSION TANK | SD- | SUPPLY - DUCT MOUNTED |
| EVC- | EVAPORATIVE CONDENSER | SF- | SUPPLY - FLOOR MOUNTED |
| EW- | EXHAUST - WALL MOUNTED | SG- | STEAM GUN |
| EW-C- | ELECTRIC WATER COOLER | SH- | SHOWER |
| EW-S- | EMERGENCY WASH STATION | SHT- | SHOWER TRIM |
| F- | FURNACE | SS- | SERVICE SINK |
| FB- | FILTER / FILTER BANK | ST- | SINK TRIM |
| FC- | FLOOR FAN | TC- | TRANSFER GRILLE - CEILING MOUNTED |
| FCU- | FAN COIL UNIT | TD- | TRENCH DRAIN |
| FD- | FLOOR DRAIN | TF- | TRANSFER GRILLE - FLOOR MOUNTED |
| FE- | EXHAUST FAN | TW- | TRANSFER GRILLE - WALL MOUNTED |
| FPC- | FIRE PROTECTION CABINET | UH- | UNIT HEATER |
| FPT- | FAN POWERED TERMINAL | UR- | URNAL |
| FR- | RETURN / RELIEF FAN | VAV- | VARIABLE AIR VOLUME TERMINAL UNIT |
| FS- | SUPPLY FAN | VF- | VACUUM FITTING |
| FSK- | FLOOR SINK | WC- | WATER CLOSET |
| FTR- | FINNED TUBE RADIATION | WH- | WALL HYDRANT |
| GF- | GAS FITTING | XFMR- | TRANSFORMER (ELEC) |
| HB- | HOSE BIBB | | |

IOWA DEPARTMENT OF TRANSPORTATION
MATERIALS BUILDING
ANALYTICAL LAB VAV BOX REPLACEMENT
AMES, IOWA

REVISION _____ DATE _____

SHEET TITLE
MECHANICAL LEGEND AND ABBREVIATIONS

PROJECT LOCATION
AMES, IOWA

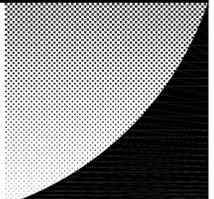
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SHEET NUMBER

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THIS IS A MASTER LIST. ALL ITEMS LISTED MAY NOT BE APPLICABLE TO THIS PARTICULAR PROJECT.



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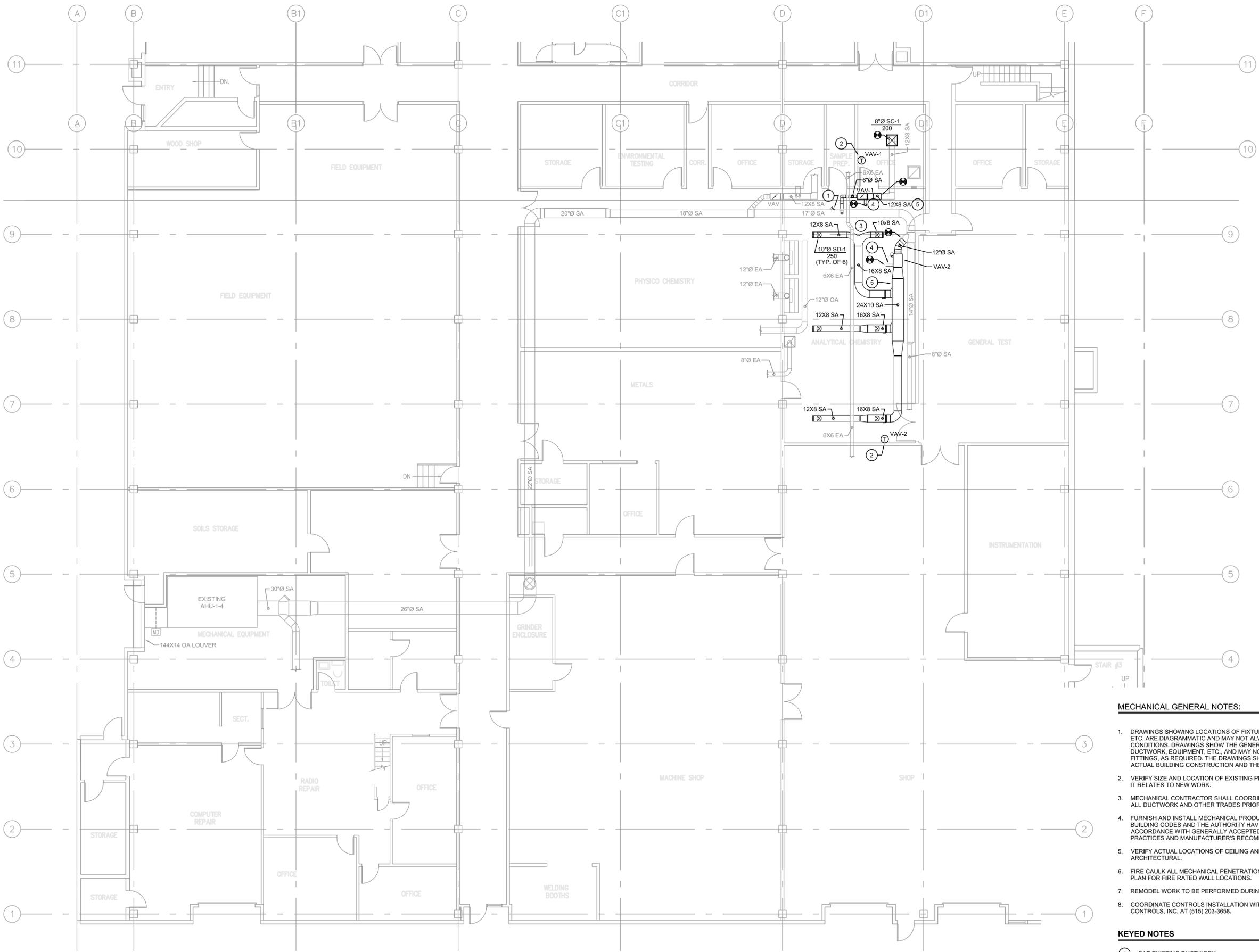
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AMES, IOWA

REVISION _____ DATE _____

SHEET TITLE
**MECHANICAL
HVAC**

PROJECT LOCATION: AMES, IOWA
PROJECT NUMBER: 15044
ISSUE DATE: 02-29-2016
SHEET NUMBER

M-101



MECHANICAL GENERAL NOTES:

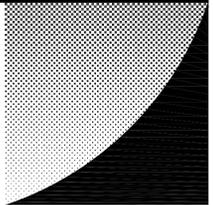
- DRAWINGS SHOWING LOCATIONS OF FIXTURES, EQUIPMENT, DUCTWORK, PIPING, ETC. ARE DIAGRAMMATIC AND MAY NOT ALWAYS REFLECT ACTUAL INSTALLATION CONDITIONS. DRAWINGS SHOW THE GENERAL ARRANGEMENT OF ALL PIPING, DUCTWORK, EQUIPMENT, ETC., AND MAY NOT INCLUDE ALL OFFSETS AND FITTINGS. AS REQUIRED, THE DRAWINGS SHALL BE FOLLOWED AS CLOSELY AS ACTUAL BUILDING CONSTRUCTION AND THE WORK OF OTHERS WILL PERMIT.
- VERIFY SIZE AND LOCATION OF EXISTING PIPING, DUCTWORK AND EQUIPMENT AS IT RELATES TO NEW WORK.
- MECHANICAL CONTRACTOR SHALL COORDINATE ALL PIPING AND DUCTWORK WITH ALL DUCTWORK AND OTHER TRADES PRIOR TO COMMENCEMENT OF WORK.
- FURNISH AND INSTALL MECHANICAL PRODUCTS IN COMPLIANCE WITH LOCAL BUILDING CODES AND THE AUTHORITY HAVING JURISDICTION, AND IN ACCORDANCE WITH GENERALLY ACCEPTED INDUSTRY STANDARDS AND PRACTICES AND MANUFACTURER'S RECOMMENDATIONS.
- VERIFY ACTUAL LOCATIONS OF CEILING AND WALL MOUNTED DEVICES WITH ARCHITECTURAL.
- FIRE CAULK ALL MECHANICAL PENETRATIONS AT FIRE RATED WALLS. SEE CODE PLAN FOR FIRE RATED WALL LOCATIONS.
- REMODEL WORK TO BE PERFORMED DURING NORMAL BUSINESS HOURS.
- COORDINATE CONTROLS INSTALLATION WITH SCOTT UNDERWOOD OF JOHNSON CONTROLS, INC. AT (515) 203-3658.

KEYED NOTES

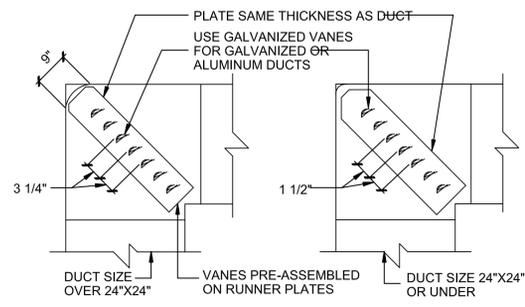
- CAP EXISTING DUCTWORK.
- WALL MOUNTED THERMOSTAT - 52" A.F.F. - PROVIDED BY JCI.
- PROVIDE "Y" DUCT FITTING.
- RECONNECT EXISTING 3/4" HWS/ HWR PIPING.
- PROVIDE ACCESS DOOR ON SIDE OF DUCT.

1 MECHANICAL DEMOLITION
SCALE: 1/8" = 1'-0"

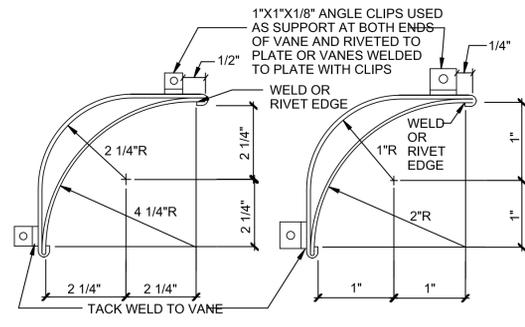
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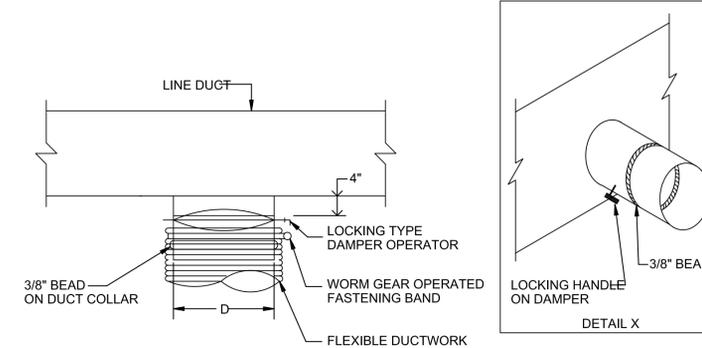


SQUARE ELBOW WITH TYPE "A" DOUBLE THICKNESS VANES **SQUARE ELBOW WITH TYPE "B" DOUBLE THICKNESS VANES**

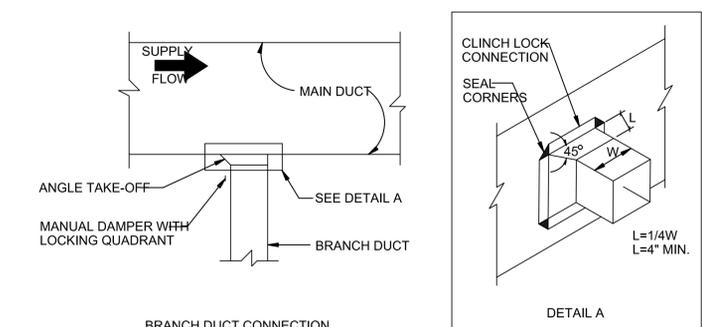


TYPE "A" VANE CONSTRUCTION **TYPE "B" VANE CONSTRUCTION**

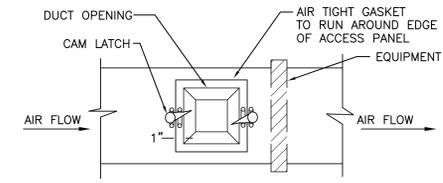
1 SQUARE DUCT ELBOWS
NOT TO SCALE



FLEXIBLE DUCT CONNECTION TO MAIN DUCTS



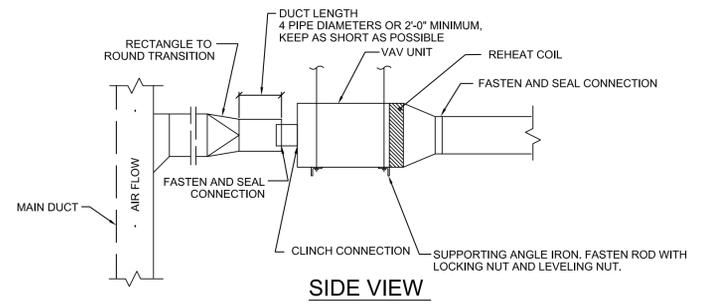
BRANCH DUCT CONNECTION
LOW PRESSURE BRANCH DUCT CONNECTIONS
NOT TO SCALE



ACCESS PANEL SIZE SCHEDULE	
DUCT SIZE	ACCESS PANEL SIZE
6" TO 15"	10" W X (DUCT DEPTH-2")D
15" TO 21"	12" W X (DUCT DEPTH-2")D
21" AND ABOVE	18" W X (DUCT DEPTH-2")D

ALL OTHER ACCESS PANELS TO BE A MINIMUM OF 15" X 15" WHERE DUCT SIZE ALLOWS. USE FOUR CAM LATCHES ON PANELS LARGER THAN 18" X 18" SIZE. REQUIRED AT ALL HEATING COILS, FIRE DAMPERS, FIRE/SMOKE DAMPERS, & MOTORIZED DAMPERS
SEE DETAIL 4 ON THIS SHEET FOR MOR INFORMATION.

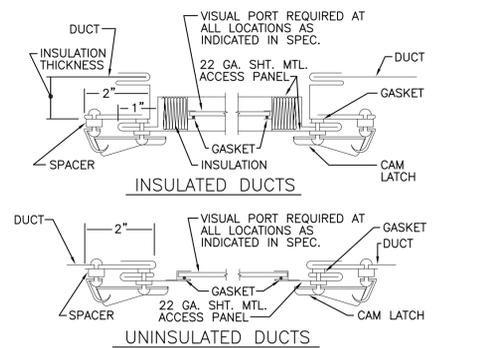
3 ACCESS PANEL DETAIL
NOT TO SCALE



SIDE VIEW

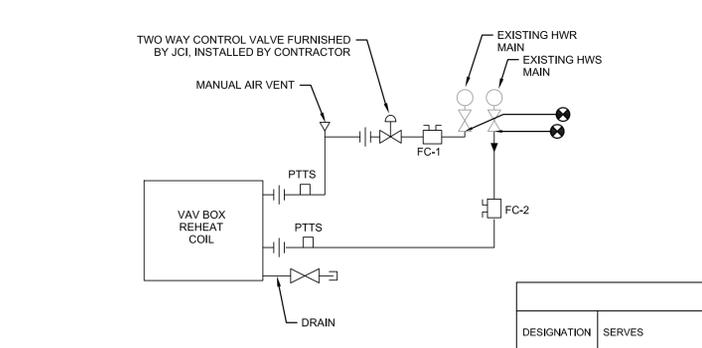
NOTES:
1. PROVIDE CONTROLS ON LEFT OR RIGHT SIDE AS REQUIRED FOR FIELD CONDITIONS.
2. ARRANGE ACCESS TO PERMIT EASY FIELD BALANCE AND MAINTENANCE OF TERMINAL UNIT.
3. WHEN MINIMUM UPSTREAM STRAIGHT DUCT CONNECTION TO TERMINALS AS INDICATED ABOVE CANNOT BE MAINTAINED PROVIDE ORIFICE PLATE STRAIGHTENING VANES OR OTHER DEVICE AS RECOMMENDED BY TERMINAL UNIT MANUFACTURER AND SUBMIT TO ENGINEER PRIOR TO INSTALLATION.

4 VARIABLE AIR VOLUME BOX DETAIL
NOT TO SCALE



NOTE:
1. ALL ACCESS PANELS TO BE A MINIMUM OF 15"X15" WHERE DUCT SIZE ALLOWS.
2. PROVIDE TRACK FULL LENGTH OF ACCESS PANEL RIVETED PANEL FOR PANEL ALIGNMENT.

5 DUCT ACCESS PANELS
LOW PRESSURE DUCTWORK
NOT TO SCALE



NOTES:
1. REFER TO SCHEDULE FOR REQUIRED FLOW RATES.
2. REFER TO SPECIFICATIONS FOR REQUIREMENTS FOR BALANCING VALVES (FC-1 AND FC-2)

6 VAV REHEAT PIPING DETAIL
NOT TO SCALE

DIFFUSER, REGISTER, & GRILLE SCHEDULE							
NECK SIZE (INCHES)		FUNCTION (S=SUPPLY; R=RETURN; E=EXHAUST; T=TRANSFER)		MOUNTING (C=CEILING; W=WALL; F=FLOOR; D=DUCT;)			
12x12		AB-1		DESIGNATION			
350				FLOW RATE (CFM)			
DESIGNATION	MANUFACTURER	MODEL NUMBER	DESCRIPTION	MATERIAL	FRAME BORDER	FINISH	REMARKS
SC-1	TITUS	TMSA	SQUARE CEILING ADJUSTABLE	STEEL	LAYIN	WHITE	-
SD-1	TITUS	XC-310	HEAVY DUTY ROUND CEILING DIFFUSER	STEEL	DUCT MOUNTED	WHITE	1

REMARKS:
1. RING OPERATED, VERTICAL TO HORIZONTAL DISCHARGE PATTERN.

VARIABLE AIR VOLUME (VAV) TERMINAL UNIT SCHEDULE																					
DESIGNATION	SERVES	MANUFACTURER	MODEL	SIZE	MAX CFM	MIN CFM	TOTAL SPD IN WG	REHEAT COIL													
								HEATING CFM	EAT °F	LAT °F	COIL CAP. MBH	EWL °F	LWT °F	FLOW RATE GPM	ROWS	WPD FT WG	CONTROL VALVE	INLET SP IN WG	DIS NC	RAD NC	REMARKS
VAV 1	OFFICE	TITUS	DESV	6	200	60	0.05	60	55	108.6	3.5	180.0	160.0	0.3	1	0.08	2-WAY	1.50	18	17	1
VAV 2	LAB	TITUS	DESV	12	1500	450	0.23	450	55	95	19.5	180.0	160.0	2.5	1	0.08	2-WAY	1.50	29	27	1

REMARKS:
1. COORDINATE CONTROL WORK WITH JOHNSON CONTROLS, INC.

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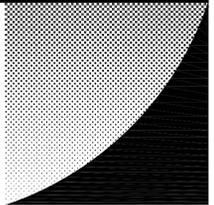
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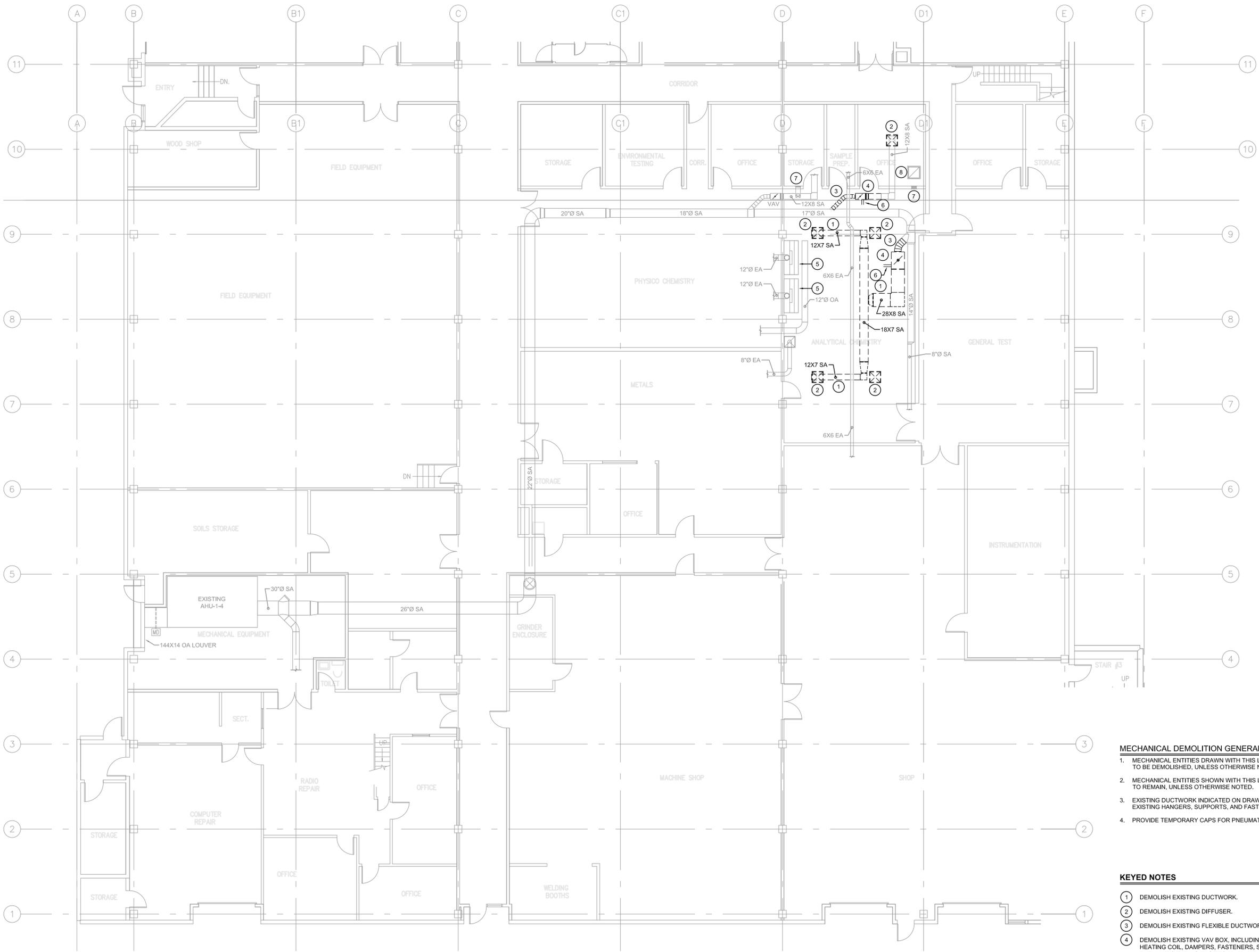
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SHEET TITLE
**MECHANICAL
DEMOLITION**

PROJECT LOCATION AMES, IOWA
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MD101



MECHANICAL DEMOLITION GENERAL NOTES:

1. MECHANICAL ENTITIES DRAWN WITH THIS LINETYPE (---) INDICATES ENTITIES TO BE DEMOLISHED, UNLESS OTHERWISE NOTED.
2. MECHANICAL ENTITIES SHOWN WITH THIS LINETYPE (---) INDICATES ENTITIES TO REMAIN, UNLESS OTHERWISE NOTED.
3. EXISTING DUCTWORK INDICATED ON DRAWINGS TO BE REMOVED, INCLUDING EXISTING HANGERS, SUPPORTS, AND FASTENERS.
4. PROVIDE TEMPORARY CAPS FOR PNEUMATIC TUBING THAT IS DISCONNECTED.

KEYED NOTES

- 1 DEMOLISH EXISTING DUCTWORK.
- 2 DEMOLISH EXISTING DIFFUSER.
- 3 DEMOLISH EXISTING FLEXIBLE DUCTWORK.
- 4 DEMOLISH EXISTING VAV BOX, INCLUDING ELECTRIC HEATING COIL, HOT WATER HEATING COIL, DAMPERS, FASTENERS, STRUT AND CONTROLS, INCLUDING PNEUMATIC TUBING BACK TO MAIN AND CAP.
- 5 EXISTING EXHAUST HOOD SHOWN FOR REFERENCE.
- 6 DEMOLISH EXISTING HWS/ HWR PIPING BACK TO EXISTING SHUT-OFF VALVES.
- 7 EXISTING TRANSFER GRILLE SHOWN FOR REFERENCE.
- 8 DEMOLISH EXISTING RETURN GRILLE.

1 MECHANICAL DEMOLITION
SCALE: 1/8" = 1'-0"

File: J:\15044 - IDOT MD 14 - Mat Lab VAV6-Contract Dwg\MD101.dwg
Plotted: 2/26/16 at 12:28pm By: nburch
XREFs: 15044-24x36 Project Titleblock.dwg Base Lower Level South.DWG Base Lower Level North.DWG
IMAGES: